## **Automation & Sensing**

# **Communication &** Networking



	AS-Interface Overview	240
	Product Overview	245
	MicroSmart AS-Interface Master Module .2	247
NEW	SX5A AS-Interface (Communication Termina and Repeater)	al 255
NEW	SwitchNet™ HW Series Control Units2	267
NEW	SwitchNet™L6 Series Control Units	278
NEW	XA/XW/FB E-Stops	289
NEW	Safety Communication Terminal/Safety Monitor	292
	LONWORKS® I/O Modules	295 313



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- Downloadable software demos & upgrades
- Part configuration tool & cross reference
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## www.idec.com/communication



**PLCs** 

**Operator Interfaces** 

**Automation Software** 

**Power Supplies** 

## Link to the world and reduce wiring at the same time!

## SwitchNet Control Units directly connect to AS-Interface

Panels can be built with substantially less wiring at a lower total cost.

- Signals and power are carried through two wires.
- A maximum of 62 switches and pilot lights can be connected. The wire length can be extended to 300m by using two repeaters.
- Spring clamp terminals save wiring time. Each control switch or pilot light contains a communication chip (AS-Interface Ver. 2.1).



## Pilot lights & Illuminated Pushbuttons Brightness Control

Illumination can be controlled at four levels according to a command from the AS-Interface master. Dynamic displays and energy savings are possible.



L6 Pilot Lights Pg. 278



Easy & Flexible

## **Flexible Network Topology**

The AS-Interface network structure can be selected from various types of topology to meet application requirements for slave locations and cable branching.



Sensors

AS-Interface Flat Cable Branch Connector (IP65)

Connectors

Three types of connectors are available for designing the inside- and outside-panel layout.











USA: 800-262-IDEC

Canada: 888-317-IDEC

Sensors

**Communication & Networking** 

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PLCs

## **Cost Savings**

## Inside-Panel Wiring Example: Cost Savings Approximately 25%



#### **Conventional Wiring**

When using conventional wiring that involves a PLC and terminal blocks, the inside of the control panel is filled with wires for switches, pilot lights and other devices. Approximately half of the total panel cost is attributable to labor costs for wiring.

#### AS-Interface & SwitchNet Wiring

All SwitchNet units are connected to the AS-Interface master module using 2-wire cables. Wiring time is reduced to approximately 1/4 of the time needed for the conventional method and the total cost can be reduced up to 40%. In addition, maintenance is much easier.



**AS-Interface & SwitchNet Wiring** 



Inside & Outside-Panel Wiring Example: Cost Savings Approximately 25%



#### Cost Comparison **Conventional Wiring**

#### AS-Interface & SwitchNet Wiring



## **Conventional Wiring**

A large amount of space and cost is required by wiring to and inside junction boxes.

### **AS-Interface & SwitchNet Wiring**

SwitchNet wiring reduces costs for inside-panel wiring resulting in a total cost reduction of approximately 25%.



Comparisons were made using IDEC products. Cost comparison is based on control panel configuration using 60 buttons and lights.

## www.idec.com

%)

**Automation Software** 

## **Product Overview**

## MicroSmart PLC AS-Interface Master Module: FC4A-AS62M Pg. 247





- AS-Interface Ver. 2.1 compliant
- Digital and analog slaves can be connected.
- 23.5-mm-wide compact housing
- Applicable CPU modules: FC5A-C24R2C, FC5A-C24R2, FC5A-D16RK1, FC5A-D16RS1, FC5A-D32K3, FC5A-D32S3, FC4A-D20RK1, FC4A-D20RS1, FC4A-D40K3, FC4A-D40S3

## PS2R AS-Interface Power Supply Pg. 251



 AS-International Association certified

NEW)

• Universal AC input: 85 to

- UL, CSA, TÜV
- CE marked

264V AC

PS2R-Q30ABL Output capacity 73W (30.5V, 2.4A)

PS2R-F20ABL Output capacity 145W (30.5V, 4.8A)

## **IDEC SmartRelay**

AS-Interface Communication Module: FL1B-CAS2 (see PLC section)



- AS-Interface Ver. 2.0 compliant
- A maximum of 31 slaves can be connected.
- I/O: 4 input points, 4 output points.
- Space-saving, labor-saving, and cost-saving intelligent relay achieves decentralized control.

## SX5A AS-Interface Communication Terminal Pg. 255 (Outside Panel)



Degree of protection: IP67, connector

- Expansion slave addresses up to 62 in the A/B slave mode
- Compatible with 2- and 3-wire sensors
- With AS-Interface power and I/O status indicators
- Overload detection on the sensor power supply
- Output overload detection (2 in/2 out, 4 in/3 out)

## SX5A AS-Interface Communication Terminal Pg. 255 (Inside Panel)



SX5A-SSM43KSN (4 inputs / 3 outputs)

- Degree of protection: IP20, terminal block
- Expansion slave addresses up to 62 in the A/B slave mode
- Removable terminal block
- Communication monitor function
- Compatible with 2- and 3-wire sensors

#### Repeater Pg. 255



- No address setting required
  - AS-Interface network can be extended up to 300 m.
  - IP65 protection
  - Input status of AS-Interface 1 and 2 are displayed with LED indicators.

#### **Emergency Stop Switches Pg. 289**



ø16mm XA Series E-Stops

ø29 & ø40mm Mushroom

Buttons





E-Stop Enclosures

- Emergency stop switches with safety slave functions can be connected to AS-Interface Safety at Work.
- Complies with IEC 61508 SIL3 (Functional safety of electrical/electronic/ programmable electronic safety-related systems) and EN954-1 safety category 4 (Safety of machinery-Safety related parts of control systems).
- Space, wire, and labor-saving solution for safety equipment

ø29 & ø40mm Mushroom

Buttons

• Equipped with AS-Interface standard slave functions.

#### AS-Interface Safety Monitors: SX5A-MBR02 Pg. 292



- 2 safety outputs x 2 circuits
  PNP Transistor Output 200mA
- PNP Transistor Output 200mA
  2NO contacts
- **Communication & Networking**

Sensors





PLC

Operator Interfaces

Automation Software

**Power Supplies** 

## **AS-Interface**

## **SwitchNet**

- Switches and pilot lights containing an AS-Interface communication chip, with IP65 degree of protection.
- The HW series for 22mm mounting holes are available in 216 models, and the L6 series (for 16mm mounting holes) in 277 models a total of 493 models to choose from.
- Spring clamp terminals reduce wiring time.
- Illuminated units can change brightness in four levels: 100%, 50%, 25%, and 12.5%.
- The same panel layout (mounting centers and behind-panel depth) as conventional HW and L6 series.

## 22mm HW Series Pg. 267

## Product Overview Con't

Mounting Hole	Series	Minimum Mounting Centers (WH)	Depth Behind Panel		
ø22	HW series	30.0 x 50.0mm (Note 1)	49.3 mm		
ø16 L6 series 24.0 x 18.0mm (Note 2) 43.8 mm					
1. 30 x 50 mm for ø40 mushroom buttons					

2. Same mounting centers for round, square, and rectangular units.

#### **Non-illuminated Pushbuttons Illuminated Pushbuttons Pilot Lights** Round Rectangular Round Square Rectangular Square Rectangular Square Round I/O: 1 in, momentary and maintained operation I/O: 1 in/1 out, momentary and maintained operation I/0:1 out **Key Switches Illuminated Selector Switches Selector Switches** Round Square Rectangular Round Square Rectangular Round Square Rectangular I/O: 1 in (2-position), 2 in (3-position) I/O: 1 in (2-position), 2 in (3-position) I/O: 1 in/1 out (2-position), 2 in/1 out (3-position) **Lever Switch**

I/O: 1 in (2-position), 2 in (3-position)

PLCs

**Communication & Networking** 

**PLCs** 

**Operator Interfaces** 

**Automation Software** 

## **MicroSmart AS-Interface Master Module**

#### **Capable of Connecting 62 Slaves**

- Compliance with AS-Interface Ver. 2.1 specifications
- Digital and analog slaves can be connected.
- Configuration and slave monitoring can be done using LED indicators and pushbuttons on the front panel as well as using WindLDR.
- Analog signals can also be processed using built-in analog voltage input terminal or optional analog I/O modules.
- IEC62026-2 compliant.



**Part Numbers** 

#### **AS-Interface Master Module**



FU4A-A30ZIVI	

Part Number

#### **Programming and Monitoring Software**



## **MicroSmart Pentra CPU**

#### All-In-One Type

	Part Number	Power	I/O Points	Input	Output	Expandability
	FC5A-C24R2C	24V DC	24 (14 in /10 out)	241/ DC (Sink/Source)	Polov	88 maximum I/O (up to
	FC5A-C24R2	100-240V AC	24 (14 in/10 out)	24V DC (Sink/Source)	Kelay	4 expansion modules)

#### Slim Type

	Part Number	Power	I/O Points	Input	Output	Expandability	
	FC5A-D16RK1	241/ DC	16 (9 in/9 out)	24V DC (Sink/Source)	6 Relays 2 Transistor Sink	496 (up to 15 expansion modules)	
	FC5A-D16RS1	240 DC	10 (0 m/ 0 0ut)		6 Relays 2 Transistor Source		č
II.	FC5A-D32K3		22 (16 in /16 out)	24V DC (Cipk/Course)	Transistor Sink	512 (up to 15	
	FC5A-D32S3	240 DC	52 (10 m/ 10 Out)	24v DG (SINK/SOULCE)	Transistor Source	expansion modules)	

#### MicroSmart Slim CPU



## Accessories

	Description	Part Number
Terminal Block for AS-Interface Master Module	3-pole	FC4A-PMT3

Power Supplies

**Automation Software** 

## **Specifications (AS-Interface Master Module)**

#### **General Specifications**

-			
Operating Temperature	0 to 55°C (no freezing)		
Storage Temperature -25 to +70°C (no freezing)			
Relative Humidity Level RH1, 30 to 90% (non-condensing)			
Pollution Degree 2 (IEC60664)			
Degree or Protection IP20			
Corrosion Immunity Atmosphere free from corrosive gases			
Altitude	Operation: 0 to 2000m Transport: 0 to 3000m		
Vibration Resistance	<ul> <li>When mounted on a DIN rail: 10 to 57 Hz amplitude 0.075mm, 57 to 150 Hz acceleration 9.8 m/s<sup>2</sup> (1G) 2 hours per axis on each of three mutually perpendicular axes</li> <li>When mounted on a panel surface: 2 to 25 Hz amplitude 1.6mm, 25 to 100 Hz acceleration 39.2 m/s<sup>2</sup> (4G) 90 minutes per axis on each of three mutually perpendicular axes</li> </ul>		
Shock Resistance	147 m/s <sup>2</sup> (15g), 11ms duration, 3 shocks on each of three mutually perpendicular axes (IEC61131)		

#### **Functional Specifications**

External Power Supply	AS-Interface power supply, 29.5 to 31.6V DC
AS-Interface	65mA (normal operation)
Current	110mA maximum
Effect of Improper Input Connection	No damage
Connector on Mother Poord	MSTB2.5/3-GF-5.08BK (Phoenix Contact)
	Insertion/removal durability: 100 times minimum
Internal Current	80mA (5V DC)
AS-Interface Master Module Power Consumption	540mW (24V DC)
Weight (approx.)	85g

## **Communication Specifications**

Maximum Bus Cycle	When 1 through 19 slaves are connected: 3ms When 20 through 62 slaves are connected: 0.156 x (1 + N) ms, where N is the number of active sla 5ms maximum when 31 slaves are connected 10ms maximum when 62 slaves are connected		$\delta x (1 + N)$ ms, where N is the number of active slaves
Maximum Slaves	Standard slaves: A/B slaves:	31 62	
Maximum I/O Points	Standard slaves: A/B slaves:	248 total (124 inputs + 434 total (248 inputs +	124 outputs) 186 outputs)
AS-Interface Cable Maximum Length	When using no repeater or extender: When using a total of 2 repeaters or extenders:		100m 300m
Rated Bus Voltage	30V DC		

#### FC4A-AS62M



**Dimensions** 

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PLCs

**Operator Interfaces** 

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#### Installation Location

- MicroSmart modules must be installed correctly for optimum performance.
- MicroSmart is designed for installation in a cabinet. Do not install the MicroSmart outside a cabinet.
- The environment for using the MicroSmart is "Pollution degree 2." Use the MicroSmart in environments of pollution degree 2 (according to IEC60664-1).
  - Make sure that the operating temperature does not drop below 0°C or exceed 55°C. If the temperature does exceed 55°C, use a fan or cooler.
  - Mount the MicroSmart on a vertical plane as shown at right.
  - To eliminate excessive temperature build-up, provide ample ventilation. Do not install the MicroSmart near, and especially above, any device which generates considerable heat, such as a heater, transformer, or large-capacity resistor. Relative humidity should be above 30% and below 95%.
  - MicroSmart should not be exposed to excessive dust, dirt, salt, direct sunlight, vibrations, or shocks. Do not use the MicroSmart in an area where corrosive chemicals or flammable gases are present. The modules should not be exposed to chemical, oil, or water splashes.

#### **Cable Connection**



- **Caution:** Make sure that operating conditions are within the specification values.
  - Connect ground terminal of the CPU module to a proper ground, otherwise electric shock may occur.
    - Do not touch live terminals, otherwise electric shock may occur.
    - Applicable ferrules, crimping tool and screwdriver are listed below.
    - · When connecting stranded wire or multiple wires to a screw terminal block, use a ferrule.

#### **Ferrules for Terminal Block**

Cross-section 0.5mm<sup>2</sup> (20AWG)

For 1-cable connection: AI 0.5-8 WH For 2-cable connection: AI-TWIN 2 x 0.5-8 WH

Cross-section 0.75mm<sup>2</sup> (18AWG)

For 1-cable connection: AI 0.75-8 WH For 2-cable connection: AI-TWIN 2 x 0.75-8 GY

Cross-section 1.5mm<sup>2</sup> (16AWG) For 1-cable connection: AI 1,5-8 BK

Recommended ferrules shown above are made by Phoenix Contact.

### **AS-Interface Cable Wiring**

Before wiring the AS-Interface cable, remove the AS-Interface cable terminal block from the AS-Interface cable connector on the AS-Interface master module.

