

# Type 4 modular light curtain with separate control unit

FF-SCAN Series

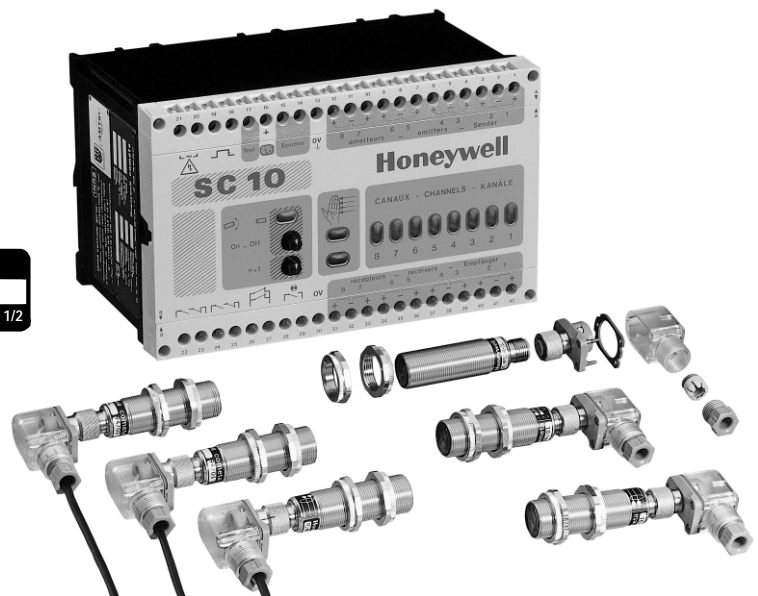
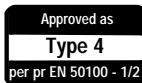
Designed to enhance application flexibility

## FEATURES

- Meets applicable parts of US OSHA 29CFR 1910.212 and RIA 15.06 regulations for Control Reliability
- Through scan detection system
- Complete system, ready for installation (amplifier, sensors, plug and cable)
- Safety amplifier with permanent self-checking, Type 4 according to IEC/EN 61496 - parts 1 & 2
- EC type examination certificate delivered by the German BG E+MIII
- Can drive from 2 to 8 multiplexed photoelectric beams
- Two guided contact output relays
- Resolution:  $\varnothing 40$  mm to 400 mm / 1.57 in to 15.76 in in compliance with EC regulations (EN 999 standard)
- Built-in individual beam alignment aid
- Restart modes available:
  - automatic restart
  - start and restart interlock after power on and any beam interruption; in this mode the FSD monitoring facility is available
- Test input for FSD monitoring

## TYPICAL APPLICATIONS

- Access protection on palletising areas
- Access control of areas containing robots or automatic machines
- Detection of automatic guided vehicles
- Ejection control
- Tool control
- Reliability of the detection information
- Thermoforming, agglomerating and moulding presses
- Door control



The FF-SCAN system uses an invisible, modulated infrared curtain. Due to its flexibility, it offers a customised solution for the protection of personnel working on dangerous machinery.

The system contains a positive-safety self-checking amplifier, M18 photoelectric sensors, connectors and one or two rolls of cable (1 shielded pair). Optional accessories are available (mounting brackets, deflection mirrors, multibeam post) to make the installation easy.

The sensors used to analyse an access area operate in through scan mode. The distance separating emitters and receivers can be as high as 33 m / 108.24 ft. Receivers are fitted with a line impedance adaptor allowing cabling connections of up to 50 m / 164 ft.

The amplifier drives from 2 to 8 sensors, that can provide a resolution of 40 mm to 400 mm / 1.57 in to 15.76 in (see sensors installation).

A built-in individual beam alignment aid provides visual information, which helps optimise optical adjustments when installing sensors. This alignment aid is helpful for any protection and any scanning ranges up to 33 m / 108.24 ft. Accessories are designed to ease sensors installation and a laser pen designed for alignment purposes can be used for perimetric protections involving one or several mirrors.

The dynamic electronic processing and the permanent self-checking of circuits provide a high level of intrinsic safety. The start and restart interlock allows reliable access control of dangerous areas surrounded by the infrared beam. The use of a test input facility provides a reliable control of the electrical interface which connects the FF-SCAN to the machine control circuits.

### **WARNING**

#### MISUSE OF DOCUMENTATION

- The information presented in this product sheet (or catalogue) is for reference only. DO NOT USE this document as system installation information.
- Complete installation, operation and maintenance information is provided in the instructions supplied with each product.

