

# M18 DC Photoelectric Switches FA



Compact M18 barrel type photoelectric switches for DC operation.

- Complete series of M18 photoelectric sensors, 10-30VDC
- Models with axial and 90 degree optics
- Models with IR, red light and red light laser emission
- Red light emission for transparent object detection
- Metal and plastic housings
- Models with or without sensitivity adjustment
- IP67 protection
- UL and CUL approved



## Options and ordering codes

	<b>FA</b>	<b>I</b>	<b>A</b>	<b>/</b>	<b>B</b>	<b>P</b>	<b>-</b>	<b>O</b>	<b>A</b>
Infrared emission		<b>I</b>							
Visible red LED emission		<b>R</b>							
Red laser diode emission		<b>L</b>							
Diffuse 50mm without sensitivity adjustment			<b>A</b>						
Diffuse 50mm with sensitivity adjustment			<b>B</b>						
Diffuse 100mm without sensitivity adjustment			<b>2</b>						
Diffuse 100mm with sensitivity adjustment			<b>3</b>						
Diffuse 200mm with sensitivity adjustment, 300mm Laser model			<b>4</b>						
Diffuse 200mm without sensitivity adjustment			<b>5</b>						
Diffuse 400mm without sensitivity adjustment			<b>6</b>						
Diffuse 400mm with sensitivity adjustment			<b>7</b>						
Diffuse 1000mm axial 800mm 90° optics, with sensitivity adj.			<b>8</b>						
Diffuse 1000mm axial 800mm 90° optics, without sensitivity adj.			<b>9</b>						
Emitter			<b>H</b>						
Receiver with sens. adj. 20m axial 15m 90° optics, (50m Laser)			<b>D</b>						
Receiver without sensitivity adjustment 20m axial 15m 90° optics			<b>Z</b>						
Retro-reflective without sensitivity adjustment, 4m			<b>C</b>						
Polarised retro-reflective without sens. adj. 3m axial 2m 90° optics			<b>P</b>						
Polarised retro with sens. adj. 3m axial 2m 90° optics (35m Laser)			<b>N</b>						
Retroreflective with sensitivity adjustment 4m			<b>M</b>						
Polarised retro-reflective with sens. adj. For transparent objects 1m			<b>L</b>						
					<b>O</b>				
					<b>X</b>				
					<b>L</b>				
					<b>D</b>				
					<b>B</b>				
						<b>P</b>			
						<b>N</b>			
						<b>O</b>			
							<b>0</b>		
							<b>1</b>		
							<b>2</b>		
							<b>3</b>		
								<b>A</b>	
								<b>E</b>	
								<b>C</b>	
								<b>K</b>	

<b>A</b>	Axial cable exit
<b>E</b>	M12 plastic axial plug exit
<b>C</b>	90° cable exit
<b>K</b>	M12 plastic 90° plug exit

<b>0</b>	Plastic housing, axial optics
<b>1</b>	Metal housing, axial optics
<b>2</b>	Plastic housing, 90° optics
<b>3</b>	Metal housing, 90° optics

<b>P</b>	PNP logic output
<b>N</b>	NPN logic output
<b>O</b>	Emitter

<b>O</b>	Emitter or 4 wire, LOn/DOn selectable
<b>X</b>	Emitter with check
<b>L</b>	3 wire, LOn
<b>D</b>	3 wire, DOn
<b>B</b>	4 wire, complementary NO and NC output

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continued

## Specification common to all models

Operating voltage	10-30VDC
Ripple	≤10%
Repeat accuracy	5%
Load current	100mA (not emitters)
Leakage current	≤10μA at Vmax (not emitters)
Supply electrical protection	Polarity reversal and transient
Output electrical protection	Short circuit (auto-reset) and over-voltage
EMC immunity	In accordance to EN50082-2;1995/EN60947-5-2;1999
Radiation	In accordance to EN50081-1;1993
Housing material	PBT (Plastic body) or Nickel plated brass (Metal body), PC (cable exit)
Tightening torque	40Nm
Time delay before availability	200ms (not with receiver/Laser emitter combination)
Storage temperature	-55° to 90°C
Protection	IP67 (EN60529)
Cable material	PVC

### Infrared LED Emission

Model	Infrared Emitter		Receiver	
	FAIH/XO-**-**	FAIH/OO-**-**	FAIZ/**-**-**	FAID/**-**-**
Nominal sensing distance	20m with axial optics, 15m with 90 degree optics			
Emission	Infrared (880nm)		-	
No load supply current	25mA			
Output voltage drop	-	1.2Vmax. I <sub>L</sub> = 100mA		
Output type	-	NPN or PNP, Q/Q <sub>not</sub> or (LOn/DOn selectable on special models)		
Switching frequency	-	250Hz		
Sensitivity adjustment	No		Yes	
Check input	BK/2 to 0V test enable	-		
Interference external light	5000 lux (incandescent lamp)		10000 lux (sunlight)	
LED indicators	Green (Power ON)		Yellow (light state)	
Optics material	PC			
Weight (approximate)	200g (plastic body type)		240g (metal body type)	