AS-Interface specifies use of brown cables for the AS-Interface + line, and blue cables for the AS-Interface – line. Connect the cables according the colors indicated on the terminal block. Tighten the terminal screws to a torque of 0.5 to 0.6 N $\bullet$ m (Replacement terminal block: FC4A-PMT3PN02, package quantity: 2)



Insert the terminal block to the connector on the AS-Interface master module, and tighten the mounting screws to a torque of 0.3 to 0.5 N•m.





### **Crimping Tool**

CRIMPFOX ZA 3 (Phoenix Contact)

#### Screwdriver

SZS 0.6x3.5 (Phoenix Contact)

#### Screw Tightening Torque

AS-Interface connector terminal screws: 0.5 to 0.6 N  $\bullet$  m AS-Interface connector mounting screws: 0.3 to 0.5 N  $\bullet$  m

Sensors

**Power Supplies** 

## PS2R AS-Interface Power Supply

## AS-Interface Power Supply with Universal AC Input Voltage

- Input voltage range: 100 to 240V AC
- Two output ratings: 73W and 145W
- Slim housing style mountable on DIN rails
- IP20 finger-safe terminals
- CE marked (LVD, EMCD)
- UL listed (UL 508), CSA (C22.2 No. 950), TÜV (EN60950, EN61010-1)
- Noise standards EN55022, EN61000-6-2 compliant
- Input indicator (orange) and output indicator (green)
- IEC62026-2 compliant



## Part Numbers

### AS-Interface Power Supply

	Output Capacity	Input Voltage	Output Voltage	Part Numbers
	73W	100 to 240V AC		PS2R-Q30ABL
	145W	100 to 240V AC	30.57 DC	PS2R-F30ABL



IDEC

## Specifications

Model			PS2R-Q30ABL	PS2R-F30ABL		
Efficiency			83% (typical) at the rated input/output			
	Voltage		100 to 240V AC (85 to 264V AC)			
	Frequency		47 to 63 Hz			
Input	0	100V AC	1.8A (typical) at the rated load	3.0A (typical) at the rated load		
	Gurrent	220V AC	1.0A (typical) at the rated load	2.0A (typical) at the rated load		
	Leakage Curr	ent	3.5mA maximum	n (UL, CSA, VDE)		
Inrush Current		t	30A maximum (25°C at cold start)			
	Rated Voltage		30.5\	/ DC		
	<b>Rated Current</b>		2.4A	4.8A		
	Adjustable Vo	ltage Range	N/	Ά		
	<b>Ripple Noise</b>	Voltage	300mV p-p maximum (0 to 10 kHz), 50mV p-p maximu	m (10 to 500 kHz) according to AS-Interface standard		
Output	Input/Load Flu	ictuation	3%			
	<b>Overall Fluctu</b>	ation	29.5 to 31.6V DC including input fluctuation, output fluctuation, temperature fluctuation and ripple voltage			
	<b>Delay Time</b>		2 sec maximum (delay in output voltage change fro	m 5V to 26.5V) according to AS-Interface standard		
	Startup Time		1 sec maximum (output voltage change from 21.5V to 29.5V) according to AS-Interface standard			
	Output Holdin	g Time	10ms minimum at 85V AC, rated load			
	Overcurrent F	rotection	110% (typical), a	utomatic reset <sup>1</sup>		
	Overvoltage F	rotection	120% mi	nimum <sup>2</sup>		
Supplementary Functions	Undervoltage	Protection	95% maximum,	automatic reset		
1 unotiono	Input Indicato	r	Orar	nge		
Output Indicator		tor	Green			
Dielectric Strength			Between inputs and outputs: Between inputs and ground: Between outputs and ground:	3.0 kV AC, 1 minute 3.0 kV AC, 1 minute 0.5 kV AC, 1 minute		
Insulation Resistance			Between inputs and outputs: Between inputs andground:	100 MΩ minimum (500V DC megger) 100 MΩ minimum (500V DC megger)		
<b>Operating Tempe</b>	rature		0 to 60°C (See the derating curve.) Vertical mounting only			
Storage Tempera	ture		-25 to +70°C (no freezing, non-condensation)			
<b>Operating Humid</b>	ity		95% RH (non-condensation)			
Vibration Resista	ince		10 to 57 Hz amplitude 0.075mm, 57 to 150 Hz acceleration 10 m/s² (1G) 10 cycles per axis on each of three mutually perpendicular axes			
Shock Resistance	e		147 m/s <sup>2</sup> (15G), 11ms duration, 2 shocks pe	er axis, on six mutually perpendicular axes		
Terminal			IP2	20		
Weight (approx.)			800g	1300g		
Dimensions			120H x 54W x 120D mm	120H x 81W x 120D mm		
Safety Standards			UL 508 listed CSA C22.2 No. 950 EN60950, EN61010			
AS-Interface Sta	ndard		EN50	0295		
ЕМС	(EMI) Radiated Emis	ssion	IEC61000-6-2 EN55022 class B ENFE023 class B			

1. The AS-Interface power supply is provided with an overvoltage protection circuit, but a long period of overload and short-circuit should be avoided. 2. After turning off the input voltage, allow more than 10 seconds before turning on again.

## **Communication & Networking**



## Block Diagram PS2R-Q30ABL PS2R-F30ABL



## Output Derating

(Operating temperture is the temperature around the power supply)



## **Terminal Names**

- ① (L) AC input terminal
- ② (N) AC input terminal (ground side)
- ③ (①) Ground terminal (protective ground)
- ④ (AS-i+) AS-Interface + output terminal
- (AS-i-) AS-Interface output terminal
- l ( 🛧 ) Ground terminal (output side)
- $\ensuremath{\textcircled{O}}$  (~) Input indicator (goes on when AC input is on)
- (AS-i) Output indicator (goes on when DC output is on)



### PS2R-030ABL



All dimensions in mm.

## Dimensions PS2R-F30ABL







**Operator Interfaces** 

#### **Precautions for Installation**

#### 1. Heat Dissipation by Convection

Keep minimum spacing of 50mm above and below, and 15mm on both sides to ensure proper ventilation.

> 50 mm N L
>  NPUT 100-240 VA  $^{\rm idec}\sim$ 🗖 AS-i 15 mm 15 mm 145w F30AB 50 mm

#### 2. Applicable Wires, Ferrules and Tightening Torque

ø3.5mm

		Ferrule Solid wire		Stranded wi	re	
lies	Ferrule/ Wire					
ddn	mm <sup>2</sup>	0.14 to 1.5	0.14 to 0.75	0.14 to 2.5	0.14 to 4	0.14 to 1.5
er S	AWG	26 to 16	26 to 18	26 to 14	26 to 12	26 to 16
MO						
۹.		<b>-</b> n	$\cap$			0.6 N•m

J<sup>C</sup>

#### 3. Mounting on 35mm-wide DIN Rails Mounting

To mount the power supply on a DIN rail, place the input terminal side up and put the groove of the power supply on the DIN rail as shown. Press the power supply towards the DIN rail.

#### Removing

Insert a flat screwdriver into the slot in the clamp. While pulling out the clamp, turn the power supply bottom out.



#### **Mounting Direction**

The AS-Interface power supply can be mounted on a vertical plane only. Other mounting directions are not allowed because of heat dissipation.

#### **Over Current Protection**

When an overcurrent of 110% of the rated output current flows due to an overload, the output voltage drops automatically and intermittent operation starts.

When the load returns to normal conditions, the normal output voltage is automatically restored. Prevent overload or short-circuitry for a long period of time, otherwise the internal elements will be damaged.

#### **Overvoltage Protection**

When the output voltage exceeds 120% the rated output voltage, the output is turned off. When the output voltage is turned off due to an overvoltage, turn the input off, and after more than 10 seconds, turn the input on again.

#### **Undervoltage Protection**

When the output voltage drops below 95% the rated output voltage, the output is turned off. When the cause of the error is removed, normal output voltage is automatically restored.

**Operator Interfaces** 

PLCs

5.4 in Ibs

## SX5A AS-Interface (Communication Terminal and Repeater)

## AS-Interface Communication Terminals (Slave Modules)

## IP67 I/O Module

- AS-Interface Ver. 2.1 compliant, capable of connecting 62 slaves
- Compatible with 2- and 3-wire sensors
- With AS-Interface power and input status indicators
- Overload detection function on the sensor power supply
- Output overload detection function (2 in/2 out model, 4 in/3 out model)

## **IP20 Terminal Block**

- AS-Interface Ver. 2.1 compliant, capable of connecting 62 slaves
- Removable terminal blocks
- Compatible with 2- and 3-wire sensors
- AS-Interface power and input status indicators
- IEC62026-2 compliant

## Repeater

- No address setting required.
- The AS-Interface network can be extended up to 300 m.
- IP65 protection
- Easy connection to AS-Interface flat cables.





## Part Numbers

SX5A AS-Interface Communication Terminals								
		Torminal		I/O Specifi	ications		Part Numbers	Applicable Base Module
		Termina	Input Points	Input	Output Points	Output	Fart wullibers	(order separately)
			4	NPN	—	—	SX5A-SWN40S02	SX5A-B3FF
IP67 I/O	0.0	Connector	4 PNP — SX5A-SWM	SX5A-SWN40K02N	SX5A-B3FF			
Module	A	Connector	2	PNP	2	PNP	SX5A-SWM22KS2N	SX5A-B3FF
	ce ides		4	PNP	3	PNP	SX5A-SWM43KS2N	SX5A-B2FF
	T	Terminal Block	4	NPN	_	—	SX5A-SSN40S0N	—
IP20 I/O Module			4	PNP	—	—	SX5A-SSN40K0N	—
	<u>HT</u>		4	PNP	3	PNP	SX5A-SSM43KSN	_

#### **Base Modules**

		Applicable I/O Module	Description	Part Numbers
Base Module for IP67	<b>A</b>	4 in model 2 in/2 out model	Substructure module to connect to AS-Interface	SX5A-B3FF
I/O Module	1.	4 in/3 out model	flat cables for AS-Interface bus and auxiliary power	SX5A-B2FF

#### Repeater

Description	Part Number
A repeater can extend the AS-Interface Network up to 300m.	SX5A-RP1

PLCs

**Operator Interfaces** 

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#### Accessories

		Description	Part Numbers	Notes
Hand-held Programming Device		Assign slave addresses and monitor system configuration	SX9Z-ADR1N	Includes: Programming device cable (SX9Z-CN1) Programming device AC adapter (SX9Z-ADPT) SwitchNet addressing port adapter (LA9Z-SNADP) Operation manual (English/Japanese)
Programming Device Cable	100	Connect the programming device to slave	SX9Z-CN1	
Programming Device AC Adapter		Charge the programming device	SX9Z-ADPT	AC input voltage: 100 to 240V AC
SwitchNet Addressing Port Adapter		Connect the programing device cable to SwitchNet contacts	LA9Z-SNADP	
AS-Interface Flat Cable Branch Connector	T. P.	Branch AS-Interface flat cable to AS-Interface flat cable	SX9Z-CF1	
T-branch Connector		Branch AS-Interface flat cable to 2-wire cable	LA9Z-SNTB	
M12 Branch Connector	Č	Branch AS-Interface flat cable to M12 cables	SX9Z-CT1	
AS-Interface Flat Cable End Tube		Protect the end of AS-Interface cable	SX9Z-CPA1	Degree of protection: IP65
Protection Cap		Ensure IP67 protection on unused M12 I/O plugs	SX9Z-CAP1	

Sensors

## **Communication & Networking**

## IDEC

### IP67 I/O Module

- AS-Interface Ver. 2.1 compliant. A maximum of 62 slaves can be connected.
- SX5A-SWN40S02 is a Ver. 2.0 standard slave, which allows for connection of up to 31 slaves.
- Compatible with 2- and 3-wire sensors
- With AS-Interface power and input status indicators
- Overload detection function on the sensor power supply
- Output overload detection function (2 in/2 out model, 4 in/3 out model)
- IEC62026-2 compliant





## **Specifications**

Models		SX5A-SWN40S02	SX5A-SWN40K02N	SX5A-SWM22KS2N	SX5A-SWM43KS2N				
	Rated Oj Voltag	perating e (Ue)		26.5 to 31.6V DC su	oplied from AS-Interface line	olied from AS-Interface line			
	Rated Oj Curre	perating nt (le)	≤ 40mA (w 240mA	ithout sensor) maximum	≤ 40mA (without sensor) 140mA maximum	≤ 40mA (without sensor) 240mA maximum			
	External A Power Sup	Auxiliary ply U (aux)		_	20 to 30V DC PELV (protectiv class 3 VDE0106 / IEC	20 to 30V DC PELV (protective very-low voltage: protection class 3 VDE0106 / IEC60364-4-41 compliant)			
General	Operating T	emperature	-25 to +60°C (no freezing)						
General	Storage Te	mperature		–25 to +	35°C (no freezing)				
	Degree of	Protection	IP67	(EN60529); Attach SX9Z-CAP1	protection caps on unused I/O co	nnectors.			
	Connectio	n Method		Insulation displacement tec M12 c	nnology for flat cables (yellow/bla onnector for I/O	sk)			
	Wei	ight		100g		150g			
	Mounting	y Method		Screw mour	ting on base module				
	Input Poin	ts/Signals	4DC inputs 2- and 3-wire sensors (NPN)	4DC inputs 2- and 3-wire sensors (PNP)	2DC inputs 2- and 3-wire sensors (PNP)	4DC inputs 2- and 3-wire sensors (PNP)			
	Input Power		20 to 31V DC supplied from AS-Interface line						
Input	Load Current Capacity		≤ 200mA ≤ 150mA	(Tb ≤ 40°C) (Tb ≤ 60°C)	≤ 100mA (Tb ≤ 40°C) ≤ 75mA (Tb ≤ 60°C)	$\leq$ 200mA (Tb $\leq$ 40°C) $\leq$ 150mA (Tb $\leq$ 60°C)			
			Provided with overload and short-circuit protection						
	OFF Current		$OFF \le 1mA$ $OFF \le 2mA$						
	ON Current (sink)		$ON \ge 4.5mA$ $ON \ge 4mA$						
	Protection Circuit		Input current limit ≤ 8mA						
	Output Points/Signals		_		2 PNP transistor outputs (with overload/short-circuit protection)	3 PNP transistor outputs (with overload/short-circuit protection)			
	Output Power			_	Supplied from external au	xiliary power supply U (Aux)			
Output	Volt	age		_	External auxiliary power voltage U (AUX) – 0.5V				
	Current		—		1A per output point 2A (OUT1, OUT2) 1.5A (OUT3) 4A total				
	Communic	ation Error			Output turns off				
	Slave	Туре	Standard slave		A/B slave				
		10	0	0	В	7			
	Profile	ID	1	А	A	А			
Communication		ID2	_	2	2	2			
Communication	Data D D D D	Bits 0 1 2 3	Input Output IN1 — IN2 — IN3 — IN4 —	Input Output IN1 — IN2 — IN3 — IN4 —	Input Output — OUT1 — OUT2 IN3 — IN4 —	Input Output IN1 OUT1 IN2 OUT2 IN3 OUT3 IN4 —			

