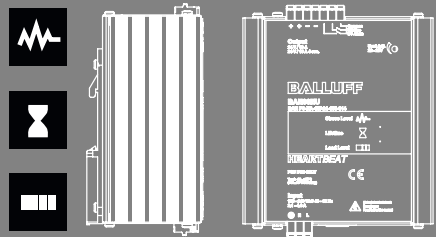


# BALLUFF

sensors worldwide

## Accessories

For perfect integration of sensors and systems





As the leading sensor specialist and system provider with more than 90 years of company tradition, Balluff GmbH has been a recognized partner in factory automation for decades. With 56 locations, Balluff has a strong presence on every continent. The corporate headquarters in Neuhausen a.d.F. is located near Stuttgart.

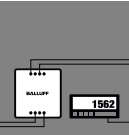
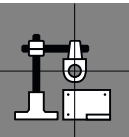
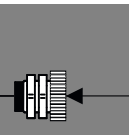
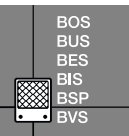
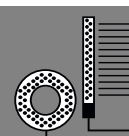

Balluff masters the entire technological variety with various operating principles, including high-quality sensors and systems for position measurement and identification, as well as sensors for detecting objects and measuring fluids. The full-range assortment includes optimal network and connection technology and a comprehensive line of accessory products.

We offer innovative, first-class products tested in our own accredited laboratory, and maintain certified quality management in accordance with DIN EN 9001:2008. Our technology speaks for itself in international applications since it also meets regional standards.

Balluff stands for application-specific customer solutions, comprehensive services, individual consultation and prompt service. Our staff of more than 2450 employees is committed to providing outstanding service worldwide.

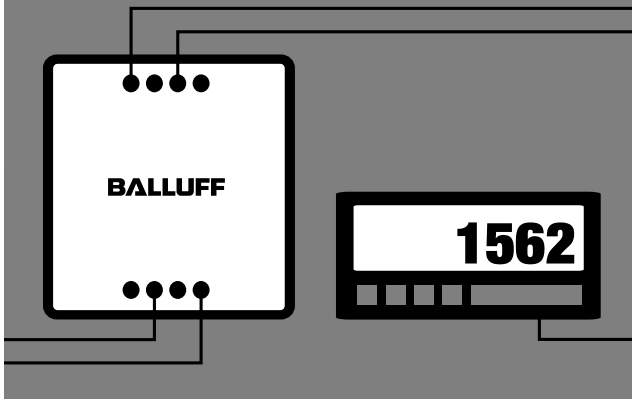
**Easy handling, accurate positioning – take advantage of the optimal peripherals for sensors.**



<b>Electrical Devices</b>	224	
Power adapters, pulse extender, function diagnostics unit, analog switching amplifier, sensor tester, testing and setting device, signal adapter, digital display		
<b>Mounting System</b>	262	
<b>Fasteners</b>	286	
<b>Product-specific Accessories</b>	312	
Photoelectric sensors, positive stops and contact protector, ultrasonic sensors, Uni/Unicompact sensors, industrial RFID systems, position and distance measurement, pressure sensors, vision sensors, protective end caps and nuts		
<b>Lights</b>	404	
<b>Basic Information and Definitions</b>	422	
Alphanumeric Index	434	
Worldwide Sales	474	

## Accessories

Fitting accessories are the optimal peripherals for sensors:  
We provide reliable products for time and cost-saving integration into  
your automation system and for reliable operation.  
We have put together a selection for you from our comprehensive  
product line.



# Electrical Devices

## Electrical devices

A wide selection of accessories, such as pulse extender, digital display and testers for all applications and the areas of inspection, testing, function and monitoring.

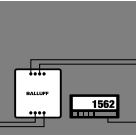




# Electrical Devices

## Contents

<b>Power Supplies</b>	
Intelligent Power Supplies	230
Single-phase Power Supplies	236
Three-phase Power Supplies	244
Technical Data	247
<b>Pulse Extender</b>	250
<b>Function Diagnostics Unit</b>	252
<b>Analog Switching Amplifiers</b>	254
<b>Sensor Tester, Testing and Setting Device</b>	256
<b>Signal Adapters</b>	258
<b>Digital Display</b>	261



# Power Supplies

## Reliable performance for high requirements

Industrial automation is becoming ever more demanding and the complexity of its tasks is constantly increasing. Efficient operation of equipment and machines demands reliable power supplies more than ever. Balluff power supplies are the powerful solution for interference-free system operation.

Take advantage of the special benefits of Balluff power supplies

- Full product line – choose just what you need
- Short-circuit and overload protection in industrial environments
- High availability of all devices
- Unlimited, precise power for increased demands
- Long service life for reliable operation
- Worldwide approvals for use anywhere

Every industrial automation system needs a reliable, clean and controlled source of power without spikes. Only then can these systems deliver the expected performance. With the Balluff power supplies you get what you expect and more. They ensure reliable power even under demanding conditions. They fall in line with the long Balluff tradition of reliable and high-quality performance products for industrial automation.

### ■ Ultra-reliable power supplies

for protecting sensitive control electronics

### ■ Protection against unforeseen events

Integrated overload and overvoltage protection

### ■ Wide selection of models

Whether stand-alone or an individual combination of various models, these solutions are perfect for your requirements

### ■ Clean, precise power supply for particularly demanding systems

Load regulation  $\pm 1\%$  for all models, ripple and noise under 50 mV for most models

### ■ Long service life for less system downtime

MTBF (Mean Time Between Failure) up to 800,000 hours/ 91 years



### Parallel/single mode

If more power is required, multiple units can be combined in parallel (most models)

### Adjustable output

The voltage output can be adjusted to compensate for losses from wiring and distributed components



### Status indicator

LED for DC ON and DC LO indicator (most models)

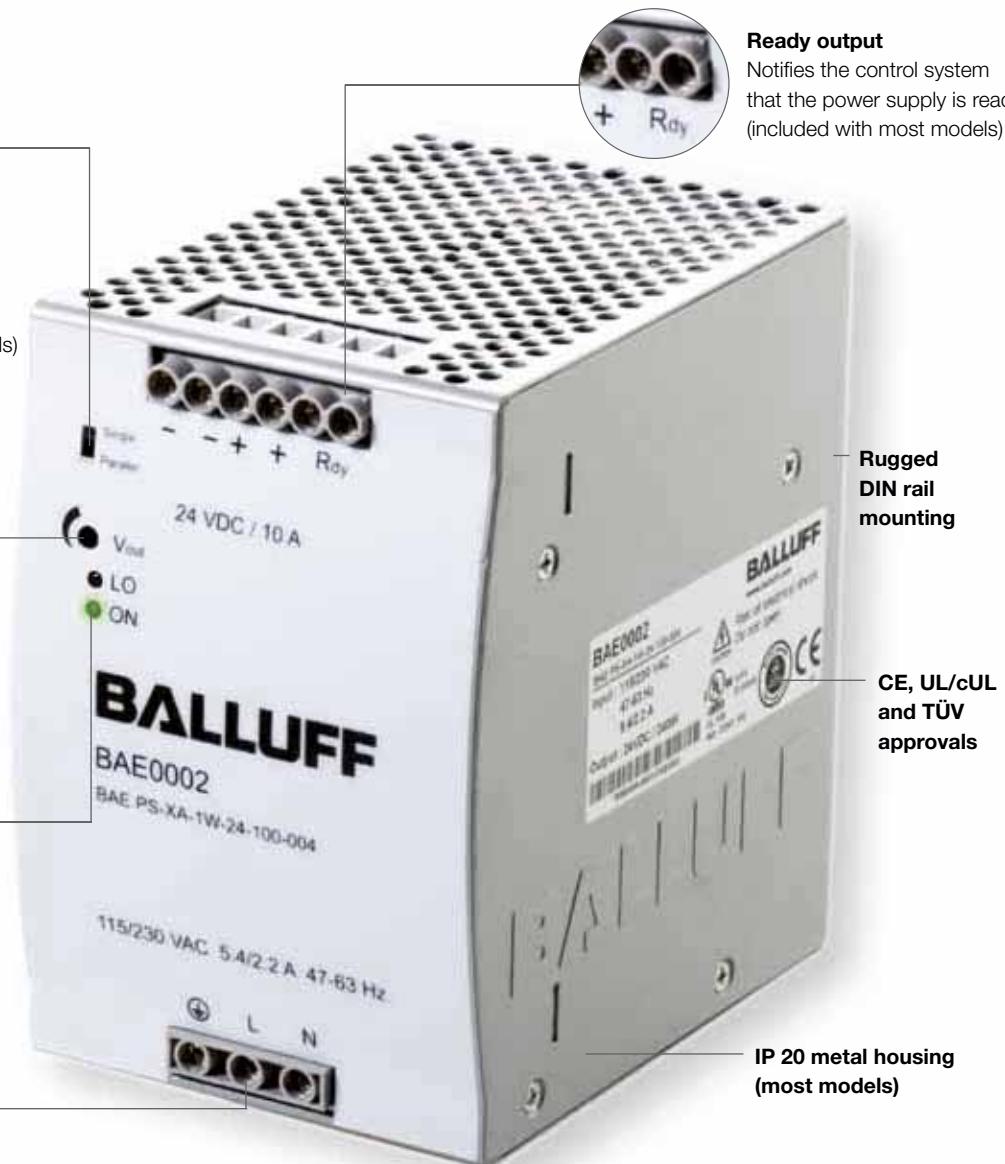
### Terminals with contact protection

No additional protection necessary



### Ready output

Notifies the control system that the power supply is ready (included with most models)



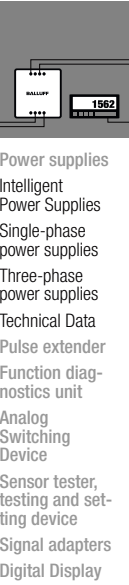
Rugged  
DIN rail  
mounting

CE, UL/cUL  
and TÜV  
approvals

IP 20 metal housing  
(most models)

# Power Supplies Overview

Version	Output power	Output voltage	Input voltage	Features	Product information		Page	
					Ordering code	Part number		
Standard IP 20	12 V	0.75 A/18 W	Single-phase <sup>1</sup>	Plastic	■	<b>BAE0036</b>	BAE PS-XA-1W-12-015-001	<b>236</b>
		1.25 A/30 W	Single-phase <sup>1</sup>	Plastic	■	<b>BAE0039</b>	BAE PS-XA-1W-12-025-002	<b>237</b>
		1.5 A/18 W	Single-phase <sup>1</sup>	Metal	■	<b>BAE003E</b>	BAE PS-XA-1W-12-050-002	<b>239</b>
	24 V	2.5 A/30 W	Single-phase <sup>2</sup>	Metal	■	<b>BAE003H</b>	BAE PS-XA-1W-12-100-003	<b>241</b>
		2.5 A/60 W	Single-phase <sup>1</sup>	Plastic	■	<b>BAE0001</b>	BAE PS-XA-1W-24-007-001	<b>236</b>
		2.5 A/120 W	Single-phase <sup>1</sup>	Plastic	■	<b>BAE0004</b>	BAE PS-XA-1W-24-012-002	<b>237</b>
		3.8 A/91.20 W	Single-phase <sup>1</sup>	Plastic	■	<b>BAE0005</b>	BAE PS-XA-1W-24-025-002	<b>238</b>
		5 A/60 W	Single-phase <sup>2</sup>	Metal	■	<b>BAE003J</b>	BAE PS-XA-1W-24-038-003	<b>240</b>
		5 A/120 W	Single-phase <sup>2</sup>	Metal	■	<b>BAE0006</b>	BAE PS-XA-1W-24-050-003	<b>241</b>
		5 A/240 W	Single-phase <sup>2</sup>	Metal	■	<b>BAE0002</b>	BAE PS-XA-1W-24-100-004	<b>242</b>
		8 A/192 W	Single-phase <sup>2</sup>	Metal	■	<b>BAE0003</b>	BAE PS-XA-1W-24-200-005	<b>243</b>
		10 A/120 W	3-phase <sup>3</sup>	Metal	■	<b>BAE0007</b>	BAE PS-XA-3Y-24-050-009	<b>244</b>
		10 A/240 W	3-phase <sup>3</sup>	Metal	■	<b>BAE0008</b>	BAE PS-XA-3Y-24-100-006	<b>245</b>
		10 A/480 W	3-phase <sup>3</sup>	Metal	■	<b>BAE0009</b>	BAE PS-XA-3Y-24-200-007	<b>245</b>
		20 A/480 W	3-phase <sup>3</sup>	Metal	■	<b>BAE003R</b>	BAE PS-XA-3Y-24-400-010	<b>246</b>
	48 V	5 A/60 W	Single-phase <sup>2</sup>	Plastic	■	<b>BAE003K</b>	BAE PS-XA-1W-48-025-003	<b>240</b>
		5 A/120 W	Single-phase <sup>2</sup>	Metal	■	<b>BAE003L</b>	BAE PS-XA-1W-48-050-004	<b>242</b>
		5 A/240 W	Single-phase <sup>2</sup>	Metal	■	<b>BAE003M</b>	BAE PS-XA-1W-48-100-005	<b>243</b>
Intelligent devices IP 20	24 V	5 A/120 W	Single-phase <sup>1</sup>	Metal	■	<b>BAE00EK</b>	BAE PS-XA-1W-24-050-013	<b>231</b>
		5 A/240 W	Single-phase <sup>1</sup>	Metal	■	<b>BAE00EU</b>	BAE PS-XA-1W-24-100-014	<b>231</b>
Intelligent devices IP 67	24 V	3.8 A/91.20 W	Single-phase <sup>1</sup>	Metal	■	<b>BAE00EN</b>	BAE PS-XA-1W-24-038-601	<b>232</b>
		5 A/60 W	Single-phase <sup>1</sup>	Metal	■	<b>BAE00EP</b>	BAE PS-XA-1W-24-038-602	<b>232</b>
		5 A/120 W	Single-phase <sup>1</sup>	Metal	■	<b>BAE00ER</b>	BAE PS-XA-1W-24-038-603	<b>233</b>
		5 A/240 W	Single-phase <sup>1</sup>	Metal	■	<b>BAE00FW</b>	BAE PS-XA-1W-24-038-607	<b>233</b>
		8 A/192 W	Single-phase <sup>1</sup>	Metal	■	<b>BAE00ET</b>	BAE PS-XA-1W-24-080-604	<b>233</b>
		10 A/120 W	Single-phase <sup>1</sup>	Metal	■	<b>BAE00FL</b>	BAE PS-XA-1W-24-080-605	<b>234</b>
		10 A/240 W	Single-phase <sup>1</sup>	Metal	■	<b>BAE00FY</b>	BAE PS-XA-1W-24-080-606	<b>234</b>



Power supplies  
Intelligent  
Power Supplies  
Single-phase  
power supplies  
Three-phase  
power supplies  
Technical Data  
Pulse extender  
Function diag-  
nostics unit  
Analog  
Switching  
Device  
Sensor tester,  
testing and set-  
ting device  
Signal adapters  
Digital Display

<sup>1</sup> = 100...240 V AC  
<sup>2</sup> = 115/230 V AC (auto-select)  
<sup>3</sup> = 340...575 V AC

## Reliable performance for the high requirements in industrial automation

### Intelligent power supply units – For outstanding system availability

If you want to operate your systems and machines with maximum efficiency, the power supply you use must be reliable. Intelligent power supply units from Balluff guarantee a high degree of reliability. They provide a complete picture of their environment wherever they are installed, allowing you to monitor the environment continuously.

#### LEDs for easy monitoring

- Load level
- Stress level
- Lifetime

LEDs indicate the load level and stress level so the operator knows immediately when the unit is operating at maximum performance. LEDs also show the service life of the devices, simplifying maintenance and operation. The user can also see when a device has to be replaced. This is how Balluff power supply units contribute to increased system availability.

### The benefits to you

- Continuous monitoring of machines and systems
  - Reliable power supply units guarantee efficient operation
  - Optimized use of devices and a longer service life
  - Maintenance planning
- Devices only replaced when necessary

### Versions

Intelligent power supply units from Balluff are available in two versions

#### IP 20 (with screw terminal)

- With a wide input voltage range from 90...264 V AC
- Designed for versatile use in industrial automation
- Also satisfies all wind turbine requirements

#### IP 67 (with connector)

- Can be used directly in harsh environments
- Fully potted housing
- High shock and vibration ratings

### Power for controllers and networks

Specially developed for controller units, Balluff power supplies can be perfectly integrated into your control package.

The PS series of ultra-reliable power supply units is available in a wide range of 12, 24, and 48 V DC models with single or 3-phase input. With a bandwidth of 18 W to 960 W, they truly leave nothing to be desired. For even greater power, multiple power supplies are interconnected (parallel switching mode).

Do you need a different voltage? Please contact us.



### Trouble-free installation

Reliable power has never been so simple to install. It starts with the convenient DIN rail mounting using the integrated Balluff high-performance mounting system. The screw terminals are aligned to enable the integration of an AC input from below and a DC output from above. Connections with contact protection render additional safety equipment superfluous.



# Power Supplies

## Reliable performance for the high requirements of industrial automation

### Load level:



#### Load level

■ Reversible in short term

Load level indicates the current load on the device. The display indicates the load without any delay.

### Heartbeat:



#### Stress level

■ Reversible in medium term

Stress level indicates the physical and thermal loads. Changing the load has an effect on device wear.

### Wear indicator:

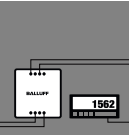


#### Lifetime

■ Irreversible in long term

Lifetime shows the remaining service life of the device, based on the total of all loads.

All indicators are multi-colored—  
● green,  
● yellow,  
● or red—and show the status of the device.



- Power supplies
- Intelligent Power Supplies
- Single-phase power supplies
- Three-phase power supplies
- Technical Data
- Pulse extender
- Function diagnostics unit
- Analog Switching Device
- Sensor tester, testing and setting device
- Signal adapters
- Digital Display

# Power Supplies

## Intelligent devices for the high requirements of industrial automation

### Intelligent power supplies from Balluff

The installation of decentralized power supply units without switch cabinets with the IP 67 degree of protection is becoming more popular in industrial automation. Although local power supply units are already available, they are generally difficult to access once installed. And to further complicate matters, monitoring the operating status is practically impossible. As a result, operators rely on preventive maintenance concepts to guarantee maximum possible availability. This procedure is reliable, but also expensive, because devices are frequently replaced during the maintenance cycle well before the end of their service life, as there is no alternative system available.

For the first time, intelligent, energy-saving power supply units from Balluff promise to remedy this situation. Their condition is represented using visible indicators.

This novel concept allows detection of the condition of the device at a glance. Since it tracks dynamic loads, it can be operated continuously even under high load conditions. This makes typical reserves of 30 to 50% superfluous.

The intelligence supports continuous high utilization of the devices. Their operational status is displayed visually via:

- Load level
- Stress level
- Lifetime

The indicators provide an easy way for the operator to quickly ascertain the status.

### General key information about the IP 20 and IP 67 power supply units

- High 92% efficiency
- Minimal heat loss and generation
- Increasing efficiency of the systems
- 3-stage status indication
- Power boost (150% for 4 sec.)
- Extremely compact
- More efficient utilization of the power supply units
- Planned reserves are not wasted
- Prevention of failures caused by continuous overload
- Scheduled maintenance and repairs no longer necessary
- Higher productivity
- PSU replaced only at the end of its service life
- Service life of 15 years (at 80% load and 40 °C), MTBF > 800,000 h
- Enclosed housing guarantees high degree of resistance to vibration and shock loads
- With IP 20, also with floating alarm contacts

Ideal areas of application for these intelligent power supply units include decentralized installations in the automobile industry, machine construction, wind turbines, etc.





# Power Supplies

## Intelligent devices

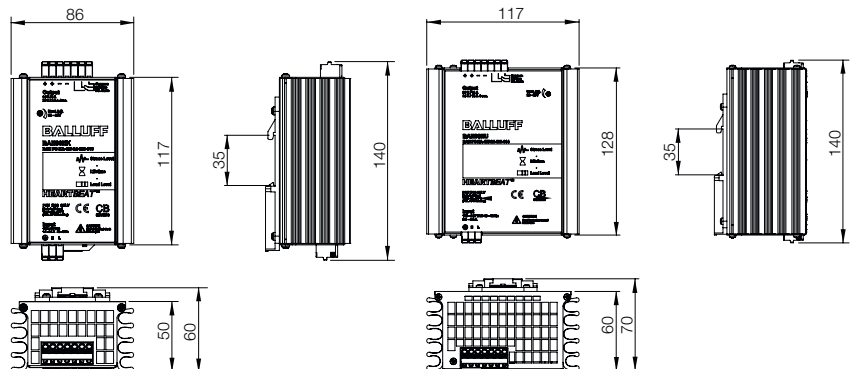
### 5 A, 10 A



	<b>5 A</b>	<b>10 A</b>
Output current	5 A	10 A
Output power	120 W	240 W
Output voltage	24 V DC (SELV)	24 V DC (SELV)
Input voltage	100...240 V AC	100...240 V AC
	Single phase	single-phase
<b>Ordering code</b>	<b>BAE00EK</b>	<b>BAE00EU</b>
Part number	BAE PS-XA-1W-24-050-013	BAE PS-XA-1W-24-100-014
Input voltage range	90...264 V AC/135...340 V DC	90...264 V AC/135...340 V DC
Inrush current	1.14 at 230 V AC / 2.1 A at 110 V AC	2.11 at 230 V AC/4.4 A at 110 V AC
Frequency range	48...62 Hz	48...62 Hz
Input fuse	6.3 A/250 V AC internal	6.3 A/250 V AC internal
Voltage adjustment range	22...28 V DC	22...28 V DC
Temperature coefficient max.	±0.03%/°C	0.03%/°C
Holdup time	> 150 ms at 230 V AC/> 25 ms at 115 V AC	> 120 ms at 230 V AC/> 15 ms at 115 V AC
Status indicator	Stress level, lifetime, load level	Stress level, lifetime, load level
Power boost	150% for 4 s	150% for 4 s
Efficiency	High efficiency, typically > 89%	High efficiency, typically > 91%
Response	Forward characteristic	Forward characteristic
Ambient temperature	-25...+70 °C	-25...+70 °C
Storage temperature	-40...+80 °C	-40...+80 °C
Mounting	DIN rail mounting	DIN rail mounting
Parallel mode	Yes (with external diodes)	Yes (with external diodes)
Degree of protection as per IEC 60529	IP 20	IP 20
Derating	-2.5%/ °C above +60 °C	-2.5%/ °C above +60 °C
Cooling	Free convection	Free convection
Housing material	Metal, semi-potted	Metal, semi-potted
Service life (at 80% load and 40 °C)	15 years	15 years
Warranty	2 years	2 years
Weight	0.80 kg	1.15 kg
Approvals	CE	CE
Wiring diagram		

- Power supplies
- Intelligent Power Supplies**
- Single-phase power supplies
- Three-phase power supplies
- Technical Data
- Pulse extender
- Function diagnostics unit
- Analog Switching Device
- Sensor tester, testing and setting device
- Signal adapters
- Digital Display

\*SELV = Safety Extra Low Voltage



# Power Supplies

## Intelligent devices

### 3.8 A

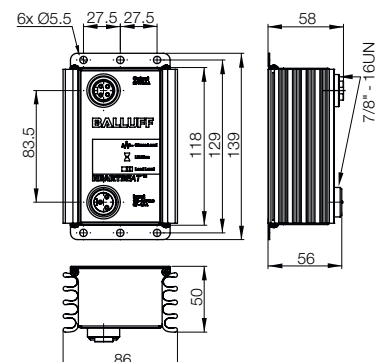
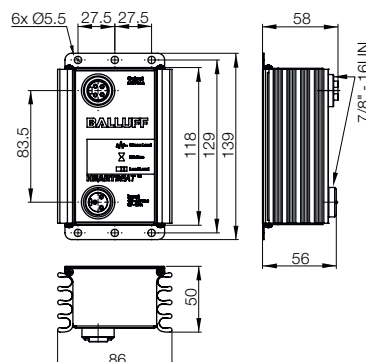


Output current	<b>3.8 A</b>	<b>3.8 A</b>	
Output power	91.2 W	91.2 W	
Output voltage	24 V DC (SELV)	24 V DC (PELV)	
Input voltage	100...240 V AC	100...240 V AC	
	Single phase	single-phase	
<b>Ordering code</b>	<b>BAE00EN</b>	<b>BAE00EP</b>	
Part number	BAE PS-XA-1W-24-038-601	BAE PS-XA-1W-24-038-602	
Input voltage range	90...264 V AC/135...340 V DC	90...264 V AC/135...340 V DC	
Inrush current	< 30 A	< 30 A	
Frequency range	48...62 Hz	48...62 Hz	
Input fuse	6.3 A/250 V AC internal	6.3 A/250 V AC internal	
Voltage adjustment range	24 V DC fixed adjustment	24 V DC fixed adjustment	
Temperature coefficient max.	±0.03%/°C	±0.03%/°C	
Holdup time	> 200 ms at 230 V AC/> 40 ms at 115 V AC	> 200 ms at 230 V AC/> 40 ms at 115 V AC	
Status indicator	Stress level, lifetime, load level	Stress level, lifetime, load level	
Power boost	150% for 4 s	150% for 4 s	
Efficiency	High efficiency, typically > 88%	High efficiency, typically > 88%	
Input	3-pin (male)	3-pin (male)	
Output	4-pin (female)	4-pin (female) e.g. for DeviceNet, Ethernet/IP modules	
Response	Forward characteristic	Forward characteristic	
Ambient temperature	-25...+70 °C	-25...+70 °C	
Storage temperature	-40...+80 °C	-40...+80 °C	
Mounting	Panel, wall, and field mounting	Panel, wall, and field mounting	
Degree of protection as per IEC 60529	IP 67	IP 67	
Derating	-2.5%/ °C above +60 °C	-2.5%/ °C above +60 °C	
Cooling	Free convection	Free convection	
Housing material	Metal, fully potted	Metal, fully potted	
Service life (at 80% load and 40 °C)	15 years	15 years	
Warranty	2 years	2 years	
Weight	1 kg	1 kg	
Approvals	CE	CE	
Wiring diagram			

\*SELV = Safety Extra Low Voltage

Appropriate cables	Length	Ordering code
Input 3-pin	2 m	<b>BCC0AH2</b>
Output 4-pin	2 m	<b>BCC06HL</b>
Output 5-pin	2 m	<b>BCC06HC</b>

Tee	Ordering code
3-pin	<b>BCC0AA5</b>
4-pin	<b>BCC0AA6</b>
5-pin	<b>BCC0AA7</b>

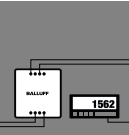




# Power Supplies

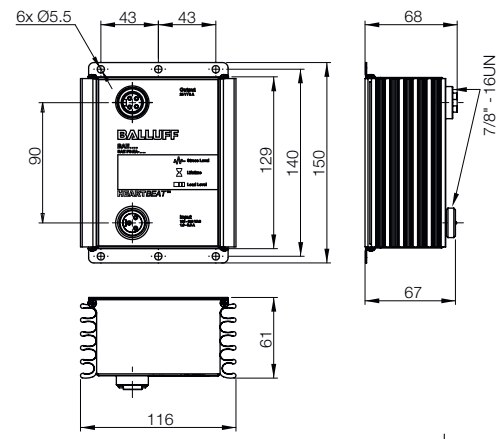
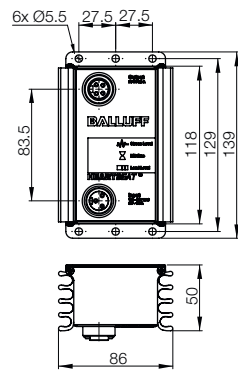
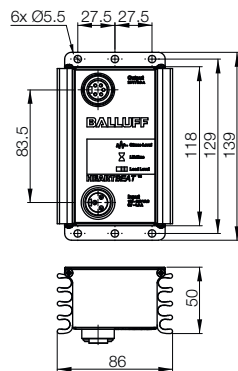
## Intelligent devices

### 3.8 A, 8 A



Power supplies  
**Intelligent Power Supplies**  
 Single-phase power supplies  
 Three-phase power supplies  
 Technical Data  
 Pulse extender  
 Function diagnostics unit  
 Analog Switching Device  
 Sensor tester, testing and setting device  
 Signal adapters  
 Digital Display

3.8 A	3.8 A	8 A
91.2 W	91.2 W	192 W
24 V DC (SELV)	24 V DC (SELV)	24 V DC (SELV)
100...240 V AC	100...240 V AC	100...240 V AC
single-phase	single-phase	single-phase
<b>BAE00ER</b>	<b>BAE00FW</b>	<b>BAE00ET</b>
BAE PS-XA-1W-24-038-603	BAE PS-XA-1W-24-038-607	BAE PS-XA-1W-24-080-604
90...264 V AC/135...340 V DC	90...264 V AC/135...340 V DC	90...264 V AC/135...340 V DC
< 30 A	< 30 A	< 20 A
48...62 Hz	48...62 Hz	48...62 Hz
6.3 A/250 V AC internal	6.3 A/250 V AC internal	6.3 A/250 V AC internal
24 V DC fixed adjustment	24 V DC fixed adjustment	24 V DC fixed adjustment
±0.03%/°C	±0.03%/°C	±0.03%/°C
> 200 ms at 230 V AC/> 40 ms at 115 V AC	> 200 ms at 230 V AC/> 40 ms at 115 V AC	> 150 ms at 230 V AC/> 20 ms at 115 V AC
Stress level, lifetime, load level	Stress level, lifetime, load level	Stress level, lifetime, load level
150% for 4 s	150% for 4 s	150% for 4 s
High efficiency, typically > 88%	High efficiency, typically > 88%	High efficiency, typically > 90%
3-pin (male)	3-pin (male)	3-pin (male)
5-pin (female) e.g. for Profibus, Profinet, CC-Link modules	4-pin (female) e.g. for DeviceNet, Ethernet/IP modules	4-pin (female) e.g. for DeviceNet, Ethernet/IP modules
Forward characteristic	Forward characteristic	Forward characteristic
-25...+70 °C	-25...+70 °C	-25...+70 °C
-40...+80 °C	-40...+80 °C	-40...+80 °C
Panel, wall, and field mounting	Panel, wall, and field mounting	Panel, wall, and field mounting
IP 67	IP 67	IP 67
-2.5%/ °C above +60 °C	-2.5%/ °C above +60 °C	-2.5%/ °C above +60 °C
Free convection	Free convection	Free convection
Metal, fully potted	Metal, fully potted	Metal, fully potted
15 years	15 years	15 years
2 years	2 years	2 years
1 kg	1 kg	1.65 kg
CE	CE	CE



# Power Supplies

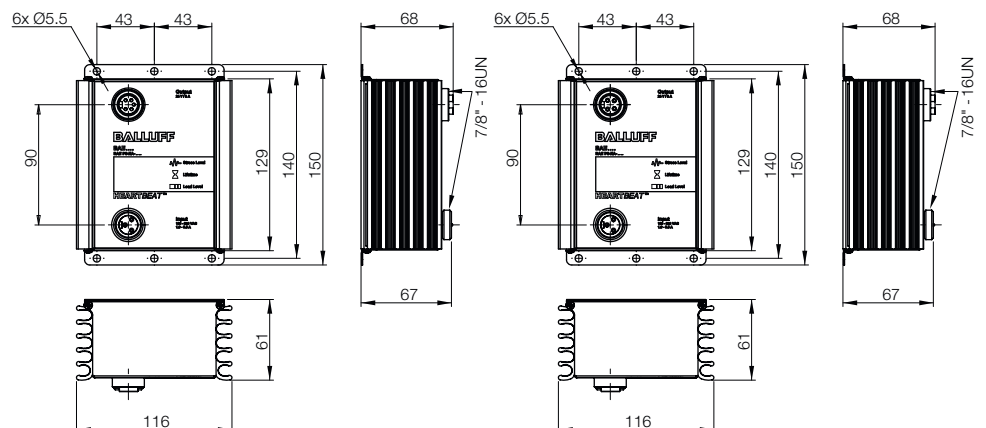
## Intelligent devices

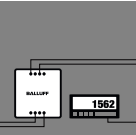
### 8 A



Output current	<b>8 A</b>	<b>8 A</b>
Output power	192 W	192 W
Output voltage	24 V DC (SELV)	24 V DC (PELV)
Input voltage	100...240 V AC	100...240 V AC
	Single phase	single-phase
<b>Ordering code</b>	<b>BAE00FL</b>	<b>BAE00FY</b>
Part number	BAE PS-XA-1W-24-080-605	BAE PS-XA-1W-24-080-606
Input voltage range	90...264 V AC/135...340 V AC	90...264 V AC/135...340 V AC
Inrush current	< 20 A	< 20 A
Frequency range	48...62 Hz	48...62 Hz
Input fuse	6.3 A/250 V AC internal	6.3 A/250 V AC internal
Voltage adjustment range	24 V DC fixed adjustment	24 V DC fixed adjustment
Temperature coefficient max.	±0.03%/°C	±0.03%/°C
Holdup time	> 150 ms at 230 V AC/> 20 ms at 115 V AC	> 150 ms at 230 V AC/> 20 ms at 115 V AC
Status indicator	Stress level, lifetime, load level	Stress level, lifetime, load level
Power boost	150% for 4 s	150% for 4 s
Efficiency	High efficiency, typically > 90%	High efficiency, typically > 90%
Input	3-pin (male)	3-pin (male)
Output	5-pin (female) e.g. for Profibus, Profinet, CC-Link modules	4-pin (female) e.g. for DeviceNet, Ethernet/IP modules
Response	Forward characteristic	Forward characteristic
Ambient temperature	-25...+70 °C	-25...+70 °C
Storage temperature	-40...+80 °C	-40...+80 °C
Mounting	Panel, wall, and field mounting	Panel, wall, and field mounting
Degree of protection as per IEC 60529	IP 67	IP 67
Derating	-2.5%/ °C above +60 °C	-2.5%/ °C above +60 °C
Cooling	Free convection	Free convection
Housing material	Metal, fully potted	Metal, fully potted
Service life (at 80% load and 40 °C)	15 years	15 years
Warranty	2 years	2 years
Weight	1.65 kg	1.65 kg
Approvals	CE	CE
Wiring diagram		

\*SELV = Safety Extra Low Voltage





Power supplies

**Intelligent Power Supplies**

Single-phase power supplies

Three-phase power supplies

Technical Data

Pulse extender

Function diagnostics unit

Analog Switching Device

Sensor tester, testing and setting device

Signal adapters

Digital Display

Power Supplies  
**Single-phase input voltage**  
**0.75 A, 1.5 A**

Plastic



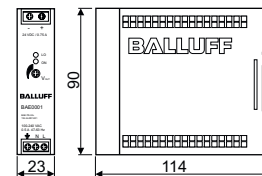
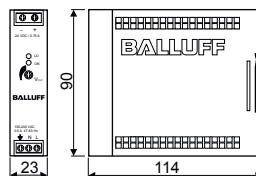
Class 2



Class 2

Output current	<b>0.75 A</b>	<b>1.5 A</b>																	
Output power	18 W	18 W																	
Output voltage	24 V DC (SELV)	12 V DC (SELV)																	
Input voltage	100...240 V AC	100...240 V AC																	
<b>Ordering code</b>	<b>BAE0001</b>	<b>BAE0036</b>																	
Part number	BAE PS-XA-1W-24-007-001	BAE PS-XA-1W-12-015-001																	
Input voltage range	90...264 V AC/120...375 V DC	90...264 V AC/120...375 V DC																	
Inrush current	115 V AC < 10 A/230 V AC < 18 A	115 V AC < 10 A/230 V AC < 18 A																	
Frequency range	47...63 Hz	47...63 Hz																	
Input fuse	T2 A/250 V AC internal	T2 A/250 V AC internal																	
Voltage adjustment range	22.5...28.5 V DC	11...14 V DC																	
Temperature coefficient max.	±0.03%/°C	±0.03%/°C																	
Ripple and noise	50 mV	50 mV																	
Holdup time	115 V AC > 20 ms/230 V AC > 30 ms	115 V AC > 20 ms/230 V AC > 30 ms																	
Status indicator DC ON	Green LED	Green LED																	
Status indicator DC LOW	Red LED	Red LED																	
Efficiency	77 %	77 %																	
Response	Hiccup mode	Hiccup mode																	
Switching frequency	> 100 kHz	> 100 kHz																	
Input/output isolation voltage	3000 V AC	3000 V AC																	
Insulation resistance	100 MΩ	100 MΩ																	
Switch-on delay	< 1 s	< 1 s																	
Ambient temperature	-20...+70 °C	-20...+70 °C																	
Derating	-2.5%/°C of +61 °C	-2.5%/°C of +61 °C																	
Parallel mode	Yes (with external diodes)	Yes (with external diodes)																	
Degree of protection as per IEC 60529	IP 20	IP 20																	
Ready output	No	No																	
Cooling	Free convection	Free convection																	
Housing material	Plastic	Plastic																	
Weight	0.15 kg	0.15 kg																	
Approvals	CE, UL/cUL, TÜV	CE, UL/cUL, TÜV																	
Wiring diagram	<table border="1"> <tr> <td>L, N</td> <td>Input terminals</td> </tr> <tr> <td>PE</td> <td>PE connection</td> </tr> <tr> <td>Vo -</td> <td>Output terminal -</td> </tr> <tr> <td>Vo +</td> <td>Output terminal +</td> </tr> </table>	L, N	Input terminals	PE	PE connection	Vo -	Output terminal -	Vo +	Output terminal +	<table border="1"> <tr> <td>L, N</td> <td>Input terminals</td> </tr> <tr> <td>PE</td> <td>PE connection</td> </tr> <tr> <td>Vo -</td> <td>Output terminal -</td> </tr> <tr> <td>Vo +</td> <td>Output terminal +</td> </tr> </table>	L, N	Input terminals	PE	PE connection	Vo -	Output terminal -	Vo +	Output terminal +	
L, N	Input terminals																		
PE	PE connection																		
Vo -	Output terminal -																		
Vo +	Output terminal +																		
L, N	Input terminals																		
PE	PE connection																		
Vo -	Output terminal -																		
Vo +	Output terminal +																		

\*SELV = Safety Extra Low Voltage



# Power Supplies

## Single-phase input voltage

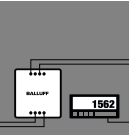
### 1.25 A, 2.5 A



Class 2

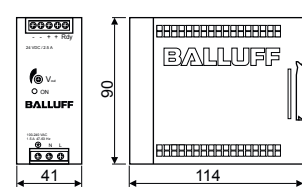
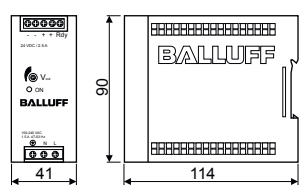


Class 2



Power supplies  
Intelligent  
Power Supplies  
**Single-phase  
power supplies**  
Three-phase  
power supplies  
Technical Data  
Pulse extender  
Function diag-  
nostics unit  
Analog  
Switching  
Device  
Sensor tester,  
testing and set-  
ting device  
Signal adapters  
Digital Display

1.25 A	2.5 A																				
30 W	30 W																				
24 V DC (SELV)	12 V DC (SELV)																				
100...240 V AC	100...240 V AC																				
<b>BAE0004</b>	<b>BAE0039</b>																				
BAE PS-XA-1W-24-012-002	BAE PS-XA-1W-12-025-002																				
85...264 V AC/90...375 V DC	85...264 V AC/90...375 V DC																				
115 V AC < 20 A/230 V AC < 40 A	115 V AC < 20 A/230 V AC < 40 A																				
47...63 Hz	47...63 Hz																				
T2 A/250 V AC internal	T2 A/250 V AC internal																				
22.5...28.5 V DC	11...14 V DC																				
±0.03%/°C	±0.03%/°C																				
50 mV	50 mV																				
115 V AC > 20 ms/230 V AC > 30 ms	115 V AC > 20 ms/230 V AC > 30 ms																				
Green LED	Green LED																				
86 %	84 %																				
Forward characteristic	Forward characteristic																				
> 80 kHz	> 80 kHz																				
3000 V AC	3000 V AC																				
100 MΩ	100 MΩ																				
< 1 s	< 1 s																				
-40...+70 °C	-40...+70 °C																				
-2.5%/°C of +61 °C	-2.5%/°C of +61 °C																				
Yes (with external diodes)	Yes (with external diodes)																				
IP 20	IP 20																				
DC OK output	DC OK output																				
Free convection	Free convection																				
Plastic	Plastic																				
0.29 kg	0.29 kg																				
CE, UL/cUL, TÜV	CE, UL/cUL, TÜV																				
<table border="1"> <tr><td>L, N</td><td>Input terminals</td></tr> <tr><td>PE</td><td>PE connection</td></tr> <tr><td>Vo -</td><td>Output terminal -</td></tr> <tr><td>Vo +</td><td>Output terminal +</td></tr> <tr><td>Rdy</td><td>Ready output</td></tr> </table>	L, N	Input terminals	PE	PE connection	Vo -	Output terminal -	Vo +	Output terminal +	Rdy	Ready output	<table border="1"> <tr><td>L, N</td><td>Input terminals</td></tr> <tr><td>PE</td><td>PE connection</td></tr> <tr><td>Vo -</td><td>Output terminal -</td></tr> <tr><td>Vo +</td><td>Output terminal +</td></tr> <tr><td>Rdy</td><td>Ready output</td></tr> </table>	L, N	Input terminals	PE	PE connection	Vo -	Output terminal -	Vo +	Output terminal +	Rdy	Ready output
L, N	Input terminals																				
PE	PE connection																				
Vo -	Output terminal -																				
Vo +	Output terminal +																				
Rdy	Ready output																				
L, N	Input terminals																				
PE	PE connection																				
Vo -	Output terminal -																				
Vo +	Output terminal +																				
Rdy	Ready output																				



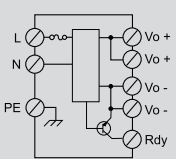
Power Supplies  
**Single-phase input voltage**  
**2.5 A**

Plastic

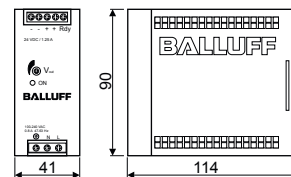


Class 2



Output current	<b>2.5 A</b>										
Output power	60 W										
Output voltage	24 V DC (SELV)										
Input voltage	100...240 V AC										
<b>Ordering code</b>	<b>BAE0005</b>										
Part number	BAE PS-XA-1W-24-025-002										
Input voltage range	85...264 V AC/90...375 V DC										
Inrush current	115 V AC < 30 A/230 V AC < 60 A										
Frequency range	47...63 Hz										
Input fuse	T2 A/250 V AC internal										
Voltage adjustment range	22.5...28.5 V DC										
Temperature coefficient max.	±0.03%/°C										
Ripple and noise	50 mV										
Holdup time	115 V AC > 20 ms/230 V AC > 30 ms										
Status indicator DC ON	Green LED										
Status indicator DC LOW											
Efficiency	89 %										
Response	Forward characteristic										
Switching frequency	> 55 kHz										
Input/output isolation voltage	3000 V AC										
Insulation resistance	100 MΩ										
Switch-on delay	< 1 s										
Ambient temperature	-40...+70 °C										
Derating	-2.5%/°C of +61 °C										
Parallel mode	Yes (with external diodes)										
Degree of protection as per IEC 60529	IP 20										
Ready output	DC OK output										
Cooling	Free convection										
Housing material	Plastic										
Weight	0.36 kg										
Approvals	CE, UL/cUL, TÜV										
Wiring diagram	 <table border="1" data-bbox="1013 1444 1300 1601"> <tr> <td>L, N</td> <td>Input terminals</td> </tr> <tr> <td>PE</td> <td>PE connection</td> </tr> <tr> <td>Vo -</td> <td>Output terminal -</td> </tr> <tr> <td>Vo +</td> <td>Output terminal +</td> </tr> <tr> <td>Rdy</td> <td>Ready output</td> </tr> </table>	L, N	Input terminals	PE	PE connection	Vo -	Output terminal -	Vo +	Output terminal +	Rdy	Ready output
L, N	Input terminals										
PE	PE connection										
Vo -	Output terminal -										
Vo +	Output terminal +										
Rdy	Ready output										

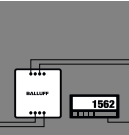
\*SELV = Safety Extra Low Voltage



# Power Supplies

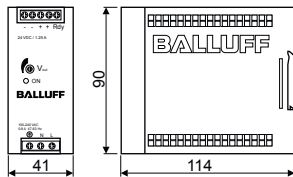
## Single-phase input voltage

### 5 A



- Power supplies
- Intelligent Power Supplies
- Single-phase power supplies**
- Three-phase power supplies
- Technical Data
- Pulse extender
- Function diagnostics unit
- Analog Switching Device
- Sensor tester, testing and setting device
- Signal adapters
- Digital Display

<b>5 A</b>											
60 W											
12 V DC (SELV)											
100...240 V AC											
<b>BAE003E</b>											
BAE PS-XA-1W-12-050-002											
85...264 V AC/90...375 V DC											
115 V AC < 30 A/230 V AC < 60 A											
47...63 Hz											
T2 A/250 V AC internal											
11...14 V DC											
±0.03%/°C											
50 mV											
115 V AC > 20 ms/230 V AC > 30 ms											
Green LED											
86 %											
Forward characteristic											
> 55 kHz											
3000 V AC											
100 MΩ											
< 1 s											
-40...+70 °C											
-2.5%/°C of +61 °C											
Yes (with external diodes)											
IP 20											
DC OK output											
Free convection											
Plastic											
0.36 kg											
CE, UL/cUL, TÜV											
<table border="1" style="margin-left: 20px;"> <tr> <td>L, N</td> <td>Input terminals</td> </tr> <tr> <td>PE</td> <td>PE connection</td> </tr> <tr> <td>Vo -</td> <td>Output terminal -</td> </tr> <tr> <td>Vo +</td> <td>Output terminal +</td> </tr> <tr> <td>Rdy</td> <td>Ready output</td> </tr> </table>	L, N	Input terminals	PE	PE connection	Vo -	Output terminal -	Vo +	Output terminal +	Rdy	Ready output	
L, N	Input terminals										
PE	PE connection										
Vo -	Output terminal -										
Vo +	Output terminal +										
Rdy	Ready output										



Power Supplies  
**Single-phase input voltage**  
**2.5 A, 3.8 A**

Metal

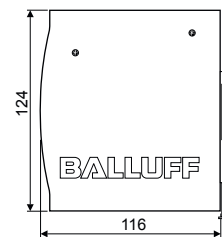
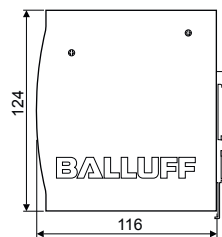
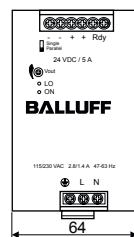


Class 2



	<b>3.8 A</b>	<b>2.5 A</b>																					
Output current	<b>3.8 A</b>	<b>2.5 A</b>																					
Output power	91.20 W	120 W																					
Output voltage	24 V DC (SELV)	48 V DC (SELV)																					
Input voltage	115/230 V AC (Auto-Select)	115/230 V AC (Auto-Select)																					
<b>Ordering code</b>	<b>BAE003J</b>	<b>BAE003K</b>																					
Part number	BAE PS-XA-1W-24-038-003	BAE PS-XA-1W-48-025-003																					
Input voltage range	90...132 V AC; 180...264 V AC/210...375 V DC	90...132 V AC; 180...264 V AC/210...375 V DC																					
Inrush current	115 V AC < 24 A/230 V AC < 48 A	115 V AC < 24 A/230 V AC < 48 A																					
Frequency range	47...63 Hz	47...63 Hz																					
Input fuse	T3.15 A/250 V AC internal	T3.15 A/250 V AC internal																					
Voltage adjustment range	22.5...24.5 V DC	47...55 V DC																					
Temperature coefficient max.	±0.03%/°C	±0.03%/°C																					
Ripple and noise	50 mV	50 mV																					
Holdup time	115 V AC > 25 ms/230 V AC > 30 ms	115 V AC > 25 ms/230 V AC > 30 ms																					
Status indicator DC ON	Green LED	Green LED																					
Status indicator DC LOW	Red LED	Red LED																					
Efficiency	86 %	87 %																					
Response	Forward characteristic	Forward characteristic																					
Switching frequency	> 55 kHz (typically)	> 55 kHz (typically)																					
Input/output isolation voltage	3000 V AC	3000 V AC																					
Insulation resistance	100 MΩ	100 MΩ																					
Switch-on delay	< 1 s	< 1 s																					
Ambient temperature	-35...+70 °C	-35...+70 °C																					
Derating	-2.5%/°C of +61 °C	-2.5%/°C of +61 °C																					
Parallel mode	No	Yes																					
Degree of protection as per IEC 60529	IP 20	IP 20																					
Ready output	DC OK output relay	DC OK output relay																					
Cooling	Free convection	Free convection																					
Housing material	Metal	Metal																					
Weight	0.92 kg	0.92 kg																					
Approvals	CE, UL/cUL, TÜV, ODVA	CE, UL/cUL, TÜV																					
Wiring diagram	<table border="1"> <tr><td>L, N</td><td>Input terminals</td></tr> <tr><td>PE</td><td>PE connection</td></tr> <tr><td>Vo -</td><td>Output terminal -</td></tr> <tr><td>Vo +</td><td>Output terminal +</td></tr> <tr><td>Rdy</td><td>Ready output</td></tr> </table>	L, N	Input terminals	PE	PE connection	Vo -	Output terminal -	Vo +	Output terminal +	Rdy	Ready output	<table border="1"> <tr><td>L, N</td><td>Input terminals</td></tr> <tr><td>PE</td><td>PE connection</td></tr> <tr><td>Vo -</td><td>Output terminal -</td></tr> <tr><td>Vo +</td><td>Output terminal +</td></tr> <tr><td>Rdy</td><td>Ready output</td></tr> </table>	L, N	Input terminals	PE	PE connection	Vo -	Output terminal -	Vo +	Output terminal +	Rdy	Ready output	
L, N	Input terminals																						
PE	PE connection																						
Vo -	Output terminal -																						
Vo +	Output terminal +																						
Rdy	Ready output																						
L, N	Input terminals																						
PE	PE connection																						
Vo -	Output terminal -																						
Vo +	Output terminal +																						
Rdy	Ready output																						

\*SELV = Safety Extra Low Voltage

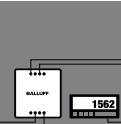




# Power Supplies

## Single-phase input voltage

### 5 A, 10 A

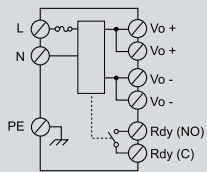


Power supplies  
Intelligent  
Power Supplies  
**Single-phase  
power supplies**  
Three-phase  
power supplies  
Technical Data  
Pulse extender  
Function diagnos-  
tics unit  
Analog  
Switching  
Device  
Sensor tester,  
testing and set-  
ting device  
Signal adapters  
Digital Display

**5 A**  
120 W  
24 V DC (SELV)  
115/230 V AC (Auto-Select)

**BAE0006**  
BAE PS-XA-1W-24-050-003

90...132 V AC; 180...264 V AC/210...375 V DC  
115 V AC < 24 A/230 V AC < 48 A  
47...63 Hz  
T3.15 A/250 V AC internal  
22.5...28.5 V DC  
±0.03%/°C  
50 mV  
115 V AC > 25 ms/230 V AC > 30 ms  
Green LED  
Red LED  
86 %  
Forward characteristic  
> 55 kHz (typically)  
3000 V AC  
100 MΩ  
< 1 s  
-35...+70 °C  
-2.5%/°C of +61 °C  
Yes  
IP 20  
DC OK output relay  
Free convection  
Metal  
0.92 kg  
CE, UL/cUL, TÜV

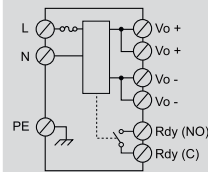


L, N	Input terminals
PE	PE connection
Vo -	Output terminal -
Vo +	Output terminal +
Rdy	Ready output

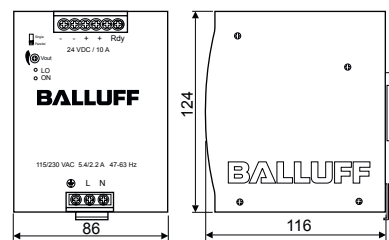
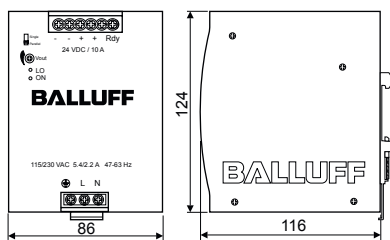
**10 A**  
120 W  
12 V DC (SELV)  
115/230 V AC (Auto-Select)

**BAE003H**  
BAE PS-XA-1W-12-100-003

90...132 V AC; 180...264 V AC/210...375 V DC  
115 V AC < 24 A/230 V AC < 48 A  
47...63 Hz  
T3.15 A/250 V AC internal  
11...14 V DC  
±0.03%/°C  
50 mV  
115 V AC > 25 ms/230 V AC > 30 ms  
Green LED  
Red LED  
84 %  
Forward characteristic  
> 55 kHz (typically)  
3000 V AC  
100 MΩ  
< 1 s  
-35...+70 °C  
-2.5%/°C of +61 °C  
Yes  
IP 20  
DC OK output relay  
Free convection  
Metal  
0.92 kg  
CE, UL/cUL, TÜV



L, N	Input terminals
PE	PE connection
Vo -	Output terminal -
Vo +	Output terminal +
Rdy	Ready output



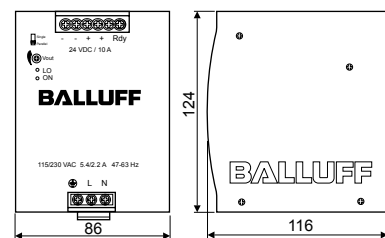
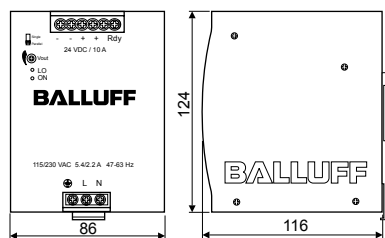
Power Supplies  
**Single-phase input voltage**  
**5 A, 10 A**

**Metal**



	<b>5 A</b>	<b>10 A</b>																					
Output current	5 A	10 A																					
Output power	240 W	240 W																					
Output voltage	48 V DC (SELV)	24 V DC (SELV)																					
Input voltage	115/230 V AC (Auto-Select)	115/230 V AC (Auto-Select)																					
<b>Ordering code</b>	<b>BAE003L</b>	<b>BAE0002</b>																					
Part number	BAE PS-XA-1W-48-050-004	BAE PS-XA-1W-24-100-004																					
Input voltage range	90...132 V AC; 180...264 V AC/210...375 V DC	90...132 V AC; 180...264 V AC/210...375 V DC																					
Inrush current	115 V AC < 30 A/230 V AC < 60 A	115 V AC < 30 A/230 V AC < 60 A																					
Frequency range	47...63 Hz	47...63 Hz																					
Input fuse	T6.3 A/250 V AC internal	T6.3 A/250 V AC internal																					
Voltage adjustment range	47...55 V DC	22.5...28.5 V DC																					
Temperature coefficient max.	±0.03%/°C	±0.03%/°C																					
Ripple and noise	100 mV	100 mV																					
Holdup time	115 V AC > 25 ms/230 V AC > 30 ms	115 V AC > 25 ms/230 V AC > 30 ms																					
Status indicator DC ON	Green LED	Green LED																					
Status indicator DC LOW	Red LED	Red LED																					
Efficiency	90 %	89 %																					
Response	Forward characteristic	Forward characteristic																					
Switching frequency	> 40 kHz (typically)	> 40 kHz (typically)																					
Input/output isolation voltage	3000 V AC	3000 V AC																					
Insulation resistance	100 MΩ	100 MΩ																					
Switch-on delay	< 1 s	< 1 s																					
Ambient temperature	-40...+70 °C	-40...+70 °C																					
Derating	-2.5%/°C of +61 °C	-2.5%/°C of +61 °C																					
Parallel mode	Yes	Yes																					
Degree of protection as per IEC 60529	IP 20	IP 20																					
Ready output	DC OK output relay	DC OK output relay																					
Cooling	Free convection	Free convection																					
Housing material	Metal	Metal																					
Weight	1.0 kg	1.0 kg																					
Approvals	CE, UL/cUL, TÜV	CE, UL/cUL, TÜV																					
Wiring diagram	<table border="1"> <tr><td>L, N</td><td>Input terminals</td></tr> <tr><td>PE</td><td>PE connection</td></tr> <tr><td>Vo -</td><td>Output terminal -</td></tr> <tr><td>Vo +</td><td>Output terminal +</td></tr> <tr><td>Rdy</td><td>Ready output</td></tr> </table>	L, N	Input terminals	PE	PE connection	Vo -	Output terminal -	Vo +	Output terminal +	Rdy	Ready output	<table border="1"> <tr><td>L, N</td><td>Input terminals</td></tr> <tr><td>PE</td><td>PE connection</td></tr> <tr><td>Vo -</td><td>Output terminal -</td></tr> <tr><td>Vo +</td><td>Output terminal +</td></tr> <tr><td>Rdy</td><td>Ready output</td></tr> </table>	L, N	Input terminals	PE	PE connection	Vo -	Output terminal -	Vo +	Output terminal +	Rdy	Ready output	
L, N	Input terminals																						
PE	PE connection																						
Vo -	Output terminal -																						
Vo +	Output terminal +																						
Rdy	Ready output																						
L, N	Input terminals																						
PE	PE connection																						
Vo -	Output terminal -																						
Vo +	Output terminal +																						
Rdy	Ready output																						

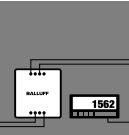
\*SELV = Safety Extra Low Voltage



# Power Supplies

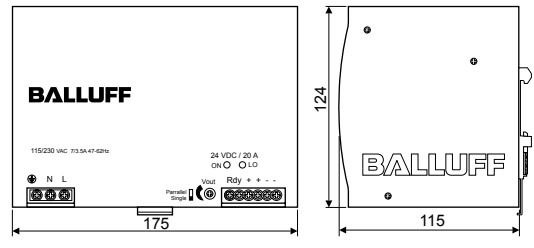
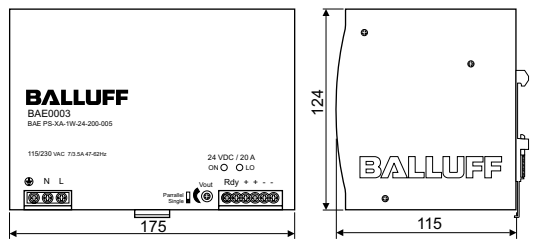
## Single-phase input voltage

### 10 A, 20 A



Power supplies  
Intelligent Power Supplies  
**Single-phase power supplies**  
Three-phase power supplies  
Technical Data  
Pulse extender  
Function diagnostics unit  
Analog Switching Device  
Sensor tester, testing and setting device  
Signal adapters  
Digital Display

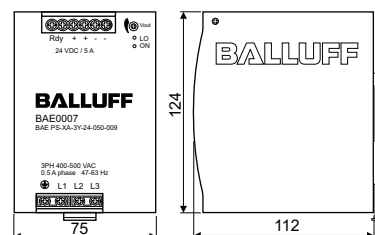
10 A	20 A																				
480 W	480 W																				
48 V DC (SELV)	24 V DC (SELV)																				
115/230 V AC (Auto-Select)	115/230 V AC (Auto-Select)																				
<b>BAE003M</b>	<b>BAE0003</b>																				
BAE PS-XA-1W-48-100-005	BAE PS-XA-1W-24-200-005																				
90...264 V AC/120...370 V DC	90...264 V AC/120...370 V DC																				
115 V AC < 25 A/230 V AC < 50 A	115 V AC < 25 A/230 V AC < 50 A																				
47...63 Hz	47...63 Hz																				
T10 A/250 V AC internal	T10 A/250 V AC internal																				
47...55 V DC	22.5...28.5 V DC																				
±0.03%/°C	±0.03%/°C																				
100 mV	100 mV																				
115 V AC > 25 ms/230 V AC > 30 ms	115 V AC > 25 ms/230 V AC > 30 ms																				
Green LED	Green LED																				
Red LED	Red LED																				
90 %	89 %																				
Forward characteristic	Forward characteristic																				
> 65 kHz (typically)	> 65 kHz (typically)																				
3000 V AC	3000 V AC																				
100 MΩ	100 MΩ																				
< 1 s	< 1 s																				
-40...+70 °C	-40...+70 °C																				
-2.5%/°C of +56 °C	-2.5%/°C of +56 °C																				
Yes	Yes																				
IP 20	IP 20																				
DC OK output relay	DC OK output relay																				
Free convection	Free convection																				
Metal	Metal																				
1.92 kg	1.92 kg																				
CE, UL/cUL, TÜV	CE, UL/cUL, TÜV																				
<table border="1"> <tr><td>L, N</td><td>Input terminals</td></tr> <tr><td>PE</td><td>PE connection</td></tr> <tr><td>Vo -</td><td>Output terminal -</td></tr> <tr><td>Vo +</td><td>Output terminal +</td></tr> <tr><td>Rdy</td><td>Ready output</td></tr> </table>	L, N	Input terminals	PE	PE connection	Vo -	Output terminal -	Vo +	Output terminal +	Rdy	Ready output	<table border="1"> <tr><td>L, N</td><td>Input terminals</td></tr> <tr><td>PE</td><td>PE connection</td></tr> <tr><td>Vo -</td><td>Output terminal -</td></tr> <tr><td>Vo +</td><td>Output terminal +</td></tr> <tr><td>Rdy</td><td>Ready output</td></tr> </table>	L, N	Input terminals	PE	PE connection	Vo -	Output terminal -	Vo +	Output terminal +	Rdy	Ready output
L, N	Input terminals																				
PE	PE connection																				
Vo -	Output terminal -																				
Vo +	Output terminal +																				
Rdy	Ready output																				
L, N	Input terminals																				
PE	PE connection																				
Vo -	Output terminal -																				
Vo +	Output terminal +																				
Rdy	Ready output																				





Output current	<b>5 A</b>										
Output power	120 W										
Output voltage	24 V DC (SELV)										
Input voltage	3× 400...500 V AC										
<b>Ordering code</b>	<b>BAE0007</b>										
Part number	BAE PS-XA-3Y-24-050-009										
Input voltage range	340...575 V AC/480...820 V DC										
Inrush current	< 10 A										
Frequency range	47...63 Hz										
Input fuse	2 A/600 V AC internal/phase										
Voltage adjustment range	22.5...28.5 V DC										
Temperature coefficient max.	±0.03%/°C										
Ripple and noise	100 mV										
Holdup time	> 20 ms										
Status indicator DC ON	Green LED										
Status indicator DC LOW	Red LED										
Efficiency	89 %										
Response	Hiccup mode										
Switching frequency	> 65 kHz (typically)										
Input/output isolation voltage	3000 V AC										
Insulation resistance	100 MΩ										
Switch-on delay	< 1 s										
Ambient temperature	-40...+70 °C										
Derating	-2.5%/°C of +61 °C										
Parallel mode	Yes (with external diodes)										
Degree of protection as per IEC 60529	IP 20										
Ready output	DC OK output relay										
Cooling	Free convection										
Housing material	Metal										
Weight	0.8 kg										
Approvals	CE, UL/cUL, TÜV										
Wiring diagram	<table border="1"> <tr> <td>L</td> <td>Input terminals</td> </tr> <tr> <td>PE</td> <td>PE connection</td> </tr> <tr> <td>Vo -</td> <td>Output terminal -</td> </tr> <tr> <td>Vo +</td> <td>Output terminal +</td> </tr> <tr> <td>Rdy</td> <td>Ready output</td> </tr> </table>	L	Input terminals	PE	PE connection	Vo -	Output terminal -	Vo +	Output terminal +	Rdy	Ready output
L	Input terminals										
PE	PE connection										
Vo -	Output terminal -										
Vo +	Output terminal +										
Rdy	Ready output										

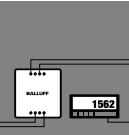
\*SELV = Safety Extra Low Voltage



# Power Supplies

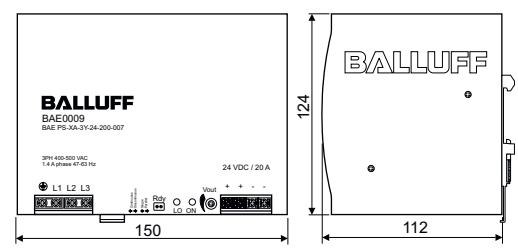
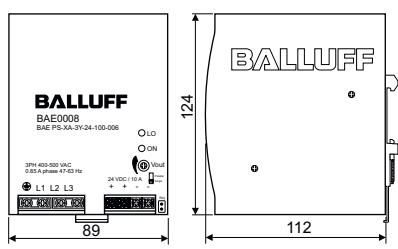
## 3-phase input voltage

### 10 A, 20 A

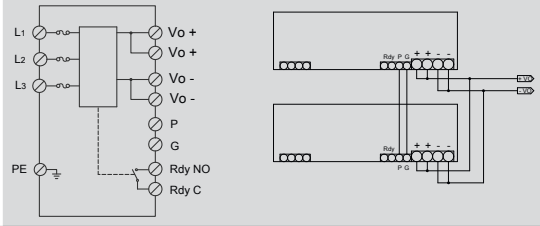


Power supplies  
Intelligent Power Supplies  
Single-phase power supplies  
**Three-phase power supplies**  
Technical Data  
Pulse extender  
Function diagnostics unit  
Analog Switching Device  
Sensor tester, testing and setting device  
Signal adapters  
Digital Display

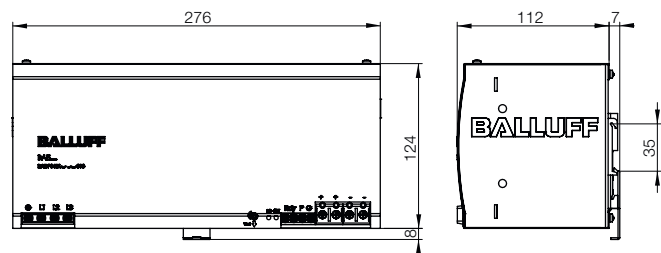
10 A	20 A																				
240 W	480 W																				
24 V DC (SELV)	24 V DC (SELV)																				
3x 400...500 V AC	3x 400...500 V AC																				
<b>BAE0008</b>	<b>BAE0009</b>																				
BAE PS-XA-3Y-24-100-006	BAE PS-XA-3Y-24-200-007																				
340...575 V AC/480...820 V DC	340...575 V AC/480...820 V DC																				
< 20 A	< 20 A																				
47...63 Hz	47...63 Hz																				
T2 A/600 V AC internal/phase	3.15 A/500 V AC internal/phase																				
22.5...28.5 V DC	22.5...28.5 V DC																				
±0.03%/°C	±0.03%/°C																				
100 mV	100 mV																				
> 20 ms	> 20 ms																				
Green LED	Green LED																				
Red LED	Red LED																				
90 %	90 %																				
Hiccup mode	Forward characteristic (C), restart after 30 s (D), Shutoff within 3 s, (C)/(D) togglable																				
> 30 kHz (typically)	> 75 kHz (typically)																				
3000 V AC	3000 V AC																				
100 MΩ	100 MΩ																				
< 1 s	< 1 s																				
-40...+70 °C	-30...+70 °C																				
-2.5%/°C of +61 °C	-2.5%/°C of +61 °C																				
Yes	Yes																				
IP 20	IP 20																				
DC OK output relay	DC OK output relay																				
Free convection	Free convection																				
Metal	Metal																				
1.1 kg	1.75 kg																				
CE, UL/cUL, TÜV	CE, UL/cUL, TÜV																				
<table border="1"> <tr><td>L</td><td>Input terminals</td></tr> <tr><td>PE</td><td>PE connection</td></tr> <tr><td>Vo -</td><td>Output terminal -</td></tr> <tr><td>Vo +</td><td>Output terminal +</td></tr> <tr><td>Rdy</td><td>Ready output</td></tr> </table>	L	Input terminals	PE	PE connection	Vo -	Output terminal -	Vo +	Output terminal +	Rdy	Ready output	<table border="1"> <tr><td>L</td><td>Input terminals</td></tr> <tr><td>PE</td><td>PE connection</td></tr> <tr><td>Vo -</td><td>Output terminal -</td></tr> <tr><td>Vo +</td><td>Output terminal +</td></tr> <tr><td>Rdy</td><td>Ready output</td></tr> </table>	L	Input terminals	PE	PE connection	Vo -	Output terminal -	Vo +	Output terminal +	Rdy	Ready output
L	Input terminals																				
PE	PE connection																				
Vo -	Output terminal -																				
Vo +	Output terminal +																				
Rdy	Ready output																				
L	Input terminals																				
PE	PE connection																				
Vo -	Output terminal -																				
Vo +	Output terminal +																				
Rdy	Ready output																				





Output current	<b>40 A</b>
Output power	960 W
Output voltage	24 V DC (SELV)
Input voltage	3× 400...500 V AC
<b>Ordering code</b>	<b>BAE003R</b>
Part number	BAE PS-XA-3Y-24-400-010
Input voltage range	340...575 V AC/480...820 V DC
Inrush current	< 30 A
Frequency range	47...63 Hz
Input fuse	T5 A/500 V AC internal/phase
Voltage adjustment range	22.5...28.5 V DC
Temperature coefficient max.	±0.03%/°C
Ripple and noise	80 mV
Holdup time	> 15 ms
Status indicator DC ON	Green LED
Status indicator DC LOW	Red LED
Efficiency	92 %
Response	Hiccup mode
Switching frequency	> 50 kHz (typically)
Input/output isolation voltage	3000 V AC
Insulation resistance	100 MΩ
Switch-on delay	< 1 s
Ambient temperature	-40...+70 °C
Derating	-3.5%/°C above +61 °C
Parallel mode	Yes
Degree of protection as per IEC 60529	IP 20
Ready output	No
Cooling	Free convection
Housing material	Metal
Weight	3.2 kg
Approvals	CE, UL/cUL, TÜV
Wiring diagram	

\*SELV = Safety Extra Low Voltage

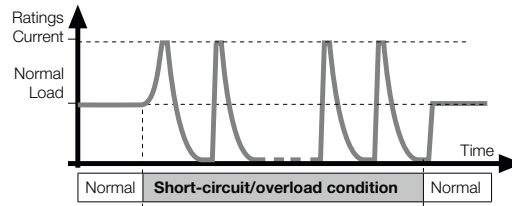


# Power Supplies

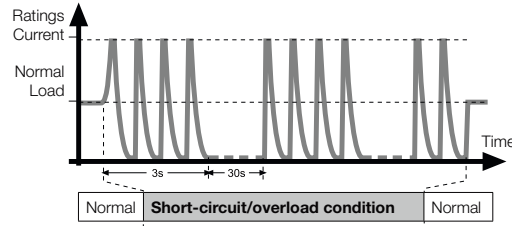
## Technical Data

### Output short circuit protection

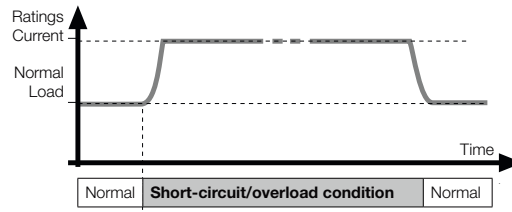
Hiccup mode overload protection\*



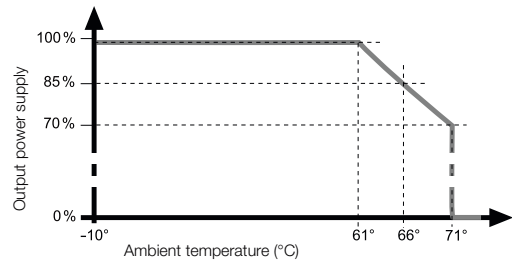
Hiccup mode with turn-off overload protection\*



Current limiter and forward characteristic\*



Temperature under-load






LED definition

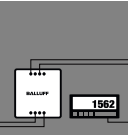
DC ON	DC LO	Possible situation
<input type="radio"/> off	<input type="radio"/> off	AC power supply off, internal fuse burned out, short circuit
<input type="radio"/> on	<input type="radio"/> off	Normal operation
<input type="radio"/> off	<input type="radio"/> on	Output voltage < 19.2 V
<input type="radio"/> on	<input checked="" type="radio"/> on	Power supply failure

Green     Red

Approvals and standards

- 
 UL/cUL  
 UL 508 listed/UL 60950-1, UL 1310 Class 2
- 
 TÜV  
 EN 60950-1
- 
 CE  
 EN 61000-6-3, EN 55022 Class B, EN 61000-3-2,  
 EN 61000-3-3, EN 61000-6-2, EN 55024  
 EN 61000-4-2, EN 61000-4-3, EN 61000-4-4  
 EN 61000-4-5, EN 61000-4-6, EN 61000-4-8,  
 EN 61000-4-11

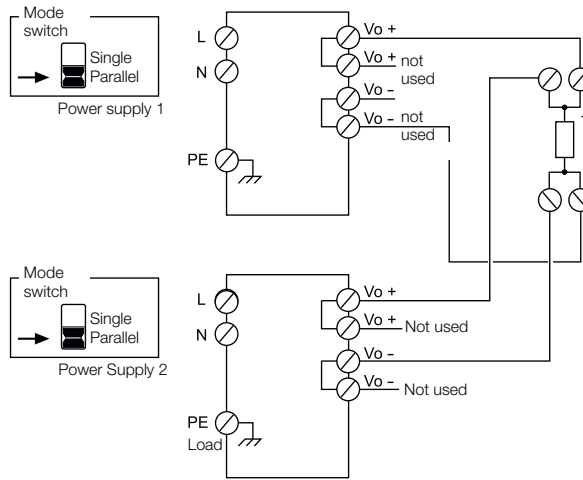
\*Note: Diagrams are for illustration only. They do not reflect the actual waveforms.



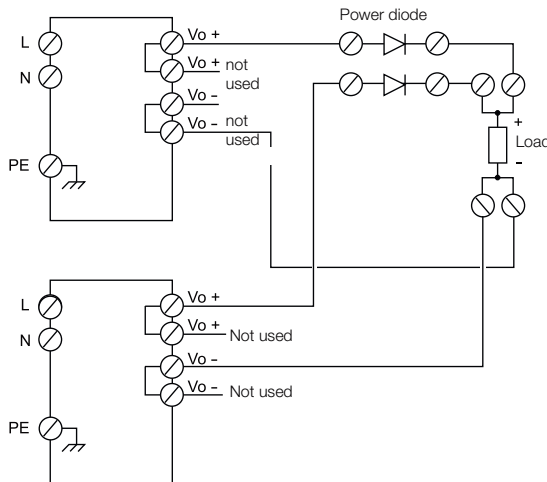
- Power supplies
- Intelligent Power Supplies
- Single-phase power supplies
- Three-phase power supplies
- Technical Data
- Pulse extender
- Function diagnostics unit
- Analog Switching Device
- Sensor tester, testing and setting device
- Signal adapters
- Digital Display

**Parallel mode\*\***

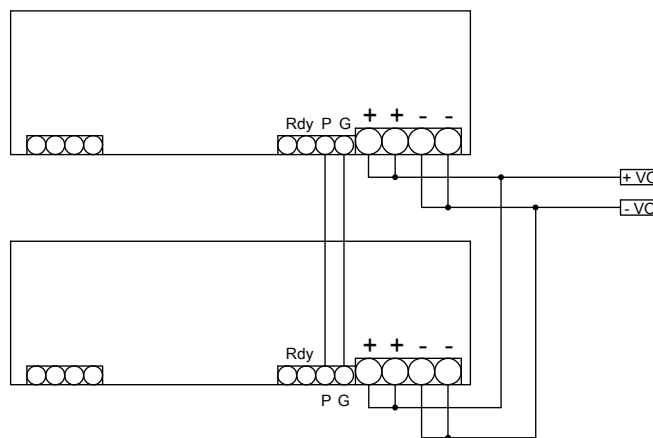
BAE0002, BAE0003 BAE0006,  
 BAE0008, BAE0009



For all without parallel switching mode

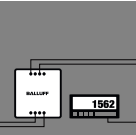


BAE003R



\*\*Note: When wiring power supplies in parallel, the cable lengths should be the same for all DC connections on the load.





- Power Supplies
- Intelligent Power Supplies
- Single-phase Power Supplies
- Three-phase Power Supplies
- Technical Data**
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### Detecting fast motion

Rapid motions on machines mean that the sensors are only actuated for a short time. Therefore, the sensor pulse can be too short to guarantee a secure evaluation. Due to its cycle time, the controller does not detect the output signal, with the consequence that important information in the controller sequence is lost. This can mean danger to your machine!

The solution is the Balluff pulse extender **BES 516-IV 2**. For controlling this device, the rising or falling edge of the sensor output signal is sufficient to generate a pulse that your controller can recognize. The length is adjustable from 2 ms to 1 sec. Small and space-saving, the device can be snapped onto a rail in a control cabinet in accordance with EN 50022-35.

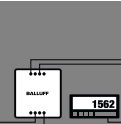


# Electrical Devices

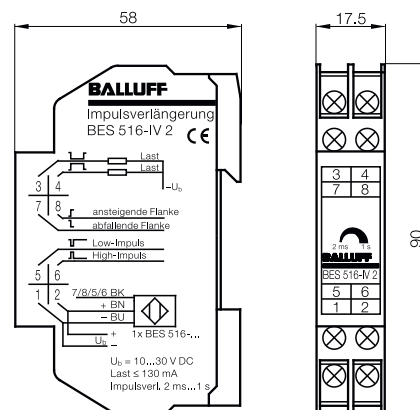
## Pulse extender



Description	<b>Pulse extender</b>
Use	Ensures secure output signals from inductive, capacitive or photoelectric sensors to the control system
<b>Ordering code</b>	<b>BAE0073</b>
Part number	BES 516-IV 2
Output (display by LEDs)	Positive switching (PNP), complementary
Adjustable pulse extender	2 ms...1 s
Set value	200 ms (+50 ms)
Input 7/8	Referenced to the respective edge of the input signal
Input 5/6	Referenced to the pulse end of the input signal
Reproducibility	< 10 %
Input	1 PNP or 1 NPN - NO or NC
Min. input pulse length	1.5 ms
Supply voltage $U_b$	10...30 V DC (input voltage = output voltage)
Residual ripple	$\leq 15\%$
No-load current	Approx. 20 mA
Output current	$\leq 130$ mA
Permissible load capacitance	$\leq 0.5 \mu\text{F}/24$ V
Ambient temperature $T_a$	0...60 °C
Housing attachment	DIN rail EN 50022-35
Max. conductor cross-section	2x2.5 mm <sup>2</sup>
Polarity reversal protected	Yes
Short-circuit protected	Yes
Degree of protection as per IEC 60529	Housing IP 40/terminals IP 20
Output	3 Low-pulse, extended 4 High-pulse, extended
Input	7 Falling edge 8 Rising edge 5 Low pulse 6 High pulse 1 $-U_s$ 2 $+U_s$
Falling edge	Output signal is triggered by rising edge
Rising edge	Output signal is triggered by rising edge
Low pulse	PNP-NC/NPN-NO short damped PNP-NO/NPN-NC short undamped
High pulse	PNP-NC/NPN-NO short damped PNP-NO/NPN-NC short undamped



Power Supplies  
**Pulse Extender**  
 Function Diag-  
 nostics Unit  
 Analog  
 Switching  
 Device  
 Sensor Tester,  
 Testing and Set-  
 ting Device  
 Signal Adapters  
 Digital Display

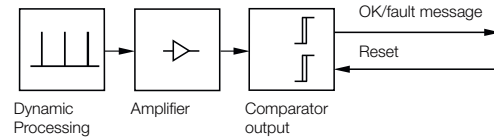


The **BES 113-FD-1** function diagnostics unit monitors a proximity switch with dynamic function diagnostics and its connection cable. A logic circuit polls the sensor signals for the presence of test pulses and also monitors for proper function of the device. For the machine control system, it emits a high level signal on the "Status/Output" message output when there is no fault and a low signal when faults are present. LEDs indicate the switching status of the sensor.

Faults that occur are stored by the device. They must be reset using a reset function (Low signal on 5).

If the BES 113-FD-1 is used as a single unit, terminals VI (3 and 4) must be bridged together.

### Function principle

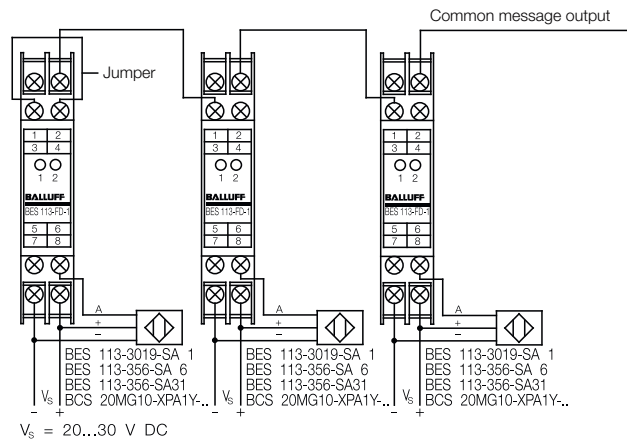


### Cascading

When cascading several BES 113-FD-1 (series connection), the output (2) must be connected to the input (3) of the downstream device. The jumper between VI is not needed except for the first device. When there is a malfunction, the message appears on the last device.

The defective sensor is indicated by the first weakly illuminated LED in the cascade.

Small and space-saving, the BES 113-FD-1 can be mounted in a DIN rail per DIN EN 50022-35.



$V_S = 20...30 \text{ V DC}$

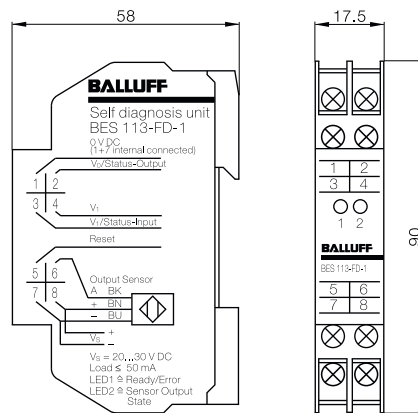
# Electrical Devices

## Function diagnostics unit



Description	<b>Function diagnostics unit</b> with electronic output	
Use	Monitoring the dynamic function diagnostics and connection cable for function diagnostics sensors BES 113-356-SA 6-..., BES 113-3019-SA 1-...	
<b>Ordering code</b>	<b>BAE006W</b>	
Part number	BES 113-FD-1	
Supply voltage $U_b$	20...30 V DC	
No-load current	Approx. 20 mA	
Output voltage $U_o$ (referenced to 0 V)	Low	0...(0.1× $U_s$ ) when the sensor or diagnostics unit has a defect (fault)
	High	(0.5× $U_s$ )... $U_s$ when functioning properly
Output current max.	50 mA	
Ambient temperature $T_a$	0...+60 °C	
LED 1 green	"Ready/Error" – when functioning properly, the LED is on bright. When there is a fault, the LED illuminates dimly.	
LED 2 yellow	"Sensor Output State" indicates the switching status of the sensor.	
Degree of protection as per IEC 60529	Housing IP 40, terminals IP 20	
Housing attachment	Rail mount in accordance with DIN EN 50022-35	
Max. conductor cross-section	2×2.5 mm <sup>2</sup>	

- Power Supplies
- Pulse Extender
- Function Diagnostics Unit**
- Analog Switching Device
- Sensor Tester, Testing and Setting Device
- Signal Adapters
- Digital Display



## Analog switching amplifier for direct installation

### Analog switching amplifier for direct installation

This switching device enables you to easily perform onsite programming of sensors that have an analog output signal, such as the BOD family, with three switching thresholds.

The sensor connected to the switching amplifier is simply moved to the desired switching distance from the target. Then connecting the control line to the (+) side of the supply voltage enables a "Teach-in" mode; in other words, the set distance is assigned to the signal level present and these values are stored in the evaluation unit. This procedure is supported with LEDs. During operation, these LEDs are available as switching state indicators.

For sensors with a temperature output, the analog temperature signal is made available in unchanged form on the device output.



### Connection example

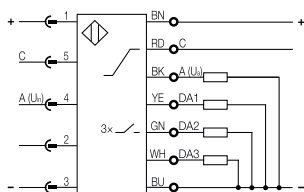
#### Analog sensors

#### Analog switching amplifier

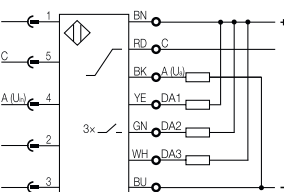


### Wiring diagrams

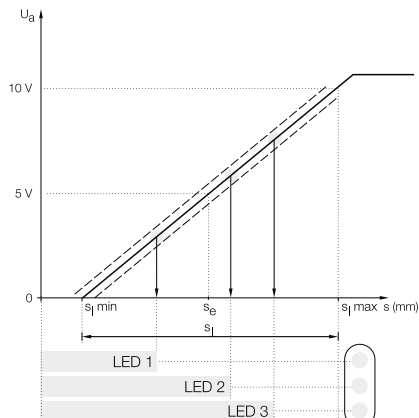
PNP analog and PNP normally open



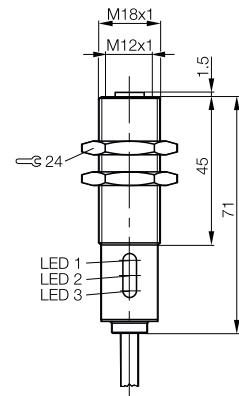
PNP analog and NPN normally open



### Approach curve



Description	<b>M18x1</b>	
Use	For analog sensors	
PNP analog and PNP NO	<b>Ordering code</b>	<b>BAE0070</b>
	Part number	BES 516-615-PS-1-PU-05
PNP analog and NPN NO	<b>Ordering code</b>	<b>BAE006Z</b>
	Part number	BES 516-615-NS-1-PU-05
Rated operating voltage $U_e$	15...30 V DC	
Supply voltage $U_B$	15...30 V DC	
Residual ripple	$\leq 15\%$ of $U_e$	
Rated insulation voltage $U_i$	75 V DC	
Rated operating current $I_e$	100 mA	
per output		
No-load supply current $I_0$ max.	$\leq 20$ mA	
Residual current $I_r$	$\leq 10$ $\mu$ A	
Polarity reversal protected	Only against $\pm$ -reversal	
Short-circuit protected	Yes	
Ambient temperature $T_a$	$-10...+70$ °C	
Switching frequency $f$	2 kHz	
Utilization category	DC 13	
Function indicator for each output	Yes	
<b>Analog input</b>		
Input voltage $U_{in}$	0...10 V (brought out to output A)	
Input impedance	4.2 k $\Omega$	
<b>Switching outputs</b>		
Freely programmable switching outputs	3	
Hysteresis H	500 mV	
Temperature drift	$\leq 2\%$ of $U_{in}$ max.	
Degree of protection as per IEC 60529	IP 67	
Housing material	CuZn coated	
Connection	Input	M12 connector, 5-pin
	Output	5 m PUR cable, 7x0.25 mm <sup>2</sup>



# Electrical Devices

## Analog switching amplifier for control cabinet installation

### Analog switching amplifier for control cabinet installation

The analog switching amplifier is operated with 24 V and provides the supply voltage for analog sensors such as the Balluff BOD. The device is driven directly by the current signals (2) or voltage signals (4).

From this signal, separate push-pull final stages (PNP/NPN) are used to create three switching points (A1...A3) which can be set independently using the potentiometer (on the front side). The respective switching status is indicated by LEDs. The operating direction (rising/falling) can be set using DIP switches inside the unit. This circuit allows width-adjustable "ranges" to be defined (cascading).

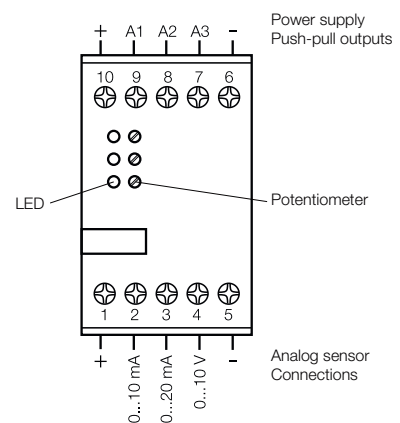
The voltage signal (4) proportional to the current can be used to drive additional analog switching amplifiers (expansion for additional switching points).

The signal inputs on the analog switching amplifier are protected against polarity reversal and the push-pull output stages against short circuit (internal fuses).



Description	<b>Analog switching amplifier</b> for analog current and voltage signals
Use	Switching point configuration on analog sensors, e.g. BOD, BAW
<b>Ordering code</b>	<b>BAE006Y</b>
Part number	BES 516-611-A-1
Supply voltage $U_B$	24 V DC $\pm 10\%$
Residual ripple	$\leq 10\%$
<b>Input circuit</b>	
Current input, terminal 2/3	0...10 mA / 0...20 mA
Input impedance	308 $\Omega$ / 154 $\Omega$
Voltage input terminal 4	0...10 V
Input impedance	13 k $\Omega$
Setting range	3...100 %
Hysteresis (referenced to set value)	3 %
<b>Output current circuit</b>	
Voltage drop PNP transistor	$\leq 3.5$ V
Voltage drop NPN-transistor	$\leq 2.5$ V
Operating current per push-pull stage	$\leq 200$ mA
Housing material	PC (glass fiber reinforced)
Housing dimensions	74x45x120 mm
Connection type	Screw terminals
max. conductor cross-section	Up to 2.5 mm <sup>2</sup>
Housing attachment	Snap mount on DIN rail
Ambient temperature $T_a$	0...+50 °C
Degree of protection as per IEC 60529	Terminals IP 20, housing IP 40

- Power Supplies
- Pulse Extender
- Function Diagnostics Unit
- Analog Switching Device**
- Sensor Tester, Testing and Setting Device
- Signal Adapters
- Digital Display



## Sensor tester, testing and setting device

### Tester BES 516-7

The sensor tester BES 516-7, in the Balluff design, is flat, handy, and visually appealing. The testing device is a simple manual testing device for PNP/NPN, normally open and normally closed sensors.

#### Benefits

- Integrated steel measuring plate for testing sensors
- Automatic shut-off after 30 s of non-use
- Power provided by a 9V battery
- Visual and acoustic signal

#### Caution!

Tester is not suitable for 2-wire Desina sensors.

### Testing and setting device BES 516-4

With this programming device, the following testing and setting functions can be carried out on the sensors:

- Programming the switching distance of analog sensors.
- Sensors with teachable switching points can also be programmed.
- Testing 3-wire sensors.
- Testing 2-wire sensors.





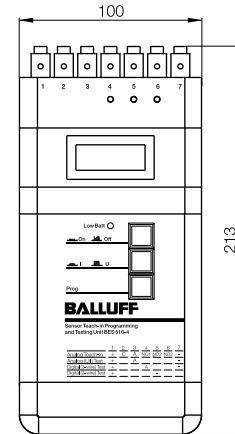
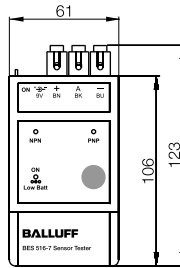
# Electrical Devices

## Sensor tester, testing and setting device



Description	Sensor tester	Testing and setting device
Use	For DC PNP/NPN 3-wire sensors	For DC PNP/NPN 2/3-wire sensors and analog sensors
<b>Ordering code</b>	<b>BAE002C</b>	<b>BAE0029</b>
Part number	BES 516-7	BES 516-4
Output voltage	18 V DC	18 V DC
LED indicators	1 operating indicator	3 function indicators, 1 operating indicator
Battery type	1 × 9 V battery	2 × 9 V batteries
Sensor connection	3 spring-loaded terminals	7 spring-loaded terminals
Degree of protection as per IEC 60529	IP 40	IP 40
Housing material	Plastic	Plastic

Acoustic and visual signal,  
built-in steel target



- Power Supplies
- Pulse Extender
- Function Diagnostics Unit
- Analog Switching Device
- Sensor Tester, Testing and Setting Device
- Signal Adapters
- Digital Display

# Electrical Devices

## Signal Adapters

With the signal adapters, various additional functions on the sensors can be adjusted quickly. For example, these can be used to change the output signals or counting and time functions without any additional installation. The signal adapter is simply plugged in between the standard M12 connections from the sensor and connection cable and adjusted via a control line.

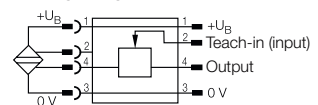
Signal adapters can also be used as switching amplifiers and can be combined with each other.



Version	Functionality	Device	Setting
NC/NO inverter	<b>Pulse or interval counter:</b> The BOS S-C counts output pulses or intervals from a sensor and sends an output pulse when a pre-defined number is reached. The count range is from 1...65535 and can be freely set. It also includes an output inverter function (NO/NC).	BOS S-C...	Interval counter 1
Flip-Flop			Interval counter 2
Divider (1 pulse per rotation)			Pulse counter n
Count parts (Count down)			Pulse counter n
Switching amplifier up to 400 mA			Pulse counter 1
Release delay	<b>Timer for switch-on and switch-off delay:</b> With the BOS S-T you can set a turn-on or release delay from 1 ms to 65 sec. A release delay of 100 ms is set in the factory.	BOS S-T...	Release delay n
Pick-up delay			Switch-on delay n
PNP/NPN conversion	<b>PNP/NPN converter:</b> The BOS S-F converts a connected PNP signal into an NPN signal. In addition, the NO/NC output function can be toggled.	BOS S-F...	Factory settings
PNP/NPN conversion and NO/NC toggle			Teach NO/NC
Downtime monitoring	<b>Frequency monitoring:</b> The BOS S-M is a freely configurable module for frequency monitoring. It is "active" when the set frequency is undershot by 5%.	BOS S-M...	
Speed monitor			
Backlog detection			

Function	
PNP	<b>Ordering code</b>
	Part number
NPN	<b>Ordering code</b>
	Part number
Supply voltage $U_B$	
Rated operating current $I_o$	
No-load supply current $I_o$ max.	
Polarity reversal protected	
Short-circuit protected	
Input impedance	
On/off delay	
Max. input frequency	
Input	
Output	
Smallest preset number	
Largest preset number	
Shortest settable time	
Longest settable time	
Monitoring frequency range	
Function indicator	
Ambient temperature $T_a$	
Degree of protection as per IEC 60529	
Protection class	
Housing material	
Connection type - input	
Connection type - output	
Weight	

### Wiring diagram

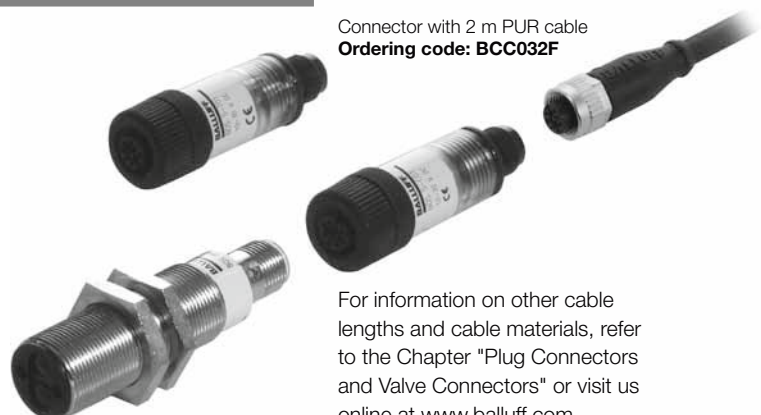


### Use

All of the listed signal adapters can be used with sensors with switching output and M12 plug connection. The sensors can be connected independent of function principle (ultrasonic, inductive, photoelectric or capacitive). Depending on which sensor is used, either a signal adapter with PNP or with NPN input is used.

### Signal adapter selection guide

BOS S-...01: PNP input (for sensors with PNP output)  
BOS S-...02: NPN input (for sensors with NPN output)



Connector with 2 m PUR cable  
**Ordering code: BCC032F**

For information on other cable lengths and cable materials, refer to the Chapter "Plug Connectors and Valve Connectors" or visit us online at [www.balluff.com](http://www.balluff.com).

# Electrical Devices

## Signal Adapters

**BOS S-C**



**BOS S-T**



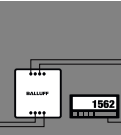
**BOS S-F**



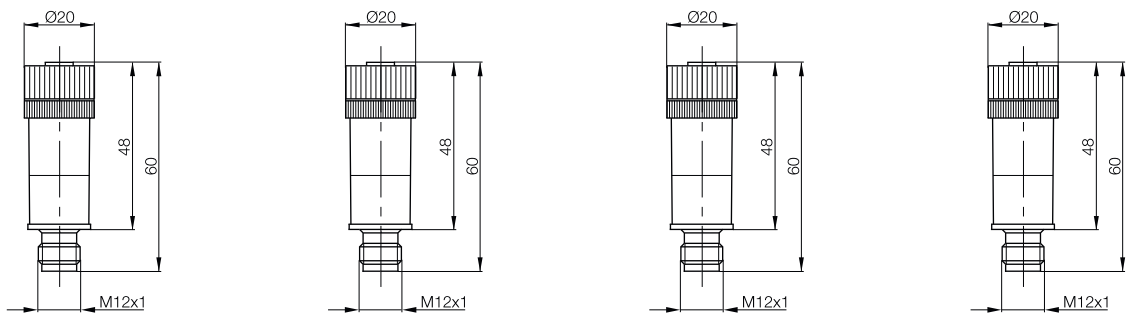
**BOS S-M**



Programmable pulse or interval counter, switching inverter	Programmable timer for switch-on and switch-off delay	NPN/PNP converter, configurable NO/NC toggle	Programmable frequency monitoring
<b>BAE002E</b>	<b>BAE002M</b>	<b>BAE002H</b>	<b>BAE002K</b>
BOS S-C01	BOS S-T01	BOS S-F01	BOS S-M01
<b>BAE002F</b>	<b>BAE002N</b>	<b>BAE002J</b>	<b>BAE002L</b>
BOS S-C02	BOS S-T02	BOS S-F02	BOS S-M02
10...30 V DC	10...30 V DC	10...30 V DC	10...30 V DC
< 400 mA	< 400 mA	< 400 mA	< 400 mA
≤ 10 mA	≤ 10 mA	≤ 10 mA	≤ 10 mA
Yes	Yes	Yes	Yes
Yes	Yes	Yes	Yes
> 10 kΩ	> 10 kΩ	> 10 kΩ	> 10 kΩ
0.1 ms	0.1 ms	0.1 ms	0.1 ms
10 kHz	10 kHz	10 kHz	10 kHz
PNP	PNP	PNP	PNP
NPN	NPN	NPN	NPN
PNP	PNP	PNP	PNP
NPN	NPN	NPN	NPN
1			
65535			
	1 ms		
	65535 ms		
			0.015 Hz...1 kHz
Red LED	Red LED	Red LED	Red LED
0...+60 °C	0...+60 °C	0...+60 °C	0...+60 °C
IP 67	IP 67	IP 67	IP 67
☐	☐	☐	☐
PBT/PA 6.6	PBT/PA 6.6	PBT/PA 6.6	PBT/PA 6.6
M12 female 4-pin	M12 female 4-pin	M12 female 4-pin	M12 female 4-pin
M12 connector, 4-pin	M12 connector, 4-pin	M12 connector, 4-pin	M12 connector, 4-pin
15 g	15 g	15 g	15 g



Power Supplies  
Pulse Extender  
Function Diagnostics Unit  
Analog Switching Device  
Sensor Tester, Testing and Setting Device  
**Signal Adapters**  
Digital Display



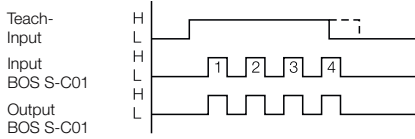
# Electrical Devices

## Setting function of signal adapters

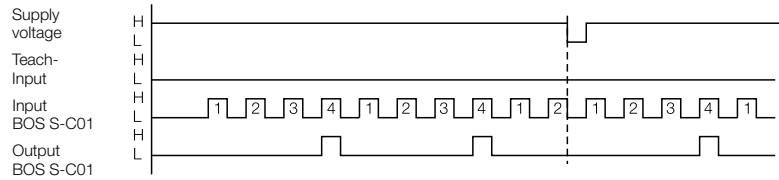
### Signal adapter BOS S-C

Programmable pulse or interval counter

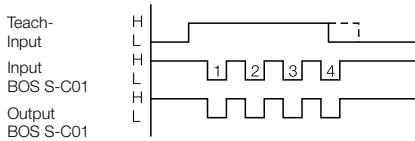
Pulse counter teaching



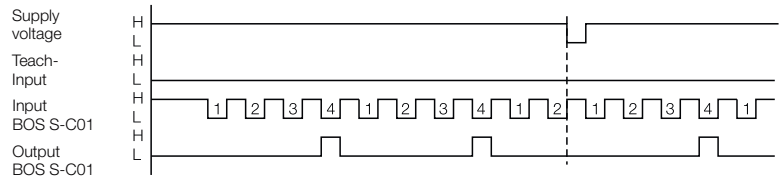
Use as a pulse counter



Interval counter teaching



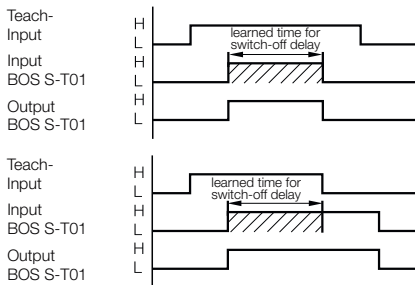
Use as an interval counter



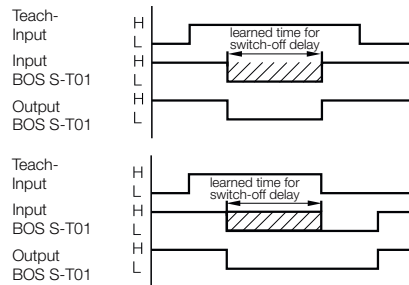
### Signal adapter BOS S-T

Programmable timer for switch-on or switch-off delay

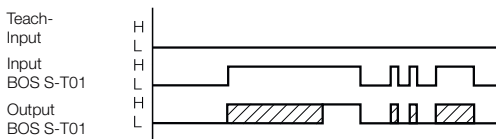
Teaching a switch-on delay



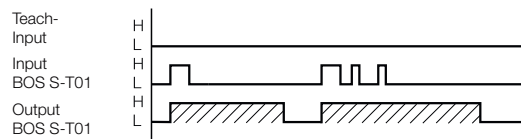
Teaching a switch-off delay



Operation with switch-on delay



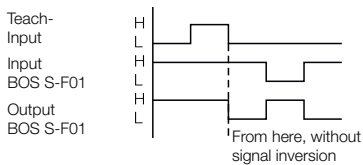
Use with switch-off delay



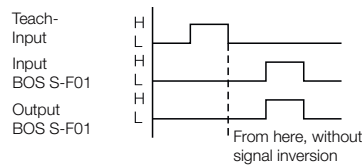
### Signal adapter BOS S-F

NPN-/PNP converter, configurable NO/NC toggle

Signal inversion teaching



Teaching without signal inversion



H = input or output active; L = input or output inactive

# Electrical Devices

## Digital display

### Digital display for analog input signals

The digital measured value display of Type **BDD-UM 3023** is a universal measuring instrument for recording analog measurement variables.

- Voltage 0...10 V DC
- Current 0...20 mA/4...20 mA

### Standard hardware

- 4 function keys on the front panel

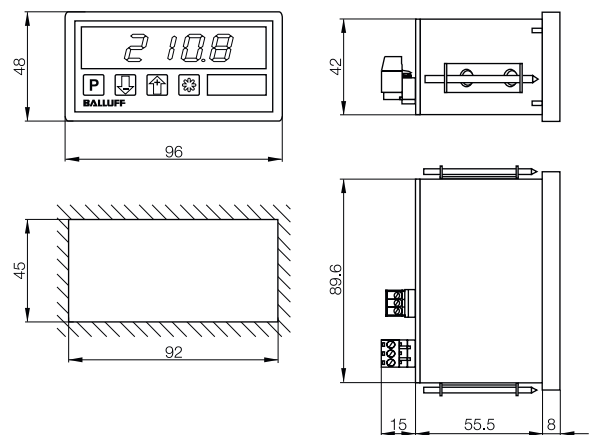
### Standard software with the following functions

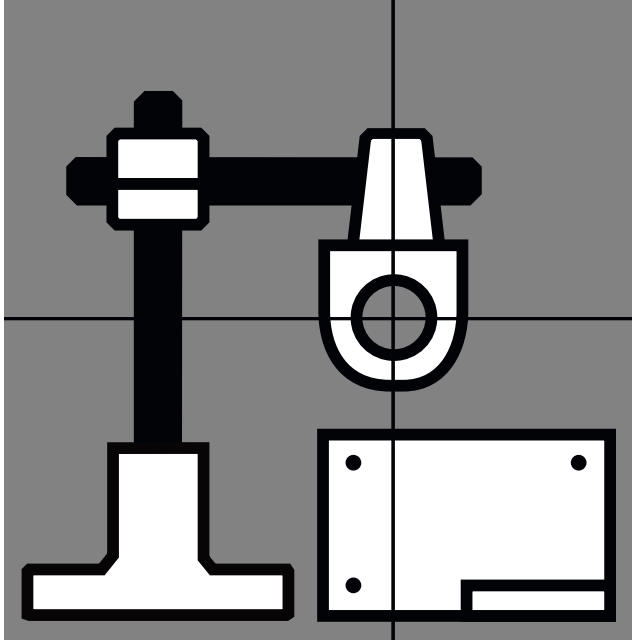
- Scaling
- Tare
- Decimal point
- Display test



Description	<b>Digital Display</b>
Use	For analog input signals BOD, BTL, BAW
<b>Ordering code</b>	<b>BAE006K</b>
Part number	BDD-UM 3023
A/D converter resolution	12 bits
<b>Measuring ranges</b>	
Voltage	0...10 V, $\pm 0.05\%$ , $\pm 1$ digit
Input impedance	$\geq 50\text{ k}\Omega$
Current	0/4...20 mA, $\pm 0.05\%$ , $\pm 1$ digit
Input impedance	10 $\Omega$
Sampling rate	5 measurements/s
Indicator	4-digit, 14 mm, red, programmable decimal point, leading zero suppression, minus symbol for negative values
Operation, keypad	Front keypad with short-stroke keys
Rated operating voltage	24 V, $\pm 20\%$ DC (isolated)
Current consumption	Max. 65 mA
<b>Housing</b>	
Dimensions	96x48x63.5 mm
Installation depth	$\leq 72$ mm (incl. screw terminals)
Degree of protection of housing front	IP 54
Degree of protection of terminals	IP 20
Ambient temperature $T_a$	0...+60 °C
Storage temperature	-20...+70 °C
Relative humidity	$\leq 80\%$ , non-condensing
Contamination class	2
Protection class	□
Weight	Approx. 200 g

- Power Supplies
- Pulse Extender
- Function Diagnostics Unit
- Analog Switching Device
- Sensor Tester, Testing and Setting Device
- Signal Adapters
- Digital Display





# Mounting System

## Mounting System

### Designed for industrial automation

Sensors must be positioned inside plants, machines or conveyor systems, usually during the setup process. Modular elements from the Balluff mounting system provide valuable assistance here. The flexible Balluff mounting system can be mounted on base plates and all standard profiles. Virtually any required solid angle can be accommodated using the versatile range of accessories.

### Balluff accessories in use

- For adapting sensors to a specific application
- For simplifying work during installation and alignment
- For protecting the sensors
- As an interface to the controller



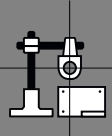
# Mounting System Contents

## Plastic Mounting System

Base Holder	264
Articulated Base Holder	265
Sensor Holders	265
Reflector Mounts	266
Cross-connectors	266

## Metal Mounting System

Base Holders	267
Cross-connectors	267
Clamping cylinders	267
Sensor Holders	270
Adjustment Units	273
Reflector Mounts	274
Adapter Ring	282
Air Blow	283
Mounting Rods	284
Mounting Kit	285



# Mounting System

## Base holder

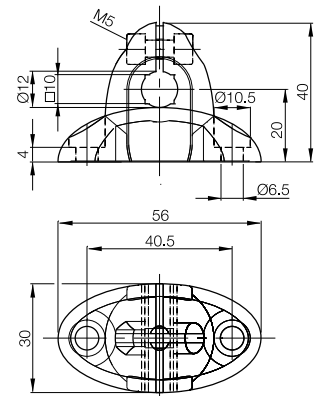
Whether sensors are used in machine tools, assembly and handling, in packaging or specialty machines - one thing is certain: to work properly they must be precisely positioned. The Balluff Mounting System makes this fast and easy.

The high-quality sensors you get from Balluff come with high-quality mounting accessories. For optimum positioning of the sensors in equipment and machines.

The Balluff mounting system can be used on base plates or on all commonly available extruded profiles and for cylindrical or cubical sensors. The flexible accessories kits allow you to cover almost every solid angle, and even offer supplementary accessories such as sensor holders and reflector mounts.



Description	<b>Base holder</b>	
Version	For 1 mounting rod Ø 12 mm or 10×10 mm	
Use	For mounting on base plates or profiles	
<b>Ordering code</b>	<b>BAM002J</b>	
Part number	BMS CU-P-D12-A040-00	
Material	POM	



Mounting rods Ø 12 mm,  
anodized aluminum or stainless steel  
See page 284.





# Mounting System

## Articulated base holder, sensor holders



### Articulated base holder

For 1 mounting rod  
 Ø 12 mm  
 For mounting on base  
 plates or profiles

#### BAM002Y

BMS CUJ-P-D12-R040-00

POM

### M8 sensor holder

For 1 mounting rod  
 Ø 12 mm or 10x10 mm  
 For M8 sensors

#### BAM002K

BMS CS-P-D12-AD08-00

POM

### M12 sensor holder

For 1 mounting rod  
 Ø 12 mm or 10x10 mm  
 For M12 sensors

#### BAM002N

BMS CS-P-D12-AD12-00

POM

### M18 sensor holder

For 1 mounting rod  
 Ø 12 mm or 10x10 mm  
 For M18 sensors

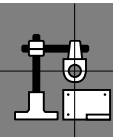
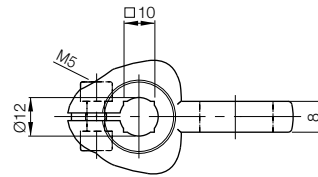
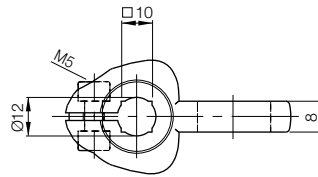
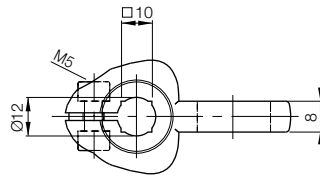
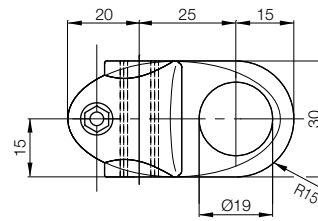
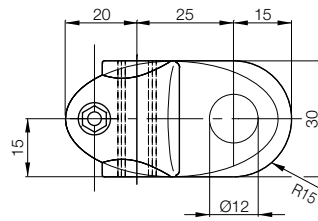
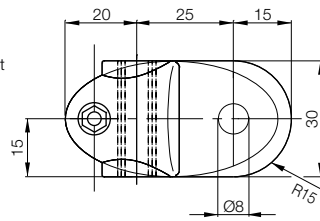
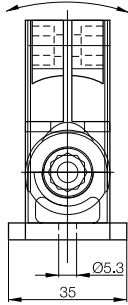
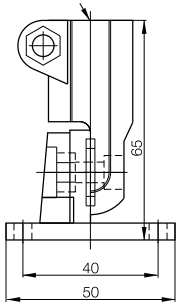
#### BAM002P

BMS CS-P-D12-AD18-00

POM

Reducing sleeve for  
 reducing from  
 18 to 12  
 mm (included in scope  
 of delivery)

Ratchet setting at  
 15° increments



Mounting System

Plastic  
 Base Holder  
 Articulated Base Holders  
 Sensor Holder  
 Reflector Mount  
 Cross-connector  
 Metal

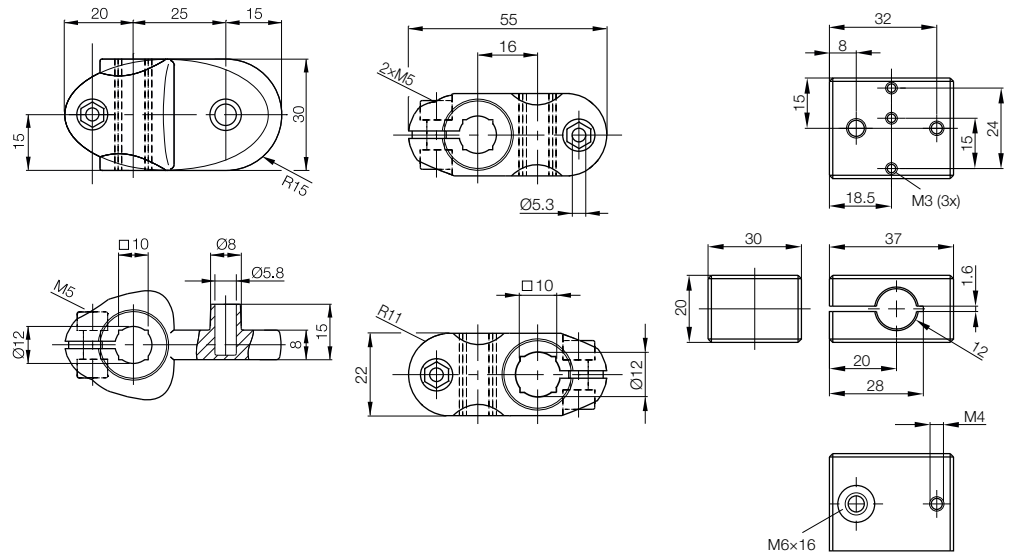


# Mounting System

## Reflector mount, cross-connectors



Description	<b>Reflector mount</b>	<b>Cross-connector</b>	<b>Cross-connector</b>	
Version	For 1 mounting rod Ø 12 mm or 10x10 mm	For 2 mounting rods Ø 12 mm	For 1 mounting rod Ø 12 mm	
Use	For reflectors Ø 20 mm (glue attachment) and BOS R-14, Ø 51 mm (plug-in)	Connecting element for 2 mounting rods Ø 12 mm or 10x10 mm	For through-beam fork sensors BGL and photoelectric sensors BOS 2K and BOS 6K, BUS R06	
<b>Ordering code</b>	<b>BAM002L</b>	<b>BAM002M</b>	<b>BAM01CW</b>	
Part number	BMS CR-P-D12-AU-00	BMS CC-P-D12-A-00	BMS CS-M-D12-BX08-07	
Material	POM	POM	Anodized aluminum	



Mounting rods Ø 12 mm,  
anodized aluminum or stainless steel  
See page 284.