### Visible Red LASER Emission

Model	Red LASER Emitter	Receiver
	FALH/XO-**-**	FAID/**-**-**
Nominal sensing distance	50m	
Emission	Red LASER 650nm (Class 1 in accordance to IEC60825-1)	
No load supply current	25mA	
Output voltage drop	-	1.8Vmax. I <sub>L</sub> = 100mA
Spot dimension	40mm at 60m	
Output type	-	NPN or PNP, Q/Q <sub>not</sub>
Switching frequency	1kHz	-
Sensitivity adjustment	Yes	-
Check input	BK/2 to 0V test enable	
Operating temperature	-15° to 55°C	
Interference external light	3000 lux (incandescent lamp) 10000 lux (sunlight)	
LED indicators	Green (Power ON)	Yellow (light state)
Optics material	PC/Glass	
Weight (approximate)	200g (plastic body type) 240g (metal body type)	

### Diffuse Red LASER Emission

Model	Red LASER Emitter
	FAL4/**-**-**
Nominal sensing distance	300mm <sup>(1)</sup>
Emission	Red LASER 650nm (Class 1 in accordance to IEC60825-1)
No load supply current	30mA
Output voltage drop	1.2Vmax. I <sub>L</sub> = 100mA
Minimum object	0.1mm
Output type	NPN or PNP, Q/Q <sub>not</sub> or (LOn/DOn selectable on special models)
Switching frequency	800Hz
Sensitivity adjustment	Yes, Teach function
Operating temperature	-15° to 55°C
Interference external light	3000 lux (incandescent lamp) 10000 lux (sunlight)
LED indicators	Yellow (Q/Q <sub>not</sub> models indicates light status, when blinking, detection level is over threshold but under twice the threshold)
Optics material	PC/Glass
Weight (approximate)	200g

(1) White target Kodak paper (100mm<sup>2</sup>) 90% reflection

### Polarized retro-reflective Red LASER Emission

Model	Red LASER Emitter
	FALN/**-**-**
Nominal sensing distance	25m with RL110
Emission	Red LASER 650nm (Class 1 in accordance to IEC60825-1)
No load supply current	≤ 20mA
Output voltage drop	1.2Vmax. I <sub>L</sub> = 100mA
Minimum object	0.7mm at 1m, 24mm at 25m
Spot dimension	25mm at 25m
Output type	NPN or PNP, Q/Q <sub>not</sub> or (LOn/DOn selectable on special models)
Switching frequency	800Hz
Sensitivity adjustment	Yes, Teach function
Operating temperature	-15° to 55°C
Interference external light	3000 lux (incandescent lamp) 10000 lux (sunlight)
LED indicators	Yellow (Q/Q <sub>not</sub> models indicates light status, when blinking, detection level is over threshold but under twice the threshold)
Optics material	PC/Glass
Weight (approximate)	200g

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## Diffuse visible red and infrared LED Emission

Model	Red LED Emitter				Infrared Emitter					
	FARA/**_**	FARB/**_**	FAR2/**_**	FAR3/**_**	FAI4/**_**	FAI5/**_**	FAI6/**_**	FAI7/**_**	FAI8/**_**	FAI9/**_**
Nominal sensing distance	50mm <sup>(1)</sup>		100mm <sup>(1)</sup>		200mm <sup>(2)</sup>		400mm <sup>(2)</sup>		1m <sup>(3)</sup>	
Emission	Red (660nm)				Infrared (880nm)					
No load supply current	30mA									
Output voltage drop	1.2Vmax. I <sub>L</sub> =100mA									
Output type	NPN or PNP, Q/Q <sub>not</sub> or (LOn/DOn selectable on special models)									
Switching frequency	250Hz									
Sensitivity adjustment	No	Yes	No	Yes	No		Yes		No	
Operating temperature	-25 to 70°C									
Interference external light	5000 lux (incandescent lamp) 10000 lux (sunlight)									
LED indicators	Yellow (light state)									
Optics material	PC									
Weight (approximate)	100g (plastic body type) 120g (metal body type)									

