

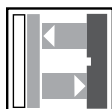


Series 28 Universal Sensors

- Extreme low temperature operation (-40 °C/F) available
- LEDs visible from 15 m (50')
- Thru-hole or dovetail mounting options



4 output options from 1 sensor:
NPN normally open, NPN normally closed,
PNP normally open, or PNP normally closed



Diffuse Mode with Background Suppression

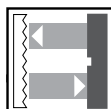
See pages 548-553

Features:

- Sharp sensing range cut-off
- Choice of infrared, visible red and laser light sources

Sensing Range: 400 mm, 700 mm, 1.5 m, 2 m

Outputs: NPN, PNP, 4-in-1, relay



Retro-Reflective Mode

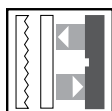
See pages 554-556

Features:

- Reliable detection of even the shiniest material
- Weak signal output available

Sensing Range: 12 m, 30 m

Outputs: NPN, PNP, 4-in-1, relay, AS-Interface



Retro-Reflective Mode with Foreground Suppression

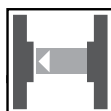
See pages 557

Features:

- Glossy targets not erroneously identified as the reflector up to 200 mm away
- Reliable detection of shrink-wrapped pallets

Sensing Range: 9 m

Outputs: NPN, PNP



Thru-Beam Mode

See pages 558-560

Features:

- Alignment LED visible through lens for faster setup
- Laser versions for long-range sensing

Sensing Range: 30 m, 65 m, 300 m

Outputs: NPN, PNP, relay, AS-Interface

See page 561-566 for Series 28 specifications, wiring and dimensions.



Diffuse Mode with Background Suppression

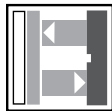
Specifications					
SENSING RANGE		20-400 mm	20-400 mm	20-400 mm	20-400 mm
SENSITIVITY ADJUSTMENT		Yes	Yes	Yes	Yes
MODEL NUMBER(S)		RL28-8-H-400-RT/49/115 •	RL28-8-H-400-RT/49/105 •	RL28-8-H-400-RT/105/110 ⚡	RL28-8-H-400-FFP-RT/47/105 ⚡
		RL28-8-H-400-IR/49/115 •	RL28-8-H-400-IR/49/105 •	RL28-8-H-400-IR/105/110 ⚡	—
OUTPUT /47, /49, or /110		1 NPN and 1 PNP	1 NPN and 1 PNP	4-in-1†	2 PNP
LOAD CURRENT		200 mA max.	200 mA max.	200 mA max.	200 mA max.
SHORT CIRCUIT AND OVERLOAD PROTECTION		Yes	Yes	Yes	Yes
REVERSE POLARITY PROTECTION		Yes	Yes	Yes	Yes
SUPPLY VOLTAGE		10-30 VDC	10-30 VDC	10-30 VDC	10-30 VDC
VOLTAGE RIPPLE		10%	10%	10%	10%
LED(s)		Yes (3)*	Yes (3)*	Yes (3)*	Yes (3)*
CURRENT CONSUMPTION		≤ 40 mA	≤ 40 mA	≤ 40 mA	≤ 40 mA
OPERATING MODE		Light on/dark on	Light on/dark on	Light on/dark on	Light on/dark on
RESPONSE TIME		≤ 2.0 ms	≤ 2.0 ms	≤ 2.0 ms	≤ 2.0 ms
TIMER FUNCTION (only on -Z models)		—	—	—	—
SWITCHING FREQUENCY		250 Hz	250 Hz	250 Hz	250 Hz
STANDARDS		EN 60947-5-2	EN 60947-5-2	EN 60947-5-2	EN 60947-5-2
PROTECTION (IEC)		IP67	IP67	IP67	IP67
LIGHT SPOT DIAMETER	-RT	≈ 12 mm at a range of 400 mm	≈ 12 mm at a range of 400 mm	≈ 12 mm at a range of 400 mm	≈ 4 mm at a range of 250 mm
	-IR	≈ 14 mm at a range of 400 mm	≈ 14 mm at a range of 400 mm	≈ 14 mm at a range of 400 mm	—
LIGHT BEAM ANGLE	-RT	1.2° transmitter/2° receiver	1.2° transmitter/2° receiver	1.2° transmitter/2° receiver	1.2° transmitter/2° receiver
	-IR	2° transmitter/2° receiver	2° transmitter/2° receiver	2° transmitter/2° receiver	—
LIGHT SOURCE	-RT	Visible red LED	Visible red LED	Visible red LED	Visible red LED
	-IR	Infrared LED	Infrared LED	Infrared LED	—
AMBIENT LIGHT RESISTANCE		≤ 50,000 lux	≤ 50,000 lux	≤ 50,000 lux	≤ 50,000 lux
TEMPERATURE RANGE	WORKING	-40 °F to +140 °F	-40 °F to +140 °F	-40 °F to +140 °F	-40 °F to +140 °F
	STORAGE	-40 °F to +167 °F	-40 °F to +167 °F	-40 °F to +167 °F	-40 °F to +167 °F
HOUSING MATERIAL		ABS	ABS	ABS	ABS
LENS		Plastic	Plastic	Plastic	Plastic
WEIGHT		2.5 oz	2.5 oz	2.5 oz	2.5 oz
APPROVALS		CE UL SP	CE UL SP	CE UL SP	CE UL SP
ELECTRICAL CONNECTION		2.5-meter cable, 4-conductor	Quick disconnect type V15	Quick disconnect type V15	Quick disconnect type V15
ADDITIONAL DATA		See pages 561-566			

*See dimensional drawings for LED functions.

†NPN normally open, NPN normally closed, PNP normally open, or PNP normally closed

⚡ Stocked item

• Typical delivery 4 weeks or less
Consult factory for all other models



Diffuse Mode with Background Suppression

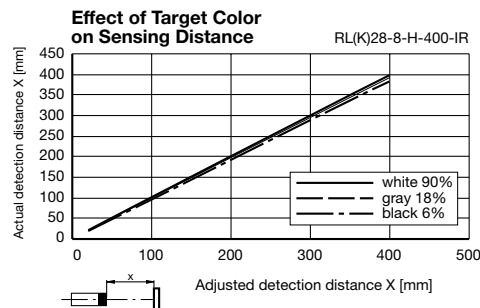
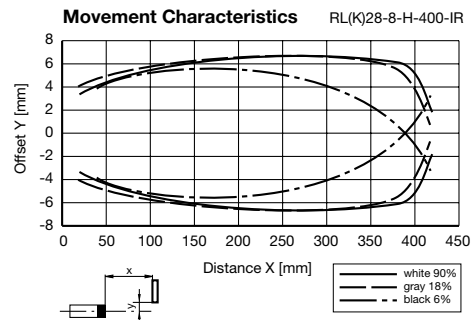
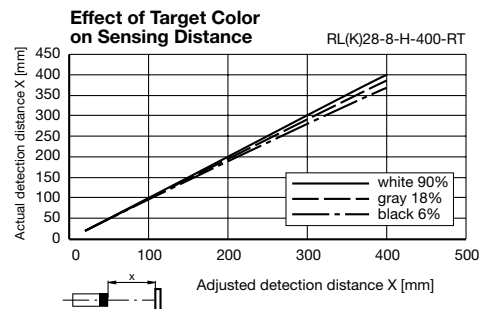
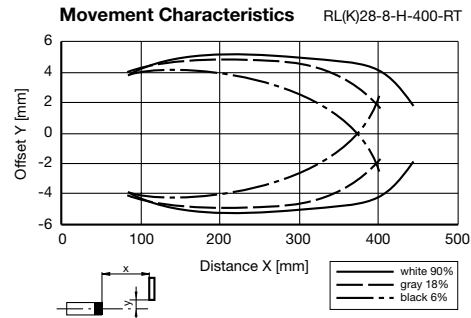
Specifications

SENSING RANGE	20-400 mm
SENSITIVITY ADJUSTMENT	Yes
MODEL NUMBER(S)	RLK28-8-H-400-RT-Z/31/116 ⚡ RLK28-8-H-400-IR-Z/31/116 ⚡
OUTPUT /31	1 SPDT relay
LOAD CURRENT	250 VDC/2 A 230 VAC/2 A
SHORT CIRCUIT AND OVERLOAD PROTECTION	—
REVERSE POLARITY PROTECTION	—
SUPPLY VOLTAGE	12-240 VAC/DC
VOLTAGE RIPPLE	10%
LED(s)	Yes (3)*
CURRENT CONSUMPTION	≤ 3 W
OPERATING MODE	Light on/dark on
RESPONSE TIME	≤ 20.0 ms
TIMER FUNCTION (only on -Z models)	On Delay, Off Delay, One Shot, On Delay+One Shot, On Delay+Off Delay (0.1 to 10 sec.)
SWITCHING FREQUENCY	25 Hz
STANDARDS	EN 60947-5-2
PROTECTION (IEC)	IP67
LIGHT SPOT DIAMETER -RT	≈ 12 mm at a range of 400 mm
-IR	≈ 14 mm at a range of 400 mm
LIGHT BEAM ANGLE -RT	1.2° transmitter/2° receiver
-IR	2° transmitter/2° receiver
LIGHT SOURCE -RT	Visible red LED
-IR	Infrared LED
AMBIENT LIGHT RESISTANCE	≤ 50,000 lux
TEMPERATURE RANGE WORKING	-40 °F to +140 °F
STORAGE	-40 °F to +167 °F
HOUSING MATERIAL	ABS
LENS	Plastic
WEIGHT	3.5oz
APPROVALS	CE UL SP
ELECTRICAL CONNECTION	Spring-loaded terminal connection
ADDITIONAL DATA	See pages 561-566

*See dimensional drawings for LED functions.