**Failure to comply with these instructions could result in death or serious injury.**

### Sensors installation

The safety distance between the protection field and the dangerous zone should be large enough to ensure that if the protection field is entered, the dangerous zone cannot be reached before the hazardous movement is ended or interrupted. The safety distance "S" (or D) is calculated according to the following formula:

$$S \geq K (t1 + t2) + C$$

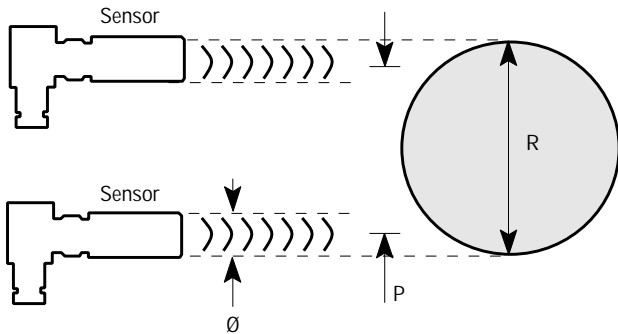
- S: Minimum safety distance (mm / in)
- K: Approach speed of the operator (mm / s)
- t1: Response time of the photoelectric curtain (30 ms)
- t2: Stopping time of the machine (ms)
- C: Additional guarding space depending on the curtain sensitivity (mm / in)

### Resolution of the photoelectric curtain

Parameter C depends on the maximum resolution of the photoelectric curtain. This resolution is determined by the sensing width of two adjacent beams as follows:

$$R = P + \emptyset$$

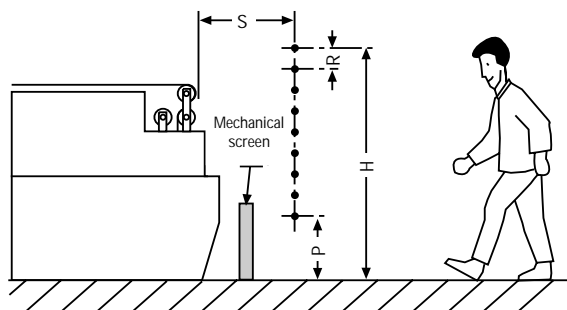
- R: Maximum resolution of the curtain (mm / in)
- P: Maximum distance separating the centers of two adjacent sensors (mm / in)
- ∅: Lens diameter (15 mm / 0.59 in)



### Values of K and C parameters according to the European EN 999 standard

The approach speed "K" depends upon the position of the curtain, and the guarding space "C" depends upon the resolution of the curtain.

### Normal approach



### Safety curtain with a resolution greater than 40 mm / 1.57 in and less than 70 mm / 2.75 in

Protective devices with such a resolution are considered by the EN 999 European project norm to be sets of multiple independent beams. They will not detect intrusion of the hands, and therefore shall only be used where the risk assessment indicates that detection of intrusion of the hands is inappropriate. When the resolution of the FF-SCAN system is set between 40 mm / 1.57 in and 70 mm / 2.75 in, the sensing field will detect arms, legs or the whole body of the operator.

In that case, the minimum allowable safety distance "S" from the dangerous zone to the vertical detection plane shall be calculated using the following formula:

$$S \geq 1600 (t1 + t2) + 850 \text{ (mm)}$$

$$\text{(or } S \geq 63 (t1 + t2) + 33.5 \text{ (in))}$$

- S: Minimum safety distance (mm / in)
- t2: Stopping time of the machine (s)
- t1: 30 ms (response time of the FF-SCAN curtain)

The risk of inadvertent access shall be taken into account during the risk assessment stage, and if it is the case, the height "H" of the uppermost beam shall be greater or equal to 900 mm / 35.46 in, and the height "P" of the lowest beam shall be lower or equal to 300 mm / 11.82 in.

Where the photoelectric safety curtain may not offer sufficient protection, additional safety devices or further photoelectric controls are required in order to prevent the operator from entering the dangerous zone without being detected, and from staying between the dangerous zone and the photoelectric safety grid.

### Multiple individual beam devices (resolution > 70 mm / 2.75 in)

When the resolution of the photoelectric safety curtain is greater than 70 mm / 2.75 in, the EN 999 project norm recommends the number of beams and their heights above the floor as follows:

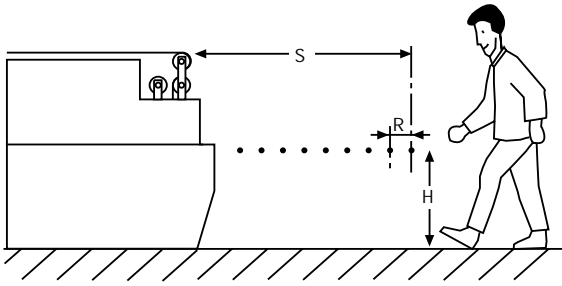
### Note

Number of beams	Heights	
	mm	in
2	400 / 900	15.76 / 35.46
3	300 / 700 / 1100	11.82 / 27.58 / 43.34
4	300 / 600 / 900 / 1200	11.82 / 23.64 / 35.46 / 47.28

Multiple individual beam devices may not necessarily detect intrusion of the body or parts of the body towards the dangerous zone. If it is the case, additional safety devices are required.