(1) White target Kodak paper (100mm<sup>2</sup>) 90% reflection

(2) White target Kodak paper (200mm<sup>2</sup>) 90% reflection

(3) White target Kodak paper (400mm<sup>2</sup>) 90% reflection

## Polarized retro-reflective, retro-reflective models with visible red, LASER and infrared LED Emission

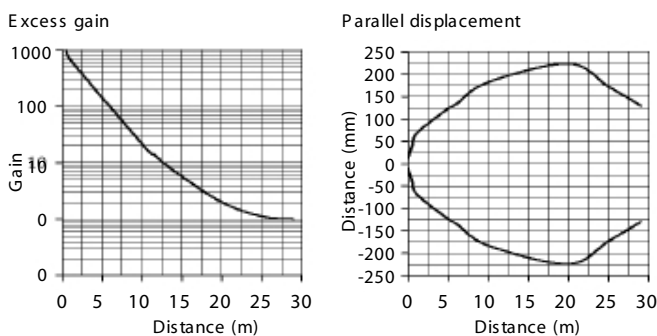
Model	Infrared	Red	Red		(for transparent objects)
	FAIC/**_**	FAIM/**_**	FAIP/**_**	FAIN/**_**	FAIL/**_**
Nominal sensing distance	4m <sup>(4)</sup>		3m <sup>(4)</sup> axial optics 2m <sup>(4)</sup> 90 degree optics		1m <sup>(4)</sup>
Emission	Infrared (880nm)		Red (660nm)		
No load supply current	30mA				
Output voltage drop	1.2Vmax. I <sub>L</sub> =100mA				
Output type	NPN or PNP, Q/Q <sub>not</sub> or (LOn/DOn selectable on special models)				
Switching frequency	250Hz				
Sensitivity adjustment	No	Yes	No		Yes
Operating temperature	-25 to 70°C				
Interference external light	5000 lux (incandescent lamp) 10000 lux (sunlight)				
LED indicators	Yellow (light state)				
Optics material	PC				
Weight (approximate)	100g (plastic body type) 120g (metal body type)				

(4) With RL110 reflector. Please refer to IMO data sheet for reflectors.

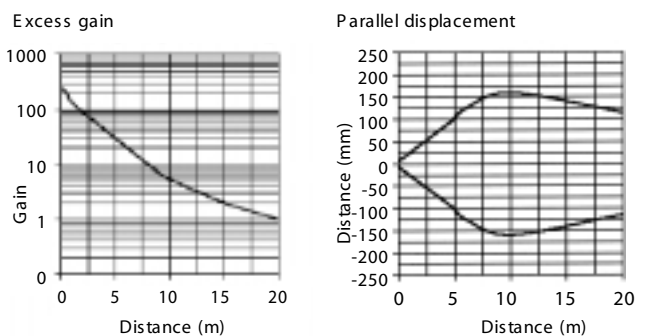
## Characteristic curves

### Through beam

FAIH/\*\*\_\*\* FAID/\*\*\_\*\* FAIZ/\*\*\_\*\* axial optic



FAIH/\*\*\_\*\* FAID/\*\*\_\*\* FAIZ/\*\*\_\*\* 90 degree optics



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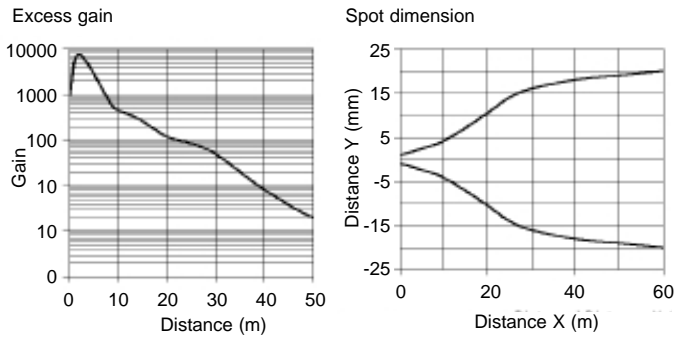


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## Characteristic curves continued

