



# NEW PRODUCT GUIDE

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Ultrasonic Sensors Programming Unit  
UT-P  
(Sold Separately)



## 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 types available ▲temperature tracking algorithm ▲sensing distance up to 8 m ▲IO-Link communication ▲316L stainless steel body.



► Product Specifications p.24



# 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, IP67G (JEM standard), IP69K protection rating for diverse applications.



► Product Specifications p.25



# SFC/SFC-R Series

## Safety Controllers

The SFC/SFC-R series safety controllers are used together with safety input devices (switches, sensors, etc.) to provide safe working environments. The controllers feature ▲17.5 mm slim size ▲front terminal design ▲up to 20 logic inputs ▲flexible OFF-delay output ▲safety circuit design to meet safety standards.



► Product Specifications p.26



**SFC-ER412**  
 Safety Expansion Unit  
 Source : 24VDC±2.5%  
 Response Time : 10ms  
 Auxiliary Output : 24VDC  
 Safety Outputs : 240VAC  
 30VDC  
 ▲ See instruction Manual

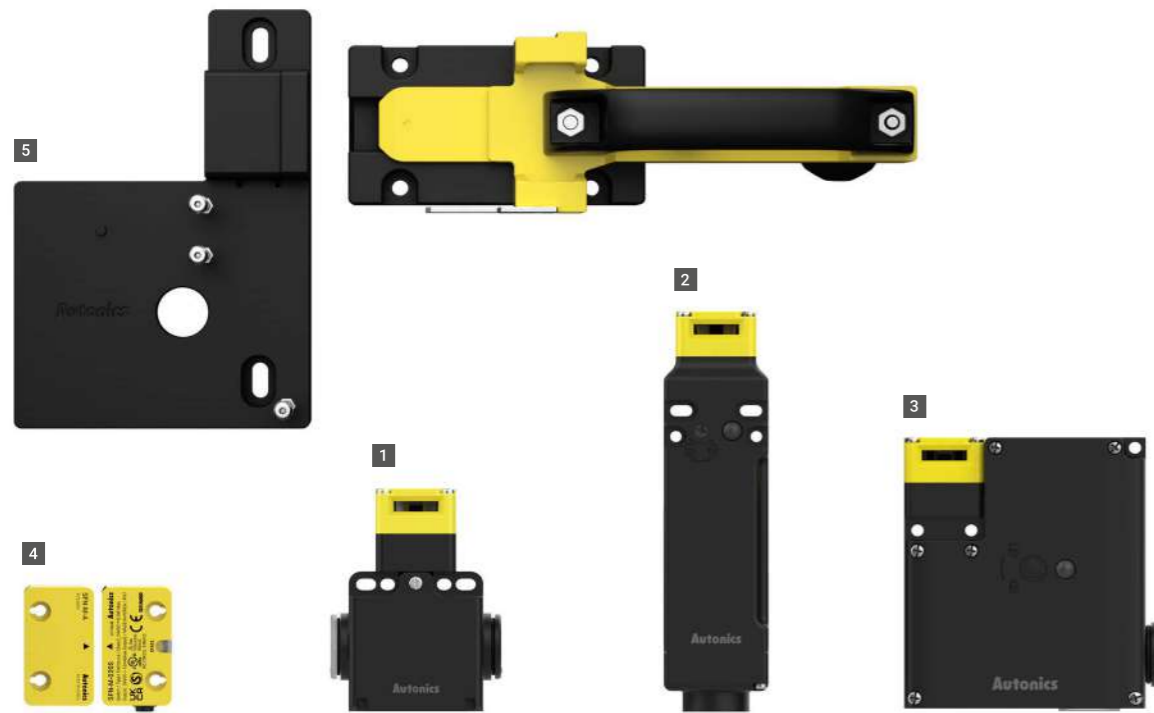
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- 1 Safety Door Switches SFD Series
- 2 Safety Door Lock Switches SFDL Series
- 3 Safety Flat Type Door Lock Switches SFDL2 Series
- 4 Safety Non-contact Switches SFN Series
- 5 Safety Slide Unit SFDL-SD/SFDL2-SD



## 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.27-28

- 1 Safety Grip Type Enabling Switches SFEN Series
- 2 Safety Key Selector Switches SF2KR Series
- 3 Emergency Stop Button Switches SF2ER Series



## 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 direct opening mechanism to prevent contact welding and provide additional safety.



► Product Specifications p.29-30



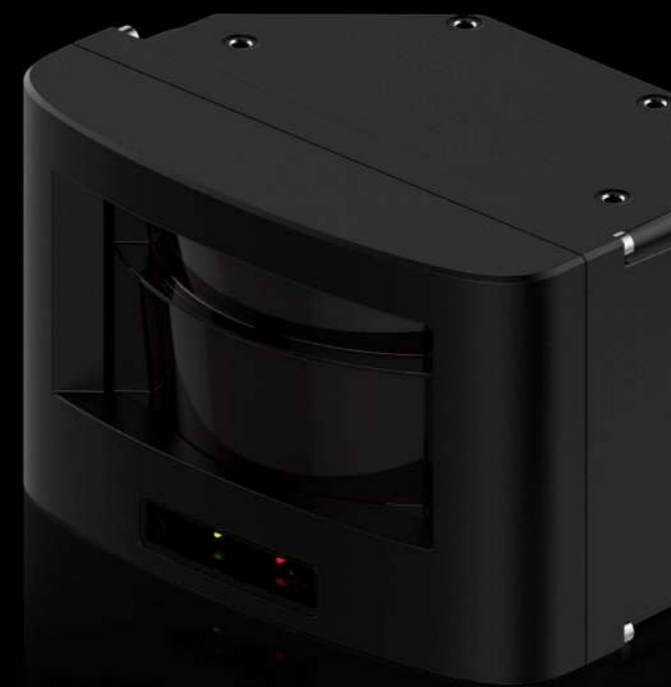
## LSC Series

### 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.

CE UK K Bluetooth \* Bluetooth model availability may differ by country

► Product Specifications p.31



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 Ethernet communication, 5G frequency noise resistance, various filter function and aluminum die-cast housing body to prevent malfunction due to fog, rain, snow and dusts, dedicated software(PC/Android devices).

