



ZoneControl™
Zero Pressure Accumulation

SICK

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Zero Pressure Accumulation

Preface



What is an accumulation conveyor?

An accumulation conveyor is a transportation conveyor designed to efficiently stage product when demand is low and deliver product when demand is high. An accumulation conveyor acts as the shock absorber in any distribution warehouse, logistics center or work-in-process operation.

What is ZPA?

Zero Pressure Accumulation (ZPA) is a more specific reference to an accumulation conveyor. A ZPA conveyor is designed to accumulate and release product with zero forward pressure on product. This results in a decreased risk of product damage or derailment.

What is *ZoneControl*™?

ZoneControl™ is the SICK family of ZPA control solutions. *ZoneControl*™ consists of integrated ZPA systems designed for accumulation conveyors and all the necessary peripherals and accessories to support the system. The *ZoneControl*™ family of products offer multiple ZPA solutions, all of which are similar in their function, but accommodate different types of conveyors by utilizing a variety of mounting configurations.

What is an integrated solution?

A ZPA control system typically consists of four primary components: a ZPA logic circuit, a pneumatic valve or other discrete output for motor control, a sensing device and daisy chain cabling. Integrated ZPA solutions generally integrate three or four of the primary components. Solutions which integrate only three of the components will have connectivity for the fourth component, usually the sensing device or pneumatic valve.

How is accumulation control accomplished?

Accumulation conveyors are designed with integral zones that are independently controlled. The individually controlled zones are activated or deactivated according to the control logic circuit and sensor status at the local and neighboring zones. There are two basic types of ZPA control: pneumatic and electric.

Pneumatic Control – AtoB and AtoD

Accumulation conveyors that pneumatically actuate the drive system utilize small air bladders, often called pucks, to actuate the conveyor drive and/or brake system. When the logic circuit generates an output, a pneumatic solenoid valve is energized causing the valve to open or close. An open valve will allow air to flow and inflate the air bladder, a closed valve will prevent airflow to the bladder causing the bladder to exhaust and deflate. The air bladder, when inflated, will elevate a drive or brake system against the conveyor transportation medium respectively activating or deactivating the zone.

A system that activates or drives the conveyor with airflow to the air bladder is referred to as air-to-drive (AtoD). A pneumatic system that deactivates or brakes the conveyor with airflow to the air bladder is referred to as air-to-brake (AtoB).

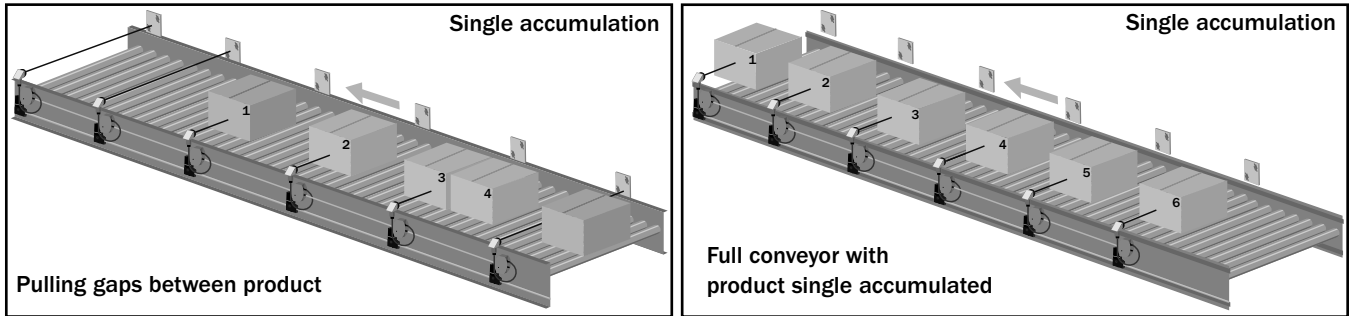
Electric Control

An electrically controlled accumulation conveyor utilizes individual electric motors to drive each zone. The logic circuit generates a discrete output to an electric motor drive circuit that activates the electric motor, in turn activating the zone.

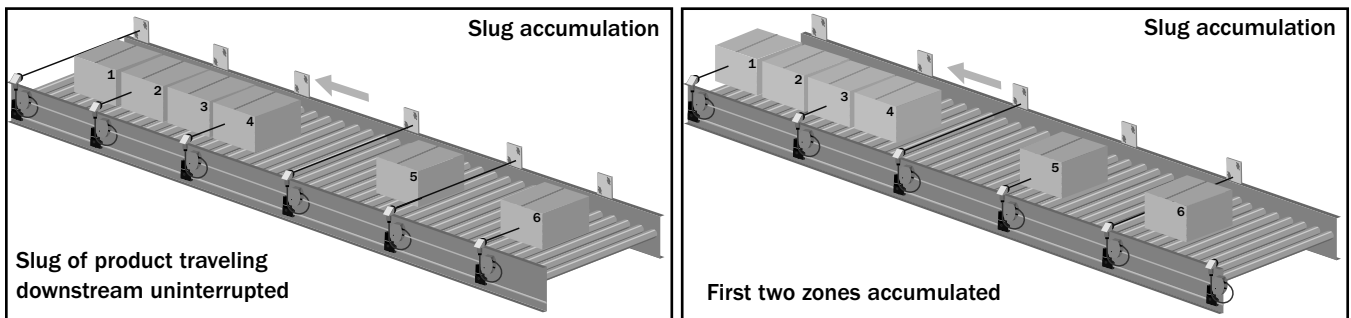
What accumulation modes are available with *ZoneControl*™?

The most typical accumulation modes are single and slug accumulation; occasionally an accumulation time delay is used to manipulate product accumulation.

Single accumulation will not allow a large block or slug of product to travel from the in-feed zone of an accumulation conveyor to the discharge zone without inflicting a gap between packages. Single accumulation will accumulate (deactivate) the upstream zone of any two consecutive zones that are detecting product, or in other words, any zone will accumulate when it is detecting product AND the downstream zone is detecting product. The result is a zone length gap between packages. The discharge zone does not have a downstream zone, which is effectively a full downstream zone; therefore, the discharge zone will accumulate when it receives a package.



Slug accumulation will allow a large block or slug of product to travel uninterrupted from the in-feed zone of an accumulation conveyor to the furthest downstream zone, typically the discharge zone. The conveyor will not accumulate (deactivate) any zone until product reaches the furthest downstream zone at which time that zone will accumulate and the immediate upstream zone effectively becomes the furthest downstream zone.



Adjustable accumulation utilizes an adjustable accumulation time delay, that effectively delays package detection, which varies the accumulation function from single to slug. When the accumulation time delay is set to zero seconds, any package detection will be immediately recognized causing the upstream zone to accumulate (deactivate) in the same manner as single accumulation. As the time delay is increased, smaller packages will not be recognized and will advance until stopped by accumulated product downstream. As the stopped packages back-up into the sensing device, the accumulation time delay will time out causing the upstream zone to accumulate in a manner similar to slug accumulation.

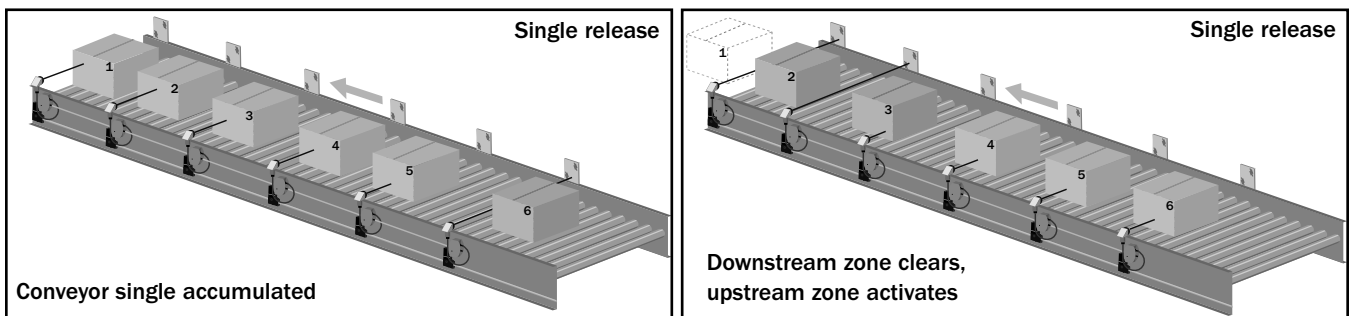
What release modes are available with ZoneControl™?

The most typical release modes are single and slug release; occasionally time delays are used to manipulate product release.

In **single release** mode, a given zone will not release (activate) until the sensing device in the downstream zone has been cleared of packages. Single release can be initiated by applying an electrical release signal at the discharge zone or removing packages in the discharge zone.

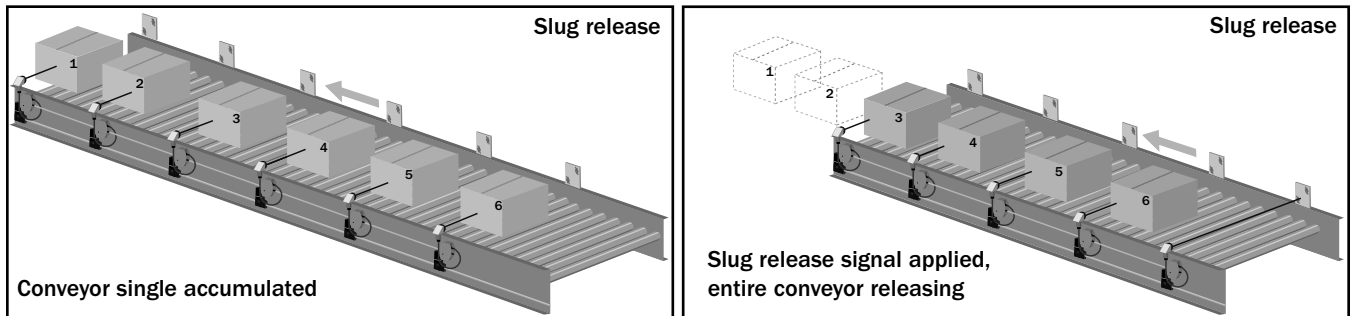
Applying an electrical single release signal at the discharge zone will act as an empty downstream zone that will cause the discharge zone to release; the immediate upstream zone will not release until the discharge zone has cleared.

Removal of packages from the discharge zone will cause that zone and the immediate upstream zone to release. Subsequent upstream zones will not release until the immediate downstream zone has cleared.



Single release time delay will add an additional gap between zones as they are released. The additional gap is directly proportional to the time delay selected.

In **slug release** mode, all zones will be activated simultaneously, regardless of sensor status, for as long as the slug release signal is applied. Slug release is initiated by applying an electrical signal at any zone using a *ZoneControl™* Tee cable or Zone Interface Module (ZIM).



Slug release time delay will inflict a small gap between zones as they are released. The small gap is directly proportional to the time delay selected. When applying a *ZoneControl™* solution with slug release time delay, the release signal must be applied at the discharge zone.

When are single and slug modes most commonly used?

Single accumulation and release is most effective when extremely high throughput is not necessary or the risk of forward pressure is not acceptable. Large or heavy products are frequently accumulated and released in single mode.

Slug accumulation and release is most effective when extremely high throughput is desired and instances of low momentary forward pressure can be tolerated. High speed conveying with small to medium package sizes are often accumulated and released in slug mode.

What is slug release termination?

In some applications it is necessary to terminate a slug release signal after a determined number of zones. Slug release termination interrupts the slug release signal by opening the slug release wire. Slug release termination is accomplished with an in-line cable that does not pass the slug signal; all other conductors are passive. Or, slug release termination can be accomplished with a ZPA Interface Module (ZIM). The slug termination cable and ZPA Interface Module (ZIM) are offered in the *ZoneControl™* family of products.

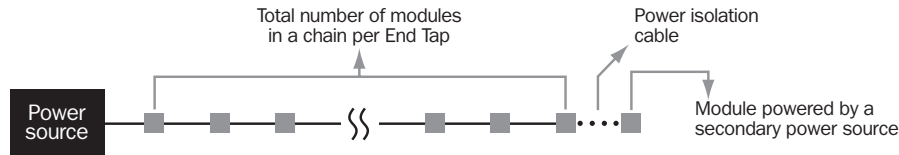
Power Isolation

Power isolation is necessary when more than one power supply is used on a ZPA control system. Power isolation interrupts the positive voltage supply line between two ZPA chains on separate power supplies. Power isolation is accomplished with an in-line cable that does not pass the positive supply voltage; all other conductors are passive. See examples on the following page.

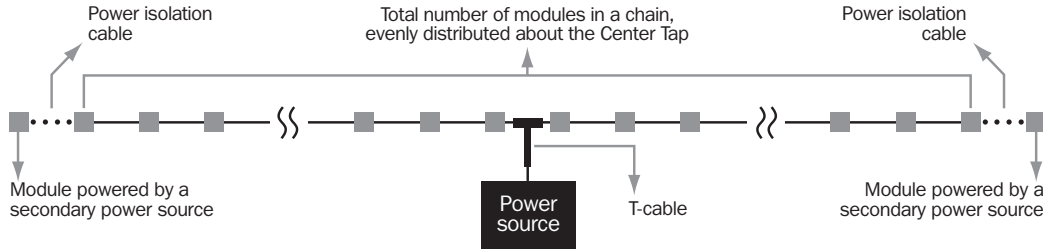
Modules per Tap

There is a limit to the number of *ZoneControl™* devices that can be connected in series (chain) before an additional power supply and power isolation unit are required. This limit is known as the “Modules per Tap” specification. The number of Modules per Tap will vary from one ZPA solution to another and is affected primarily by the power source, pneumatic valve or output load, and daisy chain cabling. There are three common wiring schemes for ZPA systems: End Tap, Center Tap and Dual Center Tap.

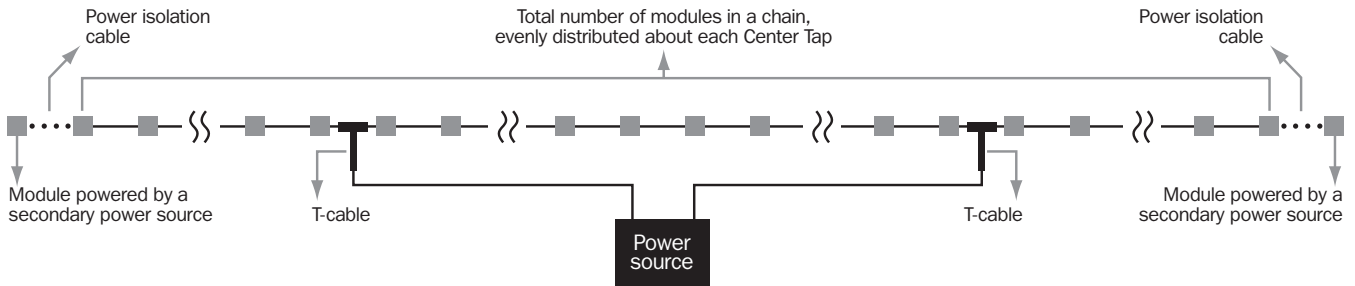
All ZoneControl™ “Modules per Tap” specifications are calculated using a 95 W power source, 24 and 28 V DC and 2 m power supply cable for End Tap and Center Tap. Dual Center Tap is calculated using the appropriate power supply cable length for the chain. The End Tap wiring scheme positions the power source at one end of a ZPA chain, typically the discharge end. A short power cable is used to connect the power source to the first ZPA module. When using End Tap wiring a 28 V DC power source will accommodate the most modules per chain. End Tap wiring is most effective when the ZPA system requires a relatively small number of modules or when a small number of modules remain unpowered on a large ZPA system that uses Center Tap wiring.



The Center Tap wiring scheme positions the power source at the center point of a ZPA chain. A short cable with an attached Tee cable is used to connect the power source to the ZPA chain between two modules. This Center Tap supplies power to the chain in both directions. The Center Tap configuration is the simplest and most common installation for wiring the power source to ZPA systems.



