SERIES DM

Installation Manual

Micro Detectors

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• GENERAL DESCRIPTION

M12 cylindrical photoelectric sensors - DC
Digital sensitivity adjustment by teach-in button or remote cable
Multifunction LED with signal level indication
Sensing distance :

- Diffuse reflection 100, 200, 300 mm , polarized 2m, through-beam 4m.
- Emission. Diffuse reflection , through-beam: infrared (880 nm)
  Polarized : red (660 nm)

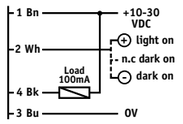
Housing Material : nickel-plated brass
Output : NPN or PNP, 100 mA , with short circuit protections.

WARNING

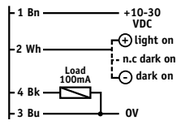
These products are NOT safety sensors and are NOT suitable for use in personal safety application

• WIRING DIAGRAMS

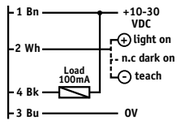
NPN - Receiver



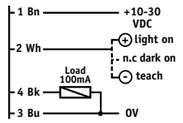
PNP - Receiver



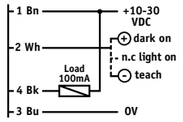
NPN - Polarized



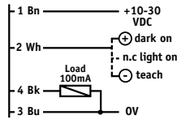
PNP - Polarized



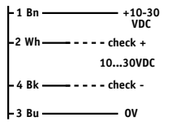
NPN - Diffuse Reflection



PNP - Diffuse Reflection



Emitter

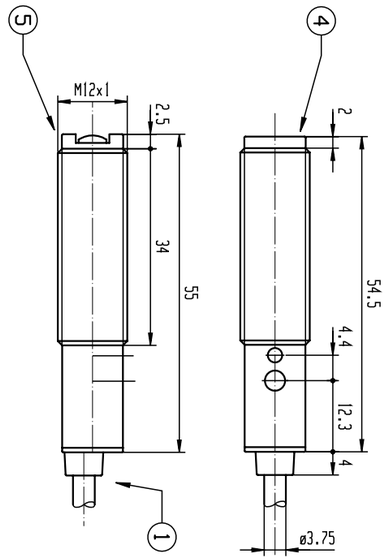


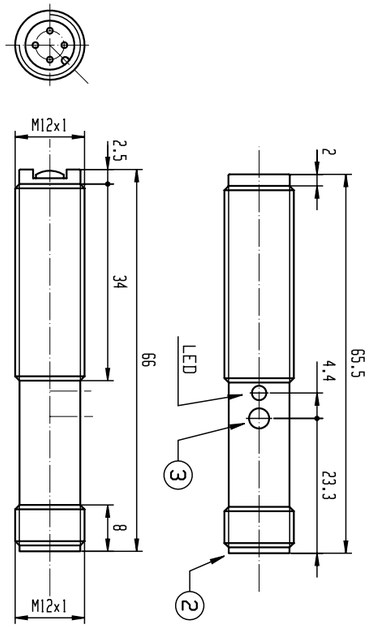
WIRING COLORS

1/Bn : Brown
2/Wh : White
3/Blu : Blue
4/Blk : Black

NOTE. In case of combined load, resistive and capacitive, the maximum admissible capacity is 0,1 μF for maximum output voltage and current

• MECHANICAL DRAWINGS





❶ Cable exit, 4x0,14mm², Ø3,75 mm, PVC, 2m
❷ M12 metal plug cable exit
❸ Teach-in button / Trimmer
❹ Diffuse reflection optic
❺ Retroreflective optic

• SUPPLIED MATERIAL

Installation Manual
Two M12 metal ring nut.
Trimmer adjustment accessory ST82 for emitters with sensitivity adjustment

• SENSITIVITY ADJUSTMENT

Two types of digital sensitivity adjustment are possible on the diffuse reflection and polarized sensors: standard adjustment and fine adjustment . Fine adjustment is ideal for achieving the greatest sensitivity for the detection of small and semi-transparent objects; if the target objects are opaque or of larger dimensions, or if the background does not affect the reading, standard adjustment should be used as it guarantees that the system can operate in harsh environments. On the through beam sensors sensitivity adjustment is available by means of a trimmer.