CE UK K

► Product Specifications p.31-32



## 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.



► Product Specifications p.33



## 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 rating.



► Product Specifications p.34





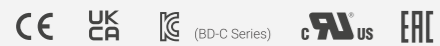
Sensor Head  
BD-300/600

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 ▲1 $\mu$ m maximum resolution ▲reference distance 30/65/100/300/600 mm ▲0.1% of F.S. linearity ▲various calculation functions ▲easy configuration with movement average, deferential and median filters.



► Product Specifications p.35



Communication Converter  
BD-C Series  
(Sold Separately)



Amplifier Unit  
BD-A1





## PRD Series (IO-Link)

### 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
- ▲ sensing distance max. 25 mm
- ▲ ring type and 4 direction LED status indicator
- ▲ oil-resistant (PVC) cable
- ▲ IP67 protection rating.

CE UK CA cUL US LISTED ENEC IO-Link

► Product Specifications p.36

## PRFD Series (IO-Link)

### 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
- ▲ IP67 protection rating.

CE UK CA cUL US LISTED ENEC IO-Link

► Product Specifications p.37







IO-Link Master Type



IO-Link Hub Type

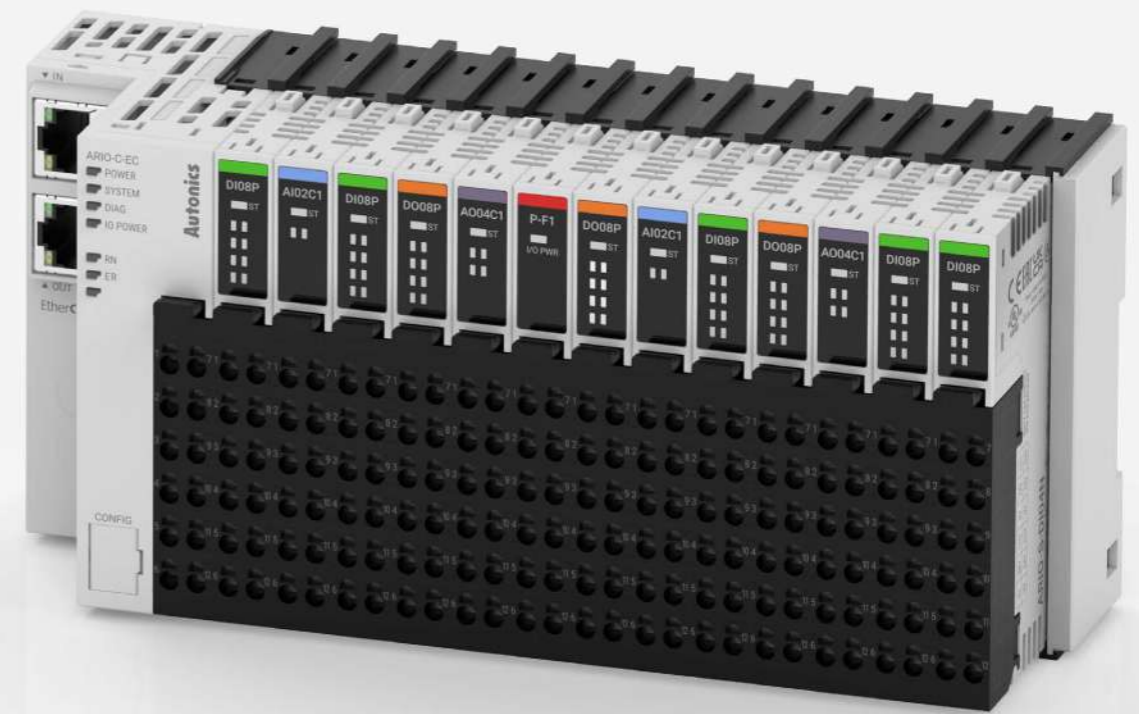
# ARIO Series

## 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 ▲54 types of input/output and power modules ▲expandable up to 64 modules ▲up to 16 digital input/output channels available ▲slim size of 12mm width ▲Hot-swap feature.



► Product Specifications p.40-41



# 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 rating.



► Product Specifications p.38-39

# 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 cUL US Modbus

► Product Specifications p.42



# 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.

CE UK CA cUL US LISTED EtherCAT Modbus

► Product Specifications p.43



# 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) ▲overcurrent/overvoltage prevention ▲wide ambient temperature range (-20°C to 70°C).



► Product Specifications p.44-45



15W  
5/12/24V

30W  
5/12/24V

60W  
12/24V



120W  
12/24V

240W  
12/24/48V

480W  
24/48V







## 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%	
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, PLe) UL listed E249635		
Certification	CE (TUV NORD)		
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 (≤ 100Ω, ≤ 10nF)			
Safety output	Relay (A contact)		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 (TUV NORD)		CE (TUV NORD)	
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 [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.
Dielectric strength	

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



## Safety Flat Type Door Lock Switches SFDL2 Series

Model	SFDL2-□□□-□□ -□	SFDL2-□□□-□□ B-□
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/s <sup>2</sup> (≈ 100 G) in each X, Y, Z direction for 3 times	
Shock (malfunction)	80 m/s <sup>2</sup> (≈ 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)	
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	
Mechanical 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/s <sup>2</sup> (≈ 100 G) in each X, Y, Z direction for 3 times	
Shock (malfunction)	80 m/s <sup>2</sup> (≈ 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)	
Accessory	SFDL-□□□-□□K (Special type release 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

※ The specifications on this guide may be changed





## 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 <sup>01)</sup> (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) UK (UL) (UL) (UL) (UL)		
Connection type	M20 connector cable	G1/2 connector cable	M12 plug connector
Unit weight (packaged)	<ul style="list-style-type: none"> <li>1 connection outlet plastic: ≈ 80 g (≈ 120 g) metallic: ≈ 110 g (≈ 150 g)</li> <li>2 connection outlet plastic: ≈ 110 g (≈ 140 g) metallic: ≈ 130 g (≈ 170 g)</li> </ul>		<ul style="list-style-type: none"> <li>Plastic: ≈ 85 g (≈ 130 g)</li> <li>Metallic: ≈ 115 g (≈ 160 g)</li> </ul>

