BALLUFF
Ultrasonic Sensors

Operating Instructions

Ultrasonic sensor with one analogue output

BUS M18M1-XB-02/015-S92G
BUS M18M1-XB-03/025-S92G
BUS M18M1-XB-07/035-S92G
BUS M18M1-XB-12/100-S92G
BUS M18M1-XA-02/015-S92G
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Product Description

The BUS _18M sensor offers a non-contact measurement of the distance to an object that has to be present within the sensor's detection zone. Depending on the set window limits, a distance-proportional analogue signal is output.
The window limits of the analogue output and its characteristic can be adjusted with the Teach-in procedure.
Two LEDs indicate operation and the state of the analogue output.

Safety Notes

- Read the operating instructions prior to start-up.
- Connection, installation and adjustment works should be carried out by expert personnel only.
- No safety component in accordance with the EU Machine Directive

Proper use

BUS _18M ultrasonic sensors are used for non-contact detection of objects.

Installation

- Mount the sensor at the installation site.
- Connect a connection cable to the M12 device plug.

Start-Up

- Connect the power supply.
- Carry out the sensor adjustment in accordance with the diagram.

		colour
1	$+U_B$	brown
3	0 V	blue
4	-	black
2	Out I/U	white
5	Com	grey

Fig. 1: Pin assignment with view onto sensor plug and colour coding of the Balluff connection cable

Factory Setting

- Rising analogue characteristic curve between the blind zone and the operating range.
- Multifunctional input »Com« set to »Teach-in«.

Synchronization

If the assembly distance falls below the values shown in Fig. 2, the internal synchronization should be used. For this purpose set the switched outputs of all sensors in accordance to the diagram »Sensor adjustment with Teach-in procedure« at first. Then set the multifunctional output »Com« to »synchronization« (see »Further settings«). Finally connect pin 5 of the sensors plug of all sensors.

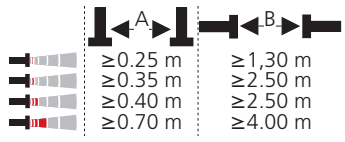

Fig.2: Assembly distances, indicating synchronization

Maintenance

Balluff sensors are maintenance-free. In case of excess caked-on dirt we recommend to clean the white sensor surface.

Notes

- The sensors of the BUS _18M family have a blind zone. Within this zone a distance measurement is not possible.
- The BUS _18M sensors are equipped with an internal temperature compensation. Due to the sensors self heating, the temperature compensation reaches its optimum working-point after approx. 20 minutes of operation.
- In the normal operating mode, an illuminated yellow LED signals the object is within the adjusted window limits.
- If synchronization is activated the Teach-in is disabled (see »Further settings«).
- The sensor can be reset to its factory setting (see »Further settings«).

