



NEW PRODUCT GUIDE

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LPD Series

Linear Positioning Sensors

The LPD series inductive linear positioning sensors can detect linear movement and position of metal objects.

The linear positioning sensors feature ▲high resistance to impact with coreless method ▲detection range 14 mm, 103 mm models ▲IO-Link communication ▲oil resistant cable (PVC) ▲IP67 protection structure.

CE UK C UL US LISTED

IO-Link

► Product Specifications p.24



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2022



UTR Series

Ultrasonic Sensors

The UTR series cylindrical ultrasonic sensors can detect and measure distance of objects by emitting and receiving high frequency sound waves and measuring the time lapse in between. The ultrasonic sensors feature ▲detection and measurement of various material and surface ▲temperature tracking algorithm ▲sensing distance up to 8 m ▲IO-Link communication ▲316L stainless steel body ▲IP66, IP67, IP68, IP69K protection structure.

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IO-Link

► Product Specifications p.25



SFL / SFLA Series

Safety Light Curtains

The SFL / SFLA series safety light curtains are installed in potentially dangerous or hazardous areas or machines to safeguard personnel from injury. The light curtains feature ▲finger / hand / body detection types ▲various protection height (144 mm to 1,868 mm) ▲15 m long sensing distance ▲various safety-related functions ▲top control output indicator & status display ▲IP65, IP67, IP67G, IP69K protection structure for diverse applications.



► Product Specifications p.26



SFC / SFC-R Series

Safety Controllers

The SFC / SFC-R series safety controllers are used to control hazards by diagnosing the operation of input/output signals and internal circuits. The safety controllers feature ▲up to 20 logic inputs ▲safety relay contact design.



► Product Specifications p.27



SFT Series

Safety I/O Terminal Blocks

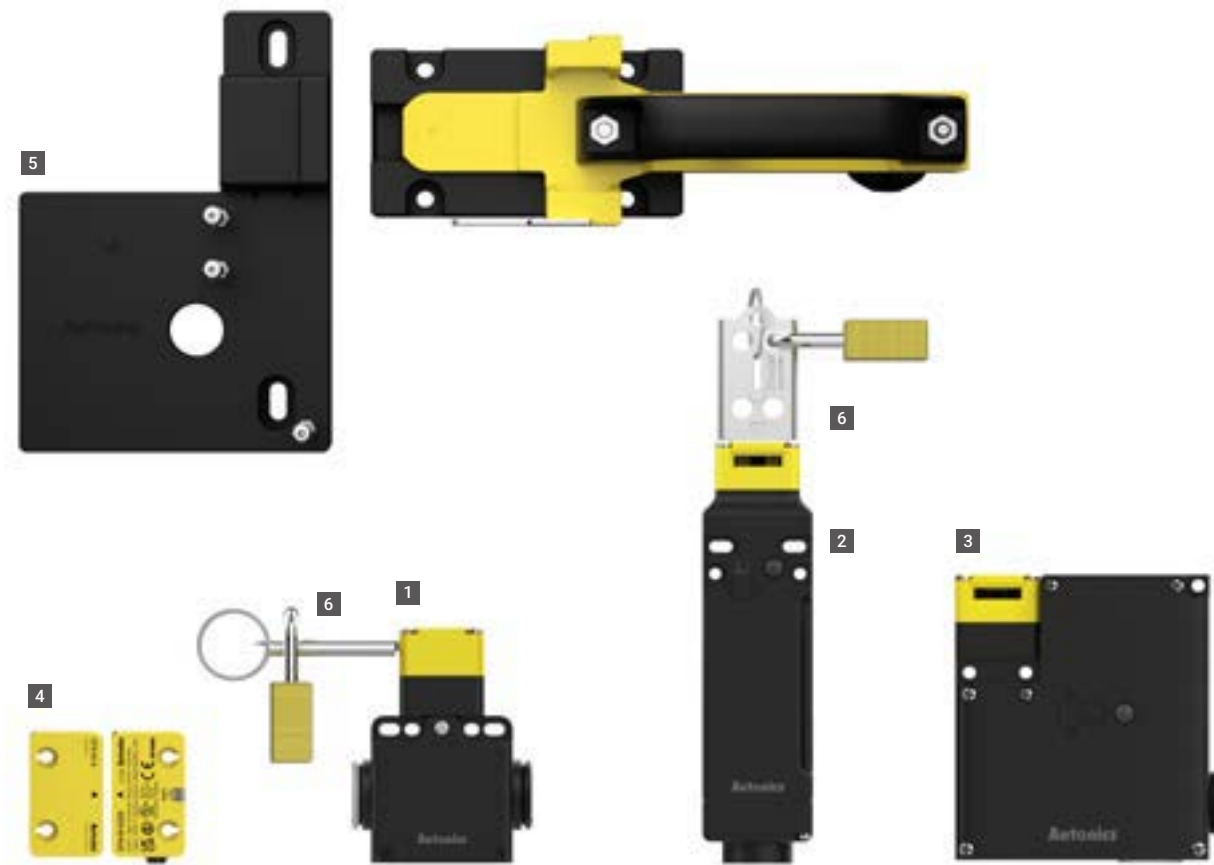
The SFT series safety relay terminal blocks allow safer control system operation with redundant circuits and signal feedback. The safety relay terminal blocks feature ▲relays with force guided contacts for safe control system ▲redundant circuits and signal feedback for safety.



► Product Specifications p.28



- 1 Safety Door Switches SFD Series
- 2 Safety Door Lock Switches SFDL Series
- 3 Safety Flat Type Door Lock Switches SFDL2 Series
- 4 Safety Non-contact Switches SFN Series
- 5 Safety Slide Unit SFDL-SD/SFDL2-SD
- 6 Group Lock Device SFD-LT, SFD-LT2
- 7 Safety Grip Type Enabling Switches SFEN Series
- 8 Safety Key Selector Switches SF2KR Series
- 9 Emergency Stop Button Switches SF2ER Series



SFDL2 / SFDL / SFD / SFN Series

Safety Door Switches

The safety door switches including door lock, door, and non-contact switches can detect the opening and closing of doors in machines.

▲The SFDL2 / SFDL / SFD series safety door locks / door switches can be inserted by 6 different types of operation keys from 5 directions.

▲The SFN series non-contact door switches allow multiple connections of up to 30 units with a single controller. The switches can be installed vertically or horizontally and can also be installed from both sides.



► Product Specifications p.29-30



SFEN / SF2KR / SF2ER Series

Safety Switches

The safety switches including grip type enabling switches, key selector switches and emergency stop button switches can be used within a hazardous area during maintenance.

▲The SFEN safety series safety grip type enabling switches provide high operation sensitivity with 3-position snap action and include standard and button types of model.

▲The SF2KR series provide additional worker safety within fences and are available in 240 different models.

▲The SF2ER series emergency stop button switches adopt a direct opening mechanism to prevent contact welding and provide user options with various head sizes.



► Product Specifications p.31-32



Sensor Head
BD-300 / 600

Sensor Head
BD-030 / 065 / 100

BD Series

Displacement Sensors

The BD series laser displacement sensors can measure thickness, width, level difference, disparity, curve, evenness of target objects by detecting the amount of displacement. The sensors feature ▲maximum resolution 1μm ▲reference distance 30 / 65 / 100 / 300 / 600 mm ▲accurate measurement with minimal influence from target color or material (diffuse reflective type) ▲stable measurement of reflective or transparent material (regular reflective type) ▲various calculation functions supported (addition, subtraction, average) ▲various filter functions (movement average, differential, median).



► Product Specifications p.34-35



Communication Converter
BD-C Series
(Sold Separately)



Amplifier Unit
BD-A1



LSC Series

LiDAR

The LiDAR sensors LSC series feature 270° detection angle and up to 25 m detection distance to accurately detect object presence. The LiDAR sensors feature ▲auto set detection area with teaching function ▲16 types of field sets ▲Ethernet, Bluetooth communication ▲ROS(Robot Operating System) and API.



► Product Specifications p.36



LSE3 Series



LSE2 Series

LSE2 / LSE3 Series

LiDAR

The 2D 90° laser scanners include LSE2 series and LSE3 series.

▲ The LSE2 series laser scanners offer 5.6 m x 5.6 m detection area and flexible installation in limited spaces with compact size (W120 x H47.5 x L89.4 mm). ▲The LSE3 series laser scanners offer 10 m x 10 m detection area and support up to 4 channels. The laser scanners offer, 5G frequency noise resistance, various filter function and aluminum die-cast housing body to prevent malfunction due to fog, rain, snow and dusts.



► Product Specifications p.36-37



PRD Series

Proximity Sensors

The PRD series cylindrical inductive proximity sensors are available in standard and IO-Link communication models. The sensors feature ▲various sizes and cable types (cable / cable connector / connector types) ▲sensing distance max. 25 mm ▲ring type and 4 direction LED status indicator ▲oil-resistant (PVC) cable ▲IP67 protection structure.

CE UK cUL US LISTED

IO-Link

► Product Specifications p.38

PRFD Series

Proximity Sensors

The PRFD series full-metal cylindrical Inductive proximity sensors are available in standard and IO-Link communication models. The sensors feature ▲high durability with full-metal sensor heads ▲reduced risk of malfunction caused by aluminum chips ▲various sizes and cable types ▲oil-resistant (PVC) cable ▲ring type status indicator ▲high durability in welding environment ▲IP66, IP67, IP67G, IP68 protection structure.

CE UK cUL US LISTED EAC

IO-Link

► Product Specifications p.39





VC Series

Smart Cameras

The VC series smart cameras utilize images captured by the integrated industrial camera lenses to determine the target object's code, OCR / OCV, patterns, alignment, presence, size, shape and more. The smart cameras feature ▲14 types of inspection functions ▲global shutter method ▲inspection simulator function ▲set up to 64 workgroups ▲optimized for heat dissipation ▲save data to FTP servers.

CE UK K C-UL US LISTED EAC

► Product Specifications p.40



B7VA Series

Voice Buzzers

The B7VA series voice buzzers offer clear notification alarms in hazardous working environments. The voice buzzers feature ▲up to 90dB sound pressure level ▲8 different alarms ▲internal/external memory type ▲inserting voice / melody available using external memory ▲LED indicator ▲IP65 protection structure.

CE UK K C-UL US LISTED

► Product Specifications p.40



TN Series

Temperature Controllers

The TN series programmable temperature controllers feature
▲2-DOF PID algorithm ▲program control and fixed control models available ▲simultaneous heating / cooling and automatic / manual control function ▲high-speed sampling speed of 50 ms and $\pm 0.2\%$ measurement accuracy.

CE UK CA c RU US

Modbus RTU Modbus ASCII

► Product Specifications p.41



TMH Series

Temperature Controllers

The TMH series modular multi-channel high performance temperature controllers are used to expand and combine various control, communication, and option input /output modules. The temperature controllers feature ▲2 types of communication modules (Modbus TCP, Modbus RTU/PLC Ladderless) ▲3 types of optional modules (analog input / output, digital input / alarm output, CT input) ▲ available 2-channel, 4-channel individual input and output ▲simultaneous heating / cooling control ▲50ms high-speed sampling and $\pm 0.3\%$ display accuracy ▲current output or SSR drive output.

CE UK CA c RU US

Modbus RTU Modbus TCP

► Product Specifications p.42-43



SPRM Series

Power Controllers

The SPRM series power controllers are used to control the amount of electric currents in devices such as heaters, furnaces, thermostats, or motors. The power controllers feature ▲single-phase / three-phase control ▲real-time monitoring load current / voltage / output / heatsink temperature / power ▲cycle control, phase control method with feedback control (constant current, constant voltage, constant power) ▲RS485, EtherCAT communication supported.



EtherCAT
performance tested

Modbus RTU

► Product Specifications p.33



SPB-A Series

SMPS

The SPB-A series switching mode power supplies convert alternating current voltage into stable direct current voltage. The SMPS features ▲various lineups for diverse applications (15W ~ 480W) ▲compact size ▲improved power factor with PFC circuit ▲overcurrent / overvoltage prevention ▲wide ambient temperature range (-20°C to 70°C).



► Product Specifications p.44-45



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2020



ARIO Series

Remote I/O System

The ARIO series slim remote I/O offers Ethernet / Fieldbus communication I/O with modular expansion. The slim remote I/O features ▲8 different communication protocols for coupler ▲various input / output and power modules ▲expandable up to 64 modules ▲12pin / 16pin terminals modules ▲slim size of 12 mm width ▲Hot-swap feature.

CE UK K cUL US LISTED

CC-Link EtherCAT performance tested EtherNet/IP Modbus TCP DeviceNet Modbus RTU PROFINET PROFINET BUS

► Product Specifications p.48-51



ADIO Series

Remote I/O System

The ADIO series remote I/O boxes can distribute various input and output signals between devices. ▲The IO-Link master type exchanges signal from secondary devices to EtherCAT, EtherNET / IP, PROFINET communication. ▲The IO-Link HUB type expands and relays multiple standard I/O through IO-Link communication. ▲The remote I/O boxes feature daisy chain connection and IP67, IP69K protection structure.

CE UK K cUL US LISTED

IO-Link EtherCAT performance tested EtherNet/IP PROFINET

► Product Specifications p.46-47



IO-Link Master Type



IO-Link Hub Type

Inductive Linear Positioning Sensors **LPD Series**

Model	LPD-14-V-□		LPD-14-C-□	LPD-14-IL2-□	LPD-103-□	LPD-103-IL2-□
Detection range	14 mm				103 mm	
Detection object distance	0.5 to 2.0 mm				0.5 to 3.0 mm	
Function	Positioning					
Detection type	Inductive					
Linearity	± 250 μm				± 400 μm	
Repeatability	± 80 μm					
Response time	≤ 30 ms					
Power supply	15 - 30 VDC≐ , Rated voltage: 24 VDC≐					
Max. power ripple	10 % of rated voltage				10 % of rated voltage	15 % of rated voltage
Output spec. ⁽⁰¹⁾	0 - 10 VDC≐	DC 4 - 20 mA	IO-Link COM2		0 - 10 VDC≐ DC 4 - 20 mA	IO-Link COM2
OOR ⁽⁰²⁾ output	10 VDC≐	20 mA	IO-Link COM2		11 ± 0.5 VDC≐ DC 24 ± 2.5 mA	IO-Link COM2
Load resistance	≥ 2,000 Ω	≤ 500 Ω	-		Voltage: ≥ 2,000 Ω Current: ≤ 500 Ω	-
Current consumption (no load)	≤ 20 mA				≤ 30 mA	≤ 35 mA
Insulation resistance	≥ 100 MΩ (500 VDC≐ megger)					
Dielectric strength	Between the charging part and the case: 500 VAC~ 50 / 60 Hz for 1 min					
Vibration	1.0 mm double amplitude at frequency 10 to 55 Hz in each X, Y, Z direction for 30 min.					
Shock	Half-sinus, 30 g , 11 ms (EN 60068-2-27, Shock)					
Protection circuit	Output short over current protection circuit, reverse polarity protection circuit					
Ambient temp. ⁽⁰³⁾	-25 to 70 °C, storage: -25 to 70 °C (no freezing or condensation)				-25 to 85 °C, storage: -25 to 85 °C (no freezing or condensation)	
Ambient humi.	35 to 85 %RH, storage: 35 to 85 %RH (no freezing or condensation)					
Protection rating	IP67 (IEC standard)					
Standard detection object material	Steel for general structure (SS275, SM45C, etc.).					
Material	Housing, sensing part: PBT					
Certification	CE    IO-Link ⁽⁰⁴⁾					

01) For more information, refer to 'Analog Output Feature Data'.
02) OOut of Range. When there is no detection object within the detection range or teaching range
03) UL approved ambient temperature: 70 °C
04) It is applied to IO-Link communication output model.

