

FAL SERIES

INSTALLATION MANUAL



CLASS 1 LASER PRODUCT

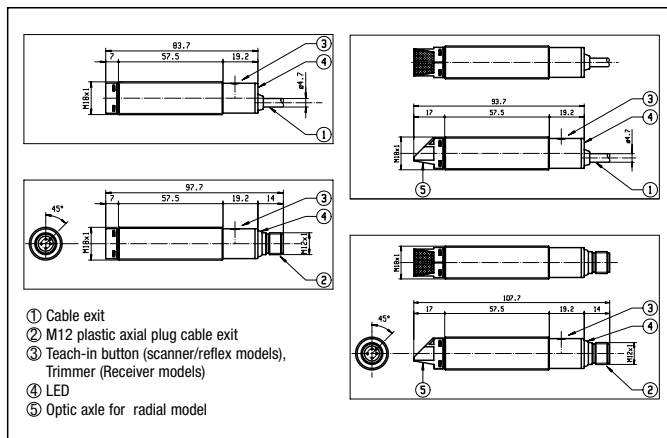
Red laser light
wavelength = 655 nm; repetitively pulsed emission.
FALN and FAL4 Frequency = 4840 Hz;
pulse duration = 9,3 μs;
maximum output power = 0,4 mW
FALH Frequency = 8330 Hz;
pulse duration = 12 μs;
maximum output power = 0,2 mW
Classified according to IEC EN 60825-1/A2:2001-01.
Complies with 21 CFR 1040.10 and 1040.11 except for
deviation pursuant to Laser Notice N° 50 dated July 26,
2001.



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MECHANICAL DRAWINGS



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

SUPPLIED MATERIAL

- Installation manual
- N° 1 photoelectric sensor
- N° 2 M18 ring nut
- Trimmer adjustment accessory ST82 for receivers

GENERAL DESCRIPTION

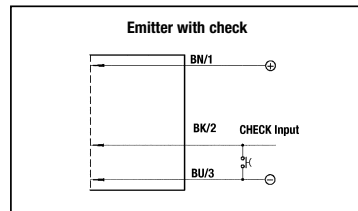
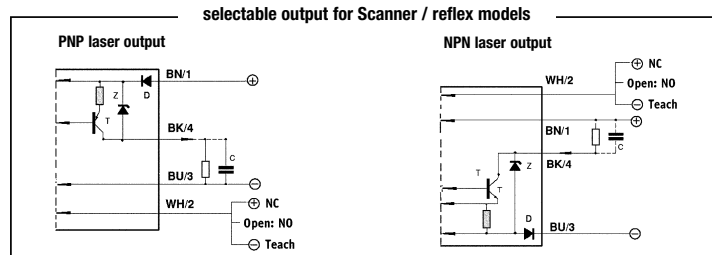
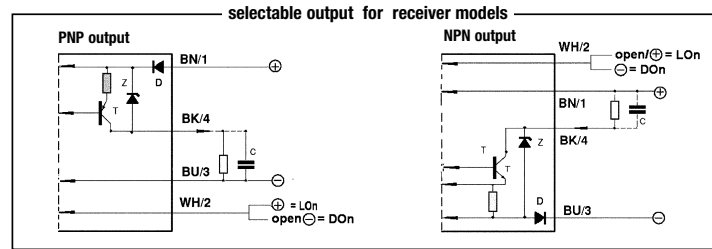
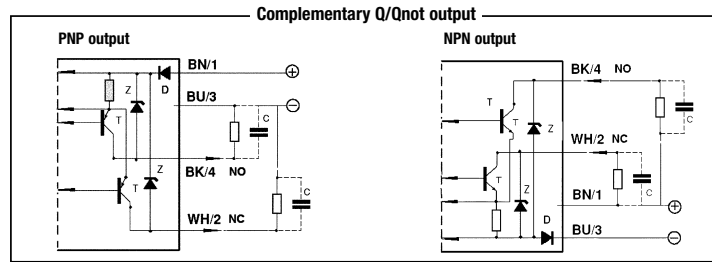
M18 cylindrical photoelectric sensor, RED LASER emission, M18, DC Sensitivity adjustment for all models (by means teach-in button placed on the sensor in reflex and scanner models or by means trimmer placed on the receiver in through beam models)

In models with LO/DO selectable output (4 wires) pin 2 (White) can be used also as remote control for the sensitivity adjustment. The button is in any case present.

CAUTIONS

The laser devices, also if class 1, always emit an intense and very concentrate light; the intentional and prolonged observation of this light can cause problems. As a result, it is advisable, where possible, to install the laser sensors so as the beam cannot exceed the operating area. We also suggest avoiding that the laser beam direction permanently meets the operator's eyes.

WIRING DIAGRAMS



1/BN: Brown
2/WH: White
3/BU: Blue
4/BK: Black

NOTE: In case of combined load, resistive and capacitive, the maximum admissible capacity is 100 nF for maximum output voltage and current.

CODE DESCRIPTION

1	2	3	4	5	6	7
FA	L				A	E
M18 photoelectric sensors 3/4 wires, DC					Axial cable exit	M12 axial plastic plug cable exit
Red laser emission						
Emitter			H		0	
Receiver with sens. adjust			D		1	
Diffuse reflection 300 mm axial optic, 200 mm radial optic with sens. adjust			4		2	
22m retro-reflective with sens. adjust			N		3	
Emitter -4 wires LOn / DOn selectable			O	O		
Emitter with check			X	P		
4 wires Q/Qnot output			B	N		

INSTALLATION

- Make sure that the operating voltage is correctly stabilized with a maximum ripple being within the specified figure as stated in the catalogue.
- 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.