01) UL approved ambient temperature: 65°C



## Safety Grip Type Enabling Switches SFEN Series

Enable switch	
Rated Insulation Voltage	250 VAC~
Rated through current	2.5 A
Rated inductive load <sup>01)</sup>	AC-15 (0.75 A / 240 VAC~), DC-13 (0.55 A / 125 VDC=)
Rated resistive load <sup>02)</sup>	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 strength)
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 gl 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 <sup>01)</sup>	AC-12 (3 A / 250 VAC~), DC-12 (3 A / 30 VDC=)
Controller strength <sup>02)</sup>	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 gl 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 <sup>01)</sup>	AC-12 (0.1 A / 125 VAC~), DC-12 (0.1 A / 30 VDC=)
Controller strength <sup>02)</sup>	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 gl 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/s² (≈ 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 mm²)
Connection type	M20 connector cable grand
Material	Cover: PA66, button: PC, rubber grip: Silicone
International standards	IEC 60947-5-1, IEC 60947-5-8, UL 60947-5-1
Approval	CE (TUV NORD) UK (UL) (UL) (UL) (UL)
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.

## Safety Non-contact Switches SFN Series

Model	SFN-M-□
Operating distance <sup>01)</sup>	OFF→ON: ≥ 5 mm ON→OFF: ≤ 15 mm
Approval	CE (TUV NORD) UK (UL) (UL) (UL) (UL)
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 ± 20 % by ambient temperature.



Power supply	24 VDC= (± 10 %)
Operating frequency	100 Hz
Power consumption <sup>01)</sup>	≤ 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 PLe 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).

※ The specifications on this guide may be changed

## Safety Key Selector Switches SF2KR Series

Model	SF2KR-□□□□	SF2KR-M□□□□
Solenoid input voltage	-	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 <sup>2</sup> )	Solenoid power: AWG 24 - 18, Contact: AWG 18 (0.823 mm <sup>2</sup> )
Allowable operation frequency <sup>01)</sup>	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 <sup>2</sup> (≈ 30 g) in each X, Y, Z direction for 3 times	
Shock (malfunction)	150 m/s <sup>2</sup> (≈ 15 g) in each X, Y, Z direction for 3 times	
Ambient temperature	-20 to 70°C <sup>02)</sup> , storage: -40 to 70 °C (at no freezing or condensation)	-10 to 55°C <sup>02)</sup> , 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) <sup>03)</sup>	≈ 130 g (≈ 192 g)	≈ 152 g (≈ 213 g)

- 01) Rotating and returning 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	6 A	3 A
	Inductive load (AC-15)	10 A	5 A	3 A	2 A
DC	Resistive load (DC-12)	10 A	2 A	0.6 A	0.2 A
	Inductive load (DC-13)	1.5 A	0.5 A	0.2 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		

## 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 <sup>01)</sup>	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 <sup>2</sup> )
Insulation resistance	≥ 100 MΩ (500 VDC± megger)
Protection structure	IP65 <sup>01)</sup> (oil resistant, IEC standards)
Material	Button: PC, body: PA6, lever in fixing unit: PA6
Approval	CE (TUV NORD)    
Weight <sup>03)</sup>	≈ 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	6 A	3 A
	Inductive load (AC-15)	10 A	5 A	3 A	2 A
DC	Resistive load (DC-12)	10 A	2 A	0.6 A	0.2 A
	Inductive load (DC-13)	1.5 A	0.5 A	0.2 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		



## 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 <sup>01)</sup>	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  		

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

Power supply	9 - 28 VDC±
Power consumption <sup>01)</sup>	< 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

## 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 <sup>01)</sup> output power	4 mW
Min. object size <sup>02)</sup>	OFF; 5, 8, 10, 15, 20, 25, 30, 35, 40 cm
Scanning frequency	25 Hz
Response time	≤ 50 ms + monitoring time
Monitoring zone <sup>03)</sup>	≤ 5.6 × 5.6 m
Angular resolution	0.25°
Aperture angle	90°
Object reflectivity <sup>04)</sup>	≥ 2 %
Approval	CE  
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 <sup>01)</sup> : ≥ 8 - 30 VDC±, L: ≤ 3 VDC±
Output	PhotoMOS relay output: 2, Resistive load: 30 VDC± / 24 VAC~, ≤ 80 mA
Vibration	2 G
Shock	30 G / 18 ms
Ambient illuminance	Sunlight: ≤ 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
Wire spec.	AWG26 (0.16 mm, 7-core), insulator outer diameter: Ø 1 mm
Material	Case: AL, Window: PC

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



※ The specifications on this guide may be changed

## LiDAR LSE3 Series

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

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


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

### Communication Interface

#### Ethernet (LSC/LSE2/LSE3)

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

#### Bluetooth (LSC)

<b>Version</b>	Bluetooth SIG v5.0
<b>Association approval</b>	 Bluetooth
<b>Frequency range</b>	2.402 ~ 2.480 GHz
<b>Application</b>	Android only



## Smart Cameras VC Series

<b>Model</b>	VC-M50T-CE
<b>Image element</b>	1 inch mono CMOS
<b>Resolution</b>	5 MP (2,560 × 2,048)
<b>Frame per second</b>	16 fps <sup>01)</sup>
<b>Bit Depth</b>	8 bit (256 gray level)
<b>Shutter</b>	Global shutter
<b>Exposure time</b>	3 μs to 3 sec
<b>Lens type</b>	C-Mount
<b>eMMC</b>	8 GB
<b>DDR4</b>	2 GB (LPDDR4), 512 MB (DDR4)
<b>Inspection work group</b>	64 (simultaneous inspection: 32)
<b>Trigger mode</b>	Continuous, External Trigger, Manual, Ethernet, RS232
<b>Communication</b>	Ethernet (TCP/IP & Modbus, 10/100/1000Base-T), RS232C
<b>FTP trans. output</b>	YES
<b>Indicator</b>	Power, LINK, DATA, USER 1, USER 2
<b>Approval</b>	CE, UKCA, ENEC, EAC
<b>Unit weight (packaged)</b>	≈ 600 g (≈ 780 g)

01) The number of camera frames per second can be different by image setting or inspection item.