Model	LPD-14-□-□		LPD-103-□-□	
Connection type	Cable type	Cable connector type	Connector type	
Connector spec.	-	M12 4-pin plug	M8 4-pin plug	M12 4-pin plug
Cable spec.	Ø 4 mm, 4-wire (oil resistant PVC)	Ø 4 mm, 4-wire (oil resistant PVC)	-	
Cable length	2 m	300 mm		
Wire spec.	AWG 23 (0.08 mm, 60-core)	AWG 23 (0.08 mm, 60-core)		
Insulator diameter	Ø 1.28 mm	Ø 1.28 mm		
Unit weight (package)	≈ 67.74 g (≈ 76.7 g)	≈ 33.06 g (≈ 42.6 g)	≈ 49.4 g (≈ 74.8 g)	≈ 53.5 g (≈ 79.0 g)

Communication Interface

Version	Ver. 1.1
Class	Class A
Baud rate	COM 2 (38.4 kbps)
Min. cycle time	2.3 ms
Data length	PD: 2 byte, OD: 1 byte (M-sequence: TYPE_2_2)
Vendor ID	899 (0x383)



View product details



Ultrasonic Sensors **UTR Series**

Model	UTRCM18-350□-□	UTRCM18-600□-□	UTRCM18-1300□-□	UTRCM30-8M□□-□□
Sensing distance	30 to 350 mm	65 to 600 mm	120 to 1300 mm	600 to 8000 mm
Blind zone ⁽⁰¹⁾	0 to 27 mm	0 to 59 mm	0 to 115 mm	0 to 590 mm
Foreground suppression ⁽⁰¹⁾	30 to 90 mm	65 to 195 mm	120 to 360 mm	600 to 1800 mm
Max. setting zone	350 mm	600 mm	1300 mm	8000 mm
Transducer frequency	305 kHz	305 kHz	200 kHz	80 kHz
Switching frequency	≥ 25 Hz	≥ 12.5 Hz	≥ 10 Hz	≥ 3 Hz
Response time	≤ 32 ms	≤ 64 ms	≤ 100 ms	≤ 300 ms
Hysteresis ⁽⁰²⁾	3 mm	5 mm	20 mm	100 mm
Standard sensing target: Aluminum	200 × 200 mm	200 × 200 mm	200 × 200 mm	500 × 500 mm
Resolution	≥ 0.069 mm	≥ 0.069 mm	≥ 0.175 mm	≥ 0.180 mm
Accuracy ⁽⁰³⁾	± 1 % F.S.			
Repeat accuracy	± 0.15 % F.S.			
Weight (packaged)	≈ 30 g (≈ 85 g)	≈ 30 g (≈ 85 g)	≈ 32 g (≈ 90 g)	≈ 210 g (≈ 330 g)

01) If a sensing target is detected in over blind zone and below foreground suppression range, the distance value is displayed as foreground suppression value.
02) Set parameter or dedicated software (atDistance)
03) Ambient temperature 25 °C, temperatures characteristic ± 0.1 % F.S. / °C

Model	UTRCM18-350-□	UTRCM18-350D-□	UTRCM18-600-□	UTRCM18-600D-□	UTRCM18-1300-□	UTRCM18-1300D-□	UTRCM30-8M-□-□	UTRCM30-8MD8-□-□
Power supply	12 - 30 VDC≐ (ripple P-P: ≤ 10 %)							
Current consumption	≤ 40 mA (no load)				≤ 45 mA (no load)		≤ 80 mA (no load)	
Digital output	Push-pull							
Load voltage	≤ 30 V							
Load current	≤ 100 mA							
Residual voltage	≤ 3 V							
Analog output	[current output] DC 4 - 20 mA / [voltage output] DC 0 - 10 V							
Current output	-	●	-	●	-	●	-	●
Voltage output	-	-	-	-	-	-	-	●
Load resistance	[voltage output] 12 - 30 VDC≐: ≥ 100 kΩ [current output] 12 - 20 VDC≐: ≤ 100 Ω / 20 - 30 VDC≐: ≤ 500 Ω							

Protection circuit	Surge protection circuit, output short over current protection circuit, reverse polarity protection
Insulation resistance	≥ 50 MΩ (500 VDC≐ megger)
Dielectric strength	Between the charging part and the case: 1,000 VAC~ 50 / 60 Hz for 1 min
Vibration	1.5 mm double amplitude at frequency of 10 to 55 Hz in each X, Y, Z direction for 2 hours
Shock	500 m/s² (≈ 50 G) in each X, Y, Z direction for 3 times
Ambient temperature	-25 to 70 °C, storage: -40 to 85 °C (no freezing or condensation)
Protection structure	UTRCM18-350, UTRCM18-600: IP66, IP67 (IEC standard), IP69K (DIN standard), IP68 UTRCM18-1300: IP66, IP67 (IEC standard), IP69K (DIN standard) UTRCM30-8M: IP66, IP67 (IEC standard)
Connection	Connector models
Connector spec.	M12 5-pin plug connector
Material	Case: mount - SUS316L, body - PC, transducer: polyurethane foam, epoxy resin with glass
Certification	CE UK    IO-Link ⁽⁰¹⁾

01) It is applied to UTRCM□-□□□-□□-IL2 model.

Communication Interface

Version	Ver. 1.1
Class	Class A
Baud rate	COM 2 (38.4 kbps)
Min. cycle time	4 ms
Data length	PD: 4 byte, OD: 2 byte (M-sequence: TYPE_2_V)
Vendor ID	899 (0x383)

Ultrasonic Sensors Programming Unit UT-P

Model	UT-P
Power supply	External power: 12 - 30 VDC≐ (ripple P-P: ≤ 10 %) USB power: 5 VDC≐ USB bus power ⁽⁰¹⁾
Current consumption ⁽⁰²⁾	≤ 25 mA (no load)
Functions	Real-time monitoring of sensing distance. Perform UTR Series functions and set parameters through the dedicated software (atDistance).
Protection circuit	Surge protection circuit, output short over current protection circuit, reverse polarity protection
Insulation resistance	≥ 50 MΩ (500 VDC≐ megger)
Dielectric strength	Between the charging part and the case : 1,000 VAC~ 50 / 60 Hz for 1 min
Vibration	1.5 mm amplitude at frequency of 10 to 55 Hz in each X, Y, Z direction for 2 hours
Shock	500 m/s² (≈ 50 G) in each X, Y, Z direction for 3 times
Ambient temperature	5 to 60 °C, storage: -40 to 85 °C (no freezing or condensation)
Ambient humidity	0 to 50 %RH, storage: 0 to 50 %RH (no freezing or condensation)
Protection structure	IP20 (IEC standard)
Connection	Cable connector type models
Connector spec.	USB (mini-B type), M12 5-pin socket connector, M12 4-pin plug connector
Material	Case: PC, cable: PVC
Approval	CE UK 

01) USB bus Power is supplied from PC or USB host controller.
02) 3 sec after supplying power, up to 50 mA with button input.



View product details



※ The specifications on this guide may be changed

Safety Light Curtains SFL/SFLA Series

Type	Standard type		
Models	SFL14-□-□	SFL20-□-□	SFL30-□-□
Sensing type	Through-beam		
Light source	Infrared LED (855 nm)		
Effective aperture angle (EAA)	Within ± 2.5 ° when the sensing distance is greater than 3 m for both emitter and receiver.		
Sensing distance	Short - Long mode (setting switch)		
Short mode	0.2 to 5 m	0.2 to 8 m	0.2 to 8 m
Long mode	0.2 to 10 m	0.2 to 15 m	0.2 to 15 m
Detection capability	Ø 14 mm (finger)	Ø 20 mm (hand)	Ø 30 mm (hand-body)
Detection object	Opaque object		
Number of optical axes	15 to 111	12 to 68	42 to 75
Protective height	144 to 1,008 mm	183 to 1,023 mm	1,043 to 1,868 mm
Optical axis pitch	9 mm	15 mm	25 mm
Series connection	Max. 3 SET (≤ 300 optical axes)		

Type	Advanced type		
Models	SFLA14-□-□	SFLA20-□-□	SFLA30-□-□
Sensing type	Through-beam		
Light source	Infrared LED (855 nm)		
Effective aperture angle (EAA)	Within ± 2.5 ° when the sensing distance is greater than 3 m for both emitter and receiver.		
Sensing distance	Short - Long mode (setting switch or atLightCurtain)		
Short mode	0.2 to 5 m	0.2 to 8 m	0.2 to 8 m
Long mode	0.2 to 10 m	0.2 to 15 m	0.2 to 15 m
Detection capability	Ø 14 mm (finger)	Ø 20 mm (hand)	Ø 30 mm (hand-body)
Detection object	Opaque object		
Number of optical axes ⁽⁰¹⁾	15 to 199	12 to 124	9 to 75
Protective height	144 to 1,800 mm	183 to 1,863 mm	218 to 1,868 mm
Optical axis pitch	9 mm	15 mm	25 mm
Series connection	Max. 4 SET (≤ 400 optical axes)		

(01) It may differ depending on the models. For more information, refer to the "SFL/SFLA User Manual."

Power supply	24 VDC≒ ± 20 % (Ripple P-P: ≤ 10 %)
Current consumption ⁽⁰¹⁾	Emitter: ≤ 106 mA, receiver: ≤ 181 mA
Response time ⁽⁰¹⁾	T _{OFF} (ON → OFF): ≤ 19.9 ms, T _{ON} (OFF → ON): ≤ 49.7 ms
Safety related output : OSSD output	NPN or PNP open collector Load voltage ⁽⁰²⁾ , ON - 24 VDC≒ (except for the residual voltage ⁽⁰³⁾), OFF - 0 VDC≒, Load current ⁽⁰³⁾ , ≤ 300 mA, Residual voltage: ≤ 2 VDC≒ (except for voltage drop due to wiring), Load capability: ≤ 2.2 μF, Leakage current: ≤ 2.0 mA, Wire resistance of load: ≤ 2.7 Ω
Auxiliary output (AUX 1/2) ⁽⁰⁵⁾	NPN or PNP open collector Load voltage: ≤ 24 VDC≒, Load current: ≤ 100 mA, Residual voltage: ≤ 2 VDC≒ (except for voltage drop due to wiring)
Lamp output (LAMP 1/2) ⁽⁰⁵⁾	NPN or PNP open collector Load voltage: ≤ 24 VDC≒, Load current: ≤ 300 mA
External input	Reset input, mute 1/2 input, EDM, external test When setting NPN output ON: 0 - 3 VDC≒, OFF: 9 - 24 VDC≒ or open, short-circuit current: ≤ 3 mA When setting PNP output ON: 9 - 24 VDC≒, OFF: 0 - 3 VDC≒ or open, short-circuit current: ≤ 3 mA
Protection circuit	Reverse power polarity, reverse output polarity, output short-circuit over-current protection
Safety-related functions	Interlock (reset hold), external device monitoring (EDM), muting/override, Blanking (fixed blanking, floating blanking), reduced resolution
General functions	Self-test, alarm for reduction of incident light level, mutual interference prevention
Others functions	Change of sensing distance, switching to NPN or PNP, external test (light emission stops), auxiliary output (AUX 1, 2), lamp output (LAMP1, 2)
Synchronization type	Timing method by RS485 synchronous line
Insulation resistance	≥ 20MΩ (at 500 VDC≒ megger)
Noise immunity	± 240 VDC≒ the square wave noise (pulse width: 1μs) by the noise simulation
Dielectric strength	1,000 VAC~ 50 / 60 Hz for 1 minute
Vibration ⁽⁰⁶⁾	10 mm double amplitude at frequency of 5 to 150 Hz, 10 sweeps in each X, Y, Z direction
Shock ⁽⁰⁶⁾	250 m/s ² (≈ 25 G), pulse width 6 ms in each X, Y, Z direction for 100 times
Ambient illumination (receiver)	Incandescent lamp: ≤ 3,000 lx, sunlight: ≤ 10,000 lx
Ambient temperature	-30 to 60 °C, storage: -30 to 70 °C (no freezing or condensation)
Ambient humidity	35 to 85 %RH, storage: 35 to 95 %RH (no freezing or condensation)
Protection rating ⁽⁰⁷⁾	IP65, IP67 (IEC standard), IP67G (JEM Standard), IP69K (DIN standard)
Material	Case: Aluminum, Front cover and sensing part: Polymethyl methacrylate, End cap: polycarbonate, Power I/O cable and connector cable: polyurethane (PUR) or polyvinyl chloride (PVC), Y type connector cable: polyvinyl chloride (PVC), lamp output cable and series connector cable: polyurethane (PUR), Top / Bottom adjustable bracket and Top / Bottom bracket: SUS304, Side adjustable bracket and Side bracket: nickel plated Zn
Approval	CE    (industrial robot protection device) ⁽⁰⁸⁾
International standards	UL 508, CSA C22.2 No. 14, ISO 13849-1 (PL e, Cat. 4), ISO 13849-2 (PL e, Cat. 4), UL 61496-1 (Type 4, ESPE), UL 61496-2 (Type 4, AOPDs), IEC/EN 61496-1 (Type 4, ESPE), IEC/EN 61496-2 (Type 4, AOPDs), IEC/EN 61508-1~7 (SIL 3), IEC/EN 62061 (SIL CL 3)

(01) It may differ depending on the models. For more information, refer to the "SFL/SFLA User Manual."

(02) The values of load voltage were drawn with PNP output, and in case of NPN output, apply these in reverse.

(03) Be sure that the load current should be greater than 6 mA.

(04) The residual voltage was drawn with 300 mA of load current.

(05) It is the non-safety output. Do not use it for safety purposes.

(06) Testing according to IEC 61496-1 standards.

(07) Approved certification protection ratings are IP65 and IP67.

(08) The certified models for S-mark and KCs (industrial robot protection device) have the same functional basis.



View product details



Standard Type



Advanced Type

Safety Controllers SFC/SFC-R Series

Unit	Basic	Advanced	Non-contact door switch
Model	SFC-422-□	SFC-A322-2□-□	SFC-N322-2□-□
Power supply	24 VDC≒		
Allowable voltage range	85 to 110% of rated voltage		
Power consumption ⁽⁰¹⁾	≤ 2.5 W	≤ 3.0 W	≤ 3.5 W
Input	ON: ≥ 11 VDC≒ ≥ 5 mA, OFF: ≤ 5 VDC≒ ≤ 1 mA		
Input time	≥ 50 ms, feedback start (manual) : ≥ 100 ms		
Cable	≤ 100 m (≤ 100Ω, ≤ 10nF)		
Safety output	P channel FET ⁽⁰²⁾		
Instantaneous	4 x	3 x ⁽⁰³⁾	3 x ⁽⁰³⁾
Off-delay ⁽⁰⁴⁾	-	2 x ⁽⁰⁵⁾	2 x ⁽⁰⁵⁾
Time accuracy	-	≤ ± 5%	≤ ± 5%
Load current	Below 2-point output: ≤ DC 1 A, Over 3-point output: ≤ DC 0.8 A		
Leakage current	≤ 0.1 mA		
Operating time (OFF → ON) ⁽⁰⁵⁾	Safety input: ≤ 50 ms	Logic input: ≤ 200 ms	Non-contact door switch input: ≤ 100 ms
Response (return) time (ON → OFF) ⁽⁰⁵⁾	≤ 15 ms, non-contact door switch input or logic input: ≤ 20 ms		
Auxiliary output	2 x PNP transistor: X1, X2 (error)		
Load current	≤ 100 mA		
Leakage current	≤ 0.1 mA		
Logical AND connections	No. of connections: max. 4 units, no. of total connections: max. 20 units No. of layers: max. 5 layers, cable length: ≤ 100 m		
SFN connections ⁽⁰⁶⁾	-	-	Max. 30 units
Approval	IEC/EN 61508 (SIL3), IEC/EN 62061 (SILCL3) IEC/EN 60947-5-1, EN ISO 13849-1 (Category 4, PL e) UL listed E249635		
Certification	CE    		
Unit weight (package)	≈ 70 g (≈ 120 g)	≈ 90 g (≈ 140 g)	≈ 100 g (≈ 150 g)

(01) Not include the power consumption of loads. (SFC-N exclude the power supplied to the non-contact door switch.)

(02) Includes a diagnostic pulse (max. 600 μs). Be cautious when using the output signal as an input signal for the control device.



(03) Available changing via setting switch on the back side of the product.

(04) Available to set Off-delay time (max. 3 sec. / 300 sec., depends on model).

(05) The operation (response) time of each model. The time increases when a logical connection or expansion relay unit is connected.

(06) SFC-N units can only be connected to Autonics non-contact door switch units SFN Series.