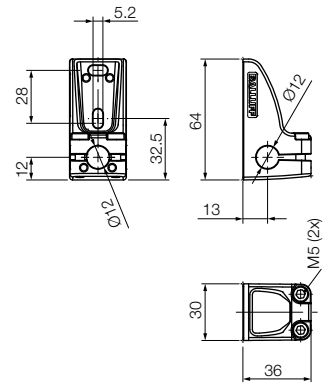
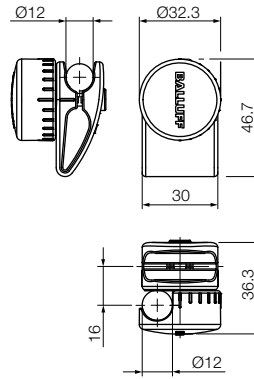
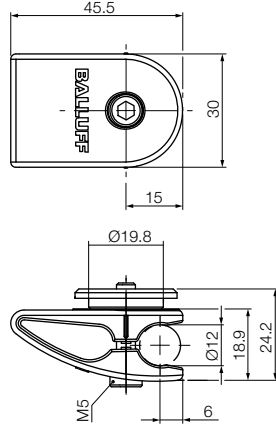
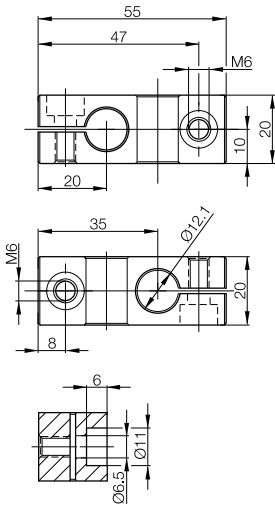
NEW

# Mounting System

## Cross-connectors, base holders



Cross-connector	Sensor holder	Joint	Base holder
For 2 mounting rods Ø 12 mm	For 1 mounting rod Ø 12 mm	For 2 mounting rods Ø 12 mm	For 1 mounting rod Ø 12 mm (vertical or horizontal)
Connecting element for 2 mounting rods Ø 12 mm	For holding all sensor and reflec- tor mounts	Adjustable connecting piece for Ø 12 mm mounting rods	For mounting on base plates or profiles
<b>BAM002Z</b>	<b>BAM024T</b>	<b>BAM024R</b>	<b>BAM024P</b>
BMS CC-M-D12-B-00	BMS CS-M-D12-BZ	BMS CCJ-M-D12-B-01	BMS CU-M-D12-B028-00
Anodized aluminum	GD-Zn/chrome-plated	GD-Zn/chrome-plated	GD-Zn/chrome-plated



- Mounting System
- Plastic
- Base Holder
- Articulated Base Holders
- Sensor Holder
- Reflector Mount
- Cross-connector
- Metal
- Cross-connector
- Base Holder
- Clamping Cylinder
- Sensor Holder
- Adjustment Units
- Reflector Mount
- Adapter Ring
- Air Blow
- Mounting Rods
- Mounting Kit



# Mounting System

## Base holder

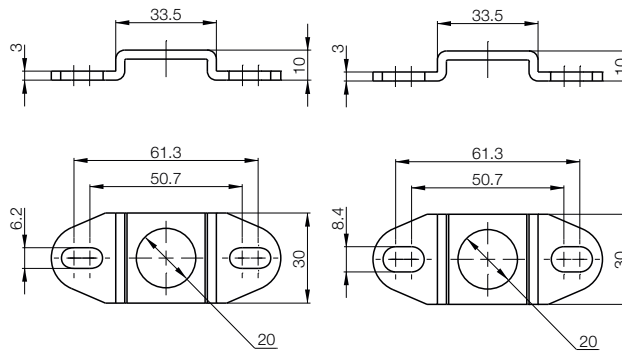


Stainless Steel

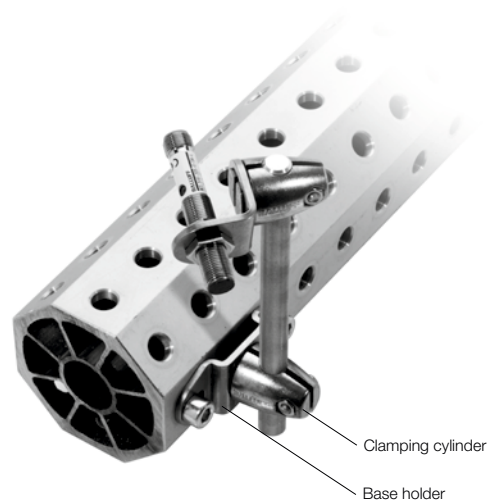


Stainless Steel

Description	<b>Base holder</b>	<b>Base holder</b>		
Version	For clamping cylinders	For clamping cylinders		
Use	For mounting on base plates or profiles with M6	For mounting on base plates or profiles with M8		
<b>Ordering code</b>	<b>BAM01CH</b>	<b>BAM0044</b>		
Part number	BMS CU-M-D12-I060-02	BMS CU-M-D12-I060-01		
Material	Stainless steel	Stainless steel		



Mounting rods  $\varnothing$  12 mm,  
anodized aluminum or stainless steel  
See page 284.



# Mounting System

## Base holders, clamping cylinders



Stainless Steel



Stainless Steel



### Clamping cylinder

For 1 mounting rod  
Ø 12 mm  
For holding all  
sensor and reflector mounts

#### BAM003Y

BMS CS-M-D12-IZ-01  
Stainless steel

### Clamping cylinder

For 1 mounting rod  
Ø 12 mm  
For holding all  
sensor and reflector mounts

#### BAM0031

BMS CS-M-D12-IZ  
GD-Zn

### Base holder

For clamping cylinders  
For holding adapter plates  
For holding sensor holders  
For holding rods  
with Ø 14 mm

#### BAM01Z8

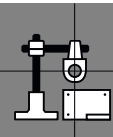
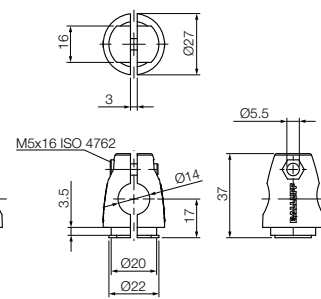
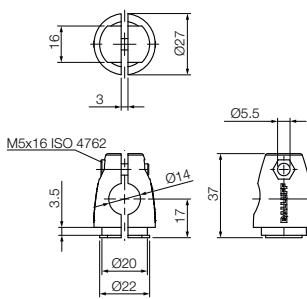
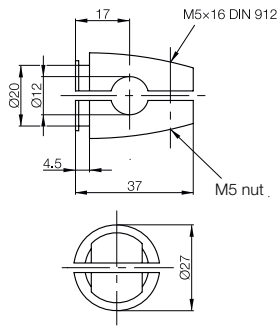
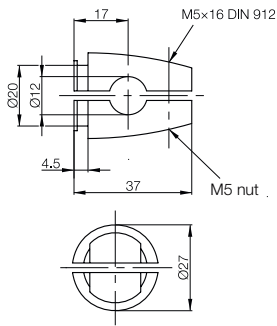
BMS CS-M-D14-IZ-01  
Stainless steel

### Base holder

For clamping cylinders  
For holding adapter plates  
For holding sensor holders  
For holding rods  
with Ø 14 mm

#### BAM01Z7

BMS CS-M-D14-IZ  
GD-Zn



Mounting System

- Plastic
- Metal
- Cross-connector
- Base Holder**
- Clamping Cylinder**
- Sensor Holder
- Adjustment Units
- Reflector Mount
- Adapter Ring
- Air Blow
- Mounting Rods
- Mounting Kit

# Mounting System

## Sensor holder



Stainless Steel

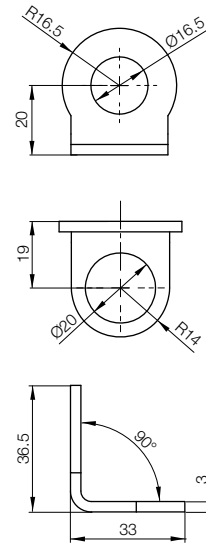
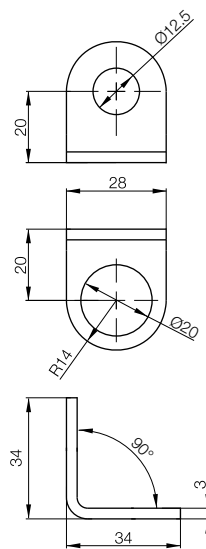
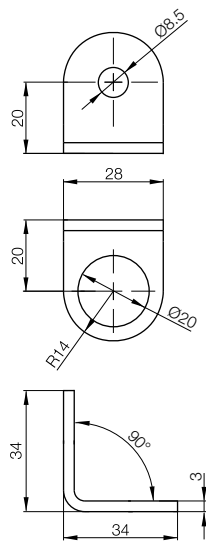


Stainless Steel



Stainless Steel

Description	<b>M8 sensor holder</b>	<b>M12 sensor holder</b>	<b>M16 sensor holder</b>	
Version	For clamping cylinders	For clamping cylinders	For clamping cylinders	
Use	For sensors and clamps M8	For sensors and clamps M12	For sensors and clamps M16	
<b>Ordering code</b>	<b>BAM0036</b>	<b>BAM0037</b>	<b>BAM003K</b>	
Part number	BMS CS-M-D12-ID08-01	BMS CS-M-D12-ID12-01	BMS CS-M-D12-ID16-01	
Material	Stainless steel	Stainless steel	Stainless steel	



Mounting rods  $\varnothing$  12 mm,  
anodized aluminum or stainless steel  
See page 284.



# Mounting System

## Sensor holder



Stainless Steel



Stainless Steel



Stainless Steel

### M18 sensor holder

For clamping cylinders  
For sensors and  
clamps M18

#### BAM0032

BMS CS-M-D12-ID18-01

Stainless steel

### M24 sensor holder

For clamping cylinders  
For sensors and  
clamps M24

#### BAM003L

BMS CS-M-D12-ID24-01

Stainless steel

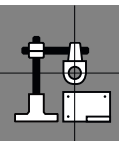
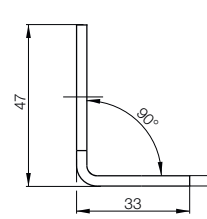
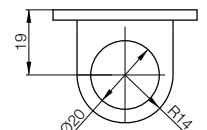
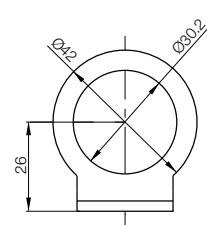
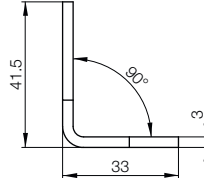
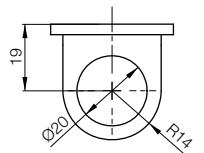
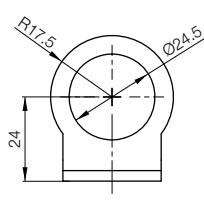
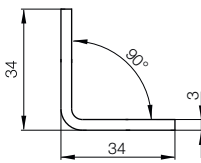
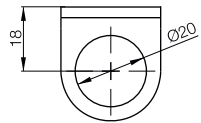
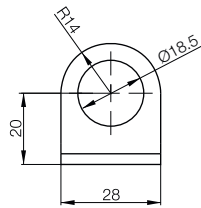
### M30 sensor holder

For clamping cylinders  
For M30 sensors and  
clamps

#### BAM0033

BMS CS-M-D12-ID30-01

Stainless steel



Mounting System

Plastic  
Metal  
Cross-connector  
Base Holder  
Clamping Cylinder  
**Sensor Holder**  
Adjustment Units  
Reflector Mount  
Adapter Ring  
Air Blow  
Mounting Rods  
Mounting Kit

# Mounting System

## Sensor holder



Stainless Steel

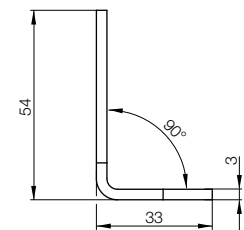
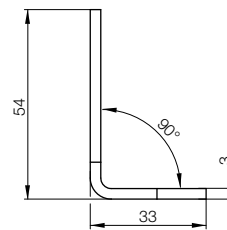
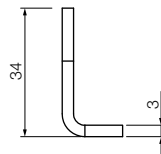
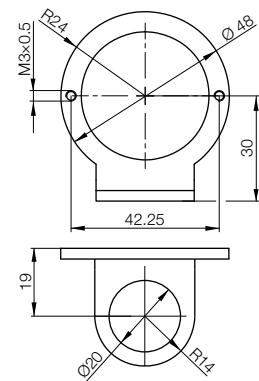
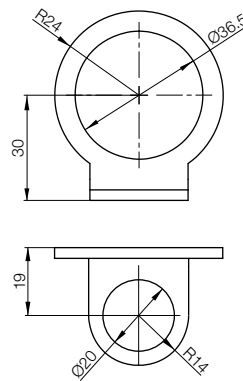
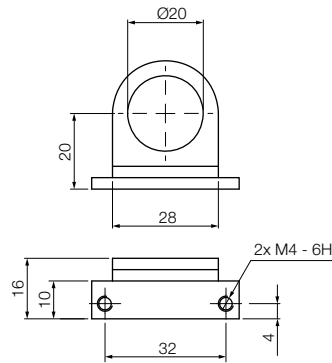


Stainless Steel



Stainless Steel

Description	<b>Ø 20 mm sensor holder</b>	<b>M36 sensor holder</b>	<b>Ø 50 mm sensor holder</b>
Version	For clamping cylinders	For clamping cylinders	For clamping cylinders
Use	For sensors BCS Q40...	For M36 sensors and clamps	For capacitive sensors Ø 50 mm (disk designs)
<b>Ordering code</b>	<b>BAM01UL</b>	<b>BAM003M</b>	<b>BAM01J2</b>
Part number	BMS CS-M-D12-IX14-01	BMS CS-M-D12-ID36-01	BMS CS-M-D12-IX09-01
Material	Stainless steel (V4A)	Stainless steel	Stainless steel



Mounting rods Ø 12 mm,  
anodized aluminum or stainless steel  
See page 284.



# Mounting System

## Adjustment units



### M12 adjustment unit

For clamping cylinders  
For aligning laser sensors M12

### BAM003E

BMS AD-M-002-D12/D12

Stainless steel

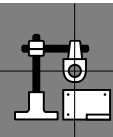
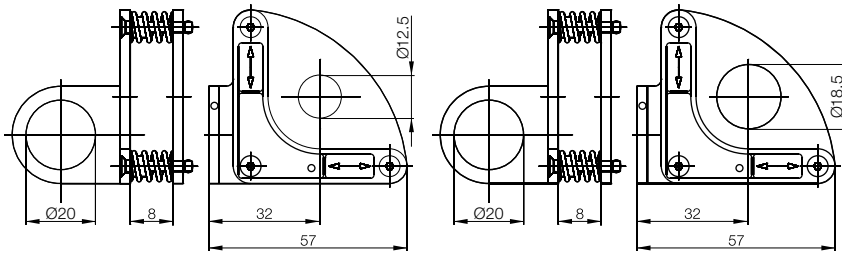
### M18 adjustment unit

For clamping cylinders  
For aligning laser sensors M18

### BAM0038

BMS AD-M-002-D12/D18

Stainless steel



Mounting System

- Plastic
- Metal
- Cross-connector
- Base Holder
- Clamping Cylinder
- Sensor Holder**
- Adjustment Units**
- Reflector Mount
- Adapter Ring
- Air Blow
- Mounting Rods
- Mounting Kit

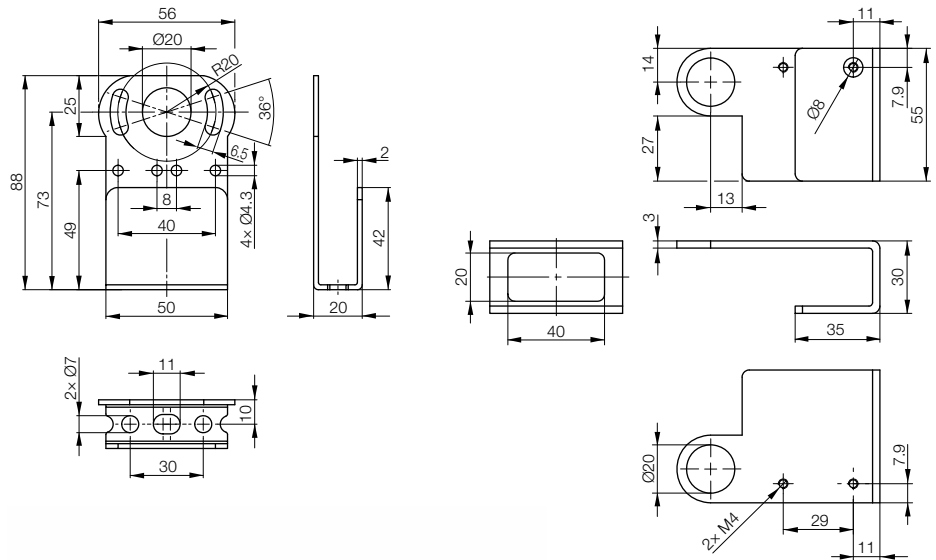


# Mounting System

## Sensor holders, reflector mounts



Description	<b>Sensor holder</b>	<b>Sensor holder</b>	
Version	For clamping cylinders	For clamping cylinders	
Use	For photoelectric sensors BOS 21M	For photoelectric sensors BOS 23K and BOS 26K	
<b>Ordering code</b>	<b>BAM0043</b>	<b>BAM01AW</b>	
Part number	BMS CS-M-D12-B21K-04	BMS CS-M-D12-B23K-05	
Material	Stainless steel	Stainless steel	



Mounting rods Ø 12 mm,  
anodized aluminum or stainless steel  
See page 284.



# Mounting System

## Sensor holders, sensor and reflector mount



Stainless Steel



Stainless Steel



Stainless Steel

### Sensor and reflector mounts

For clamping cylinders  
For photoelectric sensors BOS 50K and reflectors BOS R-11

#### BAM01AY

BMS CS-M-D12-BX07-06

Stainless steel

### Sensor holder

For clamping cylinders  
For photoelectric sensors BOS 5K, through-beam fork sensors BGL 30C, 50C and angle sensors BWL 40/40, 54/54

#### BAM01F3

BMS CS-M-D12-BX10-08

Stainless steel

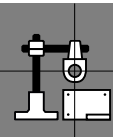
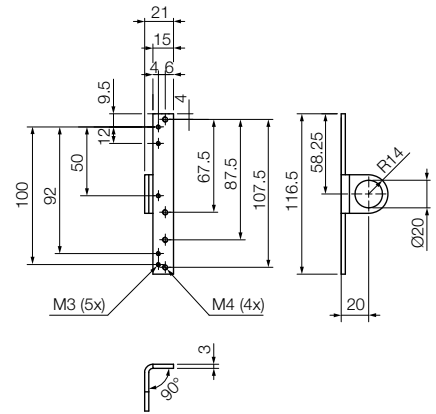
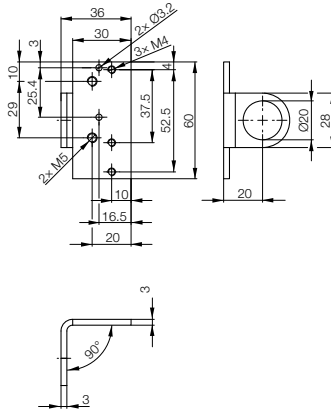
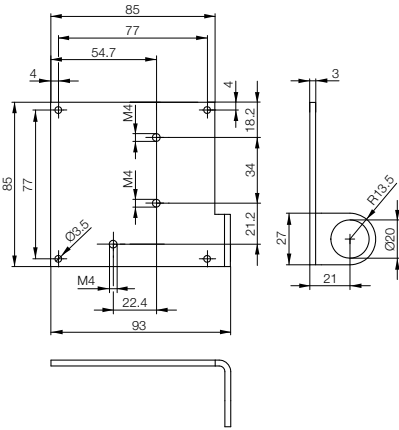
### Sensor holder

For clamping cylinders  
Background lights  
Linear lights 85 and 170 mm  
Sens. BWL68/68,90/90,110/110

#### BAM01F2

BMS CS-M-D12-BX11-09

Stainless steel



Mounting System

- Plastic
- Metal
- Cross-connector
- Base Holder
- Clamping Cylinder
- Sensor Holder**
- Adjustment Units
- Reflector Mount**
- Adapter Ring
- Air Blow
- Mounting Rods
- Mounting Kit



# Mounting System

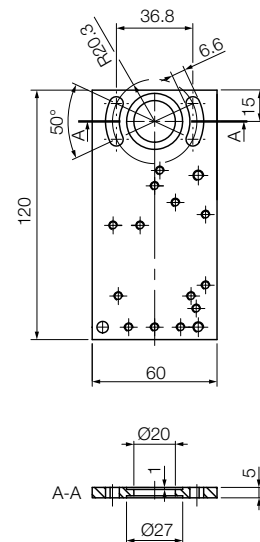
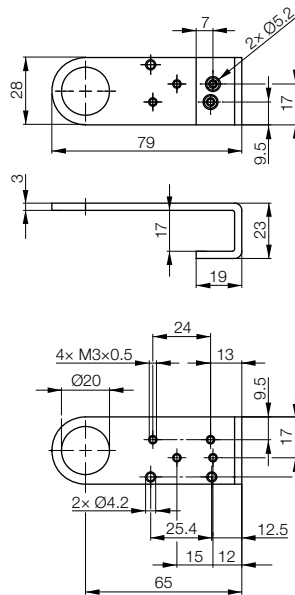
## Sensor holder



Stainless Steel



Description	<b>Sensor holder</b>	<b>Sensor holder</b>	
Version	For clamping cylinders	For base holders or clamping cylinders	
Use	For photoelectric sensors BOS 2K, 5K, 6K and BUS R06	For BOS 23K, BOS 25K, BOS26K For BOS 50K, BOS 63M, BOS 66M For BOS R-22, BOS R-34, BOS R-36 For BOS R-44, BOS R-46 for reflector BOS R-9 For sensors of the series BOS 21M	
<b>Ordering code</b>	<b>BAM0040</b>	<b>BAM003C</b>	
Part number	BMS CS-M-D12-BX06-03	BMS CS-M-D12-BX05-02	
Material	Stainless steel	Anodized aluminum	



Mounting rods  $\varnothing$  12 mm,  
anodized aluminum or stainless steel  
See page 284.



# Mounting System

## Sensor holder



Stainless Steel



Stainless Steel

### Sensor holder

For clamping cylinders  
For inductive sensors with size 40x40 mm, Unicomact, Unisensor and BES IKU

### BAM003R

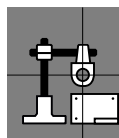
BMS CS-M-D12-IQ40-03  
Stainless steel

### Sensor holder

For clamping cylinders  
For inductive sensors with size 40x40 mm, Unicomact, Unisensor and BES IKU

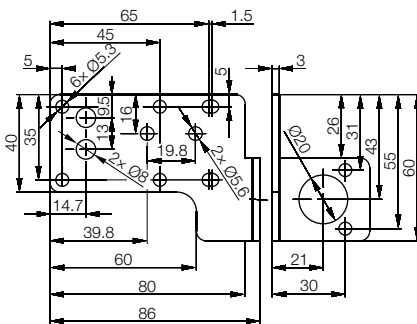
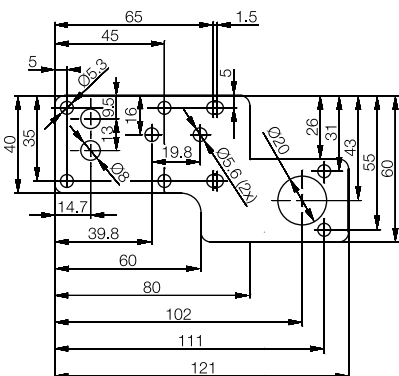
### BAM003P

BMS CS-M-D12-IQ40-02  
Stainless steel



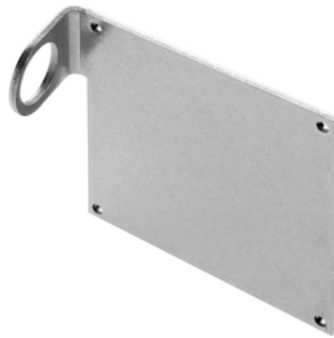
Mounting System

- Plastic
- Metal
- Cross-connector
- Base Holder
- Clamping Cylinder
- Sensor Holder**
- Adjustment Units
- Reflector Mount
- Adapter Ring
- Air Blow
- Mounting Rods
- Mounting Kit



# Mounting System

## Reflector mount

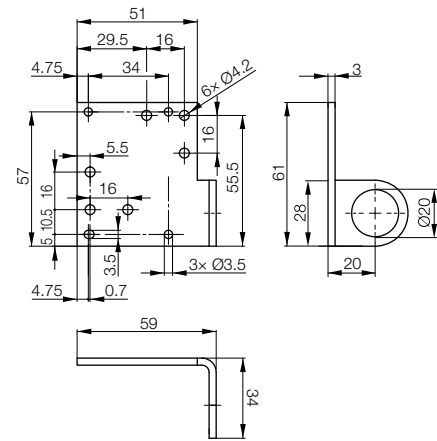
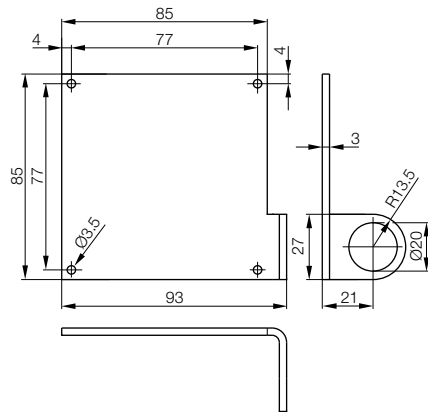


Stainless Steel



Stainless Steel

Description	<b>Reflector mount</b>	<b>Reflector mount</b>	
Version	For clamping cylinders	For clamping cylinders	
Use	For BOS R-11 reflectors	For reflectors BOS R-9 and BOS 25K, 26K	
<b>Ordering code</b>	<b>BAM0035</b>	<b>BAM0042</b>	
Part number	BMS CR-M-D12-IS-03	BMS CR-M-D12-IS-04	
Material	Stainless steel	Stainless steel	

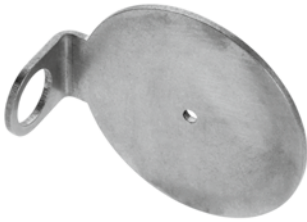


Mounting rods Ø 12 mm,  
anodized aluminum or stainless steel  
See page 284.



# Mounting System

## Reflector mount



Stainless Steel



Stainless Steel



Stainless Steel

### Reflector mount

For clamping cylinders  
For BOS R-1 reflectors

#### BAM003N

BMS CR-M-D12-IU-05

Stainless steel

### Reflector mount

For clamping cylinders  
For BOS R-1, R-2, R-3 reflectors

#### BAM0034

BMS CR-M-D12-IU-02

Stainless steel

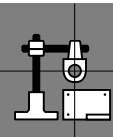
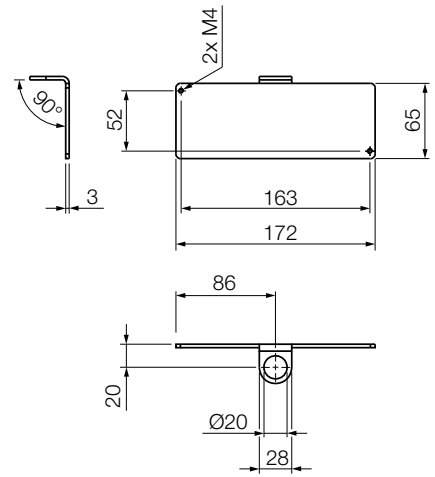
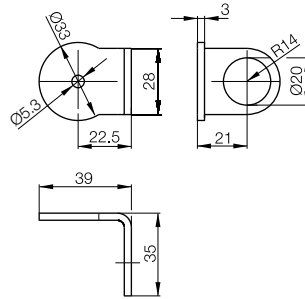
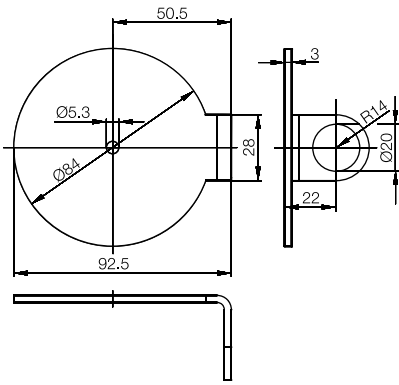
### Holder for BVS housing

For clamping cylinders  
For installing BAM PC-VS-008-1

#### BAM01TK

BMS CS-M-D12-IX13-01

Stainless steel



Mounting System

- Plastic
- Metal
- Cross-connector
- Base Holder
- Clamping Cylinder
- Sensor Holder
- Adjustment Units
- Reflector Mount**
- Adapter Ring
- Air Blow
- Mounting Rods
- Mounting Kit



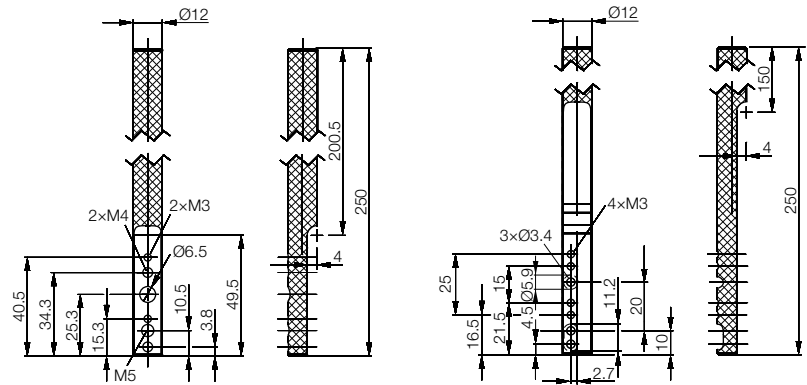


# Mounting System

## Reflector mounts, sensor holders



Description	<b>Reflector mount</b>	<b>Sensor holder</b>	
Version	For base holders	For base holders	
Use	For BOS R-1, R-9, R-14, R-22 and R-26 reflectors	For photoelectric sensors BOS 2K, 5K, 6K, Q08, inductive sensors BES Q08 and ultrasonic sensors BUS R06	
<b>Ordering code</b>	<b>BAM003A</b>	<b>BAM0039</b>	
Part number	BMS BS-M-D12-0250-01	BMS BS-M-D12-0250-02	
Material	Anodized aluminum	Anodized aluminum	





# Mounting System

## Sensor holder



### Sensor holder

For base holders with/without cross-connectors  
For through-beam fork sensors  
BGL 5A, 10A, 20A, 30A, 50A

### BAM003F

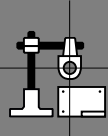
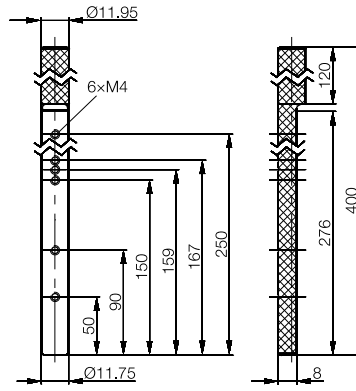
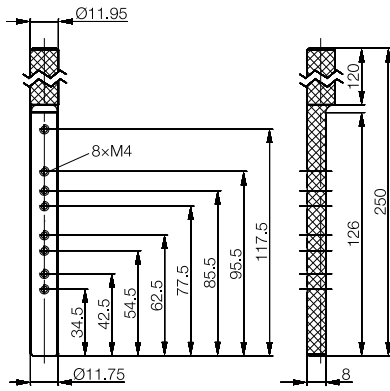
BMS BS-M-D12-0250-03  
Anodized aluminum

### Sensor holder

For base holders with/without cross-connectors  
For BGL 80A, 120A, 180A, 220A through-beam fork sensors

### BAM003H

BMS BS-M-D12-0400-04  
Anodized aluminum



Mounting System

- Plastic
- Metal
- Cross-connector
- Base Holder
- Clamping Cylinder
- Sensor Holder**
- Adjustment Units
- Reflector Mount**
- Adapter Ring
- Air Blow
- Mounting Rods
- Mounting Kit

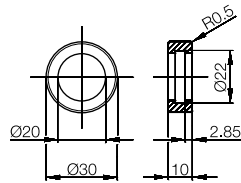


# Mounting System

## Adapter ring



Description	<b>Adapter ring</b>		
Version	For 2× BMS CS-M-D12-IZ clamping cylinders		
Use	As connecting element for 2× clamping cylinders		
<b>Ordering code</b>	<b>BAM003J</b>		
Part number	BMS AD-M-003-D12/IZ		
Material	Anodized aluminum		



Mounting rods  $\varnothing$  12 mm,  
anodized aluminum or stainless steel  
See page 284.



# Mounting System

## Air blow

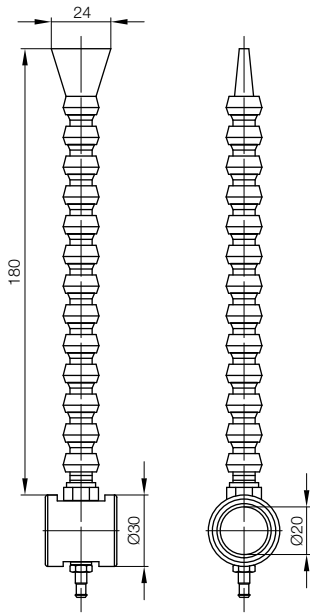


### Air Blow

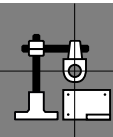
For clamping cylinders  
For blowing clear sensors and reflectors (minimum pressure 8 bar)

### BAM0041

BMS CZ-M-D12-I-001  
Anodized aluminum



Connection for compressed air hose Ø 4 mm



Mounting System

- Plastic
- Metal
- Cross-connector
- Base Holder
- Clamping Cylinder
- Sensor Holder
- Adjustment Units
- Reflector Mount
- Adapter Ring**
- Air Blow**
- Mounting Rods
- Mounting Kit



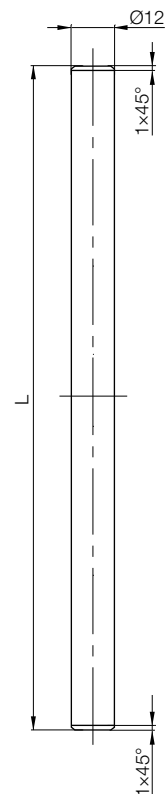
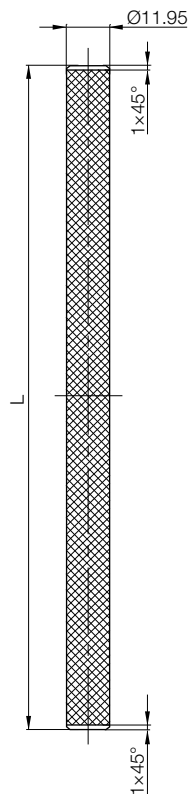
# Mounting System

## Mounting rods



Description		Mounting rod Ø 12 mm	Mounting rod Ø 12 mm
Version		Knurled, can be cut to required size	Smooth, can be cut to required size
<b>Length 100 mm</b>	<b>Ordering code</b>	<b>BAM021Y</b>	
	Part number	BMS RS-M-D12-0100-00	
<b>Length 150 mm</b>	<b>Ordering code</b>	<b>BAM002R</b>	<b>BAM0045</b>
	Part number	BMS RS-M-D12-0150-00	BMS RS-S-D12-0150-00
<b>Length 200 mm</b>	<b>Ordering code</b>	<b>BAM021T</b>	
	Part number	BMS RS-M-D12-0200-00	
<b>Length 250 mm</b>	<b>Ordering code</b>	<b>BAM002T</b>	
	Part number	BMS RS-M-D12-0250-00	
<b>Length 300 mm</b>	<b>Ordering code</b>	<b>BAM021W</b>	<b>BAM0046</b>
	Part number	BMS RS-M-D12-0300-00	BMS RS-S-D12-0300-00
<b>Length 750 mm</b>	<b>Ordering code</b>	<b>BAM021U</b>	
	Part number	BMS RS-M-D12-0750-00	
<b>Length 1000 mm</b>	<b>Ordering code</b>	<b>BAM002U</b>	
	Part number	BMS RS-M-D12-1000-00	
Material		Anodized aluminum	Stainless steel

The mounting rods are knurled full-length. This prevents any position change.



# Mounting System


















## Mounting kit

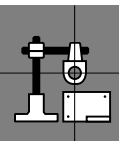
When installing sensors on machines and systems, fast solutions are often required for positioning the sensors. Installers need finished, compatible solutions for service work.

For such work, Balluff offers the BMS Kit-V1. From the base holder to rods and cross-connectors to the most commonly needed sensor holders, everything you need for establishing a secure sensor position is included in the mounting kit. Once parts have been used, an order form is included for simple reordering.

The tough aluminum case with additional, variable compartments is designed for tough industrial use.

<b>Ordering code</b>	<b>BAM003W</b>
Part number	BMS KIT-V1

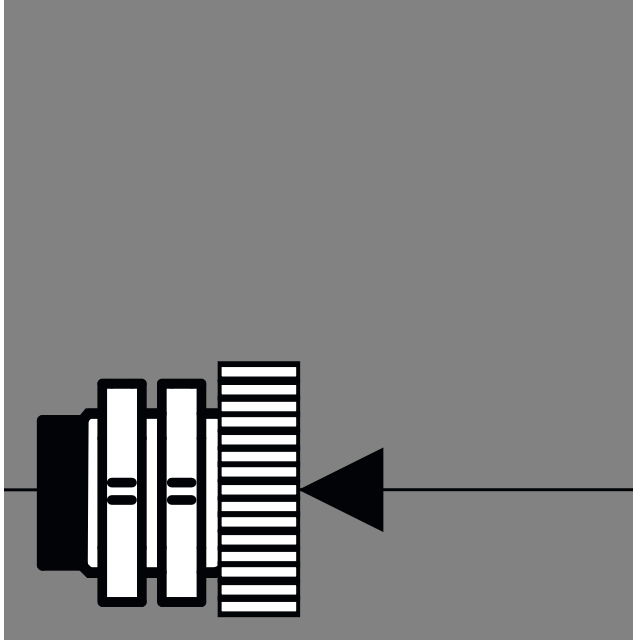
Item	Case contents Quantity	Description	Ordering code Part number
1. 	20	Base holder	<b>BAM024P</b> BMS CU-M-D12-B028-00
2. 	10	Cross-connector	<b>BAM002Z</b> BMS CC-M-D12-B-00
3. 	20	Sensor holder	<b>BAM024T</b> BMS CS-M-D12-BZ
4. 	5	M8 sensor holder	<b>BAM0036</b> BMS CS-M-D12-ID08-01
5. 	10	M12 sensor holder	<b>BAM0037</b> BMS CS-M-D12-ID12-01
6. 	10	M16 sensor holder	<b>BAM003K</b> BMS CS-M-D12-ID16-01
7. 	10	M18 sensor holder	<b>BAM0032</b> BMS CS-M-D12-ID18-01
8. 	10	M24 sensor holder	<b>BAM003L</b> BMS CS-M-D12-ID24-01
9. 	5	M30 sensor holder	<b>BAM0033</b> BMS CS-M-D12-ID30-01
10. 	5	Joint	<b>BAM024R</b> BMS CCJ-M-D12-B-01
11. 	5	Sensor holder for BOS 21M, 25K, 26K	<b>BAM003C</b> BMS CS-M-D12-BX01-01
12. 	5	Reflector mount for BOS R-9	<b>BAM0042</b> BMS CR-M-D12-IS-04
13. 	5	Reflector mounts for BOS R-1, R-9, R-14, R-22, R-26	<b>BAM003A</b> BMS BS-M-D12-0250-01
14. 	5	Reflector BOS R-9	<b>BAM00WL</b> BOS R-9
15. 	10	Mounting rod 150 mm	<b>BAM002R</b> BMS RS-M-D12-0150-00
16. 	10	Mounting rod 250 mm	<b>BAM002T</b> BMS RS-M-D12-0250-00
17. 		Empty case	<b>BAM003T</b> BMS Case-01



Mounting System

Plastic  
Metal  
Cross-connector  
Base Holder  
Clamping Cylinder  
Sensor Holder  
Adjustment Units  
Reflector Mount  
Adapter Ring  
Air Blow  
Mounting Rods  
Mounting Kit

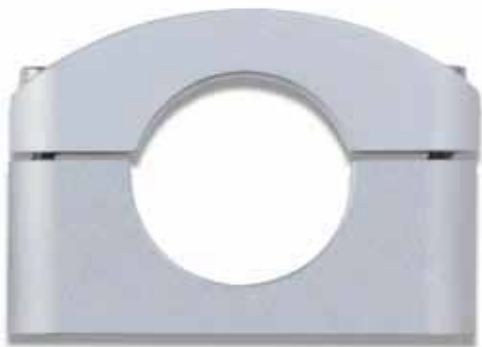




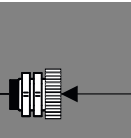
# Fasteners

## Fasteners

Sensors for individual solutions are enhanced by customized accessories. Balluff mounting elements ensure exact positioning even under difficult conditions.



<b>Fasteners</b>	
Selection Guide for Clamps	288
Clamps	290
Clamps for Air-tight Installation in Containers	296
Protective End Caps	297
Fixing Nuts	298
Mounting Cuffs	300
Mounting Clamps	302
Mounting Clamps, Reducing Sleeves, Mounting Cuffs	307
Mounting Brackets	308
Mounting Clamps for Row Mounting	310



## Selection guide for clamps



Description	Clamping holders	
	Metal/plastic clamping holder	Metal/plastic clamping holder
Version	Flush	Flush
Installation type sensor	60 °C	60 °C/400 °C
Operating temperature	60 °C	60 °C/400 °C
Use	<ul style="list-style-type: none"> <li>■ GlobalProx</li> <li>■ Standard</li> <li>■ All sensors with single switching distance</li> </ul>	<ul style="list-style-type: none"> <li>■ GlobalProx</li> <li>■ Standard</li> <li>■ All sensors with single switching distance</li> </ul>



Sensor series	Switching distance	Size	Housing material					
<b>GlobalProx</b>	Single	M12	CuZn		■	■		
		M18	CuZn		■	■		
		M30	CuZn		■	■		
	Double	M12	CuZn		■	■		
		M18	CuZn		■	■		
		M30	CuZn		■	■		
<b>Standard</b>	Single	M5	Stainless steel			■		
		M8	Stainless steel			■		
		M12	Stainless steel		■	■		
		M18	CuZn		■	■		
		M30	CuZn		■	■		
	Double	M5	Stainless steel			■		
		M8	Stainless steel			■		
		M12	CuZn		■	■		
		M18	CuZn		■	■		
		M30	CuZn		■	■		
		<b>Proxinox</b>	Single	M12	Stainless steel		■	■
				M12	Stainless steel		■	■
M18	Stainless steel				■	■		
M18	Stainless steel				■	■		
M30	Stainless steel				■	■		
Double	M30		Stainless steel		■	■		
	M12		Stainless steel		■	■		
	M18		Stainless steel					
<b>TripleProx</b>	Triple	M12	CuZn					
		M18	CuZn		■	■		
		M30	CuZn		■	■		
<b>SteelFace</b>	Double	M12	Stainless steel					
		M18	Stainless steel					

Preselection: Depending on the application, the switching distance can be reduced or increased. It is recommended that the switching behavior be checked with an application test.





# Fasteners

## Clamping holders

An old problem in installing proximity switches has now been solved. Balluff **clamps with positive stop** ensure the exact and correct position of the sensors.

Sensors can be quickly and easily changed even in difficult to access locations, and retain their position without readjustment thanks to a positive stop.

### Benefits

- Short downtimes
- Quickly replaced
- Once set, always in the right position
- No readjustment
- Easy installation and changing of proximity switches thanks to the positive stop
- Easy to attach the sensor using a compression screw

### Note regarding clamps with positive stop made of metal

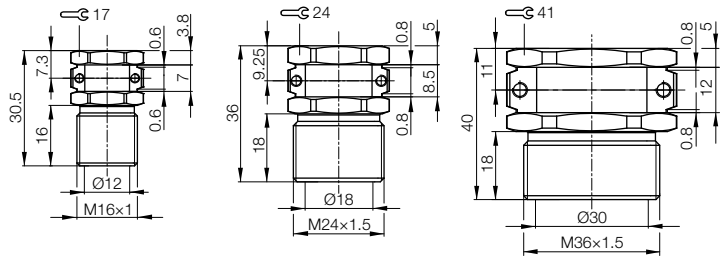
The switching distance of the sensors can be reduced by using clamps with positive stops. Take note when using this clamping system.

**Clamping holders without positive stop** can be used for nearly all inductive, capacitive or photoelectric sensors.

Selection guide, see page 288.

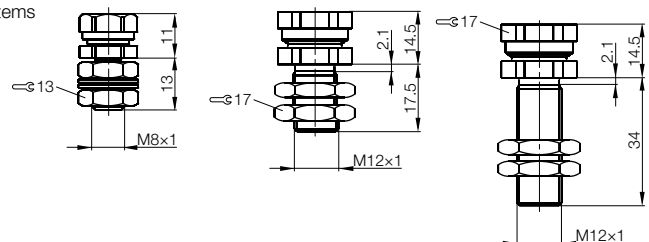


Description		<b>Clamp w/out positive stop</b>	<b>Clamp w/out positive stop</b>	<b>Clamp w/out positive stop</b>
Use		For sensors <b>Ø 12 mm and M12</b>	For sensors <b>Ø 18 mm and M18</b>	For sensors <b>Ø 30 mm and M30</b>
Nickel-plated brass	<b>Ordering code</b>	<b>BAM00E4</b>	<b>BAM00FZ</b>	<b>BAM00J8</b>
	Part number	BES 12,0-KH-4	BES 18,0-KH-4	BES 30,0-KH-4
Stainless steel	<b>Ordering code</b>			
	Part number			



Description		<b>Clamp with positive stop</b>	<b>Clamp with positive stop</b>	<b>Clamp with positive stop</b>
Use		For sensors <b>Ø 5 mm and M5</b> with thread length ≥ 30 mm	For sensors <b>Ø 8 mm and M8</b> with thread length ≥ 30 mm	For sensors <b>Ø 8 mm and M8</b> with thread length ≥ 48.5 mm
Nickel-plated brass	<b>Ordering code</b>	<b>BAM0099</b>	<b>BAM00AH</b>	<b>BAM00AE</b>
	Part number	BES 05,0-KH-2S	BES 08,0-KH-2S	BES 08,0-KH-2L
Stainless steel	<b>Ordering code</b>		<b>BAM00AR</b>	
	Part number		BES 08,0-KH-6S	
PTFE coated*	<b>Ordering code</b>		<b>BAM00AK</b>	<b>BAM00AF</b>
	Part number		BES 08,0-KH-2S/W	BES 08,0-KH-2L/W

\*Teflon coated variants for welding systems



# Fasteners

## Clamping holders



### Clamp with positive stop

For sensors  
Ø 8 mm and M8

**BAM00AM**

BES 08,0-KH-4-F

**BAM00AU**

BES 08,0-KH-7-F

### Clamp with positive stop

For sensors  
Ø 12 mm and M12

**BAM00E5**

BES 12,0-KH-4-F

### Clamp with positive stop

For sensors  
Ø 18 mm and M18

**BAM00H0**

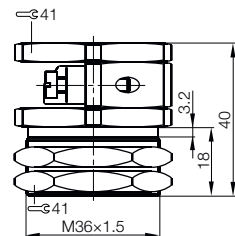
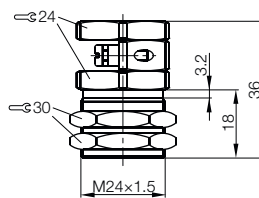
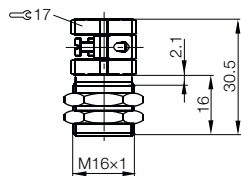
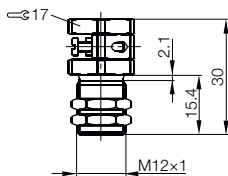
BES 18,0-KH-4-F

### Clamp with positive stop

For sensors  
Ø 30 mm and M30

**BAM00J9**

BES 30,0-KH-4-F



### Clamp with positive stop

For sensors  
Ø 8 mm and M8  
with thread length ≥ 30 mm

**BAM00AN**

BES 08,0-KH-6L

**BAM00AP**

BES 08,0-KH-6L/W

### Clamp with positive stop

For sensors  
Ø 12 mm and M12  
with thread length ≥ 30 mm

**BAM00E0**

BES 12,0-KH-2S

**BAM00E1**

BES 12,0-KH-2S/W

### Clamp with positive stop

For sensors  
Ø 12 mm and M12  
with thread length ≥ 40 mm

**BAM00CY**

BES 12,0-KH-2L

**BAM00CZ**

BES 12,0-KH-2L/W

### Clamp with positive stop

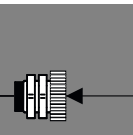
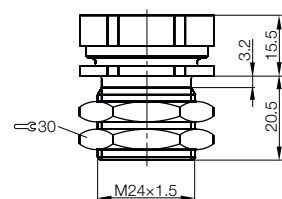
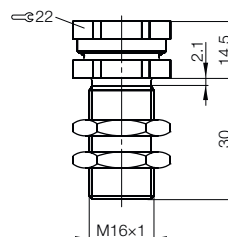
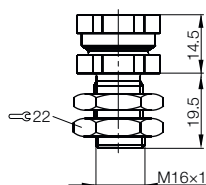
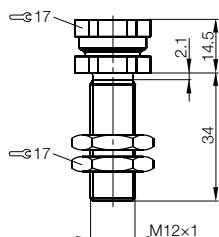
For sensors  
Ø 18 mm and M18  
with thread length ≥ 30 mm

**BAM00FT**

BES 18,0-KH-2S

**BAM00FW**

BES 18,0-KH-2S/W



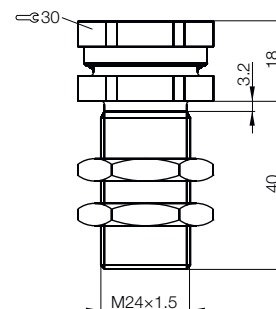
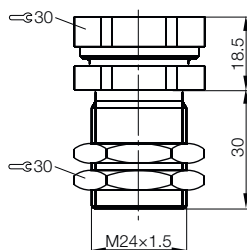
Fasteners  
Selection guide for clamps  
**Clamping Holders**  
Protective End Caps  
Fixing Nuts  
Mounting Cuffs  
Mounting Clamps  
Reducing Sleeve  
Mounting Brackets  
Mounting Clamps for Row Mounting

# Fasteners

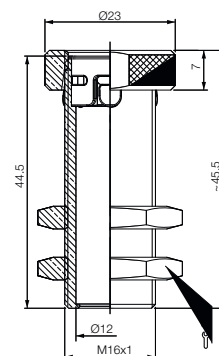
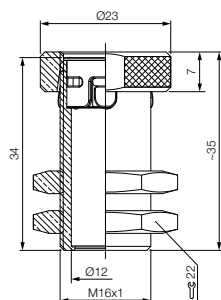
## Clamping holders



Description		<b>Clamp with positive stop</b>	<b>Clamp with positive stop</b>
Version		For sensors <b>Ø 18 mm</b> and <b>M18</b> with thread length $\geq 48$ mm	For sensors <b>Ø 18 mm</b> and <b>M18</b> with thread length $\geq 50$ mm
Nickel-plated brass	<b>Ordering code</b>	<b>BAM00FR</b>	<b>BAM00FN</b>
	Part number	BES 18,0-KH-2M	BES 18,0-KH-2L
PTFE coated (weld-immune)	<b>Ordering code</b>		<b>BAM00FP</b>
	Part number		BES 18,0-KH-2L/W



Description		<b>Clamping holders Flush with positive stop</b>	<b>Clamping holders Flush with positive stop</b>
Version		For sensors <b>Ø 12 mm</b> and <b>M12</b> With thread length 34 mm	For sensors <b>Ø 12 mm</b> and <b>M12</b> With thread length 44.5 mm
Nickel-plated brass	<b>Ordering code</b>		
	Part number		
PTFE coated (weld-immune)	<b>Ordering code</b>	<b>BAM0247</b>	<b>BAM0248</b>
	Part number	BAM MC-XA-023-D12,0-2-FM/W	BAM MC-XA-023-D12,0-2-FXL/W



# Fasteners

## Clamping holders



### Clamp with positive stop

For sensors  
**Ø 30 mm** and **M30**  
 with thread length  $\geq 30$  mm

#### BAM00J6

BES 30,0-KH-2S

#### BAM00J7

BES 30,0-KH-2S/W

### Clamp with positive stop

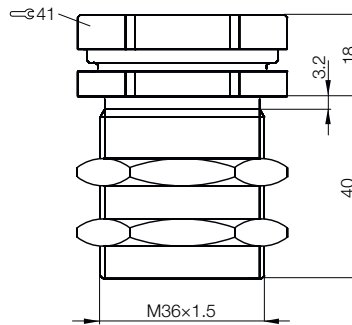
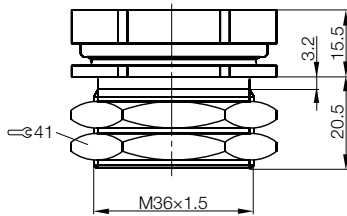
For sensors  
**Ø 30 mm** and **M30**  
 with thread length  $\geq 50$  mm

#### BAM00J4

BES 30,0-KH-2L

#### BAM00J5

BES 30,0-KH-2L/W



### Clamping holders Non-flush with positive stop

For sensors  
**Ø 12 mm** and **M12**  
 With thread length 44.5 mm

#### BAM024F

BAM MC-XA-024-D12,0-2-FXL/W

### Clamping holders Non-flush with positive stop

For sensors  
**Ø 12 mm** and **M12**  
 With thread length 34 mm

#### BAM024E

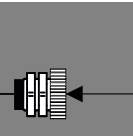
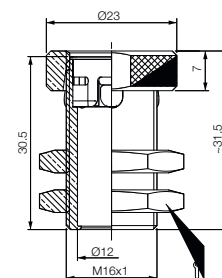
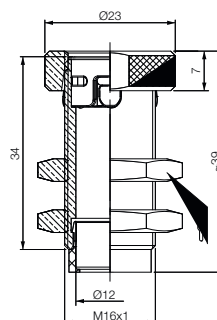
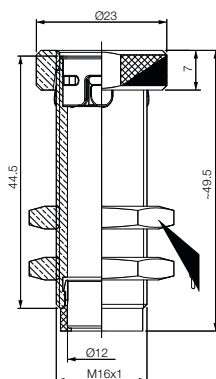
BAM MC-XA-024-D12,0-2-FM/W

### Clamping holders Flush with positive stop

For sensors  
**Ø 12 mm** and **M12**  
 with thread length  $\geq 30.5$  mm

#### BAM0246

BAM MC-XA-023-D12,0-2-FS



Fasteners  
 Selection guide  
 for clamps

### Clamping Holders

Protective End  
 Caps

Fixing Nuts

Mounting Cuffs

Mounting Clamps

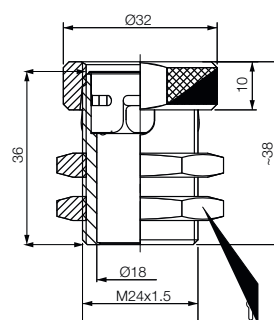
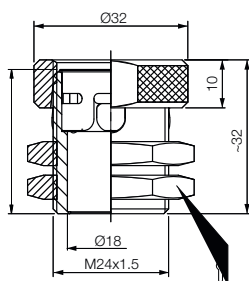
Reducing Sleeve

Mounting  
 Brackets

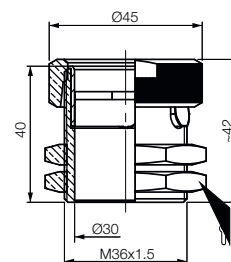
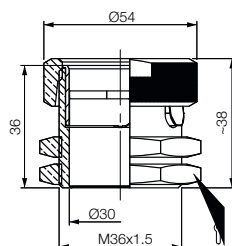
Mounting Clamps  
 for Row Mounting



Description		<b>Clamping holders</b> <b>Flush with positive stop</b>	<b>Clamping holders</b> <b>Flush with positive stop</b>
Version		For sensors <b>Ø 18 mm and M18</b> With thread length 30 mm	For sensors <b>Ø 18 mm and M18</b> With thread length 36 mm
Nickel-plated brass	<b>Ordering code</b>		<b>BAM022K</b>
	Part number		BAM MC-XA-023-D18,0-2-FS
PTFE coated (weld-immune)	<b>Ordering code</b>	<b>BAM022F</b>	
	Part number	BAM MC-XA-023-D18,0-2-FXS/W	



Description		<b>Clamping holders</b> <b>Flush with positive stop</b>	<b>Clamping holders</b> <b>Flush with positive stop</b>
Version		For sensors <b>Ø 30 mm and M30</b> With thread length 36 mm	For sensors <b>Ø 30 mm and M30</b> With thread length 40 mm
PTFE coated (weld-immune)	<b>Ordering code</b>	<b>BAM0249</b>	<b>BAM024H</b>
	Part number	BAM MC-XA-023-D30,0-2-FS/W	BAM MC-XA-023-D30,0-2-FM/W



# Fasteners

## Clamping holders



### Clamping holders Non-flush with positive stop

For sensors  
Ø 18 mm and M18  
With thread length 46 mm

#### BAM022M

BAM MC-XA-024-D18,0-2-FM/W

### Clamping holders Flush with positive stop

For sensors  
Ø 18 mm and M18  
With thread length 48.5 mm

#### BAM022L

BAM MC-XA-023-D18,0-2-FL

### Clamping holders Flush with positive stop

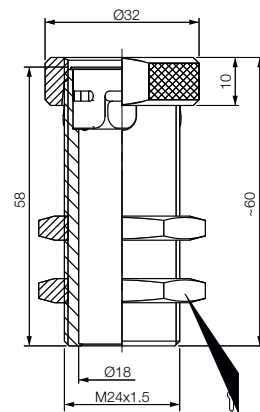
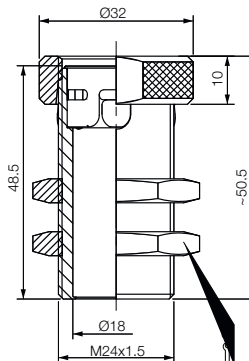
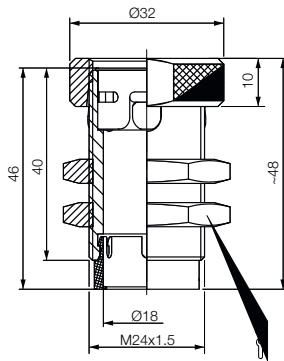
For sensors  
Ø 18 mm and M18  
With thread length 58 mm

#### BAM022H

BAM MC-XA-023-D18,0-2-FXL

#### BAM022J

BAM MC-XA-023-D18,0-2-FXL/W



### Clamping holders Flush with positive stop

For sensors  
Ø 30 mm and M30  
With thread length 58 mm

#### BAM024C

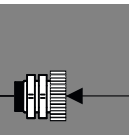
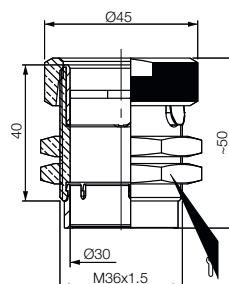
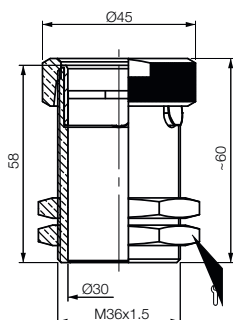
BAM MC-XA-023-D30,0-2-FXL/W

### Clamping holders Non-flush with positive stop

For sensors  
Ø 30 mm and M30  
With thread length 40 mm

#### BAM024A

BAM MC-XA-024-D30,0-2-FM/W



- Fasteners
- Selection guide for clamps
- Clamping Holders**
- Protective End Caps
- Fixing Nuts
- Mounting Cuffs
- Mounting Clamps
- Reducing Sleeve
- Mounting Brackets
- Mounting Clamps for Row Mounting

## Clamps for air-tight installation in containers

### Advantages of positive stop:

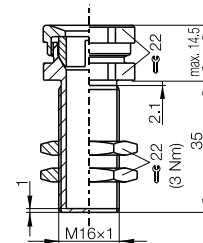
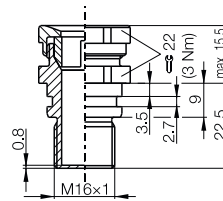
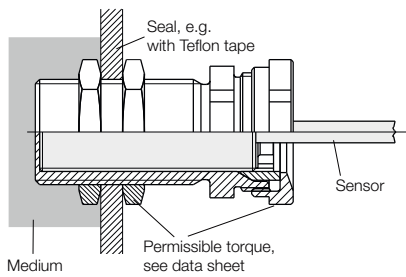
- Once set, always in the right position
- No readjustment
- Short downtimes



Description	Clamp with positive stop	Clamp with positive stop
Use	For <b>M12</b> sensors for air-tight installation	For <b>M12</b> sensors for air-tight installation
<b>Ordering code</b>	<b>BAM00E8</b>	<b>BAM00E3</b>
Part number	BES 12,0-KH-5F	BES 12,0-KH-3X
Pressure-resistant	6 bar	6 bar
Material	PBT fiberglass reinforced	PBT fiberglass reinforced

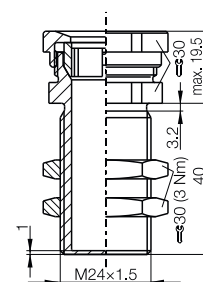
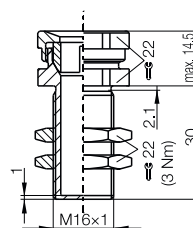
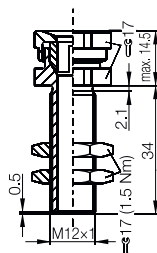
### Installation example using clamping holder BES ...-KH-3L

Particularly well suited for detecting liquid media



Description	Clamp with positive stop	Clamp with positive stop	Clamp with positive stop
Use	For <b>M8</b> sensors for air-tight installation	For <b>M12</b> sensors for air-tight installation	For <b>M18</b> sensors for air-tight installation
<b>Ordering code</b>	<b>BAM00AL</b>	<b>BAM00E2</b>	<b>BAM00FY</b>
Part number	BES 08,0-KH-3L	BES 12,0-KH-3L	BES 18,0-KH-3L
Pressure-resistant	6 bar	6 bar	6 bar
Material	PBT fiberglass reinforced	PBT fiberglass reinforced	PBT fiberglass reinforced

For all sensors with simple switching distance and appropriate diameter. The switching distance of the sensors may be reduced by the clamps when using for air-tight installation.



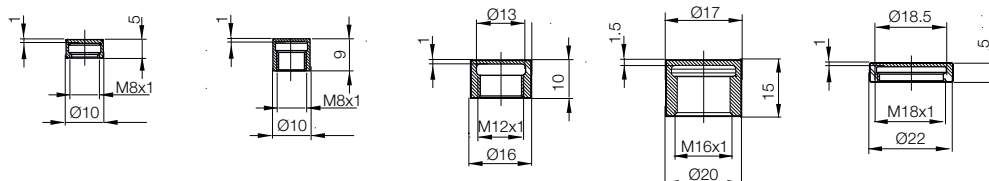


# Fasteners

## Protective end caps

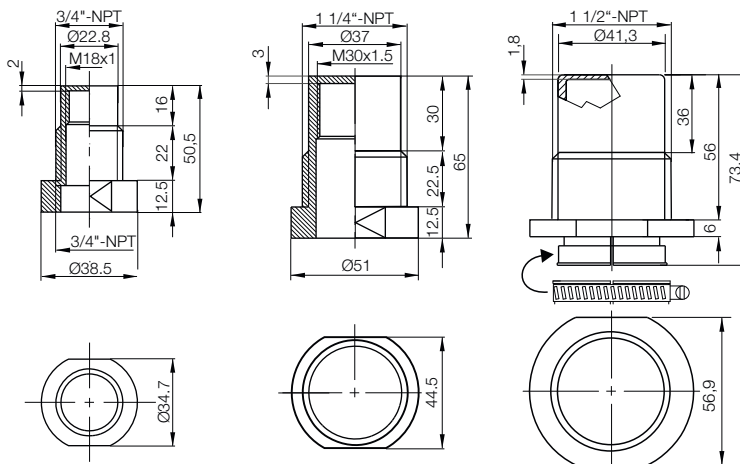


Description	<b>Protective end cap</b>	<b>Protective end cap</b>	<b>Protective end cap</b>	<b>Protective end cap</b>	<b>Protective end cap</b>
Use	For M8 sensors	For M8 sensors	For M12 sensors	For M16 sensors	For M18 sensors
<b>Ordering code</b>	<b>BAM009Z</b>	<b>BAM00A0</b>	<b>BAM00C2</b>	<b>BAM00EP</b>	<b>BAM00EZ</b>
Part number	BES 08-SM-1	BES 08-SM-1F	BES 12-SM-2	BES 16-SM-2	BES 18-SM-1
Reduction of the rated switching distance	1 mm	1 mm	1 mm	1.5 mm	1 mm
Material	PTFE	PTFE	POM	PTFE	PTFE



Description	<b>Protective end cap</b>	<b>Protective end cap</b>	<b>Protective end cap</b>	
Use	For M18 sensors	For M30 sensors	For M30 sensors	
<b>Ordering code</b>	<b>BAM00F1</b>	<b>BAM00HL</b>	<b>BAM00HM</b>	
Part number	BES 18-SM-3	BES 30-SM-3	BES 30-SM-5	
Reduction of the rated switching distance	2 mm	2 mm	2 mm	
Pressure-resistant	14 bar	14 bar	14 bar	
Material	PTFE	PTFE	PTFE	

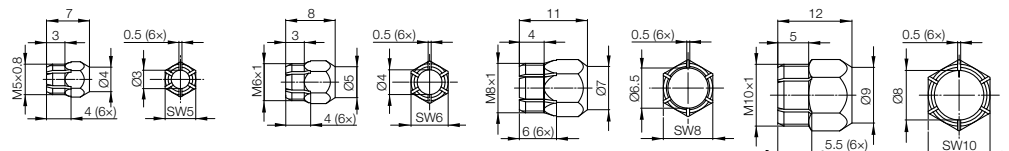
Protective end caps for installing in containers for level measurement



- Fasteners
- Selection guide for clamps
- Clamping Holders**
- Protective End Caps**
- Fixing Nuts
- Mounting Cuffs
- Mounting Clamps
- Reducing Sleeve
- Mounting Brackets
- Mounting Clamps for Row Mounting



Description	<b>Fixing nut</b>	<b>Fixing nut</b>	<b>Fixing nut</b>	<b>Fixing nut</b>
Use	For sensors and fiber optics $\varnothing$ 3 mm with mounting thread M5x0.8	For sensors and fiber optics $\varnothing$ 4 mm with mounting thread M6x1	For sensors $\varnothing$ 6.5 mm with mounting thread M8x1	For sensors $\varnothing$ 8 mm with mounting thread M10x1
<b>Ordering code</b>	<b>BAM000T</b>	<b>BAM000U</b>	<b>BAM000W</b>	<b>BAM000Y</b>
Part number	BAM MC-XA-002-D03,0-2	BAM MC-XA-002-D04,0-2	BAM MC-XA-002-D06,5-2	BAM MC-XA-002-D08,0-2
WAF	5	6	8	10
Material	Nickel-plated brass	Nickel-plated brass	Nickel-plated brass	Nickel-plated brass



Small sensors or fiber optics are used in compact systems. In some situations, they are the only option. Tight spaces under demanding conditions often make positioning of the miniature sensors difficult. The mounting clamps demonstrate their diversity by holding a range of different sensors and fiber optics. They are extremely stable, variable and flexible. With just a few work steps, sensors and fiber optics can be mounted on housings or base plates.

- Mounting clamps for smooth sensors and fiber optics:  
 $\varnothing$  3 mm,  $\varnothing$  4 mm,  $\varnothing$  6.5 mm,  $\varnothing$  8 mm
- Simple and economical mounting
- Minimal wall thickness for internal threaded bore: 2 mm





Description	<b>BMF Hex Key</b>	<b>Hex key set 0.7-2.0</b>
Version	Folding Allen key set, with additional blades, 8-piece	
Use	Tool set for all BMF sensors and BMF mounting brackets as well as for sensors having a potentiometer, e.g. BOS, BCS, BUS, etc.	Tool set for BMF sensors and BMF mounting brackets
<b>Material No.</b>	<b>139868</b>	<b>123264</b>
Material	Blade: chrome vanadium steel, fully hardened, galvanically treated. Grip: ergonomic, fiberglass reinforced housing, 55 mm long.	

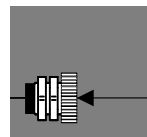


mm

0.7		
0.9		
1.3		
1.5		
2.0		
2.5		
		3.0
	PH00	



0.71
0.89
1.27
1.5
2.0



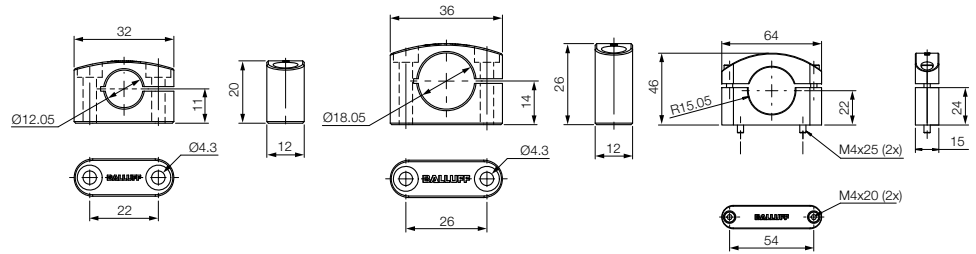
- Fasteners
- Selection guide for clamps
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- Fixing Nuts**
- Mounting Cuffs
- Mounting Clamps
- Reducing Sleeve
- Mounting Brackets
- Mounting Clamps for Row Mounting

# Fasteners

## Mounting cuffs



Description	<b>Mounting cuff</b>	<b>Mounting cuff</b>	<b>Mounting cuff</b>
Use	For sensors <b>Ø 12 mm and M12</b>	For sensors <b>Ø 18 mm and M18</b>	For sensors <b>Ø 30 mm, M30</b> and pressure sensors
<b>Ordering code</b>	<b>BAM0218</b>	<b>BAM0219</b>	<b>BAM01U0</b>
Part number	BAM MC-XA-027-D12,0-1	BAM MC-XA-027-D18,0-1	BAM MC-XA-017-D30,0-1
Material	Anodized aluminum	Anodized aluminum	Anodized aluminum

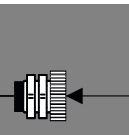
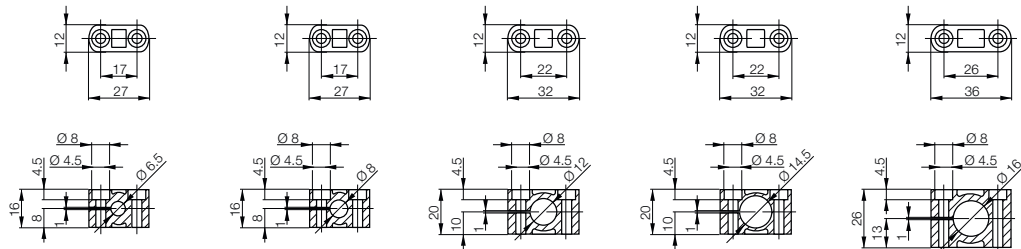


# Fasteners

## Mounting cuffs



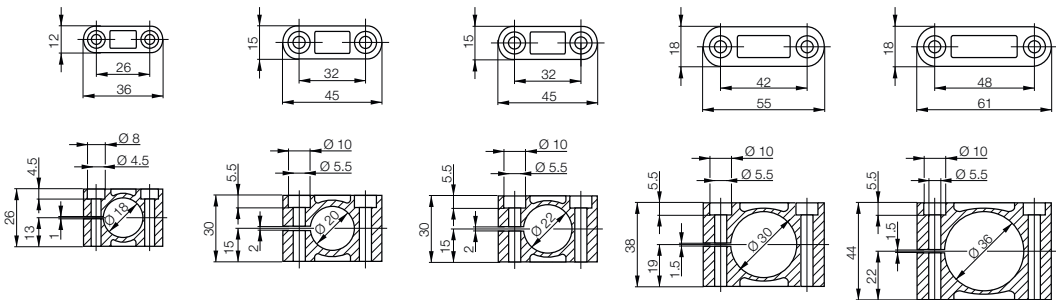
Description	Mounting cuff	Mounting cuff	Mounting cuff	Mounting cuff	Mounting cuff
Hole diameter	Ø 6.5 mm	Ø 8 mm	Ø 12 mm	Ø 14.5 mm	Ø 16 mm
<b>Ordering code</b>	<b>BAM009A</b>	<b>BAM00A2</b>	<b>BAM00C4</b>	<b>BAM00EM</b>	<b>BAM00ET</b>
Part number	BES 06,5-BS-1	BES 08,0-BS-1	BES 12,0-BS-1	BES 14,5-BS-1	BES 16,0-BS-1
Material	PA 6	PA 6	PA 6	PA 6	PA 6



- Fasteners
- Selection guide for clamps
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- Fixing Nuts
- Mounting Cuffs**
- Mounting Clamps
- Reducing Sleeve
- Mounting Brackets
- Mounting Clamps for Row Mounting



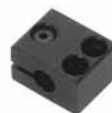
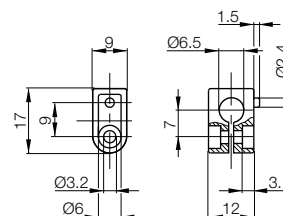
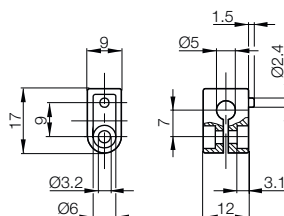
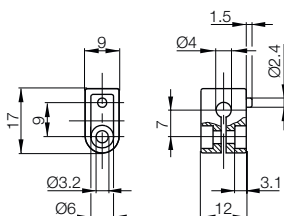
Description	Mounting cuff	Mounting cuff	Mounting cuff	Mounting cuff	Mounting cuff
Hole diameter	Ø 18 mm	Ø 20 mm	Ø 22 mm	Ø 30 mm	Ø 36 mm
<b>Ordering code</b>	<b>BAM00F2</b>	<b>BAM00H7</b>	<b>BAM00H9</b>	<b>BAM00HN</b>	<b>BAM00JN</b>
Part number	BES 18,0-BS-1	BES 20,0-BS-1	BES 22,0-BS-1	BES 30,0-BS-1	BES 36,0-BS-1
Material	PA 6	PA 6	PA 6	PA 6	PA 6



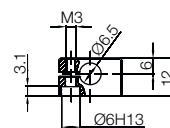
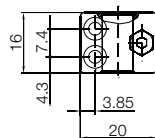
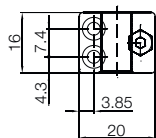
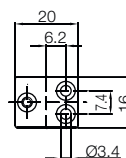
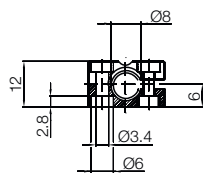
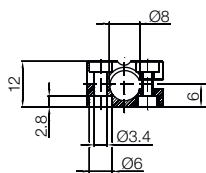
**Note:** For all sensors with appropriate diameter. Mounting cuffs can be used in nearly all inductive, capacitive, photoelectric and ultrasonic sensors.



Description	<b>Mounting clamp w/out positive stop</b>	<b>Mounting clamp w/out positive stop</b>	<b>Mounting clamp w/out positive stop</b>
Use	For sensors and fiber optics $\varnothing 4$ mm	For sensors $\varnothing 5$ mm and M5	For sensors $\varnothing 6.5$ mm
<b>Ordering code</b>	<b>BAM0094</b>	<b>BAM0097</b>	<b>BAM009C</b>
Part number	BES 04,0-KB-1	BES 05,0-KB-1	BES 06,5-KB-1
Material	PA 6	PA 6	PA 6



Description	<b>Mounting clamp w/out positive stop</b>	<b>Mounting clamp with positive stop</b>	<b>Mounting clamp w/out positive stop</b>
Use	For sensors $\varnothing 8$ mm and M8	For sensors $\varnothing 8$ mm and M8	For sensors $\varnothing 6.5$ mm
<b>Ordering code</b>	<b>BAM00A5</b>	<b>BAM00A6</b>	<b>BAM009F</b>
Part number	BES 08,0-KB-3	BES 08,0-KB-3-F	BES 06,5-KB-7
Material	PA 6	PA 6	Anodized aluminum



**Note:** For all sensors with appropriate diameter. Mounting clamps can be used in nearly all inductive, capacitive, photoelectric and ultrasonic sensors. These mounting clamps made of PA 6 are ideal for on-location installation of sensors in the vertical or horizontal direction in the materials handling industry.

# Fasteners

## Mounting clamps



### Mounting clamp w/out positive stop

For sensors and fiber optics  $\varnothing$  3 mm

**BAM0092**

BES 03,0-KB-3

PA 6

### Mounting clamp w/out positive stop

For sensors and fiber optics  $\varnothing$  4 mm

**BAM0095**

BES 04,0-KB-3

PA 6

### Mounting clamp w/out positive stop

For sensors  $\varnothing$  5 mm and M5

**BAM0098**

BES 05,0-KB-3

PA 6

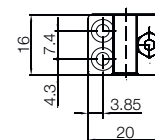
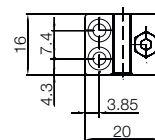
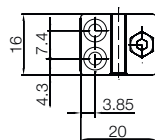
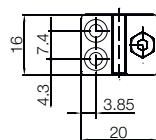
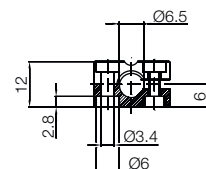
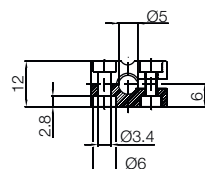
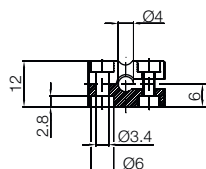
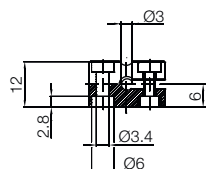
### Mounting clamp w/out positive stop

For sensors  $\varnothing$  6.5 mm

**BAM009E**

BES 06,5-KB-3

PA 6



Stackable Row mounting



Stackable Row mounting



Stackable Row mounting

### Mounting clamp w/out positive stop

For sensors  $\varnothing$  8 mm and M8

**BAM00AA**

BES 08,0-KB-7

Anodized aluminum

### Mounting clamp w/out positive stop

For sensors  $\varnothing$  12 mm and M12

**BAM00C7**

BES 12,0-KB-2

PA 6

### Mounting clamp with positive stop

For sensors  $\varnothing$  12 mm and M12

**BAM00C8**

BES 12,0-KB-2-F

PA 6

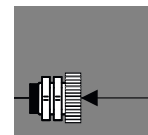
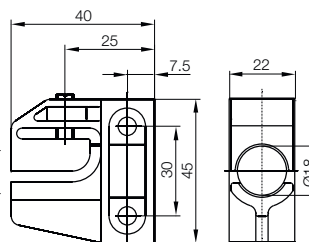
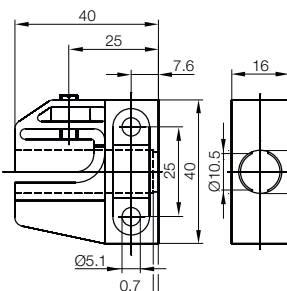
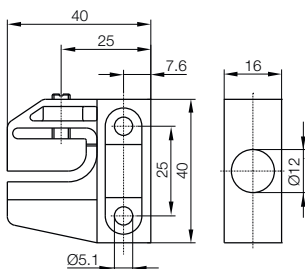
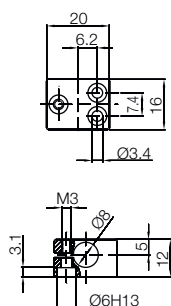
### Mounting clamp w/out positive stop

For sensors  $\varnothing$  18 mm and M18

**BAM00F6**

BES 18,0-KB-2

PA 6



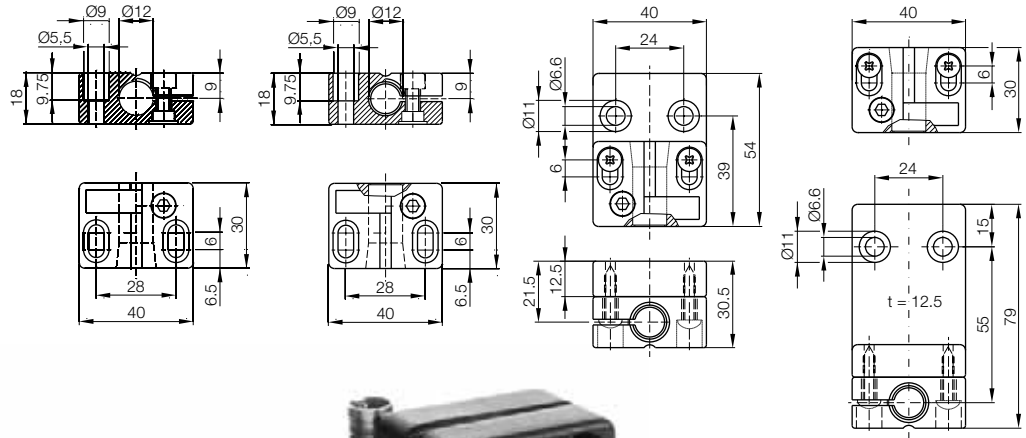
- Fasteners
- Selection guide for clamps
- Clamping Holders
- Protective End Caps
- Fixing Nuts
- Mounting Cuffs
- Mounting Clamps**
- Reducing Sleeve
- Mounting Brackets
- Mounting Clamps for Row Mounting

# Fasteners

## Mounting clamps



Description	<b>Mounting clamp w/out positive stop</b>	<b>Mounting clamp with positive stop</b>	<b>Mounting clamp with positive stop</b>	<b>Mounting clamp with positive stop</b>
Use	For sensors $\varnothing$ 12 mm and M12	For sensors $\varnothing$ 12 mm and M12	For sensors $\varnothing$ 12 mm and M12 with mounting plate for vertical seating	For sensors $\varnothing$ 12 mm and M12 with mounting bracket for horizontal seating
Ordering code	<b>BAM00C9</b>	<b>BAM00CA</b>	<b>BAM00CC</b>	<b>BAM00CE</b>
Part number	BES 12,0-KB-3	BES 12,0-KB-3-F	BES 12,0-KB-3-F-SA1	BES 12,0-KB-3-F-SA2
Material	PA 6	PA 6	PA 6	PA 6



Description	
Use	
<b>Ordering code</b>	
Part number	
Material	

**Mounting clamps with positive stop made of aluminum:** The switching distance of the sensors may be reduced by mounting clamps with positive stop. Take note when using this clamping system.

**Note:** For all sensors with appropriate diameter. Mounting clamps can be used in nearly all inductive, capacitive, photoelectric and ultrasonic sensors. These mounting clamps made of PA 6 are ideal for on-location installation of sensors in the vertical or horizontal direction in the materials handling industry.



# Fasteners

## Mounting clamps



**Mounting clamp  
w/out positive stop**  
For sensors  $\varnothing$  18 mm  
and M18

**Mounting clamp  
with positive stop**  
For sensors  $\varnothing$  18 mm  
and M18

**Mounting clamp  
with positive stop**  
For sensors  $\varnothing$  18 mm  
and M18 with mounting  
plate for vertical seating

**Mounting clamp  
with positive stop**  
For sensors  $\varnothing$  18 mm  
and M18 with mounting  
bracket for horizontal  
seating

**Mounting clamp  
with positive stop**  
For sensors  $\varnothing$  30 mm  
and M30

**BAM00F7**

**BAM00F8**

**BAM00F9**

**BAM00FA**

**BAM00HU**

BES 18,0-KB-3

BES 18,0-KB-3-F

BES 18,0-KB-3-F-SA1

BES 18,0-KB-3-F-SA2

BES 30,0-KB-3-F

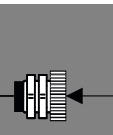
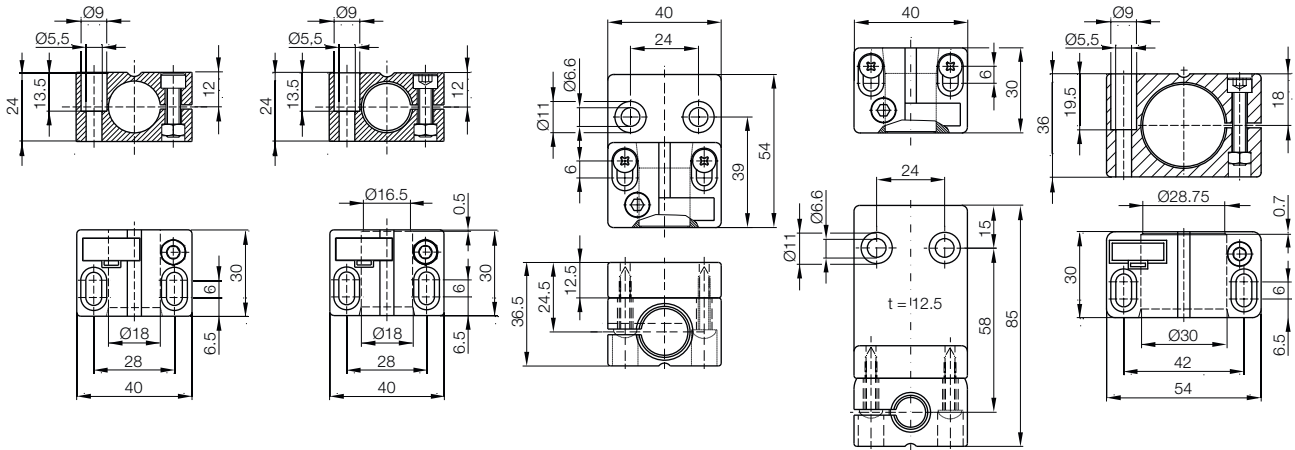
PA 6

PA 6

PA 6

PA 6

PA 6



- Fasteners
- Selection guide for clamps
- Clamping Holders
- Protective End Caps
- Fixing Nuts
- Mounting Cuffs
- Mounting Clamps**
- Reducing Sleeve
- Mounting Brackets
- Mounting Clamps for Row Mounting



**Mounting clamp  
with positive stop**

**Mounting clamp  
with positive stop**

**Mounting clamp  
with positive stop**

**Mounting clamp  
with positive stop**

For M8 and  $\varnothing$  8 mm sensors

For M12 sensors

For M18 sensors

For M30 sensors

**BAM00A7**

**BAM00CF**

**BAM00FC**

**BAM00HW**

BES 08,0-KB-4-F

BES 12,0-KB-4-F

BES 18,0-KB-4-F

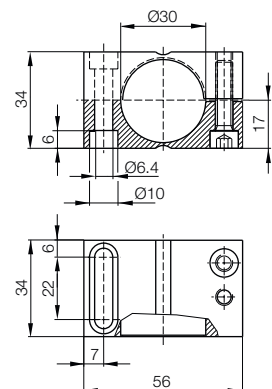
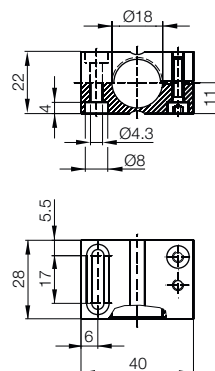
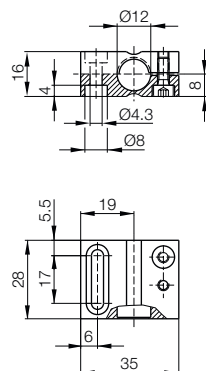
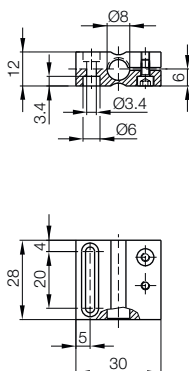
BES 30,0-KB-4-F

Anodized aluminum

Anodized aluminum

Anodized aluminum

Anodized aluminum

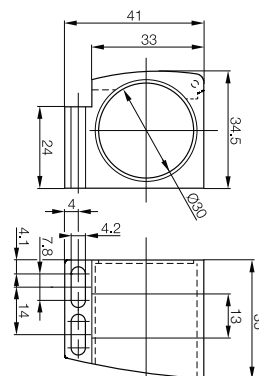
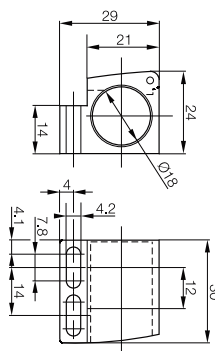
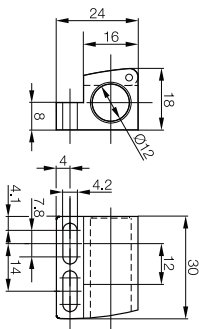
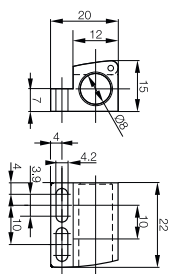


# Fasteners

## Mounting clamps



Description	<b>Mounting clamp with positive stop</b>	<b>Mounting clamp with positive stop</b>	<b>Mounting clamp with positive stop</b>	<b>Mounting clamp with positive stop</b>	
Use	For sensors $\varnothing$ 8 mm or M8	For sensors $\varnothing$ 12 mm or M12	For sensors $\varnothing$ 18 mm or M18	For sensors $\varnothing$ 30 mm or M30	
<b>Ordering code</b>	<b>BAM00A8</b>	<b>BAM00CH</b>	<b>BAM00FE</b>	<b>BAM00HY</b>	
Part number	BES 08,0-KB-5-F	BES 12,0-KB-5-F	BES 18,0-KB-5-F	BES 30,0-KB-5-F	
Material	PC	PC	PC	PC	



**Note:** For all sensors with appropriate diameter. Mounting clamps can be used in nearly all inductive, capacitive, photoelectric and ultrasonic sensors. These mounting clamps made of PC are ideal for on-location installation of sensors in the vertical or horizontal direction in the materials handling industry.



### Mounting clamp with ball joint

for cylindrical sensors with **M18** external thread

#### **BAM00T3**

BOS 18,0-KB-1

### Mounting clamp With ball joint

for cylindrical sensors with **M30** external thread

#### **BAM00TN**

BOS 30,0-KB-1

### Reducing sleeve for reducing from 12 mm to 10 mm

For sensors  $\varnothing 10$  mm for installation in mounting clamps and clamps  $\varnothing 12$  mm

#### **BAM002H**

BMS AD-P-001-12/10

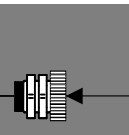
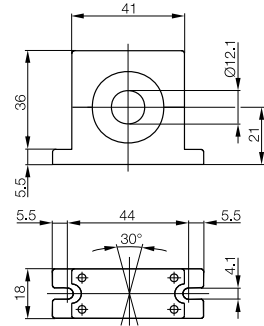
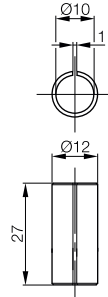
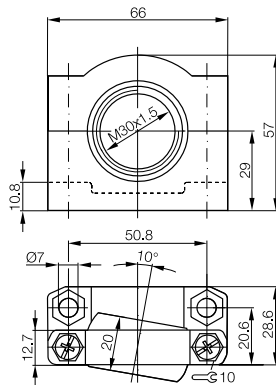
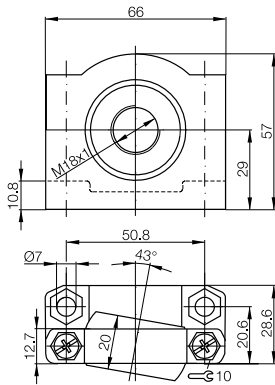
PC

### Mounting cuff

for cylindrical sensors with **M12** external thread

#### **BAM01KM**

BOS 12,0-KB-1



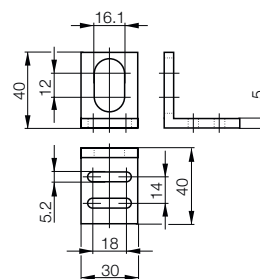
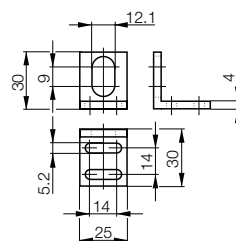
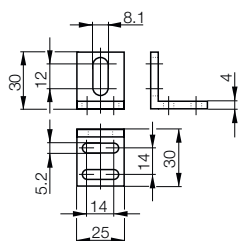
- Fasteners
- Selection guide for clamps
- Clamping Holders
- Protective End Caps
- Fixing Nuts
- Mounting Cuffs**
- Mounting Clamps**
- Reducing Sleeve
- Mounting Brackets
- Mounting Clamps for Row Mounting

# Fasteners

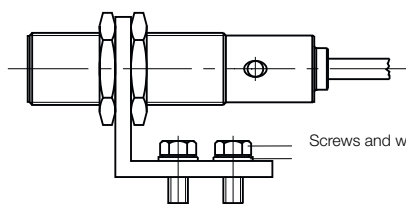
## Mounting brackets



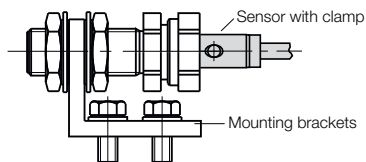
Description	<b>Mounting brackets</b>	<b>Mounting brackets</b>	<b>Mounting brackets</b>
Use	For sensors and clamps <b>M8</b>	For sensors and clamps <b>M12</b>	For sensors and clamps <b>M16</b>
<b>Ordering code</b>	<b>BAM009U</b>	<b>BAM00C0</b>	<b>BAM00EN</b>
Part number	BES 08,0-HW-1	BES 12,0-HW-1	BES 16,0-HW-1
Material	Anodized aluminum	Anodized aluminum	Anodized aluminum



These aluminum mounting brackets provide a way of easily and quickly attaching sensors to the machine. For cylindrical sensors, we recommend the additional use of clamps (see information beginning on page 288).



Screws and washers are not included.



Sensor with clamp

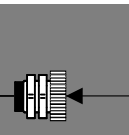
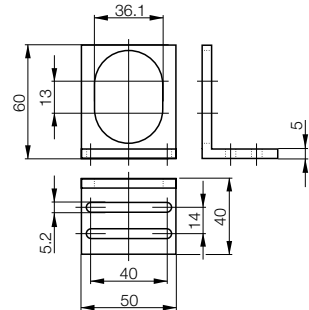
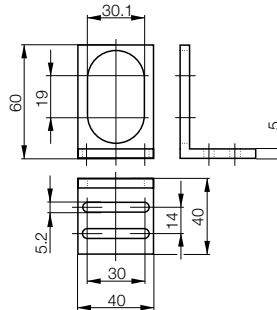
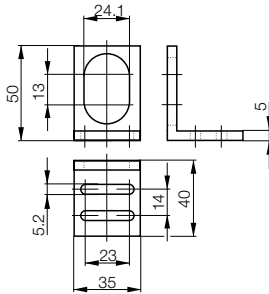
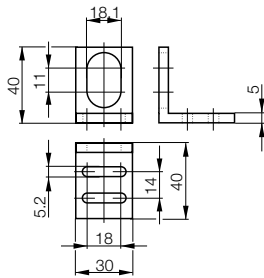
Mounting brackets

# Fasteners

## Mounting brackets



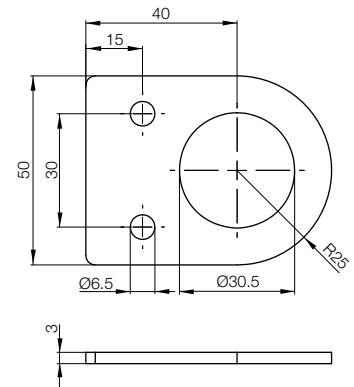
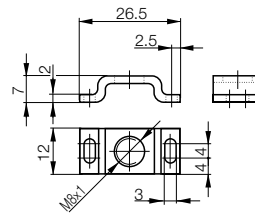
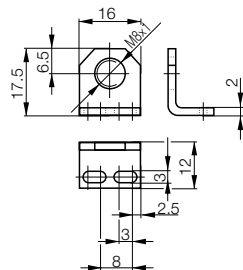
Mounting brackets	Mounting brackets	Mounting brackets	Mounting brackets
For <b>M18</b> sensors	For sensors and clamps <b>M24</b>	For <b>M30</b> sensors	For sensors and clamps <b>M36</b>
<b>BAM00EY</b>	<b>BAM00HA</b>	<b>BAM00HH</b>	<b>BAM00JK</b>
BES 18,0-HW-1	BES 24,0-HW-1	BES 30,0-HW-1	BES 36,0-HW-1
Anodized aluminum	Anodized aluminum	Anodized aluminum	Anodized aluminum



- Fasteners
- Selection guide for clamps
- Clamping Holders
- Protective End Caps
- Fixing Nuts
- Mounting Cuffs
- Mounting Clamps
- Reducing Sleeve
- Mounting Brackets**
- Mounting Clamps for Row Mounting



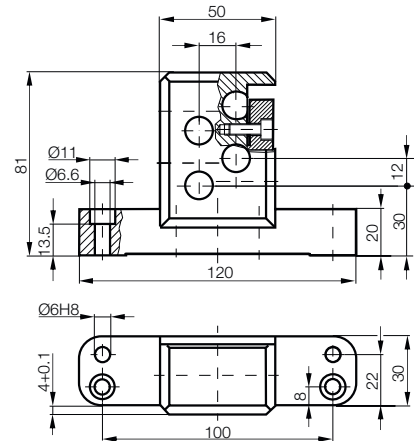
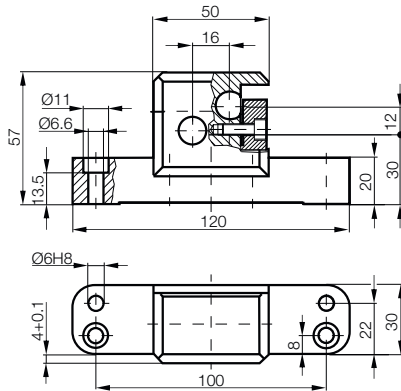
Description	Mounting brackets	Mounting brackets	Sensor holder
Use	For <b>M8x1</b> sensors	For <b>M8x1</b> sensors	For <b>M30</b> sensors
<b>Ordering code</b>	<b>BAM009W</b>	<b>BAM009Y</b>	<b>BAM01E0</b>
Part number	BES 08-HW-4	BES 08-HW-5	BAM MB-XA-004-M30-5
Material	Stainless steel	Stainless steel	Stainless steel



## Mounting clamps for row mounting



Description	<b>Clamp for M12 sensors</b>	<b>Clamp for M12 sensors</b>	
Use	Flush-mounted with 12 mm spacing, for cam tray with 12 mm spacing	Flush-mounted with 12 mm spacing, for cam tray with 12 mm spacing	
<b>Ordering code</b>	<b>BAM00CK</b>	<b>BAM00CL</b>	
Part number	BES 12-KB-602-02/12	BES 12-KB-602-04/12	
Switching points	2	4	
Clamping	M5 screw, galvanized, DIN 912	M5 screw, galvanized, DIN 912	
Ambient temperature	-25...+70 °C	-25...+70 °C	
Material	Mounting plate Al	Mounting clamp and fastening bracket EP (fiberglass reinforced)	



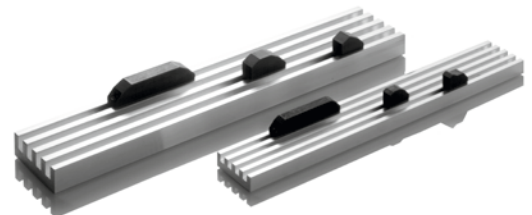
These mounting clamps allow you to arrange switch inserts in a pattern to be used in conjunction with Balluff cam trays as switching indicators for controllers.

The configuration corresponds to the switching points of our inductive multiple position switches. The flange is constructed so that the entire mounting clamp is interchangeable with our multiple position switches in housing design 602 as per DIN 43697.

- Mounting clamp with positive stop for inductive sensors
- Accepts standard M12 sensors
- Use of connector-type sensors is recommended for ease of installation
- Mounting clamp made of fiberglass reinforced epoxy, making it resistant to most coolants and lubricants



For **cams and cam trays**, please request our catalog "Object Detection – Mechanical and Inductive Multiple and Single Position Switches".



# Fasteners

## Mounting clamps for row mounting



### Clamp for M12 sensors

Flush-mounted with 12 mm spacing,  
for cam tray with 12 mm spacing

#### BAM00CM

BES 12-KB-602-06/12

6

M5 screw, galvanized, DIN 912

-25...+70 °C

Al

EP (fiberglass reinforced)

### Clamp for M12 sensors

Flush-mounted with 16 mm spacing,  
for cam tray with 16 mm spacing

#### BAM00CN

BES 12-KB-602-06/16

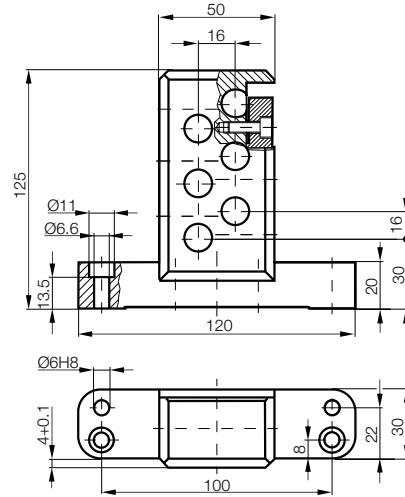
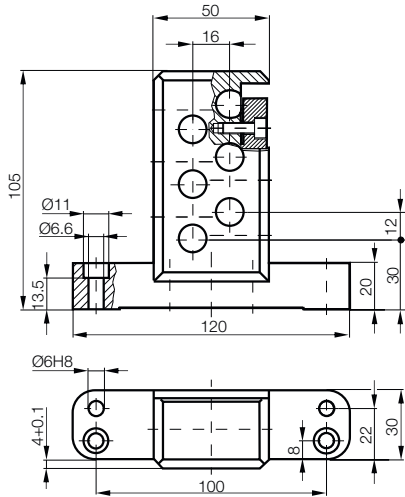
6

M5 screw, galvanized, DIN 912

-25...+70 °C

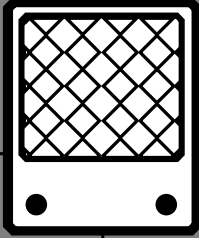
Al

EP (fiberglass reinforced)



- Fasteners
- Selection guide for clamps
- Clamping Holders
- Protective End Caps
- Fixing Nuts
- Mounting Cuffs
- Mounting Clamps
- Reducing Sleeve
- Mounting Brackets
- Mounting Clamps for Row Mounting**

BOS  
BUS  
BES  
BIS  
BSP  
BVS



Product-specific  
Accessories





# Product-specific Accessories

## Contents

### Photoelectric Sensors

Plastic Fiber Optics, Product Overview	
Plastic Fiber Optics, Through-beam	
Plastic Fiber Optics, Sensor	
Plastic Fiber Optics, True Color Sensor	
Plastic Fiber Optics, User-fabricated	
Adapter, Holder, Optics, Cutting Tool	
Lenses, Deflection Head, Metal Corrugated Tube	
Glass Fiber Optics, Product Overview	
Glass Fiber Optics, Through-beam	
Glass Fiber Optics, Sensor	

### Reflectors

Round	
Rectangular	
For Special Applications	
For Laser Retroreflective Sensors	
Reflective Foils	

### Sensors

Aperture Diaphragms	
Slit Diaphragms	
Weld Protection	
Air Shields	
Lenses, Intermediate Ring	
Protective End Caps	
Deflection Heads	
Diagonal Mirrors, Deflector	

### Fasteners

Mounting Brackets	
Sensor Holders	
Holder System	
Clamps, Adapter Plate, Cover Bracket	

### Positive Stops and Contact Protector

314 Positive Stop, Mounting Cuff for Positive Stop	368
316 Contact Protectors	370
324 Tube Switch	372

### Ultrasonic Sensors

332 Sound Deflection Angle	376
333 Focussing Attachments	378
334 Programming Device	379

### Uni/Unicompact Sensors

Mounting Plate	380
Mounting Aids	381
340 Holder System	382
341 Weld Protection, Safety Guard	383

### Industrial RFID Systems

346 Protective Cover, Mounting Bracket	384
Mounting Plate and Set	385
Antenna Holder	386
348 Mounting Brackets, Shield	387
349 Mounting Set	388
351 Connection Cable, Handle	389

### Position and Distance Measurement

353 Sensor Guide	390
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### Protective End Caps and Nuts

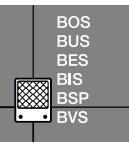
Protective End Caps	392
Spacers	393
358 Nuts	394
364 Sealing Nut	394

### Pressure Sensors

Adapters	396
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### Vision Sensors

Mounting Brackets	398
3D Holder System	401
Locking Device, Display Housing	402
Protective Housing	403





Fiber optics are generally available in a diffuse sensor or through-beam design.

The diffuse sensors have an integrated emitter and receiver fiber at the optical head; the through-beam sensors use two separate optical fibers.

It is easy to see why optical fibers are so commonly used: The variety of end configurations, with straight or angled light exit, flexible optical head or coaxial fiber arrangement, the various fiber diameters and the ability to trim them to the desired length.

**Another plus**

For complete flexibility, there are also fiber optics for user assembly; the length of the duplex cable can be trimmed as needed and can be combined with various end fittings as desired.

