

# AFM60A-BENB018x12

AFS/AFM60 Ethernet

**ABSOLUTE ENCODERS** 





### Ordering information

Туре	Part no.
AFM60A-BENB018x12	1059034

Other models and accessories → www.sick.com/AFS\_AFM60\_Ethernet

Illustration may differ



#### Detailed technical data

#### Performance

Number of steps per revolution (max. resolution)	262,144 (18 bit)
Number of revolutions	4,096 (12 bit)
Max. resolution (number of steps per revolution x number of revolutions)	18 bit x 12 bit (262,144 x 4,096)
Error limits G	0.03° <sup>1)</sup>
Repeatability standard deviation $\sigma_{\text{r}}$	0.002° <sup>2)</sup>

<sup>1)</sup> In accordance with DIN ISO 1319-1, position of the upper and lower error limit depends on the installation situation, specified value refers to a symmetrical position, i.e. deviation in upper and lower direction is the same.

#### Interfaces

Communication interface	PROFINET
Encoder profile	V4.1 class3
Data transmission rate (baud rate)	10 Mbit/s, 100 Mbit/s
Transmission medium	CAT-5e cable
Initialization time	6 s
Cycle time	≤1 ms
Parameterising data	Number of steps per revolution Number of revolutions PRESET Counting direction Sampling rate for speed calculation Unit for output of the speed value Round axis functionality
Available diagnostics data	Minimum and maximum temperature Maximumspeed Power-on counter Operatinghours counter power-on/motion Counter of direction changes/number of movements cw/number of movements ccw Maximum supply voltage

 $<sup>^{2)}</sup>$  In accordance with DIN ISO 55350-13; 68.3% of the measured values are inside the specified area.

#### Electrical data

Connection type	Male connector, Female connector, 1x, 2x, M12, M12, 4-pin, 4-pin, axial, axial 1) 2)	
Supply voltage	10 30 V	
Power consumption	≤ 3 W (without load)	
Reverse polarity protection	✓	
MTTFd: mean time to dangerous failure	80 years (EN ISO 13849-1) 3)	

<sup>1)</sup> A-coded.

#### Mechanical data

Mechanical design	Blind hollow shaft
Shaft diameter	12 mm
Weight	0.2 kg
Shaft material	Stainless steel
Flange material	Aluminum
Housing material	Aluminum
Start up torque	0.8 Ncm (+20 °C)
Operating torque	0.6 Ncm (+20 °C)
Permissible movement static	± 0.3 mm (radial) ± 0.5 mm (axial)
Permissible movement dynamic	± 0.05 mm (radial) ± 0.1 mm (axial)
Operating speed	≤ 6,000 min <sup>-1 1)</sup>
Moment of inertia of the rotor	40 gcm <sup>2</sup>
Bearing lifetime	3 x 10^9 revolutions
Angular acceleration	≤ 500,000 rad/s²

 $<sup>^{1)}</sup>$  Allow for self-heating of 3.3 K per 1,000 rpm when designing the operating temperature range.

#### Ambient data

EMC	According to EN 61000-6-2 and EN 61000-6-3
Enclosure rating	IP65, shaft side (IEC 60529) IP67, housing side (IEC 60529) <sup>1)</sup>
Permissible relative humidity	90 % (Condensation not permitted)
Operating temperature range	-40 °C +85 °C
Storage temperature range	-40 °C +100 °C, without package
Resistance to shocks	100 g, 6 ms (EN 60068-2-27)
Resistance to vibration	30 g, 10 Hz 2,000 Hz (EN 60068-2-6)

<sup>1)</sup> With mating connector fitted.

#### Classifications

ECLASS 5.0	27270502
ECLASS 5.1.4	27270502

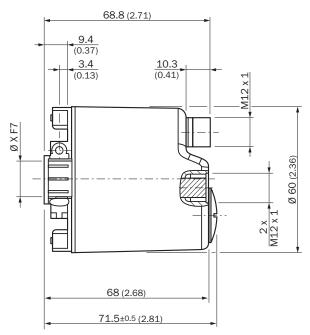
<sup>&</sup>lt;sup>2)</sup> D-coded.

<sup>3)</sup> This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of components, average ambient temperature 40°C, frequency of use 8760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.

