FFRS series

M18 IP69K photoelectric sensors with background suppression for harsh environments

features

- **Stainless steel housing AISI316L (DIN 1.4404)**
- **protection degree: IP68-IP69K**
- **Complete protection against electrical damages**
- **New sensitive adjustment through sensor housing: on object or on background**
- **Special model with reduced spot dimension and good performance on reflective material**
- **Approvals: CE and cULus Listed**

web contents

- **Application notes**
- **Photos**
- **Catalogue / Manuals**

M18 IP69K with background suppression

code description(*)

FF R S / B P - 1 E

series	FF	M18 photoelectric sensor with IP69K protection degree
emission	R	Visible red LED emission
function	S	Background suppression 30...130 mm
output	0	NO/NC selectable output, 4 wires
	B	NO+NC selectable output, 4 wires
PNP / NPN output	P	PNP output
	N	NPN output
housing	1	Stainless steel housing, axial optic
plug	E	M12 plug exit
version		Standard version
	V5	Smooth housing
	77	Special model for shiny object and 60...100 mm sensing distance
	V577	Special model with smooth housing for shiny object and 60...100 mm sensing distance

(*) ATEX models available, contact our Sales Dept. for further information.

available models

functions	housing	adjustment	distance (mm)	4 wires			
				NPN NO + NC	PNP NO + NC	NPN NO + NC	PNP NO + NC
background suppression	AISI 316L (DIN 1.4404) thread housing	Teach-In	30...130	FFRS/0N-1E	FFRS/0P-1E	FFRS/BN-1E	FFRS/BP-1E
	AISI 316L (DIN 1.4404) smooth housing			-	-	FFRS/BN-1EV5	FFRS/BP-1EV5
background suppression for shiny object	AISI 316L (DIN 1.4404) thread housing		60...100	FFRS/0N-1E77	FFRS/0P-1E77	FFRS/BN-1E77	FFRS/BP-1E77
	AISI 316L (DIN 1.4404) smooth housing			-	-	FFRS/BN-1EV577	FFRS/BP-1EV577

C+R Automations- GmbH
Nürnberger Straße 45
90513 Zirndorf
Tel. +49 (0)911 656587-0
Fax +49 (0)911 656587-99
E-Mail: info@crautomation.de
www.crautomation.com

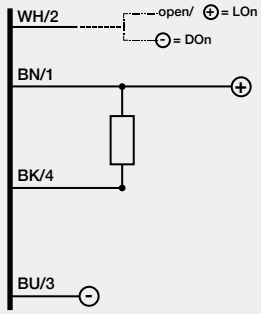
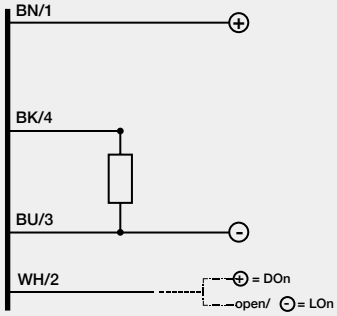
technical specification

	FFRS/**-**	FFRS/**-**77
		
nominal sensing distance	30...130 mm	60...100 mm
scanning range (Sd)	30...130 mm (white paper)	60...100 mm (white paper)
emission	red (660 nm)	
hysteresis	≤ 10 % (white paper)	≤ 15 % (white paper)
repeatability	10 %	
tolerance	+ 15 / - 5 % Sn	
supply voltage	10...30 Vdc	
ripple	≤ 10 %	
no-load supply current	50 mA (Val = 30 V)	
output current	100 mA	
leakage current	≤ 10 µA @ Vdc max	
output voltage drop	2 V max. IL = 100 mA	
output type	NPN or PNP selectable output LO/DO or complementary output NO + NC	
switching frequency	1kHz	400 Hz
power on delay	200 ms	
temperature range	- 25°C...+ 80°C (without freeze); short exposure with not working sensor 15 min to 100°C	
power supply protections	polarity reversal, transient	
output protection	short circuit (autoreset)	
protection degree	IP67; IP68 (1 m, 7 days); IP69K (according 40050 part 9) [1]	
EMC	in conformity with the EMC Directive according to EN 60947-5-2	
external light interference	5,000 lux (incandescent lamp), 10,000 lux (sunlight)	
LEDs	Green: ON: teach function available OFF: teach function blocked Fast flashing: teach in progress Yellow: output state (0 models) light State (B models)	
housing material	stainless steel	
exit plug	PA12	
optic material	PA12	
approvals	CE, cULus, IP68, IP69K, ECOLAB, Diversey	
weight (approximate)	60 gr	

[1] Protection guaranteed only with plug cable well mounted

response diagram

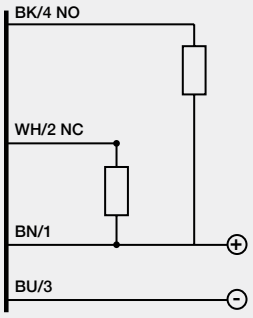
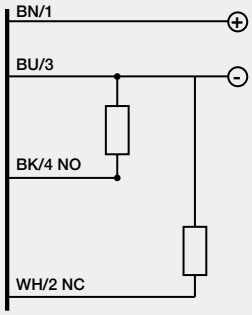
LO/DO selectable output

NPN output	PNP output
	

BN	brown
BU	blue
BK	black
WH	white

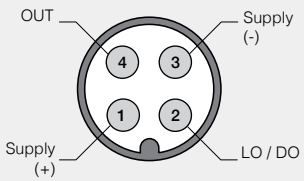
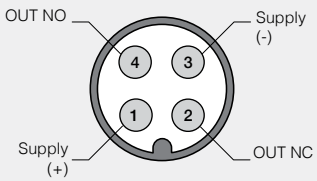
response diagram

