Safety

Архангельск (8182)63-90-72
Астана (7172)727-132
Астрахань (8512)99-46-04
Барнаул (3852)73-04-60
Белгород (4722)40-23-64
Брянск (4832)59-03-52
Владивосток (423)249-28-31
Волгоград (844)278-03-48
Вологда (8172)26-41-59
Воронеж (473)204-51-73
Екатеринбург (343)384-55-89
Иваново (4932)77-34-06
Ижевск (3412)26-03-58
Иркутск (395)279-98-46
Казань (843)206-01-48
Калининград (4012)72-03-81
Калуга (4842)92-23-67
Кемерово (3842)65-04-62
Киров (8332)68-02-04
Краснодар (861)203-40-90
Красноярск (391)204-63-61
Курск (4712)77-13-04
Липецк (4742)52-20-81
Магнитогорск (3519)55-03-13
Москва (495)268-04-70
Мурманск (8152)59-64-93
Набережные Челны (8552)20-53-41
Нижний Новгород (831)429-08-12
Новокузнецк (3843)20-46-81
Новосибирск (383)227-86-73
Омск (3812)21-46-40
Орел (4862)44-53-42
Оренбург (3532)37-68-04
Пенза (8412)22-31-16
Пермь (342)205-81-47
Ростов-на-Дону (863)308-18-15
Рязань (4912)46-61-64
Самара (846)206-03-16
Санкт-Петербург (812)309-46-40
Саратов (845)249-38-78
Севастополь (8692)22-31-93
Симферополь (3652)67-13-56
Смоленск (4812)29-41-54
Сочи (862)225-72-31
Ставрополь (8652)20-65-13
Сургут (3462)77-98-35
Тверь (4822)63-31-35
Томск (3822)98-41-53
Тула (4872)74-02-29
Тюмень (3452)66-21-18
Ульяновск (8422)24-23-59
Уфа (347)229-48-12
Хабаровск (4212)92-98-04
Челябинск (351)202-03-61
Череповец (8202)49-02-64
Ярославль (4852)69-52-93

Киргизия (996)312-96-26-47
Россия (495)268-04-70
Казахстан (772)734-952-31

balluff.nt-rt.ru || bfd@nt-rt.ru

Safely transport signals

SAFE I/O MODULES

The safe I/O modules from Balluff combine safety and automation technology using IO-Link. They provide both sensor and actuator signals as well as safety-relevant information. The best part: all you need for the safety concept in your plant is an infrastructure for implementing industrial safety in your automation processes. The universal IO-Link interface makes integrating industrial safety technology easier than ever.

At Balluff the core of Safety over IO-Link is the Safety Hub with Profisafe for Profinet. Safety switches and sensors, opto-electronic protective devices or safety command devices are quick and easy to incorporate. All you need is standard M12 cables for connecting virtually any safe field device.

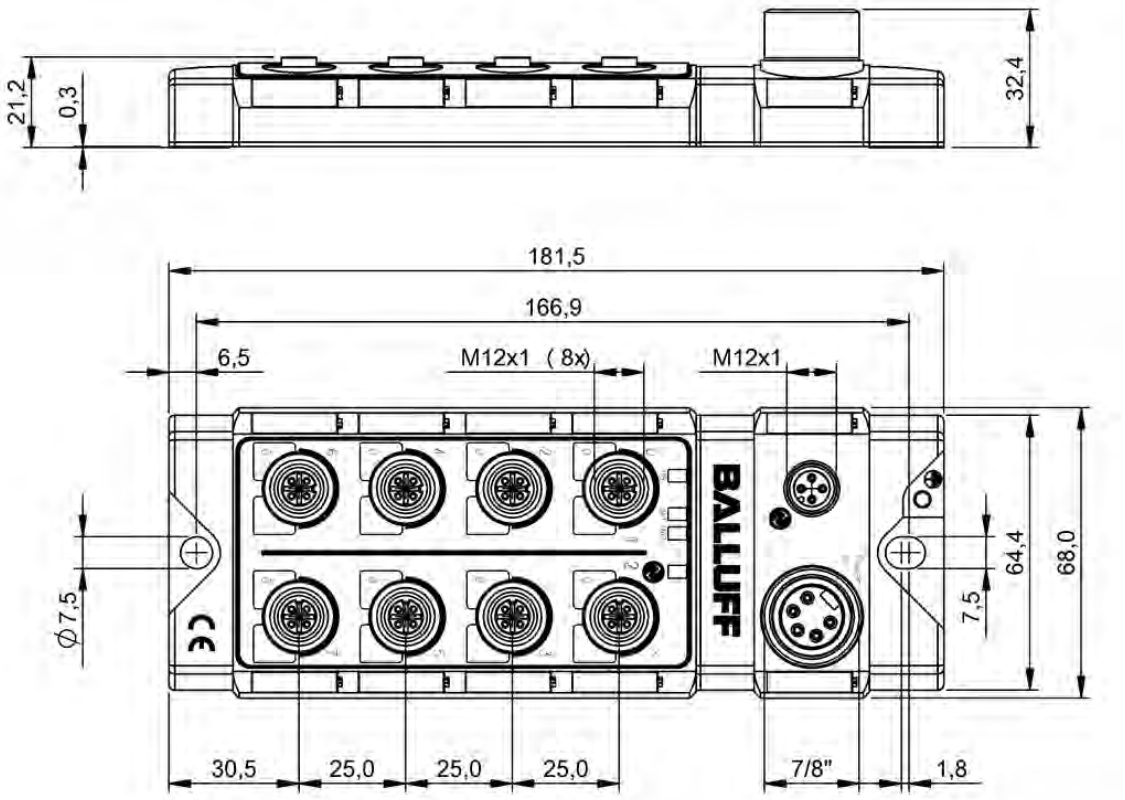
Safe communication with the controller level is via Profisafe for Profinet. Together with our safety components the result is an all-round safe system on which you can rely.

The most important benefits

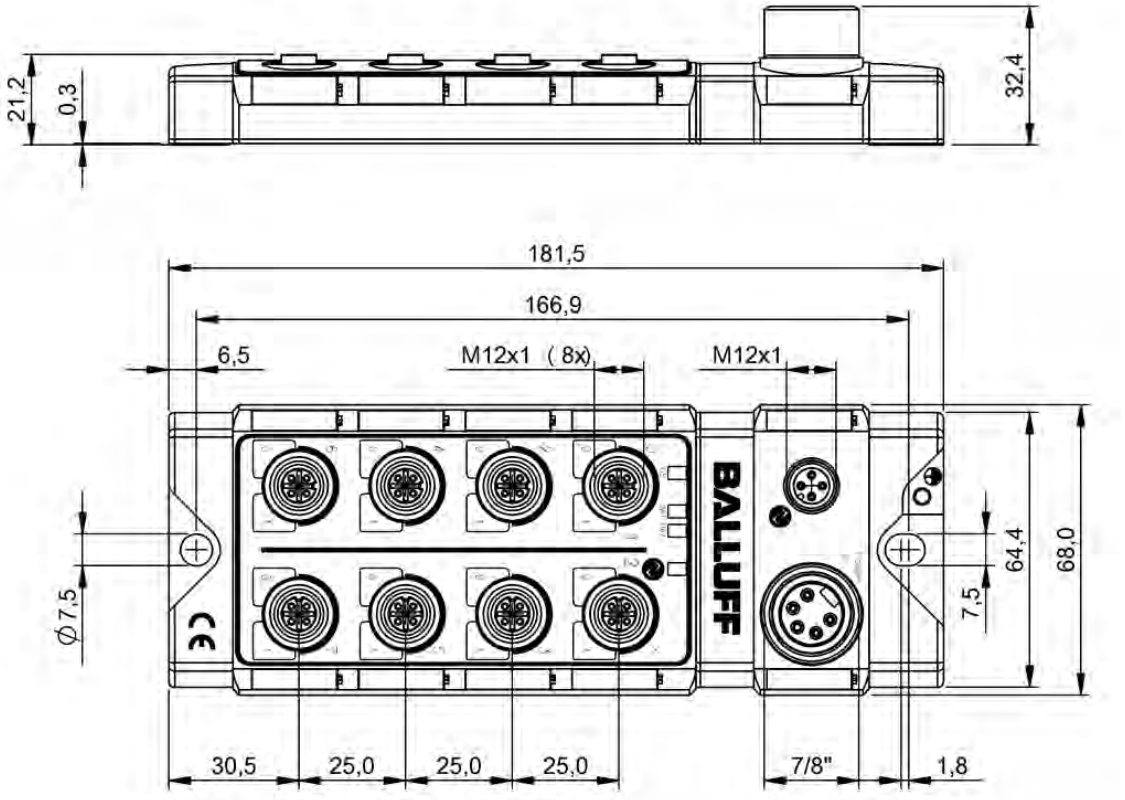
- For safety applications up to PLe/SIL3
- Reduce IP addresses
- Standardized wiring concept with M12 cables, safe interlocking devices can be directly connected
- Simple device replacement
- Nearly any safety device can be connected

	BNI0033 BNI IOL-252-000-Z013	BNI003W BNI IOL-252-S01-Z013	
Performance Level	—	—	
Safety category (EN ISO 13849-1)	—	—	
SIL (IEC 61508)	—	—	
SIL CL (EN 62061)	—	—	
Response time max.	—	—	
Approval/Conformity	CE	CE	
Current sum US, sensor	—	—	
Current sum UA, actuator	9.0 A	9.0 A	
Digital inputs	—	—	
Digital outputs	8x PNP	8x PNP	
Interface	IO-Link 1.0	IO-Link 1.0	
Connection slots	—	—	
Dimension	68 x 32.4 x 181.5 mm	68 x 32.4 x 181.5 mm	
Ambient temperature	-5...70 °C	-5...70 °C	
Protection degree	IP67	IP67	
Housing material	Zinc, die-cast	Zinc, die-cast	
Productview	Page 16	Page 16	

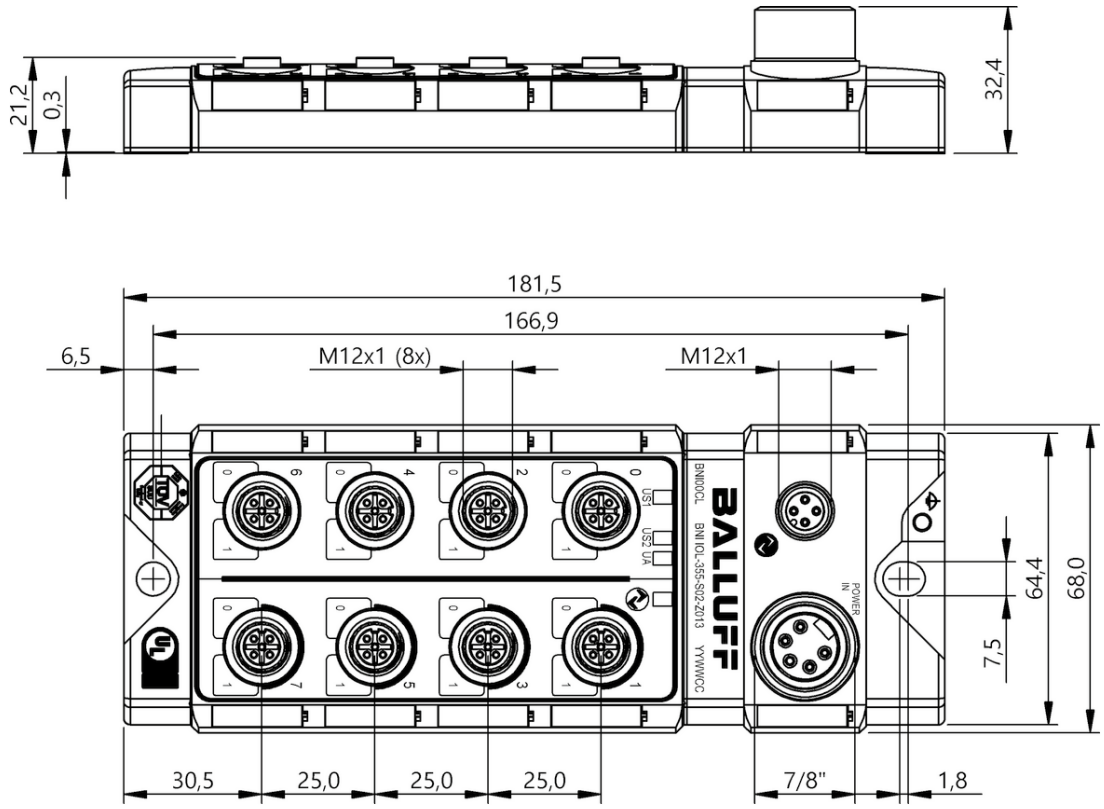
	BNI0034 BNI IOL-256-000-Z013	BNI003Y BNI IOL-256-S01-Z013	BNI00CL BNI IOL-355-S02-Z013	
	—	—	d	
	—	—	3	
	—	—	2	
	—	—	2	
	—	—	1 ms	
	CE	CE	CE, TÜV, IO-Link, cULus, UL-File E319845, VOL.1 SEC.1	
	—	—	9 A	
	9.0 A	9.0 A	9 A	
	—	—	8x PNP, Type3	
	16x PNP	16x PNP	8x yes	
	IO-Link 1.0	IO-Link 1.0	IO-Link 1.1	
	—	—	8x M12x1-Female, 5-pole, A-coded	
	68 x 32.4 x 181.5 mm	68 x 32.4 x 181.5 mm	68 x 32.4 x 181.5 mm	
	-5...70 °C	-5...70 °C	-5...55 °C	
	IP67	IP67	IP67	
	Zinc, die-cast	Zinc, die-cast	Die-cast zinc	
	Page 16	Page 16	Page 17	



BNI0033, BNI003W



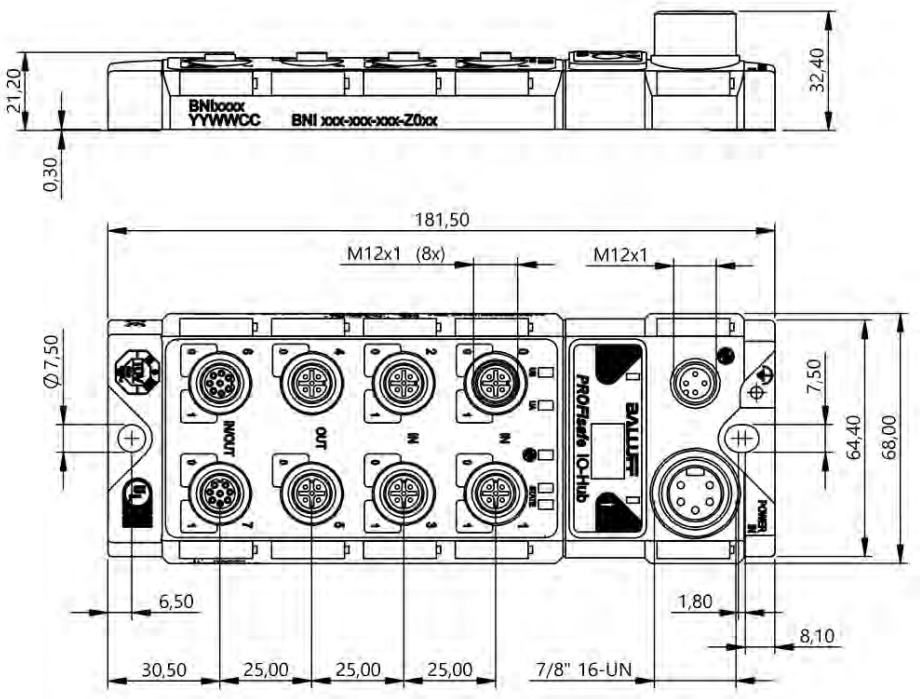
BNI0034, BNI003Y


21,2
0,3
32,4
181,5
166,9
6,5
M12x1 (8x)
M12x1
BALLUFF
BNI00CL
BNI IOL-355-S02-Z013
YYWWCC
POWER IN
64,4
68,0
7,5
30,5
25,0
25,0
25,0
7/8"
1,8

BNI00CL

Performance Level	
Safety category (EN ISO 13849-1)	
SIL (IEC 61508)	
SIL CL (EN 62061)	
Response time max.	
Approval/Conformity	
Number of safe inputs	
Number of safe inputs	
Current sum US, sensor	
Current sum UA, actuator	
Digital inputs	
Interface	
Connection slots	
Dimension	
Ambient temperature	
Protection degree	
Housing material	
Productview	

BNI0098 BNI IOF-329-P02-Z038
e
4
3
3
20 ms
CE, TÜV, cULus, UL-File E319845, VOL.1 SEC.1
12
2
4.8 A
8 A
12x PNP, Type 3
PROFIsafe over IO-Link
2x M12x1-Female, 8-pole, A-coded 6x M12x1-Female, 5-pole, A-coded
68 x 32.4 x 181.5 mm
-5...55 °C
IP67
Die-cast zinc
Page 20


21,20
0,30
32,40
BNIxxxx
YYWWCC
BNI xxx-xxx-xxx-Z0xx
181,50
M12x1 (8x)
M12x1
Ø7,50
7,50
64,40
68,00
6,50
1,80
8,10
30,50
25,00
25,00
25,00
7/8" 16-UN
IN/OUT
OUT
IN
IN
PROFIsafe IO-Hub
BALLUFF
POWER IN

BNI0098

For high plant safety

SAFETY SWITCHES AND SAFETY SENSORS

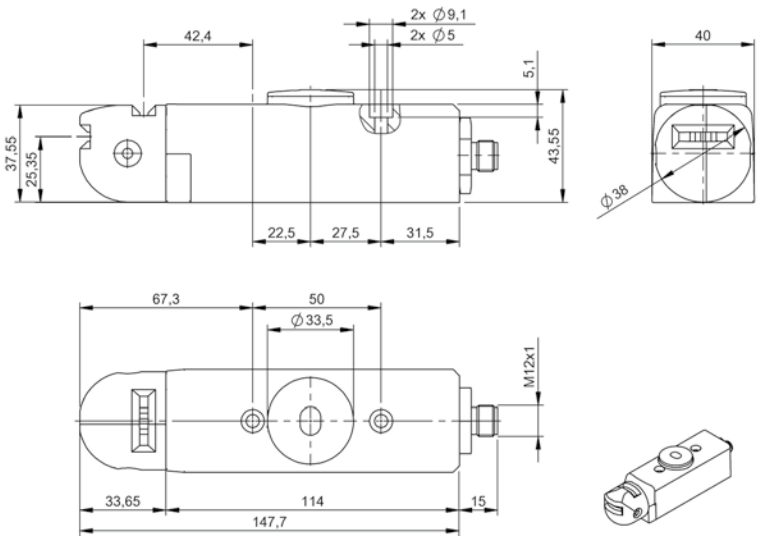
Balluff safety switches and safety sensors are designed for many different application situations. Our safe switches and sensors protect both man and machine alike. The safety switches and sensors offer you a variety of operating principles:
Inductive for non-contact safe detection of position and end-of-travel of metallic objects, electromechanical such as REED or RFID-based for access or position security for both personal and machine protection.

You save time and money thanks to universal M12 standard cables. You also avoid wiring errors, gain a clear overview and ensure reliable monitoring.

The most important benefits

- Safety switches and sensors for a variety of applications
- Rugged housing versions with LED function indicator
- Suitable for safety applications up to PLe/SIL3
- Savings of time and money plus prevention of errors thanks to standardized M12 connection technology
- Reduced installation expense and space requirements
- Also suitable for heavy protective equipment
- Manipulation-resistant
- Insensitive to vibration and imprecise door guides

	BID0005 BID F101-2M100-M20ZZ0-S92
B10d (EN ISO 13849-1)	5 million Switching operations
Coding level (EN ISO 14119)	low
Approval/Conformity	TÜV NRTL, CE, RoHS, TÜV
Operating principle	mechanical - force, contact
No of contacts	2x positive opening
Utilization category	AC-15, DC -13
Approach direction	laterally + above
Life expectancy mechanical	1 million Switching operations
Connection	M12x1-Male, 5-pole, A-coded
Dimension	40 x 147.7 x 43.5 mm
Ambient temperature	0...40 °C
Protection degree	IP65
Housing material	Aluminum
Productview	Page 25


2x ∅9,1
2x ∅5
42,4
40
5,1
37,55
25,35
43,55
∅38
22,5
27,5
31,5
67,3
50
∅33,5
M12x1
33,65
114
15
147,7

BID0005

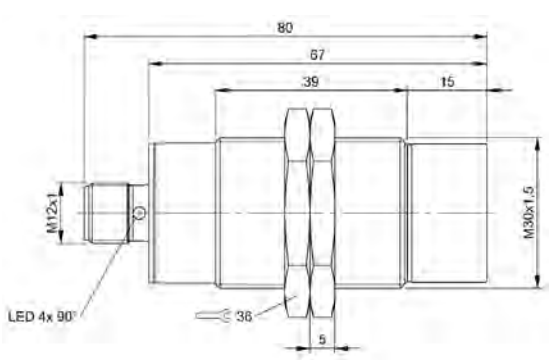


	BES0577 BES M30EP-PFC12F-S04G-D12	**BES057A** BES Q40ZU-PFC15B-S04G-D12	**BES057C** BES Q40ZU-PFC20F-S04G-D12	
Performance Level	e	e	e	
Safety category (EN ISO 13849-1)	3	3	3	
SIL (IEC 61508)	3	3	3	
SIL CL (EN 62061)	3	3	3	
Response time max.	200 ms	200 ms	200 ms	
Approval/Conformity	CE, TÜV, cULus	CE, TÜV, cULus	CE, TÜV, cULus	
Operating principle	non-contact (inductive)	non-contact (inductive)	non-contact (inductive)	
Approach direction	any to sensing surface	any to sensing surface	any to sensing surface	
Assured switch on distance Sao	12 mm	15 mm	20 mm	
Assured switch off distance Sar	30 mm	30 mm	45 mm	
Connection	M12x1-Male, 4-pole, A-coded	M12x1-Male, 4-pole, A-coded	M12x1-Male, 4-pole, A-coded	
Switching output	2x PNP OSSD	2x PNP OSSD	2x PNP OSSD	
Installation	non-flush	Shielded on one side	non-flush	
Dimension	Ø 30 x 80 mm	40 × 66 mm	40 × 66 mm	
Ambient temperature	-25...70 °C, for service life ≤ 10 years 10…40 °C, for service life ≤ 20 years	-25...70 °C, for service life ≤ 10 years 10…40 °C, for service life ≤ 20 years	-25...60 °C, for service life ≤ 10 years 10…40 °C, for service life ≤ 20 years	
Protection degree	IP68, IP69K	IP67	IP67	
Housing material	Stainless steel (1.4404)	Die-cast zinc	Die-cast zinc	
Productview	Page 28	Page 28	Page 28	