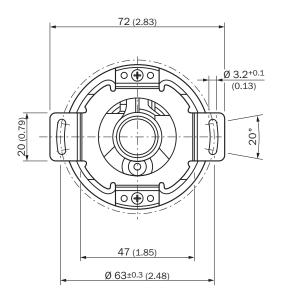
ECLASS 6.0	27270590
ECLASS 6.2	27270590
ECLASS 7.0	27270502
ECLASS 8.0	27270502
ECLASS 8.1	27270502
ECLASS 9.0	27270502
ECLASS 10.0	27270502
ECLASS 11.0	27270502
ECLASS 12.0	27270502
ETIM 5.0	EC001486
ETIM 6.0	EC001486
ETIM 7.0	EC001486
ETIM 8.0	EC001486
UNSPSC 16.0901	41112113

# Dimensional drawing (Dimensions in mm (inch))

Blind hollow shaft

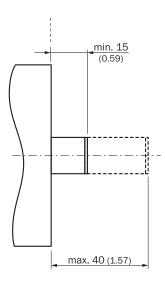


Diameter x f7 corresponds to the shaft diameter



# Attachment specifications

Blind hollow shaft



All dimensions in mm (inch)

### PIN assignment

Male connector



Supply voltage

PIN	Wire color	Signal
1	Brown	U <sub>S</sub> 10 V 30 V
2	White	Not assigned
3	Blue	GND
4	Black	Not assigned

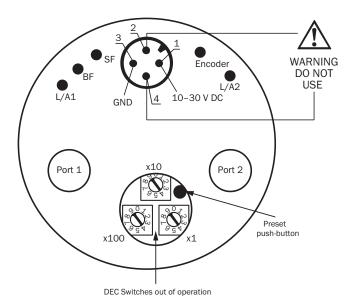
Female connector



Port 1, Port 2

PIN	Wire color	Signal
1	Yellow	T x D+
2	White	R x D+
3	Orange	T x D-
4	Blue	R x D-

### Connection diagram



#### Recommended accessories

Other models and accessories → www.sick.com/AFS\_AFM60\_Ethernet

	Brief description	Туре	Part no.			
Flanges	Flanges					
	Standard stator coupling	BEF-DS00XFX	2056812			
	One-sided stator coupling, slot, slot radius 33 mm to 211.9 mm, slot width 5.1 mm	BEF-DS03DFS/VFS	2047431			
	Stator coupling with hole circle diameter Ø72 mm	BEF-DS07XFX	2059368			
	Flange adapter, adaptation of face mount flange with 36 mm centering hub to 50 mm servo flange, aluminum, including 3 flat head screws M4 x 10, Aluminum, including 3 countersunk screws M3 x 10	BEF-FA-036-050	2029160			
8	Flange adapter, adaptation of face mount flange with 36 mm centering hub to 60 mm square mounting plate, aluminum, including 3 flat head screws M4 x 8, Aluminum, including 3 countersunk screws M4 x 8	BEF-FA-036-060REC	2029162			
	Flange adapter, adaptation of face mount flange with 36 mm centering hub to 58 mm square mounting plate with shock absorbers, aluminum, Aluminum	BEF-FA-036-060RSA	2029163			
	Flange adapter, adaptation of face mount flange with 36 mm centering hub to 63 mm square mounting plate, aluminum, including 3 flat head screws M4 x 10, Aluminum, including 3 countersunk screws M3 x 10 $$	BEF-FA-036-063REC	2034225			
	Flange adapter, adapts blind hollow shaft to REO flange, Aluminum, Including 4 fillister head screws, M3 x 6 mm $$	BEF-FA-REO1112	2048948			