- 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.

Sensitivity Adjustment

• **Diffuse reflection**
Place 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 statistically 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.

Declaration of conformity MD Micro Detectors S.p.A.

Declare under our sole responsibility that this products are in conformity with the following EEC directive: 89/336 and 73/23 and amendment.

rupted by the target object. If the yellow LED remains switched on, fine sensitivity adjustment is required

• 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.

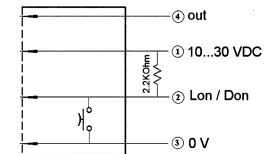
Check that the yellow LED on the receiver switches off when the optical beam is interrupted. **Check input:** Some model have a test circuit in the emitter which enables a user friendly test to be effected in order to verify that the sensor is operating correctly. In light state connected the check input (Bk/2 to ground) the pulse emission's is interrupted. This condition simulates the presence of a target within the detection range and forces the receiver output to switch. If switching does not occur it indicates a fault in the system.

Digital adjustment notes

Beyond the nominal distance of the sensor, the fine adjustment has no effect on the operating 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.

Teach with Dark ON configuration

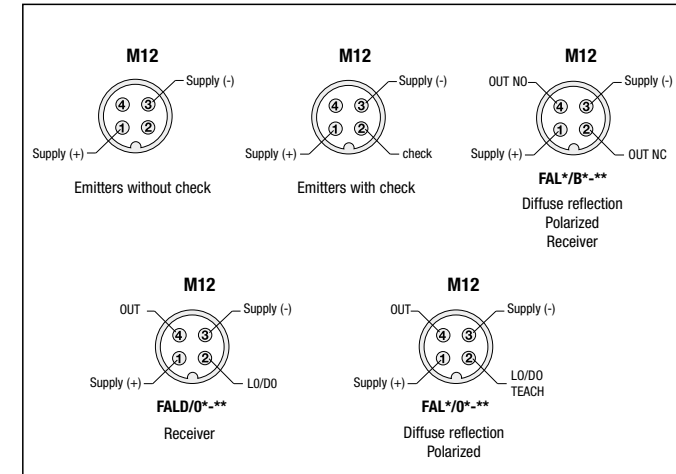
Should it be necessary to use the teach input with a DARK ON configuration 2.2 KΩ resistor must be added to avoid short circuits in the power supply when the teach mode is active.



Warranty MD Micro Detectors S.p.A.

warrants for a period of three (3) years from the date of manufacturing that all products will be free from defects and commits oneself to repairing and replacing the goods that MD considers defective. Such warranty satisfaction is available only if any alleged defect has not been caused by misuse or improper installation.

CONNECTORS



SPECIFICATIONS

Model	FAL4/**-***	FALM/**-***	FALD/**-***	FALH/**-***
Type	Diffuse reflection	Polarised Retro-reflective	Receiver	Emitter
Nominal Sensing Distance (Sn)	300 mm axial optic 200 mm radial optic (1) (focussed 100 mm)	22 m con/w/ RL110; 35 m con/w/ RL100D 5 m con/w/ RL100D		50 m
Emission	Laser diode (650nm)			Laser diode (650nm)
Laser class	Laser class 1 (IEC 60825-1)			Laser class 1 (IEC 60825-1)
Tolerance	+15/-5% of the nominal sensing distance Sn			
Differential Travel	≤ 10 %			
Repeat Accuracy	5%		10 %	-
Operating Voltage	10 – 30 V d.c.			
Ripple	≤ 10 %			
No-load Supply Current	≤ 25 mA			
Load Current	100 mA			
Leakage Current	≤ 10 μA (at V d.c. max)			
Voltage Drop	2V max a 100mA			
Output Type	NPN o PNP - Q/Qnot o/ or NO /NC selectable			
Maximum Switching Frequency	800 Hz		1 kHz	-
Time Delay Before Availability	200 ms			
Supply Electrical Protections	Polarity reversal, Transient			
Output Electrical Protections	Short circuit (autoreset)			
Temperature Range	-10 °C / +55 °C (without freeze)			
Check input	- BK/2 connected to 0 V Emission disable			
Temperature Drift	10 % Sr			
Interference to External Light	3000 lux (incandescent lamp); 10000 lux (sunlight)			
Protection Degree	IP67 (EN60529)			
Noise immunity	According EN60947-5-2			
Radiation	According EN60947-5-2			
LED Indicator	Yellow: fixed on (light state with ExG≥2) Yellow: blink (light state with 1≤ExG<2) Yellow: off (dark state) Green: power on		Yellow: light state	Green: power on Yellow: on (emission enable) Yellow: off (emission disable)
Sensitivity Adjustment	Teach-In button		Trimmer	-
Housing Material	Nichel -plated brass (metal housing), PBT (plastic housing); P(cable exit)			
Lenses Material	Glass			
Tightening Torque	40Nm (metal housing)			
Weight (approx.)	0.20 kg			

(1) White target kodak 90% reflection 100 x 100 mm