**Applications**



- Small parts detection
- For tight mounting conditions
- Inspecting parts features
- Counting (e.g. counting drops)
- Precise parts positioning
- Handling and assembly technology
- Robotics

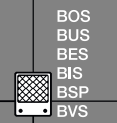


# Photoelectric Sensors

## Plastic fiber optics

### Product overview

Type		Optical head	Light exit		Fiber arrangement			Core diameter				Features			Page
			straight	90°	Standard	Coaxial	Light grids	1.5 mm	1.0 mm	0.5 mm	0.25 mm	Bendable optical tip	Extended temperature range	Highly flexible	
 <b>Through-beam fiber optics</b>															
<b>BFO005M</b>	BFO D22-LA-KB-EAK-10-02	M4	■		■			■							316
<b>BFO005T</b>	BFO D22-LAH-KB-EAK-10-02	M4	■		■			■						■	316
<b>BFO005W</b>	BFO D22-LAT-KB-EAK-10-02	M4	■		■			■					■		316
<b>BFO005U</b>	BFO D22-LAP-KB-EAK-15-02	M4	■		■		■								317
<b>BFO0002</b>	BFO D22-LA-TB-EAK-10-02	M4	■		■			■				■			317
<b>BFO005N</b>	BFO D22-LA-NB-PZK-10-02	M4	■		■			■				■			317
<b>BFO00AW</b>	BFO D22-LAH-BK-EAK-10-02	M4		■	■			■						■	317
<b>BFO005R</b>	BFO D22-LA-RB-EAK-10-02	M3	■		■			■							318
<b>BFO000C</b>	BFO N22-LA-FB-EAK-05-01	M2	■		■				■						318
<b>BFO00AY</b>	BFO D22-LAT-YB-EAK-10-0,5	Ø3		■	■			■					■		318
<b>BFO005P</b>	BFO D22-LA-QB-PAK-05-02	Ø3		■	■			■							319
<b>BFO0057</b>	BFO D13-LA-WB-EAK-05-02	Ø3		■	■			■							319
<b>BFO0051</b>	BFO D10-LA-CB-EAK-05-02	Ø2	■		■				■						319
<b>BFO0056</b>	BFO D13-LA-QB-EAK-05-02	Ø2		■	■				■						319
<b>BFO00AP</b>	BFO D22-LA-GD-EAK-52-02	10×10	■			■				■					320
<b>BFO005H</b>	BFO D22-LA-AD-EAK-52-02	20×10	■			■				■					320
<b>BFO005K</b>	BFO D22-LA-BD-EAK-52-02	15×15		■		■				■					320
<b>BFO0067</b>	BFO D25-LA-CD-EAK-110-02	19×25	■		■					■					321
<b>BFO00C5</b>	BFO D25-LA-ED-EAK-250-0,5	19×38		■		■				■					321
<b>BFO0068</b>	BFO D25-LA-ED-EAK-250-02	19×38		■		■				■					321
<b>BFB00C8</b>	BFO D25 LA-HD-EAK-465-02	23×55		■		■				■					321
<b>BFO0058</b>	BFO D13-LG-05-EAK-30-02	15×41		■						■					322
<b>BFO0059</b>	BFO D13-LG-10-EAK-30-02	20×32		■						■					322
<b>BFO000E</b>	BFO D22-LAH-ZB-EAK-10-02	5×4		■	■			■					■		322
<b>BFO00C6</b>	BFO D10-LAH-CK-EAK-05-02	11×6		■	■				■				■		323
<b>BFO00C7</b>	BFO D10-LAH-DK-EAK-05-02	13×7		■	■				■				■		323
 <b>Diffuse sensor fiber optics</b>															
<b>BFO0061</b>	BFO D22-XA-LB-EAK-20-02	M6	■		■			■							324
<b>BFO0063</b>	BFO D22-XAH-LB-EAK-20-02	M6	■		■			■					■		324
<b>BFO0065</b>	BFO D22-XAT-LB-EAK-20-02	M6	■		■			■				■			324
<b>BFO0064</b>	BFO D22-XAP-LB-EAK-30-02	M6	■		■		■								325
<b>BFO0066</b>	BFO D22-XB-LB-EAK-15-02	M6	■			■		■							325
<b>BFO0007</b>	BFO D22-XBF-LB-EAK-15-02	M6	■			■		■					■		325
<b>BFO0004</b>	BFO D22-XA-SB-EAK-20-02	M6	■		■			■				■			325
<b>BFO0003</b>	BFO D22-XA-DB-EAK-20-01	M6	■		■			■							325
<b>BFO0005</b>	BFO D22-XA-UB-EAK-20-02	M4	■		■			■							326
<b>BFO0006</b>	BFO D22-XB-UB-EAK-15-02	M4	■			■		■							326
<b>BFO0055</b>	BFO D10-XAH-KB-EAK-10-02	M4	■		■			■					■		326
<b>BFO005C</b>	BFO D13-XB-KB-EAK-10-02	M4	■			■			■						327
<b>BFO0053</b>	BFO D10-XA-HB-EAK-10-02	M4	■		■				■			■			327
<b>BFO0054</b>	BFO D10-XA-RB-EAK-10-02	M3	■		■				■						327
<b>BFO005E</b>	BFO D13-XB-RB-EAK-10-02	M3	■			■			■						327
<b>BFO00C3</b>	BFO D10-XA-VB-EAK-10-02	M3	■		■			■				■			327
<b>BFO0052</b>	BFO D10-XA-GB-EAK-10-02	M3	■		■				■			■			328
<b>BFO005A</b>	BFO D13-XA-JB-EAK-20-02	Ø3	■		■			■							328
<b>BFO0062</b>	BFO D22-XA-MB-PAK-10-02	Ø3		■	■				■						328
<b>BFO00CA</b>	BFO D22-XA-EK-PAK-10-02	Ø3		■	■				■						329
<b>BFO00AT</b>	BFO D13-XB-AB-EAK-10-01	Ø2.5	■			■		■							329
<b>BFO00AR</b>	BFO D13-XV-AK-EAK-50-02	13×20		■				■							329
<b>BFO005Z</b>	BFO D22-XA-CD-EAK-110-02	19×25	■			■				■					329
<b>BFO0060</b>	BFO D22-XA-ED-EAK-250-02	19×38		■		■				■					329



Product-specific accessories

Photoelectric Sensors

Plastic fiber optics

Adapter, Holder, Optics, Cutting Tool, Lenses, Deflection Head, Metal Corrugated Tube

Glass Fiber Optics

Reflectors

Sensors

Fasteners

Positive Stops and Contact Protector

Ultrasonic Sensors

Uni/Unicompact Sensors

Industrial RFID Systems

Position and Distance Measurement

Protective End Caps and Nuts

Pressure Sensors

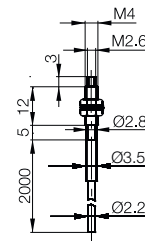
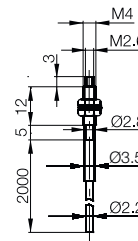
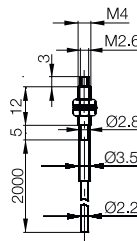
Vision Sensors



Optical head		M4 thread	M4 thread	M4 thread
Features		Standard	Highly flexible	Temperature rated
Straight light exit	<b>Ordering code</b>	<b>BFO005M</b>	<b>BFO005T</b>	<b>BFO005W</b>
	Part number	BFO D22-LA-KB-EAK-10-02	BFO D22-LAH-KB-EAK-10-02	BFO D22-LAT-KB-EAK-10-02
90° light exit	<b>Ordering code</b>			
	Part number			
Sheathing Ø		2.2 mm	2.2 mm	2.2 mm
Core Ø		1 mm	1 mm	1 mm
Fiber length		2 m	2 m	2 m
Fiber bending radius		≥ 25 mm	≥ 2 mm	≥ 25 mm
Head bending radius				
Temperature range		-55...+70 °C	-40...+70 °C	-55...+105 °C
Range	with BFB 75K-001	500 mm	300 mm	600 mm
	with BFB 75K-002*	500 mm	300 mm	600 mm
	with BFB 73K	500 mm	300 mm	500 mm
	with BFB 6K	220 mm	200 mm	230 mm
	with BFB 18KF	120 mm	90 mm	120 mm

Packaging unit: 2

\*Max. range in standard mode



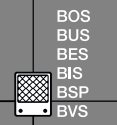
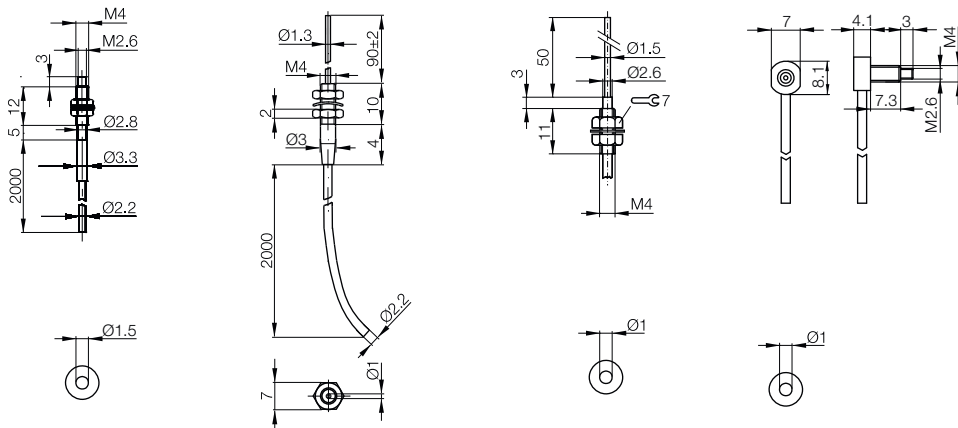
# Photoelectric Sensors

## Plastic fiber optics

### Through-beam



M4 thread	M4 thread	M4 thread	M4 thread	
<b>Long range</b>	<b>Bendable optical tip</b>	<b>Bendable optical tip</b>	<b>Highly flexible</b>	
<b>BFO005U</b>	<b>BFO0002</b>	<b>BFO005N</b>		
BFO D22-LAP-KB-EAK-15-02	BFO D22-LA-TB-EAK-10-02	BFO D22-LA-NB-PZK-10-02		
			<b>BFO00AW</b>	
			BFO D22-LAH-BK-EAK-10-02	
2.2 mm	2.2 mm	2.2 mm	2.2 mm	
1.5 mm	1 mm	1 mm	1 mm	
2 m	2 m	2 m	2 m	
≥ 40 mm	≥ 25 mm	≥ 25 mm	≥ 2 mm	
	≥ 10 mm	≥ 10 mm		
-55...+70 °C	-30...+60 °C	-55...+70 °C	-40...+70 °C	
800 mm	450 mm	500 mm	250 mm	
800 mm	450 mm	500 mm	250 mm	
800 mm	400 mm	500 mm	250 mm	
500 mm	200 mm	250 mm	170 mm	
250 mm	110 mm	120 mm	80 mm	



Product-specific accessories

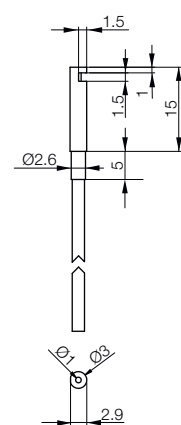
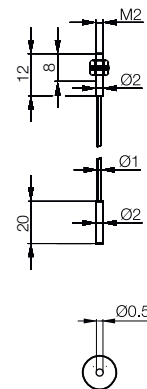
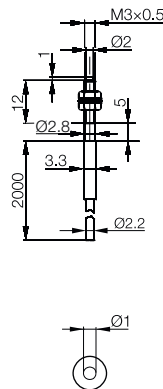
- Photoelectric Sensors
- Plastic fiber optics**
- Adapter, Holder, Optics, Cutting Tool, Lenses, Deflection Head, Metal Corrugated Tube
- Glass Fiber Optics
- Reflectors
- Sensors
- Fasteners
- Positive Stops and Contact Protector
- Ultrasonic Sensors
- Uni/Unicomact Sensors
- Industrial RFID Systems
- Position and Distance Measurement
- Protective End Caps and Nuts
- Pressure Sensors
- Vision Sensors



Optical head		M3 thread	M2 thread	Ø 3
Features		Standard	Precision	Temperature rated
Straight light exit	<b>Ordering code</b>	<b>BFO005R</b>	<b>BFO000C</b>	
	Part number	BFO D22-LA-RB-EAK-10-02	BFO N22-LA-FB-EAK-05-01	
90° light exit	<b>Ordering code</b>			<b>BFO00AY</b>
	Part number			BFO D22-LAT-YB-EAK-10-0,5
Sheathing Ø		2.2 mm	1 mm	2.2 mm
Core Ø		1 mm	0.5 mm	1 mm
Fiber length		2 m	2 m	0.5 m
Fiber bending radius		≥ 25 mm	≥ 10 mm	≥ 25 mm
Temperature range		-55...+70 °C	-30...+60 °C	-55...+70 °C
Range	with BFB 75K-001	500 mm	140 mm	600 mm
	with BFB 75K-002*	500 mm	140 mm	600 mm
	with BFB 73K	450 mm	130 mm	500 mm
	with BFB 6K	220 mm	50 mm	230 mm
	with BFB 18KF	100 mm	20 mm	120 mm

Packaging unit: 2

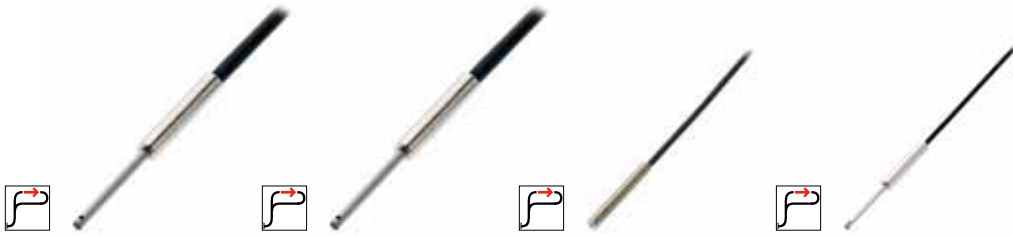
\*Max. range in standard mode



# Photoelectric Sensors

## Plastic fiber optics

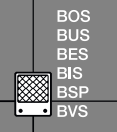
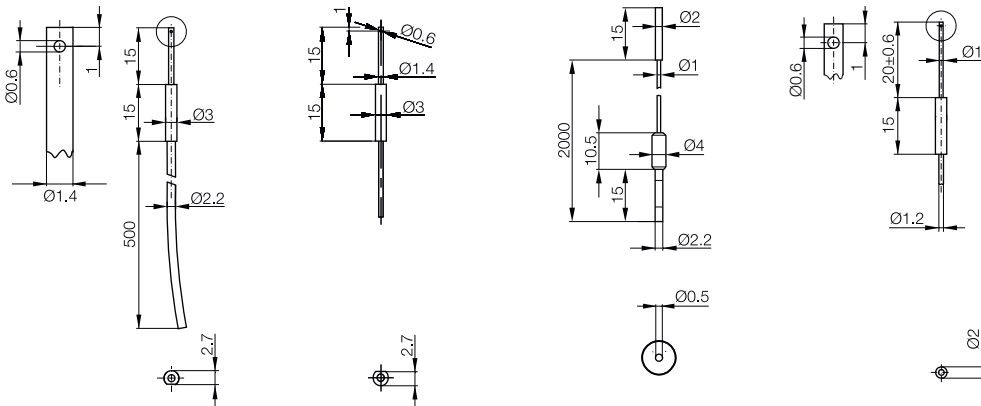
### Through-beam



	<b>Ø 3</b> <b>Light exit on side</b>		<b>Ø 3</b> <b>Standard</b>		<b>Ø 2</b> <b>Precision</b> <b>BFO0051</b>		<b>Ø 2</b> <b>Light exit on side</b>
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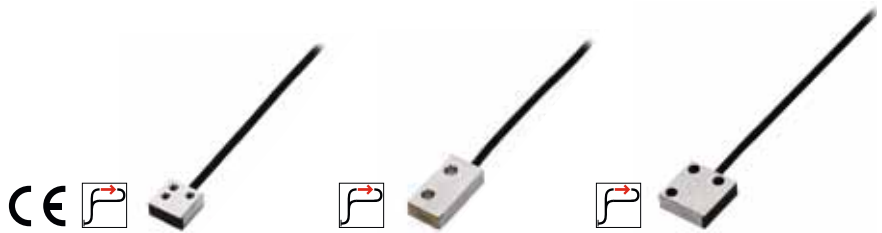
BFO D10-LA-CB-EAK-05-02

<b>BFO005P</b>	<b>BFO0057</b>	<b>BFO0051</b>	<b>BFO0056</b>
BFO D22-LA-QB-PAK-05-02	BFO D13-LA-WB-EAK-05-02		BFO D13-LA-QB-EAK-05-02
2.2 mm	1.3 mm	1 mm	1.3 mm
1 mm	1 mm	0.5 mm	0.5 mm
2 m	2 m	2 m	2 m
≥ 25 mm	≥ 25 mm	≤ 15 m	≥ 15 mm
-40...+70 °C	-40...+70 °C	-55...+70 °C	-35...+65 °C
120 mm	75 mm	130 mm	110 mm
120 mm	75 mm	130 mm	110 mm
115 mm	70 mm	120 mm	105 mm
65 mm	-	-	-
35 mm	20 mm	-	25 mm



Product-specific accessories

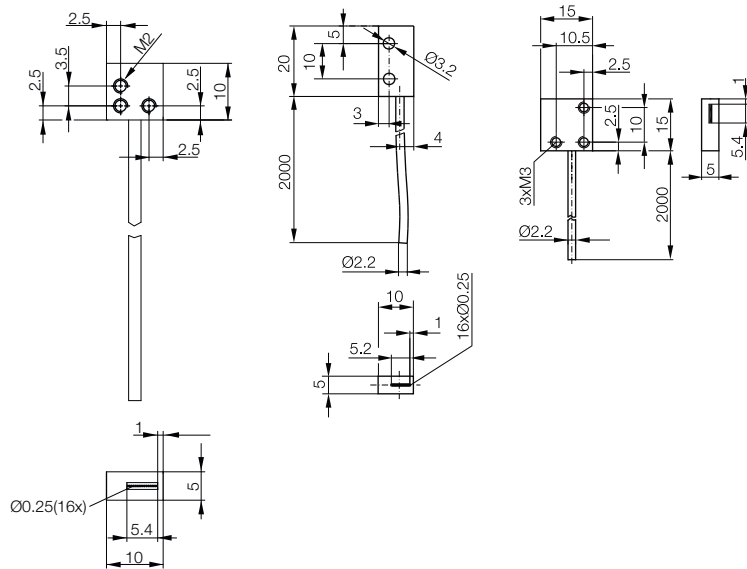
- Photoelectric Sensors
- Plastic fiber optics**
- Adapter, Holder, Optics, Cutting Tool, Lenses, Deflection Head, Metal Corrugated Tube
- Glass Fiber Optics
- Reflectors
- Sensors
- Fasteners
- Positive Stops and Contact Protector
- Ultrasonic Sensors
- Uni/Unicompact Sensors
- Industrial RFID Systems
- Position and Distance Measurement
- Protective End Caps and Nuts
- Pressure Sensors
- Vision Sensors



Optical head		<b>10×10 mm</b>	<b>20×10 mm</b>	<b>15×15 mm</b>	
Features		<b>Light grids</b>	<b>Light grids</b>	<b>Light grids</b>	
Straight light exit	<b>Ordering code</b>	<b>BFO00AP</b>	<b>BFO005H</b>		
	Part number	BFO D22-LA-GD-EAK-52-02	BFO D22-LA-AD-EAK-52-02		
90° light exit	<b>Ordering code</b>			<b>BFO005K</b>	
	Part number			BFO D22-LA-BD-EAK-52-02	
Sheathing Ø		2.2 mm	2.2 mm	2.2 mm	
Core Ø		16×0.25 mm	16×0.25 mm	16×0.25 mm	
Fiber length		2 m	2 m	2 m	
Fiber bending radius		≥ 25 mm	≥ 25 mm	≥ 25 mm	
Temperature range		-55...+70 °C	-35...+65 °C	-55...+70 °C	
Range	with BFB 75K-001	600 mm	450 mm	400 mm	
	with BFB 75K-002*	600 mm	450 mm	400 mm	
	with BFB 73K	600 mm	400 mm	350 mm	
	with BFB 6K	350 mm	220 mm	180 mm	
	with BFB 18KF	230 mm	130 mm	110 mm	

Packaging unit: 2

\*Max. range in standard mode

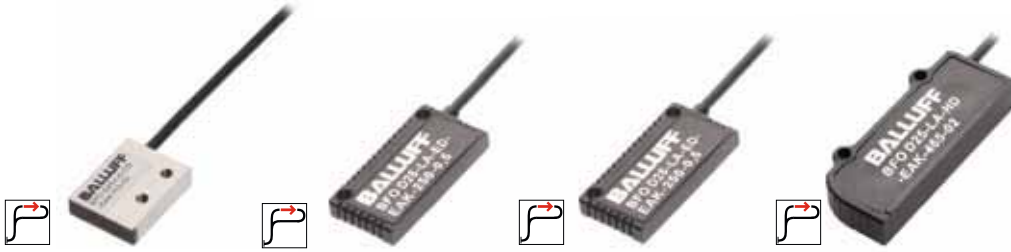




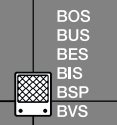
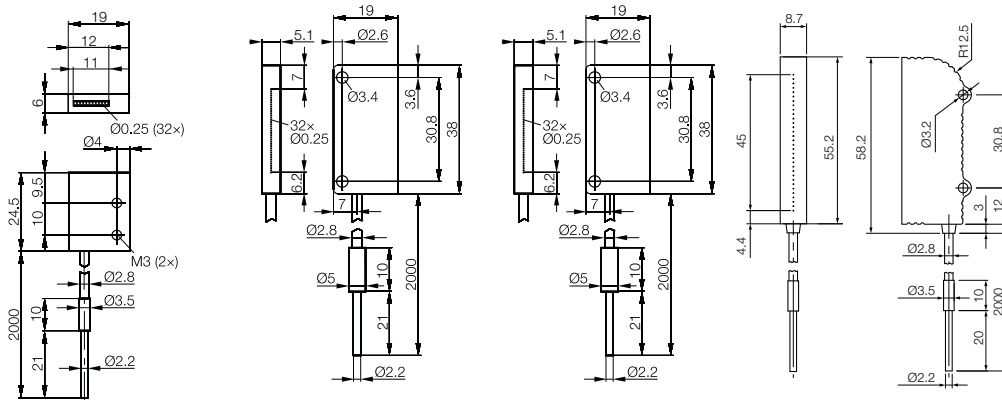
# Photoelectric Sensors

## Plastic fiber optics

### Through-beam

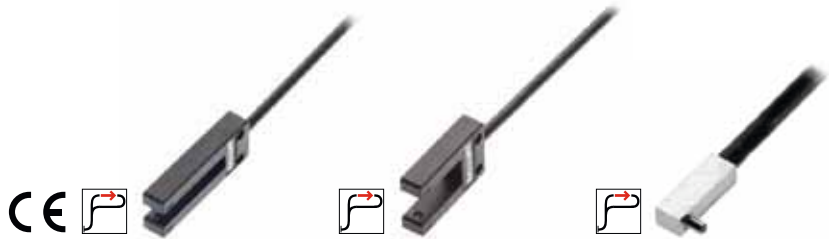


19x25 mm	19x38 mm	19x38 mm	23x55 mm	
<b>Light grids</b>	<b>Light grids</b>	<b>Light grids</b>	<b>Light grids</b>	
<b>BFO0067</b>	<b>BFO00C5</b>	<b>BFO0068</b>	<b>BFO00C8</b>	
BFO D25-LA-CD-EAK-110-02	BFO D25-LA-ED-EAK-250-0,5	BFO D25-LA-ED-EAK-250-02	BFO D25 LA-HD-EAK-465-02	
2.8 mm	2.8 mm	2.8 mm	2.8 mm	
32x0.25 mm	32x0.25 mm	32x0.25 mm	32x0.25 mm	
2 m	0.5 m	2 m	2 m	
≥ 10 mm	≥ 60 mm	≥ 60 mm	≥ 60 mm	
-55...+70 °C	-55...+70 °C	-55...+70 °C	-55...+70 °C	
600 mm	550 mm	550 mm	550 mm	
600 mm	550 mm	550 mm	550 mm	
600 mm	550 mm	550 mm	550 mm	
350 mm	360 mm	360 mm	360 mm	
230 mm	210 mm	210 mm	210 mm	



Product-specific accessories

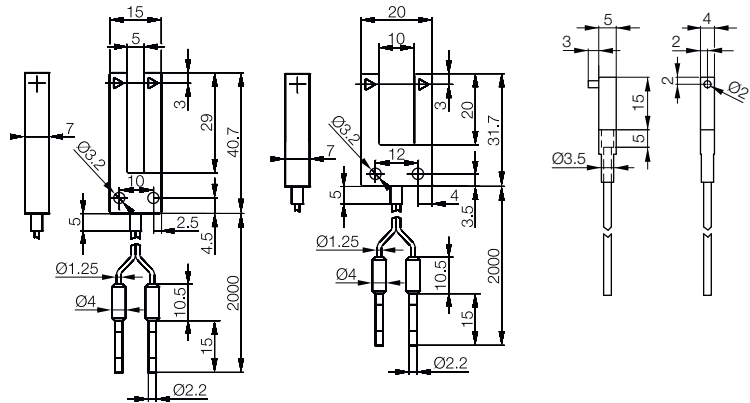
- Photoelectric Sensors
- Plastic fiber optics**
- Adapter, Holder, Optics, Cutting Tool, Lenses, Deflection Head, Metal Corrugated Tube
- Glass Fiber Optics
- Reflectors
- Sensors
- Fasteners
- Positive Stops and Contact Protector
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- Pressure Sensors
- Vision Sensors



Optical head		15x41 mm	20x32 mm	5x4 mm
Features		Fork	Fork	Highly flexible
90° light exit	<b>Ordering code</b>	<b>BFO0058</b>	<b>BFO0059</b>	<b>BFO000E</b>
	Part number	BFO D13-LG-05-EAK-30-02	BFO D13-LG-10-EAK-30-02	BFO D22-LAH-ZB-EAK-10-02
Sheathing Ø		2x1.25 mm	2x1.25 mm	2.2 mm
Core Ø		2x0.25 mm	2x0.25 mm	1 mm
Fiber length		2 m	2 m	2 m
Fiber bending radius		≥ 10 mm	≥ 10 mm	≥ 2 mm
Temperature range		-55...+70 °C	-55...+70 °C	-55...+70 °C
Range	with BFB 75K-001	5 mm	10 mm	300 mm
	with BFB 75K-002*	5 mm	10 mm	300 mm
	with BFB 73K	5 mm	10 mm	300 mm
	with BFB 6K	5 mm	10 mm	200 mm
	with BFB 18KF	5 mm	10 mm	90 mm

Packaging unit: 2

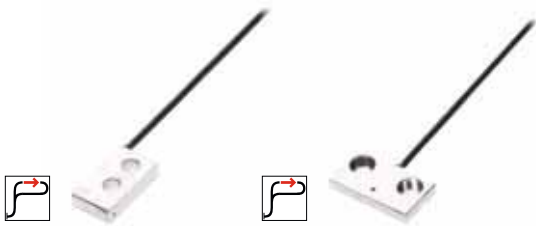
\*Max. range in standard mode



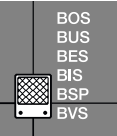
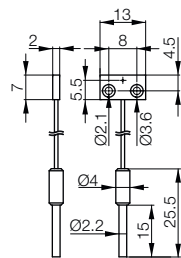
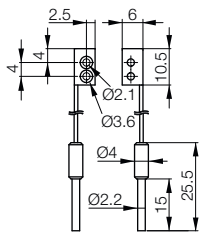
# Photoelectric Sensors

## Plastic fiber optics

### Through-beam



11×6 mm	13×7 mm			
Highly flexible	Highly flexible			
<b>BFO00C6</b>	<b>BFO00C7</b>			
BFO D10-LAH-CK-EAK-05-02	BFO D10-LAH-DK-EAK-05-02			
1 mm	1 mm			
0.5 mm	0.5 mm			
2 m	2 m			
≥ 1 mm	≥ 1 mm			
-40...+70 °C	-40...+70 °C			
55 mm	50 mm			
55 mm	50 mm			
45 mm	40 mm			
-	-			
20 mm	20 mm			



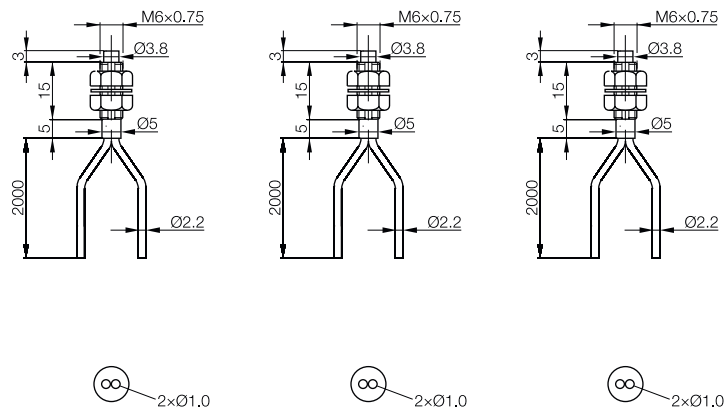
Product-specific accessories

- Photoelectric Sensors
- Plastic fiber optics**
- Adapter, Holder, Optics, Cutting Tool, Lenses, Deflection Head, Metal Corrugated Tube
- Glass Fiber Optics
- Reflectors
- Sensors
- Fasteners
- Positive Stops and Contact Protector
- Ultrasonic Sensors
- Uni/Unicompact Sensors
- Industrial RFID Systems
- Position and Distance Measurement
- Protective End Caps and Nuts
- Pressure Sensors
- Vision Sensors



Optical head		<b>M6 thread Standard</b>	<b>M6 thread Highly flexible</b>	<b>M6 thread Temperature rated</b>	
Features					
Straight light exit	<b>Ordering code</b>	<b>BFO0061</b>	<b>BFO0063</b>	<b>BFO0065</b>	
	Part number	BFO D22-XA-LB-EAK-20-02	BFO D22-XAH-LB-EAK-20-02	BFO D22-XAT-LB-EAK-20-02	
Sheathing Ø		2x2.2 mm	2x2.2 mm	2x2.2 mm	
Core Ø		2x1 mm	2x1 mm	2x1 mm	
Fiber bending radius		≥ 25 mm	≥ 2 mm	≥ 25 mm	
Head bending radius					
Temperature range		-55...+70 °C	-40...+70 °C	-55...+115 °C	
Range	with BFB 75K-001	150 mm	120 mm	130 mm	
	with BFB 75K-002*	150 mm	120 mm	130 mm	
	with BFB 73K	150 mm	120 mm	130 mm	
	with BFB 6K	100 mm	70 mm	90 mm	
	with BFB 18KF	50 mm	30 mm	50 mm	

\*Max. range in standard mode

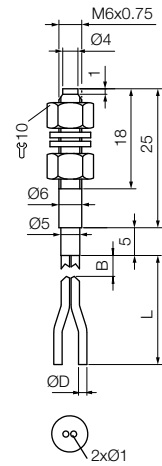
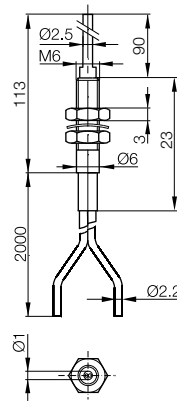
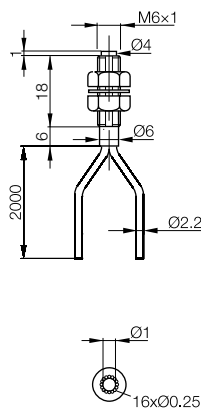
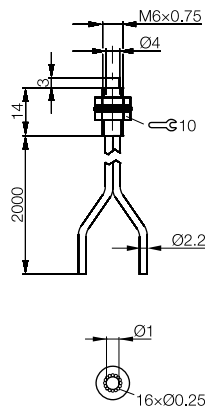
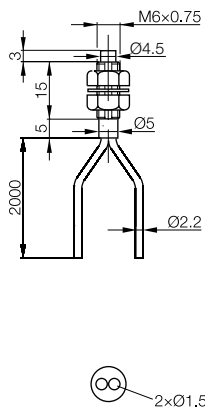


# Photoelectric Sensors

## Plastic fiber optics Sensors



M6 thread Long range BFO0064	M6 thread Coaxial BFO0066	M6 thread Coaxial, flexible BFO0007	M6 thread Bendable optical tip BFO0004	M6 thread Standard BFO0003
BFO D22-XAP-LB-EAK-30-02	BFO D22-XB-LB-EAK-15-02	BFO D22-XBF-LB-EAK-15-02	BFO D22-XA-SB-EAK-20-02	BFO D22-XA-DB-EAK-20-01
2x2.2 mm	2x2.2 mm	2x2.2 mm	2x2.2 mm	2x2.2 mm
2x1.5 mm	1x1 mm/16x0.25 mm	1x1 mm/16x0.25 mm	2x1 mm	2x1 mm
≥ 40 mm	≥ 25 mm	≥ 5 mm	≥ 25 mm	≥ 25 mm
			≥ 15 mm	
-55...+70 °C	-55...+70 °C	-40...+60 °C	-35...+65 °C	-40...+60 °C
180 mm	120 mm	110 mm	130 mm	150 mm
180 mm	120 mm	110 mm	130 mm	150 mm
180 mm	120 mm	120 mm	130 mm	150 mm
130 mm	80 mm	70 mm	90 mm	100 mm
100 mm	50 mm	30 mm	40 mm	50 mm



BOS  
BUS  
BES  
BIS  
BSP  
BVS

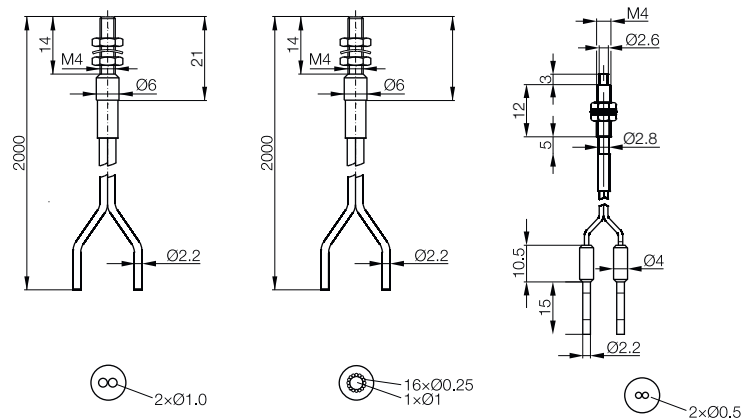
Product-specific accessories

- Photoelectric Sensors
- Plastic fiber optics**
- Adapter, Holder, Optics, Cutting Tool, Lenses, Deflection Head, Metal Corrugated Tube
- Glass Fiber Optics
- Reflectors
- Sensors
- Fasteners
- Positive Stops and Contact Protector
- Ultrasonic Sensors
- Uni/Unicompact Sensors
- Industrial RFID Systems
- Position and Distance Measurement
- Protective End Caps and Nuts
- Pressure Sensors
- Vision Sensors



Optical head		M4 thread	M4 thread	M4 thread
Features		Standard	Coaxial	Highly flexible
Straight light exit	Ordering code	BFO0005	BFO0006	BFO0055
	Part number	BFO D22-XA-UB-EAK-20-02	BFO D22-XB-UB-EAK-15-02	BFO D10-XAH-KB-EAK-10-02
Sheathing Ø		2x2.2 mm	2x2.2 mm	2x1 mm
Core Ø		2x1 mm	1x1 mm/16x0.25 mm	2x0.5 mm
Fiber bending radius		≥ 25 mm	≥ 25 mm	≥ 1 mm
Head bending radius				
Temperature range		-35...+65 °C	-40...+60 °C	-40...+70 °C
Range	with BFB 75K-001	120 mm	130 mm	40 mm
	with BFB 75K-002*	120 mm	130 mm	40 mm
	with BFB 73K	120 mm	130 mm	30 mm
	with BFB 6K	80 mm	90 mm	-
	with BFB 18KF	40 mm	50 mm	10 mm

\*Max. range in standard mode

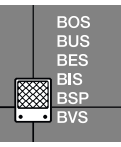
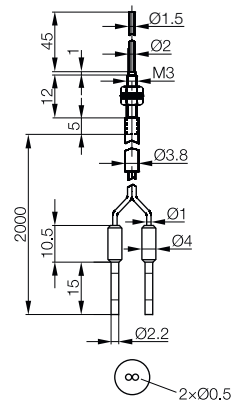
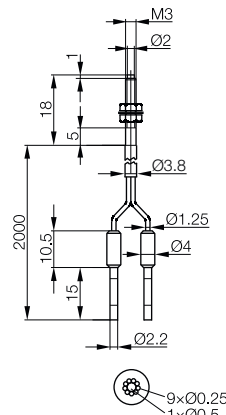
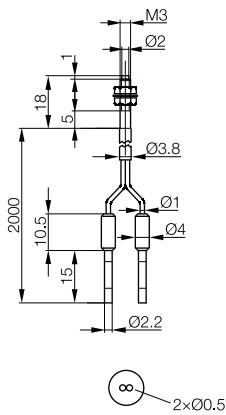
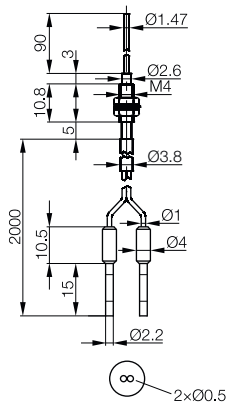
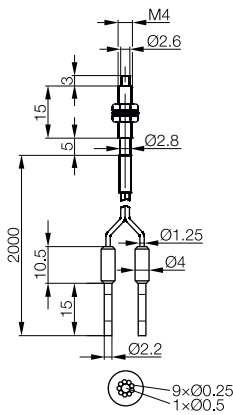


# Photoelectric Sensors

## Plastic fiber optics Sensors



M4 thread Coaxial BFO005C	M4 thread Bendable optical tip BFO0053	M3 thread Standard BFO0054	M3 thread Coaxial BFO005E	M3 thread Bendable optical tip BFO00C3
BFO D13-XB-KB-EAK-10-02	BFO D10-XA-HB-EAK-10-02	BFO D10-XA-RB-EAK-10-02	BFO D13-XB-RB-EAK-10-02	BFO D10-XA-VB-EAK-10-02
2x1.25 mm	2x1 mm	2x1 mm	2x1.25 mm	2x1 mm
1x0.5 mm/9x0.25 mm	2x0.5 mm	2x0.5 mm	1x0.5 mm/9x0.25 mm	2x0.5 mm
≥ 15 mm	≥ 15 mm	≥ 15 mm	≥ 15 mm	≥ 15 mm
≥ 10 mm	≥ 10 mm	≥ 10 mm	≥ 10 mm	≥ 10 mm
-55...+70 °C	-55...+70 °C	-55...+70 °C	-40...+60 °C	-55...+70 °C
60 mm	50 mm	50 mm	60 mm	50 mm
60 mm	50 mm	50 mm	60 mm	50 mm
60 mm	40 mm	40 mm	-	40 mm
-	-	-	-	-
20 mm	10 mm	10 mm	20 mm	10 mm



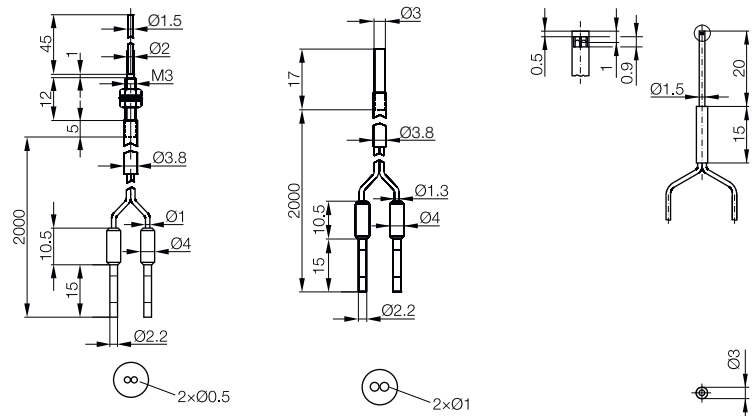
Product-specific accessories

- Photoelectric Sensors
- Plastic fiber optics**
- Adapter, Holder, Optics, Cutting Tool, Lenses, Deflection Head, Metal Corrugated Tube
- Glass Fiber Optics
- Reflectors
- Sensors
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- Pressure Sensors
- Vision Sensors



Optical head		<b>M3 thread</b>	<b>Ø 3 mm</b>	<b>Ø 3 mm</b>
Features		<b>Standard</b>	<b>Standard</b>	<b>Standard</b>
Straight light exit	<b>Ordering code</b>	<b>BFO0052</b>	<b>BFO005A</b>	
	Part number	BFO D10-XA-GB-EAK-10-02	BFO D13-XA-JB-EAK-20-02	
90° light exit	<b>Ordering code</b>			<b>BFO0062</b>
	Part number			BFO D22-XA-MB-PAK-10-02
Sheathing Ø		2×1 mm	2×1.3 mm	2×1 mm
Core Ø		2×0.5 mm	2×1 mm	2×0.5 mm
Fiber bending radius		≥ 15 mm	≥ 25 mm	≥ 25 mm
Head bending radius		≥ 10 mm		
Temperature range		-55...+70 °C	-55...+70 °C	-40...+70 °C
Range	with BFB 75K-001	50 mm	130 mm	35 mm
	with BFB 75K-002*	50 mm	130 mm	35 mm
	with BFB 73K	40 mm	130 mm	25 mm
	with BFB 6K	-	-	-
	with BFB 18KF	10 mm	50 mm	-

\*Max. range in standard mode



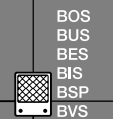
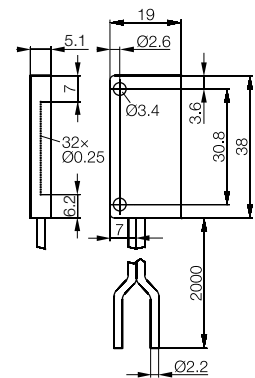
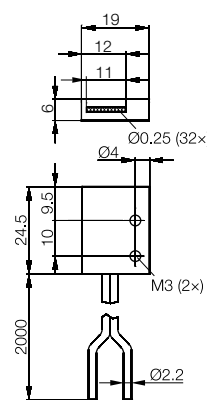
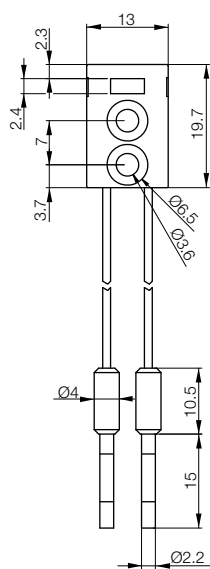
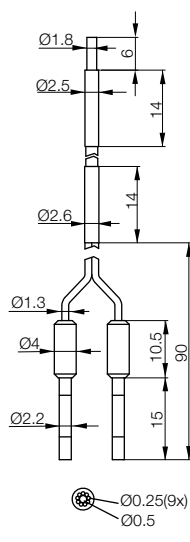
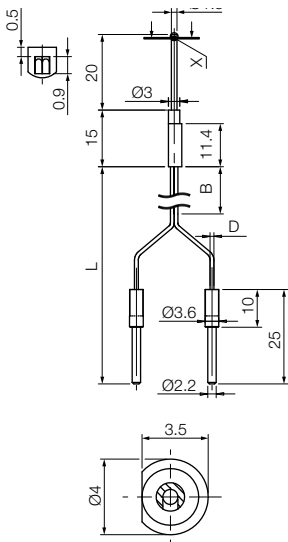


# Photoelectric Sensors

## Plastic fiber optics Sensors



Ø 3 mm Standard	Ø 2.5 mm Coaxial BFO00AT	13x20 mm Standard	19x25 mm Light grids BFO005Z	19x38 mm Light grids
	BFO D13-XB-AB-EAK-10-01		BFO D22-XA-CD-EAK-110-02	
<b>BFO00CA</b> BFO D22-XA-EK-PAK-10-02		<b>BFO00AR</b> BFO D13-XV-AK-EAK-50-02		<b>BFO0060</b> BFO D22-XA-ED-EAK-250-02
1 mm	2x1.3 mm	2x1.3 mm	2.2 mm	2.2 mm
2x0.5 mm	1x0.5 mm/9x0.25 mm	2x1 mm	32x0.25 mm	32x0.25 mm
≥ 25 mm	≥ 15 mm	≥ 25 mm	≥ 25 mm	≥ 25 mm
-40...+70 °C	-55...+70 °C	-55...+70 °C	-55...+70 °C	-55...+70 °C
35 mm	50 mm	1...6 mm	100 mm	90 mm
35 mm	50 mm	1...6 mm	100 mm	90 mm
35 mm	40 mm	1...6 mm	100 mm	90 mm
25 mm	-	-	70 mm	60 mm
-	10 mm	-	40 mm	30 mm



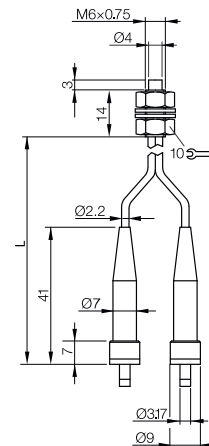
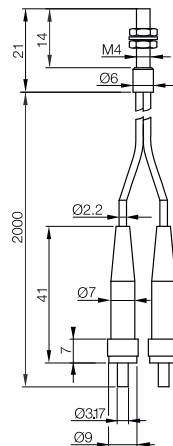
Product-specific accessories

- Photoelectric Sensors
- Plastic fiber optics**
- Adapter, Holder, Optics, Cutting Tool, Lenses, Deflection Head, Metal Corrugated Tube
- Glass Fiber Optics
- Reflectors
- Sensors
- Fasteners
- Positive Stops and Contact Protector
- Ultrasonic Sensors
- Uni/Unicompact Sensors
- Industrial RFID Systems
- Position and Distance Measurement
- Protective End Caps and Nuts
- Pressure Sensors
- Vision Sensors

Photoelectric Sensors  
**Plastic fiber optics**  
**True color sensor**



Description	<b>Optical fiber M4 with SMA connector</b>	<b>Optical fiber M6 with SMA connector</b>
Use	For BFS000L True Color sensor	For BFS000L True Color sensor
Length 1 m	<b>Ordering code</b>	<b>BFO00FP</b>
	Part number	BFO D22-XB-LB-EAK-15-SA1-01
Length 2 m	<b>Ordering code</b>	<b>BFO00C9</b>
	Part number	BFO D22-XB-UB-EAK-15-SA1-02
Length 5 m	<b>Ordering code</b>	<b>BFO00FN</b>
	Part number	BFO D22-XB-LB-EAK-15-SA1-05
Range/sensing distance with corresponding fiber optic cable	80 mm	80 mm
Packaging unit	1 pc.	1 pc.



# Plastic Fiber Optics

## Photoelectric Sensors Plastic fiber optics user-fabricated

### Individual solutions with user-fabricated plastic fiber optics

If you are not content with "off-the-shelf" solutions, we have a better suggestion.

Optical fibers can be user-cut to the desired length from a 20 m roll. This way you only use as much plastic optical fiber as you actually need. Considerable savings, especially if multiple sensors are used. For simple applications you may not need an end piece. A simple clamp will suffice. Or for convenience and flexibility, select from among the available end pieces. The plastic optical fiber is simply crimped into the end piece. Tedious gluing is eliminated. The end piece can be removed at any time.



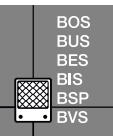
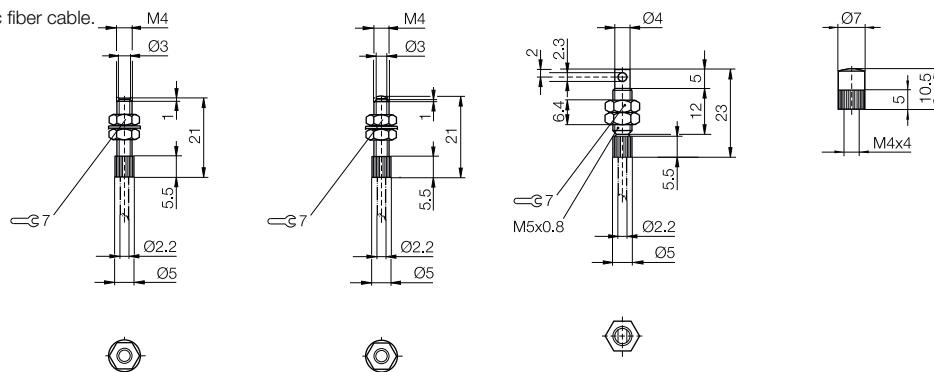
Size	<b>2.2x4.4 mm duplex wire</b>
Through-beam sensor range with L = 2 m	<b>150 mm</b>
Cable length	20 m
<b>Ordering code</b>	<b>BFO005Y</b>
Part number	BFO D22-LD-EAK-10-20
Sheathing Ø	2x1 mm
Core Ø	2.2 mm
Ambient temperature T <sub>a</sub>	-40...+85 °C
Tension on optical fiber and connection parts at 20 °C	6 N

Cutting tool BFO CT is included.



Size	<b>M4</b>	<b>M4</b>	<b>Ø 4 mm/M5</b>	<b>Ø 7 mm</b>
Features	End piece without lens	End piece with lens	90° end piece	Adapter lens
Used with	BFO D22-LD-EAK-10-...	BFO D22-LD-EAK-10-...	BFO D22-LD-EAK-10-...	BFO D22-LD-BC-10
Range	<b>150 mm</b>	<b>450 mm</b>	<b>150 mm</b>	<b>1500 mm</b>
<b>Ordering code</b>	<b>BFO005J</b>	<b>BFO005L</b>	<b>BFO005F</b>	<b>BAM00NW</b>
Part number	BFO D22-LA-BC-10	BFO D22-LA-CC-30	BFO D22-LA-AC-20	BFO 04-PK-1
Material	Optical surface: Plastic (fibers) Threaded tube: Stainless steel	Glass Stainless steel	Glass Stainless steel	Glass Stainless steel
Packaging unit	1 pc.	1 pc.	1 pc.	1 pc.

Range when used with 2 m plastic fiber cable.



Product-specific accessories

Photoelectric Sensors

**Plastic fiber optics**

Adapter, Holder, Optics, Cutting Tool, Lenses, Deflection Head, Metal Corrugated Tube

Glass Fiber Optics

Reflectors

Sensors

Fasteners

Positive Stops and Contact Protector

Ultrasonic Sensors

Uni/Unicompact Sensors

Industrial RFID Systems

Position and Distance Measurement

Protective End Caps and Nuts

Pressure Sensors

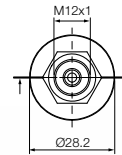
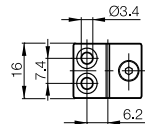
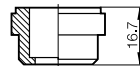
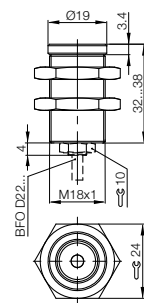
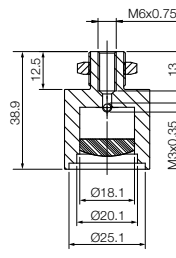
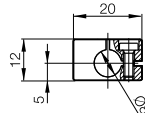
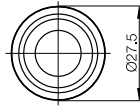
Vision Sensors

# Photoelectric Sensors

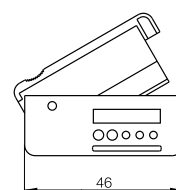
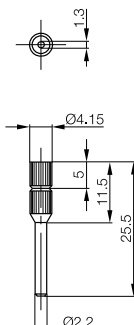
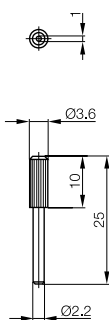
## Adapter, holder, optics, cutting tool



Description	<b>Adapters</b>	<b>Holder</b>	<b>Lens (Long Range)</b>	<b>Optics (adjustable)</b>
Use	For BFO 18V glass fiber optics for connecting to BOS 30M	For glass fiber optics and sensors with a corresponding diameter	For sensor BFO, coaxial. M6	screwed onto fiber optic BFO00C4, 200 mm True color sensor
<b>Ordering code</b>	<b>BAM00NM</b>	<b>BAM00P0</b>	<b>BAM020P</b>	<b>BAM01U2</b>
Part number	BFO 30-A1	BFO 08,0-KB-1	BAM LS-FO-003-M6-L	BAM LS-FO-002-F
Packaging unit	1 pc.	1 pc.	1 pc.	1 pc.



Description	<b>Adapters</b>	<b>Adapters</b>	<b>Cutting Tool</b>	
Use	For plastic fiber optics Ø 1 mm for connecting to fiber-optic base units	For plastic fiber optics Ø 1.3 mm for connecting to fiber-optic base units	For trimming plastic fiber optics Ø 1 mm or Ø 2.2 mm	
<b>Ordering code</b>	<b>BAM000J</b>	<b>BAM00P1</b>	<b>BAM000E</b>	
Part number	BFO D10-LA-DC-10	BFO D13-LA-EC-10	BFO CT	
Packaging unit	2 pcs.	2 pcs.	1 pc.	

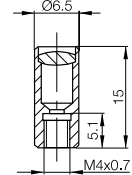
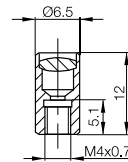
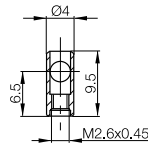
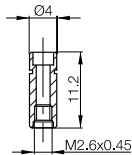


# Photoelectric Sensors

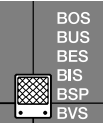
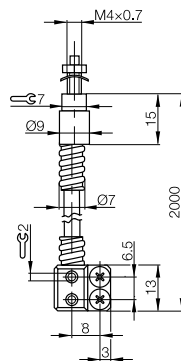
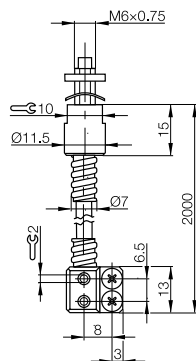
## Lenses, deflection head, metal corrugated tube



Description	<b>Adapter lens</b>	<b>90° deflection head</b>	<b>Focusing lens</b>	<b>Focusing lens</b>
Use	for through-beam optical fibers M2.6x0.45	for through-beam optical fibers M2.6x0.45	For coaxial diffuse sensor optical fibers M4x0.7	For coaxial diffuse sensor optical fibers M4x0.7
<b>Ordering code</b>	<b>BAM00NN</b>	<b>BAM00NP</b>	<b>BAM00NR</b>	<b>BAM00NT</b>
Part number	BFO 02-PK-1	BFO 02-UK-1	BFO 04-FL-1	BFO 04-FL-2
Range/sensing distance with corresponding fiber optic cable	x10	x0.7	19 mm±2 mm	7 mm±2 mm
Packaging unit	2 pcs.	2 pcs.	1 pc.	1 pc.



Description	<b>Metal corrugated tube (stainless steel)</b>	<b>Metal corrugated tube (stainless steel)</b>		
Use	For optical fiber M6x0.75	For optical fiber M4x0.7		
<b>Ordering code</b>	<b>BAM00NY</b>	<b>BAM00NU</b>		
Part number	BFO 06-FS-1	BFO 04-FS-1		
Packaging unit	1 pc.	1 pc.		



Product-specific accessories

Photoelectric Sensors  
 Plastic fiber optics  
 Adapter, Holder, Optics, Cutting Tool, Lenses, Deflection Head, Metal Corrugated Tube  
 Glass Fiber Optics  
 Reflectors  
 Sensors  
 Fasteners  
 Positive Stops and Contact Protector  
 Ultrasonic Sensors  
 Uni/Unicompact Sensors  
 Industrial RFID Systems  
 Position and Distance Measurement  
 Protective End Caps and Nuts  
 Pressure Sensors  
 Vision Sensors

The glass fiber optics in the BFO 18 series are designed for the cylindrical sensors in the BOS 18M series and are used wherever a high level of function reserve or chemical resistance is required. Likewise, temperatures over 200 °C pose no problem.

Various straight or right-angle versions are available with a polyurethane jacket, corrugated metal tube or silicon protective jacket.

**UZG type**

- Polyurethane jacket
- Strain relief
- Glass optical fiber bundle
- Flexible
- Excellent chemical resistance
- Does not become brittle from oils and cooling emulsions
- Temperature resistance -20...+85 °C

**MZG type**

- Corrugated metal armor
- Strain relief
- Glass optical fiber bundle
- Resistant to high temperatures -20...+170 °C (up to +250 °C for a fixed installation)
- Flexible
- Crush-resistant
- Resistant to hot swarf

**SMG type**

- Silicon protection jacket
- Corrugated metal armor with glass optical fiber bundle strain relief
- Extended temperature range
- -40...+150 °C
- Highly flexible
- Crush-resistant



# Photoelectric Sensors

## Glass fiber optics (BFO 18)

### Product overview

Type

		Max. sensing distance	Version		Light exit		Automotive approval	Page
			For BOS 18M-...-1PF-...	Through-beam	Sensors	straight		
<b>Through-beam fiber optics</b>								
<b>BFO001Z</b>	BFO 18A-LGG-MZG-10-0,5	400 mm	■					336
<b>BFO0020</b>	BFO 18A-LGG-MZG-10-1	400 mm	■					336
<b>BFO0023</b>	BFO 18A-LGG-SMG-10-0,5	400 mm	■					336
<b>BFO0024</b>	BFO 18A-LGG-SMG-10-1	400 mm	■					336
<b>BFO001P</b>	BFO 18A-LFF-MZG-10-0,5	400 mm	■			■		336
<b>BFO001R</b>	BFO 18A-LFF-MZG-10-1	400 mm	■			■		336
<b>BFO001U</b>	BFO 18A-LFF-SMG-10-0,5	400 mm	■			■		336
<b>BFO001W</b>	BFO 18A-LFF-SMG-10-1	400 mm	■			■		336
<b>BFO000M</b>	BFO 18A-LAA-UZG-20-0,5	700 mm	■					337
<b>BFO000N</b>	BFO 18A-LAA-UZG-20-1	700 mm	■					337
<b>BFO000F</b>	BFO 18A-LAA-MZG-20-0,5	700 mm	■					337
<b>BFO000H</b>	BFO 18A-LAA-MZG-20-1	700 mm	■					337
<b>BFO000Z</b>	BFO 18A-LCC-UZG-20-1	700 mm	■					337
<b>BFO000U</b>	BFO 18A-LCC-SMG-20-0,5	700 mm	■					337
<b>BFO000W</b>	BFO 18A-LCC-SMG-10-1	700 mm	■					337
<b>BFO001F</b>	BFO 18A-LEE-UZG-20-0,5	700 mm	■			■		337
<b>BFO001H</b>	BFO 18A-LEE-UZG-20-1	700 mm	■			■		337
<b>BFO0013</b>	BFO 18A-LEE-MZG-20-0,5	700 mm	■			■		337
<b>BFO0014</b>	BFO 18A-LEE-MZG-20-1	700 mm	■			■		337
<b>BFO0019</b>	BFO 18A-LEE-SMG-20-0,5	700 mm	■			■		337
<b>BFO001A</b>	BFO 18A-LEE-SMG-20-1	700 mm	■			■		337
<b>BFO003Y</b>	BFO 18V-LCC-MZG-23-0,5	2000 mm	■				■	337
<b>BFO003Z</b>	BFO 18V-LCC-MZG-23-0,75	2000 mm	■				■	337
<b>BFO0042</b>	BFO 18V-LCC-SMG-23-0,5	2000 mm	■				■	337
<b>BFO0047</b>	BFO 18V-LCC-MZG-23-0,75	2000 mm	■				■	337
<b>BFO004C</b>	BFO 18V-LDD-SMG-23-0,5	2000 mm	■				■	337
<b>BFO004F</b>	BFO 18V-LDD-SMG-23-1	2000 mm	■				■	337
<b>Diffuse sensor fiber optics</b>								
<b>BFO003R</b>	BFO 18A-XAG-MZG-15-0,5	50 mm		■	■			338
<b>BFO003T</b>	BFO 18A-XAG-MZG-15-1	50 mm		■	■			338
<b>BFO003H</b>	BFO 18A-XAF-MZG-15-0,5	50 mm		■		■		338
<b>BFO003J</b>	BFO 18A-XAF-MZG-15-1	50 mm		■		■		338
<b>BFO003M</b>	BFO 18A-XAF-SMG-15-0,5	50 mm		■		■		338
<b>BFO003N</b>	BFO 18A-XAF-SMG-15-1	50 mm		■		■		338
<b>BFO002M</b>	BFO 18A-XAA-UZG-30-0,5	100 mm		■		■		339
<b>BFO002N</b>	BFO 18A-XAA-UZG-30-1	100 mm		■		■		339
<b>BFO0026</b>	BFO 18A-XAA-MZG-30-0,5	100 mm		■		■		339
<b>BFO0027</b>	BFO 18A-XAA-MZG-30-1	100 mm		■		■		339
<b>BFO002F</b>	BFO 18A-XAA-SMG-30-0,5	100 mm		■		■		339
<b>BFO002H</b>	BFO 18A-XAA-SMG-30-1	100 mm		■		■		339
<b>BFO002W</b>	BFO 18A-XAC-SMG-30-1	100 mm		■		■		339
<b>BFO002U</b>	BFO 18A-XAC-SMG-30-0,5	100 mm		■		■		339
<b>BFO003C</b>	BFO 18A-XAE-UZG-30-0,5	100 mm		■			■	339
<b>BFO003E</b>	BFO 18A-XAE-UZG-30-1	100 mm		■			■	339
<b>BFO0031</b>	BFO 18A-XAE-MZG-30-0,5	100 mm		■			■	339
<b>BFO0032</b>	BFO 18A-XAE-MZG-30-1	100 mm		■			■	339
<b>BFO0037</b>	BFO 18A-XAE-SMG-30-0,5	100 mm		■			■	339
<b>BFO0038</b>	BFO 18A-XAE-SMG-30-1	100 mm		■			■	339
<b>BFO004M</b>	BFO 18V-XAC-MZG-30-0,5	200 mm		■		■		339
<b>BFO004P</b>	BFO 18V-XAC-SMG-30-0,5	200 mm		■		■		339
<b>BFO004R</b>	BFO 18V-XAC-SMG-30-1	200 mm		■		■		339
<b>BFO004U</b>	BFO 18V-XAD-MZG-30-0,5	200 mm		■			■	339
<b>BFO004Y</b>	BFO 18V-XAD-SMG-30-0,5	200 mm		■			■	339
<b>BFO004Z</b>	BFO 18V-XAD-SMG-30-1	200 mm		■			■	339

■ Ordering code

□ Part number



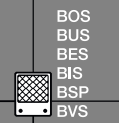
**Through-beam fiber optics**

<b>BFO001Z</b>	BFO 18A-LGG-MZG-10-0,5	400 mm	■					336
<b>BFO0020</b>	BFO 18A-LGG-MZG-10-1	400 mm	■					336
<b>BFO0023</b>	BFO 18A-LGG-SMG-10-0,5	400 mm	■					336
<b>BFO0024</b>	BFO 18A-LGG-SMG-10-1	400 mm	■					336
<b>BFO001P</b>	BFO 18A-LFF-MZG-10-0,5	400 mm	■			■		336
<b>BFO001R</b>	BFO 18A-LFF-MZG-10-1	400 mm	■			■		336
<b>BFO001U</b>	BFO 18A-LFF-SMG-10-0,5	400 mm	■			■		336
<b>BFO001W</b>	BFO 18A-LFF-SMG-10-1	400 mm	■			■		336
<b>BFO000M</b>	BFO 18A-LAA-UZG-20-0,5	700 mm	■					337
<b>BFO000N</b>	BFO 18A-LAA-UZG-20-1	700 mm	■					337
<b>BFO000F</b>	BFO 18A-LAA-MZG-20-0,5	700 mm	■					337
<b>BFO000H</b>	BFO 18A-LAA-MZG-20-1	700 mm	■					337
<b>BFO000Z</b>	BFO 18A-LCC-UZG-20-1	700 mm	■					337
<b>BFO000U</b>	BFO 18A-LCC-SMG-20-0,5	700 mm	■					337
<b>BFO000W</b>	BFO 18A-LCC-SMG-10-1	700 mm	■					337
<b>BFO001F</b>	BFO 18A-LEE-UZG-20-0,5	700 mm	■			■		337
<b>BFO001H</b>	BFO 18A-LEE-UZG-20-1	700 mm	■			■		337
<b>BFO0013</b>	BFO 18A-LEE-MZG-20-0,5	700 mm	■			■		337
<b>BFO0014</b>	BFO 18A-LEE-MZG-20-1	700 mm	■			■		337
<b>BFO0019</b>	BFO 18A-LEE-SMG-20-0,5	700 mm	■			■		337
<b>BFO001A</b>	BFO 18A-LEE-SMG-20-1	700 mm	■			■		337
<b>BFO003Y</b>	BFO 18V-LCC-MZG-23-0,5	2000 mm	■				■	337
<b>BFO003Z</b>	BFO 18V-LCC-MZG-23-0,75	2000 mm	■				■	337
<b>BFO0042</b>	BFO 18V-LCC-SMG-23-0,5	2000 mm	■				■	337
<b>BFO0047</b>	BFO 18V-LCC-MZG-23-0,75	2000 mm	■				■	337
<b>BFO004C</b>	BFO 18V-LDD-SMG-23-0,5	2000 mm	■				■	337
<b>BFO004F</b>	BFO 18V-LDD-SMG-23-1	2000 mm	■				■	337



**Diffuse sensor fiber optics**

<b>BFO003R</b>	BFO 18A-XAG-MZG-15-0,5	50 mm		■	■			338
<b>BFO003T</b>	BFO 18A-XAG-MZG-15-1	50 mm		■	■			338
<b>BFO003H</b>	BFO 18A-XAF-MZG-15-0,5	50 mm		■		■		338
<b>BFO003J</b>	BFO 18A-XAF-MZG-15-1	50 mm		■		■		338
<b>BFO003M</b>	BFO 18A-XAF-SMG-15-0,5	50 mm		■		■		338
<b>BFO003N</b>	BFO 18A-XAF-SMG-15-1	50 mm		■		■		338
<b>BFO002M</b>	BFO 18A-XAA-UZG-30-0,5	100 mm		■		■		339
<b>BFO002N</b>	BFO 18A-XAA-UZG-30-1	100 mm		■		■		339
<b>BFO0026</b>	BFO 18A-XAA-MZG-30-0,5	100 mm		■		■		339
<b>BFO0027</b>	BFO 18A-XAA-MZG-30-1	100 mm		■		■		339
<b>BFO002F</b>	BFO 18A-XAA-SMG-30-0,5	100 mm		■		■		339
<b>BFO002H</b>	BFO 18A-XAA-SMG-30-1	100 mm		■		■		339
<b>BFO002W</b>	BFO 18A-XAC-SMG-30-1	100 mm		■		■		339
<b>BFO002U</b>	BFO 18A-XAC-SMG-30-0,5	100 mm		■		■		339
<b>BFO003C</b>	BFO 18A-XAE-UZG-30-0,5	100 mm		■			■	339
<b>BFO003E</b>	BFO 18A-XAE-UZG-30-1	100 mm		■			■	339
<b>BFO0031</b>	BFO 18A-XAE-MZG-30-0,5	100 mm		■			■	339
<b>BFO0032</b>	BFO 18A-XAE-MZG-30-1	100 mm		■			■	339
<b>BFO0037</b>	BFO 18A-XAE-SMG-30-0,5	100 mm		■			■	339
<b>BFO0038</b>	BFO 18A-XAE-SMG-30-1	100 mm		■			■	339
<b>BFO004M</b>	BFO 18V-XAC-MZG-30-0,5	200 mm		■		■		339
<b>BFO004P</b>	BFO 18V-XAC-SMG-30-0,5	200 mm		■		■		339
<b>BFO004R</b>	BFO 18V-XAC-SMG-30-1	200 mm		■		■		339
<b>BFO004U</b>	BFO 18V-XAD-MZG-30-0,5	200 mm		■			■	339
<b>BFO004Y</b>	BFO 18V-XAD-SMG-30-0,5	200 mm		■			■	339
<b>BFO004Z</b>	BFO 18V-XAD-SMG-30-1	200 mm		■			■	339



Product-specific accessories

Photoelectric Sensors

Plastic fiber optics

Adapter, Holder, Optics, Cutting Tool, Lenses, Deflection Head, Metal Corrugated Tube

Glass Fiber Optics

Reflectors

Sensors

Fasteners

Positive Stops and Contact Protector

Ultrasonic Sensors

Uni/Unicompact Sensors

Industrial RFID Systems

Position and Distance Measurement

Protective End Caps and Nuts

Pressure Sensors

Vision Sensors



Photoelectric Sensors  
**Glass fiber optics (BFO 18)**  
**Through-beam**

# Glass Fiber Optics



Through-beam sensor with	BOS 18M-...-PD-...	Range	<b>100 mm</b>	<b>100 mm</b>
	BOS 18M-...-1PF-...	Range	<b>400 mm</b>	<b>400 mm</b>
	BOS 30M-...	Range		
UZG type		<b>Ordering code</b>		
0.5 m		Part number		
UZG type		<b>Ordering code</b>		
1 m		Part number		
MZG type		<b>Ordering code</b>	<b>BFO001Z</b>	<b>BFO001P</b>
0.5 m		Part number	BFO 18A-LGG-MZG-10-0,5	BFO 18A-LFF-MZG-10-0,5
MZG type		<b>Ordering code</b>		
0.75 m		Part number		
MZG type		<b>Ordering code</b>	<b>BFO0020</b>	<b>BFO001R</b>
1 m		Part number	BFO 18A-LGG-MZG-10-1	BFO 18A-LFF-MZG-10-1
SMG type		<b>Ordering code</b>	<b>BFO0023</b>	<b>BFO001U</b>
0.5 m		Part number	BFO 18A-LGG-SMG-10-0,5	BFO 18A-LFF-SMG-10-0,5
SMG type		<b>Ordering code</b>	<b>BFO0024</b>	<b>BFO001W</b>
1 m		Part number	BFO 18A-LGG-SMG-10-1	BFO 18A-LFF-SMG-10-1
Glass optical fiber bundle diameter			1 mm	1 mm
Max. tension on optical fibers and connection parts			80 N	80 N
Min. bending radius			60 mm	60 mm
Can be used with	BOS 18M-PA-1PD...		Yes	Yes
	BOS 18M-PU-1PD-SA1.../-SA4.../-SA5...		yes (remove adapter disk)	yes (remove adapter disk)
	BOS 18M-GU-1PF-...		yes (remove adapter disk)	yes (remove adapter disk)
	BOS 18M-PA-1PF-...		Yes	Yes
	BOS 30M-... (use BFO 30-A1 adapter)		No	No

Additional lengths available (in 0.5 m increments)! Contact us for more information.

Please append the desired length L of the fiber optics cable to the ordering code.  
 Adjustments from 0.5 m to max. 2 m possible.

Example:

BFO 18...-30-**0.5** for **0.5 m** fiber length

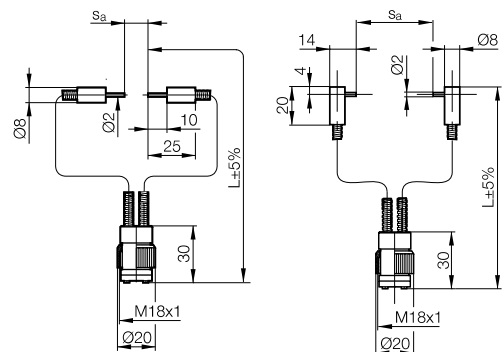
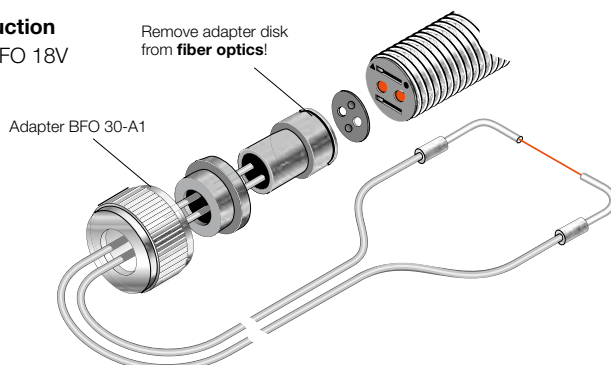
BFO 18...-30-**2** for **2 m** fiber length

**Caution!**

With a fiber optic through-beam sensor, the base unit's normally open signal switches to a normally closed signal!

**Mounting instruction**

BOS 30M with BFO 18V





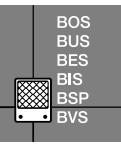
# Photoelectric Sensors

## Glass fiber optics (BFO 18)

### Through-beam

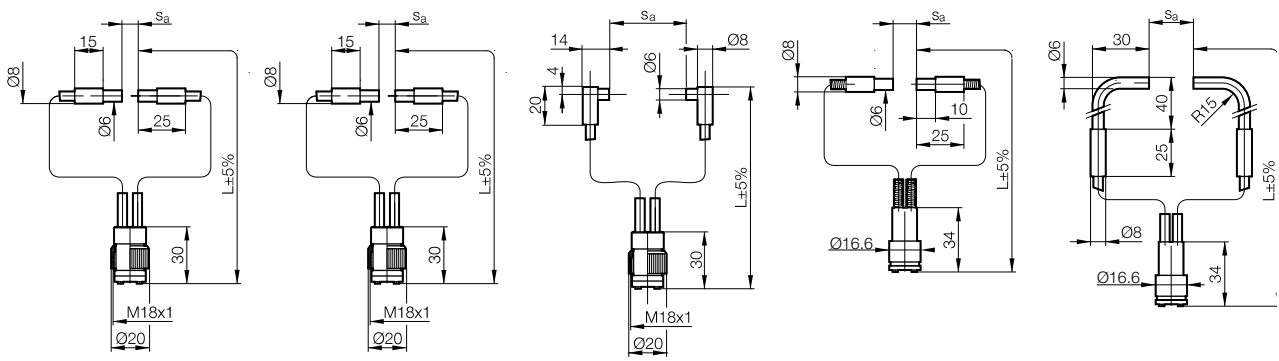


200 mm	200 mm	200 mm	200 mm	200 mm
700 mm	700 mm	700 mm	2000 mm	2000 mm
<b>BFO000M</b>		<b>BFO001F</b>		
BFO 18A-LAA-UZG-20-0,5		BFO 18A-LEE-UZG-20-0,5		
<b>BFO000N</b>	<b>BFO000Z</b>	<b>BFO001H</b>		
BFO 18A-LAA-UZG-20-1	BFO 18A-LCC-UZG-20-1	BFO 18A-LEE-UZG-20-1		
<b>BFO000F</b>		<b>BFO0013</b>	<b>BFO003Y</b>	
BFO 18A-LAA-MZG-20-0,5		BFO 18A-LEE-MZG-20-0,5	BFO 18V-LCC-MZG-23-0,5	
			<b>BFO003Z</b>	<b>BFO0047</b>
			BFO 18V-LCC-MZG-23-0,75	BFO 18V-LDD-MZG-23-0,75
<b>BFO000H</b>		<b>BFO0014</b>		
BFO 18A-LAA-MZG-20-1		BFO 18A-LEE-MZG-20-1		
	<b>BFO000U</b>	<b>BFO0019</b>	<b>BFO0042</b>	<b>BFO004C</b>
	BFO 18A-LCC-SMG-20-0,5	BFO 18A-LEE-SMG-20-0,5	BFO 18V-LCC-SMG-23-0,5	BFO 18V-LDD-SMG-23-0,5
	<b>BFO000W</b>	<b>BFO001A</b>		<b>BFO004F</b>
	BFO 18A-LCC-SMG-10-1	BFO 18A-LEE-SMG-20-1		BFO 18V-LDD-SMG-23-1
2 mm	2 mm	2 mm	2 mm	2 mm
80 N	80 N	80 N	80 N	80 N
60 mm	60 mm	60 mm	60 mm	60 mm
Yes	Yes	Yes	No	No
yes (remove adapter disk)	yes (remove adapter disk)	yes (remove adapter disk)	yes (remove adapter disk)	yes (remove adapter disk)
yes (remove adapter disk)	yes (remove adapter disk)	yes (remove adapter disk)	No	No
Yes	Yes	Yes	No	No
No	No	No	yes (remove adapter disk)	yes (remove adapter disk)



- Product-specific Accessories
- Photoelectric Sensors
- Plastic fiber optics
- Adapter, Holder, Optics, Cutting Tool, Lenses, Deflection Head, Metal Corrugated Tube

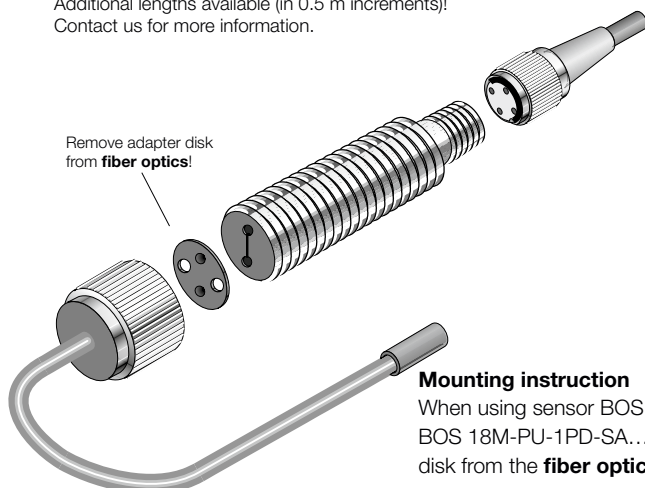
- Glass Fiber Optics
- Reflectors
- Sensors
- Fasteners
- Positive Stops and Contact Protector
- Ultrasonic Sensors
- Uni/Unicomact Sensors
- Industrial RFID Systems
- Position and Distance Measurement
- Protective End Caps and Nuts
- Pressure Sensors
- Vision Sensors





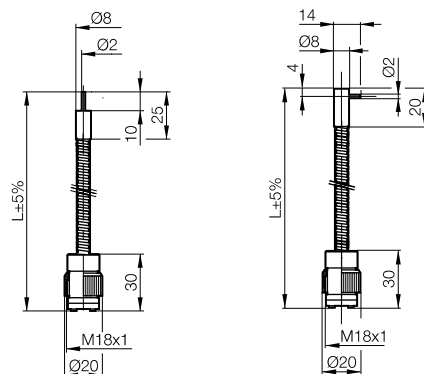
Diffuse sensor with	BOS 18M-...-PD-.../BOS 18M-...-1PF-... BOS 30M-...	<b>10 mm/50 mm</b>	<b>10 mm/50 mm</b>	
Retroreflective sensor with	BOS 18M-...-PD-.../BOS 18M-...-1PF-... BOS 30M-...	<b>300 mm/1000 mm</b>	<b>300 mm/1000 mm</b>	
UZG type	<b>Ordering code</b>			
0.5 m	Part number			
UZG type	<b>Ordering code</b>			
1 m	Part number			
MZG type	<b>Ordering code</b>	<b>BFO003R</b>	<b>BFO003H</b>	
0.5 m	Part number	BFO 18A-XAG-MZG-15-0,5	BFO 18A-XAF-MZG-15-0,5	
MZG type	<b>Ordering code</b>	<b>BFO003T</b>	<b>BFO003J</b>	
1 m	Part number	BFO 18A-XAG-MZG-15-1	BFO 18A-XAF-MZG-15-1	
SMG type	<b>Ordering code</b>		<b>BFO003M</b>	
0.5 m	Part number		BFO 18A-XAF-SMG-15-0,5	
SMG type	<b>Ordering code</b>		<b>BFO003N</b>	
1 m	Part number		BFO 18A-XAF-SMG-15-1	
Glass optical fiber bundle diameter		1.5 mm	1.5 mm	
Max. tension on optical fibers and connection parts		80 N	80 N	
Min. bending radius		60 mm	60 mm	
Can be used with	BOS 18M-PA-1PD...	Yes	Yes	
	BOS 18M-PU-1PD-SA1.../-SA4.../-SA5...	yes (remove adapter disk)	yes (remove adapter disk)	
	BOS 18M-GU-1PF-...	yes (remove adapter disk)	yes (remove adapter disk)	
	BOS 18M-PA-1PF-...	Yes	Yes	
	BOS 30M-...	No	No	
Sensing distance with	BOS 18M-PA-1PD...	10 mm	10 mm	
	BOS 18M-PU-1PD-SA1.../-SA4.../-SA5...	10 mm	10 mm	
	BOS 18M-...-1PF-...	50 mm	50 mm	
	BOS 30M-...			
Range with	BOS 18M-PA-1PD...	300 mm	300 mm	
	BOS 18M-PU-1PD-SA1.../-SA4.../-SA5...	300 mm	300 mm	
	BOS 18M-...-1PF-...	1000 mm	1000 mm	
	BOS 30M-...			

Additional lengths available (in 0.5 m increments)!  
 Contact us for more information.



#### Mounting instruction

When using sensor BOS18M-GU-1PF-S4-Y or BOS 18M-PU-1PD-SA..., please remove the adapter disk from the **fiber optics**.

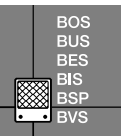


# Photoelectric Sensors

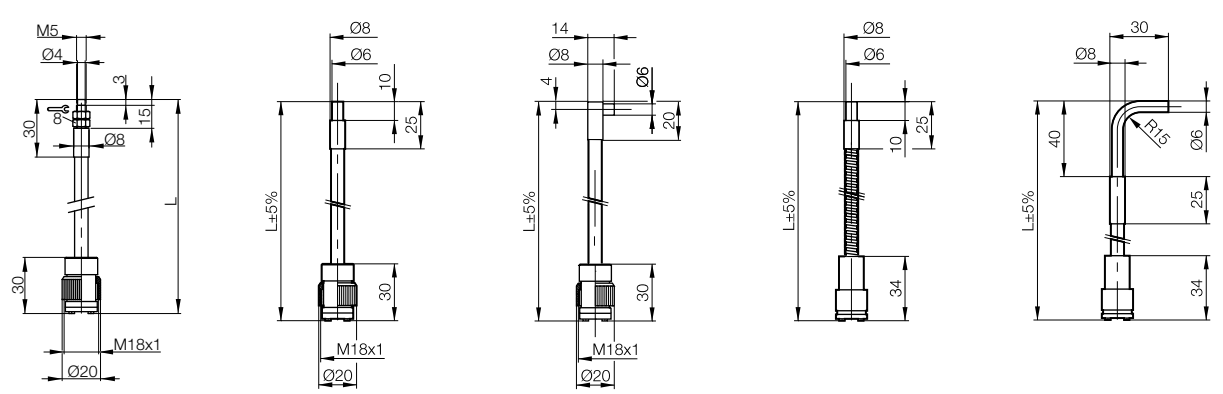
## Glass fiber optics (BFO 18) Sensors



	20 mm/100 mm	20 mm/100 mm	20 mm/100 mm	20 mm 200 mm 500 mm 2000 mm	20 mm 200 mm 500 mm 2000 mm
	500 mm/1000 mm	500 mm/1000 mm	500 mm/1000 mm		
	<b>BFO002M</b>		<b>BFO003C</b>		
	BFO 18A-XAA-UZG-30-0,5		BFO 18A-XAE-UZG-30-0,5		
	<b>BFO002N</b>		<b>BFO003E</b>		
	BFO 18A-XAA-UZG-30-1		BFO 18A-XAE-UZG-30-1		
	<b>BFO0026</b>		<b>BFO0031</b>	<b>BFO004M</b>	<b>BFO004U</b>
	BFO 18A-XAA-MZG-30-0,5		BFO 18A-XAE-MZG-30-0,5	BFO 18V-XAC-MZG-30-0,5	BFO 18V-XAD-MZG-30-0,5
	<b>BFO0027</b>		<b>BFO0032</b>		
	BFO 18A-XAA-MZG-30-1		BFO 18A-XAE-MZG-30-1		
	<b>BFO002F</b>	<b>BFO002U</b>	<b>BFO0037</b>	<b>BFO004P</b>	<b>BFO004Y</b>
	BFO 18A-XAA-SMG-30-0,5	BFO 18A-XAC-SMG-30-0,5	BFO 18A-XAE-SMG-30-0,5	BFO 18V-XAC-SMG-30-0,5	BFO 18V-XAD-SMG-30-0,5
	<b>BFO002H</b>	<b>BFO002W</b>	<b>BFO0038</b>	<b>BFO004R</b>	<b>BFO004Z</b>
	BFO 18A-XAA-SMG-30-1	BFO 18A-XAC-SMG-30-1	BFO 18A-XAE-SMG-30-1	BFO 18V-XAC-SMG-30-1	BFO 18V-XAD-SMG-30-1
	3 mm	3 mm	3 mm	3 mm	3 mm
	80 N	80 N	80 N	80 N	80 N
	60 mm	60 mm	60 mm	60 mm	60 mm
	Yes	Yes	Yes	No	No
	yes (remove adapter disk)	yes (remove adapter disk)	yes (remove adapter disk)	yes (remove adapter disk)	yes (remove adapter disk)
	yes (remove adapter disk)	yes (remove adapter disk)	yes (remove adapter disk)	No	No
	Yes	Yes	Yes	No	No
	No	No	No	Yes (remove adapter disk)	Yes (remove adapter disk)
	20 mm	20 mm	20 mm	20 mm	20 mm
	20 mm	20 mm	20 mm	20 mm	20 mm
	100 mm	100 mm	100 mm		
				200 mm	200 mm
	500 mm	500 mm	500 mm	500 mm	500 mm
	500 mm	500 mm	500 mm	500 mm	500 mm
	1000 mm	1000 mm	1000 mm		
				2000 mm	2000 mm



- Product-specific Accessories
- Photoelectric Sensors
- Plastic fiber optics
- Adapter, Holder, Optics, Cutting Tool, Lenses, Deflection Head, Metal Corrugated Tube
- Glass Fiber Optics
- Reflectors
- Sensors
- Fasteners
- Positive Stops and Contact Protector
- Ultrasonic Sensors
- Uni/Unicompact Sensors
- Industrial RFID Systems
- Position and Distance Measurement
- Protective End Caps and Nuts
- Pressure Sensors
- Vision Sensors



Sensing distances referenced to a 90% reflective Kodak gray card.  
 Diffuse sensor with glass fiber optics as a retroreflective light sensor:  
 Ranges are referenced to BOS R-1 reflector.

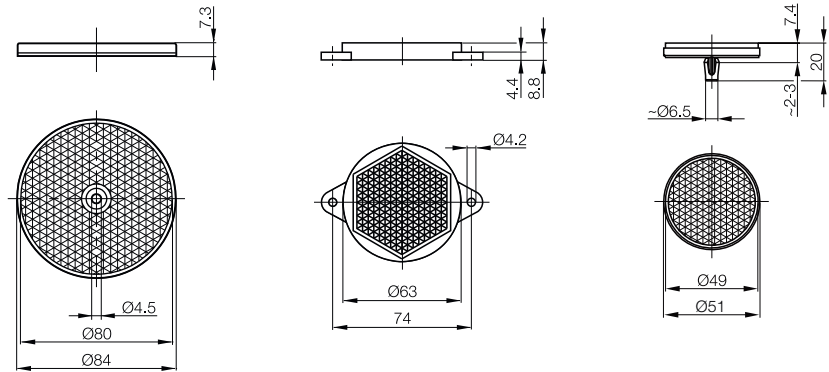
When being used as a retroreflective sensor, twice the switching distance must be used as the object dead zone.

# Photoelectric Sensors

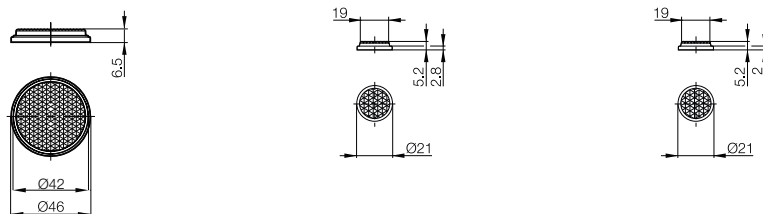
## Round reflectors



Size	Reflector Ø 84 mm	Reflector Ø 62 mm	Reflector Ø 51 mm
Mounting	M4 screw	Two M4 screws	Rivet with mounting tabs
<b>Ordering code</b>	<b>BAM00UK</b>	<b>BAM0126</b>	<b>BAM00UP</b>
Part number	BOS R-1	BOS R-10	BOS R-14
Material	PMMA/ABS	PMMA/ABS	PC
Triple size	4 mm	4 mm	4 mm
Mounting accessories	BOS 21-AD-1		
Special features			Chemical resistant
Temperature range	-20...+60 °C	-20...+60 °C	0...+100 °C



Size	Reflector Ø 46 mm	Reflector Ø 21 mm	Reflector Ø 21 mm
Mounting	Glue	Glue	Glue
<b>Ordering code</b>	<b>BAM00UW</b>	<b>BAM00W4</b>	<b>BAM00UR</b>
Part number	BOS R-2	BOS R-3	BOS R-15
Material	PMMA/ABS	PMMA/ABS	PC
Triple size	2.5 mm	2 mm	2 mm
Special features			Chemical resistant
Temperature range	-20...+60 °C	-20...+60 °C	-20...+99 °C

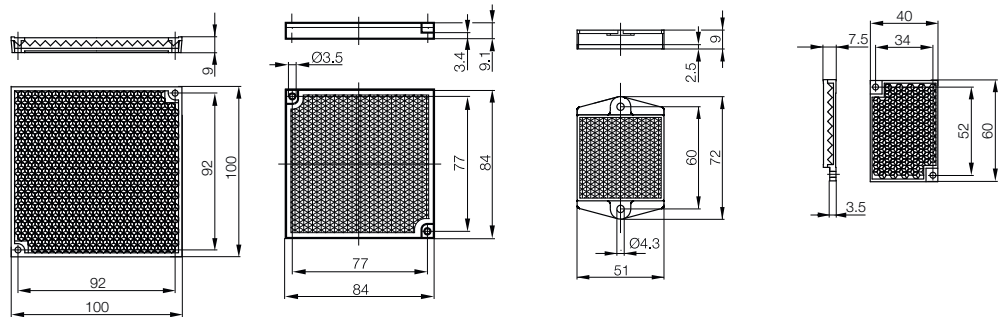


# Photoelectric Sensors

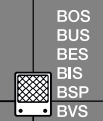
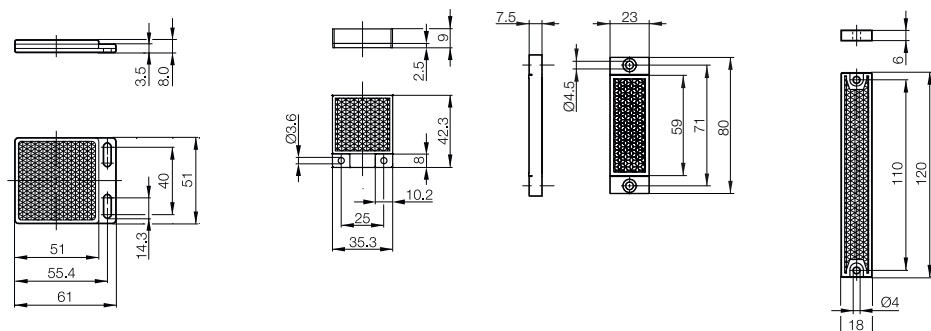
## Rectangular reflectors



Size	Reflector 100×100 mm	Reflector 84×84 mm	Reflector 51×72 mm	Reflector 60×40 mm
Mounting	Two M3 screws	Two M3 screws	Two M4 screws	Two M3 screws
<b>Ordering code</b>	<b>BAM01JN</b>	<b>BAM00UL</b>	<b>BAM00UZ</b>	<b>BAM01JP</b>
Part number	BOS R-47	BOS R-11	BOS R-25	BOS R-46
Material	PMMA/ABS	PMMA/ABS	PMMA	PMMA/ABS
Triple size	4 mm	4 mm	4 mm	4 mm
Temperature range	-20...+60 °C	-20...+60 °C	0...+50 °C	-20...+60 °C



Size	Reflector 51×61 mm	Reflector 35×42 mm	Reflector 23×80 mm	Reflector 18×120 mm
Mounting	Two M4 screws	Two M3 screws	Two M4 screws	Two M4 screws
<b>Ordering code</b>	<b>BAM00WL</b>	<b>BAM00W0</b>	<b>BAM01LA</b>	<b>BAM00WA</b>
Part number	BOS R-9	BOS R-26	BOS R-48	BOS R-5
Material	PMMA/ABS	PMMA	PMMA/ABS	PMMA/ABS
Triple size	4 mm	4 mm	4 mm	4 mm
Mounting accessories		BOS 5-HW-5		
Temperature range	-20...+60 °C	0...+50 °C	-20...+60 °C	-20...+60 °C



Product-specific Accessories

Photoelectric Sensors  
 Reflectors  
**Round**  
**Rectangular**  
 For Special Applications  
 For Laser Retroreflective Sensors  
 Reflective Foils  
 Sensors  
 Fasteners

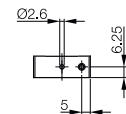
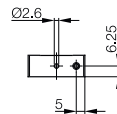
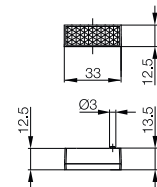
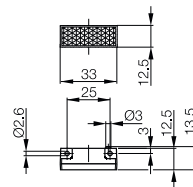
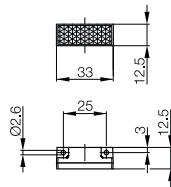
Positive Stops and Contact Protector  
 Ultrasonic Sensors  
 Uni/Unicompact Sensors  
 Industrial RFID Systems  
 Position and Distance Measurement  
 Protective End Caps and Nuts  
 Pressure Sensors  
 Vision Sensors

# Photoelectric Sensors

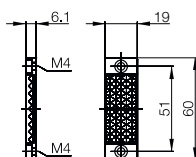
## Rectangular reflectors



Size	<b>Reflector 33×12 mm</b>	<b>Reflector 33×12 mm</b>	<b>Reflector 33×12 mm</b>
Mounting	Side screws	Rear and side screws	Rear screws
<b>Ordering code</b>	<b>BAM00W3</b>	<b>BAM00W1</b>	<b>BAM00W2</b>
Part number	BOS R-29	BOS R-27	BOS R-28
Material	PMMA	PMMA	PMMA
Triple size	2.3 mm	2.3 mm	2.3 mm
Mounting accessories	BOS 5-HW-1/2	BOS 5-HW-1/2	
Temperature range	0...+50 °C	0...+50 °C	0...+50 °C



Size	<b>Reflector 18×60 mm</b>		
Mounting	Two M4 screws		
<b>Ordering code</b>	<b>BAM00W7</b>		
Part number	BOS R-33		
Material	PMMA/ABS		
Triple size	4 mm		
Temperature range	-20...+60 °C		

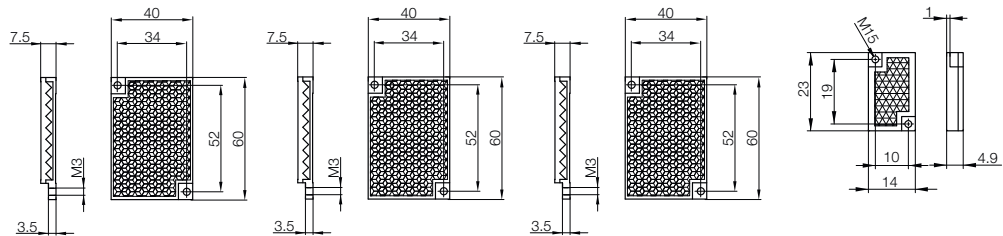


# Photoelectric Sensors

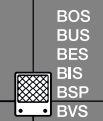
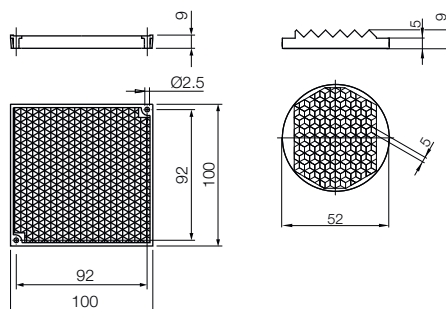
## Reflectors for special applications



Size	Reflector 60×40 mm	Reflector 60×40 mm	Reflector 60×40 mm	Reflector 14×23 mm
Mounting	Two M3 screws	Two M3 screws	Two M3 screws	Two M1.5 screws
<b>Ordering code</b>	<b>BAM00W8</b>	<b>BAM01CM</b>	<b>BAM01HE</b>	<b>BAM01NH</b>
Part number	BOS R-34	BOS R-36	BOS R-44	BOS R-49
Material	Hot thermoplastic	PMMA/ABS	Solidchem	Hot thermoplastic
Triple size	4 mm	4 mm	4 mm	0.9 mm
Special features	Heat-resistant	Anti-fogging	Chemical-resistant	Heat-resistant; For laser applications
Temperature range	-20...+150 °C	-20...+60 °C	-20...+140 °C	-20...+110 °C



Size	Cubic corner 100×100 mm	Reflector Ø 52 mm		
Mounting	Screw M3	Clamps		
<b>Ordering code</b>	<b>BAM01CN</b>	<b>BAM01H6</b>		
Part number	BOS R-37	BOS R-31		
Material	PC	Borosilicate		
Triple size	4 mm	4 mm		
Special features		Glass reflector		
Temperature range	-20...+100 °C	-20...+500 °C		



Product-specific Accessories

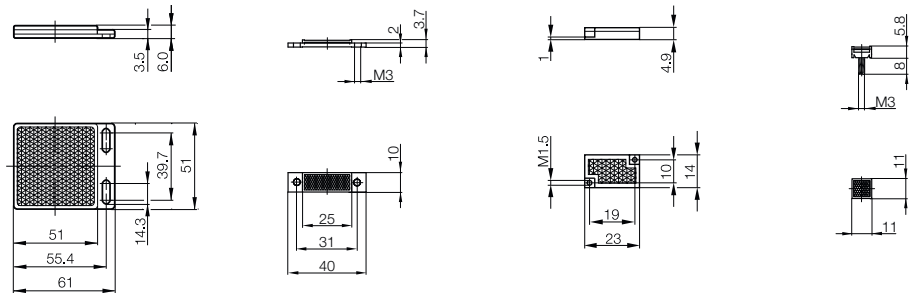
Photoelectric Sensors  
 Reflectors  
 Round  
 Rectangular  
 For Special Applications  
 For Laser Retroreflective Sensors  
 Reflective Foils  
 Sensors  
 Fasteners  
 Positive Stops and Contact Protector  
 Ultrasonic Sensors  
 Uni/Unicompact Sensors  
 Industrial RFID Systems  
 Position and Distance Measurement  
 Protective End Caps and Nuts  
 Pressure Sensors  
 Vision Sensors

# Photoelectric Sensors

## Reflectors for laser retroreflective sensors



Size	<b>Reflector 51×62 mm</b>	<b>Reflector 40×10 mm</b>	<b>Reflector 14×23 mm</b>	<b>Reflector 11×11 mm</b>	
Mounting	Two M4 screws	Two M3 screws	Two M1.5 screws	M3 screw	
<b>Ordering code</b>	<b>BAM00UY</b>	<b>BAM01H9</b>	<b>BAM00UM</b>	<b>BAM01H8</b>	
Part number	BOS R-22	BOS R-41	BOS R-12	BOS R-39	
Material	PMMA/ABS	PMMA/ABS	PMMA/ABS	PMMA/ABS	
Triple size	1.2 mm	1.2 mm	0.9 mm	0.9 mm	
Mounting accessories	BOS 5-HW-6				
Temperature range	-20...+60 °C	-20...+60 °C	-20...+60 °C	-20...+60 °C	



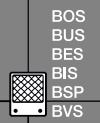
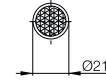
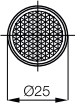
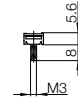
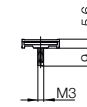
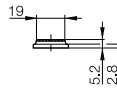
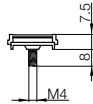
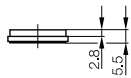


# Photoelectric Sensors

## Reflectors for laser retroreflective sensors



Reflector Ø 25 mm	Reflector Ø 25 mm	Reflector Ø 21 mm	Reflector Ø 19 mm	Reflector Ø 10 mm
Glue	M4 screw	Glue	M3 screw	M3 screw
<b>BAM00UN</b>	<b>BAM01HC</b>	<b>BAM00UT</b>	<b>BAM01HA</b>	<b>BAM01H7</b>
BOS R-13	BOS R-43	BOS R-16	BOS R-42	BOS R-38
PMMA/ABS	PMMA/ABS	PMMA/ABS	PMMA/ABS	PMMA/ABS
1.2 mm	1.2 mm	1.2 mm	0.9 mm	0.9 mm
-20...+60 °C	-20...+60 °C	-20...+60 °C	-20...+60 °C	-20...+60 °C



Product-specific Accessories

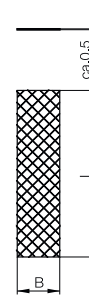
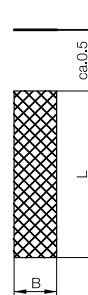
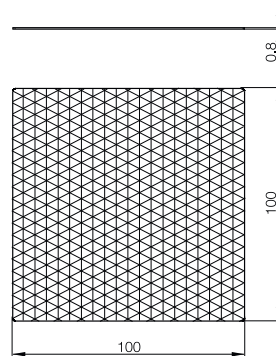
- Photoelectric Sensors
- Reflectors
- Round
- Rectangular
- For Special Applications
- For Laser Retroreflective Sensors**
- Reflective Foils
- Sensors
- Fasteners
- Positive Stops and Contact Protector
- Ultrasonic Sensors
- Uni/Unicompact Sensors
- Industrial RFID Systems
- Position and Distance Measurement
- Protective End Caps and Nuts
- Pressure Sensors
- Vision Sensors

# Photoelectric Sensors

## Reflective foils



Description	Reflective foils (standard)	Reflective foils (standard)	Reflective foils (standard) (not for polarized light)
Mounting	Self-adhesive	Self-adhesive	Self-adhesive
50 mm × 45 m	<b>Ordering code</b> Part number		<b>BAM00WE</b> BOS R-6-45
50 mm × 22 m	<b>Ordering code</b> Part number	<b>BAM00WH</b> BOS R-7-22	
25 mm × 22 m	<b>Ordering code</b> Part number	<b>BAM00WK</b> BOS R-8-22	
50 mm × 25 cm	<b>Ordering code</b> Part number	<b>BAM00WF</b> BOS R-7-0,25	<b>BAM00WC</b> BOS R-6-0,25
25 mm × 25 cm	<b>Ordering code</b> Part number	<b>BAM00WJ</b> BOS R-8-0,25	
300 × 200 mm	<b>Ordering code</b> Part number		
200 × 200 mm	<b>Ordering code</b> Part number		<b>BAM00W9</b> BOS R-35
100 × 100 mm	<b>Ordering code</b> Part number	<b>BAM01JM</b> BOS R-50	
90 × 50 mm	<b>Ordering code</b> Part number	<b>BAM00W6</b> BOS R-32-0,40	
100 × 50 mm	<b>Ordering code</b> Part number		
40 × 35 mm	<b>Ordering code</b> Part number		
Material	PMMA	PMMA	PMMA
Special features			Not for polarized light
Temperature range	-20...+60 °C	-20...+60 °C	-20...+60 °C



# Photoelectric Sensors

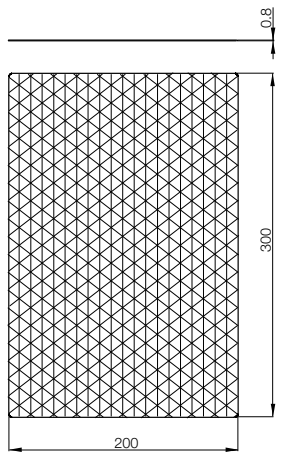
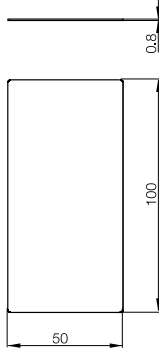
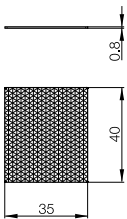
## Reflective foils



<b>Reflective tape</b>	<b>Reflective tape</b>	<b>Reflective tape</b>
Self-adhesive	Self-adhesive	Self-adhesive
		<b>BAM01HF</b>
		BOS R-45
	<b>BAM01CF</b>	
	BAM R-40	
<b>BAM00W5</b>		
BOS R-30 (standard)		
PMMA	PMMA	PMMA
	Special for laser sensors	Standard and laser sensors for large surfaces
-20...+60 °C	-20...+60 °C	-20...+60 °C

- BOS
- BUS
- BES
- BIS
- BSP
- BVS

- Product-specific Accessories
- Photoelectric Sensors
- Reflectors
- Round
- Rectangular
- For Special Applications
- For Laser Retro-reflective Sensors
- Reflective Foils**
- Sensors
- Fasteners
- Positive Stops and Contact Protector
- Ultrasonic Sensors
- Uni/Unicompact Sensors
- Industrial RFID Systems
- Position and Distance Measurement
- Protective End Caps and Nuts
- Pressure Sensors
- Vision Sensors



# Photoelectric Sensors

## Aperture diaphragms

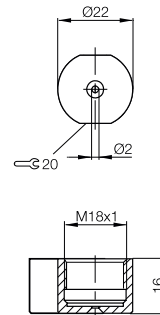
The round and slit apertures restrict the beam diameter. This allows you to detect small parts over a large range. The emitter and receiver of the photoelectric sensor must be exactly aligned with each other.

### Benefits

- Small parts detection, i.e. 1 mm drill, aperture on emitter only
- Photoelectric sensors may be mounted close to one another
- Highly reflective parts right next to the photoelectric sensor's light beam do not interfere



Description	<b>Round aperture</b>		
Use	For BLE/BLS 18		
<b>Ordering code</b>	<b>BAM00R6</b>		
Part number	BOS 18-BL-1		
	<b>Aperture on emitter</b>	<b>Aperture on receiver</b>	<b>Range</b>
	o		8 mm
		o	8 mm
	o	o	2 mm

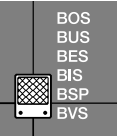
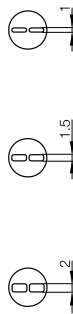
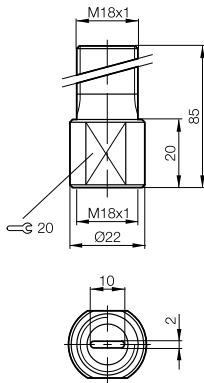


# Photoelectric Sensors

## Slit apertures



Double slit aperture			Slit aperture			
For BLE/BLS 18			For BLE/BLS 12M			
<b>BAM00R7</b>			<b>BAM00PW</b>			
BOS 18-BL-2			BOS 12-BL-1			
Aperture on emitter	Aperture on receiver	Range	Slit width	Range	Object size	
		3 mm	1 mm	0.5 mm	> 1 mm	
		2 mm	1.5 mm	1 mm	> 1.5 mm	
		2 mm	2 mm	2 mm	> 2 mm	



Product-specific Accessories

- Photoelectric Sensors
- Reflectors
- Sensors
- Round Apertures**
- Slit Apertures**
- Weld Protection
- Air Shield
- Lenses, Intermediate Ring
- Protective End Caps
- Deflection Heads
- Diagonal Mirrors, Deflector
- Fasteners
- Positive Stops and Contact Protector
- Ultrasonic Sensors
- Uni/Unicomact Sensors
- Industrial RFID Systems
- Position and Distance Measurement
- Protective End Caps and Nuts
- Pressure Sensors
- Vision Sensors

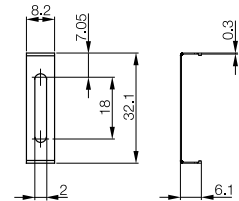
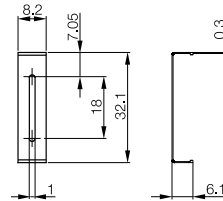
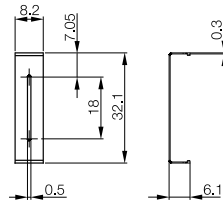
# Photoelectric Sensors

## Slit apertures

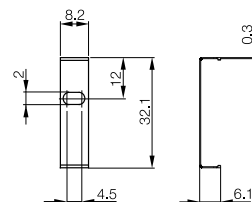
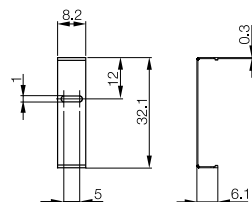
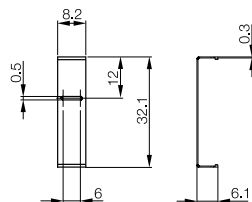


Description	<b>Vertical slit aperture</b>	<b>Vertical slit aperture</b>	<b>Vertical slit aperture</b>
Use	For BOS 5K through-beam sensors	For BOS 5K through-beam sensors	For BOS 5K through-beam sensors
<b>Ordering code</b>	<b>BAM00TU</b>	<b>BAM00TW</b>	<b>BAM00TY</b>
Part number	BOS 5-BL-1	BOS 5-BL-2	BOS 5-BL-3
Aperture size	0.5 mm vertical	1 mm vertical	2 mm vertical
Range*	1.0 (2.5 m)	1.5 (3.5 m)	3.5 (6 m)
Min. object*	0.5 (7 mm)	1.0 (7 mm)	2.0 (7 mm)
Packaging unit	2 pcs.	2 pcs.	2 pcs.

\*Values in brackets apply to slit apertures on one side



Description	<b>Horizontal slit aperture</b>	<b>Horizontal slit aperture</b>	<b>Horizontal slit aperture</b>
Use	For BOS 5K through-beam sensors	For BOS 5K through-beam sensors	For BOS 5K through-beam sensors
<b>Ordering code</b>	<b>BAM00TZ</b>	<b>BAM00U0</b>	<b>BAM00U1</b>
Part number	BOS 5-BL-4	BOS 5-BL-5	BOS 5-BL-6
Aperture size	0.5 mm horizontal	1 mm horizontal	2 mm horizontal
Range	0.7 (2 m)	1.5 (3 m)	3.0 (5.5 m)
Min. object	0.4 (7 mm)	0.7 (7 mm)	1.5 (7 mm)
Packaging unit	2 pcs.	2 pcs.	2 pcs.

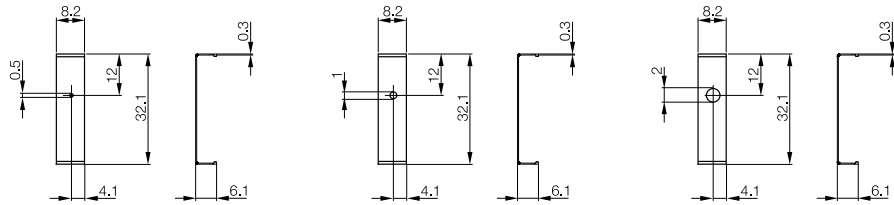


# Photoelectric Sensors

## Aperture diaphragms, weld protection



Description	<b>Round aperture</b>	<b>Round aperture</b>	<b>Round aperture</b>
Use	For BOS 5K through-beam sensors	For BOS 5K through-beam sensors	For BOS 5K through-beam sensors
<b>Ordering code</b>	<b>BAM00U2</b>	<b>BAM00U3</b>	<b>BAM00U4</b>
Part number	BOS 5-BL-7	BOS 5-BL-8	BOS 5-BL-9
Aperture size	0.5 mm Ø	1 mm Ø	2 mm Ø
Range	0.08 (0.8 m)	0.3 (1.5 m)	1.2 (2.5 m)
Min. object	0.3 (5 mm)	0.6 (5 mm)	1.5 (7 mm)
Packaging unit	2 pcs.	2 pcs.	2 pcs.

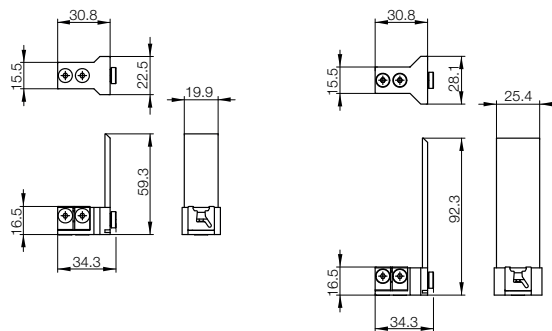


Sensor not included in the standard scope of delivery!



Sensor not included in the standard scope of delivery!

Description	<b>Weld protection</b>	<b>Weld protection</b>	
Use	For BOS 23K	For BOS 50K	
<b>Ordering code</b>	<b>BAM01L8</b>	<b>BAM01U6</b>	
Part number	BAM PC-XO-006-23K-1	BAM PC-XO-006-50K-1	



### Spare glass panes for weld protection BAM01L8 and BAM01U6

<b>Ordering code</b>	<b>BAM01YL</b>	<b>BAM01YM</b>
Part number	BAM PC-XO-006-23K-G/RK	BAM PC-XO-006-50K-G/RK

BOS  
BUS  
BES  
BIS  
BSP  
BVS

Product-specific Accessories

Photoelectric Sensors  
Reflectors  
Sensors  
**Aperture Diaphragms**  
**Slit apertures**  
**Weld protection**  
Air shield  
Lenses, Intermediate Ring  
Protective End Caps  
Deflection Heads  
Diagonal Mirrors, Deflector  
Fasteners  
Positive Stops and Contact Protector  
Ultrasonic Sensors  
Uni/Unicompact Sensors  
Industrial RFID Systems  
Position and Distance Measurement  
Protective End Caps and Nuts  
Pressure Sensors  
Vision Sensors

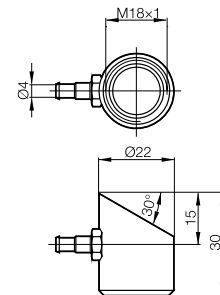
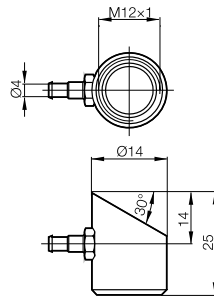
# Photoelectric Sensors

## Air shield



Description		<b>Air shield</b>	<b>Air shield</b>
Use		For BOS 12 and tube with 4 mm inner diameter	For BOS 18 and tube with 4 mm inner diameter
Focal length/focus			
<b>Ordering code</b>		<b>BAM00PY</b>	<b>BAM00R9</b>
Part number		BOS 12-LT-1	BOS 18-LT-1
Material	Lens	Glass	Glass
	Mount	Al	Al

The air shield with a compressed air source prevents premature contamination of the optics.



Description		<b>Air Blow</b>
Version		For clamping cylinders
Use		For blowing clear sensors and reflectors (minimum pressure 8 bar)
<b>Ordering code</b>		<b>BAM0041</b>
Part number		BMS CZ-M-D12-I-001
Material		Anodized aluminum

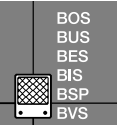
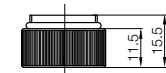
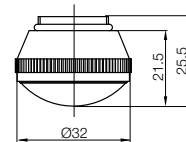
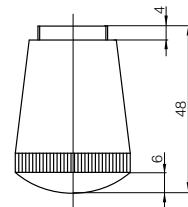
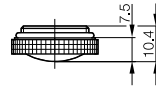
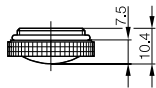
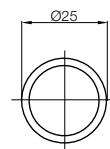
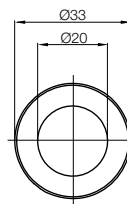
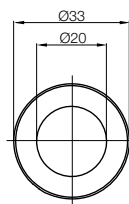
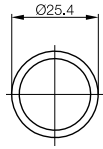
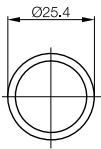


# Photoelectric Sensors

## Lenses, intermediate ring



Lens	Lens	Lens	Lens	Intermediate ring
For BKT 67 for increasing the sensing range (light spot 2x7 mm)	For BKT 67 standard lenses (light spot 1.5x4 mm)	For BKT 67 for increasing the sensing range (light spot 2x8 mm)	For BKT 67 for increasing the sensing range (light spot 2.5x11 mm)	Intermediate ring with lens for increased resolution for BKT 67 in combination with M-PK-2. It is screwed in between the sensor and the 9 mm lens.
18 mm	9 mm	28 mm	50 mm	
<b>BAM0120</b>	<b>BAM0121</b>	<b>BAM0122</b>	<b>BAM00P3</b>	<b>BAM00P2</b>
BKT M-PK-1	BKT M-PK-2	BKT M-PK-3	BKT M-PK-5	BKT M-PK-4
Glass	Glass	Glass	Glass	Glass
Al	Al	Al	Al	Al



Product-specific accessories

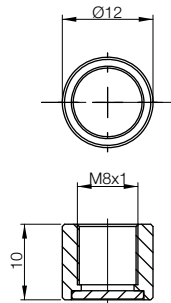
- Photoelectric Sensors
- Reflectors
- Sensors
- Aperture Diaphragms
- Slit apertures
- Weld protection
- Air shield**
- Lenses, Intermediate Ring**
- Protective End Caps
- Deflection Heads
- Diagonal Mirrors, Deflector
- Fasteners
- Positive Stops and Contact Protector
- Ultrasonic Sensors
- Uni/Unicompact Sensors
- Industrial RFID Systems
- Position and Distance Measurement
- Protective End Caps and Nuts
- Pressure Sensors
- Vision Sensors

# Photoelectric Sensors

## Protective end caps



Description	<b>M8 protective end cap</b>		<b>M12 protective end cap</b>	
Use	For BOS 08		For BOS 12	
<b>Ordering code</b>	<b>BAM01Y5</b>		<b>BAM01Y6</b>	
Part number	BAM PC-X0-005-08M-4		BOS PC-X0-005-12M-4	
Material	Mount	Stainless steel	Stainless steel	
	Disk	Glass	Glass	



The protective end cap is made with tempered glass and can be used with all M12 photoelectric sensors.

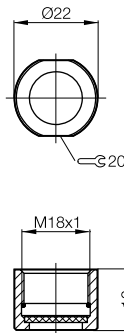
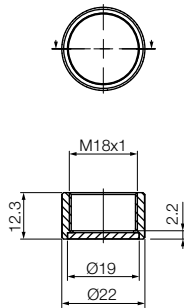
The protective glass is used to protect the optics from mechanical or thermal damage, such as weld spatter.

# Photoelectric Sensors

## Protective end caps



<b>M18 protective end cap</b>	<b>Protective end cap</b>
For BOS 18 with flat front surface	for BOS 18
<b>BAM01NC</b>	<b>BAM00RL</b>
BAM PC-XO-005-18M-4	BOS 18-SM-1
Stainless steel	POM
Glass	Glass



The protective end cap can be used in combination with all BOS 18M and BOS 18K sensors. It protects the sensor optics from external effects, such as welding spatter. For increased protection, the BOS 18-SM-2 is made of metal, providing even better protection for the sensor optics. The heat-protecting glass closes off flush with the front surface of the Protective end cap. This prevents dust deposits from forming, which can impact the range. A ring between the sensor and protective glass makes sure the system is sealed.

The protective end cap is made with tempered glass and can be used with all photoelectric sensors M18. The protective glass is used to protect the optics from mechanical or thermal damage, such as weld spatter.

BOS	
BUS	
BES	
BIS	
BSP	
BVS	

Product-specific accessories

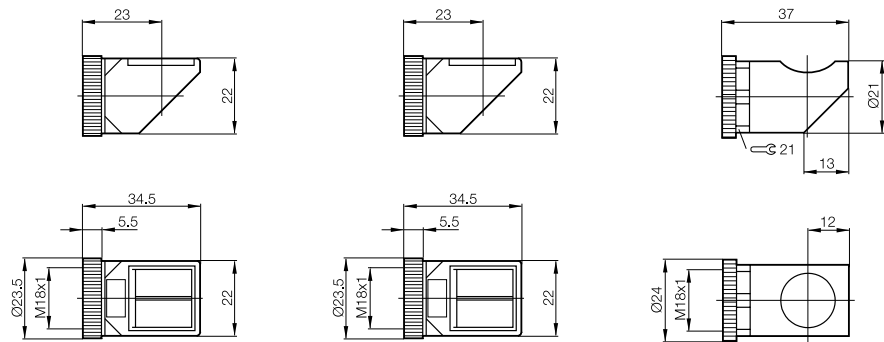
- Photoelectric Sensors
- Reflectors
- Sensors
- Aperture Diaphragms
- Slit apertures
- Weld protection
- Air shield
- Lenses, Intermediate Ring
- Protective End Caps**
- Deflection Heads
- Diagonal Mirrors, Deflector
- Fasteners
- Positive Stops and Contact Protector
- Ultrasonic Sensors
- Uni/Unicompact Sensors
- Industrial RFID Systems
- Position and Distance Measurement
- Protective End Caps and Nuts
- Pressure Sensors
- Vision Sensors

# Photoelectric Sensors

## Deflection heads



Description	<b>90° deflection head</b>	<b>90° deflection head</b>	<b>90° deflection head</b>
Use	For diffuse, retroreflective and through-beam sensors BOS 18 (except laser)	For diffuse, retroreflective and through-beam sensors BOS 18 (except laser)	For diffuse, retroreflective and through-beam sensors BOS 18
<b>Ordering code</b>	<b>BAM00RP</b>	<b>BAM00RT</b>	<b>BAM00RR</b>
Part number	BOS 18-UK-1	BOS 18-UK-2	BOS 18-UK-10

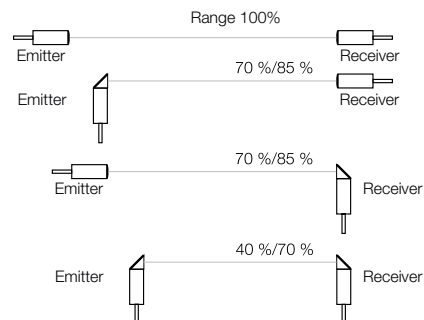


	<b>BOS 18-UK-1</b>	<b>BOS 18-UK-2</b>	<b>BOS 18-UK-10</b>
<b>Diffuse sensor</b>			
BOS 18...-XA-...100 mm	RF = 45 %		RF = 50 %
BOS 18...-XB-...200 mm	RF = 25 %		RF = 50 %
BOS 18...-PB-...200 mm	RF = 25 %		RF = 50 %
BOS 18...-XD-...400 mm		RF = 25 %	RF = 30 %
BOS 18...-PD-...400 mm		RF = 25 %	RF = 30 %
<b>Retroreflective sensor</b>			
BOS 18...-RB-...2 m		RF = 20 %	RF = 20 %
BOS 18...-RD-...4 m		RF = 20 %	RF = 20 %
<b>Through-beam sensor</b>			
BLE 18...-P-...16 m		RF = 15 %	RF = 30 %
BLS 18...-XX-...16 m		RF = 15 %	RF = 30 %

### Deflection heads, suitable combinations

All BOS 18 photoelectric sensors can be equipped with a 90° deflection head.

The table shows the appropriate deflection head for each switch type and indicates the corresponding reduction factor (RF) to apply to the range. With a through-beam sensor, the emitter and the receiver can be equipped with a 90° deflection head. Each deflection head reduces the range by approx. 15% ... 50%.



# Photoelectric Sensors

## Diagonal mirrors, deflector



### Diagonal Mirror

For diffuse and through-beam sensors BOS 12

### BAM00R0

BOS 12-WS-1

### Diagonal Mirror

For laser through-beam sensors BOS 12

### BAM00R1

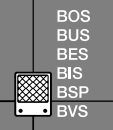
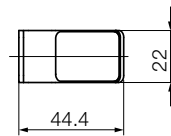
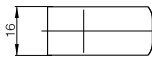
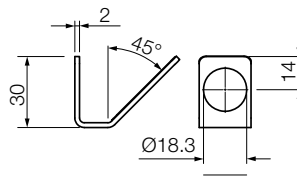
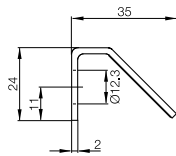
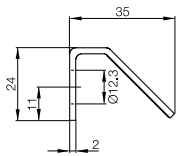
BOS 12-WS-2

### Deflector

For Series 18M  
For Series 18K

### BAM00RU

BOS 18-WS-1



Product-specific Accessories

- Photoelectric Sensors
- Reflectors
- Sensors
- Aperture Diaphragms
- Slit apertures
- Weld protection
- Air shield
- Lenses, Intermediate Ring
- Protective End Caps
- Deflection Heads**
- Diagonal Mirrors, Deflector**
- Fasteners
- Positive Stops and Contact Protector
- Ultrasonic Sensors
- Uni/Unicompact Sensors
- Industrial RFID Systems
- Position and Distance Measurement
- Protective End Caps and Nuts
- Pressure Sensors
- Vision Sensors

When using the diagonal mirror, the sensing range is reduced by 30% for the M12 diffuse and M12 through-beam sensors. Not suitable for retroreflective sensors.

