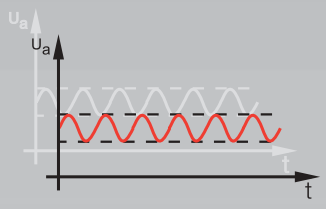
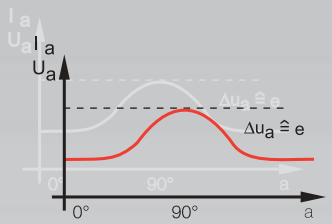
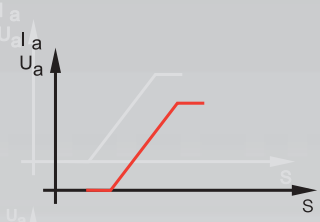
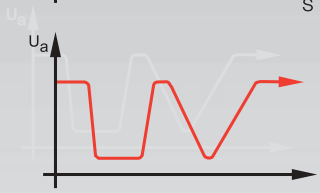
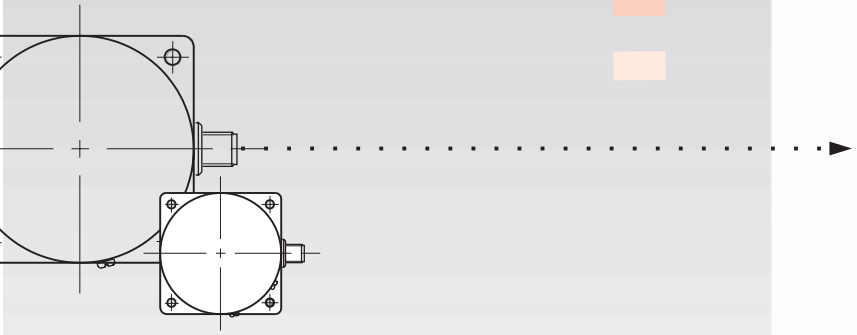










Inductive Proximity Sensors

Ultralinear™ Analog Sensors

Ideal for applications involving relatively short metal target travel, Balluff ULTRALINEAR™ analog inductive sensors provide precision non-contact position measurement in an affordable family of compact housings.

ULTRALINEAR™ analog sensors are simple three-wire devices that operate on 24 Vdc. They provide an electrical signal that varies in proportion to the position of a metal target within their working range. The linear analog signal is available in either voltage or current.

Representing a significant engineering advance compared to conventional analog inductive designs, Balluff's ULTRALINEAR™ family provides precision measurements in hostile environments. They provide:

- Extended linear measuring range
- Increased linearity within that extended range — linearization is performed in the analog domain, preserving the fine resolution of the pure analog signal
- Reduced output signal temperature drift
- Improved calibration to compensate for variance in manufacturing tolerances

Application examples

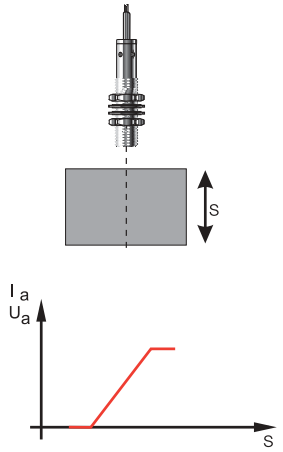
Some of the numerous applications in measuring and controlling include:

- Distance measurement
- Thickness measurement
- Run-off measurement
- Belt/band width measurement
- Detection of surface waves
- Counting
- Positioning
- Position monitoring
- General monitoring
- Selection of parts of various sizes and materials

Features

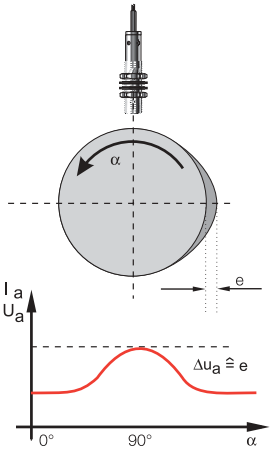
- Distance-proportional analog signal
- Housing sizes
  Ø 6.5...80×80
- Sensing ranges 1...50 mm
- Non-contact, absolute operating principle
- High repeat accuracy
- Low temperature drift
- LED for setup aid
- Compact, sealed, rugged and reliable

Axial approach



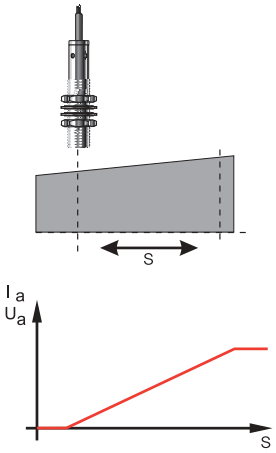
Distance changes in the sensor axis result in proportionally changing output signals.

Sensing a rotating object



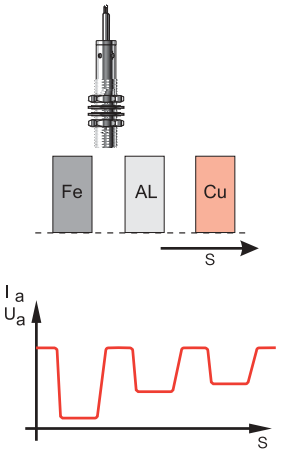
Eccentric cams, lobes or imbalances result in a periodic change of the output signal.

Lateral approach



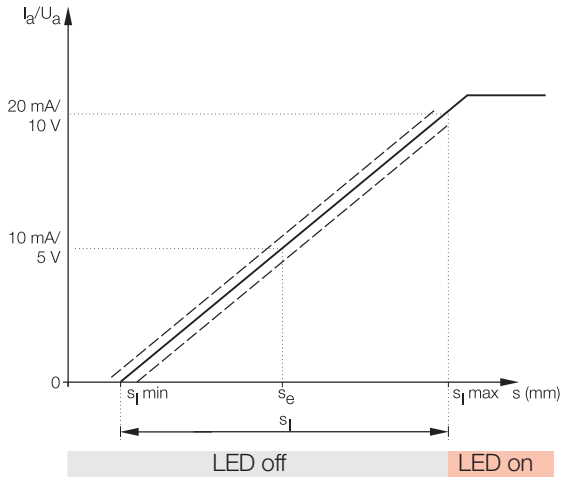
Detecting larger travel by sensing an inclined surface.