- ⚡ Stocked item
- Typical delivery 4 weeks or less
Consult factory for all other models

Sensing Characteristics





Diffuse Mode with Background Suppression

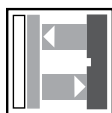
Specifications					
SENSING RANGE		20-700 mm	20-700 mm	20-700 mm	20-700 mm
SENSITIVITY ADJUSTMENT		Yes	Yes	Yes	Yes
MODEL NUMBER(S)		RL28-8-H-700-RT/49/115 •	RL28-8-H-700-RT/49/105 •	RL28-8-H-700-RT/105/110 ⚡	RLK28-8-H-700-RT-Z/31/116 ⚡
		RL28-8-H-700-IR/49/115 •	RL28-8-H-700-IR/49/105 •	RL28-8-H-700-IR/105/110 ⚡	RLK28-8-H-700-IR-Z/31/116 ⚡
OUTPUT /49, /110, or /31		1 NPN and 1 PNP	1 NPN and 1 PNP	4-in-1†	1 SPDT relay
LOAD CURRENT OR ELECTRICAL CONTACT RATING		200 mA max.	200 mA max.	200 mA max.	250 VDC/2 A 230 VAC/2 A
SHORT CIRCUIT AND OVERLOAD PROTECTION		Yes	Yes	Yes	—
REVERSE POLARITY PROTECTION		Yes	Yes	Yes	—
SUPPLY VOLTAGE		10-30 VDC	10-30 VDC	10-30 VDC	12-240 VAC/DC
VOLTAGE RIPPLE		10%	10%	10%	10%
LED(s)		Yes (3)*	Yes (3)*	Yes (3)*	Yes (3)*
CURRENT CONSUMPTION		≤ 40 mA	≤ 40 mA	≤ 40 mA	≤ 3 W
OPERATING MODE		Light on/dark on	Light on/dark on	Light on/dark on	Light on/dark on
RESPONSE TIME		≤ 2.0 ms	≤ 2.0 ms	≤ 2.0 ms	≤ 20.0 ms
TIMER FUNCTION (only on -Z models)		—	—	—	On Delay, Off Delay, One Shot, On Delay+One Shot, On Delay+Off Delay (0.1 to 10 sec.)
SWITCHING FREQUENCY		250 Hz	250 Hz	250 Hz	25 Hz
STANDARDS		EN 60947-5-2	EN 60947-5-2	EN 60947-5-2	EN 60947-5-2
PROTECTION (IEC)		IP67	IP67	IP67	IP67
LIGHT SPOT DIAMETER	-RT	≈ 15 mm at a range of 700 mm	≈ 15 mm at a range of 700 mm	≈ 15 mm at a range of 700 mm	≈ 15 mm at a range of 700 mm
	-IR	≈ 24 mm at a range of 700 mm	≈ 24 mm at a range of 700 mm	≈ 24 mm at a range of 700 mm	≈ 24 mm at a range of 700 mm
LIGHT BEAM ANGLE	-RT	1.2° transmitter/2° receiver	1.2° transmitter/2° receiver	1.2° transmitter/2° receiver	1.2° transmitter/2° receiver
	-IR	2° transmitter/2° receiver	2° transmitter/2° receiver	2° transmitter/2° receiver	2° transmitter/2° receiver
LIGHT SOURCE	-RT	Visible red LED	Visible red LED	Visible red LED	Visible red LED
	-IR	Infrared LED	Infrared LED	Infrared LED	Infrared LED
AMBIENT LIGHT RESISTANCE		≤ 50,000 lux	≤ 50,000 lux	≤ 50,000 lux	≤ 50,000 lux
TEMPERATURE RANGE	WORKING	-40 °F to +140 °F	-40 °F to +140 °F	-40 °F to +140 °F	-40 °F to +140 °F
	STORAGE	-40 °F to +167 °F	-40 °F to +167 °F	-40 °F to +167 °F	-40 °F to +167 °F
HOUSING MATERIAL		ABS	ABS	ABS	ABS
	LENS	Plastic	Plastic	Plastic	Plastic
WEIGHT		2.5 oz	2.5 oz	2.5 oz	3.5 oz
APPROVALS		CE UL SP	CE UL SP	CE UL SP	CE UL SP
ELECTRICAL CONNECTION		2.5-meter cable, 4-conductor	Quick disconnect type V15	Quick disconnect type V15	Spring-loaded terminal connection
ADDITIONAL DATA		See pages 561-566			

*See dimensional drawings for LED functions.

†NPN normally open, NPN normally closed, PNP normally open, or PNP normally closed

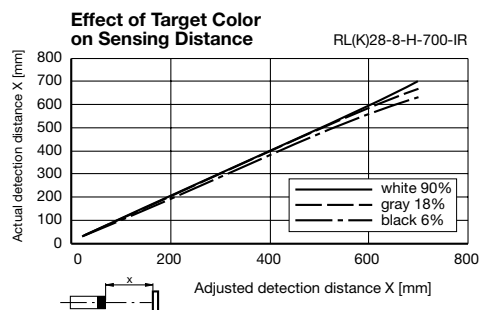
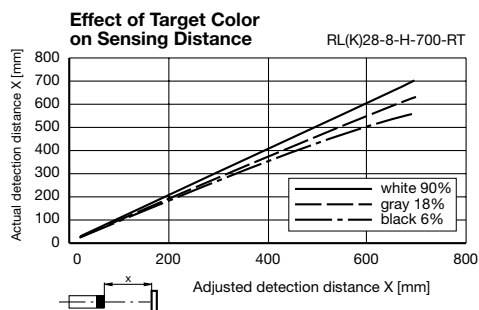
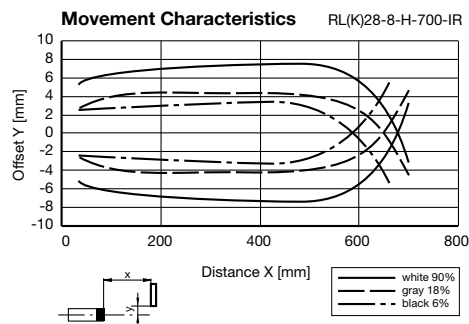
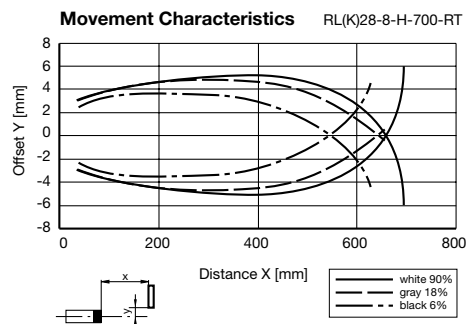
⚡ Stocked item

• Typical delivery 4 weeks or less
Consult factory for all other models



Diffuse Mode with Background Suppression

Sensing Characteristics





Diffuse Mode with Background Suppression

Specifications		Laser		
SENSING RANGE		100 mm-1.5 m	20 mm-2 m	20 mm-2 m
SENSITIVITY ADJUSTMENT		Yes	Yes	Yes
MODEL NUMBER(S)		RL28-8-H-1500-LAS/47/105 •	RL28-8-H-2000-IR/49/115 •	RL28-8-H-2000-IR/49/105 •
		RL28-8-H-1500-LAS/105/110 ⚡	—	RL28-8-H-2000-IR/105/110 ⚡
OUTPUT	/47 or /49	2 PNP	1 NPN and 1 PNP	1 NPN and 1 PNP
	/110	4-in-1†	—	4-in-1†
LOAD CURRENT		200 mA max.	200 mA max.	200 mA max.
SHORT CIRCUIT AND OVERLOAD PROTECTION		Yes	Yes	Yes
REVERSE POLARITY PROTECTION		Yes	Yes	Yes
SUPPLY VOLTAGE		10-30 VDC	10-30 VDC	10-30 VDC
VOLTAGE RIPPLE		10%	10%	10%
LED(s)		Yes (3)*	Yes (3)*	Yes (3)*
CURRENT CONSUMPTION		≤ 40 mA	≤ 40 mA	≤ 40 mA
OPERATING MODE		Light on/dark on	Light on/dark on	Light on/dark on
RESPONSE TIME		≤ 2.0 ms	≤ 2.0 ms	≤ 2.0 ms
TIMER FUNCTION (only on -Z models)		—	—	—
SWITCHING FREQUENCY		250 Hz	250 Hz	250 Hz
STANDARDS		EN 60947-5-2	EN 60947-5-2	EN 60947-5-2
PROTECTION (IEC)		IP67	IP67	IP67
LIGHT SPOT DIAMETER		≈ 4 mm at a range of 1.5 m	≈ 70 mm at a range of 2 m	≈ 70 mm at a range of 2 m
LIGHT BEAM ANGLE		0.15° transmitter/2° receiver	2° transmitter/2° receiver	2° transmitter/2° receiver
LIGHT SOURCE		Visible red laser 650 nm Class 1	Infrared LED	Infrared LED
AMBIENT LIGHT RESISTANCE		≤ 50,000 lux	≤ 50,000 lux	≤ 50,000 lux
TEMPERATURE RANGE	WORKING	+14 °F to +122 °F	-40 °F to +140 °F	-40 °F to +140 °F
	STORAGE	-4 °F to +167 °F	-40 °F to +167 °F	-40 °F to +167 °F
HOUSING MATERIAL		ABS	ABS	ABS
	LENS	Plastic	Plastic	Plastic
WEIGHT		2.5 oz	2.5 oz	2.5 oz
APPROVALS		CE UL SP	CE UL SP	CE UL SP
ELECTRICAL CONNECTION		 Quick disconnect type V15	 2.5-meter cable, 4-conductor	 Quick disconnect type V15
ADDITIONAL DATA		See pages 561-566		