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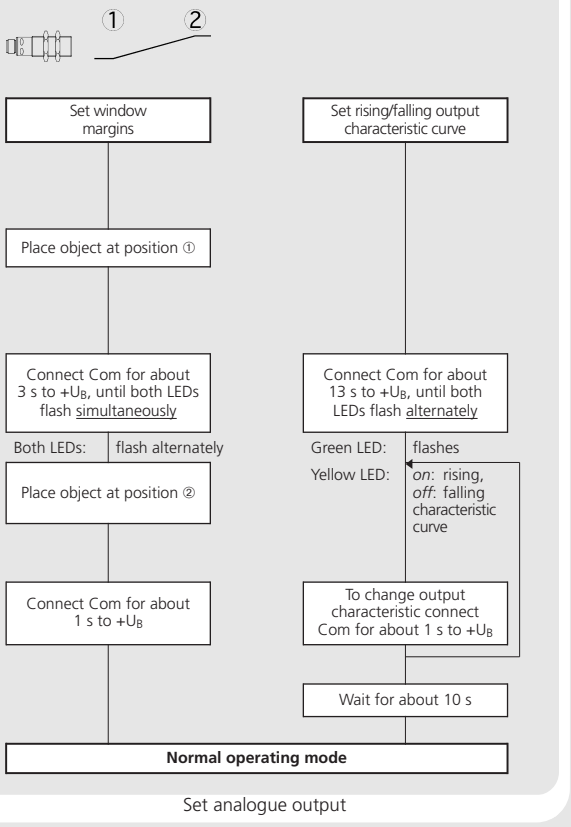
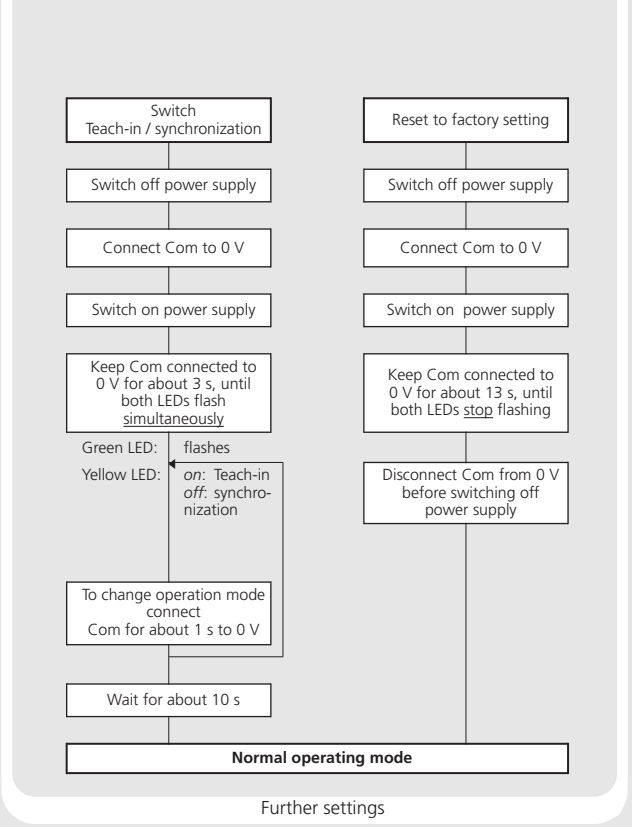
Sensor adjustment with Teach-in procedure

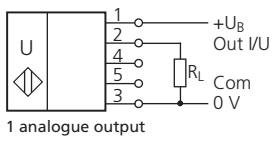


Set analogue output

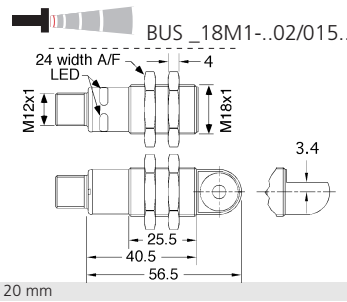


Further settings

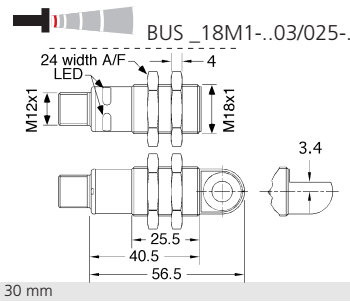
Technical data



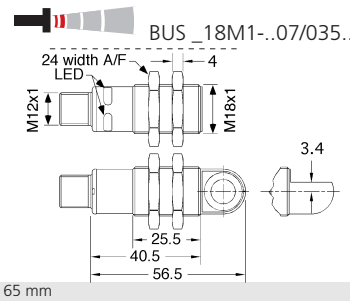
1 analogue output



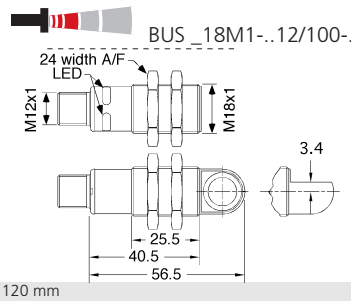
BUS _18M1-..02/015..