Sensing various materials

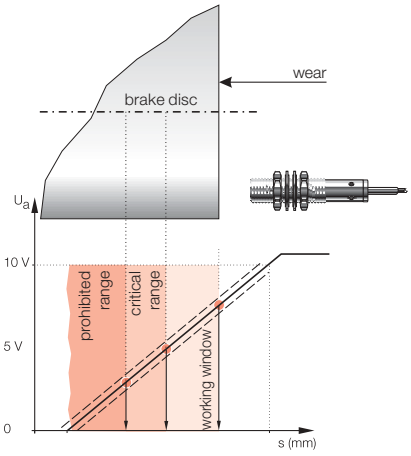


With the distance constant, the output signal will change only when the object material changes.

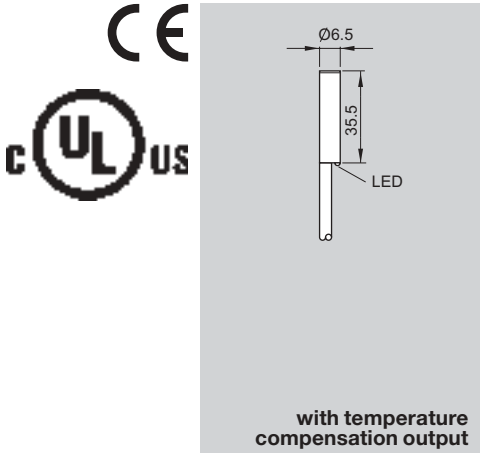
Approach curve



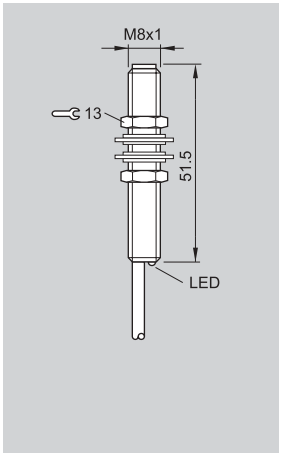
Processing programmable switchpoints

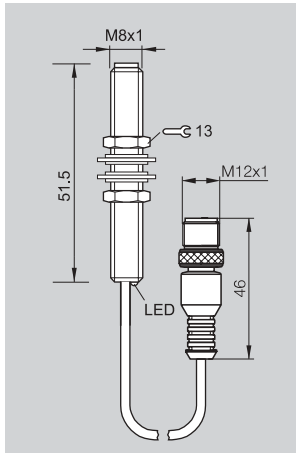


Housing size	**⌀ 6.5 mm**	**M8×1**	**M8×1**
Mounting	flush	flush	flush
Output signal	**0...10 V**	**0...10 V**	**0...10 V**
Linear range s_l	0.5...2 mm	0.5...1.5 mm	0.5...1.5 mm



with temperature compensation output

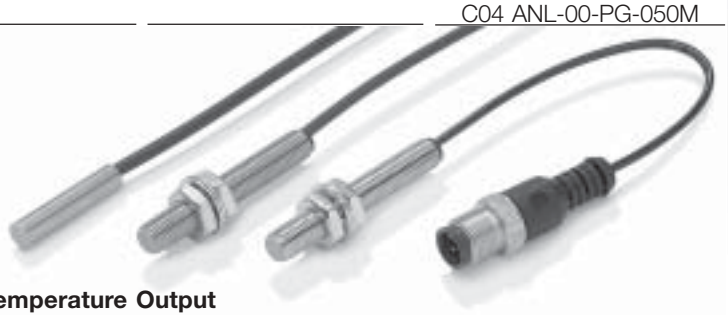




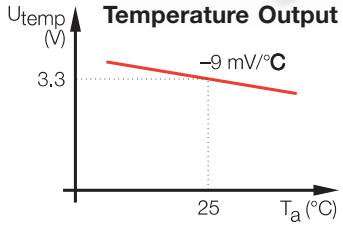
Voltage output, 0 - 10V	BAW G06EE-UAF20B-EP03-K	BAW M08EI-UAD15B-BP05	BAW M08EI-UAD15B-BP____-GS04
Current output, 0 - 20mA			
Current output, 4 - 20mA			
Rated operational voltage U_e	24 Vdc	24 Vdc	24 Vdc
Supply voltage U_B	21.6…26.4 Vdc	15…30 Vdc	15…30 Vdc
Supply voltage ripple, max. 15% of U_e	≤2.4 Vdc @ 24 Vdc	≤3.60 Vdc @ 24 Vdc	≤3.60 Vdc @ 24 Vdc
No-load supply current I_0 @ U_e	≤15.0 mA	≤8.0 mA	≤8.0 mA
Linear span s_L [1]	1.25 mm	1.00 mm	1.00 mm
Midpoint of linear range s_e [2]	1.25 ± 0.1 mm	1.00 ± 0.1 mm	1.00 ± 0.1 mm
Resolution [3], voltage output	0.01 V per 0.00125 mm	0.01 V per 0.001 mm	0.01 V per 0.001 mm
Resolution [3], current output			
Non-linearity [4]	≤ 0.0375 mm	≤ 0.03 mm	≤ 0.03 mm
Repeatability [5]	≤ 0.0375 mm	≤ 0.03 mm	≤ 0.03 mm
Temperature drift [6] (+15…55 °C)		0.00025 mm/°C	0.00025 mm/°C
Ambient temperature range T_a	+10…+60 °C	-10…+70 °C	-10…+70 °C
Cutoff frequency (-3 dB output amplitude)	1000 Hz	1000 Hz	1000 Hz
Time delay before availability t_v	≤1.0 ms	≤1.0 ms	≤1.0 ms
Load resistance R_L	≥ 5 kΩ	≥2 kΩ	≥2 kΩ
Rated insulation voltage U_i	250 Vdc	250 Vac	250 Vac
Degree of protection per IEC 529	IP 67	IP 67	IP 67
Housing material	stainless steel	stainless steel	stainless steel
Sensing face material	PBTP	PBTP	PBTP
Conductors (cable versions)	4 x 26 AWG	3 x 26 AWG	
Connection	cable	cable	cable with connector
Linear range display (LED ON when out of range)	no	no	no
Short circuit/overload protected	no	yes	yes
Protected against polarity reversal	no	yes	yes
Recommended connector (non-shielded)			C04 AEL-00-VY-050M
Recommended connector (shielded)			C04 ANL-00-PG-050M