FF-SCAN

**Parallel approach**



The minimum safety distance "S" from the dangerous zone to the outer beam is dependent on the part of the body detected, which sets the height "H" of the curtain above the floor and the resolution "R" of the curtain. This safety distance shall be calculated using the following formula:

$$S \geq 1600 (t1 + t2) + 1200 - 0.4H \text{ (mm)}$$

where  $(1200 - 0.4 H) \geq 850 \text{ mm}$

$$\text{(or } S \geq 63 (t1 + t2) + 47.3 - 0.4H \text{ (in))}$$

where  $(47.3 - 0.4 H) \geq 33.5 \text{ in}$

*t1: 30 ms (response time of the FF-SCAN curtain)*

*t2: Stopping time of the machine (s)*

*H: Height (mm / in) of the curtain above the floor*

*R: Resolution of the curtain (mm / in)*

**Note**

The height "H" shall be a maximum of 1000 mm / 39.4 in. However if the installation height "H" is greater than 300 mm / 11.82 in, there is a risk of inadvertent undetected access beneath the curtain and this must be taken into account in the risk assessment.

The height "H" of the detection plane above the floor is related to the maximum allowable resolution "R" of the curtain.

$$H = 15 (R - 50)$$

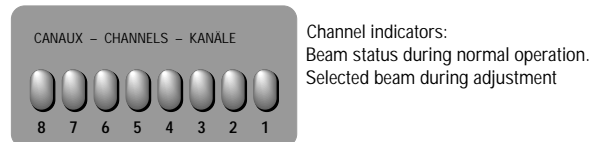
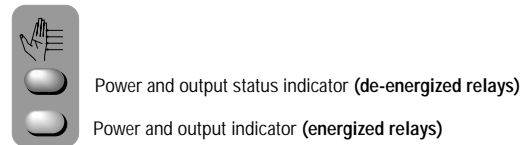
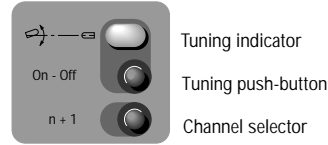
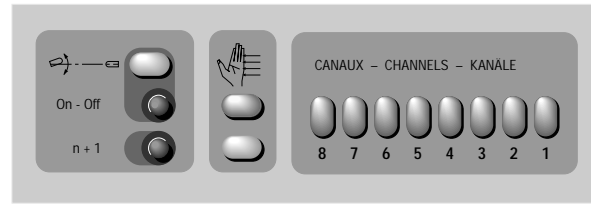
*H: Height (mm / in) of the curtain*

*R: Resolution of the curtain (in mm)*

In this way, where the height "H" of the curtain is known or fixed, a maximum allowable resolution can be calculated according to the above mentioned formula:

$$R = H/15 + 50$$

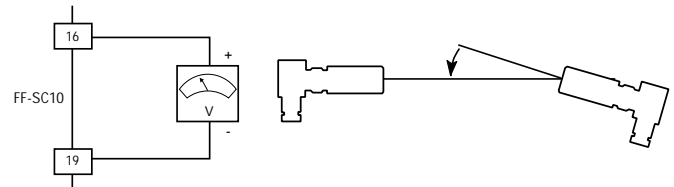
The above mentioned mountings are given as possible mountings. For any other kind of mounting, or for more information, please refer to EN 999 or get in touch with us.



**Light indicators located on the front panel of the FF-SC10**

**Sensors alignment procedure**

- Connect a voltmeter between terminals 16 and 19 of the FF-SC10 amplifier (scale: 20 Vdc).
- Select the tuning mode with the "On - Off" push-button.
- Select channel number 1 with the "n + 1" push-button (the first channel indicator must light up).
- Adjust the mechanical position of the sensors connected on the first channel until the voltage reaches a maximum on the voltmeter.

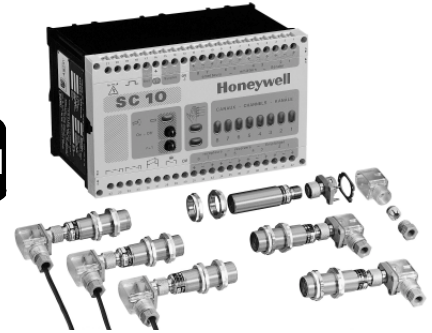
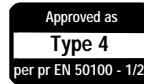


- Repeat these operations for each channel and go back to the normal mode of operation.