*See dimensional drawings for LED functions.

†NPN normally open, NPN normally closed, PNP normally open, or PNP normally closed

⚡ Stocked item

- Typical delivery 4 weeks or less
Consult factory for all other models



Diffuse Mode with Background Suppression

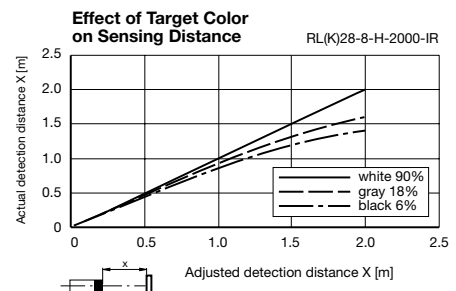
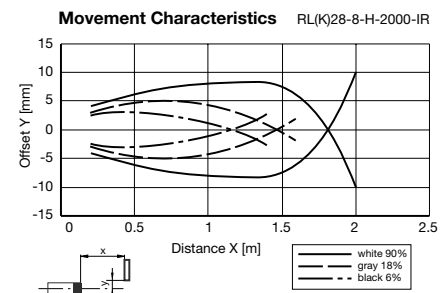
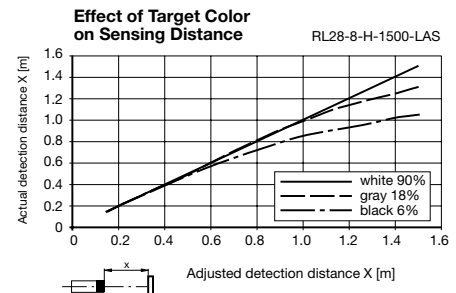
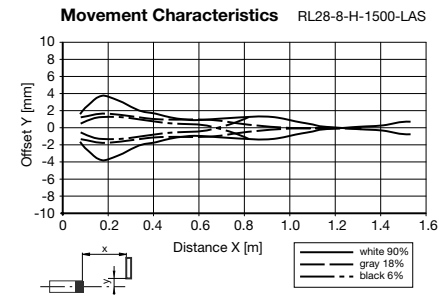
Specifications

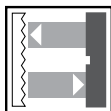
SENSING RANGE	20 mm-2 m	20 mm-2 m
SENSITIVITY ADJUSTMENT	Yes	Yes
MODEL NUMBER(S)	RLK28-8-H-2000-IR-Z/31/116 ⚡	RLK28-8-H-2000-IR-Z/31/135 ⚡
	—	—
OUTPUT /31	1 SPDT relay	1 SPDT relay
ELECTRICAL CONTACT RATING	250 VDC/2 A 230 VAC/2 A	250 VDC/2 A 230 VAC/2 A
SHORT CIRCUIT AND OVERLOAD PROTECTION	—	—
REVERSE POLARITY PROTECTION	—	—
SUPPLY VOLTAGE	12-240 VAC/DC	12-240 VAC/DC
VOLTAGE RIPPLE	10%	10%
LED(s)	Yes (3)*	Yes (3)*
CURRENT CONSUMPTION	≤ 3 W	≤ 3 W
OPERATING MODE	Light on/dark on	Light on/dark on
RESPONSE TIME	≤ 20.0 ms	≤ 20.0 ms
TIMER FUNCTION (only on -Z models)	On Delay, Off Delay, One Shot, On Delay+One Shot, On Delay+Off Delay (0.1 to 10 sec.)	On Delay, Off Delay, One Shot, On Delay+One Shot, On Delay+Off Delay (0.1 to 10 sec.)
SWITCHING FREQUENCY	25 Hz	25 Hz
STANDARDS	EN 60947-5-2	EN 60947-5-2
PROTECTION (IEC)	IP67	IP67
LIGHT SPOT DIAMETER	≈ 70 mm at a range of 2 m	≈ 70 mm at a range of 2 m
LIGHT BEAM ANGLE	2° transmitter/2° receiver	2° transmitter/2° receiver
LIGHT SOURCE	Infrared LED	Infrared LED
AMBIENT LIGHT RESISTANCE	≤ 50,000 lux	≤ 50,000 lux
TEMPERATURE RANGE	WORKING: -40 °F to +140 °F STORAGE: -40 °F to +167 °F	WORKING: -40 °F to +140 °F STORAGE: -40 °F to +167 °F
HOUSING MATERIAL	ABS	ABS
LENS	Plastic	Plastic
WEIGHT	3.5 oz	3.5 oz
APPROVALS	CE UL SP	CE UL SP
ELECTRICAL CONNECTION	Spring-loaded terminal connection	Quick disconnect type V95
ADDITIONAL DATA	See pages 561-566	

*See dimensional drawings for LED functions.

- ⚡ Stocked item
- Typical delivery 4 weeks or less
- Consult factory for all other models

Sensing Characteristics





Retro-Reflective Mode

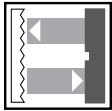
Specifications				
SENSING RANGE	0-12 m	0-12 m	0-12 m	0-12 m
SENSITIVITY ADJUSTMENT	Yes	Yes	Yes	Yes
REFLECTOR DISTANCE	50 mm-12 m	50 mm-12 m	50 mm-12 m	50 mm-12 m
POLARIZED FILTER	Yes	Yes	Yes	Yes
MODEL NUMBER(S)	RL28-55/49/82b/115 •	RL28-55/49/82b/105 •	RLK28-55/31/116 ⚡	RLK28-55-Z/31/116 ⚡
	—	RL28-55/82b/105/110 ⚡	—	—
OUTPUT	/49 or /31	1 NPN and 1 PNP	1 NPN and 1 PNP	1 SPDT relay
	/110	—	4-in-1†	—
LOAD CURRENT OR ELECTRICAL CONTACT RATING	200 mA max.	200 mA max.	30 VDC/2 A 230 VAC/2 A	30 VDC/2 A 230 VAC/2 A
SHORT CIRCUIT AND OVERLOAD PROTECTION	Yes	Yes	—	—
REVERSE POLARITY PROTECTION	Yes	Yes	—	—
SUPPLY VOLTAGE	10-30 VDC	10-30 VDC	12-240 VAC/DC	12-240 VAC/DC
VOLTAGE RIPPLE	10%	10%	10%	10%
LED(s)	Yes (3)*	Yes (3)*	Yes (3)*	Yes (3)*
CURRENT CONSUMPTION	≤ 40 mA	≤ 40 mA	≤ 3 VA	≤ 3 VA
OPERATING MODE	Light on/dark on	Light on/dark on	Light on/dark on	Light on/dark on
RESPONSE TIME	≤ 0.5 ms	≤ 0.5 ms	≤ 20.0 ms	≤ 20.0 ms
TIMER FUNCTION (only on -Z models)	—	—	—	On Delay, Off Delay, One Shot (0.1 to 10 sec.)
SWITCHING FREQUENCY	1 kHz	1 kHz	25 Hz	25 Hz
STANDARDS	EN 60947-5-2	EN 60947-5-2	EN 60947-5-2	EN 60947-5-2
PROTECTION (IEC)	IP67	IP67	IP67	IP67
LIGHT SPOT DIAMETER	≈ 200 mm at a range of 12 m	≈ 200 mm at a range of 12 m	≈ 200 mm at a range of 12 m	≈ 200 mm at a range of 12 m
LIGHT BEAM ANGLE	1.2° transmitter/2° receiver	1.2° transmitter/2° receiver	1.2° transmitter/2° receiver	1.2° transmitter/2° receiver
LIGHT SOURCE	Visible red LED	Visible red LED	Visible red LED	Visible red LED
AMBIENT LIGHT RESISTANCE	≤ 80,000 lux	≤ 80,000 lux	≤ 80,000 lux	≤ 80,000 lux
TEMPERATURE RANGE	WORKING	-40 °F to +140 °F	-40 °F to +140 °F	-40 °F to +140 °F
	STORAGE	-40 °F to +167 °F	-40 °F to +167 °F	-40 °F to +167 °F
HOUSING MATERIAL	ABS	ABS	ABS	ABS
	LENS	Plastic	Plastic	Plastic
WEIGHT	2.5 oz	2.5 oz	3.5 oz	3.5 oz
APPROVALS	CE UL SP	CE UL SP	CE UL SP	CE UL SP
ELECTRICAL CONNECTION	2.5-meter cable, 4-conductor	Quick disconnect type V15	Spring-loaded terminal connection	Spring-loaded terminal connection
ADDITIONAL DATA	See pages 561-566			

*See dimensional drawings for LED functions.