NO+NC complementary output

NPN output	PNP output
	

BN	brown
BU	blue
BK	black
WH	white

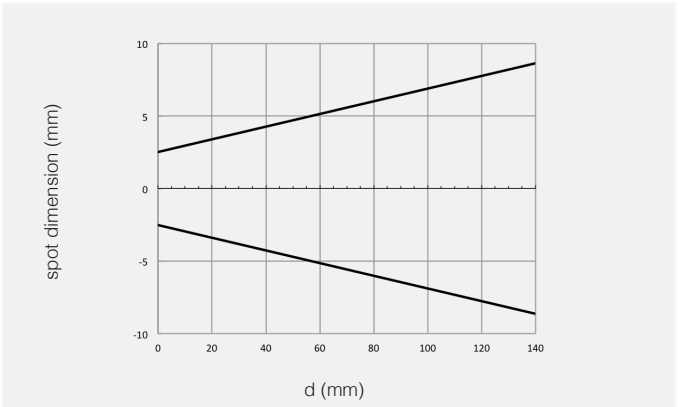
plug

M12 FF**/0*-**	M12 FF**/B*-**
	

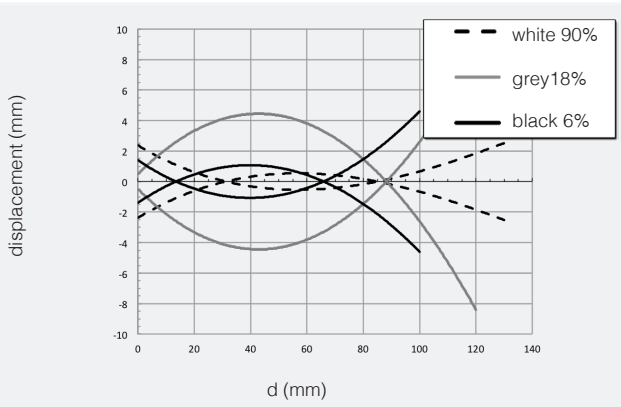
response diagrams

background suppression models

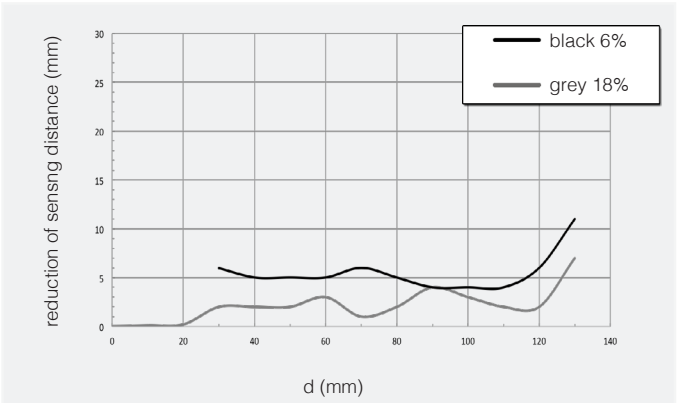
FFRS/**-** spot dimension



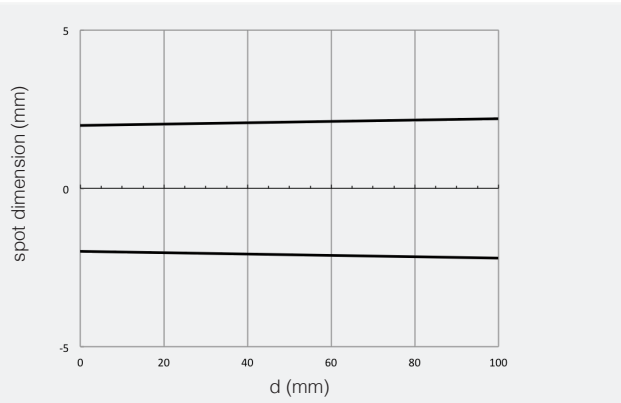
FFRS/**-** parallel displacement



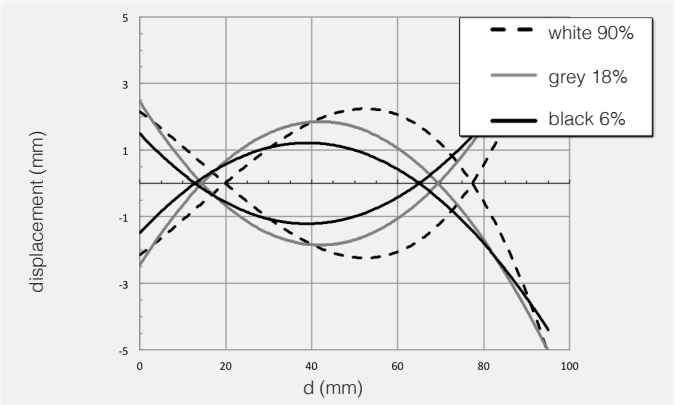
FFRS/**-** reduction of sensing distance



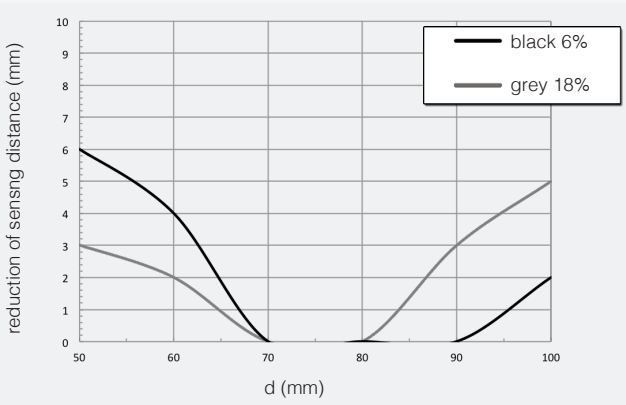
FFRS/**-**77 spot dimension



FFRS/**-**77 parallel displacement



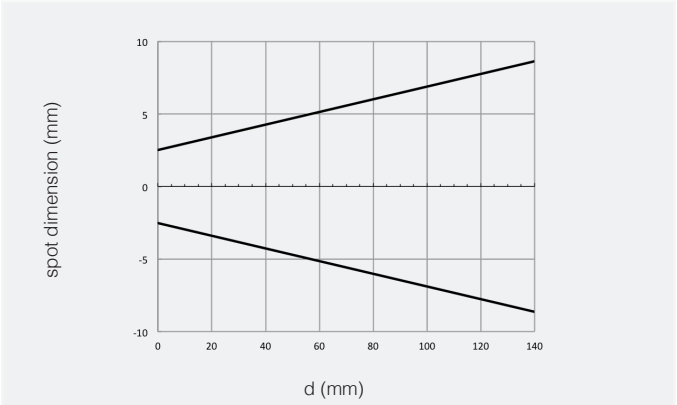
FFRS/**-**77 reduction of sensing distance