**FF-SCAN**

# FF-SCAN

- Type 4 according to IEC/EN 61496 - parts 1 & 2
- Meets applicable parts of OSHA and RIA regulations for Control Reliability
- Modular photoelectric safety curtain
- Scanning range up to 33 m / 108 ft



Dimensions in millimeters / inches, meters / feet, weights in kg / lbs

<b>Specifications</b>	<b>Supply voltage</b>	120/240 Vac, +10% -20 %, 48 to 62 Hz	24 to 48 Vdc(1) ±15 %
	<b>Power consumption</b>	20 VA	15 W
	<b>Switching capacity</b>	2 A/250 Vac, 2 safety relays with guided contacts (50 mA min.)	
	<b>Material</b>	Sensors: Aluminium alloy housing and glass lens • Amplifier: polycarbonate housing	
	<b>Response time</b>	0.03 s (Output switching frequency = 10 Hz)	
	<b>Housing size</b>	Sensors: M18 x 99 mm (with connectors) • Amplifier: 20 mm x 128,5 mm x 120 mm (Ω rail mounting according EN 50 022)	
		Sensors: M18 x 3.90 in (with connectors) • Amplifier: 0.78 in x 5.06 in x 4.72 in (Ω rail mounting according EN 50 022)	
	<b>Emission</b>	Modulated Light Source, infrared LED (875 nm)	
	<b>Resolution</b>	From ø40 mm to ø400 mm / 1.57 in to 15.76 in (in compliance with EN 999)	
	<b>Alignment tolerance</b>	±2° for emitters and receivers	
	<b>Ambient temperature</b>	0 °C to 55 °C / 32 °F to 131 °F	
	<b>Sealing</b>	Sensors: IP 67 / (NEMA 6) • Amplifier: IP 20 (need to be installed in an IP 54 enclosure)	
	<b>Electrical noise immunity</b>	IEC 801-4: level III	
	<b>Resistance to ambient light</b>	Sun: 20 000 Lux • Lamp: 15 000 Lux	
	<b>Indications</b>	LED displays on unit front panel and signalling contacts (output and beams status)	
	<b>Scanning distance</b>	Standard: 0 m to 25 m / 0 ft to 82 ft • Long range: 15 m to 33 m / 49.2 ft to 108.2 ft	
	<b>Electrical connections</b>	Sensors: Plastic plug-in connectors (Type Hirschmann ELWIKa 4012) Amplifier: 2 plug-in terminal strips	

### Ordering information<sup>(2)</sup>

FF-SCAN □18□-□

**Nominal scanning range:**  
Blank: 0 m to 25 m / 0 ft to 82 ft (standard)  
L: 15 m to 33 m / 49.2 ft to 108.2 ft (lg range)

**Supply voltage:**  
E: 120 Vac  
G: 240 Vac  
4: 24 to 48 Vdc<sup>(1)</sup>

**Number of beams:**  
2 to 8<sup>(3)</sup>

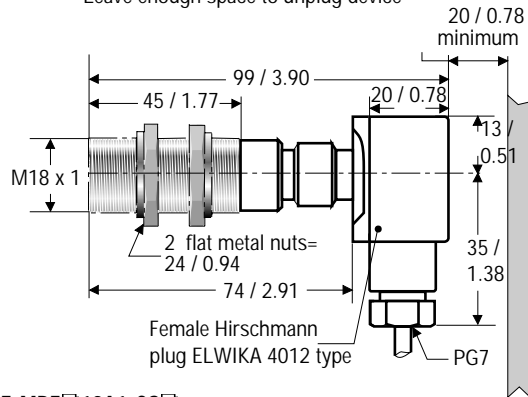
### Note

- (1) - Dc versions are featured with a galvanic insulation (dc to dc converter) that provides the immunity to external disturbances; this is essential to guarantee the safety integrity of the equipment.
- (2) - A complete set includes: a number of sensors, relevant connectors and cable, the FF-SC10 amplifier.
- (3) - For 2 to 4 beams: cable length is 100 m / 328 ft  
For 5 to 8 beams: cable length is 200 m / 656 ft

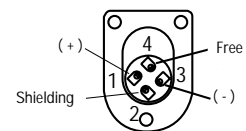
The 2 beam programming must be done by the manufacturer and cannot be modified by the user.

### Sensor FF-MPF with connector FF-MPFCONN

Leave enough space to unplug device



Female connector back view



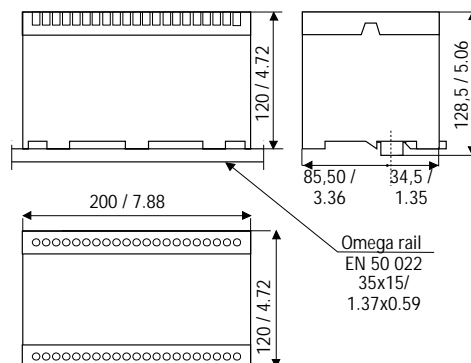
FF-MPF □18A1-CS□

E: Emitter  
R: Receiver

### Scanning range:

Blank: 0 m to 25 m / 0 ft to 82 ft (standard)  
L: 15 m to 33 m / 49.2 ft to 108.2 ft (long range)