Notes

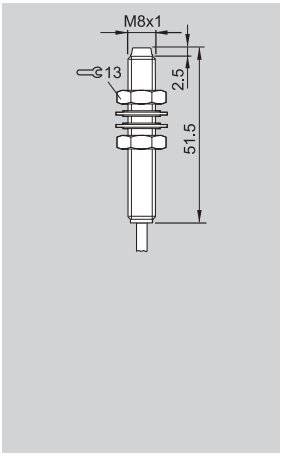
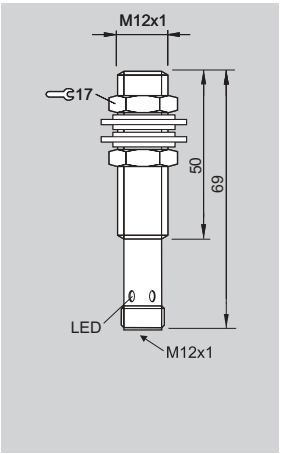
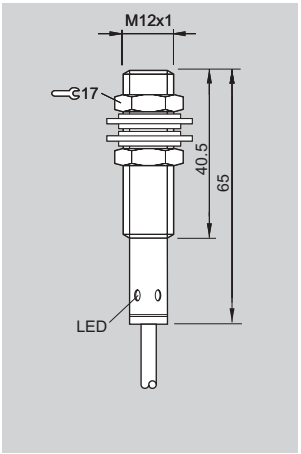
1. Size of the linear sensing window
2. Midpoint with tolerance, sensor to sensor
3. Change in output per change in target movement
4. Deviation over the linear span, 3% of full scale
5. Ability to repeat output level for a given target distance, 3% of full scale
6. Deviation relative to 25°C ambient temperature as a percent of full scale:
   +15...55°C = 1%
   +10...60°C = 2.5%
   +10...70°C = 5%
7. For pigtail connector, replace -BP05 with -BP0.2-GS04



Temperature Output



Sensors with a temperature output indicate precisely the change in measured temperature.

Housing size	**M8×1**	**M12×1**	**M12×1**
Mounting	non-flush	flush	flush
Output signal	**0...10 V**	**0...10 V**	**0...10 V, 0-20 mA**
Linear range s_l	0.5...2.5 mm	0.5...2 mm	0.5...2 mm
			
Voltage output, 0 - 10V	BAW M08EI-UAD25F-BP_ _	BAW M12MI-UAC20B-S04G	BAW M12MG2-UAC20B-BP05
Current output, 0 - 20mA			BAW M12MG2-IAC20B-BP05
Current output, 4 - 20mA			
Rated operational voltage U_e	24 Vdc	24 Vdc	24 Vdc
Supply voltage U_B	15…30 Vdc	15…30 Vdc	15…30 Vdc
Supply voltage ripple, max. 15% of U_e	≤15 %	≤ 3.60 Vdc @ 24 Vdc	≤3.60 Vdc @ 24 Vdc
No-load supply current I_0 @ U_e	≤8.0 mA	≤10.0 mA	≤10.0 mA
Linear span s_L [1]	1.00 mm	1.50 mm	1.50 mm
Midpoint of linear range s_e [2]	1.00 ± 0.1 mm	1.25 ± 0.125 mm	1.25 ± 0.125 mm
Resolution [3], voltage output	0.01 V per 0.001 mm	0.01 V per 0.0015 mm	0.01 V per 0.0015 mm
Resolution [3], current output			0.02 mA per 0.0015 mm
Non-linearity [4]	≤ 0.03 mm	≤ 0.045 mm	≤ 0.045 mm
Repeatability [5]	≤ 0.03 mm	≤ 0.045 mm	≤ 0.045 mm
Temperature drift [6] (+15…55 °C)	0.00025 mm/°C	0.000375 mm/°C	0.000375 mm/°C
Ambient temperature range T_a	-10…+70 °C	-10…+70 °C	-10…+70 °C
Cutoff frequency (-3 dB output amplitude)	1000 Hz	500 Hz	500 Hz
Time delay before availability t_v	≤1.0 ms	≤1.0 ms	≤1.0 ms
Load resistance R_L	≥2 kΩ	≥2 kΩ	≥2 kΩ
Rated insulation voltage U_i	250 Vac	250 Vac	250 Vac
Degree of protection per IEC 529	IP 67	IP 67	IP 67
Housing material	stainless steel	nickel plated brass	nickel plated brass
Sensing face material	PBTP	PA 12	PA 12
Conductors (cable versions)			3 x 22 AWG
Connection	cable with connector	connector	cable
Linear range display (LED ON when out of range)	no	yes	yes
Short circuit/overload protected	yes	yes	yes
Protected against polarity reversal	yes	yes	yes
Recommended connector (non-shielded)	C04 AEL-00-VY-050M	C04 AEL-00-VY-050M	
Recommended connector (shielded)	C04 ANL-00-PG-050M	C04 ANL-00-PG-050M	

Notes

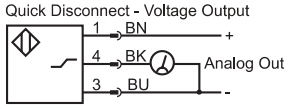
1. Size of the linear sensing window
2. Midpoint with tolerance, sensor to sensor
3. Change in output per change in target movement
4. Deviation over the linear span, 3% of full scale
5. Ability to repeat output level for a given target distance, 3% of full scale
6. Deviation relative to 25°C ambient temperature as a percent of full scale:
   +15...55°C = 1%
   +10...60°C = 2.5%
   +10...70°C = 5%
7. For pigtail connector, replace -BP05 with -BP0.2-GS04

Note: output on Pin 2

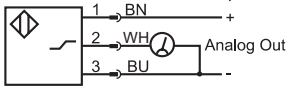
Depending on ambient electrical noise and cable routing, electrically shielded cabling may be required to preserve resolution. If so, choose a housing with an integral connector and select a shielded cordset, or contact Balluff for special shielded cable versions of pre-wired sensors.