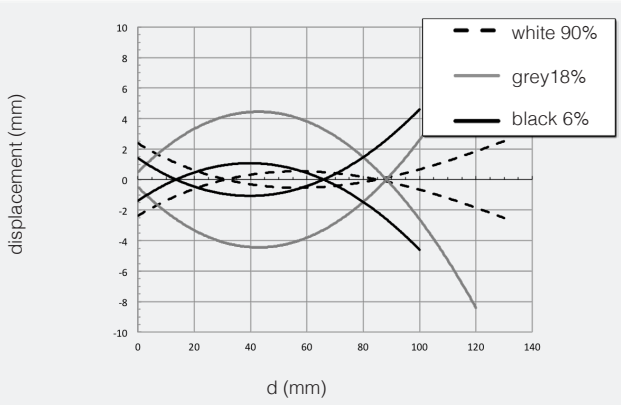
response diagrams

background suppression models

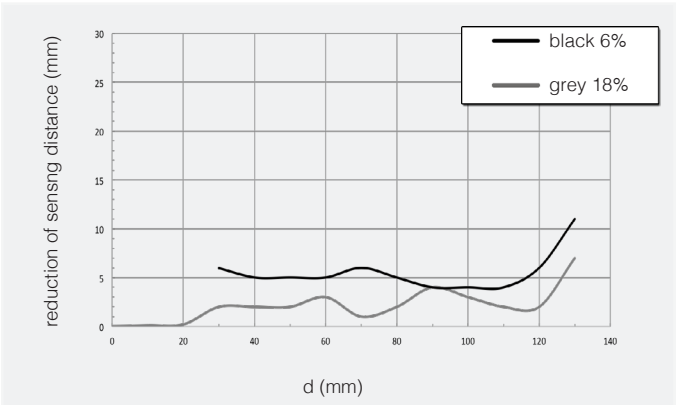
FFRS/**-** spot dimension



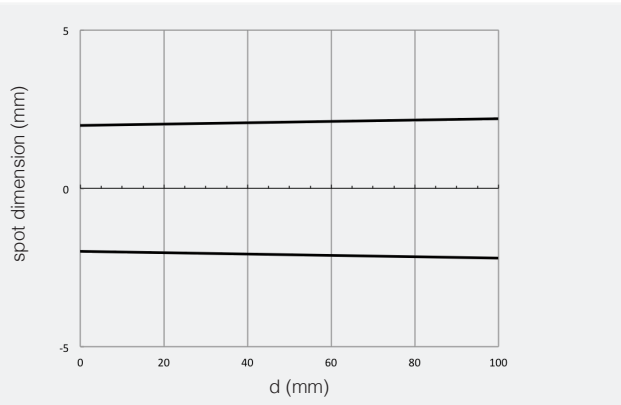
FFRS/**-** parallel displacement



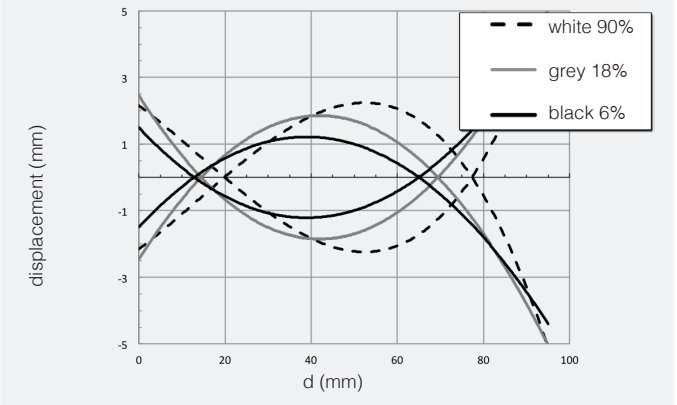
FFRS/**-** reduction of sensing distance