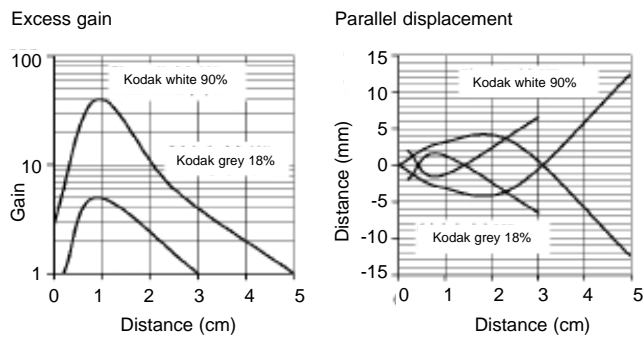
### Through beam continued

FALH/XO-\*\* FALD/\*\*-\*\*

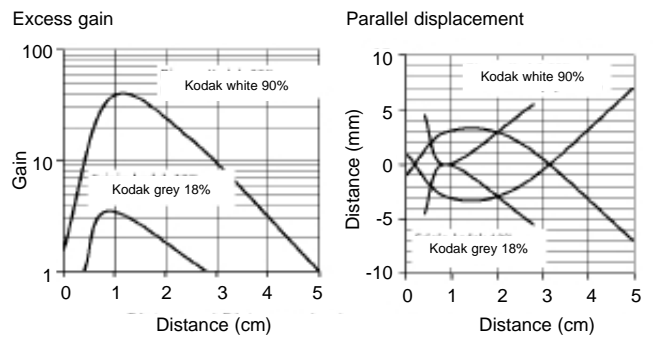


### Diffuse reflection

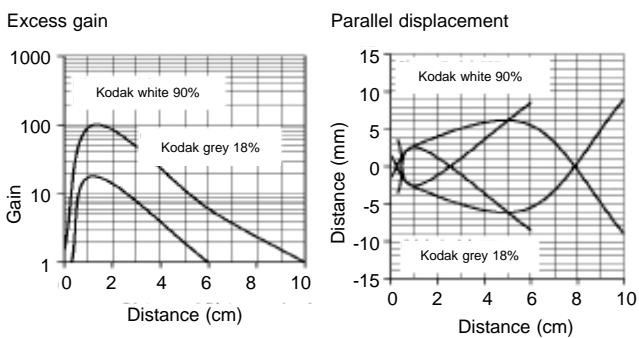
FARA/\*\*-\*\* FARB/\*\*-\*\* axial optic



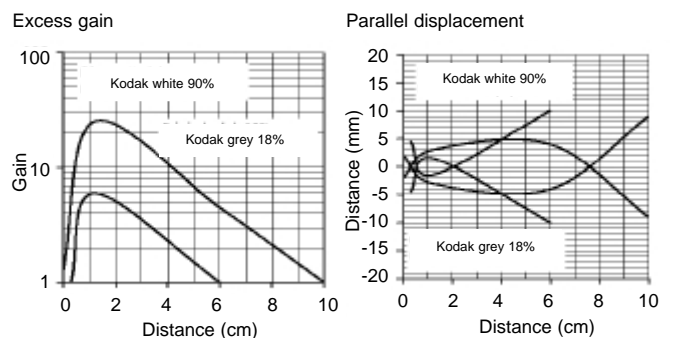
FARA/\*\*-\*\* FARB/\*\*-\*\* 90 degree optics



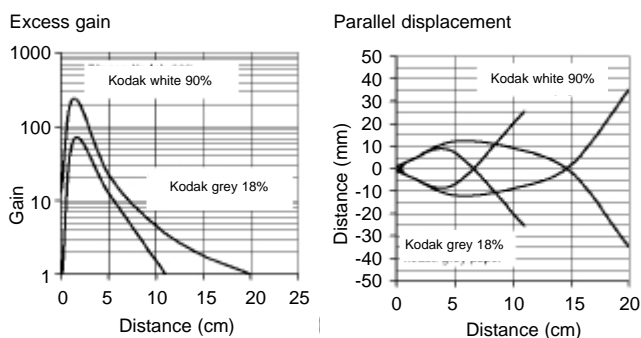
FAR2/\*\*-\*\* FAR3/\*\*-\*\* axial optic



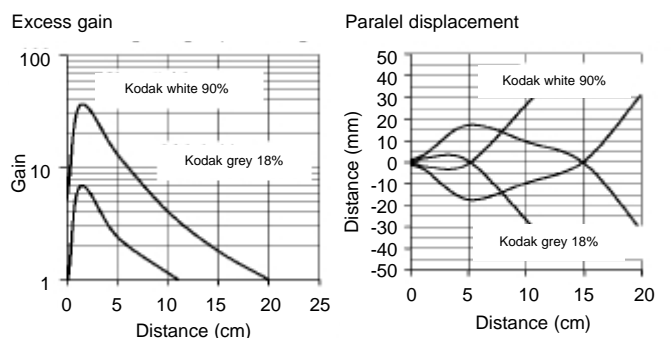
FAR2/\*\*-\*\* FAR3/\*\*-\*\* 90 degree optics



FAI4/\*\*-\*\* FAI5/\*\*-\*\* axial



FAI4/\*\*-\*\* FAI5/\*\*-\*\* 90 degree optics



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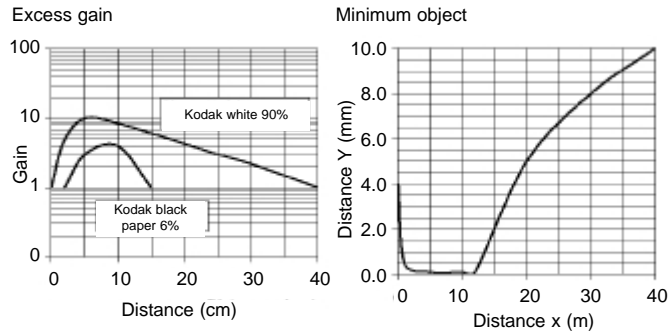