Unit	Expansion relay	Relay		
Model	SFC-ER412-□	SFC-R412-□	SFC-R212-□	SFC-R212-R2□-□
Power supply	24 VDC≡			
Allowable voltage range	85 to 110% of rated voltage			
Power consumption ⁽⁰¹⁾	≤ 2.5 W	≤ 4.0 W	≤ 4.0 W	≤ 6.0 W
Input	ON: ≥ 11 VDC ≧ 5 mA, OFF: ≤ 5 VDC ≦ 1 mA			
Input time	≥ 50 ms, feedback start (manual) : ≥ 100 ms			
Cable	≤ 100 m (≤ 1000, ≤ 10nF)			
Safety output	Relay (A contact)			
Instantaneous	4 x	4 x	2 x	2 x
Off-delay ⁽⁰²⁾	-	-	-	2 x
Time accuracy	-	-	-	≤ ± 5%
Capacity	240 VAC~ 5 A resistance load, 30 VDC≡ 5 A resistance load			
Life expectancy	Mechanical: ≥ 10,000,000 operations, Malfunction: ≥ 50,000 operations			
Contact resistance	≤ 100 mΩ			
Inductive load switching	IEC60947-5-1: AC-15(230 V/2 A), DC-13(24 V/1.5 A), UL508: B300/R300			
Conditional short-circuit current	100 A ⁽⁰³⁾			
Operating time (OFF → ON) ⁽⁰⁴⁾	≤ 30 ms ⁽⁰⁵⁾	≤ 100 ms		
Response (return) time (ON → OFF) ⁽⁰⁴⁾	≤ 10 ms	≤ 15 ms		
Auxiliary output	1 x PNP transistor: X2 (error)	1 x PNP transistor: X1		
Load current	≤ 100 mA	≤ 100 mA		
Leakage current	≤ 0.1 mA			
Expansion units connections	Max. 5 units	-		
Approval	IEC/EN 61508 (SIL3), IEC/EN 62061 (SILCL3) IEC/EN 60947-5-1, EN ISO 13849-1 (Category 4, PLe) UL listed E249635			
Certification	CE UK  ENEC	CE (TUV NORD) UK  S ENEC		
Unit weight (package)	≈ 100 g (≈ 150 g)	≈ 110 g (≈ 160 g)	≈ 80 g (≈ 130 g)	≈ 110 g (≈ 150 g)

(01) Not include the power consumption of loads.

(02) Available to set Off-delay time (max. 3 sec. / 30 sec., depends on model).

(03) Use 6 A fast-blow fuse under the IEC 60127 standard as a short-circuit protection device.

(04) The operation (response) time of each model. The time increases when a logical connection or expansion relay unit is connected.

(05) Except operation time of advanced unit, non-contact door switch unit

Pollution	3
Overvoltage category	III
Impulse withstand voltage for relay unit (IEC/EN 60947-5-1)	Input terminals and relay output terminals: 6 kV Relay contacts between 13-14 / 23-24 and 33-34 / 43-44 (37-38 / 47-48): 6 kV between 13-14 and 23-24: 4 kV between 33-34 and 43-44 (37-38 and 47-48): 4 kV
Dielectric strength	[Basic / Advanced / Non-contact door switch unit] Between all terminals and case: 500 VAC~ 50/60 Hz for 1 min. [Expansion relay / Relay unit] Between all terminals and case: 1,500 VAC~ 50/60 Hz for 1 min. Between input terminals and output terminals ⁽⁰¹⁾ : 2,500 VAC~ 50/60 Hz for 1 min.

(01) In case of relay unit, output terminals between 13-14, 23-24 and 33-34, 43-44 (37-38, 47-48)



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Controllers



Relay Units

※ The specifications on this guide may be changed

Safety I/O Terminal Blocks **SFT Series**

Model	SFTS-4P-24V-□	SFTS-6P-24V-□	SFTL-4P-24V-□	SFTL-6P-24V-□
No. of pole	4	6	4	6
Applied relay ⁽⁰¹⁾	4-pole - SFS2-DC24V: 2A2B, SFS3-DC24V: 3A1B 6-pole - SFS4-DC24V: 4A2B, SFS5-DC24V: 5A1B, SFS6-DC24V: 3A3B			
Power supply	24 VDC≒ ±10 %			
Rated load voltage	250 VAC~ 50/60 Hz, 30 VDC≒			
Continuous current	6 A ⁽⁰²⁾			
Indicator	Operation indicator: green			
Terminal type	Screw		Screwless	
Applicable wire - solid	Ø 0.3 to Ø 1.2 mm		Ø 0.6 to 1.25 mm ⁽⁰³⁾	
Applicable wire - stranded	AWG 22-16 (0.30 to 1.25 mm²)		AWG 22-18 (0.30 to 0.80 mm²) ^{(03) (04)}	
Crimp terminal connection tensile strength	≥ 30 N		-	
Tightening torque	0.5 to 0.6 N m		-	
Stripped length	-		8 to 10 mm	
Insulation resistance	≥ 1,000 MΩ (500 VDC≒ megger)			
Dielectric strength (coil-contact)	4,000 VAC~ 50/60 Hz for 1 minute			
Dielectric strength (different poles contact)	2,500 VAC~ 50/60 Hz for 1 minute			
Dielectric strength (same polarity contact)	2,500 VAC~ 50/60 Hz for 1 minute			
Vibration	0.75 mm amplitude at frequency 10 to 55 Hz in each X, Y, Z direction for 2 hours			
Vibration (malfunction)	0.75 mm amplitude at frequency 10 to 55 Hz in each X, Y, Z direction for 10 minutes			
Shock	300 m/s² (≒ 30 G) in each X, Y, Z direction for 3 times			
Shock (malfunction)	150 m/s² (≒ 15 G) in each X, Y, Z direction for 3 times			
Ambient temperature	-25 to 70 °C, storage: -30 to 80 °C (no freezing or condensation)			
Ambient humidity	25 to 85 % RH, storage: 25 to 85 % RH (no freezing or condensation)			
Protection structure	IP20 (IEC standard)			
Material	CASE, BASE, COVER: PC Terminal: C2680		CASE, BASE: PC, Terminal: PA66, Copper, Stainless Steel	
Certification	CE   			
Unit weight (packaged)	≒ 37.8 g (≒ 85.8 g)	≒ 51.2 g (≒ 99.2 g)	≒ 39.8 g (≒ 88 g)	≒ 51.2 g (≒ 99.2 g)

01) For the detailed specification, refer to the materials from the manufacturer (PANASONIC).
02) Continuous current is the maximum current at each contact and must not exceed the total current depending on the number of contacts.
03) Use the cable of copper conductor in 60°C temperature class.
04) When using the stranded wire, use End Sleeve (Ferrule Terminal).



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Safety Flat Type Door Lock Switches **SFDL2 Series**

Model	SFDL2-□□□-□□ -□ SFDL2-□□□-□□K-□	SFDL2-□□□-□□ B-□ SFDL2-□□□-□□KB-□
Directing opening force	≥ 80 N	
Directing opening distance	≥ 10 mm	
Locking pullout strength	≥ 1,300 N	
Operating speed	0.05 to 1 m/s	
Operating frequency	≤ 20/min	
Mechanical life cycle	≥ 1,000,000 operations (20/min)	
Indicator	Solenoid status or contact status (orange, depending on connection)	-
Vibration (malfunction)	0.35mm amplitude at frequency of 10 to 55 Hz in each X, Y, Z direction for 10 min	
Shock	1,000 m/s² (≈ 100 G) in each X, Y, Z direction for 3 times	
Shock (malfunction)	80 m/s² (≈ 8 G) in each X, Y, Z direction for 3 times	
Ambient temperature	-10 to 55°C, storage: -25 to 65 °C (a non freezing or condensation environment)	
Ambient humidity	35 to 85 %RH , storage: 35 to 85 %RH (a non freezing or condensation environment)	
Protection structure	IP67 ⁰¹⁾ (IEC standard, except for head)	
Material	Head: zinc or PA, case: PA	
Approval	CE (TUV NORD), RoHS, REACH, S, E, ENEC	
Accessory	SFDL2-□□□-□□K/KB-□ (Special type release key): rotating key	
Unit weight (packaged)	Normal type: ≈ 400 g (≈ 490 g), rear release button type:≈ 395 g (≈ 485 g)	

01) Rated protection structure is for the switch body. Be cautious about preventing the head part from entering the foreign materials such as dust and water.

Contact block	
Rated voltage/current for load	Resistive load: 6 A/250 VAC~, 0.6 A/250 VDC≒, Inductive load (IEC): AC-15 3 A/240 VAC~, DC-13 0.27 A/250 VDC≒, Inductive load (UL): A300, Q300
Impulse dielectric strength	Between the terminals of same polarity: 2.5 kV, Between the terminals of different polarity: 4 kV Between each terminal and non-live part: 6 kV
Insulation resistance	≥ 100 MΩ (500 VDC≒ megger)
Contact resistance	≤ 100 mΩ
Electrical life cycle	≥ 100,000 operations (250 VAC~/6 A)
Conditional short-circuit current	100 A
Solenoid	
Rated voltage	24 VDC≒, class 2
Current consumption	Supplying power: 0.26A, Normal: max. 0.2A (approx. 3 seconds after supplying power)
Insulation class	Class E
Indicator LED	
Rated voltage	24 VDC≒
Current consumption	2.2 mA

Safety Door Lock Switches **SFDL Series**

Model	SFDL-□□□-□□	SFDL-□□□-C□□
Directing opening force	≥ 80 N	
Directing opening distance	≥ 10 mm	
Locking pullout strength	≥ 1,300 N	
Operating speed	0.05 to 1 m/s	
Operating frequency	≤ 20/min	
Machanical life cycle	≥ 1,000,000 operations (20/min)	
Vibration (malfunction)	0.35mm amplitude at frequency of 10 to 55 Hz in each X, Y, Z direction for 10 min	
Shock	1,000 m/s² (≈ 100 G) in each X, Y, Z direction for 3 times	
Shock (malfunction)	80 m/s² (≈ 8 G) in each X, Y, Z direction for 3 times	
Ambient temperature	-10 to 55°C ⁰¹⁾ , storage: -25 to 65 °C (a non freezing or condensation environment)	
Ambient humidity	35 to 85 %RH , storage: 35 to 85 %RH (a non freezing or condensation environment)	
Protection structure	IP67 ⁰²⁾ (IEC standard, except for head)	
Material	Head: zinc, case: polyamide 66, operation key: stainless steel 304	
Approval	CE (TUV NORD), RoHS, REACH, S, E, ENEC	
Accessory	SFDL-□□□-□□K (Special type release keyse key) : rotating key	
Applicable cable	AWG22	
Connection type	Terminal type	Connector type
Unit weight (packaged)	≈ 375 g (≈ 440 g)	≈ 325 g (≈ 395 g)

01) UL approved ambient temperature: 50°C
02) Rated protection structure is for the switch body. Be cautious about preventing the head part from entering the foreign materials such as dust and water.

Contact block	
Rated voltage/current for load	Resistive load: 1 A/120 VAC~, 0.22 A/125 VDC≒ Inductive load (IEC): AC-15 1 A/120 VAC~, DC-13 0.22 A/125 VDC≒ Inductive load (UL): C150, R150
Impulse dielectric strength	Between the terminals of same polarity: 1.5 kV Between the terminals of different polarity: 1.5 kV Between each terminal and non-live part: 2.5kV
Insulation resistance	≥ 100 MΩ (500 VDC≒ megger)
Contact resistance	≤ 200 mΩ
Electrical life cycle	≥ 100,000 operations (125 VAC~/1 A)
Conditional short-circuit current	100 A
Solenoid	
Rated voltage	24 VDC≒, class 2
Current consumption	Supplying power: 0.26A Normal: max. 0.2A (approx. 3 seconds after supplying power)
Insulation class	Class E



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Safety Door Switches **SFD Series**

Model	SFD-□□-□M20	SFD-□□-□G1/2	SFD-□□-□C
Rated voltage/current for load	Resistive load: 6 A/250 VAC~, 0.6 A/250 VDC~ Inductive load (IEC): AC-15 3 A/240 VAC~, DC-13 0.27 A/250 VDC~ Inductive load (UL): A300, Q300		
Directing opening force	≥ 80 N		
Directing opening distance	≥ 10 mm		
Operating speed	0.05 to 1 m/s		
Operating frequency	≤ 20/min		
Insulation resistance	≥ 100 MΩ (500 VDC≈ megger)		
Contact resistance	≤ 50 mΩ (initial value)		
Impulse dielectric strength	Between the terminals: 2 kV (IEC 60947-5-1) Between each terminal and non-live part: 5 kV (IEC 60947-5-1)		
Conditional short circuit current	100 A		
Life cycle	Electrical: ≥ 100,000 operations (240 VAC~ 6 A) Mechanical: ≥ 1,000,000 operations		
Protection structure	IP67 ^{ENV} (IEC standard, except for head)		
Material	Plastic head - polyamide 6, metallic head - zinc case: polyamide 6, operation key: stainless steel 304		
Approval	CE (TUV NORD)    		
Connection type	M20 connector cable	G1/2 connector cable	M12 plug connector
Unit weight (packaged)	1 connection outlet plastic: ≈ 80 g (≈ 120 g) - metallic: ≈ 110 g (≈ 150 g) 2 connection outlet plastic: ≈ 110 g (≈ 140 g) - metallic: ≈ 130 g (≈ 170 g)		Plastic: ≈ 85 g (≈ 130 g) Metallic: ≈ 115 g (≈ 160 g)

01) UL approved ambient temperature: 65°C

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Safety Non-contact Switches **SFN Series**

Model	SFN-M-□
Operating distance ^(*)	OFF→ON ≥ 5 mm
	ON→OFF ≤ 15 mm
Approval	CE (TUV NORD) UK CS RU IN US S EAC
Unit weight (packaged)	Cable type (2 m): ≈ 100.5 g (≈ 113.8 g) Cable type (5 m): ≈ 199.5 g (≈ 214.8 g) Cable connector type: ≈ 58.1 g (≈ 71.6 g)

01) It is rated at 23°C of ambient temperature, and it may be differed up to $\pm 20\%$ by ambient temperature.

Power supply	24 VDC= (± 10 %)
Operating frequency	100 Hz
Power consumption ⁰¹⁾	≤ 0.8 W
Auxiliary output	PNP open collector output - 24 VDC=, 10 mA
Operation indicator	ON: green, OFF: red
Life expectancy	≥ 20,000,000 times (with low load)
Insulation resistance	≥ 50 MΩ (500 VDC= megger)
Protection circuit	Surge protection circuit, output short over current protection circuit, reverse polarity protection circuit
Protection structure	IP67 (IEC standard)
Connection	Cable type / cable connector type model
Cable	Ø 5 mm, 5-wire, cable type: 2 m / 5 m, cable connector type: 0.3 m
Wire	AWG26 (0.08 mm), 28-core, core diameter: Ø 0.74 mm
Connector spec.	M12 plug connector
Material	Body/CAP: PC

01) Power to the load is not included.

Characteristic level / Safety category (with SFC-N322)	IEC 61508 SIL 3 IEC 62061 SIL CL 3 ISO 13849-1 PL e Cat.4 - HFT = 1 - Diagnostic Coverage : 99 % (high) - MTTFd = 100 year (high) - Mission time = 20 year - PFH = 3.88E-09
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Safety status in case of error: the switch does not have an internal error recognition function, so it cannot maintain a safety status in the event of error. Error recognition is processed in the connected controller (SFC-N322).

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Safety Grip Type Enabling Switches **SFEN Series**

Enable switch	
Rated Insulation Voltage	250 VAC~
Rated through current	2.5 A
Rated inductive load ⁽⁹¹⁾	AC-15 (0.75 A / 240 VAC~), DC-13 (0.55 A / 125 VDC=)
Rated resistive load ⁽⁹²⁾	0.75 A / 240 VAC~, 0.55 A / 125 VDC=
Controller strength	Operation direction: 200 N, for 1 min
Operating frequency	Electrical: ≤ 20 / min, Mechanical: ≤ 20 / min
Dielectric strength	Between terminals of same polarity, between terminals of different polarity, between terminal and non-live part : 2,500 VAC~ 50 / 60 Hz for 1 min (impulse dielectric strenght)
Electrical life cycle	≥ 100,000 operations (rated load)
Mechanical life cycle	OFF → ON → OFF: ≥ 100,000 operations / OFF → ON: ≥ 1,000,000 operations

01) Use a 10 A fuse gI or gG conforming to IEC60269 as short-circuit protection. The body does not have a built-in fuse.

02) Do not use the switch more than the controller strength. Failure to follow this instruction may result in product damage.

Stop button	
Rated Insulation Voltage	250 VAC~
Rated through current	3 A
Rated resistive load ^(a)	AC-12 (3 A / 250 VAC~, DC-12 (3 A / 30 VDC=))
Controller strength ^(a)	Operation direction: 400 N, for 1 min (operation direction: 0.5 N m, for 1 min)
Operating frequency	Electrical: ≤ 10 / min, Mechanical: ≤ 10 / min
Dielectric strength	Between terminals of same polarity: 1,000 VAC~ 50 / 60 Hz for 1 min. between terminals of different polarity, between terminal and non-live part : 2,000 VAC~ 50 / 60 Hz for 1 min.
Electrical life cycle	≥ 100,000 operations (rated load) (Push / Release 1 time)
Mechanical life cycle	≥ 100,000 operations (Push / Release 1 time)

01) Use a 10 A fuse gI or gG conforming to IEC60269 as short-circuit protection. The body does not have a built-in fuse.