## Specifications

	Models	SX5A-SWN40S02	SX5A-SWN40K02N	SX5A-SWM22KS2N	SX5A-SWM43KS2N	
	PWR	AS-Interface power: Green LED				
	AUX	—		External auxiliary power U (AUX): Green LED		
	IN	4 yellow LEDs		2 yellow LEDs	4 yellow LEDs	
LED Indicators	OUT	-	_	2 yellow LEDs	3 yellow LEDs	
	FAULT	Error indication: Red LED ON: Communication error or address 0 Flash: Sensor power supply or output is overloaded				
Address Assignment	Addressing Method	Remove the protection cap from the addressing port on the I/O module. Connect the hand-held programming device ADR1N) to the addressing port on the I/O module using the programming device cable (SX9Z-CN1), then the I/O m stops communication through the AS-Interface line. Change slave addresses using the programming device.				
Certification		AS-International Association				
	Standards	UL/c-UL, CE				

- AS-Interface Ver. 2.1 compliant
- A maximum of 62 slaves can be connected.
- Removable terminal blocks
- Communication monitor function
- Compatible with 2- and 3-wire sensors
- AS-Interface power and input status indicators
- IEC62026-2 compliant



## **Specifications**

Models		SX5A-SSN40S0N	SX5A-SSN40K0N	SX5A-SSM	43KSN			
	Rated Operating Voltage (Ue)		26.5 to 31.6V DC supplied from AS-Interface line					
	Rated Opera	ating Current (le)	$\leq$ 30mA (without set	ensor)	≤ 35mA (witho	ut sensor)		
	Externa Power S	al Auxiliary Supply U (Aux)	_		20 to 30V DC PELV (protective very-low voltage: protec- tion class 3 VDE0106 / IEC60364-4-41 compliant)			
	Operating	g Temperature		—25 to +60°C (n	o freezing)			
General	Storage	Temperature		–25 to +85°C (n	o freezing)			
	Degree	of Protection		IP20 (EN60	0529)			
	Connec	tion Method	Removable	e terminal block: Applicabl	le wire size $\leq 2.5$ mm <sup>2</sup> (14 AWG)			
	v	Veight		150g				
	Mount	ing Method		DIN rail mo	unting			
	Input Po	ints/Signals	4 DC inputs, 2- and 3-wire sensors (NPN)	4 C	DC inputs, 2- and 3-wire sensors	PNP)		
Input	Input Power		Supplied from AS-Interface line (default: internal switch set to INT) Supplied from an external 12 to 24V DC PELV (internal switch set to EXT)					
	Load Current Capacity		$\leq$ 150mA (provided with overload and short-circuit protection)					
	OFF Current		OFF ≤ 2mA					
	ON Current (sink)		$ON \ge 4mA$					
	Output Points/Signals		-		3 PNP transistor outputs (with overload/short-circuit protection)			
	Output Power		_		Supplied from external auxiliary power supply U (Aux)			
Output	Voltage		-		External auxiliary power voltage U (Aux) – 0.5V			
	Current		$\begin{tabular}{lllllllllllllllllllllllllllllllllll$		3A max. (OUT1), 1.5A max. (OU 6A total (Tb $\leq$ 40°C) 2A max. (OUT1), 1A max. (OUT2) 4A total (Tb $\leq$ 60°C)	T2, OUT3), 2, OUT3),		
	Commun	ication Error	—		Output tur	ns off		
	Sla	vе Туре		A/B slav	/es			
		10	0		7			
	Profile	ID	А		А			
Communication		ID2	0		0			
	Da	nta Bits D0 D1 D2 D3	Input IN1 IN2 IN3 IN4	Output 	Input IN1 IN2 IN3 IN4	Output OUT1 OUT2 OUT3 		

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## Specifications

Models		SX5A-SSN40S0N	SX5A-SSN40K0N	SX5A-SSM43KSN	
	PWR	AS-Interface power: Green LED			
	AUX			External auxiliary power U (AUX): Green LED	
	IN	4 yellow LE		EDs	
LED Indicators	OUT	_		3 yellow LEDs	
	FAULT	Fla	: Red LED rror or address 0 or output is overloaded		
	INT	Input	power supplied from AS-	Interface line: Green LED	
Address Addressing Method		Connect the hand-held programming device (SX9Z-ADR1N) to the addressing port on the I/O module using the program- ming device cable (SX9Z-CN1), then the I/O module stops communication through the AS-Interface line. Change slave addresses using the programming device.			
	Certification	AS-International Association			
	Standards	UL/c-UL, CE			



## **Internal Circuits**

### SX5A-SWM22KS2N







#### SX5A-SWM43KS2N



#### SX5A-SSN40S0N



#### SX5A-SSN40K0N



#### SX5A-SSM43KSN



**PLCs** 

## **Connector Arrangement**





### SX5A-SWM43KS2N



## **Terminal Arrangement**





3. Set switch INT: sensor supply from AS-Interface EXT: external sensor supply

Switching the input power supply INT/EXT

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**PLCs** 

**Operator Interfaces** 

**Automation Software** 

## Dimensions

#### SX5A-SWN40S02 SX5A-SWN40K02N SX5A-SWM22KS2N

Base module is separately ordered



### SX5A-B3FF



#### SX5A-SSN40S0N SX5A-SSN40K0N SX5A-SSM43KSN



All dimensions in mm.





SX5A-B2FF



## \_



## Repeater

#### SX5A-RP1

- No address setting required
- An AS-Interface network can be extended up to 300 m.
- IP65 protection
- Insulation displacement technology allows easy connection to AS-Interface flat cables.
- Input status of AS-Interface 1 and 2 are displayed with LED indicators.
- The SX5A-RP1 repeater is used to extend the AS-Interface cable. One repeater extends the length of network up to 100 m. A maximum of two repeaters can be used in a network, enabling the construction of a network of up to 300 m.



**Automation Software** 

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**Communication & Networking** 

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## Specifications

Models		SX5A-RP1
	Input Voltage	26.5 to 31.6V DC
	Current	60mA (per segment), 120mA (total)
	<b>Operating Temperature</b>	0 to +55°C (no freezing)
	Storage Temperature	-25 to +75°C (no freezing)
	<b>Operating Humidity</b>	30 to 95% RH (no condensation)
Conorol	Degree of Protection	IP65
General	Insulation Resistance	5 MΩ minimum (500V DC megger)
	<b>Dielectric Strength</b>	1000V AC, 1 minute
	Applicable Wire	AS-Interface flat cable
	Weight	Approx. 170g
	Dimensions	60W x 118.5H x 22.5D mm
	Mounting	Screw mounting
	Standard	CE

### **LED Indicators (see Dimensions)**

Indicators	Color (when ON)	Description
AS-Interface 1	Green	Power is supplied to line 1.
AS-Interface 2	Green	Power is supplied to line 2.

18.5

## Dimensions



All dimensions in mm.

## Mounting Hole Layout



## System Setup





## Address Assignment for Communication Terminals

Remove the protection cap from the addressing port on the I/O module.

Connect the hand-held programming device (SX9Z-ADR1N) to the addressing port on the I/O module using the programming device cable (SX9Z-CN1), then the I/O module stops communication through the AS-Interface line. Change slave addresses using the programming device.

For addressing procedures, see the user's manual for the hand-held programming device.



### Using SwitchNet Addressing Port Adapter on HW

To open the addressing port lid, insert a screwdriver into the side slot as shown. Do not lose the lid.



Attach the addressing port adapter to the programming device cable and insert the addressing port adapter into the addressing port on the communication block.

#### Address Assignment for SwitchNet

Turn off the power to the SwitchNet control unit and open the lid of the addressing port. Connect the programming device cable (SX9Z-CN1) to the hand-held programming device (SX9Z-ADR1N) and attach the SwitchNet addressing port adapter (LA9Z-SNADP) to the programming device cable (SX9Z-CN1). Insert the addressing port adapter into the addressing port on the SwitchNet control unit. Change slave address using the programming device.

For addressing procedures, see the user's manual for the hand-held programming device. After completing address assignment, reattach the lid to the addressing port.



## Using SwitchNet Addressing Port Adapter on L6

To open the addressing port lid, insert a screwdriver into the right-side hole as shown. The addressing port lid can be removed from the communication block by pulling it out.



Attach the addressing port adapter to the programming device cable and insert the addressing port adapter into the addressing port on the communication block.

**PLCs** 

## Hand-held Programming Device

Model	SX9Z-ADR1N		
Standards	CE		
Power Supply	Powered by built-in battery (recharged using AC adapter)		
Operation Time	8 hours or 250 read/write operations after full charge		
Charging Time	Approx. 14 hours		
Operating Temperature	0 to +55°C		
Storage Temperature	-25 to +85°C (no freezing)		
Degree of Protection	IP20		
Weight	Approx. 275g		
<b>Communication Specifications</b>	AS-Interface Version 2.1		
Operation	Slave address assignment and data read/write (compatible with the 62-slave mode)		
Connection	Connects to a slave using programming device cable		

## SwitchNet<sup>™</sup> HW Series Control Units

## 216 Models of 22mm Control Units Contain an AS-Interface Chip

- AS-Interface Ver. 2.1 compliant, capable of connecting 62 slaves
- Signals and power are carried through two wires.
- Wire length can be extended to 300m by using two repeaters.
- Spring clamp terminals save wiring time.
- Available models include pushbuttons, pilot lights, illuminated pushbuttons, selector switches, key switches and illuminated selector switches.
- Illuminated units can change brightness in four levels: 100%, 50%, 25% and 12.5%.
- The operators and mounting hole dimensions are identical with standard HW series control units.
- Degree of protection: IP65 (from front of the panel)
- IEC62026-2 compliant

**HW Series** 



## Part Numbers

Non-illuminated Pushbuttons	Style	Operation	Part Numbers	Button Color Code		
	Round Flush	Momentary	HW1B-M1A110S®			
	nound hush	Maintained	HW1B-A1A110S <sup>①</sup>			
	Pound Extended	Momentary	HW1B-M2A110S®			
	nouna extendea	Maintained	HW1B-A2A110S <sup>①</sup>			
		Momentary	HW1B-M3A110S <sup>①</sup>	B (black)		
	Mushroom 29mm	Maintained	HW1B-A3A110S①	G (green) R (red) S (blue)		
	Mushasan 40mm	Momentary	HW1B-M4A110S <sup>①</sup>	W (white) Y (yellow)		
	Mushroom 40mm	Maintained	HW1B-A4A110S®	button color code.		
	Squaro Eluch	Momentary	HW2B-M1A110S <sup>①</sup>			
	Syudie Flush	Maintained	HW2B-A1A110S®			
	Square Extended	Momentary	HW2B-M2A110S®			
	Square Externueu	Maintained	HW2B-A2A110S <sup>①</sup>			

Pilot Lights	Style	Part Numbers	Lens Color Code	Note
	Round Flush	HW1P-1A101S4@-T	A (amber) G (green) R (red)	One LED lamp is included: LSTD-2@.
	Square Flush	HW2P-1A101S4@-T	V (white) Y (yellow) In place of @, specify a lens color code.	For dimensions, see page 275.

## /

**Operator Interfaces** 

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**Operator Interfaces** 

**Automation Software** 

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2

V Series					
Illuminated Pushbuttons	Style	Operation	Part Numbers	Lens Color Code	Note
	Bound Fluch	Momentary	HW1L-M1A111S4@		
	nounu nusii	Maintained	HW1L-A1A111S4@		
	Round Extended	Momentary	HW1L-M2A111S4@		
	nouna Extendea	Maintained	HW1L-A2A111S4@		
	Round Extended with Full Shroud	Momentary	HW1L-MF2A111S4@	A (amber) G (green) R (red) S (blue) W (white) Y (yellow) In place of @, specify a lens color code.	One LED lamp is included: LSTD-2@.
		Maintained	HW1L-AF2A111S4@		
	Mushroom 29mm	Momentary	HW1L-M3A111S4@		
		Maintained	HW1L-A3A111S4@		
	Mushroom 40mm	Momentary	HW1L-M4A111S4@		
Mus		Maintained	HW1L-A4A111S4@		
		Momentary	HW2L-M1A111S4@		
	Square Flush	Maintained	HW2L-A1A111S4@		

Selector Switches	Style	Operation			Part Numbers	Note
		00° 2 position	Maintained	1 2	HW1S-2A110S	
		90° 2-position	Spring Return from Right	<sup>1</sup> , 2	HW1S-21A110S	
1000	Knah	nob 45° 3-position	Maintained	1 0 <sup>2</sup>	HW1S-3A220XS	3-position selector switches use two AS-
	KHUD		Spring Return from Right	<sup>1</sup> 0 2	HW1S-31A220XS	Interface blocks.
			Spring Return from Left	<sup>1</sup> ( <sup>0</sup> ) <sup>2</sup>	HW1S-32A220XS	
			Spring Return Two-way	<sup>1</sup> $\bigcirc^2$	HW1S-33A220XS	

Key Switches	Style		Operation			Key Retained Position Code
		00º 2 position	Maintained	1_2	HW1K-23A110S	А, В, С
		90° Z-position	Spring Return from Right	<sup>1</sup> , 2	HW1K-21BA110S	-
	Кеу	ey AFR 2 and the	Maintained	1 <b>0</b> 2	HW1K-33A220XS	A, B, C, D, E, G, H
( CEFF)			Spring Return from Right	<sup>1</sup> 0 <sup>2</sup>	HW1K-313A220XS	B, D, G
		45° 3-position	Spring Return from Left	<sup>1</sup> ( <sup>0</sup> ) <sup>2</sup>	HW1K-323A220XS	С, D, H
			Spring Return Two-way	<sup>1</sup> $\bigcirc^2$	HW1K-33DA220XS	-

1. In place of ③ in the part number, specify a key retained position code from the table below.

2. 3-position selector switches use two communication blocks.