<b>Power supply</b>	24 VDC≒ ±10%
<b>Current consumption</b>	≤ 1 A
<b>Rated input signal</b>	24 VDC≒ ±10%
<b>Output signal</b>	NPN-PNP open collector output setting (software)
<b>HS OUT 0</b>	Strobe OUT
<b>HS OUT 1</b>	Inspection complete, Inspection result output (PASS / FAIL), Alarm, Camera work
<b>Load voltage</b>	24 VDC≒
<b>Load current</b>	≤ 100 mA
<b>Residual voltage</b>	≤ 2.5 VDC≒
<b>Protection circuit</b>	Output short overcurrent protection circuit, reverse voltage polarity protection circuit
<b>Vibration</b>	1.5 mm double amplitude at frequency 10 to 55 Hz in each X, Y, Z direction for 2 hours
<b>Shock</b>	300 m/s <sup>2</sup> (≈ 30 G) in each X, Y, Z direction for 3 times
<b>Ambient temp.</b>	0 to 45 °C, storage: -30 to 80 °C (no freezing or condensation)
<b>Ambient humi.</b>	0 to 95%RH, storage: 0 to 95%RH (no freezing or condensation)
<b>Protection structure</b>	IP67 (IEC standard / When mounting waterproof lens cover)
<b>Connection</b>	Connector type
<b>Connector spec.</b>	Power I/O: M12 8-pin, Ethernet: M12 8-pin / RJ45 (cable tightening torque: 0.4 N m)
<b>Material</b>	Die-cast Aluminum Housing
<b>Components</b>	Ethernet connector Cap (screw plug - waterproof) × 1 (tightening torque: 0.4 N m)



※ The specifications on this guide may be changed

## Voice Buzzers B7VA Series

Type	Internal memory	External memory	
Model	B7VA-8KD	B7VA-8KD-E	
Sound pressure	≤ 90 ± 10% dB (distance at 1 m)		
Signal input method	Compatible with NPN and PNP inputs		
Audio sources <sup>01)</sup>	Alarm: 8 types	Alarm: 8 types (factory settings)	
Alarms	Sound 1	Police siren sound	DAQMaster : Playlist configuration supported - No. of files: ≤ 128 - Storage size: ≤ 4 MB
	Sound 2	Fire alarm	
	Sound 3	Ambulance sound	
	Sound 4	Warning sound	
	Sound 5	Alarm sound	
	Sound 6	Doorbell ring	
	Sound 7	Ringtone 1	
	Sound 8	Ringtone 2	
Audio file format	-	MPEG-1 Audio Layer III (MP3), Waveform Audio Format (WAV) <sup>02)</sup>	
Compatible memory card	-	micro SD (SDHC) <sup>03)</sup>	
SD card format type	-	FAT32	
Indicator	Status indicator: Green / Orange LED		
Certification	CE, UKCA, RoHS, REACH	CE, UKCA, RoHS, REACH	
Unit weight (packaged)	≈ 232 g (≈ 301.5 g)	≈ 238 g (≈ 307.5 g)	

01) You can download the 8 types of alarm sounds from our website.

For external memory type, changing the audio sources will delete the provided built-in sounds.

02) The WAV file is converted to the MP3 file in DAQMaster.

03) We recommend using the micro SD card (sold separately, BSD-16G) to ensure product performance. Otherwise, we cannot guarantee the product's performance.

Power supply	12 - 24 VDC≡
Power consumption	7.2 W
Insulation resistance	≥ 1,000 MΩ (500VDC≡ megger)
Dielectric strength	Between the charging part and the case: 500 VAC~ 50 / 60 Hz for 1 min
Vibration	1.5 mm amplitude at frequency 10 to 55 Hz (for 1 min) in each X, Y, Z direction for 2 hours
Shock	300 m/s <sup>2</sup> (≈ 30 G) in each X, Y, Z direction for 3 times
Ambient temperature	-10 to 55 °C, Storage: -20 to 65 °C (no freezing or condensation)
Ambient humidity	35 to 85%RH, Storage: 35 to 85%RH (no freezing or condensation)
Protection ratings	IP65 (Front part, IEC standard)
Material	Front cover: ABS, Body: PC



## Displacement Sensors BD Series

### Sensor head

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 <sup>01)</sup>	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 <sup>02)</sup>	25 to 35 mm	55 to 75 mm	80 to 120 mm	160 to 450 mm	250 to 1,000 mm
Linearity <sup>03)</sup>	± 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 <sup>04)</sup>	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	
Approval	CE, UKCA, RoHS, REACH, ENEC			CE, UKCA, RoHS, REACH	
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.

### Amplifier unit

Model	BD-A1
Power supply	10 - 30 VDC≡ ± 10% (when connecting BD-C, communication converter, 12-30 VDC≡)
Power consumption <sup>01)</sup>	≤ 2,800 mW (30 VDC≡)
Control input <sup>02)</sup>	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 <sup>03)</sup>	NPN or PNP open collector (load current: ≤ 100 mA)
Analogue output <sup>04)</sup>	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] 1 μm [BD-300 / 600] 10 μm
Display type	11 segment (red, green), 6-digit, LED
Display range	[BD-030 / 065 / 100] ± 99.999 to ± 99 mm (4-step parameter set) [BD-300 / 600] ± 999.99 to ± 999 mm (3-step parameter set)
Display period	≈ 100 ms
Protection structure	IP40 (IEC standard)
Approval	CE, UKCA, RoHS, REACH, ENEC
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 μm) but actual value is increased/decreased per 20 μm.

03) Setting range is assigned automatically when connecting sensor head.

### Communication Converter for Laser Displacement Sensors BD-C Series

Model	BD-CRS
Supported amplifier	Amplifier unit (BD-A1) <sup>01)</sup>
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)
Protection structure	IP40 (IEC standard)
Material	Case: PC
Accessory	Side connector, Connector for RS485
Sold separately	Communication converter: SCM Series
Approval	CE, UKCA, RoHS, REACH, ENEC
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.