Wiring Diagrams

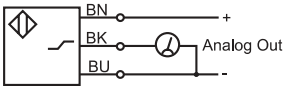
Quick Disconnect - Voltage Output

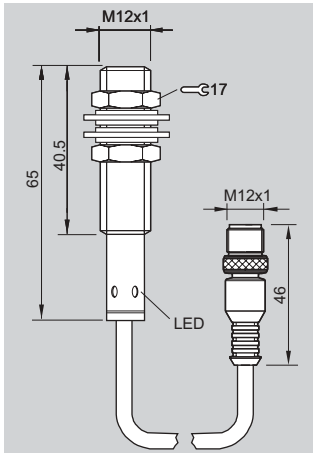
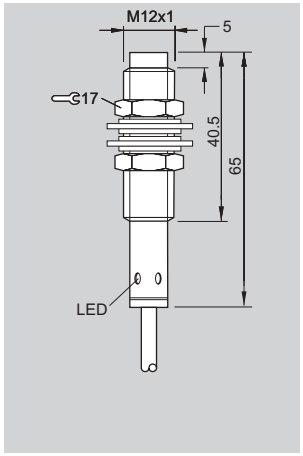
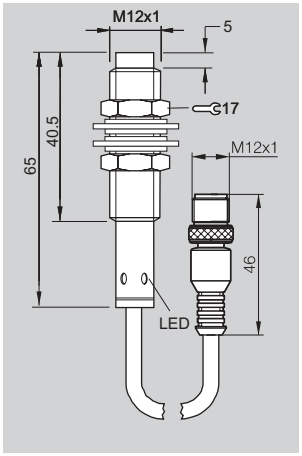
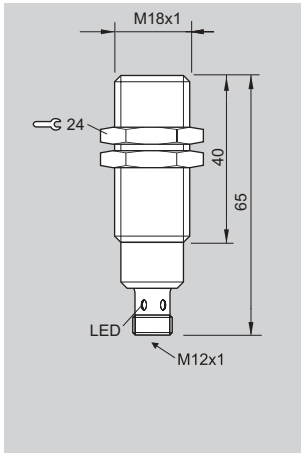


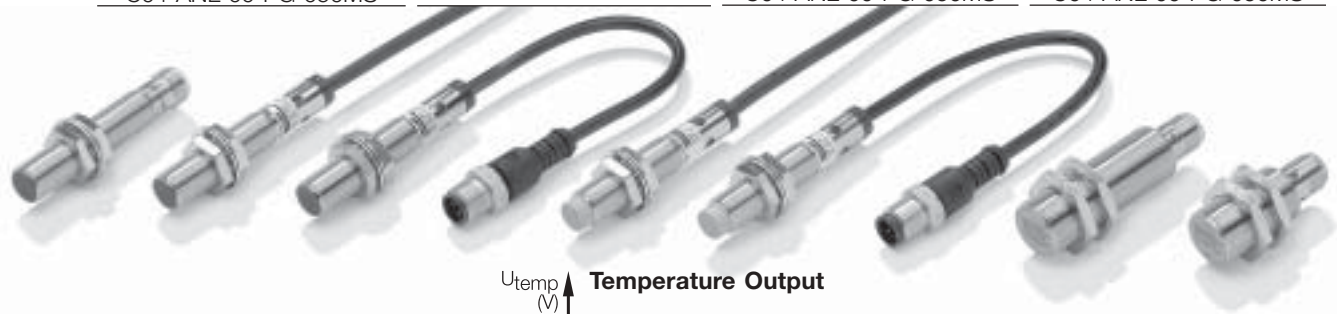
Quick Disconnect - Current Output



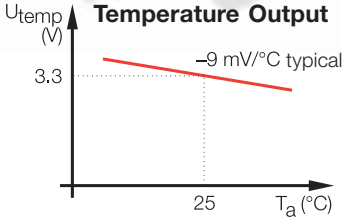
Cable Out



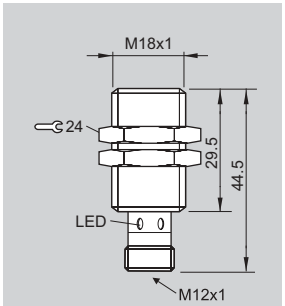
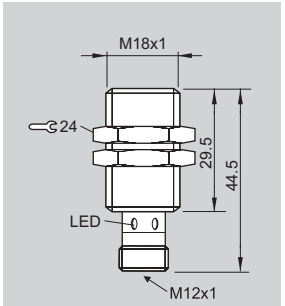
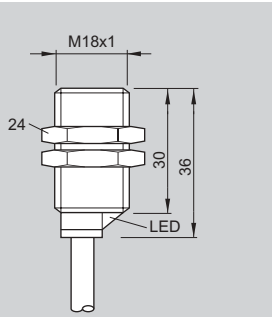
M12×1	**M12×1**	**M12×1**	**M18×1**
flush	non-flush	non-flush	flush
0...10 V, 0-20 mA	**0...10 V**	**0...10 V**	**0...10 V, 0-20 mA, 4-20 mA**
0.5...2 mm	1...4 mm	1...4 mm	1...5 mm
			
BAW M12MG2-UAC20B-BP____-GS04 BAW M12MG2-IAC20B-BP____-GS04	BAW M12MF2-UAC40F-BP05	BAW M12MF2-UAC40F-BP____-GS04	BAW M18MI-UAC50B-S04G BAW M18MI-IAC50B-S04G BAW M18MI-ICC50B-S04G
24 Vdc	24 Vdc	24 Vdc	24 Vdc
15…30 Vdc	15…30 Vdc	15…30 Vdc	15…30 Vdc
≤3.60 Vdc @ 24 Vdc	≤3.60 Vdc @ 24 Vdc	≤3.60 Vdc @ 24 Vdc	≤ 3.60 Vdc @ 24 Vdc
≤10.0 mA	≤10.0 mA	≤10.0 mA	≤10.0 mA
1.50 mm	3.00 mm	3.00 mm	4.00 mm
1.25 ± 0.125 mm	1.25 ± 0.125 mm	1.25 ± 0.125 mm	3.00 ± 0.3 mm
0.01 V per 0.0015 mm	0.01 V per 0.003 mm	0.01 V per 0.003 mm	0.01 V per 0.004 mm
0.02 mA per 0.0015 mm	-	-	0.02 (0.016) mA per 0.004 mm
≤ 0.045 mm	≤ 0.09 mm	≤ 0.09 mm	≤ 0.12 mm
≤ 0.045 mm	≤ 0.09 mm	≤ 0.09 mm	≤ 0.12 mm
0.000375 mm/°C	0.00075 mm/°C	0.00075 mm/°C	0.001 mm/°C
-10…+70 °C	-10…+70 °C	-10…+70 °C	-10…+70 °C
500 Hz	500 Hz	500 Hz	500 Hz
≤1.0 ms	≤1.0 ms	≤1.0 ms	≤1.0 ms
≥2 kΩ	≥2 kΩ	≥2 kΩ	≥2 kΩ
250 Vac	250 Vac	250 Vac	75 Vdc
IP 67	IP 67	IP 67	IP 67
nickel plated brass	nickel plated brass	nickel plated brass	nickel plated brass
PA 12	PBTP	PBTP	PBTP
	3 x 22 AWG		
cable with connector	cable	cable with connector	connector
yes	yes	yes	yes
yes	yes	yes	yes
yes	yes	yes	yes
C04 AEL-00-VY-050M		C04 AEL-00-VY-050M	C04 AEL-00-VY-050M
C04 ANL-00-PG-050MS		C04 ANL-00-PG-050MS	C04 ANL-00-PG-050MS



Temperature Output



Sensors with a temperature output indicate precisely the change in measured temperature.