The Dual Center Tap wiring scheme positions the power source at the center point of a ZPA chain. Two long cables with attached Tee cables are used to apply a Center Tap at the mid point between the power source and the end of the ZPA chain in both directions, hence, Dual Center Tap. When using Dual Center Tap wiring a 24 V DC power source will accommodate the most modules per chain.



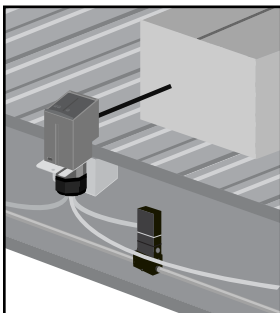
Zone Size

Zone size is the length of an individual zone within an accumulation conveyor. Typically, an accumulation conveyor has two, three or six foot zones.

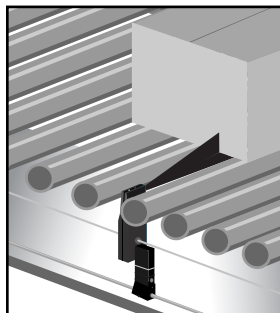
Mounting Location

In general, there are three basic locations where the sensing device of a ZPA system can be located or mounted to the accumulation conveyor: Over-the-Conveyor, Under-the-Conveyor or Side-Frame-Mount. The ZoneControl™ family of products offers multiple solutions and each can be easily mounted in one of the three basic locations.

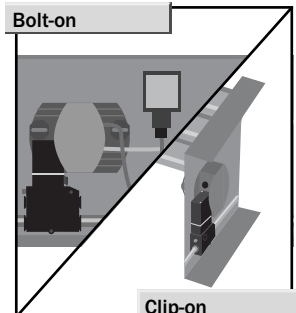
Over-the-Conveyor



Under-the-Conveyor



Side-Frame-Mount



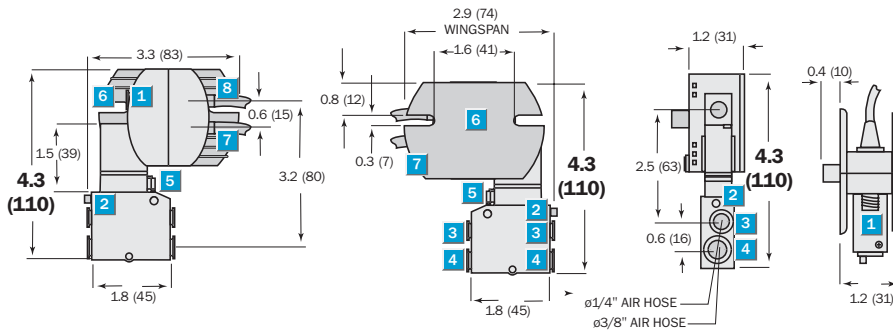
ZLM1

ZoneControl™ Logic Module with Pneumatic Valve Output

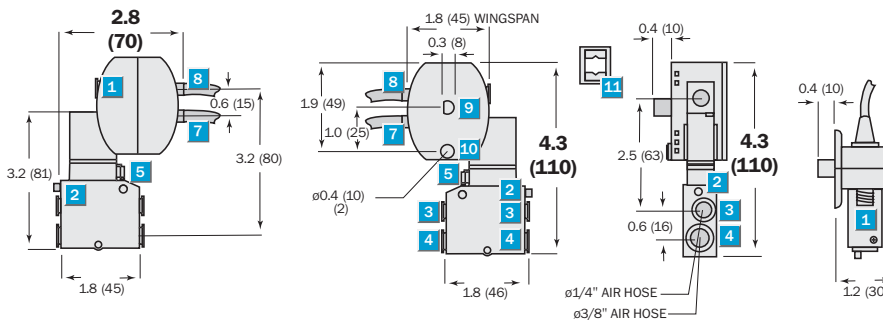


Dimensional Drawings

Bolt-on



Clip-on

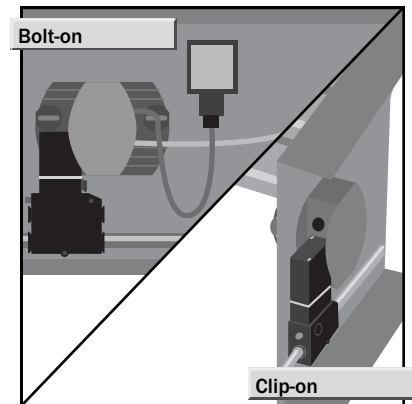


dimensions in inches (mm)

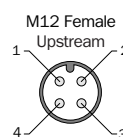
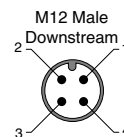
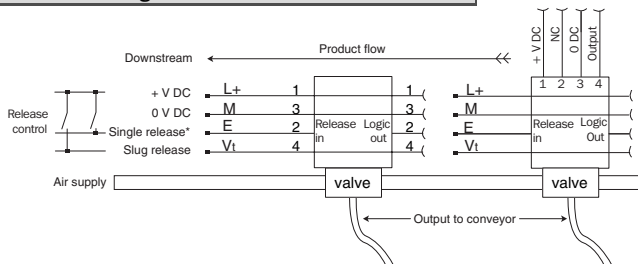
- | | |
|--------------------------------------|--|
| 1 Daisy chain connector, male | 7 Daisy chain cable, female |
| 2 Exhaust | 8 Sensor connection cable, female |
| 3 Output port (x2) | 9 Mounting stud |
| 4 Supply ports (x2) | 10 Anti-rotation stud |
| 5 Manual over-ride switch | 11 Mounting clip |
| 6 Mounting slots (x2) | |

Features

- Side-Frame-Mount
- Integrated ZPA logic, pneumatic valve, daisy chain cables and sensor cable
- American style valve with Imperial size quick connect fittings
- Connection cable for standard sensor, mounted remotely
- Single or slug accumulation logic
- Single or slug release logic
- Industrial grade M12 daisy chain cables




Connection Diagram



*Single accumulation models only

ZLM1

Technical Data	ZLM1-	C	B
Power			
Supply voltage V_s	24 V DC +20/-10%		
Ripple	< 5 V_{ss} within V_s		
Current consumption	≤ 47 mA with valve, without sensor		
Sensor			
Photoelectric sensor connection type	Cable: 0.5 m, 4-pin M8 or M12 female, (connects to sensing device - sold separately)		
Photoelectric sensor output requirements	PNP, light operate retro-reflective or dark operate diffuse (prox), 20 mA typical		
Interconnection			
Logic output type	PNP		
Logic output voltage	Single accumulation mode: beam blocked = 0 V, beam unblocked = V_s - (≤ 2 V) Slug accumulation mode: D.S. zone activated = V_s - (≤ 2 V), D.S. zone deactive = 0 V		
Logic output current max.	100 mA		
Logic output switching frequency/response time	200 Hz/2.5 ms		
Daisy chain connection type	Connector: 4-pin M12 male (connects to downstream sensor) Cable: 1.1 m or 2.1 m, 4-pin M12 female (connects to upstream sensor)		
Circuit protection	Short circuit protection; interference pulse suppression; V_s reverse polarity protected		
Modules per End Tap (95 W source)	24 V_s : 3 ft zones = 26, 6 ft zones = 20	28 V_s : 3 ft zones = 35, 6 ft zones = 27	
Modules per Center Tap (95 W source)	24 V_s : 3 ft zones = 52, 6 ft zones = 40	28 V_s : 3 ft zones = 46, 6 ft zones = 46	
Modules per Dual Center Tap (95 W source)	24 V_s : 3 ft zones = 60, 6 ft zones = 52	28 V_s : 3 ft zones = N/A, 6 ft zones = N/A	
Logic function			
Accumulation mode ¹⁾	Single or slug		
Release mode ¹⁾	Single (signal applied at discharge zone) and/or slug (signal applied anywhere along chain)		
Valve			
Compressed air	Filtered, lubricated or unlubricated		
Operation mode ¹⁾	AtoD (Air to Drive) or AtoB (Air to Brake)		
Pneumatic circuit function	3/2 way		
Port connections	Quick connect: 3/8" supply; 1/4" output (connects to local zone)		
Coil ratings	24 V DC, 1 W		
Output flow rate	40 NI/min; 1.4 SCFM		
Exhaust flow rate	40 NI/min; 1.4 SCFM		
Orifice size	0.047 in (1.2 mm)		
Operating pressure range	0...4.5 bar (0...65 PSI)		
Response time	Partially open: 10 ms; open: 23 ms; close: 21 ms		
Physical properties			
Protection class			
Enclosure rating	IP 40, NEMA 2		
Ambient operating temperature	14...131 °F (-10...55 °C)		
Storage temperature	-40...167 °F (-40...75 °C)		
Shock load	IEC 68		
Approximate weight	5.9 oz (168 g) with 1.1 m cable; 7.3 oz (206 g) with 2.1 m cable; 4.1 oz (115 g) no daisy chain cable		
Housing material	ABS		
Fastening method	Clip-on	Bolt-on	
Typical mounting location	Side-Frame-Mount		

1) Model selectable, refer to selection table on following page

ZLM1

ZLM1 Clip-on Mounting

Zone Length	Sensor Connection		Single Accumulation - Single and Slug Release		Slug Accumulation - Slug Release	
			AtoD	AtoB	AtoD	AtoB
3 ft	cable M8	⇨	ZLM1-C1121A10	ZLM1-C1121A11	ZLM1-C2121A10	ZLM1-C2121A11
3 ft	cable M12	⇨	ZLM1-C1111A10	ZLM1-C1111A11	ZLM1-C2111A10	ZLM1-C2111A11
6 ft	cable M8	⇨	ZLM1-C1221A10	ZLM1-C1221A11	ZLM1-C2221A10	ZLM1-C2221A11
6 ft	cable M12	⇨	ZLM1-C1211A10	ZLM1-C1211A11	ZLM1-C2211A10	ZLM1-C2211A11
M12 male connector	connector M8	⇨	ZLM1-C1021A10	ZLM1-C1021A11	ZLM1-C2021A10	ZLM1-C2021A11
M12 male connector	connector M12	⇨	ZLM1-C1011A10	ZLM1-C1011A11	ZLM1-C2011A10	ZLM1-C2011A11

ZLM1 Bolt-on Mounting

Zone Length	Sensor Connection		Single Accumulation - Single and Slug Release		Slug Accumulation - Slug Release	
			AtoD	AtoB	AtoD	AtoB
3 ft	cable M8	⇨	ZLM1-B1121A10	ZLM1-B1121A11	ZLM1-B2121A10	ZLM1-B2121A11
3 ft	cable M12	⇨	ZLM1-B1111A10	ZLM1-B1111A11	ZLM1-B2111A10	ZLM1-B2111A11
6 ft	cable M8	⇨	ZLM1-B1221A10	ZLM1-B1221A11	ZLM1-B2221A10	ZLM1-B2221A11
6 ft	cable M12	⇨	ZLM1-B1211A10	ZLM1-B1211A11	ZLM1-B2211A10	ZLM1-B2211A11
M12 male connector	connector M8	⇨	ZLM1-B1021A10	ZLM1-B1021A11	ZLM1-B2021A10	ZLM1-B2021A11
M12 male connector	connector M12	⇨	ZLM1-B1011A10	ZLM1-B1011A11	ZLM1-B2011A10	ZLM1-B2011A11

Order Information

Model Number	Part Number	Model Number	Part Number	Model Number	Part Number
ZLM1-C1121A10	7027756	ZLM1-C1111A10	7027764	ZLM1-C1221A10	7027772
ZLM1-C1121A11	7027757	ZLM1-C1111A11	7027765	ZLM1-C1221A11	7027773
ZLM1-C2121A10	7027758	ZLM1-C2111A10	7027766	ZLM1-C2221A10	7027774
ZLM1-C2121A11	7027759	ZLM1-C2111A11	7027767	ZLM1-C2221A11	7027775
ZLM1-B1121A10	7027760	ZLM1-B1111A10	7027768	ZLM1-B1221A10	7027776
ZLM1-B1121A11	7027761	ZLM1-B1111A11	7027769	ZLM1-B1221A11	7027777
ZLM 1-B2121A10	7027762	ZLM1-B2111A10	7027770	ZLM1-B2221A10	7027778
ZLM 1-B2121A11	7027763	ZLM1-B2111A11	7027771	ZLM1-B2221A11	7027779

Model Number	Part Number	Model Number	Part Number	Model Number	Part Number
ZLM1-C1211A10	7027780	ZLM1-C1021A10	7027788	ZLM1-C1011A10	7027796
ZLM1-C1211A11	7027781	ZLM1-C1021A11	7027789	ZLM1-C1011A11	7027797
ZLM1-C2211A10	7027782	ZLM1-C2021A10	7027790	ZLM1-C2011A10	7027798
ZLM1-C2211A11	7027783	ZLM1-C2021A11	7027791	ZLM1-C2011A11	7027799
ZLM1-B1211A10	7027784	ZLM1-B1021A10	7027792	ZLM1-B1011A10	7027800
ZLM1-B1211A11	7027785	ZLM1-B1021A11	7027793	ZLM1-B1011A11	7027801
ZLM1-B2211A10	7027786	ZLM1-B2021A10	7027794	ZLM1-B2011A10	7027802
ZLM1-B2211A11	7027787	ZLM1-B2021A11	7027795	ZLM1-B2011A11	7027803

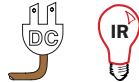
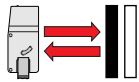
Accessories	Page
Reflectors	30
Cables	31
Mounting brackets	33
Interface module	24

WTR1

ZPA Sensor with Pneumatic Valve Output

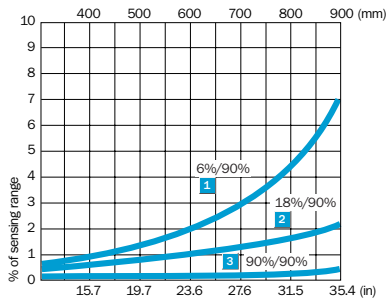


Conveyor Sensors



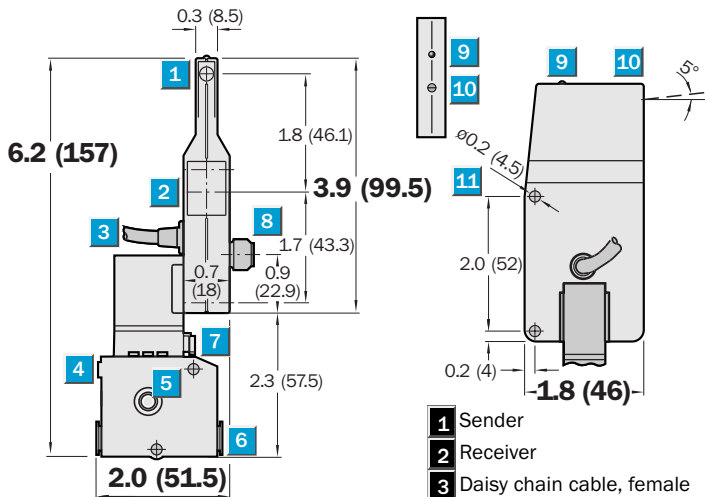
3.9...35.4 in (100...900 mm)
sensing range

Background Suppression



- 1 Sensing range on black, 6% remission
- 2 Sensing range on grey, 18% remission
- 3 Sensing range on white, 90% remission