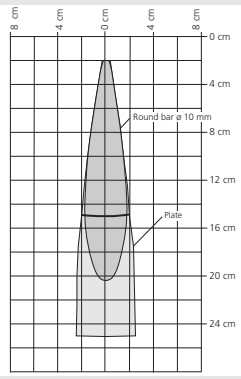
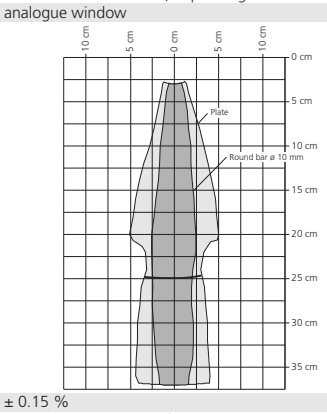
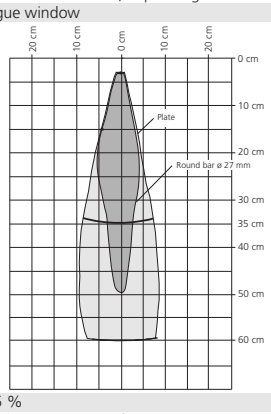
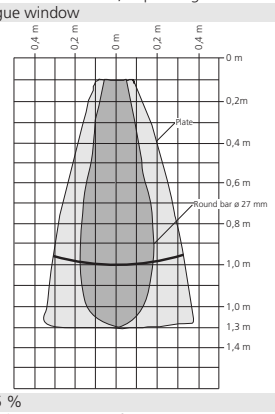
BUS _18M1-..03/025-..



BUS _18M1-..07/035..



BUS _18M1-..12/100-..