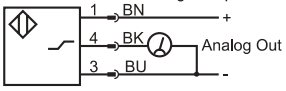
Housing size	**M18×1**	**M18×1**	**M18×1**
Mounting	flush	flush	flush
Output signal	**0...10 V**	**0...10 V**	**0...10 V**
Linear range s_l	1...5 mm	1...5 mm	1...5 mm
	 **with temperature compensation output**		
Voltage output, 0 - 10V	BAW M18ME-UAE50B-S04G-K	BAW M18ME-UAC50B-S04G	BAW M18ME-UAC50B-BP05
Current output, 0 - 20mA			
Current output, 4 - 20mA			
Rated operational voltage U_e	24 Vdc	24 Vdc	24 Vdc
Supply voltage U_B	21.6…26.4 Vdc	15…30 Vdc	15…30 Vdc
Supply voltage ripple, max. 15% of U_e	≤ 2.4 Vdc @ 24 Vdc	≤3.60 Vdc @ 24 Vdc	≤3.60 Vdc @ 24 Vdc
No-load supply current I_0 @ U_e	≤10.0 mA	≤10.0 mA	≤10.0 mA
Linear span s_L [1]	3.00 mm	4.00 mm	4.00 mm
Midpoint of linear range s_e [2]	3.00 ± 0.3 mm	3.00 ± 0.3 mm	3.00 ± 0.3 mm
Resolution [3], voltage output	0.01 V per 0.003 mm	0.01 V per 0.004 mm	0.01 V per 0.004 mm
Resolution [3], current output		-	-
Non-linearity [4]	≤ 0.09 mm	≤ 0.12 mm	≤ 0.12 mm
Repeatability [5]	≤ 0.09 mm	≤ 0.12 mm	≤ 0.12 mm
Temperature drift [6] (+15…55 °C)		0.001 mm/°C	0.001 mm/°C
Ambient temperature range T_a	+20…+50 °C	-10…+70 °C	-10…+70 °C
Cutoff frequency (-3 dB output amplitude)	500 Hz	500 Hz	500 Hz
Time delay before availability t_v	≤1.0 ms	≤ 1.0 ms	≤ 1.0 ms
Load resistance R_L	≥2 kΩ	≥2 kΩ	≥2 kΩ
Rated insulation voltage U_i	75 Vdc	250 Vac	75 Vdc
Degree of protection per IEC 529	IP 67	IP 67	IP 67
Housing material	nickel plated brass	nickel plated brass	nickel plated brass
Sensing face material	PBTP	PBTP	PBTP
Conductors (cable versions)			3 x 22 AWG
Connection	connector	connector	cable
Linear range display (LED ON when out of range)	yes	yes	yes
Short circuit/overload protected	yes	yes	yes
Protected against polarity reversal	yes	yes	yes
Recommended connector (non-shielded)	C04 AEL-00-VY-050M	C04 AEL-00-VY-050M	
Recommended connector (shielded)	C04 ANL-00-PG-050MS	C04 ANL-00-PG-050MS	

Notes

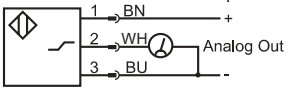
1. Size of the linear sensing window
2. Midpoint with tolerance, sensor to sensor
3. Change in output per change in target movement
4. Deviation over the linear span, 3% of full scale
5. Ability to repeat output level for a given target distance, 3% of full scale
6. Deviation relative to 25°C ambient temperature as a percent of full scale:
   +15...55°C = 1%
   +10...60°C = 2.5%
   +10...70°C = 5%
7. For pigtail connector, replace -BP05 with -BP0.2-GS04

Wiring Diagrams

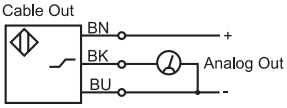
Quick Disconnect - Voltage Output

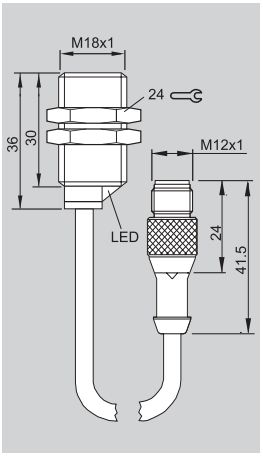
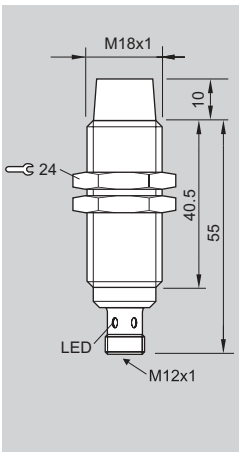
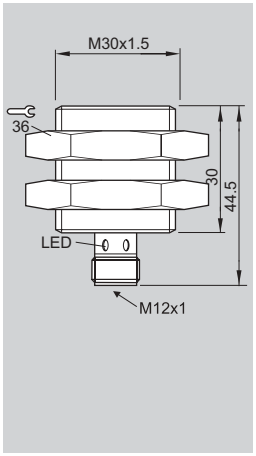
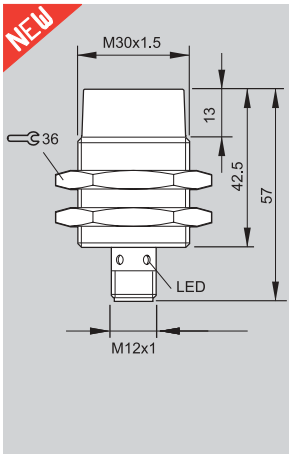
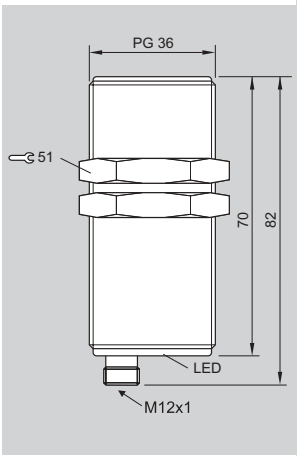