※ The specifications on this guide may be changed






## Proximity Sensors PRD Series (IO-Link)

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 <sup>01)</sup>	500 Hz	250 Hz	100 Hz
Affection by temperature	≤ ± 10 % for sensing distance at ambient temperature 20 °C		
Indicator <sup>02)</sup>	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   		

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 <sup>01)</sup>	400 Hz	200 Hz	100 Hz
Affection by temperature	≤ ± 10 % for sensing distance at ambient temperature 20 °C		
Indicator <sup>02)</sup>	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   		

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 <sup>01)</sup>	≤ 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/s <sup>2</sup> (≈ 100 G) in each X, Y, Z direction for 3 times
Ambient temp. <sup>02)</sup>	-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. <sup>03)</sup>	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)



## Proximity Sensors PRFD Series (IO-Link)

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 <sup>01)</sup>	2 mm	3 mm	7 mm	12 mm
Setting distance <sup>01)</sup>	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 <sup>02)</sup>	150 Hz	80 Hz	80 Hz	50 Hz
Affection by temperature	≤ ± 20 % for sensing distance at ambient temperature 20 °C			
Indicator <sup>03)</sup>	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   			
Unit weight (package)	≈ 10 g (≈ 35 g)	≈ 15 g (≈ 40 g)	≈ 35 g (≈ 70 g)	≈ 90 g (≈ 145 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/s <sup>2</sup> (≈ 100 G) in each X, Y, Z direction for 10 times (DIA. of sensing side Ø 8 mm : 500 m/s <sup>2</sup> (≈ 50 G) in each X, Y, Z direction for 10 times)
Ambient temp. <sup>01)</sup>	-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	IP67 (IEC standard)
Connection	Connector models
Connector	M12 plug connector
Material	Case / Nut: stainless steel 303 (SUS303), washer: stainless steel 304 (SUS304), sensing side <sup>02)</sup> : stainless steel 303 (SUS303)

01) UL approved surrounding air temperature 40 °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)

※ 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	Digital Output
Number of channels	8-CH (C/Q)
I/O common	NPN / PNP
Power supply	24 VDC≐ (18 - 30 VDC≐), Max. 300 mA
Leakage current	≦ 0.1 mA
Residual voltage	≦ 1.5 VDC≐
Short circuit protection	YES

Mode	IO-Link
Input current	2 mA
ON voltage/current	Voltage: ≧ 15 VDC≐ Current: ≧ 2 mA
OFF voltage	≦ 5 VDC≐

Protection rating	IP67 (IEC standard), IP69K (DIN standard)
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## Approvals

Approval	CE, RoHS, REACH, etc.
Association approval	IO-Link, EtherNet/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

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, atIO-Link
GSDML file	Download the GSDML file at the Autonics website.

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, atIO-Link
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.

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



## ADIO-HUB (Hub Type)

### Electrical / Mechanical specifications

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

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 <sup>(1)</sup>	At room temperature: PV ±0.1% F.S. At out of room temperature: PV ±0.3% F.S.	

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

### Electrical / Mechanical specifications

Type	Digital Input/Output	Digital Input
Model	ADIO-IL-MA08B1-HUB3	ADIO-IL-MA08CA1-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≐	-



※ The specifications on this guide may be changed

# Remote I/O System ARIO Series

## Coupler

Model	ARIO-C-EC	ARIO-C-CL	ARIO-C-PN	ARIO-C-PB
Protocol	EtherCAT	CCLink	PROFINET	PROFINET
Transfer rate	100 Mbps	10 Mbps	100 Mbps	12 Mbps
Max. connections for modules	≤ 64	≤ 32	≤ 64	≤ 32
Memory map	1024 Byte	512 Byte	1024 Byte	488 Byte
Communication connector	RJ45 × 2	5-pin PCB	RJ45 × 2	9-pin D SUB
CONFIG port	USB 2.0 type Micro B			

Model	ARIO-C-EI	ARIO-C-DN	ARIO-C-MT	ARIO-C-MR
Protocol	EtherNet/IP	DeviceNet	ModbusTCP compatible	ModbusRTU compatible
Transfer rate	10/100 Mbps	500 kbps	10/100 Mbps	115.2 kbps
Max. connections for modules	≤ 64	≤ 32	≤ 64	≤ 32
Memory map	1008 Byte	510 Byte	1024 Byte	512 Byte
Communication connector	RJ45 × 2	5-pin PCB	RJ45 × 2	5-pin PCB
CONFIG port	USB 2.0 type Micro B			

Power supply	<ul style="list-style-type: none"> <li>ABUS (external consump.): 24 VDC≒, ≤ 400 mA (≒ 9.6 W, coupler + module, ≤ 200 mA/CH, 2 CH/COM)</li> <li>ABUS (internal supply): 5 VDC≒, ≤ 960 mA (≒ 4.8 W, module)</li> <li>I/O: 24 VDC≒, ≤ 4,000 mA (≒ 96 W, ≒ 2,000 mA/CH, 2 CH/COM)</li> </ul>
Power consump.	24 VDC≒, standby/run: 200 mA, Max. load: 400 mA (coupler max. load)

## Coupler

Type	Digital input	Digital output
Model	ARIO-S-DI□□	ARIO-S-DO□□
Channel	4 CH, 8 CH model	
I/O common	NPN, PNP model	
I/O signal level	24 VDC≒ ± 10 %	
Input voltage	Turn ON: ≥ 7 VDC≒ Turn OFF: ≤ 0.4 VDC≒	-
Output leakage voltage	-	≤ 1.2 VDC≒
I/O current consumption	6 mA/CH	-
Rated output current	-	500 mA/CH
Power consumption	ABUS: 5 VDC≒, ≤ 100 mA (≒ 0.5 W)	
On delay time	≤ 0.5 ms	
Off delay time	≤ 1.5 ms	
Internal transmission speed	4 Mbps	
Insulation	I/O to inner circuit: photocoupler insulated	