†NPN normally open, NPN normally closed, PNP normally open, or PNP normally closed

⚡ Stocked item

• Typical delivery 4 weeks or less
Consult factory for all other models



Retro-Reflective Mode



Specifications		Laser*			
SENSING RANGE		0-30 m	0-30 m	0-30 m	0-30 m
SENSITIVITY ADJUSTMENT		Yes	Yes	Yes	Yes
REFLECTOR DISTANCE		300 mm-30 m	300 mm-30 m	300 mm-30 m	300 mm-30 m
POLARIZED FILTER		Yes	Yes	Yes	Yes
MODEL NUMBER(S)		RL28-55-LAS/47/82b/115 • RL28-55-LAS/76a/82b/110/115	RL28-55-LAS/47/82b/105 • RL28-55-LAS/76a/82b/105/110 ⚡	RL28-55-LAS-B3B/73c	RLK28-55-LAS-Z/31/116 •
OUTPUT	/47, -B3B, or /31 /110	2 PNP 4-in-1†	2 PNP 4-in-1†	AS-Interface	1 SPDT relay
LOAD CURRENT OR ELECTRICAL CONTACT RATING		200 mA max.	200 mA max.	—	250 VDC/2 A 250 VAC/2 A
SHORT CIRCUIT AND OVERLOAD PROTECTION		Yes	Yes	—	—
REVERSE POLARITY PROTECTION		Yes	Yes	—	—
SUPPLY VOLTAGE		10-30 VDC	10-30 VDC	from AS-Interface	12-240 VAC/DC
VOLTAGE RIPPLE		≤ 10%	≤ 10%	≤ 10%	—
LED(s)		Yes (2)†	Yes (2)†	Yes (3)†	Yes (2)†
CURRENT CONSUMPTION		≤ 35 mA	≤ 35 mA	—	≤ 3.5 VA
OPERATING MODE		Light on/dark on	Light on/dark on	Light on/dark on	Light on/dark on
RESPONSE TIME		≤ 0.5 ms	≤ 0.5 ms	≤ 0.5 ms	≤ 20.0 ms
TIMER FUNCTION (only on -Z models)		—	—	One-shot (50ms) through AS-Interface	On Delay, Off Delay, One Shot, On Delay+One Shot, On Delay+Off Delay (0.1 to 10 sec.)
SWITCHING FREQUENCY		1 kHz	1 kHz	1 kHz	25 Hz
TRANSMITTER FREQUENCY		≈ 6-20 kHz	≈ 6-20 kHz	≈ 6-20 kHz	≈ 6-20 kHz
STANDARDS		EN 60947-5-2	EN 60947-5-2	EN 60947-5-2	EN 60947-5-2
PROTECTION (IEC)		IP67	IP67	IP67	IP67
LIGHT SPOT DIAMETER		≈ 45 mm at a range of 30 m	≈ 45 mm at a range of 30 m	≈ 45 mm at a range of 30 m	≈ 45 mm at a range of 30 m
LIGHT BEAM ANGLE		< 0.1° transmitter/< 2° receiver	< 0.1° transmitter/< 2° receiver	< 0.1° transmitter/< 2° receiver	< 0.1° transmitter/< 2° receiver
LIGHT SOURCE		Visible red laser 650 nm Class 1	Visible red laser 650 nm Class 1	Visible red laser 650 nm Class 1	Visible red laser 650 nm Class 1
AMBIENT LIGHT RESISTANCE		≤ 50,000 lux	≤ 50,000 lux	≤ 50,000 lux	≤ 50,000 lux
TEMPERATURE RANGE	WORKING STORAGE	+14 °F to +122 °F -4 °F to +167 °F	+14 °F to +122 °F -4 °F to +167 °F	+14 °F to +122 °F -4 °F to +167 °F	+14 °F to +122 °F -4 °F to +167 °F
HOUSING MATERIAL	LENS	ABS Plastic	ABS Plastic	ABS Plastic	ABS Plastic
WEIGHT		2.8 oz	2.8 oz	2.8 oz	4.2 oz
APPROVALS		CE UL SP	CE UL SP	CE UL SP	CE UL SP
ELECTRICAL CONNECTION		2.5-meter cable, 5-conductor	Quick disconnect type V15	Quick disconnect type V1	Spring-loaded terminal connection
ADDITIONAL DATA		See pages 561-566			

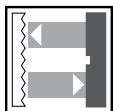
*Micro-structure corner-cube reflectors are recommended with laser retro-reflective mode sensors.

†See dimensional drawings for LED functions.

‡NPN normally open, NPN normally closed, PNP normally open, or PNP normally closed

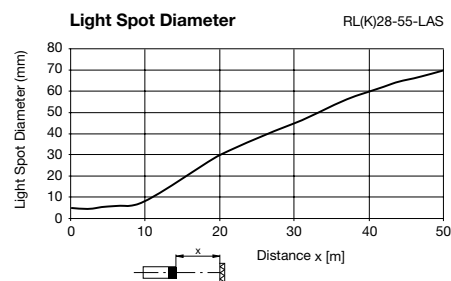
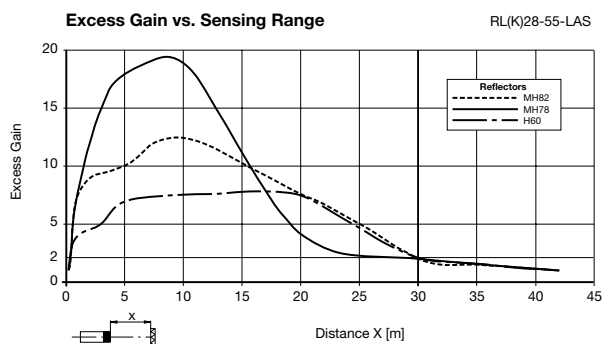
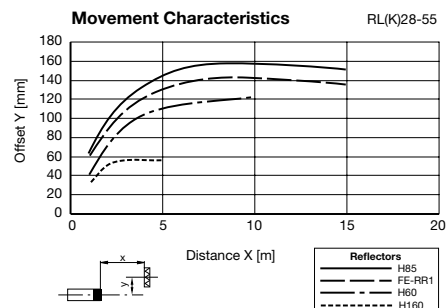
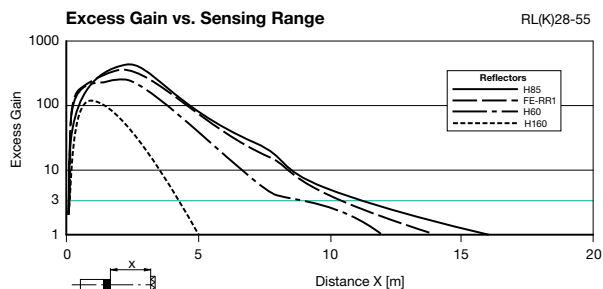
⚡ Stocked item

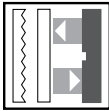
• Typical delivery 4 weeks or less
Consult factory for all other models



Retro-Reflective Mode

Sensing Characteristics

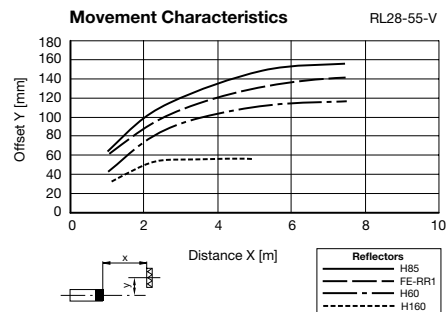
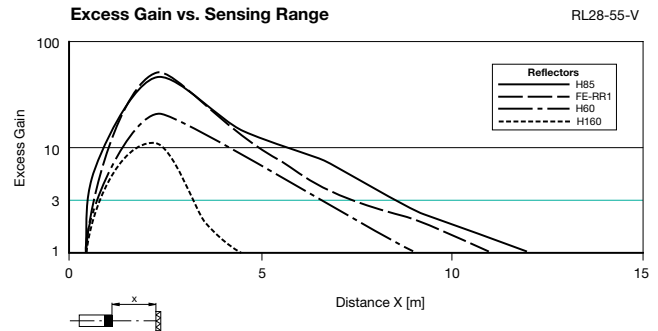