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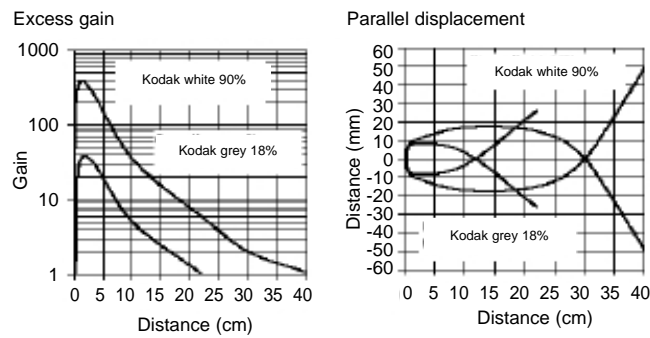
## Characteristic curves continued

### Diffuse reflective continued

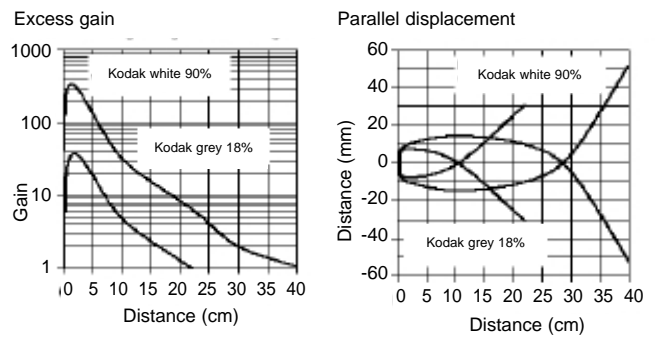
#### FA14/\*\*\_\*\*



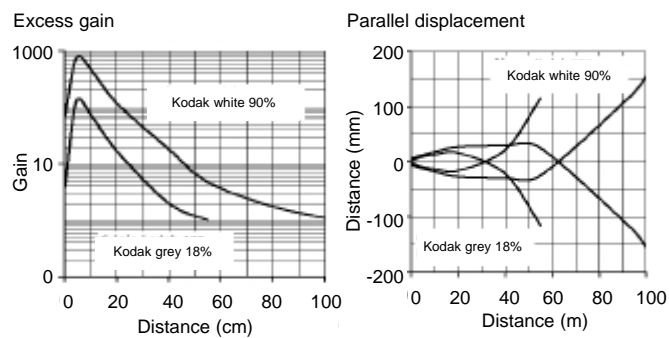
#### FA16/\*\*\_\*\* FA16/\*\*\_\*\* axial optics



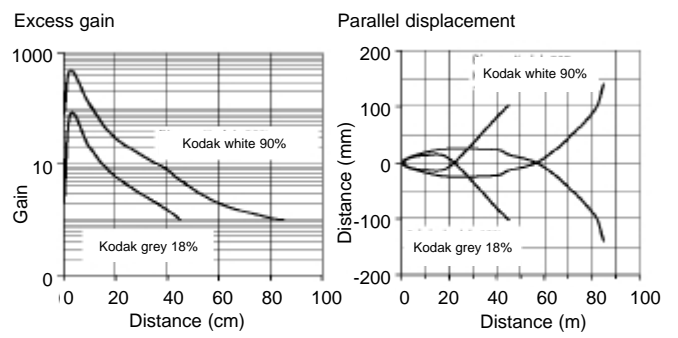
#### FA16/\*\*\_\*\* FA16/\*\*\_\*\* 90 degree optics