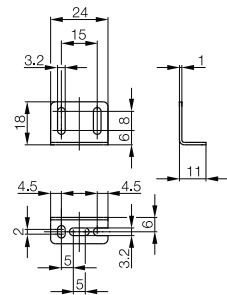
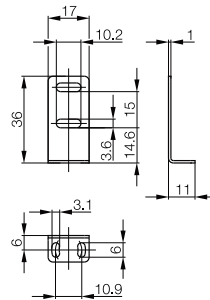
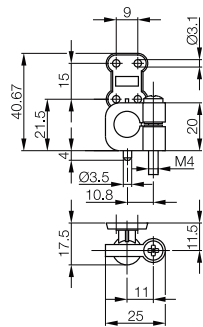
# Photoelectric Sensors

## Mounting brackets

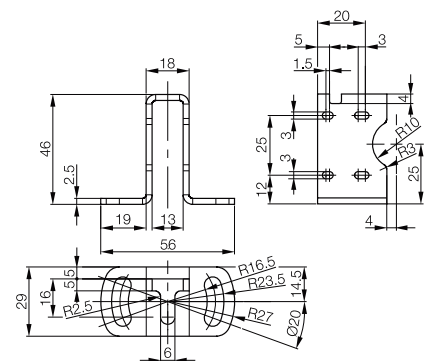
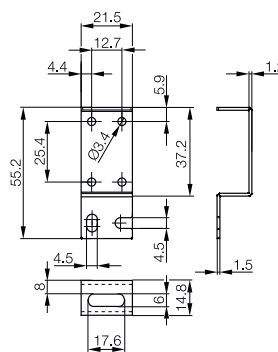
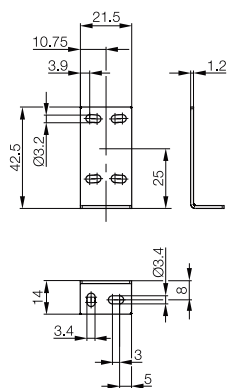
### BOS 2, BOS 5



Description	<b>Mounting brackets</b>	<b>Mounting brackets</b>	<b>Mounting brackets</b>
Use	For BOS 2K	For BOS 2K	For BOS 2K
<b>Ordering code</b>	<b>BAM00T4</b>	<b>BAM00T6</b>	<b>BAM00T5</b>
Part number	BOS 2-HW-1	BOS 2-HW-2	BOS 2-HW-3



Description	<b>Mounting brackets</b>	<b>Mounting brackets</b>	<b>Mounting brackets</b>
Use	for BOS 5K	for BOS 5K	for BOS 5K
<b>Ordering code</b>	<b>BAM00U5</b>	<b>BAM00U6</b>	<b>BAM00U7</b>
Part number	BOS 5-HW-1	BOS 5-HW-2	BOS 5-HW-3



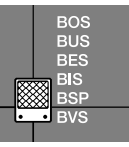
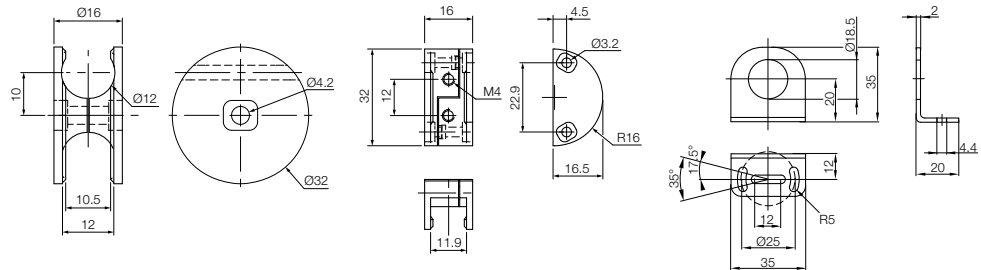
# Photoelectric Sensors

## Mounting brackets

### BOS 6, BOS 18



Description	<b>Mounting brackets</b>	<b>Mounting brackets</b>	<b>Mounting brackets</b>
Use	For Series 6K For M12 rods	for BOS 6K	for BOS 18
<b>Ordering code</b>	<b>BAM022C</b>	<b>BAM022A</b>	<b>BAM00RY</b>
Part number	BAM CS-M-D12-S6K-00	BAM MC-XO-030-6K-4	BOS 18,0-HW-1
Material	Stainless steel	Stainless steel	

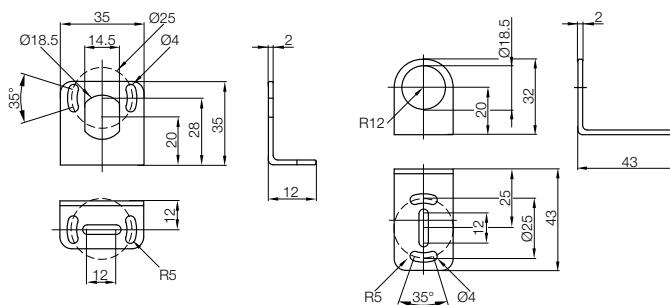


Product-specific Accessories

- Photoelectric Sensors
- Reflectors
- Sensors
- Fasteners
- Mounting Brackets**
- Sensor holder
- Holder System
- Clamps, Adapter Plate, Cover Bracket
- Positive Stops and Contact Protector
- Ultrasonic Sensors
- Uni/Unicompact Sensors
- Industrial RFID Systems
- Position and Distance Measurement
- Protective End Caps and Nuts
- Pressure Sensors
- Vision Sensors



Description	<b>Mounting brackets</b>	<b>Mounting brackets</b>	
Use	For BOS 18F/BOS 18KW	for BOS 18	
<b>Ordering code</b>	<b>BAM00RZ</b>	<b>BAM00T0</b>	
Part number	BOS 18,0-HW-2	BOS 18,0-HW-3	



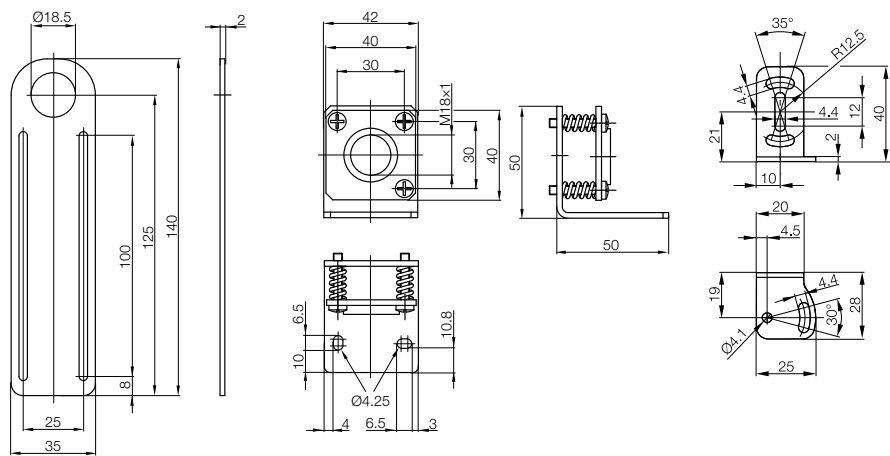
# Photoelectric Sensors

## Mounting brackets

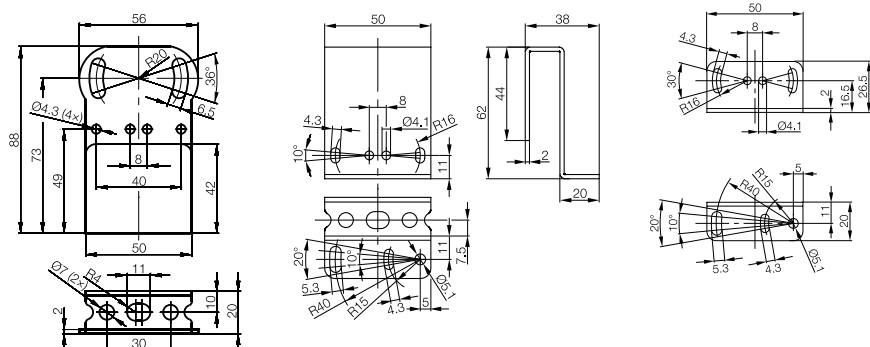
### BOS 18, BOS 21



Description	<b>Mounting brackets</b>	<b>Mounting brackets</b>	<b>Mounting brackets</b>
Use	for BOS 18	For BOS 18 laser sensors	for BOS 21M
<b>Ordering code</b>	<b>BAM00T1</b>	<b>BAM00T2</b>	<b>BAM00TA</b>
Part number	BOS 18,0-HW-4	BOS 18,0-HW-6	BOS 21-HW-2



Description	<b>Mounting brackets</b>	<b>Mounting brackets</b>	<b>Mounting brackets</b>
Use	for BOS 21M	for BOS 21M	for BOS 21M
<b>Ordering code</b>	<b>BAM00TE</b>	<b>BAM00TC</b>	<b>BAM00T9</b>
Part number	BOS 21-HW-4	BOS 21-HW-3	BOS 21-HW-1
Material			Stainless steel





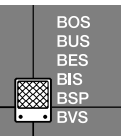
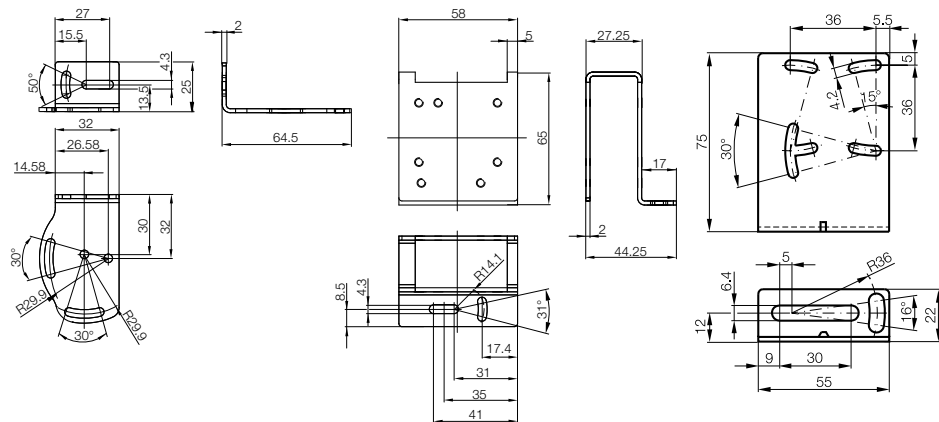
# Photoelectric Sensors

## Mounting brackets

BOS 23, BOS 36, BOS 65, BOS 66, BOS 74



Description	Mounting brackets	Mounting brackets	Mounting brackets
Use	For BOS 23	For BOS 23K	For BOS 36K
<b>Ordering code</b>	<b>BAM01FM</b>	<b>BAM01FK</b>	<b>BAM0124</b>
Part number	BAM MB-X0-007-B05-4	BAM MB-X0-006-B05-4	BOS 36-HW-1
Material	Stainless steel	Stainless steel	Steel galvanized

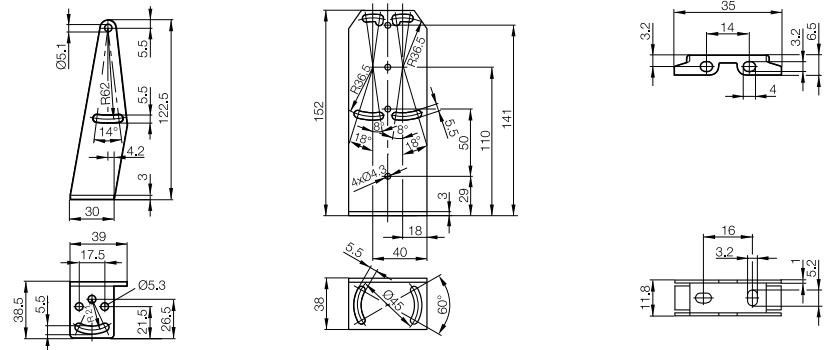


Product-specific accessories

- Photoelectric Sensors
- Reflectors
- Sensors
- Fasteners
- Mounting Brackets**
- Sensor holder
- Holder System
- Clamps, Adapter Plate, Cover Bracket
- Positive Stops and Contact Protector
- Ultrasonic Sensors
- Uni/Unicompact Sensors
- Industrial RFID Systems
- Position and Distance Measurement
- Protective End Caps and Nuts
- Pressure Sensors
- Vision Sensors



Description	Mounting brackets	Mounting brackets	Mounting brackets
Use	For BOS 65K	For BOD 66M	For BOS 74K
<b>Ordering code</b>	<b>BAM0125</b>	<b>BAM00P9</b>	<b>BAM00UJ</b>
Part number	BOS 65-HW-1	BOD 66-HW-1	BOS 74-HW-1
Material	Stainless steel	Stainless steel	



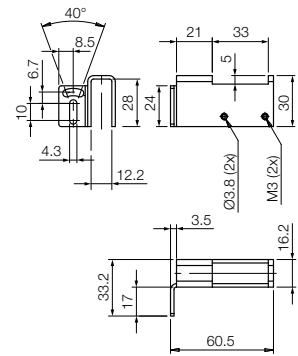
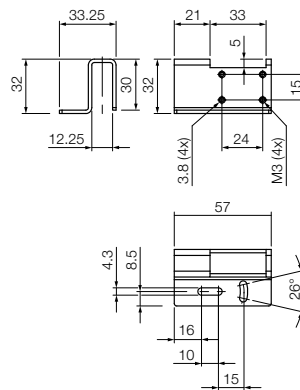
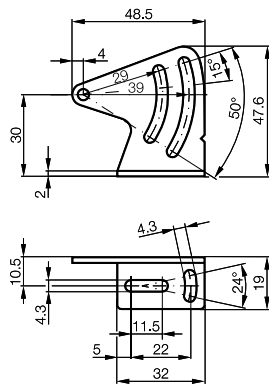
# Photoelectric Sensors

## Mounting brackets

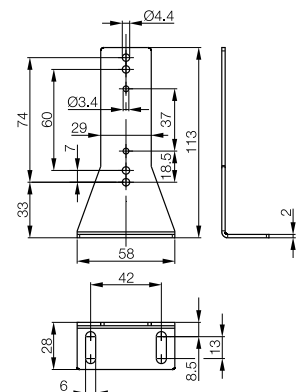
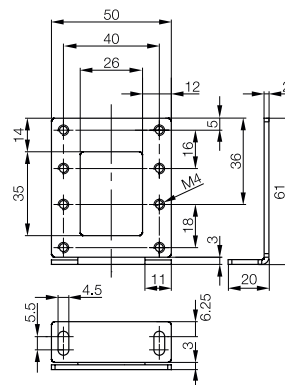
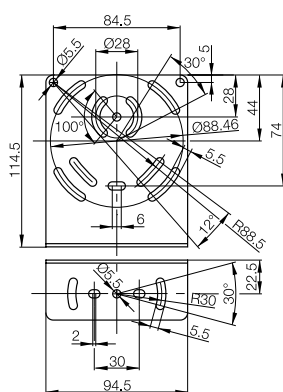
### BOS Mix



Description	<b>Mounting brackets</b>	<b>Mounting brackets</b>	<b>Mounting brackets</b>
Use	For BOS 25K, BOS 26K, BOS 21M	For BOS 23K, BOS 25K, BOS 26K, BOS R06	For BOS 25K, BOS 26K, BOS 50K, BOS R06
<b>Ordering code</b>	<b>BAM00TK</b>	<b>BAM0225</b>	<b>BAM0226</b>
Part number	BOS 26-HW-1	BAM MB-XO-014-B10-4-RRR	BAM MB-XO-014-B10-4-BRR
Material		Stainless steel	Stainless steel



Description	<b>Mounting brackets</b>	<b>Mounting brackets</b>	<b>Mounting brackets</b>
Use	For BOS 63M, BOD 63M	For reflectors BOS R-9 and BOS R-22	For reflectors BOS R-10 and BOS R-25
<b>Ordering code</b>	<b>BAM00P6</b>	<b>BAM00UA</b>	<b>BAM00U8</b>
Part number	BOS 63-HW-1	BOS 5-HW-6	BOS 5-HW-4
Material	Stainless steel		



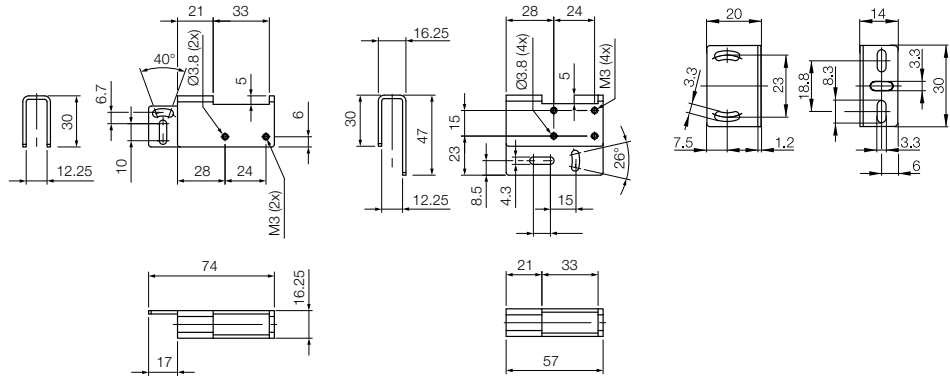
# Photoelectric Sensors

## Mounting brackets

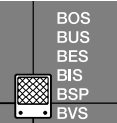
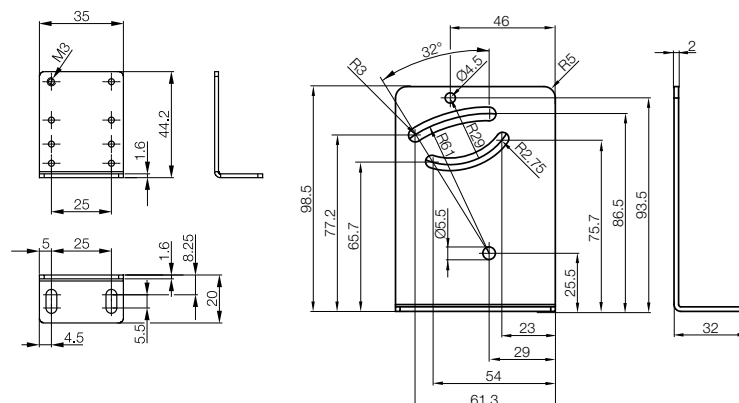
### BOS Mix



Description	<b>Mounting brackets</b>	<b>Mounting brackets</b>	<b>Mounting brackets</b>
Use	For BOS 23K, BOS 25K, BOS 26K, BUS R06	For BOS 23K, BOS 25K, BOS 26K, BUS R06	For BOS 6K and BOS 21M
<b>Ordering code</b>	<b>BAM0227</b>	<b>BAM0228</b>	<b>BAM00UH</b>
Part number	BAM MB-XO-014-B10-4-BLS	BAM MB-XO-014-B10-4-RLS	BOS 6-HW-1
Material	Stainless steel	Stainless steel	Stainless steel



Description	<b>Mounting brackets</b>	<b>Mounting brackets</b>	
Use	For BOS 50K/23K	For BOS R-26 reflectors	
<b>Ordering code</b>	<b>BAM01E8</b>	<b>BAM00U9</b>	
Part number	BAM MB-X0-005-B04-4	BOS 5-HW-5	
Material	Stainless steel		



Product-specific Accessories

- Photoelectric Sensors
- Reflectors
- Sensors
- Fasteners
- Mounting Brackets**
- Sensor Holder
- Holder System
- Clamps, Adapter Plate, Cover Bracket

- Positive Stops and Contact Protector
- Ultrasonic Sensors
- Uni/Unicompact Sensors
- Industrial RFID Systems
- Position and Distance Measurement
- Protective End Caps and Nuts
- Pressure Sensors
- Vision Sensors

# Photoelectric Sensors

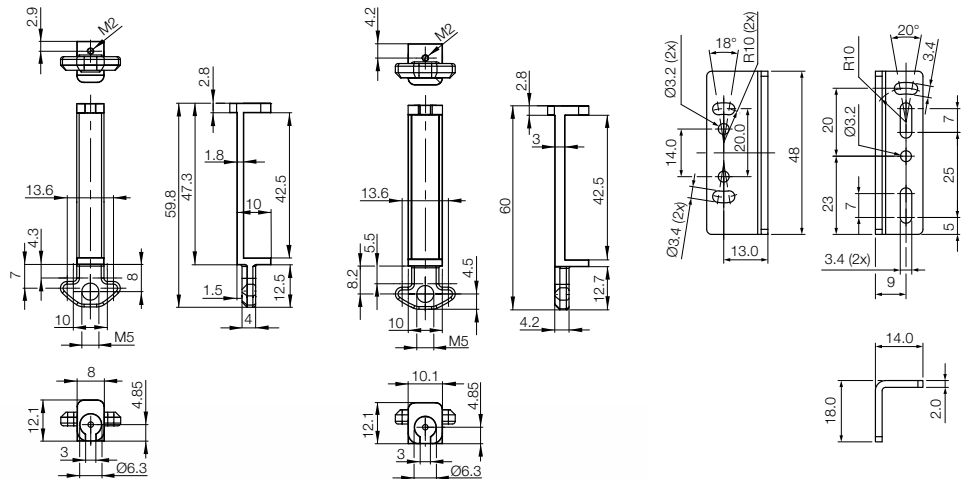
## Sensor holder for Q08, mounting bracket



Description	<b>8x8 mm sensor holder</b>	<b>8x8 mm sensor holder</b>	<b>Mounting brackets</b>
Use	For sensors BOS and BES Q08 in ITEM profiles with 8 mm groove	For sensors BOS and BES Q08 in Bosch profiles with 10 mm groove	For BOS Q08M-...
<b>Ordering code</b>	<b>BAM00NJ</b>	<b>BAM01AU</b>	<b>BAM01YW</b>
Part number	BES Q08-KH-2	BES Q08-KH-3	BAM MB-XA-013-Q08-4
Material	CuBe 2	CuBe 2	Stainless steel

### Sensor installation could hardly be easier.

Just lay the sensor in the holder and screw it in securely. Afterward, the sensor can be inserted directly from above into the profile groove – in whatever position you would like. The holder accepts all inductive and optical 8x8 cable sensors. These sensors are mainly used in handling and conveyor technology.



### Your added bonus

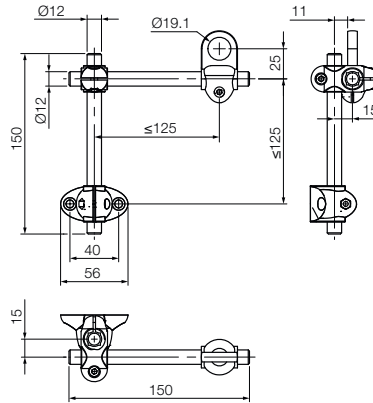
A patented mounting concept ensures flush installation in aluminum profiles.

# Photoelectric Sensors

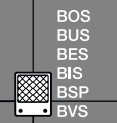
## Holder system



Description	<b>Starter set – plastic</b>	
Use	For flexible mounting; for all cylindrical sensors with M18 external thread. May be combined with other Balluff accessories.	
<b>Ordering code</b>	<b>SET011L</b>	
Part number	BAV BP-PH-00064-01	



The mounting rods are knurled full-length.  
This prevents any position change.



Product-specific  
Accessories

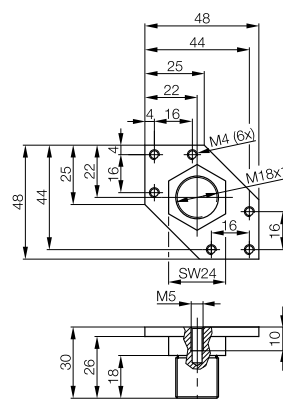
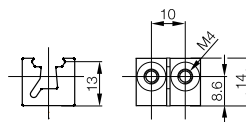
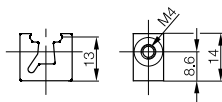
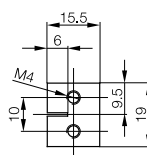
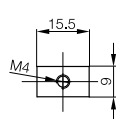
- Photoelectric Sensors
- Reflectors
- Sensors
- Fasteners
- Mounting Brackets
- Sensor holder Holder System**
- Clamps, Adapter Plate, Cover Bracket
- Positive Stops and Contact Protector
- Ultrasonic Sensors
- Uni/Unicompact Sensors
- Industrial RFID Systems
- Position and Distance Measurement
- Protective End Caps and Nuts
- Pressure Sensors
- Vision Sensors

# Photoelectric Sensors

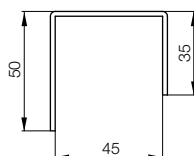
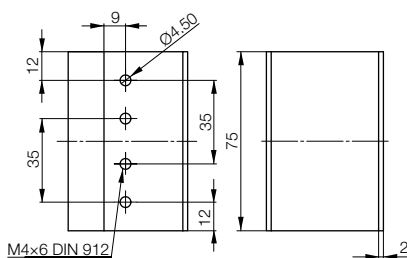
## Clamps, adapter plate, cover bracket



Description	<b>Clamping holders</b>	<b>Clamping holders</b>	<b>Adapter plate</b>
Use	Sensors with dovetail for BOS 21M	Sensors with dovetail for BOS 21M	For BOS 21M, BOS 25K, BOS 26K and BOS R-1
<b>Ordering code</b>	<b>BAM00TF</b>	<b>BAM00TH</b>	<b>BAM00T7</b>
Part number	BOS 21-KH-1	BOS 21-KH-2	BOS 21-AD-1

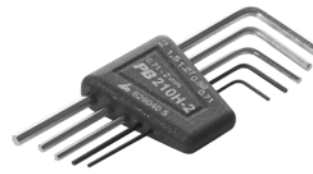


Description	<b>Cover Bracket</b>
Version	For mounting with BAM003C sensor holder
Use	For Photoelectric Distance Sensors BOD 63M and 66M for covering and for mechanical protection
<b>Ordering code</b>	<b>BAM003Z</b>
Part number	BMS CZ-M-B-001
Material	Anodized aluminum



# Photoelectric Sensors

## Tools



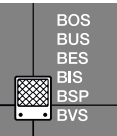
Description	<b>BMF Hex Key</b>	<b>Hex key set 0.7-2.0</b>
Version	Folding Allen key set, with additional blades, 8-piece	
Use	Tool set for all BMF sensors and BMF mounting brackets as well as for sensors having a potentiometer, e.g. BOS, BCS, BUS, etc.	Tool set for BMF sensors and BMF mounting brackets
<b>Material No.</b>	<b>139868</b>	<b>123264</b>
Material	Blade: chrome vanadium steel, fully hardened, galvanically treated. Grip: ergonomic, fiberglass reinforced housing, 55 mm long.	



0.7		
0.9		
1.3		
1.5		
2.0		
2.5		
		3.0
		PH00



0.71
0.89
1.27
1.5
2.0



Product-specific Accessories

- Photoelectric Sensors
- Reflectors
- Sensors
- Fasteners
- Mounting Brackets
- Sensor holder
- Holder System
- Clamps, Adapter Plate, Cover Bracket**
- Positive Stops and Contact Protector
- Ultrasonic Sensors
- Uni/Unicompact Sensors
- Industrial RFID Systems
- Position and Distance Measurement
- Protective End Caps and Nuts
- Pressure Sensors
- Vision Sensors

### Application

Practical folding holder for Allen keys to prevent them from getting lost. Especially good for turning very small screws, e.g. tightening down or precise setting of sensors.

Tough housing with release button for easily selecting the right blade. Eyelet with matching carabiner hook. Self-service packaging for Euro hole display.

# Positive Stops and Contact Protector

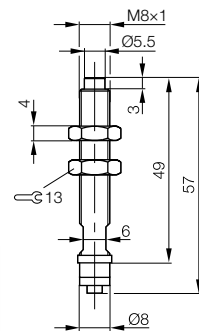
## Positive stop

### Positive stops for sensors with diameters of 4 mm or 8 mm

A positive stop that is combined with the corresponding mounting cuff can be added to inductive sensors with housing  $\varnothing$  4 mm or  $\varnothing$  8 mm.



Description	<b>Positive stop</b>	
Use	For inductive sensors for mechanical protection	
<b>Ordering code</b>	<b>BAM009L</b>	
Part number	BES 08-FA-49	
<b>Ordering code</b>		
Part number		
Temperature resistance	-25...+100 °C	
Spring force	3 N	
Impact force $F_{max.}$ (N)	100	
Spring deflection	2 mm	
Permissible torque	15 Nm	
Material	Stainless steel	



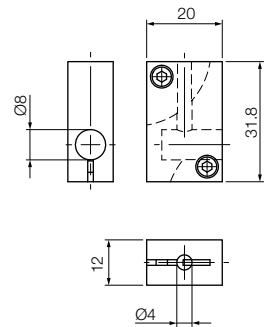
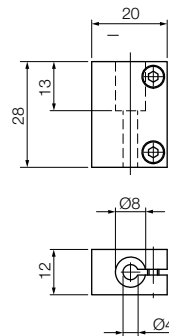
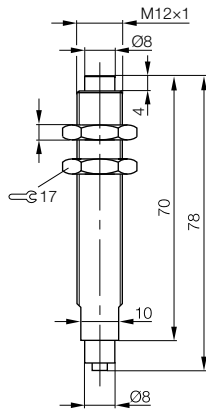
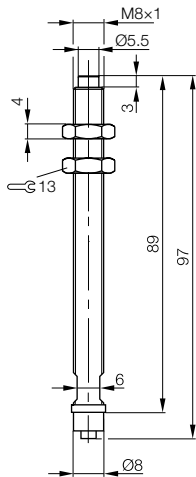


# Positive Stops and Contact Protector

## Positive stop, mounting cuff for positive stop



Positive stop	Positive stop	Mounting cuff - straight for positive stop	Mounting cuff - angled for positive stop
For inductive sensors for mechanical protection	For inductive sensors for mechanical protection	For sensors with $\varnothing$ 4 mm or $\varnothing$ 8 mm	For sensors with $\varnothing$ 4 mm or $\varnothing$ 8 mm
<b>BAM009M</b>	<b>BAM00AZ</b>	<b>BAM009N</b>	<b>BAM009P</b>
BES 08-FA-89	BES 12-FA-70	BES 08-FA-BS-4,0-G	BES 08-FA-BS-4,0-W
		<b>BAM009R</b>	<b>BAM009T</b>
		BES 08-FA-BS-8,0-G	BES 08-FA-BS-8,0-W
-25...+100 °C	-25...+100 °C	-25...+100 °C	-25...+100 °C
3 N	4 N		
100	100		
2 mm	32 mm		
15 Nm	25 Nm	15 Nm	15 Nm
Stainless steel	Stainless steel	Anodized Al	Anodized Al



BOS  
BUS  
BES  
BIS  
BSP  
BVS

Product-specific Accessories

Photoelectric Sensors  
Reflectors  
Sensors  
Fasteners  
Positive Stops and Contact Protector  
Positive stop  
Mounting Cuff for Positive Stop  
Contact protector  
Tube switch  
Ultrasonic Sensors  
Uni/Unicompact Sensors  
Industrial RFID Systems  
Position and Distance Measurement  
Protective End Caps and Nuts  
Pressure Sensors  
Vision Sensors

# Positive Stops and Contact Protector

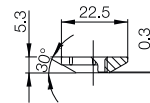
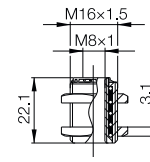
## Contact protector

### Contact protector for sensors

The contact protector absorbs contacts with displacement of up to 15 mm without the sensor being damaged. The object is incident against an attached protective cap and then pushes the sensor back. Damage to the sensor or coil is thereby prevented.



Description	<b>Contact protector</b>	
Use	For <b>M8</b> sensors for mechanical protection	
<b>Ordering code</b>	<b>BAM015U</b>	
Part number	BESA-08-CM	
WAF	22	
Ambient temperature	-45...+85 °C	
Material	Anodized Al, POM	

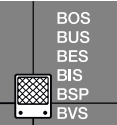
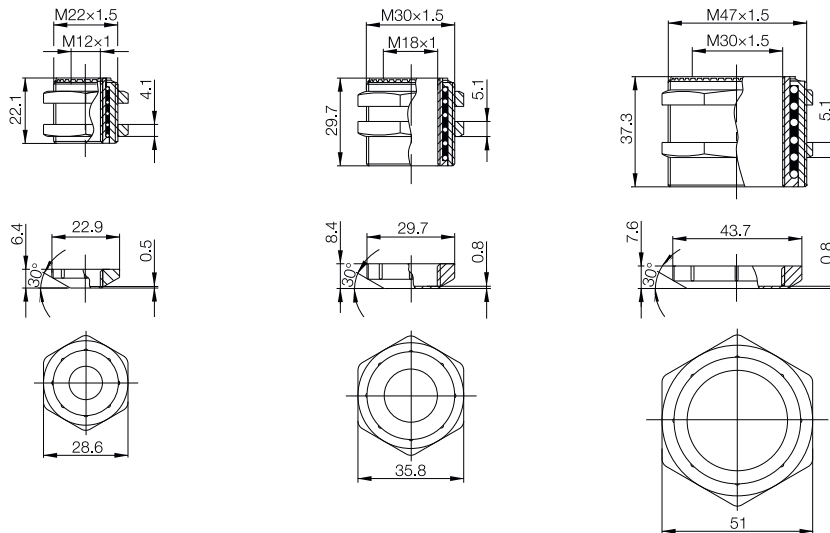


# Positive Stops and Contact Protector

## Contact protector

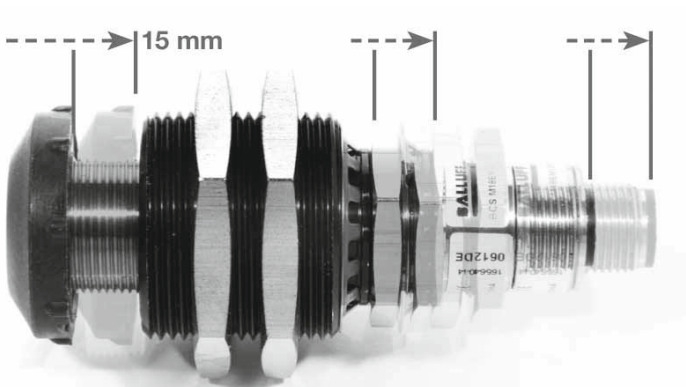


Contact protector	Contact protector	Contact protector	
For <b>M12</b> sensors for mechanical protection	For <b>M18</b> sensors for mechanical protection	For <b>M30</b> sensors for mechanical protection	
<b>BAM015W</b>	<b>BAM015Y</b>	<b>BAM015Z</b>	
BESA-12-CM	BESA-18-CM	BESA-30-CM	
29	35	51	
-45...+85 °C	-45...+85 °C	-45...+85 °C	
Anodized Al, POM	Anodized Al, POM	Anodized Al, POM	



Product-specific Accessories

- Photoelectric Sensors
- Reflectors
- Sensors
- Fasteners
- Positive Stops and Contact Protector
- Positive stop
- Mounting Cuff for Positive Stop
- Contact protector**
- Tube switch
- Ultrasonic Sensors
- Uni/Unicompact Sensors
- Industrial RFID Systems
- Position and Distance Measurement
- Protective End Caps and Nuts
- Pressure Sensors
- Vision Sensors



# Positive Stops and Contact Protector

## Tube switch

- Mechanical actuation – non-contact switching
- Protects the sensor from mechanical damage
- Plug and safe

### Rapid application – high reliability

The set includes a pre-assembled tube switch, which means you only need to bring the sensor into operation. The tube switch also combines the advantages offered by mechanical and inductive switches.

Manufactured from stainless steel, it is extremely robust and very reliable, even under difficult conditions.

### Note:

Positive stops are intended for purely axial actuation and always have to be actuated until impact.

Description	
Use	
<b>Ordering code</b>	
Part number	
Spring force F (N)	
Impact force $F_{max}$ (N)	
Switching operations min. (with $F_{max}$ )	
Housing material	



# Positive Stops and Contact Protector

## Tube switch



### Tube switch

For sensors  $\varnothing 4$  mm for mechanical protection

#### BAM01C0

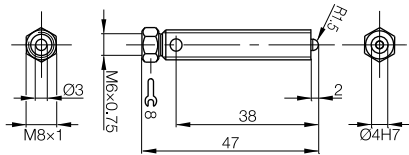
BAM FS-XE-002-D4-4

3

400

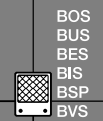
500000

Stainless steel



**BAM FS-XE-002-D4-4 can be used with the following sensors:**

Part number	PNP	NPN	Connection type
BES G04ED-PSC15B-S26G	■		Connectors
BES 516-3007-G-E4-C-S4-00,2	■		0.2 m PUR cable with connector
BES 516-3017-G-E4-C-S4-00,2	■		0.2 m PUR cable with connector
BES 516-3007-G-E4-C-S49-00,3	■		0.2 m/0.3 m PUR cable with connector
BES 516-3017-G-E4-C-S49-00,3	■		0.2 m PUR cable with connector
BES 516-3007-G-E4-C-S26-00,2	■		0.2 m PUR cable with connector
BES 516-3007-G-E4-C-PU-02	■		0.2 m PUR cable
BES 516-3017-G-E4-C-PU-02	■		0.2 m PUR cable
BES 516-3008-G-E4-C-S49-0,02		■	0.2 m/0.3 m PUR cable with connector
BES 516-3008-G-E4-C-PU-02		■	0.2 m PUR cable
BES 516-3018-G-E4-C-PU-02		■	0.2 m PUR cable



Product-specific Accessories

Photoelectric Sensors

Reflectors

Sensors

Fasteners

Positive Stops and Contact Protector

Positive stop

Mounting Cuff for Positive Stop

Contact protector

**Tube switch**

Ultrasonic Sensors

Uni/Unicompact Sensors

Industrial RFID Systems

Position and Distance Measurement

Protective End Caps and Nuts

Pressure Sensors

Vision Sensors

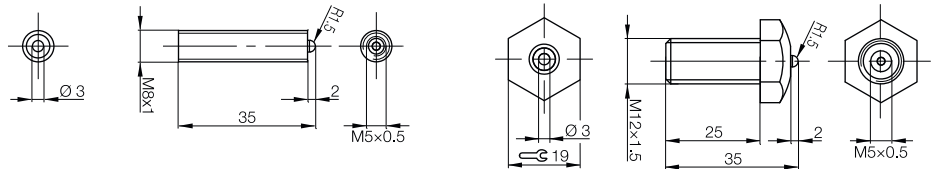


# Positive Stops and Contact Protector

## Tube switch



Description	<b>Tube switch</b>	<b>Tube switch</b>
Use	For <b>M5</b> sensors for mechanical protection	For <b>M5</b> sensors for mechanical protection
<b>Ordering code</b>	<b>BAM01AZ</b>	<b>BAM019Y</b>
Part number	BAM FS-XE-001-M5-4	BAM FS-XE-003-M5-4
Spring force F (N)	3	3
Impact force F <sub>max.</sub> (N)	400	400
Switching operations min. (with F <sub>max.</sub> )	500000	500000
Housing material	Stainless steel	Stainless steel



### BAM FS-XE-003-M5-4 and BAM FS-XE-001-M5-4 can be used with the following sensors:

Part number	PNP	NPN	Connection type
BES 516-3005-G-E5-C-S49	■		Connectors
BES 516-3022-G-E5-C-S49	■		Connectors
BES M05ED-PSC15B-S26G	■		Connectors
BES 516-3005-G-E4-C-S4-00,2	■		0.2 m PUR cable with connector
BES 516-3005-G-E4-C-S49-00,3	■		0.3 m PUR cable with connector
BES 516-3022-G-E4-C-S49-00,3	■		0.3 m PUR cable with connector
BES 516-3005-G-E4-C-S26-00,3	■		0.3 m PUR cable with connector
BES 516-3005-G-E4-C-PU-02	■		2 m PUR cable
BES 516-3022-G-E4-C-PU-02	■		2 m PUR cable
BES 516-3006-G-E5-C-S49		■	Connectors
BES 516-3023-G-E5-C-S49		■	Connectors
BES 516-3006-G-E4-C-PU-02		■	2 m PUR cable
BES 516-3023-G-E4-C-PU-02		■	2 m PUR cable

# Positive Stops and Contact Protector

## Tube switch



### Tube switch

For **M8** sensors for mechanical protection

### BAM019W

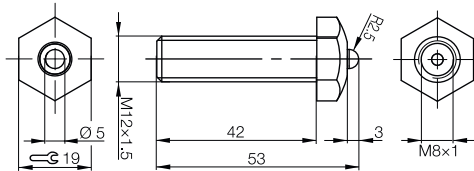
BAM FS-XE-004-M8-4

4

400

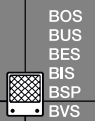
500000

Stainless steel



### BAM FS-XE-004-M8-4 can be used with the following sensors:

Part number	PNP	NPN	Connection type
BES 516-324-E3-C-S4-00,3	■		0.3 m PUR cable with connector
BES 516-324-E3-C-S49-00,3	■		0.3 m PUR cable with connector
BES 516-324-EO-C-02	■		2 m PVC cable
BES 516-324-EO-C-S49-00,2	■		0.2 m PUR cable with connector
BES 516-324-S49-C	■		Connectors
BES 516-324-SA33	■		Connectors
BES 516-377-E3-C-S4-PU-00,3	■		0.3 m PUR cable with connector
BES 516-377-EO-C-02	■		2 m PVC cable
BES 516-377-EO-C-S49-00,2	■		0.2 m PUR cable with connector
BES 516-377-S49-C	■		Connectors
BES G08EG-PSC15B-BV02	■		2 m PVC cable
BES M08EF-POC15B-BP02	■		2 m PUR cable
BES M08EF-PSC15B-BP02	■		2 m PUR cable
BES M08EH-POC15B-S04G	■		Connectors
BES M08EH-PSC15B-S04G	■		Connectors
BES M08MH1-POC15B-S04G	■		Connectors
BES M08MH1-PSC15B-S04G	■		Connectors
BES M08MI-POC15B-BV02	■		2 m PVC cable
BES M08MI-PSC15B-BV02	■		2 m PVC cable
BES M08MI-PSC15B-S49G	■		Connectors
BES M08MH1-NSC15B-S04G		■	Connectors
BES M08MH1-NOC15B-S04G		■	Connectors
BES M08MI-NSC15B-S49G		■	Connectors
BES M08EH-NSC15B-S04G		■	Connectors
BES M08EH-NOC15B-S04G		■	Connectors
BES 516-343-S49-C		■	Connectors
BES 516-378-S49-C		■	Connectors
BES M08MI-NSC15B-BV02		■	2 m PVC cable
BES 516-343-EO-C-02		■	2 m PVC cable
BES 516-378-EO-C-02		■	2 m PVC cable



Product-specific  
Accessories

Photoelectric  
Sensors  
Reflectors  
Sensors  
Fasteners

Positive Stops  
and Contact  
Protector

Positive stop  
Mounting Cuff for  
Positive Stop

Contact protector

**Tube switch**

Ultrasonic  
Sensors

Uni/Unicompact  
Sensors

Industrial RFID  
Systems

Position and  
Distance  
Measurement

Protective End  
Caps and Nuts

Pressure  
Sensors

Vision Sensors

# Ultrasonic Sensors

## Sound deflection angle

Description	
Use	
<b>Ordering code</b>	
Part number	
Material	





# Ultrasonic Sensors

## Sound deflection angle



### Sound deflection angle

For BUS M18

#### BAM01EP

BAM BD-US-001-D20-4

Stainless steel

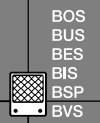
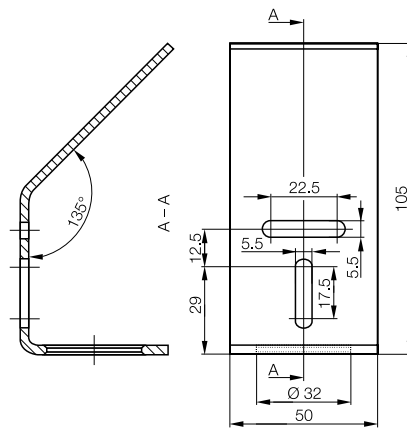
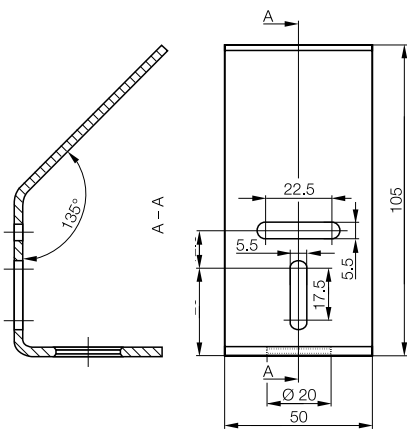
### Sound deflection angle

For BUS M30

#### BAM01ER

BAM BD-US-001-D32-4

Stainless steel



Product-specific  
Accessories

- Photoelectric Sensors
- Reflectors
- Sensors
- Fasteners
- Positive Stops and Contact Protector
- Ultrasonic Sensors
- Sound Deflection Bracket**
- Focusing Attachments
- Programming Device
- Uni/Unicomact Sensors
- Industrial RFID Systems
- Position and Distance Measurement
- Protective End Caps and Nuts
- Pressure Sensors
- Vision Sensors

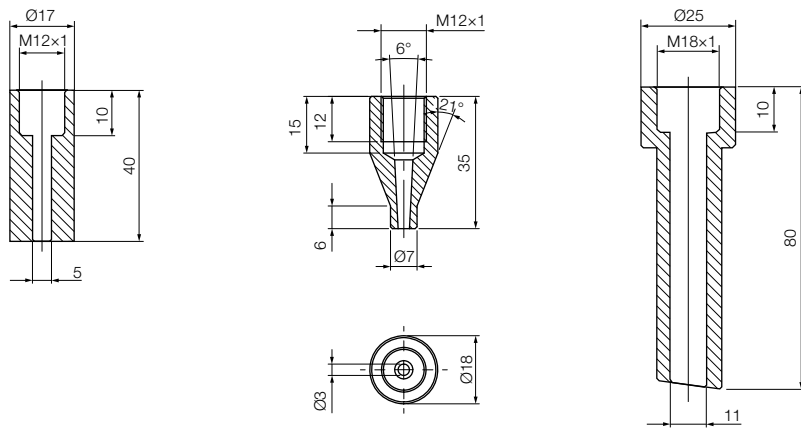


# Ultrasonic Sensors

## Focusing attachments, tool



Description	Focusing attachments M12 → 5 mm	Focusing attachments M12 → 7 mm	Focusing attachments M18 → 11 mm
<b>Ordering code</b>	<b>BAM01ET</b>	<b>BAM01JR</b>	<b>BAM01HJ</b>
Part number	BAM AP-US-001-M12-O	BAM AP-US-003-M12-O	BAM AP-US-002-M18-O
Material	POM	POM	POM



Description	<b>BMF Hex Key</b>	<b>Hex key set 0.7-2.0</b>
Version	Folding Allen key set, with additional blades, 8-piece	
Use	Tool set for all BMF sensors and BMF mounting brackets as well as for sensors having a potentiometer, e.g. BOS, BCS, BUS, etc.	Tool set for BMF sensors and BMF mounting brackets
<b>Material No.</b>	<b>139868</b>	<b>123264</b>
Material	Blade: chrome vanadium steel, fully hardened, galvanically treated. Grip: ergonomic, fiberglass reinforced housing, 55 mm long.	

Hex Key Size	Hex Key Size	Hex Key Size
0.7		
0.9		
1.3		
1.5		
2.0		
2.5		
		3.0
	PH00	

### Application

Practical folding holder for Allen keys to prevent them from getting lost. Especially good for turning very small screws, e.g. tightening down or precise setting of sensors. Tough housing with release button for easily selecting the right blade. Eyelet with matching carabiner hook. Self-service packaging for Euro hole display.

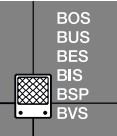
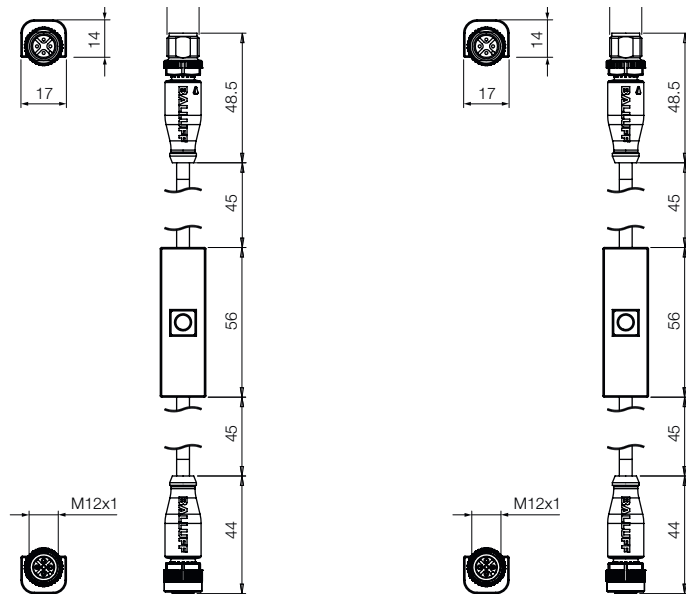
Hex Key Size
0.71
0.89
1.27
1.5
2.0

# Ultrasonic Sensors

## Programming device



Description	<b>Teach adapter</b>	<b>Teach adapter</b>
Use	For BUS M12E0-...-020-S04G	For BUS Q80K0-...-600-S92K
<b>Ordering code</b>	<b>BAE00E5</b>	<b>BAE00E6</b>
Part number	BAE PD-US-004-S04	BAE PD-US-004-S92
Teach-in	PIN2 to 0 V	PIN5 to 0 V



Product-specific Accessories

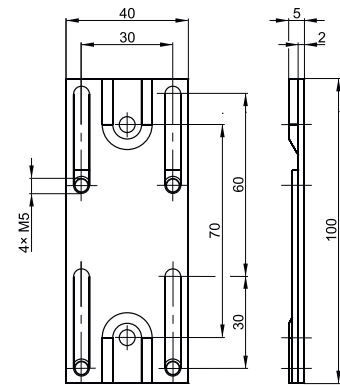
- Photoelectric Sensors
- Reflectors
- Sensors
- Fasteners
- Positive Stops and Contact Protector
- Ultrasonic Sensors
- Sound Deflection Bracket
- Focusing Attachments**
- Programming Device**
- Uni/Unicompact Sensors
- Industrial RFID Systems
- Position and Distance Measurement
- Protective End Caps and Nuts
- Pressure Sensors
- Vision Sensors

# Uni/Unicompact Sensors

## Mounting plate



Description	<b>Mounting plate – Unisensor and Unicompact</b>
Use	For Unisensor and Unicompact sensors (40x40 mm)
<b>Ordering code</b>	<b>BAMU1TM</b>
Part number	Mounting plate B 4 - 2057
Material	Anodized aluminum



Wired Unisensors attached to this mounting plate can be displaced up to 30 mm. Loosening the sensor mounting screws (M5x25; included in scope of delivery) allows the sensor to be easily repositioned to the desired location. Tighten screws!



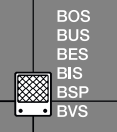
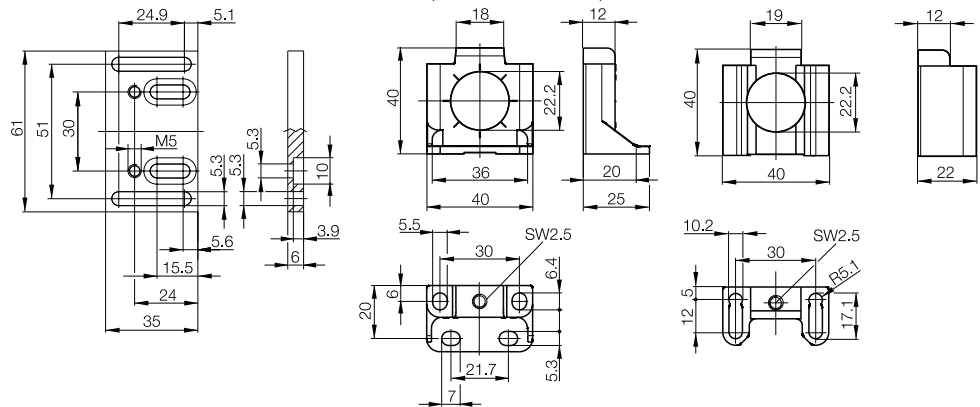
# Unicompact Sensors

## Mounting aids



Description	Unicompact mounting bracket	Unicompact mounting base	Unicompact mounting base
Use	For Unicompact sensors BES Q40KFU-... (40x40 mm)	For Unicompact sensors BES Q40KFU-... (40x40 mm)	For Unicompact sensors BES Q40KFU-... (40x40 mm)
<b>Ordering code</b>	<b>BAM00JW</b>	<b>BAM00JY</b>	<b>BAM00JZ</b>
Part number	BES Q40-HW-1	BES Q40-HW-2	BES Q40-HW-3
Material	Anodized aluminum	GD-Zn	Anodized aluminum

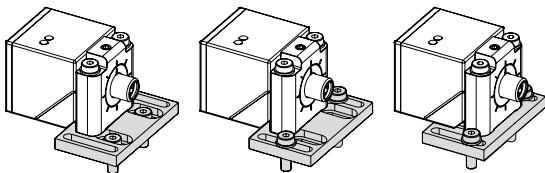
Please note permissible installation options!



Product-specific Accessories

- Photoelectric Sensors
- Reflectors
- Sensors
- Fasteners
- Positive Stops and Contact Protector
- Ultrasonic Sensors
- Uni/Unicompact Sensors
- Mounting plate**
- Mounting Aids**
- Holder System
- Weld Protection, Protective Cover
- Industrial RFID Systems
- Position and Distance Measurement
- Protective End Caps and Nuts
- Pressure Sensors
- Vision Sensors

### 3 different mounting options



# Unicomact Sensors

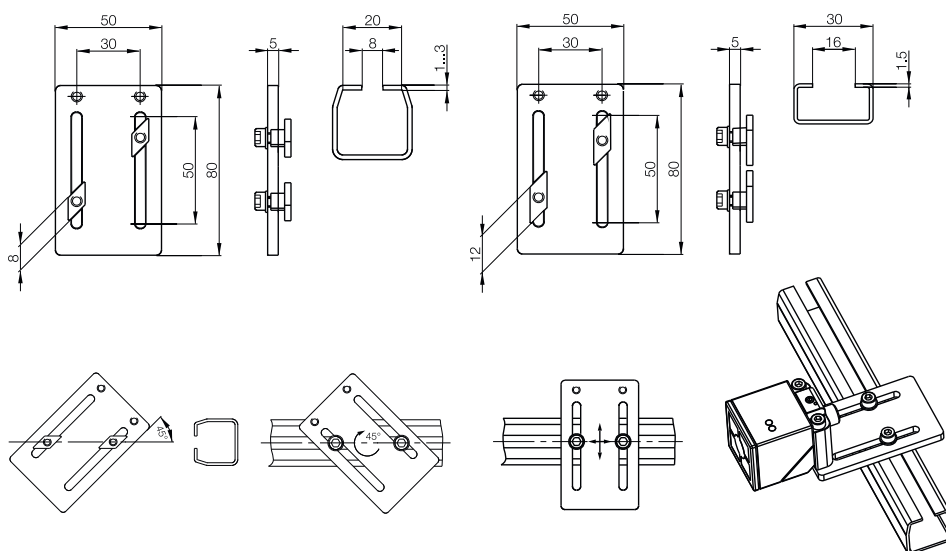
## Holder system



Description	<b>Unicomact holder system</b>	<b>Unicomact holder system</b>
Use	Unicomact sensors for fastening to profile rails (groove width: 8 mm)	Unicomact sensors for fastening to profile rails (groove width: 16 mm)
<b>Ordering code</b>	<b>BAM00JU</b>	<b>BAM00JT</b>
Part number	BES HS-01-P1-C8/Q40	BES HS-01-P1-C16/Q40
Material	Anodized aluminum, brass	Anodized aluminum, brass

### The mounting set consists of:

- 1 mounting plate
- 2 slot nuts
- 2 socket head cap screws M5×10 DIN 912
- 2 washers Ø 5.3, DIN 533
- 2 socket head cap screws M5×40, ISO 4762

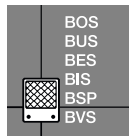
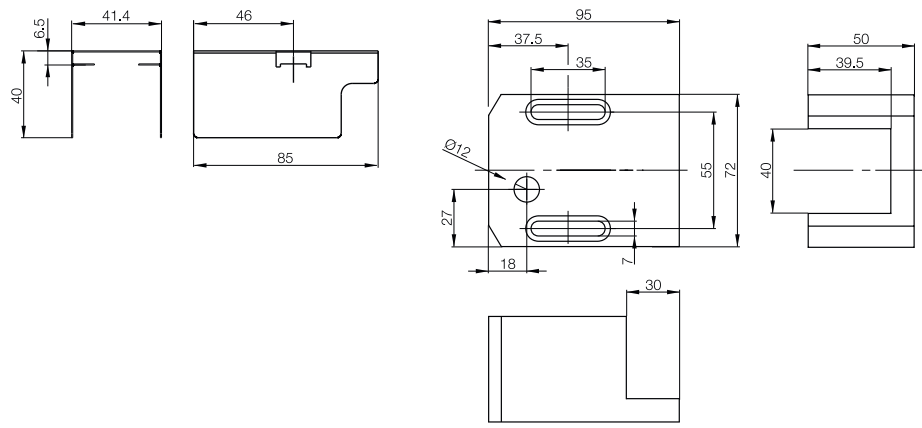


# Unicompact Sensors

## Weld protection, protective cover



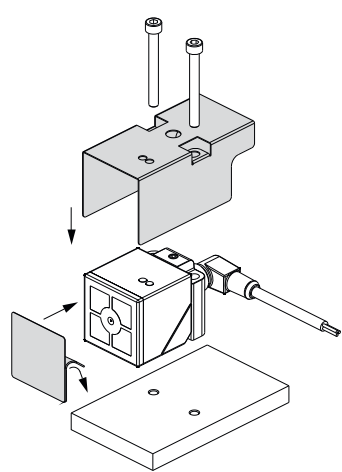
Description	<b>Weld protection - Unicompact</b>	<b>Protective cover - Unicompact</b>
Use	For magnetic field immune Unicompact sensors BES Q40KFU-... (40x40 mm)	For Unicompact sensors BES Q40KFU-... (40x40 mm)
<b>Ordering code</b>	<b>BAM00K0</b>	<b>BAM00K1</b>
Part number	BES Q40-SH-1	BES Q40-SH-2
Material	Anodized aluminum	PA 6



Product-specific Accessories

- Photoelectric Sensors
- Reflectors
- Sensors
- Fasteners
- Positive Stops and Contact Protector
- Ultrasonic Sensors
- Uni/Unicompact Sensors
- Mounting plate
- Mounting Aids
- Holder System**
- Weld Protection, Protective Cover**
- Industrial RFID Systems
- Position and Distance Measurement
- Protective End Caps and Nuts
- Pressure Sensors
- Vision Sensors

The weld protection consists of a protective cover and a self-adhering PTFE film for protecting the sensing surface. If the sensor head is replaced, the welding protection must not be removed.

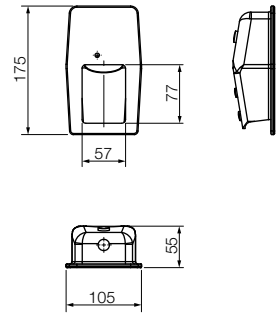


# Industrial RFID Systems

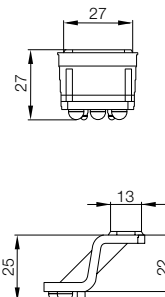
## Protective cover, mounting bracket



Description	<b>Protective cover</b>	
Use	For BIS C-870, BIS L-870, BIS M-870	
<b>Ordering code</b>	<b>BAM021R</b>	
Part number	BAM PC-XA-016-001-A	
Material	Cordura, black	



Description	<b>Mounting brackets</b>	
Use	For data carrier BIS U-102	
<b>Ordering code</b>	<b>BAM01YK</b>	
Part number	BIS Z-HW-005	



**Included for mounting are:**

- 2 Mounting brackets
- 4 socket head cap screws
- 4 Nuts



# Industrial RFID Systems

## Mounting plate, mounting set



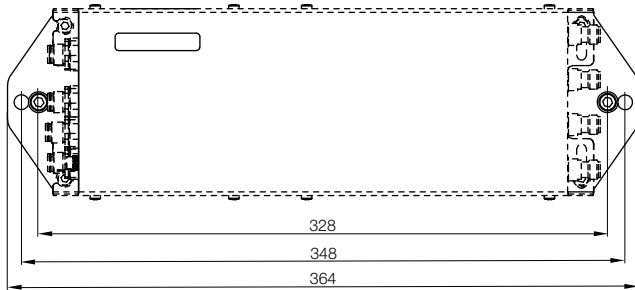
### Mounting plate

For processor units BIS U

### BAM01KN

BIS Z-HW-004

Anodized aluminum



For mounting on profile rail, steel screw connection.

### Included for mounting are:

- 2 BIS Z-HW-004 retaining plates
- 4 hexagon socket head cap screws M5×10 DIN 912, A2, 8.8
- 2 hexagon socket head cap screws M6×12 DIN 912, A2, 8.8
- 4 washers 5 DIN 125, A2
- 2 washers 6 DIN 125, A2

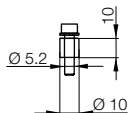


### Mounting set

For data carrier BIS U-100

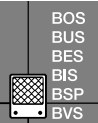
### BAM01LW

BIS Z-SP-003



### The mounting set consists of:

- 2 plastic distance rollers
- 2 hexagon socket head cap screws, ISO4762-M 5X22-8,8-A2B
- 2 washers D 125-A 5,3-ST-A2P



Product-specific Accessories

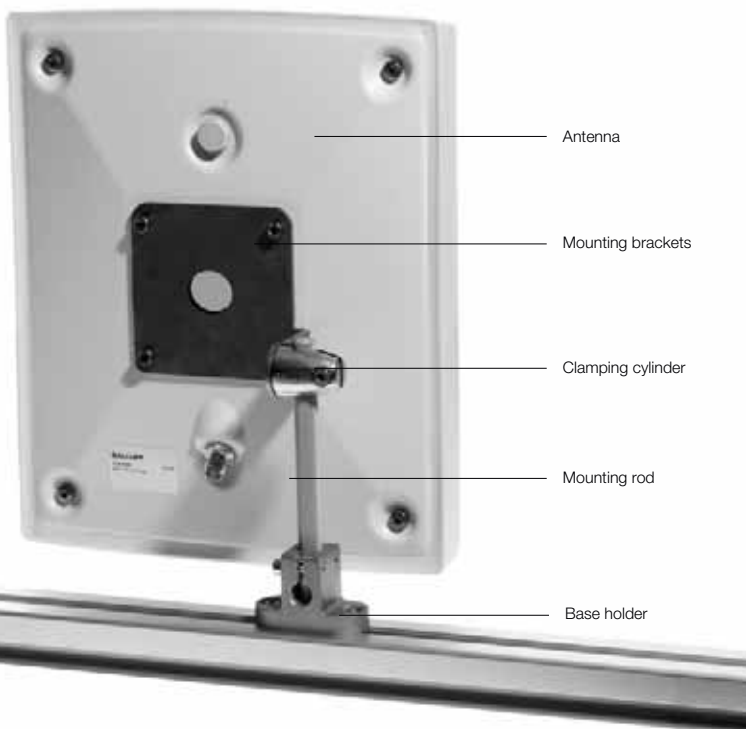
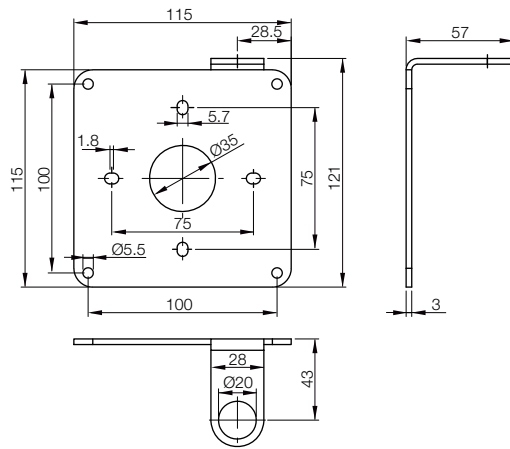
- Photoelectric Sensors
- Reflectors
- Sensors
- Fasteners
- Positive Stops and Contact Protector
- Ultrasonic Sensors
- Uni/Unicompact Sensors
- Industrial RFID Systems
- Protective Cover**
- Mounting brackets**
- Mounting plate**
- Mounting Set**
- Antenna holder
- Mounting Brackets, Shield
- Mounting Set
- Connection Cable, Handle
- Position and Distance Measurement
- Protective End Caps and Nuts
- Pressure Sensors
- Vision Sensors

# Industrial RFID Systems

## Antenna holder



Description	<b>Antenna holder</b>	
Use	For BIS U-301... and BIS U-302...	
<b>Ordering code</b>	<b>BAM01JK</b>	
Part number	BIS Z-HW-003	
Material	Stainless steel	

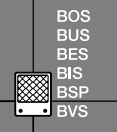
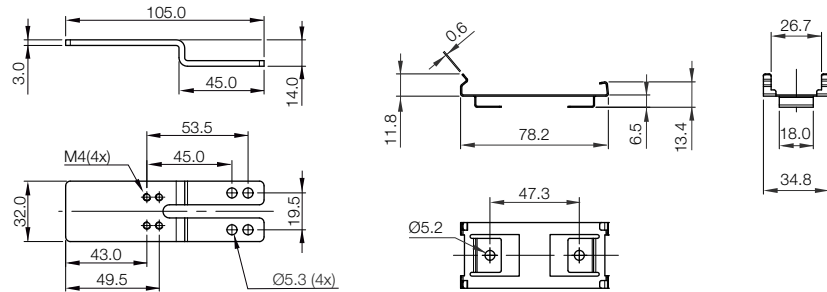


# Industrial RFID Systems

## Mounting brackets, shield



Description	<b>Mounting brackets</b>	<b>Mounting brackets</b>
Use	For mounting read/write heads on BOSCH pallet conveyor system TS1 and TS2	For BIS VM read/write head (included for BIS VM-3_...)
<b>Ordering code</b>	<b>BAM01MY</b>	<b>BAM01Y3</b>
Part number	BAM MB-XA-010-B07-4	BAM MC-XA-018-B04-4
Material	Stainless steel	Stainless steel

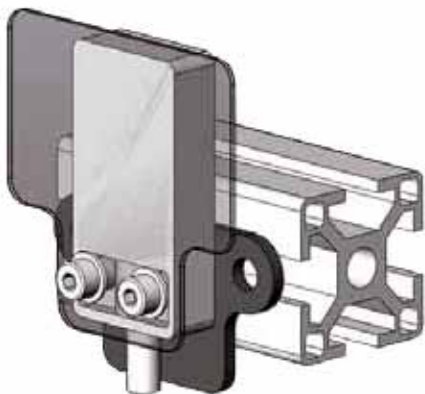
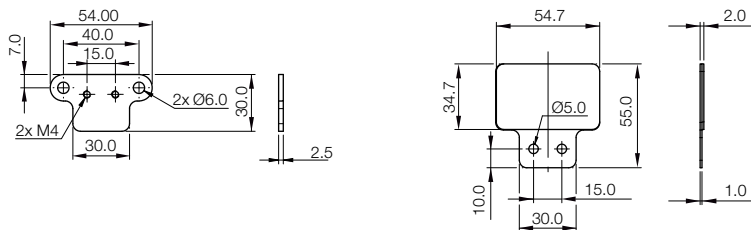


Product-specific Accessories

- Photoelectric Sensors
- Reflectors
- Sensors
- Fasteners
- Positive Stops and Contact Protector
- Ultrasonic Sensors
- Uni/Unicompact Sensors
- Industrial RFID Systems
- Protective Cover
- Mounting brackets
- Mounting plate
- Mounting Set
- Antenna holder
- Mounting Brackets, Shield
- Mounting Set
- Connection Cable, Handle
- Position and Distance Measurement
- Protective End Caps and Nuts
- Pressure Sensors
- Vision sensors



Description	<b>Mounting brackets</b>	<b>Protective cover</b>
Use	For mounting read/write heads on FlexLink Puck conveyor system	For mounting read/write heads on FlexLink Puck conveyor system for BIS004Y
<b>Ordering code</b>	<b>BAM01UH</b>	<b>BAM01Y8</b>
Part number	BAM MB-XA-012-B09-4	BAM PC-AM-010-4
Material	Stainless steel	Stainless steel



# Industrial RFID Systems

## Mounting set

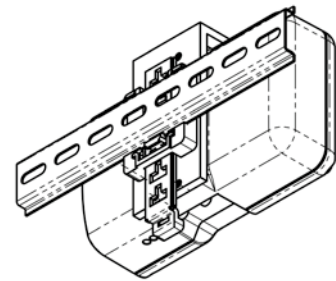
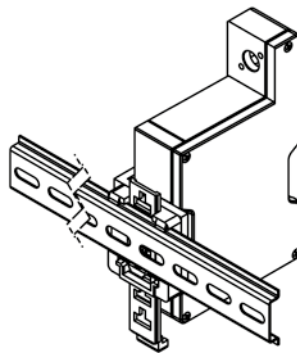


Description	<b>Mounting set for mounting rails</b>
Use	For processor units BIS C/L/M/S-600_
<b>Ordering code</b>	<b>BAM012L</b>
Part number	BIS Z-HW-001
Material	Anodized aluminum and PA 6

### For easy adjustment and attachment to profile rails

The following are added to the mounting set BIS Z-HW-001:

- 1 Mounting brackets
- 1 mounting rail holder
- 4 hexagon socket head cap screws, corresponding to DIN 912 (M4×16)
- 2 slotted socket head cap screws, corresponding to DIN 84 (M3×8)



# Industrial RFID Systems

## Connection cable, handle

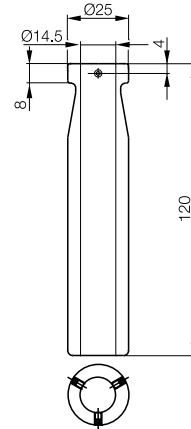
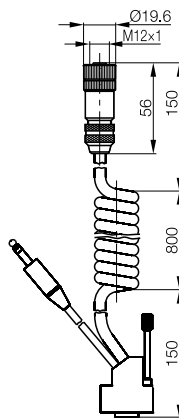


Description	<b>Connection cables</b>	<b>Handle</b>
Use	Connection cable for BIS M-4__ systems with coupling for BIS C-703-A power supply and RS232 interface	For read/write head BIS C-300-__
<b>Ordering code</b>	<b>BCC00T2</b>	<b>BAM012A</b>
Part number	BIS Z-AK-001-PU1-03	BIS C-300-HG1
Degree of protection as per IEC 60529	IP 40 (only when screwed together)	
Ambient temperature T <sub>a</sub>	0...+70 °C	0...+70 °C
Storage temperature		-20...+85 °C
Material		POM

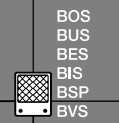
### Power supply



<b>Ordering code</b>	<b>BAE0049</b>
Part number	BIS C-703-A



Description	<b>Ergonomic handle</b>	
Use	For read/write heads or read/write heads with integrated processor unit	
For M18	<b>Ordering code</b>	<b>BAM012J</b>
	Part number	BIS Z-HG-002
For M30	<b>Ordering code</b>	<b>BAM012K</b>
	Part number	BIS Z-HG-003



### Product-specific Accessories

- Photoelectric Sensors
- Reflectors
- Sensors
- Fasteners
- Positive Stops and Contact Protector
- Ultrasonic Sensors
- Uni/Unicompact Sensors
- Industrial RFID Systems
- Protective Cover
- Mounting brackets
- Mounting plate
- Mounting set
- Antenna holder
- Mounting Brackets, Shield
- Mounting Set**
- Connection Cable, Handle**
- Position and Distance Measurement
- Protective End Caps and Nuts
- Pressure Sensors
- Vision Sensors

# Position and Distance Measurement

## Sensor guide, mounting aid, cover strip

The sensor guide consists of an aluminum rail that retains the magnetic tape and a carriage with runners that guides the sensor head accurately. A standard joint rod is used for the mechanical connection.

### Features

- Customized lengths
- Easily attached by directly screwing on or using mounting elements
- Rails can be mounted side by side and elements disassembled
- Connection of drag chains possible
- Flat design, minimal space requirements
- Low costs
- Runners need no lubrication, thus no maintenance costs
- Minimum stock-keeping, since the universal concept works for various sensor heads
- Mounting aid for easy installation of the magnetic tape

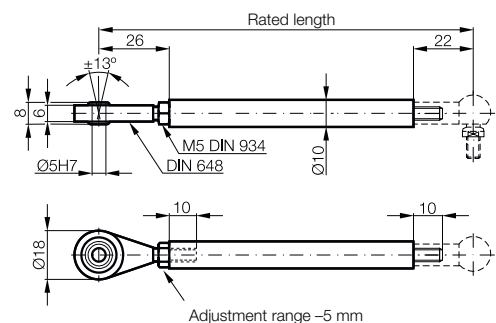
Sensor guide	
<b>Ordering code</b>	
Part number	
Features	

You may cover the magnetic tape with a stainless steel cover strip to protect it from damage caused by swarf or chemicals. Note that the permissible air gap between the sensor head and tape is reduced by the thickness of the cover strip with adhesive film (0.15 mm).

- The cover strip and magnetic tape can be ordered together in appropriate lengths.
- Cover strip by the roll can be ordered in 4 defined lengths.



Accessories	Joint rod for BML-C01, BML-C02
<b>Ordering code</b>	e.g. <b>BAM00P</b> (100 mm)
Part number	BTL2-GS10-____-A
Use	For connecting the sliding carriage to the machine



# Position and Distance Measurement

## Sensor guide, mounting aid, cover strip



Guide rail  
for sliding carriage BML-C01, BML-C02  
e.g. **BAM01N4** (3 m)  
BML-R01-M\_ \_ \_

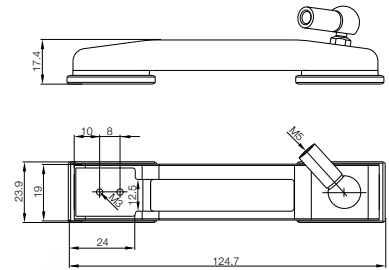
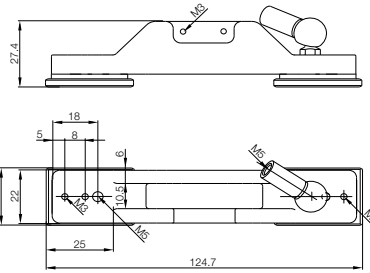
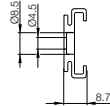
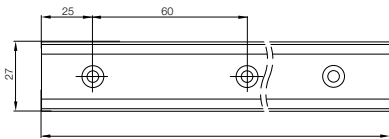
Sliding carriage  
for sensors BML-S2B, BML-S2E, BML-S1C  
**BAM01MF**  
BML-C01

Sliding carriage  
for sensors BML-S1F  
**BAM01MH**  
BML-C02

- Anodized aluminum
- Mounting holes
- Lateral groove for alternate mounting using brackets
- stackable
- Maintenance-free dry operation
- Lubricant-free
- Suitable for all linear tapes

- Aluminum
- Fully mounted with runners
- Connection for joint rod
- Connection for drag chains
- Maintenance-free dry operation
- Lubricant-free

- Aluminum
- Fully mounted with runners
- Connection for joint rod
- Connection for drag chains
- Maintenance-free dry operation
- Lubricant-free



Mounting aid

**BAM01L9**  
BML-Z0010

Installing the magnetic tape on BML-R01

Brackets (2 pieces)  
for BML-R01

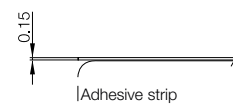
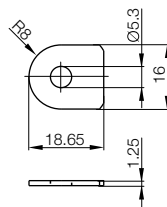
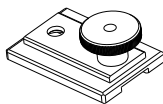
**BAM01JL**  
BML-Z0008

For lateral mounting of the rail and at transition points

Cover strip from the roll  
for BML-M02, BML-M03

e.g. **BML001K** (10 m)  
BML-A013-T\_ \_ \_

0500	1000	2400	4800
5 m	10 m	24 m	48 m



BOS  
BUS  
BES  
BIS  
BSP  
BVS

Product-specific  
Accessories

Photoelectric  
Sensors  
Reflectors  
Sensors  
Fasteners  
Positive Stops  
and Contact  
Protector  
Ultrasonic  
Sensors  
Uni/Unicompact  
Sensors  
Industrial RFID  
Systems  
Position and  
Distance  
Measurement  
**Sensor Guide,  
Mounting Aid,  
Cover Strip**  
Protective End  
Caps and Nuts  
Pressure  
Sensors  
Vision Sensors

# Protective End Caps and Nuts

## Protective end caps

These protective end caps are screwed onto sensors. They are made of POM and are used when there is increased mechanical stress.

The protective end caps are also used to protect the sensing surface from weld spatter. They can also be used at high temperatures and are particularly resistant against chemical influences.

Material	POM	PTFE
Ambient temperature $T_a$	-20...+90 °C	-20...+100 °C

### Please note!

The rated switching distance of the sensors is reduced by the wall thickness of the cap when the protective end cap is installed.

Description	
Use	
<b>Ordering code</b>	
Part number	
Reduction of the rated switching distance	
Material	

Description	
Use	
<b>Ordering code</b>	
Part number	
Material	

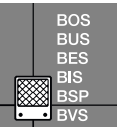
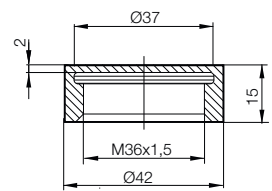
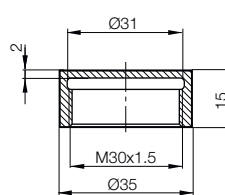
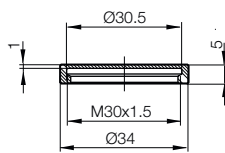
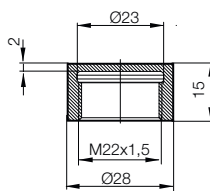
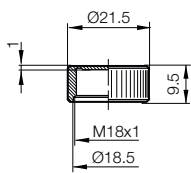


# Protective End Caps and Nuts

## Protective end caps, spacer



Protective end cap	Protective end cap	Protective end cap	Protective end cap	Protective end cap
For M18 sensors	For M22 sensors	For M30 sensors	For M30 sensors	For M36 sensors
<b>BAM00F0</b>	<b>BAM00H8</b>	<b>BAM00HJ</b>	<b>BAM00HK</b>	<b>BAM00JL</b>
BES 18-SM-2	BES 22-SM-2	BES 30-SM-1	BES 30-SM-2	BES 36-SM-2
1 mm	2 mm	1 mm	2 mm	2 mm
POM	PTFE	POM	POM	POM

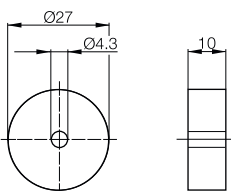


Product-specific  
Accessories

Photoelectric  
Sensors  
Reflectors  
Sensors  
Fasteners  
Positive Stops  
and Contact  
Protector  
Ultrasonic  
Sensors  
Uni/Unicompact  
Sensors  
Industrial RFID  
Systems  
Position and  
Distance  
Measurement  
Protective End  
Caps and Nuts  
**Protective end  
caps**  
**Spacer**  
Nuts  
Sealing nuts  
Pressure  
Sensors  
Vision Sensors



<b>Spacer</b>
For data carriers when mounting on metal
<b>BAM018M</b>
BIS Z-SP-001
POM

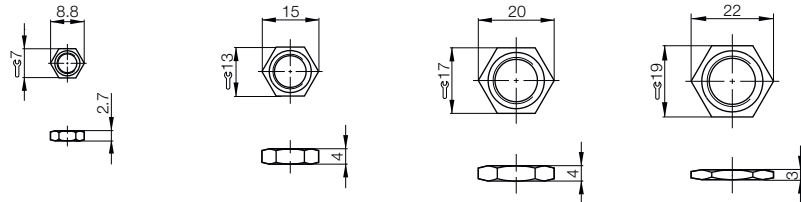


# Protective End Caps and Nuts

## Nuts, sealing nuts



Description		M5x1 nut	M8x1 nut	M12x1 nut	M16x1 nut
Steel galvanized	<b>Ordering code</b>		<b>BAM01WR</b>		
	Part number		BAM MC-XA-021-M8-3		
Nickel-plated brass	<b>Ordering code</b>			<b>BAM01W3</b>	<b>BAM01W6</b>
	Part number			BAM MC-XA-021-M12-2	BAM MC-XA-021-M16-2
Plastic	<b>Ordering code</b>				
	Part number				
Stainless steel	<b>Ordering code</b>	<b>BAM01WF</b>		<b>BAM01WH</b>	
	Part number	BAM MC-XA-021-M5-4		BAM MC-XA-021-M12-4	

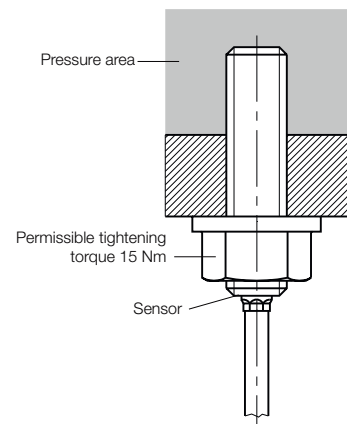
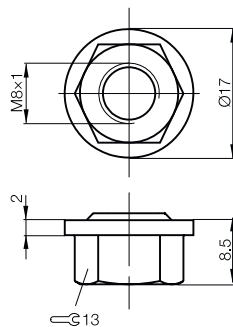


Description	<b>Sealing nuts</b>
Use	For pressure-resistant M8 sensors up to max. <b>100 bar</b>
<b>Ordering code</b>	<b>BAM009K</b>
Part number	BES 08-DM-1
Material	Steel, PA

This is used to seal pressure-resistant sensors.

### Please note!

Can be removed and tightened again up to five times.



# Protective End Caps and Nuts

## Nuts



**M18x1 nut**

**M30x1.5 nut**

**M18x1 nut**

**M30x1.5 nut**

**BAM01W4**

BAM MC-XA-021-M18-2

**BAM01W5**

BAM MC-XA-021-M30-2

**BAM01WL**

BAM MC-XA-021-M18-A

**BAM01WM**

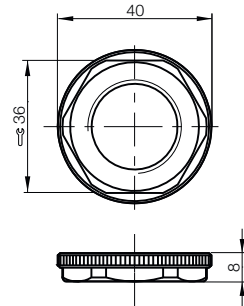
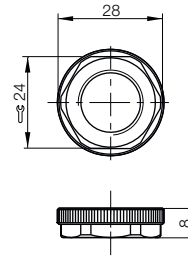
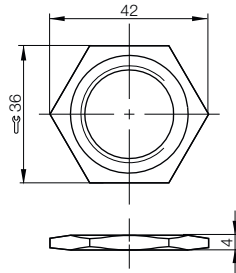
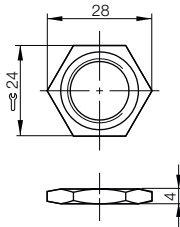
BAM MC-XA-021-M30-A

**BAM01WJ**

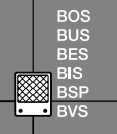
BAM MC-XA-021-M18-4

**BAM01WK**

BAM MC-XA-021-M30-4



Galvanized toothed lock washer for M5 sensors: **Ordering code 710256**  
 Galvanized toothed lock washer for M8 sensors: **Ordering code 500558**  
 Galvanized toothed lock washer for M12 sensors: **Ordering code 500552**  
 Galvanized toothed lock washer for M18 sensors: **Ordering code 117684**

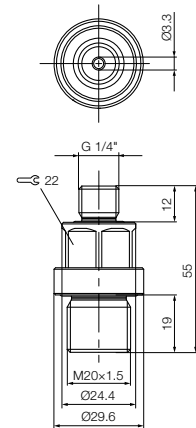


- Product-specific Accessories
- Photoelectric Sensors
  - Reflectors
  - Sensors
  - Fasteners
  - Positive Stops and Contact Protector
  - Ultrasonic Sensors
  - Uni/Unicompact Sensors
  - Industrial RFID Systems
  - Position and Distance Measurement
  - Protective End Caps and Nuts
  - Protective end caps
  - Spacer
  - Nuts**
  - Sealing nuts**
  - Pressure Sensors
  - Vision Sensors

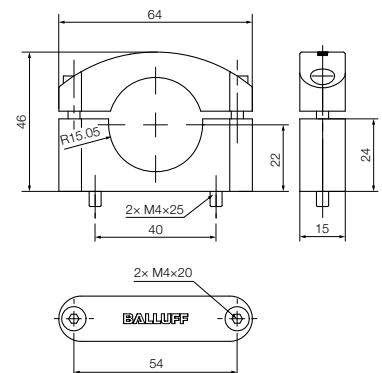
# Pressure Sensors Adapters



Description	<b>Adapter pressure sensors</b>
Use	BSP ...-E... with G1/4"
Process connection	M20x1.5
<b>Ordering code</b>	<b>BAM0209</b>
Part number	BAM AD-SP-008-1G4/M20X1,5-4
Material	Stainless steel



Description	<b>Mounting cuff</b>
Use	For sensors $\varnothing$ 30 mm, M30 and pressure sensors
<b>Ordering code</b>	<b>BAM01U0</b>
Part number	BAM MC-XA-017-D30,0-1
Material	Anodized aluminum



# Pressure Sensors Adapters



### Adapter AD-XA

BSP ...-E... with G1/4"  
1/4" NPT

#### BAM01TR

BAM AD-SP-011-1G4/1N4-4

Stainless steel

### Adapter AD-XA

BSP ...-E... with G1/4"  
R 1/4"

#### BAM01RP

BAM AD-SP-008-1G4/1R4-4

Stainless steel

### Adapter AD-XA

BSP ...-E... with G1/4"  
G 1/4"

#### BAM01KR

BAM AD-SP-008-1G4/1G4-4-EN837

Stainless steel

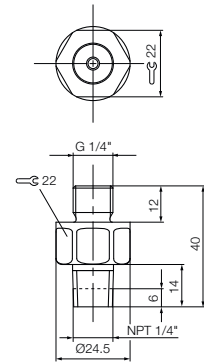
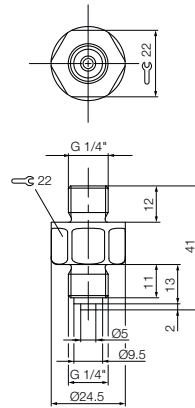
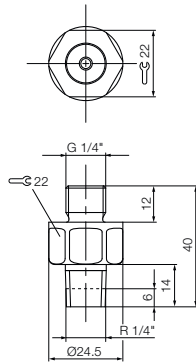
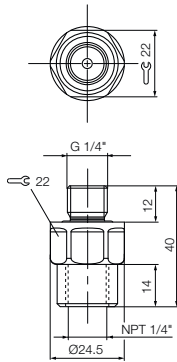
### Adapter AD-XA

BSP ...-E... with G1/4"  
NPT 1/4"

#### BAM01KT

BAM AD-SP-008-1G4/1N4-4

Stainless steel



### Description

**Adapter AD-XA**

**Adapter AD-XA**

### Use

BSP ...-E... with G1/4"

BSP ...-E... with G1/4"

### Process connection

G 1/4"

G 1/2"

### Ordering code

**BAM01KP**

**BAM01UJ**

### Part number

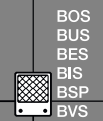
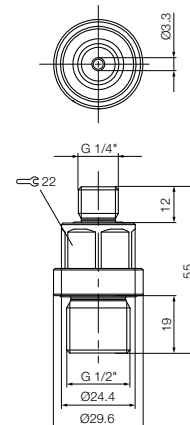
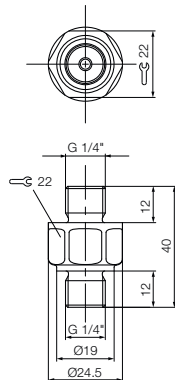
BAM AD-SP-008-1G4/1G4-4

BAM AD-SP-008-1G4/1G2-4

### Material

Stainless steel

Stainless steel



Product-specific  
Accessories

- Photoelectric Sensors
- Reflectors
- Sensors
- Fasteners
- Positive Stops and Contact Protector
- Ultrasonic Sensors
- Uni/Unicompact Sensors
- Industrial RFID Systems
- Position and Distance Measurement
- Protective End Caps and Nuts
- Pressure Sensors
- Adapters**
- Vision Sensors



Description	
Version	
Use	
<b>Ordering code</b>	
Part number	
Material	

Mounting is part of optimal integration of the BVS vision sensor. The variety of different mounting options allows you to integrate your BVS ideally into your equipment. Balluff accessories are perfectly matched to our sensors.

With flexible Balluff accessories, you can position the BVS quickly without elaborate preparatory work or time-consuming planning, even if space is limited. Through optimum adaptation, you save material and time.



# Vision Sensors

## Mounting brackets



### Mounting brackets

For clamping cylinder or for mounting on base plate  
For BVS vision sensor

#### BAM00WN

BVS Z-MB-01

Stainless steel

### Mounting brackets

For clamping cylinder or for mounting on base plate  
For BVS vision sensor and BAE ring lights

#### BAM01AC

BAM MB-XA-003-B03-1

Anodized aluminum

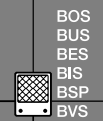
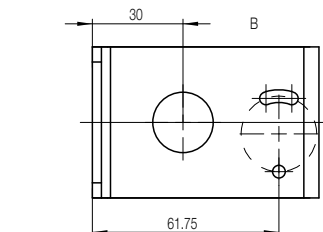
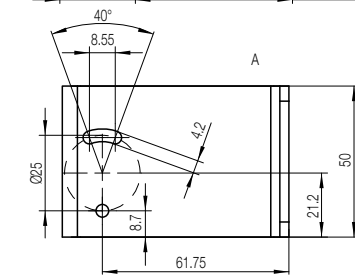
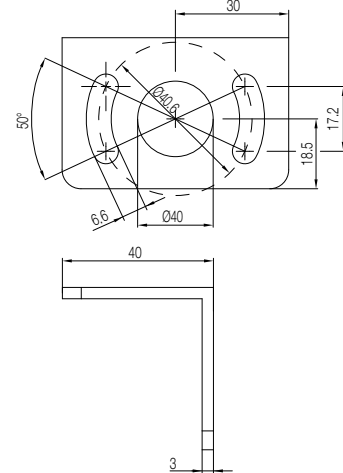
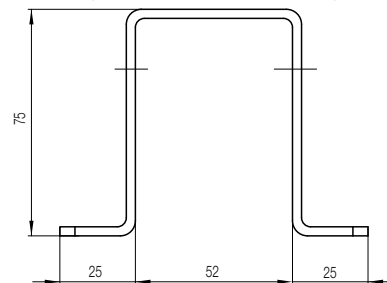
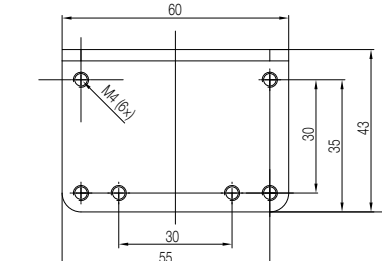
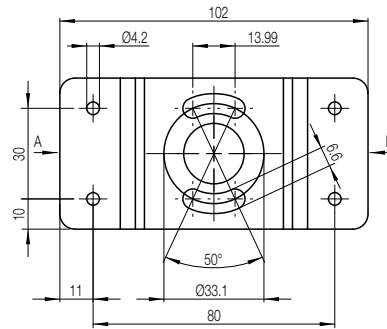
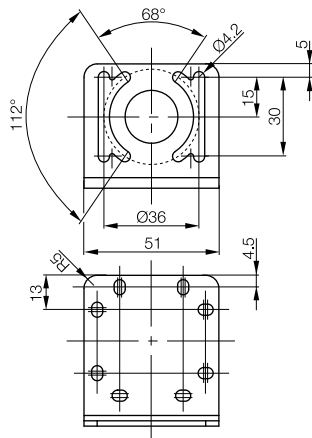
### Mounting brackets

For clamping cylinder or for mounting on base plate  
For strip and background lights BAE

#### BAM01AE

BAM MB-XA-002-B02-1

Anodized aluminum



### Product-specific Accessories

- Photoelectric Sensors
- Reflectors
- Sensors
- Fasteners
- Positive Stops and Contact Protector
- Ultrasonic Sensors
- Uni/Unicompact Sensors
- Industrial RFID Systems
- Position and Distance Measurement
- Protective End Caps and Nuts
- Pressure Sensors
- Vision Sensors
- Mounting brackets**
- 3D holder system
- Locking Device, Display Housing
- Protective Housing

## Vision Sensors

### 3D holder system

#### 3D sensor holder with quick-change plate

The Balluff 3D sensor holder with quick-change plate for industrial image processing is a novelty on the market. Originally conceived for vision sensors, this multitasking solution can also hold other sensors of similar size. This only requires replacing the sensor-specific change plate. The first holders are already being used successfully in the automotive industry.

Every desired solid angle can be configured, allowing the sensor to be aligned precisely. The position even remains intact if the sensor has to be replaced. That helps minimize downtimes. Simply removing the sensor with the quick-change plate from the holder is enough. An optionally used safety screw provides protection from tampering as needed. Without the correct tool, the sensor cannot be removed.

The industry-ready holder made of anodized aluminum is particularly easy and practical to operate. It fits on almost all common installation profiles and can be fastened directly to a machine frame, a worktop or a pallet with 3 holes. In addition, it offers you substantial design freedom, since the base, plate and holder are installed separately. The holder and change plate can be ordered separately.

#### Special Properties:

- Quick selection
- Exact alignment
- Stable, robust holder systems
- Ease of handling



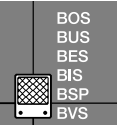
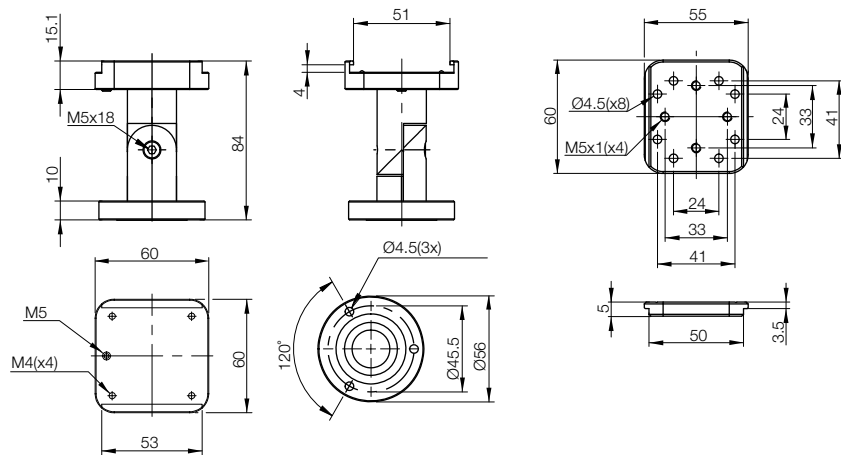


# Vision Sensors

## 3D holder system



Description	<b>3D holder system</b>	<b>3D holder system</b>
Version	Holder for quick-change plate	Quick-change plate
<b>Ordering code</b>	<b>BAM01YT</b>	<b>BAM01YP</b>
Part number	BMS CUJ-M-S25-D045-00	BMS CS-M-S25-DX15-00
Material	Anodized aluminum	Anodized aluminum



### Product-specific Accessories

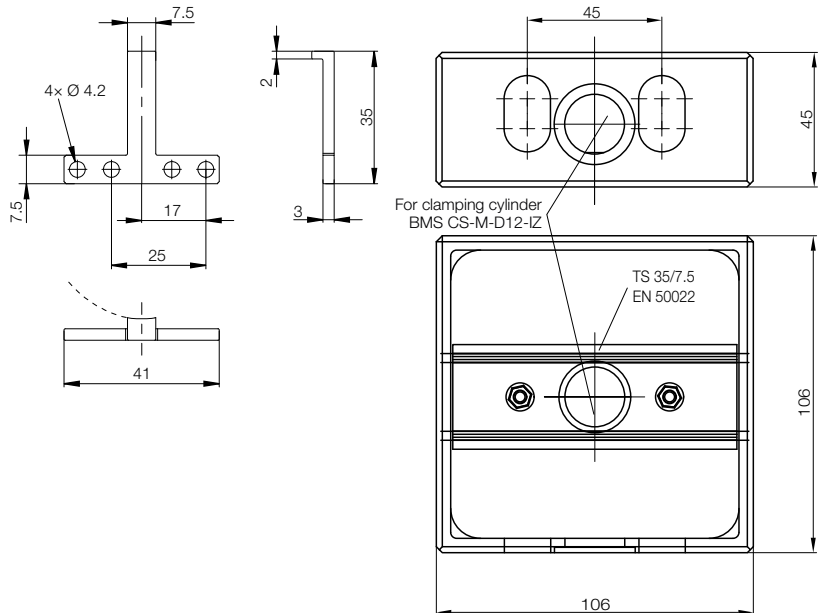
- Photoelectric Sensors
- Reflectors
- Sensors
- Fasteners
- Positive Stops and Contact Protector
- Ultrasonic Sensors
- Uni/Unicompact Sensors
- Industrial RFID Systems
- Position and Distance Measurement
- Protective End Caps and Nuts
- Pressure Sensors
- Vision Sensors
- Mounting brackets
- 3D holder system**
- Locking Device, Display Housing
- Protective Housing

# Vision Sensors

## Locking device, display housing



Description	<b>Locking device for Vision Sensor focus ring</b>	<b>Display housing for BVS monitor</b>
Use	For locking the set focus	For mounting with clamping cylinders and mounting systems BMS
<b>Ordering code</b>	<b>BAM0206</b>	<b>BAM01A8</b>
Part number	BAM FK-VS-002-03-1	BAM PC-AE-002-1
Material	Anodized aluminum	Anodized aluminum



### Focus ring lock BAM FK-VS-002-03-1

The set focus is firmly locked and can no longer be adjusted. Errors caused by unintentional adjustment of the focus are therefore prevented. If the focus needs to be adjusted, the lock can be quickly unscrewed.

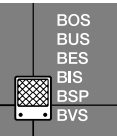
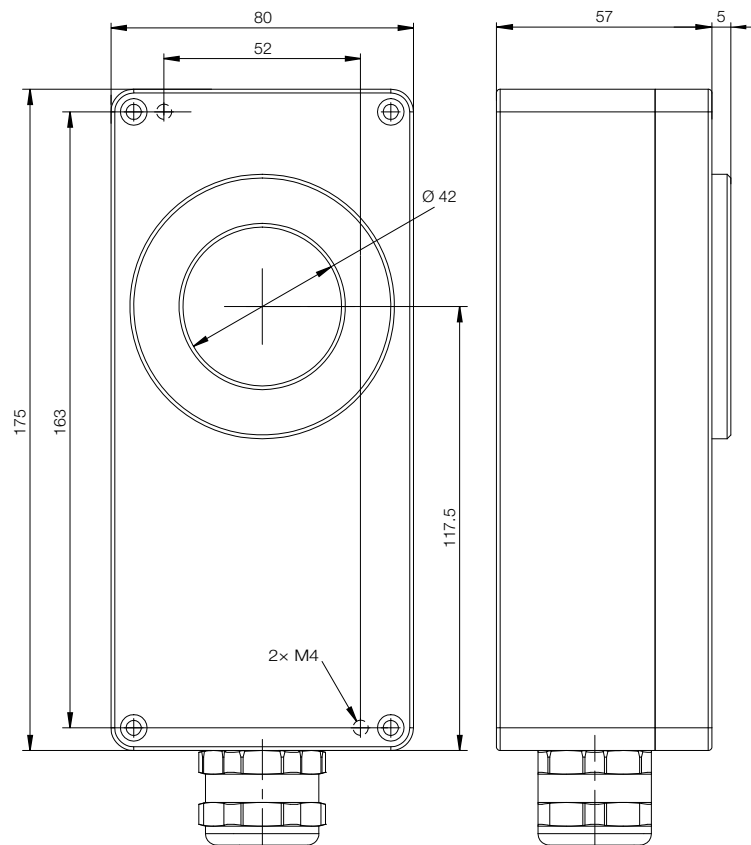
### Optional IP 67+ housing for Vision Sensors BVS

An optional housing for splash water areas and other problematic environments is available for all sensors in the Vision Sensor family. Thanks to the IP 67+ degree of protection, this also provides reliable protection for long-term use in harsh environments. With a few simple hand movements, the sensor is easily integrated in the robust housing and then mounted on a machine or system. All functions are fully available as usual.

- Rugged housing
- IP 67+ degree of protection
- Flexible handling
- Easy mounting and fastening
- Full range of sensor functions
- Inexpensive acquisition

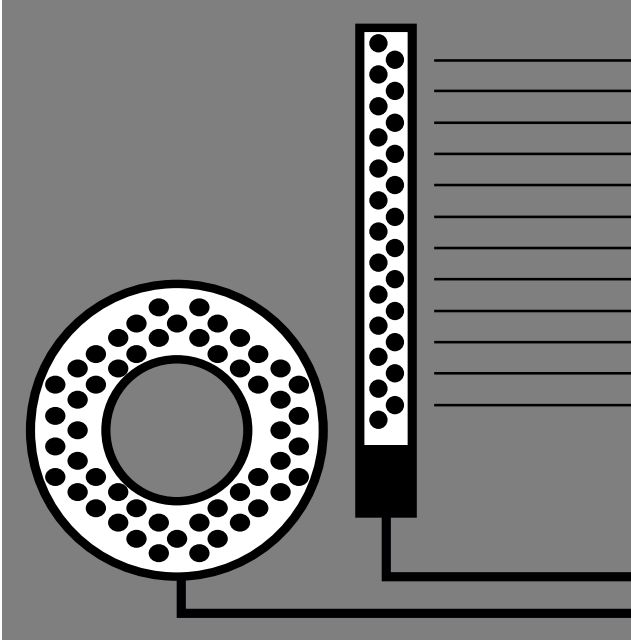


Description	<b>Protective housing for Vision Sensors BVS</b>
Use	For long-term operation in harsh environments
<b>Ordering code</b>	<b>BAM01RR</b>
Part number	BAM PC-VS-008-1
Dimensions	175x80x62 mm
Installation	M4 screws (163x52 mm)
Connection	Screwed cable gland M25x1.5 (1x dia. 5 mm, 1x dia. 6 mm)
Degree of protection as per IEC 60529	IP 67
Housing material	Cast aluminum, painted
Optical surface	Anti-reflective glass



- Product-specific Accessories
- Photoelectric Sensors
  - Reflectors
  - Sensors
  - Fasteners
  - Positive Stops and Contact Protector
  - Ultrasonic Sensors
  - Uni/Unicomact Sensors
  - Industrial RFID Systems
  - Position and Distance Measurement
  - Protective End Caps and Nuts
  - Pressure Sensors
  - Vision Sensors
  - Mounting brackets
  - 3D holder system
  - Locking Device, Display Housing
  - Protective Housing





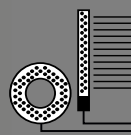
# Lights

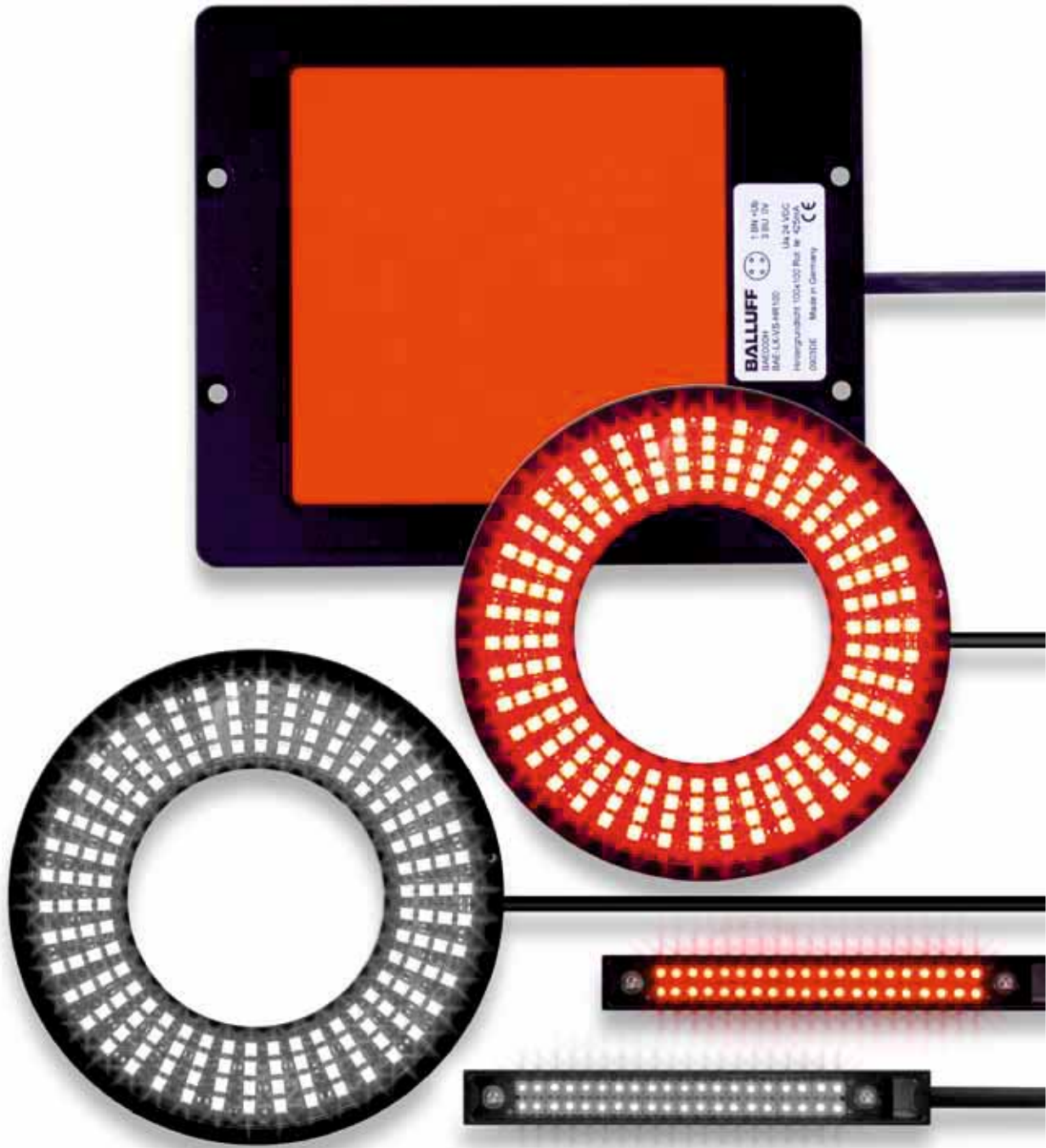
## Lights

Lights used in an industrial environment depend on maximum reliability, outstanding quality and a good price/performance ratio. Balluff offers different versions of light to suit your needs. Select the best solution for your task and profit from our mature technology.



<b>Lights</b>	
Product Overview	406
Background Lights	408
Ring Lights	412
Strip Lights	414
Spotlights	417
Coaxial Lights	418
Dark Field Light	420
Line Lasers	421





#### Background lights

- Simple monitoring of dimensions and shapes
- Independent of material and surface type
- Various light field sizes available



#### Ring lights

- Compatible mounting bracket for sensor and light
- Shadow-free illumination with very high brightness
- For inspections with a large working distance



#### Strip lights

- Homogeneous, targeted light
- Generate shadows to check features
- Available with red, infrared and white light

#### Product overview

Image processing always depends on the right lighting. Balluff provides a broad range of additional lighting. Only optimal lighting can provide an optimum solution for your application.



# The benefits to you

## Highest quality

Our wide range of lights is subject to strict quality standards. The lights are protected against damage, for example, from voltage pulses on the connection cable or static discharges (ESD). EMC tests performed by an accredited testing laboratory have proven this.

## Eye safety in accordance with IEC 62471

Strong visual radiation, such as from LEDs, can impair your vision. Therefore our lights are tested by an independent, certified test center according to the latest applicable standard (IEC 62471). All of our lights come under the "Exempt group" or "Risk group 1" and are therefore considered extremely safe. By comparison: the sun falls into risk group 3.

## Fast and easy mounting

All lights are quick, easy and economical to mount and align with the Balluff Mounting System BMS.

## Long service life

We only install extremely luminous LEDs of the highest quality in our lights. Our extremely luminous ring and strip lights are equipped with an excess temperature deactivation mechanism to extend the useful life of an LED.

## Simple startup

You only need a conventional 24 V power supply to connect our lights. Expensive control units are not required. Our background lights and dark field lights need only to be connected to a 24 V DC power supply. Ring and strip lights are triggered directly by the Vision Sensor or a PLC.

## Boost function

Ring lights and linear lights have a boost function with 30% higher light intensity, which reduces the influence of ambient light. Overall process reliability is increased as a result.

# Frequently asked questions:

## What should the distance between the light and the component be?

The intensity of illumination on an object decreases quadratically with the working distance. Therefore objects that are farther away appear darker than closer objects. A bright object should be inspected, for example, once at a distance of 10 cm and once at 100 cm. The brightness of the object at 10 cm is 100 times greater than at a distance of 100 cm. Select the optimum distance between the light source, sensor and target object. In order to prevent saturation, make sure that the brightness of the light source is correct.

## How should reflective components be illuminated?

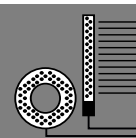
When inspecting highly reflective surfaces, the sensor must be mounted with extreme care. If necessary, attach an external light to a suitable bracket in order to maximize the contrast between the object to be detected and the background.

## How can the illumination of the part to be inspected be kept constant?

Avoid fluctuations in brightness due to ambient light, sunlight or other external light sources. These fluctuations are the most frequent cause of errors in image processing and are often difficult to identify. Errors can be limited by decreasing the exposure time of the sensor. External lighting may be required in addition to the light inside the sensor. Alternative solutions include covers or any kind of physical screen that specifically controls the light within the inspection area.

## How should the field of view be illuminated?

The entire image area should be illuminated as evenly as possible. Avoid extremely bright points or dark areas. The component features you wish to inspect should, however, contrast as much as possible and show up clearly on the background. If you want to check for the presence of a certain feature, you can illuminate the component so that a clear shadow is cast upon the function to be identified. The Vision Sensor can then detect the feature.



Lights  
Product overview  
Background lights  
Ring lights  
Strip lights  
Spotlights  
Coaxial Lights  
Dark field light  
Line Lasers



### Spotlights

- Pinpoint lighting
- Achieve greater inspection distances
- Available with red light and infrared



### Coaxial Lights

- Very homogeneous illumination
- For highly reflective surfaces
- For inspection of labels and dot-peen codes



### Dark field light

- Inspection of scratches and dents in surfaces
- Independent of material and surface type
- Various light field sizes available



### Line Lasers

- Bright, zoomable line laser up to 2000 mm
- For height detection of parts with triangulation
- For checking completeness of parts

# Lights

## Background lights

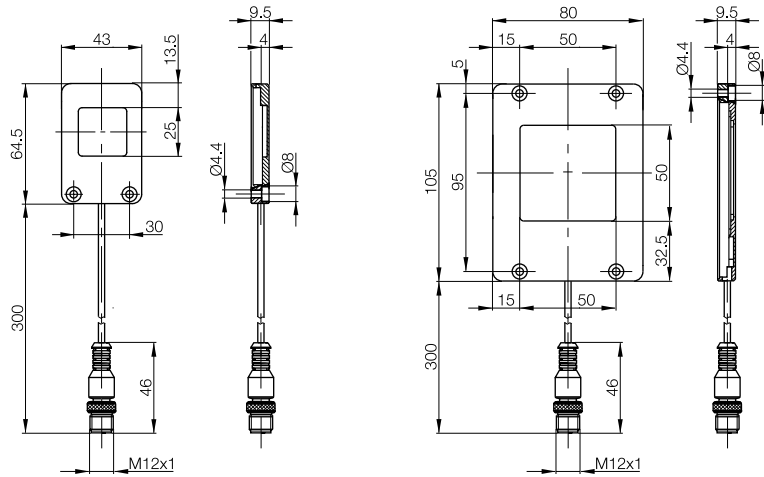


Series	BAE LX-VS	BAE LX-VS
Version	<b>Background light</b>	<b>Background light</b>
Light type	Red light	Red light
<b>Ordering code</b>	<b>BAE000E</b>	<b>BAE000F</b>
Part number	BAE LX-VS-HR025	BAE LX-VS-HR050
Supply voltage $U_b$	24 V DC	24 V DC
Operating current	150 mA	250 mA
Trigger		Yes
Light field size	25x25 mm	50x50 mm
Emitter, light type	LED, red light	LED, red light
Wavelength	617 nm	617 nm
Dimension	64.5x43x9.5 mm	105x80x9.5 mm
Mounting	M4 screws	M4 screws
Connection	M12 male, 4-pin	M12 male, 4-pin
Housing material	Anodized aluminum	Anodized aluminum
Optical surface	Glass	Glass
Weight	66 g	155 g
Degree of protection as per IEC 60529	IP 54	IP 54
Eye safety acc. to IEC 62471	Exempt group	Exempt group
Polarity reversal/short-circuit protected	Yes/Yes	Yes/Yes
Ambient temperature $T_a$	-10...+55 °C	-10...+55 °C
Storage temperature	-25...+75 °C	-25...+75 °C

**Lighting accessories:** See the section for connectors and product-specific accessories (for direct mounting or compatible with Balluff mounting system BMS).



**Background lighting:** For the transmitted light method, the background lighting is positioned behind the object you wish to detect. The Vision Sensor only detects the outline of the object based on this position and allows you to monitor part dimensions or shapes extremely easily. Ambient light also presents no problems. Changes in the surface (markings, color, etc.) can be suppressed almost completely and have no influence on the test result. Our background lights are particularly bright and versatile. You can also use them as subtle incident lights to illuminate highly reflective components. Due to the extremely flat design, they are ideal for use in applications with limited space.