Type	Analog input			
Model	ARIO-S-AI□V1	ARIO-S-AI□V2	ARIO-S-AI□C1	ARIO-S-AI□C2
Channel	2 CH, 4 CH model			
Input method	Voltage input		Current input	
Input range	-10 to 10 VDC≒	0 to 10 VDC≒	0 to 20 mA	4 to 20 mA
Accuracy	<ul style="list-style-type: none"> <li>Room temperature: PV ±0.3% F.S.</li> <li>Out of room temperature: PV ±0.6% F.S.</li> </ul>			
Input impedance	≥ 1 MΩ		≤ 250 Ω	
Status indicator ON	≤ -1 V or ≥ 1 V	≥ 1 V	≥ 1 mA	≥ 4 mA
Resolution	12-bit			
Power consumption	<ul style="list-style-type: none"> <li>ABUS: 5 VDC≒, ≤ 180 mA (≒ 0.9 W)</li> <li>I/O: 24 VDC≒, ≤ 15 mA (≒ 0.36 W)</li> </ul>			
Internal transmission speed	4 Mbps			
Insulation	<ul style="list-style-type: none"> <li>I/O to inner circuit: photocoupler insulated</li> <li>Between channels: non-insulated</li> </ul>			

Type	Analog output			
Model	ARIO-S-AO□V1	ARIO-S-AO□V2	ARIO-S-AO□C1	ARIO-S-AO□C2
Channel	2 CH, 4 CH model			
Output method	Voltage output		Current output	
Output range	-10 to 10 VDC≒	0 to 10 VDC≒	0 to 20 mA	4 to 20 mA
Accuracy	<ul style="list-style-type: none"> <li>Room temperature: PV ±0.3% F.S.</li> <li>Out of room temperature: PV ±0.6% F.S.</li> </ul>			
Load resistance	≥ 5 kΩ		≤ 350 Ω	
Status indicator ON	≤ -1 V or ≥ 1 V	≥ 1 V	≥ 1 mA	Always ON
Resolution	12-bit			
Power consumption	<ul style="list-style-type: none"> <li>ABUS: 5 VDC≒, ≤ 180 mA (≒ 0.9 W)</li> <li>I/O: 24 VDC≒, ≤ 15 mA (≒ 0.36 W)</li> <li>ABUS: 5 VDC≒, ≤ 100 mA (≒ 0.5 W)</li> <li>I/O: 24 VDC≒, ≤ 60 mA (≒ 1.44 W)</li> </ul>			
Internal transmission speed	4 Mbps			
Insulation	<ul style="list-style-type: none"> <li>I/O to inner circuit: photocoupler insulated</li> <li>Between channels: non-insulated</li> </ul>			



Type	Temperature input	
Model	ARIO-S-AI04TC	ARIO-S-AI04RTD
Channel	4 CH	
Input method	Voltage input	Resistance input
Input range	Refer to the 'Input type and using range'	
Display accuracy (01)	(PV ±0.2% F.S. or ±2 °C, select the higher one) ±1-digit	(PV ±0.2% F.S.) ±1-digit
Status indicator ON	Temperature input within the rated range ※ No operation when the thermometer is not attached	
Resolution / Display	16-bit / 0.1 °C	
Power consumption	<ul style="list-style-type: none"> <li>ABUS: 5 VDC≒, ≤ 180 mA (≒ 0.9 W)</li> <li>I/O: 24 VDC≒, ≤ 15 mA (≒ 0.36 W)</li> </ul>	
Internal transmission speed	4 Mbps	
Insulation	<ul style="list-style-type: none"> <li>I/O to inner circuit: photocoupler insulated</li> <li>Between channels: non-insulated</li> </ul>	

01) Refer to the 'Measurement accuracy' below

Type	ABUS power supply
Model	ARIO-P-B
Power supply	<ul style="list-style-type: none"> <li>ABUS (external consump.): 24 VDC≒, ≤ 320 mA (≒ 7.5 W, ≤ 160 mA/CH, 2 CH/COM)</li> <li>ABUS (internal supply): 5 VDC≒, ≤ 1,500 mA (≒ 7.5 W)</li> </ul>


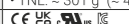
Type	I/O power supply			
Model	ARIO-P-F1	ARIO-P-F2	ARIO-P-T1	ARIO-P-T2
Input	Voltage	24 VDC≒ ±10% (≒ 48 W)	-	-
	Max. current	2,000 mA/CH, 2 CH/COM	-	-
Output	Voltage	24 VDC≒ ±10% (≒ 48 W)	24 VDC≒ ±10% (≒ 48 W)	-
	Max. current	2,000 mA/CH, 6 CH/COM	2,000 mA/CH, 8 CH/COM	-

## Common specifications

Insulation resistance	≥ 100 MΩ (500 VDC≒ megger)
Dielectric strength	Between the charging part and the case: 1000 VAC~ 50/60 Hz for 1 min
Noise immunity	±500 VDC≒ the square wave noise (pulse width: 1 μs) by the noise simulator
Vibration	0.7 mm double amplitude at frequency of 10 to 55 Hz in each X, Y, Z direction for 1 hour
Vibration (malfunction)	0.5 mm double amplitude at frequency of 10 to 55 Hz in each X, Y, Z direction for 10 min
Shock	300 m/s <sup>2</sup> (≒ 30 G) in each X, Y, Z direction for 3 times
Shock (malfunction)	100 m/s <sup>2</sup> (≒ 10 G) in each X, Y, Z direction for 3 times
Ambient temperature	-10 to 55 °C, storage: -25 to 70 °C (no freezing or condensation)
Ambient humidity	35 to 85 %RH, storage: 35 to 85 %RH (no freezing or condensation)
Protection rating	IP20 (IEC standard)
Material	Terminal: PBT, body: PC, base: PA6, POM
Installation method	DIN rail mounting
Certification	CE, RoHS, REACH, ENEC
Unit weight (packaged)	<ul style="list-style-type: none"> <li>Coupler: ≒ 165 g (≒ 265 g)</li> <li>Module: ≒ 75 g (≒ 108 g)</li> </ul>