Retro-Reflective Mode with Foreground Suppression

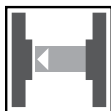
Specifications	
SENSING RANGE	200 mm-9 m
SENSITIVITY ADJUSTMENT	Yes
FOREGROUND SUPPRESSION RANGE	0-200 mm
REFLECTOR DISTANCE	500 mm-9 m
POLARIZED FILTER	Yes
MODEL NUMBER(S)	RL28-55-V/49/82b/105 •
OUTPUT	/49 1 NPN and 1 PNP
LOAD CURRENT	200 mA max.
SHORT CIRCUIT AND OVERLOAD PROTECTION	Yes
REVERSE POLARITY PROTECTION	Yes
SUPPLY VOLTAGE	10-30 VDC
VOLTAGE RIPPLE	10%
LED(s)	Yes (3)*
CURRENT CONSUMPTION	≤ 40 mA
OPERATING MODE	Light on/dark on
RESPONSE TIME	≤ 0.5 ms
SWITCHING FREQUENCY	1 kHz
STANDARDS	EN 60947-5-2
PROTECTION (IEC)	IP67
LIGHT SPOT DIAMETER	≈ 160 mm at a range of 9 m
LIGHT BEAM ANGLE	1.2° transmitter/2° receiver
LIGHT SOURCE	Visible red LED
AMBIENT LIGHT RESISTANCE	≤ 80,000 lux
TEMPERATURE RANGE	WORKING -40 °F to +140 °F STORAGE -40 °F to +167 °F
HOUSING MATERIAL	ABS
LENS	Plastic
WEIGHT	2.5 oz
APPROVALS	CE UL SP
ELECTRICAL CONNECTION	Quick disconnect type V15
ADDITIONAL DATA	See pages 561-566

Sensing Characteristics



*See dimensional drawings for LED functions.

- ⚡ Stocked item
- Typical delivery 4 weeks or less
Consult factory for all other models



Thru-Beam Mode

Specifications

SENSING RANGE		0-30 m	0-30 m	0-30 m	0-30 m
SENSITIVITY ADJUSTMENT		Yes	Yes	Yes	Yes
MODEL NUMBER(S)	Transmitter	LD28-F1/76a/105 •	LD28-F2/76a/105 •	LD28-F1/76a/116 •	LD28-F1/76a/116 •
	Receiver	LV28-F1/47/82b/105 •	LV28-F2/47/82b/105 •	LV28-Z-F1/47/82b/116 •	LV28-Z-F1/49/82b/116 •
OUTPUT		/47 or /49, 2 PNP	2 PNP	2 PNP	1 NPN and 1 PNP
LOAD CURRENT		200 mA max.	200 mA max.	200 mA max.	200 mA max.
SHORT CIRCUIT AND OVERLOAD PROTECTION		Yes	Yes	—	—
REVERSE POLARITY PROTECTION		Yes	Yes	—	—
SUPPLY VOLTAGE		10-30 VDC	10-30 VDC	10-30 VDC	10-30 VDC
VOLTAGE RIPPLE		10%	10%	10%	10%
LED(s)		Yes (2) plus alignment LED*	Yes (2) plus alignment LED*	Yes (2) plus alignment LED*	Yes (2) plus alignment LED*
CURRENT CONSUMPTION		≤ 50 mA transmitter ≤ 35 mA receiver	≤ 50 mA transmitter ≤ 35 mA receiver	≤ 50 mA transmitter ≤ 35 mA receiver	≤ 50 mA transmitter ≤ 35 mA receiver
OPERATING MODE		Light on/dark on	Light on/dark on	Light on/dark on	Light on/dark on
RESPONSE TIME		≤ 0.5 ms	≤ 0.5 ms	≤ 20.0 ms	≤ 20.0 ms
TIMER FUNCTION (only on -Z models)		—	—	On Delay, Off Delay, One Shot, On Delay+One Shot, On Delay+Off Delay (.02 to 1 sec.)	On Delay, Off Delay, One Shot, On Delay+One Shot, On Delay+Off Delay (.02 to 1 sec.)
SWITCHING FREQUENCY		1 kHz	1 kHz	1 kHz	1 kHz
TRANSMITTER FREQUENCY		F1 = 25 kHz	F1 = 25 kHz	F1 = 25 kHz	F1 = 25 kHz
STANDARDS		EN 60947-5-2	EN 60947-5-2	EN 60947-5-2	EN 60947-5-2
PROTECTION (IEC)		IP67	IP67	IP67	IP67
LIGHT SPOT DIAMETER		≈ 600 mm at a range of 30 m	≈ 600 mm at a range of 30 m	≈ 600 mm at a range of 30 m	≈ 600 mm at a range of 30 m
LIGHT BEAM ANGLE		1.2° transmitter/5° receiver	1.2° transmitter/5° receiver	1.2° transmitter/5° receiver	1.2° transmitter/5° receiver
LIGHT SOURCE		Visible red LED 660 nm	Visible red LED 660 nm	Visible red LED 660 nm	Visible red LED 660 nm
AMBIENT LIGHT RESISTANCE		≤ 50,000 lux	≤ 50,000 lux	≤ 50,000 lux	≤ 50,000 lux
TEMPERATURE RANGE	WORKING	-40 °F to +140 °F	-40 °F to +140 °F	-40 °F to +140 °F	-40 °F to +140 °F
	STORAGE	-40 °F to +167 °F	-40 °F to +167 °F	-40 °F to +167 °F	-40 °F to +167 °F
HOUSING MATERIAL		ABS	ABS	ABS	ABS
LENS		Plastic	Plastic	Plastic	Plastic
WEIGHT		2.8 oz per housing	2.8 oz per housing	4.2 oz per housing	4.2 oz per housing
APPROVALS		CE UL SR	CE UL SR	CE UL SR	CE UL SR
ELECTRICAL CONNECTION		 Quick disconnect type V15	 Quick disconnect type V15	 Spring-loaded terminal connection	 Spring-loaded terminal connection
ADDITIONAL DATA		See pages 561-566			

*See dimensional drawings for LED functions.

⚡ Stocked item

- Typical delivery 4 weeks or less
- Consult factory for all other models



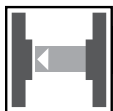
Thru-Beam Mode



Specifications		Laser			
SENSING RANGE		0-65 m	0-300 m	0-300 m	0-300 m
SENSITIVITY ADJUSTMENT		Yes	Yes	Yes	Yes
MODEL NUMBER(S)	Transmitter	LA28-F1/116 ⚡	LD28-LAS-F1/76a/105 •	LD28-LAS-F1-B3B/73c	LA28-LAS-F1/116 •
	Receiver	LK28-Z-F1/31/116 ⚡	LV28-LAS-F1/47/82b/105 •	LV28-LAS-F1-B3B/73c	LK28-LAS-F1-Z/31/116 •
OUTPUT		/47 or /49, 1 SPDT relay	2 PNP	AS-Interface	1 SPDT relay
LOAD CURRENT OR ELECTRICAL CONTACT RATING		250 VDC/2 A 250 VAC/2 A	200 mA max.	—	250 VDC/2 A 250 VAC/2 A
SHORT CIRCUIT AND OVERLOAD PROTECTION		—	Yes	—	—
REVERSE POLARITY PROTECTION		—	Yes	—	—
SUPPLY VOLTAGE		12-240 VAC/DC	10-30 VDC	from AS-Interface	12-240 VAC/DC
VOLTAGE RIPPLE		—	10%	—	—
LED(s)		Yes (2) plus alignment LED*	Yes (2) plus alignment LED*	Yes (3) plus alignment LED*	Yes (2) plus alignment LED*
CURRENT CONSUMPTION		≤ 3.5 VA	≤ 55 mA transmitter ≤ 35 mA receiver	—	≤ 3.5 VA
OPERATING MODE		Light on/dark on	Light on/dark on	Light on/dark on	Light on/dark on
RESPONSE TIME		≤ 20 ms	≤ 0.5 ms	≤ 0.5 ms	≤ 20.0 ms
TIMER FUNCTION (only on -Z models)		On Delay, Off Delay, One Shot (0.1 to 10 sec.)	—	One-shot (50 ms) through AS-Interface	On Delay, Off Delay, One Shot (0.1 to 10 sec.)
SWITCHING FREQUENCY		25 Hz	1 kHz	1 kHz	25 Hz
TRANSMITTER FREQUENCY		F1 = 25 kHz	F1 = 25 kHz	F1 = 25 kHz	F1 = 25 kHz
STANDARDS		EN 60947-5-2	EN 60947-5-2	EN 60947-5-2	EN 60947-5-2
PROTECTION (IEC)		IP67	IP67	IP67	IP67
LIGHT SPOT SIZE		≈ 1.3 m at a range of 65 m	≈ 6 mm at a range of 5 m, ≈ 75 x 300 mm at a range of 300 m (parallel to housing)	≈ 7 x 4.5 mm at a range of 0.1 m, ≈ 6 mm at a range of 5 m, ≈ 75 x 300 mm at a range of 300 m (parallel to housing)	≈ 6 mm at a range of 5 m, ≈ 75 x 300 mm at a range of 300 m (parallel to housing)
LIGHT BEAM ANGLE		1.2° transmitter/5° receiver	0.06° transmitter/5° receiver	0.06° transmitter/5° receiver	0.06° transmitter/5° receiver
LIGHT SOURCE		Visible red LED 660 nm	Visible red laser 650 nm Class 2	Visible red laser 650 nm Class 2	Visible red laser 650 nm Class 2
AMBIENT LIGHT RESISTANCE		≤ 50,000 lux	≤ 50,000 lux	≤ 50,000 lux	≤ 50,000 lux
TEMPERATURE RANGE	WORKING	-40 °F to +140 °F	+14 °F to +122 °F	+14 °F to +122 °F	+14 °F to +122 °F
	STORAGE	-40 °F to +167 °F	-4 °F to +167 °F	-4 °F to +167 °F	-4 °F to +167 °F
HOUSING MATERIAL		ABS	ABS	ABS	ABS
	LENS	Plastic	Plastic	Plastic	Plastic
WEIGHT		4.2 oz per housing	2.8 oz per housing	2.8 oz per housing	4.2 oz per housing
APPROVALS		CE UL SP	CE UL SP	CE UL SP	CE UL SP
ELECTRICAL CONNECTION		Spring-loaded terminal connection	Quick disconnect type V15	Quick disconnect type V15	Spring-loaded terminal connection
ADDITIONAL DATA		See pages 561-566			