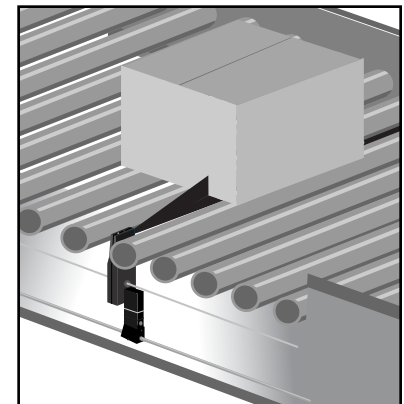
Dimensional Drawings



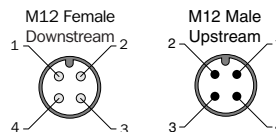
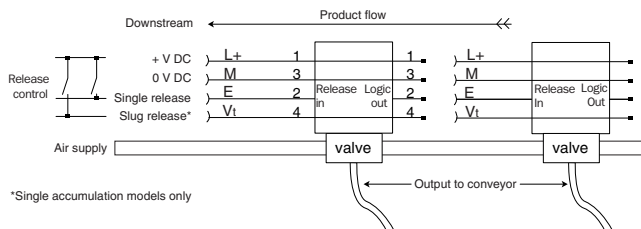
dimensions in inches (mm)

- 1 Sender
- 2 Receiver
- 3 Daisy chain cable, female
- 4 Exhaust
- 5 Output port (x1)
- 6 Supply ports (x2)
- 7 Manual over-ride switch

- 8 Daisy chain connection, male
- 9 Signal strength indicator
- 10 Beam status indicator
- 11 Mounting through-holes (x2)



Connection Diagram



Features

- Under-the-Conveyor Mount
- Integrated ZPA logic, photoelectric sensor, pneumatic valve and daisy chain cables
- American style valve with Imperial size quick connect fittings
- Adjustable Background Suppression (ABS) sensing technology, ignores background targets and no reflector is required
- Single or slug accumulation logic
- Single or slug release logic
- Industrial grade M12 daisy chain cables

WTR1

Technical Data	WTR1-	P
Power		
Supply voltage V_s	24 V DC +20/-10%	
Ripple	< 5 V_{ss} within V_s	
Current consumption	≤ 67 mA with valve	
Sensor		
Sensing range	3.9...35.4 in (100...900 mm)	
Adjustable background suppression	11.8...35.4 in (300...900 mm)	
Light spot diameter	Approx. 1.6 in at 35.4 in (40 mm at 900 mm)	
Light source	LED, IR, average life 100,000 hours at 77 °F (25 °C)	
Light beam tilt angle	5° upward from center	
Interconnection		
Logic output type	PNP	
Logic output voltage	Single accumulation mode: beam blocked = 0 V, beam unblocked = V_s - (≤ 2 V) Slug accumulation mode: D.S. zone activated = V_s - (≤ 2 V), D.S. zone deactive = 0 V	
Logic output current max.	100 mA	
Logic output switching frequency/response time	250 Hz/2.0 ms	
Daisy chain connection type	Cable: 1.2 m or 2.0 m, 4-pin M12 female (connects to downstream sensor) Connector: 4-pin M12 male (connects to upstream sensor)	
Circuit protection	Short circuit protection; interference pulse suppression; V_s reverse polarity protected	
Modules per End Tap (95 W source)	24 V_s : 3 ft zones = 23, 6 ft zones = 18 28 V_s : 3 ft zones = 32, 6 ft zones = 26	
Modules per Center Tap (95 W source)	24 V_s : 3 ft zones = 46, 6 ft zones = 36 28 V_s : 3 ft zones = 48, 6 ft zones = 48	
Modules per Dual Center Tap (95 W source)	24 V_s : 3 ft zones = 60, 6 ft zones = 48 28 V_s : 3 ft zones = N/A, 6 ft zones = N/A	
Logic function		
Accumulation mode ¹⁾	Single or slug	
Release mode ¹⁾	Single (signal applied at discharge zone) and/or slug (signal applied anywhere along chain)	
Valve		
Compressed air	Filtered, lubricated or unlubricated	
Operation mode ¹⁾	AtoD (Air to Drive) or AtoB (Air to Brake)	
Pneumatic circuit function	3/2 way	
Port connections	Quick connect: 3/8" supply; 1/4" output (connects to local zone)	
Coil ratings	24 V DC, 1 W	
Output flow rate	40 NI/min; 1.4 SCFM	
Exhaust flow rate	40 NI/min; 1.4 SCFM	
Orifice size	0.047 in (1.2 mm)	
Operating pressure range	0...4.5 bar (0...65 PSI)	
Response time	Partially open: 10 ms; open: 23 ms; close: 21 ms	
Physical properties		
Protection class	<input type="checkbox"/>	
Enclosure rating	IP 54, NEMA 3	
Ambient operating temperature	14...131 °F (-10...55 °C)	
Storage temperature	-40...167 °F (-40...75 °C)	
Shock load	IEC 68	
Approximate weight	5.9 oz (168 g) with 1.1 m cable; 7.3 oz (206 g) with 2.1 m cable: 4.1 oz (115 g) no daisy chain cable	
Housing material	Glass fiber reinforced ABS	
Typical mounting location	Under-the-Conveyor	

1) Model selectable, refer to selection table on following page

Selection Table

Zone Length	Single Accumulation- Single and Slug Release		Slug Accumulation- Single Release	
	AtoD	AtoB	AtoD	AtoB
3 ft ⇨	WTR1-P421A10	WTR1-P721A11	WTR1-P921A10	WTR1-P821A11
6 ft ⇨	WTR1-P421B10	WTR1-P721B11	WTR1-P921B10	WTR1-P821B11

Order Information

Model Number	Part Number
WTR1-P421A10	1025373
WTR1-P721A11	1025374
WTR1-P921A10	1025375
WTR1-P821A11	1025376
WTR1-P421B10	1025390
WTR1-P721B11	1025391
WTR1-P921B10	1025392
WTR1-P821B11	1025393

Accessories

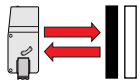
Accessories	Page
Reflectors	30
Cables	31
Mounting brackets	33
Interface module	24

WTR2

ZPA Sensor with Electric Motor Control Output

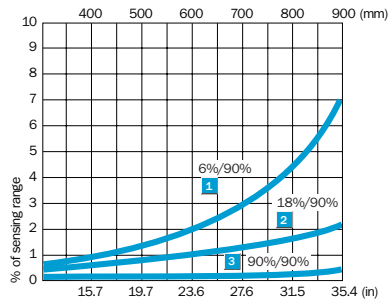


Conveyor Sensors



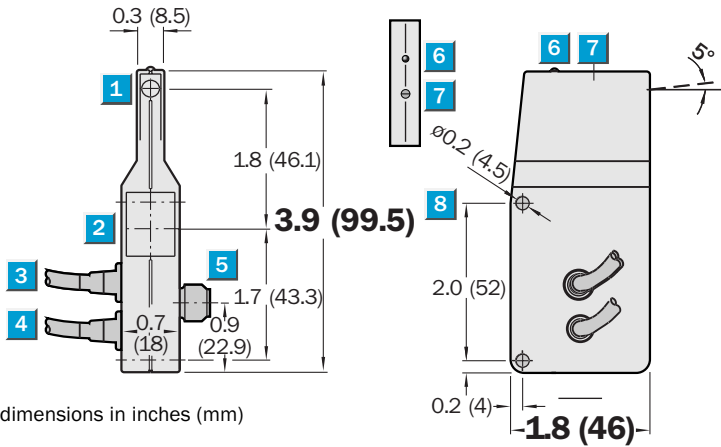
3.9...35.4 in (100...900 mm)
sensing range

Background Suppression



- 1 Sensing range on black
- 2 Sensing range on grey
- 3 Sensing range on white

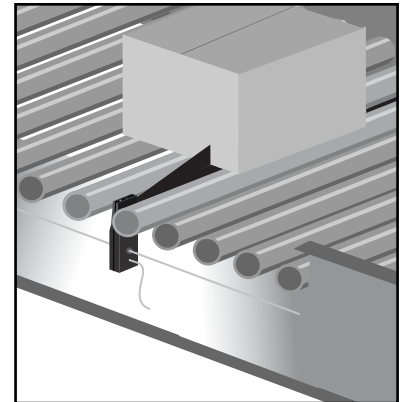
Dimensional Drawings



- 1 Sender
- 2 Receiver
- 3 Daisy chain cable, female
- 4 Output cable, flying leads
- 5 Daisy chain connection, male
- 6 Beam status indicator
- 7 Sensing distance adjustment
- 8 Mounting through-holes (x2)

Features

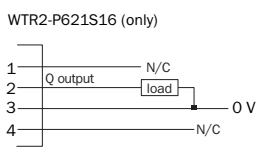
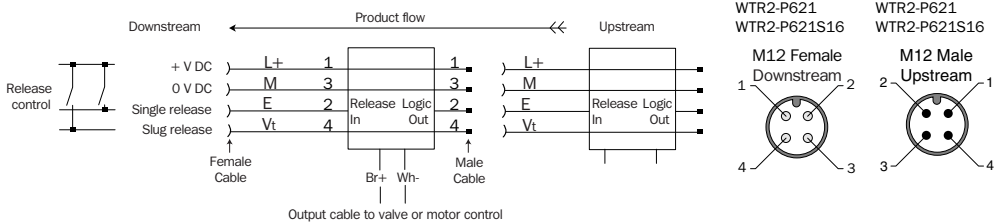
- Under-the-Conveyor Mount
- Integrated ZPA logic, photoelectric sensor, pneumatic valve cable and daisy chain cables
- Output cable for connection to electric motor control or pneumatic valve
- Adjustable Background Suppression (ABS) sensing technology, ignores background targets and no reflector is required
- Single accumulation logic
- Single or slug release logic
- Industrial grade M12 daisy chain cables



WTR2

Technical Data	WTR2-	P621	P621S16
Power			
Supply voltage V_s	10...30 V DC		
Ripple	< 5 V_{ss} within V_s		
Current consumption	≤ 25 mA without load, without valve		
Sensor			
Sensing range	3.9...35.4 in (100...900 mm)		
Adjustable background suppression	11.8...35.4 in (300...900 mm)		
Light spot diameter	Approx. 1.6 in at 35.4 ft (40 mm at 10.8 m)		
Light source	LED, IR, average life 100,000 hours at 77°F (25°C)		
Light beam tilt angle	5° upward from center		
Interconnection			
Logic output type	PNP		
Logic output voltage	Single accumulation mode: beam blocked = 0 V, beam unblocked = V_s - (≤ 2 V)		
Logic output current max.	100 mA		
Logic output switching frequency/response time	250 Hz/2.0 ms		
Daisy chain connection type	Cable: 2.0 m, 4-pin M12 female (connects to downstream sensor)	1.2 m, 4-pin M12 female (connects to downstream sensor)	
	Connector: 4-pin M12 male (connects to upstream sensor)		
Circuit protection	Short circuit protection; interference pulse suppression; V_s reverse polarity protected		
Modules per End Tap (95 W source, 1 W load)	24 V_s : 3 ft zones = 23, 6 ft zones = 18	28 V_s : 3 ft zones = 32, 6 ft zones = 26	
Modules per Center Tap (95 W source, 1 W load)	24 V_s : 3 ft zones = 46, 6 ft zones = 36	28 V_s : 3 ft zones = 48, 6 ft zones = 48	
Modules per Dual Center Tap (95 W source, 1 W load)	24 V_s : 3 ft zones = 60, 6 ft zones = 48	28 V_s : 3 ft zones = N/A, 6 ft zones = N/A	
Logic function			
Accumulation mode	Single		
Release mode	Single (signal applied at discharge zone) and slug (signal applied anywhere along chain)		
Output to motor control or external valve			
Output voltage	HIGH = V_s - (≤ 2 V); LOW = 0 V		
Output current max.	600 mA		
Circuit protection	None		
Connection type (connects to local zone)	1.5 m, 2-wire flying leads	230 mm, 4-pin M12 female	
Switching frequency/response time	250 Hz/2.0 ms		
Physical properties			
VDE protection class			
Enclosure rating	IP 54, NEMA 3		
Ambient operating temperature	-40...140°F (-40...60°C)		
Storage temperature	-40...167°F (-40...75°C)		
Shock load	IEC 68		
Approximate weight	3.9 oz (110 g) with 1.2 m cable; 5.3 oz (149 g) with 2.1 m cable		
Housing material	Glass fiber reinforced ABS		
Typical mounting location	Under-the-Conveyor		

Connection Diagram



Order Information

Model Number	Part Number
WTR2-P621	1015157
WTR2-P621S16	1026608

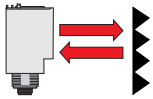
Accessories	Page
Reflectors	30
Cables	31
Mounting brackets	33
Interface module	24

WLR2100-D

DC ZPA Sensor with Electric Output for External Valve or Electric Motor Control

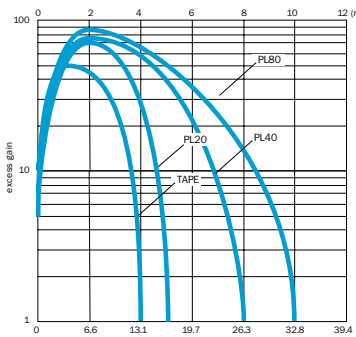


Conveyor Sensors

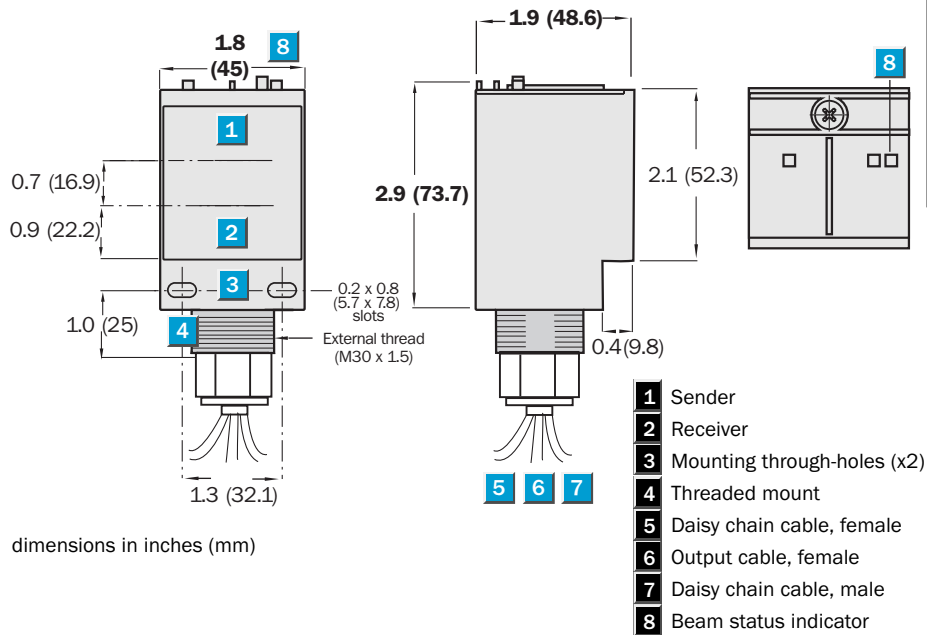


0...29.5 ft (0...9 m)
sensing range

Excess Gain

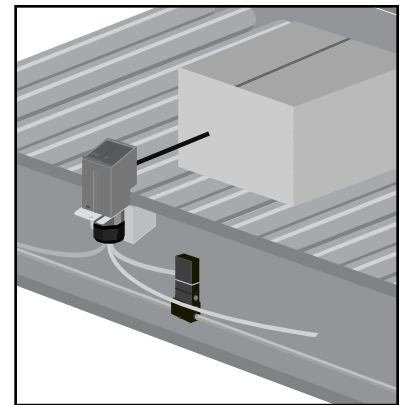


Dimensional Drawings



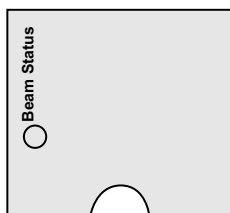
Features

- Over-the-Conveyor Mount
- Integrated ZPA logic, photoelectric sensor, pneumatic valve cable and daisy chain cables
- Output cable for connection to electric motor control or pneumatic valve
- Linear polarized retro-reflective sensing technology eliminates false detection of shiny or plastic-wrapped objects
- Single or slug accumulation logic
- Single or slug release logic
- Industrial grade M12 daisy chain cables
- Sealed to withstand harsh environments and washdown