	Brief description	Туре	Part no.		
Other mounting accessories					
	Plastic measuring wheel with smooth plastic surface (Hytrel), for 10 mm solid shaft, circumference 200 mm $$	BEF-MR-010020	5312988		
0	Measuring wheel with ridged plastic surface (Hytrel) for 10 mm solid shaft, circumference 200 mm	BEF-MR-010020G	5318678		
	Plastic measuring wheel with smooth plastic surface (Hytrel) for 10 mm solid shaft, circumference 500 mm $$	BEF-MR-010050	5312989		
	Aluminium measuring wheel with 0-ring (NBR70) for 6 mm solid shaft, circumference 200 mm $$	BEF-MR006020R	2055222		
	Measuring wheel with 0-ring (NBR70) for 6 mm solid shaft, circumference 300 mm	BEF-MR006030R	2055634		
	Aluminium measuring wheel with 0-ring (NBR70) for 10 mm solid shaft, circumference 200 mm $$	BEF-MR010020R	2055224		
	Aluminium measuring wheel with O-ring (NBR70) for 10 mm solid shaft, circumference 300 mm $$	BEF-MR010030R	2049278		
	Measuring wheel with 0-ring (NBR70) for 10 mm solid shaft, circumference 500 mm	BEF-MR010050R	2055227		
	O-ring for measuring wheels (circumference 200 mm)	BEF-OR-053-040	2064061		
	O-ring for measuring wheels (circumference 300 mm), 2x O-ring	BEF-OR-083-050	2064076		
	Clamping ring for metal hollow shaft $^{c_{\rm k}}$ , metal	BEF-KR-M	2064709		
Plug connect	ors and cables				
	<ul> <li>Connection type head A: Male connector, M12, 4-pin, straight, D-coded</li> <li>Connection type head B: Flying leads</li> <li>Signal type: Ethernet, PROFINET</li> <li>Cable: 2 m, 4-wire, PUR, halogen-free</li> <li>Description: Ethernet, PROFINET, shielded</li> <li>Application: Drag chain operation, Zones with oils and lubricants</li> </ul>	YM2D24- 020PN1XLEAX	2106171		
	<ul> <li>Connection type head A: Male connector, M12, 4-pin, straight, D-coded</li> <li>Connection type head B: Flying leads</li> <li>Signal type: Ethernet, PROFINET</li> <li>Cable: 5 m, 4-wire, PUR, halogen-free</li> <li>Description: Ethernet, PROFINET, shielded</li> <li>Application: Drag chain operation, Zones with oils and lubricants</li> </ul>	YM2D24- 050PN1XLEAX	2106172		
	<ul> <li>Connection type head A: Male connector, M12, 4-pin, straight, D-coded</li> <li>Connection type head B: Flying leads</li> <li>Signal type: Ethernet, PROFINET</li> <li>Cable: 10 m, 4-wire, PUR, halogen-free</li> <li>Description: Ethernet, PROFINET, shielded</li> <li>Application: Drag chain operation, Zones with oils and lubricants</li> </ul>	YM2D24- 100PN1XLEAX	2106173		
	<ul> <li>Connection type head A: Male connector, M12, 4-pin, angled, D-coded</li> <li>Connection type head B: Flying leads</li> <li>Signal type: Ethernet, PROFINET</li> <li>Cable: 5 m, 4-wire, PUR, halogen-free</li> <li>Description: Ethernet, PROFINET, shielded</li> <li>Application: Drag chain operation, Zones with oils and lubricants</li> </ul>	YN2D24- 050PN1XLEAX	2106175		
	<ul> <li>Connection type head A: Male connector, M12, 4-pin, angled, D-coded</li> <li>Connection type head B: Flying leads</li> <li>Signal type: Ethernet, PROFINET</li> <li>Cable: 25 m, 4-wire, PUR, halogen-free</li> <li>Description: Ethernet, PROFINET, shielded</li> <li>Application: Drag chain operation, Zones with oils and lubricants</li> </ul>	YN2D24- 250PN1XLEAX	2106180		