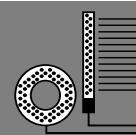
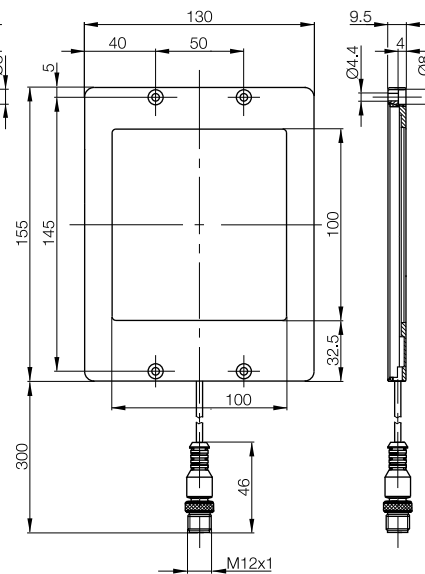
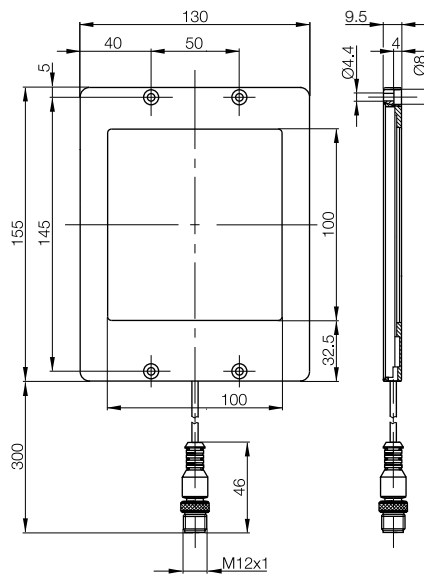
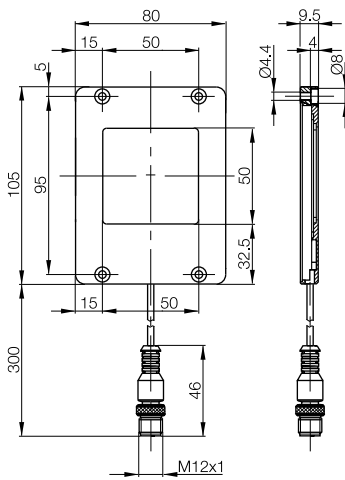


# Lights

## Background lights



BAE LX-VS <b>Background light</b> Infrared <b>BAE00KR</b>	BAE LX-VS <b>Background light</b> Red light <b>BAE000H</b>	BAE LX-VS <b>Background light</b> Infrared <b>BAE00FR</b>
BAE LX-VS-HI050	BAE LX-VS-HR100	BAE LX-VS-HI100
24 V DC	24 V DC	24 V DC
350 mA	400 mA	625 mA
Yes	Yes	Yes
50x50 mm	100x100 mm	100x100 mm
LED, infrared	LED, red light	LED, infrared
875 Nm	617 nm	875 Nm
105x80x9.5 mm	155x130x9.5 mm	155x130x9.5 mm
M4 screws	M4 screws	M4 screws
M12 male, 4-pin	M12 male, 4-pin	M12 male, 4-pin
Anodized aluminum	Anodized aluminum	Anodized aluminum
Glass	Glass	Glass
155 g	345 g	345 g
IP 54	IP 54	IP 54
Risk group 1	Exempt group	Risk group 1
Yes/Yes	Yes/Yes	Yes/Yes
-10...+55 °C	-10...+55 °C	-10...+55 °C
-25...+75 °C	-25...+75 °C	-25...+75 °C



- Lights
- Product overview
- Background lights**
- Ring Lights
- Strip Lights
- Spotlights
- Coaxial Lights
- Dark field light
- Line Lasers

# Lights

## Background lights

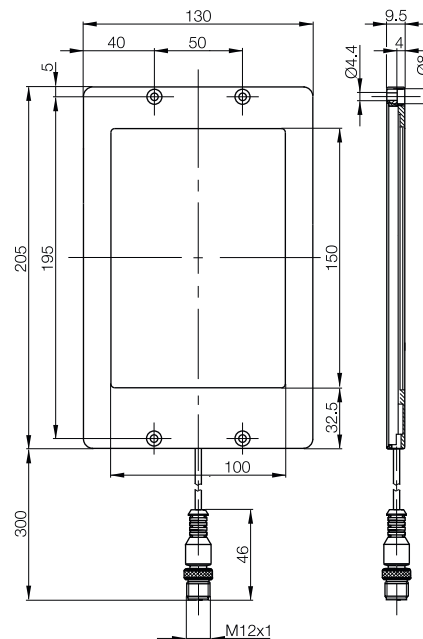


Series	BAE LX-VS	BAE LX-VS	
Version	<b>Background light</b>	<b>Background light</b>	
Light type	Red light	Infrared	
<b>Ordering code</b>	<b>BAE00C5</b>	<b>BAE00KP</b>	
Part number	BAE LX-VS-HR150	BAE LX-VS-HI150	
Supply voltage $U_B$	24 V DC	24 V DC	
Operating current	500 mA	800 mA	
Trigger	Yes	Yes	
Light field size	150×100 mm	150×100 mm	
Emitter, light type	LED, red light	LED, infrared	
Wavelength	617 nm	875 Nm	
Dimension	205×130×9.5 mm	205×130×9.5 mm	
Mounting	M4 screws	M4 screws	
Connection	M12 male, 4-pin	M12 male, 4-pin	
Housing material	Anodized aluminum	Anodized aluminum	
Optical surface	Glass	Glass	
Weight	435 g	435 g	
Degree of protection as per IEC 60529	IP 54	IP 54	
Eye safety acc. to IEC 62471	Exempt group	Risk group 1	
Polarity reversal/short-circuit protected	Yes/Yes	Yes/Yes	
Ambient temperature $T_a$	-10...+55 °C	-10...+55 °C	
Storage temperature	-25...+75 °C	-25...+75 °C	

**Lighting accessories:** See the section for connectors and product-specific accessories (for direct mounting or compatible with Balluff mounting system BMS).



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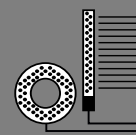
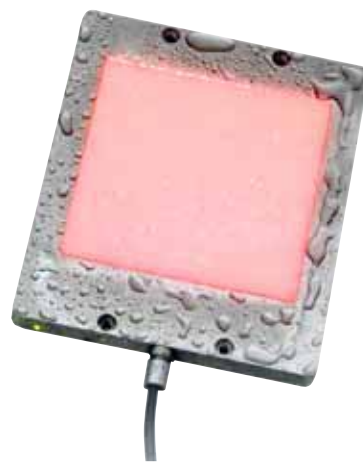
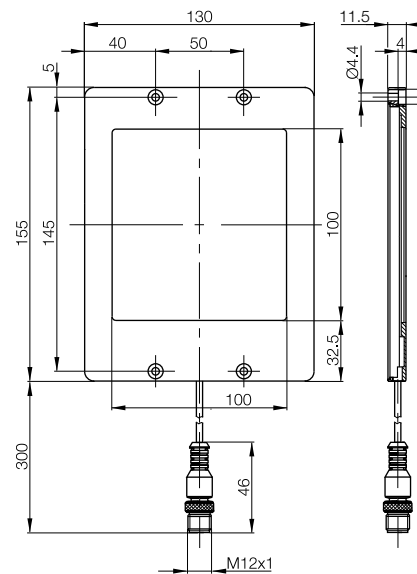
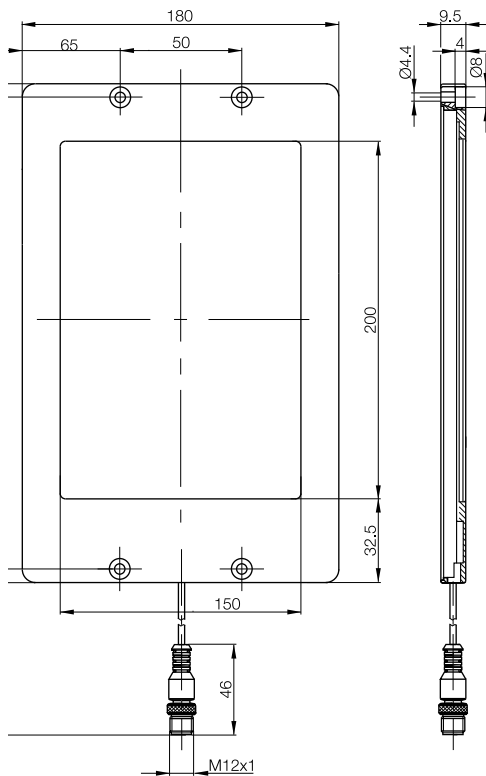
# Lights

## Background lights



IP69K

BAE LX-VS <b>Background light</b> Red light <b>BAE00JC</b>	BAE LX-VS <b>Background light</b> Infrared <b>BAE00JE</b>	BAE LX-VS <b>Background light IP 69K</b> Red light <b>BAE00JF</b>
BAE LX-VS-HR200	BAE LX-VS-HI200	BAE LX-VS-HR100-E
24 V DC	24 V DC	24 V DC
800 mA	625 mA	400 mA
Yes	Yes	Yes
200x150 mm	200x150 mm	100x100 mm
LED, red light	LED, infrared	LED, red light
617 nm	875 Nm	617 nm
255x180x9.5 mm	255x180x9.5 mm	155x130x11.5 mm
M4 screws	M4 screws	M4 screws
M12 male, 4-pin	M12 male, 4-pin	M12 male, 4-pin
Anodized aluminum	Anodized aluminum	Stainless steel
Glass	Glass	Glass
730 g	730 g	350 g
IP 54	IP 54	<b>IP 69K</b>
Exempt group	Risk group 1	Exempt group
Yes/Yes	Yes/Yes	Yes/Yes
-10...+55 °C	-10...+55 °C	-10...+55 °C
-25...+75 °C	-25...+75 °C	-25...+75 °C

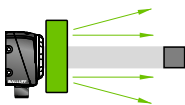


- Lights
- Product overview
- Background lights**
- Ring Lights
- Strip Lights
- Spotlights
- Coaxial Lights
- Dark field light
- Line Lasers



Series		BAE LX-VS	BAE LX-VS
Version		<b>Standard ring light</b>	<b>SlimLight ring light</b>
Light type		Red light	Red light
<b>Ordering code</b>		<b>BAE000J</b>	<b>BAE00FP</b>
Part number		BAE LX-VS-RR100	BAE LX-VS-RR100-S
Supply voltage $U_B$		24 V DC	24 V DC
Operating current	Normal	800 mA	600 mA
	Boost	1300 mA	
Trigger		Yes	Yes
Operating mode	Normal	Yes	Yes
	Boost	Yes	
Light field size		Ø 100/60 mm	Ø 100/60 mm
Emitter, light type		LED, red light	LED, red light
Wavelength		617 nm	617 nm
Dimension		Ø 116×20.5 mm	Ø 116×20.5 mm
Mounting		M4 screws	M4 screws
Connection		M12 male, 4-pin	M12 male, 4-pin
Housing material		Anodized aluminum	Anodized aluminum
Optical surface		Glass	Glass
Weight		360 g	345 g
Degree of protection as per IEC 60529		IP 65	IP 54
Eye safety acc. to IEC 62471	Normal	Exempt group	Exempt group
	Boost	Exempt group	
Polarity reversal/short-circuit protected		Yes/Yes	Yes/Yes
Ambient temperature $T_a$		-10...+55 °C	-10...+55 °C
Storage temperature		-25...+75 °C	-25...+75 °C

**Lighting accessories:** See the section for connectors and product-specific accessories (for direct mounting or compatible with Balluff mounting system BMS).



**Ring lights** are used as additional incident lights. The design of the light and powerful integral LEDs ensure virtually shadow free illumination with a high degree of intensity. Ring lights are particularly suited to applications where the distance between the BVS and the detected object is greater than 300 mm. Due to the high intensity of the light generated, these lights can also be used to suppress influences from changing ambient light. The ring light can be fitted and aligned together with the Vision Sensor using our mounting bracket specially adapted to the Balluff Mounting System. As an accessory, we offer a diffuser attachment that prevents strong reflections, for example, on shiny components.

The **diffuser attachment** ensures even light without disturbing reflections in applications with reflective surfaces. The diffuser is made of high-quality glass and can be installed directly on the light.

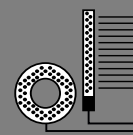
Description	Diffuser attachment
Use	For ring lights
<b>Ordering code</b>	<b>BAM01A7</b>
Part number	BAM OF-VS-001-D-RX100



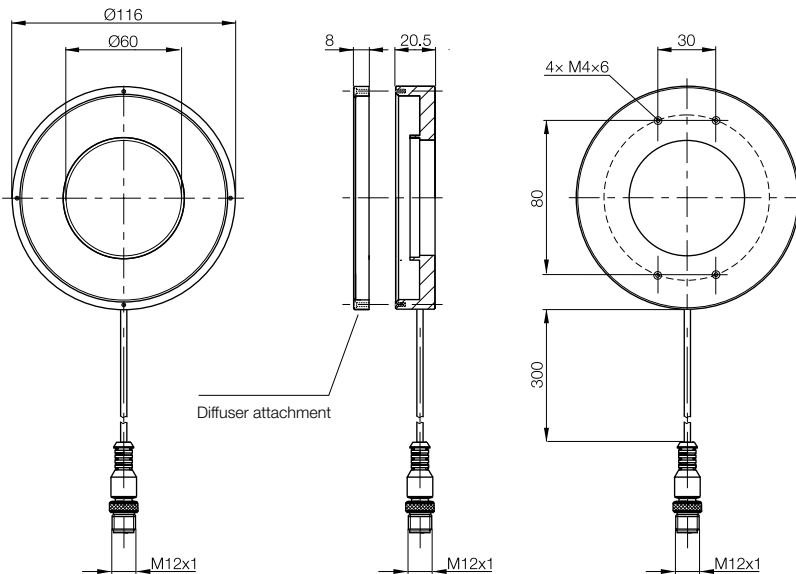
# Lights Ring lights



BAE LX-VS <b>Standard ring light</b> Infrared <b>BAE000K</b>	BAE LX-VS <b>SlimLight ring light</b> Infrared <b>BAE00FN</b>	BAE LX-VS <b>Standard ring light</b> White light <b>BAE00AN</b>	BAE LX-VS <b>SlimLight ring light</b> White light <b>BAE00FM</b>
BAE LX-VS-RI100	BAE LX-VS-RI100-S	BAE LX-VS-RW100	BAE LX-VS-RW100-S
24 V DC	24 V DC	24 V DC	24 V DC
600 mA	500 mA	700 mA	450 mA
1300 mA		1200 mA	
Yes	Yes	Yes	Yes
Yes	Yes	Yes	Yes
Yes		Yes	
Ø 100/60 mm	Ø 100/60 mm	Ø 100/60 mm	Ø 100/60 mm
LED, infrared	LED, infrared	LED, white light	LED, white light
875 Nm	875 Nm		
Ø 116×20.5 mm	Ø 116×20.5 mm	Ø 116×20.5 mm	Ø 116×20.5 mm
M4 screws	M4 screws	M4 screws	M4 screws
M12 male, 4-pin	M12 male, 4-pin	M12 male, 4-pin	M12 male, 4-pin
Anodized aluminum	Anodized aluminum	Anodized aluminum	Anodized aluminum
Glass	Glass	Glass	Glass
360 g	345 g	360 g	345 g
IP 65	IP 54	IP 65	IP 54
Risk group 1	Risk group 1	Exempt group	Exempt group
Risk group 1		Exempt group	
Yes/Yes	Yes/Yes	Yes/Yes	Yes/Yes
-10...+55 °C	-10...+55 °C	-10...+55 °C	-10...+55 °C
-25...+75 °C	-25...+75 °C	-25...+75 °C	-25...+75 °C

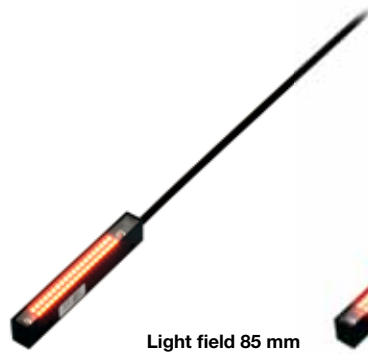


- Lights
- Product overview
- Background lights
- Ring Lights**
- Strip Lights
- Spotlights
- Coaxial Lights
- Dark field light
- Line Lasers



# Lights

## Strip lights



Light field 85 mm



Light field 170 mm

Series		BAE LX-VS	BAE LX-VS
Version		<b>Strip light</b>	<b>Strip light</b>
Light type		Red light	Red light
<b>Ordering code</b>		<b>BAE00AP</b>	<b>BAE00AZ</b>
Part number		BAE LX-VS-LR085	BAE LX-VS-LR170
Supply voltage $U_B$		24 V DC	24 V DC
Operating current	Normal	200 mA	375 mA
	Boost	375 mA	750 mA
Trigger		Yes	Yes
Operating mode	Normal	Yes	Yes
	Boost	Yes	Yes
Light field size		10×71 mm	10×170 mm
Emitter, light type		LED, red light	LED, red light
Wavelength		617 nm	617 nm
Dimension		113.5×13×18 mm	197.5×13×18 mm
Mounting		M4 screws	M4 screws
Connection		M12 male, 4-pin	M12 male, 4-pin
Housing material		Anodized aluminum	Anodized aluminum
Optical surface		Glass	Glass
Weight		80 g	110 g
Degree of protection as per IEC 60529		IP 54	IP 54
Eye safety acc. to IEC 62471	Normal	Exempt group	Exempt group
	Boost	Exempt group	Exempt group
Polarity reversal/short-circuit protected		Yes/Yes	Yes/Yes
Ambient temperature $T_a$		-10...+55 °C	-10...+55 °C
Storage temperature		-25...+75 °C	-25...+75 °C

**Lighting accessories:** See the section for connectors and product-specific accessories (for direct mounting or compatible with Balluff mounting system BMS).



**Strip lights** generate uniform, directed light, that brightens the image area directly. If used to illuminate from the side, diffuse reflections and shadows can be produced. The diffuse reflection generates more uniform illumination without shiny areas. The shadows generated allow you to check the presence or absence of features on the object more easily.

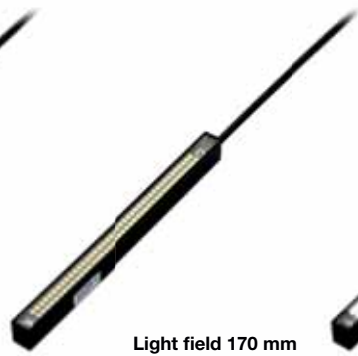


The strip lights can illuminate rectangular areas right up to the corners. Shadows can also be generated in grooves and along edges and then used for evaluation purposes.

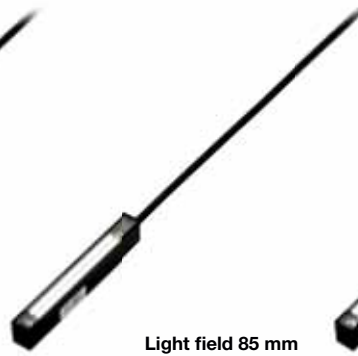
# Lights Strip lights



Light field 85 mm



Light field 170 mm

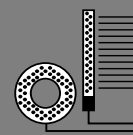


Light field 85 mm



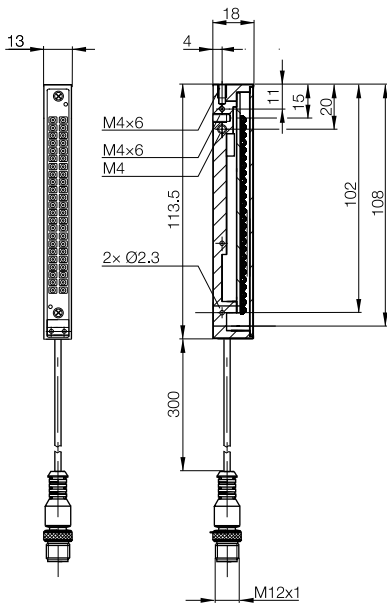
Light field 170 mm

BAE LX-VS <b>Strip light</b> Infrared <b>BAE00AT</b>	BAE LX-VS <b>Strip light</b> Infrared <b>BAE00AY</b>	BAE LX-VS <b>Strip light</b> White light <b>BAE00AR</b>	BAE LX-VS <b>Strip light</b> White light <b>BAE00AW</b>
BAE LX-VS-LI085	BAE LX-VS-LI170	BAE LX-VS-LW085	BAE LX-VS-LW170
24 V DC	24 V DC	24 V DC	24 V DC
200 mA	375 mA	200 mA	300 mA
375 mA	750 mA	375 mA	500 mA
Yes	Yes	Yes	Yes
Yes	Yes	Yes	Yes
Yes	Yes	Yes	Yes
10x71 mm	10x170 mm	10x71 mm	10x170 mm
LED, infrared	LED, infrared	LED, white light	LED, white light
875 Nm	875 Nm		
113.5x13x18 mm	197.5x13x18 mm	113.5x13x18 mm	197.5x13x18 mm
M4 screws	M4 screws	M4 screws	M4 screws
M12 male, 4-pin	M12 male, 4-pin	M12 male, 4-pin	M12 male, 4-pin
Anodized aluminum	Anodized aluminum	Anodized aluminum	Anodized aluminum
Glass	Glass	Glass	Glass
80 g	110 g	80 g	110 g
IP 54	IP 54	IP 54	IP 54
Exempt group	Exempt group	Exempt group	Exempt group
Risk group 1	Risk group 1	Exempt group	Exempt group
Yes/Yes	Yes/Yes	Yes/Yes	Yes/Yes
-10...+55 °C	-10...+55 °C	-10...+55 °C	-10...+55 °C
-25...+75 °C	-25...+75 °C	-25...+75 °C	-25...+75 °C

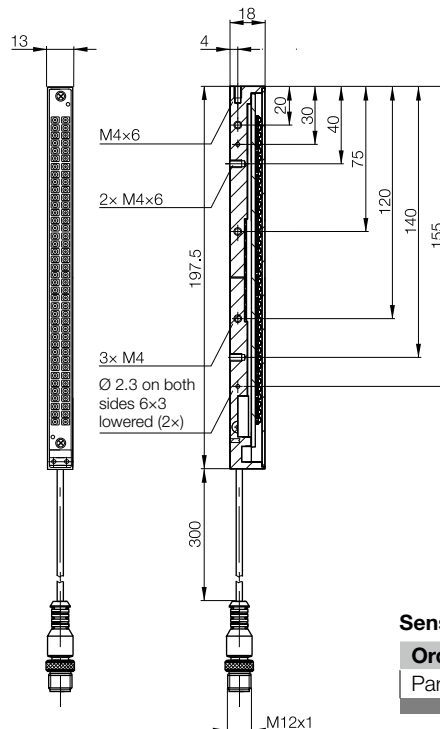


- Lights
- Product overview
- Background lights
- Ring Lights
- Strip Lights**
- Spotlights
- Coaxial Lights
- Dark field light
- Line Lasers

85 mm



170 mm

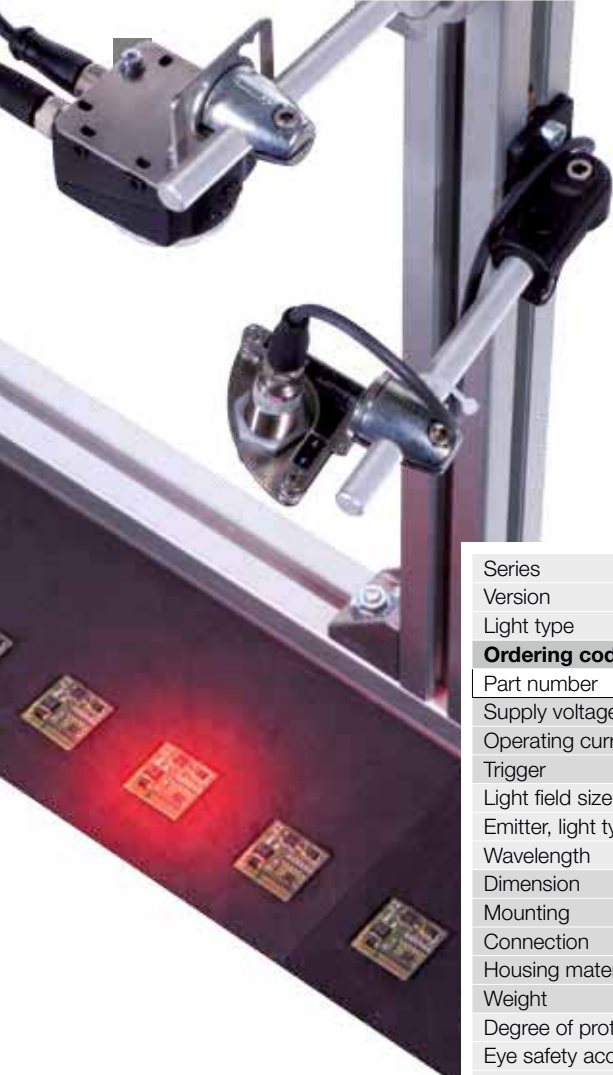


Sensor holder for linear lights

<b>Ordering code</b>	<b>BAM01F2</b>
Part number	BMS CS-M-D12-BX11-09

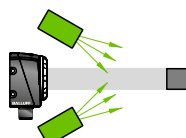
For more information, see page 275



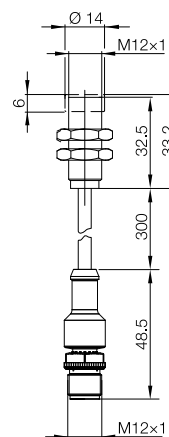


Series	BAE LX-VS
Version	<b>Spotlight</b>
Light type	Red light
<b>Ordering code</b>	<b>BAE00KF</b>
Part number	BAE LX-VS-SR012
Supply voltage $U_B$	24 V DC
Operating current	70 mA
Trigger	
Light field size	Ø 12 mm
Emitter, light type	LED, red light
Wavelength	617 nm
Dimension	M12×32.5 mm
Mounting	M12×1 nut
Connection	M12 male, 4-pin
Housing material	Stainless steel
Weight	45 g
Degree of protection as per IEC 60529	IP 67
Eye safety acc. to IEC 62471	Exempt group
Polarity reversal/short-circuit protected	Yes/Yes
Ambient temperature $T_a$	-10...+50 °C
Storage temperature	-10...+60 °C

**Lighting accessories:** See the section for connectors and product-specific accessories (for direct mounting or compatible with Balluff mounting system BMS).



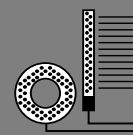
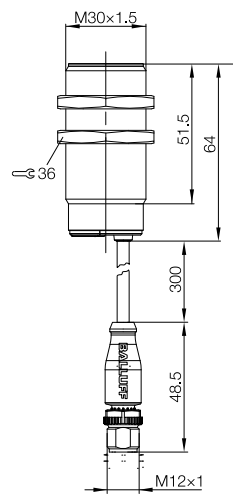
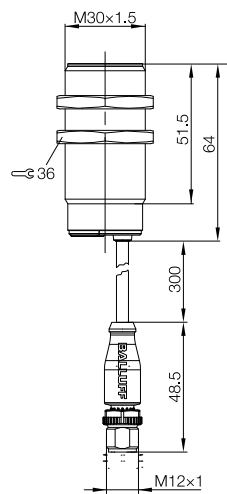
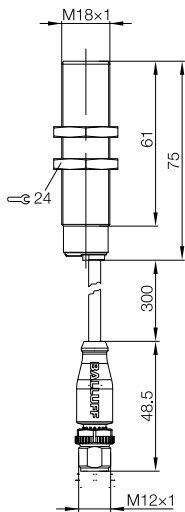
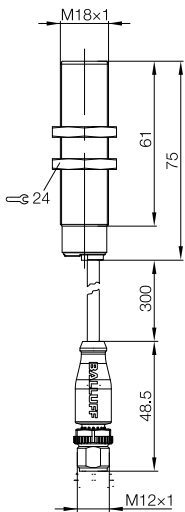
**Spotlight:** A spotlight is perfect for the precision illumination of specific areas. Greater inspection distances can be implemented if a spotlight is used. Unlike ring lights, spotlights can be attached in any position. You can swivel the light to the area requiring illumination.







BAE LX-VS <b>Spotlight</b> Red light <b>BAE00H0</b>	BAE LX-VS <b>Spotlight</b> Infrared <b>BAE00H1</b>	BAE LX-VS <b>Spotlight</b> Red light <b>BAE00FT</b>	BAE LX-VS <b>Spotlight</b> Infrared <b>BAE00H2</b>
BAE LX-VS-SR018	BAE LX-VS-SI018	BAE LX-VS-SR030	BAE LX-VS-SI030
24 V DC	24 V DC	24 V DC	24 V DC
85 mA	85 mA	120 mA	115 mA
Yes	Yes	Yes	Yes
Ø 18 mm	Ø 18 mm	Ø 30 mm	Ø 30 mm
LED, red light	LED, infrared	LED, red light	LED, infrared
617 nm	850 nm	617 nm	850 nm
M18x72 mm	M18x72 mm	M30x62 mm	M30x62 mm
M18x1 nut	M18x1 nut	M30x1.5 nut	M30x1.5 nut
M12 male, 4-pin	M12 male, 4-pin	M12 male, 4-pin	M12 male, 4-pin
Stainless steel	Stainless steel	Stainless steel	Stainless steel
75 g	75 g	90 g	90 g
IP 67	IP 67	IP 67	IP 67
Exempt group	Risk group 1	Exempt group	Risk group 1
Yes/Yes	Yes/Yes	Yes/Yes	Yes/Yes
0...+50 °C	0...+50 °C	0...+50 °C	0...+50 °C
-10...+60 °C	-10...+60 °C	-10...+60 °C	-10...+60 °C



- Lights
- Product overview
- Background lights
- Ring Lights
- Strip Lights
- Spotlights**
- Coaxial Lights
- Dark field light
- Line Lasers

## Coaxial lights

Coaxial lighting is the optimal solution for illuminating highly reflective surfaces. Therefore, coaxial lighting is well suited for transmitted light inspections of colored materials and for inspections of printed or dirty surfaces and for dot-peen codes. They are low-maintenance, industrially sound and thus can be integrated with low effort.

- Long service life
- Uniform lighting
- High standard of quality
- Energy-saving LED technology



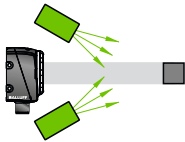
# Lights

## Coaxial lights

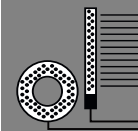
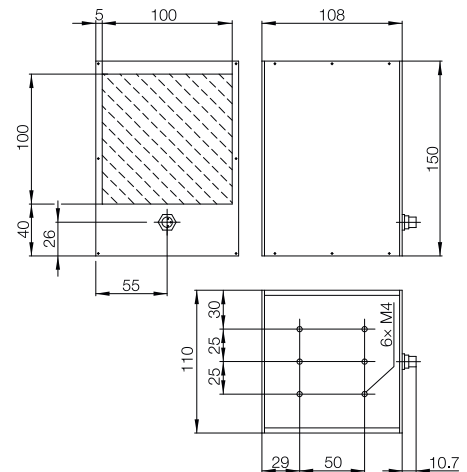
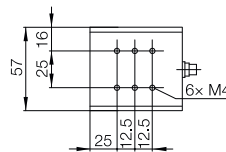
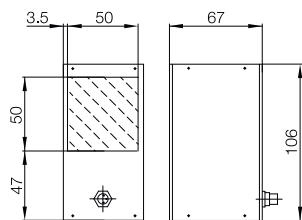


Series	BAE LX-VS	BAE LX-VS
Version	<b>Coaxial lighting</b>	<b>Coaxial lighting</b>
Light type	Red light	Red light
<b>Ordering code</b>	<b>BAE00J9</b>	<b>BAE00JA</b>
Part number	BAE LX-VS-OR50	BAE LX-VS-OR100
Supply voltage $U_B$	24 V DC	24 V DC
Operating current	218 mA	600 mA
Light field size	50×50 mm	100×100 mm
Emitter, light type	LED, red light	LED, red light
Wavelength	630 nm	630 nm
Dimension	106×67×57 mm	150×108×110 mm
Mounting	M4 screws	M4 screws
Connection	M8 connector, 2-pin	M8 connector, 2-pin
Housing material	Anodized aluminum	Anodized aluminum
Optical surface	Glass	Glass
Weight	450 g	1500 g
Degree of protection as per IEC 60529	IP 54	IP 54
Eye safety acc. to IEC 62471	Exempt group	Exempt group
Polarity reversal/short-circuit protected	Yes/Yes	Yes/Yes
Ambient temperature $T_a$	-10...+55 °C	-10...+55 °C
Storage temperature	-25...+75 °C	-25...+75 °C

**Lighting accessories:** See the section for connectors and product-specific accessories (for direct mounting or compatible with Baluff mounting system BMS).



**Coaxial lighting** is used if the industrial image processing system requires diffuse light, for example, to illuminate highly reflective surfaces uniformly and prevent reflections.



Lights  
 Product overview  
 Background lights  
 Ring Lights  
 Strip Lights  
 Spotlights  
**Coaxial Lights**  
 Dark field light  
 Line Lasers

# Lights

## Dark field light

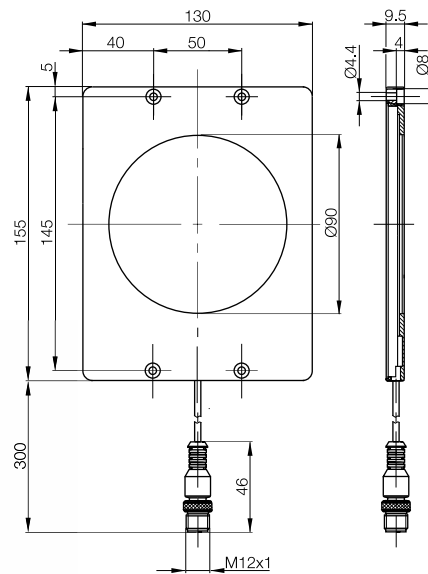


Series	BAE LX-VS
Version	<b>Dark field light</b>
Light type	Red light
<b>Ordering code</b>	<b>BAE00AM</b>
Part number	BAE LX-VS-DR090
Supply voltage $U_B$	24 V DC
Operating current	425 mA
Trigger	Yes
Light field size	Ø 90 mm
Emitter, light type	LED, red light
Wavelength	617 nm
Dimension	105×80×9.5 mm
Mounting	M4 screws
Connection	M12 male, 4-pin
Housing material	Anodized aluminum
Optical surface	PMMA
Weight	250 g
Degree of protection as per IEC 60529	IP 54
Eye safety acc. to IEC 62471	Exempt group
Polarity reversal/short-circuit protected	Yes/Yes
Ambient temperature $T_a$	-10...+55 °C
Storage temperature	-25...+75 °C

**Lighting accessories:** See the section for connectors and product-specific accessories (for direct mounting or compatible with Balluff mounting system BMS).



**Dark field lighting:** With dark field lighting you can illuminate scratches, dents and impurities on surfaces extremely well. The dark field light must be attached to the detection object at a distance of 10...20 mm so that the surfaces on the component can be inspected. If the diameter of the dark field is insufficient, two or more linear lights can also be installed to implement this type of illumination.



The dark field light allows you to illuminate surfaces to clearly reveal indentations and scratches. This ensures quick and reliable surface inspections.

# Lights

## Line Lasers



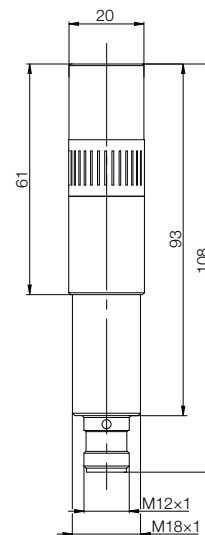
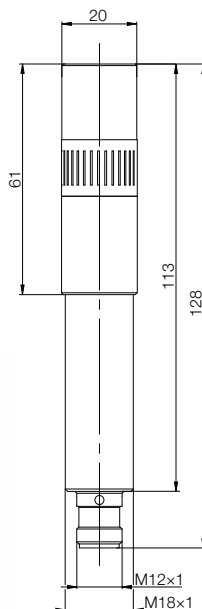
Series	BAE LX-XO	BAE LX-XO
Version	<b>Line Lasers</b>	<b>Line Lasers</b>
Light type	Red light	Red light
<b>Ordering code</b>	<b>BAE00KE</b>	<b>BAE00KZ</b>
Part number	BAE LX-XO-PL018-L1-S4	BAE LX-XO-PL018-L2-S4
Supply voltage $U_B$	5...30 V DC	5...30 V DC
Operating current	30 mA	30 mA
Trigger	Yes	Yes
Line width/ line length	100 mm distance 500 mm distance 1000 mm distance 2000 mm distance	77 $\mu$ m/82 mm 170 $\mu$ m/420 mm 320 $\mu$ m/840 mm 677 $\mu$ m/1650 mm
Emitter, light type	Laser, red light	Laser, red light
Wavelength	640 nm	635 Nm
Dimension	$\varnothing$ 20x128 mm	$\varnothing$ 20x108 mm
Connection	M12 male, 4-pin	M12 male, 4-pin
Housing material	Brass coated, anodized aluminum	Brass coated, anodized aluminum
Optical surface	Glass	Glass
Weight	66 g	56 g
Degree of protection as per IEC 60529	IP 67	IP 67
Laser class per IEC 60825-1	2M	1M
Polarity reversal/short-circuit protected	Yes/Yes	Yes/Yes
Ambient temperature $T_a$	-10...+50 $^{\circ}$ C	-10...+50 $^{\circ}$ C
Storage temperature	-10...+80 $^{\circ}$ C	-10...+80 $^{\circ}$ C

**Lighting accessories:** See the section for connectors and product-specific accessories (for direct mounting or compatible with Balluff mounting system BMS).



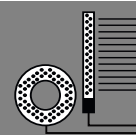
### Caution

Do not view laser radiation directly with optical instruments (magnifiers, microscopes, etc.). Laser class 1M and 2M (DIN EN 60825-1: 2008)

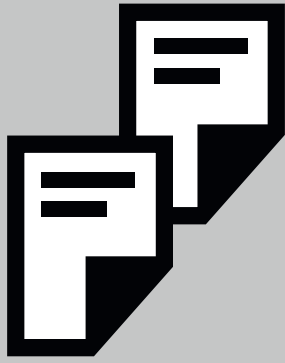


### Exceptional uniformity, focusable and high standard of quality

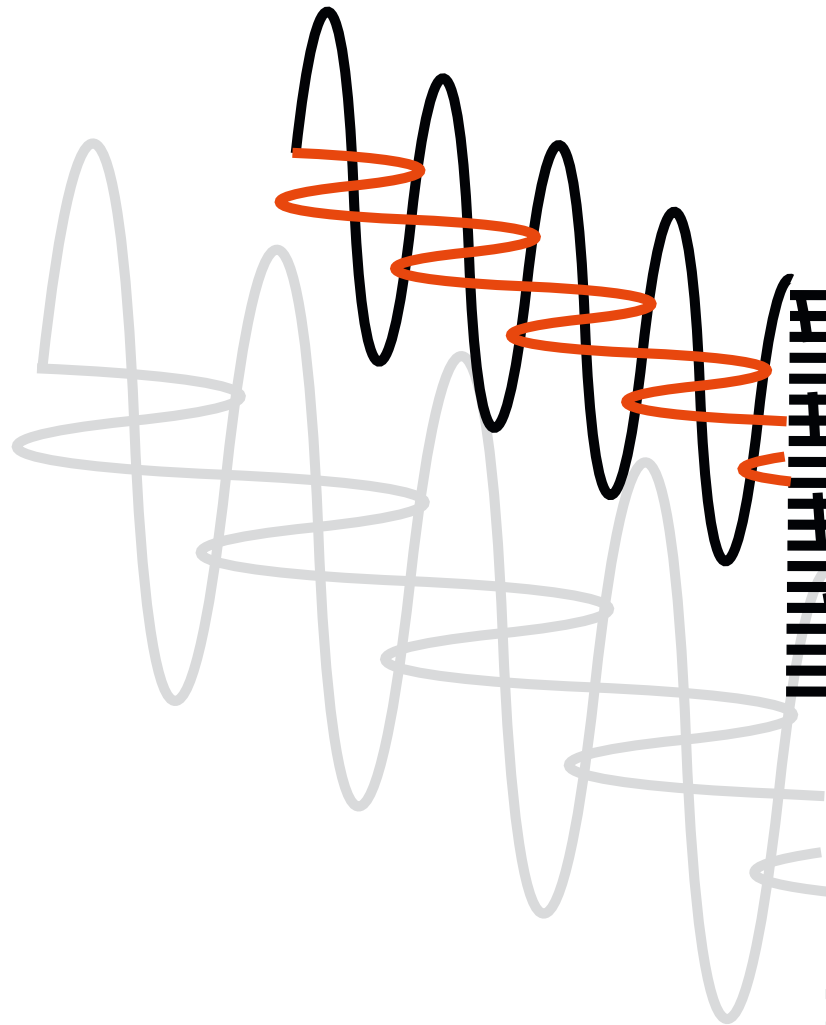
Line lasers are used in industrial image processing and for aligning and positioning workpieces or accessories. The combination of laser lighting and image processing provides interesting options for automating visual quality control. They are used in many ways for detecting and measuring defects, presence, diameters, edges, gaps, steps, etc. Our line lasers with uniform power distribution can be precisely and securely adjusted without a tool and using a lock. The line position stays unchanged.



Lights  
Product overview  
Background lights  
Ring lights  
Strip lights  
Spotlights  
Coaxial Lights  
**Dark field light**  
**Line Lasers**



# Basic Information and Definitions

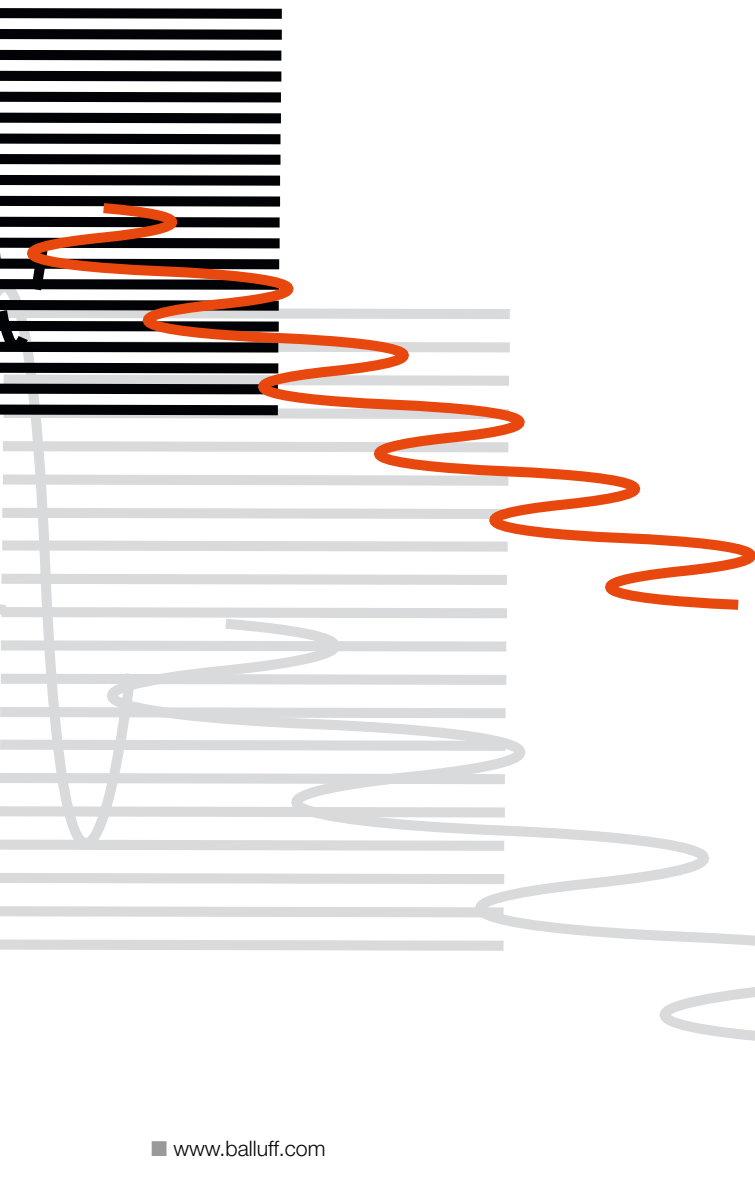


# Basic Information and Definitions

## Contents

### General basic information

Quality	424
Electrical Properties	425
Mechanical Properties	428
Photoelectric Sensors	430



### Quality and the environment

#### Quality management system as per DIN EN ISO 9001:2008

Balluff companies	
Balluff GmbH	Germany
Balluff SIE Sensorik GmbH	Germany
Balluff Controles Eléctricos Ltda.	Brazil
Balluff Sensors (Chengdu) Co., Ltd.	China
Balluff Ltd.	Great Britain
Balluff Automation S.R.L.	Italy
Balluff Canada Inc.	Canada
Balluff de México S.A. de C.V.	Mexico
Balluff GmbH	Austria
Balluff Sp. z o.o.	Poland
Balluff Hy-Tech AG	Switzerland
Balluff Sensortechnik AG	Switzerland
Balluff S.L.	Spain
Balluff CZ, s.r.o	Czech Republic
Balluff Elektronika Kft.	Hungary
Balluff Inc.	USA



#### Environmental management system as per DIN EN ISO 14001:2009

Balluff companies	
Balluff GmbH	Germany
Balluff Sensors (Chengdu) Co., Ltd.	China
Balluff Elektronika Kft	Hungary

#### Testing laboratory

The Balluff testing laboratory operates in accordance with ISO/IEC 17025 and is accredited by DAkks for testing electromagnetic compatibility (EMC).



#### Balluff products comply with EU directives

Products that require labeling are subject to a conformity evaluation process according to the EU directive and the product is labeled with the CE marking. Balluff products fall under the following EU directive:



2004/108/EC	EMC directive
2006/95/EC	Low Voltage Directive valid for products with supply voltage $\geq 75$ V DC/ $\geq 50$ V AC
94/9/EC	ATEX-directive valid for products with Ex-label



#### Product approvals

Product approvals are awarded by domestic and international institutions. Their symbols affirm that our products meet the specifications of these institutions.

"US Safety System" and "Canadian Standards Association" under the auspices of Underwriters Laboratories Inc. (cUL).

CCC-Code by the Chinese CQC.





### Cable properties

#### Cable types

PUR cable

No. of wires × conductor cross-section	Outside diameter typical
2×0.08 mm <sup>2</sup>	3...4 mm
2×0.14 mm <sup>2</sup>	3...4.1 mm
2×0.34 mm <sup>2</sup>	4...5.5 mm
3×0.06 mm <sup>2</sup>	2...2.5 mm
3×0.09 mm <sup>2</sup>	2.5...3 mm
3×0.14 mm <sup>2</sup>	2.5...3.5 mm
3×0.25 mm <sup>2</sup>	3.5...4.5 mm
3×0.34 mm <sup>2</sup>	4...5.5 mm
3×0.75 mm <sup>2</sup>	6.5...7 mm
4×0.14 mm <sup>2</sup>	3...4 mm
4×0.25 mm <sup>2</sup>	4...5.5 mm
4×0.34 mm <sup>2</sup>	4...5.5 mm
5×0.34 mm <sup>2</sup>	4.5...6 mm
8×0.25 mm <sup>2</sup>	6...8 mm
12×0.25 mm <sup>2</sup>	6...8 mm

PVC cable

No. of wires × conductor cross-section	Outside diameter typical
2×0.14 mm <sup>2</sup>	2.5...3.5 mm
2×0.34 mm <sup>2</sup>	4.5...5.5 mm
3×0.14 mm <sup>2</sup>	2.7...4.5 mm
3×0.25 mm <sup>2</sup>	4...5 mm
3×0.34 mm <sup>2</sup>	4.5...5.5 mm
4×0.25 mm <sup>2</sup>	4.5...5.5 mm
4×0.34 mm <sup>2</sup>	4.5...5.5 mm
5×0.34 mm <sup>2</sup>	4.7...6 mm
8×0.25 mm <sup>2</sup>	5...7 mm
12×0.25 mm <sup>2</sup>	6...8 mm

#### Cable properties PUR

Flame resistance acc. to IEC 332-2  
Halogen-free acc. to IEC 60754-1  
Drag chain-compatible

#### Smallest bending radius

	tensioned	untensioned
PUR	4×D	5×D
PVC	15×D	8×D

#### Bending cycles and drag chain compatibility for PUR and PVC materials

Bending cycles	> 10×D	> 2 mil.
Drag chain compatibility	Vertical travel permitted Horizontal travel permitted	at 5m/sec <sup>2</sup> 2 m at 5m/sec <sup>2</sup> 5 m

#### Tightening torques

Permissible tightening torque for connectors	
M8	0.4 Nm
M12	0.6 Nm
7/8"	1.5 Nm

#### Wire colors

Coding as per  
DIN IEC 60757

BN	brown
BK	Black
BU	Blue
WH	white

#### Approvals

Cable design PUR
in accordance with UL-AWM Style 21 198
Temperature range +80 °C
Cable design PVC
in accordance with UL-AWM Style 2517
Temperature range +80 °C

# Basic Information and Definitions

## Electric properties

### Standards

<b>Sensors</b>	Low-voltage switchgear and controlgear	EN 60947-5-2/IEC 60947-5-2
	NAMUR-sensors	EN 60947-5-6/IEC 60947-5-6
<b>Protection class</b>	II □	EN 60947-5-2/IEC 60947-5-2
<b>Degree of protection</b>	IP 60...67	EN 60529/IEC 60529
	IP 68 per BWN Pr. 20	Balluff factory standard (BWN): Temperature storage 48 h at 60 °C, 8 temperature cycles according to EN 60068-2-14/IEC 60068-2-14 between the benchmark temperatures according to the data sheet, 1 h storage in water, insulation test, 24 h storage in water, insulation test, 8 temperature cycles according to EN 60068-2-14 IEC 60068-2-14 between the benchmark temperatures according to the data sheet, 7 days storage in water, insulation test.
	IP 68 according to BWN Pr. 27	Balluff Factory Standard (BWN): Testing products for use in the foods industry.
	IP 69K	DIN 40050 part 9: Protection against entry of water under high pressure- or steam jet cleaning.
<b>EMC (Electromagnetic Compatibility)</b>	Interference emissions, radio interference voltage and radio interference emissions from electrical equipment	EN 55011
	Interference immunity against discharge of static electricity (ESD)	EN 61000-4-2/IEC 61000-4-2
	Immunity against high-frequency electromagnetic fields (RFI)	EN 61000-4-3/IEC 61000-4-3
	Immunity to fast transients (bursts)	EN 61000-4-4/IEC 61000-4-4
	Immunity against conducted interference induced by high-frequency fields	EN 61000-4-6/IEC 61000-4-6
	Immunity to voltage dips and short interruptions	EN 61000-4-11/IEC 61000-4-11
	Surge-voltage stability	EN 60947-5-2/IEC 60947-5-2
<b>Environmental simulation</b>	Vibration, sinusoidal	EN 60068-2-6/IEC 60068-2-6
	Shock	EN 60068-2-27/IEC 60068-2-27
	Continuous shock	EN 60068-2-29/IEC 60068-2-29
<b>EX area</b>	Electrical equipment for explosive atmospheres, general requirements.	EN 50014
	Succeeded by: Electrical equipment for gas explosive atmospheres, general requirements.	EN 60079-0
	Electrical apparatus for explosive areas – intrinsic safety "i".	EN 50020

For conformity, see product marking.

# Basic Information and Definitions

## Electric properties

### Mounting torques

The following torques are to be followed so that the sensors are not mechanically destroyed during installation, as long as no other information is indicated on the data sheet or the sensor packaging.

Size	Material	Tightening torque
M5×0.5	Stainless steel	3 Nm
M8 × 1	Stainless steel	15 Nm
M12×1	Stainless steel	40 Nm
M18×1	PBT	1 Nm
M18×1	Stainless steel	60 Nm
M30×1.5	PBT	3 Nm
M30×1.5	Stainless steel	90 Nm

Size	Plastic nut	Brass nut	Stainless steel nut
M5			1 Nm
M8		6 Nm	10 Nm
M12	1 Nm	15 Nm	20 Nm
M18	2 Nm	30 Nm	40 Nm
M30	6 Nm	70 Nm	80 Nm

### Housing tolerances for cylindrical sensors without threading

Diameter	Tolerance
Ø 3 mm	-0.1
Ø 4 mm	-0.1
Ø 6.5 mm	-0.15
Ø 8 mm	-0.15

### Degree of protection

The degrees of protection are given according to IEC 60529. Code letters IP (International Protection) designate protection against shock hazard, ingress of solid foreign bodies, and water, for electrical equipment.

#### IP 69K

Protection against ingress of water at high pressure and steam cleaning per DIN 40050 Part 9.

#### First digit:

- 2 Protection against penetration of solid bodies larger than 12 mm, shielding from fingers and objects
- 4 Protection against penetration of solid bodies larger than 1 mm, shielding from tools and wires
- 5 Protection against harmful dust deposits, complete contact protection
- 6 Protection against penetration of dust, complete contact protection

#### Second digit:

- 0 No special protection
- 4 Protection against water spraying from all directions against the piece of equipment concerned
- 5 Protection against a water jet from a nozzle directed towards the piece of equipment concerned from any direction
- 7 Protection against water, when the piece of equipment concerned (housing) is immersed in water under specified pressure and time conditions
- 8 Protection against water during continuous submersion



General Basic Information  
Quality  
**Electric properties**  
Mechanical properties  
Power supplies  
Photoelectric sensors

# Basic Information and Definitions

## Mechanical properties

### Materials

Material	Use and characteristics
Plastics	
<b>ABS</b> Acrylnitrile-Butadiene-Styrene	Impact-resistant, stiff, limited chemical resistance. Some types flame-retardant. Housing material.
<b>AES/CP</b> Acrylnitrile-Ethylene-Propylene-Styrene	Impact-resistant, stiff, limited chemical resistance. Housing material.
<b>EP</b> Epoxy resin	Duromer, molded plastic material, highest mechanical strength and temperature resistance. Very good dimensional stability. Cannot be melted.
<b>Epoxy resin - hollow glass spheres</b>	Hollow glass spheres can be treated with epoxy resins. They are used for manufacturing converters with low density and high pressure rating.
<b>FEP</b> Tetrafluoroethylene-perfluorpropylene	High temperature resistance up to 180 °C, insulation material for cable.
<b>LCP</b> Liquid Crystalline Polymer	High mechanical strength and temperature resistance. Very good chemical resistance. Inherently non-flammable.
<b>PA</b> Polyamide	High impact resistance, good chemical resistance.
<b>PA 6, PA 66, PA mod., PA 12</b> Polyamide	Good mechanical strength. Temperature resistance. PA 12 approved for food industry applications.
<b>PA transp.</b> Transparent polyamide	Transparent, hard, inflexible. Good chemical resistance.
<b>PBT</b> Polybutylene terephthalate	High mechanical strength and temperature resistance. Some types flame-retardant. Good chemical resistance. Good oil resistance.
<b>PC</b> Polycarbonate	Clear, hard, elastic and impact resistant. Good temperature resistance. Limited chemical resistance.
<b>PEEK</b> Polyetheretherketone	Thermoplastic. Very high strength and temperature resistance. Good chemical resistance. Can be sterilized, good resistance to ionizing radiation.
<b>PEI</b> Polyetherimide	High mechanical strength and good temperature resistance. Good chemical resistance even with many solvents. Transparent with amber-yellow inherent color (not pigmented).
<b>PET</b> Polyethylene terephthalate	High resistance to breakage, good dimensional stability. Frequently used in the food industry.
<b>PMMA</b> Polymethylmethacrylate	Clear, transparent, hard, scratch-resistant, UV-resistant, mainly for optical applications.
<b>POM</b> Polyoxymethylene	High impact resistance, good mechanical strength. Good chemical resistance.

# Basic Information and Definitions

## Mechanical properties

Material	Use and characteristics
<b>Plastics</b>	
<b>PP</b> Polypropylene	Very good electrical properties. Impact resistant, tough, mechanically resilient. Very low water uptake. Good to very good chemical resistance.
<b>PPE</b> Polyphenylene ether	Tough, inflexible, high mechanical strength over a wide temperature range. Good chemical resistance. Good hot water resistance.
<b>PSU</b> Polysulfone	High temperature resistance, high impact resistance, good chemical resistance, FDA approved (food grade).
<b>PTFE</b> Polytetrafluoroethylene	Best temperature and chemical resistance, FDA approved (food grade).
<b>PUR</b> Polyurethane	Elastic, abrasion-resistant, impact-resistant. Good resistance to oils, greases, solvents (used for gaskets and cable jackets).
<b>PVC</b> Polyvinyl chloride	Good mechanical strength and chemical resistance (cable).
<b>PVDF</b> Polyvinylidene fluoride	Thermoplastic. High mechanical strength and temperature resistance. Good chemical resistance (similar to PTFE).
<b>Metal</b>	
<b>Al</b> Wrought aluminum alloy	Standard-aluminum for machined cutting. Can be anodized. Material for housings and mounting components.
<b>CuZn</b> Brass	Standard-housing material with surface protection.
<b>Stainless steel</b>	Excellent corrosion resistance and strength. Quality 1.4034, 1.4104: Standard-material; <b>quality 1.4305, 1.4301</b> : Standard-material for the food industry; <b>quality 1.4401, 1.4404, 1.4571</b> : With increased requirements on chemical resistance at elevated temperatures for the food industry.
<b>GD-Al</b> die-cast-aluminum	Low specific gravity. Good strength and resistance. Some types can be anodized.
<b>GD-Zn</b> die-cast-zinc	Good resistance and strength. Usually with protective surface coating.
<b>Other</b>	
<b>Glass</b>	Good chemical resistance and strength. Used primarily in optical applications (lenses, cover lenses).
<b>Ceramic</b>	Very good strength and chemical resistance. Electrically insulating. Excellent temperature resistance.



General Basic Information  
Quality  
Electric properties  
**Mechanical properties**  
Power supplies  
Photoelectric sensors

# Basic Information and Definitions

## Photoelectric sensors

### Fiber optics



Optical conductors are made of glass or plastic with a diameter of as little as 50 µm and bunched in bundles of several hundred individual fibers to form so-called fiber optics. The fiber ends are ground and polished to meet the quality criteria of the optical industry.

The individual fibers are coated with a very thin layer of lubricant. This reduces friction against the outer jacket and between the fibers, so that broken fibers are prevented even when the cable is continuously flexed. The transmission properties are guaranteed over a longer period of time.

The ends of the bundles are potted with the connection sleeve and the jacket. Balluff fiber optics thus have an IP 67 degree of protection rating (IP 65 for metal jacket). Moisture and aggressive media cannot hurt either the fibers or the slide coating, so the optical properties remain unaffected.

This design distributes axial pull forces evenly over all the fibers, and protects the individual fibers from excessive pull loads.

### Polyurethane jacket

- Temperature T = +85 °C
- Excellent chemical resistance
- Flexible
- No embrittlement from oils and cooling emulsions.

### Corrugated metal tube, silicon jacketed

- Temperature T = +150 °C
- Highly flexible
- Crush-resistant
- Can be sterilized.

### Metal jacket

- Temperature T = +150 °C
- Resistant to hot swarf
- Flexible
- Crush-resistant

### Focusing

To achieve a smaller light spot, the light beam from the emitter is focused using lenses. Focusing and the resulting light spot allow the switches to better detect small parts and details. Focusing is often used with diffuse sensors with background suppression, as well as with retroreflective sensors.

### Ambient light

The ambient light is the portion of light that is received by the receiver, but does not originate at the associated emitter.

# Basic Information and Definitions

## Photoelectric sensors

### Luminescence

To locate invisible marks on objects, so-called luminescent materials (contained in special chalks, inks, paints etc.) are used which can only be made visible under ultraviolet (UV) light. The fluorescent materials convert the invisible UV light (short wavelength, here 380 nm) into visible light (between blue 450 nm and dark red 780 nm). This effect is called photoluminescence. The visible light can then be detected as usual by the receiver component of the sensor.

### Lasers, laser class

The purpose of laser protection classes is to protect persons from laser radiation by specifying limit values. Based on this, the lasers used are classified according to a scale reflecting the degree of hazard. The calculations and associated limit values relevant for the classification are described in the standard EN 60825-1:2001-11. The grouping is based on a combination of output power and wavelength, taking into account emission duration, number of pulses and angle extension.

Balluff sensors work in the following laser protection classes:

**Class 1 (M1):** Not dangerous, no protective measures.

**Class 2 (M2):** Low output, lid-closing reflex sufficient for protection. With devices of protection class 2, the eye closes on its own due to the lid closing reflex before it has been open to the beam for too long. Laser warning signs on the device and possibly also on the machine in which a laser is being used are sufficient. Additional protective measures are not required. When using devices of protection classes 1 and 2, no laser safety officer is necessary in the company.

### Light as a sensor medium

Light is used as a sensor medium in many areas of technology and daily life.

Used in controllers- and regulation equipment as a sensor medium. Generally a change in the light intensity in an optical beam (between emitter and receiver) caused by a target object is evaluated. Depending on the properties of this object and the characteristics of the optical beam, the light beam is either interrupted or reflected, or even scattered.

Predominantly clocked infrared light-LEDs are used as emitters and phototransistors are used as receivers. The output signal is for the most part independent of the ambient light conditions, since visible light can be easily filtered out.

With critical detection procedures, diffuse sensors and -beams can be used with red light-LEDs, because the light beam and the detection point can be measured visually and can be adjusted more easily.

For the various usage conditions, Balluff offers three sensor variants: diffuse sensors, retroreflective light sensors, and one-way photoelectric sensors.



General Basic  
Information  
Quality  
Electric properties  
Mechanical  
properties  
Power supplies  
**Photoelectric  
sensors**

# Basic Information and Definitions

## Photoelectric sensors

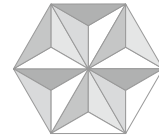
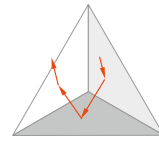
### Reflectors

(Optically active triple mirrors)

The two-dimensional principle of retroreflection described above can be carried over to a spatial system with three mirrors which are oriented at right angles to each other (one corner of a cube standing on its point). A light beam entering this system is totally reflected by all three surfaces and exits parallel to the incident beam.

Triple mirrors are called **optically active**, because they also turn the polarization level of the reflected light beam by 90°.

This property first enables a secure recognition of reflective detection objects, together with a **polarizing filter** with retroreflective light sensors.



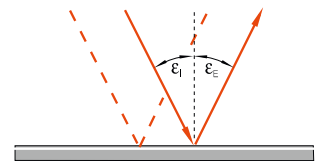
Each six triple mirrors are to be arranged into a hexagon and arranged in a honeycomb next to each other. Their orientation with respect to the light beam is then totally unproblematic. These are generally made of plastics with high optical density, injected as sheets or pressed into flexible tape.

### Reflection

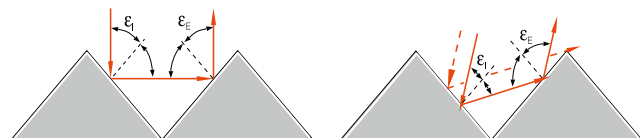
#### What is it?

Light beams extend to a straight line in free space. Upon striking an object, they are reflected. Depending on the surface properties of the object, one of three types of reflection occurs: total reflection, retroreflection, and diffuse reflection.

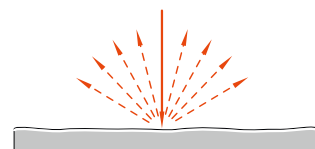
**The total reflection** reaches a highly reflective (mirroring) surface. The angle of incidence of a light beam is thereby the same as the angle of reflection ( $\epsilon_i = \epsilon_r$ ). The reflection losses are in the ideal case negligible.



**The retroreflection** is caused by two mirrors aligned vertically to each other. A light beam is again projected back through double reflection in the same direction. The angle of incidence can thus be altered in a relatively wide range.



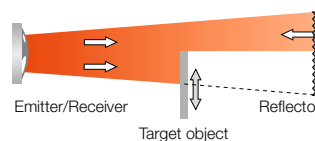
**Diffuse reflection** occurs on an uneven and rough surface. It can be illustrated through a wide variety of poorly reflective and differently aligned miniature mirrors. Incidental light is widely "scattered" from such a surface. The reflection losses are higher the darker and more matte finished the surface is. Diffuse sensors, for example, detect diffuse reflecting light from target objects.



### Retroreflective sensor

With retroreflective light sensors, the emitter and the receiver are in a single housing. A reflector on the opposite side of the beam bounces the emitter's light back to the receiver.

A target object interrupts the reflected light beam and causes a change in the output signal. With reflective interfaces, it is advisable that the light reflected from the object is to be blanked out with a polarizing filter in front of the receiver optics, in order to prevent possible error signals.







General Basic  
Information  
Quality  
Electric properties  
Mechanical  
properties  
Power supplies  
**Photoelectric  
sensors**

# Alphanumeric Index

## Sorted by part number

Part number	Ordering code	Page	Part number	Ordering code	Page
<b>BAE</b>			<b>BAM</b>		
BAE LX-VS-DR090	<b>BAE00AM</b>	420	BAM AD-SP-008-1G4/1G2-4	<b>BAM01UJ</b>	397
BAE LX-VS-HI050	<b>BAE00KR</b>	409	BAM AD-SP-008-1G4/1G4-4	<b>BAM01KP</b>	397
BAE LX-VS-HI100	<b>BAE00FR</b>	409	BAM AD-SP-008-1G4/1G4-4-EN837	<b>BAM01KR</b>	397
BAE LX-VS-HI150	<b>BAE00KP</b>	410	BAM AD-SP-008-1G4/1N4-4	<b>BAM01KT</b>	397
BAE LX-VS-HI200	<b>BAE00JE</b>	411	BAM AD-SP-008-1G4/1R4-4	<b>BAM01RP</b>	397
BAE LX-VS-HR025	<b>BAE00OE</b>	408	BAM AD-SP-008-1G4/M20X1,5-4	<b>BAM0209</b>	396
BAE LX-VS-HR050	<b>BAE00OF</b>	408	BAM AD-SP-011-1G4/1N4-4	<b>BAM01TR</b>	397
BAE LX-VS-HR100	<b>BAE00OH</b>	409	BAM AP-US-001-M12-0	<b>BAM01ET</b>	378
BAE LX-VS-HR100-E	<b>BAE00JF</b>	411	BAM AP-US-002-M18-0	<b>BAM01HJ</b>	378
BAE LX-VS-HR150	<b>BAE00C5</b>	410	BAM AP-US-003-M12-0	<b>BAM01JR</b>	378
BAE LX-VS-HR200	<b>BAE00JC</b>	411	BAM BD-US-001-D20-4	<b>BAM01EP</b>	377
BAE LX-VS-LI085	<b>BAE00AT</b>	415	BAM BD-US-001-D32-4	<b>BAM01ER</b>	377
BAE LX-VS-LI170	<b>BAE00AY</b>	415	BAM CC-XA-025-C03-P	<b>BAM01EC</b>	206
BAE LX-VS-LR085	<b>BAE00AP</b>	414	BAM CC-XA-028-T05-P	<b>BAM01EA</b>	206
BAE LX-VS-LR170	<b>BAE00AZ</b>	414	BAM CS-CC-009-H4-A	<b>BAM020M</b>	207
BAE LX-VS-LW085	<b>BAE00AR</b>	415	BAM CS-CC-010-H4-A	<b>BAM020N</b>	207
BAE LX-VS-LW170	<b>BAE00AW</b>	415	BAM CS-M-D12-S6K-00	<b>BAM022C</b>	359
BAE LX-VS-OR100	<b>BAE00JA</b>	419	BAM CS-XA-001-M8-C	<b>BAM01C1</b>	205
BAE LX-VS-OR50	<b>BAE00J9</b>	419	BAM CS-XA-002-M12-A	<b>BAM01C2</b>	205
BAE LX-VS-RI100	<b>BAE00OK</b>	413	BAM CS-XA-008-M12-4	<b>BAM01YN</b>	207
BAE LX-VS-RI100-S	<b>BAE00FN</b>	413	BAM FK-CC-005-M08-A	<b>BAM01Z5</b>	207
BAE LX-VS-RR100	<b>BAE000J</b>	412	BAM FK-CC-005-M12-A	<b>BAM01Z4</b>	207
BAE LX-VS-RR100-S	<b>BAE00FP</b>	412	BAM FK-NI-PBS-01-C	<b>BAM01JO</b>	206
BAE LX-VS-RW100	<b>BAE00AN</b>	413	BAM FK-VS-002-03-1	<b>BAM0206</b>	402
BAE LX-VS-RW100-S	<b>BAE00FM</b>	413	BAM FS-XE-001-M5-4	<b>BAM01AZ</b>	374
BAE LX-VS-SI018	<b>BAE00H1</b>	417	BAM FS-XE-002-D4-4	<b>BAM01C0</b>	373
BAE LX-VS-SI030	<b>BAE00H2</b>	417	BAM FS-XE-003-M5-4	<b>BAM019Y</b>	374
BAE LX-VS-SR012	<b>BAE00KF</b>	416	BAM FS-XE-004-M8-4	<b>BAM019W</b>	375
BAE LX-VS-SR018	<b>BAE00H0</b>	417	BAM IA-CC-002-01	<b>BAM023F</b>	206
BAE LX-VS-SR030	<b>BAE00FT</b>	417	BAM IA-CC-002-02	<b>BAM023H</b>	206
BAE LX-XO-PL018-L1-S4	<b>BAE00KE</b>	421	BAM IA-CC-002-03	<b>BAM023J</b>	206
BAE LX-XO-PL018-L2-S4	<b>BAE00KZ</b>	421	BAM LS-FO-002-F	<b>BAM01U2</b>	332
BAE PD-US-004-S04	<b>BAE00E5</b>	379	BAM LS-FO-003-M6-L	<b>BAM020P</b>	332
BAE PD-US-004-S92	<b>BAE00E6</b>	379	BAM MB-X0-005-B04-4	<b>BAM01E8</b>	363
BAE-PS-XA-1W-12-015-001	<b>BAE0036</b>	236	BAM MB-X0-006-B05-4	<b>BAM01FK</b>	361
BAE-PS-XA-1W-12-025-002	<b>BAE0039</b>	237	BAM MB-X0-007-B05-4	<b>BAM01FM</b>	361
BAE-PS-XA-1W-12-050-002	<b>BAE003E</b>	239	BAM MB-XA-002-B02-1	<b>BAM01AE</b>	399
BAE-PS-XA-1W-12-100-003	<b>BAE003H</b>	241	BAM MB-XA-003-B03-1	<b>BAM01AC</b>	399
BAE-PS-XA-1W-24-007-001	<b>BAE0001</b>	236	BAM MB-XA-004-M30-5	<b>BAM01E0</b>	309
BAE-PS-XA-1W-24-012-002	<b>BAE0004</b>	237	BAM MB-XA-010-B07-4	<b>BAM01MY</b>	387
BAE-PS-XA-1W-24-025-002	<b>BAE0005</b>	238	BAM MB-XA-012-B09-4	<b>BAM01UH</b>	387
BAE-PS-XA-1W-24-038-003	<b>BAE003J</b>	240	BAM MB-XA-013-Q08-4	<b>BAM01YW</b>	364
BAE-PS-XA-1W-24-038-601	<b>BAE00EN</b>	232	BAM MB-X0-014-B10-4-BLS	<b>BAM0227</b>	363
BAE-PS-XA-1W-24-038-602	<b>BAE00EP</b>	232	BAM MB-X0-014-B10-4-BRR	<b>BAM0226</b>	362
BAE-PS-XA-1W-24-038-603	<b>BAE00ER</b>	233	BAM MB-X0-014-B10-4-RLS	<b>BAM0228</b>	363
BAE-PS-XA-1W-24-038-607	<b>BAE00FW</b>	233	BAM MB-X0-014-B10-4-RRR	<b>BAM0225</b>	362
BAE-PS-XA-1W-24-050-003	<b>BAE0006</b>	241	BAM MC-XA-002-D03,0-2	<b>BAM000T</b>	298
BAE-PS-XA-1W-24-050-013	<b>BAE00EK</b>	231	BAM MC-XA-002-D04,0-2	<b>BAM000U</b>	298
BAE-PS-XA-1W-24-080-604	<b>BAE00ET</b>	233	BAM MC-XA-002-D06,5-2	<b>BAM000W</b>	298
BAE-PS-XA-1W-24-080-605	<b>BAE00FL</b>	234	BAM MC-XA-002-D08,0-2	<b>BAM000Y</b>	298
BAE-PS-XA-1W-24-080-606	<b>BAE00FY</b>	234	BAM MC-XA-017-D30,0-1	<b>BAM01U0</b>	300, 396
BAE-PS-XA-1W-24-100-004	<b>BAE0002</b>	242	BAM MC-XA-018-B04-4	<b>BAM01Y3</b>	387
BAE-PS-XA-1W-24-100-014	<b>BAE00EU</b>	231	BAM MC-XA-021-M12-2	<b>BAM01W3</b>	394
BAE-PS-XA-1W-24-200-005	<b>BAE0003</b>	243	BAM MC-XA-021-M12-4	<b>BAM01WH</b>	394
BAE-PS-XA-1W-48-025-003	<b>BAE003K</b>	240	BAM MC-XA-021-M16-2	<b>BAM01W6</b>	394
BAE-PS-XA-1W-48-050-004	<b>BAE003L</b>	242	BAM MC-XA-021-M18-2	<b>BAM01W4</b>	395
BAE-PS-XA-1W-48-100-005	<b>BAE003M</b>	243	BAM MC-XA-021-M18-4	<b>BAM01WJ</b>	395
BAE-PS-XA-3Y-24-050-009	<b>BAE0007</b>	244	BAM MC-XA-021-M18-A	<b>BAM01WL</b>	395
BAE-PS-XA-3Y-24-100-006	<b>BAE0008</b>	245	BAM MC-XA-021-M30-2	<b>BAM01W5</b>	395
BAE-PS-XA-3Y-24-200-007	<b>BAE0009</b>	245	BAM MC-XA-021-M30-4	<b>BAM01WK</b>	395
BAE-PS-XA-3Y-24-400-010	<b>BAE003R</b>	246	BAM MC-XA-021-M30-A	<b>BAM01WM</b>	395

# Alphanumeric Index

## Sorted by part number

Part number	Ordering code	Page	Part number	Ordering code	Page
BAM MC-XA-021-M5-4	<b>BAM01WF</b>	394	BCC A314-0000-10-003-PX04A5-020	<b>BCC06HU</b>	105
BAM MC-XA-021-M8-3	<b>BAM01WR</b>	394	BCC A314-0000-10-003-PX04A5-050	<b>BCC06HW</b>	105
BAM MC-XA-023-D12,0-2-FM/W	<b>BAM0247</b>	293	BCC A314-0000-10-003-PX04A5-100	<b>BCC06HY</b>	105
BAM MC-XA-023-D12,0-2-FS	<b>BAM0246</b>	293	BCC A314-000-20-003-PX04A5-020	<b>BCC06HL</b>	106
BAM MC-XA-023-D12,0-2-FXL/W	<b>BAM0248</b>	293	BCC A314-000-20-003-PX04A5-050	<b>BCC06HM</b>	106
BAM MC-XA-023-D18,0-2-FL	<b>BAM022L</b>	295	BCC A314-000-20-003-PX04A5-100	<b>BCC06HN</b>	106
BAM MC-XA-023-D18,0-2-FS	<b>BAM022K</b>	294	BCC A314-A314-30-304-PX04A5-006	<b>BCC06J2</b>	109
BAM MC-XA-023-D18,0-2-FXL	<b>BAM022H</b>	295	BCC A314-A314-30-304-PX04A5-020	<b>BCC06J3</b>	109
BAM MC-XA-023-D18,0-2-FXL/W	<b>BAM022J</b>	295	BCC A314-A314-30-304-PX04A5-050	<b>BCC06J4</b>	109
BAM MC-XA-023-D18,0-2-FXS/W	<b>BAM022F</b>	294	BCC A314-A314-30-304-PX04A5-100	<b>BCC06J5</b>	109
BAM MC-XA-023-D30,0-2-FM/W	<b>BAM024H</b>	294	BCC A314-A314-30-304-PX04A5-150	<b>BCC06J6</b>	109
BAM MC-XA-023-D30,0-2-FS/W	<b>BAM0249</b>	294	BCC A314-A314-A314-T0022-000	<b>BCC0AA6</b>	114
BAM MC-XA-023-D30,0-2-FXL/W	<b>BAM024C</b>	295	BCC A314-A324-30-304-PX04A5-006	<b>BCC06J7</b>	109
BAM MC-XA-024-D12,0-2-FM/W	<b>BAM024E</b>	293	BCC A314-A324-30-304-PX04A5-020	<b>BCC06J8</b>	109
BAM MC-XA-024-D12,0-2-FXL/W	<b>BAM024F</b>	293	BCC A314-A324-30-304-PX04A5-050	<b>BCC06J9</b>	109
BAM MC-XA-024-D18,0-2-FM/W	<b>BAM022M</b>	295	BCC A314-A324-30-304-PX04A5-100	<b>BCC06JA</b>	109
BAM MC-XA-024-D30,0-2-FM/W	<b>BAM024A</b>	295	BCC A314-A324-30-304-PX04A5-150	<b>BCC06JC</b>	109
BAM MC-XA-027-D12,0-1	<b>BAM0218</b>	300	BCC A315-0000-10-030-VS85N6-020	<b>BCC09UY</b>	188
BAM MC-XA-027-D18,0-1	<b>BAM0219</b>	300	BCC A315-0000-10-030-VS85N6-050	<b>BCC09W0</b>	188
BAM MC-XO-030-6K-4	<b>BAM022A</b>	359	BCC A315-0000-10-030-VS85N6-100	<b>BCC09W3</b>	188
BAM OF-VS-001-D-RX100	<b>BAM01A7</b>	412	BCC A315-0000-10-063-PX05A5-020	<b>BCC06HC</b>	107
BAM PC-AE-002-1	<b>BAM01A8</b>	402	BCC A315-0000-10-063-PX05A5-050	<b>BCC06HE</b>	107
BAM PC-AM-010-4	<b>BAM01Y8</b>	387	BCC A315-0000-10-063-PX05A5-100	<b>BCC06HF</b>	107
BAM PC-VS-008-1	<b>BAM01RR</b>	403	BCC A315-0000-10-067-PS75N6-020	<b>BCC0AYR</b>	188
BAM PC-XO-005-08M-4	<b>BAM01Y5</b>	354	BCC A315-0000-10-067-PS75N6-050	<b>BCC0AYP</b>	188
BAM PC-XA-016-001-A	<b>BAM021R</b>	384	BCC A315-0000-10-067-PS75N6-100	<b>BCC0AYN</b>	188
BAM PC-XO-005-18M-4	<b>BAM01NC</b>	355	BCC A315-0000-1A-R04	<b>BCC0A0A</b>	193
BAM PC-XO-006-23K-1	<b>BAM01L8</b>	351	BCC A315-0000-20-030-VS85N6-020	<b>BCC09W8</b>	189
BAM PC-XO-006-23K-G/RK	<b>BAM01YL</b>	351	BCC A315-0000-20-030-VS85N6-050	<b>BCC09WA</b>	189
BAM PC-XO-006-50K-1	<b>BAM01U6</b>	351	BCC A315-0000-20-030-VS85N6-100	<b>BCC09WF</b>	189
BAM PC-XO-006-50K-G/RK	<b>BAM01YM</b>	351	BCC A315-0000-20-063-PX05A5-020	<b>BCC0886</b>	107
BAM PT-XA-002-100-2-R15	<b>BAM022Z</b>	208	BCC A315-0000-20-063-PX05A5-050	<b>BCC0887</b>	107
BAM PT-XA-002-130-2-R15	<b>BAM0230</b>	208	BCC A315-0000-20-063-PX05A5-100	<b>BCC0888</b>	107
BAM PT-XA-002-190-2-R15	<b>BAM0231</b>	209	BCC A315-0000-20-067-PS75N6-020	<b>BCC0AYM</b>	189
BAM PT-XA-002-380-2-R15	<b>BAM0232</b>	209	BCC A315-0000-20-067-PS75N6-050	<b>BCC0AYL</b>	189
BAM PT-XA-002-500-2-R15	<b>BAM0233</b>	209	BCC A315-0000-20-067-PS75N6-100	<b>BCC0AYK</b>	189
BAM PT-XA-004-070-T-R16	<b>BAM0212</b>	208	BCC A315-0000-2A-R04	<b>BCC0A09</b>	193
BAM PT-XA-004-100-T-R16	<b>BAM0213</b>	208	BCC A315-A315-30-330-VS85N6-006	<b>BCC09YA</b>	189
BAM PT-XA-004-130-T-R16	<b>BAM0214</b>	209	BCC A315-A315-30-330-VS85N6-020	<b>BCC09YE</b>	189
BAM PT-XA-004-160-T-R16	<b>BAM0215</b>	209	BCC A315-A315-30-330-VS85N6-050	<b>BCC09YJ</b>	189
BAM PT-XA-004-190-T-R16	<b>BAM0216</b>	209	BCC A315-A315-30-330-VS85N6-100	<b>BCC09YP</b>	189
BAM PT-XA-004-500-T-R16	<b>BAM0217</b>	209	BCC A315-A315-30-330-VS85N6-150	<b>BCC09YT</b>	189
BAM PT-XA-005-260-T-R20	<b>BAM021E</b>	208	BCC A315-A315-30-335-PX05A5-006	<b>BCC06FM</b>	110
BAM PT-XA-005-510-T-R20	<b>BAM021F</b>	208	BCC A315-A315-30-335-PX05A5-020	<b>BCC06FN</b>	110
BAM R-40	<b>BAM01CF</b>	347	BCC A315-A315-30-335-PX05A5-050	<b>BCC06FP</b>	110
BAM TO-CC-001-A3-1,5/24,0	<b>BAM00ZN</b>	204	BCC A315-A315-30-335-PX05A5-100	<b>BCC06FR</b>	110
BAM TO-CC-001-M3-0,4/8,0	<b>BAM00ZL</b>	204	BCC A315-A315-30-335-PX05A5-150	<b>BCC06FT</b>	110
BAM TO-CC-001-M4-0,6/12,0	<b>BAM00ZM</b>	204	BCC A315-A315-30-344-PS75N6-006	<b>BCC0AYJ</b>	189
BAM TO-CC-002-M6	<b>BAM01TY</b>	204	BCC A315-A315-30-344-PS75N6-020	<b>BCC0AYF</b>	189
<b>BAV</b>			BCC A315-A315-30-344-PS75N6-050	<b>BCC0AYE</b>	189
BAV BP-PH-00064-01	<b>SET011L</b>	365	BCC A315-A315-30-344-PS75N6-100	<b>BCC0AYC</b>	189
<b>BCC</b>			BCC A315-A315-30-344-PS75N6-150	<b>BCC0AYA</b>	189
BCC A313-0000-10-097-PX03A5-020	<b>BCC0AHZ</b>	104	BCC A315-A315-A315-T0023-000	<b>BCC0AA7</b>	115, 192
BCC A313-0000-10-097-PX03A5-050	<b>BCC0AJ0</b>	104	BCC A315-A325-30-335-PX05A5-006	<b>BCC06FU</b>	111
BCC A313-0000-10-097-PX03A5-100	<b>BCC0AJ1</b>	104	BCC A315-A325-30-335-PX05A5-020	<b>BCC06FW</b>	111
BCC A313-A313-30-365-PX03A5-006	<b>BCC0AR6</b>	108	BCC A315-A325-30-335-PX05A5-050	<b>BCC06FY</b>	111
BCC A313-A313-30-365-PX03A5-020	<b>BCC0ARH</b>	108	BCC A315-A325-30-335-PX05A5-100	<b>BCC06FZ</b>	111
BCC A313-A313-30-365-PX03A5-050	<b>BCC0ARJ</b>	108	BCC A315-A325-30-335-PX05A5-150	<b>BCC06H0</b>	111
BCC A313-A313-30-365-PX03A5-100	<b>BCC0ARK</b>	108	BCC A323-0000-10-097-PX03A5-020	<b>BCC0AJ2</b>	105
BCC A313-A313-30-365-PX03A5-150	<b>BCC0ARL</b>	108	BCC A323-0000-10-097-PX03A5-050	<b>BCC0AJ3</b>	105
BCC A313-A313-A313-T0021-000	<b>BCC0AA5</b>	114	BCC A323-0000-10-097-PX03A5-100	<b>BCC0AJ4</b>	105
			BCC A323-A313-30-365-PX03A5-006	<b>BCC0C3H</b>	108
			BCC A323-A313-30-365-PX03A5-020	<b>BCC0C3J</b>	108

# Alphanumeric Index

## Sorted by part number

Part number	Ordering code	Page
BCC A323-A313-30-365-PX03A5-050	<b>BCC0C3K</b>	108
BCC A323-A313-30-365-PX03A5-100	<b>BCC0C3L</b>	108
BCC A323-A313-30-365-PX03A5-150	<b>BCC0C3M</b>	108
BCC A324-0000-10-003-PX04A5-020	<b>BCC06HZ</b>	105
BCC A324-0000-10-003-PX04A5-050	<b>BCC06JO</b>	105
BCC A324-0000-10-003-PX04A5-100	<b>BCC06J1</b>	105
BCC A324-0000-20-003-PX04A5-020	<b>BCC06HP</b>	106
BCC A324-0000-20-003-PX04A5-050	<b>BCC06HR</b>	106
BCC A324-0000-20-003-PX04A5-100	<b>BCC06HT</b>	106
BCC A324-A314-30-304-PX04A5-006	<b>BCC06JE</b>	109
BCC A324-A314-30-304-PX04A5-020	<b>BCC06JF</b>	109
BCC A324-A314-30-304-PX04A5-050	<b>BCC06JH</b>	109
BCC A324-A314-30-304-PX04A5-100	<b>BCC06JJ</b>	109
BCC A324-A314-30-304-PX04A5-150	<b>BCC06JK</b>	109
BCC A324-A324-30-304-PX04A5-006	<b>BCC06JL</b>	110
BCC A324-A324-30-304-PX04A5-020	<b>BCC06JM</b>	110
BCC A324-A324-30-304-PX04A5-050	<b>BCC06JN</b>	110
BCC A324-A324-30-304-PX04A5-100	<b>BCC06JP</b>	110
BCC A324-A324-30-304-PX04A5-150	<b>BCC06JR</b>	110
BCC A325-0000-10-063-PX05A5-020	<b>BCC06HH</b>	107
BCC A325-0000-10-063-PX05A5-050	<b>BCC06HJ</b>	107
BCC A325-0000-10-063-PX05A5-100	<b>BCC06HK</b>	107
BCC A325-0000-20-063-PX05A5-020	<b>BCC0889</b>	107
BCC A325-0000-20-063-PX05A5-050	<b>BCC088A</b>	107
BCC A325-0000-20-063-PX05A5-100	<b>BCC088C</b>	107
BCC A325-A315-30-335-PX05A5-006	<b>BCC06H1</b>	111
BCC A325-A315-30-335-PX05A5-020	<b>BCC06H2</b>	111
BCC A325-A315-30-335-PX05A5-050	<b>BCC06H3</b>	111
BCC A325-A315-30-335-PX05A5-100	<b>BCC06H4</b>	111
BCC A325-A315-30-335-PX05A5-150	<b>BCC06H5</b>	111
BCC A325-A325-30-335-PX05A5-006	<b>BCC06H6</b>	111
BCC A325-A325-30-335-PX05A5-020	<b>BCC06H7</b>	111
BCC A325-A325-30-335-PX05A5-050	<b>BCC06H8</b>	111
BCC A325-A325-30-335-PX05A5-100	<b>BCC06H9</b>	111
BCC A325-A325-30-335-PX05A5-150	<b>BCC06HA</b>	111
BCC A333-0000-10-000-61X3A5-000	<b>BCC0AT9</b>	112
BCC A333-0000-10-000-71X3A5-000	<b>BCC0ATA</b>	112
BCC A333-0000-20-000-61X3A5-000	<b>BCC0ATC</b>	112
BCC A333-0000-20-000-71X3A5-000	<b>BCC0ATE</b>	112
BCC A334-0000-10-000-51X4A5-000	<b>BCC0706</b>	113
BCC A334-0000-10-000-61X4A5-000	<b>BCC0707</b>	113
BCC A334-0000-10-000-71X4A5-000	<b>BCC0708</b>	113
BCC A334-0000-20-000-51X4A5-000	<b>BCC0709</b>	113
BCC A334-0000-20-000-61X4A5-000	<b>BCC070A</b>	113
BCC A334-0000-20-000-71X4A5-000	<b>BCC070C</b>	113
BCC A335-0000-10-000-51X5A5-000	<b>BCC070E</b>	113, 191
BCC A335-0000-10-000-61X5A5-000	<b>BCC070F</b>	113, 191
BCC A335-0000-10-000-71X5A5-000	<b>BCC070H</b>	113, 191
BCC A335-0000-20-000-51X5A5-000	<b>BCC070J</b>	113, 191
BCC A335-0000-20-000-61X5A5-000	<b>BCC070K</b>	113, 191
BCC A335-0000-20-000-71X5A5-000	<b>BCC070L</b>	113, 191
BCC B314-B314-30-304-MW8434-003	<b>BCC0EJT</b>	152
BCC B314-B314-30-304-MW8434-006	<b>BCC0EJU</b>	152
BCC B314-B314-30-304-MW8434-010	<b>BCC0EJW</b>	152
BCC B314-B314-30-304-MW8434-015	<b>BCC0EJY</b>	152
BCC B314-B314-30-304-MW8434-020	<b>BCC0EJZ</b>	152
BCC B314-B324-30-304-MW8434-003	<b>BCC0EK5</b>	152
BCC B314-B324-30-304-MW8434-006	<b>BCC0EK6</b>	152
BCC B314-B324-30-304-MW8434-010	<b>BCC0EK7</b>	152
BCC B314-B324-30-304-MW8434-015	<b>BCC0EK8</b>	152
BCC B314-B324-30-304-MW8434-020	<b>BCC0EK9</b>	152
BCC B324-B314-30-304-MW8434-003	<b>BCC0EK0</b>	153
BCC B324-B314-30-304-MW8434-006	<b>BCC0EK1</b>	153

Part number	Ordering code	Page
BCC B324-B314-30-304-MW8434-010	<b>BCC0EK2</b>	153
BCC B324-B314-30-304-MW8434-015	<b>BCC0EK3</b>	153
BCC B324-B314-30-304-MW8434-020	<b>BCC0EK4</b>	153
BCC B324-B324-30-304-MW8434-003	<b>BCC0EJL</b>	153
BCC B324-B324-30-304-MW8434-006	<b>BCC0EJM</b>	153
BCC B324-B324-30-304-MW8434-010	<b>BCC0EJN</b>	153
BCC B324-B324-30-304-MW8434-015	<b>BCC0EJP</b>	153
BCC B324-B324-30-304-MW8434-020	<b>BCC0EJR</b>	153
BCC D259-M414-M415-U0029-000-C011	<b>BCC0COY</b>	172
BCC D269-M414-M415-U0029-000-C011	<b>BCC0C0Z</b>	173
BCC D279-0000-E0-000-65X4N1-000-C011	<b>BCC0C10</b>	172
BCC D289-0000-E0-000-65X4N1-000-C011	<b>BCC0C11</b>	173
BCC E834-0000-20-000-53X4T2-000	<b>BCC06FH</b>	179, 199
BCC E834-E834-90-334-PS54T2-006	<b>BCC04KE</b>	177
BCC E834-E834-90-334-PS54T2-020	<b>BCC04KF</b>	177
BCC E834-E834-90-334-PS54T2-050	<b>BCC04KH</b>	177
BCC E834-E834-90-334-PS54T2-100	<b>BCC04KJ</b>	177
BCC E834-E834-90-334-PS54T2-150	<b>BCC04ZK</b>	177
BCC E834-E834-90-334-PS54T2-200	<b>BCC04KK</b>	177
BCC E834-E834-90-334-PS54T2-300	<b>BCC04KL</b>	177
BCC E834-E834-90-339-ES64N9-006	<b>BCC0CZJ</b>	195
BCC E834-E834-90-339-ES64N9-020	<b>BCC0CZK</b>	195
BCC E834-E834-90-339-ES64N9-050	<b>BCC0CZL</b>	195
BCC E834-E834-90-339-ES64N9-100	<b>BCC0CZM</b>	195
BCC E834-E834-90-339-ES64N9-150	<b>BCC0CZN</b>	195
BCC E834-E834-90-367-EX64N9-006	<b>BCC0CZP</b>	197
BCC E834-E834-90-367-EX64N9-020	<b>BCC0CZR</b>	197
BCC E834-E834-90-367-EX64N9-050	<b>BCC0CZT</b>	197
BCC E834-E834-90-367-EX64N9-100	<b>BCC0CZU</b>	197
BCC E834-E834-90-367-EX64N9-150	<b>BCC0CNU</b>	197
BCC E878-0000-Z1-41X8T4	<b>BCC09N2</b>	207
BCC M313-0000-10-001-PH0334-050	<b>BCC0836</b>	118
BCC M313-0000-10-001-PW0334-050	<b>BCC0AJK</b>	125
BCC M313-0000-10-001-PW0334-100	<b>BCC0CAP</b>	125
BCC M313-0000-10-001-PW3334-050	<b>BCC0C3A</b>	131
BCC M313-0000-10-001-PX0334-020	<b>BCC02M8</b>	26
BCC M313-0000-10-001-PX0334-050	<b>BCC02M9</b>	26
BCC M313-0000-10-001-PX0334-100	<b>BCC02MA</b>	26
BCC M313-0000-10-001-VX8334-020	<b>BCC02NU</b>	26
BCC M313-0000-10-001-VX8334-050	<b>BCC02NW</b>	26
BCC M313-0000-10-001-VX8334-100	<b>BCC02NY</b>	26
BCC M313-0000-10-004-PX0334-020	<b>BCC0AW9</b>	27
BCC M313-0000-10-004-PX0334-050	<b>BCC0AWA</b>	27
BCC M313-0000-10-004-PX0334-100	<b>BCC0AWC</b>	27
BCC M313-0000-10-004-VX8334-020	<b>BCC0C06</b>	27
BCC M313-0000-10-004-VX8334-050	<b>BCC0AY0</b>	27
BCC M313-0000-10-004-VX8334-100	<b>BCC0C07</b>	27
BCC M313-0000-20-001-PX0334-020	<b>BCC02M2</b>	28
BCC M313-0000-20-001-PX0334-050	<b>BCC02M3</b>	28
BCC M313-0000-20-001-PX0334-100	<b>BCC02M4</b>	28
BCC M313-0000-20-001-VX8334-020	<b>BCC02NL</b>	28
BCC M313-0000-20-001-VX8334-050	<b>BCC02NM</b>	28
BCC M313-0000-20-001-VX8334-100	<b>BCC02NN</b>	28
BCC M313-M313-30-300-PX0334-003	<b>BCC02R5</b>	32
BCC M313-M313-30-300-PX0334-006	<b>BCC02R6</b>	32
BCC M313-M313-30-300-PX0334-010	<b>BCC02R7</b>	32
BCC M313-M313-30-300-PX0334-015	<b>BCC02R8</b>	32
BCC M313-M313-30-300-PX0334-020	<b>BCC02R9</b>	32
BCC M313-M313-30-300-PX0334-030	<b>BCC02RA</b>	32
BCC M313-M313-30-300-PX0334-050	<b>BCC02RC</b>	32
BCC M313-M313-30-300-VX8334-003	<b>BCC02UR</b>	32
BCC M313-M313-30-300-VX8334-006	<b>BCC02UT</b>	32
BCC M313-M313-30-300-VX8334-010	<b>BCC02UU</b>	32



# Alphanumeric Index

## Sorted by part number

Part number	Ordering code	Page	Part number	Ordering code	Page
BCC M313-M313-30-300-VX8334-015	<b>BCC02UW</b>	32	BCC M314-0000-20-003-PX0434-050	<b>BCC02MW</b>	30
BCC M313-M313-30-300-VX8334-020	<b>BCC02UY</b>	32	BCC M314-0000-20-003-PX0434-100	<b>BCC02MY</b>	30
BCC M313-M313-30-300-VX8334-030	<b>BCC02UZ</b>	32	BCC M314-0000-20-003-VX8434-020	<b>BCC02PC</b>	30
BCC M313-M313-30-300-VX8334-050	<b>BCC02WO</b>	32	BCC M314-0000-20-003-VX8434-050	<b>BCC02PE</b>	30
BCC M313-M313-30-602-PX0334-003	<b>BCC0AZA</b>	32	BCC M314-0000-20-003-VX8434-100	<b>BCC02PF</b>	30
BCC M313-M313-30-602-PX0334-006	<b>BCC0AZC</b>	32	BCC M314-M313-30-300-PX0334-003	<b>BCC0CAH</b>	34
BCC M313-M313-30-602-PX0334-010	<b>BCC0AZE</b>	32	BCC M314-M313-30-300-PX0334-006	<b>BCC0AUL</b>	34
BCC M313-M313-30-602-PX0334-015	<b>BCC0AZF</b>	32	BCC M314-M313-30-300-PX0334-010	<b>BCC0A77</b>	34
BCC M313-M313-30-602-PX0334-020	<b>BCC0AZH</b>	32	BCC M314-M313-30-300-PX0334-020	<b>BCC0A78</b>	34
BCC M313-M313-30-602-PX0334-030	<b>BCC0AZJ</b>	32	BCC M314-M313-30-300-PX0334-030	<b>BCC0C6A</b>	34
BCC M313-M313-30-602-PX0334-050	<b>BCC0AZK</b>	32	BCC M314-M313-30-300-PX0334-050	<b>BCC0C6C</b>	34
BCC M313-M313-M313-U2017-003	<b>BCC0A07</b>	48	BCC M314-M313-M313-U2024-003	<b>BCC0AFL</b>	48
BCC M313-M323-30-300-PX0334-003	<b>BCC02RE</b>	33	BCC M314-M313-M313-U2024-010	<b>BCC0AFM</b>	48
BCC M313-M323-30-300-PX0334-006	<b>BCC02RF</b>	33	BCC M314-M314-30-304-PX0434-003	<b>BCC02TF</b>	35
BCC M313-M323-30-300-PX0334-010	<b>BCC02RH</b>	33	BCC M314-M314-30-304-PX0434-006	<b>BCC02TH</b>	35
BCC M313-M323-30-300-PX0334-015	<b>BCC02RJ</b>	33	BCC M314-M314-30-304-PX0434-010	<b>BCC02TJ</b>	35
BCC M313-M323-30-300-PX0334-020	<b>BCC02RK</b>	33	BCC M314-M314-30-304-PX0434-015	<b>BCC02TK</b>	35
BCC M313-M323-30-300-PX0334-030	<b>BCC02RL</b>	33	BCC M314-M314-30-304-PX0434-020	<b>BCC02TL</b>	35
BCC M313-M323-30-300-PX0334-050	<b>BCC02RM</b>	33	BCC M314-M314-30-304-PX0434-030	<b>BCC02TM</b>	35
BCC M313-M323-30-300-VX8334-003	<b>BCC02W1</b>	33	BCC M314-M314-30-304-PX0434-050	<b>BCC02TN</b>	35
BCC M313-M323-30-300-VX8334-006	<b>BCC02W2</b>	33	BCC M314-M314-30-304-VX8434-003	<b>BCC02Y2</b>	35
BCC M313-M323-30-300-VX8334-010	<b>BCC02W3</b>	33	BCC M314-M314-30-304-VX8434-006	<b>BCC02Y3</b>	35
BCC M313-M323-30-300-VX8334-015	<b>BCC02W4</b>	33	BCC M314-M314-30-304-VX8434-010	<b>BCC02Y4</b>	35
BCC M313-M323-30-300-VX8334-020	<b>BCC02W5</b>	33	BCC M314-M314-30-304-VX8434-015	<b>BCC02Y5</b>	35
BCC M313-M323-30-300-VX8334-030	<b>BCC02W6</b>	33	BCC M314-M314-30-304-VX8434-020	<b>BCC02Y6</b>	35
BCC M313-M323-30-300-VX8334-050	<b>BCC02W7</b>	33	BCC M314-M314-30-304-VX8434-030	<b>BCC02Y7</b>	35
BCC M313-M413-3E-300-PX0334-003	<b>BCC03F4</b>	38	BCC M314-M314-30-304-VX8434-050	<b>BCC02Y8</b>	35
BCC M313-M413-3E-300-PX0334-006	<b>BCC03F5</b>	38	BCC M314-M324-30-304-PX0434-003	<b>BCC02TP</b>	35
BCC M313-M413-3E-300-PX0334-010	<b>BCC03F6</b>	38	BCC M314-M324-30-304-PX0434-006	<b>BCC02TR</b>	35
BCC M313-M413-3E-300-PX0334-015	<b>BCC03F7</b>	38	BCC M314-M324-30-304-PX0434-010	<b>BCC02TT</b>	35
BCC M313-M413-3E-300-PX0334-020	<b>BCC03F8</b>	38	BCC M314-M324-30-304-PX0434-015	<b>BCC02TU</b>	35
BCC M313-M413-3E-300-PX0334-030	<b>BCC03F9</b>	38	BCC M314-M324-30-304-PX0434-020	<b>BCC02TW</b>	35
BCC M313-M413-3E-300-PX0334-050	<b>BCC03FA</b>	38	BCC M314-M324-30-304-PX0434-030	<b>BCC02TY</b>	35
BCC M313-M413-3E-300-VX8334-003	<b>BCC03HE</b>	38	BCC M314-M324-30-304-PX0434-050	<b>BCC02TZ</b>	35
BCC M313-M413-3E-300-VX8334-006	<b>BCC03HF</b>	38	BCC M314-M324-30-304-VX8434-003	<b>BCC02Y9</b>	35
BCC M313-M413-3E-300-VX8334-010	<b>BCC03HH</b>	38	BCC M314-M324-30-304-VX8434-006	<b>BCC02YA</b>	35
BCC M313-M413-3E-300-VX8334-015	<b>BCC03HJ</b>	38	BCC M314-M324-30-304-VX8434-010	<b>BCC02YC</b>	35
BCC M313-M413-3E-300-VX8334-020	<b>BCC03HK</b>	38	BCC M314-M324-30-304-VX8434-015	<b>BCC02YE</b>	35
BCC M313-M413-3E-300-VX8334-030	<b>BCC03HL</b>	38	BCC M314-M324-30-304-VX8434-020	<b>BCC02YF</b>	35
BCC M313-M413-3E-300-VX8334-050	<b>BCC03HM</b>	38	BCC M314-M324-30-304-VX8434-030	<b>BCC02YH</b>	35
BCC M313-M423-3E-300-PX0334-003	<b>BCC03FC</b>	38	BCC M314-M324-30-304-VX8434-050	<b>BCC02YJ</b>	35
BCC M313-M423-3E-300-PX0334-006	<b>BCC03FE</b>	38	BCC M314-M414-3E-304-PX0434-003	<b>BCC03JP</b>	40
BCC M313-M423-3E-300-PX0334-010	<b>BCC03FF</b>	38	BCC M314-M414-3E-304-PX0434-006	<b>BCC03JR</b>	40
BCC M313-M423-3E-300-PX0334-015	<b>BCC03FH</b>	38	BCC M314-M414-3E-304-PX0434-010	<b>BCC03JT</b>	40
BCC M313-M423-3E-300-PX0334-020	<b>BCC03FJ</b>	38	BCC M314-M414-3E-304-PX0434-015	<b>BCC03JU</b>	40
BCC M313-M423-3E-300-PX0334-030	<b>BCC03FK</b>	38	BCC M314-M414-3E-304-PX0434-020	<b>BCC03JW</b>	40
BCC M313-M423-3E-300-PX0334-050	<b>BCC03FL</b>	38	BCC M314-M414-3E-304-PX0434-030	<b>BCC03JY</b>	40
BCC M313-M423-3E-300-VX8334-003	<b>BCC03HN</b>	38	BCC M314-M414-3E-304-PX0434-050	<b>BCC03JZ</b>	40
BCC M313-M423-3E-300-VX8334-006	<b>BCC03HP</b>	38	BCC M314-M414-3E-304-VX8434-003	<b>BCC03L1</b>	40
BCC M313-M423-3E-300-VX8334-010	<b>BCC03HR</b>	38	BCC M314-M414-3E-304-VX8434-006	<b>BCC03L2</b>	40
BCC M313-M423-3E-300-VX8334-015	<b>BCC03HT</b>	38	BCC M314-M414-3E-304-VX8434-010	<b>BCC03L3</b>	40
BCC M313-M423-3E-300-VX8334-020	<b>BCC03HU</b>	38	BCC M314-M414-3E-304-VX8434-015	<b>BCC03L4</b>	40
BCC M313-M423-3E-300-VX8334-030	<b>BCC03HW</b>	38	BCC M314-M414-3E-304-VX8434-020	<b>BCC03L5</b>	40
BCC M313-M423-3E-300-VX8334-050	<b>BCC03HY</b>	38	BCC M314-M414-3E-304-VX8434-030	<b>BCC03L6</b>	40
BCC M314-0000-10-003-PW0434-050	<b>BCC0AJM</b>	125	BCC M314-M414-3E-304-VX8434-050	<b>BCC03L7</b>	40
BCC M314-0000-10-003-PW3434-050	<b>BCC0C21</b>	131	BCC M314-M424-3E-304-PX0434-003	<b>BCC03K0</b>	40
BCC M314-0000-10-003-PX0434-020	<b>BCC02N2</b>	29	BCC M314-M424-3E-304-PX0434-006	<b>BCC03K1</b>	40
BCC M314-0000-10-003-PX0434-050	<b>BCC02N3</b>	29	BCC M314-M424-3E-304-PX0434-010	<b>BCC03K2</b>	40
BCC M314-0000-10-003-PX0434-100	<b>BCC02N4</b>	29	BCC M314-M424-3E-304-PX0434-015	<b>BCC03K3</b>	40
BCC M314-0000-10-003-VX8434-020	<b>BCC02PL</b>	29	BCC M314-M424-3E-304-PX0434-020	<b>BCC03K4</b>	40
BCC M314-0000-10-003-VX8434-050	<b>BCC02PM</b>	29	BCC M314-M424-3E-304-PX0434-030	<b>BCC03K5</b>	40
BCC M314-0000-10-003-VX8434-100	<b>BCC02PN</b>	29	BCC M314-M424-3E-304-PX0434-050	<b>BCC03K6</b>	40
BCC M314-0000-20-003-PX0434-020	<b>BCC02MU</b>	30	BCC M314-M424-3E-304-VX8434-003	<b>BCC03L8</b>	40

# Alphanumeric Index

## Sorted by part number

Part number	Ordering code	Page	Part number	Ordering code	Page
BCC M314-M424-3E-304-VX8434-006	<b>BCC03L9</b>	40	BCC M323-M323-30-300-VX8334-010	<b>BCC02WW</b>	34
BCC M314-M424-3E-304-VX8434-010	<b>BCC03LA</b>	40	BCC M323-M323-30-300-VX8334-015	<b>BCC02WY</b>	34
BCC M314-M424-3E-304-VX8434-015	<b>BCC03LC</b>	40	BCC M323-M323-30-300-VX8334-020	<b>BCC02WZ</b>	34
BCC M314-M424-3E-304-VX8434-020	<b>BCC03LE</b>	40	BCC M323-M323-30-300-VX8334-030	<b>BCC02Y0</b>	34
BCC M314-M424-3E-304-VX8434-030	<b>BCC03LF</b>	40	BCC M323-M323-30-300-VX8334-050	<b>BCC02Y1</b>	34
BCC M314-M424-3E-304-VX8434-050	<b>BCC03LH</b>	40	BCC M323-M413-3E-300-PX0334-003	<b>BCC03FM</b>	39
BCC M323-0000-10-001-PW0334-050	<b>BCC0AJR</b>	125	BCC M323-M413-3E-300-PX0334-006	<b>BCC03FN</b>	39
BCC M323-0000-10-001-PW3334-050	<b>BCC0C24</b>	131	BCC M323-M413-3E-300-PX0334-010	<b>BCC03FP</b>	39
BCC M323-0000-10-001-PX0334-020	<b>BCC02ML</b>	27	BCC M323-M413-3E-300-PX0334-015	<b>BCC03FR</b>	39
BCC M323-0000-10-001-PX0334-050	<b>BCC02MM</b>	27	BCC M323-M413-3E-300-PX0334-020	<b>BCC03FT</b>	39
BCC M323-0000-10-001-PX0334-100	<b>BCC02MN</b>	27	BCC M323-M413-3E-300-PX0334-030	<b>BCC03FU</b>	39
BCC M323-0000-10-001-PX0334-020	<b>BCC02P5</b>	27	BCC M323-M413-3E-300-PX0334-050	<b>BCC03FW</b>	39
BCC M323-0000-10-001-VX8334-050	<b>BCC02P6</b>	27	BCC M323-M413-3E-300-VX8334-003	<b>BCC03HZ</b>	39
BCC M323-0000-10-001-VX8334-100	<b>BCC02P7</b>	27	BCC M323-M413-3E-300-VX8334-006	<b>BCC03J0</b>	39
BCC M323-0000-10-004-PX0334-020	<b>BCC02MH</b>	27	BCC M323-M413-3E-300-VX8334-010	<b>BCC03J1</b>	39
BCC M323-0000-10-004-PX0334-050	<b>BCC02MJ</b>	27	BCC M323-M413-3E-300-VX8334-015	<b>BCC03J2</b>	39
BCC M323-0000-10-004-PX0334-100	<b>BCC02MK</b>	27	BCC M323-M413-3E-300-VX8334-020	<b>BCC03J3</b>	39
BCC M323-0000-10-004-VX8334-020	<b>BCC02P2</b>	27	BCC M323-M413-3E-300-VX8334-030	<b>BCC03J4</b>	39
BCC M323-0000-10-004-VX8334-050	<b>BCC02P3</b>	27	BCC M323-M413-3E-300-VX8334-050	<b>BCC03J5</b>	39
BCC M323-0000-10-004-VX8334-100	<b>BCC02P4</b>	27	BCC M323-M413-3E-602-PX0334-003	<b>BCC03H5</b>	39
BCC M323-0000-20-001-PX0334-020	<b>BCC02M5</b>	28	BCC M323-M413-3E-602-PX0334-006	<b>BCC03H6</b>	39
BCC M323-0000-20-001-PX0334-050	<b>BCC02M6</b>	28	BCC M323-M413-3E-602-PX0334-010	<b>BCC03H7</b>	39
BCC M323-0000-20-001-PX0334-100	<b>BCC02M7</b>	28	BCC M323-M413-3E-602-PX0334-015	<b>BCC03H8</b>	39
BCC M323-0000-20-001-VX8334-020	<b>BCC02NP</b>	28	BCC M323-M413-3E-602-PX0334-020	<b>BCC03H9</b>	39
BCC M323-0000-20-001-VX8334-050	<b>BCC02NR</b>	28	BCC M323-M413-3E-602-PX0334-030	<b>BCC03HA</b>	39
BCC M323-0000-20-001-VX8334-100	<b>BCC02NT</b>	28	BCC M323-M413-3E-602-PX0334-050	<b>BCC03HC</b>	39
BCC M323-M313-30-300-PX0334-003	<b>BCC02RZ</b>	33	BCC M323-M413-3E-602-VX8334-003	<b>BCC03JF</b>	39
BCC M323-M313-30-300-PX0334-006	<b>BCC02T0</b>	33	BCC M323-M413-3E-602-VX8334-006	<b>BCC03JH</b>	39
BCC M323-M313-30-300-PX0334-010	<b>BCC02T1</b>	33	BCC M323-M413-3E-602-VX8334-010	<b>BCC03JJ</b>	39
BCC M323-M313-30-300-PX0334-015	<b>BCC02T2</b>	33	BCC M323-M413-3E-602-VX8334-015	<b>BCC03JK</b>	39
BCC M323-M313-30-300-PX0334-020	<b>BCC02T3</b>	33	BCC M323-M413-3E-602-VX8334-020	<b>BCC03JL</b>	39
BCC M323-M313-30-300-PX0334-030	<b>BCC02T4</b>	33	BCC M323-M413-3E-602-VX8334-030	<b>BCC03JM</b>	39
BCC M323-M313-30-300-PX0334-050	<b>BCC02T5</b>	33	BCC M323-M413-3E-602-VX8334-050	<b>BCC03JN</b>	39
BCC M323-M313-30-300-VX8334-003	<b>BCC02WJ</b>	33	BCC M323-M423-3E-300-PX0334-003	<b>BCC03FY</b>	39
BCC M323-M313-30-300-VX8334-006	<b>BCC02WK</b>	33	BCC M323-M423-3E-300-PX0334-006	<b>BCC03FZ</b>	39
BCC M323-M313-30-300-VX8334-010	<b>BCC02WL</b>	33	BCC M323-M423-3E-300-PX0334-010	<b>BCC03H0</b>	39
BCC M323-M313-30-300-VX8334-015	<b>BCC02WM</b>	33	BCC M323-M423-3E-300-PX0334-015	<b>BCC03H1</b>	39
BCC M323-M313-30-300-VX8334-020	<b>BCC02WN</b>	33	BCC M323-M423-3E-300-PX0334-020	<b>BCC03H2</b>	39
BCC M323-M313-30-300-VX8334-030	<b>BCC02WP</b>	33	BCC M323-M423-3E-300-PX0334-030	<b>BCC03H3</b>	39
BCC M323-M313-30-300-VX8334-050	<b>BCC02WR</b>	33	BCC M323-M423-3E-300-PX0334-050	<b>BCC03H4</b>	39
BCC M323-M313-30-602-PX0334-003	<b>BCC02RN</b>	33	BCC M323-M423-3E-300-VX8334-003	<b>BCC03J6</b>	39
BCC M323-M313-30-602-PX0334-006	<b>BCC02RP</b>	33	BCC M323-M423-3E-300-VX8334-006	<b>BCC03J7</b>	39
BCC M323-M313-30-602-PX0334-010	<b>BCC02RR</b>	33	BCC M323-M423-3E-300-VX8334-010	<b>BCC03J8</b>	39
BCC M323-M313-30-602-PX0334-015	<b>BCC02RT</b>	33	BCC M323-M423-3E-300-VX8334-015	<b>BCC03J9</b>	39
BCC M323-M313-30-602-PX0334-020	<b>BCC02RU</b>	33	BCC M323-M423-3E-300-VX8334-020	<b>BCC03JA</b>	39
BCC M323-M313-30-602-PX0334-030	<b>BCC02RW</b>	33	BCC M323-M423-3E-300-VX8334-030	<b>BCC03JC</b>	39
BCC M323-M313-30-602-PX0334-050	<b>BCC02RY</b>	33	BCC M323-M423-3E-300-VX8334-050	<b>BCC03JE</b>	39
BCC M323-M313-30-602-VX8334-003	<b>BCC02W8</b>	33	BCC M324-0000-10-003-PW0434-050	<b>BCC0AJW</b>	125
BCC M323-M313-30-602-VX8334-006	<b>BCC02W9</b>	33	BCC M324-0000-10-003-PW3434-050	<b>BCC0C20</b>	131
BCC M323-M313-30-602-VX8334-010	<b>BCC02WA</b>	33	BCC M324-0000-10-003-PX0434-020	<b>BCC02NC</b>	29
BCC M323-M313-30-602-VX8334-015	<b>BCC02WC</b>	33	BCC M324-0000-10-003-PX0434-050	<b>BCC02NE</b>	29
BCC M323-M313-30-602-VX8334-020	<b>BCC02WE</b>	33	BCC M324-0000-10-003-PX0434-100	<b>BCC02NF</b>	29
BCC M323-M313-30-602-VX8334-030	<b>BCC02WF</b>	33	BCC M324-0000-10-003-VX8434-020	<b>BCC02PZ</b>	29
BCC M323-M313-30-602-VX8334-050	<b>BCC02WH</b>	33	BCC M324-0000-10-003-VX8434-050	<b>BCC02R0</b>	29
BCC M323-M323-30-300-PX0334-003	<b>BCC02T6</b>	34	BCC M324-0000-10-003-VX8434-100	<b>BCC02R1</b>	29
BCC M323-M323-30-300-PX0334-006	<b>BCC02T7</b>	34	BCC M324-0000-10-008-PX0434-020	<b>BCC02N8</b>	29
BCC M323-M323-30-300-PX0334-010	<b>BCC02T8</b>	34	BCC M324-0000-10-008-PX0434-050	<b>BCC02N9</b>	29
BCC M323-M323-30-300-PX0334-015	<b>BCC02T9</b>	34	BCC M324-0000-10-008-PX0434-100	<b>BCC02NA</b>	29
BCC M323-M323-30-300-PX0334-020	<b>BCC02TA</b>	34	BCC M324-0000-10-008-VX8434-020	<b>BCC02PU</b>	29
BCC M323-M323-30-300-PX0334-030	<b>BCC02TC</b>	34	BCC M324-0000-10-008-VX8434-050	<b>BCC02PW</b>	29
BCC M323-M323-30-300-PX0334-050	<b>BCC02TE</b>	34	BCC M324-0000-10-008-VX8434-100	<b>BCC02PY</b>	29
BCC M323-M323-30-300-VX8334-003	<b>BCC02WT</b>	34	BCC M324-0000-20-003-PX0434-020	<b>BCC02MZ</b>	30
BCC M323-M323-30-300-VX8334-006	<b>BCC02WU</b>	34	BCC M324-0000-20-003-PX0434-050	<b>BCC02N0</b>	30