Inside Cover

All types



1 Beam status indicator

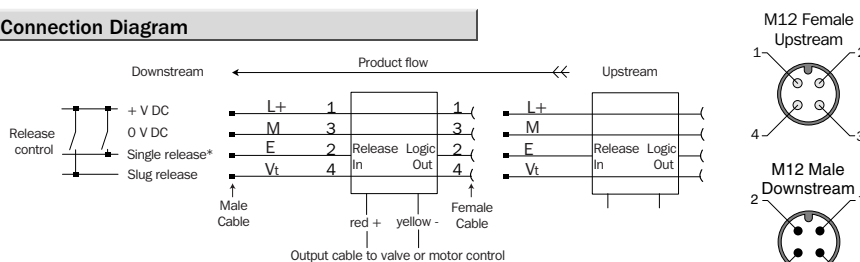
WLR2100-D

Technical Data	WLR2100	D1	D2
Power			
Supply voltage V_s	10...30 V DC		
Ripple	< 5 V_{ss} within V_s		
Current consumption	≤ 40 mA, without load, without valve		
Sensor			
Sensing range	0...29.5 ft (0...9 m) with PL 80A reflector		
Light spot diameter	Approx. 8.0 in at 29.5 ft (205 mm at 9 m)		
Light source	LED, red, polarized, average life 100,000 hours at 77 °F (25 °C)		
Interconnection			
Logic output type	PNP		
Logic output voltage	Single accumulation mode: beam blocked = 0 V, beam unblocked = V_s - (≤ 2 V) Slug accumulation mode: D.S. zone activated = V_s - (≤ 2 V), D.S. zone deactivated = 0 V		
Logic output current max.	100 mA		
Logic output switching frequency/response time	500 Hz/1.0 ms		
Daisy chain connection type	Cable: 300 mm, 4-pin M12 male (connects to downstream sensor) Cable: 1.1 m or 2.1 m, 4-pin M12 female (connects to upstream sensor)		
Circuit protection	Short circuit protection; interference pulse suppression; V_s reverse polarity protected		
Modules per End Tap (95 W source, 1 W load)	24 V_s : 3 ft zones = 23, 6 ft zones = 18	28 V_s : 3 ft zones = 31, 6 ft zones = 25	
Modules per Center Tap (95 W source, 1 W load)	24 V_s : 3 ft zones = 46, 6 ft zones = 36	28 V_s : 3 ft zones = 46, 6 ft zones = 46	
Modules per Dual Center Tap (95 W source, 1 W load)	24 V_s : 3 ft zones = 60, 6 ft zones = 42	28 V_s : 3 ft zones = N/A, 6 ft zones = N/A	
Logic function			
Accumulation mode ¹⁾	Single or slug		
Release mode ¹⁾	Single (signal applied at discharge zone) and/or slug (signal applied anywhere along chain)		
Output to motor control or external valve			
Output voltage	HIGH = V_s - (≤ 2 V); LOW = 0 V		
Output current max.	100 mA		
Circuit protection	None		
Connection type (connects to local zone) Cable:	300 mm, 2-wire spade	300 mm, 9.4 mm DIN (43650) type C female	
Switching frequency/response time	500 Hz/1.0 ms		
Physical properties			
Protection class	□		
Enclosure rating	IP 67, NEMA 6		
Ambient operating temperature	-13...131 °F (-25...55 °C)		
Storage temperature	-40...158 °F (-40...70 °C)		
Shock load	IEC 68		
Approximate weight	5.3 oz (150 g) with 1.1 m cable; 6.6 oz (188 g) with 2.1 m cable		
Housing material	Glass fiber reinforced ABS		
Typical mounting location	Over-the-Conveyor		

1) Model selectable, refer to selection table on following page

Zone Length	Valve Connection		Single Accumulation - Single and Slug Release	Slug Accumulation - Slug Release
3 ft	DIN 9.4 mm	⇨	WLR2100-D2311	WLR2100-D2321
3 ft	Spade Conn	⇨	WLR2100-D1311	WLR2100-D1321
6 ft	DIN 9.4 mm	⇨	WLR2100-D2312	WLR2100-D2322
6 ft	Spade Conn	⇨	WLR2100-D1312	WLR2100-D1322

Connection Diagram



Order Information

Model Number	Part Number
WLR2100-D1311	7027185
WLR2100-D2311	7027808
WLR2100-D1321	7027754
WLR2100-D2321	7027809
WLR2100-D1312	7027753
WLR2100-D2312	7027811
WLR2100-D1322	7027755
WLR2100-D2322	7027810

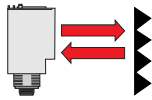
Accessories	Page
Reflectors	30
Cables	31
Mounting brackets	33
Interface module	24

WLR2100-M

AC ZPA Sensor with Electric Output for External Valve or Electric Motor Control



Conveyor Sensors

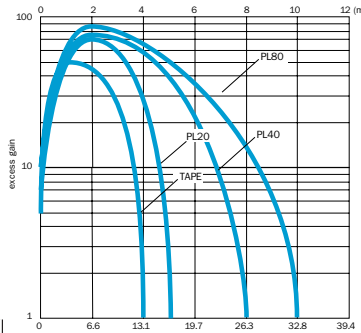


0...29.5 ft (0...9 m)

sensing range



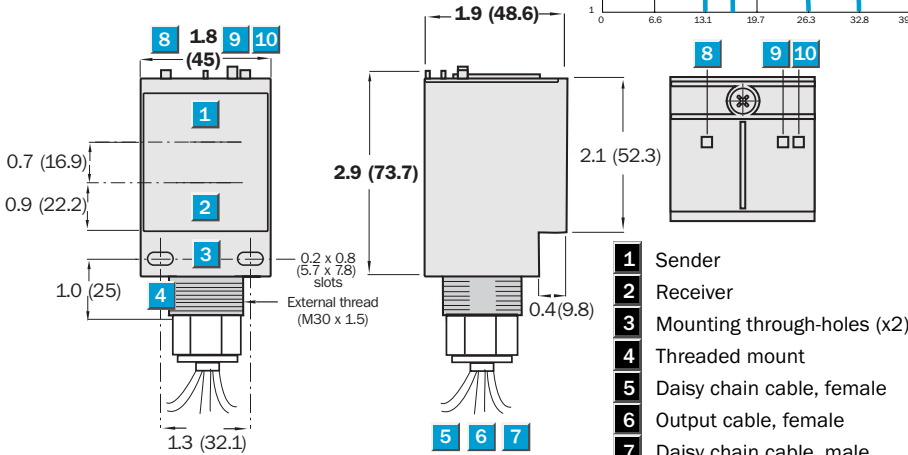
Excess Gain



Features

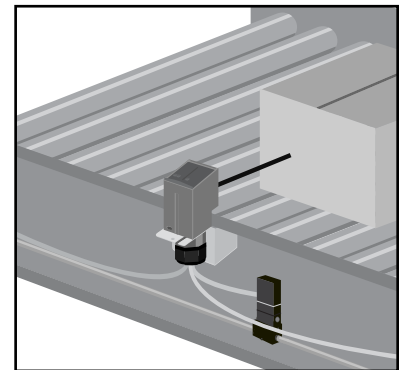
- Over-the-Conveyor Mount
- Integrated ZPA logic, photoelectric sensor, pneumatic valve cable and daisy chain cables
- AC supply voltage
- Output cable for connection to electric motor control or pneumatic valve
- Linear polarized retro-reflective sensing technology eliminates false detection of shiny or plastic-wrapped objects
- Adjustable time delay accumulation
- Single or slug time delay release
- Individual slug release configurability, switch selectable
- Industrial grade M12 daisy chain cables
- Sealed to withstand harsh environments and washdown

Dimensional Drawings



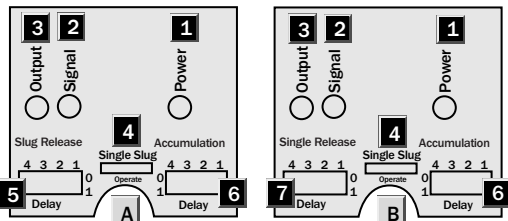
dimensions in inches (mm)

- 1 Sender
- 2 Receiver
- 3 Mounting through-holes (x2)
- 4 Threaded mount
- 5 Daisy chain cable, female
- 6 Output cable, female
- 7 Daisy chain cable, male
- 8 Power indicator
- 9 Signal strength indicator
- 10 Beam status indicator



Inside Cover and Adjustments

WLR2100-M6361	WLR2100-M6381
WLR2100-M6362	WLR2100-M6382



- 1 Power indicator
- 2 Signal strength indicator
- 3 Output status indicator
- 4 Single/slug selector switch
- 5 Slug release time delay DIP switches
- 6 Accumulation time delay DIP switches
- 7 Single release time delay DIP switches

A Slug/Accumulation Delay Settings 0...2 seconds

msec.	4321	msec.	4321
0	0000	1095	1000
360	0001	1225	1001
300	0010	1370	1010
435	0011	1500	1011
550	0100	1615	1100
680	0101	1745	1101
820	0110	1890	1110
955	0111	2020	1111

B Release/Accumulation Delay Settings 0...10 seconds

msec.	4321	msec.	4321
0.1	0000	5.2	1000
0.7	0001	5.9	1001
1.4	0010	6.6	1010
2.0	0011	7.2	1011
2.6	0100	7.8	1100
3.2	0101	8.4	1101
3.9	0110	9.1	1110
4.6	0111	9.8	1111

WLR2100-M

Technical Data	WLR2100	M
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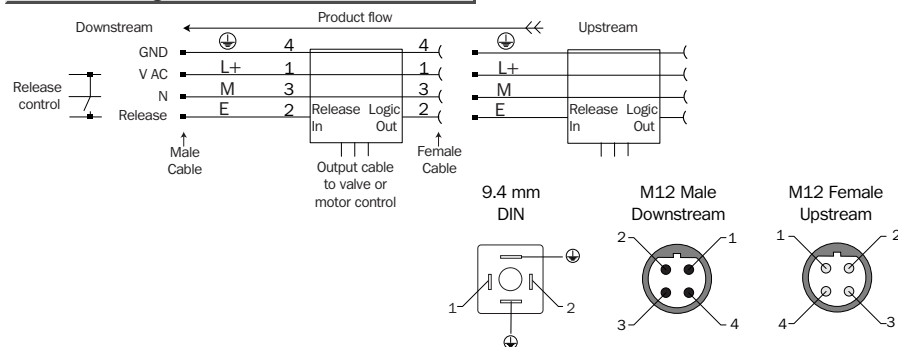
Power	
Supply voltage V_s	90...240 V AC
Ripple	< 5 V_{ss} within V_s
Power consumption	≤ 6 W
Sensor	
Sensing range	0...29.5 ft (0...9 m) with PL 80A reflector
Light spot diameter	Approx. 8.0 in at 29.5 ft (205 mm at 9 m)
Light source	LED, red, polarized, average life 100,000 hours at 77 °F (25 °C)
Interconnection	
Logic output type	FET
Logic output current max.	100 mA
Logic output switching frequency/response time	250 Hz/2.0 ms
Daisy chain connection type	Cable: 300 mm, 4-pin M12 male (connects to downstream sensor) Cable: 1.1 m or 2.1 m, 4-pin M12 female (connects to upstream sensor)
Circuit protection	Short circuit protection; interference pulse suppression; V_s reverse polarity protected
Modules per End Tap (440 W source, 5 W load)	110 V_s : 3 ft zones = 27, 6 ft zones = 22
Modules per Center Tap (440 W source, 5 W load)	110 V_s : 3 ft zones = 40, 6 ft zones = 40
Logic function	
Accumulation mode	Adjustable time delay
Release mode ¹⁾	Single and adjustable time delay slug (switch configurable) or slug and adjustable time delay single (switch configurable)
Output to motor control or external valve	
Output voltage	HIGH = V_s - (≤ 2 V); LOW = 0 V
Output current max.	150 mA
Circuit protection	None
Connection type	Cable: 300 mm, 9.4 mm DIN (43650) type C female (connects to local zone)
Switching frequency/response time	500 Hz/1.0 ms
Physical properties	
VDE protection class	□
Enclosure rating	IP 67, NEMA 6
Ambient operating temperature	-13...131 °F (-25...55 °C)
Storage temperature	-40...158 °F (-40...70 °C)
Shock load	IEC 68
Approximate weight	5.3 oz (150 g) with 1.1 m cable; 6.6 oz (188 g) with 2.1 m cable
Housing material	Glass fiber reinforced ABS
Typical mounting location	Over-the-Conveyor

1) Model selectable, refer to selection table on following page

Selection Table				
Zone Length	Valve Connection	Adjustable Accumulation -		
		Single or Adjustable Slug Release	Adjustable Accumulation - Slug or Adjustable Single Release	
3 ft	DIN 9.4 mm	⇨	⇩	⇩
6 ft	DIN 9.4 mm	⇨	⇩	⇩
			WLR2100-M6361	WLR2100-M6381
			WLR2100-M6362	WLR2100-M6382

Order Information	
Model Number	Part Number
WLR2100-M6381	7027819
WLR2100-M6382	7027820
WLR2100-M6361	7027089
WLR2100-M6362	7027090

Connection Diagram



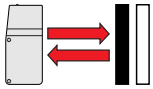
Accessories	Page
Reflectors	30
Cables	31
Mounting brackets	33

WTR2

Photoelectric Diffuse Sensor with M12 Connector

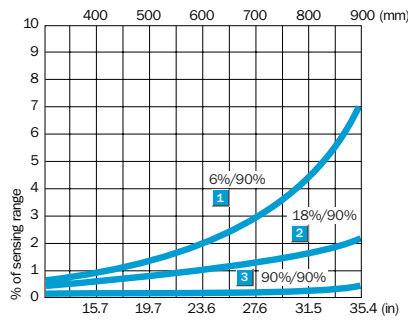


Conveyor Sensors



3.9...35.4 in (100...900 mm)
sensing range

Background Suppression

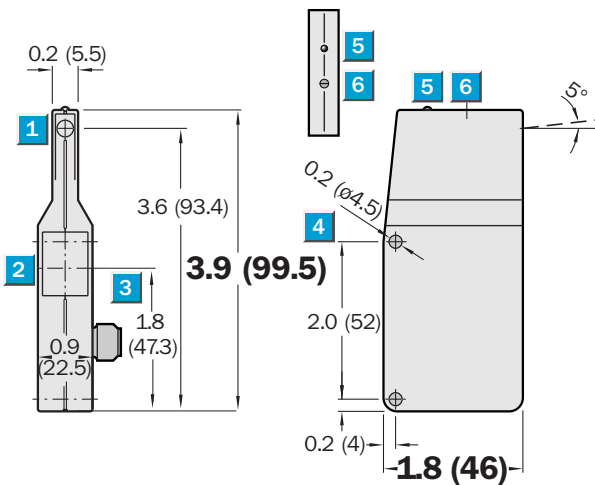


- 1 Sensing range on black, 6% remission
- 2 Sensing range on grey, 18% remission
- 3 Sensing range on white, 90% remission

Features

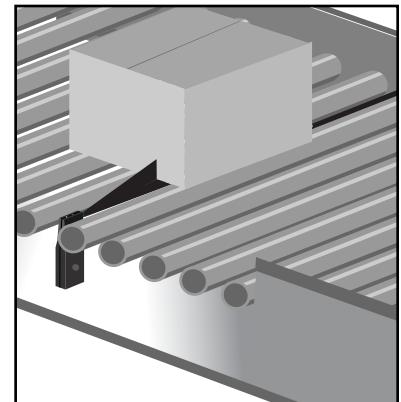
- Under-the-Conveyor Mount
- Stand alone sensor easily integrated with ZPA systems
- Multiple output configurations including: PNP, NPN, light and dark operate
- Adjustable Background Suppression (ABS) sensing technology, ignores background targets and no reflector is required
- Industrial grade M12 cable connection