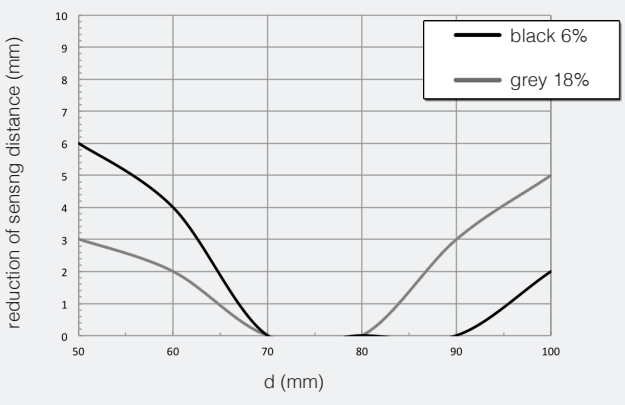
FFRS/**-**77 spot dimension



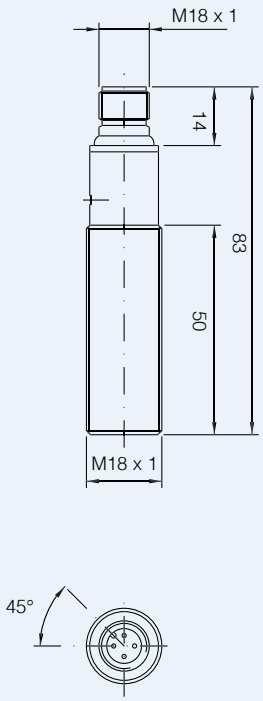
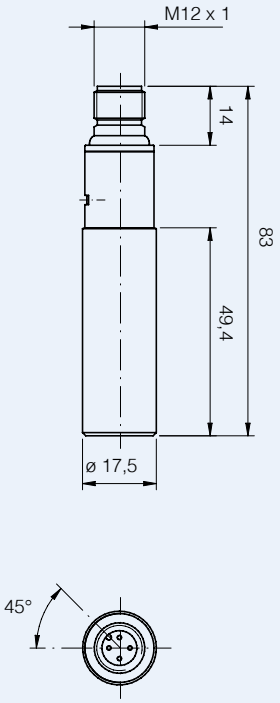
FFRS/**-**77 parallel displacement



FFRS/**-**77 reduction of sensing distance

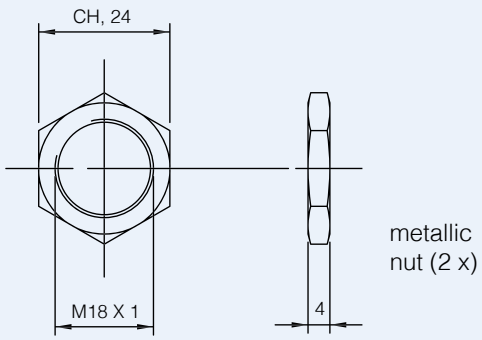


dimensions (mm)

FFRS/**-**	FFRS/**-V5
	

dimensions (mm)

accessories included in all metallic models



metallic
nut (2 x)

FF series

M18 IP69K photoelectric sensors
for harsh environments

+80°C

features

- AISI 316L (DIN 1.4404) stainless steel housing
- LED status indicators: yellow (output), green (teach-in function)
- IP67 - IP68 - IP69K protection degree
- Complete protection against electrical damages
- ATEX models, cat. 3, available on request
- Direct diffuse, polarized, through beam models
- Innovative teach-in function through sensor's housing
- Approvals: CE and cULus Listed

web contents

- Application notes
- Photos
- Catalogue / Manuals

M18 IP69K
for harsh environments

code description(*)

FF R 3 / B P - 1 E

series	FF	M18 photoelectric sensor for food + beverage applications
emission	R	Visible red LED emission
	I	Infrared LED emission
type	3	100 mm direct diffuse with sens. adjust.
	7	400 mm direct diffuse with sens. adjust.
	8	800 mm direct diffuse with sens. adjust.
	N	4.5 m polarized with sens. adjust.
	P	4.5 m polarized without sens. adjust.
	L	1 m retroref. for transp. objects with sens. adjust.
	H	Emitter
	Z	20 m receiver without sens. adjust.
output	B	NO+NC complementary output, 4 wires
	0	LO/DO selectable output, 4 wires - Emitter
	X	Emitter with Check
PNP / NPN	P	PNP output
	N	NPN output
	0	Emitter
housing	1	Stainless steel housing, axial optic
plug output	E	M12 plug exit
version		Standard version
	V5	Smooth housing

(*) ATEX models available, contact our Sales Dept. for further information.

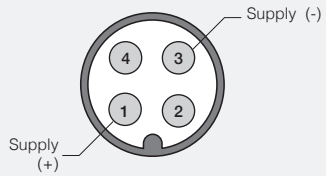
C+R Automations- GmbH
Nürnberger Straße 45
90513 Zirndorf
Tel. +49 (0)911 656587-0
Fax +49 (0)911 656587-99
E-Mail: info@crautomation.de
www.crautomation.com

available models

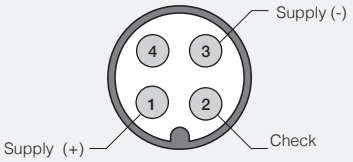
model	housing	adjustment	distance	4 wires			
				NPN NO + NC	PNP NO + NC	NPN NO + NC	PNP NO + NC
direct diffuse	AISI 316L (DIN 1.4404)	Teach-In	100 mm	FFR3/0N-1E	FFR3/0P-1E	FFR3/BN-1E	FFR3/BP-1E
			400 mm	FFI7/0N-1E	FFI7/0P-1E	FFI7/BN-1E	FFI7/BP-1E
			800 mm	FFI8/0N-1E	FFI8/0P-1E	FFI8/BN-1E	FFI8/BP-1E
polarized			4 m	FFRN/0N-1E	FFRN/0P-1E	FFRN/BN-1E	FFRN/BP-1E
		-		FFRP/0N-1E	FFRP/0P-1E	FFRP/BN-1E	FFRP/BP-1E
retroreflective for transparent objects		Teach-In	0.1...1.5 m	FFRL/0N-1E	FFRL/0P-1E	FFRL/BN-1E	FFRL/BP-1E
receiver		-	20 m	FFIZ/0N-1E	FFIZ/0P-1E	FFIZ/BN-1E	FFIZ/BP-1E
emitter with check				FFIH/X0-1E			
emitter without check				FFIH/00-1E			

plug

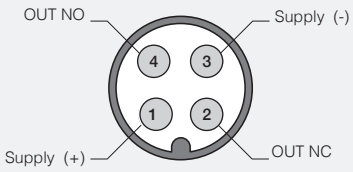
M12 emitter without check



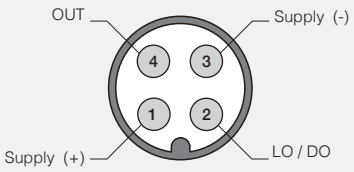
M12 emitter with check



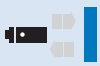
M12 diffuse reflection polarized receiver