	Brief description	Туре	Part no.
(a) (a)	<ul> <li>Connection type head A: Male connector, M12, 4-pin, angled, D-coded</li> <li>Connection type head B: Male connector, M12, 4-pin, angled, D-coded</li> <li>Signal type: PROFINET</li> <li>Cable: 5 m, 4-wire, CAT5, CAT5e, PUR, halogen-free</li> <li>Description: PROFINET, shielded, Head A: male connector, M12, 4-pin, angled, D coded Head B: male connector, M12, 4-pin, angled, D coded Cable: PUR, halogen-free, shielded, 4 x 0.34 mm², Ø 6.5 mm</li> </ul>	SSL-1204-W05MZ	6050636
	<ul> <li>Connection type head A: Male connector, RJ45, 4-pin, straight</li> <li>Connection type head B: Male connector, M12, 4-pin, angled, D-coded</li> <li>Signal type: PROFINET, EtherCAT<sup>®</sup></li> <li>Cable: 30 m, 4-wire, CAT5, CAT5e, PVC</li> <li>Description: PROFINET, EtherCAT<sup>®</sup>, shielded</li> </ul>	SSL-2J04-F30MZ	6059450
	<ul> <li>Connection type head A: Male connector, M12, 4-pin, straight, D-coded</li> <li>Connection type head B: Male connector, RJ45, 4-pin, straight</li> <li>Signal type: PROFINET</li> <li>Cable: 5 m, 4-wire, CAT5, CAT5e, PVC</li> <li>Description: PROFINET, shielded, Head A: male connector, M12, 4-pin, straight, D coded Head B: male connector, RJ45, 4-pin, straight Cable: PVC, shielded, 4 x 0.34 mm², Ø 6.5 mm</li> </ul>	SSL-2J04-G05MZ60	6048245
8 8	<ul> <li>Connection type head A: Male connector, M12, 4-pin, straight, D-coded</li> <li>Connection type head B: Male connector, RJ45, 4-pin, straight</li> <li>Signal type: Ethernet, PROFINET</li> <li>Cable: 2 m, 4-wire, PUR, halogen-free</li> <li>Description: Ethernet, PROFINET, shielded</li> <li>Application: Drag chain operation, Zones with oils and lubricants</li> </ul>	YM2D24- 020PN1MRJA4	2106182
	<ul> <li>Connection type head A: Male connector, M12, 4-pin, straight, D-coded</li> <li>Connection type head B: Male connector, M12, 4-pin, angled, D-coded</li> <li>Signal type: Ethernet, PROFINET</li> <li>Cable: 2 m, 4-wire, PUR, halogen-free</li> <li>Description: Ethernet, PROFINET, shielded</li> <li>Application: Drag chain operation, Zones with oils and lubricants</li> </ul>	YM2D24- 020PN1N2D24	2106165
8	<ul> <li>Connection type head A: Male connector, M12, 4-pin, straight, D-coded</li> <li>Connection type head B: Male connector, M12, 4-pin, straight, D-coded</li> <li>Signal type: Ethernet, PROFINET</li> <li>Cable: 5 m, 4-wire, PUR, halogen-free</li> <li>Description: Ethernet, PROFINET, shielded</li> <li>Application: Drag chain operation, Zones with oils and lubricants</li> </ul>	YM2D24- 050PN1M2D24	2106160
	<ul> <li>Connection type head A: Male connector, M12, 4-pin, straight, D-coded</li> <li>Connection type head B: Male connector, M12, 4-pin, angled, D-coded</li> <li>Signal type: Ethernet, PROFINET</li> <li>Cable: 5 m, 4-wire, PUR, halogen-free</li> <li>Description: Ethernet, PROFINET, shielded</li> <li>Application: Drag chain operation, Zones with oils and lubricants</li> </ul>	YM2D24- 050PN1N2D24	2106166
8 8	<ul> <li>Connection type head A: Male connector, M12, 4-pin, straight, D-coded</li> <li>Connection type head B: Male connector, M12, 4-pin, straight, D-coded</li> <li>Signal type: Ethernet, PROFINET</li> <li>Cable: 10 m, 4-wire, PUR, halogen-free</li> <li>Description: Ethernet, PROFINET, shielded</li> <li>Application: Drag chain operation, Zones with oils and lubricants</li> </ul>	YM2D24- 100PN1M2D24	2106161
4 8	<ul> <li>Connection type head A: Male connector, M12, 4-pin, straight, D-coded</li> <li>Connection type head B: Male connector, RJ45, 4-pin, straight</li> <li>Signal type: Ethernet, PROFINET</li> <li>Cable: 10 m, 4-wire, PUR, halogen-free</li> <li>Description: Ethernet, PROFINET, shielded</li> <li>Application: Drag chain operation, Zones with oils and lubricants</li> </ul>	YM2D24- 100PN1MRJA4	2106185
6.0	<ul> <li>Connection type head A: Male connector, M12, 4-pin, straight, D-coded</li> <li>Connection type head B: Male connector, M12, 4-pin, angled, D-coded</li> <li>Signal type: Ethernet, PROFINET</li> <li>Cable: 10 m, 4-wire, PUR, halogen-free</li> <li>Description: Ethernet, PROFINET, shielded</li> <li>Application: Drag chain operation, Zones with oils and lubricants</li> </ul>	YM2D24- 100PN1N2D24	2106167