Dimensional Drawings



dimensions in inches (mm)

- 1 Sender
- 2 Receiver
- 3 Connector, M12 male
- 4 Mounting through-holes (x2)
- 5 Signal strength indicator
- 6 Sensing distance adjustment

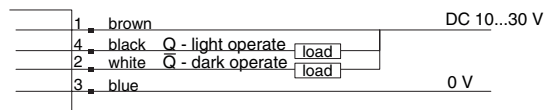


WTR2

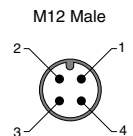
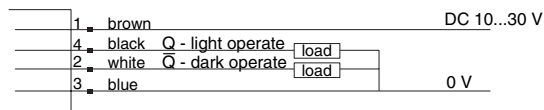
Technical Data	WTR2-	P551S08	N551S05	N551S06	P521S14	P521	P511
Sensing range		3.9...35.4 in (100...900 mm)					
Adjustable background suppression		11.8...35.4 in (300...900 mm)					
Light spot diameter		Approx. 1.6 in at 35.4 in (40 mm at 900 mm)					
Light source		LED, infrared light					
External light immunity		Modulated light source with digital signal evaluation via SICK custom ASIC					
Crosstalk immunity		Automatic modulation frequency shift via SICK custom ASIC					
Response time frequency		< 25 ms beam block, < 1 ms beam unblock/40 Hz				< 1 ms/500 Hz	
Supply voltage V_s		10...30 V DC (limit values)					
Ripple (within V_s tolerance)		< 5 V peak to peak					
Current consumption (no load)		< 40 mA					
Switching type		PNP	NPN		PNP		
Switching current max.		200 mA					
Alarm output type		-		NPN	-		
Alarm output current max.		-		200 mA	-		
Output switching mode		Light or dark switching via complimentary outputs			Dark switching		Light switching
Connection type		M12 4-pin connector					
Housing		Glass fiber reinforced plastic					
Enclosure rating		IP 54					
VDE protection class		□					
EMC		IEC 801					
Shock rating		IEC 68					
Circuit protection		Outputs short circuit protected, V_s reverse polarity protected					
Ambient operating temperature		-40...140 °F (-40...60 °C)					
Storage temperature		-40...167 °F (-40...75 °C)					
Mounting bracket		2017417 (not included)					
Approximate weight		Approx. 3.5 oz (100 g)					

Connection Diagram

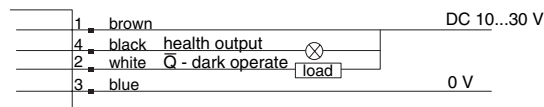
WTR2-N551S05



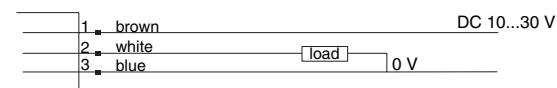
WTR2-P551S08



WTR2-N551S06

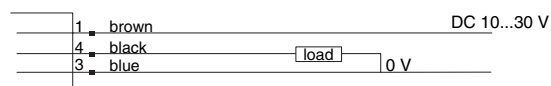


WTR2-P521
WTR2-P511



wire colors refer to standard cable, not included

WTR2-P521S14



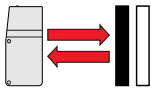
Order Information		Accessories	Page
Model Number	Part Number	Reflectors	30
WTR2-P551S08	1022927	Cables	31
WTR2-N551S05	1019320	Mounting brackets	33
WTR2-N551S06	1019583	Interface module	24
WTR2-P521	1015074		
WTR2-P511	1015158		
WTR2-P521S14	1025619		

WTR2

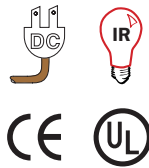
Photoelectric Diffuse Sensor with Integral Cable



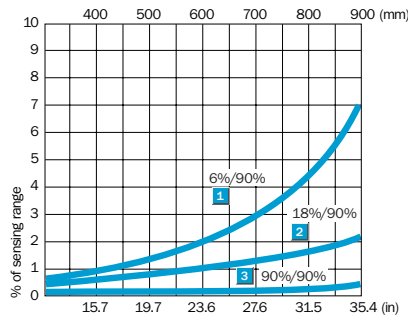
Conveyor Sensors



3.9...35.4 in (100...900 mm)
sensing range



Background Suppression

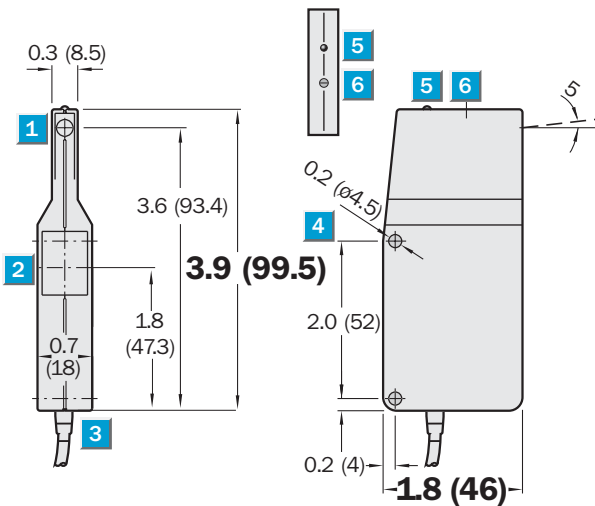


- 1 Sensing range on black, 6% remission
- 2 Sensing range on grey, 18% remission
- 3 Sensing range on white, 90% remission

Features

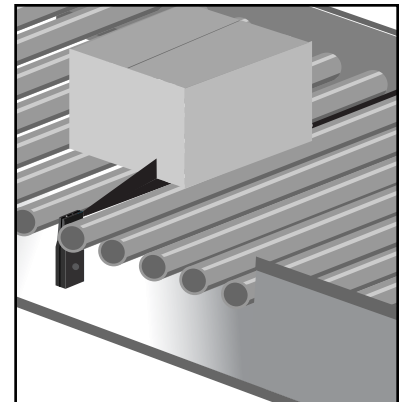
- Under-the-Conveyor Mount
- Stand alone sensor easily integrated with ZPA systems
- PNP and NPN complimentary outputs
- Adjustable Background Suppression (ABS) sensing technology, ignores background targets and no reflector is required
- Wago 733-103 for connection to popular driver cards

Dimensional Drawings



dimensions in inches (mm)

- 1 Sender
- 2 Receiver
- 3 Output cable, flying leads or Wago 733-103 connector
- 4 Mounting through-holes (x2)
- 5 Beam status indicator
- 6 Sensing distance adjustment

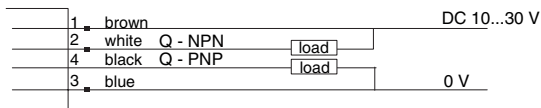


WTR2

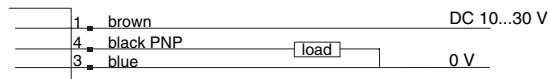
Technical Data	WTR2-	P511S20	P511S20A10	P511S20A03	P511S20A11
Sensing range		3.9...35.4 in (100...900 mm)			
Adjustable background suppression		11.8...35.4 in (300...900 mm)			
Light spot diameter		Approx. 1.6 in at 35.4 in (40 mm at 900 mm)			
Light source		LED, infrared light			
External light immunity		Modulated light source with digital signal evaluation via SICK custom ASIC			
Crosstalk immunity		Automatic modulation frequency shift via SICK custom ASIC			
Response time frequency		< 25 ms beam block, < 1 ms beam unblock/40 Hz			
Supply voltage V_s		10...30 V DC (limit values)			
Ripple (within V_s tolerance)		< 5 V peak to peak			
Current consumption (no load)		< 25 mA			
Switching type		PNP/NPN	NPN	PNP	NPN
Switching current max.		200 mA			
Output switching mode		Light switching			
Cable Length		79 in (2000 mm)	30 in (761 mm)	40 in (1020 mm)	79 in (2000 mm)
Connection type		Flying leads	Wago 733-103	Wago 733-103	Wago 733-103
Housing		Glass fiber reinforced plastic			
Enclosure rating		IP 54			
Protection class		□			
EMC		IEC 801			
Shock rating		IEC 68			
Circuit protection		Outputs short circuit protected, V_s reverse polarity protected			
Ambient operating temperature		-40...140 °F (-40...60 °C)			
Storage temperature		-40...167 °F (-40...75 °C)			
Approximate weight		Approx. 3.5 oz (100 g)			

Connection Diagram

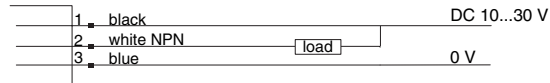
WTR2-P511S20



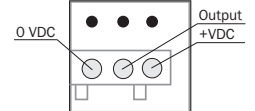
WTR2-P511S20A03



WTR2-P511S20A10
WTR2-P511S20A11



Wago 733-103



Order Information

Model Number	Part Number
WTR2-P511S20	1028700
WTR2-P511S20A10	1029257
WTR2-P511S20A03	7029979
WTR2-P511S20A11	1029258

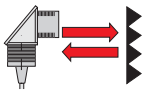
Accessories	Page
Reflectors	30
Cables	31
Mounting brackets	33
Interface module	24

ELF

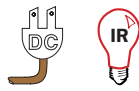
Photoelectric Retro-Reflective Sensor



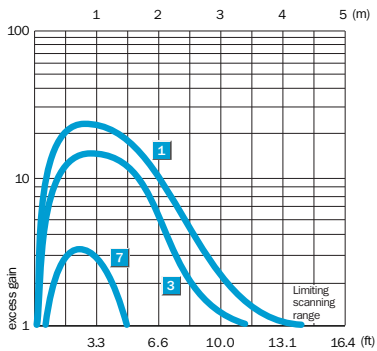
Conveyor Sensors



0.2...13.1 ft (0.07...4 m)
sensing range



Excess Gain - Reflex/Retro-Reflective

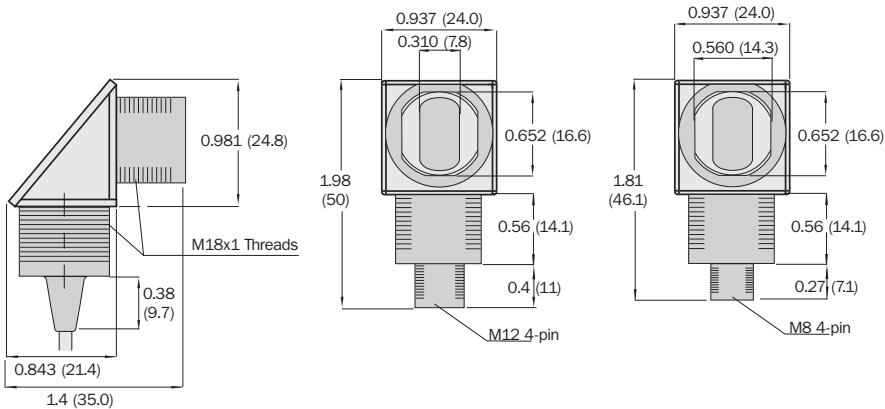


*See additional reflector information on opposite page

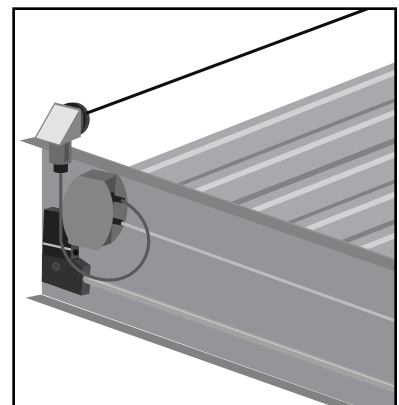
Features

- ELF - Economical Little Functional
- Extremely compact to fit almost any application
- Universal mounting configuration for simple installation
- Unparalleled optical performance
- Electrical functionality previously available only in large sensors
- Available with M8 or M12 connector or pre-leaded cable

Dimensional Drawings

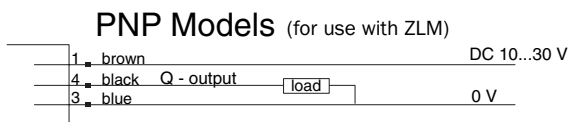


dimensions in inches (mm)

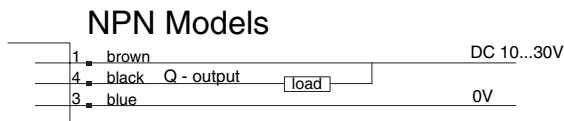
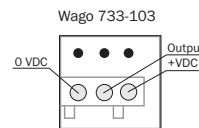
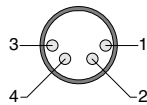


Technical Data	EL1	P124	P127	E123S06	E123S07	E123S08
Light source	LED, red light, polarized; average life 100,000 hours at 77 °F (25 °C)					
Light spot	3.1 x 3.1 in at 78.7 in (80 x 80 mm at 2 m)					
Supply voltage VS	10...30 V DC					
Ripple	< 5 V _{SS} , must be within VS tolerances					
Current consumption	< 20 mA, without load					
Switching outputs	PNP, light operate			NPN, dark operate		
Output current IA max.	50 mA					
Response time	< 2.5 ms					
Switching frequency	200 Hz					
Cable Length				12 in (305 mm)	30 in (761 mm)	79 in (2000 mm)
Connector	M12 4-pin	M8 4-pin	Wago 733-103			
Enclosure rating	IP 54					
Ambient operating temperature	-13...122 °F (-25...50 °C)					
Storage temperature	-40...158 °F (-40...70 °C)					
Housing material	Glass fiber reinforced ABS					
Circuit protection	Reverse polarity protection, overload and short circuit protection					
Mounting hardware	Quantity 1, M18 x 1 nut which can be used near connector or lens					

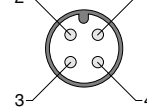
Connection Diagram



M8 Connector



M12 Connector



Reflector Type	Sensing Range
1 PL 80 A	0.07...4.0 m
2 PL50 A	0.07...2.7 m
3 P250	0.07...3.3 m
4 PL40 A	0.07...2.4 m
5 PL 30 A	0.07...2.1 m
6 PL20 A	0.07...1.5 m
7 2000X reflective tape min 50 x 50 mm ²	0.2...1.5 m

Order Information

Model Number	Part Number	Connector
EL1-P124	7027214	M12
EL1-P127	7027268	M8
EL1-E123S06	7123306	Wago 733-103
EL1-E123S07	7123309	Wago 733-103
EL1-E123S08	7123312	Wago 733-103

Accessories	Page
Reflectors	30
Cables	31
Mounting brackets	33

W2000

Photoelectric Retro-Reflective Sensor



Conveyor Sensors



0...59 ft (0...18 m)
sensing range

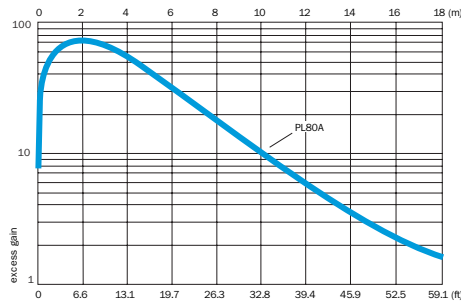


Reflector Type	Sensing Range
1 PL80 A	1...15 m
2 PL50 A	0...11 m
3 PL40 A	0...11 m
4 PL30 A	0...8 m
5 PL20 A	0...8 m
6 Reflective tape diamond grade	0...8 m