#### FA18/\*\*\_\*\* FA19/\*\*\_\*\* axial optics

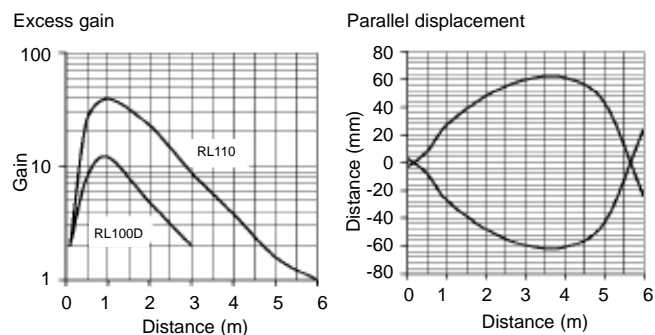


#### FA18/\*\*\_\*\* FA19/\*\*\_\*\* 90 degree optics

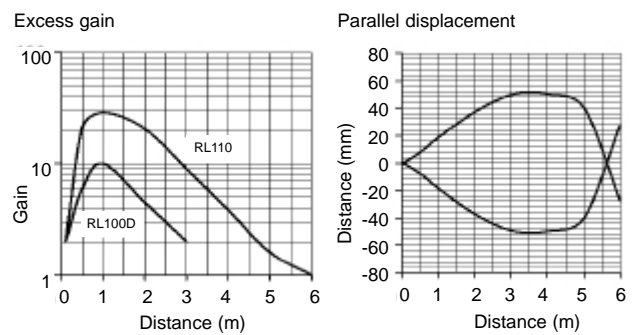


## Retro-reflective

#### FA1C/\*\*\_\*\* FA1M/\*\*\_\*\* axial optics



#### FA1C/\*\*\_\*\* FA1M/\*\*\_\*\* 90 degree optics



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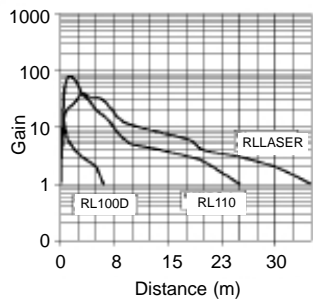
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## Characteristic curves continued