※ The specifications on this guide may be changed

## Temperature Controllers TN Series

Model	TNS	TNH	TNL
<b>Size</b>	DIN W48 X H48 mm	DIN W48 X H96 mm	DIN W96 X H96 mm
<b>Power supply</b>	100 - 240 VAC~, 50/60 Hz		
<b>Permissible voltage range</b>	90 to 110 % of rated voltage		
<b>Power consumption</b>	≤ 8 VA		
<b>Display type</b>	11 segment, LCD type (operating value display part: 7 segment)		
<b>Sampling period</b>	50 / 100 / 250 ms (parameter)		
<b>Input specification</b>	Refer to 'Input Type and Using Range'		
<b>Option input</b>	<b>CT</b>	<ul style="list-style-type: none"> <li>0.0-50.0 A (primary current measurement range)</li> <li>CT ratio: 1/1,000</li> <li>Measurement accuracy: ±5% F.S. ±1digit</li> </ul>	
	<b>Digital</b>	<ul style="list-style-type: none"> <li>Contact - ON: ≤ 2 kΩ, OFF: ≥ 90 kΩ</li> <li>Non contact - residual voltage ≤ 1.0 V, leakage current ≤ 0.1 mA</li> <li>Outflow current: ≈ 0.5 mA per input</li> </ul>	
<b>Control output</b>	<b>Relay</b>	250 VAC~ 3A 1a	
	<b>SSR</b>	12 VDC= ±2 V, ≤ 20 mA	
	<b>Current</b>	DC 0 - 20 mA or DC 4 - 20 mA (parameter), Load resistance: ≤ 500 Ω	
<b>Option output</b>	<b>Alarm</b>	250 VAC~ 3 A 1a	
	<b>Transmission</b>	DC 4 - 20 mA (load resistance: ≤ 500 Ω, output accuracy: ±0.3% F.S.)	
<b>Option output</b>	<b>Communication</b>	RS485	
	<b>Type</b>	ON/OFF, P, PI, PD, PID	
<b>Control type</b>	<b>Multi SV</b>	≤ 4 SV	
	<b>Group PID</b>	≤ 8 group	
	<b>Zone PID</b>	4 zones	
	<b>ARW (Anti Reset Windup)</b>	50 to 200 %	
<b>Program control</b>	<b>Program</b>	≤ 10 patterns	
	<b>Step</b>	≤ 200 steps (1 pattern: ≤ 20 steps)	
	<b>Setting type</b>	Time setting	
<b>Hysteresis</b>	<ul style="list-style-type: none"> <li>Thermocouple, RTD: 1 to 100 (0.1 to 100.0) °C/°F</li> <li>Analog: 1 to 100 digit</li> </ul>		
<b>Proportional band (P)</b>	0.1 to 999.9 °C (0.1 to 999.9%)		
<b>Integral time (I)</b>	0 to 9,999 sec		
<b>Derivative time (D)</b>	0 to 9,999 sec		
<b>Control cycle (T)</b>	<ul style="list-style-type: none"> <li>Relay / SSRP output: 0.1 to 120.0 sec</li> <li>Selectable current or SSR drive output: 1.0 to 120.0 sec</li> </ul>		
<b>Manual reset</b>	0.0 to 100.0%		
<b>Dielectric strength</b>	Between the charging part and the case: 3,000 VAC~ 50/60 Hz for 1 min		
<b>Vibration</b>	0.75 mm amplitude at frequency of 5 to 55 Hz in each X, Y, Z direction for 2 hours		
<b>Relay life cycle</b>	<b>Mechanical</b>	<ul style="list-style-type: none"> <li>OUT1/2: ≥ 5,000,000 operations</li> <li>AL1/2/3/4/5/6: ≥ 20,000,000 operations</li> </ul>	
	<b>Electrical</b>	<ul style="list-style-type: none"> <li>OUT1/2: ≥ 200,000 operations</li> <li>AL1/2/3/4/5/6: ≥ 100,000 operations</li> </ul>	
<b>Insulation resistance</b>	≥ 100 MΩ (500 VDC= megger)		
<b>Insulation type</b>	Double insulation or reinforced insulation (mark:  , dielectric strength between the measuring input part and the power part: 3 kV)		
<b>Noise immunity</b>	±2 kV square shaped noise by noise simulator (pulse width: 1 μs) R-phase, S-phase		
<b>Memory retention</b>	≈ 10 years (non-volatile semiconductor memory type)		
<b>Ambient temperature</b>	-10 to 50 °C, storage: -20 to 60 °C (no freezing or condensation)		
<b>Ambient humidity</b>	35 to 85%RH		
<b>Protection structure</b>	IP65 (Front panel, IEC standards)		
<b>Loader port</b>	• TNS: top side		• TNH, TNL: front side
<b>Unit weight (packaged)</b>	<ul style="list-style-type: none"> <li>TNS: ≈ 128 g (≈ 156 g)</li> <li>TNH: ≈ 184 g (≈ 286 g)</li> <li>TNL: ≈ 301 g (≈ 443 g)</li> </ul>		
<b>Certification</b>			

### Communication Interface

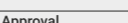
#### RS485

<b>Comm. protocol</b>	Modbus RTU/ASCII, Sync-Master, PLC ladderless
<b>Connection type</b>	RS-485, RS-422A
<b>Application standard</b>	EIA RS485 compliance with
<b>Maximum connection</b>	32 units (address: 01 to 99)
<b>Synchronous method</b>	Asynchronous
<b>Comm. Method</b>	Two-wire half duplex
<b>Comm. effective range</b>	≤ 800 m
<b>Comm. speed</b>	≤ 115,200 bps
<b>Response time</b>	5 to 99 ms (default: 20 ms)
<b>Start bit</b>	1 bit (fixed)
<b>Data bit</b>	8 bit (fixed)
<b>Parity bit</b>	None (default), Odd, Even
<b>Stop bit</b>	1 bit, 2 bit (default)
<b>EEPROM life cycle</b>	≈ 1,000,000 operations (Erase / Write)

\* 1 character of Modbus RTU is fixed at 11 bit.



## Power Controllers SPRM Series

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

(1) It is the rated load current of each channel in single-phase operation.