# Alphanumeric Index

## Sorted by part number

Part number	Ordering code	Page	Part number	Ordering code	Page
BCC M324-0000-20-003-PX0434-100	<b>BCC02N1</b>	30	BCC M324-M414-3E-606-PX0434-015	<b>BCC03KW</b>	41
BCC M324-0000-20-003-VX8434-020	<b>BCC02PH</b>	30	BCC M324-M414-3E-606-PX0434-020	<b>BCC03KY</b>	41
BCC M324-0000-20-003-VX8434-050	<b>BCC02PJ</b>	30	BCC M324-M414-3E-606-PX0434-030	<b>BCC03KZ</b>	41
BCC M324-0000-20-003-VX8434-100	<b>BCC02PK</b>	30	BCC M324-M414-3E-606-PX0434-050	<b>BCC03L0</b>	41
BCC M324-M314-30-304-PX0434-003	<b>BCC02U7</b>	35	BCC M324-M414-3E-606-VX8434-003	<b>BCC03M2</b>	41
BCC M324-M314-30-304-PX0434-006	<b>BCC02U8</b>	35	BCC M324-M414-3E-606-VX8434-006	<b>BCC03M3</b>	41
BCC M324-M314-30-304-PX0434-010	<b>BCC02U9</b>	35	BCC M324-M414-3E-606-VX8434-010	<b>BCC03M4</b>	41
BCC M324-M314-30-304-PX0434-015	<b>BCC02UA</b>	35	BCC M324-M414-3E-606-VX8434-015	<b>BCC03M5</b>	41
BCC M324-M314-30-304-PX0434-020	<b>BCC02UC</b>	35	BCC M324-M414-3E-606-VX8434-020	<b>BCC03M6</b>	41
BCC M324-M314-30-304-PX0434-030	<b>BCC02UE</b>	35	BCC M324-M414-3E-606-VX8434-030	<b>BCC03M7</b>	41
BCC M324-M314-30-304-PX0434-050	<b>BCC02UF</b>	35	BCC M324-M414-3E-606-VX8434-050	<b>BCC03M8</b>	41
BCC M324-M314-30-304-VX8434-003	<b>BCC02YU</b>	35	BCC M324-M424-3E-304-PX0434-003	<b>BCC03KH</b>	41
BCC M324-M314-30-304-VX8434-006	<b>BCC02YW</b>	35	BCC M324-M424-3E-304-PX0434-006	<b>BCC03KJ</b>	41
BCC M324-M314-30-304-VX8434-010	<b>BCC02YY</b>	35	BCC M324-M424-3E-304-PX0434-010	<b>BCC03KK</b>	41
BCC M324-M314-30-304-VX8434-015	<b>BCC02YZ</b>	35	BCC M324-M424-3E-304-PX0434-015	<b>BCC03KL</b>	41
BCC M324-M314-30-304-VX8434-020	<b>BCC02Z0</b>	35	BCC M324-M424-3E-304-PX0434-020	<b>BCC03KM</b>	41
BCC M324-M314-30-304-VX8434-030	<b>BCC02Z1</b>	35	BCC M324-M424-3E-304-PX0434-030	<b>BCC03KN</b>	41
BCC M324-M314-30-304-VX8434-050	<b>BCC02Z2</b>	35	BCC M324-M424-3E-304-PX0434-050	<b>BCC03KP</b>	41
BCC M324-M314-30-606-PX0434-003	<b>BCC02U0</b>	36	BCC M324-M424-3E-304-VX8434-003	<b>BCC03LT</b>	41
BCC M324-M314-30-606-PX0434-006	<b>BCC02U1</b>	36	BCC M324-M424-3E-304-VX8434-006	<b>BCC03LU</b>	41
BCC M324-M314-30-606-PX0434-010	<b>BCC02U2</b>	36	BCC M324-M424-3E-304-VX8434-010	<b>BCC03LW</b>	41
BCC M324-M314-30-606-PX0434-015	<b>BCC02U3</b>	36	BCC M324-M424-3E-304-VX8434-015	<b>BCC03LY</b>	41
BCC M324-M314-30-606-PX0434-020	<b>BCC02U4</b>	36	BCC M324-M424-3E-304-VX8434-020	<b>BCC03LZ</b>	41
BCC M324-M314-30-606-PX0434-030	<b>BCC02U5</b>	36	BCC M324-M424-3E-304-VX8434-030	<b>BCC03M0</b>	41
BCC M324-M314-30-606-PX0434-050	<b>BCC02U6</b>	36	BCC M324-M424-3E-304-VX8434-050	<b>BCC03M1</b>	41
BCC M324-M314-30-606-VX8434-003	<b>BCC02YK</b>	36	BCC M333-0000-10-000-22X334-000	<b>BCC09EU</b>	43
BCC M324-M314-30-606-VX8434-006	<b>BCC02YL</b>	36	BCC M333-0000-10-000-31X350-000	<b>BCC06Z1</b>	42
BCC M324-M314-30-606-VX8434-010	<b>BCC02YM</b>	36	BCC M333-0000-10-000-34X325-000	<b>BCC06YW</b>	42
BCC M324-M314-30-606-VX8434-015	<b>BCC02YN</b>	36	BCC M333-0000-20-000-22X334-000	<b>BCC09EW</b>	44
BCC M324-M314-30-606-VX8434-020	<b>BCC02YP</b>	36	BCC M333-0000-20-000-31X350-000-C027	<b>BCC0E7N</b>	43
BCC M324-M314-30-606-VX8434-030	<b>BCC02YR</b>	36	BCC M333-0000-20-000-34X325-000	<b>BCC06YZ</b>	43
BCC M324-M314-30-606-VX8434-050	<b>BCC02YT</b>	36	BCC M334-0000-10-000-22X434-000	<b>BCC09EY</b>	45
BCC M324-M324-30-304-PX0434-003	<b>BCC02UH</b>	36	BCC M334-0000-20-000-22X434-000	<b>BCC09EZ</b>	45
BCC M324-M324-30-304-PX0434-006	<b>BCC02UJ</b>	36	BCC M343-0000-10-000-34X325-000	<b>BCC06YY</b>	43
BCC M324-M324-30-304-PX0434-010	<b>BCC02UK</b>	36	BCC M343-0000-20-000-34X325-000	<b>BCC06Z0</b>	44
BCC M324-M324-30-304-PX0434-015	<b>BCC02UL</b>	36	BCC M353-0000-10-RM049-005	<b>BCC0E4Y</b>	46
BCC M324-M324-30-304-PX0434-020	<b>BCC02UM</b>	36	BCC M353-0000-10-RM049-020	<b>BCC0E4Z</b>	46
BCC M324-M324-30-304-PX0434-030	<b>BCC02UN</b>	36	BCC M353-0000-20-RM049-005	<b>BCC0E50</b>	46
BCC M324-M324-30-304-PX0434-050	<b>BCC02UP</b>	36	BCC M353-0000-20-RM049-020	<b>BCC0E51</b>	46
BCC M324-M324-30-304-VX8434-003	<b>BCC02Z3</b>	36	BCC M354-0000-10-RM050-005	<b>BCC0E35</b>	47
BCC M324-M324-30-304-VX8434-006	<b>BCC02Z4</b>	36	BCC M354-0000-10-RM050-020	<b>BCC0E38</b>	47
BCC M324-M324-30-304-VX8434-010	<b>BCC02Z5</b>	36	BCC M354-0000-20-RM050-005	<b>BCC0E2Z</b>	47
BCC M324-M324-30-304-VX8434-015	<b>BCC02Z6</b>	36	BCC M354-0000-20-RM050-020	<b>BCC0E32</b>	47
BCC M324-M324-30-304-VX8434-020	<b>BCC02Z7</b>	36	BCC M412-0000-2B-031-PS72N1-020	<b>BCC0A0Y</b>	169
BCC M324-M324-30-304-VX8434-030	<b>BCC02Z8</b>	36	BCC M412-0000-2B-031-PS72N1-050	<b>BCC0A0Z</b>	169
BCC M324-M324-30-304-VX8434-050	<b>BCC02Z9</b>	36	BCC M412-0000-2B-031-PS72N1-100	<b>BCC0A10</b>	169
BCC M324-M414-3E-304-PX0434-003	<b>BCC03K7</b>	41	BCC M413-0000-2A-001-PX0334-020	<b>BCC02ZA</b>	52
BCC M324-M414-3E-304-PX0434-006	<b>BCC03K8</b>	41	BCC M413-0000-2A-001-PX0334-050	<b>BCC02ZC</b>	52
BCC M324-M414-3E-304-PX0434-010	<b>BCC03K9</b>	41	BCC M413-0000-2A-001-PX0334-100	<b>BCC02ZE</b>	52
BCC M324-M414-3E-304-PX0434-015	<b>BCC03KA</b>	41	BCC M413-0000-2A-001-VX8334-020	<b>BCC0334</b>	52
BCC M324-M414-3E-304-PX0434-020	<b>BCC03KC</b>	41	BCC M413-0000-2A-001-VX8334-050	<b>BCC0335</b>	52
BCC M324-M414-3E-304-PX0434-030	<b>BCC03KE</b>	41	BCC M413-0000-2A-001-VX8334-100	<b>BCC0336</b>	52
BCC M324-M414-3E-304-PX0434-050	<b>BCC03KF</b>	41	BCC M413-0000-2A-002-PX0334-020	<b>BCC02ZF</b>	55
BCC M324-M414-3E-304-VX8434-003	<b>BCC03LJ</b>	41	BCC M413-0000-2A-002-PX0334-050	<b>BCC02ZH</b>	55
BCC M324-M414-3E-304-VX8434-006	<b>BCC03LK</b>	41	BCC M413-0000-2A-002-PX0334-100	<b>BCC02ZJ</b>	55
BCC M324-M414-3E-304-VX8434-010	<b>BCC03LL</b>	41	BCC M413-0000-2A-002-VX8334-020	<b>BCC0337</b>	55
BCC M324-M414-3E-304-VX8434-015	<b>BCC03LM</b>	41	BCC M413-0000-2A-002-VX8334-050	<b>BCC0338</b>	55
BCC M324-M414-3E-304-VX8434-020	<b>BCC03LN</b>	41	BCC M413-0000-2A-002-VX8334-100	<b>BCC0339</b>	55
BCC M324-M414-3E-304-VX8434-030	<b>BCC03LP</b>	41	BCC M413-0000-2A-036-PS0334-020	<b>BCC02ZK</b>	52
BCC M324-M414-3E-304-VX8434-050	<b>BCC03LR</b>	41	BCC M413-0000-2A-036-PS0334-050	<b>BCC02ZL</b>	52
BCC M324-M414-3E-606-PX0434-003	<b>BCC03KR</b>	41	BCC M413-0000-2A-036-PS0334-100	<b>BCC02ZM</b>	52
BCC M324-M414-3E-606-PX0434-006	<b>BCC03KT</b>	41	BCC M413-0000-2A-036-VS8334-020	<b>BCC033A</b>	52
BCC M324-M414-3E-606-PX0434-010	<b>BCC03KU</b>	41	BCC M413-0000-2A-036-VS8334-050	<b>BCC033C</b>	52



# Alphanumeric Index

## Sorted by part number

Part number	Ordering code	Page	Part number	Ordering code	Page
BCC M413-0000-2A-036-VS8334-100	<b>BCC033E</b>	52	BCC M414-M415-M415-U2027-010	<b>BCC0AK3</b>	129
BCC M413-0000-2A-037-PS0334-020	<b>BCC02ZN</b>	55	BCC M414-M415-M415-U2027-020	<b>BCC0C27</b>	129
BCC M413-0000-2A-037-PS0334-050	<b>BCC02ZP</b>	55	BCC M414-M415-M415-U2028-003	<b>BCC0AUA</b>	98
BCC M413-0000-2A-037-PS0334-100	<b>BCC02ZR</b>	55	BCC M414-M415-M415-U2028-006	<b>BCC0AUC</b>	98
BCC M413-0000-2A-037-VS8334-020	<b>BCC033F</b>	55	BCC M414-M415-M415-U2028-010	<b>BCC0AUE</b>	98
BCC M413-0000-2A-037-VS8334-050	<b>BCC033H</b>	55	BCC M414-M415-M415-U2028-020	<b>BCC0AUF</b>	98
BCC M413-0000-2A-037-VS8334-100	<b>BCC033J</b>	55	BCC M414-M415-M415-U2028-030	<b>BCC0AUH</b>	98
BCC M414-0000-2A-003-PX0434-020	<b>BCC031N</b>	59	BCC M414-M415-M415-U2032-003	<b>BCC0C7A</b>	136
BCC M414-0000-2A-003-PX0434-050	<b>BCC031P</b>	59	BCC M414-M415-M415-U2032-006	<b>BCC0C7C</b>	136
BCC M414-0000-2A-003-PX0434-100	<b>BCC031R</b>	59	BCC M414-M415-M415-U2032-010	<b>BCC0C7E</b>	136
BCC M414-0000-2A-003-VX8434-020	<b>BCC035F</b>	59	BCC M414-M425-M425-U2034-003	<b>BCC0C9U</b>	98
BCC M414-0000-2A-003-VX8434-050	<b>BCC035H</b>	59	BCC M414-M425-M425-U2034-006	<b>BCC0C9T</b>	98
BCC M414-0000-2A-003-VX8434-100	<b>BCC035J</b>	59	BCC M414-M425-M425-U2034-010	<b>BCC0C9R</b>	98
BCC M414-0000-2A-014-PS0434-020	<b>BCC031T</b>	59	BCC M414-M425-M425-U2034-020	<b>BCC0C9P</b>	98
BCC M414-0000-2A-014-PS0434-050	<b>BCC031U</b>	59	BCC M414-M425-M425-U2034-030	<b>BCC0C9N</b>	98
BCC M414-0000-2A-014-PS0434-100	<b>BCC031W</b>	59	BCC M414-M425-M425-U2035-003	<b>BCC0CA2</b>	136
BCC M414-0000-2A-014-VS8434-020	<b>BCC035K</b>	59	BCC M414-M425-M425-U2035-006	<b>BCC0CA3</b>	136
BCC M414-0000-2A-014-VS8434-050	<b>BCC035L</b>	59	BCC M414-M425-M425-U2035-010	<b>BCC0CA4</b>	136
BCC M414-0000-2A-014-VS8434-100	<b>BCC035M</b>	59	BCC M414-M425-M425-U2035-020	<b>BCC0CA5</b>	136
BCC M414-0000-2A-068-VS24N7-020	<b>BCC084R</b>	183	BCC M414-M425-M425-U2035-030	<b>BCC0CA6</b>	136
BCC M414-0000-2A-068-VS24N7-050	<b>BCC084T</b>	183	BCC M415-0000-1A-001-PH0334-020	<b>BCC082W</b>	119
BCC M414-0000-2A-068-VS24N7-100	<b>BCC084U</b>	183	BCC M415-0000-1A-001-PH0334-050	<b>BCC082Y</b>	119
BCC M414-E814-BG-RM013-000	<b>BCC085F</b>	180, 200	BCC M415-0000-1A-001-PH0334-100	<b>BCC082Z</b>	119
BCC M414-E834-8G-668-PS54T2-006	<b>BCC04K6</b>	177	BCC M415-0000-1A-001-PX0334-020	<b>BCC030K</b>	51
BCC M414-E834-8G-668-PS54T2-020	<b>BCC04K7</b>	177	BCC M415-0000-1A-001-PX0334-050	<b>BCC030L</b>	51
BCC M414-E834-8G-668-PS54T2-050	<b>BCC04K8</b>	177	BCC M415-0000-1A-001-PX0334-100	<b>BCC030M</b>	51
BCC M414-E834-8G-668-PS54T2-100	<b>BCC04K9</b>	177	BCC M415-0000-1A-001-VX8334-020	<b>BCC034A</b>	51
BCC M414-E834-8G-668-PS54T2-150	<b>BCC04ZJ</b>	177	BCC M415-0000-1A-001-VX8334-050	<b>BCC034C</b>	51
BCC M414-E834-8G-668-PS54T2-200	<b>BCC04KA</b>	177	BCC M415-0000-1A-001-VX8334-100	<b>BCC034E</b>	51
BCC M414-E834-8G-668-PS54T2-300	<b>BCC04KC</b>	177	BCC M415-0000-1A-002-PX0334-020	<b>BCC030N</b>	53
BCC M414-E834-8G-672-ES64N9-006	<b>BCC0CZA</b>	195	BCC M415-0000-1A-002-PX0334-050	<b>BCC030P</b>	53
BCC M414-E834-8G-672-ES64N9-020	<b>BCC0CZC</b>	195	BCC M415-0000-1A-002-PX0334-100	<b>BCC030R</b>	53
BCC M414-E834-8G-672-ES64N9-050	<b>BCC0CZE</b>	195	BCC M415-0000-1A-002-VX8334-020	<b>BCC034F</b>	53
BCC M414-E834-8G-672-ES64N9-100	<b>BCC0CZF</b>	195	BCC M415-0000-1A-002-VX8334-050	<b>BCC034H</b>	53
BCC M414-E834-8G-672-ES64N9-150	<b>BCC0CZH</b>	195	BCC M415-0000-1A-002-VX8334-100	<b>BCC034J</b>	53
BCC M414-E834-8G-695-EX64N9-006	<b>BCC0E0A</b>	197	BCC M415-0000-1A-003-PH0434-020	<b>BCC0AA9</b>	119
BCC M414-E834-8G-695-EX64N9-020	<b>BCC0E0C</b>	197	BCC M415-0000-1A-003-PH0434-050	<b>BCC0AAA</b>	119
BCC M414-E834-8G-695-EX64N9-050	<b>BCC0CNP</b>	197	BCC M415-0000-1A-003-PH0434-100	<b>BCC0AAC</b>	119
BCC M414-E834-8G-695-EX64N9-100	<b>BCC0CNR</b>	197	BCC M415-0000-1A-003-PW0434-020	<b>BCC0AK4</b>	127
BCC M414-E834-8G-695-EX64N9-150	<b>BCC0CNT</b>	197	BCC M415-0000-1A-003-PW0434-050	<b>BCC0AK5</b>	127
BCC M414-M313-M313-U2026-006	<b>BCC0AFW</b>	98	BCC M415-0000-1A-003-PW0434-100	<b>BCC0AK6</b>	127
BCC M414-M313-M313-U2026-010	<b>BCC0AFY</b>	98	BCC M415-0000-1A-003-PW3434-020	<b>BCC09J6</b>	132
BCC M414-M313-M313-U2026-020	<b>BCC0AFZ</b>	98	BCC M415-0000-1A-003-PW3434-050	<b>BCC0C23</b>	132
BCC M414-M313-M313-U2026-030	<b>BCC0AHO</b>	98	BCC M415-0000-1A-003-PW3434-100	<b>BCC0C7W</b>	132
BCC M414-M414-6D-331-PS54T2-006	<b>BCC04K0</b>	177	BCC M415-0000-1A-003-PX0434-020	<b>BCC032F</b>	56
BCC M414-M414-6D-331-PS54T2-020	<b>BCC04K1</b>	177	BCC M415-0000-1A-003-PX0434-050	<b>BCC032H</b>	56
BCC M414-M414-6D-331-PS54T2-050	<b>BCC04K2</b>	177	BCC M415-0000-1A-003-PX0434-100	<b>BCC032J</b>	56
BCC M414-M414-6D-331-PS54T2-100	<b>BCC04K3</b>	177	BCC M415-0000-1A-003-VX8434-020	<b>BCC0367</b>	56
BCC M414-M414-6D-331-PS54T2-150	<b>BCC04ZH</b>	177	BCC M415-0000-1A-003-VX8434-050	<b>BCC0368</b>	56
BCC M414-M414-6D-331-PS54T2-200	<b>BCC04K4</b>	177	BCC M415-0000-1A-003-VX8434-100	<b>BCC0369</b>	56
BCC M414-M414-6D-331-PS54T2-300	<b>BCC04K5</b>	177	BCC M415-0000-1A-004-PX0334-020	<b>BCC030A</b>	51
BCC M414-M414-6D-338-ES64N9-006	<b>BCC09NL</b>	195	BCC M415-0000-1A-004-PX0334-050	<b>BCC030C</b>	51
BCC M414-M414-6D-338-ES64N9-020	<b>BCC09NN</b>	195	BCC M415-0000-1A-004-PX0334-100	<b>BCC030E</b>	51
BCC M414-M414-6D-338-ES64N9-050	<b>BCC09NP</b>	195	BCC M415-0000-1A-004-VX8334-020	<b>BCC0344</b>	51
BCC M414-M414-6D-338-ES64N9-100	<b>BCC09NR</b>	195	BCC M415-0000-1A-004-VX8334-050	<b>BCC0345</b>	51
BCC M414-M414-6D-338-ES64N9-150	<b>BCC09NT</b>	195	BCC M415-0000-1A-004-VX8334-100	<b>BCC0346</b>	51
BCC M414-M414-6D-366-EX64N9-006	<b>BCC0E08</b>	196	BCC M415-0000-1A-005-PX0334-020	<b>BCC030F</b>	53
BCC M414-M414-6D-366-EX64N9-020	<b>BCC0CLZ</b>	196	BCC M415-0000-1A-005-PX0334-050	<b>BCC030H</b>	53
BCC M414-M414-6D-366-EX64N9-050	<b>BCC0CM1</b>	196	BCC M415-0000-1A-005-PX0334-100	<b>BCC030J</b>	53
BCC M414-M414-6D-366-EX64N9-100	<b>BCC0CM3</b>	196	BCC M415-0000-1A-005-VX8334-020	<b>BCC0347</b>	53
BCC M414-M414-6D-366-EX64N9-150	<b>BCC0E09</b>	196	BCC M415-0000-1A-005-VX8334-050	<b>BCC0348</b>	53
BCC M414-M415-M415-U2027-003	<b>BCC0AK1</b>	129	BCC M415-0000-1A-005-VX8334-100	<b>BCC0349</b>	53
BCC M414-M415-M415-U2027-006	<b>BCC0AK2</b>	129	BCC M415-0000-1A-008-PX0434-020	<b>BCC0327</b>	56



# Alphanumeric Index

## Sorted by part number

Part number	Ordering code	Page	Part number	Ordering code	Page
BCC M415-0000-1A-008-PX0434-050	<b>BCC0328</b>	56	BCC M415-0000-2A-030-VS85N6-020	<b>BCC0E00</b>	187
BCC M415-0000-1A-008-PX0434-100	<b>BCC0329</b>	56	BCC M415-0000-2A-030-VS85N6-050	<b>BCC0E01</b>	187
BCC M415-0000-1A-008-VX8434-020	<b>BCC0361</b>	56	BCC M415-0000-2A-030-VS85N6-100	<b>BCC0E02</b>	187
BCC M415-0000-1A-008-VX8434-050	<b>BCC0362</b>	56	BCC M415-0000-2A-034-PX0534-020	<b>BCC08JE</b>	61
BCC M415-0000-1A-008-VX8434-100	<b>BCC0363</b>	56	BCC M415-0000-2A-034-PX0534-050	<b>BCC08JC</b>	61
BCC M415-0000-1A-010-PX0434-020	<b>BCC032A</b>	57	BCC M415-0000-2A-034-PX0534-100	<b>BCC08JA</b>	61
BCC M415-0000-1A-010-PX0434-050	<b>BCC032C</b>	57	BCC M415-0000-2A-067-PS75N6-020	<b>BCC09MM</b>	187
BCC M415-0000-1A-010-PX0434-100	<b>BCC032E</b>	57	BCC M415-0000-2A-067-PS75N6-050	<b>BCC09MN</b>	187
BCC M415-0000-1A-010-VX8434-020	<b>BCC0364</b>	57	BCC M415-0000-2A-067-PS75N6-100	<b>BCC09MP</b>	187
BCC M415-0000-1A-010-VX8434-050	<b>BCC0365</b>	57	BCC M415-0000-2A-R03	<b>BCC06Y4</b>	185
BCC M415-0000-1A-010-VX8434-100	<b>BCC0366</b>	57	BCC M415-0000-2A-R04	<b>BCC09MR</b>	193
BCC M415-0000-1A-014-PS0434-020	<b>BCC032K</b>	56	BCC M415-0000-2B-R01	<b>BCC0718</b>	174
BCC M415-0000-1A-014-PS0434-050	<b>BCC032L</b>	56	BCC M415-0000-2B-R02	<b>BCC0719</b>	174
BCC M415-0000-1A-014-PS0434-100	<b>BCC032M</b>	56	BCC M415-M313-3F-300-PX0334-003	<b>BCC03M9</b>	68
BCC M415-0000-1A-014-VS8434-020	<b>BCC036A</b>	56	BCC M415-M313-3F-300-PX0334-006	<b>BCC03MA</b>	68
BCC M415-0000-1A-014-VS8434-050	<b>BCC036C</b>	56	BCC M415-M313-3F-300-PX0334-010	<b>BCC03MC</b>	68
BCC M415-0000-1A-014-VS8434-100	<b>BCC036E</b>	56	BCC M415-M313-3F-300-PX0334-015	<b>BCC03ME</b>	68
BCC M415-0000-1A-017-PX0534-020	<b>BCC08FE</b>	60	BCC M415-M313-3F-300-PX0334-020	<b>BCC03MF</b>	68
BCC M415-0000-1A-017-PX0534-050	<b>BCC098C</b>	60	BCC M415-M313-3F-300-PX0334-030	<b>BCC03MH</b>	68
BCC M415-0000-1A-017-PX0534-100	<b>BCC0860</b>	60	BCC M415-M313-3F-300-PX0334-050	<b>BCC03MJ</b>	68
BCC M415-0000-1A-017-VX8534-050	<b>BCC0AT5</b>	60	BCC M415-M313-3F-300-VX8334-003	<b>BCC03NW</b>	68
BCC M415-0000-1A-017-VX8534-100	<b>BCC0AN9</b>	60	BCC M415-M313-3F-300-VX8334-006	<b>BCC03NY</b>	68
BCC M415-0000-1A-030-VS85N6-020	<b>BCC0CZW</b>	187	BCC M415-M313-3F-300-VX8334-010	<b>BCC03NZ</b>	68
BCC M415-0000-1A-030-VS85N6-050	<b>BCC0CZY</b>	187	BCC M415-M313-3F-300-VX8334-015	<b>BCC03P0</b>	68
BCC M415-0000-1A-030-VS85N6-100	<b>BCC0CZZ</b>	187	BCC M415-M313-3F-300-VX8334-020	<b>BCC03P1</b>	68
BCC M415-0000-1A-034-PW3534-015	<b>BCC087F</b>	133	BCC M415-M313-3F-300-VX8334-030	<b>BCC03P2</b>	68
BCC M415-0000-1A-034-PW3534-050	<b>BCC087H</b>	133	BCC M415-M313-3F-300-VX8334-050	<b>BCC03P3</b>	68
BCC M415-0000-1A-034-PW3534-075	<b>BCC087J</b>	133	BCC M415-M313-3F-602-PX0334-003	<b>BCC0506</b>	68
BCC M415-0000-1A-034-PW3534-100	<b>BCC087K</b>	133	BCC M415-M313-3F-602-PX0334-006	<b>BCC0507</b>	68
BCC M415-0000-1A-034-PX0534-020	<b>BCC09H4</b>	60	BCC M415-M313-3F-602-PX0334-010	<b>BCC0508</b>	68
BCC M415-0000-1A-034-PX0534-050	<b>BCC09H5</b>	60	BCC M415-M313-3F-602-PX0334-015	<b>BCC0509</b>	68
BCC M415-0000-1A-034-PX0534-100	<b>BCC09H6</b>	60	BCC M415-M313-3F-602-PX0334-020	<b>BCC050A</b>	68
BCC M415-0000-1A-036-PS0334-020	<b>BCC030T</b>	51	BCC M415-M313-3F-602-PX0334-030	<b>BCC050C</b>	68
BCC M415-0000-1A-036-PS0334-050	<b>BCC030U</b>	51	BCC M415-M313-3F-602-PX0334-050	<b>BCC050E</b>	68
BCC M415-0000-1A-036-PS0334-100	<b>BCC030W</b>	51	BCC M415-M313-M313-U0014-000	<b>BCC09JC</b>	99
BCC M415-0000-1A-036-VS8334-020	<b>BCC034K</b>	51	BCC M415-M314-3F-304-PX0434-003	<b>BCC03RE</b>	71
BCC M415-0000-1A-036-VS8334-050	<b>BCC034L</b>	51	BCC M415-M314-3F-304-PX0434-006	<b>BCC03RF</b>	71
BCC M415-0000-1A-036-VS8334-100	<b>BCC034M</b>	51	BCC M415-M314-3F-304-PX0434-010	<b>BCC03RH</b>	71
BCC M415-0000-1A-037-PS0334-020	<b>BCC030Y</b>	53	BCC M415-M314-3F-304-PX0434-015	<b>BCC03RJ</b>	71
BCC M415-0000-1A-037-PS0334-050	<b>BCC030Z</b>	53	BCC M415-M314-3F-304-PX0434-020	<b>BCC03RK</b>	71
BCC M415-0000-1A-037-PS0334-100	<b>BCC0310</b>	53	BCC M415-M314-3F-304-PX0434-030	<b>BCC03RL</b>	71
BCC M415-0000-1A-037-VS8334-020	<b>BCC034N</b>	53	BCC M415-M314-3F-304-PX0434-050	<b>BCC03RM</b>	71
BCC M415-0000-1A-037-VS8334-050	<b>BCC034P</b>	53	BCC M415-M314-3F-304-VX8434-003	<b>BCC03TP</b>	71
BCC M415-0000-1A-037-VS8334-100	<b>BCC034R</b>	53	BCC M415-M314-3F-304-VX8434-006	<b>BCC03TR</b>	71
BCC M415-0000-1A-067-PS75N6-020	<b>BCC09MJ</b>	187	BCC M415-M314-3F-304-VX8434-010	<b>BCC03TT</b>	71
BCC M415-0000-1A-067-PS75N6-050	<b>BCC09MK</b>	187	BCC M415-M314-3F-304-VX8434-015	<b>BCC03TU</b>	71
BCC M415-0000-1A-067-PS75N6-100	<b>BCC09ML</b>	187	BCC M415-M314-3F-304-VX8434-020	<b>BCC03TW</b>	71
BCC M415-0000-1A-068-VS24N7-020	<b>BCC06Y1</b>	183	BCC M415-M314-3F-304-VX8434-030	<b>BCC03TY</b>	71
BCC M415-0000-1A-068-VS24N7-050	<b>BCC06Y2</b>	183	BCC M415-M314-3F-304-VX8434-050	<b>BCC03TZ</b>	71
BCC M415-0000-1A-068-VS24N7-100	<b>BCC06Y3</b>	183	BCC M415-M323-3F-300-PX0334-003	<b>BCC03MK</b>	69
BCC M415-0000-1A-R04	<b>BCC0A08</b>	193	BCC M415-M323-3F-300-PX0334-006	<b>BCC03ML</b>	69
BCC M415-0000-1B-031-PS72N1-020	<b>BCC070Y</b>	169	BCC M415-M323-3F-300-PX0334-010	<b>BCC03MM</b>	69
BCC M415-0000-1B-031-PS72N1-050	<b>BCC070Z</b>	169	BCC M415-M323-3F-300-PX0334-015	<b>BCC03MN</b>	69
BCC M415-0000-1B-031-PS72N1-100	<b>BCC0710</b>	169	BCC M415-M323-3F-300-PX0334-020	<b>BCC03MP</b>	69
BCC M415-0000-1B-031-PS72N1-150	<b>BCC0A0K</b>	169	BCC M415-M323-3F-300-PX0334-030	<b>BCC03MR</b>	69
BCC M415-0000-1B-031-PS72N1-200	<b>BCC0A0L</b>	169	BCC M415-M323-3F-300-PX0334-050	<b>BCC03MT</b>	69
BCC M415-0000-1B-R01	<b>BCC0C6E</b>	174	BCC M415-M323-3F-300-VX8334-003	<b>BCC03P4</b>	69
BCC M415-0000-2A-017-PX0534-020	<b>BCC0C76</b>	61	BCC M415-M323-3F-300-VX8334-006	<b>BCC03P5</b>	69
BCC M415-0000-2A-017-PX0534-050	<b>BCC0C77</b>	61	BCC M415-M323-3F-300-VX8334-010	<b>BCC03P6</b>	69
BCC M415-0000-2A-017-PX0534-100	<b>BCC0C78</b>	61	BCC M415-M323-3F-300-VX8334-015	<b>BCC03P7</b>	69
BCC M415-0000-2A-017-VX8534-020	<b>BCC0AU3</b>	61	BCC M415-M323-3F-300-VX8334-020	<b>BCC03P8</b>	69
BCC M415-0000-2A-017-VX8534-050	<b>BCC0AT6</b>	61	BCC M415-M323-3F-300-VX8334-030	<b>BCC03P9</b>	69
BCC M415-0000-2A-017-VX8534-100	<b>BCC0AUK</b>	61	BCC M415-M323-3F-300-VX8334-050	<b>BCC03PA</b>	69

# Alphanumeric Index

## Sorted by part number

Part number	Ordering code	Page	Part number	Ordering code	Page
BCC M415-M324-3F-304-PX0434-003	<b>BCC03RN</b>	71	BCC M415-M414-3A-606-PX0434-015	<b>BCC03A4</b>	76
BCC M415-M324-3F-304-PX0434-006	<b>BCC03RP</b>	71	BCC M415-M414-3A-606-PX0434-020	<b>BCC03A5</b>	76
BCC M415-M324-3F-304-PX0434-010	<b>BCC03RR</b>	71	BCC M415-M414-3A-606-PX0434-030	<b>BCC03A6</b>	76
BCC M415-M324-3F-304-PX0434-015	<b>BCC03RT</b>	71	BCC M415-M414-3A-606-PX0434-050	<b>BCC03A7</b>	76
BCC M415-M324-3F-304-PX0434-020	<b>BCC03RU</b>	71	BCC M415-M414-3A-606-VX8434-003	<b>BCC03CU</b>	76
BCC M415-M324-3F-304-PX0434-030	<b>BCC03RW</b>	71	BCC M415-M414-3A-606-VX8434-006	<b>BCC03CW</b>	76
BCC M415-M324-3F-304-PX0434-050	<b>BCC03RY</b>	71	BCC M415-M414-3A-606-VX8434-010	<b>BCC03CY</b>	76
BCC M415-M324-3F-304-VX8434-003	<b>BCC03U0</b>	71	BCC M415-M414-3A-606-VX8434-015	<b>BCC03CZ</b>	76
BCC M415-M324-3F-304-VX8434-006	<b>BCC03U1</b>	71	BCC M415-M414-3A-606-VX8434-020	<b>BCC03E0</b>	76
BCC M415-M324-3F-304-VX8434-010	<b>BCC03U2</b>	71	BCC M415-M414-3A-606-VX8434-030	<b>BCC03E1</b>	76
BCC M415-M324-3F-304-VX8434-015	<b>BCC03U3</b>	71	BCC M415-M414-3A-606-VX8434-050	<b>BCC03E2</b>	76
BCC M415-M324-3F-304-VX8434-020	<b>BCC03U4</b>	71	BCC M415-M415-3A-312-PX0534-003	<b>BCC09FL</b>	80
BCC M415-M324-3F-304-VX8434-030	<b>BCC03U5</b>	71	BCC M415-M415-3A-312-PX0534-006	<b>BCC09FM</b>	80
BCC M415-M324-3F-304-VX8434-050	<b>BCC03U6</b>	71	BCC M415-M415-3A-312-PX0534-010	<b>BCC09FN</b>	80
BCC M415-M412-3B-329-PS72N1-006	<b>BCC0A12</b>	169	BCC M415-M415-3A-312-PX0534-015	<b>BCC09FP</b>	80
BCC M415-M412-3B-329-PS72N1-010	<b>BCC0A13</b>	169	BCC M415-M415-3A-312-PX0534-020	<b>BCC09FR</b>	80
BCC M415-M412-3B-329-PS72N1-020	<b>BCC0A14</b>	169	BCC M415-M415-3A-312-PX0534-030	<b>BCC09FT</b>	80
BCC M415-M412-3B-329-PS72N1-050	<b>BCC0A15</b>	169	BCC M415-M415-3A-312-PX0534-050	<b>BCC09FU</b>	80
BCC M415-M412-3B-329-PS72N1-100	<b>BCC0A16</b>	169	BCC M415-M415-3A-313-PW0534-006	<b>BCC0AJJ</b>	129
BCC M415-M412-3B-329-PS72N1-150	<b>BCC0A17</b>	169	BCC M415-M415-3A-313-PW0534-010	<b>BCC0AK7</b>	129
BCC M415-M412-3B-329-PS72N1-200	<b>BCC0A18</b>	169	BCC M415-M415-3A-313-PW0534-015	<b>BCC0COM</b>	129
BCC M415-M413-3A-300-PX0334-003	<b>BCC036Y</b>	74	BCC M415-M415-3A-313-PW0534-020	<b>BCC0AK8</b>	129
BCC M415-M413-3A-300-PX0334-006	<b>BCC036Z</b>	74	BCC M415-M415-3A-313-PW0534-030	<b>BCC0AK9</b>	129
BCC M415-M413-3A-300-PX0334-010	<b>BCC0370</b>	74	BCC M415-M415-3A-313-PW0534-050	<b>BCC0AKA</b>	129
BCC M415-M413-3A-300-PX0334-015	<b>BCC0371</b>	74	BCC M415-M415-3A-313-PW3534-006	<b>BCC087R</b>	135
BCC M415-M413-3A-300-PX0334-020	<b>BCC0372</b>	74	BCC M415-M415-3A-313-PW3534-010	<b>BCC087T</b>	135
BCC M415-M413-3A-300-PX0334-030	<b>BCC0373</b>	74	BCC M415-M415-3A-313-PW3534-015	<b>BCC087U</b>	135
BCC M415-M413-3A-300-PX0334-050	<b>BCC0374</b>	74	BCC M415-M415-3A-313-PW3534-020	<b>BCC087W</b>	135
BCC M415-M413-3A-300-VX8334-003	<b>BCC0386</b>	74	BCC M415-M415-3A-313-PW3534-030	<b>BCC09M2</b>	135
BCC M415-M413-3A-300-VX8334-006	<b>BCC0387</b>	74	BCC M415-M415-3A-313-PW3534-050	<b>BCC09M1</b>	135
BCC M415-M413-3A-300-VX8334-010	<b>BCC0388</b>	74	BCC M415-M415-3A-313-PX0534-003	<b>BCC09FW</b>	80
BCC M415-M413-3A-300-VX8334-015	<b>BCC0389</b>	74	BCC M415-M415-3A-313-PX0534-006	<b>BCC09FY</b>	80
BCC M415-M413-3A-300-VX8334-020	<b>BCC038A</b>	74	BCC M415-M415-3A-313-PX0534-010	<b>BCC09FZ</b>	80
BCC M415-M413-3A-300-VX8334-030	<b>BCC038C</b>	74	BCC M415-M415-3A-313-PX0534-015	<b>BCC09H0</b>	80
BCC M415-M413-3A-300-VX8334-050	<b>BCC038E</b>	74	BCC M415-M415-3A-313-PX0534-020	<b>BCC09H1</b>	80
BCC M415-M414-3A-304-PW0434-003	<b>BCC0AP1</b>	128	BCC M415-M415-3A-313-PX0534-030	<b>BCC09H2</b>	80
BCC M415-M414-3A-304-PW0434-006	<b>BCC0AP2</b>	128	BCC M415-M415-3A-313-PX0534-050	<b>BCC09H3</b>	80
BCC M415-M414-3A-304-PW0434-010	<b>BCC0AP3</b>	128	BCC M415-M415-3A-313-PX0534-100	<b>BCC0AJC</b>	80
BCC M415-M414-3A-304-PW0434-015	<b>BCC0AP4</b>	128	BCC M415-M415-3A-330-VS85N6-006	<b>BCC0E03</b>	187
BCC M415-M414-3A-304-PW0434-020	<b>BCC0AP5</b>	128	BCC M415-M415-3A-330-VS85N6-020	<b>BCC0E04</b>	187
BCC M415-M414-3A-304-PW0434-050	<b>BCC0AP7</b>	128	BCC M415-M415-3A-330-VS85N6-050	<b>BCC0E05</b>	187
BCC M415-M414-3A-304-PX0434-003	<b>BCC039H</b>	76	BCC M415-M415-3A-330-VS85N6-100	<b>BCC0E06</b>	187
BCC M415-M414-3A-304-PX0434-006	<b>BCC039J</b>	76	BCC M415-M415-3A-330-VS85N6-150	<b>BCC0E07</b>	187
BCC M415-M414-3A-304-PX0434-010	<b>BCC039K</b>	76	BCC M415-M415-3A-344-PS75N6-006	<b>BCC09M8</b>	187
BCC M415-M414-3A-304-PX0434-015	<b>BCC039L</b>	76	BCC M415-M415-3A-344-PS75N6-020	<b>BCC09MA</b>	187
BCC M415-M414-3A-304-PX0434-020	<b>BCC039M</b>	76	BCC M415-M415-3A-344-PS75N6-050	<b>BCC09MC</b>	187
BCC M415-M414-3A-304-PX0434-030	<b>BCC039N</b>	76	BCC M415-M415-3A-344-PS75N6-100	<b>BCC09ME</b>	187
BCC M415-M414-3A-304-PX0434-050	<b>BCC039P</b>	76	BCC M415-M415-3A-344-PS75N6-150	<b>BCC09MF</b>	187
BCC M415-M414-3A-304-VX8434-003	<b>BCC03C9</b>	76	BCC M415-M415-M415-U0003-000	<b>BCC089P</b>	99, 185, 192
BCC M415-M414-3A-304-VX8434-006	<b>BCC03CA</b>	76	BCC M415-M415-M415-U0016-000	<b>BCC09MU</b>	99
BCC M415-M414-3A-304-VX8434-010	<b>BCC03CC</b>	76	BCC M415-M423-3A-300-PX0334-003	<b>BCC0375</b>	74
BCC M415-M414-3A-304-VX8434-015	<b>BCC03CE</b>	76	BCC M415-M423-3A-300-PX0334-006	<b>BCC0376</b>	74
BCC M415-M414-3A-304-VX8434-020	<b>BCC03CF</b>	76	BCC M415-M423-3A-300-PX0334-010	<b>BCC0377</b>	74
BCC M415-M414-3A-304-VX8434-030	<b>BCC03CH</b>	76	BCC M415-M423-3A-300-PX0334-015	<b>BCC0378</b>	74
BCC M415-M414-3A-304-VX8434-050	<b>BCC03CJ</b>	76	BCC M415-M423-3A-300-PX0334-020	<b>BCC0379</b>	74
BCC M415-M414-3A-337-VS24N7-006	<b>BCC06WU</b>	183	BCC M415-M423-3A-300-PX0334-030	<b>BCC037A</b>	74
BCC M415-M414-3A-337-VS24N7-020	<b>BCC06WW</b>	183	BCC M415-M423-3A-300-PX0334-050	<b>BCC037C</b>	74
BCC M415-M414-3A-337-VS24N7-050	<b>BCC06WY</b>	183	BCC M415-M423-3A-300-VX8334-003	<b>BCC038F</b>	74
BCC M415-M414-3A-337-VS24N7-100	<b>BCC06WZ</b>	183	BCC M415-M423-3A-300-VX8334-006	<b>BCC038H</b>	74
BCC M415-M414-3A-337-VS24N7-150	<b>BCC06Y0</b>	183	BCC M415-M423-3A-300-VX8334-010	<b>BCC038J</b>	74
BCC M415-M414-3A-606-PX0434-003	<b>BCC03A1</b>	76	BCC M415-M423-3A-300-VX8334-015	<b>BCC038K</b>	74
BCC M415-M414-3A-606-PX0434-006	<b>BCC03A2</b>	76	BCC M415-M423-3A-300-VX8334-020	<b>BCC038L</b>	74
BCC M415-M414-3A-606-PX0434-010	<b>BCC03A3</b>	76	BCC M415-M423-3A-300-VX8334-030	<b>BCC038M</b>	74

# Alphanumeric Index

## Sorted by part number

Part number	Ordering code	Page	Part number	Ordering code	Page
BCC M415-M423-3A-300-VX8334-050	<b>BCC038N</b>	74	BCC M423-0000-2A-001-VX8334-020	<b>BCC033N</b>	53
BCC M415-M424-3A-304-PX0434-003	<b>BCC039R</b>	77	BCC M423-0000-2A-001-VX8334-050	<b>BCC033P</b>	53
BCC M415-M424-3A-304-PX0434-006	<b>BCC039T</b>	77	BCC M423-0000-2A-001-VX8334-100	<b>BCC033R</b>	53
BCC M415-M424-3A-304-PX0434-010	<b>BCC039U</b>	77	BCC M423-0000-2A-002-PX0334-020	<b>BCC0301</b>	55
BCC M415-M424-3A-304-PX0434-015	<b>BCC039W</b>	77	BCC M423-0000-2A-002-PX0334-050	<b>BCC0302</b>	55
BCC M415-M424-3A-304-PX0434-020	<b>BCC039Y</b>	77	BCC M423-0000-2A-002-PX0334-100	<b>BCC0303</b>	55
BCC M415-M424-3A-304-PX0434-030	<b>BCC039Z</b>	77	BCC M423-0000-2A-002-VX8334-020	<b>BCC033T</b>	55
BCC M415-M424-3A-304-PX0434-050	<b>BCC0390</b>	77	BCC M423-0000-2A-002-VX8334-050	<b>BCC033U</b>	55
BCC M415-M424-3A-304-VX8434-003	<b>BCC03CK</b>	77	BCC M423-0000-2A-002-VX8334-100	<b>BCC033W</b>	55
BCC M415-M424-3A-304-VX8434-006	<b>BCC03CL</b>	77	BCC M423-0000-2A-036-PS0334-020	<b>BCC0304</b>	53
BCC M415-M424-3A-304-VX8434-010	<b>BCC03CM</b>	77	BCC M423-0000-2A-036-PS0334-050	<b>BCC0305</b>	53
BCC M415-M424-3A-304-VX8434-015	<b>BCC03CN</b>	77	BCC M423-0000-2A-036-PS0334-100	<b>BCC0306</b>	53
BCC M415-M424-3A-304-VX8434-020	<b>BCC03CP</b>	77	BCC M423-0000-2A-036-VS8334-020	<b>BCC033Y</b>	53
BCC M415-M424-3A-304-VX8434-030	<b>BCC03CR</b>	77	BCC M423-0000-2A-036-VS8334-050	<b>BCC033Z</b>	53
BCC M415-M424-3A-304-VX8434-050	<b>BCC03CT</b>	77	BCC M423-0000-2A-036-VS8334-100	<b>BCC0340</b>	53
BCC M418-0000-1A-044-PX0825-020	<b>BCC06K1</b>	62	BCC M423-0000-2A-037-PS0334-020	<b>BCC0307</b>	55
BCC M418-0000-1A-044-PX0825-050	<b>BCC06K2</b>	62	BCC M423-0000-2A-037-PS0334-050	<b>BCC0308</b>	55
BCC M418-0000-1A-044-PX0825-100	<b>BCC06K3</b>	62	BCC M423-0000-2A-037-PS0334-100	<b>BCC0309</b>	55
BCC M418-0000-1A-045-PX0825-020	<b>BCC09HC</b>	63	BCC M423-0000-2A-037-VS8334-020	<b>BCC0341</b>	55
BCC M418-0000-1A-045-PX0825-050	<b>BCC09HE</b>	63	BCC M423-0000-2A-037-VS8334-050	<b>BCC0342</b>	55
BCC M418-0000-1A-045-PX0825-100	<b>BCC09HF</b>	63	BCC M423-0000-2A-037-VS8334-100	<b>BCC0343</b>	55
BCC M418-0000-1A-046-PS0825-020	<b>BCC0994</b>	62	BCC M424-0000-2A-003-PX0434-020	<b>BCC0321</b>	59
BCC M418-0000-1A-046-PS0825-050	<b>BCC0995</b>	62	BCC M424-0000-2A-003-PX0434-050	<b>BCC0322</b>	59
BCC M418-0000-1A-046-PS0825-100	<b>BCC0996</b>	62	BCC M424-0000-2A-003-PX0434-100	<b>BCC0323</b>	59
BCC M418-0000-1A-069-PX0825-020	<b>BCC09J3</b>	62	BCC M424-0000-2A-003-VS0434-020	<b>BCC035Y</b>	59
BCC M418-0000-1A-069-PX0825-050	<b>BCC09J4</b>	62	BCC M424-0000-2A-003-VS0434-050	<b>BCC035Z</b>	59
BCC M418-0000-1A-069-PX0825-100	<b>BCC085Z</b>	62	BCC M424-0000-2A-003-VS0434-100	<b>BCC0360</b>	59
BCC M418-0000-2A-044-PX0825-020	<b>BCC06JT</b>	65	BCC M424-0000-2A-003-VX0434-020	<b>BCC04ZU</b>	59
BCC M418-0000-2A-044-PX0825-050	<b>BCC06JU</b>	65	BCC M424-0000-2A-003-VX0434-050	<b>BCC04ZW</b>	59
BCC M418-0000-2A-044-PX0825-100	<b>BCC06JW</b>	65	BCC M424-0000-2A-003-VX0434-100	<b>BCC035W</b>	59
BCC M418-0000-2A-044-VX8825-020	<b>BCC06K7</b>	65	BCC M424-0000-2A-014-PS0434-020	<b>BCC0324</b>	59
BCC M418-0000-2A-044-VX8825-050	<b>BCC06K8</b>	65	BCC M424-0000-2A-014-PS0434-050	<b>BCC0325</b>	59
BCC M418-0000-2A-044-VX8825-100	<b>BCC06K9</b>	65	BCC M424-0000-2A-014-PS0434-100	<b>BCC0326</b>	59
BCC M418-M418-3A-342-PX0825-003	<b>BCC0AC0</b>	84	BCC M424-E814-BG-RM013-000	<b>BCC085H</b>	180, 200
BCC M418-M418-3A-342-PX0825-006	<b>BCC0AAZ</b>	84	BCC M425-0000-1A-001-PH0334-020	<b>BCC0832</b>	119
BCC M418-M418-3A-342-PX0825-010	<b>BCC0AC1</b>	84	BCC M425-0000-1A-001-PH0334-050	<b>BCC0833</b>	119
BCC M418-M418-3A-342-PX0825-015	<b>BCC0AC2</b>	84	BCC M425-0000-1A-001-PH0334-100	<b>BCC0AA8</b>	119
BCC M418-M418-3A-342-PX0825-020	<b>BCC0AC3</b>	84	BCC M425-0000-1A-001-PW3334-020	<b>BCC086T</b>	132
BCC M418-M418-3A-342-PX0825-030	<b>BCC0AC4</b>	84	BCC M425-0000-1A-001-PW3334-050	<b>BCC086U</b>	132
BCC M418-M418-3A-342-PX0825-050	<b>BCC0AC5</b>	84	BCC M425-0000-1A-001-PW3334-100	<b>BCC086W</b>	132
BCC M418-M41C-3A-674-PX0825-006	<b>BCC088J</b>	84	BCC M425-0000-1A-001-PX0334-020	<b>BCC0317</b>	51
BCC M418-M41C-3A-674-PX0825-010	<b>BCC088K</b>	84	BCC M425-0000-1A-001-PX0334-050	<b>BCC0318</b>	51
BCC M418-M41C-3A-674-PX0825-020	<b>BCC088L</b>	84	BCC M425-0000-1A-001-PX0334-100	<b>BCC0319</b>	51
BCC M41C-0000-1A-049-PX0C25-020	<b>BCC06UK</b>	66	BCC M425-0000-1A-001-VX8334-020	<b>BCC0351</b>	51
BCC M41C-0000-1A-049-PX0C25-050	<b>BCC06UL</b>	66	BCC M425-0000-1A-001-VX8334-050	<b>BCC0352</b>	51
BCC M41C-0000-1A-049-PX0C25-100	<b>BCC06UM</b>	66	BCC M425-0000-1A-001-VX8334-100	<b>BCC0353</b>	51
BCC M41C-0000-1A-049-VX8C25-020	<b>BCC06UP</b>	66	BCC M425-0000-1A-002-PX0334-020	<b>BCC031A</b>	54
BCC M41C-0000-1A-049-VX8C25-050	<b>BCC06UR</b>	66	BCC M425-0000-1A-002-PX0334-050	<b>BCC031C</b>	54
BCC M41C-0000-1A-049-VX8C25-100	<b>BCC06UT</b>	66	BCC M425-0000-1A-002-PX0334-100	<b>BCC031E</b>	54
BCC M41C-0000-2A-049-PX0C25-020	<b>BCC06UU</b>	67	BCC M425-0000-1A-002-VX8334-020	<b>BCC0354</b>	54
BCC M41C-0000-2A-049-PX0C25-050	<b>BCC06UW</b>	67	BCC M425-0000-1A-002-VX8334-050	<b>BCC0355</b>	54
BCC M41C-0000-2A-049-PX0C25-100	<b>BCC06UY</b>	67	BCC M425-0000-1A-002-VX8334-100	<b>BCC0356</b>	54
BCC M41C-0000-2A-049-VX8C25-020	<b>BCC06UZ</b>	67	BCC M425-0000-1A-003-PH0434-020	<b>BCC0AAE</b>	119
BCC M41C-0000-2A-049-VX8C25-050	<b>BCC06W0</b>	67	BCC M425-0000-1A-003-PH0434-050	<b>BCC0AAF</b>	119
BCC M41C-0000-2A-049-VX8C25-100	<b>BCC06W1</b>	67	BCC M425-0000-1A-003-PH0434-100	<b>BCC0AAH</b>	119
BCC M41C-M41C-3A-325-PX0C25-003	<b>BCC0AY4</b>	85	BCC M425-0000-1A-003-PW0434-050	<b>BCC0AKE</b>	127
BCC M41C-M41C-3A-325-PX0C25-006	<b>BCC088E</b>	85	BCC M425-0000-1A-003-PW0434-100	<b>BCC0AKF</b>	127
BCC M41C-M41C-3A-325-PX0C25-010	<b>BCC088F</b>	85	BCC M425-0000-1A-003-PW3434-050	<b>BCC0C22</b>	133
BCC M41C-M41C-3A-325-PX0C25-020	<b>BCC088H</b>	85	BCC M425-0000-1A-003-PX0434-020	<b>BCC032Y</b>	57
BCC M41C-M41C-3A-325-PX0C25-100	<b>BCC0E9J</b>	85	BCC M425-0000-1A-003-PX0434-050	<b>BCC032Z</b>	57
BCC M423-0000-2A-001-PX0334-020	<b>BCC02ZY</b>	53	BCC M425-0000-1A-003-PX0434-100	<b>BCC0330</b>	57
BCC M423-0000-2A-001-PX0334-050	<b>BCC02ZZ</b>	53	BCC M425-0000-1A-003-VX8434-020	<b>BCC036N</b>	57
BCC M423-0000-2A-001-PX0334-100	<b>BCC0300</b>	53	BCC M425-0000-1A-003-VX8434-050	<b>BCC036P</b>	57



# Alphanumeric Index

## Sorted by part number

Part number	Ordering code	Page
BCC M425-0000-1A-003-VX8434-100	<b>BCC036R</b>	57
BCC M425-0000-1A-004-PW3334-020	<b>BCC09J8</b>	132
BCC M425-0000-1A-004-PW3334-030	<b>BCC08MZ</b>	132
BCC M425-0000-1A-004-PW3334-100	<b>BCC08LE</b>	132
BCC M425-0000-1A-004-PX0334-020	<b>BCC0311</b>	52
BCC M425-0000-1A-004-PX0334-050	<b>BCC0312</b>	52
BCC M425-0000-1A-004-PX0334-100	<b>BCC0313</b>	52
BCC M425-0000-1A-004-VX8334-020	<b>BCC034T</b>	52
BCC M425-0000-1A-004-VX8334-050	<b>BCC034U</b>	52
BCC M425-0000-1A-004-VX8334-100	<b>BCC034W</b>	52
BCC M425-0000-1A-005-PX0334-020	<b>BCC0314</b>	54
BCC M425-0000-1A-005-PX0334-050	<b>BCC0315</b>	54
BCC M425-0000-1A-005-PX0334-100	<b>BCC0316</b>	54
BCC M425-0000-1A-005-VX8334-020	<b>BCC034Y</b>	54
BCC M425-0000-1A-005-VX8334-050	<b>BCC034Z</b>	54
BCC M425-0000-1A-005-VX8334-100	<b>BCC0350</b>	54
BCC M425-0000-1A-008-PX0434-020	<b>BCC032N</b>	58
BCC M425-0000-1A-008-PX0434-050	<b>BCC032P</b>	58
BCC M425-0000-1A-008-PX0434-100	<b>BCC032R</b>	58
BCC M425-0000-1A-008-VX8434-020	<b>BCC036F</b>	58
BCC M425-0000-1A-008-VX8434-050	<b>BCC036H</b>	58
BCC M425-0000-1A-008-VX8434-100	<b>BCC036J</b>	58
BCC M425-0000-1A-010-PX0434-020	<b>BCC032T</b>	58
BCC M425-0000-1A-010-PX0434-050	<b>BCC032U</b>	58
BCC M425-0000-1A-010-PX0434-100	<b>BCC032W</b>	58
BCC M425-0000-1A-010-VX8434-020	<b>BCC036K</b>	58
BCC M425-0000-1A-010-VX8434-050	<b>BCC036L</b>	58
BCC M425-0000-1A-010-VX8434-100	<b>BCC036M</b>	58
BCC M425-0000-1A-014-PS0434-020	<b>BCC0331</b>	57
BCC M425-0000-1A-014-PS0434-050	<b>BCC0332</b>	57
BCC M425-0000-1A-014-PS0434-100	<b>BCC0333</b>	57
BCC M425-0000-1A-014-VS8434-020	<b>BCC036T</b>	57
BCC M425-0000-1A-014-VS8434-050	<b>BCC036U</b>	57
BCC M425-0000-1A-014-VS8434-100	<b>BCC036W</b>	57
BCC M425-0000-1A-017-PX0534-020	<b>BCC09H7</b>	60
BCC M425-0000-1A-017-PX0534-050	<b>BCC08FC</b>	60
BCC M425-0000-1A-017-PX0534-100	<b>BCC08FA</b>	60
BCC M425-0000-1A-034-PX0534-020	<b>BCC08F9</b>	60
BCC M425-0000-1A-034-PX0534-050	<b>BCC08F8</b>	60
BCC M425-0000-1A-034-PX0534-100	<b>BCC08F7</b>	60
BCC M425-0000-1A-036-PS0334-020	<b>BCC031F</b>	51
BCC M425-0000-1A-036-PS0334-050	<b>BCC031H</b>	51
BCC M425-0000-1A-036-PS0334-100	<b>BCC031J</b>	51
BCC M425-0000-1A-036-VS8334-020	<b>BCC0357</b>	51
BCC M425-0000-1A-036-VS8334-050	<b>BCC0358</b>	51
BCC M425-0000-1A-036-VS8334-100	<b>BCC0359</b>	51
BCC M425-0000-1A-037-PS0334-020	<b>BCC031K</b>	54
BCC M425-0000-1A-037-PS0334-050	<b>BCC031L</b>	54
BCC M425-0000-1A-037-PS0334-100	<b>BCC031M</b>	54
BCC M425-0000-1A-037-VS8334-020	<b>BCC035A</b>	54
BCC M425-0000-1A-037-VS8334-050	<b>BCC035C</b>	54
BCC M425-0000-1A-037-VS8334-100	<b>BCC035E</b>	54
BCC M425-0000-1A-039-PX0534-020	<b>BCC08F6</b>	61
BCC M425-0000-1A-039-PX0534-050	<b>BCC08F5</b>	61
BCC M425-0000-1A-039-PX0534-100	<b>BCC08F4</b>	61
BCC M425-0000-1A-040-PW3534-015	<b>BCC087L</b>	133
BCC M425-0000-1A-040-PW3534-050	<b>BCC087M</b>	133
BCC M425-0000-1A-040-PW3534-075	<b>BCC087N</b>	133
BCC M425-0000-1A-040-PW3534-100	<b>BCC087P</b>	133
BCC M425-0000-1A-040-PX0534-020	<b>BCC08HP</b>	61
BCC M425-0000-1A-040-PX0534-050	<b>BCC08HR</b>	61
BCC M425-0000-1A-040-PX0534-100	<b>BCC08HT</b>	61
BCC M425-0000-1A-099-PW3434-020	<b>BCC0C3Z</b>	133

Part number	Ordering code	Page
BCC M425-0000-1A-099-PW3434-050	<b>BCC0C41</b>	133
BCC M425-0000-1A-099-PW3434-100	<b>BCC0C42</b>	133
BCC M425-0000-1A-100-PW3534-020	<b>BCC0C7U</b>	134
BCC M425-0000-1A-100-PW3534-050	<b>BCC0C7T</b>	134
BCC M425-0000-1A-100-PW3534-100	<b>BCC0C7R</b>	134
BCC M425-M313-3F-300-PX0334-003	<b>BCC03MU</b>	69
BCC M425-M313-3F-300-PX0334-006	<b>BCC03MW</b>	69
BCC M425-M313-3F-300-PX0334-010	<b>BCC03MY</b>	69
BCC M425-M313-3F-300-PX0334-015	<b>BCC03MZ</b>	69
BCC M425-M313-3F-300-PX0334-020	<b>BCC03NO</b>	69
BCC M425-M313-3F-300-PX0334-030	<b>BCC03N1</b>	69
BCC M425-M313-3F-300-PX0334-050	<b>BCC03N2</b>	69
BCC M425-M313-3F-300-VX8334-003	<b>BCC03PC</b>	69
BCC M425-M313-3F-300-VX8334-006	<b>BCC03PE</b>	69
BCC M425-M313-3F-300-VX8334-010	<b>BCC03PF</b>	69
BCC M425-M313-3F-300-VX8334-015	<b>BCC03PH</b>	69
BCC M425-M313-3F-300-VX8334-020	<b>BCC03PJ</b>	69
BCC M425-M313-3F-300-VX8334-030	<b>BCC03PK</b>	69
BCC M425-M313-3F-300-VX8334-050	<b>BCC03PL</b>	69
BCC M425-M313-3F-602-PX0334-003	<b>BCC03NA</b>	69
BCC M425-M313-3F-602-PX0334-006	<b>BCC03NC</b>	69
BCC M425-M313-3F-602-PX0334-010	<b>BCC03NE</b>	69
BCC M425-M313-3F-602-PX0334-015	<b>BCC03NF</b>	69
BCC M425-M313-3F-602-PX0334-020	<b>BCC03NH</b>	69
BCC M425-M313-3F-602-PX0334-030	<b>BCC03NJ</b>	69
BCC M425-M313-3F-602-PX0334-050	<b>BCC03NK</b>	69
BCC M425-M313-3F-602-VX8334-003	<b>BCC03PY</b>	69
BCC M425-M313-3F-602-VX8334-006	<b>BCC03PZ</b>	69
BCC M425-M313-3F-602-VX8334-010	<b>BCC03RO</b>	69
BCC M425-M313-3F-602-VX8334-015	<b>BCC03R1</b>	69
BCC M425-M313-3F-602-VX8334-020	<b>BCC03R2</b>	69
BCC M425-M313-3F-602-VX8334-030	<b>BCC03R3</b>	69
BCC M425-M313-3F-602-VX8334-050	<b>BCC03R4</b>	69
BCC M425-M314-3F-304-PX0434-003	<b>BCC03RZ</b>	71
BCC M425-M314-3F-304-PX0434-006	<b>BCC03T0</b>	71
BCC M425-M314-3F-304-PX0434-010	<b>BCC03T1</b>	71
BCC M425-M314-3F-304-PX0434-015	<b>BCC03T2</b>	71
BCC M425-M314-3F-304-PX0434-020	<b>BCC03T3</b>	71
BCC M425-M314-3F-304-PX0434-030	<b>BCC03T4</b>	71
BCC M425-M314-3F-304-PX0434-050	<b>BCC03T5</b>	71
BCC M425-M314-3F-304-VX8434-003	<b>BCC03U7</b>	71
BCC M425-M314-3F-304-VX8434-006	<b>BCC03U8</b>	71
BCC M425-M314-3F-304-VX8434-010	<b>BCC03U9</b>	71
BCC M425-M314-3F-304-VX8434-015	<b>BCC03UA</b>	71
BCC M425-M314-3F-304-VX8434-020	<b>BCC03UC</b>	71
BCC M425-M314-3F-304-VX8434-030	<b>BCC03UE</b>	71
BCC M425-M314-3F-304-VX8434-050	<b>BCC03UF</b>	71
BCC M425-M314-3F-606-PX0434-003	<b>BCC03TF</b>	72
BCC M425-M314-3F-606-PX0434-006	<b>BCC03TH</b>	72
BCC M425-M314-3F-606-PX0434-010	<b>BCC03TJ</b>	72
BCC M425-M314-3F-606-PX0434-015	<b>BCC03TK</b>	72
BCC M425-M314-3F-606-PX0434-020	<b>BCC03TL</b>	72
BCC M425-M314-3F-606-PX0434-030	<b>BCC03TM</b>	72
BCC M425-M314-3F-606-PX0434-050	<b>BCC03TN</b>	72
BCC M425-M314-3F-606-VX8434-003	<b>BCC03UR</b>	72
BCC M425-M314-3F-606-VX8434-006	<b>BCC03UT</b>	72
BCC M425-M314-3F-606-VX8434-010	<b>BCC03UU</b>	72
BCC M425-M314-3F-606-VX8434-015	<b>BCC03UW</b>	72
BCC M425-M314-3F-606-VX8434-020	<b>BCC03UY</b>	72
BCC M425-M314-3F-606-VX8434-030	<b>BCC03UZ</b>	72
BCC M425-M314-3F-606-VX8434-050	<b>BCC03W0</b>	72
BCC M425-M323-3F-300-PX0334-003	<b>BCC03N3</b>	70
BCC M425-M323-3F-300-PX0334-006	<b>BCC03N4</b>	70

# Alphanumeric Index

## Sorted by part number

Part number	Ordering code	Page	Part number	Ordering code	Page
BCC M425-M323-3F-300-PX0334-010	<b>BCC03N5</b>	70	BCC M425-M413-3A-602-VX8334-010	<b>BCC0399</b>	75
BCC M425-M323-3F-300-PX0334-015	<b>BCC03N6</b>	70	BCC M425-M413-3A-602-VX8334-015	<b>BCC039A</b>	75
BCC M425-M323-3F-300-PX0334-020	<b>BCC03N7</b>	70	BCC M425-M413-3A-602-VX8334-020	<b>BCC039C</b>	75
BCC M425-M323-3F-300-PX0334-030	<b>BCC03N8</b>	70	BCC M425-M413-3A-602-VX8334-030	<b>BCC039E</b>	75
BCC M425-M323-3F-300-PX0334-050	<b>BCC03N9</b>	70	BCC M425-M413-3A-602-VX8334-050	<b>BCC039F</b>	75
BCC M425-M323-3F-300-VX8334-003	<b>BCC03PM</b>	70	BCC M425-M414-3A-304-PW0434-003	<b>BCC0ANP</b>	128
BCC M425-M323-3F-300-VX8334-006	<b>BCC03PN</b>	70	BCC M425-M414-3A-304-PW0434-006	<b>BCC0ANR</b>	128
BCC M425-M323-3F-300-VX8334-010	<b>BCC03PP</b>	70	BCC M425-M414-3A-304-PW0434-010	<b>BCC0ANT</b>	128
BCC M425-M323-3F-300-VX8334-015	<b>BCC03PR</b>	70	BCC M425-M414-3A-304-PW0434-015	<b>BCC0ANU</b>	128
BCC M425-M323-3F-300-VX8334-020	<b>BCC03PT</b>	70	BCC M425-M414-3A-304-PW0434-020	<b>BCC0ANW</b>	128
BCC M425-M323-3F-300-VX8334-030	<b>BCC03PU</b>	70	BCC M425-M414-3A-304-PW0434-030	<b>BCC0ANZ</b>	128
BCC M425-M323-3F-300-VX8334-050	<b>BCC03PW</b>	70	BCC M425-M414-3A-304-PX0434-003	<b>BCC03A8</b>	77
BCC M425-M323-3F-602-PX0334-003	<b>BCC03NL</b>	70	BCC M425-M414-3A-304-PX0434-006	<b>BCC03A9</b>	77
BCC M425-M323-3F-602-PX0334-006	<b>BCC03NM</b>	70	BCC M425-M414-3A-304-PX0434-010	<b>BCC03AA</b>	77
BCC M425-M323-3F-602-PX0334-010	<b>BCC03NN</b>	70	BCC M425-M414-3A-304-PX0434-015	<b>BCC03AC</b>	77
BCC M425-M323-3F-602-PX0334-015	<b>BCC03NP</b>	70	BCC M425-M414-3A-304-PX0434-020	<b>BCC03AE</b>	77
BCC M425-M323-3F-602-PX0334-020	<b>BCC03NR</b>	70	BCC M425-M414-3A-304-PX0434-030	<b>BCC03AF</b>	77
BCC M425-M323-3F-602-PX0334-030	<b>BCC03NT</b>	70	BCC M425-M414-3A-304-PX0434-050	<b>BCC03AH</b>	77
BCC M425-M323-3F-602-PX0334-050	<b>BCC03NU</b>	70	BCC M425-M414-3A-304-VX8434-003	<b>BCC03E3</b>	77
BCC M425-M323-3F-602-VX8334-003	<b>BCC03R5</b>	70	BCC M425-M414-3A-304-VX8434-006	<b>BCC03E4</b>	77
BCC M425-M323-3F-602-VX8334-006	<b>BCC03R6</b>	70	BCC M425-M414-3A-304-VX8434-010	<b>BCC03E5</b>	77
BCC M425-M323-3F-602-VX8334-010	<b>BCC03R7</b>	70	BCC M425-M414-3A-304-VX8434-015	<b>BCC03E6</b>	77
BCC M425-M323-3F-602-VX8334-015	<b>BCC03R8</b>	70	BCC M425-M414-3A-304-VX8434-020	<b>BCC03E7</b>	77
BCC M425-M323-3F-602-VX8334-020	<b>BCC03R9</b>	70	BCC M425-M414-3A-304-VX8434-030	<b>BCC03E8</b>	77
BCC M425-M323-3F-602-VX8334-030	<b>BCC03RA</b>	70	BCC M425-M414-3A-304-VX8434-050	<b>BCC03E9</b>	77
BCC M425-M323-3F-602-VX8334-050	<b>BCC03RC</b>	70	BCC M425-M414-3A-606-PX0434-003	<b>BCC03AT</b>	77
BCC M425-M324-3F-304-PX0434-003	<b>BCC03T6</b>	72	BCC M425-M414-3A-606-PX0434-006	<b>BCC03AU</b>	77
BCC M425-M324-3F-304-PX0434-006	<b>BCC03T7</b>	72	BCC M425-M414-3A-606-PX0434-010	<b>BCC03AW</b>	77
BCC M425-M324-3F-304-PX0434-010	<b>BCC03T8</b>	72	BCC M425-M414-3A-606-PX0434-015	<b>BCC03AY</b>	77
BCC M425-M324-3F-304-PX0434-015	<b>BCC03T9</b>	72	BCC M425-M414-3A-606-PX0434-020	<b>BCC03AZ</b>	77
BCC M425-M324-3F-304-PX0434-020	<b>BCC03TA</b>	72	BCC M425-M414-3A-606-PX0434-030	<b>BCC03C0</b>	77
BCC M425-M324-3F-304-PX0434-030	<b>BCC03TC</b>	72	BCC M425-M414-3A-606-PX0434-050	<b>BCC03C1</b>	77
BCC M425-M324-3F-304-PX0434-050	<b>BCC03TE</b>	72	BCC M425-M414-3A-606-VX8434-003	<b>BCC03EL</b>	77
BCC M425-M324-3F-304-VX8434-003	<b>BCC03UH</b>	72	BCC M425-M414-3A-606-VX8434-006	<b>BCC03EM</b>	77
BCC M425-M324-3F-304-VX8434-006	<b>BCC03UJ</b>	72	BCC M425-M414-3A-606-VX8434-010	<b>BCC03EN</b>	77
BCC M425-M324-3F-304-VX8434-010	<b>BCC03UK</b>	72	BCC M425-M414-3A-606-VX8434-015	<b>BCC03EP</b>	77
BCC M425-M324-3F-304-VX8434-015	<b>BCC03UL</b>	72	BCC M425-M414-3A-606-VX8434-020	<b>BCC03ER</b>	77
BCC M425-M324-3F-304-VX8434-020	<b>BCC03UM</b>	72	BCC M425-M414-3A-606-VX8434-030	<b>BCC03ET</b>	77
BCC M425-M324-3F-304-VX8434-030	<b>BCC03UN</b>	72	BCC M425-M414-3A-606-VX8434-050	<b>BCC03EU</b>	77
BCC M425-M324-3F-304-VX8434-050	<b>BCC03UP</b>	72	BCC M425-M414-3A-650-PW0434-003	<b>BCC0ANE</b>	128
BCC M425-M413-3A-300-PX0334-003	<b>BCC037E</b>	75	BCC M425-M414-3A-650-PW0434-006	<b>BCC0ANF</b>	128
BCC M425-M413-3A-300-PX0334-006	<b>BCC037F</b>	75	BCC M425-M414-3A-650-PW0434-010	<b>BCC0ANH</b>	128
BCC M425-M413-3A-300-PX0334-010	<b>BCC037H</b>	75	BCC M425-M414-3A-650-PW0434-015	<b>BCC0ANJ</b>	128
BCC M425-M413-3A-300-PX0334-015	<b>BCC037J</b>	75	BCC M425-M414-3A-650-PW0434-020	<b>BCC0ANK</b>	128
BCC M425-M413-3A-300-PX0334-020	<b>BCC037K</b>	75	BCC M425-M414-3A-650-PW0434-050	<b>BCC0ANM</b>	128
BCC M425-M413-3A-300-PX0334-030	<b>BCC037L</b>	75	BCC M425-M414-3A-650-PX0434-003	<b>BCC03C2</b>	78
BCC M425-M413-3A-300-PX0334-050	<b>BCC037M</b>	75	BCC M425-M414-3A-650-PX0434-006	<b>BCC03C3</b>	78
BCC M425-M413-3A-300-VX8334-003	<b>BCC038P</b>	75	BCC M425-M414-3A-650-PX0434-010	<b>BCC03C4</b>	78
BCC M425-M413-3A-300-VX8334-006	<b>BCC038R</b>	75	BCC M425-M414-3A-650-PX0434-015	<b>BCC03C5</b>	78
BCC M425-M413-3A-300-VX8334-010	<b>BCC038T</b>	75	BCC M425-M414-3A-650-PX0434-020	<b>BCC03C6</b>	78
BCC M425-M413-3A-300-VX8334-015	<b>BCC038U</b>	75	BCC M425-M414-3A-650-PX0434-030	<b>BCC03C7</b>	78
BCC M425-M413-3A-300-VX8334-020	<b>BCC038W</b>	75	BCC M425-M414-3A-650-PX0434-050	<b>BCC03C8</b>	78
BCC M425-M413-3A-300-VX8334-030	<b>BCC038Y</b>	75	BCC M425-M414-3A-650-VX8434-003	<b>BCC03EW</b>	78
BCC M425-M413-3A-300-VX8334-050	<b>BCC038Z</b>	75	BCC M425-M414-3A-650-VX8434-006	<b>BCC03Y4</b>	78
BCC M425-M413-3A-602-PX0334-003	<b>BCC037Z</b>	75	BCC M425-M414-3A-650-VX8434-010	<b>BCC03EZ</b>	78
BCC M425-M413-3A-602-PX0334-006	<b>BCC0380</b>	75	BCC M425-M414-3A-650-VX8434-015	<b>BCC03F0</b>	78
BCC M425-M413-3A-602-PX0334-010	<b>BCC0381</b>	75	BCC M425-M414-3A-650-VX8434-020	<b>BCC03F1</b>	78
BCC M425-M413-3A-602-PX0334-015	<b>BCC0382</b>	75	BCC M425-M414-3A-650-VX8434-030	<b>BCC03F2</b>	78
BCC M425-M413-3A-602-PX0334-020	<b>BCC0383</b>	75	BCC M425-M414-3A-650-VX8434-050	<b>BCC03F3</b>	78
BCC M425-M413-3A-602-PX0334-030	<b>BCC0384</b>	75	BCC M425-M414-3A-691-PW3434-003	<b>BCC0C4K</b>	135
BCC M425-M413-3A-602-PX0334-050	<b>BCC0385</b>	75	BCC M425-M414-3A-691-PW3434-006	<b>BCC0C52</b>	135
BCC M425-M413-3A-602-VX8334-003	<b>BCC0397</b>	75	BCC M425-M414-3A-691-PW3434-010	<b>BCC0C4L</b>	135
BCC M425-M413-3A-602-VX8334-006	<b>BCC0398</b>	75	BCC M425-M414-3A-691-PW3434-015	<b>BCC0C4M</b>	135

# Alphanumeric Index

## Sorted by part number

Part number	Ordering code	Page
BCC M425-M414-3A-691-PW3434-020	<b>BCC0C4N</b>	135
BCC M425-M414-3A-691-PW3434-030	<b>BCC0C4P</b>	135
BCC M425-M414-3A-691-PW3434-050	<b>BCC0C4R</b>	135
BCC M425-M415-3A-312-PX0534-003	<b>BCC08H8</b>	81
BCC M425-M415-3A-312-PX0534-006	<b>BCC08H9</b>	81
BCC M425-M415-3A-312-PX0534-010	<b>BCC08HA</b>	81
BCC M425-M415-3A-312-PX0534-015	<b>BCC08HC</b>	81
BCC M425-M415-3A-312-PX0534-020	<b>BCC08HE</b>	81
BCC M425-M415-3A-312-PX0534-030	<b>BCC08HF</b>	81
BCC M425-M415-3A-312-PX0534-050	<b>BCC08HH</b>	81
BCC M425-M415-3A-313-PW0534-006	<b>BCC0AKH</b>	129
BCC M425-M415-3A-313-PW0534-010	<b>BCC0AKJ</b>	129
BCC M425-M415-3A-313-PW0534-020	<b>BCC0AKK</b>	129
BCC M425-M415-3A-313-PW0534-030	<b>BCC0AKL</b>	129
BCC M425-M415-3A-313-PW0534-050	<b>BCC0AKM</b>	129
BCC M425-M415-3A-313-PX0534-003	<b>BCC08H0</b>	81
BCC M425-M415-3A-313-PX0534-006	<b>BCC08H1</b>	81
BCC M425-M415-3A-313-PX0534-010	<b>BCC08H2</b>	81
BCC M425-M415-3A-313-PX0534-015	<b>BCC08H3</b>	81
BCC M425-M415-3A-313-PX0534-020	<b>BCC08H4</b>	81
BCC M425-M415-3A-313-PX0534-030	<b>BCC08H5</b>	81
BCC M425-M415-3A-313-PX0534-050	<b>BCC08H6</b>	81
BCC M425-M415-3A-660-PX0534-003	<b>BCC09FA</b>	81
BCC M425-M415-3A-660-PX0534-006	<b>BCC09FC</b>	81
BCC M425-M415-3A-660-PX0534-010	<b>BCC09FE</b>	81
BCC M425-M415-3A-660-PX0534-015	<b>BCC09FH</b>	81
BCC M425-M415-3A-660-PX0534-020	<b>BCC09FF</b>	81
BCC M425-M415-3A-660-PX0534-030	<b>BCC09FJ</b>	81
BCC M425-M415-3A-660-PX0534-050	<b>BCC09FK</b>	81
BCC M425-M415-3A-661-PW0534-006	<b>BCC0C0N</b>	129
BCC M425-M415-3A-661-PW0534-010	<b>BCC0C0P</b>	129
BCC M425-M415-3A-661-PW0534-015	<b>BCC0C0R</b>	129
BCC M425-M415-3A-661-PW0534-020	<b>BCC0C0T</b>	129
BCC M425-M415-3A-661-PW0534-030	<b>BCC0C0U</b>	129
BCC M425-M415-3A-661-PW0534-050	<b>BCC0C0W</b>	129
BCC M425-M415-3A-661-PX0534-003	<b>BCC09F9</b>	82
BCC M425-M415-3A-661-PX0534-006	<b>BCC09F8</b>	82
BCC M425-M415-3A-661-PX0534-010	<b>BCC09F7</b>	82
BCC M425-M415-3A-661-PX0534-015	<b>BCC09F3</b>	82
BCC M425-M415-3A-661-PX0534-020	<b>BCC09F4</b>	82
BCC M425-M415-3A-661-PX0534-030	<b>BCC09F5</b>	82
BCC M425-M415-3A-661-PX0534-050	<b>BCC09F6</b>	82
BCC M425-M415-3A-692-PW3534-003	<b>BCC0C4T</b>	135
BCC M425-M415-3A-692-PW3534-006	<b>BCC0C4U</b>	135
BCC M425-M415-3A-692-PW3534-010	<b>BCC0C4W</b>	135
BCC M425-M415-3A-692-PW3534-015	<b>BCC0C4Y</b>	135
BCC M425-M415-3A-692-PW3534-020	<b>BCC0C4Z</b>	135
BCC M425-M415-3A-692-PW3534-030	<b>BCC0C50</b>	135
BCC M425-M415-3A-692-PW3534-050	<b>BCC0C51</b>	135
BCC M425-M415-3A-692-PX0534-003	<b>BCC0C4J</b>	82
BCC M425-M415-3A-692-PX0534-006	<b>BCC0C4H</b>	82
BCC M425-M415-3A-692-PX0534-010	<b>BCC0C4F</b>	82
BCC M425-M415-3A-692-PX0534-015	<b>BCC0C4E</b>	82
BCC M425-M415-3A-692-PX0534-020	<b>BCC0C4G</b>	82
BCC M425-M415-3A-692-PX0534-030	<b>BCC0C4A</b>	82
BCC M425-M415-3A-692-PX0534-050	<b>BCC0C49</b>	82
BCC M425-M424-3A-304-PX0434-003	<b>BCC03AJ</b>	78
BCC M425-M424-3A-304-PX0434-006	<b>BCC03AK</b>	78
BCC M425-M424-3A-304-PX0434-010	<b>BCC03AL</b>	78
BCC M425-M424-3A-304-PX0434-015	<b>BCC03AM</b>	78
BCC M425-M424-3A-304-PX0434-020	<b>BCC03AN</b>	78
BCC M425-M424-3A-304-PX0434-030	<b>BCC03AP</b>	78
BCC M425-M424-3A-304-PX0434-050	<b>BCC03AR</b>	78

Part number	Ordering code	Page
BCC M425-M424-3A-304-VX8434-003	<b>BCC03EA</b>	78
BCC M425-M424-3A-304-VX8434-006	<b>BCC03EC</b>	78
BCC M425-M424-3A-304-VX8434-010	<b>BCC03EE</b>	78
BCC M425-M424-3A-304-VX8434-015	<b>BCC03EF</b>	78
BCC M425-M424-3A-304-VX8434-020	<b>BCC03EH</b>	78
BCC M425-M424-3A-304-VX8434-030	<b>BCC03EJ</b>	78
BCC M425-M424-3A-304-VX8434-050	<b>BCC03EK</b>	78
BCC M425-M425-3A-660-PX0534-003	<b>BCC08FF</b>	83
BCC M425-M425-3A-660-PX0534-006	<b>BCC08FH</b>	83
BCC M425-M425-3A-660-PX0534-010	<b>BCC08FJ</b>	83
BCC M425-M425-3A-660-PX0534-015	<b>BCC08FK</b>	83
BCC M425-M425-3A-660-PX0534-020	<b>BCC08FL</b>	83
BCC M425-M425-3A-660-PX0534-030	<b>BCC08FM</b>	83
BCC M425-M425-3A-660-PX0534-050	<b>BCC08FN</b>	83
BCC M425-M425-3A-661-PX0534-003	<b>BCC08FP</b>	83
BCC M425-M425-3A-661-PX0534-006	<b>BCC08FR</b>	83
BCC M425-M425-3A-661-PX0534-010	<b>BCC08FT</b>	83
BCC M425-M425-3A-661-PX0534-015	<b>BCC08FU</b>	83
BCC M425-M425-3A-661-PX0534-020	<b>BCC08FW</b>	83
BCC M425-M425-3A-661-PX0534-030	<b>BCC08FY</b>	83
BCC M425-M425-3A-661-PX0534-050	<b>BCC08FZ</b>	83
BCC M428-0000-1A-044-PX0825-020	<b>BCC06K4</b>	63
BCC M428-0000-1A-044-PX0825-050	<b>BCC06K5</b>	63
BCC M428-0000-1A-044-PX0825-100	<b>BCC06K6</b>	63
BCC M428-0000-1A-045-PX0825-020	<b>BCC09H8</b>	64
BCC M428-0000-1A-045-PX0825-050	<b>BCC09H9</b>	64
BCC M428-0000-1A-045-PX0825-100	<b>BCC09HA</b>	64
BCC M428-0000-1A-046-PS0825-020	<b>BCC0997</b>	63
BCC M428-0000-1A-046-PS0825-050	<b>BCC0998</b>	63
BCC M428-0000-1A-046-PS0825-100	<b>BCC0999</b>	63
BCC M428-0000-2A-044-PX0825-020	<b>BCC06JY</b>	65
BCC M428-0000-2A-044-PX0825-050	<b>BCC06JZ</b>	65
BCC M428-0000-2A-044-PX0825-100	<b>BCC06K0</b>	65
BCC M428-0000-2A-044-VX0825-020	<b>BCC06KA</b>	65
BCC M428-0000-2A-044-VX0825-050	<b>BCC06KC</b>	65
BCC M428-0000-2A-044-VX0825-100	<b>BCC06KE</b>	65
BCC M42C-0000-1A-049-PX0C25-050	<b>BCC0942</b>	66
BCC M42C-0000-1A-049-PX0C25-100	<b>BCC0943</b>	66
BCC M42C-0000-2A-049-PX0C25-020	<b>BCC0941</b>	67
BCC M42C-0000-2A-049-PX0C25-050	<b>BCC09M5</b>	67
BCC M42C-0000-2A-049-PX0C25-100	<b>BCC09M4</b>	67
BCC M434-0000-2A-000-41X475-000	<b>BCC06M4</b>	88
BCC M434-0000-2A-000-43X434-000	<b>BCC08C0</b>	88
BCC M434-0000-2A-000-51X475-000	<b>BCC06F7</b>	88, 184, 190
BCC M434-0000-2A-000-55X450-000	<b>BCC06Y5</b>	88, 184, 190
BCC M435-0000-1A-000-41X475-000	<b>BCC06Z9</b>	86
BCC M435-0000-1A-000-43X434-000	<b>BCC06ZY</b>	87
BCC M435-0000-1A-000-51X475-000	<b>BCC06F6</b>	86, 184, 190
BCC M435-0000-1A-000-51X575-000	<b>BCC06W9</b>	90
BCC M435-0000-1A-000-55X450-000	<b>BCC06Y6</b>	86, 184, 190
BCC M435-0000-1A-000-A1X575-000	<b>BCC09JP</b>	92
BCC M435-0000-2A-000-41X575-000	<b>BCC06YA</b>	90
BCC M435-0000-2A-000-51X575-000	<b>BCC06EY</b>	90
BCC M435-0000-2A-000-A1X575-000	<b>BCC09JW</b>	92
BCC M435-000-1A-000-41X575-000	<b>BCC06ZF</b>	90
BCC M444-0000-2A-000-41X475-000	<b>BCC06ZC</b>	89
BCC M444-0000-2A-000-51X475-000	<b>BCC06ZE</b>	89
BCC M445-0000-1A-000-41X475-000	<b>BCC06ZA</b>	87
BCC M445-0000-1A-000-51X475-000	<b>BCC06Y8</b>	87
BCC M445-0000-1A-000-51X575-000	<b>BCC06ZJ</b>	90
BCC M445-0000-2A-000-51X575-000	<b>BCC06ZL</b>	91
BCC M445-000-1A-000-41X575-000	<b>BCC06ZH</b>	90
BCC M445-000-2A-000-41X575-000	<b>BCC06ZK</b>	91



# Alphanumeric Index

## Sorted by part number

Part number	Ordering code	Page	Part number	Ordering code	Page
BCC M452-0000-2B-RM080-002	<b>BCC0E40</b>	175	BCC S425-0000-1A-003-VX8434-100	<b>BCC06MF</b>	122
BCC M454-0000-2A-RM020-005	<b>BCC099A</b>	94	BCC S425-0000-1A-003-VX8434-150	<b>BCC06MH</b>	122
BCC M454-0000-2A-RM020-020	<b>BCC0E53</b>	94	BCC S425-0000-1A-003-VX8434-200	<b>BCC06MJ</b>	122
BCC M454-M454-5D-RM002-000	<b>BCC06YP</b>	181, 201	BCC S425-0000-1A-003-VX8434-250	<b>BCC06MK</b>	122
BCC M455-0000-1A-RM014-005	<b>BCC09JZ</b>	95	BCC S425-0000-1A-003-VX8434-300	<b>BCC06ML</b>	122
BCC M455-0000-1A-RM014-020	<b>BCC0E54</b>	95	BCC S425-0000-1A-003-VX8434-350	<b>BCC06MM</b>	122
BCC M455-0000-1A-RM020-005	<b>BCC099C</b>	94	BCC S425-0000-1A-004-PX0334-020	<b>BCC08CM</b>	121
BCC M455-0000-1A-RM020-020	<b>BCC0CAE</b>	94	BCC S425-0000-1A-004-PX0334-030	<b>BCC08CN</b>	121
BCC M455-0000-1B-RM080-002	<b>BCC0E3Z</b>	175	BCC S425-0000-1A-004-PX0334-050	<b>BCC08CP</b>	121
BCC M455-0000-2A-RM014-005	<b>BCC09K0</b>	95	BCC S425-0000-1A-004-PX0334-100	<b>BCC08CR</b>	121
BCC M455-0000-2A-RM014-020	<b>BCC0E5F</b>	95	BCC S425-0000-1A-004-PX0334-150	<b>BCC06UE</b>	121
BCC M458-0000-1A-RM015-005	<b>BCC0E55</b>	96	BCC S425-0000-1A-004-PX0334-200	<b>BCC06UF</b>	121
BCC M458-0000-1A-RM015-020	<b>BCC0E56</b>	96	BCC S425-0000-1A-004-PX0334-250	<b>BCC06UH</b>	121
BCC M458-0000-2A-RM015-005	<b>BCC0E57</b>	96	BCC S425-0000-1A-004-PX0334-400	<b>BCC06UJ</b>	121
BCC M458-0000-2A-RM015-020	<b>BCC0E58</b>	96	BCC S425-0000-1A-004-VX8334-050	<b>BCC0A2L</b>	121
BCC M45C-0000-1A-RM081-005	<b>BCC0E59</b>	97	BCC S425-0000-1A-004-VX8334-100	<b>BCC0A2M</b>	121
BCC M45C-0000-1A-RM081-020	<b>BCC0E5A</b>	97	BCC S425-0000-1A-004-VX8334-150	<b>BCC06U9</b>	121
BCC M45C-0000-2A-RM081-005	<b>BCC0E5C</b>	97	BCC S425-0000-1A-004-VX8334-200	<b>BCC06UA</b>	121
BCC M45C-0000-2A-RM081-020	<b>BCC0E5E</b>	97	BCC S425-0000-1A-004-VX8334-250	<b>BCC06UC</b>	121
BCC M474-0000-1D-000-51X475-000	<b>BCC03Y1</b>	178, 198	BCC S425-0000-1A-008-PX0434-050	<b>BCC08CU</b>	122
BCC M474-0000-2D-000-51X475-000	<b>BCC03WZ</b>	179, 199	BCC S425-0000-1A-008-PX0434-100	<b>BCC0A2K</b>	122
BCC M475-0000-1B-000-01X575-000	<b>BCC0715</b>	170	BCC S425-0000-1A-008-VX0434-050	<b>BCC0CTE</b>	122
BCC M475-0000-2B-000-01X575-000	<b>BCC0714</b>	171	BCC S425-0000-1A-008-VX0434-100	<b>BCC0CTC</b>	122
BCC M478-0000-1A-000-43X834-000	<b>BCC04MC</b>	91	BCC S425-0000-1A-008-VX0434-150	<b>BCC0CTA</b>	122
BCC M484-0000-1D-000-51X475-000	<b>BCC03Y2</b>	178, 198	BCC S425-0000-1A-008-VX0434-200	<b>BCC0CT9</b>	122
BCC M484-0000-2D-000-51X475-000	<b>BCC03Y0</b>	179, 199	BCC S425-0000-1A-008-VX0434-250	<b>BCC0CT8</b>	122
BCC M485-0000-1B-000-01X575-000	<b>BCC0717</b>	170	BCC S445-0000-1A-000-51X475-000-C024	<b>BCC0CAA</b>	93
BCC M485-0000-2B-000-01X575-000	<b>BCC0716</b>	171	BCC VA04-0000-10-053-PX0350-020	<b>BCC04W0</b>	156
BCC M488-0000-1A-000-43X834-000	<b>BCC04ME</b>	91	BCC VA04-0000-10-053-PX0350-050	<b>BCC04W1</b>	156
BCC M61C-0000-10-065-PX0BP4-020	<b>BCC06KN</b>	100	BCC VA04-0000-10-053-PX0350-100	<b>BCC04W2</b>	156
BCC M61C-0000-10-065-PX0BP4-050	<b>BCC06KP</b>	100	BCC VA04-0000-10-053-VX8350-020	<b>BCC04W3</b>	156
BCC M61C-0000-10-065-PX0BP4-100	<b>BCC06KR</b>	100	BCC VA04-0000-10-053-VX8350-050	<b>BCC04W4</b>	156
BCC M61C-M41C-3E-675-PX0C25-006	<b>BCC088M</b>	102	BCC VA04-0000-10-053-VX8350-100	<b>BCC04W5</b>	156
BCC M61C-M41C-3E-675-PX0C25-010	<b>BCC088N</b>	102	BCC VA04-0000-10-054-PX0350-020	<b>BCC04W6</b>	156
BCC M61C-M41C-3E-675-PX0C25-020	<b>BCC088P</b>	102	BCC VA04-0000-10-054-PX0350-050	<b>BCC04W7</b>	156
BCC M61L-0000-10-022-PX0LP4-020	<b>BCC06KY</b>	101	BCC VA04-0000-10-054-PX0350-100	<b>BCC04W8</b>	156
BCC M61L-0000-10-022-PX0LP4-050	<b>BCC06KZ</b>	101	BCC VA04-0000-10-054-VX8350-020	<b>BCC04W9</b>	156
BCC M61L-0000-10-022-PX0LP4-100	<b>BCC06L0</b>	101	BCC VA04-0000-10-054-VX8350-050	<b>BCC04WA</b>	156
BCC M62C-0000-10-065-PX0BP4-020	<b>BCC06KT</b>	101	BCC VA04-0000-10-054-VX8350-100	<b>BCC04WC</b>	156
BCC M62C-0000-10-065-PX0BP4-050	<b>BCC06KU</b>	101	BCC VA04-M413-3E-664-PX0350-003	<b>BCC04WF</b>	157
BCC M62C-0000-10-065-PX0BP4-100	<b>BCC06KW</b>	101	BCC VA04-M413-3E-664-PX0350-006	<b>BCC04WH</b>	157
BCC M62C-M41C-3E-675-PX0C25-006	<b>BCC088R</b>	102	BCC VA04-M413-3E-664-PX0350-010	<b>BCC0502</b>	157
BCC M62C-M41C-3E-675-PX0C25-010	<b>BCC088T</b>	102	BCC VA04-M413-3E-664-PX0350-015	<b>BCC04WJ</b>	157
BCC M62C-M41C-3E-675-PX0C25-020	<b>BCC088U</b>	102	BCC VA04-M413-3E-664-PX0350-020	<b>BCC04WK</b>	157
BCC M62L-0000-10-022-PX0LP4-020	<b>BCC06L1</b>	101	BCC VA04-M413-3E-664-PX0350-030	<b>BCC04WL</b>	157
BCC M62L-0000-10-022-PX0LP4-050	<b>BCC06L2</b>	101	BCC VA04-M413-3E-664-PX0350-050	<b>BCC04WM</b>	157
BCC M62L-0000-10-022-PX0LP4-100	<b>BCC06L3</b>	101	BCC VB03-0000-10-055-PX0350-020	<b>BCC03YC</b>	158
BCC PA04-0000-10-070-PX0550-020	<b>BCC071A</b>	164	BCC VB03-0000-10-055-PX0350-050	<b>BCC03YE</b>	158
BCC PA04-0000-10-070-PX0550-050	<b>BCC071C</b>	164	BCC VB03-0000-10-055-PX0350-100	<b>BCC03YF</b>	158
BCC PA04-0000-10-070-PX0550-100	<b>BCC071E</b>	164	BCC VB03-0000-10-055-VX8350-020	<b>BCC03ZZ</b>	158
BCC PA24-0000-10-070-PX0550-020	<b>BCC071F</b>	164	BCC VB03-0000-10-055-VX8350-050	<b>BCC0400</b>	158
BCC PA24-0000-10-070-PX0550-050	<b>BCC071H</b>	164	BCC VB03-0000-10-055-VX8350-100	<b>BCC0401</b>	158
BCC PA24-0000-10-070-PX0550-100	<b>BCC071J</b>	164	BCC VB03-M413-3E-666-PX0350-003	<b>BCC064E</b>	159
BCC S323-0000-10-004-PX0334-020	<b>BCC08CZ</b>	121	BCC VB03-M413-3E-666-PX0350-006	<b>BCC064F</b>	159
BCC S323-0000-10-004-PX0334-030	<b>BCC0A2F</b>	121	BCC VB03-M413-3E-666-PX0350-010	<b>BCC064H</b>	159
BCC S323-0000-10-004-PX0334-050	<b>BCC08E0</b>	121	BCC VB03-M413-3E-666-PX0350-015	<b>BCC064J</b>	159
BCC S323-0000-10-004-PX0334-100	<b>BCC0A2H</b>	121	BCC VB03-M413-3E-666-PX0350-020	<b>BCC064K</b>	159
BCC S415-0000-1A-003-VX8434-100	<b>BCC06M7</b>	121	BCC VB03-M413-3E-666-PX0350-030	<b>BCC064L</b>	159
BCC S415-0000-1A-003-VX8434-150	<b>BCC06M8</b>	121	BCC VB03-M413-3E-666-PX0350-050	<b>BCC064M</b>	159
BCC S415-0000-1A-003-VX8434-200	<b>BCC06M9</b>	121	BCC VB23-0000-10-055-PX0350-020	<b>BCC03YH</b>	158
BCC S415-0000-1A-003-VX8434-250	<b>BCC06MA</b>	121	BCC VB23-0000-10-055-PX0350-050	<b>BCC03YJ</b>	158
BCC S415-0000-1A-003-VX8434-300	<b>BCC06MC</b>	121	BCC VB23-0000-10-055-PX0350-100	<b>BCC03YK</b>	158
BCC S415-0000-1A-003-VX8434-350	<b>BCC06ME</b>	121	BCC VB23-0000-10-055-VX8350-020	<b>BCC0402</b>	158

# Alphanumeric Index

## Sorted by part number

Part number	Ordering code	Page
BCC VB23-0000-10-055-VX8350-050	<b>BCC0403</b>	158
BCC VB23-0000-10-055-VX8350-100	<b>BCC0404</b>	158
BCC VB23-M413-3E-666-PX0350-003	<b>BCC064N</b>	159
BCC VB23-M413-3E-666-PX0350-006	<b>BCC064P</b>	159
BCC VB23-M413-3E-666-PX0350-010	<b>BCC064R</b>	159
BCC VB23-M413-3E-666-PX0350-015	<b>BCC064T</b>	159
BCC VB23-M413-3E-666-PX0350-020	<b>BCC064U</b>	159
BCC VB23-M413-3E-666-PX0350-030	<b>BCC064W</b>	159
BCC VB23-M413-3E-666-PX0350-050	<b>BCC064Y</b>	159
BCC VB43-0000-10-055-PX0350-020	<b>BCC03YL</b>	160
BCC VB43-0000-10-055-PX0350-050	<b>BCC03YM</b>	160
BCC VB43-0000-10-055-PX0350-100	<b>BCC03YN</b>	160
BCC VB43-0000-10-055-VX8350-020	<b>BCC0405</b>	160
BCC VB43-0000-10-055-VX8350-050	<b>BCC0406</b>	160
BCC VB43-0000-10-055-VX8350-100	<b>BCC0407</b>	160
BCC VB43-M413-3E-666-PX0350-003	<b>BCC064Z</b>	161
BCC VB43-M413-3E-666-PX0350-006	<b>BCC0650</b>	161
BCC VB43-M413-3E-666-PX0350-010	<b>BCC0651</b>	161
BCC VB43-M413-3E-666-PX0350-015	<b>BCC0652</b>	161
BCC VB43-M413-3E-666-PX0350-020	<b>BCC0653</b>	161
BCC VB43-M413-3E-666-PX0350-030	<b>BCC0654</b>	161
BCC VB43-M413-3E-666-PX0350-050	<b>BCC0655</b>	161
BCC VB63-0000-10-055-PX0350-020	<b>BCC03YP</b>	160
BCC VB63-0000-10-055-PX0350-050	<b>BCC03YR</b>	160
BCC VB63-0000-10-055-PX0350-100	<b>BCC03YT</b>	160
BCC VB63-0000-10-055-VX8350-020	<b>BCC0408</b>	160
BCC VB63-0000-10-055-VX8350-050	<b>BCC0409</b>	160
BCC VB63-0000-10-055-VX8350-100	<b>BCC040A</b>	160
BCC VB63-M413-3E-666-PX0350-003	<b>BCC0656</b>	161
BCC VB63-M413-3E-666-PX0350-006	<b>BCC0657</b>	161
BCC VB63-M413-3E-666-PX0350-010	<b>BCC0658</b>	161
BCC VB63-M413-3E-666-PX0350-015	<b>BCC0659</b>	161
BCC VB63-M413-3E-666-PX0350-020	<b>BCC065A</b>	161
BCC VB63-M413-3E-666-PX0350-030	<b>BCC065C</b>	161
BCC VB63-M413-3E-666-PX0350-050	<b>BCC065E</b>	161
BCC VC04-0000-10-053-PX0350-020	<b>BCC04MZ</b>	162
BCC VC04-0000-10-053-PX0350-050	<b>BCC04N0</b>	162
BCC VC04-0000-10-053-PX0350-100	<b>BCC04N1</b>	162
BCC VC04-0000-10-053-VX8350-020	<b>BCC04N2</b>	162
BCC VC04-0000-10-053-VX8350-050	<b>BCC04N3</b>	162
BCC VC04-0000-10-053-VX8350-100	<b>BCC04N4</b>	162
BCC VC04-M413-3E-664-PX0350-003	<b>BCC04NC</b>	162
BCC VC04-M413-3E-664-PX0350-006	<b>BCC04NE</b>	162
BCC VC04-M413-3E-664-PX0350-010	<b>BCC04NF</b>	162
BCC VC04-M413-3E-664-PX0350-015	<b>BCC04NH</b>	162
BCC VC04-M413-3E-664-PX0350-020	<b>BCC04NJ</b>	162
BCC VC04-M413-3E-664-PX0350-030	<b>BCC04NK</b>	162
BCC VC04-M413-3E-664-PX0350-050	<b>BCC04NL</b>	162
BCC VC44-0000-10-053-PX0350-020	<b>BCC04RF</b>	163
BCC VC44-0000-10-053-PX0350-050	<b>BCC04RH</b>	163
BCC VC44-0000-10-053-PX0350-100	<b>BCC04RJ</b>	163
BCC VC44-0000-10-053-VX8350-020	<b>BCC04RK</b>	163
BCC VC44-0000-10-053-VX8350-050	<b>BCC04RL</b>	163
BCC VC44-0000-10-053-VX8350-100	<b>BCC04RM</b>	163
BCC VC44-M413-3E-664-PX0350-003	<b>BCC04RY</b>	163
BCC VC44-M413-3E-664-PX0350-006	<b>BCC04RZ</b>	163
BCC VC44-M413-3E-664-PX0350-010	<b>BCC04T0</b>	163
BCC VC44-M413-3E-664-PX0350-015	<b>BCC04T1</b>	163
BCC VC44-M413-3E-664-PX0350-020	<b>BCC04T2</b>	163
BCC VC44-M413-3E-664-PX0350-030	<b>BCC04T3</b>	163
BCC VC44-M413-3E-664-PX0350-050	<b>BCC04T4</b>	163
BCC W313-W413-3E-300-BW8334-003	<b>BCC0EHY</b>	144
BCC W313-W413-3E-300-BW8334-006	<b>BCC0EHZ</b>	144

Part number	Ordering code	Page
BCC W313-W413-3E-300-BW8334-010	<b>BCC0EJO</b>	144
BCC W313-W413-3E-300-FW9334-003	<b>BCC0EJ1</b>	148
BCC W313-W413-3E-300-FW9334-006	<b>BCC0EJ2</b>	148
BCC W313-W413-3E-300-FW9334-010	<b>BCC0EJ3</b>	148
BCC W313-W413-3E-300-SW0334-003	<b>BCC0EMH</b>	140
BCC W313-W413-3E-300-SW0334-006	<b>BCC0EMJ</b>	140
BCC W313-W413-3E-300-SW0334-010	<b>BCC0EMK</b>	140
BCC W313-W413-3E-300-TW0334-003	<b>BCC0EHT</b>	146
BCC W313-W413-3E-300-TW0334-006	<b>BCC0EHU</b>	146
BCC W313-W413-3E-300-TW0334-010	<b>BCC0EHW</b>	146
BCC W314-W313-W313-U2050-003	<b>BCC0EW7</b>	142
BCC W314-W313-W313-U2050-006	<b>BCC0EW8</b>	142
BCC W314-W314-30-304-SW0434-003	<b>BCC0EH7</b>	140
BCC W314-W314-30-304-SW0434-006	<b>BCC0EH8</b>	140
BCC W314-W314-30-304-SW0434-010	<b>BCC0EH9</b>	140
BCC W314-W314-30-304-SW0434-015	<b>BCC0EHA</b>	140
BCC W314-W314-30-304-SW0434-020	<b>BCC0EHC</b>	140
BCC W314-W314-30-304-SW0434-030	<b>BCC0EHE</b>	140
BCC W314-W314-30-304-SW0434-050	<b>BCC0EHF</b>	140
BCC W314-W323-W323-U2050-003	<b>BCC0EW9</b>	142
BCC W314-W323-W323-U2050-006	<b>BCC0EWA</b>	142
BCC W314-W414-3E-304-SW0434-003	<b>BCC0EHO</b>	141
BCC W314-W414-3E-304-SW0434-006	<b>BCC0EH1</b>	141
BCC W314-W414-3E-304-SW0434-010	<b>BCC0EH2</b>	141
BCC W314-W414-3E-304-SW0434-015	<b>BCC0EH3</b>	141
BCC W314-W414-3E-304-SW0434-020	<b>BCC0EH4</b>	141
BCC W314-W414-3E-304-SW0434-030	<b>BCC0EH5</b>	141
BCC W314-W414-3E-304-SW0434-050	<b>BCC0EH6</b>	141
BCC W414-W313-W313-U2049-003	<b>BCC0EW3</b>	143
BCC W414-W313-W313-U2049-006	<b>BCC0EW4</b>	143
BCC W414-W323-W323-U2049-003	<b>BCC0EW5</b>	143
BCC W414-W323-W323-U2049-006	<b>BCC0EW6</b>	143
BCC W414-W415-W415-U2044-003	<b>BCC0EHH</b>	145
BCC W414-W415-W415-U2044-006	<b>BCC0EHJ</b>	145
BCC W414-W415-W415-U2045-003	<b>BCC0EL3</b>	149
BCC W414-W415-W415-U2045-006	<b>BCC0EL4</b>	149
BCC W414-W415-W415-U2046-003	<b>BCC0EHM</b>	143
BCC W414-W415-W415-U2046-006	<b>BCC0EHN</b>	143
BCC W414-W415-W415-U2048-003	<b>BCC0EFF</b>	147
BCC W414-W415-W415-U2048-006	<b>BCC0EFH</b>	147
BCC W414-W425-W425-U2044-003	<b>BCC0EHK</b>	145
BCC W414-W425-W425-U2044-006	<b>BCC0EHL</b>	145
BCC W414-W425-W425-U2045-003	<b>BCC0EL5</b>	149
BCC W414-W425-W425-U2045-006	<b>BCC0EL6</b>	149
BCC W414-W425-W425-U2046-003	<b>BCC0EHP</b>	143
BCC W414-W425-W425-U2046-006	<b>BCC0EHR</b>	143
BCC W414-W425-W425-U2048-003	<b>BCC0EFJ</b>	147
BCC W414-W425-W425-U2048-006	<b>BCC0EFK</b>	147
BCC W415-0000-1A-003-SW0434-020	<b>BCC0EFY</b>	139
BCC W415-0000-1A-003-SW0434-030	<b>BCC0EUY</b>	139
BCC W415-0000-1A-003-SW0434-050	<b>BCC0EUZ</b>	139
BCC W415-W414-3A-304-BW8434-003	<b>BCC0EJA</b>	144
BCC W415-W414-3A-304-BW8434-006	<b>BCC0EJC</b>	144
BCC W415-W414-3A-304-BW8434-010	<b>BCC0EJE</b>	144
BCC W415-W414-3A-304-BW8434-015	<b>BCC0EJF</b>	144
BCC W415-W414-3A-304-BW8434-020	<b>BCC0EJH</b>	144
BCC W415-W414-3A-304-BW8434-050	<b>BCC0EJJ</b>	144
BCC W415-W414-3A-304-FW9434-003	<b>BCC0ELM</b>	148
BCC W415-W414-3A-304-FW9434-006	<b>BCC0ELN</b>	148
BCC W415-W414-3A-304-FW9434-010	<b>BCC0ELP</b>	148
BCC W415-W414-3A-304-FW9434-015	<b>BCC0ELR</b>	148
BCC W415-W414-3A-304-FW9434-020	<b>BCC0ELT</b>	148
BCC W415-W414-3A-304-FW9434-050	<b>BCC0ELU</b>	148