### Control unit (amplifier FF-SC10)



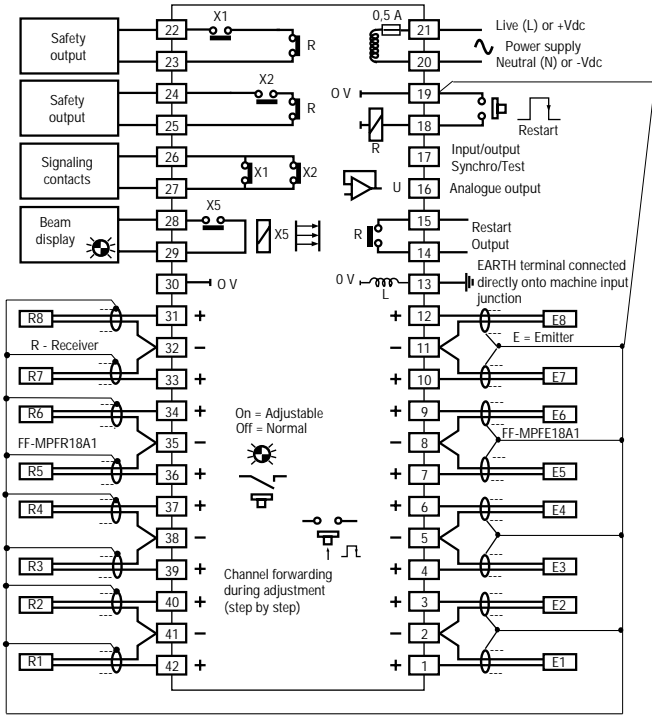
FF-SC10M08□

### Supply voltage:

E: 120 Vac  
G: 240 Vac  
4: 24 Vdc to 48 Vdc<sup>(1)</sup>

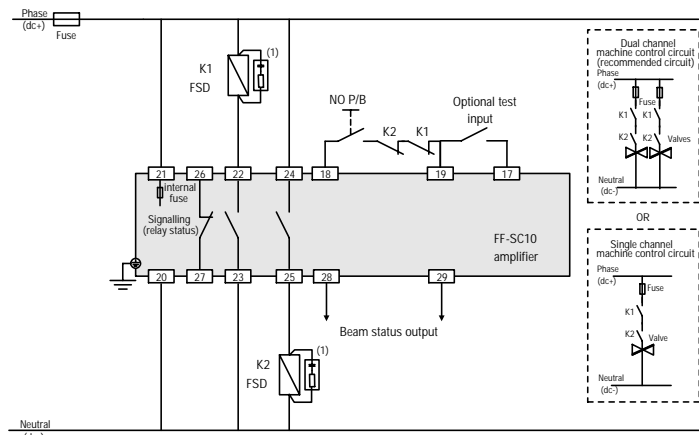
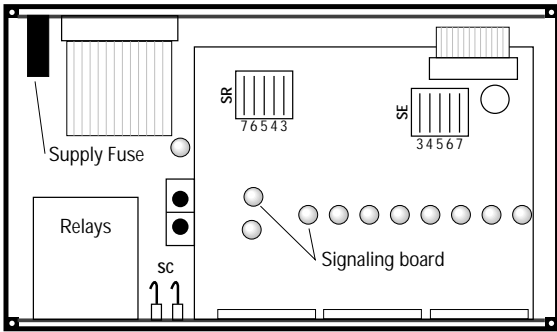
### Connection diagram

#### FF-SC10 Amplifier

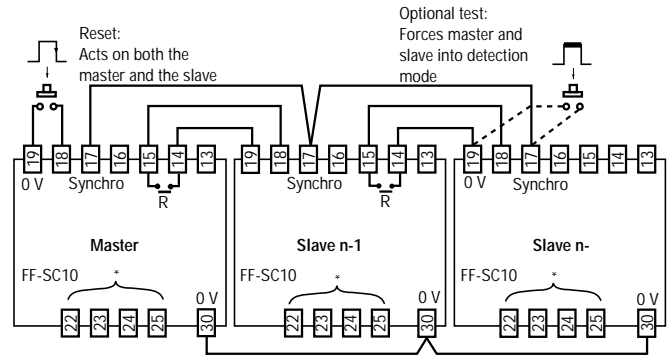


Notice: Other devices should not be connected to internally generated supply. Vdc versions are protected against reversed polarity due to a rectifier.

#### Locating the configuration devices



### Multiple amplifier connection



#### SR and SE switches positions:

Number of channels	Number of beams used	Position SR					Position SE				
		7	6	5	4	3	3	4	5	6	7
3	1 to 3	1	1	1	1	1	0	0	0	0	0
4	1 to 4	1	1	1	1	0	1	0	0	0	0
5	1 to 5	1	1	1	0	0	1	1	0	0	0
6	1 to 6	1	1	0	0	0	1	1	1	0	0
7	1 to 7	1	0	0	0	0	1	1	1	1	0
8	1 to 8	0	0	0	0	0	1	1	1	1	1

The 2 beam programming must be done by the manufacturer and cannot be modified by the user.