3. For dimensions, see page 275.

Sensors

Key Retained Position Code									
90° 2-position 45° 3-position									
А	В	C	Α	В	C	D	E	G	Н
⁰ ∕∕ ⊘	1 2	● ②	0 0 2	1 0 2	0_02	0_0_0	1 2	1 0 2	
Not retained	Right retained	Left retained	Not retained	Right retained	Left retained	Right/Left retained	Center retained	Center/Right retained	Center/Left retained

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	-	_	-
	D	F	C
ЬC.		<b>Charter</b>	-

Illuminated Selector Switches	Style	Operation			Part Numbers	Lens Color Code
		90° 2-position	Maintained	1_2	HW1F-2A111S4@	
			Spring Return from Right	<sup>1</sup> >> <sup>2</sup>	HW1F-21A111S4@	A (amber)
	Knah	45° 3-position	Maintained	1 0 2	HW1F-3A221XS4@	R (red)
	KNOD		Spring Return from Right	<sup>1</sup> <sup>0</sup> <sup>2</sup>	HW1F-31A221XS4@	S (blue)
			Spring Return from Left	<sup>1</sup> <b>1 2</b>	HW1F-32A221XS4@	Y (white) Y (yellow)
			Spring Return Two-way	1 0 2	HW/1E-334221XS4@	., .

In place of <sup>(2)</sup> in the part number, specify a lens color code.
 3-position selector switches use two communication blocks.
 One LED lamp is included: LSTD-2<sup>(2)</sup>.

4. For dimensions, see page 275.

#### Accessories

1000300103								
Name & Appe	arance	Application/Specification	Part Numbers	Remarks				
T-branch Connector		Connects AS-Interface flat cable to 2-wire cable	LA9Z-SNTB	Current capacity 3A For wiring instructions, see page 275.				
Hand-held Programming Device		Assigns slave addresses and monitors system configuration	SX9Z-ADR1N	Contains: • Programming device cable (SX9Z-CN1) • Programming device AC adapter (SX9Z-ADPT) • SwitchNet addressing port adapter (LA9Z-SNADP) • Operating manual (English/Japanese)				
Programming Device Cable	Jos	Connects programming device to slave	SX9Z-CN1	Included with hand-held programming de	vice SX9Z-ADR1N			
Programming Device AC Adapter		Charges programming device	SX9Z-ADPT	AC input voltage: 100-240V AC Included with hand-held programming device SX9Z-ADR1N				
SwitchNet Addressing Port Adapter		Connects programing device cable to SwitchNet communication blocks	LA9Z-SNADP	Included with hand-held programming de	vice SX9Z-ADR1N			
	Locking Ring Wrench	Made of metal Weight: Approx. 150g	MW9Z-T1	Used to tighten the plastic locking ring.				
Tools	Lamp Holder Tool	Made of rubber	OR-55	Used to remove and install LED lamps.	0; 0; 59 4; 6 7; 6 7; 7; 6			
	Wiring Screwdriver	Weight: Approx. 20g	BC1S-SD0	Used to wire spring clamp terminals.	975 145			
Anti-rotation Ring	0	Made of plastic	HW9Z-RL	Prevents rotation of control unit in mounting hole.				
Rubber Mounting Hole Plug	ubber Mounting ole Plug Black rubber		OB-31	For plugging unused 22mm mounting holes in panel.				
Metallic Mounting Hole Plug		Diecast metal (Locking ring: plastic)	LW9Z-BM	<ul> <li>For plugging unused 22mm mounting holes in panel.</li> <li>Tighten the attached locking ring to a torque of 1.2 N·m.</li> <li>Degree of protection: IP66</li> </ul>				

**PLCs** 

#### Accessories

	Name & Appe	arance	Application/Specification	Part Numbers	Remarks	
PLCs	Switch Guard	Spring return		HW9Z-K1	<ul> <li>For preventing inadvertent operation on flush pushbuttons and illuminated pushbuttons.</li> <li>Degree of protection: IP65</li> <li>Maintained cover stops at 90° and 180°.</li> <li>Not applicable for mushcome buttons.</li> </ul>	
		Maintained	Made of plastic	HW9Z-K11		
Ces	Pushbutton Clear Boot	For flush buttons		OC-31		
ator Interfa		For extended buttons	Made of rubber	0C-32	Used to cover and protect pushbuttons. Not used outdoors and not oil resistant.	
Software Oper:	Padlock Cover		Body: Polyarylate Gasket: Nitrile rubber	HW9Z-KL1	Used to lockout pushbuttons, illuminated pushbuttons, or selector switches.	
Automation						

## **HW Series Replacement Parts**

Name & Appearance			Part Numbers	Remarks
Button	Round Flush		HW1A-B1 <sup>①</sup>	In place of a presity a button color and
	Round Extended		HW1A-B2①	B (black)
	29mm Mushroom		HW1A-B3①	G (green)
	40mm Mushroom		HW1A-B4 <sup>①</sup>	S (blue)
	Square Flush		HW2A-B1 <sup>①</sup>	W (white)
and the second se	Square Extended		HW2A-B2①	Y (yenow)
	Round Flush Illuminated PB		HW9Z-L11@	In place of ${\ensuremath{\mathbb O}}$ , specify a lens color code. A (amber)
Lens	Round Extended Pilot Light Illuminated PB		HW9Z-L12@	C (clear) G (green) R (red) _ S (blue)
	Square Flush Pilot Light Illuminated PB		HW9Z-L21@	Y (yellow) Note: For white illumination W, use a C (clear) lens.
	29mm Illuminated PB 40mm Illuminated	Non-marking	ALW3LU-@	
Lens		Marking Lens	ALW3BLU-@	②: C (clear), G (green), R (red), S (blue),
0		Non-marking	ALW4LU-@	
	РВ	Marking Lens	ALW4BLU-@	

Sensors

Power Supplies

#### **HW Series Replacement Parts**

Name & Appearance		Part Numbers	Remarks
Marking Plate	Round Flush	HW9Z-P11	
	Round Extended	HW9Z-P12	
	Square Flush	HW9Z-P21	Color: white
	29/40mm Mushroom	ALW3B	
Illuminated Selector Knob		HW9Z-FDY@	In place of @, specify a lens color code. A (amber) G (green) R (red) S (blue) W (white) Y (yellow)
Replacement Key			
No.	For key switch	HW9Z-SKP	
Locking Ring			
0		HW9Z-LN	Black
Safety Lever Lock		HWLS-TK1971	Yellow

## LED Lamp

Rated Voltage	Current Draw	Part Number	Lens Color Code
24V AC/DC ±10%	10mA AC 11mA DC	LSTD-2@	A (amber), G (green), R (red), S (blue), W (white), Y (yellow) In place of $@$ , specify a lens color code.

## **HW Nameplates**

Name	Specifications	Part Number	Notes/Dimensions
HWAM Nameplate	Without legend plate Made of black plastic 1.5mm thick	HWAM	Order a legend plate HWNP-④ separately.
HWAQ Nameplate	Without legend plate Made of black plastic 1.5mm thick	HWAQ	Order a legend plate HWNP-⊕ separately.

④ Specify engraving of nameplate on page 272.

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#### Legend Plate

	Name	Specifications	Part Number	Notes/Dimensions
PLUS	HWNP Legend Plate	Black aluminum plate 1.0mm thick	HWNP-@	White letter on black background. In place of ④, specify legend code from table below.

## **Standard Legend Codes**

Pushbuttons			Pushbuttons/Selector Switches				Selector Switches		
Legend	Code	Legend	Code	Legend	Code	Legend	Code	Legend	Code
AUTO CLOSE DOWN EMERG.STOP FAST FORWARD HAND HIGH IN INCH JOG LOW LOWER OFF ON	101 102 103 104 105 106 107 108 109 110 111 112 113 114 115	OPEN OUT RAISE RESET REVERSE RUN SLOW START STOP TEST UP I (Int'I On) O (Int'I Off) EMO	116 117 118 119 120 121 122 123 125 126 127 150 151 152	AUTO-MAN CLOSE-OPEN DOWN-UP FAST-SLOW FOR-REV HAND-AUTO HIGH-LOW JOG-RUN LEFT-RIGHT LOWER-RAISE MAN-AUTO OFF-ON ON-OFF OPEN-CLOSE RAISE-LOWER	201 202 203 204 205 206 207 208 209 210 211 212 213 214 215	REV-FOR RUN-JOG RUN-SAFE SAFE-RUN SLOW-FAST START-STOP STOP-START UP-DOWN OI (Int'I OFF ON)	216 217 218 219 220 221 222 223 250	AUTO-MAN-OFF AUTO-OFF-MAN CLOSE-OFF-OPEN DOWN-OFF-SLOW FAST-OFF-SLOW FOR-OFF-REV LEFT-OFF-RIGHT LOWER-OFF-RAISE OFF-MAN-AUTO OFF-SLOW-FAST OFF-1-2 OPEN-OFF-CLOSE SLOW-OFF-FAST SUMMER-OFF-WINTER UP-OFF-DOWN 1-OFF-2	301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316

**Power Supplies** 

**Operator Interfaces** 

To order engraved nameplates, add legend code to nameplate part number.

Character height based on the number of characters and size of nameplate. Standard character size is 3/16".

Nameplates with standard legends are the same list price as blank nameplates.

4. Nameplates have built-in anti-rotation feature for use with notched panel cut-outs. Additional anti-rotation ring (HW9Z-RL) is not necessary.

- Fig. 1 shows the procedure to install the legend plate into the nameplate.
- Fig. 2 shows how to remove the legend plate from the nameplate. Insert a thin screwdriver into the top of the legend plate to remove the legend plate.
- When using the nameplate, the applicable panel thickness reduces by 1.5mm, the thickness of the nameplate.
- When anti-rotation is not necessary and the recess is not provided in the mounting hole, break the anti-rotation tab off the nameplate as shown in Fig. 2.



Operating Voltage	26.5 to 31.6V DC					
Maximum Input Current	Pushbutton, selector 2-position, key 2-position:16mAPilot light, illuminated PB, illuminated selector 2-position:25mASelector 3-position, key 3-position:32mA (2 slaves: 1-in slave 16mA)Illuminated selector 3-position:41mA (2 slaves: 1-in slave 16mA, 1-in/1-out slave 25mA)					
Dielectric Strength	Between AS-Interface terminal and dead parts: 500V AC, 1 minute					
Insulation Resistance	Between AS-Interface terminal and dead parts: 100 M $\Omega$ minimum (500V DC megger)					
Operating Temperature	-25 to +55°C (no freezing)					
Storage Temperature	-40 to +80°C (no freezing)					
Operating Humidity	95% RH maximum (non-condensing)					
Altitude	Operate: 2000m maximum, Transport: 3000m maximum					
Pollution Degree	3 (IEC60664)					
Degree of Protection	IP65					
Corrosion Immunity	Atmosphere free from corrosive gases					
Vibration Resistance	5 to 55 Hz amplitude 0.5mm, 50 m/s <sup>2</sup> (5G) 1 hour per axis on each of three mutually perpendicular axes					
Shock Resistance	1000 m/s <sup>2</sup> (100G), 5 shocks on each of three mutually perpendicular axes					
Weight	Approx. 40g (3-position selector switches: approx. 44g)					

## **Communication Specifications**

Applicable Standard	AS-Interface Ver. 2.1					
Slave Profile	I/O code/ID2 code: B/A/E					
Occupied Slave Addresses	Pushbutton, pilot light, illuminated PB, selector 2-position (knob, key, illuminated):       1 slave address         Selector 3-position (knob, key, illuminated):       2 slave addresses					
Digital I/O Data Allocation	See page 274					
Illumination Control	LED illumination brightness of SwitchNet units can be controlled using the Write_Parameter command. For Write_Parameter command and settings, see page 274.					
AS-Interface Communication Specifications	Control system:Master/slave systemTopology:Free topologyTransmission medium:2-wire cableMaximum slaves:62 (A/B slaves), 31 (standard slaves)Maximum I/O points:434 (A/B slaves), 248 (standard slaves)Maximum network length:100m (without repeater)Maximum bus scan time:10ms (62 A/B slaves), 5ms (31 standard slaves)					

## **Mechanical/Electrical Specifications**

Terminal Style	Spring clamp			
Applicable Wire	Parallel 2-wire cable (twisted pair cable not applicable)         Single wires can also be used for connection over short distances.         Stranded wire:       0.5 to 0.75mm² (AWG20 to 18)         Solid wire:       0.5 to 1.5mm² (AWG20 to 16)			
Mounting Hole Size	ø22.3mm, +0.4 or –0mm			
Applicable LED Lamp	LSTD-2 <sup>(2)</sup> (rated current 10mA DC)			
Mechanical Life	Momentary:5,000,000 operations minimumMaintained, selector:500,000 operations minimumAddressing port adapter durability:100 insertions/removals minimum			
Certification				
Certification	AS-International Association			
Standards	UL listed, c-UL listed, CE marked			

## **Digital I/O Data Allocation**

Slave Unit	Used I/O	Used I/O Communication Block		Input Data (slave send data)				Output Data (slave receive data)		
		woulding Position	DI3	DI2	DI1	DIO	D03	D02	D01	D00
Pushbutton	1 in	2	0	X1	1	1	*	—	—	—
Pilot light	1 out	2	0	0	1	1	*		—	X1
Illuminated pushbutton	1 in/1 out	0	0	X1	1	1	*		—	X1
Selector, Key 2-position	1 in	0	0	X2	1	1	*		—	—
	1 in	D	0	X3	1	1	*		—	_
Selector, Key 3-position	1 in	0	0	X3	1	1	*		—	_
Illuminated selector 2-position	1 in/1 out	0	0	X2	1	1	*		—	X1
	1 in	١	0	X3	1	1	*		—	_
mummateu selector 3-position	1 in/1 out	0	0	X3	1	1	*		—	X1



3

**Operator Interfaces** 

PLCs

In the above table, bits marked with X1, X2 and X3 are used.