02) Do not use the switch more than the controller strength. Failure to follow this instruction may result in product damage.

Momentary button	
Rated Insulation Voltage	125 VAC~
Rated through current	0.1 A
Rated resistive load ⁽¹⁾	AC-12 (0.1 A / 125 VAC~), DC-12 (0.1 A / 30 VDC=)
Controller strength ⁽²⁾	Operation direction: 10 N, for 1 min
Operating frequency	Electrical: ≤ 25 / min, Mechanical: ≤ 60 / min
Dielectric strength	Between terminals of same polarity: 600 VAC~ 50 / 60 Hz for 1 min. between terminals of different polarity, between terminal and non-live part : 1,000 VAC~ 50 / 60 Hz for 1 min.
Electrical life cycle	≥ 100,000 operations (rated load)
Mechanical life cycle	≥ 1,000,000 operations

01) Use a 10 A fuse gI or gG conforming to IEC60269 as short-circuit protection. The body does not have a built-in fuse.

02) Do not use the switch more than the controller strength. Failure to follow this instruction may result in product damage.

Common spec.	
Conditional short circuit current	100 A
Min. applied load	DC24 V 4 mA
Directing opening force	30 N ± 10
Directing opening distance	4.8 mm ± 0.5
Insulation resistance	≥ 100 MΩ (500 VDC = megger)
Vibration (malfunction)	1.5 mm double amplitude at frequency of 10 to 55 Hz in each X, Y, Z direction for 10 min
Shock (malfunction)	150 m/s ² (≈ 15 G) in each X, Y, Z direction for 3 times
Ambient temperature	-10 to 55 °C, storage: -25 to 65 °C (no freezing or condensation)
Ambient humidity	35 to 85 %RH, storage: 35 to 85 %RH (no freezing or condensation)
Insulation class	Class II (double insulation)
Indicator	Enable operation indicator (green)
Protection structure	SFEN: IP66 (IEC standard) SFEN-B, SFEN-M: IP65 (IEC standard)
Applicable wire	AWG 20 to 18 (0.5 to 0.75 mm ²)
Connection type	M20 connector cable gland
Material	Cover: PA66, button: PC, rubber grip: Silicone
International standards	IEC 60947-5-1, IEC 60947-5-8, UL 60947-5-1
Approval	    
Unit weight (package)	SFEN: ≈ 238 g (≈ 363 g) SFEN-B: ≈ 268 g (≈ 388 g) SFEN-M: ≈ 252 g (≈ 376 g)

Contact composition			
	SFEN	SFEN-B	SFEN-M
Enable switch	2 N.O.	2 N.O.	2 N.O.
Option output	1 N.C.	-	-
Stop button	-	2 N.C.	-
Momentary button	-	-	2 N.O.

※ The specifications on this guide may be changed

Safety Key Selector Switches SF2KR Series

Model	SF2KR-□-□-□	SF2KR-M□-□-□
Solenoid input volatge	-	Non-polar 24 VDC≐ (± 10%)
Solenoid current consumption	-	38.7 mA ± 5%
Conditional short circuit current	100 A	
Indicator	-	Solenoid operation (green)
Applicable wire	Contact: AWG 18 (0.823 mm ²)	Solenoid power: AWG 24 - 18, Contact: AWG 18 (0.823 mm ²)
Allowable operation frequency ⁰¹⁾	30 times/minute	
Life cycle	Mechanical: ≥ 100,000 times, electrical: ≥ 100,000 times	
Key pushing force	≥ 20 N	
Key rotating torque	0.2 to 1.8 N·m	
Insulation resistance	≥ 100 MΩ (500 VDC≐ megger)	
Dielectric strength	2,500 VAC~ 50/60 Hz for 1 minute	
Vibration	1.5 mm double amplitude at frequency of 10 to 55 Hz in each X, Y, Z direction for 2 hours	
Vibration (malfunction)	1.5 mm double amplitude at frequency of 10 to 55 Hz in each X, Y, Z direction for 10 minutes	
Shock	300 m/s ² (≈ 30 g) in each X, Y, Z direction for 3 times	
Shock (malfunction)	150 m/s ² (≈ 15 g) in each X, Y, Z direction for 3 times	
Ambient temperature	-20 to 70°C ⁰²⁾ , storage: -40 to 70 °C (at no freezing or condensation)	-10 to 55°C ⁰²⁾ , storage: -20 to 70 °C (at no freezing or condensation)
Ambient humidity	35 to 85%RH, storage: 35 to 85%RH (at no freezing or condensation)	
Protection structure	IP65 (front panel, IEC standard)	
Material	PC, POM	
Approval	CE (TUV NORD)    	
Unit weight (packaged) ⁰³⁾	≈ 130 g (≈ 192 g)	≈ 152 g (≈ 213 g)

01) Rotating and retuning once is counted as one operation.
02) UL approved ambient temperature: 55 °C
03) It is switch with contact blocks.

Contact capacity
IEC (EN60947-5-1)

Rated current	10 A			
Rated voltage	24 V	110 V	220 V	380 V
AC	Resistive load (AC-12)	10 A	10 A	3 A
	Inductive load (AC-15)	10 A	5 A	2 A
DC	Resistive load (DC-12)	10 A	2 A	0.2 A
	Inductive load (DC-13)	1.5 A	0.5 A	0.1 A

UL / CSA (UL508, CSA C22.2 No. 14)
A300

Rated voltage	Through current	Current (A)		Volt ampere (VA)	
		Making	Breaking	Making	Breaking
AC120 V	10 A	60	6	7,200	720
AC240 V		30	3		

Q300

Rated voltage	Through current	Current (A)		Volt ampere (VA)	
		Making	Breaking	Making	Breaking
DC125 V	2.5 A	0.55	0.55	69	69
DC250 V		0.27	0.27		



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Emergency Stop Button Switches SF2ER Series

Model	SF2ER-□□□□-□
Rated voltage/current	IEC: AC-15 (220 VAC~, 3 A), DC-13 (220 VDC≐, 0.2 A) UL: A300, Q300
Contact operating power	3.0 to 8.0 W/ 1 contact
Operation distance	5.0 mm (0/-0.5)
Rotation angle	CW (clock wise) 52°
Allowable operation frequency ⁰¹⁾	Mechanical: 20 times/minute, electrical: 20 times/minute
Life cycle	Mechanical: ≥ 250,000 times, electrical: ≥ 100,000 times
Applicable wire	AWG 18 (0.823 mm ²)
Insulation resistance	≥ 100 MΩ (500 VDC≐ megger)
Protection structure	IP65 ⁰¹⁾ (oil resistant, IEC standards)
Material	Button: PC, body: PA6, lever in fixing unit: PA6
Approval	CE (TUV NORD)    
Weight ⁰³⁾	≈ 66g

01) Setting and resetting once is counted as one operation.
02) It is only for part from front of the panel. Protection structure is guaranteed only when the switch is installed on flat and smooth surface with mounting holes Ø22mm.
03) It is switch with three contact blocks.

Contact capacity
IEC (EN60947-5-1)

Rated current	10 A			
Rated voltage	24 V	110 V	220 V	380 V
AC	Resistive load (AC-12)	10 A	10 A	3 A
	Inductive load (AC-15)	10 A	5 A	2 A
DC	Resistive load (DC-12)	10 A	2 A	0.2 A
	Inductive load (DC-13)	1.5 A	0.5 A	0.1 A

UL / CSA (UL508, CSA C22.2 No. 14)
A300

Rated voltage	Through current	Current (A)		Volt ampere (VA)	
		Making	Breaking	Making	Breaking
AC120 V	10 A	60	6	7,200	720
AC240 V		30	3		

Q300

Rated voltage	Through current	Current (A)		Volt ampere (VA)	
		Making	Breaking	Making	Breaking
DC125 V	2.5 A	0.55	0.55	69	69
DC250 V		0.27	0.27		



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Power Controllers SPRM Series

Model	SPRM3-F□R	SPRM3-F□EC
Control phases	Single phase 3 Ch or 3-phase	
Rated load voltage	Free voltage 220 - 440 VAC~ 50 / 60 Hz	
Rated load current ⁰¹⁾	25 / 40 / 55 / 70 / 90 / 110 / 160 A	
Display method	5 digit 11 segment LCD (white) × 4, Output BAR	
Auto control input	Current ⁰²⁾ : DC 4 - 20 mA × 3 Ch, voltage: 0 - 5 / 1 - 5 / 0 - 10 VDC≐, External adjuster (10 kΩ), communication: RS485, EtherCAT	
Manual control input	Parameter setting	
Digital input (DI)	RUN / STOP selectable, AUTO / MANU selectable, RESET	
Alarm output	250 VAC~ 2 A, 30 VDC≐ 2 A, 1c resistance load	
Comm. output	RS485	RS485, EtherCAT
Cooling method	Rated load current 25 / 40 / 55 A: natural cooling Rated load current 70 / 90 / 110 / 160 A: forced air cooling (with cooling fan)	
Unit weight (packaged)	Rated load current 25 / 40 / 55 A: ≈ 4.75 kg (≈ 5.75 kg)	
	Rated load current 70 A: ≈ 4.8 kg (≈ 5.8 kg)	
	Rated load current 90 / 110 / 160 A: ≈ 9.42 kg (≈ 10.55 kg)	
Approval	CE   	
SCCR Rating	100 kA (UL certification)	

01) It is the rated load current of each channel in single-phase operation.
02) Input impedance = 100 Ω

Control method	Phase control	Cycle control
Control mode	Normal / Constant current feedback / Constant voltage feedback / Constant power feedback	Fixed cycle / Variable cycle
Applied load	Resistance load, inductive load	Resistance load
Output range	Resistance load: 0 to 98 % Inductive load: 5 to 98 %	0 to 100 %
Output accuracy	Varies by control mode	
Normal	Within ± 10 % F.S. of rated load voltage	-
	Constant current / voltage / power feedback	Within ± 3 % F.S. of rated load current / voltage / power

Power supply	24 VDC≐	
Permissible voltage range	90 to 110 % of rated voltage	
Min. load current	1 A	
Power consumption	≤ 15 W	
Insulation resistance	≥ 200 MΩ (500 VDC≐ megger)	
Dielectric strength	Between the charging part and the case: 3,000 VAC~ 50 / 60 Hz for 1 min	
Output leakage current	≤ 10 mArms	
Noise immunity	± 500 V square wave noise (pulse width: 1 μs) by the noise simulator	
Memory retention	≈ 10 years (when using non-volatile semiconductor memory type)	
Vibration	0.5 mm double amplitude at frequency of 5 to 55 Hz in each X, Y, Z direction for 2 hours	
Vibration (malfunction)	0.5 mm double amplitude at frequency of 5 to 55 Hz in each X, Y, Z direction for 10 min	
Ambient temperature	-10 to 40 °C, storage: -20 to 80 °C (no freezing or condensation)	
Ambient humidity	35 to 85 %RH, storage: 35 to 85 %RH (no freezing or condensation)	

Communication Interface

RS485

Comm. protocol	Modbus RTU (16 bit CRC), Modbus ASCII
Application standard	Compliance with EIA RS485
Max. connection	31-unit (address: 1 to 99)
Comm. synchronous method	Asynchronous
Comm. method	2-wire half duplex
Comm. distance	≤ 800 m
Comm. speed	2,400 / 4,800 / 9,600 (default) / 14,400 / 19,200 / 38,400 / 57,600 / 115,200 bps
Comm. response time	0 to 9999 ms (default: 0 ms)
Start bit	-
Data bit	8 bit (fixed)
Parity bit	None (default), Even, Odd
Stop bit	1 bit (default), 2 bit
EEPROM life cycle	≈ 50,000 operations (Erase / Write)

EtherCAT

Comm. specifications	EtherCAT
Association approval ⁰¹⁾	EtherCAT 
Connection cable	CAT5e class or over (Shield type: SF/FTP, S/FTP, SF/UTP)
Max. comm. distance	Within 100 m distance between nodes
Max. baud rate	10 / 100 Mbps
Topology	Star, Line, Tree

01) EtherCAT® is registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.



View product details



※ The specifications on this guide may be changed

Displacement Sensors BD Series

Model	BD-030R	BD-065R	BD-100R
Beam shape	Standard		
Spot diameter (near)	≈ 100×100 μm	≈ 150×150 μm	≈ 200×200 μm
Spot diameter (reference)	≈ 100×100 μm	≈ 150×150 μm	≈ 220×220 μm
Spot diameter (far)	≈ 100×100 μm	≈ 150×150 μm	≈ 240×240 μm
Resolution ⁰¹⁾	1 μm	2 μm	4 μm
Reference distance	27.3 mm	62.9 mm	98.3 mm
Max. measurement range	24.9 to 29.7 mm	56.9 to 68.9 mm	86.3 to 110.3 mm
Rated measurement range ⁰²⁾	25.3 to 29.3 mm	57.9 to 67.9 mm	88.3 to 108.3 mm
Linearity ⁰³⁾	± 0.1% of F.S.		
Temperature characteristic ⁰⁴⁾	± 0.05% of F.S./°C		
Light source	Red semiconductor laser (wavelength: 660 nm, IEC 60825-1:2014)		
Optical method	Regular reflection		
Laser class	Class 1 (IEC/EN), Class I (FDA (CDRH) CFR Part 1002)		
Output	≤ 300 μW		
Laser Pulse duration	Max. 2 ms		
Material	Case: PC, Cable: PVC, Sensing part: Glass		
Certification	CE, RoHS, REACH		
Unit weight (packaged)	≈ 55 g (≈ 205 g)	≈ 66 g (≈ 228 g)	≈ 66 g (≈ 228 g)

01) When measuring mirror in stop state at the reference distance with belows.
[Conditions] reference temperature 25°C, reference distance response time 1 ms, average 128 times
02) The rated measurement range guarantees linearity.
03) Measurement error for linear displacement of white matte paper in the rated measurement range.
04) Value measured by using an aluminum jig fix the sensor head and non-glossy white paper.

Model	BD-030	BD-065	BD-100	BD-300	BD-600
Beam shape	Standard				
Spot diameter (near)	≈ 290×790 μm (25 mm)	≈ 360×1,590 μm (55 mm)	≈ 480×1,870 μm (80 mm)	≈ 990×1,000 μm (160 mm)	≈ 1,140×1,175 μm (250 mm)
Spot diameter (reference)	≈ 240×660 μm (30 mm)	≈ 290×1,180 μm (65 mm)	≈ 410×1,330 μm (100 mm)	≈ 490×510 μm (300 mm)	≈ 860×830 μm (600 mm)
Spot diameter (far)	≈ 190×450 μm (35 mm)	≈ 210×830 μm (75 mm)	≈ 330×950 μm (120 mm)	≈ 365×355 μm (450 mm)	≈ 800×775 μm (1,000 mm)
Resolution ⁰¹⁾	1 μm	2 μm	4 μm	20 μm	40 μm
Reference distance	30 mm	65 mm	100 mm	300 mm	600 mm
Max. measurement range	20 to 40 mm	50 to 80 mm	70 to 130 mm	160 to 450 mm	250 to 1,000 mm
Rated measurement ranges ⁰²⁾	25 to 35 mm	55 to 75 mm	80 to 120 mm	160 to 450 mm	250 to 1,000 mm
Linearity ⁰³⁾	± 0.1% of F.S.	± 0.1% of F.S.	± 0.15% of F.S.	± 0.25% of F.S.	± 0.25% of F.S. (250 to 600 mm) ± 0.5% of F.S. (600 to 1,000 mm)
Temperature characteristic ⁰⁴⁾	0.05% of F.S./°C	0.06% of F.S./°C		0.08% of F.S./°C	
Light source	Red semiconductor laser (wavelength: 660 nm, IEC 60825-1:2014)				
Optical method	Diffuse reflection				
Laser class	Class 1 (IEC/EN), Class I (FDA (CDRH) CFR Part 1002)	Class 2 (IEC/EN), Class II (FDA (CDRH) CFR Part 1002)			
Output	≤ 300 μW	≤ 1 mW			
Laser Pulse duration	2 ms Max.				
Material	Case: PC, Cable: PVC, Sensing part: Glass			Front case: AL, Rear case: PC, Cable: PVC, Sensing part: Glass	
Certification	CE   			CE  	
Unit weight (packaged)	≈ 56 g (≈ 209 g)	≈ 68 g (≈ 233 g)	≈ 68 g (≈ 233 g)	≈ 151 g (≈ 330 g)	≈ 153 g (≈ 332 g)

01) When measuring white paper in stop state at the reference distance with belows.
[Conditions] reference temperature 25°C, reference distance response time (BD-030 / 065 / 100) 1 ms, (BD-300 / 600) 2 ms, average 128 times
02) The rated measurement range guarantees linearity.
03) Measurement error for linear displacement of white matte paper in the rated measurement range.
04) Value measured by using an aluminum jig fix the sensor head and non-glossy white paper.