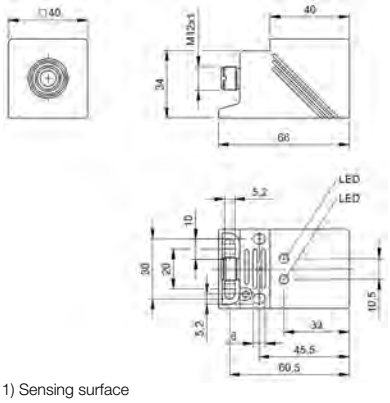




	BES0574 BES M12EN-PFC40F-S04G-D11	BES0575 BES M18EN-PFC80F-S04G-D11	BES0576 BES M18MN-PFC50B-S04G-D11	BES0578 BES M30EN-PFC15F-S04G-D11	BES0579 BES M30MN-PFC10B-S04G-D11
	d	d	d	d	d
	2	2	2	2	2
	2	2	2	2	2
	2	2	2	2	2
	1 ms	1 ms	1 ms	1 ms	1 ms
	CE, TÜV, cULus	CE, TÜV, cULus	CE, TÜV, cULus	CE, TÜV, cULus	CE, TÜV, cULus
	non-contact (inductive)	non-contact (inductive)	non-contact (inductive)	non-contact (inductive)	non-contact (inductive)
	any to sensing surface	any to sensing surface	any to sensing surface	any to sensing surface	any to sensing surface
	4 mm	8 mm	5 mm	15 mm	10 mm
	6 mm	12 mm	7 mm	22 mm	15 mm
	M12x1-Male, 4-pole, A-coded	M12x1-Male, 4-pole, A-coded	M12x1-Male, 4-pole, A-coded	M12x1-Male, 4-pole, A-coded	M12x1-Male, 4-pole, A-coded
	PNP OSSD, PNP normally closed (NC)	PNP OSSD, PNP normally closed (NC)	PNP OSSD, PNP normally closed (NC)	PNP OSSD, PNP normally closed (NC)	PNP OSSD, PNP normally closed (NC)
	non-flush	non-flush	for flush mounting	non-flush	for flush mounting
	Ø 12 x 70 mm	Ø 18 x 70.5 mm	Ø 18 x 70.5 mm	Ø 30 x 70 mm	Ø 30 x 70 mm
	-25...70 °C, for service life ≤ 10 years 10…40 °C, for service life ≤ 20 years	-25...70 °C, for service life ≤ 10 years 10…40 °C, for service life ≤ 20 years	-25...70 °C, for service life ≤ 10 years 10…40 °C, for service life ≤ 20 years	-25...70 °C, for service life ≤ 10 years 10…40 °C, for service life ≤ 20 years	-25...70 °C, for service life ≤ 10 years 10…40 °C, for service life ≤ 20 years
	IP67	IP67	IP67	IP67	IP67
	Stainless steel (1.4404)	Stainless steel (1.4571)	Brass	Stainless steel (1.4571)	Brass
	Page 28	Page 28	Page 28	Page 28	Page 28

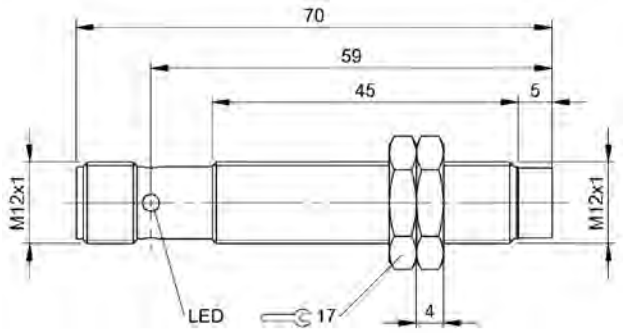


BES0577

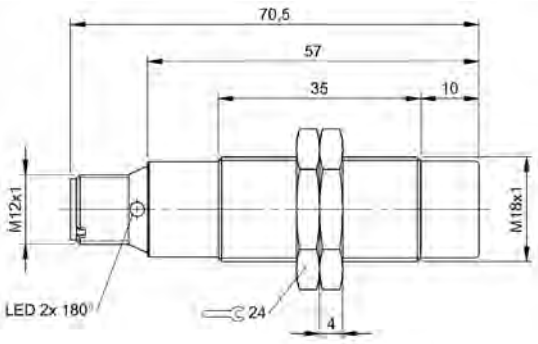


1) Sensing surface

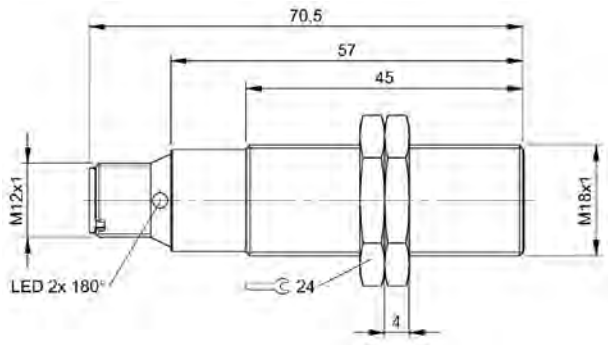
BES057A, BES057C



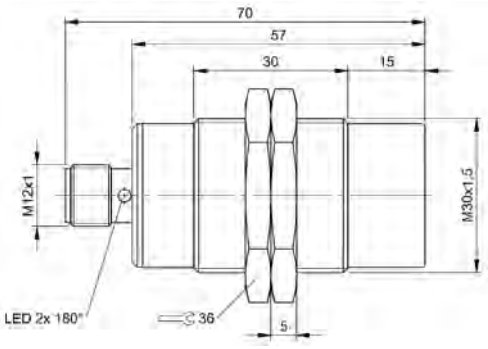
BES0574



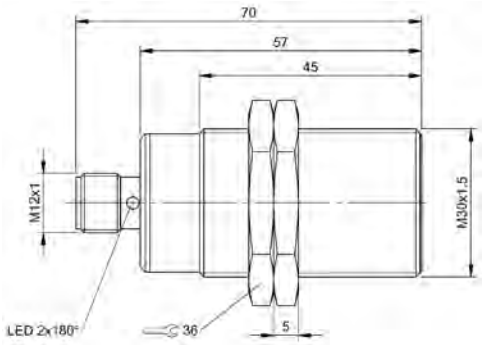
BES0575



BES0576



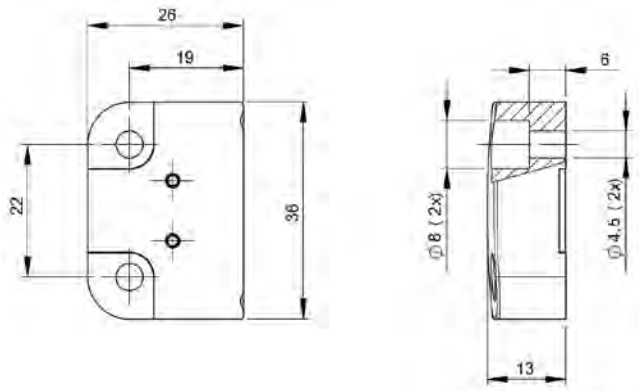
BES0578



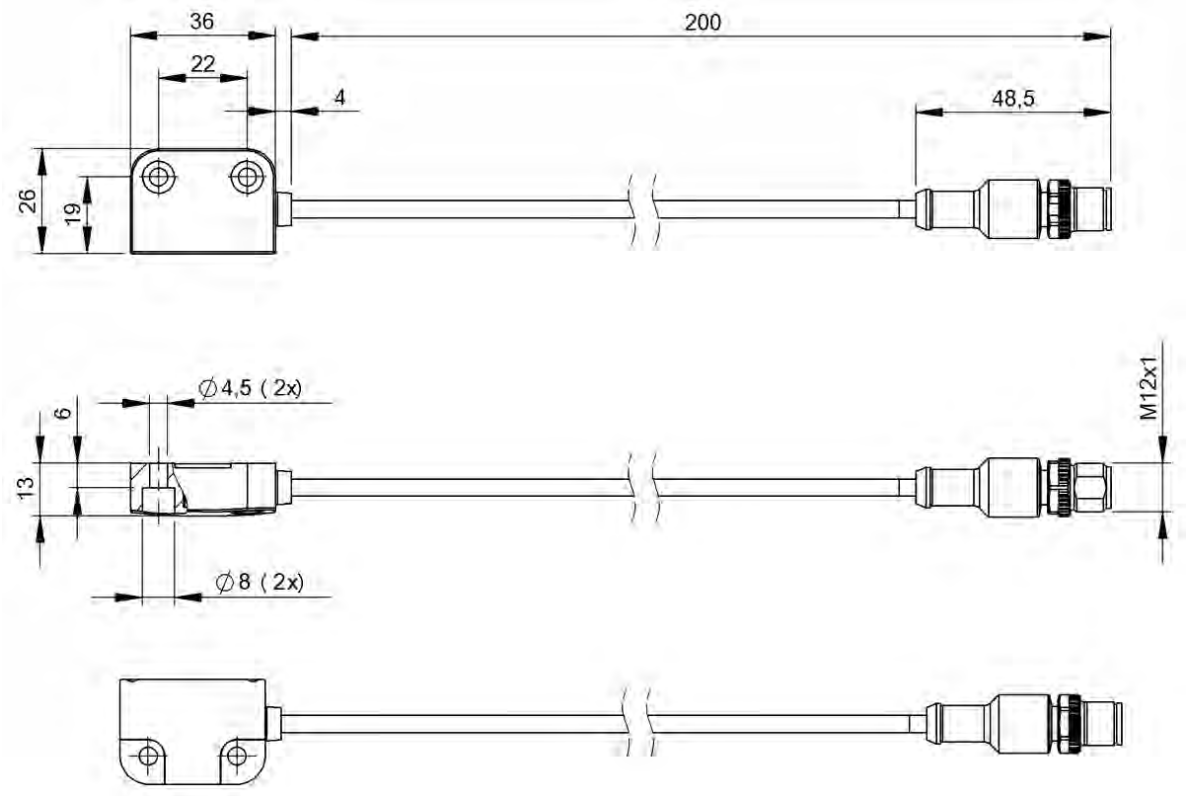
BES0579

	BID000T BID R01K-4M100	
B10d (EN ISO 13849-1)	—	
Coding level (EN ISO 14119)	low	
Approval/Conformity	CE, cULus	
Operating principle	non-contact (magnetic)	
No of contacts	—	
Approach direction	—	
Life expectancy mechanical	—	
Assured switch on distance Sao	5 mm	
Assured switch off distance Sar	—	
Connection	—	
Dimension	26 x 36 x 13 mm	
Ambient temperature	-25...70 °C	
Protection degree	—	
Housing material	Thermoplastic, glass-fibre reinforced	
Productview	Seite 32	

BID0007 BID R01K-4M100-M20ZZ0-EP00,2-S92	
NC at 20% contact load 25 mil. Switching operations	
—	
CE, cULus	
non-contact (magnetic)	
2x NC	
vertrical to the active surface	
100 million Switching operations	
5 mm	
15 mm	
Cable with connector, M12x1, 5-pin, 20 cm, PUR	
26 x 36 x 13 mm	
-25...70 °C	
IP67	
Thermoplastic, glass-fibre reinforced	
Seite 32	



BID000T



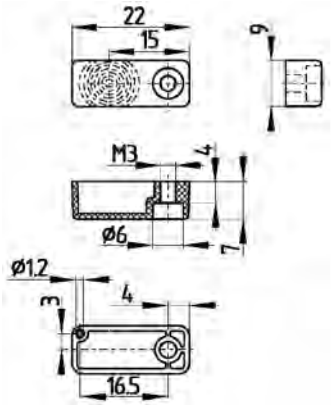
BID0007

	BID000W BID Q02K-4R300	BID000U BID R02K-4R300	
Performance Level	—	—	
Safety category (EN ISO 13849-1)	—	—	
SIL (IEC 61508)	—	—	
SIL CL (EN 62061)	—	—	
Coding level (EN ISO 14119)	—	—	
Response time max.	—	—	
Approval/Conformity	TÜV, cULus, CE	TÜV, cULus, CE	
Operating principle	—	—	
Approach direction	—	—	
Actuator retention force	—	—	
Assured switch on distance Sao	—	—	
Assured switch off distance Sar	—	—	
Connection	—	—	
Switching output	—	—	
Installation	any	any	
Dimension	22 x 7 x 9 mm	39.2 x 18 x 29.5 mm	
Ambient temperature	-25...65 °C	-25...65 °C	
IP rating	—	—	
Housing material	Thermoplast	Thermoplast	
Productview	Page 38	Page 38	

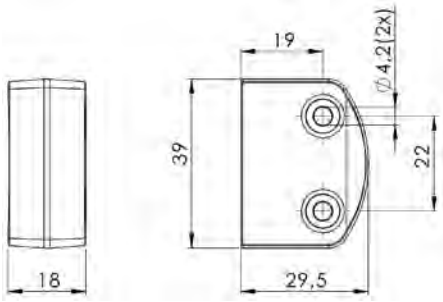
	BID0008 BID R02K-4R100-020ZZ0-EP00,2-S92	BID0009 BID R02K-4R300-020ZZ0-EP00,2-S92	BID000Y BID R03K-4R300	BID000C BID R03K-4R100-020ZZ0-S92
	e	e	—	e
	4	4	—	4
	3	3	—	3
	3	3	—	3
	low	high	—	low
	100 ms	100 ms	—	100 ms
	TÜV, cULus, CE	TÜV, cULus, CE	CE, cULus, TÜV, Ecolab	CE, cULus, TÜV, Ecolab
	non-contact (RFID)	non-contact (RFID)	non-contact (RFID)	non-contact (RFID)
	any to the active surface or laterally	any to the active surface or laterally	—	any to sensing surface
	—	—	0 N	0 N
	4 mm 8 mm	4 mm 8 mm	—	10 mm
	18 mm	18 mm	—	20 mm
	Cable with connector, M12x1, 5-pin, 25 cm, PUR	Cable with connector, M12x1, 5-pin, 25 cm, PUR	—	Connector, M12x1, 5-pin
	2x PNP OSSD	2x PNP OSSD	—	2x PNP OSSD
	for flush mounting	for flush mounting	any	for flush mounting
	39.2 x 18 x 29.5 mm	39.2 x 18 x 29.5 mm	91 x 25 x 22 mm	106 x 25 x 22 mm
	-25...65 °C	-25...65 °C	-25...70 °C	-25...70 °C
	IP65, IP67	IP65, IP67	—	IP65, IP67, IP69
	Thermoplast	Thermoplast	Thermoplastic, glass-fibre reinforced	Thermoplastic, glass-fibre reinforced
	Page 38	Page 38	Page 39	Page 39

	BID000F BID R03K-4R300-O20ZZ0-S92	**BID000Z** BID R03K-4R3S0	
Performance Level	e	—	
Safety category (EN ISO 13849-1)	4	—	
SIL (IEC 61508)	3	—	
SIL CL (EN 62061)	3	—	
Coding level (EN ISO 14119)	high	—	
Response time max.	100 ms	—	
Approval/Conformity	CE, cULus, TÜV, Ecolab	CE, cULus, TÜV, Ecolab	
Operating principle	non-contact (RFID)	non-contact (RFID)	
Approach direction	any to sensing surface	—	
Actuator retention force	0 N	18 N	
Assured switch on distance Sao	10 mm	—	
Assured switch off distance Sar	20 mm	—	
Connection	Connector, M12x1, 5-pin	—	
Switching output	2x PNP OSSD	—	
Installation	for flush mounting	any	
Dimension	106 x 25 x 22 mm	91 x 25 x 22 mm	
Ambient temperature	-25...70 °C	-25...70 °C	
Protection degree	IP65, IP67, IP69	—	
Housing material	Thermoplastic, glass-fibre reinforced	Thermoplastic, glass-fibre reinforced	
Productview	Page 39	Page 39	

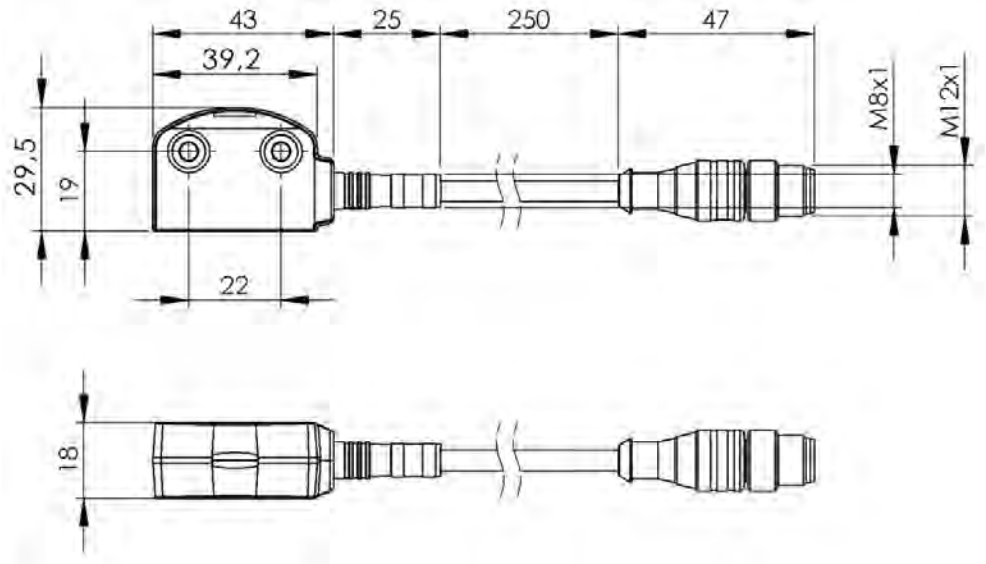
	BID000E BID R03K-4R1S0-020ZZ0-S92	BID000H BID R03K-4R3S0-020ZZ0-S92		
	e	e		
	4	4		
	3	3		
	3	3		
	low	high		
	100 ms	100 ms		
	CE, cULus, TÜV, Ecolab	CE, cULus, TÜV, Ecolab		
	non-contact (RFID)	non-contact (RFID)		
	any to sensing surface	any to sensing surface		
	18 N	18 N		
	10 mm	10 mm		
	20 mm	20 mm		
	Connector, M12x1, 5-pin	Connector, M12x1, 5-pin		
	2x PNP OSSD	2x PNP OSSD		
	for flush mounting	for flush mounting		
	106 x 25 x 22 mm	106 x 25 x 22 mm		
	-25...70 °C	-25...70 °C		
	IP65, IP67, IP69	IP65, IP67, IP69		
	Thermoplastic, glass-fibre reinforced	Thermoplastic, glass-fibre reinforced		
	Page 39	Page 39		



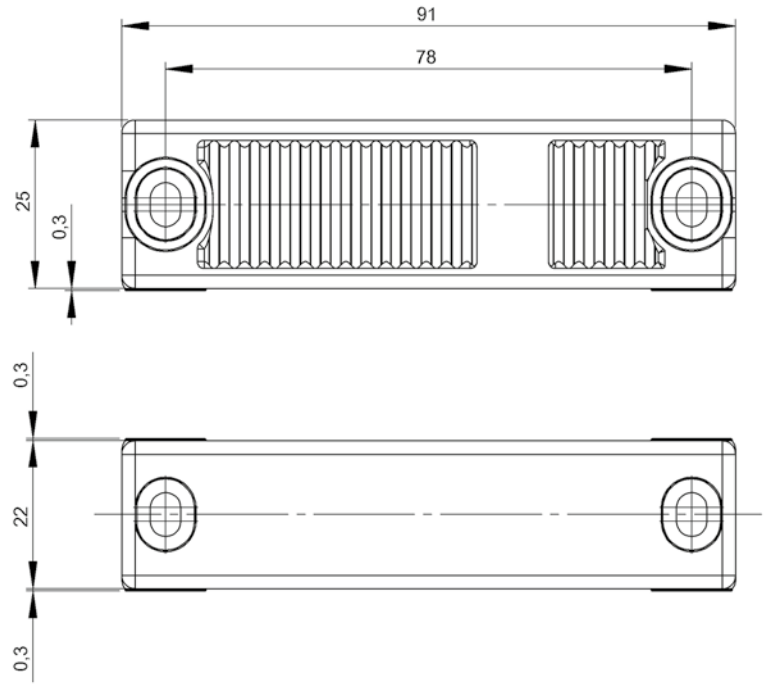
BID000W



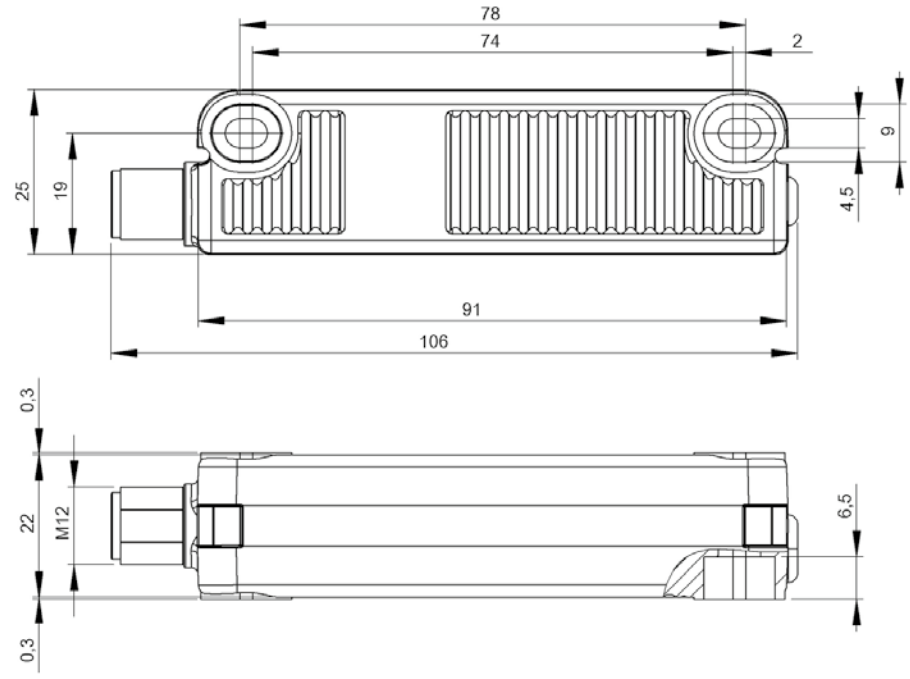
BID000U



BID0008, BID0009



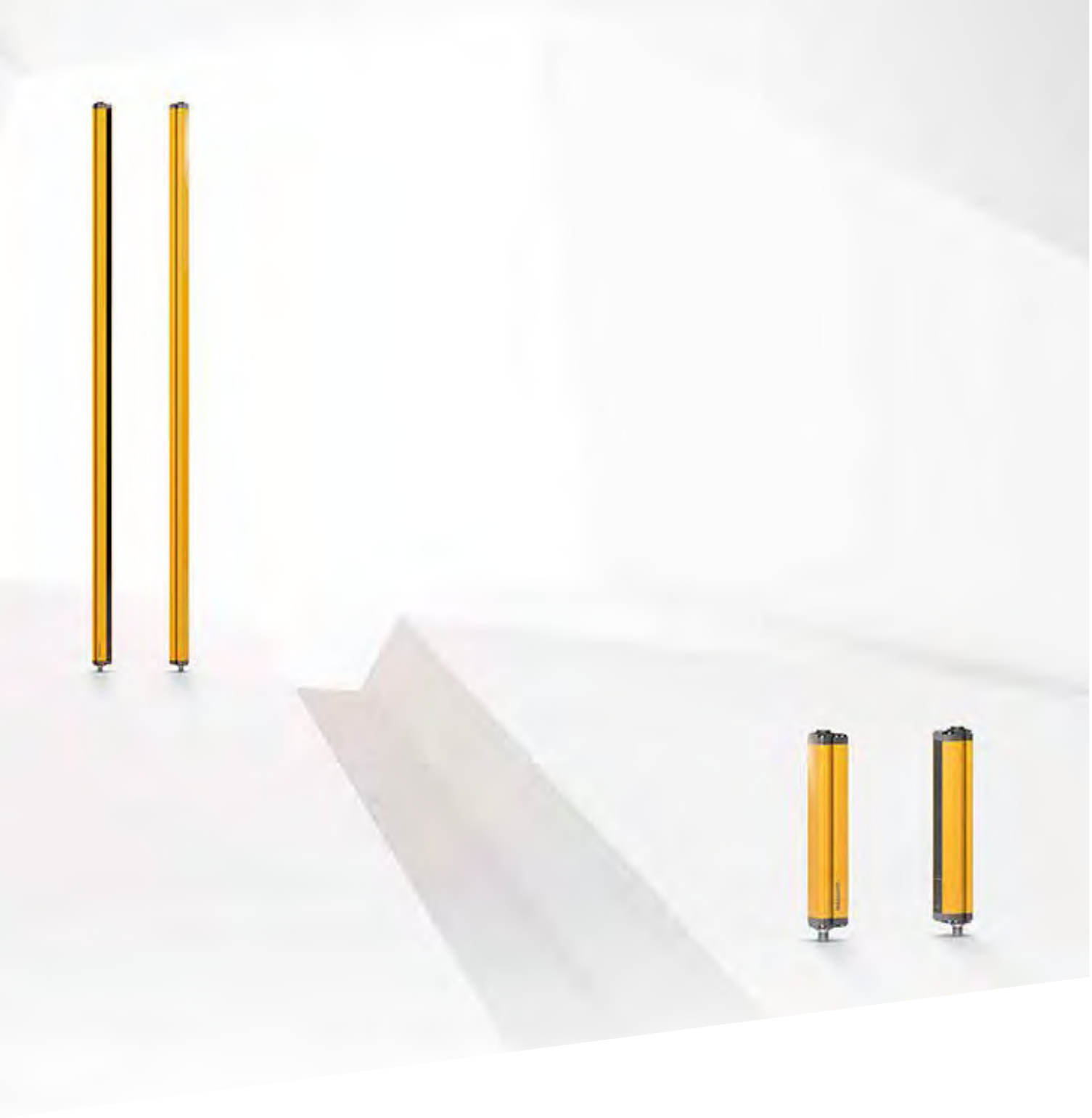
BID000Y, BID000Z



BID000C, BID000F, BID000E, BID000H

Safe personal protection for interaction between man and machine

OPTO-ELECTRONIC PROTECTIVE DEVICES



Flexible production places high demands on safety when man and machine work so closely together.
This interplay must not ever compromise the safety of employees. Opto-electronic protective devices such as light curtains from Balluff provide safe solutions that also enable great flexibility. Another benefit to you: by using light curtains that consist of multiple parallel light beams, you save space since they can replace cumbersome guard fence constructions or assemblies of multiple through-beam sensors.