Features

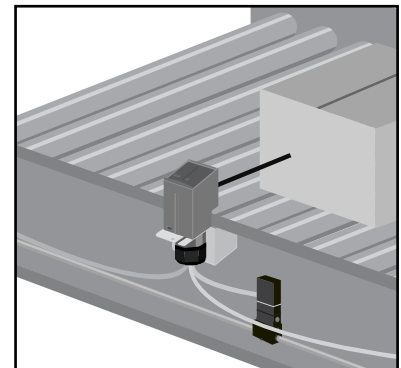
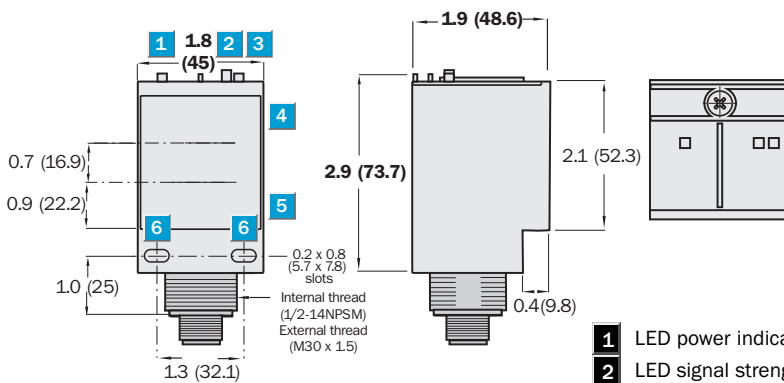
- Over-the-Conveyor Mount
- Rugged plastic housing
- Standard mounting for your existing applications
- Alarm output
- Crosstalk immunity
- Polarizing filters prevent false readings on shiny surfaces
- Red light for easy alignment
- Selectable time delays
- Cable or M12 quick disconnect versions

Excess Gain



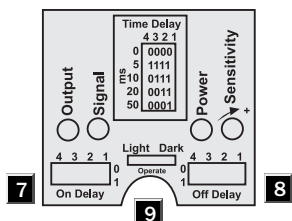
Dimensional Drawings

dimensions in inches (mm)



Adjustments

All types



- 1 LED power indicator (green)
- 2 LED signal strength indicator (red)
- 3 LED output indicator (yellow)
- 4 Center of optical axis, sender
- 5 Center of optical axis, receiver
- 6 Mounting through-hole \varnothing 0.2 x 0.8 mm
- 7 ON delay selector
- 8 OFF delay selector
- 9 Light/dark switching selector

W2000

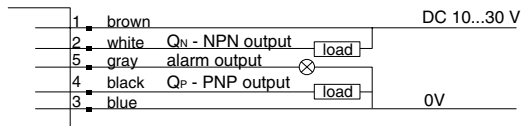
Technical Data	W2000	-B5320	-B5350	-B4300
Sensing range	0...59 ft (0...18 m)			
Light source ¹⁾ , light type	LED, red light, 660 nm, polarized			
Light spot diameter	Approx. 12.5 in at 45.9 ft (320 mm at 14 m)			
Angle of divergence	Approx. 1.3°			
Supply voltage V_S	10...30 V DC ²⁾			
Ripple ³⁾	≤ 5 V			
Current consumption ⁴⁾	≤ 80 mA			
Switching outputs	PNP or NPN			
Voltage drop (max.)	2 V			
Operation mode	Light/dark operating via switch			
Output current I_A max.	100 mA			
Response time ⁵⁾	≤ 1 ms			
Max. switching frequency ⁶⁾	500 Hz			
Alarm output	PNP			---
Time delay settings				
ON/OFF delay	0, 5, 10, 20 or 50 ms		0, 1, 5, 10 and 14 s	
Connection types	Plug, M12 5-pin			Plug, M12 4-pin
Protection class ⁷⁾	□			
Circuit protection	Reverse polarity protection, overload and short circuit protection			
Enclosure rating	IP 67/NEMA 6			
Ambient operating temperature T_A	-13...104 °F (-25...40 °C)			
Storage temperature	-40...158 °F (-40...70 °C)			
Approximate weight	5.3 oz (150 g)			
Housing material	Glass fiber reinforced plastic			

- 1) Average service life 100,000 h at $T_A = 25 °C$
- 2) Limit values
- 3) May not exceed or fall short of V_S tolerances

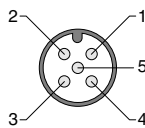
- 4) Without load
- 5) Signal transit time with resistive load
- 6) With light/dark ratio 1:1
- 7) Reference voltage 50 V DC

Connection Diagram

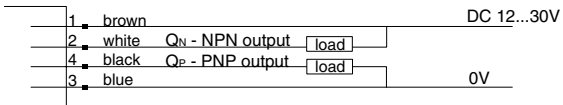
W2000-B5320 W2000-B5350



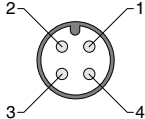
M12 Connector



W2000-B4300



M12 Connector



Order Information

Model Number	Part Number
WL2000-B5320	7023049
WL2000-B5350	7028913
WL2000-B4300	7024002

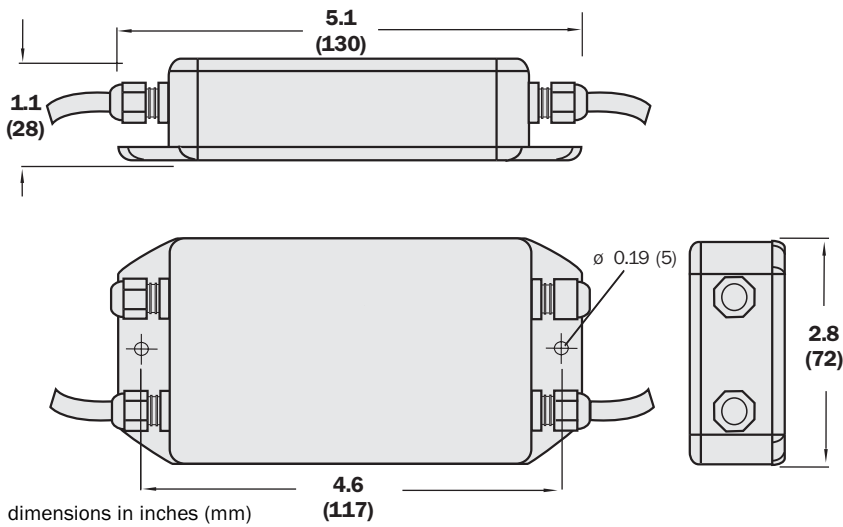
Accessories	Page
Reflectors	30
Cables	31
Mounting brackets	33

ZIM-2 ZPA Interface Module



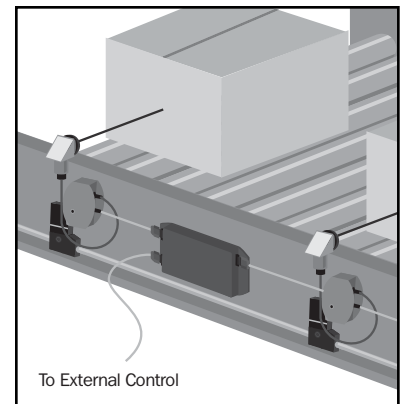
The SICK Zone Interface Module (ZIM) is an important accessory to the *ZoneControl™* family of Zero Pressure Accumulation (ZPA) solutions. It provides electrical isolation for external processes and controls and facilitates *ZoneControl™* system manipulation.

Dimensional Drawings

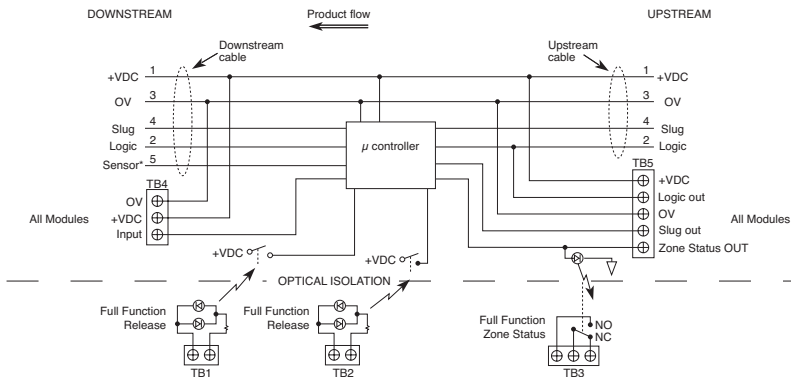


Features

- Provides simple and flexible interface to ZPA control systems
- Reduces installation labor and component costs
- Plug-n-play connectivity provides error proof installation
- Relay isolated single and slug release
- Adjustable zone release time delay, 0 to 20 seconds
- Zone status reporting
- Stop zone function
- Provides power tap connections



Connection Diagram



*Fifth wire only available on 5 wire Logic Modules and Interface Modules.

ZIM-2

Technical Data	ZIM-2	B1...	B2...
Interface to ZPA system		ZLM1, WLR2100-D	WTR
Upstream connection		Female, M12, 5-pin, 300 mm cable	Male, M12, 5-pin, 300 mm cable
Downstream connection		Male, M12, 5-pin, 300 mm cable	Female, M12, 5-pin, 300 mm cable
Power			
Supply voltage from daisy chain		18...30 V DC ³⁾	
Power consumption of ZIM		10 mA, no load	
ZoneControl system power TB4 input		24...28 V DC typical; 30 V DC max. ³⁾	
Input ratings			
TB5 & TB4 power + V DC, 0 V		24...28 V DC typical, 30 V DC max. ³⁾	
TB4 release/interrupt/zone status		18...30 V DC ³⁾	
		Guaranteed OFF voltage: ≤ 4 V DC	
		Guaranteed ON voltage: ≥ 15 V DC	
		Typical ON state current draw at 24 V: 4 mA	
TB1 single release/logic interrupt ¹⁾		18...250 V UC	
		Guaranteed OFF voltage: ≤ 4 V DC	
		Guaranteed ON voltage: ≥ 15 V DC	
		Typical ON state current draw 2.5 mA	
TB2 Slug Release		18...250 V UC ¹⁾	
		Guaranteed OFF voltage: ≤ 4 V DC	
		Guaranteed ON voltage: ≥ 15 V DC	
		Typical ON state current draw 2.5 mA	
		maximum number of logic modules slugged: 80 across no more than 2 power supplies*	
Output ratings			
TB5 logic		PNP; 2.21 kΩ impedance typical	
TB5 zone status		PNP; 2.21 kΩ impedance typical	
TB3 zone status relay ²⁾		250 V UC max; 100 mA max. Resistive load ²⁾	
Delays			
Timing		All delays are 0...20 s	
Physical properties			
Terminal block			
Terminal block wire		30...12 AWG (2.5...0.2 mm ²), strip length 0.25 in (6.0 mm)	
Screw terminal torque		5 in-lbs (0.56 Nm)	
Potentiometers			
Mechanical angle		270° nominal	
Stop strength		7.0 oz-in minimum	
Housing			
Dimensions		5.25 x 3.75 x 1.125 in (130 x 95 x 29 mm)	
Mounting		3/16 in holes in mounting flange or double-sided adhesive, any orientation	
Enclosure rating		IP 42, NEMA 1	
Shock and vibration		IEC 68 2-27, IEC 68 2-29, and EC 68 2-6	
Operating temperature		-13...131° F (-25...55° C)	
Storage temperature		-40...185° F (-40...85° C)	
Approximate weight		0.9 lb (400 g)	
Certifications		cULus	

¹⁾ These inputs are optically isolated from the rest of the Class 2 circuitry. Isolation voltage from Universal-Voltage inputs to Class 2 circuitry: 5000 V rms. Inputs are not sensitive to polarity.

²⁾ Optically isolated solid state relay with 1 Normally Open and 1 Normally Closed contact. Isolation voltage from Zone Status relay terminals to Class 2 circuitry: 5000 V rms.

³⁾ Class 2 source required

NOTE: Specifications above are for Full Function Module. Some data may not apply to Release and Zone Status modules.

* See application section for more info on slug specifications

ZIM-2

Applications

The following rules apply to the following applications.

- All references of upstream or downstream are given with respect to the ZIM
- Factory default jumper (JPx) position is 1-2
- Jumpers (JPx) other than those referenced in a given application note have no influence on that application

Single Release

Action: Upstream Logic Module releases despite upstream and downstream zone status.

Isolated AC/DC Configuration: Apply a high (ON) signal input to TB1 terminals when JP3 is on 1-2.

Non-isolated DC Configuration: Apply a high (ON) signal input to TB4 terminal 3 when JP4 is on 1-2.

Slug Release

Action: All Logic Modules connected to the Slug line will release regardless of zone status or accumulation status. (see Logic Crossover configuration for exception)

Slug Interrupt/Isolator should be used to limit the number of logic modules slug released by a single ZIM module to 80 logic modules across no more than 2 power supplies. If more than 2 power supplies or more than 80 logic modules are to be slug released, use an additional ZIM to release the additional logic modules. If the logic modules use 2 power supplies, reduce the "modules per tap" maximum by 3 for the power tap section supplying the ZIM.

Isolated AC/DC Configuration: Apply a high signal level (ON) to TB2 with JP1 on 1-2 and JP3 on 1-2.

Logic Crossover Configuration: The downstream logic release signal (downstream logic line ON) is crossed-over to the upstream slug release line when JP1 is on 4-5 and JP2 is on 2-3.

Pulse Release

Action: Upstream Logic Module releases for a duration of time set by ZS ON (0-20 s) and then accumulates for a duration of time set by ZS OFF (0-20 s), despite upstream and downstream zone status.

Isolated AC/DC Configuration: Apply a high signal (ON) to TB1 when JP3 is removed.

Adjustability: Release time is set by ZS ON potentiometer from 0 to 20 seconds. Accumulation time is set by ZS OFF potentiometer from 0 to 20 seconds.

Zone Release Delay (Logic Line Delay)

Action: Upstream logic module will release after the downstream zone has cleared and the logic delay has expired.

Adjustability: Adjust LOGIC potentiometer from 0 to 20 seconds.

Logic Interrupt/Stop Zone

Action: Upstream logic module accumulates when the upstream Logic Module detects a package, despite downstream zone status.

Isolated AC/DC Configuration: Apply a low (OFF) signal input to TB1 when JP3 is on 2-3.

Non-isolated DC Configuration: Apply a low (OFF) signal input to TB4 when JP4 is on 2-3.

Downstream Slug Interrupt

Action: Downstream Logic Modules will not slug release when Slug Release is initiated at the ZIM or upstream of the ZIM.

Configuration: JP1 is on 2-3 and JP2 is on 1-2.

Upstream Slug Interrupt

Action: Upstream Logic Modules will not slug release when Slug Release is initiated at the ZIM or downstream of the ZIM.

Configuration: JP1 is on 1-2 and JP2 is on 2-3.

Zone Status Indication

Action: Zone status output on TB5 terminal 1 and TB3 is activated when the downstream logic module or remote sensor indicate an occupied zone.

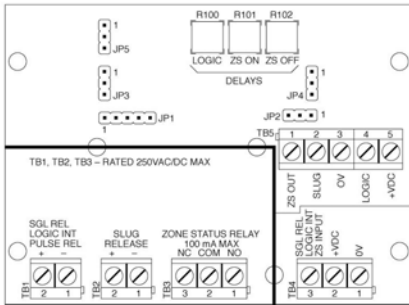
Configuration for Downstream Logic Module: JP4 is on 1-2 or 2-3 and JP5 is on 1-2 or removed.

Configuration for Auxiliary Sensor or PLC Input: JP4 is removed and a high (ON) signal is applied to TB4 terminal 3.

Zone Status Delay: The output transition of the Zone Status from (OFF) to (ON) or (ON) to (OFF) will only occur if the time delays set by the ZS ON and ZS OFF delay potentiometers have expired. A non-zero delay setting will filter out transitions that occur for less than the set time. This is typically used to indicate a zone is full only after a product is detected for a period of time indicative of a full and accumulated lane.