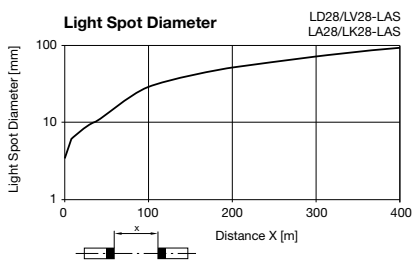
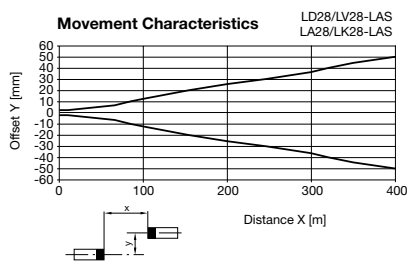
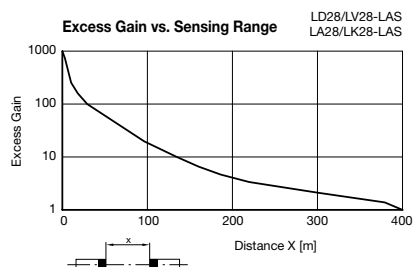
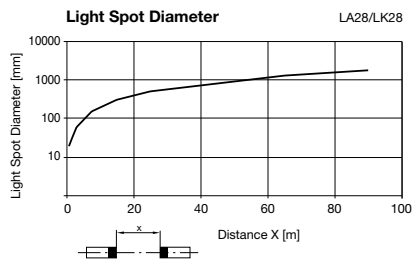
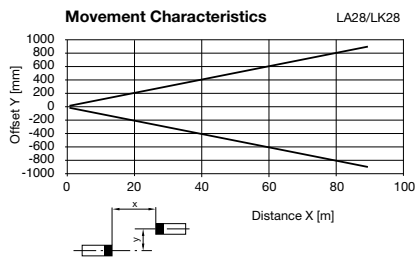
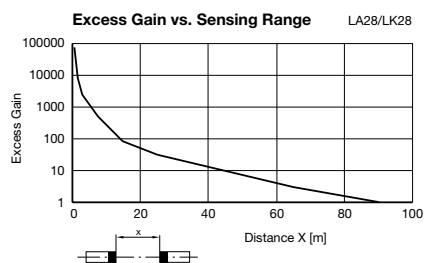
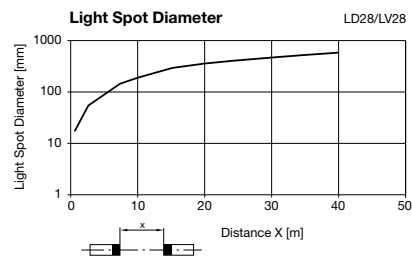
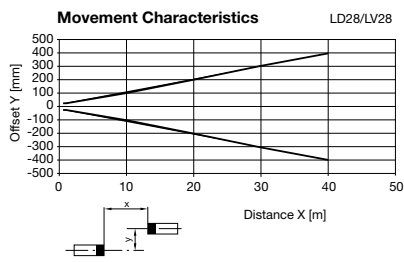
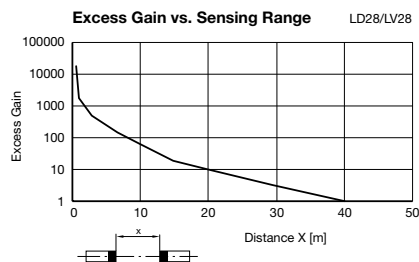
*See dimensional drawings for LED functions.

- ⚡ Stocked item
- Typical delivery 4 weeks or less
Consult factory for all other models

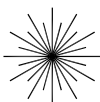


Thru-Beam Mode

Sensing Characteristics



CAUTION



**LASER RADIATION—
DO NOT STARE INTO BEAM**

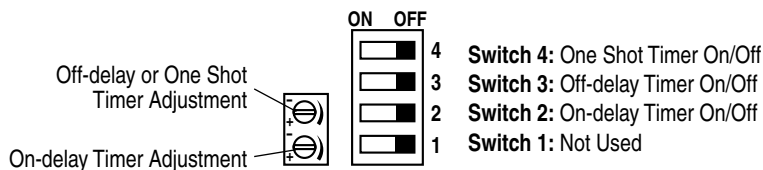
**650nm LASER LIGHT
1mW PEAK POWER**

**PRODUCT CONFORMS TO 21CFR1040
CLASS II LASER PRODUCT**

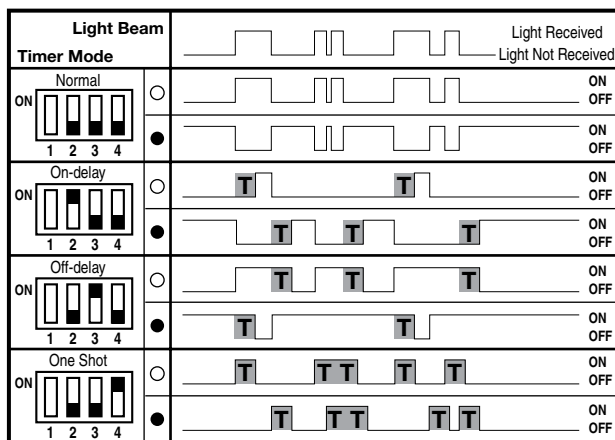
AVOID EXPOSURE – Laser radiation
is emitted from this aperture

Series 28 Programming Information

Note: Timer functions on -Z models only.



TIMING CHART



○ Denotes Light on ● Denotes Dark on **T** = Adjustable time span

AS-Interface Programming

Address preset to 00; can be changed via the master or with a hand-held addressing device.
Addresses 1A-31A and 1B-31B are available

IO-Code	3
---------	---

ID-Code A

ID2	1
-----	---

Data bits

Bit	Function	Description
D0	switch output	0 = no light received (with P1=1), 0=light received (with P1=0), 1 = no light received (with P1=0), 1=light received (with P1=1)
D1	weak signal output	0 = alarm 1 = no alarm
D2	test input	0 = transmitter active 1 = transmitter deactivated
D3	not used	

Parameter bits

Bit	Function (1/0)
P0	not used
P1	light on/dark on mode (0=dark on, 1=light on)
P2	50ms one shot timer (0=timer on, 1=timer off)
P3	not used

Wiring Diagrams

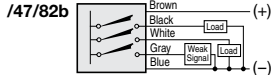
DC



Cable Connection

Light On/Dark On

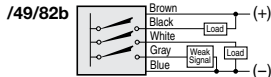
PNP Outputs



Weak Signal Output: Output is on for adequate gain.

Light On/Dark On

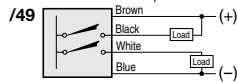
NPN and PNP Outputs



Weak Signal Output: Output is off when weak signal is present for 10s, or immediately when four light beam interruptions occur.

Light On/Dark On

NPN and PNP Outputs



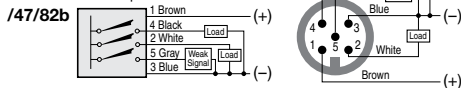
Quick Disconnect

Note: Wiring diagrams show quick disconnect pin numbers.

V15 Type

Light On/Dark On

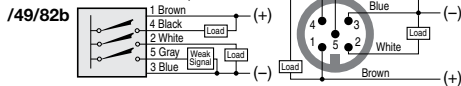
PNP Outputs



Weak Signal Output: Output is on for adequate gain.