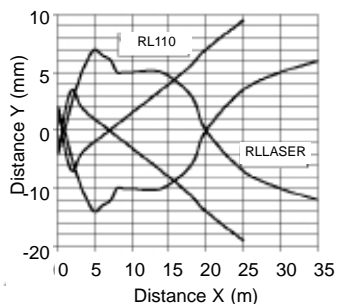
### Retro-reflective continued

#### FALM/\*\*\_\*\*

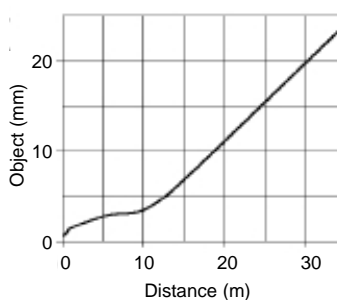
Excess gain



Parallel displacement

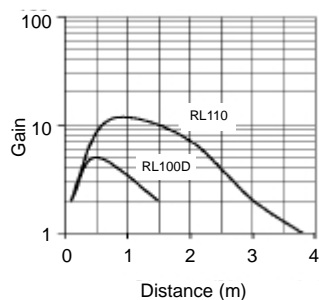


Minimum object

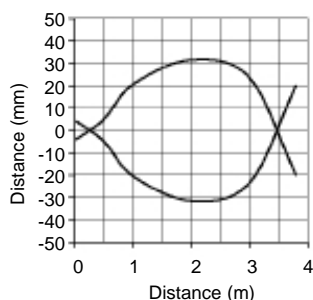


#### FARP/\*\*\_\*\* FARN/\*\*\_\*\* axial optics

Excess gain

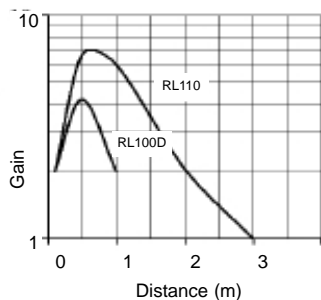


Parallel displacement

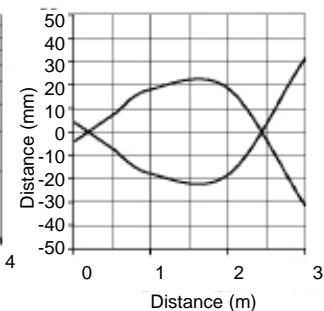


#### FARP/\*\*\_\*\* FARN/\*\*\_\*\* 90 degree optics

Excess gain

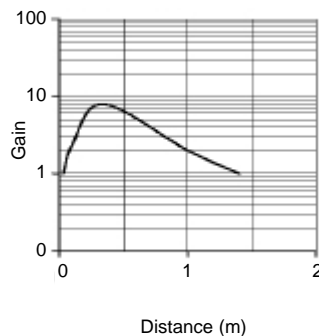


Parallel displacement

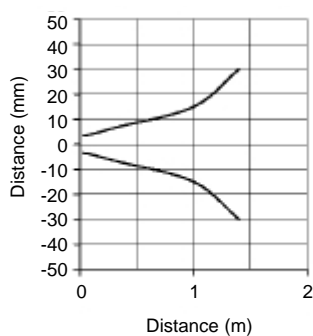


#### FARL/\*\*\_\*\*

Excess gain



Parallel displacement

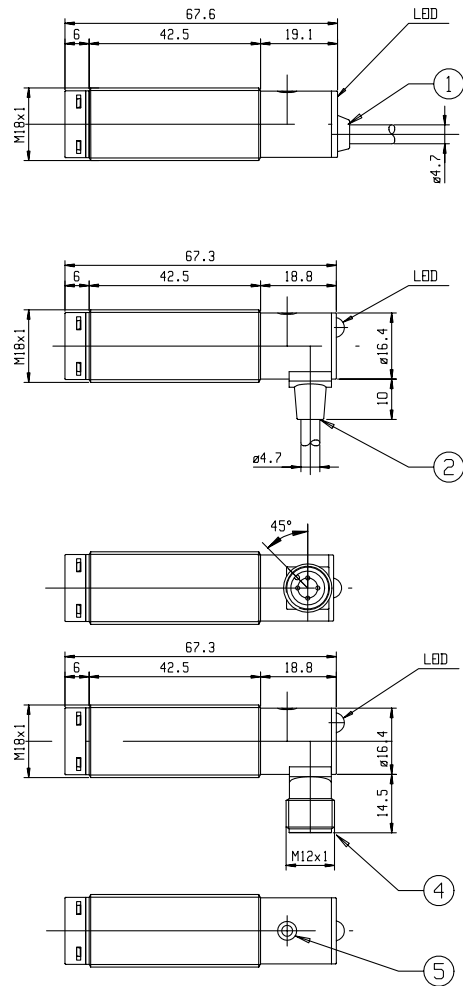
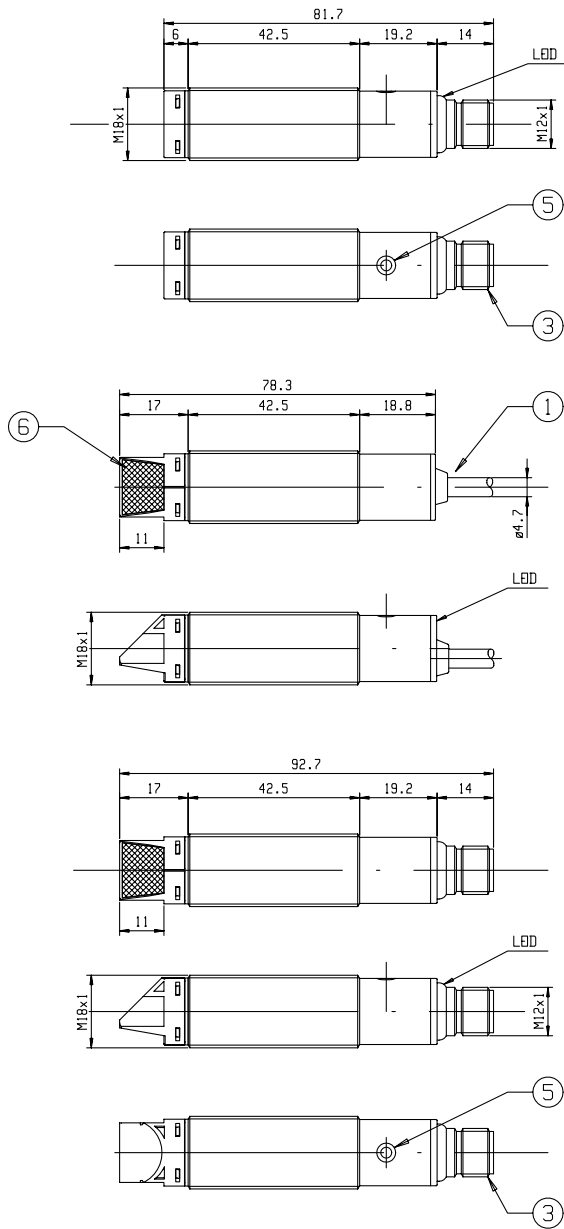


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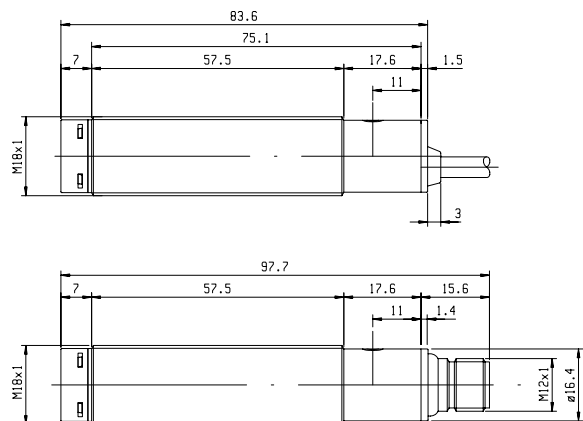
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## Dimensions (mm)