ZIM-2

ZIM Board Layout - Full Function



Model Number	Part Number	Description
ZIM-2B1110	7029608	Full Function Module, for ZLM or WLR2100
ZIM-2B2110	7029704	Full Function Module, for WTR1

Warnings and Cautions

NOTE: A qualified electrician must perform installation and servicing, in addition to checking with local code before installation, to ensure safe operation of the product. For technical assistance with this product, call SICK at 1-800-325-7425.

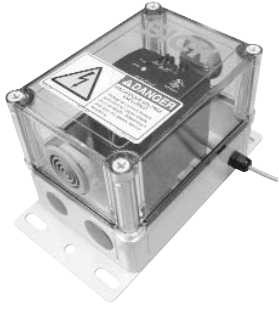
- Be consistent with UL listing requirements for maximum protection. The input line cable and line fuses must be sized in accordance with the rated input current of the unit.
- Do not make any connections when connected to AC/DC utility supply line.
- Before applying power, make sure that all covers are closed.
- Verify there is no possible floating ground potential.
- Provide recommended interfacing wire type (i.e. 16-24 AWG multi-strand heat resistive copper wires).
- Any motor cables should cross other cables at an angle of 90 degrees.
- If conduit is being used for wiring, use separate conduits for the input power wiring, the output power wiring, the signal wiring and the control wiring.
- Serviceability/field repair: Devices are not serviceable.

Read manuals thoroughly and make sure you understand the procedures before you attempt to install, set up, or operate any SICK brand ZoneControl™ devices.

The information contained in this manual is subject to change without notice.

CAUTION
RISK OF ELECTRICAL SHOCK-MORE THAN ONE DISCONNECT SWITCH MAY BE REQUIRED TO DE-ENERGIZE THE EQUIPMENT BEFORE SERVICING

ZoneControl™ Power Supply



SICK PS 50W-24V-ENC and PS 95W-24V-ENC power supplies feature a compact housing design that is designed specifically for use with SICK's ZoneControl™ line of Logic Modules and conveyor sensors.

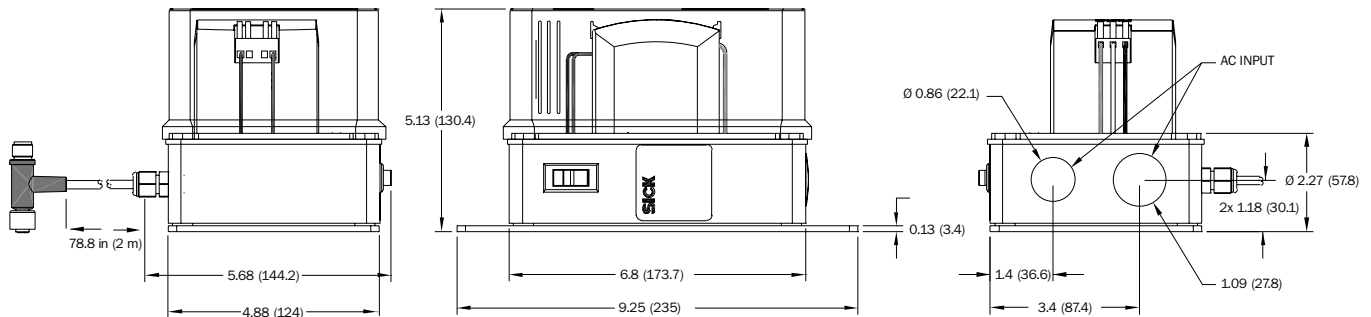
These units meet the latest NEC Class II requirements in accordance with UL, EN, IEC standards. Installation is fast and easy due to slotted holes in a durable mounting plate that mounts directly to the side of the conveyor.

SICK PS 50W-24V-ENC and PS 95W-24V-ENC power supplies are also capable of buffering brief power failure conditions at rated voltage (e.g. 20 ms at 120 V AC) in accordance with EN 60 624-1. Global acceptance is also achieved by conformance with cULus standards (North American compliance) and CE standard requirements (European compliance).

Features

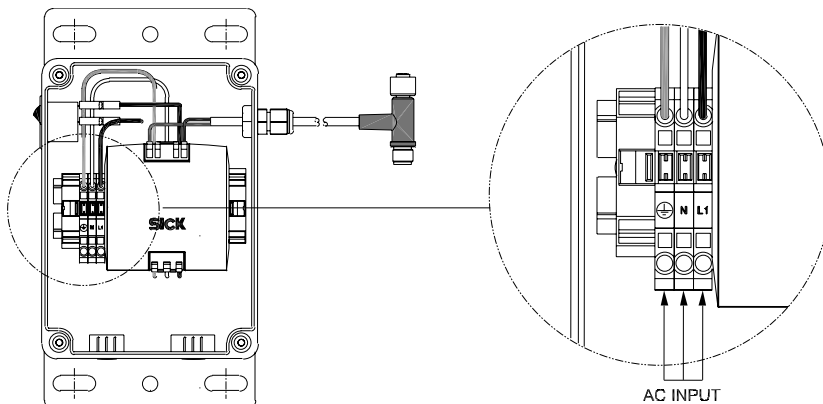
- Adjustable output voltage up to 24...28 V DC
- 115/230 V AC input
- State-of-the-art design
- Perfect integration with ZoneControl™ system
- IP 20 enclosure
- Bolt on mounting

Dimensional Drawings



dimensions in inches (mm)

Connection Diagram



* Required mounting orientation

ZoneControl™ Power Supply

Technical Data	PS50W-24V-ENC	PS95W-24V-ENC
Input parameters		
Input voltage range V AC (nominal)	100...240 V	100...120/220...240 V
Input voltage range V AC (continuous)	85...264 V	85...132/184...264 V
Input frequency	47...63 Hz	
Input voltage range V DC (see derating requirements)	85...375 V	220...375 V
Power Consumption	< 11.5 W max	
Inrush current	< 10 A (100 V AC) < 0.6 A (196 V AC)	< 2.0 A (100 V AC) < 0.95 A (196 V AC)
Transient immunity over entire load range	In acc. VDE 0160/W2 (750 V/1.3 ms)	
Output parameters (at tee cable)		
Power	50 W	95 W
Output voltage	24...28 V DC adjustable (factory set to 24 V) ³⁾	
Output voltage preset	24.5 ± 0.5%	
Ripple/noise at 20 MHz, 50 Ohm	< 50 m V _{pp}	
Output voltage regulation accuracy	0.5% V _{out} static, ± 2.0% V _{out} dynamic	0.5% V _{out} static, ± 1.5% V _{out} dynamic
Output rated current	2.1 A (at 24 V DC), 1.8 A (at 28 V DC)	3.9 A (at 24 V DC), 3.2 A (at 28 V DC)
Hold up time during input supply interruption	> 97 ms (196 V AC)	> 20 ms (196 V AC, 24.5 V/3.9 A)
	> 17 ms (100 V AC)	> 20 ms (100 V AC, 24.5 V/3.9 A)
General device parameters		
Operating temperature range (T _{amb}) - full load	14...122 °F (-10...50 °C)	14...122 °F (-10...50 °C)
Operating temperature range (T _{amb}) - derated	122...140 °F (50...60 °C)	
Storage temperature	-13...185 °F (-25...85 °C)	
Humidity	90% max., non-condensing	
Input cable access	one hole for 3/4" conduit, one hole for 1/2" conduit	
AC connection wires ¹⁾		
Stranded cable	0.3...2.5 mm ² /AWG 28-12	
Solid cable	0.3...4 mm ² /AWG 28-12	
Stripping at wire end	0.24 in (6 mm)	
Output connector cables	M12 4-pin tee cable, 2 m/AWG 22	
Efficiency	88.5% (typ. at 230 V AC), 88% (typ. at 110 V AC); 2.1 A	90% (typ. at 230 V AC), 89% (typ. at 110 V AC); 3.9 A
Protection class	IP 20 (DIN/IEC 60 529)	
MTBF ²⁾	600,000 hours	500,000 hours
Dimensions	9.25 x 5.67 x 5.13 in (235 x 144 x 130.4 mm)	
Weight	4.1 lbs (1.9 kg)	3.9 lbs (1.8 kg)
Mounting	Only vertical mounting with 3 vent slots on top and AC entering bottom. Any other orientation may cause damage to device.	
Clearance	Keep 2" clearance around vents	
Applicable standards		
EN 60 950, IEC 60 950	Yes	
EN 60 204-1, EN 50 178	Yes	
Third party approvals		
UL 508 Listing (US and Canada)	Multiple listing	
UL 60 950 Recognition (US and Canada)	Multiple listing	
NEC Class II according to UL 1310	Multiple listing	

- 1) NOTE: Secure wires from strain
2) MTBF at 24 V DC, 4 A; 230 V AC;
T_{amb} 104 °F (+40 °C)
3) 24...28 VDC is set at power supply.
Actual at tee cable is 27 V full load.

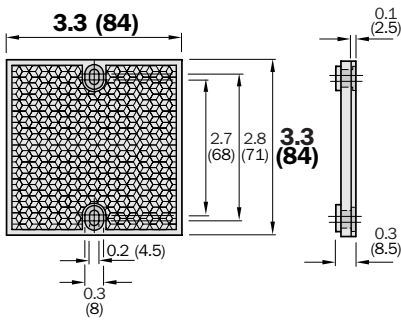
Order Information	
Model Number	Part Number
PS50W-24V-ENC	7029741
PS95W-24V-ENC	7029740

Warnings and Cautions

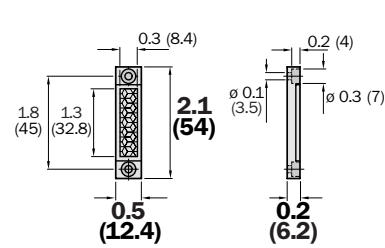
This is not a user or installation manual. See manual supplied with the power supply for full details, specifications, installation warnings and cautions!

Accessories: Reflectors

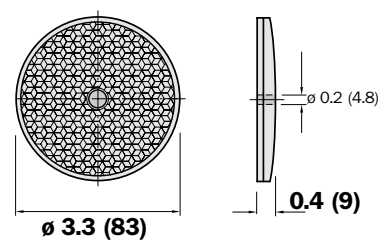
Reflective area 80 x 80 mm	
Model Number	Part Number
PL80A	1003865



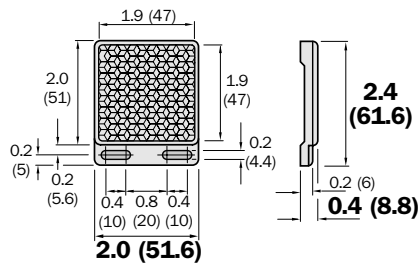
Reflective area 32.8 x 8.4 mm	
Model Number	Part Number
P45	5308002



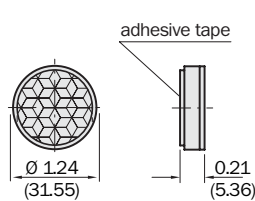
Reflector Ø 83 mm, center hole mounting	
Model Number	Part Number
P975	7020558



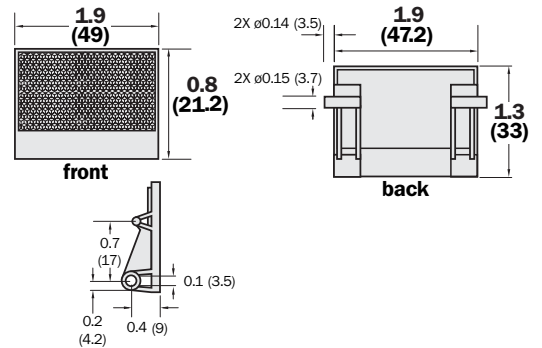
Reflective area 47 x 47 mm	
Model Number	Part Number
P250	5304812



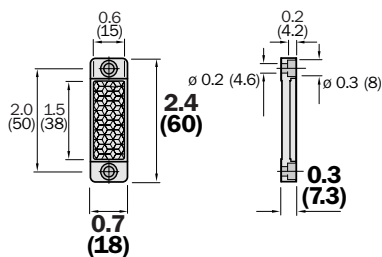
Reflective area Ø 23 mm, self-adhesive	
Model Number	Part Number
PL1.25	7029889



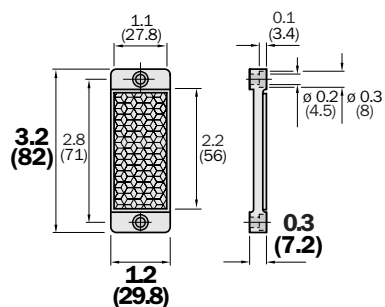
Reflector hexagonal	
Model Number	Part Number
PL2IMS02	7122603



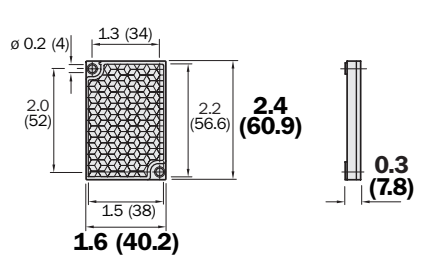
Reflector area 15 x 38 mm	
Model Number	Part Number
PL20A	1012719



Reflective area 28 x 56 mm	
Model Number	Part Number
PL30A	1002314



Reflective area 38 x 56 mm	
Model Number	Part Number
PL40A	1012720

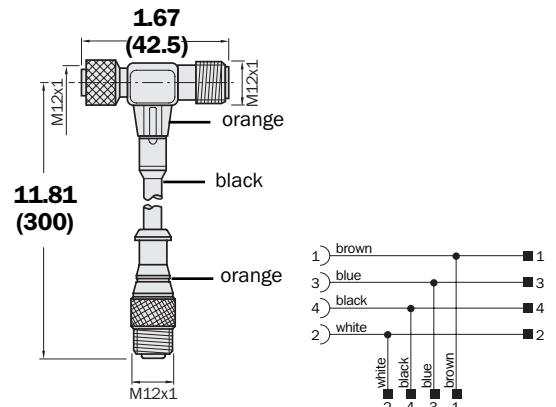


dimensions in inches (mm)

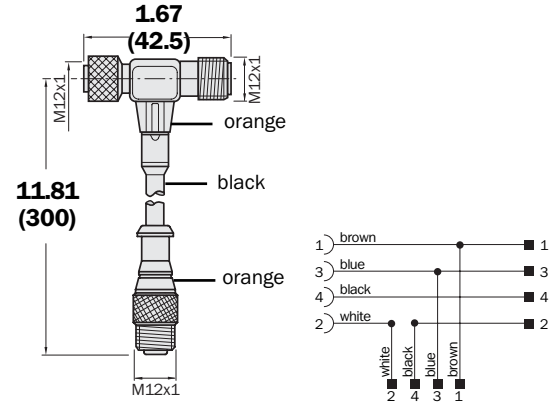
Accessories: Cables

Power and Interconnect Cables		
Model Number	Part Number	Description
JD4-TM12300A	6011682	Tee cable type 1, M12 DC 4-pin, 300 mm
JD4-TM12300B	6011683	Tee cable type 2, M12 DC 4-pin, 300 mm
JD4-TM122000A	7122472	Tee cable type 1, M12 DC 4-pin, 2 m
JD4-TM122000C	7029863	Tee cable type 1, M12 DC 4-pin, to flying leads, 2 m
KD4-SIM122	7020020	2 m straight M12 DC 4-pin cable
KD4-SIM125	7020678	5 m straight M12 DC 4-pin cable
KD4-SIM1210	7020080	10 m straight M12 DC 4-pin cable
KD4-RIM122	7020023	2 m right angle M12 DC 4-pin cable
KD4-RIM125	7020679	5 m right angle M12 DC 4-pin cable
KD4-RIM1210	7021244	10 m right angle M12 DC 4-pin cable
ZPI-P1	7027723	Power isolator
ZSI-P4	7027187	Slug interrupt
ZL1-P2	7029124	Logic interrupt cable
ZGC-1	7027804	Gender changer - male/male
ZGC-2	7028421	Gender changer - female/female
ZLCO-MD	7028474	Logic crossover - pin 2 male, pin 4 female
ZLCO-FD	7029473	Logic crossover - pin 2 female, pin 4 male
KA14-SEM121	7027083	1 m straight M12 reverse-key AC 4-pin cable
KA14-SEM122	7027086	2 m straight M12 reverse-key AC 4-pin cable
KD4-SEM120.25SM12	7028981	Extension cable, M12 DC 4-pin, 0.25 m
KD4-SIM122SM12	7023135	Extension cable, M12 DC 4-pin, 2 m
KD4-SIM123SM12	7028657	Extension cable, M12 DC 4-pin, 3 m
-	7028451	Kit, 1/4" plug and clip
-	7028457	1/4" plug
-	7028425	3/8" plug