Quick Disconnect - Current Output

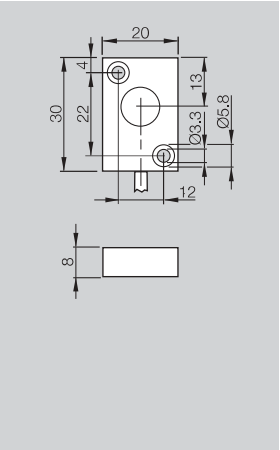
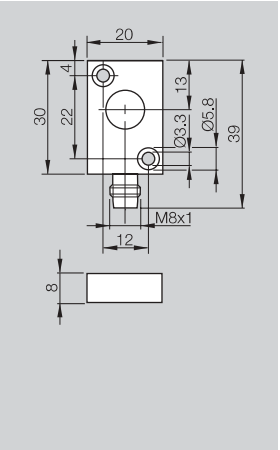
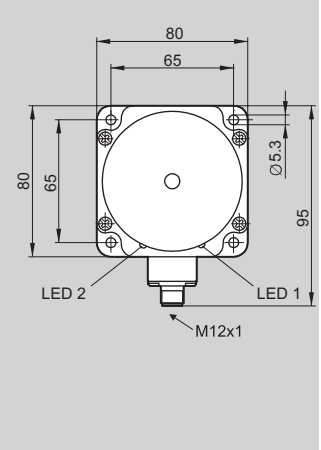


Cable Out



M18×1	**M18×1**	**M30x1.5**	**M30x1.5**	**PG 36**
flush	non-flush	flush	non-flush	flush
0...10 V	**0...10 V**	**0...10 V**	**0...10 V**	**0...10 V**
1...5 mm	2...8 mm	2...10 mm	3...15 mm	0...20 mm (adj.)
			NEW 	
BAW M18ME-UAC50B-BP____-GS04	BAW M18MG-UAC80F-S04G	BAW M30ME-UAC10B-S04G	BAW M30ME-UAC15F-S04G	BAW MKZ-471.19-S4
24 Vdc	24 Vdc	24 Vdc	24 Vdc	24 Vdc
15…30 Vdc	15…30 Vdc	15…30 Vdc	15…30 Vdc	20…30 Vdc
≤3.60 Vdc @ 24 Vdc	≤3.60 Vdc @ 24 Vdc	≤3.60 Vdc @ 24 Vdc	≤15%	≤3.60 Vdc @ 24 Vdc
≤10.0 mA	≤10.0 mA	≤10.0 mA	≤10.0 mA	≤12.0 mA
4.00 mm	6.00 mm	8.00 mm	9.00 mm	20.0 mm
3.00 ± 0.3 mm	5.00 ± 0.5 mm	6.00 ± 0.6 mm	6.00 ± 0.6 mm	10.0 ± 0.1 mm
0.01 V per 0.004 mm	0.01 V per 0.006 mm	0.01 V per 0.008 mm	0.01 V per 0.008 mm	0.01 V per 0.02 mm
-	-			-
≤ 0.12 mm	≤ 0.18 mm	≤ 0.24 mm	≤ 0.24 mm	≤ 0.2 mm
≤ 0.12 mm	≤ 0.18 mm	≤ 0.24 mm	≤ 0.24 mm	≤ 0.2 mm
0.001 mm/°C	0.0015 mm/°C	0.002 mm/°C	0.002 mm/°C	0.005 mm/°C
-10…+70 °C	-10…+70 °C	-10…+70 °C	-10…+70 °C	-10…+70 °C
500 Hz	500 Hz	500 Hz	500 Hz	20 Hz
≤ 1.0 ms	≤1.0 ms	≤1.0 ms	≤1.0 ms	≤1.0 ms
≥2 kΩ	≥ 2 kΩ	≥2 kΩ	≥2 kΩ	≥10 kΩ
75 Vdc	75 Vdc	250 Vac	250 Vac	250 V AC
IP 67	IP 67	IP 67	IP 67	IP 67
nickel plated brass	nickel plated brass	nickel plated brass	nickel plated brass	nickel plated brass
PBTP	PBTP	PBTP	PBTP	polymeric PBT
connector	connector	connector	connector	connector
yes	yes	yes	yes	no
yes	yes	yes	yes	yes
yes	yes	yes	yes	yes
C04 AEL-00-VY-050M	C04 AEL-00-VY-050M	C04 AEL-00-VY-050M	C04 AEL-00-VY-050M	C04 AEL-00-VY-050M
C04 ANL-00-PG-050MS	C04 ANL-00-PG-050MS	C04 ANL-00-PG-050MS	C04 ANL-00-PG-050MS	C04 ANL-00-PG-050MS

- For mounting brackets & accessories see section 7.
- For mating connectors see section 6.

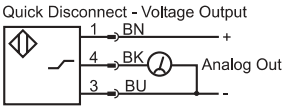
Housing size	**20×30×8**	**20×30×8**	**80×80×40**
Mounting	flush	flush	non-flush
Output signal	**0...10 V**	**0...10 V**	**0...10 V**
Linear range s_l	0.5...2 mm	0.5...2 mm	0...50 mm (adj.)
			
Voltage output, 0 - 10V	BAW R06AC-UAF20B-EP _ _	BAW R06AC-UAF20B-S49G	BAW MKK-050.19-S4
Current output, 0 - 20mA			
Current output, 4 - 20mA			
Rated operational voltage U_e	24 Vdc	24 Vdc	24 Vdc
Supply voltage U_B	21.6…26.4 Vdc	20…30 Vdc	20…30 Vdc
Supply voltage ripple, max. 15% of U_e	≤10%	≤3.60 Vdc @ 24 Vdc	≤3.60 Vdc @ 24 Vdc
No-load supply current I_0 @ U_e	≤12.0 mA	≤12.0 mA	≤12.0 mA
Linear span s_L [1]	50.0 mm	50.0 mm	50.0 mm
Midpoint of linear range s_e [2]	25.0 ± 1.0 mm	25.0 ± 1.0 mm	25.0 ± 1.0 mm
Resolution [3], voltage output	0.01 V per 0.05 mm	0.01 V per 0.05 mm	0.01 V per 0.05 mm
Resolution [3], current output	-	-	-
Non-linearity [4]	≤ 1.0 mm	≤ 1.0 mm	≤ 1.0 mm
Repeatability [5]	≤ 1.0 mm	≤ 1.0 mm	≤ 1.0 mm
Temperature drift [6] (+15…55 °C)	0.0125 mm/°C	0.0125 mm/°C	0.0125 mm/°C
Ambient temperature range T_a	-10…+70 °C	-10…+70 °C	-10…+70 °C
Cutoff frequency (-3 dB output amplitude)	15 Hz	15 Hz	15 Hz
Time delay before availability t_v	≤1.0 ms	≤1.0 ms	≤1.0 ms
Load resistance R_L	≥10 kΩ	≥10 kΩ	≥10 kΩ
Rated insulation voltage U_i	250 Vac	250 Vac	250 Vac
Degree of protection per IEC 529	IP 67	IP 67	IP 67
Housing material			
Sensing face material	polymeric PBT	polymeric PBT	polymeric PBT
Conductors (cable versions)			
Connection	cable	connector	connector
Linear range display (LED ON when out of range)	no	no	no
Short circuit/overload protected	yes	yes	yes
Protected against polarity reversal	yes	yes	yes
Recommended connector (non-shielded)		C49 ANE-00-VY-050M	C04 AEL-00-VY-050M
Recommended connector (shielded)			C04 ANL-00-PG-050MS