Supported amplifier	Amplifier unit (BD-A1) ⁰¹⁾
Power supply	From the amplifier unit (BD-A1)
Operation indicator	Power indicator (red), Laser emission indicator (green), NEAR/FAR indicator (green)
Insulation resistance	≥ 20 MΩ (500 VDC≒ megger)
Noise immunity	Square shaped noise by noise simulator (pulse width: 1μs) ±500V
Dielectric strength	Between the charging part and the case: 1,000 VAC~ 50/60 Hz for 1 minute
Vibration	1.5 mm amplitude at frequency of 10 to 55Hz in each X, Y, Z direction for 2 hours
Shock	300 m/s ² (≈ 30 G) in each X, Y, Z direction for 3 times
Ambient illumination	≤ 10,000 lx incandescent lamp
Ambient temperature	-10 to 50 °C, Storage: -15 to 60 °C (no freezing or condensation)
Ambient humidity	35 ~ 85%RH, Storage: 35 ~ 85%RH (no freezing or condensation)
Protection structure	IP67 (IEC Standards, except connector of extension cable)

01) Sensor head model BD-300/600 supports only over 5.0 firmware version of the amplifier unit (BD-A1) and communication converter (BD-C).



Amplifier unit	
Model	BD-A1
Power supply	10 - 30 VDC≒ ±10% (when connecting BD-C, communication converter, 12-30 VDC≒)
Power consumption ⁰¹⁾	≤ 2,800 mW (30 VDC≒)
Control Input	Hold trigger, Output reset, Laser OFF, Zero-point adjustment, BANK-A/B combinations : No-voltage input
Judgment output (HIGH/GO/LOW)	NPN or PNP open collector (load current: ≤ 100 mA)
Alarm output	NPN or PNP open collector (load current: ≤ 100 mA)
Analog output	Voltage: -5 - 5 V, 0 - 5 V, 1 - 5 V (resistance: 100 Ω, ± 0.05% F.S., at 10 V) Current: 4 - 20 mA 4 - 20 mA (load resistance: ≤ 350 Ω, ± 0.2% F.S., at 16 mA)
Residual voltage	NPN: ≤ 1.5 V, PNP: ≤ 2.5 V
Protection circuit	Reverse polarity protection circuit, output over current (short-circuit) protection circuit
Response Time	0.33 / 0.5 / 1 / 2 / 5 ms
Min. display unit	[BD-030 / 065 / 100 / 030R / 065R / 100R] 1 μm [BD-300 / 600] 10 μm ⁰²⁾
Display type	11 segment (red, green), 6-digit, LED
Display range ⁰³⁾	[BD-030 / 065 / 100 / 030R / 065R / 100R] ± 99.999 to ± 99 mm (4-step paramete set) [BD-300 / 600] ± 999.99 to ± 999 mm (3-step parameter set)
Display period	≈ 100 ms
Insulation resistance	≥ 20 MΩ (500 VDC≒ megger)
Noise immunity	Square shaped noise by noise simulator (pulse width: 1 μs) ± 500 V
Dielectric strength	Between the charging part and the case: 1,000 VAC~ 50/60 Hz for 1 minute
Vibration	1.5 mm amplitude at frequency of 10 to 55 Hz in each X, Y, Z direction for 2 hours
Shock	300 m/s ² (approx. 30 G) in each X, Y, Z direction for 3 times
Ambient temperature	-10 to 50 °C, Storage: -15 to 60 °C (no freezing or condensation)
Ambient humidity	≤ 85%RH, Storage: ≤ 85%RH (no freezing or condensation)
Material	Case: PC, Cover: PC, cable: PVC
Supported sensor head	Sensor head (BD-□) ⁰⁴⁾
Supported communication converter	Communication converter (BD-C) ⁰⁵⁾
Protection structure	IP40 (IEC standard)
Certification	CE, RoHS, REACH
Unit weight (packaged)	≈ 126 g (≈ 228 g)

01) Power to the load is not included.
02) Sensor head model BD-600 displays values per min. display unit (10 il) but actual value is increased/decreased per 20 il.
03) Setting range is assigned automatically when connecting sensor head.
04) Sensor head model BD-300 / 600 / 030R / 065R / 100R supports only over 5.0 firmware version of the amplifier unit (BD-A1).
05) The communication converter (BD-C) over 5.0 firmware version of supports only over 5.0 firmware version of the amplifier unit (BD-A1).



Communication Converter for Laser Displacement Sensors BD-C Series

Model	BD-CRS
Supported amplifier	Amplifier unit (BD-A1) ⁰¹⁾
Power supply	From the amplifier unit (BD-A1) (12 - 30 VDC≒)
Power Consumption	≤ 2.3 W
Communication Protocol	Modbus RTU
Connection type	RS-232C, RS-485
Communication speed	9600, 19200, 38400, 115200 bps (default)
Function	Executes every BD-Series feature, sets parameter and real-time monitoring by external device (Master)
Ambient temperature	-10 to 50 °C, Storage: -15 to 60 °C (no freezing or condensation)
Ambient humidity	≤ 85%RH, Storage: ≤ 85%RH (no freezing or condensation)
Vibration	1.5 mm amplitude at frequency of 10 to 55 Hz in each X, Y, Z direction for 2 hours
Shock	300 m/s ² (≈ 50 G) in each X, Y, Z direction for 3 times
Protection structure	IP40 (IEC standard)
Material	Case: PC
Accessory	Side connector, Connector for RS485
Sold separately	Communication converter: SCM Series
Certification	CE, RoHS, REACH
Unit weight (packaged)	≈ 49 g (≈ 91 g)

01) Communication converter (BD-C) firmware 5.0 and later only supports amplifier unit (BD-A1) firmware 5.0 and later.



LiDAR LSC Series

Model	LSC-C5CT3-ET	LSC-C10CT3-ET	LSC-C25CT3-ET
Environment of use	Indoor		
Emitting property	Infrared laser		
Laser class	CLASS 1		
Wave length band	905 nm		
Max. pulse output power	6 W		
Light beam emitting angle	14.5 mrad		
Scanning frequency	15 Hz		
Response time	Typ. 67 ms		
Detection distance range	0.05 to 5 m	0.05 to 10 m	0.05 to 25 m
Max. detection distance of 10 % reflector	5 m	8 m	
Detection distance error	System error: Typ. ± 60 mm, statistical error: Typ. 20 mm (1 σ)		
Min. object size ⁰¹⁾	At detection distance of 8 m: ≈ 121 mm		
Angular resolution	0.33°		
Aperture angle	270°		
Object reflectivity	> 4 %		
Number of field sets	16 (1 set: Consists of subfields 1, 2, 3)		
Number of field sets that can be used concurrently	1		
Unit weight (package)	≈ 228 g (314 g)		
Approval	CE UK ENEC IEC60947-2		

01) Even objects smaller than the set min. object size can be detected depending on the environment

Power supply	9 - 28 VDC≒
Power consumption ⁰¹⁾	< 4 W
Input	4 Photocoupler inputs H: ≥ 9 - 28 VDC≒, L: ≤ 3 VDC≒
Output signal	4: 3-output + 1-Ready / Error, Sync output NPN-PNP open collector output (software setting)
Load voltage	9 - 28 VDC≒
Load current	≤ 100 mA
Residual voltage	≤ 3.0 VDC≒
Protection structure	IP67 (IEC standard)
Connector specification	Power I / O: M12 12-pin, Ethernet: M12 8-pin
Material	Case: AL, Window: PC

01) Excluding power supplied to the load



View product details



LiDAR LSE3 Series

Model	LSE3-4A5R2-ET	LSE3-4A10R2-ET
Laser for detection emitting property	Infrared laser: 1	
Laser class	CLASS 1	
Wave length band	905 nm	
Max. pulse output power	80 W	
Laser for installation emitting property	Visible light laser: 3	
Laser class	CLASS 3R	
Wave length band	650 nm	
Max. CW output power	4 mW	
Min. object size ⁰¹⁾	Detection distance of 3 m : 2.1 × 2.1 × 2.1 cm Detection distance of 5 m : 3.5 × 3.5 × 3.5 cm	Detection distance of 3 m : 2.1 × 2.1 × 2.1 cm Detection distance of 5 m : 3.5 × 3.5 × 3.5 cm Detection distance of 10 m : 7.0 × 7.0 × 7.0 cm
Scanning frequency	15 Hz	
Response time	≤ 20 to 80 ms + monitoring time	
Scanning mode	Motion and presence	
Monitoring zone ⁰²⁾	0.3 × 0.3 to 5.6 × 5.6 m	0.3 × 0.3 to 10 × 10 m
Front contamination ⁰³⁾	Normal operation with max. 30 % contamination of one material	
Angular resolution	0.4 °	
Aperture angle	90 °	
Object reflectivity ⁰⁴⁾	≥ 2 %	
Certification	CE UK ENEC	
Korean Railway Standards	KRS SG 0068	
Unit weight (package)	≈ 0.9 kg (≈ 1.1 kg)	

01) At object reflectivity: 90 % (Kodak Gray card R-27, White), min. object size: OFF

02) At object reflectivity: 10 %, fog filter level: 0, based on the concentrated monitoring zone 0.3 m setting

03) At object reflectivity: 90 %, fog filter level: 0

04) At detection distance: 2.5 m, fog filter level: 0, object size = W 700 × H 300 × L 200 mm

Power supply	10 to 35 VDC≒
Power consumption	≤ 10 W
Input	Photocoupler input: 1 H ⁰¹⁾ : ≥ 8 - 30 VDC≒, L: ≤ 3 VDC≒
Output	PhotoMOS relay output: 2 Resistive load: 30 VDC≒ / 24 VAC~, ≤ 80 mA
Vibration	2 G (RMS 18.7 m/s ²)
Shock	30 G / 18 ms
Ambient illuminance	≤ 100,000 lx
Ambient temperature	-30 to 60 °C, storage: -30 to 70 °C (no freezing or condensation)
Ambient humidity	0 to 95 %RH, storage: 0 to 95 %RH (no freezing or condensation)
Protection structure	IP67 (IEC standard)
Cable spec.	Power I / O cable: Ø 5 mm, 8-wire, 5 m Ethernet cable: Ø 5 mm, 4-wire, 3 m, shield cable, RJ45 connector
Wire spec.	AWG26 (0.16 mm, 7-core), insulator outer diameter: Ø 1 mm
Material	Case: AL, Window: PC

01) At object reflectivity: 90 % (Kodak Gray card R-27, White), min. object size: OFF



View product details



LiDAR LSE2 Series

Model	LSE2-A5R2-ET
Laser for detection emitting property	Infrared laser: 1
Laser class	CLASS 1
Wave length band	905 nm
Max. pulse output power	27 W
Laser for installation emitting property	Visible light laser: 2
Laser class	CLASS 3R
Wave length band	650nm
Max. CW ⁰¹⁾ output power	4 mW
Min. object size ⁰²⁾	OFF, 5, 8, 10, 15, 20, 25, 30, 35, 40 cm
Scanning frequency	25 Hz
Response time	≤ 50 ms + monitoring time
Monitoring zone ⁰³⁾	≤ 5.6 × 5.6 m
Angular resolution	0.25°
Aperture angle	90°
Object reflectivity ⁰⁴⁾	≥ 2 %
Certification	CE UK ENEC ENEC
Korean Railway Standards	KRS SG 0068
Unit weight (package)	≈ 0.8 kg (≈ 1 kg)

01) Continuous wave

02) It is based on a white reflector.

Even objects smaller than the set min. object size can be detected depending on the environment.

03) At detection distance: 4 m, object reflectivity: 5 %, fog filter level: 0

04) At detection distance: 1.5 m, fog filter level: 0, object size = W 700 × H 300 × L 200 mm

Power supply	24 VDC≒ ± 15 %
Power consumption	< 10 W
Input	Photocoupler input: 1 H ⁰¹⁾ : ≥ 8 - 30 VDC≒, L: ≤ 3 VDC≒
Output	PhotoMOS relay output: 2, Resistive load: 30 VDC≒ / 24 VAC~, ≤ 80 mA
Ambient illuminance	≤ 100,000 lx
Ambient temperature	-30 to 60 °C, storage: -30 ~ 70 °C (no freezing or condensation)
Ambient humidity	0 to 95 %RH, storage: 0 to 95 %RH (no freezing or condensation)
Protection structure	IP67 (IEC standard)
Cable spec.	Power I / O cable: Ø 5 mm, 8-wire, 5 m Ethernet cable: Ø 5 mm, 4-wire, 3 m, shield cable, RJ45 connector

01) Operates as output test mode and outputs obstacle detection output and error status output.



View product details



Communication Interface

Ethernet (LSC/LSE2/LSE3)

Communication protocol	TCP/IP
Communication speed	100BASE-TX
Baud rate	100Mbps

Bluetooth (LSC)

Version	Bluetooth SIG v5.0
Association approval	Bluetooth
Frequency range	2.402 ~ 2.480 GHz
Application	Andriod only

※ The specifications on this guide may be changed

Proximity Sensors PRD Series

Installation	Flush type		
Model	PRD□12-4D-□-IL2	PRD□18-7D-□-IL2	PRD□30-15D-□-IL2
DIA. of sensing side	Ø 12 mm	Ø 18 mm	Ø 30 mm
Sensing distance	4 mm	7 mm	15 mm
Setting distance	0 to 2.8 mm	0 to 4.9 mm	0 to 10.5 mm
Hysteresis	≤ 10 % of sensing distance		
Standard sensing target: iron	12 × 12 × 1 mm	20 × 20 × 1 mm	45 × 45 × 1 mm
Response frequency ⁰¹⁾	500 Hz	250 Hz	100 Hz
Affection by temperature	≤ ± 10 % for sensing distance at ambient temperature 20 °C		
Indicator ⁰²⁾	IO-Link mode, SIO mode (varies by mode)		
IO-Link mode	Communication indicator (flashing green), operation indicator (orange), Abnormal detect indicator (cross-flashing green, orange)		
SIO mode	Operation indicator (orange), stable indicator (green), Abnormal detect indicator (cross-flashing green, orange)		
Approval	CE UK   IO-Link		

- 01) The response frequency is the average value. The standard sensing target is used and the width is set as 2 times of the standard sensing target, 1/2 of the sensing distance for the distance.
- 02) In case of SIO mode, use the device within the range where the stable indicator (green) is ON.
If the sensing target is in the too close detection distance, the stable indicator turns OFF but it is in a stable detection state.
In case of IO-Link mode, use the device within the range where unstable detection (Byte0_bit6) turns 0.
If the sensing target is in the too close detection distance, the too close detection (Byte0_bit5) is 1, but it is a stable detection state.

Installation	Non-flush type		
Model	PRD□12-8D-□-IL2	PRD□18-14D-□-IL2	PRD□30-25D-□-IL2
DIA. of sensing side	Ø 12 mm	Ø 18 mm	Ø 30 mm
Sensing distance	8 mm	14 mm	25 mm
Setting distance	0 to 5.6 mm	0 to 9.8 mm	0 to 17.5 mm
Hysteresis	≤ 10 % of sensing distance		
Standard sensing target: iron	25 × 25 × 1 mm	40 × 40 × 1 mm	75 × 75 × 1 mm
Response frequency ⁰¹⁾	400 Hz	200 Hz	100 Hz
Affection by temperature	≤ ± 10 % for sensing distance at ambient temperature 20 °C		
Indicator ⁰²⁾	IO-Link mode, SIO mode (varies by mode)		
IO-Link mode	Communication indicator (flashing green), operation indicator (orange), Abnormal detect indicator (cross-flashing green, orange)		
SIO mode	Operation indicator (orange), stable indicator (green), Abnormal detect indicator (cross-flashing green, orange)		
Approval	CE UK   IO-Link		

- 01) The response frequency is the average value. The standard sensing target is used and the width is set as 2 times of the standard sensing target, 1/2 of the sensing distance for the distance.
- 02) In case of SIO mode, use the device within the range where the stable indicator (green) is ON.
If the sensing target is in the too close detection distance, the stable indicator turns OFF, but it is in a stable detection state.
In case of IO-Link mode, use the device within the range where unstable detection (Byte0_bit6) turns 0.
If the sensing target is in the too close detection distance, the too close detection (Byte0_bit5) is 1, but it is a stable detection state.