The most important benefits

- Finger, hand and body detection for convenient and fast interaction between man and machine
- Defined protected area with infrared protection field – suitable for safety applications up to PLe SIL3
- Safe machine stoppage in safety-critical applications
- Better space utilization by eliminating the need for protective fence structures
- High level of manipulation protection



	BLG000A BLG 4A-015-600-014-001-SX	**BLG000C** BLG 4A-030-600-014-001-SX	**BLG000E** BLG 4A-045-600-014-001-SX	
Performance Level	e	e	e	
Safety category (EN ISO 13849-1)	4	4	4	
SIL (IEC 61508)	3	3	3	
SIL CL (EN 62061)	3	3	3	
Response time max.	11 ms	15 ms	18 ms	
Approval/Conformity	TÜV, cULus, CE	TÜV, cULus, CE	TÜV, cULus, CE	
Operating principle	non-contact (photoelectric)	non-contact (photoelectric)	non-contact (photoelectric)	
Detection capability	14 mm	14 mm	14 mm	
Protective field height (Hp)	150 mm	300 mm	450 mm	
Range	6 m	6 m	6 m	
Connection 1	Emitter: M12x1-Male, A-coded	Emitter: M12x1-Male, A-coded	Emitter: M12x1-Male, A-coded	
Connection 2	Receiver: M12x1-Male, A-coded	Receiver: M12x1-Male, A-coded	Receiver: M12x1-Male, A-coded	
Switching output	2x PNP OSSD	2x PNP OSSD	2x PNP OSSD	
Dimension	32.3 x 233.3 x 37 mm	32.3 x 383.2 x 37 mm	32.3 x 533.2 x 37 mm	
Ambient temperature	0...55 °C	0...55 °C	0...55 °C	
Protection degree	IP65	IP65	IP65	
Housing material	Aluminum	Aluminum	Aluminum	
Productview	Seite 46	Seite 46	Seite 47	

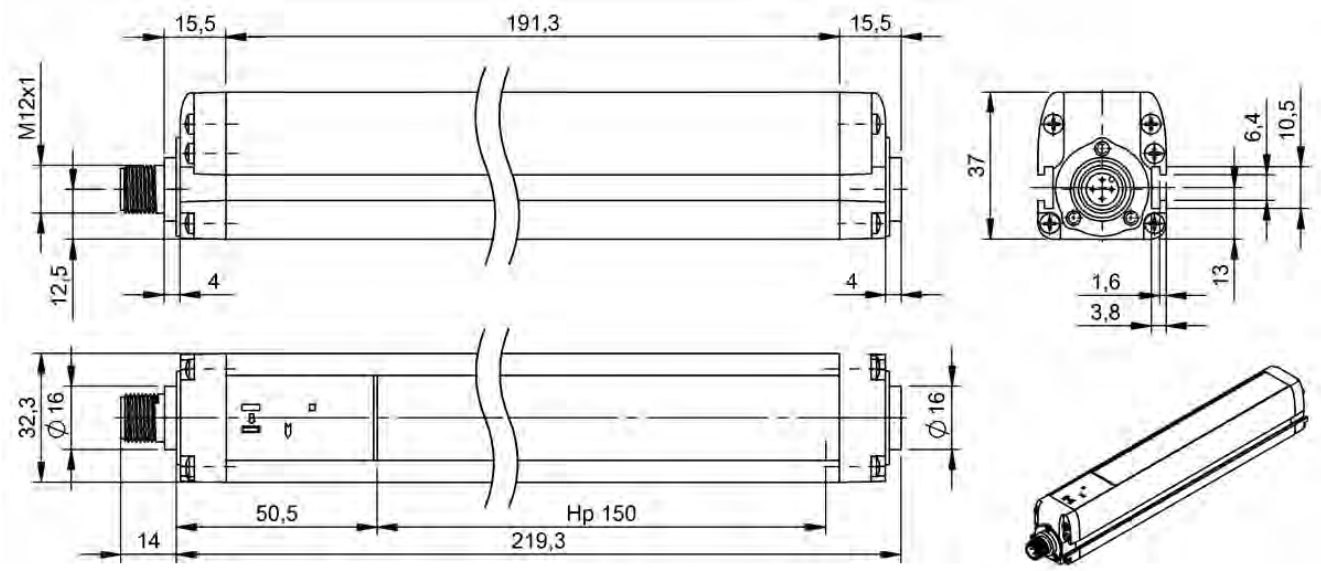




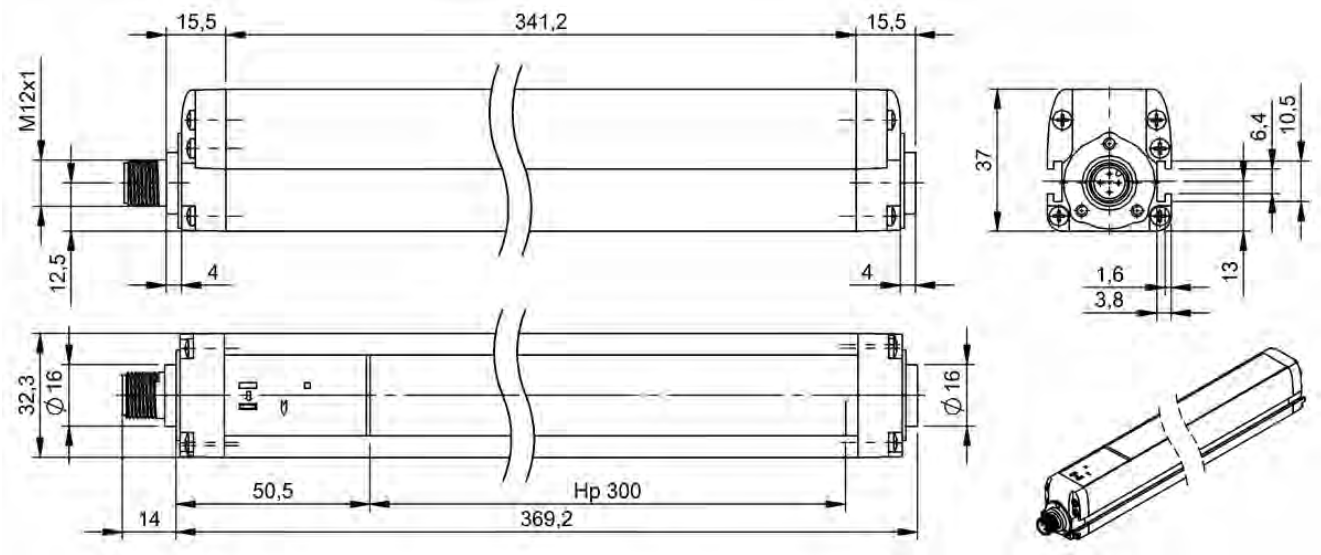
	BLG000F BLG 4A-060-600-014-001-SX	BLG000H BLG 4A-075-600-014-001-SX	BLG000J BLG 4A-090-600-014-001-SX	BLG000K BLG 4A-105-600-014-001-SX	BLG000L BLG 4A-120-600-014-001-SX
	e	e	e	e	e
	4	4	4	4	4
	3	3	3	3	3
	3	3	3	3	3
	22 ms	25 ms	29 ms	33 ms	36 ms
	TÜV, cULus, CE	TÜV, cULus, CE	TÜV, cULus, CE	TÜV, cULus, CE	TÜV, cULus, CE
	non-contact (photoelectric)	non-contact (photoelectric)	non-contact (photoelectric)	non-contact (photoelectric)	non-contact (photoelectric)
	14 mm	14 mm	14 mm	14 mm	14 mm
	600 mm	750 mm	900 mm	1050 mm	1200 mm
	6 m	6 m	6 m	6 m	6 m
	Emitter: M12x1-Male, A-coded	Emitter: M12x1-Male, A-coded	Emitter: M12x1-Male, A-coded	Emitter: M12x1-Male, A-coded	Emitter: M12x1-Male, A-coded
	Receiver: M12x1-Male, A-coded	Receiver: M12x1-Male, A-coded	Receiver: M12x1-Male, A-coded	Receiver: M12x1-Male	Receiver: M12x1-Male
	2x PNP OSSD	2x PNP OSSD	2x PNP OSSD	2x PNP OSSD	2x PNP OSSD
	32.3 x 683.2 x 37 mm	32.3 x 833.2 x 37 mm	32.3 x 983.2 x 37 mm	32.3 x 1133.2 x 37 mm	32.3 x 1283.3 x 37 mm
	0...55 °C	0...55 °C	0...55 °C	0...55 °C	0...55 °C
	IP65	IP65	IP65	IP65	IP65
	Aluminum	Aluminum	Aluminum	Aluminum	Aluminum
	Seite 47	Seite 48	Seite 48	Seite 49	Seite 49

	BLG000R BLG 4A-135-600-014-001-SX	**BLG000M** BLG 4A-150-600-014-001-SX	**BLG000N** BLG 4A-165-600-014-001-SX	
Performance Level	e	e	e	
Safety category (EN ISO 13849-1)	4	4	4	
SIL (IEC 61508)	3	3	3	
SIL CL (EN 62061)	3	3	3	
Response time max.	40 ms	43 ms	47 ms	
Approval/Conformity	TÜV, cULus, CE	TÜV, cULus, CE	TÜV, cULus, CE	
Operating principle	non-contact (photoelectric)	non-contact (photoelectric)	non-contact (photoelectric)	
Detection capability	14 mm	14 mm	14 mm	
Protective field height (Hp)	1350 mm	1500 mm	1650 mm	
Range	6 m	6 m	6 m	
Connection 1	Emitter: M12x1-Male, A-coded	Emitter: M12x1-Male, A-coded	Emitter: M12x1-Male, A-coded	
Connection 2	Receiver: M12x1-Male	Receiver: M12x1-Male	Receiver: M12x1-Male	
Switching output	2x PNP OSSD	2x PNP OSSD	2x PNP OSSD	
Dimension	32.3 x 1433.2 x 37 mm	32.3 x 1583.3 x 37 mm	32.3 x 1733.3 x 37 mm	
Ambient temperature	0...55 °C	0...55 °C	0...55 °C	
Protection degree	IP65	IP65	IP65	
Housing material	Aluminum	Aluminum	Aluminum	
Productview	Seite 50	Seite 50	Seite 51	

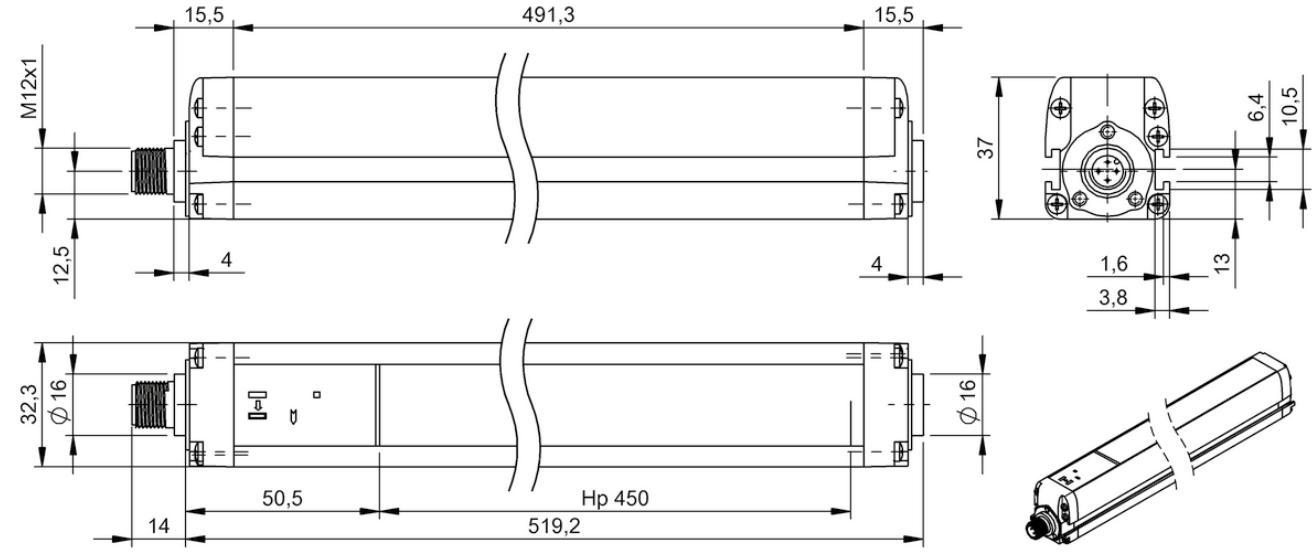
	BLG000P BLG 4A-180-600-014-001-SX				
	e				
	4				
	3				
	3				
	50 ms				
	TÜV, cULus, CE				
	non-contact (photoelectric)				
	14 mm				
	1800 mm				
	6 m				
	Emitter: M12x1-Male, A-coded				
	Receiver: M12x1-Male				
	2x PNP OSSD				
	32.3 x 1883.3 x 37 mm				
	0...55 °C				
	IP65				
	Aluminum				
	Seite 51				