Notes

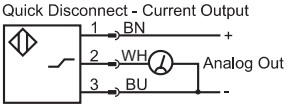
1. Size of the linear sensing window
2. Midpoint with tolerance, sensor to sensor
3. Change in output per change in target movement
4. Deviation over the linear span, 3% of full scale
5. Ability to repeat output level for a given target distance, 3% of full scale
6. Deviation relative to 25°C ambient temperature as a percent of full scale:
   +15...55°C = 1%
   +10...60°C = 2.5%
   +10...70°C = 5%
7. For pigtail connector, replace -BP05 with -BP0.2-GS04

Wiring Diagrams

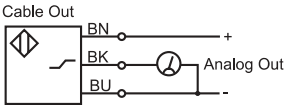
Quick Disconnect - Voltage Output



Quick Disconnect - Current Output



Cable Out



The analog set point controller ...

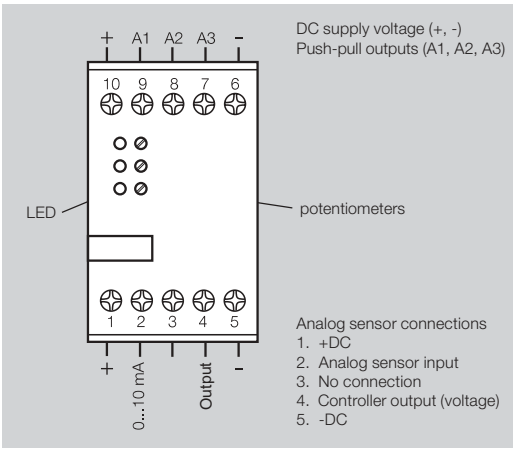
... is powered with 24 Vdc (terminals 6 & 10). It provides the supply voltage for Balluff analog sensors (terminals 1 & 5) and is switched directly by their current outputs. Based on these signals, three switch-points (A1...A3) are output through separate push-pull final stages (PNP/NPN). The switchpoints are individually set using the front-mounted potentiometers. The corresponding switching state is displayed using LED's. The effective direction (rising/falling) can be configured using wire jumpers inside the controller.

Terminal (4) has a voltage output proportional to the current, which can be used for other external analog switching devices (to provide additional switchpoints, for example).

The signal inputs are protected against polarity reversal and the push-pull stages against short circuit (fuse protected internally).

Analog Set Point Controller

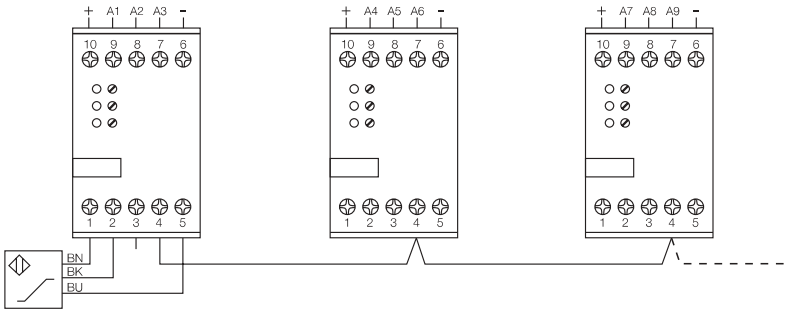
for analog current and voltage signals



Ordering Code	BES 516-611-A-1
Supply voltage U_B	24 Vdc
Ripple	≤ 10 %
Input circuit	
Current input terminal 2/terminal 3	0...10 mA/0...20 mA
Input resistance	308 Ω/154 Ω
Voltage input terminal 4	0...10 V
Input resistance	13 kΩ
Range of adjustment	3...100 %
Hysteresis (with respect to the pre-set value)	3 %
Output circuit	
Voltage drop PNP transistor	≤ 3.5 V
Voltage drop NPN transistor	≤ 2.5 V
Operational current per push-pull stage	≤ 200 mA
Housing material	PC (fiberglass reinforced)
Housing dimensions b × l × h	74 × 45 × 120 mm
Connection	screw terminals
Max. cross section for connection	up to 2.5 mm²
Mounting	snap-on rail mount
Ambient temperature range T_a	0...+50 °C
Degree of protection per IEC 60529	terminals IP 20, housing IP 40

Parallel arrangement of set point controllers

Expansion for additional switchpoints



ULTRALINEAR

Technical Description

For the ultimate in flexibility, Balluff offers an ULTRALINEAR™ analog sensor with three independently programmable, discrete setpoint outputs, along with an analog voltage output for reference. By holding a metal target in position and momentarily connecting the control line to the supply, the output is preset to change states whenever it reaches the programmed analog signal level. Setpoint programming can be accomplished using a PLC output, a pushbutton, or with an available hand-held teach unit. (Order separately BES-516-4, see section 7.)

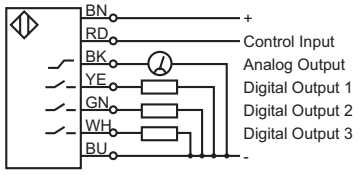
Features

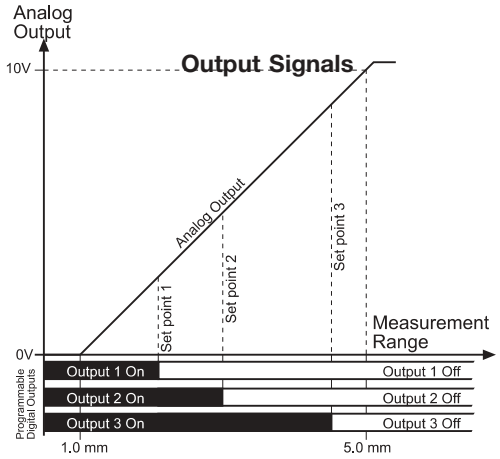
All the exceptional features from our standard ULTRALINEAR™ family plus...