Light On/Dark On

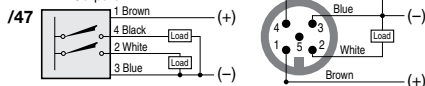
NPN and PNP Outputs



Weak Signal Output: Output is off when weak signal is present for 10s, or immediately when four light beam interruptions occur.

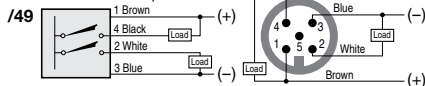
Light On/Dark On

PNP Outputs



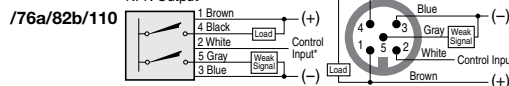
Light On/Dark On

NPN and PNP Outputs



Light On/Dark On

NPN Output



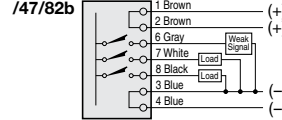
* **Control Input:** transmitter deactivated when connected to (+)
Weak Signal Output: Output is on for adequate gain.



Terminal Connection

Light On/Dark On

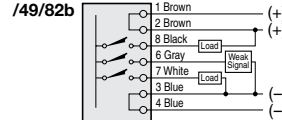
PNP Outputs



Weak Signal Output: Output is on for adequate gain.

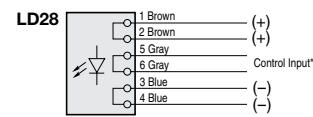
Light On/Dark On

NPN and PNP Outputs



Weak Signal Output: Output is on for adequate gain.

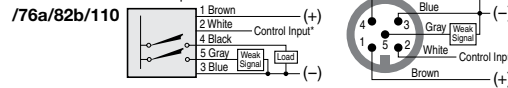
Transmitter (thru-beam models)



* **Control Input:** transmitter deactivated when connected to (+)

Light On/Dark On

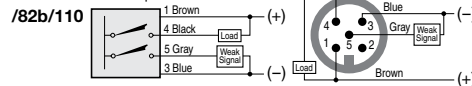
PNP Output



* **Control Input:** transmitter deactivated when connected to (+)
Weak Signal Output: Output is on for adequate gain.

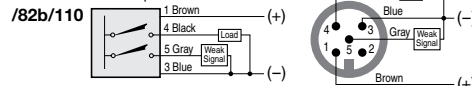
Light On/Dark On

NPN Output



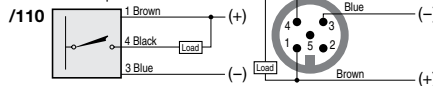
Light On/Dark On

PNP Output



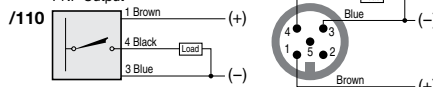
Light On/Dark On

NPN Output

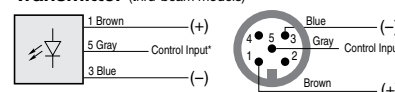


Light On/Dark On

PNP Output



Transmitter (thru-beam models)



* **Control Input:** transmitter deactivated when connected to (+)

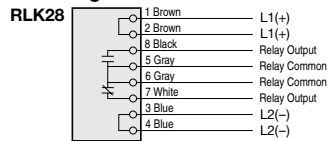
Wiring Diagrams

AC/DC



Terminal Connection

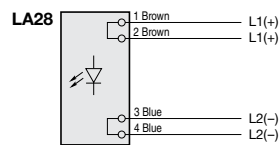
Light On/Dark On



LO/DO Switch set to LO: Terminal 7 Normally Closed
Terminal 8 Normally Open

LO/DO Switch set to DO: Terminal 7 Normally Open
Terminal 8 Normally Closed

Transmitter (thru-beam models)

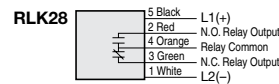


Quick Disconnect

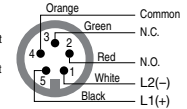
Note: Wiring diagrams show quick disconnect pin numbers.

V95 Type

Light On/Dark On



Male Receptacle End View



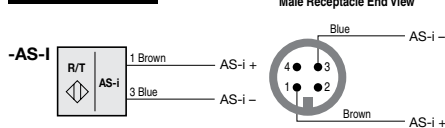
AS-Interface



Quick Disconnect

Note: Wiring diagrams show quick disconnect pin numbers.

V1 Type



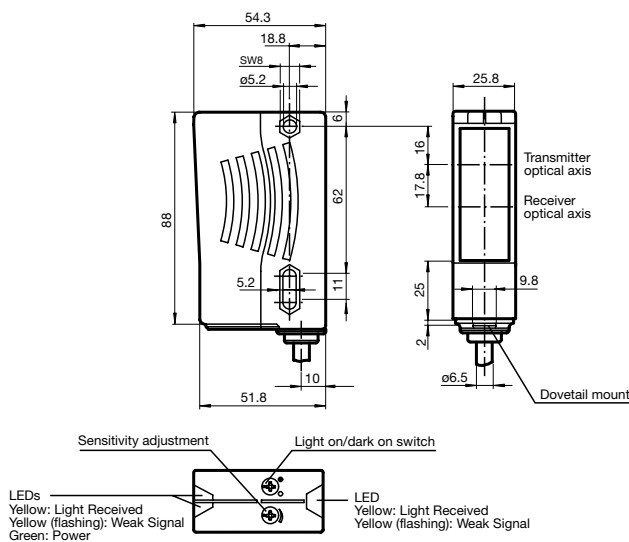
4-in-1 Output

The 4-in-1 output offers one normally open and one normally closed output, both of which automatically detect the connected load, so the outputs either source or sink current depending on the load. A single sensor can operate as NPN normally open, NPN normally closed, PNP normally open, or PNP normally closed.

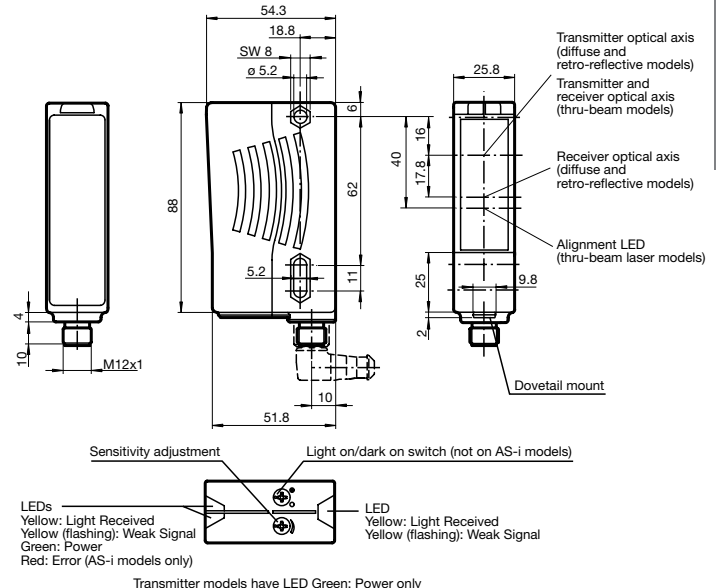
4 IN 1
FOUR OUTPUTS
ONE SENSOR

Dimensions (mm)

RL28-.../115

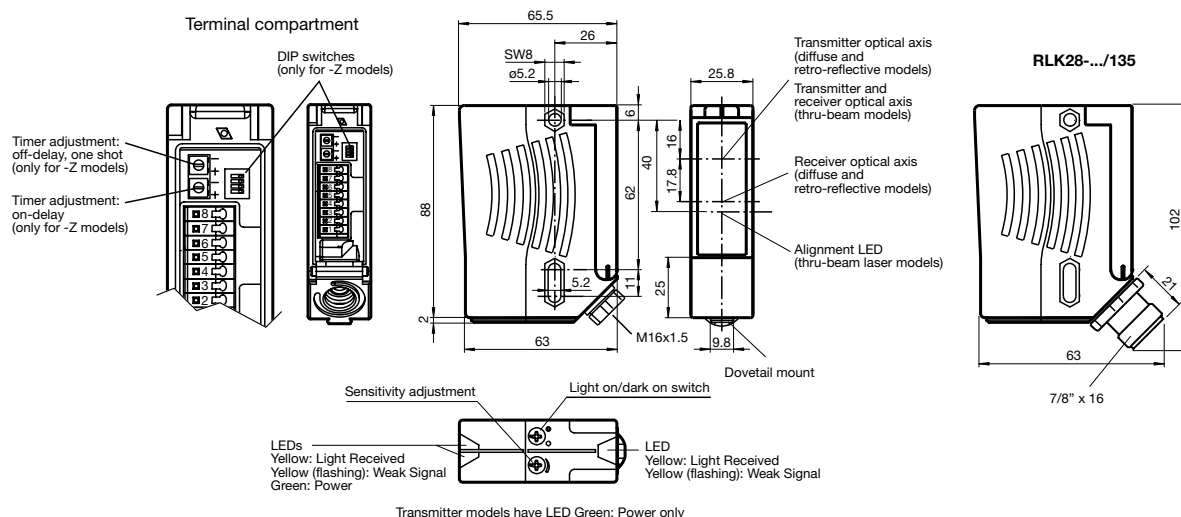


LD28-.../105, LV28-.../105, RL28-.../105, RL28-.../73c



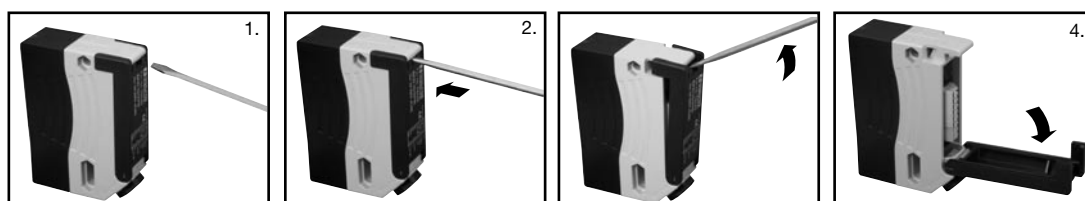
Dimensions (mm)