X1: When pushbutton is pressed, input data is 1 (on). When not pressed, input data is 0 (off). When output data is 1 (on), LED is on. When output data is 0 (off), LED is off. X2: The input data of 2-position selector switches depend on the operator position as

5. Unused input bits DI3 and DI2 are 0 (off) and unused input bits DI1 and DI0 are 1 (on). Slaves ignore unused output data sent from the master. \*: The master uses bit DO3 for addressing A/B slaves.

6.



On 3-position selector switches and illuminated selector switches, communication blocks O and <sup>'</sup>2 are mounted in positions as shown above.

2 shown below.



X3: The input data of 3-position selector sswitches depend on the operator position as 4. shown below.



### Write\_Parameter Command



#### Write\_Parameter Settings

LED Brightness	Output Selection	Contro	Control Data Remarks			
	P2	P1	PO			
100%		1	1	Default		
50%	1: D00	0	1			
25%	0: D01	1	0			
12.50%		0	0			
# **Dimensions (mm)**





#### **Pushbuttons**







#### **T-Branch Connector: LZ9Z-SNTB**

















#### **Illuminated Selector Switch**



#### **Panel Cut-out**



**Automation Software** 

20 13 J

02.5

#### Wiring Instructions

- Locate the wire hole on top of the T-branch connector. To open the spring clamp in the wire hole, insert an optional screwdriver (BC1S-SD0) diagonally into the adjoining screwdriver hole until it hits the bottom. Slightly jerk the screwdriver to insert easily.
  - 2. With the screwdriver held in the hole, insert a wire or ferrule to the bottom of the wire hole, then pull out the screwdriver.

Screwdriver Tip According to DIN5264



3. Strip the cable insulation 6 to 8mm from the end. When wiring with 0.75mm<sup>2</sup> or AWG18 stranded wires, use a ferrule to ensure a sufficient strength. If a stranded wire of this thickness is connected without using a ferrule, the wire strength is reduced.

PLCs

Operator Interfaces

#### **Panel Mounting**

Remove the AS-Interface communication block from the operator. Insert the operator into the panel cutout from the front, then install the communication block to the operator.

#### Removing/Installing the Communication Block

Turn the locking lever on the communication block in the direction opposite to the arrow on the housing. Then the communication block can be removed.

To install the communication block, align the TOP markings on the communication block and the operator, and insert the communication block. Then, turn the locking lever in the direction of the arrow.



#### **Notes for Panel Mounting**

When mounting the operator onto a panel, use the optional locking ring wrench (MW9Z-T1) to tighten the locking ring. Recommended tightening torque is 2.0 N·m. Do not use pliers. Excessive tightening will damage the locking ring.

On pilot lights and illuminated pushbuttons, do not apply excessive force to the LED lamp installed in the unit. Otherwise the lamp base may be damaged.

# Notes for Illuminated Pushbuttons with Full Shroud

The full shroud cannot be removed from the full shroud type operator.

## **Operating Instructions**

Using the Safety Lever Lock

To make sure that the lock lever is in the locked position, use of the attached safety lever lock (HWLS-TK1971, yellow) is recommended.

Use the safety lever lock according to the instructions described below.

- The minimum vertical mounting centers of HW control units are 50mm. Determine the mounting centers in consideration of convenience for installing the safety lever lock. (100mm is recommended.)
- After mounting the HW units on a panel, turn the locking lever to the locked position and put on the safety lever lock.
- 3. When the HW units are mounted on mounting centers smaller than the recommended distance, first put on the safety lever lock with the locking lever unlocked and install the communication block onto the operator. Turn the lock lever into the locked position and push down the safety lever lock into place.
- 4. To remove the safety lever lock, insert a screwdriver into the hole in the safety lever lock and pull up the safety lever lock.

#### Installing/Removing the Safety Lever Lock



#### Replacement of the Lens and Marking Plate

 To remove the lens unit (lens, marking plate and lens holder), insert a screwdriver into the recess of the lens. Recesses are on the side marked "TOP" and the opposite side.

#### **Removing the Lens Unit**



2. To remove the lens, insert a screwdriver between the lens and lens holder to disengage the latches. Then, the marking plate can be removed.

#### **Removing the Lens**



Note: The filter on the lens holder is for waterproof and oiltight purposes and cannot be removed.

#### Installation

For round lens models, place the marking plate on the lens holder with the anti-rotation projection engaged and press the lens onto the lens holder to engage the latches. For square lens models, insert the marking plate into the lens and press the lens onto the lens holder to engage the latches.

Pay attention to the orientation of the marking plate. **Round Lens** 



Lens Marking Plate Lens Holder

#### **Square Lens**

Note the orientation.



Automation Software

Power Supplies

PLCS

# Legend Marking

For HW series pilot lights and illuminated pushbuttons, legends and symbols can be engraved on marking plates, or printed Mylar can be inserted under the lens for labeling purposes.

# Marking Plate and Marking Film Size



## Insertion Order of Marking Plate and Film

#### **Round Lens (Flush)**



Note: Mylar is not included

## Square Lens (Flush)



Note: Mylar is not included with the control unit. When using Mylar, place the marking plate in the reverse direction.

## **Replacement of LED Lamps**

LED lamps can be replaced using the lamp holder tool (OR-55) from the front of the panel. The lamp can also be replaced by removing the communication block from the operator unit.

# **Replacement of Lamps from Panel Front**

#### Removal

Push in and turn the LED lamp counterclockwise using the lamp holder tool, then the LED lamp can be removed.



## Installation

1. Insert the LED lamp into the lamp holder tool and hold the lamp as shown below.



2. Align the contact pins of the lamp base with thegrooves in the lamp receptacle in the operator unit, then push in the LED lamp lightly and turn it clockwise into place.



## Wiring

 Locate the wire hole in the back of the communication contact block. To open the spring clamp in the wire hole, insert an optional screwdriver (BC1S-SD0) into the adjoining screwdriver hole until it hits the bottom. Slightly jerk the screwdriver to insert wire easily.



2. With the screwdriver held in the hole, insert a wire or ferrule to the bottom of the wire hole, then pull out the screwdriver.



6 to 8mm from the end.

#### **Anti-rotation Ring**

When using the anti-rotation ring, align the TOP marking on the operator and the  $\blacktriangle$  mark on the anti-rotation ring with the recess in the mounting hole.



#### Panel Cut-out (IEC947-5-1)



IDEC

Sensors

# SwitchNet<sup>™</sup> L6 Series Control Units

# 277 Models of 16mm Control Units Containing AS-Interface Chip

- AS-Interface Ver. 2.1 compliant, capable of connecting 62 slaves
- Signals and power are carried through two wires.
- The wire length can be extended to 300m by using two repeaters.
- Spring clamp terminals reduce wiring time.
- Available models include pushbuttons, pilot lights, illuminated pushbuttons, selector switches, key switches, illuminated selector switches and lever switches.
- Illuminated units can change the brightness in four levels: 100%, 50%, 25% and 12.5%.
  The operators and mounting hole dimensions are identical with standard L6 series
- The operators and mounting note dimensions are identical with standard L6 series control units.
- Degree of protection: IP65 (from front of the panel)
- IEC62026-2 compliant





# **Part Numbers**

L6 Series				
Non-illuminated Pushbuttons	Style	Operation	Part Numbers	Button Color Code
	Round	Momentary	LA1B-M1A1S®	
	noullu	Maintained	LA1B-A1A1S®	B (black)
	Square	Momentary	LA2B-M1A1S®	R (red) S (blue)
		Maintained	LA2B-A1A1S®	W (white) Y (yellow)
	Rectangular	Momentary	LA3B-M1A1S <sup>①</sup>	ton color code.
		Maintained	LA3B-A1A1S <sup>①</sup>	

**Pilot Lights** Style **Part Numbers** Lens Color Code Note Round LA1P-1A04S@ A (amber) G (green) R (red) One LED lamp is included: S (blue) Square LA2P-1A04S@ LFTD-2@. W (white) Y (yellow) In place of @, specify a lens color code. Rectangular LA3P-1A04S@