M12 diffuse reflection polarized receiver



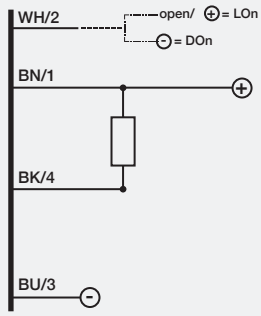
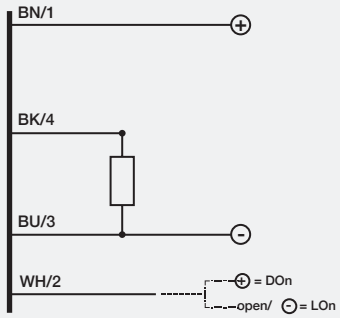
technical specification

	direct diffuse			polarized		for transparent objects	through beam	
	FFR3	FFI7	FFI8	FFRN	FFRP	FFRL	FFIZ	FFIH
								
nominal sensing distance	100 mm (1)	400 mm (2)	800 mm (3)	4.5 m (4)		0.1...1.5 m (5)	20 m	
emission	red (660 nm)	infrared (880 nm)		red (660 nm)			-	infrared (880 nm)
hysteresis	≤ 10 %							
repeatability	5 %							
tolerance	+ 15 / - 5 % Sn							
operating voltage	10...30 Vdc							
ripple	≤ 10 %							
no-load supply current	max 35 mA (at Val = 30 V)						25 mA	40 mA
load current	100 mA							
leakage current	≤ 10 µA @ Vmax							
output voltage drop	2 V max. IL = 100 mA							
output type	NPN o PNP selectable output LO / DO or complementary output NO + NC							
switching frequency	500 Hz						250 Hz	-
power on delay	200 ms							
temperature range	- 25°C...+ 80°C (without freeze)							
power supply protections	polarity reversal, transient							
output protection	short circuit (autoreset)							
sensitivity adjustment	Teach			-		Teach	-	-
temperature drift	10 % Sr							
protection degree	IP67; IP68 (1 m, 7 days); IP69K (according 40050 part 9) (6)							
EMC	in conformity with the EMC Directive according to EN 60947-5-2							
external light interference	5,000 lux (ncandescent lamp), 10,000 lux (sunlight))							
LEDs	Green: ON: teach function available OFF: teach function blocked Fast flashing: fine teach active Slow flashing: teach in progress Yellow: output state - excess gain (0 models) light State - excess gain (B models) (7)						Yellow: output state (0 models) light state (B models)	yellow (supply on)
housing material	stainless steel AISI316							
exit plug	PA12							
optic material	PA12							
tightening torque	50 Nm							
approvals	CE, cULus, IP69K, ECOLAB, Diversey							
weight (approximate)	60 gr							

(1) White target Kodak 90% reflection 100x100 mm (2) White target Kodak 90% reflection 200x200 mm (3) White target Kodak 90% reflection 400x400 mm (4) With RL110 reflector (5) With RL113G or RL116 reflector (6) Protection guaranteed only with plug cable well mounted (7) Yellow LED Fixed On: Excess Gain ≤ 2, Yellow LED flashing: Excess Gain <2

electrical diagrams of the connections

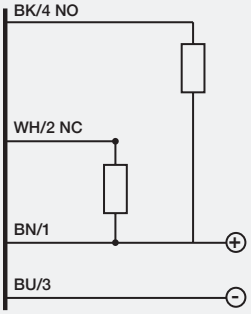
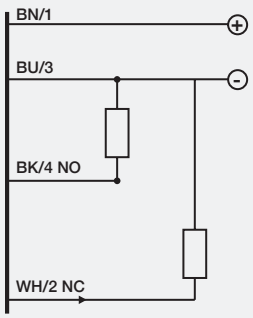
LO/DO selectable output