LA28-.../116, LK28-.../116, RLK28-.../116



Opening the Terminal Compartment (.../116 Models)

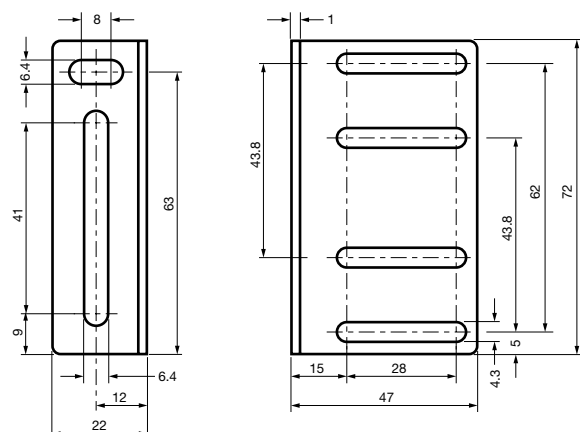
1. A flat-head screwdriver is needed to open the terminal compartment.
2. Insert the flat-head screwdriver into the center notch under the LED window next to the printed black door with the blade all the way to the back of this notch.
3. Push the screwdriver upward toward the direction of the LED.
4. The hinged door with printing will pivot outward, exposing the terminal compartment. To close, simply push the hinged door to its original position so that it snaps back into position.



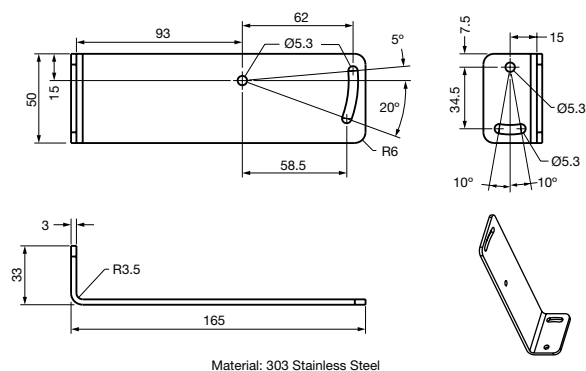
Accessories

(Dimensions in mm)

Mounting Bracket Model OMH-RL25



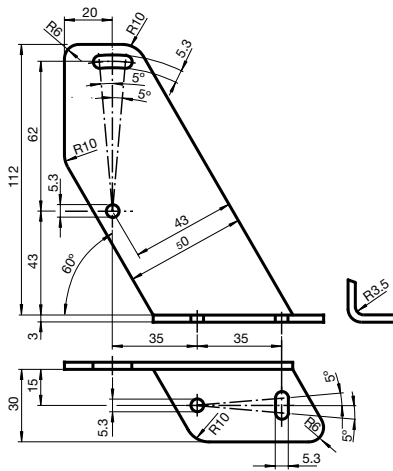
Mounting Bracket Model OMH-21-T High-profile right angle mounting bracket



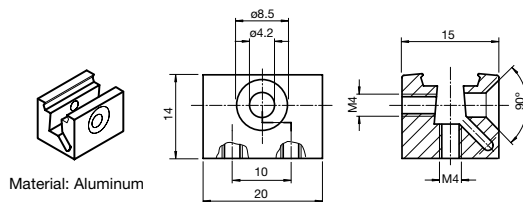
Accessories (cont.)

(Dimensions in mm)

Mounting Bracket Model OMH-21



Dovetail Mounting Clamp Model OMH-MLV11-K



Material: Aluminum

Conduit Adapter Model M16-1/2"NPT



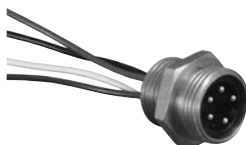
Receptacles for /116 option:

Receptacle Model M16-V124-G-S-.076M
Male 4-pin Micro AC (1/2"-20) receptacle

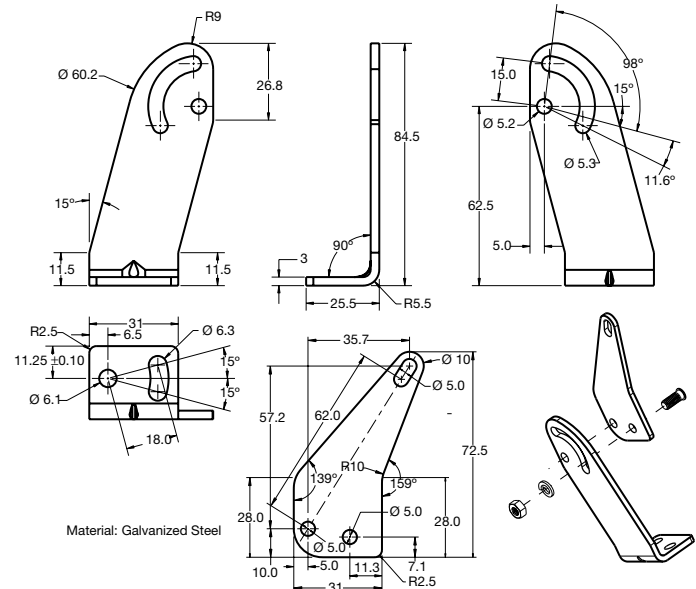
Receptacle Model M16-V125-G-S-.3M
Male 5-pin Micro AC (1/2"-20) receptacle

Receptacle Model M16-V93-G-S-.15M
Male 3-pin Mini (7/8"-16) receptacle

Receptacle Model M16-V95-G-S-.15M
Male 5-pin Mini (7/8"-16) receptacle

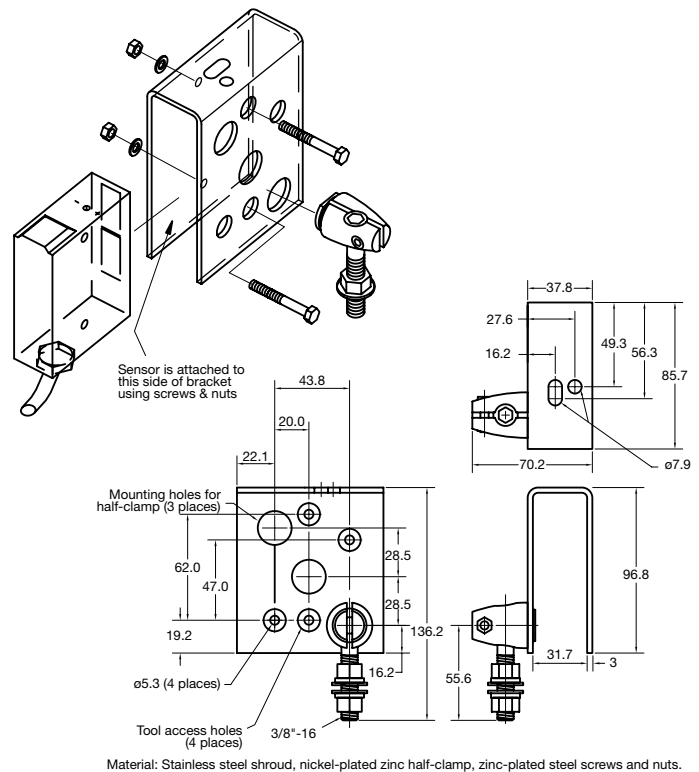


Mounting Bracket Model OMH-RL2-H Hinged right angle mounting bracket



Material: Galvanized Steel

Mounting Bracket Model OMH-RL2-S Protective shroud bracket with 360° rotatability half-clamp



Material: Stainless steel shroud, nickel-plated zinc half-clamp, zinc-plated steel screws and nuts.

Accessories (cont.)

(Dimensions in mm)

Weld Slag Cover Model OMH-RL28-C



Replacement Glass Kit Model RL28-GLASS-C
for Weld Slag Cover Model OMH-RL28-C



See pages
803-854 for
cordsets



See pages
797-802 for
reflectors



See pages 865-872
for additional
accessories