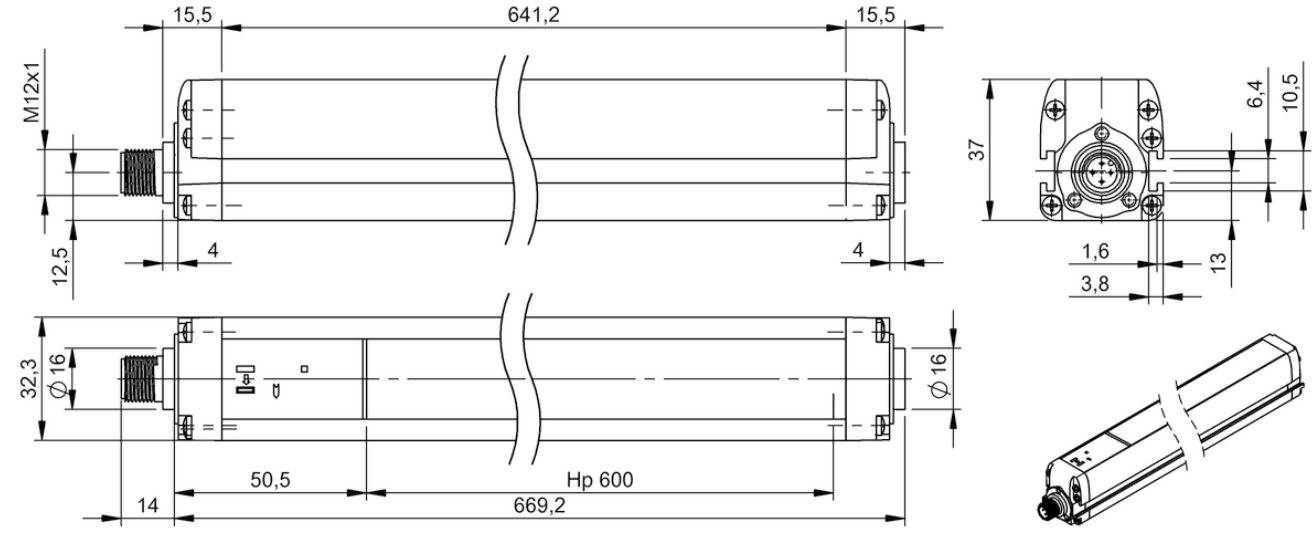
BLG000A



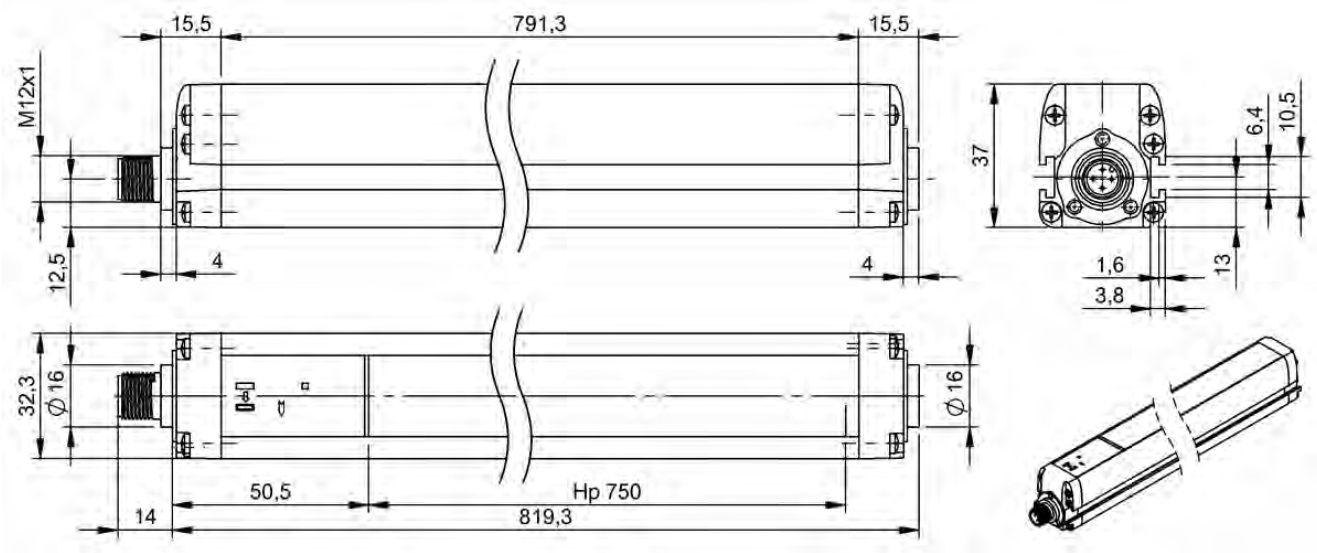
BLG000C



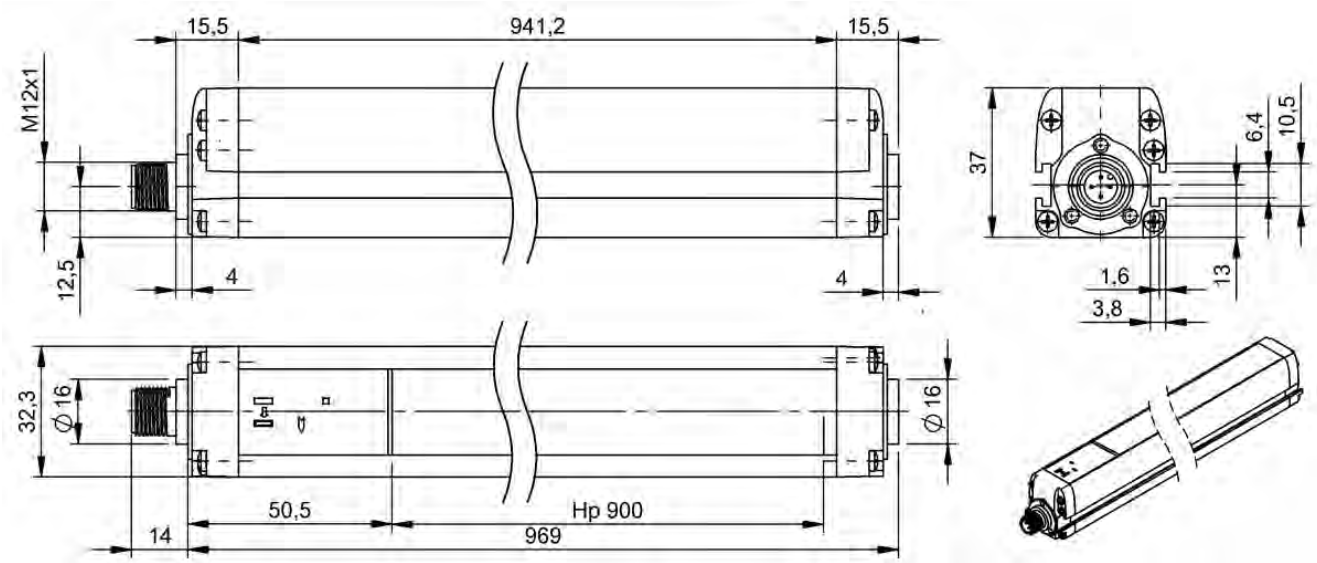
BLG000E



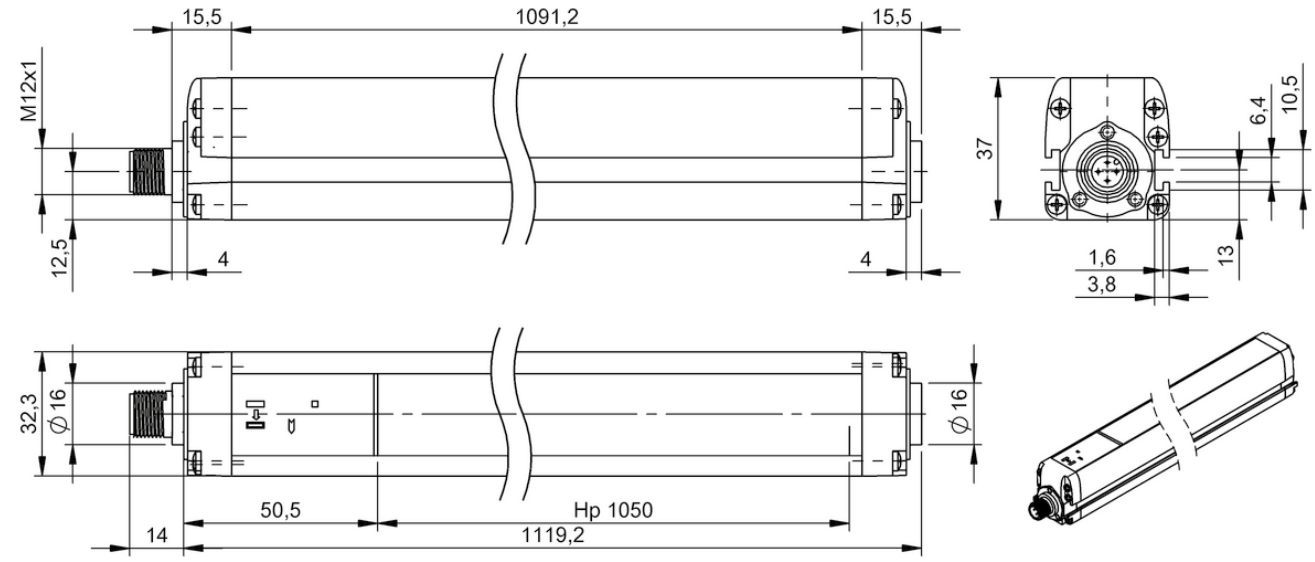
BLG000F



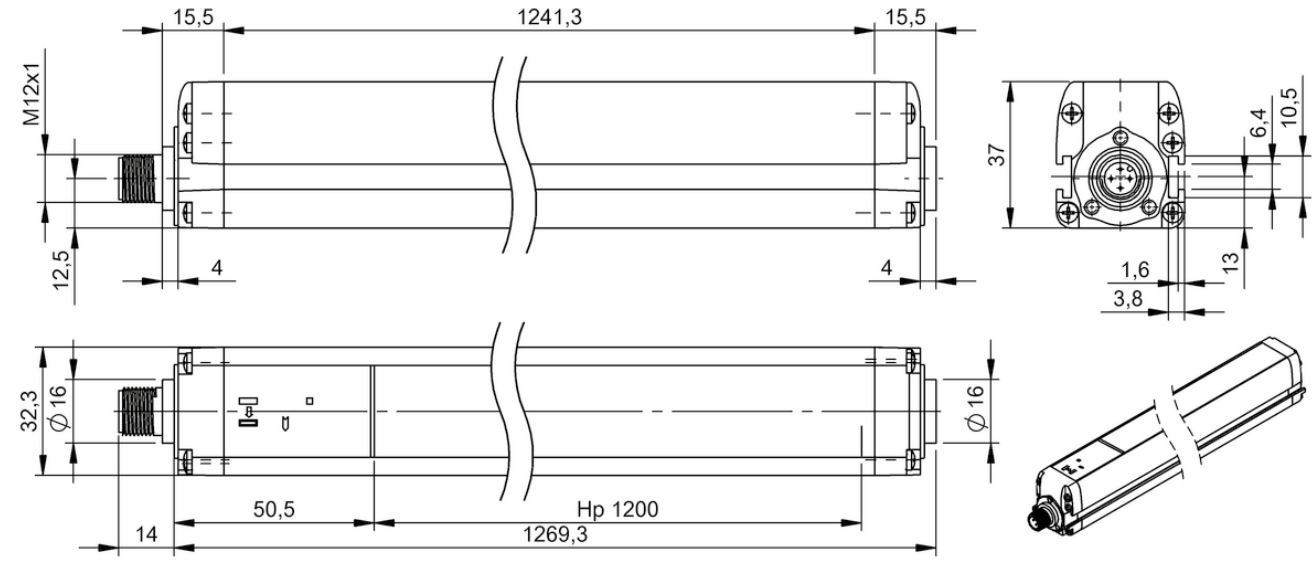
BLG000H



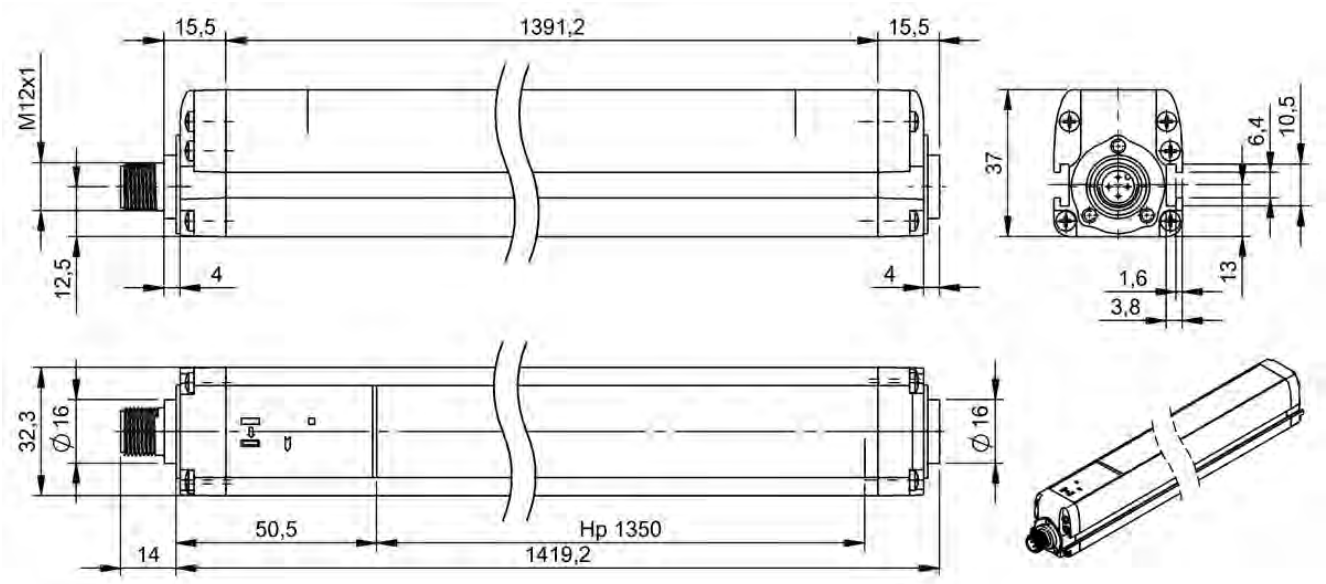
BLG000J



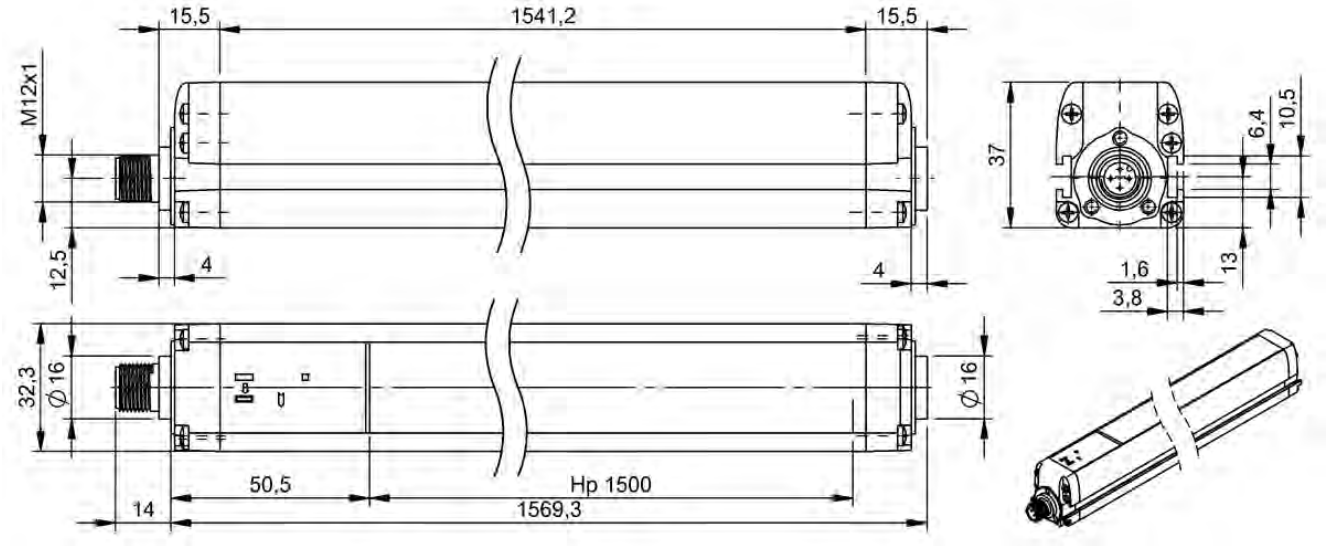
BLG000K



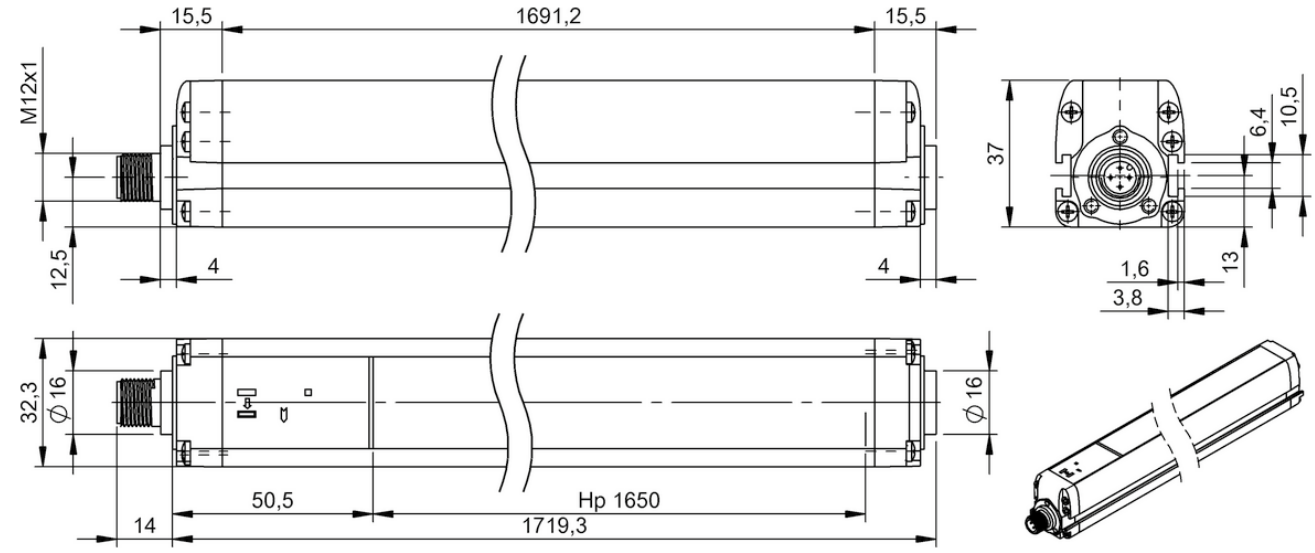
BLG000L



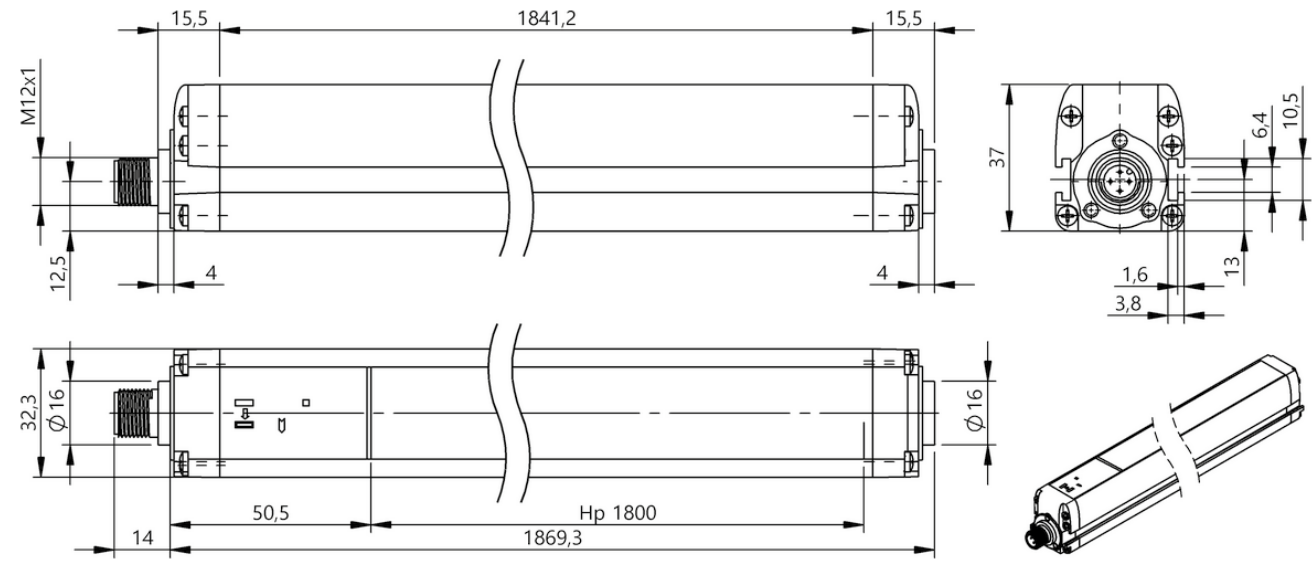
BLG000R



BLG000M



BLG000N



BLG000P



	BLG000T BLG 4A-015-19X-030-001-SX	**BLG000U** BLG 4A-030-19X-030-001-SX	**BLG000W** BLG 4A-045-19X-030-001-SX	
Performance Level	e	e	e	
Safety category (EN ISO 13849-1)	4	4	4	
SIL (IEC 61508)	3	3	3	
SIL CL (EN 62061)	3	3	3	
Response time max.	9 ms	11 ms	13 ms	
Approval/Conformity	TÜV, cULus, CE	TÜV, cULus, CE	TÜV, cULus, CE	
Operating principle	non-contact (photoelectric)	non-contact (photoelectric)	non-contact (photoelectric)	
Detection capability	30 mm	30 mm	30 mm	
Protective field height (Hp)	150 mm	300 mm	450 mm	
Range	19 m	19 m	19 m	
Connection 1	Emitter: M12x1-Male, A-coded	Emitter: M12x1-Male, A-coded	Emitter: M12x1-Male, A-coded	
Connection 2	Receiver: M12x1-Male, A-coded	Receiver: M12x1-Male, A-coded	Receiver: M12x1-Male, A-coded	
Switching output	2x PNP OSSD	2x PNP OSSD	2x PNP OSSD	
Dimension	32.3 x 233.3 x 37 mm	32.3 x 383.2 x 37 mm	32.3 x 533.2 x 37 mm	
Ambient temperature	0...55 °C	0...55 °C	0...55 °C	
Protection degree	IP65	IP65	IP65	
Housing material	Aluminum	Aluminum	Aluminum	
Productview	Seite 56	Seite 56	Seite 57	

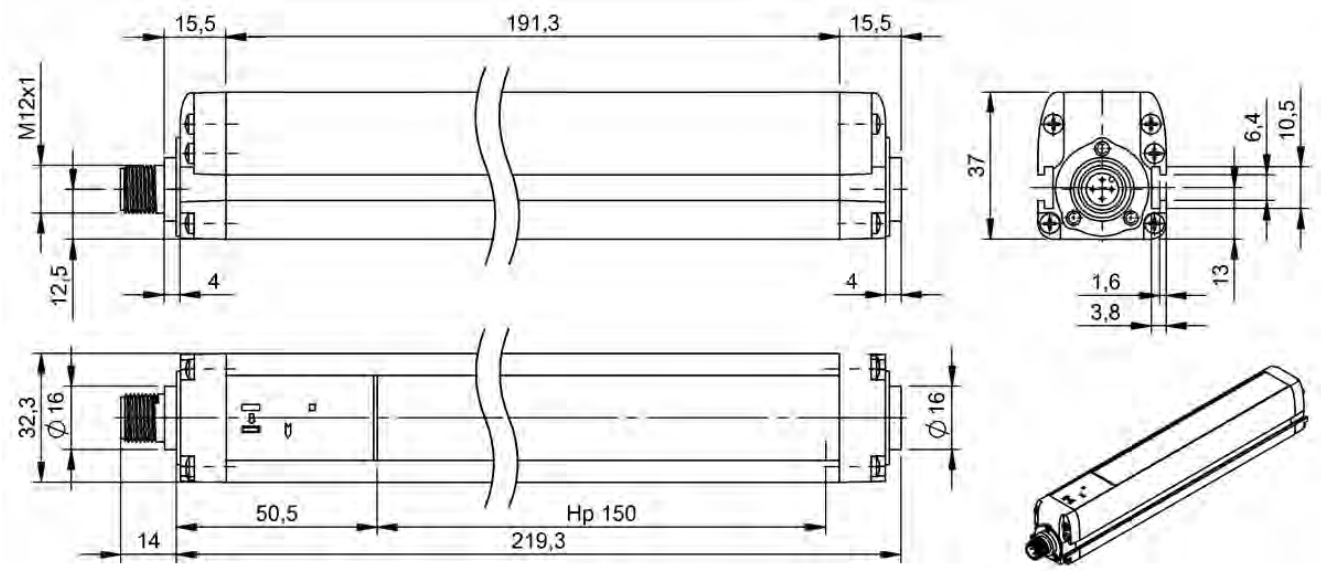




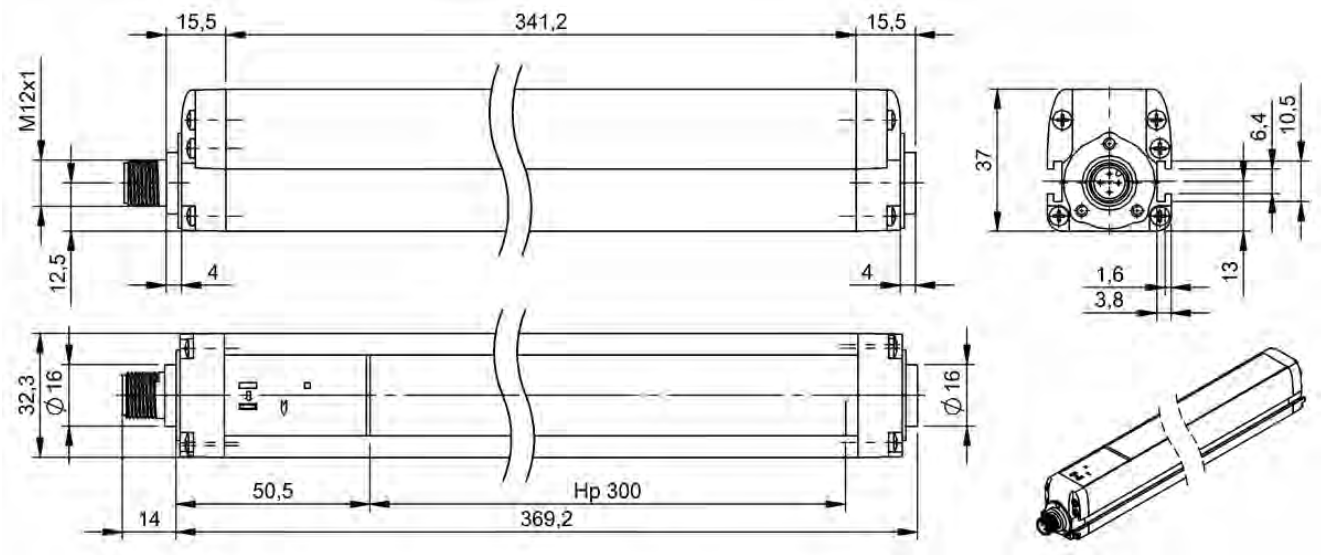
	BLG000Y BLG 4A-060-19X-030-001-SX	BLG000Z BLG 4A-075-19X-030-001-SX	BLG0010 BLG 4A-090-19X-030-001-SX	BLG0011 BLG 4A-105-19X-030-001-SX	BLG0012 BLG 4A-120-19X-030-001-SX
	e	e	e	e	e
	4	4	4	4	4
	3	3	3	3	3
	3	3	3	3	3
	14 ms	16 ms	18 ms	19 ms	21 ms
	TÜV, cULus, CE	TÜV, cULus, CE	TÜV, cULus, CE	TÜV, cULus, CE	TÜV, cULus, CE
	non-contact (photoelectric)	non-contact (photoelectric)	non-contact (photoelectric)	non-contact (photoelectric)	non-contact (photoelectric)
	30 mm	30 mm	30 mm	30 mm	30 mm
	600 mm	750 mm	900 mm	1050 mm	1200 mm
	19 m	19 m	19 m	19 m	19 m
	Emitter: M12x1-Male, A-coded	Emitter: M12x1-Male, A-coded	Emitter: M12x1-Male, A-coded	Emitter: M12x1-Male, A-coded	Emitter: M12x1-Male, A-coded
	Receiver: M12x1-Male, A-coded	Receiver: M12x1-Male, A-coded	Receiver: M12x1-Male, A-coded	Receiver: M12x1-Male, A-coded	Receiver: M12x1-Male
	2x PNP OSSD	2x PNP OSSD	2x PNP OSSD	2x PNP OSSD	2x PNP OSSD
	32.3 x 683.2 x 37 mm	32.3 x 833.2 x 37 mm	32.3 x 983.2 x 37 mm	32.3 x 1133.2 x 37 mm	32.3 x 1283.3 x 37 mm
	0...55 °C	0...55 °C	0...55 °C	0...55 °C	0...55 °C
	IP65	IP65	IP65	IP65	IP65
	Aluminum	Aluminum	Aluminum	Aluminum	Aluminum
	Seite 57	Seite 58	Seite 58	Seite 59	Seite 59

	BLG0013 BLG 4A-135-19X-030-001-SX	**BLG0014** BLG 4A-150-19X-030-001-SX	**BLG0015** BLG 4A-165-19X-030-001-SX	
Performance Level	e	e	e	
Safety category (EN ISO 13849-1)	4	4	4	
SIL (IEC 61508)	3	3	3	
SIL CL (EN 62061)	3	3	3	
Response time max.	23 ms	25 ms	26 ms	
Approval/Conformity	TÜV, cULus, CE	TÜV, cULus, CE	TÜV, cULus, CE	
Operating principle	non-contact (photoelectric)	non-contact (photoelectric)	non-contact (photoelectric)	
Detection capability	30 mm	30 mm	30 mm	
Protective field height (Hp)	1350 mm	1500 mm	1650 mm	
Range	19 m	19 m	19 m	
Connection 1	Emitter: M12x1-Male, A-coded	Emitter: M12x1-Male, A-coded	Emitter: M12x1-Male, A-coded	
Connection 2	Receiver: M12x1-Male	Receiver: M12x1-Male	Receiver: M12x1-Male	
Switching output	2x PNP OSSD	2x PNP OSSD	2x PNP OSSD	
Dimension	32.3 x 1433.2 x 37 mm	32.3 x 1583.3 x 37 mm	32.3 x 1733.3 x 37 mm	
Ambient temperature	0...55 °C	0...55 °C	0...55 °C	
Protection degree	IP65	IP65	IP65	
Housing material	Aluminum	Aluminum	Aluminum	
Productview	Seite 60	Seite 60	Seite 61	