NPN output	PNP output
	

BN brown
BU blue
BK black
WH white
PK pink
GY gray

electrical diagrams of the connections

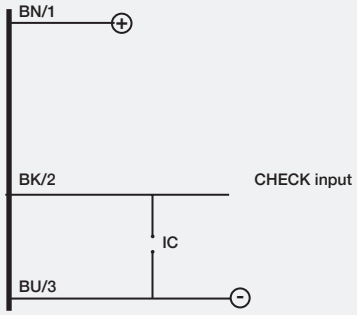
NO+NC complementary output

NPN output	PNP output
	

BN brown
BU blue
BK black
WH white
PK pink
GY gray

electrical diagrams of the connections

emitter with check

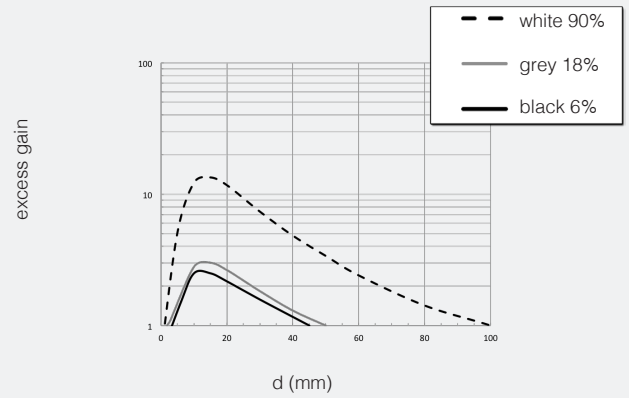


BN brown
BU blue
BK black
WH white
PK pink
GY gray

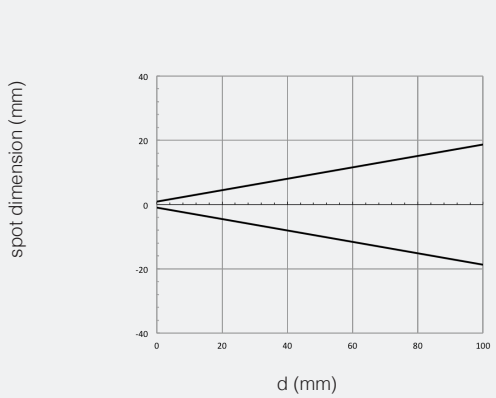
response diagrams

direct diffuse models

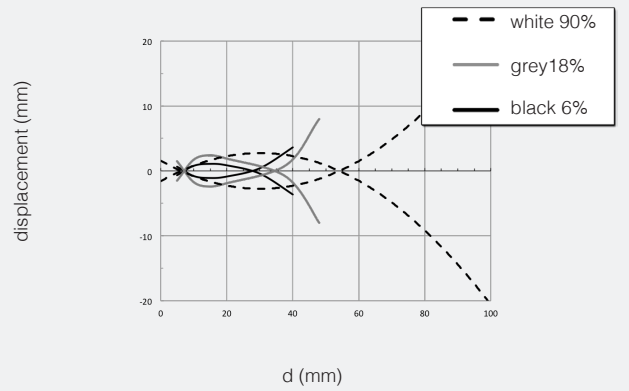
FFR3/**-1E excess gain



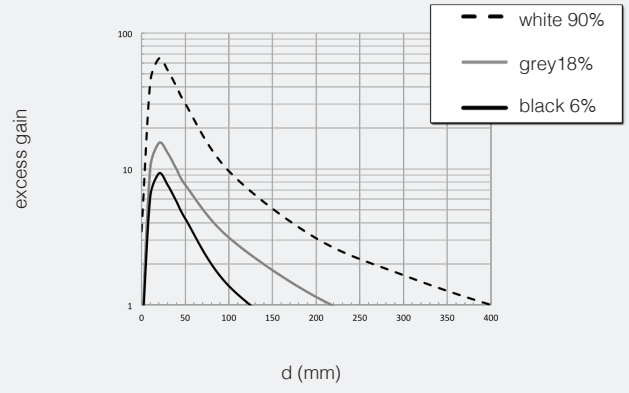
FFR3/**-1E spot dimension



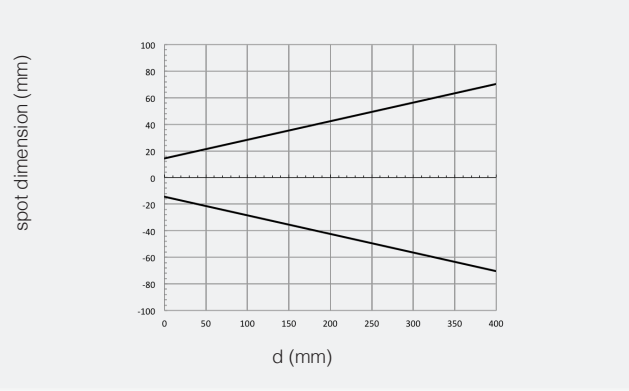
FFR3/**-1E parallel displacement