# Alphanumeric Index

## Sorted by part number

Part number	Ordering code	Page	Part number	Ordering code	Page
BCC W415-W414-3A-304-MW8434-003	<b>BCC0EKP</b>	150	<b>BES</b>		
BCC W415-W414-3A-304-MW8434-006	<b>BCC0EKR</b>	150	BES 03,0-KB-3	<b>BAM0092</b>	303
BCC W415-W414-3A-304-MW8434-010	<b>BCC0EKT</b>	150	BES 04,0-KB-1	<b>BAM0094</b>	302
BCC W415-W414-3A-304-MW8434-015	<b>BCC0EKU</b>	150	BES 04,0-KB-3	<b>BAM0095</b>	303
BCC W415-W414-3A-304-MW8434-020	<b>BCC0EKW</b>	150	BES 05,0-KB-1	<b>BAM0097</b>	302
BCC W415-W414-3A-304-SW0434-003	<b>BCC0ELW</b>	141	BES 05,0-KB-3	<b>BAM0098</b>	303
BCC W415-W414-3A-304-SW0434-006	<b>BCC0ELY</b>	141	BES 05,0-KH-2S	<b>BAM0099</b>	290
BCC W415-W414-3A-304-SW0434-010	<b>BCC0ELZ</b>	141	BES 06,5-BS-1	<b>BAM009A</b>	301
BCC W415-W414-3A-304-SW0434-015	<b>BCC0EM0</b>	141	BES 06,5-KB-1	<b>BAM009C</b>	302
BCC W415-W414-3A-304-SW0434-020	<b>BCC0EM1</b>	141	BES 06,5-KB-3	<b>BAM009E</b>	303
BCC W415-W414-3A-304-SW0434-030	<b>BCC0EUU</b>	141	BES 06,5-KB-7	<b>BAM009F</b>	302
BCC W415-W414-3A-304-SW0434-050	<b>BCC0EUW</b>	141	BES 08,0-BS-1	<b>BAM00A2</b>	301
BCC W415-W414-3A-304-TW0434-003	<b>BCC0EJ4</b>	146	BES 08,0-HW-1	<b>BAM009U</b>	308
BCC W415-W414-3A-304-TW0434-006	<b>BCC0EJ5</b>	146	BES 08,0-KB-3	<b>BAM00A5</b>	302
BCC W415-W414-3A-304-TW0434-010	<b>BCC0EJ6</b>	146	BES 08,0-KB-3-F	<b>BAM00A6</b>	302
BCC W415-W414-3A-304-TW0434-015	<b>BCC0EJ7</b>	146	BES 08,0-KB-4-F	<b>BAM00A7</b>	305
BCC W415-W414-3A-304-TW0434-020	<b>BCC0EJ8</b>	146	BES 08,0-KB-5-F	<b>BAM00A8</b>	306
BCC W415-W414-3A-304-TW0434-050	<b>BCC0EJ9</b>	146	BES 08,0-KB-7	<b>BAM00AA</b>	303
BCC W415-W424-3A-304-MW8434-003	<b>BCC0EKA</b>	150	BES 08,0-KH-2L	<b>BAM00AE</b>	290
BCC W415-W424-3A-304-MW8434-006	<b>BCC0EKC</b>	150	BES 08,0-KH-2L/W	<b>BAM00AF</b>	290
BCC W415-W424-3A-304-MW8434-010	<b>BCC0EKE</b>	150	BES 08,0-KH-2S	<b>BAM00AH</b>	290
BCC W415-W424-3A-304-MW8434-015	<b>BCC0EKF</b>	150	BES 08,0-KH-2S/W	<b>BAM00AK</b>	290
BCC W415-W424-3A-304-MW8434-020	<b>BCC0EKH</b>	150	BES 08,0-KH-3L	<b>BAM00AL</b>	296
BCC W425-0000-1A-003-SW0434-020	<b>BCC0EFZ</b>	139	BES 08,0-KH-4-F	<b>BAM00AM</b>	291
BCC W425-0000-1A-003-SW0434-030	<b>BCC0EWO</b>	139	BES 08,0-KH-6L	<b>BAM00AN</b>	291
BCC W425-0000-1A-003-SW0434-050	<b>BCC0EW1</b>	139	BES 08,0-KH-6L/W	<b>BAM00AP</b>	291
BCC W425-W414-3A-304-BW8434-003	<b>BCC0EM8</b>	145	BES 08,0-KH-6S	<b>BAM00AR</b>	290
BCC W425-W414-3A-304-BW8434-006	<b>BCC0EM9</b>	145	BES 08,0-KH-7-F	<b>BAM00AU</b>	291
BCC W425-W414-3A-304-BW8434-010	<b>BCC0EMA</b>	145	BES 08-DM-1	<b>BAM009K</b>	394
BCC W425-W414-3A-304-BW8434-015	<b>BCC0EMC</b>	145	BES 08-FA-49	<b>BAM009L</b>	368
BCC W425-W414-3A-304-BW8434-020	<b>BCC0EME</b>	145	BES 08-FA-89	<b>BAM009M</b>	369
BCC W425-W414-3A-304-BW8434-050	<b>BCC0EMF</b>	145	BES 08-FA-BS-4,0-G	<b>BAM009N</b>	369
BCC W425-W414-3A-304-FW9434-003	<b>BCC0EL7</b>	149	BES 08-FA-BS-4,0-W	<b>BAM009P</b>	369
BCC W425-W414-3A-304-FW9434-006	<b>BCC0EL8</b>	149	BES 08-FA-BS-8,0-G	<b>BAM009R</b>	369
BCC W425-W414-3A-304-FW9434-010	<b>BCC0EL9</b>	149	BES 08-FA-BS-8,0-W	<b>BAM009T</b>	369
BCC W425-W414-3A-304-FW9434-015	<b>BCC0ELA</b>	149	BES 08-HW-4	<b>BAM009W</b>	309
BCC W425-W414-3A-304-FW9434-020	<b>BCC0ELC</b>	149	BES 08-HW-5	<b>BAM009Y</b>	309
BCC W425-W414-3A-304-FW9434-050	<b>BCC0ELE</b>	149	BES 08-SM-1	<b>BAM009Z</b>	297
BCC W425-W414-3A-304-MW8434-003	<b>BCC0EKY</b>	151	BES 08-SM-1F	<b>BAM00A0</b>	297
BCC W425-W414-3A-304-MW8434-006	<b>BCC0EKZ</b>	151	BES 113-FD-1	<b>BAE006W</b>	253
BCC W425-W414-3A-304-MW8434-010	<b>BCC0ELO</b>	151	BES 12,0-BS-1	<b>BAM00C4</b>	301
BCC W425-W414-3A-304-MW8434-015	<b>BCC0EL1</b>	151	BES 12,0-HW-1	<b>BAM00C0</b>	308
BCC W425-W414-3A-304-MW8434-020	<b>BCC0EL2</b>	151	BES 12,0-KB-2	<b>BAM00C7</b>	303
BCC W425-W414-3A-304-SW0434-003	<b>BCC0EU7</b>	141	BES 12,0-KB-2-F	<b>BAM00C8</b>	303
BCC W425-W414-3A-304-SW0434-006	<b>BCC0EU8</b>	141	BES 12,0-KB-3	<b>BAM00C9</b>	304
BCC W425-W414-3A-304-SW0434-010	<b>BCC0EU9</b>	141	BES 12,0-KB-3-F	<b>BAM00CA</b>	304
BCC W425-W414-3A-304-SW0434-015	<b>BCC0EUA</b>	141	BES 12,0-KB-3-F-SA1	<b>BAM00CC</b>	304
BCC W425-W414-3A-304-SW0434-020	<b>BCC0EUC</b>	141	BES 12,0-KB-3-F-SA2	<b>BAM00CE</b>	304
BCC W425-W414-3A-304-TW0434-003	<b>BCC0EM2</b>	147	BES 12,0-KB-4-F	<b>BAM00CF</b>	305
BCC W425-W414-3A-304-TW0434-006	<b>BCC0EM3</b>	147	BES 12,0-KB-5-F	<b>BAM00CH</b>	306
BCC W425-W414-3A-304-TW0434-010	<b>BCC0EM4</b>	147	BES 12,0-KH-2L	<b>BAM00CY</b>	291
BCC W425-W414-3A-304-TW0434-015	<b>BCC0EM5</b>	147	BES 12,0-KH-2L/W	<b>BAM00CZ</b>	291
BCC W425-W414-3A-304-TW0434-020	<b>BCC0EM6</b>	147	BES 12,0-KH-2S	<b>BAM00E0</b>	291
BCC W425-W414-3A-304-TW0434-050	<b>BCC0EM7</b>	147	BES 12,0-KH-2S/W	<b>BAM00E1</b>	291
BCC W425-W424-3A-304-MW8434-003	<b>BCC0EKJ</b>	151	BES 12,0-KH-3L	<b>BAM00E2</b>	296
BCC W425-W424-3A-304-MW8434-006	<b>BCC0EKK</b>	151	BES 12,0-KH-3X	<b>BAM00E3</b>	296
BCC W425-W424-3A-304-MW8434-010	<b>BCC0EKL</b>	151	BES 12,0-KH-4	<b>BAM00E4</b>	290
BCC W425-W424-3A-304-MW8434-015	<b>BCC0EKM</b>	151	BES 12,0-KH-4-F	<b>BAM00E5</b>	291
BCC W425-W424-3A-304-MW8434-020	<b>BCC0EKN</b>	151	BES 12,0-KH-5F	<b>BAM00E8</b>	296
<b>BDD</b>			BES 12-FA-70	<b>BAM00AZ</b>	369
BDD-UM 3023	<b>BAE006K</b>	261	BES 12-KB-602-02/12	<b>BAM00CK</b>	310
			BES 12-KB-602-04/12	<b>BAM00CL</b>	310
			BES 12-KB-602-06/12	<b>BAM00CM</b>	311

# Alphanumeric Index

## Sorted by part number

Part number	Ordering code	Page
BES 12-KB-602-06/16	<b>BAM00CN</b>	311
BES 12-SM-2	<b>BAM00C2</b>	297
BES 14,5-BS-1	<b>BAM00EM</b>	301
BES 16,0-BS-1	<b>BAM00ET</b>	301
BES 16,0-HW-1	<b>BAM00EN</b>	308
BES 16-SM-2	<b>BAM00EP</b>	297
BES 18,0-BS-1	<b>BAM00F2</b>	301
BES 18,0-HW-1	<b>BAM00EY</b>	309
BES 18,0-KB-2	<b>BAM00F6</b>	303
BES 18,0-KB-3	<b>BAM00F7</b>	305
BES 18,0-KB-3-F	<b>BAM00F8</b>	305
BES 18,0-KB-3-F-SA1	<b>BAM00F9</b>	305
BES 18,0-KB-3-F-SA2	<b>BAM00FA</b>	305
BES 18,0-KB-4-F	<b>BAM00FC</b>	305
BES 18,0-KB-5-F	<b>BAM00FE</b>	306
BES 18,0-KH-2L	<b>BAM00FN</b>	292
BES 18,0-KH-2L/W	<b>BAM00FP</b>	292
BES 18,0-KH-2M	<b>BAM00FR</b>	292
BES 18,0-KH-2S	<b>BAM00FT</b>	291
BES 18,0-KH-2S/W	<b>BAM00FW</b>	291
BES 18,0-KH-3L	<b>BAM00FY</b>	296
BES 18,0-KH-4	<b>BAM00FZ</b>	290
BES 18,0-KH-4-F	<b>BAM00HO</b>	291
BES 18-SM-1	<b>BAM00EZ</b>	297
BES 18-SM-2	<b>BAM00FO</b>	393
BES 18-SM-3	<b>BAM00F1</b>	297
BES 20,0-BS-1	<b>BAM00H7</b>	301
BES 22,0-BS-1	<b>BAM00H9</b>	301
BES 22-SM-2	<b>BAM00H8</b>	393
BES 24,0-HW-1	<b>BAM00HA</b>	309
BES 30,0-BS-1	<b>BAM00HN</b>	301
BES 30,0-HW-1	<b>BAM00HH</b>	309
BES 30,0-KB-3-F	<b>BAM00HU</b>	305
BES 30,0-KB-4-F	<b>BAM00HW</b>	305
BES 30,0-KB-5-F	<b>BAM00HY</b>	306
BES 30,0-KH-2L	<b>BAM00J4</b>	292
BES 30,0-KH-2L/W	<b>BAM00J5</b>	292
BES 30,0-KH-2S	<b>BAM00J6</b>	292
BES 30,0-KH-2S/W	<b>BAM00J7</b>	292
BES 30,0-KH-4	<b>BAM00J8</b>	290
BES 30,0-KH-4-F	<b>BAM00J9</b>	291
BES 30-SM-1	<b>BAM00HJ</b>	393
BES 30-SM-2	<b>BAM00HK</b>	393
BES 30-SM-3	<b>BAM00HL</b>	297
BES 30-SM-5	<b>BAM00HM</b>	297
BES 36,0-BS-1	<b>BAM00JN</b>	301
BES 36,0-HW-1	<b>BAM00JK</b>	309
BES 36-SM-2	<b>BAM00JL</b>	393
BES 516-4	<b>BAE0029</b>	257
BES 516-611-A-1	<b>BAE006Y</b>	255
BES 516-615-NS-1-PU-05	<b>BAE006Z</b>	254
BES 516-615-PS-1-PU-05	<b>BAE0070</b>	254
BES 516-7	<b>BAE002C</b>	257
BES 516-IV 2	<b>BAE0073</b>	251
BES HS-01-P1-C16/Q40	<b>BAM00JT</b>	382
BES HS-01-P1-C8/Q40	<b>BAM00JU</b>	382
BES Q08-KH-2	<b>BAM00NJ</b>	364
BES Q08-KH-3	<b>BAM01AU</b>	364
BES Q40-HW-1	<b>BAM00JW</b>	381
BES Q40-HW-2	<b>BAM00JY</b>	381
BES Q40-HW-3	<b>BAM00JZ</b>	381
BES Q40-SH-1	<b>BAM00KO</b>	383
BES Q40-SH-2	<b>BAM00K1</b>	383

Part number	Ordering code	Page
BESA-08-CM	<b>BAM015U</b>	370
BESA-12-CM	<b>BAM015W</b>	371
BESA-18-CM	<b>BAM015Y</b>	371
BESA-30-CM	<b>BAM015Z</b>	371

### BFO

Part number	Ordering code	Page
BFO 02-PK-1	<b>BAM00NN</b>	333
BFO 02-UK-1	<b>BAM00NP</b>	333
BFO 04-FL-1	<b>BAM00NR</b>	333
BFO 04-FL-2	<b>BAM00NT</b>	333
BFO 04-FS-1	<b>BAM00NU</b>	333
BFO 04-PK-1	<b>BAM00NW</b>	331
BFO 06-FS-1	<b>BAM00NY</b>	333
BFO 08,0-KB-1	<b>BAM00PO</b>	332
BFO 18A-LAA-MZG-20-0,5	<b>BF0000F</b>	337
BFO 18A-LAA-MZG-20-1	<b>BF0000H</b>	337
BFO 18A-LAA-UZG-20-0,5	<b>BF0000M</b>	337
BFO 18A-LAA-UZG-20-1	<b>BF0000N</b>	337
BFO 18A-LCC-SMG-10-1	<b>BF0000W</b>	337
BFO 18A-LCC-SMG-20-0,5	<b>BF0000U</b>	337
BFO 18A-LCC-SMG-20-1	<b>BF0000Z</b>	337
BFO 18A-LEE-MZG-20-0,5	<b>BF00013</b>	337
BFO 18A-LEE-MZG-20-1	<b>BF00014</b>	337
BFO 18A-LEE-SMG-20-0,5	<b>BF00019</b>	337
BFO 18A-LEE-SMG-20-1	<b>BF0001A</b>	337
BFO 18A-LEE-UZG-20-0,5	<b>BF0001F</b>	337
BFO 18A-LEE-UZG-20-1	<b>BF0001H</b>	337
BFO 18A-LFF-MZG-10-0,5	<b>BF0001P</b>	336
BFO 18A-LFF-MZG-10-1	<b>BF0001R</b>	336
BFO 18A-LFF-SMG-10-0,5	<b>BF0001U</b>	336
BFO 18A-LFF-SMG-10-1	<b>BF0001W</b>	336
BFO 18A-LGG-MZG-10-0,5	<b>BF0001Z</b>	336
BFO 18A-LGG-MZG-10-1	<b>BF00020</b>	336
BFO 18A-LGG-SMG-10-0,5	<b>BF00023</b>	336
BFO 18A-LGG-SMG-10-1	<b>BF00024</b>	336
BFO 18A-XAA-MZG-30-0,5	<b>BF00026</b>	339
BFO 18A-XAA-MZG-30-1	<b>BF00027</b>	339
BFO 18A-XAA-SMG-30-0,5	<b>BF0002F</b>	339
BFO 18A-XAA-SMG-30-1	<b>BF0002H</b>	339
BFO 18A-XAA-UZG-30-0,5	<b>BF0002M</b>	339
BFO 18A-XAA-UZG-30-1	<b>BF0002N</b>	339
BFO 18A-XAC-SMG-30-0,5	<b>BF0002U</b>	339
BFO 18A-XAC-SMG-30-1	<b>BF0002W</b>	339
BFO 18A-XAE-MZG-30-0,5	<b>BF00031</b>	339
BFO 18A-XAE-MZG-30-1	<b>BF00032</b>	339
BFO 18A-XAE-SMG-30-0,5	<b>BF00037</b>	339
BFO 18A-XAE-SMG-30-1	<b>BF00038</b>	339
BFO 18A-XAE-UZG-30-0,5	<b>BF0003C</b>	339
BFO 18A-XAE-UZG-30-1	<b>BF0003E</b>	339
BFO 18A-XAF-MZG-15-0,5	<b>BF0003H</b>	338
BFO 18A-XAF-MZG-15-1	<b>BF0003J</b>	338
BFO 18A-XAF-SMG-15-0,5	<b>BF0003M</b>	338
BFO 18A-XAF-SMG-15-1	<b>BF0003N</b>	338
BFO 18A-XAG-MZG-15-0,5	<b>BF0003R</b>	338
BFO 18A-XAG-MZG-15-1	<b>BF0003T</b>	338
BFO 18V-LCC-MZG-23-0,5	<b>BF0003Y</b>	337
BFO 18V-LCC-MZG-23-0,75	<b>BF0003Z</b>	337
BFO 18V-LCC-SMG-23-0,5	<b>BF00042</b>	337
BFO 18V-LDD-SMG-23-0,5	<b>BF0004C</b>	337
BFO 18V-LDD-MZG-23-0,75	<b>BF00047</b>	337
BFO 18V-LDD-SMG-23-1	<b>BF0004F</b>	337
BFO 18V-XAC-MZG-30-0,5	<b>BF0004M</b>	339
BFO 18V-XAC-SMG-30-0,5	<b>BF0004P</b>	339

# Alphanumeric Index

## Sorted by part number

Part number	Ordering code	Page
BFO 18V-XAC-SMG-30-1	<b>BF0004R</b>	339
BFO 18V-XAD-MZG-30-0,5	<b>BF0004U</b>	339
BFO 18V-XAD-SMG-30-0,5	<b>BF0004Y</b>	339
BFO 18V-XAD-SMG-30-1	<b>BF0004Z</b>	339
BFO 30-A1	<b>BAM00NM</b>	332
BFO CT	<b>BAM000E</b>	332
BFO D10-LA-CB-EAK-05-02	<b>BF00051</b>	319
BFO D10-LA-DC-10	<b>BAM000J</b>	332
BFO D10-LAH-CK-EAK-05-02	<b>BF000C6</b>	323
BFO D10-LAH-DK-EAK-05-02	<b>BF000C7</b>	323
BFO D10-XA-GB-EAK-10-02	<b>BF00052</b>	328
BFO D10-XA-HB-EAK-10-02	<b>BF00053</b>	327
BFO D10-XAH-KB-EAK-10-02	<b>BF00055</b>	326
BFO D10-XA-RB-EAK-10-02	<b>BF00054</b>	327
BFO D10-XA-VB-EAK-10-02	<b>BF000C3</b>	327
BFO D13-LA-EC-10	<b>BAM00P1</b>	332
BFO D13-LA-QB-EAK-05-02	<b>BF00056</b>	319
BFO D13-LA-WB-EAK-05-02	<b>BF00057</b>	319
BFO D13-LG-05-EAK-30-02	<b>BF00058</b>	322
BFO D13-LG-10-EAK-30-02	<b>BF00059</b>	322
BFO D13-XA-JB-EAK-20-02	<b>BF0005A</b>	328
BFO D13-XB-AB-EAK-10-01	<b>BF000AT</b>	329
BFO D13-XB-KB-EAK-10-02	<b>BF0005C</b>	327
BFO D13-XB-RB-EAK-10-02	<b>BF0005E</b>	327
BFO D13-XV-AK-EAK-50-02	<b>BF000AR</b>	329
BFO D22-LA-AC-20	<b>BF0005F</b>	331
BFO D22-LA-AD-EAK-52-02	<b>BF0005H</b>	320
BFO D22-LA-BC-10	<b>BF0005J</b>	331
BFO D22-LA-BD-EAK-52-02	<b>BF0005K</b>	320
BFO D22-LA-CC-30	<b>BF0005L</b>	331
BFO D22-LA-GD-EAK-52-02	<b>BF000AP</b>	320
BFO D22-LAH-BK-EAK-10-02	<b>BF000AW</b>	317
BFO D22-LAH-KB-EAK-10-02	<b>BF0005T</b>	316
BFO D22-LAH-ZB-EAK-10-02	<b>BF0000E</b>	322
BFO D22-LA-KB-EAK-10-02	<b>BF0005M</b>	316
BFO D22-LA-NB-PZK-10-02	<b>BF0005N</b>	317
BFO D22-LAP-KB-EAK-15-02	<b>BF0005U</b>	317
BFO D22-LA-QB-PAK-05-02	<b>BF0005P</b>	319
BFO D22-LA-RB-EAK-10-02	<b>BF0005R</b>	318
BFO D22-LA-TB-EAK-10-02	<b>BF00002</b>	317
BFO D22-LAT-KB-EAK-10-02	<b>BF0005W</b>	316
BFO D22-LAT-YB-EAK-10-0,5	<b>BF000AY</b>	318
BFO D22-LD-EAK-10-20	<b>BF0005Y</b>	331
BFO D22-XA-CD-EAK-110-02	<b>BF0005Z</b>	329
BFO D22-XA-DB-EAK-20-01	<b>BF00003</b>	325
BFO D22-XA-ED-EAK-250-02	<b>BF00060</b>	329
BFO D22-XA-EK-PAK-10-02	<b>BF000CA</b>	329
BFO D22-XAH-LB-EAK-20-02	<b>BF00063</b>	324
BFO D22-XA-LB-EAK-20-02	<b>BF00061</b>	324
BFO D22-XA-MB-PAK-10-02	<b>BF00062</b>	328
BFO D22-XAP-LB-EAK-30-02	<b>BF00064</b>	325
BFO D22-XA-SB-EAK-20-02	<b>BF00004</b>	325
BFO D22-XAT-LB-EAK-20-02	<b>BF00065</b>	324
BFO D22-XA-UB-EAK-20-02	<b>BF00005</b>	326
BFO D22-XBF-LB-EAK-15-02	<b>BF00007</b>	325
BFO D22-XB-LB-EAK-15-02	<b>BF00066</b>	325
BFO D22-XB-LB-EAK-15-SA1-01	<b>BF000FP</b>	330
BFO D22-XB-LB-EAK-15-SA1-02	<b>BF000C4</b>	330
BFO D22-XB-LB-EAK-15-SA1-05	<b>BF000FN</b>	330
BFO D22-XB-UB-EAK-15-02	<b>BF00006</b>	326
BFO D22-XB-UB-EAK-15-SA1-02	<b>BF000C9</b>	330
BFO D25 LA-HD-EAK-465-02	<b>BF000C8</b>	321
BFO D25-LA-CD-EAK-110-02	<b>BF00067</b>	321

Part number	Ordering code	Page
BFO D25-LA-ED-EAK-250-0,5	<b>BF000C5</b>	321
BFO D25-LA-ED-EAK-250-02	<b>BF00068</b>	321
BFO N22-LA-FB-EAK-05-01	<b>BF0000C</b>	318

### BIS

Part number	Ordering code	Page
BIS C-300-HG	<b>BAM012A</b>	389
BIS C-703-A	<b>BAE0049</b>	389
BIS Z-AK-001-PU1-03	<b>BCC00T2</b>	389
BIS Z-HG-002	<b>BAM012J</b>	389
BIS Z-HG-003	<b>BAM012K</b>	389
BIS Z-HW-001	<b>BAM012L</b>	388
BIS Z-HW-003	<b>BAM01JK</b>	386
BIS Z-HW-004	<b>BAM01KN</b>	385
BIS Z-HW-005	<b>BAM01YK</b>	384
BIS Z-SP-001	<b>BAM018M</b>	393
BIS Z-SP-003	<b>BAM01LW</b>	385

### BKS

Part number	Ordering code	Page
BKS-12-CS-01	<b>BAM0114</b>	205
BKS-7/8-CS-00-A	<b>BAM012T</b>	205
BKS-7/8-CS-00-I	<b>BAM012U</b>	205
BKS-B 25-1/GS49-PU-00,3	<b>BCC00HF</b>	24
BKS-B 25-1/GS49-PU-00,6	<b>BCC00HH</b>	24
BKS-B 25-1/GS49-PU-01	<b>BCC00HJ</b>	24
BKS-B 25-1-PU-03	<b>BCC00HE</b>	22
BKS-B 25-3-PU-03	<b>BCC00HK</b>	23
BKS-B 25-3-PU-05	<b>BCC00HL</b>	23
BKS-B 26-1/GS49-PU-01	<b>BCC00HN</b>	24
BKS-B 26-1-PU-03	<b>BCC00HM</b>	23
BKS-B 26-3-PU-03	<b>BCC00HP</b>	23
BKS-B 26-3-PU-05	<b>BCC00HR</b>	23
BKS-S 76-RT04	<b>BCC02H6</b>	87
BKS-S 77-RT04	<b>BCC02H7</b>	89
BKS-S107-RT14	<b>BCC02H8</b>	87
BKS-S109-RT14	<b>BCC02H9</b>	89
BKS-S111-RT13	<b>BCC02HC</b>	42
BKS-S113-RT13	<b>BCC02HE</b>	44
BKS-S144-00	<b>BCC0158</b>	86
BKS-S216-RT14	<b>BCC02HF</b>	45
BKS-S218-RT14	<b>BCC02HH</b>	45

### BKT

Part number	Ordering code	Page
BKT M-PK-1	<b>BAM0120</b>	353
BKT M-PK-2	<b>BAM0121</b>	353
BKT M-PK-3	<b>BAM0122</b>	353
BKT M-PK-4	<b>BAM00P2</b>	353
BKT M-PK-5	<b>BAM00P3</b>	353

### BML

Part number	Ordering code	Page
BML-A013-T_ _ _ _	<b>BML001K</b>	391
BML-C01	<b>BAM01MF</b>	391
BML-C02	<b>BAM01MH</b>	391
BML-R01-M_ _ _	<b>BAM01N4</b>	391
BML-Z0008	<b>BAM01JL</b>	391
BML-Z0010	<b>BAM01L9</b>	391

### BMS

Part number	Ordering code	Page
BMS AD-M-002-D12/D12	<b>BAM003E</b>	273
BMS AD-M-002-D12/D18	<b>BAM0038</b>	273
BMS AD-M-003-D12/IZ	<b>BAM003J</b>	282
BMS AD-P-001-12/10	<b>BAM002H</b>	307
BMS BS-M-D12-0250-01	<b>BAM003A</b>	280
BMS BS-M-D12-0250-02	<b>BAM0039</b>	280

# Alphanumeric Index

## Sorted by part number

Part number	Ordering code	Page
BMS BS-M-D12-0250-03	<b>BAM003F</b>	281
BMS BS-M-D12-0400-04	<b>BAM003H</b>	281
BMS CCJ-M-D12-B-01	<b>BAM024R</b>	267
BMS CC-M-D12-B-00	<b>BAM002Z</b>	267
BMS CC-P-D12-A-00	<b>BAM002M</b>	266
BMS CR-M-D12-IS-03	<b>BAM0035</b>	278
BMS CR-M-D12-IS-04	<b>BAM0042</b>	278
BMS CR-M-D12-IU-02	<b>BAM0034</b>	279
BMS CR-M-D12-IU-05	<b>BAM003N</b>	279
BMS CR-P-D12-AU-00	<b>BAM002L</b>	266
BMS CS-M-D12-B21K-04	<b>BAM0043</b>	274
BMS CS-M-D12-B23K-05	<b>BAM01AW</b>	274
BMS CS-M-D12-BX05-02	<b>BAM003C</b>	276
BMS CS-M-D12-BX06-03	<b>BAM0040</b>	276
BMS CS-M-D12-BX07-06	<b>BAM01AY</b>	275
BMS CS-M-D12-BX08-07	<b>BAM01CW</b>	266
BMS CS-M-D12-BX10-08	<b>BAM01F3</b>	275
BMS CS-M-D12-BX11-09	<b>BAM01F2</b>	275, 415
BMS CS-M-D12-BZ	<b>BAM024T</b>	267
BMS CS-M-D12-ID08-01	<b>BAM0036</b>	270
BMS CS-M-D12-ID12-01	<b>BAM0037</b>	270
BMS CS-M-D12-ID16-01	<b>BAM003K</b>	270
BMS CS-M-D12-ID18-01	<b>BAM0032</b>	271
BMS CS-M-D12-ID24-01	<b>BAM003L</b>	271
BMS CS-M-D12-ID30-01	<b>BAM0033</b>	271
BMS CS-M-D12-ID36-01	<b>BAM003M</b>	272
BMS CS-M-D12-IQ40-02	<b>BAM003P</b>	277
BMS CS-M-D12-IQ40-03	<b>BAM003R</b>	277
BMS CS-M-D12-IX09-01	<b>BAM01J2</b>	272
BMS CS-M-D12-IX13-0	<b>BAM01TK</b>	279
BMS CS-M-D12-IX14-01	<b>BAM01UL</b>	272
BMS CS-M-D12-IZ	<b>BAM0031</b>	269
BMS CS-M-D12-IZ-01	<b>BAM003Y</b>	269
BMS CS-M-D14-IZ	<b>BAM01Z7</b>	269
BMS CS-M-D14-IZ-01	<b>BAM01Z8</b>	269
BMS CS-M-S25-DX15-00	<b>BAM01YP</b>	401
BMS CS-P-D12-AD08-00	<b>BAM002K</b>	265
BMS CS-P-D12-AD12-00	<b>BAM002N</b>	265
BMS CS-P-D12-AD18-00	<b>BAM002P</b>	265
BMS CUJ-M-S25-D045-00	<b>BAM01YT</b>	401
BMS CUJ-P-D12-R040-00	<b>BAM002Y</b>	265
BMS CU-M-D12-B028-00	<b>BAM024P</b>	267
BMS CU-M-D12-I060-01	<b>BAM0044</b>	268
BMS CU-M-D12-I060-02	<b>BAM01CH</b>	268
BMS CU-P-D12-A040-00	<b>BAM002J</b>	264
BMS CZ-M-B-001	<b>BAM003Z</b>	366
BMS CZ-M-D12-I-001	<b>BAM0041</b>	283, 352
BMS KIT-V1	<b>BAM003W</b>	285
BMS RS-M-D12-0100-00	<b>BAM021Y</b>	284
BMS RS-M-D12-0150-00	<b>BAM002R</b>	284
BMS RS-M-D12-0200-00	<b>BAM021T</b>	284
BMS RS-M-D12-0250-00	<b>BAM002T</b>	284
BMS RS-M-D12-0300-00	<b>BAM021W</b>	284
BMS RS-M-D12-0750-00	<b>BAM021U</b>	284
BMS RS-M-D12-1000-00	<b>BAM002U</b>	284
BMS RS-S-D12-0150-00	<b>BAM0045</b>	284
BMS RS-S-D12-0300-00	<b>BAM0046</b>	284

<b>BNI</b>		
BNI ACC-L01-000	<b>BAM01AT</b>	206

<b>BOD</b>		
BOD 66-HW-1	<b>BAM00P9</b>	361

Part number	Ordering code	Page
<b>BOS</b>		
BOS 12,0-KB-1	<b>BAM01KM</b>	307
BOS 12-BL-1	<b>BAM00PW</b>	349
BOS 12-LT-1	<b>BAM00PY</b>	352
BOS 12-WS-1	<b>BAM00R0</b>	357
BOS 12-WS-2	<b>BAM00R1</b>	357
BOS 18,0-HW-1	<b>BAM00RY</b>	359
BOS 18,0-HW-2	<b>BAM00RZ</b>	359
BOS 18,0-HW-3	<b>BAM00T0</b>	359
BOS 18,0-HW-4	<b>BAM00T1</b>	360
BOS 18,0-HW-6	<b>BAM00T2</b>	360
BOS 18,0-KB-1	<b>BAM00T3</b>	307
BOS 18-BL-1	<b>BAM00R6</b>	348
BOS 18-BL-2	<b>BAM00R7</b>	349
BOS 18-LT-1	<b>BAM00R9</b>	352
BOS 18-SM-1	<b>BAM00RL</b>	355
BOS 18-UK-1	<b>BAM00RP</b>	356
BOS 18-UK-10	<b>BAM00RR</b>	356
BOS 18-UK-2	<b>BAM00RT</b>	356
BOS 18-WS-1	<b>BAM00RU</b>	357
BOS 21-AD-1	<b>BAM00T7</b>	366
BOS 21-HW-1	<b>BAM00T9</b>	360
BOS 21-HW-2	<b>BAM00TA</b>	360
BOS 21-HW-3	<b>BAM00TC</b>	360
BOS 21-HW-4	<b>BAM00TE</b>	360
BOS 21-KH-1	<b>BAM00TF</b>	366
BOS 21-KH-2	<b>BAM00TH</b>	366
BOS 26-HW-1	<b>BAM00TK</b>	362
BOS 2-HW-1	<b>BAM00T4</b>	358
BOS 2-HW-2	<b>BAM00T6</b>	358
BOS 2-HW-3	<b>BAM00T5</b>	358
BOS 30,0-KB-1	<b>BAM00TN</b>	307
BOS 36-HW-1	<b>BAM0124</b>	361
BOS 5-BL-1	<b>BAM00TU</b>	350
BOS 5-BL-2	<b>BAM00TW</b>	350
BOS 5-BL-3	<b>BAM00TY</b>	350
BOS 5-BL-4	<b>BAM00TZ</b>	350
BOS 5-BL-5	<b>BAM00U0</b>	350
BOS 5-BL-6	<b>BAM00U1</b>	350
BOS 5-BL-7	<b>BAM00U2</b>	351
BOS 5-BL-8	<b>BAM00U3</b>	351
BOS 5-BL-9	<b>BAM00U4</b>	351
BOS 5-HW-1	<b>BAM00U5</b>	358
BOS 5-HW-2	<b>BAM00U6</b>	358
BOS 5-HW-3	<b>BAM00U7</b>	358
BOS 5-HW-4	<b>BAM00U8</b>	362
BOS 5-HW-5	<b>BAM00U9</b>	363
BOS 5-HW-6	<b>BAM00UA</b>	362
BOS 63-HW-1	<b>BAM00P6</b>	362
BOS 65-HW-1	<b>BAM0125</b>	361
BOS 6-HW-1	<b>BAM00UH</b>	363
BOS 74-HW-1	<b>BAM00UJ</b>	361
BOS PC-X0-005-12M-4	<b>BAM01Y6</b>	354
BOS R-1	<b>BAM00UK</b>	340
BOS R-10	<b>BAM0126</b>	340
BOS R-11	<b>BAM00UL</b>	341
BOS R-12	<b>BAM00UM</b>	344
BOS R-13	<b>BAM00UN</b>	345
BOS R-14	<b>BAM00UP</b>	340
BOS R-15	<b>BAM00UR</b>	340
BOS R-16	<b>BAM00UT</b>	345
BOS R-2	<b>BAM00UW</b>	340
BOS R-22	<b>BAM00UY</b>	344



# Alphanumeric Index

## Sorted by part number

Part number	Ordering code	Page	Part number	Ordering code	Page
BOS R-25	BAM00UZ	341	BPI 8M303P-2K-00-KPXA0-030	BPI0030	214
BOS R-26	BAM00W0	341	BPI 8M303P-2K-00-KPXA0-050	BPI0031	214
BOS R-27	BAM00W1	342	BPI 8M303P-2K-00-KPXA0-100	BPI0032	214
BOS R-28	BAM00W2	342	BPI 8M303P-2K-00-KPXA0-150	BPI0033	214
BOS R-29	BAM00W3	342	BPI 8M303P-2K-00-SM4CT	BPI003T	213
BOS R-3	BAM00W4	340	BPI 8M304P-2K-00-KPXK0-030	BPI003K	215
BOS R-30 (standard)	BAM00W5	347	BPI 8M304P-2K-00-KPXK0-050	BPI003L	215
BOS R-31	BAM01H6	343	BPI 8M304P-2K-00-KPXK0-100	BPI003M	215
BOS R-32-0,40	BAM00W6	346	BPI 8M304P-2K-00-KPXK0-150	BPI003N	215
BOS R-33	BAM00W7	342	BPI 8M4A4P-2K-00-KPXB0-030	BPI0059	216
BOS R-34	BAM00W8	343	BPI 8M4A4P-2K-00-KPXB0-050	BPI005A	216
BOS R-35	BAM00W9	346	BPI 8M4A4P-2K-00-KPXB0-100	BPI005C	216
BOS R-36	BAM01CM	343	BPI 8M4A4P-2K-00-KPXB0-150	BPI005E	216
BOS R-37	BAM01CN	343	BPI 8M4A4P-2K-00-SM6CT	BPI0050	218
BOS R-38	BAM01H7	345	BPI 8M4A4P-2K-00-TP0E	BPI007E	221
BOS R-39	BAM01H8	344	BPI 8M4A4P-2K-00-TPSE	BPI007J	220
BOS R-41	BAM01H9	344	BPI 8M4A5P-2K-00-KPXL0-030	BPI004R	217
BOS R-42	BAM01HA	345	BPI 8M4A5P-2K-00-KPXL0-050	BPI004T	217
BOS R-43	BAM01HC	345	BPI 8M4A5P-2K-00-KPXL0-100	BPI004U	217
BOS R-44	BAM01HE	343	BPI 8M4A5P-2K-00-KPXL0-150	BPI004W	217
BOS R-45	BAM01HF	347	BPI 8M4A5P-2K-00-SM6LT	BPI0051	219
BOS R-46	BAM01JP	341	BPI 8M4A5P-2K-00-TP0N	BPI007F	223
BOS R-47	BAM01JN	341	BPI 8M4A5P-2K-00-TPSN	BPI007H	222
BOS R-48	BAM01LA	341	BPI T009-K-00-KPX70-030	BPI007Z	221
BOS R-49	BAM01NH	343	BPI T009-K-00-KPX70-050	BPI0080	221
BOS R-5	BAM00WA	341	BPI T009-K-00-KPX70-100	BPI0081	221
BOS R-50	BAM01JM	346	BPI T009-K-00-KPX70-150	BPI0082	221
BOS R-6-0,25	BAM00WC	346	BPI T00E-K-00-KPXB0-030	BPI0083	221
BOS R-6-45	BAM00WE	346	BPI T00E-K-00-KPXB0-050	BPI0084	221
BOS R-7-0,25	BAM00WF	346	BPI T00E-K-00-KPXB0-100	BPI0085	221
BOS R-7-22	BAM00WH	346	BPI T00E-K-00-KPXB0-150	BPI0086	221
BOS R-8-0,25	BAM00WJ	346	BPI T00G-K-00-KPXB0-030	BPI007M	223
BOS R-8-22	BAM00WK	346	BPI T00G-K-00-KPXB0-050	BPI007N	223
BOS R-9	BAM00WL	341	BPI T00G-K-00-KPXB0-100	BPI007P	223
BOS S-C01	BAE002E	259	BPI T00G-K-00-KPXB0-150	BPI007R	223
BOS S-C02	BAE002F	259	BPI T00N-K-00-KPXL0-030	BPI007T	223
BOS S-F01	BAE002H	259	BPI T00N-K-00-KPXL0-050	BPI007U	223
BOS S-F02	BAE002J	259	BPI T00N-K-00-KPXL0-100	BPI007W	223
BOS S-M01	BAE002K	259	BPI T00N-K-00-KPXL0-150	BPI007Y	223
BOS S-M02	BAE002L	259			
BOS S-T01	BAE002M	259			
BOS S-T02	BAE002N	259			

### BPI

BPI 4M303P-2K-00-KPX60-030	BPI002N	214
BPI 4M303P-2K-00-KPX60-050	BPI002P	214
BPI 4M303P-2K-00-KPX60-100	BPI002R	214
BPI 4M303P-2K-00-KPX60-150	BPI002T	214
BPI 4M303P-2K-00-SM4	BPI003P	213
BPI 4M304P-2K-00-KPXA0-030	BPI0038	215
BPI 4M304P-2K-00-KPXA0-050	BPI0039	215
BPI 4M304P-2K-00-KPXA0-100	BPI003A	215
BPI 4M304P-2K-00-KPXA0-150	BPI003C	215
BPI 4M4A4P-2K-00-SM6CT	BPI004Y	218
BPI 4M4A4P-2K-00-TP09	BPI007A	221
BPI 4M4A4P-2K-00-TPS9	BPI007L	220
BPI 4M4A5P-2K-00-KPXB0-030	BPI0049	217
BPI 4M4A5P-2K-00-KPXB0-050	BPI004A	217
BPI 4M4A5P-2K-00-KPXB0-100	BPI004C	217
BPI 4M4A5P-2K-00-KPXB0-150	BPI004E	217
BPI 4M4A5P-2K-00-SM6LT	BPI004Z	219
BPI 4M4A5P-2K-00-TP0G	BPI007C	223
BPI 4M4A5P-2K-00-TPSG	BPI007K	222

### BTL

BTL2-GS10-_-_-_-A	BAM000P	390
-------------------	---------	-----

### BVS

BVS Z-MB-01	BAM00WN	399
-------------	---------	-----

### Sonstiges

11023834	FHW0003	204
BAV BP-PH-00064-01	SET011L	365

# Alphanumeric Index

## Sorted by ordering code

Ordering code	Part number	Page
<b>BAE</b>		
<b>BAE0001</b>	BAE-PS-XA-1W-24-007-001	236
<b>BAE0002</b>	BAE-PS-XA-1W-24-100-004	242
<b>BAE0003</b>	BAE-PS-XA-1W-24-200-005	243
<b>BAE0004</b>	BAE-PS-XA-1W-24-012-002	237
<b>BAE0005</b>	BAE-PS-XA-1W-24-025-002	238
<b>BAE0006</b>	BAE-PS-XA-1W-24-050-003	241
<b>BAE0007</b>	BAE-PS-XA-3Y-24-050-009	244
<b>BAE0008</b>	BAE-PS-XA-3Y-24-100-006	245
<b>BAE0009</b>	BAE-PS-XA-3Y-24-200-007	245
<b>BAE000E</b>	BAE LX-VS-HR025	408
<b>BAE000F</b>	BAE LX-VS-HR050	408
<b>BAE000H</b>	BAE LX-VS-HR100	409
<b>BAE000J</b>	BAE LX-VS-RR100	412
<b>BAE000K</b>	BAE LX-VS-RI100	413
<b>BAE0029</b>	BES 516-4	257
<b>BAE002C</b>	BES 516-7	257
<b>BAE002E</b>	BOS S-C01	259
<b>BAE002F</b>	BOS S-C02	259
<b>BAE002H</b>	BOS S-F01	259
<b>BAE002J</b>	BOS S-F02	259
<b>BAE002K</b>	BOS S-M01	259
<b>BAE002L</b>	BOS S-M02	259
<b>BAE002M</b>	BOS S-T01	259
<b>BAE002N</b>	BOS S-T02	259
<b>BAE0036</b>	BAE-PS-XA-1W-12-015-001	236
<b>BAE0039</b>	BAE-PS-XA-1W-12-025-002	237
<b>BAE003E</b>	BAE-PS-XA-1W-12-050-002	239
<b>BAE003H</b>	BAE-PS-XA-1W-12-100-003	241
<b>BAE003J</b>	BAE-PS-XA-1W-24-038-003	240
<b>BAE003K</b>	BAE-PS-XA-1W-48-025-003	240
<b>BAE003L</b>	BAE-PS-XA-1W-48-050-004	242
<b>BAE003M</b>	BAE-PS-XA-1W-48-100-005	243
<b>BAE003R</b>	BAE-PS-XA-3Y-24-400-010	246
<b>BAE0049</b>	BIS C-703-A	389
<b>BAE006K</b>	BDD-UM 3023	261
<b>BAE006W</b>	BES 113-FD-1	253
<b>BAE006Y</b>	BES 516-611-A-1	255
<b>BAE006Z</b>	BES 516-615-NS-1-PU-05	254
<b>BAE0070</b>	BES 516-615-PS-1-PU-05	254
<b>BAE0073</b>	BES 516-IV 2	251
<b>BAE00AM</b>	BAE LX-VS-DR090	420
<b>BAE00AN</b>	BAE LX-VS-RW100	413
<b>BAE00AP</b>	BAE LX-VS-LR085	414
<b>BAE00AR</b>	BAE LX-VS-LW085	415
<b>BAE00AT</b>	BAE LX-VS-LI085	415
<b>BAE00AW</b>	BAE LX-VS-LW170	415
<b>BAE00AY</b>	BAE LX-VS-LI170	415
<b>BAE00AZ</b>	BAE LX-VS-LR170	414
<b>BAE00C5</b>	BAE LX-VS-HR150	410
<b>BAE00E5</b>	BAE PD-US-004-S04	379
<b>BAE00E6</b>	BAE PD-US-004-S92	379
<b>BAE00EK</b>	BAE-PS-XA-1W-24-050-013	231
<b>BAE00EN</b>	BAE-PS-XA-1W-24-038-601	232
<b>BAE00EP</b>	BAE-PS-XA-1W-24-038-602	232
<b>BAE00ER</b>	BAE-PS-XA-1W-24-038-603	233
<b>BAE00ET</b>	BAE-PS-XA-1W-24-080-604	233
<b>BAE00EU</b>	BAE-PS-XA-1W-24-100-014	231
<b>BAE00FL</b>	BAE-PS-XA-1W-24-080-605	234
<b>BAE00FM</b>	BAE LX-VS-RW100-S	413
<b>BAE00FN</b>	BAE LX-VS-RI100-S	413
<b>BAE00FP</b>	BAE LX-VS-RR100-S	412

Ordering code	Part number	Page
<b>BAE00FR</b>	BAE LX-VS-HI100	409
<b>BAE00FT</b>	BAE LX-VS-SR030	417
<b>BAE00FW</b>	BAE-PS-XA-1W-24-038-607	233
<b>BAE00FY</b>	BAE-PS-XA-1W-24-080-606	234
<b>BAE00H0</b>	BAE LX-VS-SR018	417
<b>BAE00H1</b>	BAE LX-VS-SI018	417
<b>BAE00H2</b>	BAE LX-VS-SI030	417
<b>BAE00J9</b>	BAE LX-VS-OR50	419
<b>BAE00JA</b>	BAE LX-VS-OR100	419
<b>BAE00JC</b>	BAE LX-VS-HR200	411
<b>BAE00JE</b>	BAE LX-VS-HI200	411
<b>BAE00JF</b>	BAE LX-VS-HR100-E	411
<b>BAE00KE</b>	BAE LX-XO-PL018-L1-S4	421
<b>BAE00KF</b>	BAE LX-VS-SR012	416
<b>BAE00KP</b>	BAE LX-VS-HI150	410
<b>BAE00KR</b>	BAE LX-VS-HI050	409
<b>BAE00KZ</b>	BAE LX-XO-PL018-L2-S4	421
<b>BAM</b>		
<b>BAM000E</b>	BFO CT	332
<b>BAM000J</b>	BFO D10-LA-DC-10	332
<b>BAM000P</b>	BTL2-GS10-__-__-A	390
<b>BAM000T</b>	BAM MC-XA-002-D03,0-2	298
<b>BAM000U</b>	BAM MC-XA-002-D04,0-2	298
<b>BAM000W</b>	BAM MC-XA-002-D06,5-2	298
<b>BAM000Y</b>	BAM MC-XA-002-D08,0-2	298
<b>BAM002H</b>	BMS AD-P-001-12/10	307
<b>BAM002J</b>	BMS CU-P-D12-A040-00	264
<b>BAM002K</b>	BMS CS-P-D12-AD08-00	265
<b>BAM002L</b>	BMS CR-P-D12-AU-00	266
<b>BAM002M</b>	BMS CC-P-D12-A-00	266
<b>BAM002N</b>	BMS CS-P-D12-AD12-00	265
<b>BAM002P</b>	BMS CS-P-D12-AD18-00	265
<b>BAM002R</b>	BMS RS-M-D12-0150-00	284
<b>BAM002T</b>	BMS RS-M-D12-0250-00	284
<b>BAM002U</b>	BMS RS-M-D12-1000-00	284
<b>BAM002Y</b>	BMS CUJ-P-D12-R040-00	265
<b>BAM002Z</b>	BMS CC-M-D12-B-00	267
<b>BAM0031</b>	BMS CS-M-D12-IZ	269
<b>BAM0032</b>	BMS CS-M-D12-ID18-01	271
<b>BAM0033</b>	BMS CS-M-D12-ID30-01	271
<b>BAM0034</b>	BMS CR-M-D12-IU-02	279
<b>BAM0035</b>	BMS CR-M-D12-IS-03	278
<b>BAM0036</b>	BMS CS-M-D12-ID08-01	270
<b>BAM0037</b>	BMS CS-M-D12-ID12-01	270
<b>BAM0038</b>	BMS AD-M-002-D12/D18	273
<b>BAM0039</b>	BMS BS-M-D12-0250-02	280
<b>BAM003A</b>	BMS BS-M-D12-0250-01	280
<b>BAM003C</b>	BMS CS-M-D12-BX05-02	276
<b>BAM003E</b>	BMS AD-M-002-D12/D12	273
<b>BAM003F</b>	BMS BS-M-D12-0250-03	281
<b>BAM003H</b>	BMS BS-M-D12-0400-04	281
<b>BAM003J</b>	BMS AD-M-003-D12/IZ	282
<b>BAM003K</b>	BMS CS-M-D12-ID16-01	270
<b>BAM003L</b>	BMS CS-M-D12-ID24-01	271
<b>BAM003M</b>	BMS CS-M-D12-ID36-01	272
<b>BAM003N</b>	BMS CR-M-D12-IU-05	279
<b>BAM003P</b>	BMS CS-M-D12-IQ40-02	277
<b>BAM003R</b>	BMS CS-M-D12-IQ40-03	277
<b>BAM003W</b>	BMS KIT-V1	285
<b>BAM003Y</b>	BMS CS-M-D12-IZ-01	269
<b>BAM003Z</b>	BMS CZ-M-B-001	366
<b>BAM0040</b>	BMS CS-M-D12-BX06-03	276

# Alphanumeric Index

## Sorted by ordering code

Ordering code	Part number	Page
BAM0041	BMS CZ-M-D12-I-001	283, 352
BAM0042	BMS CR-M-D12-IS-04	278
BAM0043	BMS CS-M-D12-B21K-04	274
BAM0044	BMS CU-M-D12-I060-01	268
BAM0045	BMS RS-S-D12-0150-00	284
BAM0046	BMS RS-S-D12-0300-00	284
BAM0092	BES 03,0-KB-3	303
BAM0094	BES 04,0-KB-1	302
BAM0095	BES 04,0-KB-3	303
BAM0097	BES 05,0-KB-1	302
BAM0098	BES 05,0-KB-3	303
BAM0099	BES 05,0-KH-2S	290
BAM009A	BES 06,5-BS-1	301
BAM009C	BES 06,5-KB-1	302
BAM009E	BES 06,5-KB-3	303
BAM009F	BES 06,5-KB-7	302
BAM009K	BES 08-DM-1	394
BAM009L	BES 08-FA-49	368
BAM009M	BES 08-FA-89	369
BAM009N	BES 08-FA-BS-4,0-G	369
BAM009P	BES 08-FA-BS-4,0-W	369
BAM009R	BES 08-FA-BS-8,0-G	369
BAM009T	BES 08-FA-BS-8,0-W	369
BAM009U	BES 08,0-HW-1	308
BAM009W	BES 08-HW-4	309
BAM009Y	BES 08-HW-5	309
BAM009Z	BES 08-SM-1	297
BAM00A0	BES 08-SM-1F	297
BAM00A2	BES 08,0-BS-1	301
BAM00A5	BES 08,0-KB-3	302
BAM00A6	BES 08,0-KB-3-F	302
BAM00A7	BES 08,0-KB-4-F	305
BAM00A8	BES 08,0-KB-5-F	306
BAM00AA	BES 08,0-KB-7	303
BAM00AE	BES 08,0-KH-2L	290
BAM00AF	BES 08,0-KH-2L/W	290
BAM00AH	BES 08,0-KH-2S	290
BAM00AK	BES 08,0-KH-2S/W	290
BAM00AL	BES 08,0-KH-3L	296
BAM00AM	BES 08,0-KH-4-F	291
BAM00AN	BES 08,0-KH-6L	291
BAM00AP	BES 08,0-KH-6L/W	291
BAM00AR	BES 08,0-KH-6S	290
BAM00AU	BES 08,0-KH-7-F	291
BAM00AZ	BES 12-FA-70	369
BAM00C0	BES 12,0-HW-1	308
BAM00C2	BES 12-SM-2	297
BAM00C4	BES 12,0-BS-1	301
BAM00C7	BES 12,0-KB-2	303
BAM00C8	BES 12,0-KB-2-F	303
BAM00C9	BES 12,0-KB-3	304
BAM00CA	BES 12,0-KB-3-F	304
BAM00CC	BES 12,0-KB-3-F-SA1	304
BAM00CE	BES 12,0-KB-3-F-SA2	304
BAM00CF	BES 12,0-KB-4-F	305
BAM00CH	BES 12,0-KB-5-F	306
BAM00CK	BES 12-KB-602-02/12	310
BAM00CL	BES 12-KB-602-04/12	310
BAM00CM	BES 12-KB-602-06/12	311
BAM00CN	BES 12-KB-602-06/16	311
BAM00CY	BES 12,0-KH-2L	291
BAM00CZ	BES 12,0-KH-2L/W	291
BAM00E0	BES 12,0-KH-2S	291

Ordering code	Part number	Page
BAM00E1	BES 12,0-KH-2S/W	291
BAM00E2	BES 12,0-KH-3L	296
BAM00E3	BES 12,0-KH-3X	296
BAM00E4	BES 12,0-KH-4	290
BAM00E5	BES 12,0-KH-4-F	291
BAM00E8	BES 12,0-KH-5F	296
BAM00EM	BES 14,5-BS-1	301
BAM00EN	BES 16,0-HW-1	308
BAM00EP	BES 16-SM-2	297
BAM00ET	BES 16,0-BS-1	301
BAM00EY	BES 18,0-HW-1	309
BAM00EZ	BES 18-SM-1	297
BAM00F0	BES 18-SM-2	393
BAM00F1	BES 18-SM-3	297
BAM00F2	BES 18,0-BS-1	301
BAM00F6	BES 18,0-KB-2	303
BAM00F7	BES 18,0-KB-3	305
BAM00F8	BES 18,0-KB-3-F	305
BAM00F9	BES 18,0-KB-3-F-SA1	305
BAM00FA	BES 18,0-KB-3-F-SA2	305
BAM00FC	BES 18,0-KB-4-F	305
BAM00FE	BES 18,0-KB-5-F	306
BAM00FN	BES 18,0-KH-2L	292
BAM00FP	BES 18,0-KH-2L/W	292
BAM00FR	BES 18,0-KH-2M	292
BAM00FT	BES 18,0-KH-2S	291
BAM00FW	BES 18,0-KH-2S/W	291
BAM00FY	BES 18,0-KH-3L	296
BAM00FZ	BES 18,0-KH-4	290
BAM00H0	BES 18,0-KH-4-F	291
BAM00H7	BES 20,0-BS-1	301
BAM00H8	BES 22-SM-2	393
BAM00H9	BES 22,0-BS-1	301
BAM00HA	BES 24,0-HW-1	309
BAM00HH	BES 30,0-HW-1	309
BAM00HJ	BES 30-SM-1	393
BAM00HK	BES 30-SM-2	393
BAM00HL	BES 30-SM-3	297
BAM00HM	BES 30-SM-5	297
BAM00HN	BES 30,0-BS-1	301
BAM00HU	BES 30,0-KB-3-F	305
BAM00HW	BES 30,0-KB-4-F	305
BAM00HY	BES 30,0-KB-5-F	306
BAM00J4	BES 30,0-KH-2L	292
BAM00J5	BES 30,0-KH-2L/W	292
BAM00J6	BES 30,0-KH-2S	292
BAM00J7	BES 30,0-KH-2S/W	292
BAM00J8	BES 30,0-KH-4	290
BAM00J9	BES 30,0-KH-4-F	291
BAM00JK	BES 36,0-HW-1	309
BAM00JL	BES 36-SM-2	393
BAM00JN	BES 36,0-BS-1	301
BAM00JT	BES HS-01-P1-C16/Q40	382
BAM00JU	BES HS-01-P1-C8/Q40	382
BAM00JW	BES Q40-HW-1	381
BAM00JY	BES Q40-HW-2	381
BAM00JZ	BES Q40-HW-3	381
BAM00KO	BES Q40-SH-1	383
BAM00K1	BES Q40-SH-2	383
BAM00NJ	BES Q08-KH-2	364
BAM00NM	BFO 30-A1	332
BAM00NN	BFO 02-PK-1	333
BAM00NP	BFO 02-UK-1	333

# Alphanumeric Index

## Sorted by ordering code

Ordering code	Part number	Page
BAM00NR	BFO 04-FL-1	333
BAM00NT	BFO 04-FL-2	333
BAM00NU	BFO 04-FS-1	333
BAM00NW	BFO 04-PK-1	331
BAM00NY	BFO 06-FS-1	333
BAM00P0	BFO 08,0-KB-1	332
BAM00P1	BFO D13-LA-EC-10	332
BAM00P2	BKT M-PK-4	353
BAM00P3	BKT M-PK-5	353
BAM00P6	BOS 63-HW-1	362
BAM00P9	BOD 66-HW-1	361
BAM00PW	BOS 12-BL-1	349
BAM00PY	BOS 12-LT-1	352
BAM00R0	BOS 12-WS-1	357
BAM00R1	BOS 12-WS-2	357
BAM00R6	BOS 18-BL-1	348
BAM00R7	BOS 18-BL-2	349
BAM00R9	BOS 18-LT-1	352
BAM00RL	BOS 18-SM-1	355
BAM00RP	BOS 18-UK-1	356
BAM00RR	BOS 18-UK-10	356
BAM00RT	BOS 18-UK-2	356
BAM00RU	BOS 18-WS-1	357
BAM00RY	BOS 18,0-HW-1	359
BAM00RZ	BOS 18,0-HW-2	359
BAM00T0	BOS 18,0-HW-3	359
BAM00T1	BOS 18,0-HW-4	360
BAM00T2	BOS 18,0-HW-6	360
BAM00T3	BOS 18,0-KB-1	307
BAM00T4	BOS 2-HW-1	358
BAM00T5	BOS 2-HW-3	358
BAM00T6	BOS 2-HW-2	358
BAM00T7	BOS 21-AD-1	366
BAM00T9	BOS 21-HW-1	360
BAM00TA	BOS 21-HW-2	360
BAM00TC	BOS 21-HW-3	360
BAM00TE	BOS 21-HW-4	360
BAM00TF	BOS 21-KH-1	366
BAM00TH	BOS 21-KH-2	366
BAM00TK	BOS 26-HW-1	362
BAM00TN	BOS 30,0-KB-1	307
BAM00TU	BOS 5-BL-1	350
BAM00TW	BOS 5-BL-2	350
BAM00TY	BOS 5-BL-3	350
BAM00TZ	BOS 5-BL-4	350
BAM00U0	BOS 5-BL-5	350
BAM00U1	BOS 5-BL-6	350
BAM00U2	BOS 5-BL-7	351
BAM00U3	BOS 5-BL-8	351
BAM00U4	BOS 5-BL-9	351
BAM00U5	BOS 5-HW-1	358
BAM00U6	BOS 5-HW-2	358
BAM00U7	BOS 5-HW-3	358
BAM00U8	BOS 5-HW-4	362
BAM00U9	BOS 5-HW-5	363
BAM00UA	BOS 5-HW-6	362
BAM00UH	BOS 6-HW-1	363
BAM00UJ	BOS 74-HW-1	361
BAM00UK	BOS R-1	340
BAM00UL	BOS R-11	341
BAM00UM	BOS R-12	344
BAM00UN	BOS R-13	345
BAM00UP	BOS R-14	340

Ordering code	Part number	Page
BAM00UR	BOS R-15	340
BAM00UT	BOS R-16	345
BAM00UW	BOS R-2	340
BAM00UY	BOS R-22	344
BAM00UZ	BOS R-25	341
BAM00W0	BOS R-26	341
BAM00W1	BOS R-27	342
BAM00W2	BOS R-28	342
BAM00W3	BOS R-29	342
BAM00W4	BOS R-3	340
BAM00W5	BOS R-30 (standard)	347
BAM00W6	BOS R-32-0,40	346
BAM00W7	BOS R-33	342
BAM00W8	BOS R-34	343
BAM00W9	BOS R-35	346
BAM00WA	BOS R-5	341
BAM00WC	BOS R-6-0,25	346
BAM00WE	BOS R-6-45	346
BAM00WF	BOS R-7-0,25	346
BAM00WH	BOS R-7-22	346
BAM00WJ	BOS R-8-0,25	346
BAM00WK	BOS R-8-22	346
BAM00WL	BOS R-9	341
BAM00WN	BVS Z-MB-01	399
BAM00ZL	BAM TO-CC-001-M3-0,4/8,0	204
BAM00ZM	BAM TO-CC-001-M4-0,6/12,0	204
BAM00ZN	BAM TO-CC-001-A3-1,5/24,0	204
BAM0114	BKS-12-CS-01	205
BAM0120	BKT M-PK-1	353
BAM0121	BKT M-PK-2	353
BAM0122	BKT M-PK-3	353
BAM0124	BOS 36-HW-1	361
BAM0125	BOS 65-HW-1	361
BAM0126	BOS R-10	340
BAM012A	BIS C-300-HG	389
BAM012J	BIS Z-HG-002	389
BAM012K	BIS Z-HG-003	389
BAM012L	BIS Z-HW-001	388
BAM012T	BKS-7/8-CS-00-A	205
BAM012U	BKS-7/8-CS-00-I	205
BAM015U	BESA-08-CM	370
BAM015W	BESA-12-CM	371
BAM015Y	BESA-18-CM	371
BAM015Z	BESA-30-CM	371
BAM018M	BIS Z-SP-001	393
BAM019W	BAM FS-XE-004-M8-4	375
BAM019Y	BAM FS-XE-003-M5-4	374
BAM01A7	BAM OF-VS-001-D-RX100	412
BAM01A8	BAM PC-AE-002-1	402
BAM01AC	BAM MB-XA-003-B03-1	399
BAM01AE	BAM MB-XA-002-B02-1	399
BAM01AT	BNI ACC-L01-000	206
BAM01AU	BES Q08-KH-3	364
BAM01AW	BMS CS-M-D12-B23K-05	274
BAM01AY	BMS CS-M-D12-BX07-06	275
BAM01AZ	BAM FS-XE-001-M5-4	374
BAM01C0	BAM FS-XE-002-D4-4	373
BAM01C1	BAM CS-XA-001-M8-C	205
BAM01C2	BAM CS-XA-002-M12-A	205
BAM01CF	BAM R-40	347
BAM01CH	BMS CU-M-D12-I060-02	268
BAM01CM	BOS R-36	343
BAM01CN	BOS R-37	343



# Alphanumeric Index

## Sorted by ordering code

Ordering code	Part number	Page
BAM01CW	BMS CS-M-D12-BX08-07	266
BAM01E0	BAM MB-XA-004-M30-5	309
BAM01E8	BAM MB-XO-005-B04-4	363
BAM01EA	BAM CC-XA-028-T05-P	206
BAM01EC	BAM CC-XA-025-C03-P	206
BAM01EP	BAM BD-US-001-D20-4	377
BAM01ER	BAM BD-US-001-D32-4	377
BAM01ET	BAM AP-US-001-M12-0	378
BAM01F2	BMS CS-M-D12-BX11-09	275, 415
BAM01F3	BMS CS-M-D12-BX10-08	275
BAM01FK	BAM MB-XO-006-B05-4	361
BAM01FM	BAM MB-XO-007-B05-4	361
BAM01H6	BOS R-31	343
BAM01H7	BOS R-38	345
BAM01H8	BOS R-39	344
BAM01H9	BOS R-41	344
BAM01HA	BOS R-42	345
BAM01HC	BOS R-43	345
BAM01HE	BOS R-44	343
BAM01HF	BOS R-45	347
BAM01HJ	BAM AP-US-002-M18-0	378
BAM01J0	BAM FK-NI-PBS-01-C	206
BAM01J2	BMS CS-M-D12-IX09-01	272
BAM01JK	BIS Z-HW-003	386
BAM01JL	BML-Z0008	391
BAM01JM	BOS R-50	346
BAM01JN	BOS R-47	341
BAM01JP	BOS R-46	341
BAM01JR	BAM AP-US-003-M12-0	378
BAM01KM	BOS 12,0-KB-1	307
BAM01KN	BIS Z-HW-004	385
BAM01KP	BAM AD-SP-008-1G4/1G4-4	397
BAM01KR	BAM AD-SP-008-1G4/1G4-4-EN837	397
BAM01KT	BAM AD-SP-008-1G4/1N4-4	397
BAM01L8	BAM PC-XO-006-23K-1	351
BAM01L9	BML-Z0010	391
BAM01LA	BOS R-48	341
BAM01LW	BIS Z-SP-003	385
BAM01MF	BML-C01	391
BAM01MH	BML-C02	391
BAM01MY	BAM MB-XA-010-B07-4	387
BAM01NC	BAM PC-XO-005-18M-4	355
BAM01NH	BOS R-49	343
BAM01RP	BAM AD-SP-008-1G4/1R4-4	397
BAM01RR	BAM PC-VS-008-1	403
BAM01TK	BMS CS-M-D12-IX13-0	279
BAM01TR	BAM AD-SP-011-1G4/1N4-4	397
BAM01TY	BAM TO-CC-002-M6	204
BAM01U0	BAM MC-XA-017-D30,0-1	300, 396
BAM01U2	BAM LS-FO-002-F	332
BAM01U6	BAM PC-XO-006-50K-1	351
BAM01UH	BAM MB-XA-012-B09-4	387
BAM01UJ	BAM AD-SP-008-1G4/1G2-4	397
BAM01UL	BMS CS-M-D12-IX14-01	272
BAM01W3	BAM MC-XA-021-M12-2	394
BAM01W4	BAM MC-XA-021-M18-2	395
BAM01W5	BAM MC-XA-021-M30-2	395
BAM01W6	BAM MC-XA-021-M16-2	394
BAM01WF	BAM MC-XA-021-M5-4	394
BAM01WH	BAM MC-XA-021-M12-4	394
BAM01WJ	BAM MC-XA-021-M18-4	395
BAM01WK	BAM MC-XA-021-M30-4	395
BAM01WL	BAM MC-XA-021-M18-A	395

Ordering code	Part number	Page
BAM01WM	BAM MC-XA-021-M30-A	395
BAM01WR	BAM MC-XA-021-M8-3	394
BAM01Y3	BAM MC-XA-018-B04-4	387
BAM01Y5	BAM PC-XO-005-08M-4	354
BAM01Y6	BOS PC-XO-005-12M-4	354
BAM01Y8	BAM PC-AM-010-4	387
BAM01YK	BIS Z-HW-005	384
BAM01YL	BAM PC-XO-006-23K-G/RK	351
BAM01YM	BAM PC-XO-006-50K-G/RK	351
BAM01YN	BAM CS-XA-008-M12-4	207
BAM01YP	BMS CS-M-S25-DX15-00	401
BAM01YT	BMS CUJ-M-S25-D045-00	401
BAM01YW	BAM MB-XA-013-Q08-4	364
BAM01Z4	BAM FK-CC-005-M12-A	207
BAM01Z5	BAM FK-CC-005-M08-A	207
BAM01Z7	BMS CS-M-D14-IZ	269
BAM01Z8	BMS CS-M-D14-IZ-01	269
BAM0206	BAM FK-VS-002-03-1	402
BAM0209	BAM AD-SP-008-1G4/M20X1,5-4	396
BAM020M	BAM CS-CC-009-H4-A	207
BAM020N	BAM CS-CC-010-H4-A	207
BAM020P	BAM LS-FO-003-M6-L	332
BAM0212	BAM PT-XA-004-070-T-R16	208
BAM0213	BAM PT-XA-004-100-T-R16	208
BAM0214	BAM PT-XA-004-130-T-R16	209
BAM0215	BAM PT-XA-004-160-T-R16	209
BAM0216	BAM PT-XA-004-190-T-R16	209
BAM0217	BAM PT-XA-004-500-T-R16	209
BAM0218	BAM MC-XA-027-D12,0-1	300
BAM0219	BAM MC-XA-027-D18,0-1	300
BAM021E	BAM PT-XA-005-260-T-R20	208
BAM021F	BAM PT-XA-005-510-T-R20	208
BAM021R	BAM PC-XA-016-001-A	384
BAM021T	BMS RS-M-D12-0200-00	284
BAM021U	BMS RS-M-D12-0750-00	284
BAM021W	BMS RS-M-D12-0300-00	284
BAM021Y	BMS RS-M-D12-0100-00	284
BAM0225	BAM MB-XO-014-B10-4-RRR	362
BAM0226	BAM MB-XO-014-B10-4-BRR	362
BAM0227	BAM MB-XO-014-B10-4-BLS	363
BAM0228	BAM MB-XO-014-B10-4-RLS	363
BAM022A	BAM MC-XO-030-6K-4	359
BAM022C	BAM CS-M-D12-S6K-00	359
BAM022F	BAM MC-XA-023-D18,0-2-FXS/W	294
BAM022H	BAM MC-XA-023-D18,0-2-FXL	295
BAM022J	BAM MC-XA-023-D18,0-2-FXL/W	295
BAM022K	BAM MC-XA-023-D18,0-2-FS	294
BAM022L	BAM MC-XA-023-D18,0-2-FL	295
BAM022M	BAM MC-XA-024-D18,0-2-FM/W	295
BAM022Z	BAM PT-XA-002-100-2-R15	208
BAM0230	BAM PT-XA-002-130-2-R15	208
BAM0231	BAM PT-XA-002-190-2-R15	209
BAM0232	BAM PT-XA-002-380-2-R15	209
BAM0233	BAM PT-XA-002-500-2-R15	209
BAM023F	BAM IA-CC-002-01	206
BAM023H	BAM IA-CC-002-02	206
BAM023J	BAM IA-CC-002-03	206
BAM0246	BAM MC-XA-023-D12,0-2-FS	293
BAM0247	BAM MC-XA-023-D12,0-2-FM/W	293
BAM0248	BAM MC-XA-023-D12,0-2-FXL/W	293
BAM0249	BAM MC-XA-023-D30,0-2-FS/W	294
BAM024A	BAM MC-XA-024-D30,0-2-FM/W	295
BAM024C	BAM MC-XA-023-D30,0-2-FXL/W	295

# Alphanumeric Index

## Sorted by ordering code

Ordering code	Part number	Page
<b>BAM024E</b>	BAM MC-XA-024-D12,0-2-FM/W	293
<b>BAM024F</b>	BAM MC-XA-024-D12,0-2-FXL/W	293
<b>BAM024H</b>	BAM MC-XA-023-D30,0-2-FM/W	294
<b>BAM024P</b>	BMS CU-M-D12-B028-00	267
<b>BAM024R</b>	BMS CCJ-M-D12-B-01	267
<b>BAM024T</b>	BMS CS-M-D12-BZ	267
<b>BAM01N4</b>	BML-R01-M_ _ _	391
<b>BAMU1TM</b>	Mounting plate B 4 - 2057	380

### BCC

<b>BCC00HE</b>	BKS-B 25-1-PU-03	22
<b>BCC00HF</b>	BKS-B 25-1/GS49-PU-00,3	24
<b>BCC00HH</b>	BKS-B 25-1/GS49-PU-00,6	24
<b>BCC00HJ</b>	BKS-B 25-1/GS49-PU-01	24
<b>BCC00HK</b>	BKS-B 25-3-PU-03	23
<b>BCC00HL</b>	BKS-B 25-3-PU-05	23
<b>BCC00HM</b>	BKS-B 26-1-PU-03	23
<b>BCC00HN</b>	BKS-B 26-1/GS49-PU-01	24
<b>BCC00HP</b>	BKS-B 26-3-PU-03	23
<b>BCC00HR</b>	BKS-B 26-3-PU-05	23
<b>BCC00T2</b>	BIS Z-AK-001-PU1-03	389
<b>BCC0158</b>	BKS-S144-00	86
<b>BCC02H6</b>	BKS-S 76-RT04	87
<b>BCC02H7</b>	BKS-S 77-RT04	89
<b>BCC02H8</b>	BKS-S107-RT14	87
<b>BCC02H9</b>	BKS-S109-RT14	89
<b>BCC02HC</b>	BKS-S111-RT13	42
<b>BCC02HE</b>	BKS-S113-RT13	44
<b>BCC02HF</b>	BKS-S216-RT14	45
<b>BCC02HH</b>	BKS-S218-RT14	45
<b>BCC02M2</b>	BCC M313-0000-20-001-PX0334-020	28
<b>BCC02M3</b>	BCC M313-0000-20-001-PX0334-050	28
<b>BCC02M4</b>	BCC M313-0000-20-001-PX0334-100	28
<b>BCC02M5</b>	BCC M323-0000-20-001-PX0334-020	28
<b>BCC02M6</b>	BCC M323-0000-20-001-PX0334-050	28
<b>BCC02M7</b>	BCC M323-0000-20-001-PX0334-100	28
<b>BCC02M8</b>	BCC M313-0000-10-001-PX0334-020	26
<b>BCC02M9</b>	BCC M313-0000-10-001-PX0334-050	26
<b>BCC02MA</b>	BCC M313-0000-10-001-PX0334-100	26
<b>BCC02MH</b>	BCC M323-0000-10-004-PX0334-020	27
<b>BCC02MJ</b>	BCC M323-0000-10-004-PX0334-050	27
<b>BCC02MK</b>	BCC M323-0000-10-004-PX0334-100	27
<b>BCC02ML</b>	BCC M323-0000-10-001-PX0334-020	27
<b>BCC02MM</b>	BCC M323-0000-10-001-PX0334-050	27
<b>BCC02MN</b>	BCC M323-0000-10-001-PX0334-100	27
<b>BCC02MU</b>	BCC M314-0000-20-003-PX0434-020	30
<b>BCC02MW</b>	BCC M314-0000-20-003-PX0434-050	30
<b>BCC02MY</b>	BCC M314-0000-20-003-PX0434-100	30
<b>BCC02MZ</b>	BCC M324-0000-20-003-PX0434-020	30
<b>BCC02N0</b>	BCC M324-0000-20-003-PX0434-050	30
<b>BCC02N1</b>	BCC M324-0000-20-003-PX0434-100	30
<b>BCC02N2</b>	BCC M314-0000-10-003-PX0434-020	29
<b>BCC02N3</b>	BCC M314-0000-10-003-PX0434-050	29
<b>BCC02N4</b>	BCC M314-0000-10-003-PX0434-100	29
<b>BCC02N8</b>	BCC M324-0000-10-008-PX0434-020	29
<b>BCC02N9</b>	BCC M324-0000-10-008-PX0434-050	29
<b>BCC02NA</b>	BCC M324-0000-10-008-PX0434-100	29
<b>BCC02NC</b>	BCC M324-0000-10-003-PX0434-020	29
<b>BCC02NE</b>	BCC M324-0000-10-003-PX0434-050	29
<b>BCC02NF</b>	BCC M324-0000-10-003-PX0434-100	29
<b>BCC02NL</b>	BCC M313-0000-20-001-VX8334-020	28
<b>BCC02NM</b>	BCC M313-0000-20-001-VX8334-050	28
<b>BCC02NN</b>	BCC M313-0000-20-001-VX8334-100	28

Ordering code	Part number	Page
<b>BCC02NP</b>	BCC M323-0000-20-001-VX8334-020	28
<b>BCC02NR</b>	BCC M323-0000-20-001-VX8334-050	28
<b>BCC02NT</b>	BCC M323-0000-20-001-VX8334-100	28
<b>BCC02NU</b>	BCC M313-0000-10-001-VX8334-020	26
<b>BCC02NW</b>	BCC M313-0000-10-001-VX8334-050	26
<b>BCC02NY</b>	BCC M313-0000-10-001-VX8334-100	26
<b>BCC02P2</b>	BCC M323-0000-10-004-VX8334-020	27
<b>BCC02P3</b>	BCC M323-0000-10-004-VX8334-050	27
<b>BCC02P4</b>	BCC M323-0000-10-004-VX8334-100	27
<b>BCC02P5</b>	BCC M323-0000-10-001-VX8334-020	27
<b>BCC02P6</b>	BCC M323-0000-10-001-VX8334-050	27
<b>BCC02P7</b>	BCC M323-0000-10-001-VX8334-100	27
<b>BCC02PC</b>	BCC M314-0000-20-003-VX8434-020	30
<b>BCC02PE</b>	BCC M314-0000-20-003-VX8434-050	30
<b>BCC02PF</b>	BCC M314-0000-20-003-VX8434-100	30
<b>BCC02PH</b>	BCC M324-0000-20-003-VX8434-020	30
<b>BCC02PJ</b>	BCC M324-0000-20-003-VX8434-050	30
<b>BCC02PK</b>	BCC M324-0000-20-003-VX8434-100	30
<b>BCC02PL</b>	BCC M314-0000-10-003-VX8434-020	29
<b>BCC02PM</b>	BCC M314-0000-10-003-VX8434-050	29
<b>BCC02PN</b>	BCC M314-0000-10-003-VX8434-100	29
<b>BCC02PU</b>	BCC M324-0000-10-008-VX8434-020	29
<b>BCC02PW</b>	BCC M324-0000-10-008-VX8434-050	29
<b>BCC02PY</b>	BCC M324-0000-10-008-VX8434-100	29
<b>BCC02PZ</b>	BCC M324-0000-10-003-VX8434-020	29
<b>BCC02R0</b>	BCC M324-0000-10-003-VX8434-050	29
<b>BCC02R1</b>	BCC M324-0000-10-003-VX8434-100	29
<b>BCC02R5</b>	BCC M313-M313-30-300-PX0334-003	32
<b>BCC02R6</b>	BCC M313-M313-30-300-PX0334-006	32
<b>BCC02R7</b>	BCC M313-M313-30-300-PX0334-010	32
<b>BCC02R8</b>	BCC M313-M313-30-300-PX0334-015	32
<b>BCC02R9</b>	BCC M313-M313-30-300-PX0334-020	32
<b>BCC02RA</b>	BCC M313-M313-30-300-PX0334-030	32
<b>BCC02RC</b>	BCC M313-M313-30-300-PX0334-050	32
<b>BCC02RE</b>	BCC M313-M323-30-300-PX0334-003	33
<b>BCC02RF</b>	BCC M313-M323-30-300-PX0334-006	33
<b>BCC02RH</b>	BCC M313-M323-30-300-PX0334-010	33
<b>BCC02RJ</b>	BCC M313-M323-30-300-PX0334-015	33
<b>BCC02RK</b>	BCC M313-M323-30-300-PX0334-020	33
<b>BCC02RL</b>	BCC M313-M323-30-300-PX0334-030	33
<b>BCC02RM</b>	BCC M313-M323-30-300-PX0334-050	33
<b>BCC02RN</b>	BCC M323-M313-30-602-PX0334-003	33
<b>BCC02RP</b>	BCC M323-M313-30-602-PX0334-006	33
<b>BCC02RR</b>	BCC M323-M313-30-602-PX0334-010	33
<b>BCC02RT</b>	BCC M323-M313-30-602-PX0334-015	33
<b>BCC02RU</b>	BCC M323-M313-30-602-PX0334-020	33
<b>BCC02RW</b>	BCC M323-M313-30-602-PX0334-030	33
<b>BCC02RY</b>	BCC M323-M313-30-602-PX0334-050	33
<b>BCC02RZ</b>	BCC M323-M313-30-300-PX0334-003	33
<b>BCC02T0</b>	BCC M323-M313-30-300-PX0334-006	33
<b>BCC02T1</b>	BCC M323-M313-30-300-PX0334-010	33
<b>BCC02T2</b>	BCC M323-M313-30-300-PX0334-015	33
<b>BCC02T3</b>	BCC M323-M313-30-300-PX0334-020	33
<b>BCC02T4</b>	BCC M323-M313-30-300-PX0334-030	33
<b>BCC02T5</b>	BCC M323-M313-30-300-PX0334-050	33
<b>BCC02T6</b>	BCC M323-M323-30-300-PX0334-003	34
<b>BCC02T7</b>	BCC M323-M323-30-300-PX0334-006	34
<b>BCC02T8</b>	BCC M323-M323-30-300-PX0334-010	34
<b>BCC02T9</b>	BCC M323-M323-30-300-PX0334-015	34
<b>BCC02TA</b>	BCC M323-M323-30-300-PX0334-020	34
<b>BCC02TC</b>	BCC M323-M323-30-300-PX0334-030	34
<b>BCC02TE</b>	BCC M323-M323-30-300-PX0334-050	34
<b>BCC02TF</b>	BCC M314-M314-30-304-PX0434-003	35

# Alphanumeric Index

## Sorted by ordering code

Ordering code	Part number	Page
BCC02TH	BCC M314-M314-30-304-PX0434-006	35
BCC02TJ	BCC M314-M314-30-304-PX0434-010	35
BCC02TK	BCC M314-M314-30-304-PX0434-015	35
BCC02TL	BCC M314-M314-30-304-PX0434-020	35
BCC02TM	BCC M314-M314-30-304-PX0434-030	35
BCC02TN	BCC M314-M314-30-304-PX0434-050	35
BCC02TP	BCC M314-M324-30-304-PX0434-003	35
BCC02TR	BCC M314-M324-30-304-PX0434-006	35
BCC02TT	BCC M314-M324-30-304-PX0434-010	35
BCC02TU	BCC M314-M324-30-304-PX0434-015	35
BCC02TW	BCC M314-M324-30-304-PX0434-020	35
BCC02TY	BCC M314-M324-30-304-PX0434-030	35
BCC02TZ	BCC M314-M324-30-304-PX0434-050	35
BCC02U0	BCC M324-M314-30-606-PX0434-003	36
BCC02U1	BCC M324-M314-30-606-PX0434-006	36
BCC02U2	BCC M324-M314-30-606-PX0434-010	36
BCC02U3	BCC M324-M314-30-606-PX0434-015	36
BCC02U4	BCC M324-M314-30-606-PX0434-020	36
BCC02U5	BCC M324-M314-30-606-PX0434-030	36
BCC02U6	BCC M324-M314-30-606-PX0434-050	36
BCC02U7	BCC M324-M314-30-304-PX0434-003	35
BCC02U8	BCC M324-M314-30-304-PX0434-006	35
BCC02U9	BCC M324-M314-30-304-PX0434-010	35
BCC02UA	BCC M324-M314-30-304-PX0434-015	35
BCC02UC	BCC M324-M314-30-304-PX0434-020	35
BCC02UE	BCC M324-M314-30-304-PX0434-030	35
BCC02UF	BCC M324-M314-30-304-PX0434-050	35
BCC02UH	BCC M324-M324-30-304-PX0434-003	36
BCC02UJ	BCC M324-M324-30-304-PX0434-006	36
BCC02UK	BCC M324-M324-30-304-PX0434-010	36
BCC02UL	BCC M324-M324-30-304-PX0434-015	36
BCC02UM	BCC M324-M324-30-304-PX0434-020	36
BCC02UN	BCC M324-M324-30-304-PX0434-030	36
BCC02UP	BCC M324-M324-30-304-PX0434-050	36
BCC02UR	BCC M313-M313-30-300-VX8334-003	32
BCC02UT	BCC M313-M313-30-300-VX8334-006	32
BCC02UU	BCC M313-M313-30-300-VX8334-010	32
BCC02UW	BCC M313-M313-30-300-VX8334-015	32
BCC02UY	BCC M313-M313-30-300-VX8334-020	32
BCC02UZ	BCC M313-M313-30-300-VX8334-030	32
BCC02W0	BCC M313-M313-30-300-VX8334-050	32
BCC02W1	BCC M313-M323-30-300-VX8334-003	33
BCC02W2	BCC M313-M323-30-300-VX8334-006	33
BCC02W3	BCC M313-M323-30-300-VX8334-010	33
BCC02W4	BCC M313-M323-30-300-VX8334-015	33
BCC02W5	BCC M313-M323-30-300-VX8334-020	33
BCC02W6	BCC M313-M323-30-300-VX8334-030	33
BCC02W7	BCC M313-M323-30-300-VX8334-050	33
BCC02W8	BCC M323-M313-30-602-VX8334-003	33
BCC02W9	BCC M323-M313-30-602-VX8334-006	33
BCC02WA	BCC M323-M313-30-602-VX8334-010	33
BCC02WC	BCC M323-M313-30-602-VX8334-015	33
BCC02WE	BCC M323-M313-30-602-VX8334-020	33
BCC02WF	BCC M323-M313-30-602-VX8334-030	33
BCC02WH	BCC M323-M313-30-602-VX8334-050	33
BCC02WJ	BCC M323-M313-30-300-VX8334-003	33
BCC02WK	BCC M323-M313-30-300-VX8334-006	33
BCC02WL	BCC M323-M313-30-300-VX8334-010	33
BCC02WM	BCC M323-M313-30-300-VX8334-015	33
BCC02WN	BCC M323-M313-30-300-VX8334-020	33
BCC02WP	BCC M323-M313-30-300-VX8334-030	33
BCC02WR	BCC M323-M313-30-300-VX8334-050	33
BCC02WT	BCC M323-M323-30-300-VX8334-003	34

Ordering code	Part number	Page
BCC02WU	BCC M323-M323-30-300-VX8334-006	34
BCC02WW	BCC M323-M323-30-300-VX8334-010	34
BCC02WY	BCC M323-M323-30-300-VX8334-015	34
BCC02WZ	BCC M323-M323-30-300-VX8334-020	34
BCC02Y0	BCC M323-M323-30-300-VX8334-030	34
BCC02Y1	BCC M323-M323-30-300-VX8334-050	34
BCC02Y2	BCC M314-M314-30-304-VX8434-003	35
BCC02Y3	BCC M314-M314-30-304-VX8434-006	35
BCC02Y4	BCC M314-M314-30-304-VX8434-010	35
BCC02Y5	BCC M314-M314-30-304-VX8434-015	35
BCC02Y6	BCC M314-M314-30-304-VX8434-020	35
BCC02Y7	BCC M314-M314-30-304-VX8434-030	35
BCC02Y8	BCC M314-M314-30-304-VX8434-050	35
BCC02Y9	BCC M314-M324-30-304-VX8434-003	35
BCC02YA	BCC M314-M324-30-304-VX8434-006	35
BCC02YC	BCC M314-M324-30-304-VX8434-010	35
BCC02YE	BCC M314-M324-30-304-VX8434-015	35
BCC02YF	BCC M314-M324-30-304-VX8434-020	35
BCC02YH	BCC M314-M324-30-304-VX8434-030	35
BCC02YJ	BCC M314-M324-30-304-VX8434-050	35
BCC02YK	BCC M324-M314-30-606-VX8434-003	36
BCC02YL	BCC M324-M314-30-606-VX8434-006	36
BCC02YM	BCC M324-M314-30-606-VX8434-010	36
BCC02YN	BCC M324-M314-30-606-VX8434-015	36
BCC02YP	BCC M324-M314-30-606-VX8434-020	36
BCC02YR	BCC M324-M314-30-606-VX8434-030	36
BCC02YT	BCC M324-M314-30-606-VX8434-050	36
BCC02YU	BCC M324-M314-30-304-VX8434-003	35
BCC02YW	BCC M324-M314-30-304-VX8434-006	35
BCC02YY	BCC M324-M314-30-304-VX8434-010	35
BCC02YZ	BCC M324-M314-30-304-VX8434-015	35
BCC02Z0	BCC M324-M314-30-304-VX8434-020	35
BCC02Z1	BCC M324-M314-30-304-VX8434-030	35
BCC02Z2	BCC M324-M314-30-304-VX8434-050	35
BCC02Z3	BCC M324-M324-30-304-VX8434-003	36
BCC02Z4	BCC M324-M324-30-304-VX8434-006	36
BCC02Z5	BCC M324-M324-30-304-VX8434-010	36
BCC02Z6	BCC M324-M324-30-304-VX8434-015	36
BCC02Z7	BCC M324-M324-30-304-VX8434-020	36
BCC02Z8	BCC M324-M324-30-304-VX8434-030	36
BCC02Z9	BCC M324-M324-30-304-VX8434-050	36
BCC02ZC	BCC M413-0000-2A-001-PX0334-050	52
BCC02ZE	BCC M413-0000-2A-001-PX0334-100	52
BCC02ZF	BCC M413-0000-2A-002-PX0334-020	55
BCC02ZH	BCC M413-0000-2A-002-PX0334-050	55
BCC02ZJ	BCC M413-0000-2A-002-PX0334-100	55
BCC02ZK	BCC M413-0000-2A-036-PS0334-020	52
BCC02ZL	BCC M413-0000-2A-036-PS0334-050	52
BCC02ZM	BCC M413-0000-2A-036-PS0334-100	52
BCC02ZN	BCC M413-0000-2A-037-PS0334-020	55
BCC02ZP	BCC M413-0000-2A-037-PS0334-050	55
BCC02ZR	BCC M413-0000-2A-037-PS0334-100	55
BCC02ZY	BCC M423-0000-2A-001-PX0334-020	53
BCC02ZZ	BCC M423-0000-2A-001-PX0334-050	53
BCC0300	BCC M423-0000-2A-001-PX0334-100	53
BCC0301	BCC M423-0000-2A-002-PX0334-020	55
BCC0302	BCC M423-0000-2A-002-PX0334-050	55
BCC0303	BCC M423-0000-2A-002-PX0334-100	55
BCC0304	BCC M423-0000-2A-036-PS0334-020	53
BCC0305	BCC M423-0000-2A-036-PS0334-050	53
BCC0306	BCC M423-0000-2A-036-PS0334-100	53
BCC0307	BCC M423-0000-2A-037-PS0334-020	55
BCC0308	BCC M423-0000-2A-037-PS0334-050	55



# Alphanumeric Index

## Sorted by ordering code

Ordering code	Part number	Page
<b>BCC0309</b>	BCC M423-0000-2A-037-PS0334-100	55
<b>BCC030A</b>	BCC M415-0000-1A-004-PX0334-020	51
<b>BCC030C</b>	BCC M415-0000-1A-004-PX0334-050	51
<b>BCC030E</b>	BCC M415-0000-1A-004-PX0334-100	51
<b>BCC030F</b>	BCC M415-0000-1A-005-PX0334-020	53
<b>BCC030H</b>	BCC M415-0000-1A-005-PX0334-050	53
<b>BCC030J</b>	BCC M415-0000-1A-005-PX0334-100	53
<b>BCC030K</b>	BCC M415-0000-1A-001-PX0334-020	51
<b>BCC030L</b>	BCC M415-0000-1A-001-PX0334-050	51
<b>BCC030M</b>	BCC M415-0000-1A-001-PX0334-100	51
<b>BCC030N</b>	BCC M415-0000-1A-002-PX0334-020	53
<b>BCC030P</b>	BCC M415-0000-1A-002-PX0334-050	53
<b>BCC030R</b>	BCC M415-0000-1A-002-PX0334-100	53
<b>BCC030T</b>	BCC M415-0000-1A-036-PS0334-020	51
<b>BCC030U</b>	BCC M415-0000-1A-036-PS0334-050	51
<b>BCC030W</b>	BCC M415-0000-1A-036-PS0334-100	51
<b>BCC030Y</b>	BCC M415-0000-1A-037-PS0334-020	53
<b>BCC030Z</b>	BCC M415-0000-1A-037-PS0334-050	53
<b>BCC0310</b>	BCC M415-0000-1A-037-PS0334-100	53
<b>BCC0311</b>	BCC M425-0000-1A-004-PX0334-020	52
<b>BCC0312</b>	BCC M425-0000-1A-004-PX0334-050	52
<b>BCC0313</b>	BCC M425-0000-1A-004-PX0334-100	52
<b>BCC0314</b>	BCC M425-0000-1A-005-PX0334-020	54
<b>BCC0315</b>	BCC M425-0000-1A-005-PX0334-050	54
<b>BCC0316</b>	BCC M425-0000-1A-005-PX0334-100	54
<b>BCC0317</b>	BCC M425-0000-1A-001-PX0334-020	51
<b>BCC0318</b>	BCC M425-0000-1A-001-PX0334-050	51
<b>BCC0319</b>	BCC M425-0000-1A-001-PX0334-100	51
<b>BCC031A</b>	BCC M425-0000-1A-002-PX0334-020	54
<b>BCC031C</b>	BCC M425-0000-1A-002-PX0334-050	54
<b>BCC031E</b>	BCC M425-0000-1A-002-PX0334-100	54
<b>BCC031F</b>	BCC M425-0000-1A-036-PS0334-020	51
<b>BCC031H</b>	BCC M425-0000-1A-036-PS0334-050	51
<b>BCC031J</b>	BCC M425-0000-1A-036-PS0334-100	51
<b>BCC031K</b>	BCC M425-0000-1A-037-PS0334-020	54
<b>BCC031L</b>	BCC M425-0000-1A-037-PS0334-050	54
<b>BCC031M</b>	BCC M425-0000-1A-037-PS0334-100	54
<b>BCC031N</b>	BCC M414-0000-2A-003-PX0434-020	59
<b>BCC031P</b>	BCC M414-0000-2A-003-PX0434-050	59
<b>BCC031R</b>	BCC M414-0000-2A-003-PX0434-100	59
<b>BCC031T</b>	BCC M414-0000-2A-014-PS0434-020	59
<b>BCC031U</b>	BCC M414-0000-2A-014-PS0434-050	59
<b>BCC031W</b>	BCC M414-0000-2A-014-PS0434-100	59
<b>BCC0321</b>	BCC M424-0000-2A-003-PX0434-020	59
<b>BCC0322</b>	BCC M424-0000-2A-003-PX0434-050	59
<b>BCC0323</b>	BCC M424-0000-2A-003-PX0434-100	59
<b>BCC0324</b>	BCC M424-0000-2A-014-PS0434-020	59
<b>BCC0325</b>	BCC M424-0000-2A-014-PS0434-050	59
<b>BCC0326</b>	BCC M424-0000-2A-014-PS0434-100	59
<b>BCC0327</b>	BCC M415-0000-1A-008-PX0434-020	56
<b>BCC0328</b>	BCC M415-0000-1A-008-PX0434-050	56
<b>BCC0329</b>	BCC M415-0000-1A-008-PX0434-100	56
<b>BCC032A</b>	BCC M415-0000-1A-010-PX0434-020	57
<b>BCC032C</b>	BCC M415-0000-1A-010-PX0434-050	57
<b>BCC032E</b>	BCC M415-0000-1A-010-PX0434-100	57
<b>BCC032F</b>	BCC M415-0000-1A-003-PX0434-020	56
<b>BCC032H</b>	BCC M415-0000-1A-003-PX0434-050	56
<b>BCC032J</b>	BCC M415-0000-1A-003-PX0434-100	56
<b>BCC032K</b>	BCC M415-0000-1A-014-PS0434-020	56
<b>BCC032L</b>	BCC M415-0000-1A-014-PS0434-050	56
<b>BCC032M</b>	BCC M415-0000-1A-014-PS0434-100	56
<b>BCC032N</b>	BCC M425-0000-1A-008-PX0434-020	58
<b>BCC032P</b>	BCC M425-0000-1A-008-PX0434-050	58

Ordering code	Part number	Page
<b>BCC032R</b>	BCC M425-0000-1A-008-PX0434-100	58
<b>BCC032T</b>	BCC M425-0000-1A-010-PX0434-020	58
<b>BCC032U</b>	BCC M425-0000-1A-010-PX0434-050	58
<b>BCC032W</b>	BCC M425-0000-1A-010-PX0434-100	58
<b>BCC032Y</b>	BCC M425-0000-1A-003-PX0434-020	57
<b>BCC032Z</b>	BCC M425-0000-1A-003-PX0434-050	57
<b>BCC0330</b>	BCC M425-0000-1A-003-PX0434-100	57
<b>BCC0331</b>	BCC M425-0000-1A-014-PS0434-020	57
<b>BCC0332</b>	BCC M425-0000-1A-014-PS0434-050	57
<b>BCC0333</b>	BCC M425-0000-1A-014-PS0434-100	57
<b>BCC0334</b>	BCC M413-0000-2A-001-VX8334-020	52
<b>BCC0335</b>	BCC M413-0000-2A-001-VX8334-050	52
<b>BCC0336</b>	BCC M413-0000-2A-001-VX8334-100	52
<b>BCC0337</b>	BCC M413-0000-2A-002-VX8334-020	55
<b>BCC0338</b>	BCC M413-0000-2A-002-VX8334-050	55
<b>BCC0339</b>	BCC M413-0000-2A-002-VX8334-100	55
<b>BCC033A</b>	BCC M413-0000-2A-036-VS8334-020	52
<b>BCC033C</b>	BCC M413-0000-2A-036-VS8334-050	52
<b>BCC033E</b>	BCC M413-0000-2A-036-VS8334-100	52
<b>BCC033F</b>	BCC M413-0000-2A-037-VS8334-020	55
<b>BCC033H</b>	BCC M413-0000-2A-037-VS8334-050	55
<b>BCC033J</b>	BCC M413-0000-2A-037-VS8334-100	55
<b>BCC033N</b>	BCC M423-0000-2A-001-VX8334-020	53
<b>BCC033P</b>	BCC M423-0000-2A-001-VX8334-050	53
<b>BCC033R</b>	BCC M423-0000-2A-001-VX8334-100	53
<b>BCC033T</b>	BCC M423-0000-2A-002-VX8334-020	55
<b>BCC033U</b>	BCC M423-0000-2A-002-VX8334-050	55
<b>BCC033W</b>	BCC M423-0000-2A-002-VX8334-100	55
<b>BCC033Y</b>	BCC M423-0000-2A-036-VS8334-020	53
<b>BCC033Z</b>	BCC M423-0000-2A-036-VS8334-050	53
<b>BCC0340</b>	BCC M423-0000-2A-036-VS8334-100	53
<b>BCC0341</b>	BCC M423-0000-2A-037-VS8334-020	55
<b>BCC0342</b>	BCC M423-0000-2A-037-VS8334-050	55
<b>BCC0343</b>	BCC M423-0000-2A-037-VS8334-100	55
<b>BCC0344</b>	BCC M415-0000-1A-004-VX8334-020	51
<b>BCC0345</b>	BCC M415-0000-1A-004-VX8334-050	51
<b>BCC0346</b>	BCC M415-0000-1A-004-VX8334-100	51
<b>BCC0347</b>	BCC M415-0000-1A-005-VX8334-020	53
<b>BCC0348</b>	BCC M415-0000-1A-005-VX8334-050	53
<b>BCC0349</b>	BCC M415-0000-1A-005-VX8334-100	53
<b>BCC034A</b>	BCC M415-0000-1A-001-VX8334-020	51
<b>BCC034C</b>	BCC M415-0000-1A-001-VX8334-050	51
<b>BCC034E</b>	BCC M415-0000-1A-001-VX8334-100	51
<b>BCC034F</b>	BCC M415-0000-1A-002-VX8334-020	53
<b>BCC034H</b>	BCC M415-0000-1A-002-VX8334-050	53
<b>BCC034J</b>	BCC M415-0000-1A-002-VX8334-100	53
<b>BCC034K</b>	BCC M415-0000-1A-036-VS8334-020	51
<b>BCC034L</b>	BCC M415-0000-1A-036-VS8334-050	51
<b>BCC034M</b>	BCC M415-0000-1A-036-VS8334-100	51
<b>BCC034N</b>	BCC M415-0000-1A-037-VS8334-020	53
<b>BCC034P</b>	BCC M415-0000-1A-037-VS8334-050	53
<b>BCC034R</b>	BCC M415-0000-1A-037-VS8334-100	53
<b>BCC034T</b>	BCC M425-0000-1A-004-VX8334-020	52
<b>BCC034U</b>	BCC M425-0000-1A-004-VX8334-050	52
<b>BCC034W</b>	BCC M425-0000-1A-004-VX8334-100	52
<b>BCC022A</b>	BCC M413-0000-2A-001-PX0334-020	52
<b>BCC034Y</b>	BCC M425-0000-1A-005-VX8334-020	54
<b>BCC034Z</b>	BCC M425-0000-1A-005-VX8334-050	54
<b>BCC0350</b>	BCC M425-0000-1A-005-VX8334-100	54
<b>BCC0351</b>	BCC M425-0000-1A-001-VX8334-020	51
<b>BCC0352</b>	BCC M425-0000-1A-001-VX8334-050	51
<b>BCC0353</b>	BCC M425-0000-1A-001-VX8334-100	51
<b>BCC0354</b>	BCC M425-0000-1A-002-VX8334-020	54

# Alphanumeric Index

## Sorted by ordering code

Ordering code	Part number	Page	Ordering code	Part number	Page
BCC0355	BCC M425-0000-1A-002-VX8334-050	54	BCC0377	BCC M425-M413-3A-602-PX0334-003	75
BCC0356	BCC M425-0000-1A-002-VX8334-100	54	BCC0380	BCC M425-M413-3A-602-PX0334-006	75
BCC0357	BCC M425-0000-1A-036-VS8334-020	51	BCC0381	BCC M425-M413-3A-602-PX0334-010	75
BCC0358	BCC M425-0000-1A-036-VS8334-050	51	BCC0382	BCC M425-M413-3A-602-PX0334-015	75
BCC0359	BCC M425-0000-1A-036-VS8334-100	51	BCC0383	BCC M425-M413-3A-602-PX0334-020	75
BCC035A	BCC M425-0000-1A-037-VS8334-020	54	BCC0384	BCC M425-M413-3A-602-PX0334-030	75
BCC035C	BCC M425-0000-1A-037-VS8334-050	54	BCC0385	BCC M425-M413-3A-602-PX0334-050	75
BCC035E	BCC M425-0000-1A-037-VS8334-100	54	BCC0386	BCC M415-M413-3A-300-VX8334-003	74
BCC035F	BCC M414-0000-2A-003-VX8434-020	59	BCC0387	BCC M415-M413-3A-300-VX8334-006	74
BCC035H	BCC M414-0000-2A-003-VX8434-050	59	BCC0388	BCC M415-M413-3A-300-VX8334-010	74
BCC035J	BCC M414-0000-2A-003-VX8434-100	59	BCC0389	BCC M415-M413-3A-300-VX8334-015	74
BCC035K	BCC M414-0000-2A-014-VS8434-020	59	BCC038A	BCC M415-M413-3A-300-VX8334-020	74
BCC035L	BCC M414-0000-2A-014-VS8434-050	59	BCC038C	BCC M415-M413-3A-300-VX8334-030	74
BCC035M	BCC M414-0000-2A-014-VS8434-100	59	BCC038E	BCC M415-M413-3A-300-VX8334-050	74
BCC035W	BCC M424-0000-2A-003-VX0434-100	59	BCC038F	BCC M415-M423-3A-300-VX8334-003	74
BCC035Y	BCC M424-0000-2A-003-VS0434-020	59	BCC038H	BCC M415-M423-3A-300-VX8334-006	74
BCC035Z	BCC M424-0000-2A-003-VS0434-050	59	BCC038J	BCC M415-M423-3A-300-VX8334-010	74
BCC0360	BCC M424-0000-2A-003-VS0434-100	59	BCC038K	BCC M415-M423-3A-300-VX8334-015	74
BCC0361	BCC M415-0000-1A-008-VX8434-020	56	BCC038L	BCC M415-M423-3A-300-VX8334-020	74
BCC0362	BCC M415-0000-1A-008-VX8434-050	56	BCC038M	BCC M415-M423-3A-300-VX8334-030	74
BCC0363	BCC M415-0000-1A-008-VX8434-100	56	BCC038N	BCC M415-M423-3A-300-VX8334-050	74
BCC0364	BCC M415-0000-1A-010-VX8434-020	57	BCC038P	BCC M425-M413-3A-300-VX8334-003	75
BCC0365	BCC M415-0000-1A-010-VX8434-050	57	BCC038R	BCC M425-M413-3A-300-VX8334-006	75
BCC0366	BCC M415-0000-1A-010-VX8434-100	57	BCC038T	BCC M425-M413-3A-300-VX8334-010	75
BCC0367	BCC M415-0000-1A-003-VX8434-020	56	BCC038U	BCC M425-M413-3A-300-VX8334-015	75
BCC0368	BCC M415-0000-1A-003-VX8434-050	56	BCC038W	BCC M425-M413-3A-300-VX8334-020	75
BCC0369	BCC M415-0000-1A-003-VX8434-100	56	BCC038Y	BCC M425-M413-3A-300-VX8334-030	75
BCC036A	BCC M415-0000-1A-014-VS8434-020	56	BCC038Z	BCC M425-M413-3A-300-VX8334-050	75
BCC036C	BCC M415-0000-1A-014-VS8434-050	56	BCC0390	BCC M415-M424-3A-304-PX0434-050	77
BCC036E	BCC M415-0000-1A-014-VS8434-100	56	BCC0397	BCC M425-M413-3A-602-VX8334-003	75
BCC036F	BCC M425-0000-1A-008-VX8434-020	58	BCC0398	BCC M425-M413-3A-602-VX8334-006	75
BCC036H	BCC M425-0000-1A-008-VX8434-050	58	BCC0399	BCC M425-M413-3A-602-VX8334-010	75
BCC036J	BCC M425-0000-1A-008-VX8434-100	58	BCC039A	BCC M425-M413-3A-602-VX8334-015	75
BCC036K	BCC M425-0000-1A-010-VX8434-020	58	BCC039C	BCC M425-M413-3A-602-VX8334-020	75
BCC036L	BCC M425-0000-1A-010-VX8434-050	58	BCC039E	BCC M425-M413-3A-602-VX8334-030	75
BCC036M	BCC M425-0000-1A-010-VX8434-100	58	BCC039F	BCC M425-M413-3A-602-VX8334-050	75
BCC036N	BCC M425-0000-1A-003-VX8434-020	57	BCC039H	BCC M415-M414-3A-304-PX0434-003	76
BCC036P	BCC M425-0000-1A-003-VX8434-050	57	BCC039J	BCC M415-M414-3A-304-PX0434-006	76
BCC036R	BCC M425-0000-1A-003-VX8434-100	57	BCC039K	BCC M415-M414-3A-304-PX0434-010	76
BCC036T	BCC M425-0000-1A-014-VS8434-020	57	BCC039L	BCC M415-M414-3A-304-PX0434-015	76
BCC036U	BCC M425-0000-1A-014-VS8434-050	57	BCC039M	BCC M415-M414-3A-304-PX0434-020	76
BCC036W	BCC M425-0000-1A-014-VS8434-100	57	BCC039N	BCC M415-M414-3A-304-PX0434-030	76
BCC036Y	BCC M415-M413-3A-300-PX0334-003	74	BCC039P	BCC M415-M414-3A-304-PX0434-050	76
BCC036Z	BCC M415-M413-3A-300-PX0334-006	74	BCC039R	BCC M415-M424-3A-304-PX0434-003	77
BCC0370	BCC M415-M413-3A-300-PX0334-010	74	BCC039T	BCC M415-M424-3A-304-PX0434-006	77
BCC0371	BCC M415-M413-3A-300-PX0334-015	74	BCC039U	BCC M415-M424-3A-304-PX0434-010	77
BCC0372	BCC M415-M413-3A-300-PX0334-020	74	BCC039W	BCC M415-M424-3A-304-PX0434-015	77
BCC0373	BCC M415-M413-3A-300-PX0334-030	74	BCC039Y	BCC M415-M424-3A-304-PX0434-020	77
BCC0374	BCC M415-M413-3A-300-PX0334-050	74	BCC039Z	BCC M415-M424-3A-304-PX0434-030	77
BCC0375	BCC M415-M423-3A-300-PX0334-003	74	BCC03A1	BCC M415-M414-3A-606-PX0434-003	76
BCC0376	BCC M415-M423-3A-300-PX0334-006	74	BCC03A2	BCC M415-M414-3A-606-PX0434-006	76
BCC0377	BCC M415-M423-3A-300-PX0334-010	74	BCC03A3	BCC M415-M414-3A-606-PX0434-010	76
BCC0378	BCC M415-M423-3A-300-PX0334-015	74	BCC03A4	BCC M415-M414-3A-606-PX0434-015	76
BCC0379	BCC M415-M423-3A-300-PX0334-020	74	BCC03A5	BCC M415-M414-3A-606-PX0434-020	76
BCC037A	BCC M415-M423-3A-300-PX0334-030	74	BCC03A6	BCC M415-M414-3A-606-PX0434-030	76
BCC037C	BCC M415-M423-3A-300-PX0334-050	74	BCC03A7	BCC M415-M414-3A-606-PX0434-050	76
BCC037E	BCC M425-M413-3A-300-PX0334-003	75	BCC03A8	BCC M425-M414-3A-304-PX0434-003	77
BCC037F	BCC M425-M413-3A-300-PX0334-006	75	BCC03A9	BCC M425-M414-3A-304-PX0434-006	77
BCC037H	BCC M425-M413-3A-300-PX0334-010	75	BCC03AA	BCC M425-M414-3A-304-PX0434-010	77
BCC037J	BCC M425-M413-3A-300-PX0334-015	75	BCC03AC	BCC M425-M414-3A-304-PX0434-015	77
BCC037K	BCC M425-M413-3A-300-PX0334-020	75	BCC03AE	BCC M425-M414-3A-304-PX0434-020	77
BCC037L	BCC M425-M413-3A-300-PX0334-030	75	BCC03AF	BCC M425-M414-3A-304-PX0434-030	77
BCC037M	BCC M425-M413-3A-300-PX0334-050	75	BCC03AH	BCC M425-M414-3A-304-PX0434-050	77

# Alphanumeric Index

## Sorted by ordering code

Ordering code	Part number	Page
<b>BCC03AJ</b>	BCC M425-M424-3A-304-PX0434-003	78
<b>BCC03AK</b>	BCC M425-M424-3A-304-PX0434-006	78
<b>BCC03AL</b>	BCC M425-M424-3A-304-PX0434-010	78
<b>BCC03AM</b>	BCC M425-M424-3A-304-PX0434-015	78
<b>BCC03AN</b>	BCC M425-M424-3A-304-PX0434-020	78
<b>BCC03AP</b>	BCC M425-M424-3A-304-PX0434-030	78
<b>BCC03AR</b>	BCC M425-M424-3A-304-PX0434-050	78
<b>BCC03AT</b>	BCC M425-M414-3A-606-PX0434-003	77
<b>BCC03AU</b>	BCC M425-M414-3A-606-PX0434-006	77
<b>BCC03AW</b>	BCC M425-M414-3A-606-PX0434-010	77
<b>BCC03AY</b>	BCC M425-M414-3A-606-PX0434-015	77
<b>BCC03AZ</b>	BCC M425-M414-3A-606-PX0434-020	77
<b>BCC03C0</b>	BCC M425-M414-3A-606-PX0434-030	77
<b>BCC03C1</b>	BCC M425-M414-3A-606-PX0434-050	77
<b>BCC03C2</b>	BCC M425-M414-3A-650-PX0434-003	78
<b>BCC03C3</b>	BCC M425-M414-3A-650-PX0434-006	78
<b>BCC03C4</b>	BCC M425-M414-3A-650-PX0434-010	78
<b>BCC03C5</b>	BCC M425-M414-3A-650-PX0434-015	78
<b>BCC03C6</b>	BCC M425-M414-3A-650-PX0434-020	78
<b>BCC03C7</b>	BCC M425-M414-3A-650-PX0434-030	78
<b>BCC03C8</b>	BCC M425-M414-3A-650-PX0434-050	78
<b>BCC03C9</b>	BCC M415-M414-3A-304-VX8434-003	76
<b>BCC03CA</b>	BCC M415-M414-3A-304-VX8434-006	76
<b>BCC03CC</b>	BCC M415-M414-3A-304-VX8434-010	76
<b>BCC03CE</b>	BCC M415-M414-3A-304-VX8434-015	76
<b>BCC03CF</b>	BCC M415-M414-3A-304-VX8434-020	76
<b>BCC03CH</b>	BCC M415-M414-3A-304-VX8434-030	76
<b>BCC03CJ</b>	BCC M415-M414-3A-304-VX8434-050	76
<b>BCC03CK</b>	BCC M415-M424-3A-304-VX8434-003	77
<b>BCC03CL</b>	BCC M415-M424-3A-304-VX8434-006	77
<b>BCC03CM</b>	BCC M415-M424-3A-304-VX8434-010	77
<b>BCC03CN</b>	BCC M415-M424-3A-304-VX8434-015	77
<b>BCC03CP</b>	BCC M415-M424-3A-304-VX8434-020	77
<b>BCC03CR</b>	BCC M415-M424-3A-304-VX8434-030	77
<b>BCC03CT</b>	BCC M415-M424-3A-304-VX8434-050	77
<b>BCC03CU</b>	BCC M415-M414-3A-606-VX8434-003	76
<b>BCC03CW</b>	BCC M415-M414-3A-606-VX8434-006	76
<b>BCC03CY</b>	BCC M415-M414-3A-606-VX8434-010	76
<b>BCC03CZ</b>	BCC M415-M414-3A-606-VX8434-015	76
<b>BCC03E0</b>	BCC M415-M414-3A-606-VX8434-020	76
<b>BCC03E1</b>	BCC M415-M414-3A-606-VX8434-030	76
<b>BCC03E2</b>	BCC M415-M414-3A-606-VX8434-050	76
<b>BCC03E3</b>	BCC M425-M414-3A-304-VX8434-003	77
<b>BCC03E4</b>	BCC M425-M414-3A-304-VX8434-006	77
<b>BCC03E5</b>	BCC M425-M414-3A-304-VX8434-010	77
<b>BCC03E6</b>	BCC M425-M414-3A-304-VX8434-015	77
<b>BCC03E7</b>	BCC M425-M414-3A-304-VX8434-020	77
<b>BCC03E8</b>	BCC M425-M414-3A-304-VX8434-030	77
<b>BCC03E9</b>	BCC M425-M414-3A-304-VX8434-050	77
<b>BCC03EA</b>	BCC M425-M424-3A-304-VX8434-003	78
<b>BCC03EC</b>	BCC M425-M424-3A-304-VX8434-006	78
<b>BCC03EE</b>	BCC M425-M424-3A-304-VX8434-010	78
<b>BCC03EF</b>	BCC M425-M424-3A-304-VX8434-015	78
<b>BCC03EH</b>	BCC M425-M424-3A-304-VX8434-020	78
<b>BCC03EJ</b>	BCC M425-M424-3A-304-VX8434-030	78
<b>BCC03EK</b>	BCC M425-M424-3A-304-VX8434-050	78
<b>BCC03EL</b>	BCC M425-M414-3A-606-VX8434-003	77
<b>BCC03EM</b>	BCC M425-M414-3A-606-VX8434-006	77
<b>BCC03EN</b>	BCC M425-M414-3A-606-VX8434-010	77
<b>BCC03EP</b>	BCC M425-M414-3A-606-VX8434-015	77
<b>BCC03ER</b>	BCC M425-M414-3A-606-VX8434-020	77
<b>BCC03ET</b>	BCC M425-M414-3A-606-VX8434-030	77
<b>BCC03EU</b>	BCC M425-M414-3A-606-VX8434-050	77