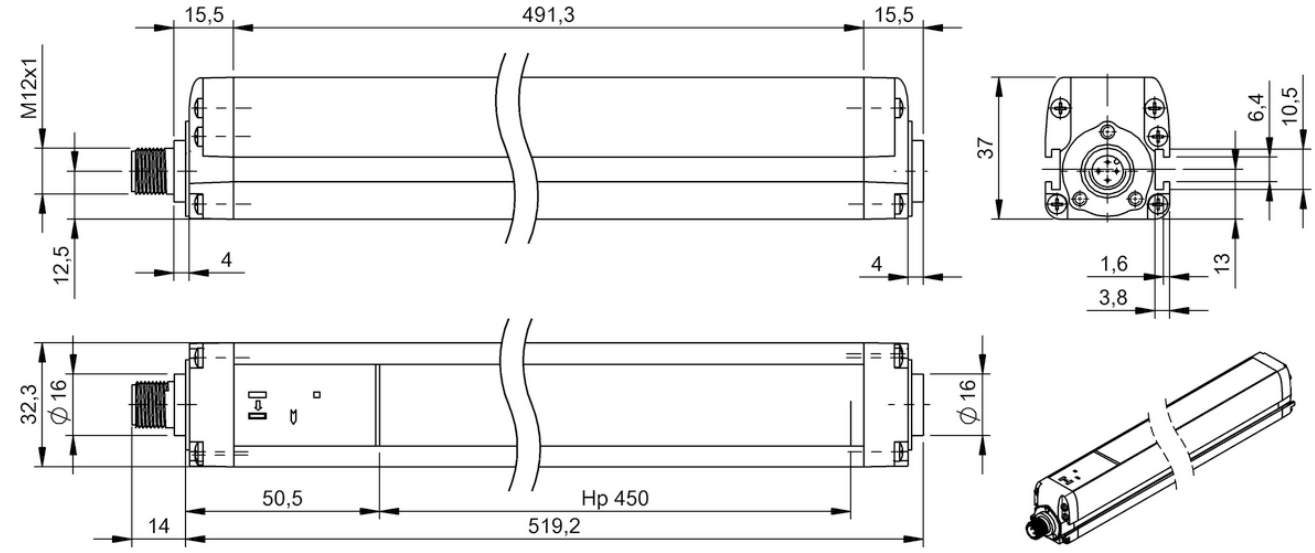
	BLG0016 BLG 4A-180-19X-030-001-SX				
	e				
	4				
	3				
	3				
	28 ms				
	TÜV, CE, cULus				
	non-contact (photoelectric)				
	30 mm				
	1800 mm				
	19 m				
	Emitter: M12x1-Male, A-coded				
	Receiver: M12x1-Male				
	2x PNP OSSD				
	32.3 x 1883.3 x 37 mm				
	0...55 °C				
	IP65				
	Aluminum				
	Seite 61				