IDEC

# IDEC

Image: Contract in the contra	Illuminated Pushbuttons	S	Style	Operation Part Numbers		Len	s Color Code	Notes			
Maintained     LA1L-A1A1SQ     A[anber]     Control     Contro     Control     Control     Control<		R	ound	Momentary	LA1L-M1A	LA1L-M1A14S@					
Square         Momentary         L/L2L-M1A14S9         Bready Bready Statuary         One LED lamp is included: L12L-A1A14S9         One LED lamp is included: L22L-A1A14S9			ounu	Maintained	LA1L-A1A	14S@	A (amber)			PLCs	
Image: Column (Column (Colum (Column (Column (Column (Column (Column (Column (C		S	auaro	Momentary	LA2L-M1A	14S@	R (red) S (blue)		One LED lamp is included: LFTD-2@.		
Momentary     LA3L-M1A1450     Induct of W- spectry of easy of the sector W- spectry of th		0	quare	Maintained	LA2L-A1A	14S@	W (white Y (yellow	) ) of @_snacify a long	For dimensions, see page 285.		
Maintained     LASL-AIA14SQ       Selector Switches     Style     Operation     Part Numbers       0° 2-position     Maintained     1,32     LAIS-2A18       0° 2-position     Maintained     1,32     LAIS-3A28       0° 2-position     Maintained     1,32     LAIS-3A28       0° 2-position     Spring Return from Right     1,32     LAIS-3A28       0° 2-position     Maintained     1,32     LAIS-3A28       0° 2-position     Spring Return from Right     1,32     LAIS-3A28       Maintained     1,32     LAIS-3A28     Spring Return from Right       100 2-position     Spring Return from Right     1,32     LAIS-3A28       Spring Return from Right     1,32 <td< td=""><td></td><td>Boot</td><td>angular</td><td>Momentary</td><td>LA3L-M1A</td><td>14S@</td><td>color code</td><td></td><td></td><td></td></td<>		Boot	angular	Momentary	LA3L-M1A	14S@	color code				
Selector Switches         Style         Operation         Part Numbers           Maintained         \frip         LA1S-2A1S         Spring Return from Right         \frip         LA1S-2A1S           Maintained         \frip         LA1S-2A1S         Spring Return from Right         \frip         LA1S-2A1S           Maintained         \frip         LA1S-2A1S         Spring Return from Right         \frip         LA1S-3A2S           Af5° 3-position         Maintained         \frip         LA1S-3A2S         Spring Return from Right         \frip         LA1S-3A2S           Square         90° 2-position         Maintained         \frip         LA2S-2A1S         Spring Return from Right         \frip         LA2S-2A1S         Spring Return from Right         \frip         LA2S-3A2S         Spring Return from Right         \fri		TIECT	angulai	Maintained	LA3L-A1A	14S@				perato	
Solution         Solution         Pain Authors         Pain Authors           00° 2-position         Maintained         V         LAIS-2A1S           Prime Return form Right         V         LAIS-2A1S           Maintained         V         LAIS-2A1S           Maintained         V         LAIS-2A1S           Maintained         V         LAIS-3A2S           Spring Return from Right         V         LAIS-3A2S	Coloctor Switchoo	Stulo		Operation		Dort N	umboro			r Inte	
90° 2-position     Maintained     Maintaine	Selector Switches	Style		Maintained	1 2		2010			rfac	
Round       Association       Association       Association       Association         45° 3-position       Spring Return from Right       1/2*       LAIS-3A2S       LAIS-3A2S         Spring Return from Right       1/2*       LAIS-3A2S       LAIS-3A2S       Spring Return from Right       1/2*       LAIS-3A2S         Spring Return from Left       1/2*       LAIS-3A2S       LAIS-3A2S       Maintained       1/2*       LAIS-3A2S         Square       90° 2-position       Maintained       1/2*       LAIS-3A2S       Maintained       1/2*       LAIS-3A2S         Square       90° 2-position       Maintained       1/2*       LAIS-3A2S       Maintained       1/2*       LAIS-3A2S         Spring Return from Right       1/2*       LAIS-3A2S       Spring Return from Right       1/2*       LAIS-3A2S         Spring Return from Right       1/2*       LAIS-3A2S       Spring Return from Right       1/2*       LAIS-3A2S         Spring Return from Right       1/2*       LAIS-3A2S       Spring Return from Right       1/2*       LAIS-3A2S         Spring Return from Right       1/2*       LAIS-3A2S       Spring Return from Right       1/2*       LAIS-3A2S         Spring Return from Right       1/2*       LAIS-3A2S       Spring Return from Right <td></td> <td></td> <td>90° 2-positior</td> <td>n Spring Beturn from Bight</td> <td>× ۱٫٫٫²</td> <td>LATS</td> <td>21/10</td> <td></td> <td></td> <td>Sa</td>			90° 2-positior	n Spring Beturn from Bight	× ۱٫٫٫²	LATS	21/10			Sa	
Round       45° 3-position       Spring Return from Right       '\botheta'       LAINS-31A2S         Spring Return from Right       '\botheta'       LAINS-31A2S       Spring Return from Right       '\botheta'         Square       90° 2-position       Spring Return from Right       '\botheta'       LAINS-33A2S         Square       90° 2-position       Spring Return from Right       '\botheta'       LAINS-33A2S         Af5° 3-position       Spring Return from Right       '\botheta'       LAINS-33A2S         Af5° 3-position       Spring Return from Right       '\botheta'       LAINS-33A2S         Spring Return from Right       '\botheta' </td <td></td> <td></td> <td rowspan="4">Round 45° 3-position</td> <td>Maintained</td> <td>1 0 2</td> <td>LAIS</td> <td>-3A2S</td> <td>-</td> <td></td> <td></td>			Round 45° 3-position	Maintained	1 0 2	LAIS	-3A2S	-			
45° 3-position       Spring Return from Left       1		Round		Round 45° 3-position	Spring Return from Right	1 0 2	LA1S-	31A2S			
Image: bit with the second s					n Spring Return from Left	1 0 <sup>2</sup>	LA1S-	32A2S			A
Square90° 2-positionMaintained12LA2S-2A1SSquare90° 2-positionSpring Return from Right12LA2S-21A1SAf5° 3-positionMaintained112LA2S-3A2SSpring Return from Left112LA2S-31A2SSpring Return from Left112LA2S-33A2SSpring Return from Left112LA2S-33A2SSpring Return from Right12LA2S-33A2SSpring Return from Right12LA3S-33A2SSpring Return from Right12LA3S-33A2SSpring Return from Right12LA3S-31A2SSpring Return from Right12LA3S-31A2SSpring Return from Right12LA3S-31A2SSpring Return from Right12LA3S-31A2SSpring Return from Left12LA3S-31A2SSpring Return from Left12LA3S-31A2SSpring Return from Left12LA3S-31A2SSpring Return from Left12LA3S-33A2SSpring Return from Left12LA3S-33A2S <td></td> <td></td> <td>Spring Return Two-way</td> <td>1 0<sup>2</sup></td> <td>LA1S-</td> <td>33A2S</td> <td></td> <td></td> <td>utom</td>				Spring Return Two-way	1 0 <sup>2</sup>	LA1S-	33A2S			utom	
Square       90° 2-position       Spring Return from Right       1 • 2        LA2S-21A1S         Maintained       1 • 2        LA2S-3A2S       LA2S-3A2S         Spring Return from Right       1 • 2        LA2S-31A2S         Spring Return from Left       1 • 2        LA2S-33A2S         Spring Return from Left       1 • 2        LA2S-33A2S         Spring Return from Left       1 • 2        LA2S-33A2S         Spring Return from Right       1 • 2        LA2S-33A2S         Spring Return from Right       1 • 2        LA3S-2A1S         Spring Return from Right       1 • 2        LA3S-2A1S         Spring Return from Right       1 • 2        LA3S-3A2S         Spring Return from Right       1 • 2        LA3S-31A2S         Spring Return from Right       1 • 2        LA3S-31A2S         Spring Return from Left       1 • 2        LA3S-33A2S         Spring Return from Left       1 • 2        LA3S-33A2S         Spring Return frow-way       1			000 0 ivi	Maintained	1 2	LA2S	-2A1S			latio	
Square       Maintained       1 ° 2       LA2S-3A2S         Spring Return from Right       1 ° 2       LA2S-31A2S         Spring Return from Left       1 ° 2       LA2S-32A2S         Spring Return from Left       1 ° 2       LA2S-33A2S         Spring Return from Left       1 ° 2       LA2S-33A2S         Spring Return from Right       1 ° 2       LA2S-33A2S         Spring Return from Right       1 ° 2       LA3S-2A1S         Spring Return from Right       1 ° 2       LA3S-21A1S         Spring Return from Right       1 ° 2       LA3S-31A2S         Spring Return from Right       1 ° 2       LA3S-21A1S         Spring Return from Right       1 ° 2       LA3S-31A2S         Spring Return from Left       1 ° 2       LA3S-33A2S         Spring Return from No-way       1 ° 2       LA3S-33A2S			90° 2-positio	n Spring Return from Right	1 ~2	LA2S-	21A1S			n So	
Square       A5° 3-position       Spring Return from Right       1 0 2       LA2S-31A2S         Spring Return from Left       1 0 2       LA2S-32A2S         Spring Return Two-way       1 0 2       LA2S-33A2S         Spring Return from Right       1 0 2       LA2S-33A2S         Spring Return from Right       1 0 2       LA3S-2A1S         Spring Return from Right       1 2       LA3S-2A1S         Spring Return from Right       1 2       LA3S-3A2S         Spring Return from Right       1 2       LA3S-3A2S         Spring Return from Right       1 0 2       LA3S-3A2S         Spring Return from Right       1 0 2       LA3S-3A2S         Spring Return from Right       1 0 2       LA3S-3A2S         Spring Return from Left       1 0 2       LA3S-33A2S         Spring Return Two-way       1 0 2       LA3S-33A2S		Squara		Maintained	1 <b>0</b> 2	LA2S	-3A2S			ftwa	
Spring Return from Left     1     2     LA2S-32A2S       Spring Return Two-way     1     2     LA2S-33A2S       Maintained     1     2     LA3S-2A1S       90° 2-position     Maintained     1     2     LA3S-2A1S       Spring Return from Right     1     2     LA3S-2A1S       Spring Return from Right     1     2     LA3S-3A2S       Spring Return from Left     1     2     LA3S-33A2S       Spring Return from Left     1     2     LA3S-33A2S		Square	15º 2 positio	Spring Return from Right	<sup>1</sup> $\overset{0}{\checkmark}$ <sup>2</sup>	LA2S-	31A2S			ire	
Spring Return Two-way     1     2     LA2S-33A2S       Maintained     1     2     LA3S-2A1S       Spring Return from Right     1     2     LA3S-21A1S       Rectangular     45° 3-position     Maintained     1     2     LA3S-3A2S       Spring Return from Right     1     2     LA3S-3A2S       Spring Return from Right     1     2     LA3S-3A2S       Spring Return from Right     1     0     2     LA3S-3A2S       Spring Return from Left     1     0     2     LA3S-3A2S       Spring Return from Left     1     0     2     LA3S-3A2S       Spring Return from Left     1     0     2     LA3S-3A2S			40 0-розно	Spring Return from Left	<sup>1</sup> <sup>0</sup> <sup>2</sup>	LA2S-	32A2S				
P0° 2-position       Maintained       1 2       LA3S-2A1S         Spring Return from Right       1 2       LA3S-21A1S         Maintained       1 2       LA3S-3A2S         Spring Return from Right       1 2       LA3S-31A2S         Spring Return from Left       1 2       LA3S-32A2S         Spring Return from Left       1 2       LA3S-31A2S         Spring Return from Left       1 2       LA3S-32A2S         Spring Return from Left       1 2       LA3S-32A2S         Spring Return from Left       1 2       LA3S-33A2S				Spring Return Two-way	<sup>1</sup> $\bigcirc$ <sup>2</sup>	LA2S-	33A2S				
Rectangular     Ass 2 position     Spring Return from Right     1 2     LA3S-21A1S       45° 3-position     Maintained     1 0 2     LA3S-3A2S       Spring Return from Right     1 0 2     LA3S-31A2S       Spring Return from Left     1 0 2     LA3S-32A2S       Spring Return from Left     1 0 2     LA3S-33A2S       Spring Return from Left     1 0 2     LA3S-33A2S       Spring Return from Left     1 0 2     LA3S-33A2S				Maintained	1 2	LA3S	-2A1S				
Rectangular       45° 3-position       Maintained       1 • 0 - 2       LA3S-3A2S         Spring Return from Right       1 • 0 - 2       LA3S-31A2S         Spring Return from Left       1 • 0 - 2       LA3S-32A2S         Spring Return from Left       1 • 0 - 2       LA3S-32A2S         Spring Return from Left       1 • 0 - 2       LA3S-33A2S         Spring Return Two-way       1 • 0 - 2       LA3S-33A2S	Rectangular		Spring Return from Right	1 2	LA3S-	21A1S			Pov		
45° 3-position       Spring Return from Right       1 • • 2       LA3S-31A2S         Spring Return from Left       1 • • 2       LA3S-32A2S         Spring Return Two-way       1 • • 2       LA3S-33A2S			Maintained		LA3S	-3A2S			ver		
Spring Return from Left12LA3S-32A2SSpring Return Two-way12LA3S-33A2S			45° 3-positio	Spring Return from Right		LA3S-	31A2S			ldnS	
Spring Return Two-way <sup>1</sup> <sup>(a)</sup> <sup>2</sup> LA3S-33A2S				Spring Return from Left		LA3S-	32A2S			plies	
				Spring Return Two-way	<sup>1</sup> $\bigcirc$ <sup>2</sup>	LA3S-	33A2S			41	

# IDEC

PLCs

**Operator Interfaces** 

**Automation Software** 

# SwitchNet L6 Series

# **Communication & Networking**

Key Switches	Style		Operation		Part Numbers	Notes
		000 0	Maintained	1_2	LA1K-2A1S3	А, В, С
		90° 2-position	Spring Return from Right	<sup>1</sup> , 2	LA1K-21A1SB	-
	Pound		Maintained	1 <b>0</b> <sup>2</sup>	LA1K-3A2S3	A, B, C, D, E, G, H
	nouriu	4E° 2 position	Spring Return from Right	<sup>1</sup> 0 2	LA1K-31A2S3	B, D, G
		45 5-position	Spring Return from Left	<sup>1</sup> 4	LA1K-32A2S3	С, D, H
			Spring Return Two-way	<sup>1</sup>	LA1K-33A2SD	-
		00° 2 position	Maintained	1 2	LA2K-2A1S3	A, B, C
		50 Z-position	Spring Return from Right	<sup>1</sup> ~2	LA2K-21A1SB	-
	Squara	45° 3-position	Maintained	1 <b>0 2</b>	LA2K-3A2S3	A, B, C, D, E, G, H
	Square		Spring Return from Right	<sup>1</sup> 0 2	LA2K-31A2S3	B, D, G
			Spring Return from Left	<sup>1</sup> <b>1 1 1</b>	LA2K-32A2S3	С, D, H
			Spring Return Two-way	<sup>1</sup>	LA2K-33A2SD	-
		00° 2 position	Maintained	1 2	LA3K-2A1S3	A, B, C
		90 Z-position	Spring Return from Right	<sup>1</sup> ~2	LA3K-21A1SB	-
	Postongular		Maintained	1 0 2	LA3K-3A2S3	A, B, C, D, E, G, H
	nectanyular	45° 2 position	Spring Return from Right	<sup>1</sup> <sup>0</sup> <sup>2</sup>	LA3K-31A2S3	B, D, G
		45° 3-position	Spring Return from Left	<sup>1</sup> 4	LA3K-32A2S3	С, D, H
			Spring Return Two-way	<sup>1</sup> (1) <sup>2</sup>	LA3K-33A2SD	-

In place of ③ in the part number, specify a key retained position code from the table below.

# **Key Retained Position Code**

90° 2-position						45° 3-position			
А	В	C	Α	В	C	D	E	G	Н
٦ 🗸 🔍	⁰ ∕ ∕ ∕	● ②	0 0 2	1 0 2	0_02	0_0_0	1 2	0 0 2	0 0 2
Not retained	Right retained	Left retained	Not retained	Right retained	Left retained	Right/Left retained	Center retained	Center/Right retained	Center/Left retained

Illuminated Selector Switches	Style		Operation		Part Numbers	Note
		00° 2 position	Maintained	1 2	LA1F-2A14S@	
		90 Z-position	Spring Return from Right	<sup>1</sup> ~2	LA1F-21A14S@	
Ca	Pound		Maintained	1 0 2	LA1F-3A24S@	
	nounu	45° 2 position	Spring Return from Right	<sup>1</sup> 0 2	LA1F-31A24S@	
•		45 5-position	Spring Return from Left	<sup>1</sup> <b>1 2</b>	LA1F-32A24S@	
			Spring Return Two-way	<sup>1</sup> $\bigcirc^{2}$	LA1F-33A24S@	
		00° 2 position	Maintained	1_2	LA2F-2A14S@	A (amber)
	Square	50 Z-position	Spring Return from Right	<sup>1</sup> , 2	LA2F-21A14S@	G (green)
		45° 3-position	Maintained	1 <b>0 2</b>	LA2F-3A24S@	S (blue)
			Spring Return from Right	<sup>1</sup> 0 2	LA2F-31A24S@	W (white)
			Spring Return from Left	<sup>1</sup> 4	LA2F-32A24S@	In place of @ in the part number, specify a lens
			Spring Return Two-way	<sup>1</sup>	LA2F-33A24S@	color code.
		00° 2 position	Maintained	1 2	LA3F-2A14S@	
		90 Z-position	Spring Return from Right	<sup>1</sup> , 2	LA3F-21A14S@	
1Ca	Doctorgular		Maintained	1 0 2	LA3F-3A24S@	
	nectanyular	45° 2 position	Spring Return from Right	<sup>1</sup> <sup>0</sup> <sup>2</sup>	LA3F-31A24S@	
		40 S-POSILION	Spring Return from Left	<sup>1</sup> ( <sup>0</sup> ) <sup>2</sup>	LA3F-32A24S@	
			Spring Return Two-way	<sup>1</sup>	LA3F-33A24S@	

One LED lamp is included: LFTD-2@.

**PLCs** 

**Operator Interfaces** 

**Automation Software** 

**Power Supplies** 

Sensors

**Communication & Networking** 

Lever Selector Switches	Style		Operation	Part Numbers
		2-position	Maintained	LA1T-2A1S
			Spring Return from Top	LA1T-21A1S
			Spring Return from Bottom	LA1T-22A1S
	Round	3-position	Maintained	LA1T-3A2S
			Spring Return from Top	LA1T-31A2S
			Spring Return from Bottom	LA1T-32A2S
			Spring Return Two-way	LA1T-33A2S

#### **L6 Accessories**

Name & Appearance		Application/Specification	Part Numbers	Remarks
T-branch Connector		Connects AS-Interface flat cable to 2-wire cable	LA9Z-SNTB	Current capacity 3A For wiring instructions, see page 286.
Hand-held Programming Device		Assigns slave addresses and monitor system configuration	SX9Z-ADR1N	Contains: • Programming device cable (SX9Z-CN1) • Programming device AC adapter (SX9Z-ADPT) • SwitchNet addressing port adapter (LA9Z-SNADP) • Operation manual (English/Japanese)
Programming Device Cable		Connects programming device to slave	SX9Z-CN1	Included with hand-held programming device SX9Z-ADR1N
Programming Device AC Adapter		Charges programming device	SX9Z-ADPT	AC input voltage: 100-240V AC Included with hand-held programming device SX9Z-ADR1N
SwitchNet Addressing Port Adapter		Connects programing device cable to SwitchNet communication blocks	LA9Z-SNADP	Included with hand-held programming device SX9Z-ADR1N
	Locking Ring Wrench	Made of nickel-plated brass	MT-001	<ul> <li>Used to tighten the plastic locking ring when installing an L6 unit.</li> <li>Tightening torque: 0.88 N·m maximum</li> </ul>
Tools	Lamp Holder Tool	Made of rubber	OR-44	Used to remove and install LED lamps.
Lens Removal Tool		Made of stainless steel	MT-101	Used to remove the lens or button from the operator.
Switch Guard	For round/square units		AL-K6SP	
Spring Return	For rectangular units		AL-KH6SP	<ul> <li>For preventing inadvertent operation.</li> <li>Degree of protection: IP65</li> <li>For dimensions, see page 285.</li> </ul>