Unit weight (package)	Ø 12 mm	Ø 18 mm	Ø 30 mm
Cable	≈ 62 g (≈ 74 g)	≈ 97 g (≈ 115 g)	≈ 143 g (≈ 180 g)
Cable connector	≈ 37 g (≈ 67 g)	≈ 62 g (≈ 80 g)	≈ 108 g (≈ 145 g)
Connector	≈ 20g (≈ 49 g)	≈ 41 g (≈ 81 g)	≈ 138 g (≈ 197 g)

Power supply	12 - 24 VDC≡ (ripple P-P: ≤ 10 %), operating voltage: 10 - 30 VDC≡
Current consumption	IO-Link mode: ≤ 25 mA, SIO mode: ≤ 20 mA
Control output	≤ 100 mA
Residual voltage ⁰¹⁾	≤ 2 V
Protection circuit	Surge protection circuit, output short over current protection circuit, reverse polarity protection
Insulation resistance	≥ 50 MΩ (500 VDC≡ megger)
Dielectric strength	Between the charging part and the case: 1,000 VAC~ 50 / 60 Hz for 1 min
Vibration	1.5 mm double amplitude at frequency 10 to 55 Hz in each X, Y, Z direction for 2 hours
Shock	1000 m/s² (≈ 100 G) in each X, Y, Z direction for 3 times
Ambient temp. ⁰²⁾	-25 to 70 °C, storage: -25 to 70 °C (no freezing or condensation)
Ambient humi.	35 to 95 %RH, storage: 35 to 95 %RH (no freezing or condensation)
Protection rating	IP67 (IEC standard)
Connection	Cable / Cable connector / connector models
Cable spec. ⁰³⁾	DIA. of sensing side Ø 12 mm: Ø 4 mm, 4-wire DIA. of sensing side Ø 18 mm, Ø 30 mm : Ø 5 mm, 4-wire
Wire spec.	AWG 22 (0.08 mm, 60-core), insulator diameter: Ø 1.25 mm
Connector spec.	M12 plug connector
Material	Standard type cable (black): polyvinyl chloride (PVC), Oil resistant cable (gray): polyvinyl chloride (oil resistant PVC), case / nut: nickel plated brass, washer: nickel plated iron, sensing side: PBT

- 01) Load current: 100 mA, cable length: 2 m
- 02) UL approved surrounding air temperature 40 °C
- 03) Cable type: 2 m, Cable connector type: 300 mm

Communication Interface

IO-Link	
Version	Ver. 1.1
Class	Class A
Baud rate	COM 2 (38.4 kbps)
Min. cycle time	2.3 ms
Data length	PD: 2 byte, OD: 1 byte (M-sequence: TYPE_2_2)
Vendor ID	899 (0x383)



View product details



Proximity Sensors PRFD Series

Installation	Flush type			
General	PRFDCM08-2D-IL2	PRFDCM12-3D-IL2	PRFDCM18-7D-IL2	PRFDCM30-12D-IL2
DIA. of sensing side	Ø 8 mm	Ø 12 mm	Ø 18 mm	Ø 30 mm
Sensing distance ⁰¹⁾	2 mm	3 mm	7 mm	12 mm
Setting distance ⁰¹⁾	0 to 1.4 mm	0 to 2.1 mm	0 to 4.9 mm	0 to 8.4 mm
Hysteresis	≤ 15 % of sensing distance			
Standard sensing target: iron	12 × 12 × 1 mm	12 × 12 × 1 mm	30 × 30 × 1 mm	54 × 54 × 1 mm
Response frequency ⁰²⁾	150 Hz	80 Hz	80 Hz	50 Hz
Affection by temperature	≤ ± 20 % for sensing distance at ambient temperature 20 °C			
Indicator ⁰³⁾	IO-Link mode, SIO mode			
IO-Link mode	Communication indicator (flashing green), operation indicator (orange), Abnormal detect indicator (cross-flashing green, orange)			
SIO mode	Operation indicator (orange), stable indicator (green), Abnormal detect indicator (cross-flashing green, orange)			
Approval	CE UK   IO-Link			
Unit weight (package)	≈ 10 g (≈ 35 g)	≈ 15 g (≈ 40 g)	≈ 32 g (≈ 67 g)	≈ 85 g (≈ 140 g)

- 01) Use accessories (nut, washer) made of SUS. Or, sensing distance cannot be guaranteed.
- 02) The response frequency is the average value. The standard sensing target is used and the width is set as 2 times of the standard sensing target, 1/2 of the sensing distance for the distance.
- 03) In case of SIO mode, use the device within the range where the stable indicator (green) is ON.
In case of IO-Link mode, use the device within the range where unstable detection (Byte0_bit6) turns 0.

Power supply	10 - 30 VDC≡ (ripple P-P: ≤ 10 %)
Current consumption	≤ 20 mA
Control output	≤ 100 mA
Residual voltage	≤ 2.5 V
Protection circuit	Surge protection circuit, output short over current protection circuit, reverse polarity protection
Insulation resistance	≥ 50 MΩ (500 VDC≡ megger)
Dielectric strength	1,000 VAC~ 50 / 60Hz for 1 minute (between all terminals and case)
Vibration	1.5 mm double amplitude at frequency 10 to 55 Hz in each X, Y, Z direction for 2 hours
Shock	1,000 m/s² (≈ 100 G) in each X, Y, Z direction for 10 times (DIA. of sensing side Ø 8 mm : 500 m/s² (≈ 50 G) in each X, Y, Z direction for 10 times)
Ambient temp. ⁰¹⁾	-25 to 70 °C, storage: -25 to 70 °C (no freezing or condensation)
Ambient humi.	35 to 95 %RH, storage: 35 to 95 %RH (no freezing or condensation)
Protection	IP66, IP67 (IEC standard), IP67G (JEM standard), IP68
Connection	Connector models
Connector	M12 plug connector
Material	Case / Nut: stainless steel 303 (SUS303), washer: stainless steel 304 (SUS304), sensing side ⁰²⁾ : stainless steel 303 (SUS303)

- 01) UL approved surrounding air temperature 60 °C
- 02) Thickness: DIA. of sensing side Ø 8 mm: 0.2 mm / DIA. of sensing side Ø 12 mm, Ø 18 mm: 0.4 mm /DIA. of sensing side Ø 30 mm: 0.5 mm

Communication Interface

IO-Link	
Version	Ver. 1.1
Class	Class A
Baud rate	COM 2 (38.4 kbps)
Min. cycle time	2.3 ms
Data length	PD: 2 byte, OD: 1 byte (M-sequence: TYPE_2_2)
Vendor ID	899 (0x383)



View product details



※ The specifications on this guide may be changed

Temperature Controllers TMH Series

Control module

Model	TMH2-□□□	TMH2-□□□-L	TMH4-□□□	TMH4-□□□-L
No. of channels	2 channels		4 channels	
Sampling period	50 ms (2 channels or 4 channels synchronous sampling)			
Input specification	Thermocouple, RTD, Analog (refer to 'Input Specification')			
CT input	• 0.0 - 50.0A (primary current measurement range) • CT ratio: 1/1,000, • Measurement accuracy: ±5% F.S. ±1 digit			
Digital input	• Connect input ON: ≤ 1 kΩ, OFF: ≥ 100 kΩ • Solid state input Residual voltage: ≤ 0.9 V, Leakage current: ≤ 0.5 mA • Outflow current: ≈ 0.3 mA per input		-	
Control type	Heating, cooling, heating & cooling: ON/OFF, P, PI, PD, PID control			
Control output	• Relay: 250 VAC~ 3 A 1a mechanical life cycle: ≥ 10,000,000 operations, electrical life cycle: ≥ 100,000 operations • SSR: 12 VDC≐ ±3 V, ≤ 20 mA • Current ⁽¹⁾ : DC 4 - 20 mA or DC 0 - 20 mA (Load: ≤ 500 Ω)			
Alarm output	250 VAC~ 3 A 1a Mechanical life cycle: ≥ 10,000,000 operations Electrical life cycle: ≥ 100,000 operations		-	
Communication	Modbus RTU			
Hysteresis	• Thermocouple / RTD: 1 to 100 (0.1 to 100.0) °C/°F • Analog: 1 to 100 digit			
Proportional band (P)	• Thermocouple / RTD: 0.1 to 999.9 °C/°F • Analog: 0.1 to 999.9 %			
Integral time (I)	0 to 9,999 sec			
Derivative time (D)	0 to 9,999 sec			
Control period (T)	• Relay output, SSR drive output: 0.1 to 120.0 sec • Selectable current or SSR drive output: 1.0 to 120.0 sec			
Manual reset	0 to 100 (0.0 to 100.0) %			
Insulation type	Double insulation or reinforced insulation (mark: □, dielectric strength between the measuring input part and the power part: 1 kV)			
Unit weight (packaged)	≈ 174 g (≈ 249 g)	≈ 162 g (≈ 261 g)	≈ 154 g (≈ 229 g)	≈ 151 g (≈ 250 g)

01) When the control output is set to the current output, the heater current value monitoring function through the CT input terminals is not available.

Option module

Model	TMHA-42A	TMHA-42A-L
No. of channels	4 channels	
Sampling period	50 ms (4 channels synchronous sampling)	
Input specification	Thermocouple, RTD, analog (refer to 'Input Specification')	
Transmission output	DC 4 - 20 mA or DC 0 - 20 mA (Load: ≤ 500 Ω)	
Communication	Modbus RTU	
Insulation type	Double insulation or reinforced insulation (mark: □, dielectric strength between the measuring input part and the power part: 1 kV)	
Unit weight (packaged)	≈ 160 g (≈ 235 g)	≈ 148 g (≈ 247 g)

Model	TMHE-82R	TMHE-82R-L	TMHCT-82N	TMHCT-82N-L
No. of I/O points	8 points		8 points	
Input specification	- Digital input • Connect input ON: ≤ 1 kΩ, OFF: ≥ 100 kΩ • Solid state input Residual voltage: ≤ 0.9 V, Leakage current: ≤ 0.5 mA • Outflow current: ≈ 0.3 mA per input		- CT input • 0.0-50.0 A (primary current measurement range) • CT ratio: 1/1,000 • Measurement accuracy: ±5% F.S. ±1 digit	
Alarm output	250 VAC~ 3 A 1a, • Mechanical life cycle: ≤ 10,000,000 operations • Electrical life cycle: ≤ 100,000 operations		-	
Communication	Modbus RTU			
Insulation type	Double insulation or reinforced insulation (mark: □, dielectric strength between the measuring input part and the power part: 1 kV)		-	
Unit weight (packaged)	≈ 163 g (≈ 239 g)	≈ 151 g (≈ 250 g)	≈ 144 g (≈ 219 g)	≈ 133 g (≈ 232 g)



View product details



Communication module

Model		TMHC-22L	TMHC-22L-L	TMHC-22E
Communi- -cation	COM1	• Connection type: RS422 / RS485 • Protocol: Modbus RTU, PLC Ladderless communication		• Connection type: Ethernet (10/100BaseT) • Protocol: Modbus TCP
	COM2			
Insulation type		Double insulation or reinforced insulation (mark:  , dielectric strength between the measuring input part and the power part: 1 kV)		
Unit weight (packaged)		≈ 147 g (≈ 222 g)	≈ 137 g (≈ 236 g)	≈ 129 g (≈ 204 g)

Common

Power supply	24 VDC≡
Permissible voltage range	90 to 110% of rated voltage
Power Consumption	≤ 5 W (for max. load)
Display type	None- parameter setting and monitoring is available at external devices
Memory retention	≈ 10 years (non-volatile semiconductor memory type)
Insulation resistance	100 MΩ (500 VDC≡ megger)
Dielectric strength	Between the charging part and the case: 1,000 VAC~ 50/60 Hz for 1 min
Vibration	0.75mm amplitude at frequency of 5 to 55Hz in each X, Y, Z direction for 2 hours
Noise immunity	Square shaped noise by noise simulator (pulse width 1 μs) ±0.5 kV
Ambient temperature	-10 to 50 °C, storage: -20 to 60 °C (no freezing or condensation)
Ambient humidity	35 to 85%RH, Storage: 35 to 85%RH (no freezing or condensation)
Protection structure	IP20 (IEC standard)
Certification	CE, UKCA, RoHS, REACH

Communication Setting

Interface

Module	Control	Option	Communication	
Series	TMH2/4	TMHA, TMHE, TMHCT	TMHC-22L	TMHC-22E
Protocol	Modbus RTU		Modbus RTU, PLC Ladderless communication	Modbus TCP
Comm. method	RS485		RS422, RS485	Ethernet (10/100BaseT)
PC loader	TTL (Protocol: Modbus RTU)			
Maximum connection	32 units (address: 01 to 32) • 16 units in case of connecting TMHC module (address: 01 to 16)	16 units per each module	Control module 16 units, option module 16 units per each module (32 units in total)	
Synchronization	Asynchronous			-
Connection method	Two-wire half duplex			-
Comm. effective range	≤ 800 m			-
Comm. speed	4,800 / 9,600 (default) / 19,200 / 38,400 / 115,200 bps (parameter)			10/100 Mbps
Response time	5 to 99 ms (default: 20 ms)			-
Start bit	1 bit (fixed)			-
Data bit	8 bit (fixed)			-
Parity bit	None (default) , Odd, Even			-
Stop bit	1 bit, 2 bit (default)			-
EEPROM life cycle	≈ 1,000,000 operations (Erase / Write)			

- When changing the setting value related to communication interface, reboot the device for normal operation.
- It is recommended to use Autonics communication converter. Please use twisted pair wire, which is suitable for RS485 communication.

※ The specifications on this guide may be changed

SMPS SPB-A Series

Indicator	Output indicator (green), output low voltage indicator (red)
Over-current protection	≥ 121 %
Over-voltage protection	≈ 130 %
Output short-circuit protection ⁰¹⁾	Built-in
Overheat protection	Built-in
Parallel operation ⁰²⁾	Available
Insulation resistance	Between all input terminals, all output terminals and PE : ≥ 100 MΩ (500 VDC≡ megger)
Dielectric strength	Between all input terminals and all output terminals: 3 kVAC~, Cutoff current = 20 mA Between all input terminals and PE: 2 kVAC~, Cutoff current = 20 mA Between all output terminals and PE: 1 kVAC~, Cutoff current = 20 mA
Vibration ⁰³⁾	10 to 55 Hz, 0.75 mm double amplitude, in each X, Y, Z direction for 2 hours
Shock	150 m/s ² (≈ 15 G) in each X, Y, Z direction for 3 times
EMS	Conforms to EN61000-6-2
EMI	Conforms to EN61000-6-4
Ambient temperature ⁰⁴⁾	-20 to 70 °C, storage: -25 to 80 °C (no freezing or condensation)
Ambient humidity	20 to 90 %RH, storage: 20 to 90 %RH (no freezing or condensation)
Life expectancy ⁰⁵⁾	10 years
Protection structure	IP20 (IEC standard)
Certification ⁰⁵⁾	  

- 01) To reset the overvoltage protection, shut off input power for at least 5 minutes and then restart.
02) For more information, refer the product manuals.
03) Applies when the device is installed vertically to the ground. For non-vertical installation, secure the product to withstand vibration and shock.
04) UL approved ambient temperature 40 °C, refer to the 'Derating Curve'.
05) It is for 100 - 240 VAC~ / VDC≡ power input only.