(2) Input impedance = 100 Ω

Control method	Phase control	Cycle control
<b>Control mode</b>	Normal / Constant current feedback / Constant voltage feedback / Constant power feedback	Fixed cycle / Variable cycle
<b>Applied load</b>	Resistance load, inductive load	Resistance load
<b>Output range</b>	Resistance load: 0 to 98 % Inductive load: 5 to 98 %	0 to 100 %
<b>Output accuracy</b>	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	


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

### Communication Interface

#### RS485

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

#### EtherCAT

<b>Comm. specifications</b>	EtherCAT
<b>Association approval</b> <sup>(1)</sup>	
<b>Connection cable</b>	CAT5e class or over (Shield type: SF/FTP, S/FTP, SF/UTP)
<b>Max. comm. distance</b>	Within 100 m distance between nodes
<b>Max. baud rate</b>	10 / 100 Mbps
<b>Topology</b>	Star, Line, Tree

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



※ 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 <sup>(01)</sup>	Built-in
Overheat protection	Built-in
Parallel operation <sup>(02)</sup>	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 <sup>(03)</sup>	10 to 55 Hz, 0.75 mm double amplitude, in each X, Y, Z direction for 2 hours
Shock	150 m/s <sup>2</sup> (≈ 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 <sup>(04)</sup>	-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)
Protection structure	IP20 (IEC standard)
Certification <sup>(05)</sup>	CE, RoHS, REACH

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



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

Model	SPB-A240-12	SPB-A240-24	SPB-A240-48	SPB-A480-24	SPB-A480-48
<b>Input</b>	100 - 240 VAC~ / 90 - 350 VDC≡ (allowable voltage: 85 - 264 VAC~)				
<b>Voltage</b> <sup>(01)</sup>	100 - 240 VAC~ / 90 - 350 VDC≡ (allowable voltage: 85 - 264 VAC~)				
<b>Current</b> <sup>(02)</sup>	115 VAC~ 2.5 A				230 VAC~ 4.8 A
<b>(Typical)</b>	230 VAC~ 1.3 A				230 VAC~ 2.4 A
<b>Frequency</b>	50 / 60 Hz (allowable frequency: 47 - 63 Hz)				
<b>Efficiency</b> <sup>(02)</sup>	115 VAC~ 0.86	115 VAC~ 0.89	115 VAC~ 0.90	230 VAC~ 0.88	230 VAC~ 0.89
<b>(Typical)</b>	230 VAC~ 0.89	230 VAC~ 0.92	230 VAC~ 0.93	230 VAC~ 0.91	230 VAC~ 0.92
<b>Power factor</b> <sup>(02)</sup>	115 VAC~ 0.99				230 VAC~ 0.99
<b>(Typical)</b>	230 VAC~ 0.9				230 VAC~ 0.97
<b>Power factor correction circuit (PFC)</b>	Available				
<b>Inrush current</b> <sup>(03)</sup>	115 VAC~ 16 A				230 VAC~ 40 A
<b>(Typical)</b>	230 VAC~ 32 A				55 A
<b>Leakage current</b>	115 VAC~ 0.14 mA				0.13 mA
<b>(Typical)</b>	230 VAC~ 0.25 mA				0.24 mA
<b>Output</b>					
<b>Voltage</b>	12 VDC≡	24 VDC≡	48 VDC≡	24 VDC≡	48 VDC≡
<b>Current</b>	20 A	10 A	5 A	20 A	10 A
<b>Power</b>	240 W				480 W
<b>Power boost</b> <sup>(04)</sup>	120 % of rated current				
<b>Voltage adjustment range</b>	-10 to 15 % (with VAdjust)				
<b>Ripple</b> <sup>(02)(05)</sup>	430 mV <sub>p-p</sub>	300 mV <sub>p-p</sub>	360 mV <sub>p-p</sub>	270 mV <sub>p-p</sub>	320 mV <sub>p-p</sub>
<b>Input variation</b> <sup>(06)</sup>	≤ 0.5 %				
<b>Load variation</b> <sup>(07)</sup>	≤ 2.0 %	≤ 1.5 %	≤ 1.5 %		
<b>Temperature variation</b>	≤ 0.05 % / °C				
<b>Start-up time</b> <sup>(02)</sup>	115 VAC~ 290 ms	115 VAC~ 310 ms	115 VAC~ 390 ms	230 VAC~ 430 ms	230 VAC~ 290 ms
<b>(Typical)</b>	230 VAC~ 250 ms	230 VAC~ 250 ms	230 VAC~ 290 ms	230 VAC~ 300 ms	230 VAC~ 260 ms
<b>Hold time</b> <sup>(02)</sup>	115 VAC~ 36 ms	115 VAC~ 40 ms	115 VAC~ 36 ms	230 VAC~ 31 ms	230 VAC~ 22 ms
<b>(Typical)</b>	230 VAC~ 39 ms	230 VAC~ 38 ms	230 VAC~ 36 ms	230 VAC~ 30 ms	230 VAC~ 21 ms
<b>Output low voltage indicate</b>	9.6 V (± 10 %)	20.0 V (± 10 %)	43.0 V (± 10 %)	20.0 V (± 10 %)	43.0 V (± 10 %)
<b>Unit weight (Package)</b>	≈ 850 g (≈ 1,050 g)		≈ 1,350 g (≈ 1,570 g)		

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

# Autonics

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## Products

### Sensors, Controllers, Motion Devices, Safety, Measuring Equipment, Connection Equipment and more

- Photoelectric Sensors • Photomicro Sensors • Fiber Optic Sensors • Door Sensors • Area Sensors • Proximity Sensors • LiDAR
- Displacement Sensors • Ultrasonic Sensors • Rotary Encoders • Temperature Sensors • Temperature Transmitters • Pressure Sensors
- Pressure Transmitters • Smart Camera • Vision Sensors • Safety Light Curtains • Safety Door Switches • Safety Switches
- Safety Controllers • Temperature Controllers • Solid State Relays • Power Controllers • Counters • Timers • Digital Panel Meters
- Digital Display Units • Sensor Controllers • SMPS • Industrial PC • HMIs • Recorders • Indicators • Network Converters
- Closed Loop Stepper Motor System • 5-Phase Stepper Motor & Drivers • 2-Phase Stepper Motor Drivers • Motion Controllers
- Industrial Networking • I/O Terminal Blocks • Distribution Boxes • Cables • Control Switches / Pilot Lights / Buzzers • Software

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

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