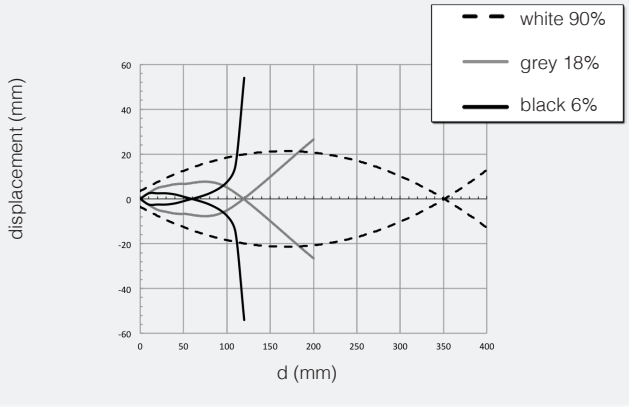
FFI7/**-** excess gain



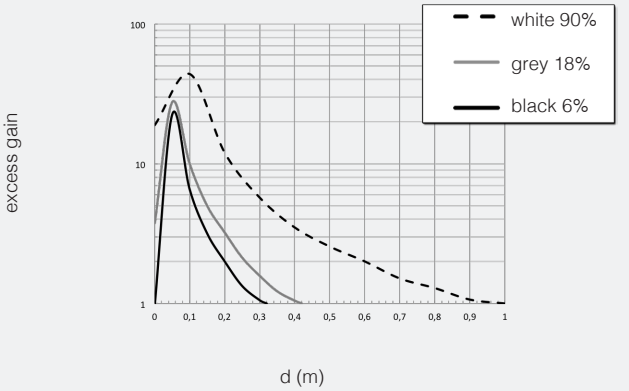
FFI7/**-** spot dimension



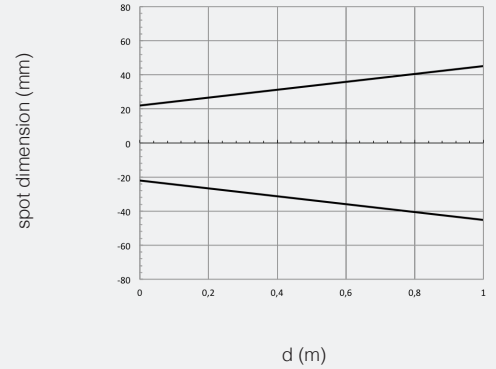
FFI7/**-** parallel displacement



FFI8/**-** excess gain



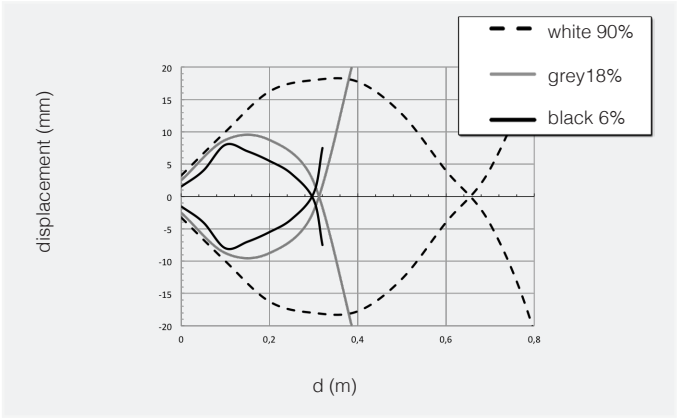
FFI8/**-** spot dimension



response diagrams

direct diffuse models

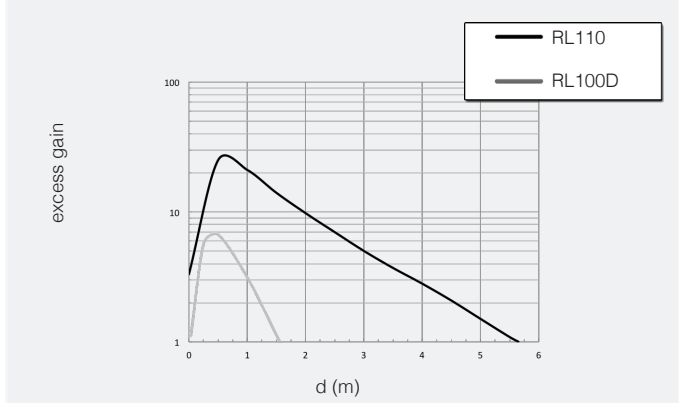
FFI8/-** parallel displacement**



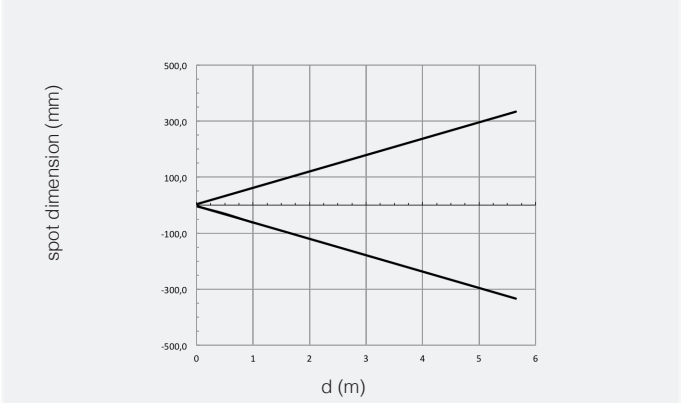
response diagrams

polarized models

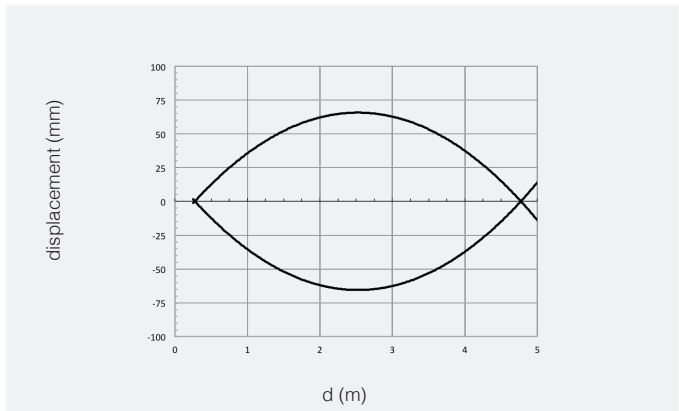
FFRN/- 1E - FFRP/**- 1E excess gain**



FFRN/- 1E - FFRP/**- 1E spot dimension**



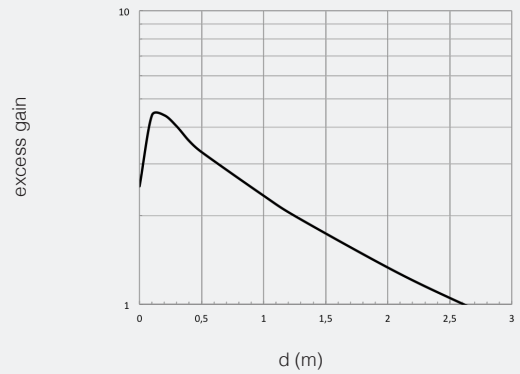
FFRN/- 1E - FFRP/**- 1E* parallel displacement**