Ordering code	Part number	Page
<b>BCC03EW</b>	BCC M425-M414-3A-650-VX8434-003	78
<b>BCC03EZ</b>	BCC M425-M414-3A-650-VX8434-010	78
<b>BCC03F0</b>	BCC M425-M414-3A-650-VX8434-015	78
<b>BCC03F1</b>	BCC M425-M414-3A-650-VX8434-020	78
<b>BCC03F2</b>	BCC M425-M414-3A-650-VX8434-030	78
<b>BCC03F3</b>	BCC M425-M414-3A-650-VX8434-050	78
<b>BCC03F4</b>	BCC M313-M413-3E-300-PX0334-003	38
<b>BCC03F5</b>	BCC M313-M413-3E-300-PX0334-006	38
<b>BCC03F6</b>	BCC M313-M413-3E-300-PX0334-010	38
<b>BCC03F7</b>	BCC M313-M413-3E-300-PX0334-015	38
<b>BCC03F8</b>	BCC M313-M413-3E-300-PX0334-020	38
<b>BCC03F9</b>	BCC M313-M413-3E-300-PX0334-030	38
<b>BCC03FA</b>	BCC M313-M413-3E-300-PX0334-050	38
<b>BCC03FC</b>	BCC M313-M423-3E-300-PX0334-003	38
<b>BCC03FE</b>	BCC M313-M423-3E-300-PX0334-006	38
<b>BCC03FF</b>	BCC M313-M423-3E-300-PX0334-010	38
<b>BCC03FH</b>	BCC M313-M423-3E-300-PX0334-015	38
<b>BCC03FJ</b>	BCC M313-M423-3E-300-PX0334-020	38
<b>BCC03FK</b>	BCC M313-M423-3E-300-PX0334-030	38
<b>BCC03FL</b>	BCC M313-M423-3E-300-PX0334-050	38
<b>BCC03FM</b>	BCC M323-M413-3E-300-PX0334-003	39
<b>BCC03FN</b>	BCC M323-M413-3E-300-PX0334-006	39
<b>BCC03FP</b>	BCC M323-M413-3E-300-PX0334-010	39
<b>BCC03FR</b>	BCC M323-M413-3E-300-PX0334-015	39
<b>BCC03FT</b>	BCC M323-M413-3E-300-PX0334-020	39
<b>BCC03FU</b>	BCC M323-M413-3E-300-PX0334-030	39
<b>BCC03FW</b>	BCC M323-M413-3E-300-PX0334-050	39
<b>BCC03FY</b>	BCC M323-M423-3E-300-PX0334-003	39
<b>BCC03FZ</b>	BCC M323-M423-3E-300-PX0334-006	39
<b>BCC03H0</b>	BCC M323-M423-3E-300-PX0334-010	39
<b>BCC03H1</b>	BCC M323-M423-3E-300-PX0334-015	39
<b>BCC03H2</b>	BCC M323-M423-3E-300-PX0334-020	39
<b>BCC03H3</b>	BCC M323-M423-3E-300-PX0334-030	39
<b>BCC03H4</b>	BCC M323-M423-3E-300-PX0334-050	39
<b>BCC03H5</b>	BCC M323-M413-3E-602-PX0334-003	39
<b>BCC03H6</b>	BCC M323-M413-3E-602-PX0334-006	39
<b>BCC03H7</b>	BCC M323-M413-3E-602-PX0334-010	39
<b>BCC03H8</b>	BCC M323-M413-3E-602-PX0334-015	39
<b>BCC03H9</b>	BCC M323-M413-3E-602-PX0334-020	39
<b>BCC03HA</b>	BCC M323-M413-3E-602-PX0334-030	39
<b>BCC03HC</b>	BCC M323-M413-3E-602-PX0334-050	39
<b>BCC03HE</b>	BCC M313-M413-3E-300-VX8334-003	38
<b>BCC03HF</b>	BCC M313-M413-3E-300-VX8334-006	38
<b>BCC03HH</b>	BCC M313-M413-3E-300-VX8334-010	38
<b>BCC03HJ</b>	BCC M313-M413-3E-300-VX8334-015	38
<b>BCC03HK</b>	BCC M313-M413-3E-300-VX8334-020	38
<b>BCC03HL</b>	BCC M313-M413-3E-300-VX8334-030	38
<b>BCC03HM</b>	BCC M313-M413-3E-300-VX8334-050	38
<b>BCC03HN</b>	BCC M313-M423-3E-300-VX8334-003	38
<b>BCC03HP</b>	BCC M313-M423-3E-300-VX8334-006	38
<b>BCC03HR</b>	BCC M313-M423-3E-300-VX8334-010	38
<b>BCC03HT</b>	BCC M313-M423-3E-300-VX8334-015	38
<b>BCC03HU</b>	BCC M313-M423-3E-300-VX8334-020	38
<b>BCC03HW</b>	BCC M313-M423-3E-300-VX8334-030	38
<b>BCC03HY</b>	BCC M313-M423-3E-300-VX8334-050	38
<b>BCC03HZ</b>	BCC M323-M413-3E-300-VX8334-003	39
<b>BCC03J0</b>	BCC M323-M413-3E-300-VX8334-006	39
<b>BCC03J1</b>	BCC M323-M413-3E-300-VX8334-010	39
<b>BCC03J2</b>	BCC M323-M413-3E-300-VX8334-015	39
<b>BCC03J3</b>	BCC M323-M413-3E-300-VX8334-020	39
<b>BCC03J4</b>	BCC M323-M413-3E-300-VX8334-030	39
<b>BCC03J5</b>	BCC M323-M413-3E-300-VX8334-050	39
<b>BCC03J6</b>	BCC M323-M423-3E-300-VX8334-003	39



# Alphanumeric Index

## Sorted by ordering code

Ordering code	Part number	Page	Ordering code	Part number	Page
BCC03J7	BCC M323-M423-3E-300-VX8334-006	39	BCC03LK	BCC M324-M414-3E-304-VX8434-006	41
BCC03J8	BCC M323-M423-3E-300-VX8334-010	39	BCC03LL	BCC M324-M414-3E-304-VX8434-010	41
BCC03J9	BCC M323-M423-3E-300-VX8334-015	39	BCC03LM	BCC M324-M414-3E-304-VX8434-015	41
BCC03JA	BCC M323-M423-3E-300-VX8334-020	39	BCC03LN	BCC M324-M414-3E-304-VX8434-020	41
BCC03JC	BCC M323-M423-3E-300-VX8334-030	39	BCC03LP	BCC M324-M414-3E-304-VX8434-030	41
BCC03JE	BCC M323-M423-3E-300-VX8334-050	39	BCC03LR	BCC M324-M414-3E-304-VX8434-050	41
BCC03JF	BCC M323-M413-3E-602-VX8334-003	39	BCC03LT	BCC M324-M424-3E-304-VX8434-003	41
BCC03JH	BCC M323-M413-3E-602-VX8334-006	39	BCC03LU	BCC M324-M424-3E-304-VX8434-006	41
BCC03JJ	BCC M323-M413-3E-602-VX8334-010	39	BCC03LW	BCC M324-M424-3E-304-VX8434-010	41
BCC03JK	BCC M323-M413-3E-602-VX8334-015	39	BCC03LY	BCC M324-M424-3E-304-VX8434-015	41
BCC03JL	BCC M323-M413-3E-602-VX8334-020	39	BCC03LZ	BCC M324-M424-3E-304-VX8434-020	41
BCC03JM	BCC M323-M413-3E-602-VX8334-030	39	BCC03M0	BCC M324-M424-3E-304-VX8434-030	41
BCC03JN	BCC M323-M413-3E-602-VX8334-050	39	BCC03M1	BCC M324-M414-3E-606-VX8434-050	41
BCC03JP	BCC M314-M414-3E-304-PX0434-003	40	BCC03M2	BCC M324-M414-3E-606-VX8434-003	41
BCC03JR	BCC M314-M414-3E-304-PX0434-006	40	BCC03M3	BCC M324-M414-3E-606-VX8434-006	41
BCC03JT	BCC M314-M414-3E-304-PX0434-010	40	BCC03M4	BCC M324-M414-3E-606-VX8434-010	41
BCC03JU	BCC M314-M414-3E-304-PX0434-015	40	BCC03M5	BCC M324-M414-3E-606-VX8434-015	41
BCC03JW	BCC M314-M414-3E-304-PX0434-020	40	BCC03M6	BCC M324-M414-3E-606-VX8434-020	41
BCC03JY	BCC M314-M414-3E-304-PX0434-030	40	BCC03M7	BCC M324-M414-3E-606-VX8434-030	41
BCC03JZ	BCC M314-M414-3E-304-PX0434-050	40	BCC03M8	BCC M324-M414-3E-606-VX8434-050	41
BCC03K0	BCC M314-M424-3E-304-PX0434-003	40	BCC03M9	BCC M415-M313-3F-300-PX0334-003	68
BCC03K1	BCC M314-M424-3E-304-PX0434-006	40	BCC03MA	BCC M415-M313-3F-300-PX0334-006	68
BCC03K2	BCC M314-M424-3E-304-PX0434-010	40	BCC03MC	BCC M415-M313-3F-300-PX0334-010	68
BCC03K3	BCC M314-M424-3E-304-PX0434-015	40	BCC03ME	BCC M415-M313-3F-300-PX0334-015	68
BCC03K4	BCC M314-M424-3E-304-PX0434-020	40	BCC03MF	BCC M415-M313-3F-300-PX0334-020	68
BCC03K5	BCC M314-M424-3E-304-PX0434-030	40	BCC03MH	BCC M415-M313-3F-300-PX0334-030	68
BCC03K6	BCC M314-M424-3E-304-PX0434-050	40	BCC03MJ	BCC M415-M313-3F-300-PX0334-050	68
BCC03K7	BCC M324-M414-3E-304-PX0434-003	41	BCC03MK	BCC M415-M323-3F-300-PX0334-003	69
BCC03K8	BCC M324-M414-3E-304-PX0434-006	41	BCC03ML	BCC M415-M323-3F-300-PX0334-006	69
BCC03K9	BCC M324-M414-3E-304-PX0434-010	41	BCC03MM	BCC M415-M323-3F-300-PX0334-010	69
BCC03KA	BCC M324-M414-3E-304-PX0434-015	41	BCC03MN	BCC M415-M323-3F-300-PX0334-015	69
BCC03KC	BCC M324-M414-3E-304-PX0434-020	41	BCC03MP	BCC M415-M323-3F-300-PX0334-020	69
BCC03KE	BCC M324-M414-3E-304-PX0434-030	41	BCC03MR	BCC M415-M323-3F-300-PX0334-030	69
BCC03KF	BCC M324-M414-3E-304-PX0434-050	41	BCC03MT	BCC M415-M323-3F-300-PX0334-050	69
BCC03KH	BCC M324-M424-3E-304-PX0434-003	41	BCC03MU	BCC M425-M313-3F-300-PX0334-003	69
BCC03KJ	BCC M324-M424-3E-304-PX0434-006	41	BCC03MW	BCC M425-M313-3F-300-PX0334-006	69
BCC03KK	BCC M324-M424-3E-304-PX0434-010	41	BCC03MY	BCC M425-M313-3F-300-PX0334-010	69
BCC03KL	BCC M324-M424-3E-304-PX0434-015	41	BCC03MZ	BCC M425-M313-3F-300-PX0334-015	69
BCC03KM	BCC M324-M424-3E-304-PX0434-020	41	BCC03N0	BCC M425-M313-3F-300-PX0334-020	69
BCC03KN	BCC M324-M424-3E-304-PX0434-030	41	BCC03N1	BCC M425-M313-3F-300-PX0334-030	69
BCC03KP	BCC M324-M424-3E-304-PX0434-050	41	BCC03N2	BCC M425-M313-3F-300-PX0334-050	69
BCC03KR	BCC M324-M414-3E-606-PX0434-003	41	BCC03N3	BCC M425-M323-3F-300-PX0334-003	70
BCC03KT	BCC M324-M414-3E-606-PX0434-006	41	BCC03N4	BCC M425-M323-3F-300-PX0334-006	70
BCC03KU	BCC M324-M414-3E-606-PX0434-010	41	BCC03N5	BCC M425-M323-3F-300-PX0334-010	70
BCC03KW	BCC M324-M414-3E-606-PX0434-015	41	BCC03N6	BCC M425-M323-3F-300-PX0334-015	70
BCC03KY	BCC M324-M414-3E-606-PX0434-020	41	BCC03N7	BCC M425-M323-3F-300-PX0334-020	70
BCC03KZ	BCC M324-M414-3E-606-PX0434-030	41	BCC03N8	BCC M425-M323-3F-300-PX0334-030	70
BCC03L0	BCC M324-M414-3E-606-PX0434-050	41	BCC03N9	BCC M425-M323-3F-300-PX0334-050	70
BCC03L1	BCC M314-M414-3E-304-VX8434-003	40	BCC03NA	BCC M425-M313-3F-602-PX0334-003	69
BCC03L2	BCC M314-M414-3E-304-VX8434-006	40	BCC03NC	BCC M425-M313-3F-602-PX0334-006	69
BCC03L3	BCC M314-M414-3E-304-VX8434-010	40	BCC03NE	BCC M425-M313-3F-602-PX0334-010	69
BCC03L4	BCC M314-M414-3E-304-VX8434-015	40	BCC03NF	BCC M425-M313-3F-602-PX0334-015	69
BCC03L5	BCC M314-M414-3E-304-VX8434-020	40	BCC03NH	BCC M425-M313-3F-602-PX0334-020	69
BCC03L6	BCC M314-M414-3E-304-VX8434-030	40	BCC03NJ	BCC M425-M313-3F-602-PX0334-030	69
BCC03L7	BCC M314-M414-3E-304-VX8434-050	40	BCC03NK	BCC M425-M313-3F-602-PX0334-050	69
BCC03L8	BCC M314-M424-3E-304-VX8434-003	40	BCC03NL	BCC M425-M323-3F-602-PX0334-003	70
BCC03L9	BCC M314-M424-3E-304-VX8434-006	40	BCC03NM	BCC M425-M323-3F-602-PX0334-006	70
BCC03LA	BCC M314-M424-3E-304-VX8434-010	40	BCC03NN	BCC M425-M323-3F-602-PX0334-010	70
BCC03LC	BCC M314-M424-3E-304-VX8434-015	40	BCC03NP	BCC M425-M323-3F-602-PX0334-015	70
BCC03LE	BCC M314-M424-3E-304-VX8434-020	40	BCC03NR	BCC M425-M323-3F-602-PX0334-020	70
BCC03LF	BCC M314-M424-3E-304-VX8434-030	40	BCC03NT	BCC M425-M323-3F-602-PX0334-030	70
BCC03LH	BCC M314-M424-3E-304-VX8434-050	40	BCC03NU	BCC M425-M323-3F-602-PX0334-050	70
BCC03LJ	BCC M324-M414-3E-304-VX8434-003	41	BCC03NW	BCC M415-M313-3F-300-VX8334-003	68

# Alphanumeric Index

## Sorted by ordering code

Ordering code	Part number	Page
BCC03NY	BCC M415-M313-3F-300-VX8334-006	68
BCC03NZ	BCC M415-M313-3F-300-VX8334-010	68
BCC03P0	BCC M415-M313-3F-300-VX8334-015	68
BCC03P1	BCC M415-M313-3F-300-VX8334-020	68
BCC03P2	BCC M415-M313-3F-300-VX8334-030	68
BCC03P3	BCC M415-M313-3F-300-VX8334-050	68
BCC03P4	BCC M415-M323-3F-300-VX8334-003	69
BCC03P5	BCC M415-M323-3F-300-VX8334-006	69
BCC03P6	BCC M415-M323-3F-300-VX8334-010	69
BCC03P7	BCC M415-M323-3F-300-VX8334-015	69
BCC03P8	BCC M415-M323-3F-300-VX8334-020	69
BCC03P9	BCC M415-M323-3F-300-VX8334-030	69
BCC03PA	BCC M415-M323-3F-300-VX8334-050	69
BCC03PC	BCC M425-M313-3F-300-VX8334-003	69
BCC03PE	BCC M425-M313-3F-300-VX8334-006	69
BCC03PF	BCC M425-M313-3F-300-VX8334-010	69
BCC03PH	BCC M425-M313-3F-300-VX8334-015	69
BCC03PJ	BCC M425-M313-3F-300-VX8334-020	69
BCC03PK	BCC M425-M313-3F-300-VX8334-030	69
BCC03PL	BCC M425-M313-3F-300-VX8334-050	69
BCC03PM	BCC M425-M323-3F-300-VX8334-003	70
BCC03PN	BCC M425-M323-3F-300-VX8334-006	70
BCC03PP	BCC M425-M323-3F-300-VX8334-010	70
BCC03PR	BCC M425-M323-3F-300-VX8334-015	70
BCC03PT	BCC M425-M323-3F-300-VX8334-020	70
BCC03PU	BCC M425-M323-3F-300-VX8334-030	70
BCC03PW	BCC M425-M323-3F-300-VX8334-050	70
BCC03PY	BCC M425-M313-3F-602-VX8334-003	69
BCC03PZ	BCC M425-M313-3F-602-VX8334-006	69
BCC03R0	BCC M425-M313-3F-602-VX8334-010	69
BCC03R1	BCC M425-M313-3F-602-VX8334-015	69
BCC03R2	BCC M425-M313-3F-602-VX8334-020	69
BCC03R3	BCC M425-M313-3F-602-VX8334-030	69
BCC03R4	BCC M425-M313-3F-602-VX8334-050	69
BCC03R5	BCC M425-M323-3F-602-VX8334-003	70
BCC03R6	BCC M425-M323-3F-602-VX8334-006	70
BCC03R7	BCC M425-M323-3F-602-VX8334-010	70
BCC03R8	BCC M425-M323-3F-602-VX8334-015	70
BCC03R9	BCC M425-M323-3F-602-VX8334-020	70
BCC03RA	BCC M425-M323-3F-602-VX8334-030	70
BCC03RC	BCC M425-M323-3F-602-VX8334-050	70
BCC03RE	BCC M415-M314-3F-304-PX0434-003	71
BCC03RF	BCC M415-M314-3F-304-PX0434-006	71
BCC03RH	BCC M415-M314-3F-304-PX0434-010	71
BCC03RJ	BCC M415-M314-3F-304-PX0434-015	71
BCC03RK	BCC M415-M314-3F-304-PX0434-020	71
BCC03RL	BCC M415-M314-3F-304-PX0434-030	71
BCC03RM	BCC M415-M314-3F-304-PX0434-050	71
BCC03RN	BCC M415-M324-3F-304-PX0434-003	71
BCC03RP	BCC M415-M324-3F-304-PX0434-006	71
BCC03RR	BCC M415-M324-3F-304-PX0434-010	71
BCC03RT	BCC M415-M324-3F-304-PX0434-015	71
BCC03RU	BCC M415-M324-3F-304-PX0434-020	71
BCC03RW	BCC M415-M324-3F-304-PX0434-030	71
BCC03RY	BCC M415-M324-3F-304-PX0434-050	71
BCC03RZ	BCC M425-M314-3F-304-PX0434-003	71
BCC03T0	BCC M425-M314-3F-304-PX0434-006	71
BCC03T1	BCC M425-M314-3F-304-PX0434-010	71
BCC03T2	BCC M425-M314-3F-304-PX0434-015	71
BCC03T3	BCC M425-M314-3F-304-PX0434-020	71
BCC03T4	BCC M425-M314-3F-304-PX0434-030	71
BCC03T5	BCC M425-M314-3F-304-PX0434-050	71
BCC03T6	BCC M425-M324-3F-304-PX0434-003	72

Ordering code	Part number	Page
BCC03T7	BCC M425-M324-3F-304-PX0434-006	72
BCC03T8	BCC M425-M324-3F-304-PX0434-010	72
BCC03T9	BCC M425-M324-3F-304-PX0434-015	72
BCC03TA	BCC M425-M324-3F-304-PX0434-020	72
BCC03TC	BCC M425-M324-3F-304-PX0434-030	72
BCC03TE	BCC M425-M324-3F-304-PX0434-050	72
BCC03TF	BCC M425-M314-3F-606-PX0434-003	72
BCC03TH	BCC M425-M314-3F-606-PX0434-006	72
BCC03TJ	BCC M425-M314-3F-606-PX0434-010	72
BCC03TK	BCC M425-M314-3F-606-PX0434-015	72
BCC03TL	BCC M425-M314-3F-606-PX0434-020	72
BCC03TM	BCC M425-M314-3F-606-PX0434-030	72
BCC03TN	BCC M425-M314-3F-606-PX0434-050	72
BCC03TP	BCC M415-M314-3F-304-VX8434-003	71
BCC03TR	BCC M415-M314-3F-304-VX8434-006	71
BCC03TT	BCC M415-M314-3F-304-VX8434-010	71
BCC03TU	BCC M415-M314-3F-304-VX8434-015	71
BCC03TW	BCC M415-M314-3F-304-VX8434-020	71
BCC03TY	BCC M415-M314-3F-304-VX8434-030	71
BCC03TZ	BCC M415-M314-3F-304-VX8434-050	71
BCC03U0	BCC M415-M324-3F-304-VX8434-003	71
BCC03U1	BCC M415-M324-3F-304-VX8434-006	71
BCC03U2	BCC M415-M324-3F-304-VX8434-010	71
BCC03U3	BCC M415-M324-3F-304-VX8434-015	71
BCC03U4	BCC M415-M324-3F-304-VX8434-020	71
BCC03U5	BCC M415-M324-3F-304-VX8434-030	71
BCC03U6	BCC M415-M324-3F-304-VX8434-050	71
BCC03U7	BCC M425-M314-3F-304-VX8434-003	71
BCC03U8	BCC M425-M314-3F-304-VX8434-006	71
BCC03U9	BCC M425-M314-3F-304-VX8434-010	71
BCC03UA	BCC M425-M314-3F-304-VX8434-015	71
BCC03UC	BCC M425-M314-3F-304-VX8434-020	71
BCC03UE	BCC M425-M314-3F-304-VX8434-030	71
BCC03UF	BCC M425-M314-3F-304-VX8434-050	71
BCC03UH	BCC M425-M324-3F-304-VX8434-003	72
BCC03UJ	BCC M425-M324-3F-304-VX8434-006	72
BCC03UK	BCC M425-M324-3F-304-VX8434-010	72
BCC03UL	BCC M425-M324-3F-304-VX8434-015	72
BCC03UM	BCC M425-M324-3F-304-VX8434-020	72
BCC03UN	BCC M425-M324-3F-304-VX8434-030	72
BCC03UP	BCC M425-M324-3F-304-VX8434-050	72
BCC03UR	BCC M425-M314-3F-606-VX8434-003	72
BCC03UT	BCC M425-M314-3F-606-VX8434-006	72
BCC03UU	BCC M425-M314-3F-606-VX8434-010	72
BCC03UW	BCC M425-M314-3F-606-VX8434-015	72
BCC03UY	BCC M425-M314-3F-606-VX8434-020	72
BCC03UZ	BCC M425-M314-3F-606-VX8434-030	72
BCC03W0	BCC M425-M314-3F-606-VX8434-050	72
BCC03WZ	BCC M474-0000-2D-000-51X475-000	179, 199
BCC03Y0	BCC M484-0000-2D-000-51X475-000	179, 199
BCC03Y1	BCC M474-0000-1D-000-51X475-000	178, 198
BCC03Y2	BCC M484-0000-1D-000-51X475-000	178, 198
BCC03Y4	BCC M425-M414-3A-650-VX8434-006	78
BCC03YC	BCC VB03-0000-10-055-PX0350-020	158
BCC03YE	BCC VB03-0000-10-055-PX0350-050	158
BCC03YF	BCC VB03-0000-10-055-PX0350-100	158
BCC03YH	BCC VB23-0000-10-055-PX0350-020	158
BCC03YJ	BCC VB23-0000-10-055-PX0350-050	158
BCC03YK	BCC VB23-0000-10-055-PX0350-100	158
BCC03YL	BCC VB43-0000-10-055-PX0350-020	160
BCC03YM	BCC VB43-0000-10-055-PX0350-050	160
BCC03YN	BCC VB43-0000-10-055-PX0350-100	160
BCC03YP	BCC VB63-0000-10-055-PX0350-020	160



# Alphanumeric Index

## Sorted by ordering code

Ordering code	Part number	Page
BCC03YR	BCC VB63-0000-10-055-PX0350-050	160
BCC03YT	BCC VB63-0000-10-055-PX0350-100	160
BCC03ZZ	BCC VB03-0000-10-055-VX8350-020	158
BCC0400	BCC VB03-0000-10-055-VX8350-050	158
BCC0401	BCC VB03-0000-10-055-VX8350-100	158
BCC0402	BCC VB23-0000-10-055-VX8350-020	158
BCC0403	BCC VB23-0000-10-055-VX8350-050	158
BCC0404	BCC VB23-0000-10-055-VX8350-100	158
BCC0405	BCC VB43-0000-10-055-VX8350-020	160
BCC0406	BCC VB43-0000-10-055-VX8350-050	160
BCC0407	BCC VB43-0000-10-055-VX8350-100	160
BCC0408	BCC VB63-0000-10-055-VX8350-020	160
BCC0409	BCC VB63-0000-10-055-VX8350-050	160
BCC040A	BCC VB63-0000-10-055-VX8350-100	160
BCC04K0	BCC M414-M414-6D-331-PS54T2-006	177
BCC04K1	BCC M414-M414-6D-331-PS54T2-020	177
BCC04K2	BCC M414-M414-6D-331-PS54T2-050	177
BCC04K3	BCC M414-M414-6D-331-PS54T2-100	177
BCC04K4	BCC M414-M414-6D-331-PS54T2-200	177
BCC04K5	BCC M414-M414-6D-331-PS54T2-300	177
BCC04K6	BCC M414-E834-8G-668-PS54T2-006	177
BCC04K7	BCC M414-E834-8G-668-PS54T2-020	177
BCC04K8	BCC M414-E834-8G-668-PS54T2-050	177
BCC04K9	BCC M414-E834-8G-668-PS54T2-100	177
BCC04KA	BCC M414-E834-8G-668-PS54T2-200	177
BCC04KC	BCC M414-E834-8G-668-PS54T2-300	177
BCC04KE	BCC E834-E834-90-334-PS54T2-006	177
BCC04KF	BCC E834-E834-90-334-PS54T2-020	177
BCC04KH	BCC E834-E834-90-334-PS54T2-050	177
BCC04KJ	BCC E834-E834-90-334-PS54T2-100	177
BCC04KK	BCC E834-E834-90-334-PS54T2-200	177
BCC04KL	BCC E834-E834-90-334-PS54T2-300	177
BCC04MC	BCC M478-0000-1A-000-43X834-000	91
BCC04ME	BCC M488-0000-1A-000-43X834-000	91
BCC04MZ	BCC VC04-0000-10-053-PX0350-020	162
BCC04N0	BCC VC04-0000-10-053-PX0350-050	162
BCC04N1	BCC VC04-0000-10-053-PX0350-100	162
BCC04N2	BCC VC04-0000-10-053-VX8350-020	162
BCC04N3	BCC VC04-0000-10-053-VX8350-050	162
BCC04N4	BCC VC04-0000-10-053-VX8350-100	162
BCC04NC	BCC VC04-M413-3E-664-PX0350-003	162
BCC04NE	BCC VC04-M413-3E-664-PX0350-006	162
BCC04NF	BCC VC04-M413-3E-664-PX0350-010	162
BCC04NH	BCC VC04-M413-3E-664-PX0350-015	162
BCC04NJ	BCC VC04-M413-3E-664-PX0350-020	162
BCC04NK	BCC VC04-M413-3E-664-PX0350-030	162
BCC04NL	BCC VC04-M413-3E-664-PX0350-050	162
BCC04RF	BCC VC44-0000-10-053-PX0350-020	163
BCC04RH	BCC VC44-0000-10-053-PX0350-050	163
BCC04RJ	BCC VC44-0000-10-053-PX0350-100	163
BCC04RK	BCC VC44-0000-10-053-VX8350-020	163
BCC04RL	BCC VC44-0000-10-053-VX8350-050	163
BCC04RM	BCC VC44-0000-10-053-VX8350-100	163
BCC04RY	BCC VC44-M413-3E-664-PX0350-003	163
BCC04RZ	BCC VC44-M413-3E-664-PX0350-006	163
BCC04T0	BCC VC44-M413-3E-664-PX0350-010	163
BCC04T1	BCC VC44-M413-3E-664-PX0350-015	163
BCC04T2	BCC VC44-M413-3E-664-PX0350-020	163
BCC04T3	BCC VC44-M413-3E-664-PX0350-030	163
BCC04T4	BCC VC44-M413-3E-664-PX0350-050	163
BCC04W0	BCC VA04-0000-10-053-PX0350-020	156
BCC04W1	BCC VA04-0000-10-053-PX0350-050	156
BCC04W2	BCC VA04-0000-10-053-PX0350-100	156

Ordering code	Part number	Page
BCC04W3	BCC VA04-0000-10-053-VX8350-020	156
BCC04W4	BCC VA04-0000-10-053-VX8350-050	156
BCC04W5	BCC VA04-0000-10-053-VX8350-100	156
BCC04W6	BCC VA04-0000-10-054-PX0350-020	156
BCC04W7	BCC VA04-0000-10-054-PX0350-050	156
BCC04W8	BCC VA04-0000-10-054-PX0350-100	156
BCC04W9	BCC VA04-0000-10-054-VX8350-020	156
BCC04WA	BCC VA04-0000-10-054-VX8350-050	156
BCC04WC	BCC VA04-0000-10-054-VX8350-100	156
BCC04WF	BCC VA04-M413-3E-664-PX0350-003	157
BCC04WH	BCC VA04-M413-3E-664-PX0350-006	157
BCC04WJ	BCC VA04-M413-3E-664-PX0350-015	157
BCC04WK	BCC VA04-M413-3E-664-PX0350-020	157
BCC04WL	BCC VA04-M413-3E-664-PX0350-030	157
BCC04WM	BCC VA04-M413-3E-664-PX0350-050	157
BCC04ZH	BCC M414-M414-6D-331-PS54T2-150	177
BCC04ZJ	BCC M414-E834-8G-668-PS54T2-150	177
BCC04ZK	BCC E834-E834-90-334-PS54T2-150	177
BCC04ZU	BCC M424-0000-2A-003-VX0434-020	59
BCC04ZW	BCC M424-0000-2A-003-VX0434-050	59
BCC0502	BCC VA04-M413-3E-664-PX0350-010	157
BCC0506	BCC M415-M313-3F-602-PX0334-003	68
BCC0507	BCC M415-M313-3F-602-PX0334-006	68
BCC0508	BCC M415-M313-3F-602-PX0334-010	68
BCC0509	BCC M415-M313-3F-602-PX0334-015	68
BCC050A	BCC M415-M313-3F-602-PX0334-020	68
BCC050C	BCC M415-M313-3F-602-PX0334-030	68
BCC050E	BCC M415-M313-3F-602-PX0334-050	68
BCC064E	BCC VB03-M413-3E-666-PX0350-003	159
BCC064F	BCC VB03-M413-3E-666-PX0350-006	159
BCC064H	BCC VB03-M413-3E-666-PX0350-010	159
BCC064J	BCC VB03-M413-3E-666-PX0350-015	159
BCC064K	BCC VB03-M413-3E-666-PX0350-020	159
BCC064L	BCC VB03-M413-3E-666-PX0350-030	159
BCC064M	BCC VB03-M413-3E-666-PX0350-050	159
BCC064N	BCC VB23-M413-3E-666-PX0350-003	159
BCC064P	BCC VB23-M413-3E-666-PX0350-006	159
BCC064R	BCC VB23-M413-3E-666-PX0350-010	159
BCC064T	BCC VB23-M413-3E-666-PX0350-015	159
BCC064U	BCC VB23-M413-3E-666-PX0350-020	159
BCC064W	BCC VB23-M413-3E-666-PX0350-030	159
BCC064Y	BCC VB23-M413-3E-666-PX0350-050	159
BCC064Z	BCC VB43-M413-3E-666-PX0350-003	161
BCC0650	BCC VB43-M413-3E-666-PX0350-006	161
BCC0651	BCC VB43-M413-3E-666-PX0350-010	161
BCC0652	BCC VB43-M413-3E-666-PX0350-015	161
BCC0653	BCC VB43-M413-3E-666-PX0350-020	161
BCC0654	BCC VB43-M413-3E-666-PX0350-030	161
BCC0655	BCC VB43-M413-3E-666-PX0350-050	161
BCC0656	BCC VB63-M413-3E-666-PX0350-003	161
BCC0657	BCC VB63-M413-3E-666-PX0350-006	161
BCC0658	BCC VB63-M413-3E-666-PX0350-010	161
BCC0659	BCC VB63-M413-3E-666-PX0350-015	161
BCC065A	BCC VB63-M413-3E-666-PX0350-020	161
BCC065C	BCC VB63-M413-3E-666-PX0350-030	161
BCC065E	BCC VB63-M413-3E-666-PX0350-050	161
BCC06EY	BCC M435-0000-2A-000-51X575-000	90
BCC06F6	BCC M435-0000-1A-000-51X475-000	86, 184, 190
BCC06F7	BCC M434-0000-2A-000-51X475-000	88, 184, 190
BCC06FH	BCC E834-0000-20-000-53X472-000	179, 199
BCC06FM	BCC A315-A315-30-335-PX05A5-006	110
BCC06FN	BCC A315-A315-30-335-PX05A5-020	110
BCC06FP	BCC A315-A315-30-335-PX05A5-050	110

# Alphanumeric Index

## Sorted by ordering code

Ordering code	Part number	Page
BCC06FR	BCC A315-A315-30-335-PX05A5-100	110
BCC06FT	BCC A315-A315-30-335-PX05A5-150	110
BCC06FU	BCC A315-A325-30-335-PX05A5-006	111
BCC06FW	BCC A315-A325-30-335-PX05A5-020	111
BCC06FY	BCC A315-A325-30-335-PX05A5-050	111
BCC06FZ	BCC A315-A325-30-335-PX05A5-100	111
BCC06H0	BCC A315-A325-30-335-PX05A5-150	111
BCC06H1	BCC A325-A315-30-335-PX05A5-006	111
BCC06H2	BCC A325-A315-30-335-PX05A5-020	111
BCC06H3	BCC A325-A315-30-335-PX05A5-050	111
BCC06H4	BCC A325-A315-30-335-PX05A5-100	111
BCC06H5	BCC A325-A315-30-335-PX05A5-150	111
BCC06H6	BCC A325-A325-30-335-PX05A5-006	111
BCC06H7	BCC A325-A325-30-335-PX05A5-020	111
BCC06H8	BCC A325-A325-30-335-PX05A5-050	111
BCC06H9	BCC A325-A325-30-335-PX05A5-100	111
BCC06HA	BCC A325-A325-30-335-PX05A5-150	111
BCC06HC	BCC A315-0000-10-063-PX05A5-020	107
BCC06HE	BCC A315-0000-10-063-PX05A5-050	107
BCC06HF	BCC A315-0000-10-063-PX05A5-100	107
BCC06HH	BCC A325-0000-10-063-PX05A5-020	107
BCC06HJ	BCC A325-0000-10-063-PX05A5-050	107
BCC06HK	BCC A325-0000-10-063-PX05A5-100	107
BCC06HL	BCC A314-000-20-003-PX04A5-020	106
BCC06HM	BCC A314-000-20-003-PX04A5-050	106
BCC06HN	BCC A314-000-20-003-PX04A5-100	106
BCC06HP	BCC A324-0000-20-003-PX04A5-020	106
BCC06HR	BCC A324-0000-20-003-PX04A5-050	106
BCC06HT	BCC A324-0000-20-003-PX04A5-100	106
BCC06HU	BCC A314-0000-10-003-PX04A5-020	105
BCC06HW	BCC A314-0000-10-003-PX04A5-050	105
BCC06HY	BCC A314-0000-10-003-PX04A5-100	105
BCC06HZ	BCC A324-0000-10-003-PX04A5-020	105
BCC06J0	BCC A324-0000-10-003-PX04A5-050	105
BCC06J1	BCC A324-0000-10-003-PX04A5-100	105
BCC06J2	BCC A314-A314-30-304-PX04A5-006	109
BCC06J3	BCC A314-A314-30-304-PX04A5-020	109
BCC06J4	BCC A314-A314-30-304-PX04A5-050	109
BCC06J5	BCC A314-A314-30-304-PX04A5-100	109
BCC06J6	BCC A314-A314-30-304-PX04A5-150	109
BCC06J7	BCC A314-A324-30-304-PX04A5-006	109
BCC06J8	BCC A314-A324-30-304-PX04A5-020	109
BCC06J9	BCC A314-A324-30-304-PX04A5-050	109
BCC06JA	BCC A314-A324-30-304-PX04A5-100	109
BCC06JC	BCC A314-A324-30-304-PX04A5-150	109
BCC06JE	BCC A324-A314-30-304-PX04A5-006	109
BCC06JF	BCC A324-A314-30-304-PX04A5-020	109
BCC06JH	BCC A324-A314-30-304-PX04A5-050	109
BCC06JJ	BCC A324-A314-30-304-PX04A5-100	109
BCC06JK	BCC A324-A314-30-304-PX04A5-150	109
BCC06JL	BCC A324-A324-30-304-PX04A5-006	110
BCC06JM	BCC A324-A324-30-304-PX04A5-020	110
BCC06JN	BCC A324-A324-30-304-PX04A5-050	110
BCC06JP	BCC A324-A324-30-304-PX04A5-100	110
BCC06JR	BCC A324-A324-30-304-PX04A5-150	110
BCC06JT	BCC M418-0000-2A-044-PX0825-020	65
BCC06JU	BCC M418-0000-2A-044-PX0825-050	65
BCC06JW	BCC M418-0000-2A-044-PX0825-100	65
BCC06JY	BCC M428-0000-2A-044-PX0825-020	65
BCC06JZ	BCC M428-0000-2A-044-PX0825-050	65
BCC06K0	BCC M428-0000-2A-044-PX0825-100	65
BCC06K1	BCC M418-0000-1A-044-PX0825-020	62
BCC06K2	BCC M418-0000-1A-044-PX0825-050	62

Ordering code	Part number	Page
BCC06K3	BCC M418-0000-1A-044-PX0825-100	62
BCC06K4	BCC M428-0000-1A-044-PX0825-020	63
BCC06K5	BCC M428-0000-1A-044-PX0825-050	63
BCC06K6	BCC M428-0000-1A-044-PX0825-100	63
BCC06K7	BCC M418-0000-2A-044-VX8825-020	65
BCC06K8	BCC M418-0000-2A-044-VX8825-050	65
BCC06K9	BCC M418-0000-2A-044-VX8825-100	65
BCC06KA	BCC M428-0000-2A-044-VX0825-020	65
BCC06KC	BCC M428-0000-2A-044-VX0825-050	65
BCC06KE	BCC M428-0000-2A-044-VX0825-100	65
BCC06KN	BCC M61C-0000-10-065-PX0BP4-020	100
BCC06KP	BCC M61C-0000-10-065-PX0BP4-050	100
BCC06KR	BCC M61C-0000-10-065-PX0BP4-100	100
BCC06KT	BCC M62C-0000-10-065-PX0BP4-020	101
BCC06KU	BCC M62C-0000-10-065-PX0BP4-050	101
BCC06KW	BCC M62C-0000-10-065-PX0BP4-100	101
BCC06KY	BCC M61L-0000-10-022-PX0LP4-020	101
BCC06KZ	BCC M61L-0000-10-022-PX0LP4-050	101
BCC06L0	BCC M61L-0000-10-022-PX0LP4-100	101
BCC06L1	BCC M62L-0000-10-022-PX0LP4-020	101
BCC06L2	BCC M62L-0000-10-022-PX0LP4-050	101
BCC06L3	BCC M62L-0000-10-022-PX0LP4-100	101
BCC06M4	BCC M434-0000-2A-000-41X475-000	88
BCC06M7	BCC S415-0000-1A-003-VX8434-100	121
BCC06M8	BCC S415-0000-1A-003-VX8434-150	121
BCC06M9	BCC S415-0000-1A-003-VX8434-200	121
BCC06MA	BCC S415-0000-1A-003-VX8434-250	121
BCC06MC	BCC S415-0000-1A-003-VX8434-300	121
BCC06ME	BCC S415-0000-1A-003-VX8434-350	121
BCC06MF	BCC S425-0000-1A-003-VX8434-100	122
BCC06MH	BCC S425-0000-1A-003-VX8434-150	122
BCC06MJ	BCC S425-0000-1A-003-VX8434-200	122
BCC06MK	BCC S425-0000-1A-003-VX8434-250	122
BCC06ML	BCC S425-0000-1A-003-VX8434-300	122
BCC06MM	BCC S425-0000-1A-003-VX8434-350	122
BCC06U9	BCC S425-0000-1A-004-VX8334-150	121
BCC06UA	BCC S425-0000-1A-004-VX8334-200	121
BCC06UC	BCC S425-0000-1A-004-VX8334-250	121
BCC06UE	BCC S425-0000-1A-004-PX0334-150	121
BCC06UF	BCC S425-0000-1A-004-PX0334-200	121
BCC06UH	BCC S425-0000-1A-004-PX0334-250	121
BCC06UJ	BCC S425-0000-1A-004-PX0334-400	121
BCC06UK	BCC M41C-0000-1A-049-PX0C25-020	66
BCC06UL	BCC M41C-0000-1A-049-PX0C25-050	66
BCC06UM	BCC M41C-0000-1A-049-PX0C25-100	66
BCC06UP	BCC M41C-0000-1A-049-VX8C25-020	66
BCC06UR	BCC M41C-0000-1A-049-VX8C25-050	66
BCC06UT	BCC M41C-0000-1A-049-VX8C25-100	66
BCC06UU	BCC M41C-0000-2A-049-PX0C25-020	67
BCC06UW	BCC M41C-0000-2A-049-PX0C25-050	67
BCC06UY	BCC M41C-0000-2A-049-PX0C25-100	67
BCC06UZ	BCC M41C-0000-2A-049-VX8C25-020	67
BCC06W0	BCC M41C-0000-2A-049-VX8C25-050	67
BCC06W1	BCC M41C-0000-2A-049-VX8C25-100	67
BCC06W9	BCC M435-0000-1A-000-51X575-000	90
BCC06WU	BCC M415-M414-3A-337-VS24N7-006	183
BCC06WW	BCC M415-M414-3A-337-VS24N7-020	183
BCC06WY	BCC M415-M414-3A-337-VS24N7-050	183
BCC06WZ	BCC M415-M414-3A-337-VS24N7-100	183
BCC06Y0	BCC M415-M414-3A-337-VS24N7-150	183
BCC06Y1	BCC M415-0000-1A-068-VS24N7-020	183
BCC06Y2	BCC M415-0000-1A-068-VS24N7-050	183
BCC06Y3	BCC M415-0000-1A-068-VS24N7-100	183

# Alphanumeric Index

## Sorted by ordering code

Ordering code	Part number	Page
BCC06Y4	BCC M415-0000-2A-R03	185
BCC06Y5	BCC M434-0000-2A-000-55X450-000	88, 184, 190
BCC06Y6	BCC M435-0000-1A-000-55X450-000	86, 184, 190
BCC06Y8	BCC M445-0000-1A-000-51X475-000	87
BCC06YA	BCC M435-0000-2A-000-41X575-000	90
BCC06YP	BCC M454-M454-5D-RM002-000	181, 201
BCC06YW	BCC M333-0000-10-000-34X325-000	42
BCC06YY	BCC M343-0000-10-000-34X325-000	43
BCC06YZ	BCC M333-0000-20-000-34X325-000	43
BCC06Z0	BCC M343-0000-20-000-34X325-000	44
BCC06Z1	BCC M333-0000-10-000-31X350-000	42
BCC06Z9	BCC M435-0000-1A-000-41X475-000	86
BCC06ZA	BCC M445-0000-1A-000-41X475-000	87
BCC06ZC	BCC M444-0000-2A-000-41X475-000	89
BCC06ZE	BCC M444-0000-2A-000-51X475-000	89
BCC06ZF	BCC M435-000-1A-000-41X575-000	90
BCC06ZH	BCC M445-000-1A-000-41X575-000	90
BCC06ZJ	BCC M445-0000-1A-000-51X575-000	90
BCC06ZK	BCC M445-000-2A-000-41X575-000	91
BCC06ZL	BCC M445-0000-2A-000-51X575-000	91
BCC06ZY	BCC M435-0000-1A-000-43X434-000	87
BCC0706	BCC A334-0000-10-000-51X4A5-000	113
BCC0707	BCC A334-0000-10-000-61X4A5-000	113
BCC0708	BCC A334-0000-10-000-71X4A5-000	113
BCC0709	BCC A334-0000-20-000-51X4A5-000	113
BCC070A	BCC A334-0000-20-000-61X4A5-000	113
BCC070C	BCC A334-0000-20-000-71X4A5-000	113
BCC070E	BCC A335-0000-10-000-51X5A5-000	113, 191
BCC070F	BCC A335-0000-10-000-61X5A5-000	113, 191
BCC070H	BCC A335-0000-10-000-71X5A5-000	113, 191
BCC070J	BCC A335-0000-20-000-51X5A5-000	113, 191
BCC070K	BCC A335-0000-20-000-61X5A5-000	113, 191
BCC070L	BCC A335-0000-20-000-71X5A5-000	113, 191
BCC070Y	BCC M415-0000-1B-031-PS72N1-020	169
BCC070Z	BCC M415-0000-1B-031-PS72N1-050	169
BCC0710	BCC M415-0000-1B-031-PS72N1-100	169
BCC0714	BCC M475-0000-2B-000-01X575-000	171
BCC0715	BCC M475-0000-1B-000-01X575-000	170
BCC0716	BCC M485-0000-2B-000-01X575-000	171
BCC0717	BCC M485-0000-1B-000-01X575-000	170
BCC0718	BCC M415-0000-2B-R01	174
BCC0719	BCC M415-0000-2B-R02	174
BCC071A	BCC PA04-0000-10-070-PX0550-020	164
BCC071C	BCC PA04-0000-10-070-PX0550-050	164
BCC071E	BCC PA04-0000-10-070-PX0550-100	164
BCC071F	BCC PA24-0000-10-070-PX0550-020	164
BCC071H	BCC PA24-0000-10-070-PX0550-050	164
BCC071J	BCC PA24-0000-10-070-PX0550-100	164
BCC082W	BCC M415-0000-1A-001-PH0334-020	119
BCC082Y	BCC M415-0000-1A-001-PH0334-050	119
BCC082Z	BCC M415-0000-1A-001-PH0334-100	119
BCC0832	BCC M425-0000-1A-001-PH0334-020	119
BCC0833	BCC M425-0000-1A-001-PH0334-050	119
BCC0836	BCC M313-0000-10-001-PH0334-050	118
BCC084R	BCC M414-0000-2A-068-VS24N7-020	183
BCC084T	BCC M414-0000-2A-068-VS24N7-050	183
BCC084U	BCC M414-0000-2A-068-VS24N7-100	183
BCC085F	BCC M414-E814-BG-RM013-000	180, 200
BCC085H	BCC M424-E814-BG-RM013-000	180, 200
BCC085Z	BCC M418-0000-1A-069-PX0825-100	62
BCC0860	BCC M415-0000-1A-017-PX0534-100	60
BCC086T	BCC M425-0000-1A-001-PW3334-020	132
BCC086U	BCC M425-0000-1A-001-PW3334-050	132

Ordering code	Part number	Page
BCC086W	BCC M425-0000-1A-001-PW3334-100	132
BCC087F	BCC M415-0000-1A-034-PW3534-015	133
BCC087H	BCC M415-0000-1A-034-PW3534-050	133
BCC087J	BCC M415-0000-1A-034-PW3534-075	133
BCC087K	BCC M415-0000-1A-034-PW3534-100	133
BCC087L	BCC M425-0000-1A-040-PW3534-015	133
BCC087M	BCC M425-0000-1A-040-PW3534-050	133
BCC087N	BCC M425-0000-1A-040-PW3534-075	133
BCC087P	BCC M425-0000-1A-040-PW3534-100	133
BCC087R	BCC M415-M415-3A-313-PW3534-006	135
BCC087T	BCC M415-M415-3A-313-PW3534-010	135
BCC087U	BCC M415-M415-3A-313-PW3534-015	135
BCC087W	BCC M415-M415-3A-313-PW3534-020	135
BCC0886	BCC A315-0000-20-063-PX05A5-020	107
BCC0887	BCC A315-0000-20-063-PX05A5-050	107
BCC0888	BCC A315-0000-20-063-PX05A5-100	107
BCC0889	BCC A325-0000-20-063-PX05A5-020	107
BCC088A	BCC A325-0000-20-063-PX05A5-050	107
BCC088C	BCC A325-0000-20-063-PX05A5-100	107
BCC088E	BCC M41C-M41C-3A-325-PX0C25-006	85
BCC088F	BCC M41C-M41C-3A-325-PX0C25-010	85
BCC088H	BCC M41C-M41C-3A-325-PX0C25-020	85
BCC088J	BCC M418-M41C-3A-674-PX0825-006	84
BCC088K	BCC M418-M41C-3A-674-PX0825-010	84
BCC088L	BCC M418-M41C-3A-674-PX0825-020	84
BCC088M	BCC M61C-M41C-3E-675-PX0C25-006	102
BCC088N	BCC M61C-M41C-3E-675-PX0C25-010	102
BCC088P	BCC M61C-M41C-3E-675-PX0C25-020	102
BCC088R	BCC M62C-M41C-3E-675-PX0C25-006	102
BCC088T	BCC M62C-M41C-3E-675-PX0C25-010	102
BCC088U	BCC M62C-M41C-3E-675-PX0C25-020	102
BCC089P	BCC M415-M415-M415-U0003-000	99, 185, 192
BCC08C0	BCC M434-0000-2A-000-43X434-000	88
BCC08CM	BCC S425-0000-1A-004-PX0334-020	121
BCC08CN	BCC S425-0000-1A-004-PX0334-030	121
BCC08CP	BCC S425-0000-1A-004-PX0334-050	121
BCC08CR	BCC S425-0000-1A-004-PX0334-100	121
BCC08CU	BCC S425-0000-1A-008-PX0434-050	122
BCC08CZ	BCC S323-0000-10-004-PX0334-020	121
BCC08E0	BCC S323-0000-10-004-PX0334-050	121
BCC08F4	BCC M425-0000-1A-039-PX0534-100	61
BCC08F5	BCC M425-0000-1A-039-PX0534-050	61
BCC08F6	BCC M425-0000-1A-039-PX0534-020	61
BCC08F7	BCC M425-0000-1A-034-PX0534-100	60
BCC08F8	BCC M425-0000-1A-034-PX0534-050	60
BCC08F9	BCC M425-0000-1A-034-PX0534-020	60
BCC08FA	BCC M425-0000-1A-017-PX0534-100	60
BCC08FC	BCC M425-0000-1A-017-PX0534-050	60
BCC08FE	BCC M415-0000-1A-017-PX0534-020	60
BCC08FF	BCC M425-M425-3A-660-PX0534-003	83
BCC08FH	BCC M425-M425-3A-660-PX0534-006	83
BCC08FJ	BCC M425-M425-3A-660-PX0534-010	83
BCC08FK	BCC M425-M425-3A-660-PX0534-015	83
BCC08FL	BCC M425-M425-3A-660-PX0534-020	83
BCC08FM	BCC M425-M425-3A-660-PX0534-030	83
BCC08FN	BCC M425-M425-3A-660-PX0534-050	83
BCC08FP	BCC M425-M425-3A-661-PX0534-003	83
BCC08FR	BCC M425-M425-3A-661-PX0534-006	83
BCC08FT	BCC M425-M425-3A-661-PX0534-010	83
BCC08FU	BCC M425-M425-3A-661-PX0534-015	83
BCC08FW	BCC M425-M425-3A-661-PX0534-020	83
BCC08FY	BCC M425-M425-3A-661-PX0534-030	83
BCC08FZ	BCC M425-M425-3A-661-PX0534-050	83



# Alphanumeric Index

## Sorted by ordering code

Ordering code	Part number	Page
BCC08H0	BCC M425-M415-3A-313-PX0534-003	81
BCC08H1	BCC M425-M415-3A-313-PX0534-006	81
BCC08H2	BCC M425-M415-3A-313-PX0534-010	81
BCC08H3	BCC M425-M415-3A-313-PX0534-015	81
BCC08H4	BCC M425-M415-3A-313-PX0534-020	81
BCC08H5	BCC M425-M415-3A-313-PX0534-030	81
BCC08H6	BCC M425-M415-3A-313-PX0534-050	81
BCC08H8	BCC M425-M415-3A-312-PX0534-003	81
BCC08H9	BCC M425-M415-3A-312-PX0534-006	81
BCC08HA	BCC M425-M415-3A-312-PX0534-010	81
BCC08HC	BCC M425-M415-3A-312-PX0534-015	81
BCC08HE	BCC M425-M415-3A-312-PX0534-020	81
BCC08HF	BCC M425-M415-3A-312-PX0534-030	81
BCC08HH	BCC M425-M415-3A-312-PX0534-050	81
BCC08HP	BCC M425-0000-1A-040-PX0534-020	61
BCC08HR	BCC M425-0000-1A-040-PX0534-050	61
BCC08HT	BCC M425-0000-1A-040-PX0534-100	61
BCC08JC	BCC M415-0000-2A-034-PX0534-050	61
BCC08JE	BCC M415-0000-2A-034-PX0534-020	61
BCC08LE	BCC M425-0000-1A-004-PW3334-100	132
BCC08MZ	BCC M425-0000-1A-004-PW3334-030	132
BCC0941	BCC M42C-0000-2A-049-PX0C25-020	67
BCC0942	BCC M42C-0000-1A-049-PX0C25-050	66
BCC0943	BCC M42C-0000-1A-049-PX0C25-100	66
BCC098C	BCC M415-0000-1A-017-PX0534-050	60
BCC0994	BCC M418-0000-1A-046-PS0825-020	62
BCC0995	BCC M418-0000-1A-046-PS0825-050	62
BCC0996	BCC M418-0000-1A-046-PS0825-100	62
BCC0997	BCC M428-0000-1A-046-PS0825-020	63
BCC0998	BCC M428-0000-1A-046-PS0825-050	63
BCC0999	BCC M428-0000-1A-046-PS0825-100	63
BCC099A	BCC M454-0000-2A-RM020-005	94
BCC099C	BCC M455-0000-1A-RM020-005	94
BCC09EU	BCC M333-0000-10-000-22X334-000	43
BCC09EW	BCC M333-0000-20-000-22X334-000	44
BCC09EY	BCC M334-0000-10-000-22X434-000	45
BCC09EZ	BCC M334-0000-20-000-22X434-000	45
BCC09F3	BCC M425-M415-3A-661-PX0534-015	82
BCC09F4	BCC M425-M415-3A-661-PX0534-020	82
BCC09F5	BCC M425-M415-3A-661-PX0534-030	82
BCC09F6	BCC M425-M415-3A-661-PX0534-050	82
BCC09F7	BCC M425-M415-3A-661-PX0534-010	82
BCC09F8	BCC M425-M415-3A-661-PX0534-006	82
BCC09F9	BCC M425-M415-3A-661-PX0534-003	82
BCC09FA	BCC M425-M415-3A-660-PX0534-003	81
BCC09FC	BCC M425-M415-3A-660-PX0534-006	81
BCC09FE	BCC M425-M415-3A-660-PX0534-010	81
BCC09FF	BCC M425-M415-3A-660-PX0534-020	81
BCC09FH	BCC M425-M415-3A-660-PX0534-015	81
BCC09FJ	BCC M425-M415-3A-660-PX0534-030	81
BCC09FK	BCC M425-M415-3A-660-PX0534-050	81
BCC09FL	BCC M415-M415-3A-312-PX0534-003	80
BCC09FM	BCC M415-M415-3A-312-PX0534-006	80
BCC09FN	BCC M415-M415-3A-312-PX0534-010	80
BCC09FP	BCC M415-M415-3A-312-PX0534-015	80
BCC09FR	BCC M415-M415-3A-312-PX0534-020	80
BCC09FT	BCC M415-M415-3A-312-PX0534-030	80
BCC09FU	BCC M415-M415-3A-312-PX0534-050	80
BCC09FW	BCC M415-M415-3A-313-PX0534-003	80
BCC09FY	BCC M415-M415-3A-313-PX0534-006	80
BCC09FZ	BCC M415-M415-3A-313-PX0534-010	80
BCC09H0	BCC M415-M415-3A-313-PX0534-015	80
BCC09H1	BCC M415-M415-3A-313-PX0534-020	80

Ordering code	Part number	Page
BCC09H2	BCC M415-M415-3A-313-PX0534-030	80
BCC09H3	BCC M415-M415-3A-313-PX0534-050	80
BCC09H4	BCC M415-0000-1A-034-PX0534-020	60
BCC09H5	BCC M415-0000-1A-034-PX0534-050	60
BCC09H6	BCC M415-0000-1A-034-PX0534-100	60
BCC09H7	BCC M425-0000-1A-017-PX0534-020	60
BCC09H8	BCC M428-0000-1A-045-PX0825-020	64
BCC09H9	BCC M428-0000-1A-045-PX0825-050	64
BCC09HA	BCC M428-0000-1A-045-PX0825-100	64
BCC09HC	BCC M418-0000-1A-045-PX0825-020	63
BCC09HE	BCC M418-0000-1A-045-PX0825-050	63
BCC09HF	BCC M418-0000-1A-045-PX0825-100	63
BCC09J3	BCC M418-0000-1A-069-PX0825-020	62
BCC09J4	BCC M418-0000-1A-069-PX0825-050	62
BCC09J6	BCC M415-0000-1A-003-PW3434-020	132
BCC09J8	BCC M425-0000-1A-004-PW3334-020	132
BCC09JC	BCC M415-M313-M313-U0014-000	99
BCC09JP	BCC M435-0000-1A-000-A1X575-000	92
BCC09JW	BCC M435-0000-2A-000-A1X575-000	92
BCC09JZ	BCC M455-0000-1A-RM014-005	95
BCC09K0	BCC M455-0000-2A-RM014-005	95
BCC09M1	BCC M415-M415-3A-313-PW3534-050	135
BCC09M2	BCC M415-M415-3A-313-PW3534-030	135
BCC09M4	BCC M42C-0000-2A-049-PX0C25-100	67
BCC09M5	BCC M42C-0000-2A-049-PX0C25-050	67
BCC09M8	BCC M415-M415-3A-344-PS75N6-006	187
BCC09MA	BCC M415-M415-3A-344-PS75N6-020	187
BCC09MC	BCC M415-M415-3A-344-PS75N6-050	187
BCC09ME	BCC M415-M415-3A-344-PS75N6-100	187
BCC09MF	BCC M415-M415-3A-344-PS75N6-150	187
BCC09MJ	BCC M415-0000-1A-067-PS75N6-020	187
BCC09MK	BCC M415-0000-1A-067-PS75N6-050	187
BCC09ML	BCC M415-0000-1A-067-PS75N6-100	187
BCC09MM	BCC M415-0000-2A-067-PS75N6-020	187
BCC09MN	BCC M415-0000-2A-067-PS75N6-050	187
BCC09MP	BCC M415-0000-2A-067-PS75N6-100	187
BCC09MR	BCC M415-0000-2A-R04	193
BCC09MU	BCC M415-M415-M415-U0016-000	99
BCC09N2	BCC E878-0000-Z1-41X8T4	207
BCC09NL	BCC M414-M414-6D-338-ES64N9-006	195
BCC09NN	BCC M414-M414-6D-338-ES64N9-020	195
BCC09NP	BCC M414-M414-6D-338-ES64N9-050	195
BCC09NR	BCC M414-M414-6D-338-ES64N9-100	195
BCC09NT	BCC M414-M414-6D-338-ES64N9-150	195
BCC09UY	BCC A315-0000-10-030-VS85N6-020	188
BCC09W0	BCC A315-0000-10-030-VS85N6-050	188
BCC09W3	BCC A315-0000-10-030-VS85N6-100	188
BCC09W8	BCC A315-0000-20-030-VS85N6-020	189
BCC09WA	BCC A315-0000-20-030-VS85N6-050	189
BCC09WF	BCC A315-0000-20-030-VS85N6-100	189
BCC09YA	BCC A315-A315-30-330-VS85N6-006	189
BCC09YE	BCC A315-A315-30-330-VS85N6-020	189
BCC09YJ	BCC A315-A315-30-330-VS85N6-050	189
BCC09YP	BCC A315-A315-30-330-VS85N6-100	189
BCC09YT	BCC A315-A315-30-330-VS85N6-150	189
BCC0A07	BCC M313-M313-M313-U2017-003	48
BCC0A08	BCC M415-0000-1A-R04	193
BCC0A09	BCC A315-0000-2A-R04	193
BCC0A0A	BCC A315-0000-1A-R04	193
BCC0A0K	BCC M415-0000-1B-031-PS72N1-150	169
BCC0A0L	BCC M415-0000-1B-031-PS72N1-200	169
BCC0A0Y	BCC M412-0000-2B-031-PS72N1-020	169
BCC0A0Z	BCC M412-0000-2B-031-PS72N1-050	169

# Alphanumeric Index

## Sorted by ordering code

Ordering code	Part number	Page
BCC0A10	BCC M412-0000-2B-031-PS72N1-100	169
BCC0A12	BCC M415-M412-3B-329-PS72N1-006	169
BCC0A13	BCC M415-M412-3B-329-PS72N1-010	169
BCC0A14	BCC M415-M412-3B-329-PS72N1-020	169
BCC0A15	BCC M415-M412-3B-329-PS72N1-050	169
BCC0A16	BCC M415-M412-3B-329-PS72N1-100	169
BCC0A17	BCC M415-M412-3B-329-PS72N1-150	169
BCC0A18	BCC M415-M412-3B-329-PS72N1-200	169
BCC0A2F	BCC S323-0000-10-004-PX0334-030	121
BCC0A2H	BCC S323-0000-10-004-PX0334-100	121
BCC0A2K	BCC S425-0000-1A-008-PX0434-100	122
BCC0A2L	BCC S425-0000-1A-004-VX8334-050	121
BCC0A2M	BCC S425-0000-1A-004-VX8334-100	121
BCC0A77	BCC M314-M313-30-300-PX0334-010	34
BCC0A78	BCC M314-M313-30-300-PX0334-020	34
BCC0AA5	BCC A313-A313-A313-T0021-000	114
BCC0AA6	BCC A314-A314-A314-T0022-000	114
BCC0AA7	BCC A315-A315-A315-T0023-000	115, 192
BCC0AA8	BCC M425-0000-1A-001-PH0334-100	119
BCC0AA9	BCC M415-0000-1A-003-PH0434-020	119
BCC0AAA	BCC M415-0000-1A-003-PH0434-050	119
BCC0AAC	BCC M415-0000-1A-003-PH0434-100	119
BCC0AAE	BCC M425-0000-1A-003-PH0434-020	119
BCC0AAF	BCC M425-0000-1A-003-PH0434-050	119
BCC0AAH	BCC M425-0000-1A-003-PH0434-100	119
BCC0AAZ	BCC M418-M418-3A-342-PX0825-006	84
BCC0AC0	BCC M418-M418-3A-342-PX0825-003	84
BCC0AC1	BCC M418-M418-3A-342-PX0825-010	84
BCC0AC2	BCC M418-M418-3A-342-PX0825-015	84
BCC0AC3	BCC M418-M418-3A-342-PX0825-020	84
BCC0AC4	BCC M418-M418-3A-342-PX0825-030	84
BCC0AC5	BCC M418-M418-3A-342-PX0825-050	84
BCC0AFL	BCC M314-M313-M313-U2024-003	48
BCC0AFM	BCC M314-M313-M313-U2024-010	48
BCC0AFW	BCC M414-M313-M313-U2026-006	98
BCC0AFY	BCC M414-M313-M313-U2026-010	98
BCC0AFZ	BCC M414-M313-M313-U2026-020	98
BCC0AH0	BCC M414-M313-M313-U2026-030	98
BCC0AHZ	BCC A313-0000-10-097-PX03A5-020	104
BCC0AJ0	BCC A313-0000-10-097-PX03A5-050	104
BCC0AJ1	BCC A313-0000-10-097-PX03A5-100	104
BCC0AJ2	BCC A323-0000-10-097-PX03A5-020	105
BCC0AJ3	BCC A323-0000-10-097-PX03A5-050	105
BCC0AJ4	BCC A323-0000-10-097-PX03A5-100	105
BCC0AJC	BCC M415-M415-3A-313-PW0534-100	80
BCC0AJJ	BCC M415-M415-3A-313-PW0534-006	129
BCC0AJK	BCC M313-0000-10-001-PW0334-050	125
BCC0AJM	BCC M314-0000-10-003-PW0434-050	125
BCC0AJR	BCC M323-0000-10-001-PW0334-050	125
BCC0AJW	BCC M324-0000-10-003-PW0434-050	125
BCC0AK1	BCC M414-M415-M415-U2027-003	129
BCC0AK2	BCC M414-M415-M415-U2027-006	129
BCC0AK3	BCC M414-M415-M415-U2027-010	129
BCC0AK4	BCC M415-0000-1A-003-PW0434-020	127
BCC0AK5	BCC M415-0000-1A-003-PW0434-050	127
BCC0AK6	BCC M415-0000-1A-003-PW0434-100	127
BCC0AK7	BCC M415-M415-3A-313-PW0534-010	129
BCC0AK8	BCC M415-M415-3A-313-PW0534-020	129
BCC0AK9	BCC M415-M415-3A-313-PW0534-030	129
BCC0AKA	BCC M415-M415-3A-313-PW0534-050	129
BCC0AKE	BCC M425-0000-1A-003-PW0434-050	127
BCC0AKF	BCC M425-0000-1A-003-PW0434-100	127
BCC0AKH	BCC M425-M415-3A-313-PW0534-006	129

Ordering code	Part number	Page
BCC0AKJ	BCC M425-M415-3A-313-PW0534-010	129
BCC0AKK	BCC M425-M415-3A-313-PW0534-020	129
BCC0AKL	BCC M425-M415-3A-313-PW0534-030	129
BCC0AKM	BCC M425-M415-3A-313-PW0534-050	129
BCC0AN9	BCC M415-0000-1A-017-VX8534-100	60
BCC0ANE	BCC M425-M414-3A-650-PW0434-003	128
BCC0ANF	BCC M425-M414-3A-650-PW0434-006	128
BCC0ANH	BCC M425-M414-3A-650-PW0434-010	128
BCC0ANJ	BCC M425-M414-3A-650-PW0434-015	128
BCC0ANK	BCC M425-M414-3A-650-PW0434-020	128
BCC0ANM	BCC M425-M414-3A-650-PW0434-050	128
BCC0ANP	BCC M425-M414-3A-304-PW0434-003	128
BCC0ANR	BCC M425-M414-3A-304-PW0434-006	128
BCC0ANT	BCC M425-M414-3A-304-PW0434-010	128
BCC0ANU	BCC M425-M414-3A-304-PW0434-015	128
BCC0ANW	BCC M425-M414-3A-304-PW0434-020	128
BCC0ANZ	BCC M425-M414-3A-304-PW0434-050	128
BCC0AP1	BCC M415-M414-3A-304-PW0434-003	128
BCC0AP2	BCC M415-M414-3A-304-PW0434-006	128
BCC0AP3	BCC M415-M414-3A-304-PW0434-010	128
BCC0AP4	BCC M415-M414-3A-304-PW0434-015	128
BCC0AP5	BCC M415-M414-3A-304-PW0434-020	128
BCC0AP7	BCC M415-M414-3A-304-PW0434-050	128
BCC0AR6	BCC A313-A313-30-365-PX03A5-006	108
BCC0ARH	BCC A313-A313-30-365-PX03A5-020	108
BCC0ARJ	BCC A313-A313-30-365-PX03A5-050	108
BCC0ARK	BCC A313-A313-30-365-PX03A5-100	108
BCC0ARL	BCC A313-A313-30-365-PX03A5-150	108
BCC0AT5	BCC M415-0000-1A-017-VX8534-050	60
BCC0AT6	BCC M415-0000-2A-017-VX8534-050	61
BCC0AT9	BCC A333-0000-10-000-61X3A5-000	112
BCC0ATA	BCC A333-0000-10-000-71X3A5-000	112
BCC0ATC	BCC A333-0000-20-000-61X3A5-000	112
BCC0ATE	BCC A333-0000-20-000-71X3A5-000	112
BCC0AU3	BCC M415-0000-2A-017-VX8534-020	61
BCC0AUA	BCC M414-M415-M415-U2028-003	98
BCC0AUC	BCC M414-M415-M415-U2028-006	98
BCC0AUE	BCC M414-M415-M415-U2028-010	98
BCC0AUF	BCC M414-M415-M415-U2028-020	98
BCC0AUH	BCC M414-M415-M415-U2028-030	98
BCC0AUK	BCC M415-0000-2A-017-VX8534-100	61
BCC0AUL	BCC M314-M313-30-300-PX0334-006	34
BCC0AW9	BCC M313-0000-10-004-PX0334-020	27
BCC0AWA	BCC M313-0000-10-004-PX0334-050	27
BCC0AWC	BCC M313-0000-10-004-PX0334-100	27
BCC0AY0	BCC M313-0000-10-004-VX8334-050	27
BCC0AY4	BCC M41C-M41C-3A-325-PX0C25-003	85
BCC0AYA	BCC A315-A315-30-344-PS75N6-150	189
BCC0AYC	BCC A315-A315-30-344-PS75N6-100	189
BCC0AYE	BCC A315-A315-30-344-PS75N6-050	189
BCC0AYF	BCC A315-A315-30-344-PS75N6-020	189
BCC0AYJ	BCC A315-A315-30-344-PS75N6-006	189
BCC0AYK	BCC A315-0000-20-067-PS75N6-100	189
BCC0AYL	BCC A315-0000-20-067-PS75N6-050	189
BCC0AYM	BCC A315-0000-20-067-PS75N6-020	189
BCC0AYN	BCC A315-0000-10-067-PS75N6-100	188
BCC0AYP	BCC A315-0000-10-067-PS75N6-050	188
BCC0AYR	BCC A315-0000-10-067-PS75N6-020	188
BCC0AZA	BCC M313-M313-30-602-PX0334-003	32
BCC0AZC	BCC M313-M313-30-602-PX0334-006	32
BCC0AZE	BCC M313-M313-30-602-PX0334-010	32
BCC0AZF	BCC M313-M313-30-602-PX0334-015	32
BCC0AZH	BCC M313-M313-30-602-PX0334-020	32

# Alphanumeric Index

## Sorted by ordering code

Ordering code	Part number	Page
<b>BCC0AZJ</b>	BCC M313-M313-30-602-PX0334-030	32
<b>BCC0AZK</b>	BCC M313-M313-30-602-PX0334-050	32
<b>BCC0C06</b>	BCC M313-0000-10-004-VX8334-020	27
<b>BCC0C07</b>	BCC M313-0000-10-004-VX8334-100	27
<b>BCC0C0M</b>	BCC M415-M415-3A-313-PW0534-015	129
<b>BCC0C0N</b>	BCC M425-M415-3A-661-PW0534-006	129
<b>BCC0C0P</b>	BCC M425-M415-3A-661-PW0534-010	129
<b>BCC0C0R</b>	BCC M425-M415-3A-661-PW0534-015	129
<b>BCC0C0T</b>	BCC M425-M415-3A-661-PW0534-020	129
<b>BCC0C0U</b>	BCC M425-M415-3A-661-PW0534-030	129
<b>BCC0C0V</b>	BCC M425-M415-3A-661-PW0534-050	129
<b>BCC0C0Y</b>	BCC D259-M414-M415-U0029-000-C011	172
<b>BCC0C0Z</b>	BCC D269-M414-M415-U0029-000-C011	173
<b>BCC0C10</b>	BCC D279-0000-E0-000-65X4N1-000-C011	172
<b>BCC0C11</b>	BCC D289-0000-E0-000-65X4N1-000-C011	173
<b>BCC0C20</b>	BCC M324-0000-10-003-PW3434-050	131
<b>BCC0C21</b>	BCC M314-0000-10-003-PW3434-050	131
<b>BCC0C22</b>	BCC M425-0000-1A-003-PW3434-050	133
<b>BCC0C23</b>	BCC M415-0000-1A-003-PW3434-050	132
<b>BCC0C24</b>	BCC M323-0000-10-001-PW3334-050	131
<b>BCC0C27</b>	BCC M414-M415-M415-U2027-020	129
<b>BCC0C3A</b>	BCC M313-0000-10-001-PW3334-050	131
<b>BCC0C3H</b>	BCC A323-A313-30-365-PX03A5-006	108
<b>BCC0C3J</b>	BCC A323-A313-30-365-PX03A5-020	108
<b>BCC0C3K</b>	BCC A323-A313-30-365-PX03A5-050	108
<b>BCC0C3L</b>	BCC A323-A313-30-365-PX03A5-100	108
<b>BCC0C3M</b>	BCC A323-A313-30-365-PX03A5-150	108
<b>BCC0C3Z</b>	BCC M425-0000-1A-099-PW3434-020	133
<b>BCC0C41</b>	BCC M425-0000-1A-099-PW3434-050	133
<b>BCC0C42</b>	BCC M425-0000-1A-099-PW3434-100	133
<b>BCC0C49</b>	BCC M425-M415-3A-692-PX0534-050	82
<b>BCC0C4A</b>	BCC M425-M415-3A-692-PX0534-030	82
<b>BCC0C4C</b>	BCC M425-M415-3A-692-PX0534-020	82
<b>BCC0C4E</b>	BCC M425-M415-3A-692-PX0534-015	82
<b>BCC0C4F</b>	BCC M425-M415-3A-692-PX0534-010	82
<b>BCC0C4H</b>	BCC M425-M415-3A-692-PX0534-006	82
<b>BCC0C4J</b>	BCC M425-M415-3A-692-PX0534-003	82
<b>BCC0C4K</b>	BCC M425-M414-3A-691-PW3434-003	135
<b>BCC0C4L</b>	BCC M425-M414-3A-691-PW3434-010	135
<b>BCC0C4M</b>	BCC M425-M414-3A-691-PW3434-015	135
<b>BCC0C4N</b>	BCC M425-M414-3A-691-PW3434-020	135
<b>BCC0C4P</b>	BCC M425-M414-3A-691-PW3434-030	135
<b>BCC0C4R</b>	BCC M425-M414-3A-691-PW3434-050	135
<b>BCC0C4T</b>	BCC M425-M415-3A-692-PW3534-003	135
<b>BCC0C4U</b>	BCC M425-M415-3A-692-PW3534-006	135
<b>BCC0C4W</b>	BCC M425-M415-3A-692-PW3534-010	135
<b>BCC0C4Y</b>	BCC M425-M415-3A-692-PW3534-015	135
<b>BCC0C4Z</b>	BCC M425-M415-3A-692-PW3534-020	135
<b>BCC0C50</b>	BCC M425-M415-3A-692-PW3534-030	135
<b>BCC0C51</b>	BCC M425-M415-3A-692-PW3534-050	135
<b>BCC0C52</b>	BCC M425-M414-3A-691-PW3434-006	135
<b>BCC0C6A</b>	BCC M314-M313-30-300-PX0334-030	34
<b>BCC0C6C</b>	BCC M314-M313-30-300-PX0334-050	34
<b>BCC0C6E</b>	BCC M415-0000-1B-R01	174
<b>BCC0C76</b>	BCC M415-0000-2A-017-PX0534-020	61
<b>BCC0C77</b>	BCC M415-0000-2A-017-PX0534-050	61
<b>BCC0C78</b>	BCC M415-0000-2A-017-PX0534-100	61
<b>BCC0C7A</b>	BCC M414-M415-M415-U2032-003	136
<b>BCC0C7C</b>	BCC M414-M415-M415-U2032-006	136
<b>BCC0C7E</b>	BCC M414-M415-M415-U2032-010	136
<b>BCC0C7T</b>	BCC M425-0000-1A-100-PW3534-050	134
<b>BCC0C7U</b>	BCC M425-0000-1A-100-PW3534-020	134
<b>BCC0C7R</b>	BCC M425-0000-1A-100-PW3534-100	134

Ordering code	Part number	Page
<b>BCC0C7W</b>	BCC M415-0000-1A-003-PW3434-100	132
<b>BCC0C9N</b>	BCC M414-M425-M425-U2034-030	98
<b>BCC0C9P</b>	BCC M414-M425-M425-U2034-020	98
<b>BCC0C9R</b>	BCC M414-M425-M425-U2034-010	98
<b>BCC0C9T</b>	BCC M414-M425-M425-U2034-006	98
<b>BCC0C9U</b>	BCC M414-M425-M425-U2034-003	98
<b>BCC0CA2</b>	BCC M414-M425-M425-U2035-003	136
<b>BCC0CA3</b>	BCC M414-M425-M425-U2035-006	136
<b>BCC0CA4</b>	BCC M414-M425-M425-U2035-010	136
<b>BCC0CA5</b>	BCC M414-M425-M425-U2035-020	136
<b>BCC0CA6</b>	BCC M414-M425-M425-U2035-030	136
<b>BCC0CAA</b>	BCC S445-0000-1A-000-51X475-000-C024	93
<b>BCC0CAE</b>	BCC M455-0000-1A-RM020-020	94
<b>BCC0CAH</b>	BCC M314-M313-30-300-PX0334-003	34
<b>BCC0CAP</b>	BCC M313-0000-10-001-PW0334-100	125
<b>BCC0CLZ</b>	BCC M414-M414-6D-366-EX64N9-020	196
<b>BCC0CM1</b>	BCC M414-M414-6D-366-EX64N9-050	196
<b>BCC0CM3</b>	BCC M414-M414-6D-366-EX64N9-100	196
<b>BCC0CNP</b>	BCC M414-E834-8G-695-EX64N9-050	197
<b>BCC0CNR</b>	BCC M414-E834-8G-695-EX64N9-100	197
<b>BCC0CNT</b>	BCC M414-E834-8G-695-EX64N9-150	197
<b>BCC0CNU</b>	BCC E834-E834-90-367-EX64N9-150	197
<b>BCC0CT8</b>	BCC S425-0000-1A-008-VX0434-250	122
<b>BCC0CT9</b>	BCC S425-0000-1A-008-VX0434-200	122
<b>BCC0CTA</b>	BCC S425-0000-1A-008-VX0434-150	122
<b>BCC0CTC</b>	BCC S425-0000-1A-008-VX0434-100	122
<b>BCC0CTE</b>	BCC S425-0000-1A-008-VX0434-050	122
<b>BCC0CZA</b>	BCC M414-E834-8G-672-ES64N9-006	195
<b>BCC0CZC</b>	BCC M414-E834-8G-672-ES64N9-020	195
<b>BCC0CZE</b>	BCC M414-E834-8G-672-ES64N9-050	195
<b>BCC0CZF</b>	BCC M414-E834-8G-672-ES64N9-100	195
<b>BCC0CZH</b>	BCC M414-E834-8G-672-ES64N9-150	195
<b>BCC0CZJ</b>	BCC E834-E834-90-339-ES64N9-006	195
<b>BCC0CZK</b>	BCC E834-E834-90-339-ES64N9-020	195
<b>BCC0CZL</b>	BCC E834-E834-90-339-ES64N9-050	195
<b>BCC0CZM</b>	BCC E834-E834-90-339-ES64N9-100	195
<b>BCC0CZN</b>	BCC E834-E834-90-339-ES64N9-150	195
<b>BCC0CZP</b>	BCC E834-E834-90-367-EX64N9-006	197
<b>BCC0CZR</b>	BCC E834-E834-90-367-EX64N9-020	197
<b>BCC0CZT</b>	BCC E834-E834-90-367-EX64N9-050	197
<b>BCC0CZU</b>	BCC E834-E834-90-367-EX64N9-100	197
<b>BCC0CZW</b>	BCC M415-0000-1A-030-VS85N6-020	187
<b>BCC0CZY</b>	BCC M415-0000-1A-030-VS85N6-050	187
<b>BCC0CZZ</b>	BCC M415-0000-1A-030-VS85N6-100	187
<b>BCC0E00</b>	BCC M415-0000-2A-030-VS85N6-020	187
<b>BCC0E01</b>	BCC M415-0000-2A-030-VS85N6-050	187
<b>BCC0E02</b>	BCC M415-0000-2A-030-VS85N6-100	187
<b>BCC0E03</b>	BCC M415-M415-3A-330-VS85N6-006	187
<b>BCC0E04</b>	BCC M415-M415-3A-330-VS85N6-020	187
<b>BCC0E05</b>	BCC M415-M415-3A-330-VS85N6-050	187
<b>BCC0E06</b>	BCC M415-M415-3A-330-VS85N6-100	187
<b>BCC0E07</b>	BCC M415-M415-3A-330-VS85N6-150	187
<b>BCC0E08</b>	BCC M414-M414-6D-366-EX64N9-006	196
<b>BCC0E09</b>	BCC M414-M414-6D-366-EX64N9-150	196
<b>BCC0E0A</b>	BCC M414-E834-8G-695-EX64N9-006	197
<b>BCC0E0C</b>	BCC M414-E834-8G-695-EX64N9-020	197
<b>BCC0E2Z</b>	BCC M354-0000-20-RM050-005	47
<b>BCC0E32</b>	BCC M354-0000-20-RM050-020	47
<b>BCC0E35</b>	BCC M354-0000-10-RM050-005	47
<b>BCC0E38</b>	BCC M354-0000-10-RM050-020	47
<b>BCC0E3Z</b>	BCC M455-0000-1B-RM080-002	175
<b>BCC0E40</b>	BCC M452-0000-2B-RM080-002	175
<b>BCC0E4Y</b>	BCC M353-0000-10-RM049-005	46



# Alphanumeric Index

## Sorted by ordering code

Ordering code	Part number	Page
BCC0E4Z	BCC M353-0000-10-RM049-020	46
BCC0E50	BCC M353-0000-20-RM049-005	46
BCC0E51	BCC M353-0000-20-RM049-020	46
BCC0E53	BCC M454-0000-2A-RM020-020	94
BCC0E54	BCC M455-0000-1A-RM014-020	95
BCC0E55	BCC M458-0000-1A-RM015-005	96
BCC0E56	BCC M458-0000-1A-RM015-020	96
BCC0E57	BCC M458-0000-2A-RM015-005	96
BCC0E58	BCC M458-0000-2A-RM015-020	96
BCC0E59	BCC M45C-0000-1A-RM081-005	97
BCC0E5A	BCC M45C-0000-1A-RM081-020	97
BCC0E5C	BCC M45C-0000-2A-RM081-005	97
BCC0E5E	BCC M45C-0000-2A-RM081-020	97
BCC0E5F	BCC M455-0000-2A-RM014-020	95
BCC0E7N	BCC M333-0000-20-000-31X350-000-C027	43
BCC0E9J	BCC M41C-M41C-3A-325-PX0C25-100	85
BCC0EFF	BCC W414-W415-W415-U2048-003	147
BCC0EFH	BCC W414-W415-W415-U2048-006	147
BCC0EFJ	BCC W414-W425-W425-U2048-003	147
BCC0EFK	BCC W414-W425-W425-U2048-006	147
BCC0EFY	BCC W415-0000-1A-003-SW0434-020	139
BCC0EFZ	BCC W425-0000-1A-003-SW0434-020	139
BCC0EH0	BCC W314-W414-3E-304-SW0434-003	141
BCC0EH1	BCC W314-W414-3E-304-SW0434-006	141
BCC0EH2	BCC W314-W414-3E-304-SW0434-010	141
BCC0EH3	BCC W314-W414-3E-304-SW0434-015	141
BCC0EH4	BCC W314-W414-3E-304-SW0434-020	141
BCC0EH5	BCC W314-W414-3E-304-SW0434-030	141
BCC0EH6	BCC W314-W414-3E-304-SW0434-050	141
BCC0EH7	BCC W314-W314-30-304-SW0434-003	140
BCC0EH8	BCC W314-W314-30-304-SW0434-006	140
BCC0EH9	BCC W314-W314-30-304-SW0434-010	140
BCC0EHA	BCC W314-W314-30-304-SW0434-015	140
BCC0EHC	BCC W314-W314-30-304-SW0434-020	140
BCC0EHE	BCC W314-W314-30-304-SW0434-030	140
BCC0EHF	BCC W314-W314-30-304-SW0434-050	140
BCC0EHH	BCC W414-W415-W415-U2044-003	145
BCC0EHJ	BCC W414-W415-W415-U2044-006	145
BCC0EHK	BCC W414-W425-W425-U2044-003	145
BCC0EHL	BCC W414-W425-W425-U2044-006	145
BCC0EHM	BCC W414-W415-W415-U2046-003	143
BCC0EHN	BCC W414-W415-W415-U2046-006	143
BCC0EHP	BCC W414-W425-W425-U2046-003	143
BCC0EHR	BCC W414-W425-W425-U2046-006	143
BCC0EHT	BCC W313-W413-3E-300-TW0334-003	146
BCC0EHU	BCC W313-W413-3E-300-TW0334-006	146
BCC0EHW	BCC W313-W413-3E-300-TW0334-010	146
BCC0EHY	BCC W313-W413-3E-300-BW8334-003	144
BCC0EHZ	BCC W313-W413-3E-300-BW8334-006	144
BCC0EJ0	BCC W313-W413-3E-300-BW8334-010	144
BCC0EJ1	BCC W313-W413-3E-300-FW9334-003	148
BCC0EJ2	BCC W313-W413-3E-300-FW9334-006	148
BCC0EJ3	BCC W313-W413-3E-300-FW9334-010	148
BCC0EJ4	BCC W415-W414-3A-304-TW0434-003	146
BCC0EJ5	BCC W415-W414-3A-304-TW0434-006	146
BCC0EJ6	BCC W415-W414-3A-304-TW0434-010	146
BCC0EJ7	BCC W415-W414-3A-304-TW0434-015	146
BCC0EJ8	BCC W415-W414-3A-304-TW0434-020	146
BCC0EJ9	BCC W415-W414-3A-304-TW0434-050	146
BCC0EJA	BCC W415-W414-3A-304-BW8434-003	144
BCC0EJC	BCC W415-W414-3A-304-BW8434-006	144
BCC0EJE	BCC W415-W414-3A-304-BW8434-010	144
BCC0EJF	BCC W415-W414-3A-304-BW8434-015	144

Ordering code	Part number	Page
BCC0EJH	BCC W415-W414-3A-304-BW8434-020	144
BCC0EJJ	BCC W415-W414-3A-304-BW8434-050	144
BCC0EJL	BCC B324-B324-30-304-MW8434-003	153
BCC0EJM	BCC B324-B324-30-304-MW8434-006	153
BCC0EJN	BCC B324-B324-30-304-MW8434-010	153
BCC0EJP	BCC B324-B324-30-304-MW8434-015	153
BCC0EJR	BCC B324-B324-30-304-MW8434-020	153
BCC0EJT	BCC B314-B314-30-304-MW8434-003	152
BCC0EJU	BCC B314-B314-30-304-MW8434-006	152
BCC0EJW	BCC B314-B314-30-304-MW8434-010	152
BCC0EJY	BCC B314-B314-30-304-MW8434-015	152
BCC0EJZ	BCC B314-B314-30-304-MW8434-020	152
BCC0EK0	BCC B324-B314-30-304-MW8434-003	153
BCC0EK1	BCC B324-B314-30-304-MW8434-006	153
BCC0EK2	BCC B324-B314-30-304-MW8434-010	153
BCC0EK3	BCC B324-B314-30-304-MW8434-015	153
BCC0EK4	BCC B324-B314-30-304-MW8434-020	153
BCC0EK5	BCC B314-B324-30-304-MW8434-003	152
BCC0EK6	BCC B314-B324-30-304-MW8434-006	152
BCC0EK7	BCC B314-B324-30-304-MW8434-010	152
BCC0EK8	BCC B314-B324-30-304-MW8434-015	152
BCC0EK9	BCC B314-B324-30-304-MW8434-020	152
BCC0EKA	BCC W415-W424-3A-304-MW8434-003	150
BCC0EKC	BCC W415-W424-3A-304-MW8434-006	150
BCC0EKE	BCC W415-W424-3A-304-MW8434-010	150
BCC0EKF	BCC W415-W424-3A-304-MW8434-015	150
BCC0EKH	BCC W415-W424-3A-304-MW8434-020	150
BCC0EKJ	BCC W425-W424-3A-304-MW8434-003	151
BCC0EKK	BCC W425-W424-3A-304-MW8434-006	151
BCC0EKL	BCC W425-W424-3A-304-MW8434-010	151
BCC0EKM	BCC W425-W424-3A-304-MW8434-015	151
BCC0EKN	BCC W425-W424-3A-304-MW8434-020	151
BCC0EKP	BCC W415-W414-3A-304-MW8434-003	150
BCC0EKR	BCC W415-W414-3A-304-MW8434-006	150
BCC0EKT	BCC W415-W414-3A-304-MW8434-010	150
BCC0EKU	BCC W415-W414-3A-304-MW8434-015	150
BCC0EKW	BCC W415-W414-3A-304-MW8434-020	150
BCC0EKY	BCC W425-W414-3A-304-MW8434-003	151
BCC0EKZ	BCC W425-W414-3A-304-MW8434-006	151
BCC0EL0	BCC W425-W414-3A-304-MW8434-010	151
BCC0EL1	BCC W425-W414-3A-304-MW8434-015	151
BCC0EL2	BCC W425-W414-3A-304-MW8434-020	151
BCC0EL3	BCC W414-W415-W415-U2045-003	149
BCC0EL4	BCC W414-W415-W415-U2045-006	149
BCC0EL5	BCC W414-W425-W425-U2045-003	149
BCC0EL6	BCC W414-W425-W425-U2045-006	149
BCC0EL7	BCC W425-W414-3A-304-FW9434-003	149
BCC0EL8	BCC W425-W414-3A-304-FW9434-006	149
BCC0EL9	BCC W425-W414-3A-304-FW9434-010	149
BCC0ELA	BCC W425-W414-3A-304-FW9434-015	149
BCC0ELC	BCC W425-W414-3A-304-FW9434-020	149
BCC0ELE	BCC W425-W414-3A-304-FW9434-050	149
BCC0ELM	BCC W415-W414-3A-304-FW9434-003	148
BCC0ELN	BCC W415-W414-3A-304-FW9434-006	148
BCC0ELP	BCC W415-W414-3A-304-FW9434-010	148
BCC0ELR	BCC W415-W414-3A-304-FW9434-015	148
BCC0ELT	BCC W415-W414-3A-304-FW9434-020	148
BCC0ELU	BCC W415-W414-3A-304-FW9434-050	148
BCC0ELW	BCC W415-W414-3A-304-SW0434-003	141
BCC0ELY	BCC W415-W414-3A-304-SW0434-006	141
BCC0ELZ	BCC W415-W414-3A-304-SW0434-010	141
BCC0EM0	BCC W415-W414-3A-304-SW0434-015	141
BCC0EM1	BCC W415-W414-3A-304-SW0434-020	141



# Alphanumeric index

## Sorted by ordering code

Ordering code	Part number	Page
<b>BCC0EM2</b>	BCC W425-W414-3A-304-TW0434-003	147
<b>BCC0EM3</b>	BCC W425-W414-3A-304-TW0434-006	147
<b>BCC0EM4</b>	BCC W425-W414-3A-304-TW0434-010	147
<b>BCC0EM5</b>	BCC W425-W414-3A-304-TW0434-015	147
<b>BCC0EM6</b>	BCC W425-W414-3A-304-TW0434-020	147
<b>BCC0EM7</b>	BCC W425-W414-3A-304-TW0434-050	147
<b>BCC0EM8</b>	BCC W425-W414-3A-304-BW8434-003	145
<b>BCC0EM9</b>	BCC W425-W414-3A-304-BW8434-006	145
<b>BCC0EMA</b>	BCC W425-W414-3A-304-BW8434-010	145
<b>BCC0EMC</b>	BCC W425-W414-3A-304-BW8434-015	145
<b>BCC0EME</b>	BCC W425-W414-3A-304-BW8434-020	145
<b>BCC0EMF</b>	BCC W425-W414-3A-304-BW8434-050	145
<b>BCC0EMH</b>	BCC W313-W413-3E-300-SW0334-003	140
<b>BCC0EMJ</b>	BCC W313-W413-3E-300-SW0334-006	140
<b>BCC0EMK</b>	BCC W313-W413-3E-300-SW0334-010	140
<b>BCC0EU7</b>	BCC W425-W414-3A-304-SW0434-003	141
<b>BCC0EU8</b>	BCC W425-W414-3A-304-SW0434-006	141
<b>BCC0EU9</b>	BCC W425-W414-3A-304-SW0434-010	141
<b>BCC0EUA</b>	BCC W425-W414-3A-304-SW0434-015	141
<b>BCC0EUC</b>	BCC W425-W414-3A-304-SW0434-020	141
<b>BCC0EUU</b>	BCC W415-W414-3A-304-SW0434-030	141
<b>BCC0EUW</b>	BCC W415-W414-3A-304-SW0434-050	141
<b>BCC0EUY</b>	BCC W415-0000-1A-003-SW0434-030	139
<b>BCC0EUZ</b>	BCC W415-0000-1A-003-SW0434-050	139
<b>BCC0EW0</b>	BCC W425-0000-1A-003-SW0434-030	139
<b>BCC0EW1</b>	BCC W425-0000-1A-003-SW0434-050	139
<b>BCC0EW3</b>	BCC W414-W313-W313-U2049-003	143
<b>BCC0EW4</b>	BCC W414-W313-W313-U2049-006	143
<b>BCC0EW5</b>	BCC W414-W323-W323-U2049-003	143
<b>BCC0EW6</b>	BCC W414-W323-W323-U2049-006	143
<b>BCC0EW7</b>	BCC W314-W313-W313-U2050-003	142
<b>BCC0EW8</b>	BCC W314-W313-W313-U2050-006	142
<b>BCC0EW9</b>	BCC W314-W323-W323-U2050-003	142
<b>BCC0EWA</b>	BCC W314-W323-W323-U2050-006	142
<b>BCC08JA</b>	BCC M415-0000-2A-034-PX0534-100	61

BFO		
<b>BFB00C8</b>	BFO D25 LA-HD-EAK-465-02	321
<b>BF00002</b>	BFO D22-LA-TB-EAK-10-02	317
<b>BF00003</b>	BFO D22-XA-DB-EAK-20-01	325
<b>BF00004</b>	BFO D22-XA-SB-EAK-20-02	325
<b>BF00005</b>	BFO D22-XA-UB-EAK-20-02	326
<b>BF00006</b>	BFO D22-XB-UB-EAK-15-02	326
<b>BF00007</b>	BFO D22-XBF-LB-EAK-15-02	325
<b>BF0000C</b>	BFO N22-LA-FB-EAK-05-01	318
<b>BF0000E</b>	BFO D22-LAH-ZB-EAK-10-02	322
<b>BF0000F</b>	BFO 18A-LAA-MZG-20-0,5	337
<b>BF0000H</b>	BFO 18A-LAA-MZG-20-1	337
<b>BF0000M</b>	BFO 18A-LAA-UZG-20-0,5	337
<b>BF0000N</b>	BFO 18A-LAA-UZG-20-1	337
<b>BF0000O</b>	BFO 18A-LCC-SMG-20-0,5	337
<b>BF0000W</b>	BFO 18A-LCC-SMG-10-1	337
<b>BF0000Z</b>	BFO 18A-LCC-UZG-20-1	337
<b>BF00013</b>	BFO 18A-LEE-MZG-20-0,5	337
<b>BF00014</b>	BFO 18A-LEE-MZG-20-1	337
<b>BF00019</b>	BFO 18A-LEE-SMG-20-0,5	337
<b>BF0001A</b>	BFO 18A-LEE-SMG-20-1	337
<b>BF0001F</b>	BFO 18A-LEE-UZG-20-0,5	337
<b>BF0001H</b>	BFO 18A-LEE-UZG-20-1	337
<b>BF0001P</b>	BFO 18A-LFF-MZG-10-0,5	336
<b>BF0001R</b>	BFO 18A-LFF-MZG-10-1	336
<b>BF0001U</b>	BFO 18A-LFF-SMG-10-0,5	336
<b>BF0001W</b>	BFO 18A-LFF-SMG-10-1	336

Ordering code	Part number	Page
<b>BF0001Z</b>	BFO 18A-LGG-MZG-10-0,5	336
<b>BF00020</b>	BFO 18A-LGG-MZG-10-1	336
<b>BF00023</b>	BFO 18A-LGG-SMG-10-0,5	336
<b>BF00024</b>	BFO 18A-LGG-SMG-10-1	336
<b>BF00026</b>	BFO 18A-XAA-MZG-30-0,5	339
<b>BF00027</b>	BFO 18A-XAA-MZG-30-1	339
<b>BF0002F</b>	BFO 18A-XAA-SMG-30-0,5	339
<b>BF0002H</b>	BFO 18A-XAA-SMG-30-1	339
<b>BF0002M</b>	BFO 18A-XAA-UZG-30-0,5	339
<b>BF0002N</b>	BFO 18A-XAA-UZG-30-1	339
<b>BF0002U</b>	BFO 18A-XAC-SMG-30-0,5	339
<b>BF0002W</b>	BFO 18A-XAC-SMG-30-1	339
<b>BF00031</b>	BFO 18A-XAE-MZG-30-0,5	339
<b>BF00032</b>	BFO 18A-XAE-MZG-30-1	339
<b>BF00037</b>	BFO 18A-XAE-SMG-30-0,5	339
<b>BF00038</b>	BFO 18A-XAE-SMG-30-1	339
<b>BF0003C</b>	BFO 18A-XAE-UZG-30-0,5	339
<b>BF0003E</b>	BFO 18A-XAE-UZG-30-1	339
<b>BF0003H</b>	BFO 18A-XAF-MZG-15-0,5	338
<b>BF0003J</b>	BFO 18A-XAF-MZG-15-1	338
<b>BF0003M</b>	BFO 18A-XAF-SMG-15-0,5	338
<b>BF0003N</b>	BFO 18A-XAF-SMG-15-1	338
<b>BF0003R</b>	BFO 18A-XAG-MZG-15-0,5	338
<b>BF0003T</b>	BFO 18A-XAG-MZG-15-1	338
<b>BF0003Y</b>	BFO 18V-LCC-MZG-23-0,5	337
<b>BF0003Z</b>	BFO 18V-LCC-MZG-23-0,75	337
<b>BF00042</b>	BFO 18V-LCC-SMG-23-0,5	337
<b>BF00047</b>	BFO 18V-LDD-MZG-23-0,75	337
<b>BF0004C</b>	BFO 18V-LDD-SMG-23-0,5	337
<b>BF0004F</b>	BFO 18V-LDD-SMG-23-1	337
<b>BF0004M</b>	BFO 18V-XAC-MZG-30-0,5	339
<b>BF0004P</b>	BFO 18V-XAC-SMG-30-0,5	339
<b>BF0004R</b>	BFO 18V-XAC-SMG-30-1	339
<b>BF0004U</b>	BFO 18V-XAD-MZG-30-0,5	339
<b>BF0004Y</b>	BFO 18V-XAD-SMG-30-0,5	339
<b>BF0004Z</b>	BFO 18V-XAD-SMG-30-1	339
<b>BF00051</b>	BFO D10-LA-CB-EAK-05-02	319
<b>BF00052</b>	BFO D10-XA-GB-EAK-10-02	328
<b>BF00053</b>	BFO D10-XA-HB-EAK-10-02	327
<b>BF00054</b>	BFO D10-XA-RB-EAK-10-02	327
<b>BF00055</b>	BFO D10-XAH-KB-EAK-10-02	326
<b>BF00056</b>	BFO D13-LA-QB-EAK-05-02	319
<b>BF00057</b>	BFO D13-LA-WB-EAK-05-02	319
<b>BF00058</b>	BFO D13-LG-05-EAK-30-02	322
<b>BF00059</b>	BFO D13-LG-10-EAK-30-02	322
<b>BF0005A</b>	BFO D13-XA-JB-EAK-20-02	328
<b>BF0005C</b>	BFO D13-XB-KB-EAK-10-02	327
<b>BF0005E</b>	BFO D13-XB-RB-EAK-10-02	327
<b>BF0005F</b>	BFO D22-LA-AC-20	331
<b>BF0005H</b>	BFO D22-LA-AD-EAK-52-02	320
<b>BF0005J</b>	BFO D22-LA-BC-10	331
<b>BF0005K</b>	BFO D22-LA-BD-EAK-52-02	320
<b>BF0005L</b>	BFO D22-LA-CC-30	331
<b>BF0005M</b>	BFO D22-LA-KB-EAK-10-02	316
<b>BF0005N</b>	BFO D22-LA-NB-PZK-10-02	317
<b>BF0005P</b>	BFO D22-LA-QB-PAK-05-02	319
<b>BF0005R</b>	BFO D22-LA-RB-EAK-10-02	318
<b>BF0005T</b>	BFO D22-LAH-KB-EAK-10-02	316
<b>BF0005U</b>	BFO D22-LAP-KB-EAK-15-02	317
<b>BF0005W</b>	BFO D22-LAT-KB-EAK-10-02	316
<b>BF0005Y</b>	BFO D22-LD-EAK-10-20	331
<b>BF0005Z</b>	BFO D22-XA-CD-EAK-110-02	329
<b>BF00060</b>	BFO D22-XA-ED-EAK-250-02	329

# Alphanumeric Index

## Sorted by ordering code

Ordering code	Part number	Page
<b>BF00061</b>	BFO D22-XA-LB-EAK-20-02	324
<b>BF00062</b>	BFO D22-XA-MB-PAK-10-02	328
<b>BF00063</b>	BFO D22-XAH-LB-EAK-20-02	324
<b>BF00064</b>	BFO D22-XAP-LB-EAK-30-02	325
<b>BF00065</b>	BFO D22-XAT-LB-EAK-20-02	324
<b>BF00066</b>	BFO D22-XB-LB-EAK-15-02	325
<b>BF00067</b>	BFO D25-LA-CD-EAK-110-02	321
<b>BF00068</b>	BFO D25-LA-ED-EAK-250-02	321
<b>BF000AP</b>	BFO D22-LA-GD-EAK-52-02	320
<b>BF000AR</b>	BFO D13-XV-AK-EAK-50-02	329
<b>BF000AT</b>	BFO D13-XB-AB-EAK-10-01	329
<b>BF000AW</b>	BFO D22-LAH-BK-EAK-10-02	317
<b>BF000AY</b>	BFO D22-LAT-YB-EAK-10-0,5	318
<b>BF000C3</b>	BFO D10-XA-VB-EAK-10-02	327
<b>BF000C4</b>	BFO D22-XB-LB-EAK-15-SA1-02	330
<b>BF000C5</b>	BFO D25-LA-ED-EAK-250-0,5	321
<b>BF000C6</b>	BFO D10-LAH-CK-EAK-05-02	323
<b>BF000C7</b>	BFO D10-LAH-DK-EAK-05-02	323
<b>BF000C9</b>	BFO D22-XB-UB-EAK-15-SA1-02	330
<b>BF000CA</b>	BFO D22-XA-EK-PAK-10-02	329
<b>BF000FN</b>	BFO D22-XB-LB-EAK-15-SA1-05	330
<b>BF000FP</b>	BFO D22-XB-LB-EAK-15-SA1-01	330

BML		
<b>BML001K</b>	BML-A013-T_ _ _ _	391

BPI		
<b>BPI002N</b>	BPI 4M303P-2K-00-KPX60-030	214
<b>BPI002P</b>	BPI 4M303P-2K-00-KPX60-050	214
<b>BPI002R</b>	BPI 4M303P-2K-00-KPX60-100	214
<b>BPI002T</b>	BPI 4M303P-2K-00-KPX60-150	214
<b>BPI0030</b>	BPI 8M303P-2K-00-KPXA0-030	214
<b>BPI0031</b>	BPI 8M303P-2K-00-KPXA0-050	214
<b>BPI0032</b>	BPI 8M303P-2K-00-KPXA0-100	214
<b>BPI0033</b>	BPI 8M303P-2K-00-KPXA0-150	214
<b>BPI0038</b>	BPI 4M304P-2K-00-KPXA0-030	215
<b>BPI0039</b>	BPI 4M304P-2K-00-KPXA0-050	215
<b>BPI003A</b>	BPI 4M304P-2K-00-KPXA0-100	215
<b>BPI003C</b>	BPI 4M304P-2K-00-KPXA0-150	215
<b>BPI003K</b>	BPI 8M304P-2K-00-KPXK0-030	215
<b>BPI003L</b>	BPI 8M304P-2K-00-KPXK0-050	215
<b>BPI003M</b>	BPI 8M304P-2K-00-KPXK0-100	215
<b>BPI003N</b>	BPI 8M304P-2K-00-KPXK0-150	215
<b>BPI003P</b>	BPI 4M303P-2K-00-SM4	213
<b>BPI003T</b>	BPI 8M303P-2K-00-SM4CT	213
<b>BPI0049</b>	BPI 4M4A5P-2K-00-KPXB0-030	217
<b>BPI004A</b>	BPI 4M4A5P-2K-00-KPXB0-050	217
<b>BPI004C</b>	BPI 4M4A5P-2K-00-KPXB0-100	217
<b>BPI004E</b>	BPI 4M4A5P-2K-00-KPXB0-150	217
<b>BPI004R</b>	BPI 8M4A5P-2K-00-KPXLO-030	217
<b>BPI004T</b>	BPI 8M4A5P-2K-00-KPXLO-050	217
<b>BPI004U</b>	BPI 8M4A5P-2K-00-KPXLO-100	217
<b>BPI004W</b>	BPI 8M4A5P-2K-00-KPXLO-150	217
<b>BPI004Y</b>	BPI 4M4A4P-2K-00-SM6CT	218
<b>BPI004Z</b>	BPI 4M4A5P-2K-00-SM6LT	219
<b>BPI0050</b>	BPI 8M4A4P-2K-00-SM6CT	218
<b>BPI0051</b>	BPI 8M4A5P-2K-00-SM6LT	219
<b>BPI0059</b>	BPI 8M4A4P-2K-00-KPXB0-030	216
<b>BPI005A</b>	BPI 8M4A4P-2K-00-KPXB0-050	216
<b>BPI005C</b>	BPI 8M4A4P-2K-00-KPXB0-100	216
<b>BPI005E</b>	BPI 8M4A4P-2K-00-KPXB0-150	216
<b>BPI007A</b>	BPI 4M4A4P-2K-00-TP09	221
<b>BPI007C</b>	BPI 4M4A5P-2K-00-TP0G	223

Ordering code	Part number	Page
<b>BPI007E</b>	BPI 8M4A4P-2K-00-TP0E	221
<b>BPI007F</b>	BPI 8M4A5P-2K-00-TP0N	223
<b>BPI007H</b>	BPI 8M4A5P-2K-00-TPSN	222
<b>BPI007J</b>	BPI 8M4A4P-2K-00-TPSE	220
<b>BPI007K</b>	BPI 4M4A5P-2K-00-TPSG	222
<b>BPI007L</b>	BPI 4M4A4P-2K-00-TPS9	220
<b>BPI007M</b>	BPI T00G-K-00-KPXB0-030	223
<b>BPI007N</b>	BPI T00G-K-00-KPXB0-050	223
<b>BPI007P</b>	BPI T00G-K-00-KPXB0-100	223
<b>BPI007R</b>	BPI T00G-K-00-KPXB0-150	223
<b>BPI007T</b>	BPI T00N-K-00-KPXLO-030	223
<b>BPI007U</b>	BPI T00N-K-00-KPXLO-050	223
<b>BPI007W</b>	BPI T00N-K-00-KPXLO-100	223
<b>BPI007Y</b>	BPI T00N-K-00-KPXLO-150	223
<b>BPI007Z</b>	BPI T009-K-00-KPX70-030	221
<b>BPI0080</b>	BPI T009-K-00-KPX70-050	221
<b>BPI0081</b>	BPI T009-K-00-KPX70-100	221
<b>BPI0082</b>	BPI T009-K-00-KPX70-150	221
<b>BPI0083</b>	BPI T00E-K-00-KPXB0-030	221
<b>BPI0084</b>	BPI T00E-K-00-KPXB0-050	221
<b>BPI0085</b>	BPI T00E-K-00-KPXB0-100	221
<b>BPI0086</b>	BPI T00E-K-00-KPXB0-150	221

Sonstiges		
<b>FHW0003</b>	11023834	204
<b>SET011L</b>	BAV BP-PH-00064-01	365

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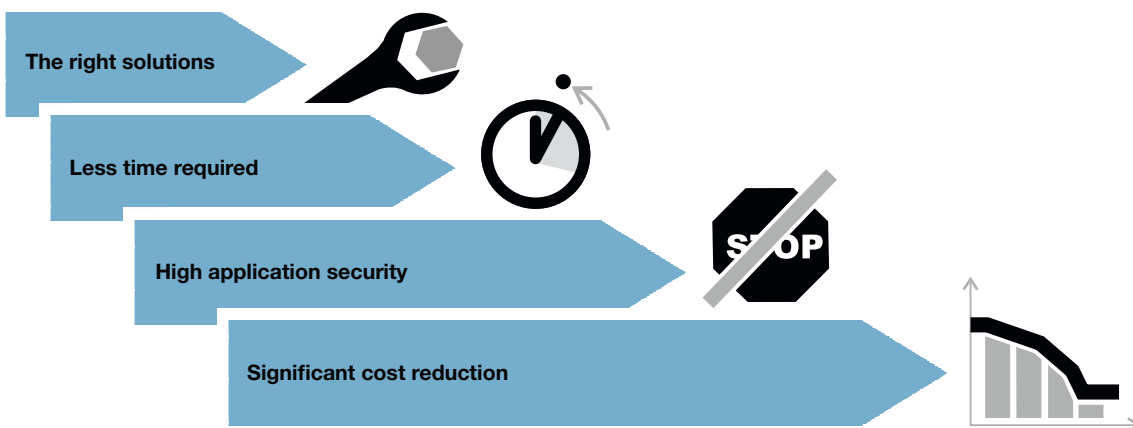
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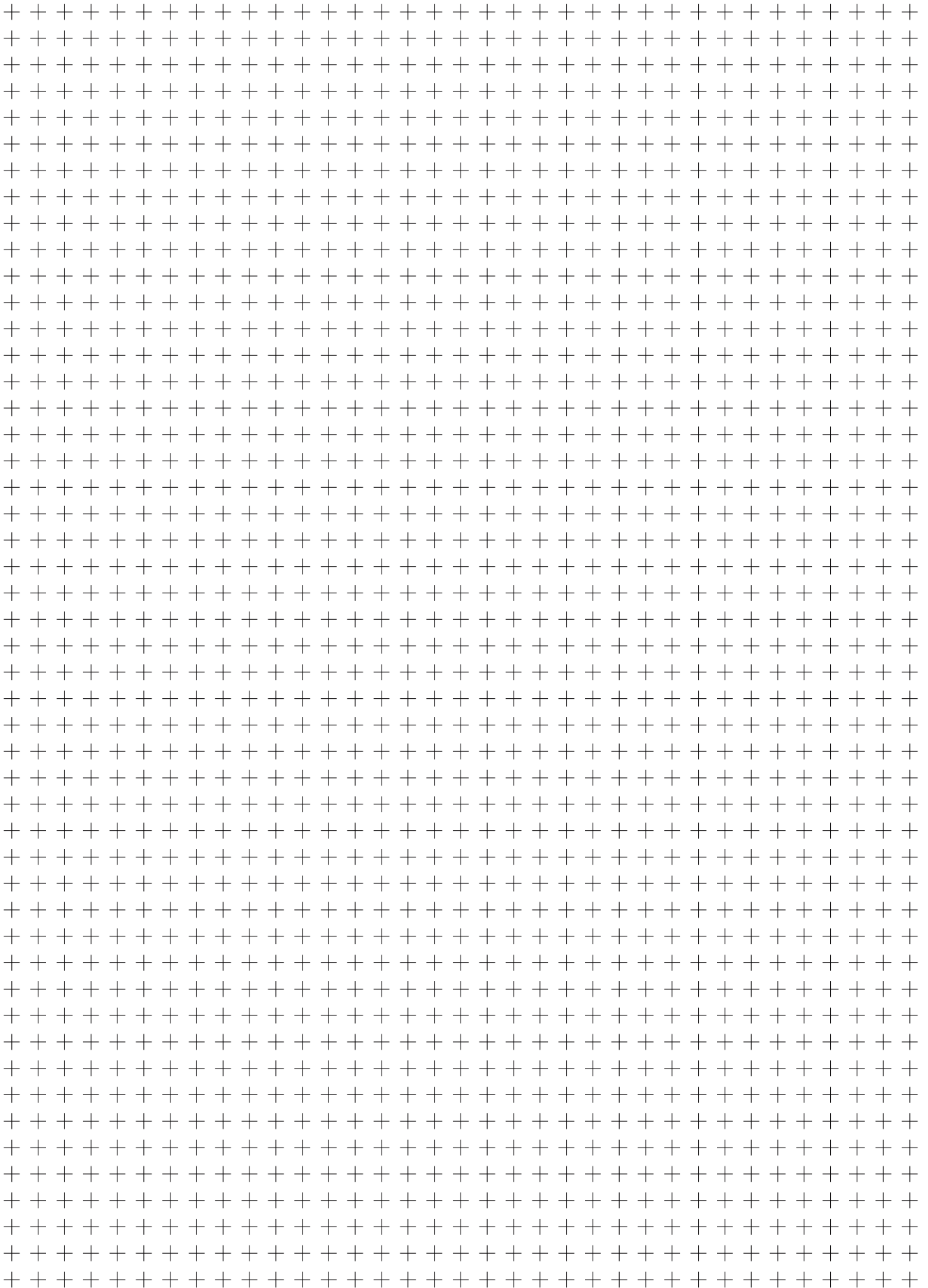
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<p><b>Application advice through our TecSupport</b> Individualized expertise for your technical requirements</p>	<p>Real-world examples:</p> <ul style="list-style-type: none"> <li>■ Selection of the correct identification procedure for an assembly line</li> <li>■ IO-Link concept as a cost-effective alternative to conventional wiring</li> <li>■ System consulting for radio frequency identification (RFID): identification of large steel pipes in adverse environments</li> <li>■ Recognizing multiple containers on a pallet in goods receiving</li> </ul>
<p><b>Commissioning</b> Order expert knowledge. And benefit from a quick start of production.</p>	<p>Real-world examples:</p> <ul style="list-style-type: none"> <li>■ Setting up an optical checkpoint with the vision sensor BVS</li> <li>■ Consulting and support during the programming of RFID systems BIS</li> <li>■ Installation and commissioning of a color detection application with the BFS color sensor</li> </ul>
<p><b>Fully customized products</b> Specific versions according to your requirements: from pre-assembly to engineering services</p>	<p>Real-world examples:</p> <ul style="list-style-type: none"> <li>■ Extending the housing of a BHS high-pressure resistant inductive sensor</li> <li>■ Extra threads for the housing cover of a BTL micropulse transducer</li> <li>■ Customer-specific holder for an RFID data carrier</li> <li>■ Adaptation of the characteristics for BAW analog sensors</li> </ul>
<p><b>Training</b> Make use of well-founded manufacturer knowledge. And benefit from application security.</p>	<ul style="list-style-type: none"> <li>■ <b>Professional sensor use:</b> Select operating principles, install sensors professionally and ensure the reliable operation of your application.</li> <li>■ <b>Position and distance measurement:</b> This is how you make precise and wear-free measurements.</li> <li>■ <b>RFID:</b> The right data at the right time at the right place.</li> <li>■ <b>Vision sensor:</b> Using an image processing sensor, ensure manufacturing quality in three steps.</li> <li>■ <b>Vision sensor identification:</b> Reliably identify data matrix codes with an image-processing sensor.</li> <li>■ <b>Industrial networking with IO-Link:</b> Manage signals intelligently and cost-effectively.</li> </ul>







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