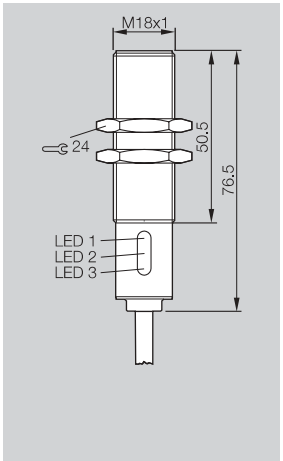
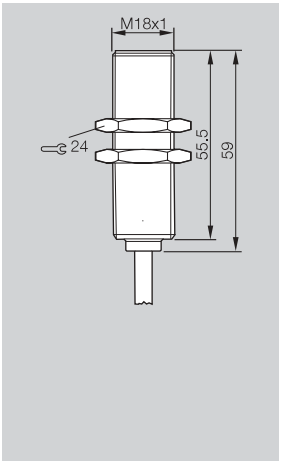
- Remotely programmable setpoints
- No need to physically adjust sensor position for a particular setpoint
- Status LED for each setpoint output

Wiring Diagram

Cable Out





Housing size	**M18×1**	**M18×1**
Mounting	flush	flush
Output signal	**0...10 V**	**0...10 V**
Linear range s_l	1...5 mm	1...5 mm
		
Ordering code	BAW M18MI2-UAC50B-BP__-002	BAW M18MM-UAZ50B-BP__-505
Rated operational voltage U_e	24 Vdc	24 Vdc
Supply voltage U_B	15…30 Vdc	21.6…26.4 Vdc
Ripple	≤15% U_e	≤10% U_e
Rated insulation voltage U_i	250 Vac	250 Vac
Rated sensing distance S_e	3 mm	3 mm
Load resistance R_i for analog output	≤ 2 kΩ	≤ 2 kΩ
No-load supply current I_0 at U_e	20 mA	20 mA
Protected against plairty reversal	yes	yes
Short circuit protected	yes	yes
Ambient temperature range T_a	-10…+70 °C	-10…+60 °C
Degree of protection per IEC 60529	IP 67	IP 67
Insulation class	⧈	⧈
Housing material	nickel plated brass	nickel plated brass
Material of sensing face	PBT	PBT
Connection	cable	cable
No. of wiresxconductor cross section	7 x 24 AWG	7 x 24 AWG
Approval	cULus	
LED indication for each output	yes	no
Teach-in function	yes	yes
Hysteresis	≤ 0.3 mm	≤ 0.3 mm
Repeat accuracy R	≤ 0.1 mm	≤ 0.1 mm
Rated operational current I_e for one switching output	20 mA	20 mA
Voltage drop U_d at I_e	≤ 1.5 V	≤ 1.5 V

Notes

1. Size of the linear sensing window
2. Midpoint with tolerance, sensor to sensor
3. Change in output per change in target movement
4. Deviation over the linear span, 3% of full scale
5. Ability to repeat output level for a given target distance, 3% of full scale
6. Deviation relative to 25°C ambient temperature as a percent of full scale:
   +15...55°C = 1%
   +10...60°C = 2.5%
   +10...70°C = 5%
7. For pigtail connector, replace -BP05 with -BP0.2-GS04

Analog Set Point Controller with integrated Switching Outputs

This device can be connected to any Balluff 0…10V analog sensor (Inductive, Photoelectric, BIL) and provide an analog output plus 3 integrated switching outputs.

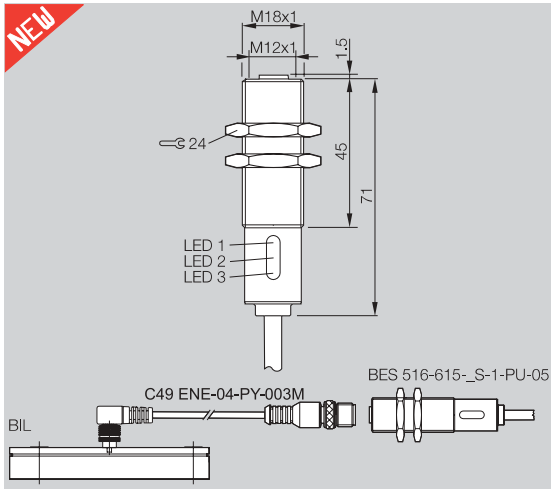
Analog sensors provide a signal which is proportional to the target distance from the sensor face. However, many applications also require a switching signal at certain points along the full range.

The 3 switching outputs are programmed using a teach-in procedure, whereby the sensor is positioned at the desired distance from the object.

By holding a target in postion and momentarily connecting the control line to the supply, the output is set.

An LED for each output indicates the switching state of that output.

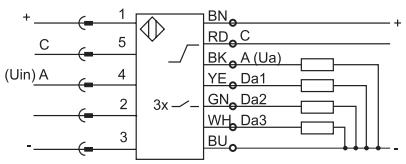
Housing size	**M18×1**
Output signal	**0...10 V**



PNP	Normally-open	BES 516-615-PS-1-PU-
NPN	Normally-open	BES 516-615-NS-1-PU-

Rated operational voltage U_e	24 Vdc
Supply voltage U_B	15…30 Vdc
Ripple	≤15%
Rated insulation voltage U_i	75 Vdc
Load resistance R_i for analog output	4200 Ohm
No-load supply current I_0 at U_e	20 mA
Protected against plairty reversal	yes
Ambient temperature range T_a	-10…+70 °C
Hysteresis	500mV
Operating frequency f	2000
Degree of protection per IEC 60529	IP 67
Housing material	nickel plated brass
Connection	cable
No. of wires x gauge	7 x 24 AWG
Approvals	cULus
Recommended connector	C49 ENE-04-PY-003M
LED indication for each output	yes
Teach-in function	yes
Rated operational current I_e for one switching output	100 mA
Voltage drop U_d at I_e	≤ 1.5 V

PNP analog and PNP discrete output



NPN analog and NPN discrete output