#### Restart mode:

SC in position 1 - 1: Automatic mode  
 SC in position 0 - 0: Start and restart mode

#### Connection diagram

(please refer to EN 954 for electrical interface)

Example with start and restart interlock / FSD monitoring.

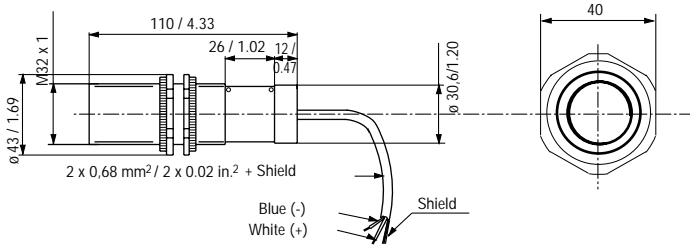
NO P/B: normally open contact of a push-button;  
 FSD: Final Switching Device.(1): RC (220 Ω + 0.22 μF) for ac interfaces, or varistors for dc interfaces.

## FF-SCAN accessories

### Explosion-proof photoelectric sensor

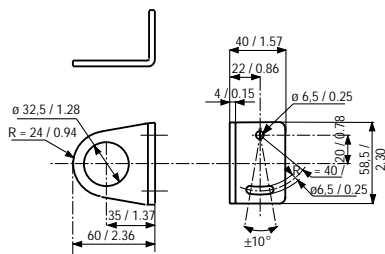
#### FF-MPFE/R32EX-□

(emitter and receiver) Cable length 2 m, 3 m, 5 m, 10 m / 6.56 ft, 9.84 ft, 16.4 ft, 32.8 ft



#### FF-MPZS32EX

Mounting bracket with adjustment of  $\pm 10^\circ$

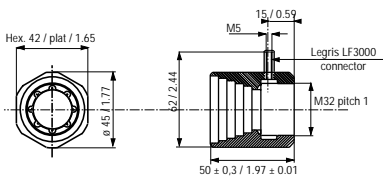


Order 2 mountings FF-MPZS32XP for one beam.

#### FF-MPZT32EX

Protective hood

Connection on compressed air:  
P = 0.3 Bar approximately

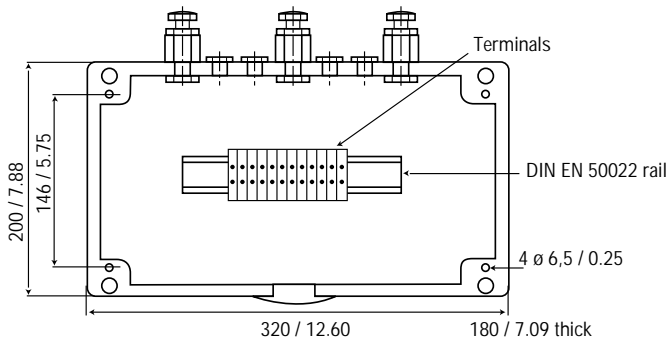


Order 2 hoods FF-MPZT32EX for one beam to keep dust/paint away from sensor lens.

### Sensor

- Infrared through-scan detection
- Certified by the L.C.I.E. no. 91C6094.
- In accordance with CENELEC European standard EN 50014 and EN 50018.
- Group EEX "d" II CT6.
- Detection up to 15 m / 49.2 ft with the FF-SC10 amplifier.
- Max. response time: 30 ms
- Diameter of glass lens:  $\varnothing 12$  mm / 0.47 in
- Sealing: IP 67 / NEMA 6.
- Aperture angle:  $\pm 2^\circ$
- Operating temperature: 0 °C to 55 °C / 32 °F to 131 °F
- Material of the protective covering: Nickel-plated brass
- Explosion-proof cord extension: FF-MP1750EX (100 m / 328 ft of shielded cable, to be ordered separately)

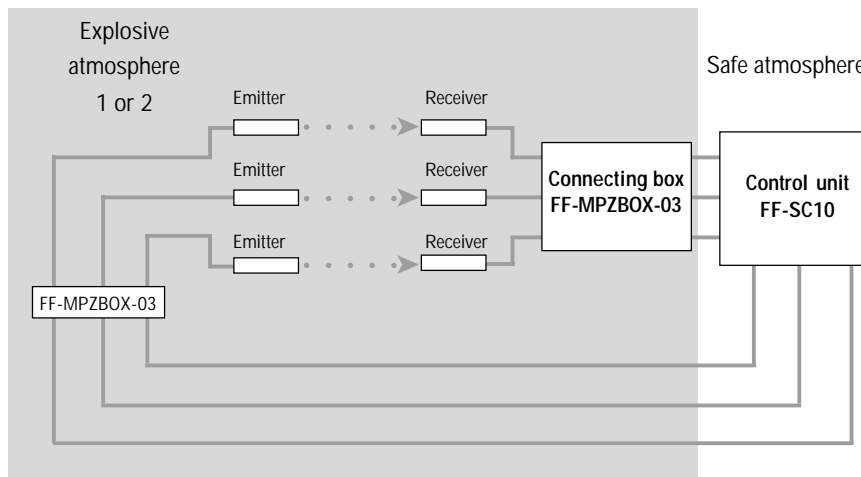
#### FF-MPZBOX-03



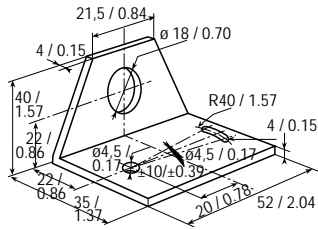
### Connecting box

Box for the connection of 3 sensors max.