Model		SPB-A015 -05	SPB-A015 -12	SPB-A015 -24	SPB-A030 -05	SPB-A030 -12	SPB-A030 -24
Input							
Voltage ⁽⁰¹⁾		100 - 240 VAC~ / 90 - 350 VDC≡ (allowable voltage: 85 - 264 VAC~)					
Current ⁽⁰²⁾ (Typical)	115 VAC~	0.32 A	0.29 A	0.31 A	0.54 A	0.57 A	0.58 A
	230 VAC~	0.21 A	0.19 A	0.2 A	0.33 A	0.36 A	0.36 A
Frequency		50 / 60 Hz (allowable frequency: 47 - 63 Hz)					
Efficiency ⁽⁰²⁾ (Typical)	115 VAC~	0.72	0.78	0.75	0.73	0.82	0.82
	230 VAC~	0.70	0.74	0.75	0.71	0.81	0.82
Power factor ⁽⁰²⁾ (Typical)	115 VAC~	0.56	0.56	0.57	0.5	0.51	0.53
	230 VAC~	0.44	0.47	0.45	0.44	0.41	0.43
Power factor correction circuit (PFC)		Not available					
Inrush current ⁽⁰³⁾ (Typical)	115 VAC~	16 A					0.16 mA
	230 VAC~	32 A					
Leakage current (Typical)	115 VAC~	0.21 mA			0.16 mA		
	230 VAC~	0.28 mA			0.25 mA		
Output							
Voltage		5 VDC≡	12 VDC≡	24 VDC≡	5 VDC≡	12 VDC≡	24 VDC≡
Current		3 A	1.2 A	0.65 A	5 A	2.5 A	1.3 A
Power		15 W	14.4 W	15.6 W	25 W	30 W	31.2 W
Power boost ⁽⁰⁴⁾		120 % of rated current					
Voltage adjustment range		-10 to 15 % (with VAdjust)					
Ripple ⁽⁰²⁾⁽⁰⁵⁾		260 mV _{p-p}	150 mV _{p-p}	170 mV _{p-p}	120 mV _{p-p}	120 mV _{p-p}	150 mV _{p-p}
Input variation ⁽⁰⁶⁾		≤ 0.5 %					
Load variation ⁽⁰⁷⁾		≤ 3.0 %	≤ 2.0 %	≤ 1.5 %	≤ 3.0 %	≤ 2.0 %	≤ 1.5 %
Temperature variation		≤ 0.05 % / °C					
Start-up time ⁽⁰²⁾	115 VAC~	720 ms	810 ms	820 ms	580 ms	650 ms	850 ms
	230 VAC~	330 ms	400 ms	650 ms	670 ms	510 ms	710 ms
Hold time ⁽⁰²⁾ (Typical)	115 VAC~	32 ms	33 ms	43 ms	33 ms	29 ms	28 ms
	230 VAC~	136 ms	146 ms	140 ms	149 ms	131 ms	129 ms
Output low voltage indicate		4.2 V	9.6 V	20.0 V	4.2 V	9.6 V	20.0 V
		(± 10 %)	(± 10 %)	(± 10 %)	(± 10 %)	(± 10 %)	(± 10 %)
Unit weight (Package)		≈ 135 g (≈ 230 g)			≈ 170 g (≈ 265 g)		



View product details



Model	SPB-A060-12		SPB-A060-24	SPB-A120-12	SPB-A120-24
Input					
Voltage ⁽⁰¹⁾		100 - 240 VAC~ / 90 - 350 VDC≡ (allowable voltage: 85 - 264 VAC~)			
Current ⁽⁰²⁾ (Typical)	115 VAC~	1.05 A	1.1 A	1.3 A	1.3 A
	230 VAC~	0.6 A	0.7 A	0.7 A	0.7 A
Frequency		50 / 60 Hz (allowable frequency: 47 - 63 Hz)			
Efficiency ⁽⁰³⁾ (Typical)	115 VAC~	0.81	0.85	0.82	0.86
	230 VAC~	0.82	0.87	0.84	0.89
Power factor ⁽⁰²⁾ (Typical)	115 VAC~	0.54	0.54	0.99	0.99
	230 VAC~	0.46	0.46	0.92	0.91
Power factor correction circuit (PFC)		Not available		Available	
Inrush current ⁽⁰³⁾ (Typical)	115 VAC~	16 A		32 A	
	230 VAC~	32 A			
Leakage current (Typical)	115 VAC~	0.16 mA		0.3 mA	
	230 VAC~	0.3 mA		0.38 mA	
Output					
Voltage		12 VDC≡	24 VDC≡	12 VDC≡	24 VDC≡
Current		4.5 A	2.5 A	10 A	5 A
Power		54 W	60 W	120 W	
Power boost ⁽⁰⁴⁾		120 % of rated current			
Voltage adjustment range		-10 to 15 % (with VAdjust)			
Ripple ^{(02) (05)}		460 mV _{p-p}	110 mV _{p-p}	470 mV _{p-p}	310 mV _{p-p}
Input variation ⁽⁰⁶⁾		≤ 0.5 %			
Load variation ⁽⁰⁷⁾		≤ 2.0 %	≤ 1.5 %	≤ 2.0 %	≤ 1.5 %
Temperature variation		≤ 0.05 % / °C			
Start-up time ⁽⁰²⁾	115 VAC~	635 ms	830 ms	740 ms	990 ms
	230 VAC~	655 ms	770 ms	710 ms	930 ms
Hold time ⁽⁰²⁾ (Typical)	115 VAC~	23 ms	22 ms	32 ms	34 ms
	230 VAC~	106 ms	103 ms	31 ms	32 ms
Output low voltage indicate		9.6 V (± 10 %)	20.0 V (± 10 %)	9.6 V (± 10 %)	20.0 V (± 10 %)
Unit weight (Package)		≈ 230 g (≈ 325 g)		≈ 565 g (≈ 725 g)	

Model	SPB-A240-12	SPB-A240-24	SPB-A240-48	SPB-A480-24	SPB-A480-48
Input					
Voltage ⁰¹⁾	100 - 240 VAC~ / 90 - 350 VDC≡ (allowable voltage: 85 - 264 VAC~)				
Current ⁰²⁾ (Typical)	115 VAC~	2.5 A		4.8 A	
	230 VAC~	1.3 A		2.4 A	
Frequency	50 / 60 Hz (allowable frequency: 47 - 63 Hz)				
Efficiency ⁰²⁾ (Typical)	115 VAC~	0.86	0.89	0.90	0.89
	230 VAC~	0.89	0.92	0.93	0.91
Power factor ⁰²⁾ (Typical)	115 VAC~	0.99		0.99	
	230 VAC~	0.9		0.97	
Power factor correction circuit (PFC)	Available				
Inrush current ⁰³⁾ (Typical)	115 VAC~	16 A		40 A	
	230 VAC~	32 A		55 A	
Leakage current (Typical)	115 VAC~	0.14 mA		0.13 mA	
	230 VAC~	0.25 mA		0.24 mA	
Output					
Voltage	12 VDC≡	24 VDC≡	48 VDC≡	24 VDC≡	48 VDC≡
Current	20 A	10 A	5 A	20 A	10 A
Power	240 W			480 W	
Power boost ⁰⁴⁾	120 % of rated current				
Voltage adjustment range	-10 to 15 % (with VAdjust)				
Ripple ^{02),05)}	430 mV _{p-p}	300 mV _{p-p}	360 mV _{p-p}	270 mV _{p-p}	320 mV _{p-p}
Input variation ⁰⁶⁾	≤ 0.5 %				
Load variation ⁰⁷⁾	≤ 2.0 %	≤ 1.5 %		≤ 1.5 %	
Temperature variation	≤ 0.05 % / °C				
Start-up time ⁰²⁾	115 VAC~	290 ms	310 ms	390 ms	430 ms
	230 VAC~	250 ms	250 ms	290 ms	300 ms
Hold time ⁰²⁾ (Typical)	115 VAC~	36 ms	40 ms	36 ms	31 ms
	230 VAC~	39 ms	38 ms	36 ms	30 ms
Output low voltage indicate (± 10 %)	9.6 V (± 10 %)	20.0 V (± 10 %)	43.0 V (± 10 %)	20.0 V (± 10 %)	43.0 V (± 10 %)
	20.0 V (± 10 %)	20.0 V (± 10 %)	43.0 V (± 10 %)	20.0 V (± 10 %)	43.0 V (± 10 %)
Unit weight (Package)	≈ 850 g (≈ 1,050 g)			≈ 1,350 g (≈ 1,570 g)	

01) For DC voltage input, install a external fuse to ensure safety.

Model	Fuse specification
SPB-A015 / 030-□	≥ 350 VDC≡, 4 A
SPB-A060 / 120-□	≥ 350 VDC≡, 6 A
SPB-A240 / 480-□	≥ 350 VDC≡, 12 A

- 02) Based on 100 % load
03) When cold start operation at 25 °C.
04) For more information, refer the product manuals.
05) Based on 20 MHz (Typ).
Data measured by connecting capacitors of 22 μF (Aluminum electrolytic capacitor) and 0.1 μF (Film capacitor) to 150 mm from the output terminal. Ripple specifications change when operating in Burst mode.
06) Based on 85 - 264 VAC~ input, 100 % load
07) Based on 0 to 100 % load

※ The specifications on this guide may be changed

Remote I/O System **ADIO Series**

■ **ADIO-ILM (Master Type)**

Supply voltage	18 - 30 VDC≒
Rated voltage	24 VDC≒
Current consumption	2.4 W (≤ 216 W)
Supplying current per port	≤ 2 A/Port
Sensor current (US)	≤ 9 A
Dimensions	W 66 × H 215 × D 38 mm
Material	Zinc Die casting
Ethernet port	M12 (Socket-Female), 4-pin, D-coded, Push-Pull Number of ports: 2 (IN/OUT) Supported function: daisy chain
Power supply port	Input: 7/8" (Plug-Male), 5-pin Output: 7/8" (Socket-Female), 5-pin Number of ports: 2 (IN/OUT) Supported function: daisy chain
PDCT port	M12 (Socket-Female), 5-pin, A-coded, Push-Pull Number of ports: 1 Connection method: USB serial communication
I/O port	M12 (Socket-Female), 5-pin, A-coded, Push-Pull Number of ports: 8
Mounting method	Mounting hole: fixed with M4 screw
Grounding method	Grounding hole: fixed with M4 screw
Unit weight (packaged)	≈ 700 g (≈ 900 g)

Mode specifications

Mode	Digital Input
Number of channels	16-CH (I/Q: 8-CH, C/Q: 8-CH)
I/O common	NPN / PNP
Input current	5 mA
ON voltage/current	Voltage: ≥ 15 VDC≒ Current: ≥ 5 mA
OFF voltage	≤ 5 VDC≒
Mode	IO-Link
Input current	2 mA
ON voltage/current	Voltage: ≥ 15 VDC≒ Current: ≥ 2 mA
OFF voltage	≤ 5 VDC≒

Certification

Certification	CE UKCA
Association approval	IO-LinkIO-LinkEtherNet/IP

■ **Communication Interface**

Ethernet

Ethernet standard	100BASE-TX
Cable spec.	STP (Shielded Twisted Pair) Ethernet cable over Cat 5
Transmission rate	100 Mbps
Cable length	≤ 100 m
Protocol	EtherCAT

EtherNet/IP

Ethernet standard	100BASE-TX
Cable spec.	STP (Shielded Twisted Pair) Ethernet cable over Cat 5
Transmission rate	10 / 100 Mbps
Cable length	≤ 100 m
Protocol	EtherNet/IP
Address settings	Rotary switches, DHCP, BOOTP, atIOLink
Factory settings	• IP Address: 192.168.2.3 • Subnet Mask: 255.255.255.0 • Gateway Address: 192.168.2.1
EDS file	Download the EDS file at the Autonics website.

PROFINET

Ethernet standard	100BASE-TX
Cable spec.	STP (Shielded Twisted Pair) Ethernet cable over Cat 5
Transmission rate	100 Mbps
Cable length	≤ 100 m
Protocol	PROFINET
Address settings	Rotary switches, DCP, atIOLink
GSDML file	Download the GSDML file at the Autonics website.

IO-Link

Version	1.1
Transmission rate	COM1 : 4.8 kbps / COM2 : 38.4 kbps / COM3 : 230.4 kbps
Port class	Class A
Standard	IO-Link Interface and System Specification Version 1.1.2 IO-Link Test Specification Version 1.1.2



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■ **ADIO-HUB (Hub Type)**

Electrical / Mechanical specifications

Type	Analog Input
Model	ADIO-IL-MA08EAA1-HUB3
Rated voltage / current	24 VDC≒, ≤ 4 A (±10%)
Supply current	150 mA ±10%
Dimensions	W 66 × H 165 × D 32 (20) mm
Material	Zinc die casting
IO-Link port	M12 (Plug-Male), 4-pin, A-coded Number of ports: 1
Standard I/O port	M12 (Socket-Female), 4-pin, A-coded Push-Pull connector supported Number of ports: 8
Mounting method	Mounting hole: fixed with M4 screw
Grounding method	Grounding hole: fixed with M4 screw
Unit weight (packaged)	≈ 550 g (≈ 750 g)

Analog input specifications

Type	Analog Input	
Number of input channels	8-CH (1 channel in each port)	
Input type	Voltage input	Current input
Input range	-10 to 10 VDC≒ (default value), 0 to 10 VDC≒	0 to 20 mA, 4 to 20 mA
Input allowable range	±5% F.S.	±5% F.S.
Input impedance	≥ 500 kΩ	≤ 30 Ω
Resolution	10 / 12 / 14 / 16-bit (default value)	
Accuracy ⁰¹⁾	At room temperature: PV ±0.1% F.S. At out of room temperature: PV ±0.3% F.S.	

01) The range of room temperature: 25 °C ±5 °C

Electrical / Mechanical specifications

Type	Digital Input/Output	Digital Input
Model	ADIO-IL-MA08B□-HUB3	ADIO-IL-MA08CA□-HUB3
Rated voltage / current	24 VDC≒, ≤ 9 A (±10%)	24 VDC≒, ≤ 4 A (±10%)
Supply current	300 mA ±10%	150 mA ±10%
Dimensions	W 66 × H 165 × D 32 (20) mm	
Material	Zinc die casting	
IO-Link port	M12 (Plug-Male), 4-pin, A-coded Number of ports: 1	
Auxiliary power port	7/8" (Plug-Male), 5-pin Number of ports: 1	-
Standard I/O port	M12 (Socket-Female), 4-pin, A-coded Push-Pull connector supported Number of ports: 8	
Mounting method	Mounting hole: fixed with M4 screw	
Grounding method	Grounding hole: fixed with M4 screw	
Unit weight (packaged)	≈ 550 g (≈ 750 g)	≈ 550 g (≈ 750 g)

Digital input/output specifications

Type	Digital Input/Output	Digital Input
Number of channels	16-CH (2 channels in each port)	
Digital input	It depends on the I/O specifications.	
NPN (sink type)	ON state: 5 VDC≒, ≤ 1.5 mA	
	OFF state: 11 VDC≒, ≥ 2 mA	
	Leakage current: -	
PNP (source type)	ON state: 11 VDC≒, ≥ 2 mA	
	OFF state: 5 VDC≒, ≤ 1.5 mA	
	Leakage current: ≤ 0.1 mA	-
Input filter	none / 0.5 / 1 (default value) / 2 / 4 / 8 / 16 / 32 / 64 / 128 ms	
Digital output	It depends on the I/O specifications.	
	-	
NPN (sink type)	Output current: ≤ 1.0 A/CH	
	Leakage voltage: -	
PNP (source type)	Output current: ≤ 1.0 A/CH	
	Leakage voltage: ≤ 1.2 VDC≒	



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※ The specifications on this guide may be changed

Remote I/O System **ARIO Series**

■ Power Modules

General specifications	
Transmission speed (ABUS)	4 Mbps
Protection circuit ⁰¹⁾	Reverse bus power protection circuit, Bus power short circuit protection circuit
Indicator ⁰²⁾	Power status indicator (green)
Material	Terminal: PBT, body: PC, base: PA6, POM
Installation method	DIN rail 35 mm
Unit weight (packaged)	≈ 75 g (≈ 108 g)

01) Applicable models: ARIO-P-B, ARIO-P-M

02) ARIO-P1-T5 model: Does not support the indicator.