#### L6 Accessories

	Name & App	earance	Application/Specification	Part Numbers	Remarks
	Dustproof Cover	For round units		AL-D6	
\$		For square units		AL-DQ6	For minimum mounting centers when using dust proof
PLC		For rectangular units		AL-DH6	Operating temperature: -10 to +55°C
		Rubber Mounting Hole Plug	Nitrile rubber (black)	AL-B6	Degree of protection: IP65
Operator Interfaces	Mounting Hole Plug	Metallic Mounting Hole Plug	Metal (Locking ring: plastic)	AL-BM6	Degree of protection: IP66

# L6 Series Replacement Parts

Name and A	ppearance	Part Numbers	Remarks
Button	For round units	AB6M-BK2①	
	For square units	AB6Q-BK20	In place of ①, specify a button color code. B (black) G (green) B (red) S (blue) W (white) Y (vellow)
	For rectangular units	AB6H-BK2①	
Lens	For round units	AL6M-LK2@	In place of (2) specify a lens color code
	For square units	AL6Q-LK2@	A (amber), C (clear), G (green), R (red), S (blue), Y (yellow)
	For rectangular units	AL6H-LK2@	Note: For white illumination W, use a C (clear) lens.
Marking Plate	For round units	AL6M-W	
	For square units	AL6Q-W	White
	For rectangular units	AL6H-W	
Replacement Key	For key switch	AS6-SK	Key #132
Illuminated Selector Knob	For illuminated selector switch	LA1A-F©	In place of ②, specify a lens color code. A (amber), G (green), R (red), S (blue), W (white), Y (yellow)

Sensors

**Automation Software** 

Power Supplies

LED	Lamp
	Lamp

LD Lamp				
Rated Voltage	Current Draw	Part Numbers	Lens Color Code	Lamp Base
24V AC/DC ±10%	8mA AC/DC	LFTD-2@	A (amber), G (green), R (red), S (blue), W (white), Y (yellow) In place of @, specify a lens color code.	T 1-3/4 Miniature flange base

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# Specifications

## **General Specifications**

Operating Voltage	26.5 to 31.6V DC			
Maximum Input Current	Pushbutton, selector, key selector, lever: 16mA Pilot light, illuminated pushbutton, illuminated selector: 22mA			
Dielectric Strength	Between AS-Interface terminal and dead parts: 500V AC, 1 minute			
Insulation Resistance	Between AS-Interface terminal and dead parts: 100 MΩ minimum (500V DC megger)			
Operating Temperature	-25 to +55°C (no freezing)			
Storage Temperature	-40 to +80°C (no freezing)			
Operating Humidity	95% RH maximum (non-condensing)			
Altitude	Operate: 2000m maximum Transport: 3000m maximum			
Pollution Degree	3 (IEC60664)			
Degree of Protection	IP65			
Corrosion Immunity	Atmosphere free from corrosive gases			
Vibration Resistance	5 to 55 Hz amplitude 0.5mm, 50 m/s² (5G) 1 hour per axis on each of three mutually perpendicular axes			
Shock Resistance	1000 m/s <sup>2</sup> (100G), 5 shocks on each of three mutually perpendicular axes			
Weight	Approx. 20g			

#### **Communication Specifications**

Applicable Standard	AS-Interface Ver. 2.1							
Slave Profile	I/O code/ID code/ID2 code: B/A/E							
Occupied Slave Address	1 slave address							
Digital I/O Data Allocation	See page 284	See page 284						
Illumination Control	LED illumination brightness of Switc For Write_Parameter command and	.ED illumination brightness of SwitchNet units can be controlled using the Write_Parameter command. For Write_Parameter command and settings, see page 284						
AS-Interface Communication Specifications	Control system: Topology: Transmission medium: Maximum slaves: Maximum l/O points: Maximum network length: Maximum bus scan time:	Master/slave system Free topology 2-wire cable 62 (A/B slaves), 31(standard slaves) 434 (A/B slaves), 248 (standard slaves) 100m (without repeater) 10ms (62 A/B slaves), 5ms (31 standard slaves)						

#### **Mechanical/Electrical Specifications**

Terminal Style	Spring clamp					
Applicable Wire	Parallel 2-wire cable (twisted pair cable not applicable)         Single wires can also be used for connection over short distances.         Stranded wire:       0.5 to 0.75mm² (AWG20 to 18)         Solid wire:       0.5 to 1.5mm² (AWG20 to 16)         Do not twist single wires together.					
Mounting Centers	/ertical: 18mm, Horizontal: 24mm					
Mounting Hole Size	16.2mm, +0.2 or –0mm					
Applicable LED Lamp	LFTD-2@ (rated current 8mA AC/DC)					
Momentary: 2,000,000 operations minimum Maintained, selector, lever: 250,000 operations minimum Addressing port adapter durability: 100 insertions/removals minimum						
Certification						

ocranouton	
Certification	AS-International Association
Standards	UL listed, c-UL listed, CE marked

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In the above table, bits marked with X1, X2 and X3 are used.

1

0

operator position as shown below.

2-position Operator

**Operator Position** 

X1: When pushbutton is pressed, input data is 1 (on). When not pressed, input data is 0 (off).

X2: The input data of 2-position selector switches and 2-position lever switches depend on the

When output data is 1 (on), LED is on. When output data is 0 (off), LED is off.

2

2

#### **Digital I/O Data Allocation**

Claus Unit	Used I/O		Input Data (sla	ave send data)		Output Data (slave receive data)			
Slave Onit		DI3	DI2	DI1	DIO	D03	D02	D01	D00
Pushbutton	1 in	0	X1	1	1	*	—	—	—
Pilot light	1 out	0	0	1	1	*			X1
Illuminated pushbutton	1 in/1 out	0	X1	1	1	*	_	—	X1
Selector, Key selector, Lever 2-position	1 in	0	X2	1	1	*		—	—
Selector, Key selector, Lever 3-position	2 in	Х3	X3	1	1	*	—	—	—
Illuminated selector 2-position	1 in/1 out	0	X2	1	1	*			X1
Illuminated selector 3-position	2 in/1 out	X3	X3	1	1	*	—	—	X1

4

2

3

PLCs

**Operator Interfaces** 

## Write\_Parameter Command

DI2

0	0	A4	A3	A2	A1	AO	1	Sel P3	P2	P1	PO	PB	1
---	---	----	----	----	----	----	---	-----------	----	----	----	----	---

#### Write\_Parameter Settings

LED Brightness	Output Selection	Contro	Remarks	
	P2	P1	PO	
100%		1	1	Default
50%	1: D00 0: D01	0	1	
25%		1	0	
12.50%		0	0	

#### X3: The input data of 3-position selector switches and 3-position lever switches depend on the operator position as shown below



Unused input bits DI3 and DI2 are 0 (off), and unused input bits DI1 and DI0 are 1 (on). Slaves 5. ignore unused output data sent from the master. \*: The master uses bit DO3 for addressing A/B slaves.

6.

Engraving depth 0.5mm maximum.

# Marking Plate Size and Engraving Area for Illuminated Units

Style	Marking Plate Size	Marking Area
Round	ø13.8mm	ø12mm
Square	13.8 x13.8mm	12 x 12mm
Rectangular	13.8 x19.8mm	12 x 18mm



284

# **Communication & Networking**

**SwitchNet L6 Series** 

# IDEC



# **Accessory Dimensions**

#### **Switch Guard**



For Rectangular Units





# **Dustproof Cover**







For Square Units 24







With Dustproof Cover Installed

**Minimum Mounting Centers** 

# **Power Supplies**



ø16.2<sup>+0.2</sup>



# **Round/Square Units**



24



Waterproof Gasket

Determine the mounting centers in consideration of easy operation. All dimensions in mm.



Locate the wire hole in the back of the communication contact block. To open the spring clamp in the wire hole, insert an optional screwdriver (BC1S-SD0) diagonally into the adjoining screwdriver hole until it hits the bottom. Slightly jerk the screwdriver to insert easily.

#### Wiring



With the screwdriver held in the hole, insert a wire or ferrule to the bottom of the wire hole, then pull out the screwdriver. If an excessive force (normal operating force: 20 to 30N) is applied to the contact block while the L6 control unit is mounted on a panel, the communication block may be damaged. If the spring clamp does not open easily, remove the communication block from the operator and try again.

#### **Applicable Screwdriver Tip**



#### **Terminal Arrangement**



Screwdriver Holes

#### Removal

To remove the operator (color lens, marking plate and lens holder), hold the color lens recesses with the lens removal tool (MT-101) and pull it out. Remove the marking plate by disengaging the latches between the color lens and lens holder. Engrave a legend on the correct side of the marking plate, if required.



#### Installation

Place the marking plate on the lens holder in the correct direction and press the color lens onto the lens holder to engage the latches. Insert the lens holder into the housing in the correct direction.

#### **Replacement of LED Lamps**

Lamps can be replaced using the lamp holder tool (OR-44) from the front of the panel. The lamp can also be replaced by removing the communication block from the operator.

#### Removal

1. Push and turn the LED lamp counterclockwise using the lamp holder tool, then the LED lamp and the lamp holder can be removed.



2. Push the lamp head into the lamp holder and pull out the LED lamp from the rear of the lamp holder.



#### Installation

- 1. First, insert the LED lamp into the lamp holder from the rear. The lamp can be pushed in using the thinner end of the lamp holder tool.
- 2. Hold the LED lamp in the lamp holder tool as shown below.



3. Insert the LED lamp into the communication block. With the slit in the lamp holder aligned with the contact pin inside, push in and turn clockwise until the lamp holder is secured.

# **Panel Mounting**

Remove the communication block from the operator. Insert the operator into the panel cut-out from the front, then install the communication block to the operator.

#### **Removing/Installing the Communication Block**

With the yellow lever stop depressed in the direction of ①, turn the lock lever in the direction of ② (opposite to the arrow on the communication block), and pull out the communication block.

To install, align the TOP markings on the operator and the communication block together, insert the operator into the communication block and turn the lock lever in the direction of 3 (the arrow on the communication block).



#### **Notes for Panel Mounting**

Use the optional ring wrench (MT-001) to mount the operator onto a panel. Tighten the locking ring to a recommended torque of 0.88 N·m. Use of pliers or excessive tightening will damage the locking ring.

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PLC

Operator Interfaces

Automation Software

PLCs

**Operator Interfaces** 

Automation Software

## Precautions for AS-interface Wiring (Common Notices)

- 1. Do not run the AS-Interface network cables in parallel with or near power lines. Keep the cables away from noise sources.
- Turn power off before wiring. After wiring, confirm that wiring is correct before turning power on.
  - 3. For wiring, use cables appropriate for each slave as listed in the table below.
- Cables applicable to slaves can also be used for the AS-Interface master module and AS-Interface power supply.
- For SwitchNet slaves (HW and L6 units), single wires can also be used for connection over short distances: stranded wires 0.5 to 0.75mm<sup>2</sup> (AWG20 to 18) or solid wires 0.5 to 1.5mm<sup>2</sup> (AWG20 to 16).

Slave	Applicable Cable		Cable Part Numbers	Manufacturer	Remarks	
SwitchNet HW/L6 all models SX5A AS-Interface I/O Module IP20 type	2-core para	allel cable				
SVEA AS Interface I/O Medule all medale	AS Interface Flat Cable	Yellow (data and power)	2170 228		Sheath material: EPDM	
5X5A A5-INTERTACE I/U Module all models	AS-IIILEITALE FIAL CADIE	Black (auxiliary power)	2170 229	LAFF		

Do not use twisted pair cables and do not twist single cables together.

4. When using a ferrule on a stranded wire for wiring SwitchNet slaves (HW and L6 units) or T-branch connectors, use ferrules in table below. If a stranded wire of 0.75mm<sup>2</sup> or AWG18 is connected without using a ferrule, the wire strength decreases.

Cable Size (Stranded Wire)	Ferrule Type (Phoenix Contact)	Order No.	Pcs./Pkt.
0.5mm <sup>2</sup> (AWG20)	AI 0.5-8 WH	32 00 01 4	100
0.75mm <sup>2</sup> (AWG18)	AI 0.75-8 GY	32 00 51 9	100

- 5. The maximum total cable length is 100m, including all network cables. The maximum cable length can be extended to 200m using one repeater, or to 300m using two repeaters.
- 6. AS-Interface does not require a terminator.
- 7. Slave module address default is set to 00 on shipment from factory.

8. Network error causes include:

- Disconnected or shorted network cable
- Strong external noise
- Dropped power voltage for the master and slaves below the minimum power voltage.
- Use of improper network cables



**Part Numbers** 

#### **Features**

- Emergency stop switches with safety slave functions can be connected to the AS-Interface Safety at Work network.
- Complies with IEC61508 SIL3 (Functional safety of electrical/electronic/programmable electronic safety-related systems) and EN954-1 safety category 4 (Safety of machinery-Safety related parts of control systems).
- Space, wire and labor-saving solutions for safety equipment
- Equipped with AS-Interface standard slave functions. Monitored with AS-Interface master devices.









# ø16mm XA Series

51011117010011						
	Button/Lens Size	Connector Terminal	l/O Points	Illumination	Part Numbers	Button/Lens (*) Color Code
		IDC†	1-IN	Non-illuminated	XA1E-BV3Z10C1*	
	29mm		1-IN 1-OUT	Illuminated	XA1E-LV3Z114C1R	R: red RH: bright red
			1-IN	Non-illuminated	XA1E-BV4Z10C1*	N: grey*
	40mm		1-IN 1-OUT	Illuminated	XA1E-LV4Z114C1R	(zəmm oniy)



\*Grey is used for teaching pendants and not to be used as an E-Stop.
 \*IDC - insulation displacment connector.