### Application



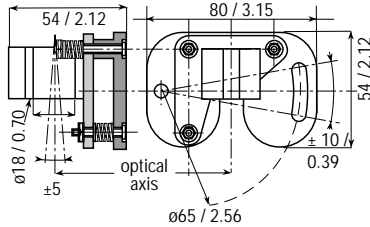
**FF-MPZS1018**



**Basic bracket**

- Suitable for detection distances up to 6 m / 19.7 ft
- Sturdy construction from 4 mm / 0.16 in aluminium alloy
- Black anodized finish
- Adjustable ( $\pm 10^\circ$  azimuth)
- Mounting with 4 mm / 0.16 in screws

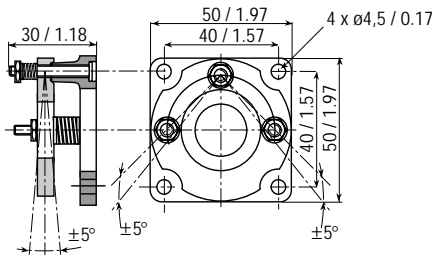
**FF-MPZS2018**



**Adjustable sensor mounting bracket (parallel to optical axis)**

- Suitable for detection distances up to 33 m / 108.3 ft
- Sturdy construction from 4 mm / 0.16 in aluminium
- Black anodized finish
- Adjustment springs
- Easy adjustment ( $\pm 5^\circ$ : site /  $\pm 10^\circ$ : azimuth)
- Mounting with 4 mm / 0.16 in screws

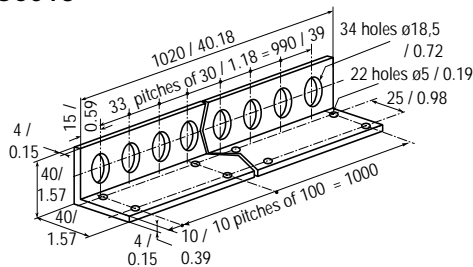
**FF-MPZS3018**



**Adjustable sensor mounting bracket (perpendicular to optical axis)**

- Suitable for detection distances up to 33 m / 108.3 ft
- Sturdy construction from 4 mm / 0.16 in aluminium
- Black anodized finish
- Adjustment springs
- Easy adjustment ( $\pm 5^\circ$ : site /  $\pm 10^\circ$ : azimuth)
- Mounting with 4 mm / 0.16 in screws

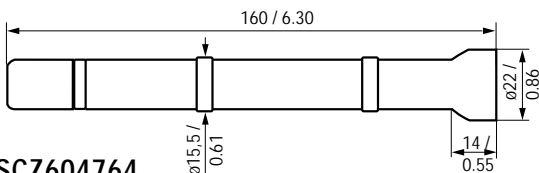
**FF-MPZS6018**



**Sensor mounting rail**

- Suitable for detection distances up to 33 m / 108.3 ft
- Sturdy construction from 4 mm / 0.16 in aluminium
- L-shaped extrusion 40 mm x 40 mm / 1.57 in x 1.57 in, 1 m / 3.28 ft long
- 18 mm / 0.70 in diameter sensor mounting holes, 30 mm / 1.18 in distance between centers
- Can be easily cut to any desired length
- Mounting with 5 mm / 0.19 in screws

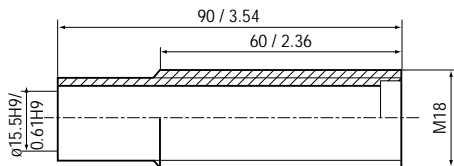
**FF-SPZLASER**



**Laser pen**

The laser pen FF-SPZLASER is a self-contained and compact laser device designed to ease infrared beam alignments. Its Ila class conforms to the EN 60825 European standard and the US 21 CFR 1040 American standard.

**FF-SCZ604764**



**Mechanical adapter M18x90**

To be used with the laser pen (to be installed on the FF-MPZS4018 brackets).