Bus power modules

Model	ARIO-P-B
Number of terminal holes	12 holes
System bus power	≤ 2 A @ 24 VDC≡ (≤ 48 W)/hole, (up to 4 A)
Internal system bus power	≤ 1.5 A @ 5 VDC≡ (≤ 7.5 W)

Field power modules

Model	ARIO-P-F1	ARIO-P-F2
Number of terminal holes	12 holes	
Field power configuration	24 VDC≡ × 6 0 VDC≡ × 2	24 VDC≡ × 2 0 VDC≡ × 6
Field power	≤ 2 A @ 24 VDC≡ (≤ 48 W)/hole, (up to 4 A)	
Internal field power	≤ 2 A @ 24 VDC≡ (≤ 48 W)/hole, (up to 4 A)	

Bus + Field power modules

Model	ARIO-P-M
Number of terminal holes	12 holes
System bus power	≤ 2 A @ 24 VDC≡ (≤ 48 W)/hole, (up to 4 A)
Internal system bus power	≤ 1.5 A @ 5 VDC≡ (≤ 7.5 W)
Field power	≤ 2 A @ 24 VDC≡ (≤ 48 W)/hole, (up to 4 A)
Internal field power	≤ 2 A @ 24 VDC≡ (≤ 48 W)/hole, (up to 4 A)

Terminal power modules

Model	ARIO-P-T1	ARIO-P-T2
Number of terminal holes	12 holes	
Field power configuration	24 VDC≡ × 8 0 VDC≡ × 4	24 VDC≡ × 4 0 VDC≡ × 8
Field output power	≤ 2 A @ 24 VDC≡ (≤ 48 W)/hole, (up to 4 A)	

Model	ARIO-P1-T3	ARIO-P1-T4	ARIO-P1-T5	ARIO-P1-T6
Number of terminal holes	16 holes			
Field power configuration	24 VDC≡ × 16	0 VDC≡ × 16	F.G. × 16	24 VDC≡ × 8 0 VDC≡ × 8
Field output power	≤ 2 A @ 24 VDC≡ (≤ 48 W)/hole, (up to 4 A)			

■ Couplers

General specifications	
Protection circuit	Reverse field and supply power protection circuit
Power supply	- ARIO unit: ≤ 9.6 W, ≤ 400 mA (≤ 200 mA/CH, 2-CH/COM) - Field: ≤ 96 W, ≤ 4,000 mA (≤ 2,000 mA/CH, 2-CH/COM)
Supply voltage	- Coupler input voltage: 24 VDC≡ - ABUS supply voltage: 5 VDC≡, ≤ 960 mA - Field supply voltage: 24 VDC≡
Current consumption	- The standby and run mode: 200 mA - The maximum load: 400 mA (at coupler max. load)
CONFIG port	USB 2.0 type Micro B
Transmission speed (ABUS)	4 Mbps
Indicator	Coupler status indicator, field network status indicator
Material	Terminal: PBT, body: PC, base: PA6, POM
Installation method	DIN rail 35 mm
Unit weight (packaged)	≈ 165 g (≈ 265 g)

Couplers

Model	ARIO-C-EC	ARIO-C-CL	ARIO-C-CL1
Communication protocol	EtherCAT	CC-Link (ver. 2.0)	CC-Link (ver. 1.1)
Transfer rate	100 Mbps	10 Mbps	10 Mbps
Comm. connector	RJ45 × 2	5-pin PCB × 1	5-pin PCB × 1
Memory size	1024-byte	512-byte	96-byte
Number of connectable modules	≤ 64	≤ 32	≤ 32
Maximum connectable length	≤ 768 mm	≤ 384 mm	≤ 384 mm



View product details



Model	ARIO-C-PN	ARIO-C-PB	ARIO-C-EI
Communication protocol	PROFINET	PROFIBUS	EtherNet/IP
Transfer rate	100 Mbps	12 Mbps	10/100 Mbps
Comm. connector	RJ45 × 2	9-pin D SUB × 1	RJ45 × 2
Memory size	1024-byte	488-byte	1008-byte
Number of connectable modules	≤ 64	≤ 32	≤ 64
Maximum connectable length	≤ 768 mm	≤ 384 mm	≤ 768 mm

Model	ARIO-C-DN	ARIO-C-MT	ARIO-C-MR
Communication protocol	DeviceNet	Modbus/TCP compatible	Modbus/RTU compatible
Transfer rate	500 kbps	10/100 Mbps	115.2 kbps
Comm. connector	5-pin PCB × 1	RJ45 × 2	5-pin PCB × 1
Memory size	510-byte	1024-byte	512-byte
Number of connectable modules	≤ 32	≤ 64	≤ 32
Maximum connectable length	≤ 384 mm	≤ 768 mm	≤ 384 mm

■ Digital Input/Output Modules

General specifications	
Transmission speed (ABUS)	4 Mbps
Protection circuit	It depends on the module type.
Digital input module	Reverse field power protection circuit
Digital output module	Reverse field power protection circuit, output short circuit protection circuit
Insulation	I/O to internal circuit: photocoupler insulated
Indicator	Module status indicator (green, red), channel status indicator (green)
Material	Terminal: PBT, body: PC, base: PA6, POM
Installation method	DIN rail 35 mm
Unit weight (packaged)	≈ 75 g (≈ 108 g)

Digital input modules

Model	ARIO-S-DI□P	ARIO-S1-DI□P
Input specifications	PNP type	
Channels	4-CH / 8-CH	4-CH / 8-CH / 16-CH
Data size	4-bit / 8-bit	4-bit / 8-bit / 16-bit
ON input voltage	≥ 15 VDC≡	
OFF input voltage	≤ 5 VDC≡	
Signal delay time	≤ 1.5 ms	
Sensor connection method	2-wire / 3-wire	1-wire / 2-wire / 2-wire + FG / 3-wire + FG
Max. current consump.	6 mA/CH @ 24 VDC≡	
Power consump. (ABUS)	≤ 100 mA @ 5 VDC≡ (≤ 0.5 W)	≤ 70 mA @ 5 VDC≡ (≤ 0.35 W)
Power consump. (Field)	≤ 65 mA @ 24 VDC≡ (≤ 1.56 W)	≤ 30 mA @ 24 VDC≡ (≤ 0.72 W)

Model	ARIO-S-DI□N	ARIO-S1-DI□N
Input specifications	NPN type	
Channels	4-CH / 8-CH	4-CH / 8-CH / 16-CH
Data size	4-bit / 8-bit	4-bit / 8-bit / 16-bit
ON input voltage	≤ 5 VDC≡	
OFF input voltage	≥ 15 VDC≡	
Signal delay time	≤ 1.5 ms	
Sensor connection method	2-wire / 3-wire	1-wire / 2-wire / 2-wire + FG / 3-wire + FG
Max. current consump.	6 mA/CH @ 24 VDC≡	
Power consump. (ABUS)	≤ 100 mA @ 5 VDC≡ (≤ 0.5 W)	≤ 70 mA @ 5 VDC≡ (≤ 0.35 W)
Power consump. (Field)	≤ 65 mA @ 24 VDC≡ (≤ 1.56 W)	≤ 85 mA @ 24 VDC≡ (≤ 2.04 W)

Digital output modules

Model	ARIO-S-DO□P	ARIO-S1-DO□P
Output specifications	PNP type	
Channels	4-CH / 8-CH	4-CH / 8-CH / 16-CH
Data size	4-bit / 8-bit	4-bit / 8-bit / 16-bit
Max. output current	0.5 A/CH @ 24 VDC≡	
Output leakage voltage	≤ 1.2 VDC≡	
Signal delay time	≤ 1.5 ms	
Actuator connection method	2-wire / 3-wire	1-wire / 2-wire / 2-wire + FG / 3-wire + FG
Power consump. (ABUS)	≤ 100 mA @ 5 VDC≡ (≤ 0.5 W)	≤ 85 mA @ 5 VDC≡ (≤ 0.43 W)
Power consump. (Field)	It depends on the number of channels.	
4 channels	≤ 2 A @ 24 VDC≡ (≤ 48 W)	
8 / 16 channels	≤ 4 A @ 24 VDC≡ (≤ 96 W)	

Model	ARIO-S-DO□N	ARIO-S1-DO□N
Output specifications	NPN type	
Channels	4-CH / 8-CH	4-CH / 8-CH / 16-CH
Data size	4-bit / 8-bit	4-bit / 8-bit / 16-bit
Max. output current	0.5 A/CH @ 24 VDC≡	
Output leakage voltage	≤ 1.2 VDC≡	
Signal delay time	≤ 1.5 ms	
Actuator connection method	2-wire / 3-wire	1-wire / 2-wire / 2-wire + FG / 3-wire + FG
Power consump. (ABUS)	≤ 100 mA @ 5 VDC≡ (≤ 0.5 W)	≤ 85 mA @ 5 VDC≡ (≤ 0.43 W)
Power consump. (Field)	It depends on the number of channels.	
4 channels	≤ 2 A @ 24 VDC≡ (≤ 48 W)	
8 / 16 channels	≤ 4 A @ 24 VDC≡ (≤ 96 W)	

※ The specifications on this guide may be changed

■ Analog Input/Output Modules

General specifications

Transmission speed (ABUS)	4 Mbps
Protection circuit	It depends on the module type.
Analog input module	Reverse field power protection circuit
Analog output module	Reverse field power protection circuit
Insulation	I/O to internal circuit: photocoupler insulated / Between channels: non-insulated
Indicator	Module status indicator (green, red), channel status indicator (green)
Material	Terminal: PBT, body: PC, base: PA6, POM
Installation method	DIN rail 35 mm
Unit weight (packaged)	≈ 75 g (≈ 108 g)

Analog input modules

Model	ARIO-S-AI□V1	ARIO-S-AI□V2
Input specifications	Voltage input	
Channels	2-CH / 4-CH	
Data size	4-byte / 8-byte	
Input range	±10 VDC≒	0 to 10 VDC≒
Allowable limit range	±12 VDC≒	-1.0 to 11 VDC≒
Resolution	12-bit	
Accuracy	At room temperature: ±0.3% F.S / Outside room temperature: ±0.6% F.S	
Input impedance	≥ 1 MΩ	
Sensor connection method	2-wire / 2-wire + FG	
Power consump. (ABUS)	≤ 180 mA @ 5 VDC≒ (≤ 0.9 W)	
Power consump. (Field)	≤ 15 mA @ 24 VDC≒ (≤ 0.36 W)	

Model	ARIO-S1-AI08V3	
Input specifications	Voltage input	
Channels	8-CH	
Data size	16-byte	
Input range	±10 VDC≒ / 0 to 10 VDC≒ (default)	
Allowable limit range	±11 VDC≒ / -0.5 to 10.5 VDC≒	
Resolution	16-bit	
Accuracy	At room temperature: ±0.1% F.S / Outside room temperature: ±0.5% F.S	
Input impedance	≥ 550 kΩ	
Sensor connection method	2-wire	
Power consump. (ABUS)	≤ 100 mA @ 5 VDC≒ (≤ 0.5 W)	
Power consump. (Field)	≤ 0 mA @ 24 VDC≒ (≤ 0.0 W)	

Model	ARIO-S-AI□C1	ARIO-S-AI□C2
Input specifications	Current input	
Channels	2-CH / 4-CH	
Data size	4-byte / 8-byte	
Input range	0 to 20 mA	4 to 20 mA
Allowable limit range	0 to 22 mA	2.4 to 21.6 mA
Resolution	12-bit	
Accuracy	At room temperature: ±0.3% F.S / Outside room temperature: ±0.6% F.S	
Input impedance	≤ 250 Ω	
Sensor connection method	2-wire / 2-wire + FG	
Power consump. (ABUS)	≤ 180 mA @ 5 VDC≒ (≤ 0.9 W)	
Power consump. (Field)	≤ 15 mA @ 24 VDC≒ (≤ 0.36 W)	

Model	ARIO-S1-AI08C3	
Input specifications	Current input	
Channels	8-CH	
Data size	16-byte	
Input range	0 to 20 mA / 4 to 20 mA (default)	
Allowable limit range	0 to 21 mA / 3.2 to 20.8 mA	
Resolution	16-bit	
Accuracy	At room temperature: ±0.1% F.S / Outside room temperature: ±0.5% F.S	
Input impedance	≤ 150 Ω	
Sensor connection method	2-wire	
Power consump. (ABUS)	≤ 100 mA @ 5 VDC≒ (≤ 0.5 W)	
Power consump. (Field)	≤ 0 mA @ 24 VDC≒ (≤ 0.0 W)	

Analog output modules

Model	ARIO-S-AO□V1	ARIO-S-AO□V2
Output specifications	Voltage output	
Channels	2-CH / 4-CH	
Data size	4-byte / 8-byte	
Output range	±10 VDC≒	0 to 10 VDC≒
Resolution	12-bit	
Accuracy	At room temperature: ±0.3% F.S / Outside room temperature: ±0.6% F.S	
Load resistance	≥ 5 kΩ	
Actuator connection method	2-wire / 2-wire + FG	
Power consump. (ABUS)	≤ 180 mA @ 5 VDC≒ (≤ 0.9 W)	
Power consump. (Field)	≤ 15 mA @ 24 VDC≒ (≤ 0.36 W)	

Model	ARIO-S1-AO08V3	
Output specifications	Voltage output	
Channels	8-CH	
Data size	16-byte	
Output range	±10 VDC≒ / 0 to 10 VDC≒ (default)	
Resolution	14-bit	
Accuracy	At room temperature: ±0.1% F.S / Outside room temperature: ±0.5% F.S	
Load resistance	≥ 5 kΩ	
Actuator connection method	2-wire	
Power consump. (ABUS)	≤ 70 mA @ 5 VDC≒ (≤ 0.35 W)	
Power consump. (Field)	≤ 55 mA @ 24 VDC≒ (≤ 1.32 W)	

Model	ARIO-S-AO□C1	ARIO-S-AO□C2
Output specifications	Current output	
Channels	2-CH / 4-CH	
Data size	4-byte / 8-byte	
Output range	0 to 20 mA	4 to 20 mA
Resolution	12-bit	
Accuracy	At room temperature: ±0.3% F.S / Outside room temperature: ±0.6% F.S	
Load resistance	≤ 350 Ω	
Actuator connection method	2-wire / 2-wire + FG	
Power consump. (ABUS)	≤ 100 mA @ 5 VDC≒ (≤ 0.5 W)	
Power consump. (Field)	≤ 60 mA @ 24 VDC≒ (≤ 1.44 W)	

Model	ARIO-S1-AO08C3	
Output specifications	Current output	
Channels	8-CH	
Data size	16-byte	
Output range	0 to 20 mA / 4 to 20 mA (default)	
Resolution	14-bit	
Accuracy	At room temperature: ±0.1% F.S / Outside room temperature: ±0.5% F.S	
Load resistance	≤ 350 Ω	
Actuator connection method	2-wire	
Power consump. (ABUS)	≤ 70 mA @ 5 VDC≒ (≤ 0.35 W)	
Power consump. (Field)	≤ 140 mA @ 24 VDC≒ (≤ 3.36 W)	

■ Temperature Input Modules

General specifications

Transmission speed (ABUS)	4 Mbps
Protection circuit	Reverse field power protection circuit
Insulation	I/O to internal circuit: photocoupler insulated / Between channels: non-insulated
Indicator	Module status indicator (green, red), channel status indicator (green)
Material	Terminal: PBT, body: PC, base: PA6, POM
Installation method	DIN rail 35 mm
Unit weight (packaged)	≈ 75 g (≈ 108 g)

Thermocouple (TC) input modules

Model	ARIO-S-AI04TC	ARIO-S1-AI08TC
Channels	4-CH	8-CH
Data size	8-byte	16-byte
Sensor type	K (default), J, E, T, B, R, S, N, C / W5, G / W, L, U, PL II	
Sensor connection method	2-wire	
Resolution	16-bit	
Accuracy	±0.2% F.S (at room temperature: 23 °C ±5 °C)	
Temperature range	-200 to 2300 °C	
Sampling rate	50 msec/CH	
Power consump. (ABUS)	≤ 180 mA @ 5 VDC≒ (≤ 0.9 W)	≤ 140 mA @ 5 VDC≒ (≤ 0.7 W)
Power consump. (Field)	≤ 15 mA @ 24 VDC≒ (≤ 0.36 W)	≤ 20 mA @ 24 VDC≒ (≤ 0.48 W)

Resistance thermometer (RTD) input modules

Model	ARIO-S-AI04RTD	ARIO-S1-AI08RTD
Channels	4-CH	8-CH
Data size	8-byte	16-byte
Sensor type	Pt50, Pt100 (default), Pt1000 / JPt50, JPt100, JPt1000 / Ni100, Ni120, Ni1000 / Cu50, Cu100	
Sensor connection method	3-wire	2-wire
Resolution	16-bit	
Accuracy	Pt, JPt: ±0.2% F.S / Ni: ±0.3% F.S / Cu: ±0.5% F.S (at room temperature: 23 °C ±5°C)	
Temperature range	-200 to 650 °C	
Sampling rate	50 msec/CH	
Power consump. (ABUS)	≤ 180 mA @ 5 VDC≒ (≤ 0.9 W)	≤ 120 mA @ 5 VDC≒ (≤ 0.6 W)
Power consump. (Field)	≤ 15 mA @ 24 VDC≒ (≤ 0.36 W)	≤ 20 mA @ 24 VDC≒ (≤ 0.48 W)

※ The specifications on this guide may be changed



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* The dimensions or specifications on this product guide may change and some models may be discontinued without notice.

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