- 1. Axial cable exit with tang
- 2. Right angle cable exit with tang
- 3. M12 plug cable exit
- 4. Right angle M12 plug cable exit
- 5. Sensitivity adjustment trimmer

### FAL models (laser)



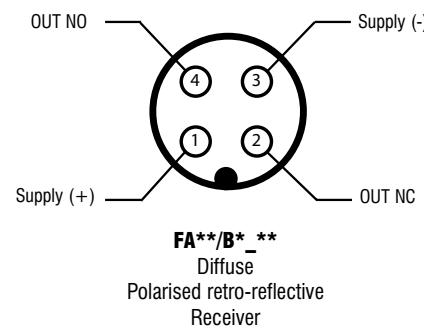
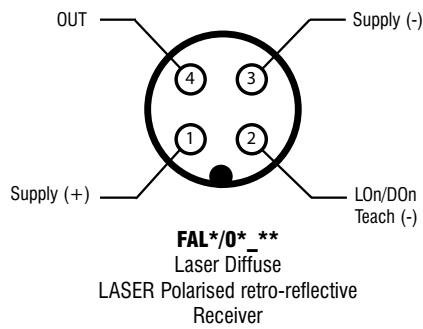
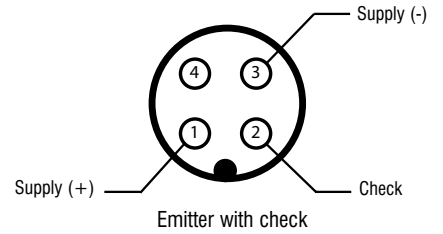
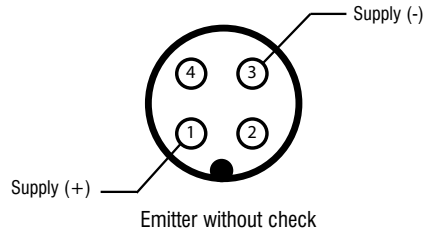
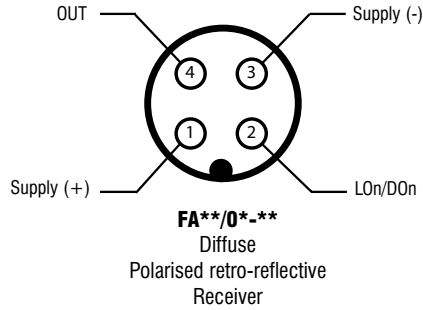
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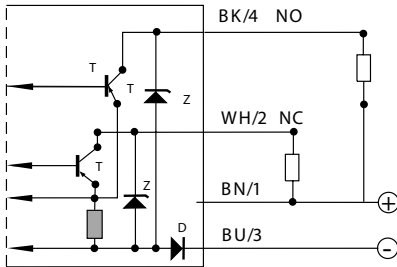
## Wiring connections and outputs

### M12 plug connector

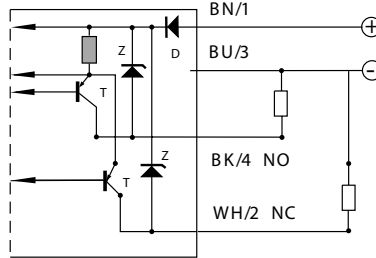


### Complementary Q/Q<sub>not</sub> output

#### NPN

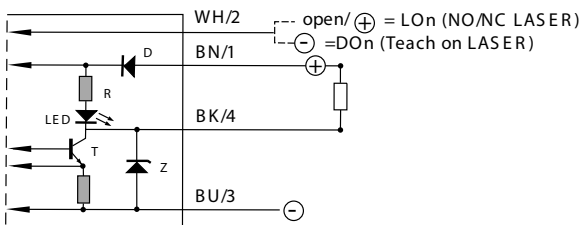


#### PNP

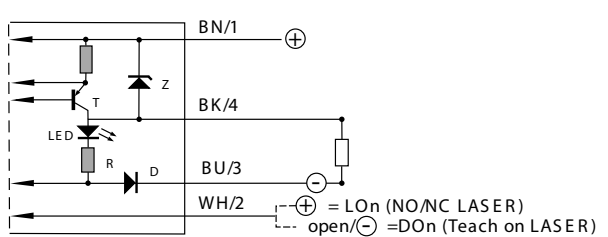


### LOn/DOn selectable output

#### NPN

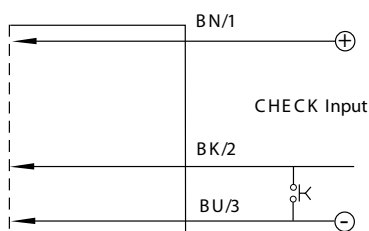


#### PNP



### Complementary Q/Q<sub>not</sub> output

#### Emitter with check



#### Emitter without check