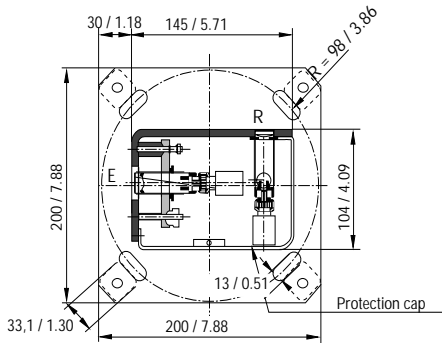
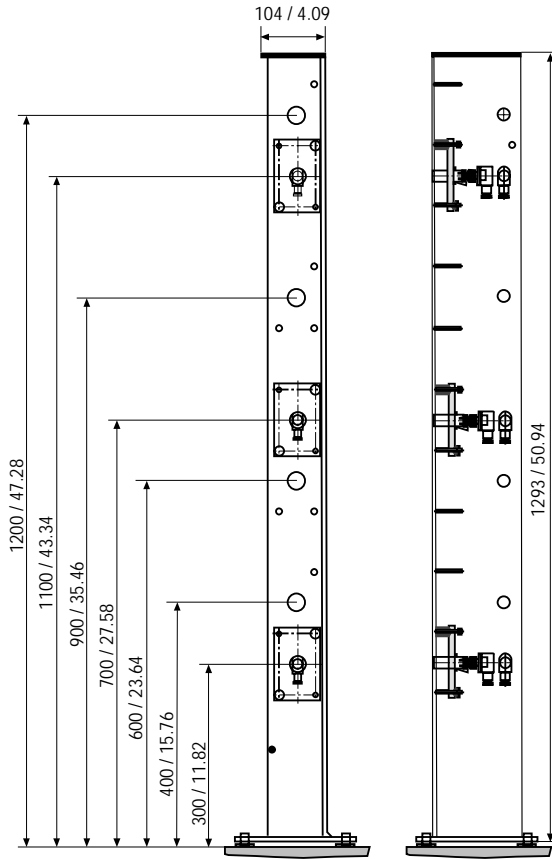
**FF-MP175090 and FF-MP1750EX**



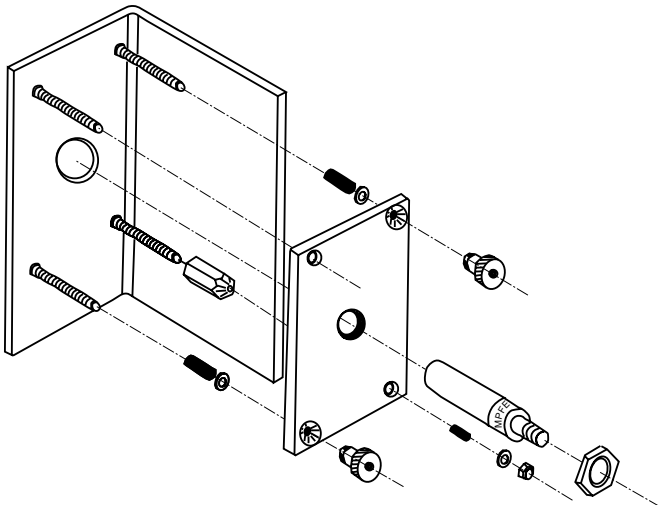
**Shielded cable**

- FF-MP175090 100 m / 328 ft shielded cable (2 x 0,22 mm<sup>2</sup> / AWG32).
- FF-MP1750EX 100 m / 328 ft shielded cable (2 x 0,68 mm<sup>2</sup> / AWG24) for explosive atmospheres.

**FF-SCZS1218**



**FF-MPZS4018**



**Multibeam safety column for access control**

- Floor mounting column for the FF-SCAN M18 sensor
- Mounting positions for sensors in compliance with European norm requirements for 2, 3, or 4 safety beams (EN 999)
- Optical alignment:  
Vertical and angular column position easily adjusted  
Separate mounting brackets FF-MPZS4018 for optimum adjustment of the emitters
- Emitters and receivers can be mounted together for fully closed areas
- Finish: RAL 1021 yellow paint
- Weight: 21 kg / 46.2 lbs

European norm (EN 999) specifies beam heights as follows:

Number of beams	Heights	
	mm	in
2	400 / 900	15.76 / 35.46
3	300 / 700 / 1100	11.82 / 27.58 / 43.34
4	300 / 600 / 900 / 1200	11.82 / 23.64 / 35.46 / 47.28

**Typical applications**

Access control for dangerous zones: robotic areas, automatic machinery, transporting and conveyor systems, punching and shearing machines, etc.

The FF-SCZS1218 safety column provides a full area trip protection when used with FF-SCZO...MIR deflection mirrors and the FF-SCAN modular safety curtain.

**Bracket for FF-MPF emitter**

The FF-MPZS4018 brackets allow optimum adjustments. They must be ordered separately and are not supplied with the FF-SCZS1218 column.

Order one bracket per emitter.

For alignment operation, the FF-SPZLASER laser pen can be installed on the emitter bracket with the FF-SCZ604764 mechanical adapter.