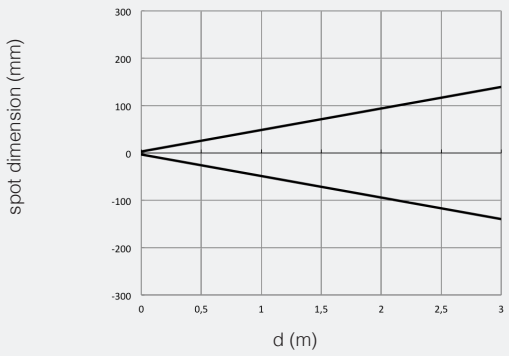
response diagrams

models for transparent objects

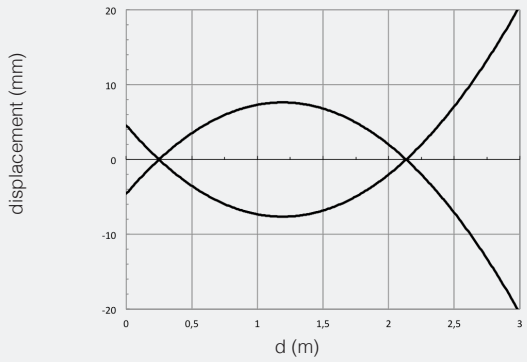
FFRL/**-1E excess gain



FFRL/**-1E spot dimension



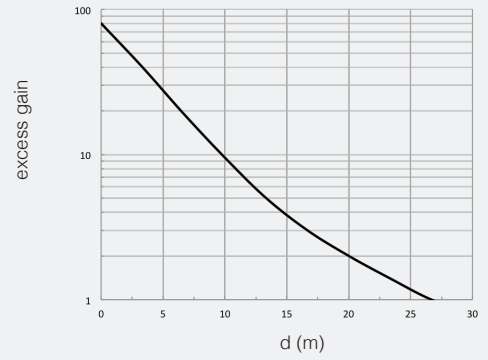
FFRL/**-1E parralel displacement



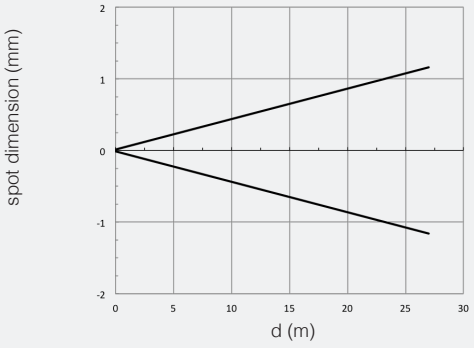
response diagrams

through beam models

FFIH/**-1E + FFIZ/**-1E excess gain



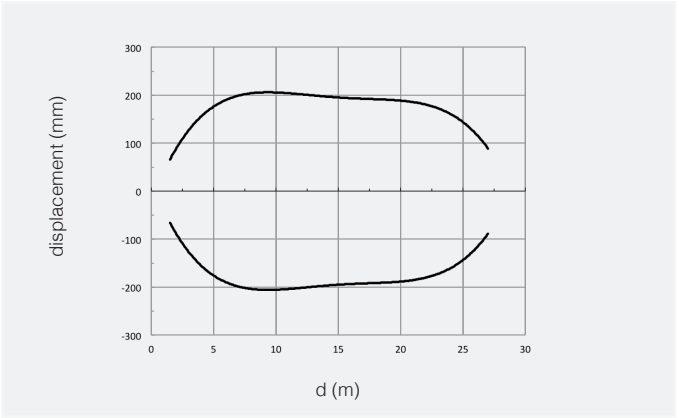
FFIH/**-1E + FFIZ/**-1E spot dimension



response diagrams

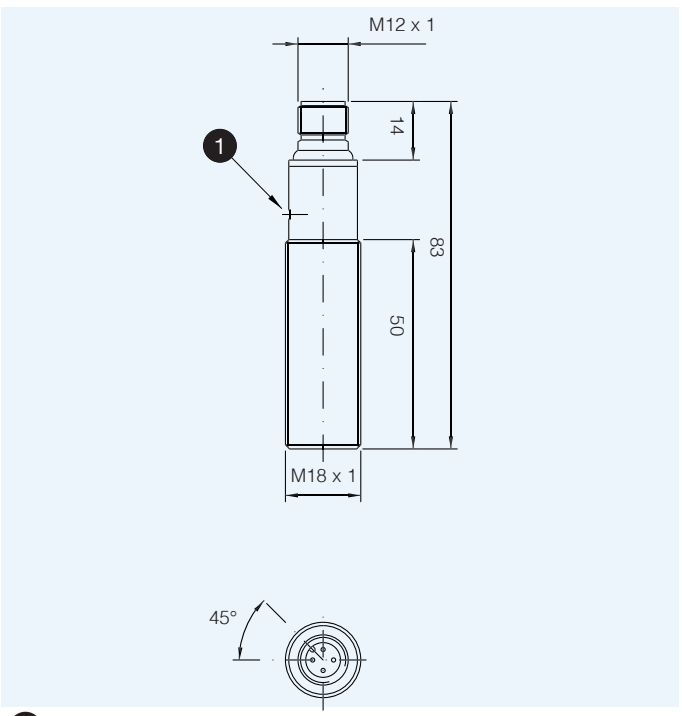
through beam models

FFIH/-1E + FFIZ/**-1E parallel displacement**

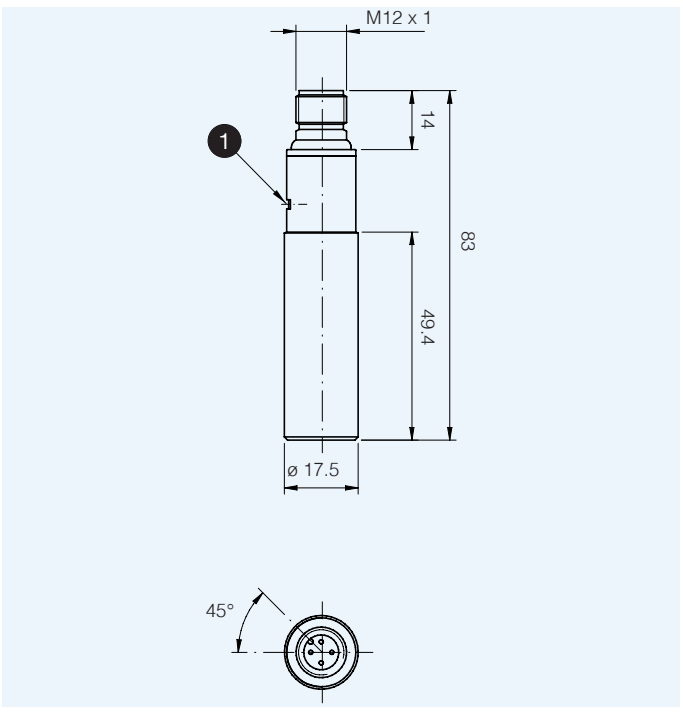


dimensions (mm)

FF/**-**



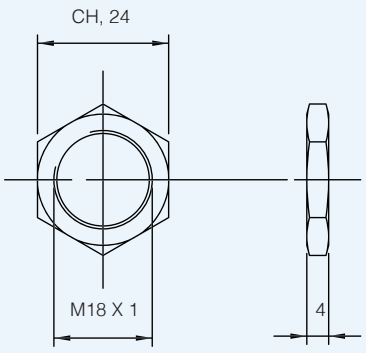
FF/**-1EV5**



1 Inductive Teach-In

dimensions (mm)

accessories included in all metallic models



metallic
nut (2 x)

C+R Automations- GmbH
Nürnberger Straße 45
90513 Zirndorf

Tel. +49 (0)911 656587-0
E-Mail: info@crautomation.de
www.crautomation.com