	Brief description	Туре	Part no.
96	<ul> <li>Connection type head A: Male connector, M12, 4-pin, angled, D-coded</li> <li>Connection type head B: Male connector, RJ45, 4-pin, straight</li> <li>Signal type: Ethernet, PROFINET</li> <li>Cable: 2 m, 4-wire, PUR, halogen-free</li> <li>Description: Ethernet, PROFINET, shielded</li> <li>Application: Drag chain operation, Zones with oils and lubricants</li> </ul>	YN2D24- 020PN1MRJA4	2106162
	<ul> <li>Connection type head A: Male connector, M12, 4-pin, angled, D-coded</li> <li>Connection type head B: Male connector, M12, 4-pin, angled, D-coded</li> <li>Signal type: Ethernet, PROFINET</li> <li>Cable: 2 m, 4-wire, PUR, halogen-free</li> <li>Description: Ethernet, PROFINET, shielded</li> <li>Application: Drag chain operation, Zones with oils and lubricants</li> </ul>	YN2D24- 020PN1N2D24	2106168
	<ul> <li>Connection type head A: Male connector, M12, 4-pin, angled, D-coded</li> <li>Connection type head B: Male connector, RJ45, 4-pin, straight</li> <li>Signal type: Ethernet, PROFINET</li> <li>Cable: 5 m, 4-wire, PUR, halogen-free</li> <li>Description: Ethernet, PROFINET, shielded</li> <li>Application: Drag chain operation, Zones with oils and lubricants</li> </ul>	YN2D24- 050PN1MRJA4	2106163
	<ul> <li>Connection type head A: Male connector, M12, 4-pin, angled, D-coded</li> <li>Connection type head B: Male connector, RJ45, 4-pin, straight</li> <li>Signal type: Ethernet, PROFINET</li> <li>Cable: 10 m, 4-wire, PUR, halogen-free</li> <li>Description: Ethernet, PROFINET, shielded</li> <li>Application: Drag chain operation, Zones with oils and lubricants</li> </ul>	YN2D24- 100PN1MRJA4	2106164
	<ul> <li>Connection type head A: Male connector, M12, 4-pin, angled, D-coded</li> <li>Connection type head B: Male connector, M12, 4-pin, angled, D-coded</li> <li>Signal type: Ethernet, PROFINET</li> <li>Cable: 10 m, 4-wire, PUR, halogen-free</li> <li>Description: Ethernet, PROFINET, shielded</li> <li>Application: Drag chain operation, Zones with oils and lubricants</li> </ul>	YN2D24- 100PN1N2D24	2106170
Others			
	Connection type head A: Female connector, M12, 4-pin, angled, A-coded     Description: Unshielded, Head A: female connector, M12, 4-pin, angled, unshielded, for power supply, for cable diameter 3 mm 6.5 mm Head B: -     Connection systems: Screw-type terminals     Permitted cross-section: ≤ 0.75 mm²	DOS-1204-W	6007303
00	<ul> <li>Connection type head A: Female connector, M12, 4-pin, D-coded</li> <li>Connection type head B: Female connector, RJ45, 8-pin</li> <li>Signal type: Ethernet</li> <li>Cable: CAT5, CAT5e</li> <li>Description: Ethernet, shielded</li> <li>Note: Cabinet through</li> </ul>	Feedthrough fe- male connector Ethernet RJ45	6048180
186	<ul> <li>Connection type head A: Male connector, M12, 4-pin, angled, D-coded</li> <li>Connection type head B: Male connector, RJ45, 8-pin, straight</li> <li>Signal type: Ethernet</li> <li>Cable: 20 m, 4-wire, CAT5, CAT5e, PUR, halogen-free</li> <li>Description: Ethernet, shielded, Head A: male connector, M12, 4-pin, angled, D coded Head B: male connector, RJ45, 8-pin, straight Cable: PUR, halogen-free, shielded, 2 x 2 x 0.14 mm², Ø 6.4 mm</li> </ul>	SSL-2J04-H20ME	6063701
	<ul> <li>Connection type head A: Male connector, M12, 4-pin, angled, D-coded</li> <li>Signal type: PROFINET</li> <li>Cable: CAT5, CAT5e</li> <li>Description: PROFINET, shielded, Head A: male connector, M12, 4-pin, angled, D coded, shielded, for cable diameter 4 mm 8 mm</li> <li>Connection systems: IDC quick connection</li> <li>Permitted cross-section: 0.14 mm² 0.34 mm²</li> </ul>	STE-1204-WZ	6048262