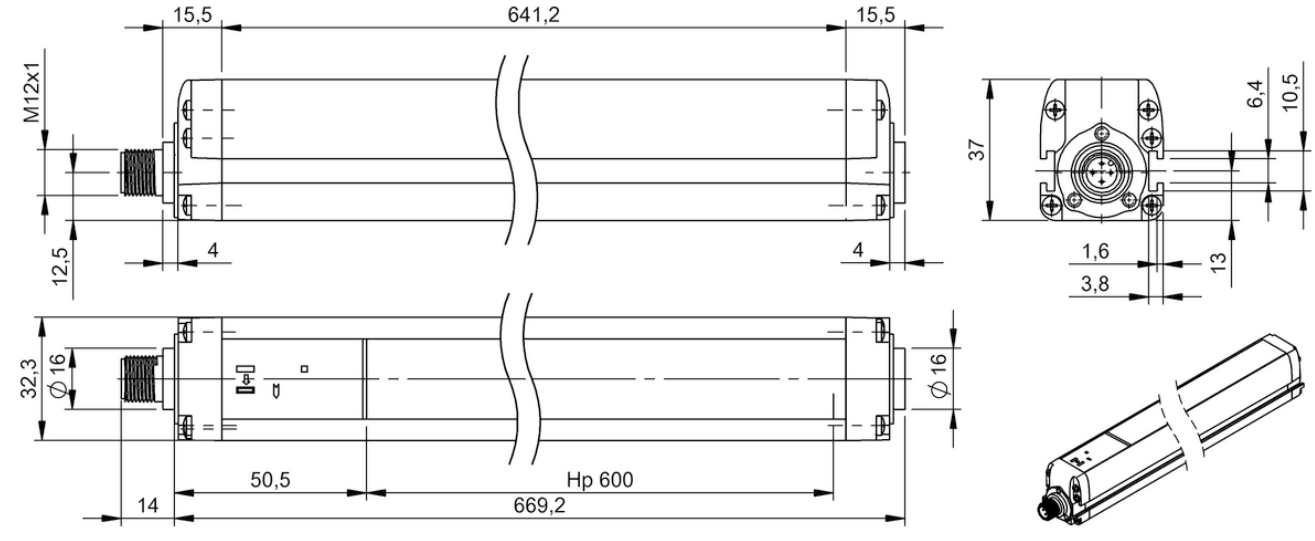
BLG000T



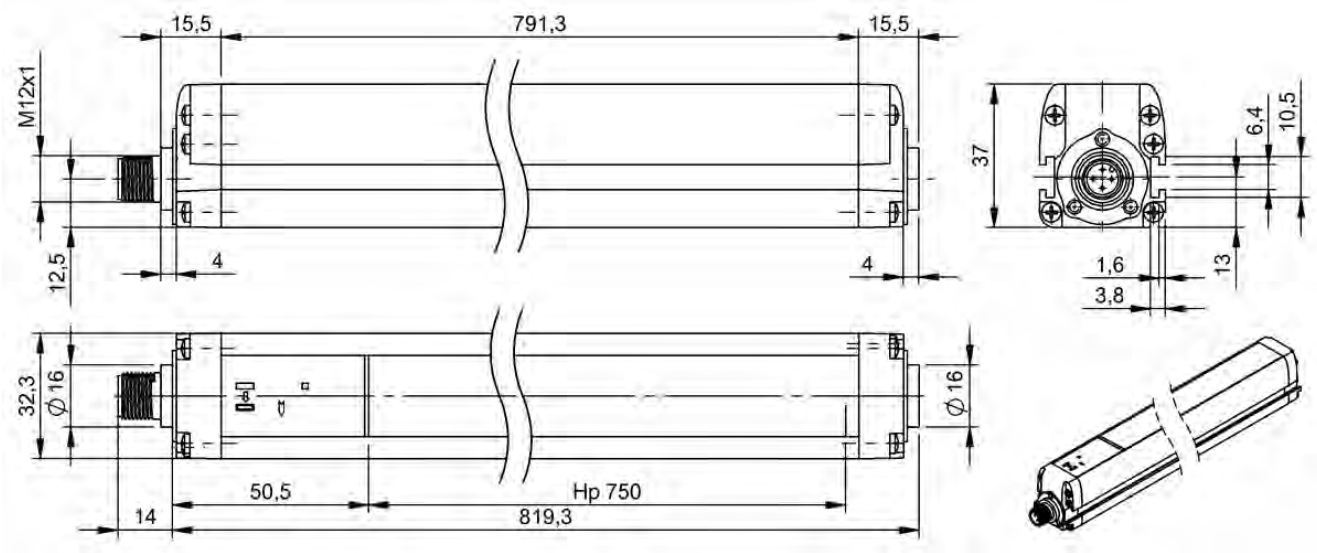
BLG000U



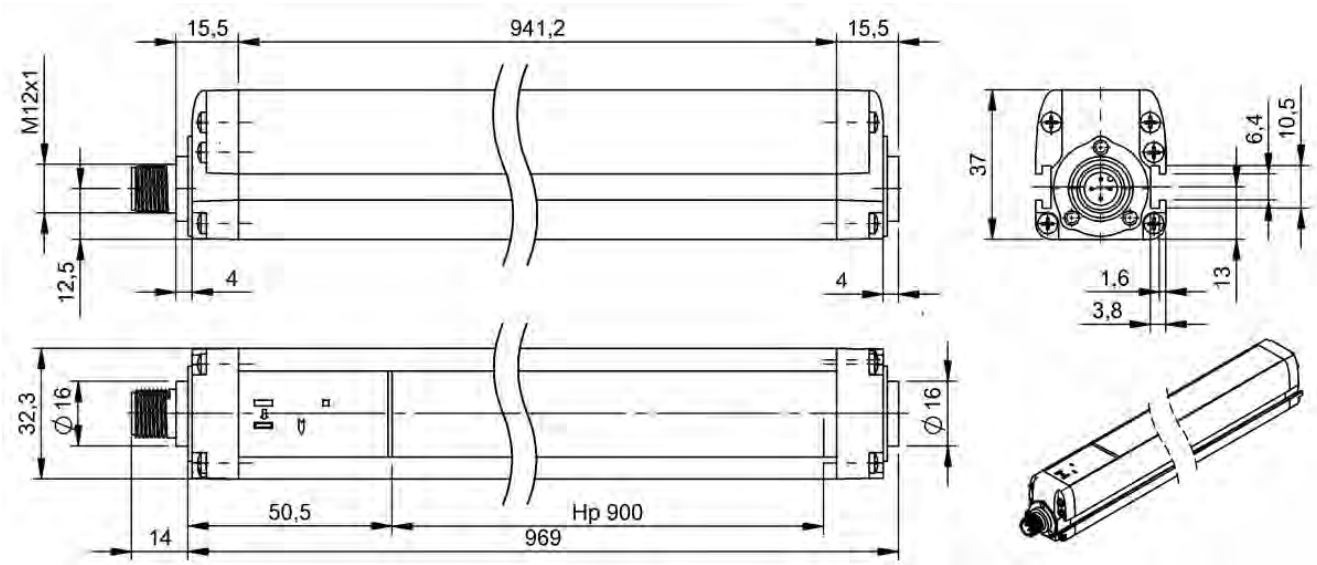
BLG000W



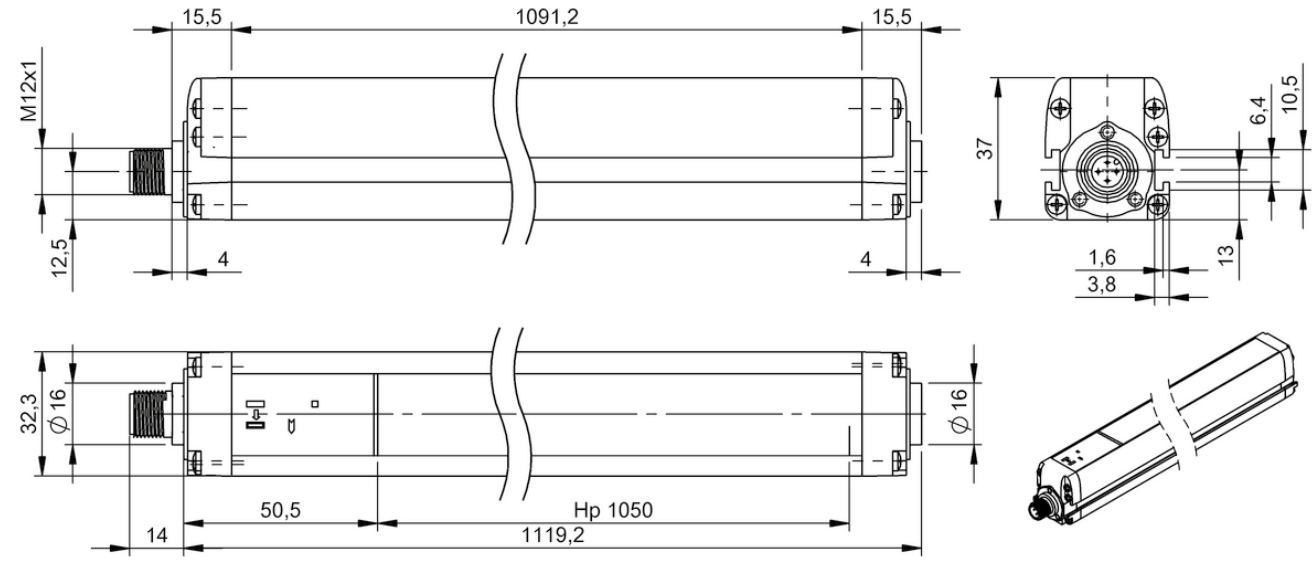
BLG000Y



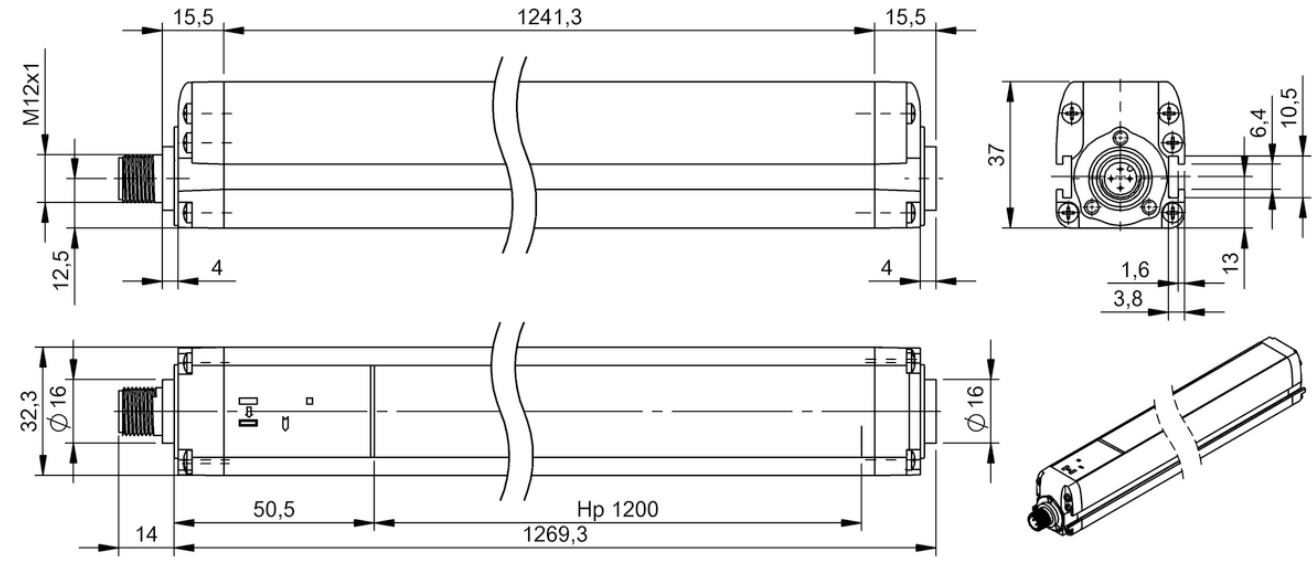
BLG000Z



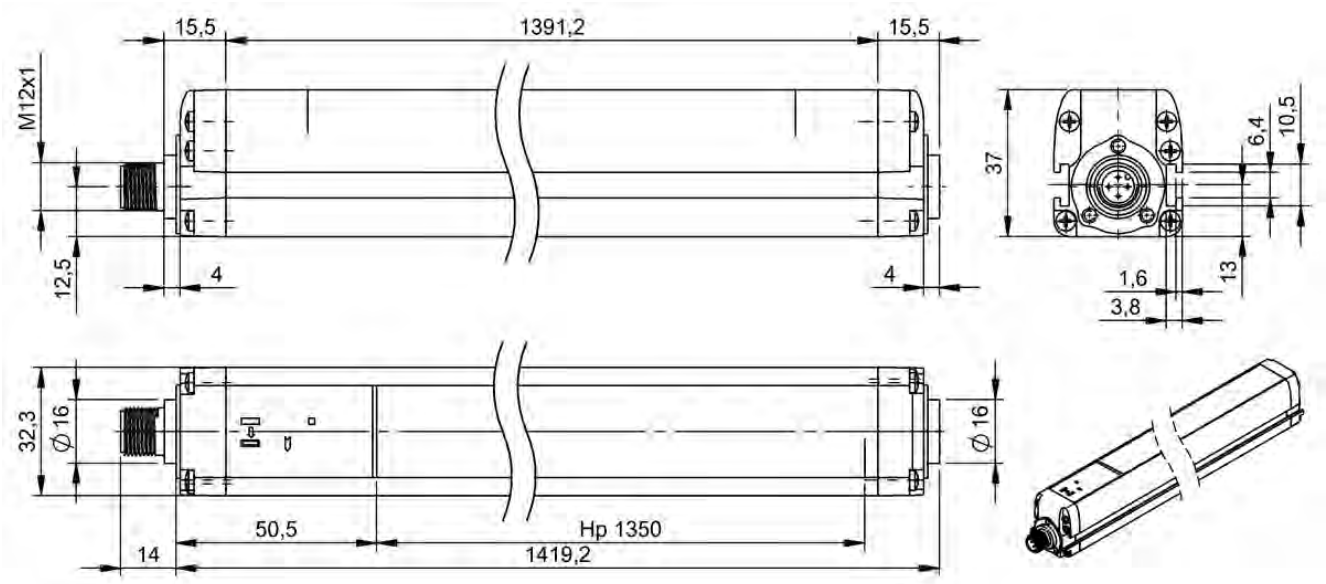
BLG0010



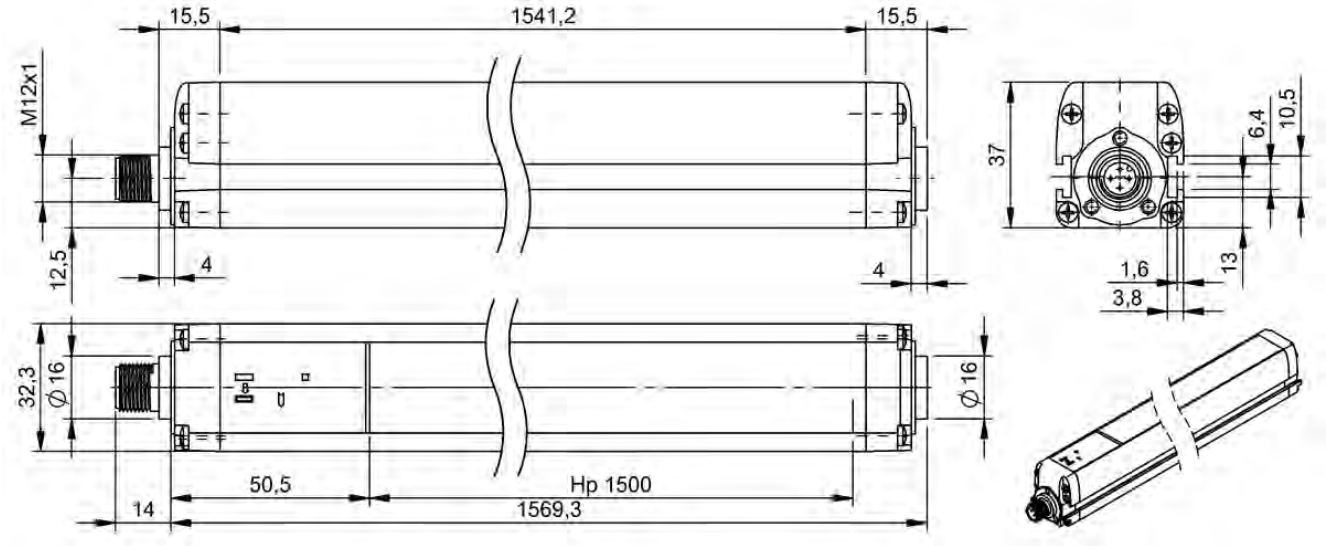
BLG0011



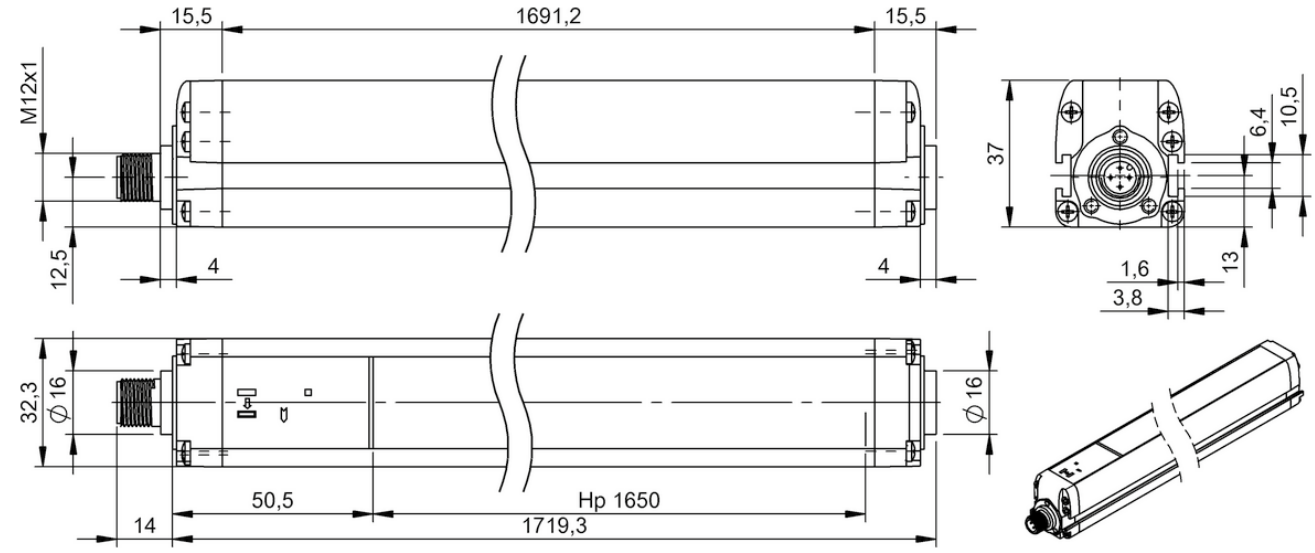
BLG0012



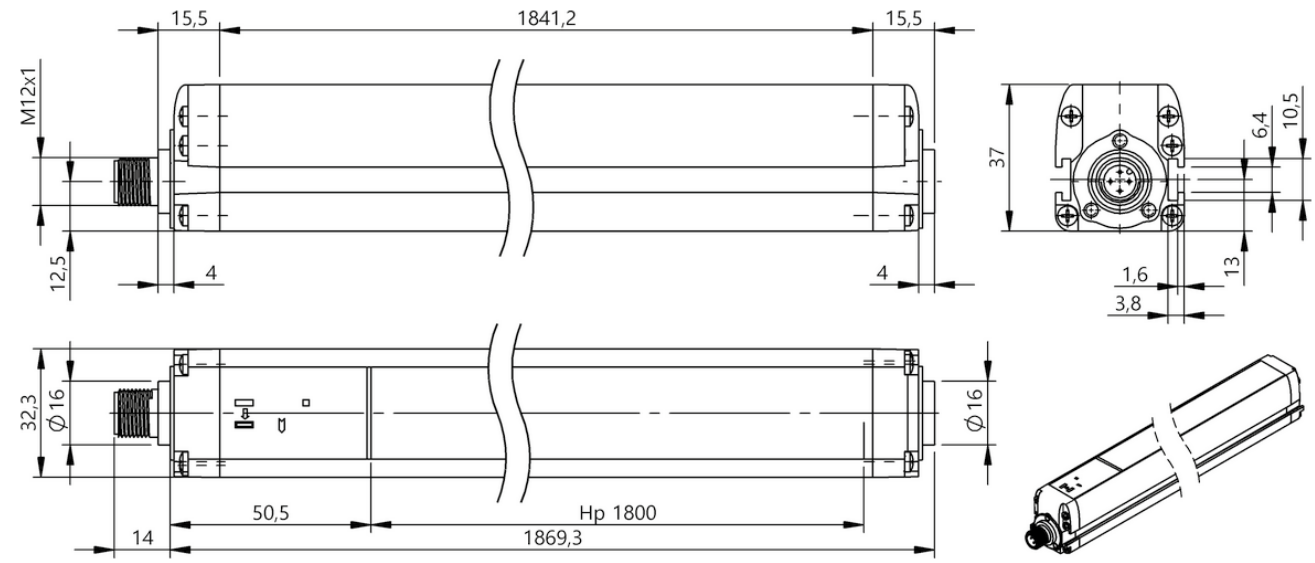
BLG0013



BLG0014



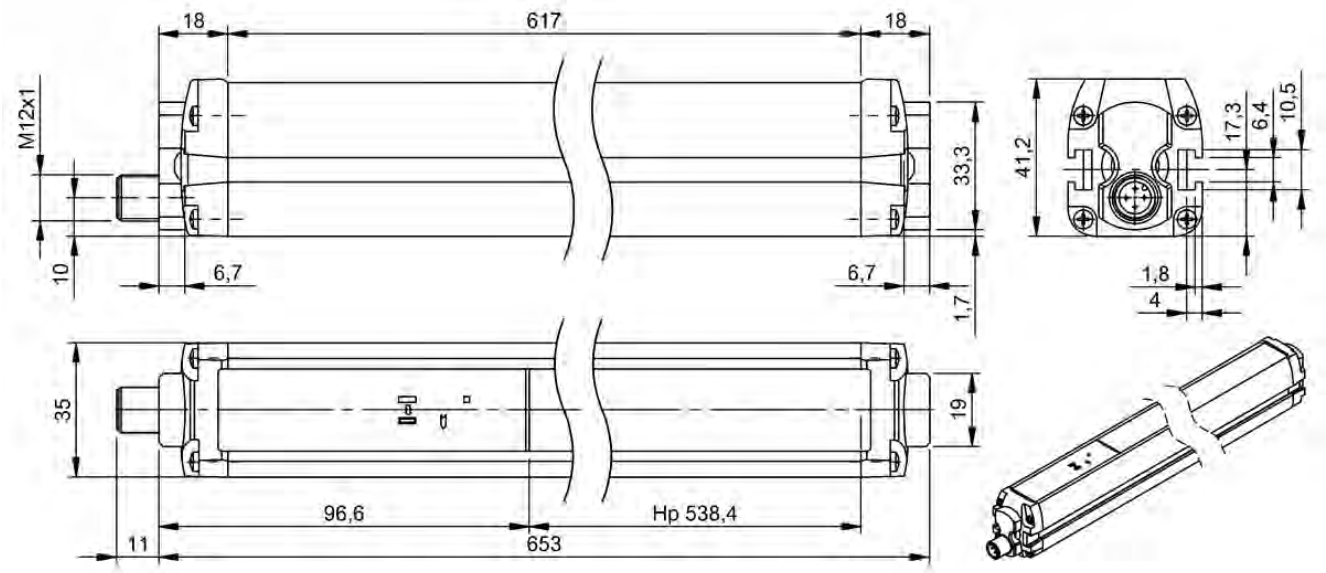
BLG0015



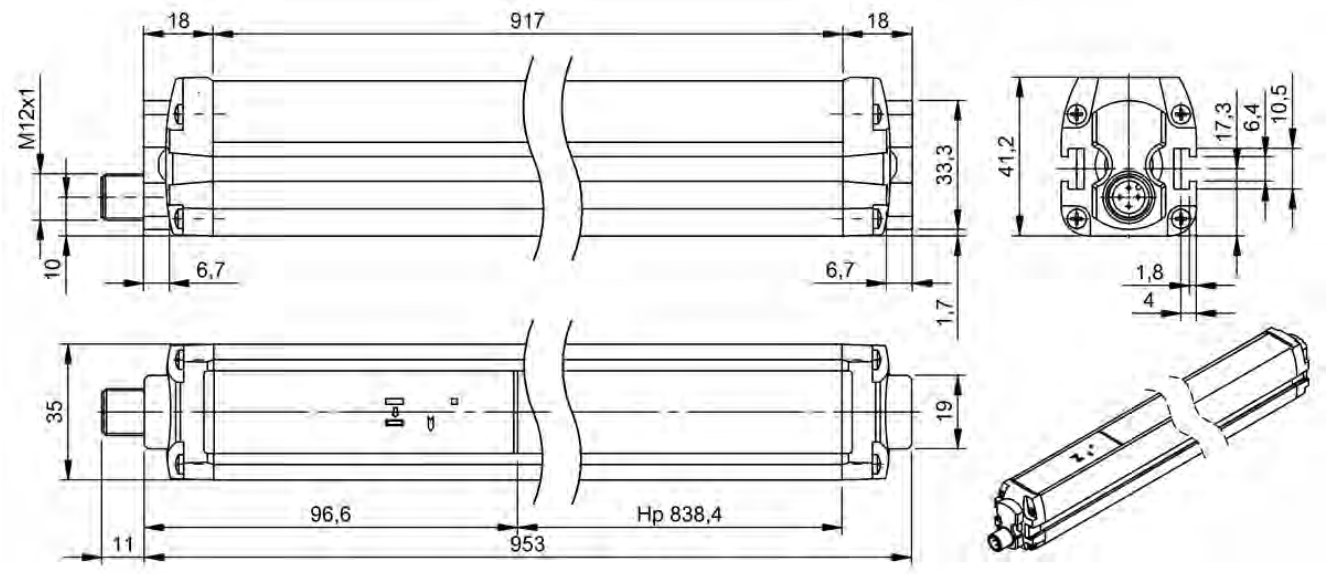
BLG0016

	BLG0006 BLG 4A-050-50X-B02-001-SX	
Performance Level	e	
Safety category (EN ISO 13849-1)	4	
SIL (IEC 61508)	3	
SIL CL (EN 62061)	3	
Response time max.	14 ms	
Approval/Conformity	TÜV, cULus, CE	
Operating principle	non-contact (photoelectric)	
Light beams, number	2	
Protective field height (Hp)	515 mm	
Range	50 m	
Connection 1	Emitter: M12x1-Male, A-coded	
Connection 2	Receiver: M12x1-Male, A-coded	
Switching output	2x PNP OSSD	
Dimension	35 x 664 x 41.2 mm	
Ambient temperature	-10...55 °C	
Protection degree	IP65	
Housing material	Aluminum	
Productview	Seite 64	

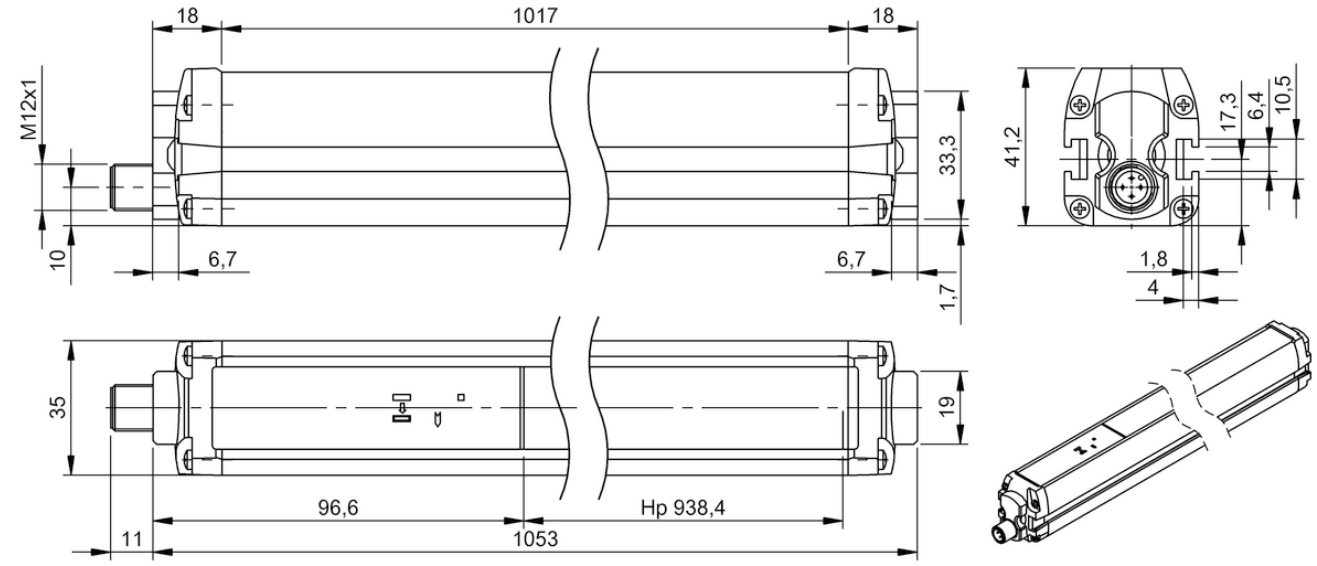
	BLG0007 BLG 4A-080-50X-B03-001-SX	BLG0008 BLG 4A-090-50X-B04-001-SX	BLG0009 BLG 4A-120-50X-B04-001-SX
	e	e	e
	4	4	4
	3	3	3
	3	3	3
	14 ms	16 ms	16 ms
	TÜV, cULus, CE	TÜV, cULus, CE	TÜV, cULus, CE
	non-contact (photoelectric)	non-contact (photoelectric)	non-contact (photoelectric)
	3	4	4
	815 mm	915 mm	1215 mm
	50 m	50 m	50 m
	Emitter: M12x1-Male, A-coded	Emitter: M12x1-Male, A-coded	Emitter: M12x1-Male, A-coded
	Receiver: M12x1-Male, A-coded	Receiver: M12x1-Male, A-coded	Receiver: M12x1-Male
	2x PNP OSSD	2x PNP OSSD	2x PNP OSSD
	35 x 964 x 41.2 mm	35 x 1064 x 41.2 mm	35 x 1364 x 41.2 mm
	-10...55 °C	-10...55 °C	-10...55 °C
	IP65	IP65	IP65
	Aluminum	Aluminum	Aluminum
	Seite 64	Seite 65	Seite 65



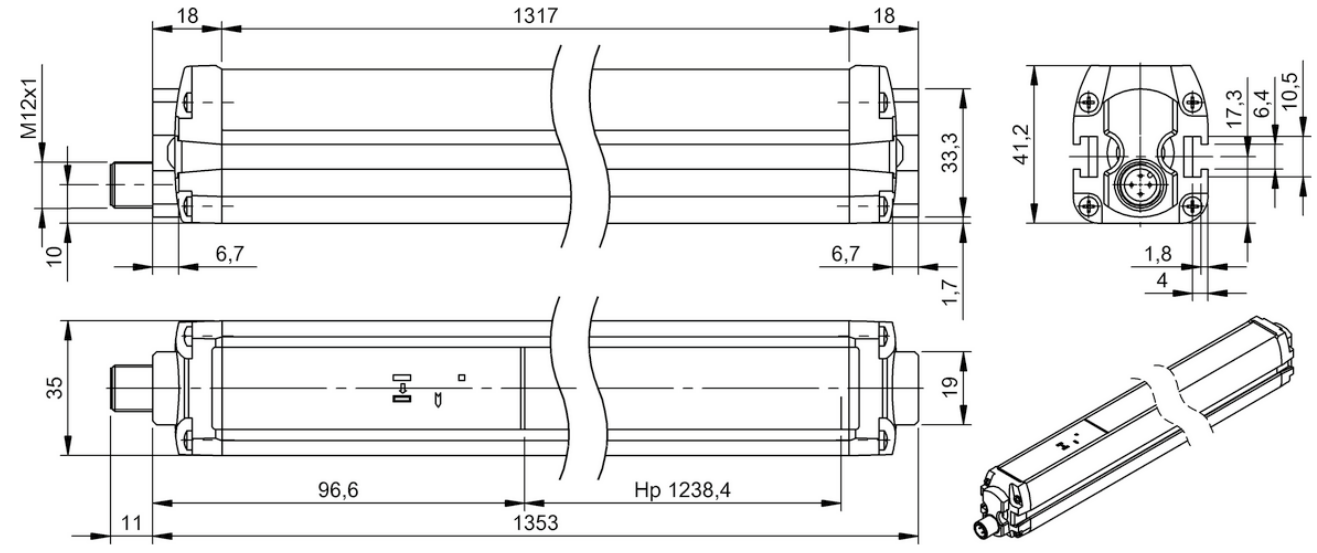
BLG0006



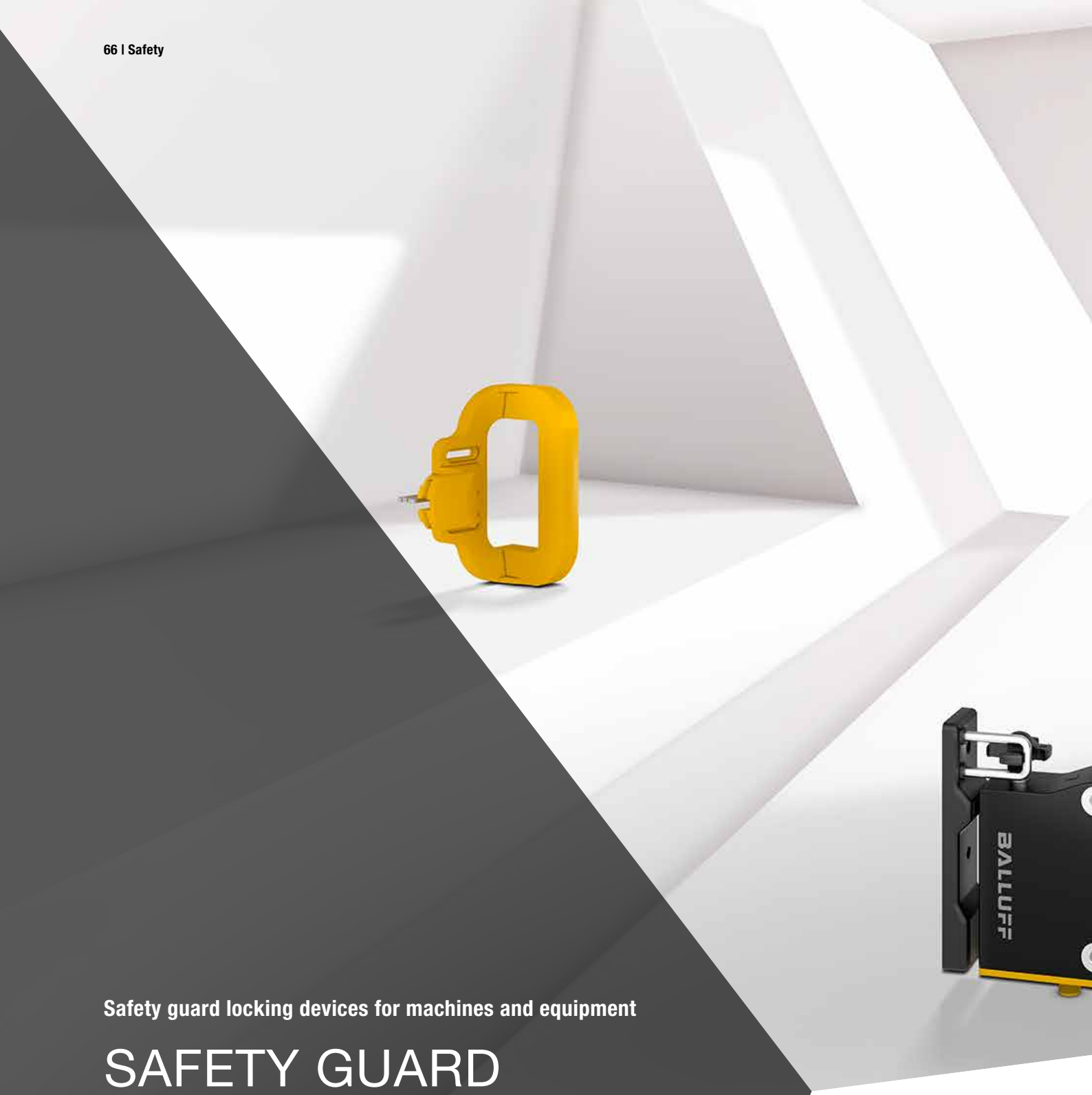
BLG0007



BLG0008



BLG0009



Safety guard locking devices for machines and equipment

SAFETY GUARD LOCKING DEVICES

Interlocking and guard devices from Balluff offer high holding forces of 1000 to 2500 newtons and ensure personal and machine protection. They are suitable for safety applications up to PLe/SIL3 and are an intelligent solution for preventing uncontrolled access to hazardous areas. Our safe interlocking devices feature a high coding level with great anti-tamper protection.

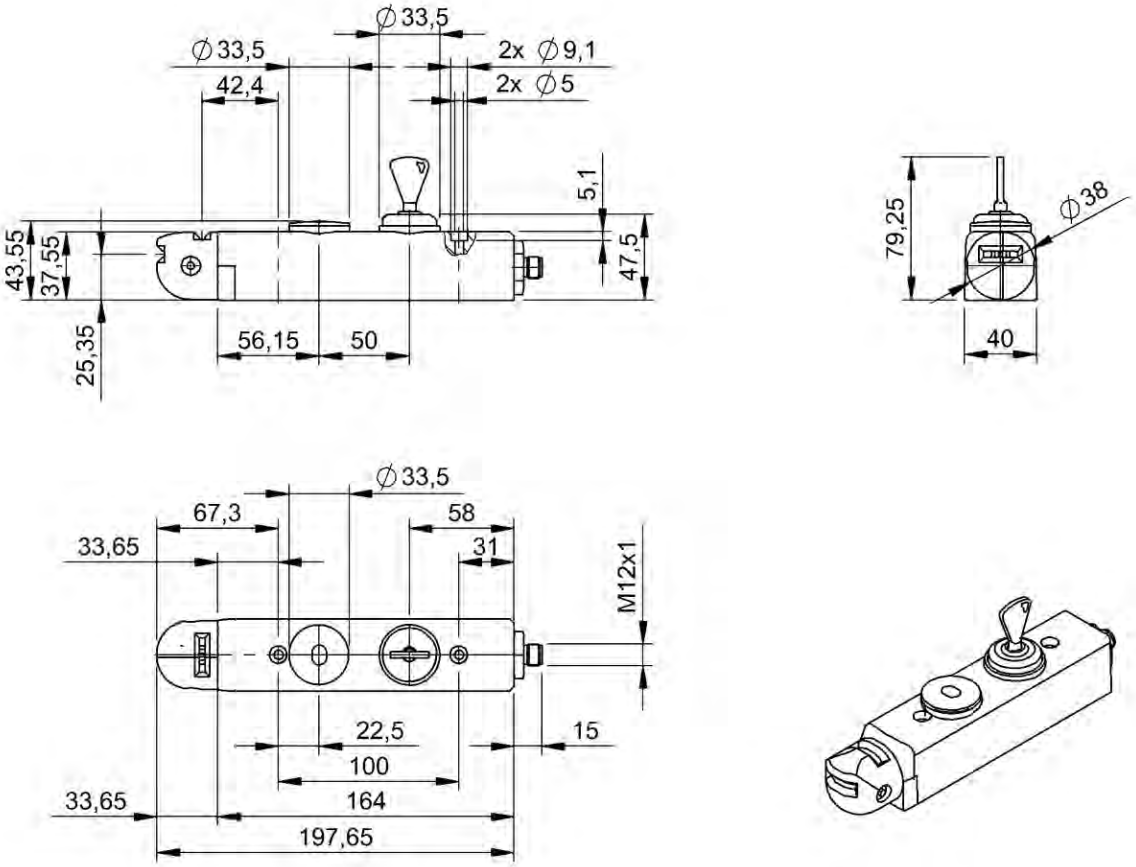
With the different operating principles available from Balluff you can enjoy a wide range of application possibilities. Choose from electromechanical or transponder-coded interlocking devices. It's also good to know that the rugged housings with LED indicator will stand up to harsh environments. This makes selecting the right solution easy.