blind zone	20 mm	30 mm	65 mm	120 mm
operating range	150 mm	250 mm	350 mm	1,000 mm
maximum range	250 mm	350 mm	600 mm	1,300 mm
angle of beam spread	See detection zone	See detection zone	See detection zone	See detection zone
transducer frequency	380 kHz	320 kHz	400 kHz	200 kHz
resolution	0.069 mm	0.069 mm bis 0.10 mm, depending on the analogue window	0.069 mm bis 0.17 mm, depending on the analogue window	0.069 mm bis 0.38 mm, depending on the analogue window
detection zones for different objects: The dark grey areas are determined with a round bar and indicate the typical operating range of a sensor. In order to obtain the light grey areas, a plate (100 x 100 mm) is introduced into the beam spread from the side. In doing so, the optimum angle between plate and sensor is always employed. This therefore indicates the maximum detection zone of the sensor. It is not possible to evaluate ultrasonic reflections outside this area.				
reproducibility	± 0.15 %	± 0.15 %	± 0.15 %	± 0.15 %
accuracy	± 1 % (Temperature drift internal compensated)	± 1 % (Temperature drift internal compensated)	± 1 % (Temperature drift internal compensated)	± 1 % (Temperature drift internal compensated)
no-load current consumption	< 40 mA	< 40 mA	< 40 mA	< 40 mA
operating voltage ripple	±10 %	±10 %	±10 %	±10 %
housing	brass sleeve, nickel-plated, plastic parts: PBT; ultrasonic transducer: polyurethane foam, epoxy resin with glass content	brass sleeve, nickel-plated, plastic parts: PBT; ultrasonic transducer: polyurethane foam, epoxy resin with glass content	brass sleeve, nickel-plated, plastic parts: PBT; ultrasonic transducer: polyurethane foam, epoxy resin with glass content	brass sleeve, nickel-plated, plastic parts: PBT; ultrasonic transducer: polyurethane foam, epoxy resin with glass content
max. tightening torque of nuts	15 Nm	15 Nm	15 Nm	15 Nm
class of protection to EN 60 529	IP 67	IP 67	IP 67	IP 67
type of connection	5-pin M12 plug	5-pin M12 plug	5-pin M12 plug	5-pin M12 plug
controls	Teach-in via pin 5 (Com)	Teach-in via pin 5 (Com)	Teach-in via pin 5 (Com)	Teach-in via pin 5 (Com)
indicators	LED green (operation) LED yellow (state of analogue output)	LED green (operation) LED yellow (state of analogue output)	LED green (operation) LED yellow (state of analogue output)	LED green (operation) LED yellow (state of analogue output)
programmable	Teach-in	Teach-in	Teach-in	Teach-in
synchronisation	internal synchronisation up to 10 sensors	internal synchronisation up to 10 sensors	internal synchronisation up to 10 sensors	internal synchronisation up to 10 sensors
operating temperature	-25°C to +70°C	-25°C to +70°C	-25°C to +70°C	-25°C to +70°C
storage temperature	-40°C to +85°C	-40°C to +85°C	-40°C to +85°C	-40°C to +85°C
response time	32 ms	32 ms	32 ms	32 ms
time delay before availability	< 300 ms	< 300 ms	< 300 ms	< 300 ms
norm conformity	EN 60947-5-2	EN 60947-5-2	EN 60947-5-2	EN 60947-5-2
analogue output 4-20 mA	$R_L \leq 500\ \Omega$, rising/falling characteristic	$R_L \leq 500\ \Omega$, rising/falling characteristic	$R_L \leq 500\ \Omega$, rising/falling characteristic	$R_L \leq 500\ \Omega$, rising/falling characteristic
operating voltage U_B	10 - 30 V DC for $R_L \leq 100\ \Omega$, 20 - 30 V DC for $R_L > 100\ \Omega$, terminal reverse polarity protected	10 - 30 V DC for $R_L \leq 100\ \Omega$, 20 - 30 V DC for $R_L > 100\ \Omega$, terminal reverse polarity protected	10 - 30 V DC for $R_L \leq 100\ \Omega$, 20 - 30 V DC for $R_L > 100\ \Omega$, terminal reverse polarity protected	10 - 30 V DC for $R_L \leq 100\ \Omega$, 20 - 30 V DC for $R_L > 100\ \Omega$, terminal reverse polarity protected
order no. unbowed	**BUS M18M1-XB-02/015-S92G**	**BUS M18M1-XB-03/025-S92G**	**BUS M18M1-XB-07/035-S92G**	**BUS M18M1-XB-12/100-S92G**
order code	**BUS0025**	**BUS002C**	**BUS004W**	**BUS004M**
order no. angular head	**BUS W18M1-XB-02/015-S92G**	**BUS W18M1-XB-03/025-S92G**	**BUS W18M1-XB-07/035-S92G**	**BUS W18M1-XB-12/100-S92G**
order code	**BUS0027**	**BUS002E**	**BUS004U**	**BUS0053**
analogue output 0-10 V	$R_L \geq 100\ k\Omega$, short circuit proof, rising/falling characteristic	$R_L \geq 100\ k\Omega$, short circuit proof, rising/falling characteristic	$R_L \geq 100\ k\Omega$, short circuit proof, rising/falling characteristic	$R_L \geq 100\ k\Omega$, short circuit proof, rising/falling characteristic
operating voltage U_B	15 - 30 V DC, terminal reverse polarity protected	15 - 30 V DC, terminal reverse polarity protected	15 - 30 V DC, terminal reverse polarity protected	15 - 30 V DC, terminal reverse polarity protected
order no. unbowed	**BUS M18M1-XA-02/015-S92G**	**BUS M18M1-XA-03/025-S92G**	**BUS M18M1-XA-07/035-S92G**	**BUS M18M1-XA-12/100-S92G**
order code	**BUS0026**	**BUS0024**	**BUS004T**	**BUS0052**
order no. angular head	**BUS W18M1-XA-02/015-S92G**	**BUS W18M1-XA-03/025-S92G**	**BUS W18M1-XA-07/035-S92G**	**BUS W18M1-XA-12/100-S92G**
order code	**BUS0028**	**BUS0050**	**BUS004R**	**BUS0051**