	Brief description	Туре	Part no.
1	<ul> <li>Connection type head A: Female connector, M12, 4-pin, straight, A-coded</li> <li>Connection type head B: Flying leads</li> <li>Signal type: Sensor/actuator cable</li> <li>Cable: 2 m, 4-wire, PUR, halogen-free</li> <li>Description: Sensor/actuator cable, unshielded</li> <li>Application: Zones with oils and lubricants, Drag chain operation, Robot</li> </ul>	YF2A14- 020UB3XLEAX	2095607
	<ul> <li>Connection type head A: Female connector, M12, 4-pin, straight, A-coded</li> <li>Connection type head B: Flying leads</li> <li>Signal type: Sensor/actuator cable</li> <li>Cable: 5 m, 4-wire, PUR, halogen-free</li> <li>Description: Sensor/actuator cable, unshielded</li> <li>Application: Zones with oils and lubricants, Drag chain operation, Robot</li> </ul>	YF2A14- 050UB3XLEAX	2095608
	<ul> <li>Connection type head A: Female connector, M12, 4-pin, straight, A-coded</li> <li>Connection type head B: Flying leads</li> <li>Signal type: Sensor/actuator cable</li> <li>Cable: 10 m, 4-wire, PUR, halogen-free</li> <li>Description: Sensor/actuator cable, unshielded</li> <li>Application: Zones with oils and lubricants, Drag chain operation, Robot</li> </ul>	YF2A14- 100UB3XLEAX	2095609
	<ul> <li>Connection type head A: Female connector, M12, 4-pin, straight, A-coded</li> <li>Connection type head B: Flying leads</li> <li>Signal type: Sensor/actuator cable</li> <li>Cable: 25 m, 4-wire, PUR, halogen-free</li> <li>Description: Sensor/actuator cable, unshielded</li> <li>Application: Zones with oils and lubricants, Drag chain operation, Robot</li> </ul>	YF2A14- 250UB3XLEAX	2095615
	<ul> <li>Connection type head A: Female connector, M12, 4-pin, angled, A-coded</li> <li>Connection type head B: Flying leads</li> <li>Signal type: Sensor/actuator cable</li> <li>Cable: 2 m, 4-wire, PUR, halogen-free</li> <li>Description: Sensor/actuator cable, unshielded</li> <li>Application: Zones with oils and lubricants, Drag chain operation, Robot</li> </ul>	YG2A14- 020UB3XLEAX	2095766
	<ul> <li>Connection type head A: Female connector, M12, 4-pin, angled, A-coded</li> <li>Connection type head B: Flying leads</li> <li>Signal type: Sensor/actuator cable</li> <li>Cable: 5 m, 4-wire, PUR, halogen-free</li> <li>Description: Sensor/actuator cable, unshielded</li> <li>Application: Zones with oils and lubricants, Drag chain operation, Robot</li> </ul>	YG2A14- 050UB3XLEAX	2095767
	<ul> <li>Connection type head A: Female connector, M12, 4-pin, angled, A-coded</li> <li>Connection type head B: Flying leads</li> <li>Signal type: Sensor/actuator cable</li> <li>Cable: 10 m, 4-wire, PUR, halogen-free</li> <li>Description: Sensor/actuator cable, unshielded</li> <li>Application: Zones with oils and lubricants, Drag chain operation, Robot</li> </ul>	YG2A14- 100UB3XLEAX	2095768
3	<ul> <li>Connection type head A: Female connector, M12, 4-pin, angled, A-coded</li> <li>Connection type head B: Flying leads</li> <li>Signal type: Sensor/actuator cable</li> <li>Cable: 25 m, 4-wire, PUR, halogen-free</li> <li>Description: Sensor/actuator cable, unshielded</li> <li>Application: Zones with oils and lubricants, Drag chain operation, Robot</li> </ul>	YG2A14- 250UB3XLEAX	2095771

# SICK AT A GLANCE

SICK is one of the leading manufacturers of intelligent sensors and sensor solutions for industrial applications. A unique range of products and services creates the perfect basis for controlling processes securely and efficiently, protecting individuals from accidents and preventing damage to the environment.

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