The most important benefits

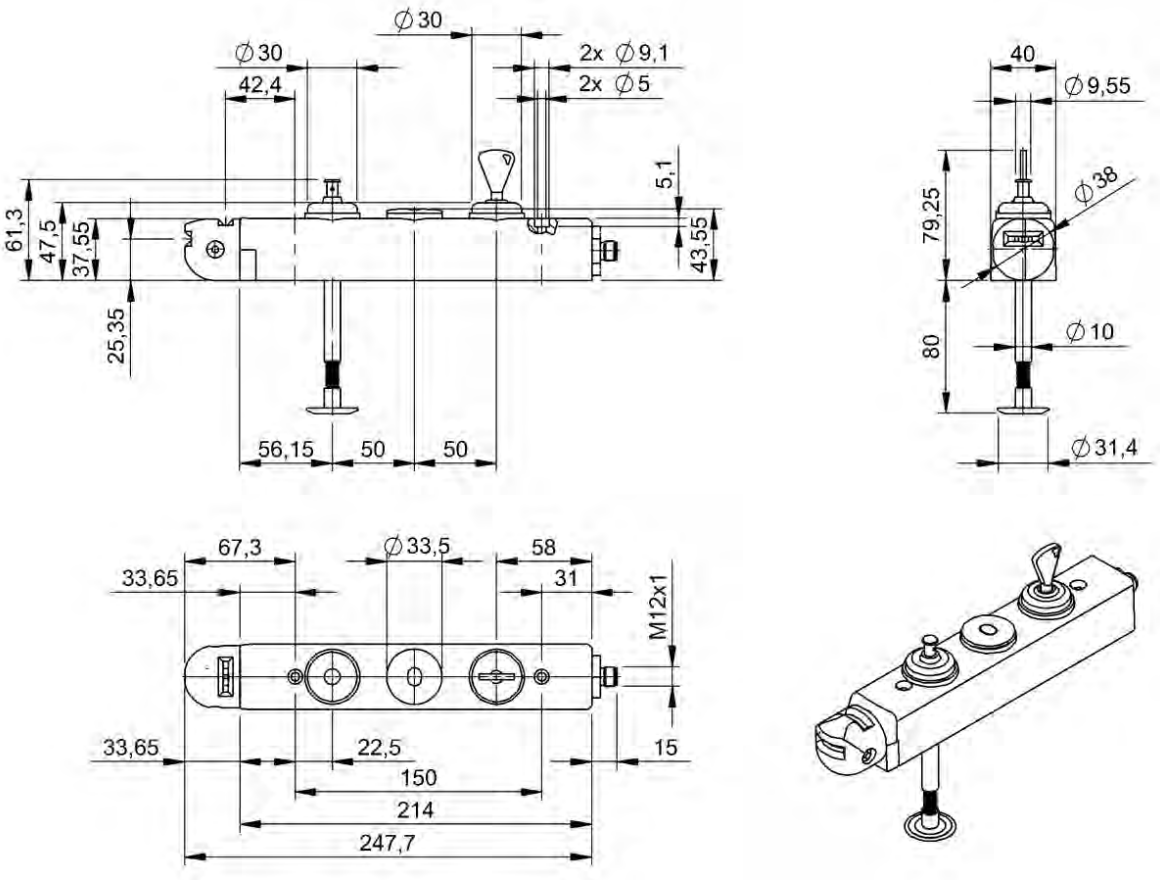
- Suitable for safety applications up to PLe/SIL3
- Insensitive to vibration and mechanical play
- Save installation and assembly time and money
- Also suitable for heavy protective equipment
- Manipulation-resistant
- Simple connections using standardized M12 connectivity

	BID0004 BID F101-2M1M3-M02AZ0-S115	
B10d (EN ISO 13849-1)	5 million Switching operations	
Coding level (EN ISO 14119)	low	
Approval/Conformity	CE, TÜV NRTL, TÜV, RoHS	
Operating principle	mechanical - force, contact	
No of contacts	2x positive opening	
Utilization category	AC-15, DC -13	
Approach direction	laterally + above	
Guard locking, principle	yes, spring force (power to unlock)	
Holding force FZH	2500 N	
Auxillary release	key	
Escape release	no	
Life expectancy mechanical	1 mil. switching operations	
Connection	Connector, M12x1 connector, 8-pin	
Dimension	40 x 197.7 x 47.5 mm	
Ambient temperature	0...40 °C	
Protection degree	IP65	
Housing material	Aluminum	
Productview	Seite 70	

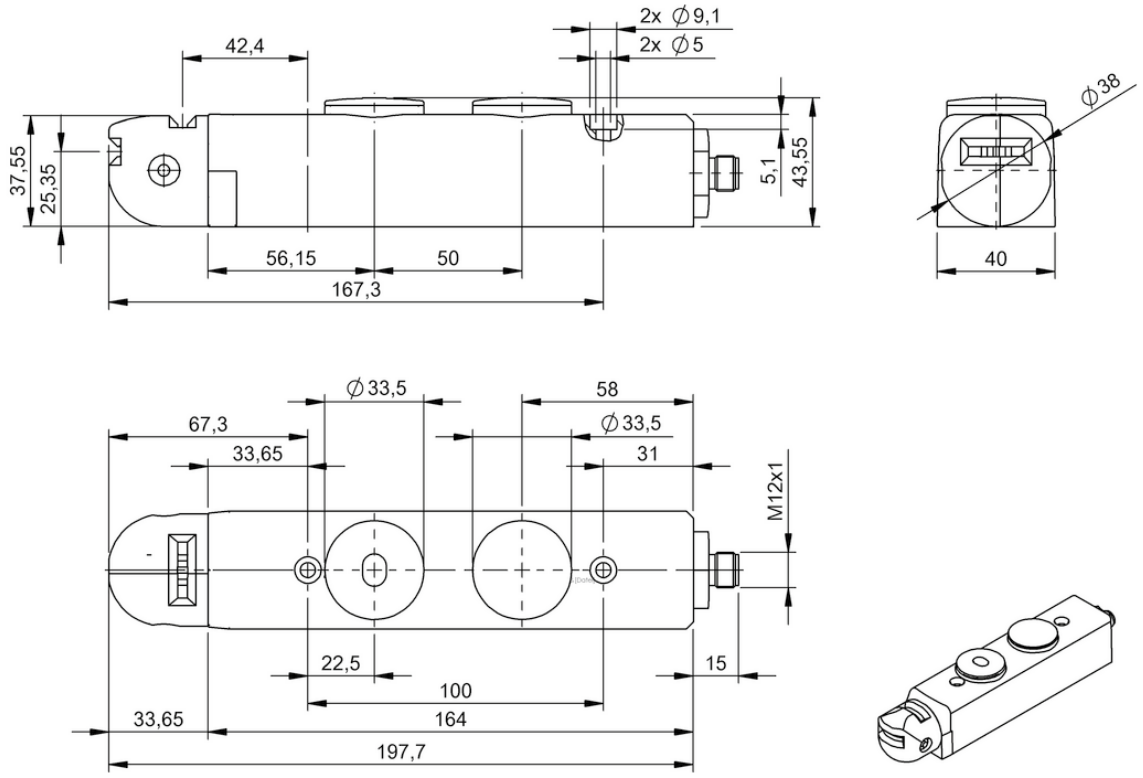
	BID0002 BID F101-2M1M3R-M02AZ0-S115	BID0003 BID F101-2M1E3-M02AZ0-S115	BID0001 BID F101-2M1E3R-M02AZ0-S115
	5 million Switching operations	5 million Switching operations	5 million Switching operations
	low	low	low
	CE, TÜV NRTL, TÜV, RoHS	CE, TÜV NRTL, TÜV, RoHS	TÜV NRTL, TÜV, CE, RoHS
	mechanical - force, contact	mechanical - force, contact	mechanical - force, contact
	2x positive opening	2x positive opening	2x positive opening
	AC-15, DC -13	AC-15, DC -13	AC-15, DC -13
	laterally + above	laterally + above	laterally + above
	yes, spring force (power to unlock)	yes, magnetic force (power to lock)	yes, magnetic force (power to lock)
	2500 N	2500 N	2500 N
	key	no	no
	yes	no	yes
	1 mil. switching operations	1 mil. switching operations	1 mil. switching operations
	Connector, M12x1 connector, 8-pin	Connector, M12x1 connector, 8-pin	Connector, M12x1 connector, 8-pin
	40 x 247.7 x 61.3 mm	40 x 197.7 x 44 mm	40 x 247.7 x 61.3 mm
	0...40 °C	0...40 °C	0...40 °C
	IP65	IP65	IP65
	Aluminum	Aluminum	Aluminum
	Seite 70	Seite 71	Seite 71



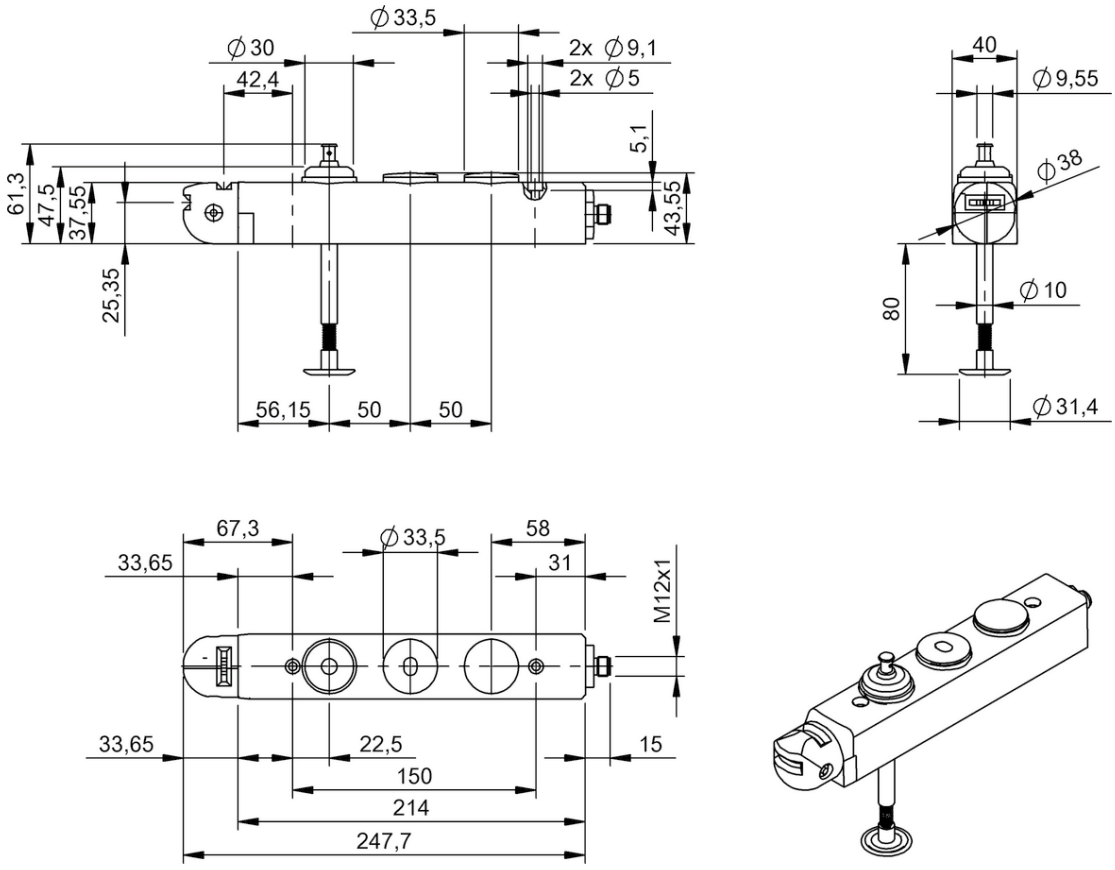
BID0004



BID0002



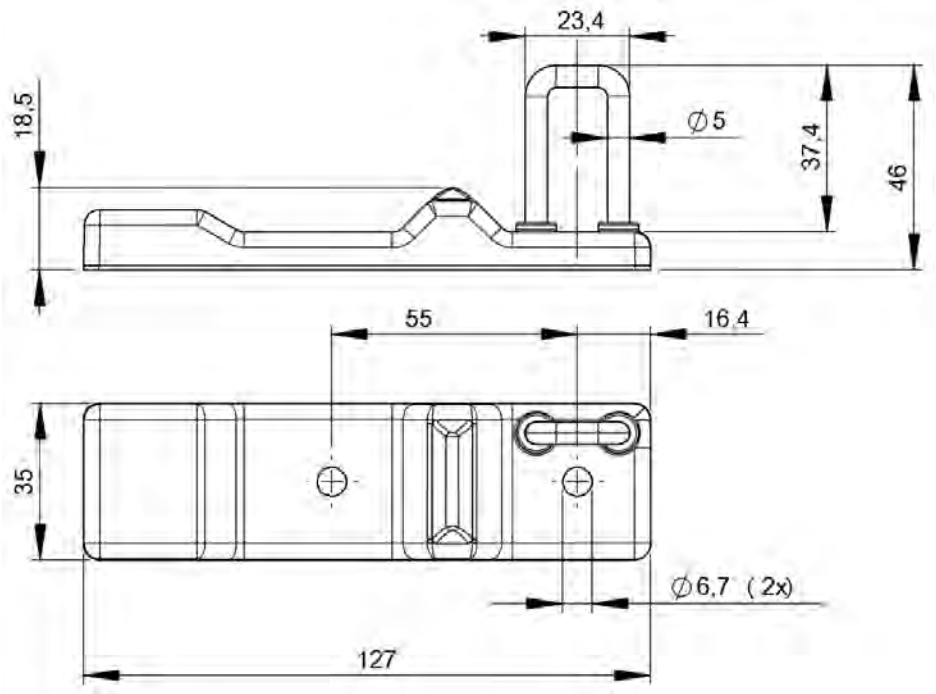
BID0003



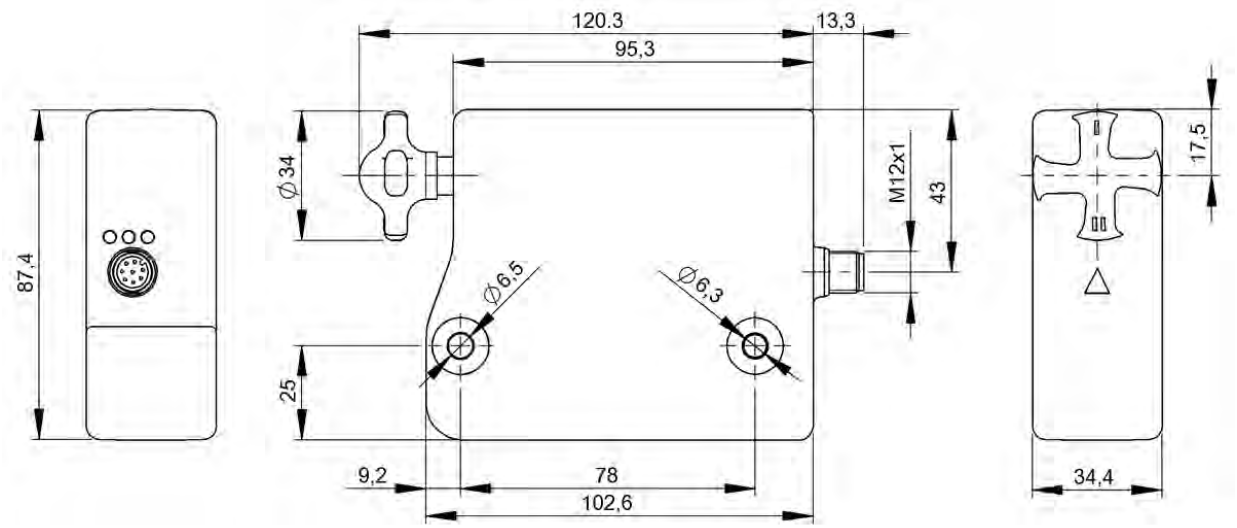
BID0001

	BID0010 BID Z01K-4R3M0	
Performance Level	—	
Safety category (EN ISO 13849-1)	—	
SIL (IEC 61508)	—	
SIL CL (EN 62061)	—	
Coding level (EN ISO 14119)	—	
Response time max.	—	
Approval/Conformity	Ecolab	
Operating principle	non-contact (RFID)	
Utilization category	—	
Approach direction	—	
Guard locking, principle	—	
Holding force FZH	—	
Auxillary release	—	
Escape release	—	
Life expectancy mechanical	—	
Connection	—	
Switching output	—	
Dimension	46 x 127 x 35 mm	
Ambient temperature	0...60 °C	
Protection degree	—	
Housing material	Thermoplastic, glass-fibre reinforced	
Productview	Page 74	

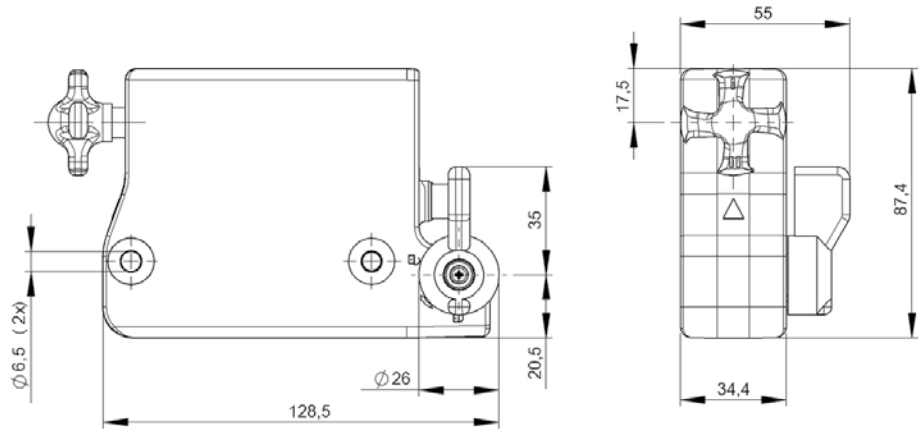
	BID0011 BID Z01K-4R3M3-002KZ0-S115	**BID0013** BID Z01K-4R3M3R-002KZ0-S115	**BID0012** BID Z01K-4R3E3-002KZ0-S115
	e (for locking function), d (for retention function)	e (for locking function), d (for retention function)	d (for retention function), e (for locking function)
	4 (for locking function), 2 (for retention function)	4 (for locking function), 2 (for retention function)	4 (for locking function), 2 (for retention function)
	3 (for locking function), 2 (for retention function)	3 (for locking function), 2 (for retention function)	3 (for locking function), 2 (for retention function)
	3 (for locking function), 2 (for retention function)	3 (for locking function), 2 (for retention function)	3 (for locking function), 2 (for retention function)
	high	high	high
	100 ms	100 ms	100 ms
	CE, cULus, TÜV, Ecolab	CE, cULus, TÜV, Ecolab	CE, cULus, TÜV, Ecolab
	non-contact (RFID)	non-contact (RFID)	non-contact (RFID)
	DC-12: 24 V/0.25 A, DC-13: 24 V/0.25 A	DC-12: 24 V/0.25 A, DC-13: 24 V/0.25 A	DC-12: 24 V/0.25 A, DC-13: 24 V/0.25 A
	lateral	lateral	lateral
	yes, spring force (power to unlock)	yes, spring force (power to unlock)	yes, magnetic force (power to lock)
	1000 N	1000 N	1000 N
	Screwdriver	Triangular Key	Screwdriver
	no	yes	no
	1 mil. switching operations	1 mil. switching operations	1 mil. switching operations
	Connector, M12x1, 8-pin	Connector, M12x1, 8-pin	Connector, M12x1, 8-pin
	2x PNP OSSD, PNP NC	2x PNP OSSD, PNP NC	2x PNP OSSD, PNP NC
	87.5 x 120 x 35 mm	87.5 x 129 x 35 mm	87.5 x 120 x 35 mm
	0...60 °C	0...60 °C	0...60 °C
	IP69, IP67, IP66	IP69, IP67, IP66	IP69, IP67, IP66
	Thermoplastic, glass-fibre reinforced	Thermoplastic, glass-fibre reinforced	Thermoplastic, glass-fibre reinforced
	Page 74	Page 75	Page 74



BID0010



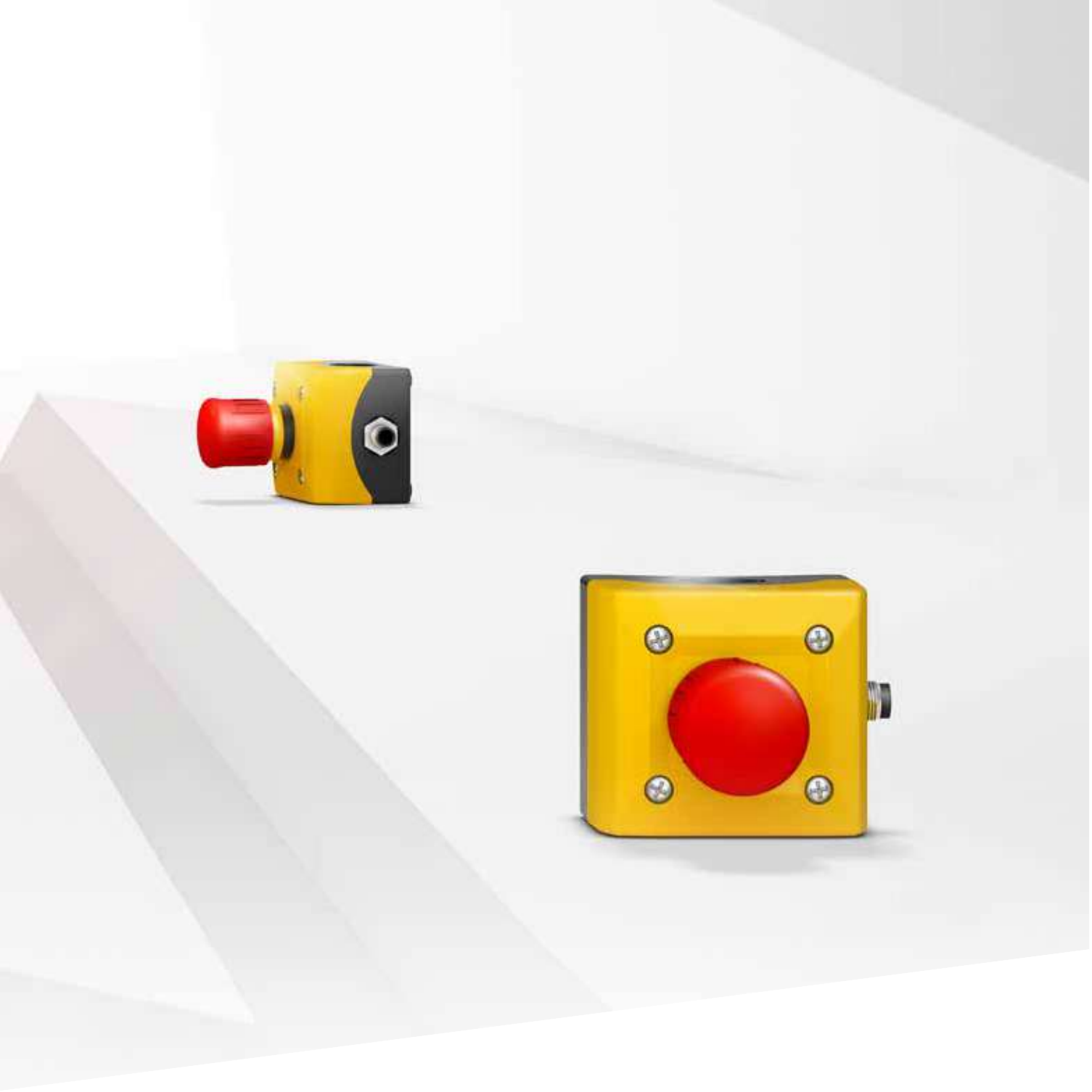
BID0011, BID0012



BID0013

Quickly stop machines at critical times

SAFETY COMMAND DEVICES



Safe operation of automatic machines and equipment falls under a company's due diligence responsibility. To be sure that in emergency situations machine hazards can be prevented or reduced, safety command devices such as E-Stop or E-Off units must be used. As a supplementary protective measure equipment must always include an E-Stop device – whether during installation, operation or maintenance. And regardless of whether this function is implemented as an E-Off (shuts off power) or an E-Stop (hazardous process or movement is stopped).

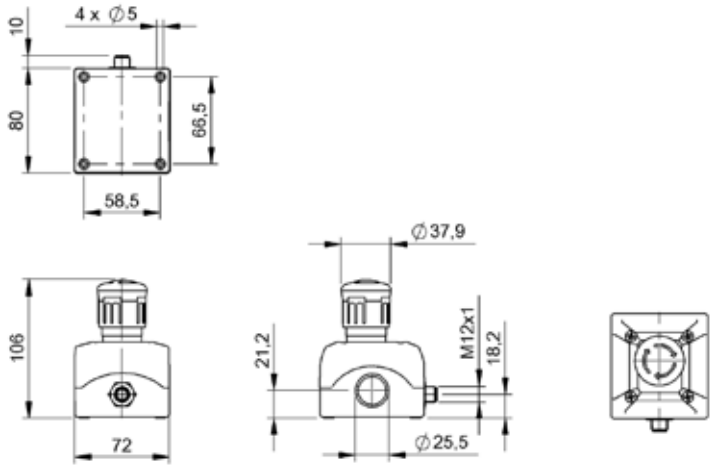
The safety command devices must be easy to reach, always available and functional, and should bring the machine to a safe condition immediately. Our highly visible command devices carry out an immediate E-Stop function when there is a malfunction. This makes them ideal for protecting both persons and machines.

The safety command devices from Balluff feature a compact housing, so that you can install them on various machines, even where space is at a premium. They are also quite easy to install.