Diffuse reflection

Install the unit and select the output state. Position the target object at the sensing distance required, checking that the optical axis is perpendicular to the surface of the object. Assuming the worst possible conditions (object smaller and object or part of object darker than the background), position the object at the furthest possible point from the sensor. Press the teach button or connect pin 2 (white cable) to earth for 2-5 secs. until the yellow signal LED switches back on constantly. The threshold is set at 50% of the detected signal, thus giving the device a standard sensitivity adjustment. Remove the object and check that the yellow LED has switched off. If the yellow LED remains switched on, fine sensitivity adjustment is required.

To carry out the fine adjustment connect pin 2 (white cable) to earth or press the Teach-in button for t > 8 secs. until the yellow signal LED starts flashing. The threshold is set below the detected signal of the hysteresis amplitude. Remove the object and check that the yellow LED has switched off.

Polarized

Install the retro-reflector so that its surface is perpendicular to the sensor's optical axis. Make sure that the distance between the sensor and the retro-reflector is not greater than that specified for the retro-reflector in use. Provisionally secure the sensor in a stable position and select the output state. To achieve the best alignment, use the following procedure. Press the Teach button, or connect pin 2 (white cable) to earth for t > 8 secs., until the yellow signal LED starts flashing. The threshold is set below the detected signal of the hysteresis amplitude. Adjust the sensor by moving it vertically and horizontally until the LED switches on constantly, or at least until the frequency of the flashes decreases. Repeat the operation until it is no longer possible to vary the frequency at which the yellow LED flashes. Secure the sensor in a stable position and check that the LED switches off when the beam is interrupted by the target object. In this way a correct centring on the retro-reflector in use and a fine adjustment of device sensitivity have been carried out. This adjustment is ideal for the accurate detection of semi-transparent objects.

For applications in which the target objects are not transparent, the standard adjustment is recommended (after having carried out the operations described above). This gives the highest possible margin of immunity to the dust or dirt which can deposit on the optical elements. To carry out a standard adjustment press the Teach button or connect pin 2 (white cable) to earth for 2-5 secs until the yellow signal LED switches back on constantly. The threshold is set at 50% of the detected signal.

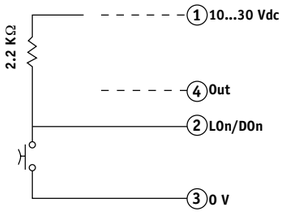
Check that the LED switches off when the beam is interrupted by the target object. If the yellow LED remains switched on, fine sensitivity adjustment is required.

Digital adjustment notes.

Beyond the nominal distance of the sensor, the fine adjustment has no effect on the operating distance. As shown from the curves, the hyteresis increases with a correspondent increase in the teach distance. If a fine adjustment is required, the sensor must be used within the nominal sensing distance. To check if the sensor is capable of adjusting the sensitivity correctly, it is always advisable to carry out a fine adjustment and to make certain that the LED is flashing at the end of the procedure. If the LED remains constant, either the sensor operates at too high distance in relation to the target object or the sensor is not correctly aligned. If it is sufficient only to detect the presence of objects and this is not affected by backgrounds or other objects behind those to be detected, the sensor can be used till the distance indicated in the curves is reached. If necessary, repeat the setting by carrying out a brief teach. The curves represent the relationship between the position in which the sensor is placed to carry out the sensitivity adjustment and the position in which the sensor is activated with a margin >=2.

Teach with Dark ON configuration

Should it be necessary to use the teach input with a DARK ON configuration 2.2 KΩ resistor must be added to avoid short circuits in the power supply when the teach mode is active.