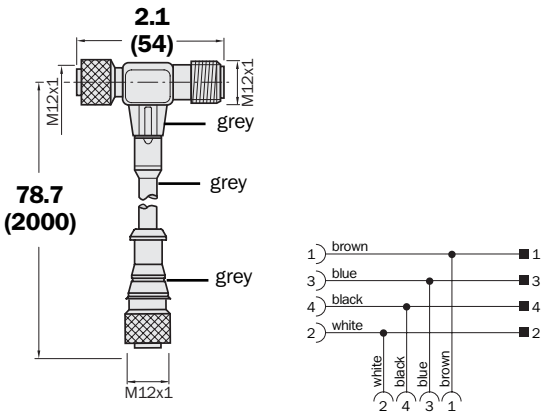
Tee cable type 1, M12 DC 4-pin, 300 mm



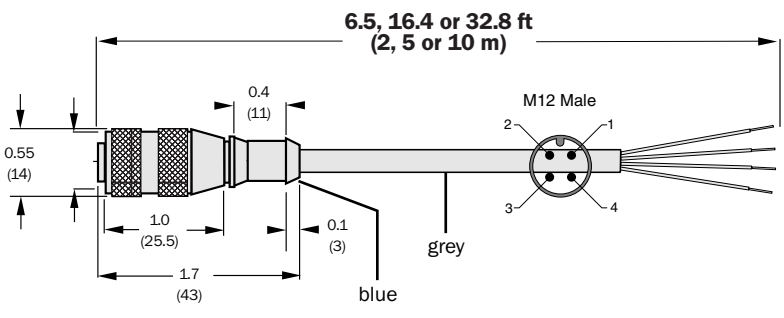
Tee cable type 2, M12 DC 4-pin, 300 mm



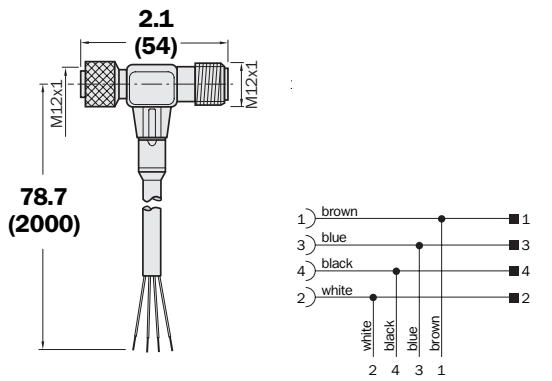
Tee cable type 1, M12 DC 4-pin, 2 m



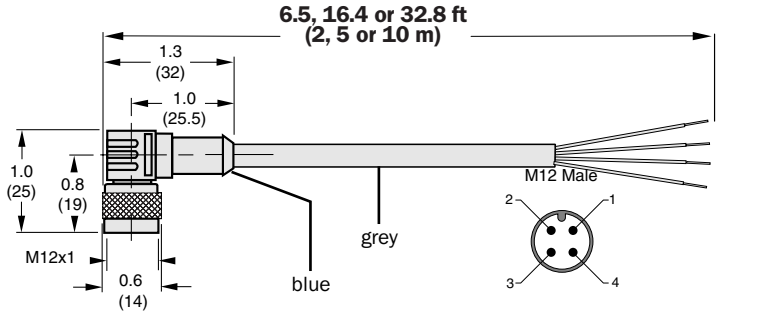
2 m, 5 m, 10 m straight M12 DC 4-pin cable



Tee cable type 1, M12 DC 4-pin to flying leads, 2 m



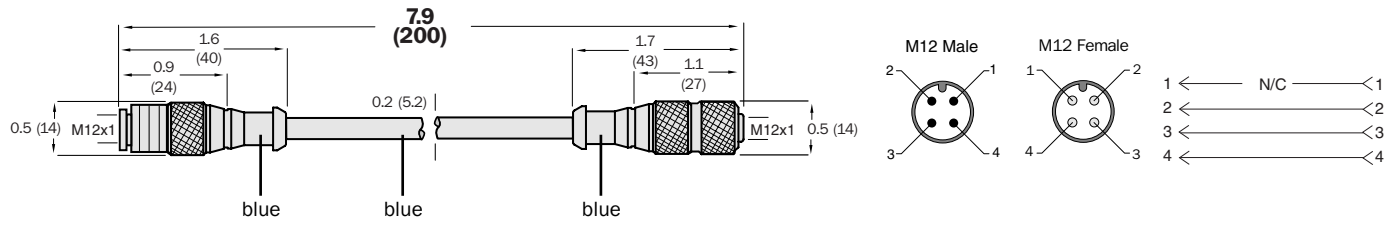
2 m, 5 m, 10 m right angle M12 DC 4-pin cable



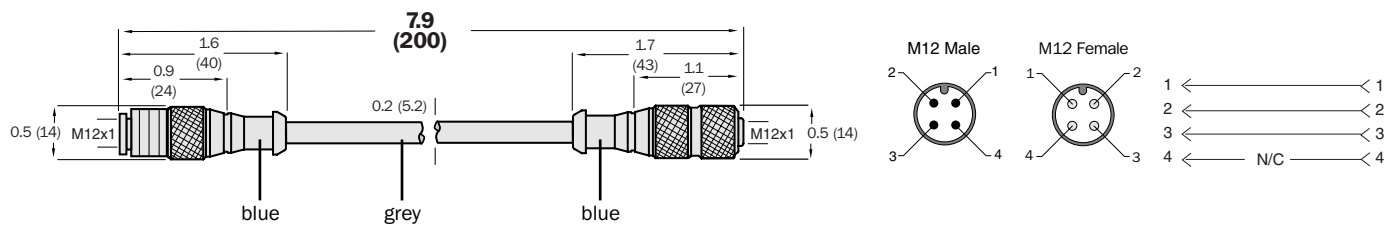
dimensions in inches (mm)

Accessories: Cables

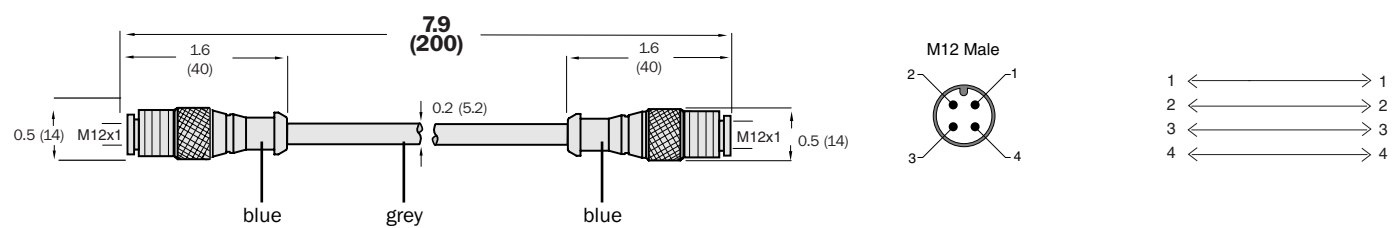
Power isolator



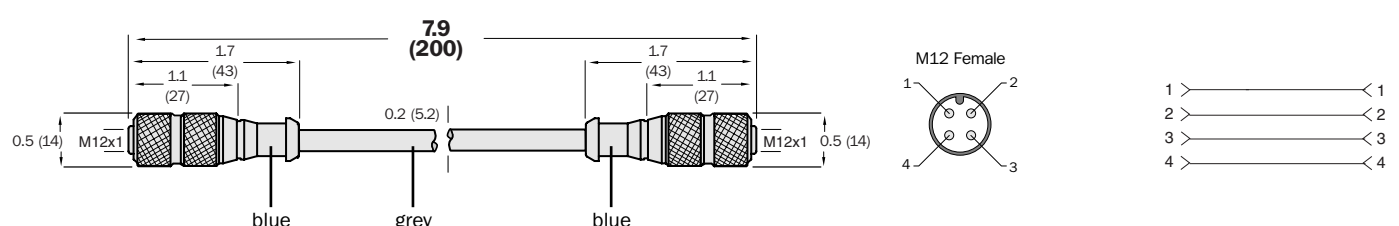
Slug interrupt



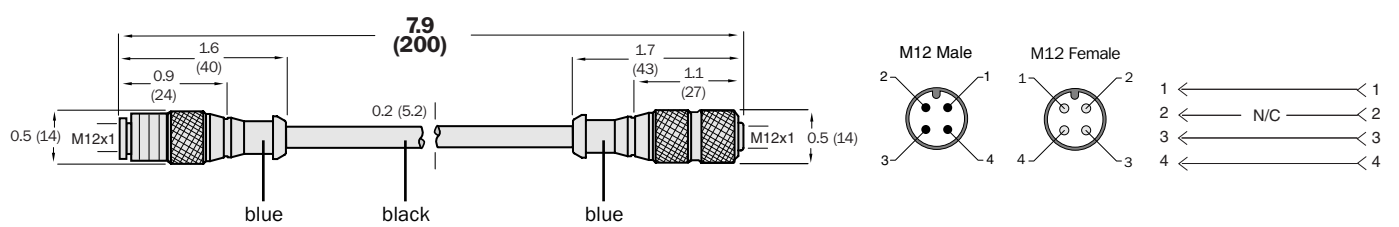
Gender changer - male/male



Gender changer - female/female

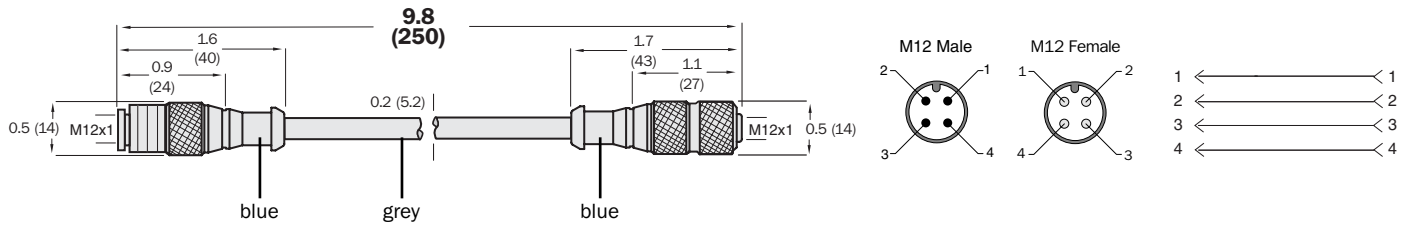


Logic interrupt

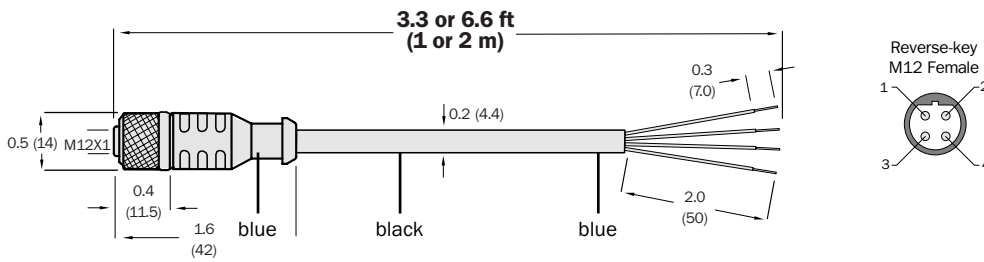


Accessories: Cables

Extension cable



1 m, 2 m, straight M12 reverse-key AC 4-pin cable

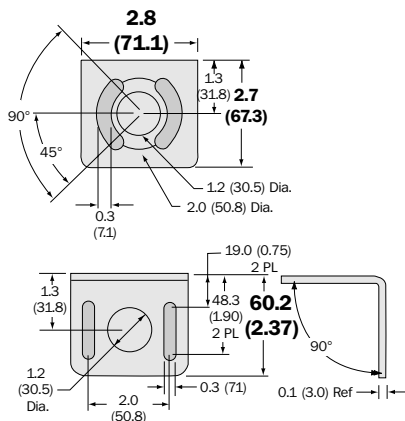


dimensions in inches (mm)

Mounting Brackets

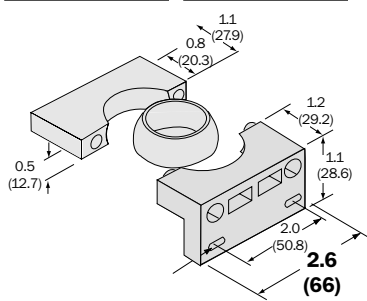
Mounting bracket, W.2000, stainless steel

Model Number	Part Number
MB-W2000	7022981



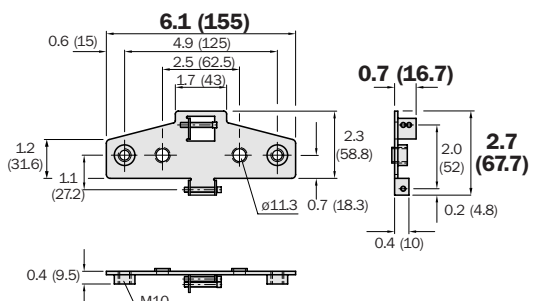
Mounting bracket, W.2000B, stainless steel

Model Number	Part Number
MB-W2000B	7022976



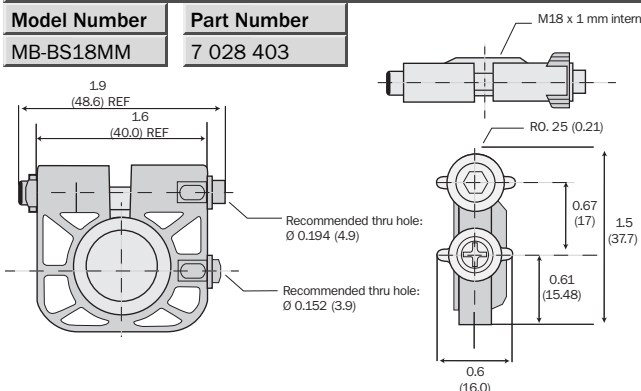
Mounting bracket, WTR

Model Number	Part Number
BEF-WN-WTR	2017417



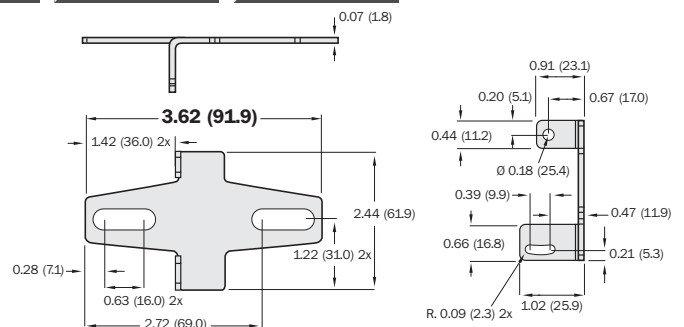
Mounting Bracket for 18 mm threaded sensors

Model Number	Part Number
MB-BS18MM	7 028 403



Mounting bracket kit, WTR

Model Number	Part Number
MB-WTR-1 KIT	7029344



dimensions in inches (mm)



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