The most important benefits

- Reliable disconnection of the power supply
- Positive opening operation compliant with IEC 60947-5-1, Addendum K
- Pluggable connection with M12 (5-pin)
- Turn-to-release mushroom pushbutton
- High degree of protection against dust and water
- Compact housing, easy installation

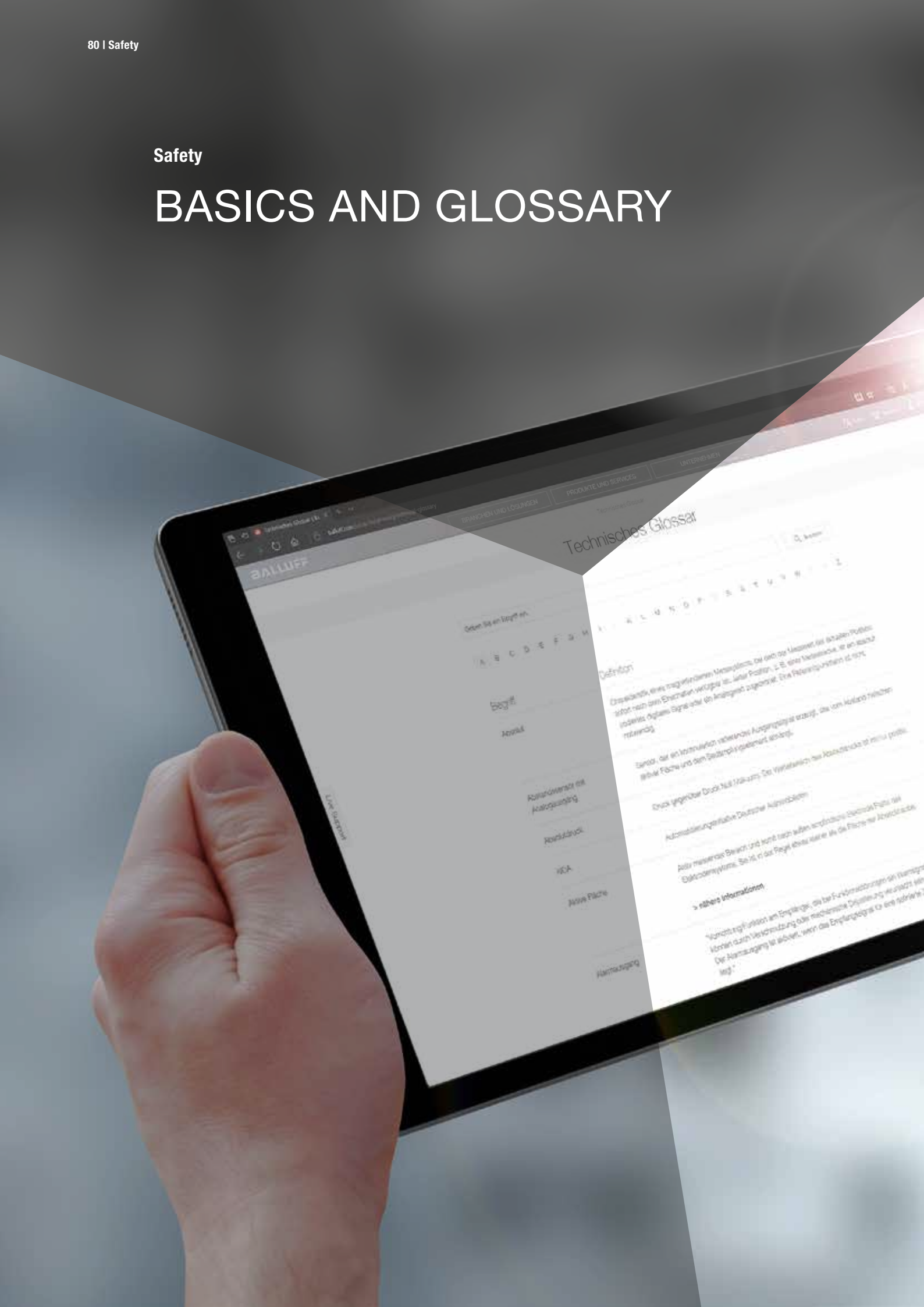
	BAM02HA BAM ES-XA-01D-01-R01-201-S92
B10d (EN ISO 13849-1)	0.1 million Switching operations
Approval/Conformity	UL CERTIFIED, CE, TÜV
Operating principle	PIM-Export ERROR: Attribute failed
No of contacts	2x positive opening
Utilization category	AC-15, DC -13
Type of release	Turning
Life expectancy mechanical	0.06 million Switching operations
Connection	M12x1-Male, 5-pole, A-coded
Dimension	80 x 106 x 72 mm
Ambient temperature	-25...70 °C
Protection degree	IP65
Housing material	Plastic
Productview	Page 79

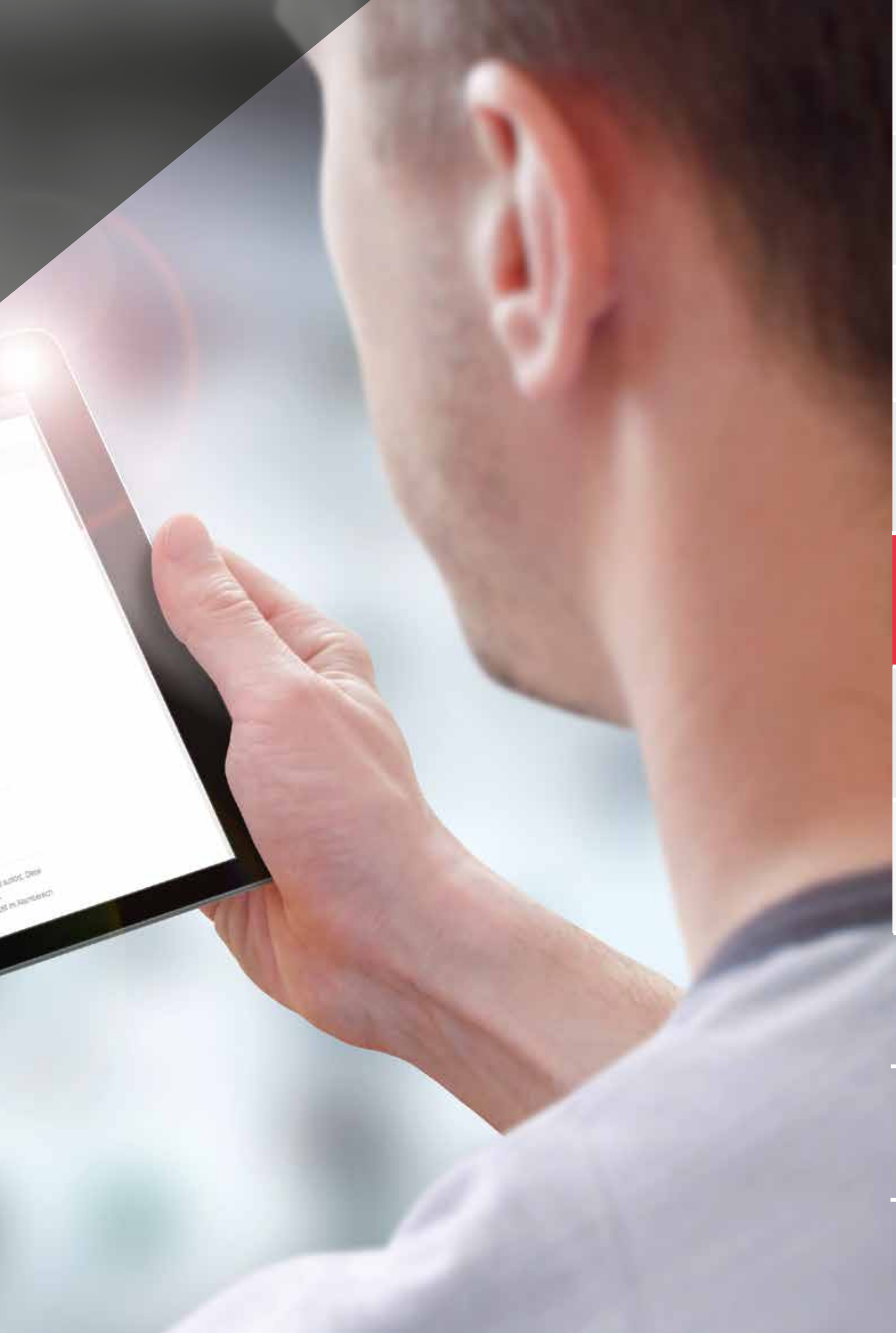


BAM02HA

Safety

BASICS AND GLOSSARY





AOPD	Active opto-electronic protective devices (e.g. light curtains)	DIN EN ISO 13849-1, EN ISO 12 100
AOPDDR	Active opto-electronic protective device responsive to diffuse reflection (e.g. laser scanners)	DIN EN ISO 13849-1, EN ISO 12 100
Open-circuit principle	Using the example of an interlock: when the actuator is plugged in, the current circuit of the safety contacts is closed when the solenoid is energized, causing the device to lock. If the voltage is eliminated from the solenoid, the safety contacts are opened and the locking mechanism is released. See also "Closed-circuit principle"	
Failure	The inability of a unit to fulfill a required function	DIN EN ISO 13849-1, EN ISO 12 100
β	Is the common cause failure factor for undetectable dangerous faults λ_{DU}	IEC 62061
B_{10d}	Number of cycles until 10 % of the components fail dangerously	DIN EN ISO 13849-1
Construction types (of interlocks)	**Type 1:** Interlock with mechanically actuated position switch with non-coded actuator (e.g. interlock with hinge) **Type 2:** Interlock with mechanically actuated position switch with coded actuator (e.g. tongue actuated position switches) **Type 3:** Interlock with non-contract actuated position switch with non-coded actuator (e.g. proximity switches) **Type 4:** Interlock with non-contract actuated position switch with coded actuator (e.g. RFID transponder actuated position switches)	DIN EN ISO 14119
User information (illustrative safety)	All of the information required for safe and proper use of the machine. It informs the user of the residual risk and warn him of it.	EN 12100

ESPE	Electro-sensitive protective equipment	EN 61496
CCF	Common cause failure, a specific type of dependent failure where several failures result from a single shared cause.	DIN EN ISO 13849-1
CE marking	Indication from the manufacturer, distributor or EU-Representative that declares a product in compliance with EU regulation 765/2008, meaning the product meets the prevailing requirements as specified in the harmonization legislation of the Union regarding its affixing.	EU regulation 765/2008, EU regulation 765/2008
Coding	Connectors are designed to be reverse polarity protected.	DIN EN ISO 13849-1, IEC 62061, IEC 61508-2:2000
Coding levels (of interlocks)	The coding of actuators/tags is intended to prevent the interlocking device to be defeated using easily available means. Low coding = 1 to 9 different codes Medium coding = 10 to 1000 different codes High coding = > 1000 different codes	EN ISO 14119
CRC	Cyclic redundancy check, procedure for determining a check value for data in order to detect errors in transmission or saving.	
DC	Diagnostic coverage indicator of the probability that the errors will be revealed by means of a test. Safety systems must be tested so that one knows whether they still function. The diagnostic coverage depends on the quality of the test. Poor tests cover only a few, whereas good tests cover many or even all errors. DC = $\sum\lambda dd/\lambda dtotal$	DIN EN ISO 13855
DCavg	Average diagnostic coverage DC: Measure of the effectiveness of the diagnostics, which can be determined as the ratio of the failure rate of the detected hazardous fault and the fault rate of the total dangerous failures.	DIN EN ISO 13849-1
Diversity	Having multiple means for performing a required function. Diversity-redundant systems can increase reliability.	DIN EN 61508-4, VDE 0803-4

E/E/PES	Functional safety of electrical/electronic/programmable electronic safety-related systems	DIN EN 61508
EDM	Monitoring of controlled actuators, feedback circuit	
Supplementary protective measures (indirect safety) (indirect safety measures)	Standards that must be taken to protect persons from hazards which cannot be sufficiently prevented or where the risks cannot be sufficiently limited.	EN 12100
Broken spring	A failure in a mechanical switching element that can result in a malfunction.	
Error	Condition of a unit characterized by its inability to perform a required function. Not to be confused with "tampering"	DIN EN ISO 13849-1, EN ISO 12100
FIT	Failure in time: A singular failure per 10^9 hours, or one failure per 114,000 years.	DIN EN ISO 13849-1
Escape release	Ability for manual unlocking of the interlocking device without aid from inside the protected area in order to exit this area.	DIN EN ISO 14119
FMEA	Failure mode effects analysis	DIN EN ISO 13849-1, EN ISO 12100
Functional safety	The part of overall safety which depends on the correct function of the E/E/PE safety related system for risk reduction	DIN EN 61508-4 VDE 0803-4
Hazard/risk	Potential source of damage	DIN EN ISO 13849-1
Hazardous area (risk area)	Any area in a machine and/or around a machine in which a person can be subjected to a hazard.	EN ISO 12100
Strict liability	The liability for damages resulting from a permissible risk (e.g. operation of a hazardous device, keeping of a house pet). Strict liability does not depend on the illegality of the action or on the fault of the injuring party.	§§ 1, 10 ProdHaftG – Manufacturer of a (defective) product

Device types	Devices which are evaluated as a system first by the design process of the user are Device Type 2 or 3. Type 1 or Type 4 have been developed directly for use in a safety function. **Device Type 1:** Devices are ready to use safety devices with integrated diagnostics. These are already classified as SIL or PL. Examples: Safety light curtain, safety light grid, components for safety controllers, safe drives/drive functions, safety switching devices **Device Type 2:** Devices where the user must himself evaluate the device in terms of its safety. This requires additional application data (circuit structure, DC, CCF). Examples: Non-safe electronics, e.g. operational amplifier, proximity switch, pressure sensor, hydraulic valve **Device Type 3:** Devices are subject to wear. The user must provide additional application data for evaluating the safety function (switching frequency, actuation frequency, circuit structure, DC, CCF). Examples: Wear-prone electro-mechanical components, including power contactors, switches, pneumatic valves, interlocking devices, command devices **Device Type 4:** A special case of Device Type 1. For Device Type 4 the probability of a dangerous failure per hour PFHD = 0. The fault is either precluded or the fault always results in a safe state.	EN 62061, VDMA 66413 standard sheet
GSD file	General station description, a file which describes the features of a device type uniquely and fully in an exactly specified format. The GSD is generated individually for each device type by the manufacturer and provided to the user as a file for designing Profinet systems.	
GSDML	GSD Markup Language is a language for describing Profinet IO field devices. See also "GSD file"	
HFT	Hardware fault tolerance: Ability to still perform a required function in the presence of errors or failures	DIN EN 62061, VDE0113-50
Auxiliary Release	The manual unlocking of the interlocking device using a tool or key from outside the protected area in case of a malfunction. An interlocking device with auxiliary release is not suitable for emergency release or escape release of the interlocking device.	DIN EN ISO 14119

Inherent safety	Direct intrinsic safety: A design that prevents hazards or reduces risks through suitable selection of design features of the machine itself.	EN 12100
Placing on the market	Includes the responsibility if a distributed product does not comply with the relevant regulations.	MaschRL 2006/42/EG Article 5
IODD Checker	A tool that tool checks not only the schema conformity, but also all the rules of the IODD specification which cannot be checked using an XML schema.	EN 12100
IODD	IO device description concerning sensors and actuators in an IO-Link network. It contains information for identification, device parameters, process and diagnostics data, communication properties and the structure of the user interface in engineering tools.	ISO 15745
IO-Link	IO-Link is the standardized IO technology for communicating with sensors and actuators. IO-Link is not a fieldbus, but rather a point-to-point communication based on the long-familiar 3-conductor sensor and actuator connection.	IEC 61131-9
Iterative process	A process of repetition of the same or similar actions for approaching a solution or particular goal.	DIN EN ISO 13849-1
Category [Cat.]	Categorization of the safety-related parts of a controller with respect to their resistance to errors and their behavior following an error. Categories are based on the structure of the arrangement of the parts, the error detection and/or their reliability.	IEC 61131-9
Conformity	Declaration by the manufacturer that the distributed machine complies with all the relevant safety and health requirements.	MaschRL 2006/42/EG Article 7/12

λ (lambda)	Failure rate in [FIT] = 10^{-9} 1/h	IEC 62061
λ_d	Failure rate in the unsafe (hazardous) direction	IEC 62061
λ_{dd}	Failure rate in the unsafe (hazardous) direction; the failure is however detected through diagnostic means before it can have a hazardous effect.	IEC 62061
λ_{du}	Failure rate in the unsafe (hazardous) direction; the failure is not detected	IEC 62061
Λ_s (also: λsafe)	Failure rate in the safe direction	IEC 62061
Tampering	Intentional defeating or by-passing of protective devices and their components	Addendum 1 No. 2.8 BetrSichV
MTTFd	Mean time to failure: Expected value of the average time until a dangerous failure	DIN EN ISO 13849-1
MTTR	Mean time to repair	
Muting	Temporary automatic suppression of one or more safety functions by the SRP/CS	DIN EN ISO 13849-1
NC	Normally closed contact	
NO	Normally open contact	
Emergency unlocking	Ability for manual unlocking of the interlocking device in emergency cases without aids from outside the protected area. An interlocking device with emergency unlocking can for example be required for freeing enclosed persons or for fire fighting.	

OSSD	Output Signal switching device	EN 61496-1
PDDB (formerly PDF)	Proximity switch with defined behavior under fault conditions	DIN EN 60947-5-3:2014-12, VDE 0660-214:2014-12
PL	Performance level: Discrete level which specifies the capability of safety-relevant parts of a controller for performing a safety function under predictable conditions	DIN EN ISO 13849-1
Personal protection	Use of an interlocking device for protecting a person from a hazard. (See also "Process protection")	
PFD	Probability of failure on demand	EN IEC 61 508-1/-7:2001
PFD(T)	Probability of a hazardous failure on demand at time T. (T generally refers to the proof test interval)	
PFDav	Average probability of failure on demand	
PFH	Probability of (dangerous) failure per hour	
PFHd	Probability of a dangerous failure per hour of a safety system or sub-system	DIN EN 62061, VDE 0113-50
PIPD	Passive infrared protective device	
Product liability	Liability for damages compensation on the part of the manufacturer for damages to the end user resulting from a defective product	§4 Par. 1 Sentence 1 ProduktHaftG
Profisafe	How safety devices (E-Stop buttons, light grids, overfill prevention systems etc.) safely communicate with safety controllers over Profibus.	

Process protection	Use of an interlocking device for protection against interruption of the work process. See also "Personal protection"	DIN EN 62061, VDE 0113-50
PTE	Probability of transmission error: Probability of a hazardous transmission error	EN 61508, EN 62061
RDF	Ratio of dangerous failures (= λD/λ)	VDMA 66413 standard sheet
Response time (for devices)	Time between action and reaction Example for safe I/O module: – Time between detection of a (state) change on the input port and the availability of this information on the communication interface (IO-Link) – Time between detection of new information on the communication interface (IO-Link) and its implementation on the output port	EN 61508, EN 62061
Redundancy	Reproducing critical components or functions of a system in order to increase reliability	IEC 61784-3
Residual risk	Risk remaining after protective measures have been taken	DIN EN ISO 13849-1, ISO 12100
Risk analysis	Combination of determining the limits of the machine, identifying the risk, and risk assessment	DIN EN ISO 13849-1, EN ISO 12100
Risk assessment	Totality of the process which includes a risk analysis and risk assessment	DIN EN ISO 13849-1, EN ISO 12100
	Assessment based on the risk analysis as to whether the goals for risk reduction were achieved	DIN EN ISO 13849-1, EN ISO 12100
Risk estimation	Determination of the probable extent of damage and probability of its occurrence	EN ISO 12100-1, DIN EN 1050

Risk graph	Means for classifying risk. Determines which PL or SIL results from a given case. Factors include severity of the injury, frequency and/or duration of exposure to the hazard, and possibilities for preventing the hazard	DIN EN ISO 13849-1, DIN EN 62061
Closed-circuit principle	Using the example of an interlock: when the actuator is plugged in the current circuit of the safety contacts is closed when the solenoid is energized, so that the device locks. The principle of circuit design where a normally energized electric circuit which, on being interrupted or deenergized, will cause the controlled function to assume its most restrictive condition. See also "Open-circuit principle"	
Safe stop 1 SS1	Corresponds to Stop Category 1 pursuant to IEC 60204. See also "Stop category"	IEC 60204-1
Safe stop 2 SS2	Corresponds to Stop Category 2 pursuant to IEC 60204. See also "Stop category"	IEC 60204-1
Safe torque OFF STO	Corresponds to Stop Category 0 pursuant to IEC 60204. See also "Stop category"	IEC 60204-1
Damage	Physical injury and/or damage too health or objects	DIN EN ISO 13849-1, DIN EN 61508-4, VDE 0803-4
Protection devices	Protective device or guard for protecting persons from possible dangers of a machine.	EN ISO 12100
Protection field	Area in which a specified test body is detected by the protective device	DIN EN ISO 13855
Protective measure	Measure which provides for risk reduction	DIN EN 62061, VDE 0113-50
SFF	Safe failure fraction: Fraction of the total failure rate of a sub-system which results in a non-dangerous failure	DIN EN 61508-4, VDE 0803-4, DIN EN 62061, VDE 0113-50

Safety function	Function of a machine whereby a failure of the function can result in an increased risk (or risks)	DIN EN ISO 13849-1, EN ISO 12100
SIL	Safety integrity level discrete level for specifying the safety integrity of the safety functions, whereby SIL 4 represents the highest level and SIL 1 the lowest level.	EN 61508
SIL CL	SIL claim limit (of a sub-system)	EN 62061
Simatic	Product family name of the Siemens company. It is used for products in automation technology, control technology and the manufacturing execution level.	
SRCF	Safety-relevant control function	EN 62061
SRECS	Safety-relevant electrical control system	EN 62061
SRP/CS	Safety-relevant part of a controller which responds to safety-relevant input signals and generates safety-relevant output signals	DIN EN ISO 13849-1
SRS	Safety requirements specification	
Stop category	**Stop category 0:** Bringing to a stop by immediately interrupting power to the machine drive elements (i.e. an uncontrolled stop) **Stop category 1:** Controlled stopping, where the power to the machine drive elements is retained in order to cause stopping. The power is only interrupted when stop is achieved. **Stop category 1b:** Controlled stopping, where the power to the machine drive elements is maintained in order to cause stopping. Continuity of the stop condition is monitored, and when a failure is detected power is interrupted without generating a hazardous situation. **Stop category 2:** Controlled stopping, where power to the machine drive elements is maintained	IEC 60204-1

TCI	Tool calling interface: Software for enabling communication over Profibus DP or Profinet IO	
TD	Diagnostic test interval: Time between online tests for uncovering errors in a safety-relevant system with a specified diagnostic coverage degree.	DIN EN 61508-4
TIA	Totally integrated automation: Software framework for the entire automation software. The TIA portal is the successor to the traditional STEP 7	
TM	Mission time: Time which covers the specified use of the SRP/CS	DIN EN ISO 13849-1
TS	Sub-system	DIN EN 62061
TSE	Sub-system element	DIN EN 62062
By-passing	An action by means of which the interlocking device can be disabled or by passed such that a machine can no longer be used as intended by the designer or only without the required safety measured.	DGUV
Validation	German Social Accident Insurance, ensures that a product provides the required results. See also "Verification"	DIN EN 61508-4, VDE 0803-4 PMBOK
Verification	Confirmation that a product meets the requirements. See also "Validation"	DIN EN 61508-4, VDE 0803-4 PMBOK
Interlock(ing device)	Mechanical, electrical, or other type of device meant to prevent dangerous machine functions under defined conditions (in general as long as the isolating protection device is not closed). See also "Construction types [of interlocking devices]"	DIN EN ISO 14119

Fault-based liability	The obligation for damages replacement based on legal liability provisions under private law which presume a culpable, i.e. not only objective illegal, but rather personally attributable behavior which is intentional or negligent.	§§ 823 ff BGB
Guard locking device	Device whose purpose is to keep a separating protective device in the closed position and which is connected to the controller.	DIN EN ISO 14119
Reliability	The ability of an object to perform a particular function under particular conditions over a specified time interval	IEC 60050
Positive opening contacts	Contacts in a relay/contactor which are mechanically connected to each other such that normally open and normally closed can never be in the same position at the same time.	IEC EN 60947-5-1, Addendum L
Positive opening	Assurance of contact separation as a direct result of a specified movement of the operating component of the switch over non-sprung parts.	DIN EN 60947-5-1, Addendum K