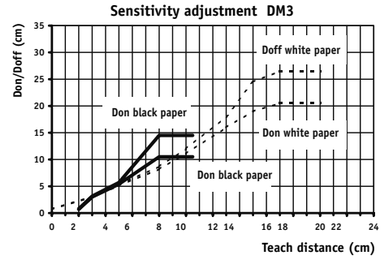


Through-beam

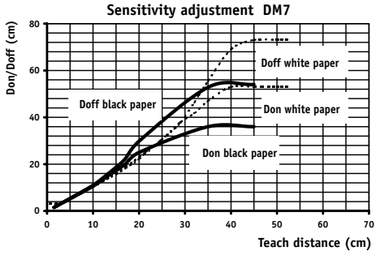
Using the recommended brackets, provisionally install the emitter and receiver within the sensing distance. Position the components so that they coincide with the optical axis as much as possible. Check that the sensitivity adjustment trimmer is turned to the furthest clockwise position. Adjust the emitter by moving it vertically and horizontally until the yellow LED on the receiver switches on. Adjust the receiver by moving it vertically and horizontally until the yellow LED switches on constantly. Secure the system properly and proceed with the sensitivity adjustment. Check that, when no object is present, the yellow LED on the receiver is constantly switched on. Turn the sensitivity adjustment trimmer in an anticlockwise direction until the LED switches off. Turn the trimmer in a clockwise direction until the signal LED switches back on constantly. This is the position in which the system can operate in the optimum conditions for detecting both solid parts and spaces with equal precision and with a good safety margin. If the target object does not create problems, the trimmer can be turned clockwise to the furthest position to achieve higher working limits.

Check that the yellow LED on the receiver switches off when the optical beam is interrupted.

Sensitivity adjustment DM3



Sensitivity adjustment DM7



• CODE DESCRIPTION

DM 2 / 0 0 - 1 A 25

Series
M12 cylindrical photoelectric sensors — DM

Models
diffuse reflection 100 mm without sensitivity adjustment — 2
diffuse reflection 100 mm with sensitivity adjustment — 3
diffuse reflection 200 mm without sensitivity adjustment — 5
diffuse reflection 300 mm with sensitivity adjustment — 7
Polarized 2m with sensitivity adjustment — P
Emitter 4m with power emission adjustment — E
Receiver 4m — R

Output state
emitter without check – NO/NC selectable. — 0
emitter with check — X

Logic
0 — emitter
N — NPN output
P — PNP output

Housing
1 — metal housing

Cable exit
A — axial cable exit
E — M12 plug cable exit

Special model
25 — DMP and DME without sensitivity adjustment

• SPECIFICATIONS

Models	DM2/0x-1x	DM3/0x-1x	DM5/0x-1x	DM7/0x-1x	DMP/0x-1x *	DMP/0x-1x 25 *	DMR/0x-1x	DME/x0-1x	DME/x0-1x 25
Type	diffuse reflection				Polarized		Through-beam		
Nominal sensing distance	100 mm	100 mm	200 mm	300 mm	2 m		4 m		
Tolerance	+15/-5%								
Repeat accuracy	5%								
Operating voltage	10 – 30 Vdc								
Ripple	≤ 10 %								
No-load current	≤ 20 mA								
Load current	100 mA								
Leakage current	≤ 10 μA (VDC max)								
Output voltage drop	2V max. IL=100 mA								
Output type	NPN o PNP – NO/NC selectable								
Switching frequency	400 Hz						250 Hz		
Time delay before availability	150 ms								
Supply electrical protections	Polarity reversal, transient								
Output electrical protections	Short circuit (autoreset)								
Temperature drift	10%Sr								
Interference to external light	3000lux (incandescent lamp); 10000lux (sunlight)								
Protection degree	IP67 (EN60529)								
Sensitivity Adjustement	No	Teach -in	No	Teach -in	Teach -in	No	No	Trimmer	No
Check input	No							Decoupled input 10 .. 30 Vdc	
LED indicators	Yellow : fixed on (light state with ExG≥2) : blink (light state with 1≤ExG<2) : off (dark state)								

• INSTALLATION

- To aid fastening the following optional brackets are available :ST12-A , ST12C , ST04
- Do not use the sensor where it may be exposed to dust, water, steam etc. which could affect detection.
- Do not use alcohol or chemical products to clean lens.
- Do not allow a strong light such as sun light to radiate directly on the sensor.
- On the models with plug cable exit the ring nuts must be tightened firmly to avoid impairing the sensor's protection degree IP67

• CONNECTIONS

1 Make sure that the operating voltage is correctly stabilized with a maximum ripple being within the specified figure as stated in the catalogue.
2 When using a "switching" regulator for the power source be sure to earth both the frame round terminal and the sensor.
3 In the event that the noise induced by the power lines is greater than that specified by the EC regulation (interference immunity), detach the sensor cables from the power and high voltage lines and insert the cable in an earthed metal conduit. Furthermore, it is advisable to connect the sensor directly to the supply source and not downstream of other devices
4 To extend the supply and output cables, a cable with a minimum cross-section of 1 mm² must be used. The length of such an extension is limit to a maximum of 100m (with respect to a minimum voltage and load current of 100mA).
5 The sensor will become active 150ms after supply voltage is applied. During this time, the outputs will be OFF.

• M12 CONNECTORS