#### ø22mm XW Series

	Button/Lens Size	Connector Terminal	l/O Points	Illumination	Part Numbers	Button/Lens (*) Color Code
		IDC	1-IN	Non-illuminated	XW1E-BV4Z10C1*	
	40mm 60mm	Crimp			XW1E-BV4Z10C2*	
		IDC	1-IN 1-OUT	Illuminated	XW1E-LV4Z114C1R	R: red
		Crimp			XW1E-LV4Z114C2R	RH: bright red
		IDC	1 IN	Non-illuminated	XW1E-BV5Z10C1*	
		Crimp	I-IIN		XW1E-BV5Z10C2*	

#### FB Series (Plastic Box + XW Series)

	Button/Lens Size	Connector Terminal	l/O Points	Illumination	Nameplate	Part Numbers	Button/Lens (*) Color Code
B JERGENCL B			1 INI	N. 10 1 4 1	Without	FB1W-XW1EBV4Z10C2*-Y0-1	
	10mm		1-111	Non-munimateu	With	FB1W-XW1EBV4Z10C2*-Y1-1	
	4011111	M12	1-IN	Illuminated	Without	FB1W-XW1ELV4Z114C2R-Y0-1	
			1-0UT	munnateu	With	FB1W-XW1ELV4Z114C2R-Y1-1	
	60mm		1-IN	Non-illuminated	Without	FB1W-XW1EBV5Z10C2*-Y0-1	R: red
			1 111	Non-illuminated	Without	FB1W-XW1EBV4Z10C2*-Y0-2	RH: bright red
0 0	10mm		1-IIN		With	FB1W-XW1EBV4Z10C2*-Y1-2	
	4011111	AS-interface Piercing	1-IN	Illuminated	Without	FB1W-XW1ELV4Z114C2R-Y0-2	
			1-0UT	munnateu	With	FB1W-XW1ELV4Z114C2R-Y1-2	
	60mm		1-IN	Non-illuminated	Without	FB1W-XW1EBV5Z10C2*-Y0-2	

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# General Specifications

**Operating Voltage** 

**Dielectric Strength** 

Input Current

XA/XW/FB Series

26.5 to 31.6V DC (supplied from AS-Interface) Illuminated: 35mA (XA series), 40mA (XW, FB series)

Non-illuminated: 25mA

500V AC, 1 minute

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Insulation Resistance	100 MΩ (500V DC megger)		
Operating Temperature	XA, XW series:-25 to +55°C (no freezing)FB series:Illuminated -25 to +50°C (no freezing)Non-illuminated -25 to +55°C (no freezing)		
Storage Temperature	-40 to +70°C (no freezing)		
Operating Humidity	45 to 85% RH (no condensation)		
	XA, XW series Operator unit: 3, Communication unit: 2		
Pollution Degree (IEC60664)	FB series: 3 (UL rating: 2)		
Degree of Protection (IEC60529)	Operator unit: IP65 Terminal unit: IP20 (FB series: IP65)		
Corrosion Immunity	Free from corrosive gases		
Vibration Resistance	Damage limits/Operating extremes: 10 to 500 Hz, amplitude 0.35mm, acceleration 50 m/s <sup>2</sup> (5G)		
Shock Resistance	Damage limits: 150 m/s <sup>2</sup> (15G) Operating extremes: 1000 m/s <sup>2</sup> (100G)		
Weight (approx.)	XA series ø29: 35g, ø40: 40g XW series ø40: 60g, ø60: 70g FB series M12 connector: 195g (ø40), 205g (ø60) Piercing: 235g (ø40), 245g (ø60)		
Mechanical/Electrical Specific	cations		
Operating Force	Pushlock:10.5N (XA series), 32N (XW, FB series)Pull reset:10N (XA series), 21N (XW, FB series)Turn reset:0.16N·m (XA series), 0.27 N·m (XW, FB series)		

Miniumum Force Required for Direct Opening Action	60N (XA series), 80N (XW, FB series)
Minimum Operator Stroke Required for Direct Opening Action	4.0mm
Maximum Operating Stroke	4.5mm
Operation Frequency	900 operations/hour
Mechanical Life	250,000 operations minimum
Electrical Life	250,000 operations minimum
Connectors	IDC connector (XA series) IDC connector, crimping connector (XW series) M12 connector/AS-Interface piercing connector (FB series)
Recommended Tightening Torque for Locking Ring	0.88 N·m (XA series), 2.0 N·m (XW series)

#### **Communication Specifications**

Communication		AS-Interface Ver. 3.0		
Slave Type		Safety slave		
Maximum Network Le	ngth	Om total		
Maximum No. of Slave	es	(when only safety slaves are connected)		
Profile (I/O, ID, ID2)		, B, E (illuminated type) , B, E (non-illuminated type)		
	Innut	Emergency stop switch DI0 DI1 DI2 DI3		
		When pressed 0 0 0 0		
Data Rit	mput	Emergency stop switch DI0 DI1 DI2 DI3		
		When not pressed X X X X X: 0.1 (Unspecified)		
Ordered	Output	DO0 = 1 Pilot light: on DO1 to 3: not used		
Output		000 = 0 Pilot light: off		
Parameter Bit		Not used		

# D -

Sensors



#### Accessories

Name	Specification	Part Numbers	
XA/XW Series	End connector (with cover)	XW9Z-C100-1	
IDC Connector Kit*	Through connector (with cover)	XW9Z-C100-2	
IDC Connector Termination Tool	Manufactured by ITW Pancon	MMIT-156F	
XW Series Connector Cable	Length 500mm, without connector	XW9Z-C205	
	Length 1m, without connector	XW9Z-C210	
FB Series Control Box	Length 300mm, straight	FB9Z-CS03	
	Length 1m, straight	FB9Z-CS10	
M12 Connector Coble	Length 2m, straight	FB9Z-CS20	
	Length 1m, right-angle	FB9Z-CL10	
	Length 2m, right-angle	FB9Z-CL20	

\*The package quantity is 5 pieces. IDC connector termination tool MMIT-156F (ITW

Pancon) is needed to connect the cable to the connector.

# Dimensions/Panel Cut-out





**XW Series** 



Communication Block

33.6

54 :

IDC Conn (Optional)

RO.8 max

022.3 ×0

17.4 20.1

Panel Cut-out

3.2 0 +0.2

24.1<sup>+0.4</sup>

#### **FB Series**

#### AS-Interface Piercing Type





M12 Connector Cable for FB Series Box



**PLCs** 



PLCs

**Operator Interfaces** 

# **Safety Communication Terminal/ Safety Monitor**

#### **Reduces Safety Equipment Wiring**

- EN954-1 category 4 compliant
  - Safety network can be established simply by connecting the safety slave and monitor to the AS-Interface network.
  - Standard slaves and safety slaves can be used in the same network, and no new safety network is necessary.
  - Response time 40 ms maximum (time interval after the safety input of safety slave has been shut down until the safety output is turned off)
  - A maximum of 31 safety slaves can be connected.
  - Stop category 0 or 1 can be selected (stop category 0: when a warning signal is input, the safety relay is shut down instantly; stop category 1: when a warning signal is input, the safety relay is shut down after the machine driving part has moved to safe status)
  - The setting of safety monitor can be made easily using the AS-Interface safety monitor configuration software on a Windows PC.





**AS-Interface Safety Communication Terminal** 

Safety Monitor



**Power Supplies** 

Sensors

**Communication & Networking** 

# Unit

Product	Description	Part Number
SX5A AS-Interface Safety Communication Terminal (Safety Slave)	2 inputs (safety input)	SX5A-AWN20
Base Module	Used with AS-Interface safety communication terminal	SX5A-G1FA
SX5A AS-Interface Safety Monitor	2 safety outputs x 2 circuits	SX5A-MBR02
Base models must be purchased to allow Safety Communication Term	inal to connect to network.	

#### Accessories

Product	Description	Part Number	
Safety Monitor Configuration Software	CD-ROM	SX9Y-ASMTR	
Cable	For connecting the safety monitor and PC	SX9Z-PCCABLE	
	For connecting two safety monitors	SX9Z-MTRCABLE	
Manual	For safety monitor	SX9Z-B760	
Manual	For safety monitor configuration software	SX9Z-B762	

# **Specifications**

Part Numbers

#### SX5A AS-Interface Safety Monitor

	Voltage	24V DC ±15%
	Current	200 mA
cieculcal specifications	<b>Response Time</b>	<40 msec
	Startup Delay Time	<10s
	Profile	Monitor 7.F
AS-Interface	ID Code	F
Communication Specifications Configuration Interface Specifications	IO Code	7
	Voltage	18.5 to 31.6V
	<b>Current Draw</b>	45 mA
	Interface	RS232C
	<b>Communication Speed</b>	9600 bps, No parity, 1 start bit , 1 end bit, 8 data bits

Innut	Start Input	Destance unlar input: Llich active approx. 10 mA (24)/ DC)			
mput	<b>External Device Monitor Input</b>	Photocouplet linput. High active approx. To fitA (24v DC)			
	Message Output (safety on)	PNP transistor output 200 mA Short-circuit/reverse connection protection			
Output	Safety Output	2NO contacts x 2 circuits Maximum contact load AC-15: 230V AC, 3A, DC-13: 24V DC, 1A Continuous current: 3A per circuit			
	Fuse	Maximum 4A slow-blow type (external)			
	<b>Overvoltage Category</b>	3 (complies with rated operating voltage 300V AC, VDE0110)			
	<b>Operating Temperature</b>	-20 to +60°C (no freezing)			
Environment Specifications	Storage Temperature	-30 to +70°C (no freezing)			
opoonioutiono	Degree of Protection	IP20 (for use only in electric control room or control panel of IP54 or higher protection)			
	Weight	450 g approx.			
Mechanical Specifications	<b>Connection Method</b>	Screw terminal			
	Mounting	DIN rail			
	Size	45 x 104.2 x 120 mm			
	Standards	UL, CSA, TÜV (EN954-1, VDE0801/A1, EN61496-1, EN60947-5-1), AS-International Association, CE			

#### SX5A AS-Interface Safety Communication Terminal (Safety Slave)

	LED POWER	AS-Interface power: Green				
Indicator Specifications	LED 11/12	Input status: Yellow				
	LED Fault	Communication error or address 0: Red				
Flectrical Specifications	Operating Voltage (Ue)	26.5 to 31.6V (from AS-Interface)				
Lieculcal Specifications	<b>Operating Current (le)</b>	<70mA (without connecting input devices)				
Input	Input Points	Mechanical switch 2 points With cross check Cable length <30m				
	Power Supply	From AS-Interface				
	<b>Operation Level</b>	10 mA				
	Profile	S-0.B.E				
Program Information	IO Code	0				
	ID Code	В				
	ID2 Code	E				
Data Bit	D0/D1	Depends on the switch 1 input status ON: dynamic code OFF: 0				
	D2/D3	Depends on the switch 2 input status ON: dynamic code OFF: 0				
Parameter Bit	P0, P1, P2, P3	Unused				
Ambient Temperature	<b>Operating Temperature</b>	-25 to +55°C (no freezing)				
Amplent Temperature	Storage Temperature	-25 to +85°C (no freezing)				
	Degree of Protection	IP67 (EN 60529 compliant) *				
	Connection Method	AS-Interface: cable-piercing method				
	Applicable Base Module	SX5A-G1FA				
Structure Specifications	Applicable Wire Diameter	ø7mm (8AWG)				
	Weight	180g				
	Installation Method	DIN rail or panel mounting				
	Standards	UL/c-UL, TÜV (EN 954-1, EN 60947-5-3, EN 51078, AS-Interface Association, CE				

\* See the

\* See the instruction manual of AS-Interface safety communication terminal.

**PLCs** 

# **Dimensions**

#### **AS-Interface Safety Monitor**





**AS-Interface Safety Communication Terminal** 



# 5 Base module i

Wiring

# Wiring Example





#### **AS-Interface Safety Monitor Terminal Assignment**

Safety on / message output 2 (Channel 2)

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Sensors

**Automation Software** 

**Power Supplies** 

2.32

**Block Diagram** 

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AS-i 1. power supply unit 2. control logic 3. control logic 4. control for safety switching output 1, channel 1 4. control for safety switching output 2, channel 1 5. control for safety switching output 1, channel 2 6. control for safety switching output 2, channel 2



# Service Button

Channel 2 Status LED Indicators

#### **AS-Interface Safety Communication Terminal Terminal Assignment**

Terminal	
1.1	Mechanical switch 1 +
1.2	Not used
1.3	Mechanical switch 1 -
2.1	Mechanical switch 2 -
2.2	Unused
2.3	Mechanical switch 2 +
3.1	Not used
3.2	Not used
3.3	Not used
4.1	Not used
4.2	Not used
4.3	Not used

#### Wiring Example

ſ		η.	Γ		7
11	1.2	13	2.1	2.2	23
			Ċ		Ċ
□ 3.1	□ 3.2	 3.3	□ 4.1	□ 4.2	() 4.3
¢		Ó	Ò		Ļ



# LONWORKS® I/O Modules

#### LONWORKS<sup>®</sup> I/O modules for building automation

LONWORKS is a leading open solution for building and home automation, industrial, transportation and public utility control networks.

IDEC provides a variety of compact LONWORKS communication terminals containing SNVTs to enable cost-effective design and implementation of multivendor control systems.

LON, LONWORKS, LOnMaker, LONMARK, 3120 and Echelon are registered trademarks of Echelon, USA.

#### Terminal Block Style I/O Modules Open Networks for Building Automation Standard Network Variable Type (SNVT)

- Removable finger-safe spring-up terminal blocks protect against electric shocks and save wiring time.
- Compact housing for all modules: 75H x 132W x 48D mm
- 12 different modules designed for general purpose digital control
- I/O signals for specialized applications.

LONWORKS® is the registered trademark of Echelon Corporation.

- Digital I/O module is also available for start/stop control with 8 inputs and 8 outputs.
- Analog input and Pt100Ω input modules are ideal for air-conditioning and temperature control.
- Pulse input module can count input pulse signals.
- · Lighting control module is used for illumination control of fluorescent and incandescent lamps.
- Standard configuration property type (SCPT) allows for adjusting communication traffic.
- LONMARK compliant.

#### Illumination

• ON/OFF Control



#### **HVAC**

· Start/stop heaters and air-conditioners



#### Elevator

• ON/OFF control



#### **Energy Control**

· Data collection of utility charges for each floor



#### Alarm

· Fire, earthquake,gas leakage alarm



#### Security





#### Access Control

• ID card scanner data transmission



## **Building Control**

· Control and monitoring from a central control room



Sensors

Operator Interfaces

**Automation Software** 

Power Supplies

PLC

Part Numbers

	Module Name	Voltage	I/O	Features	Part Number
	Digital Input	24V DC	16-point source/sink input		SX5L-SBN16B1
S	Digital Output	041/00	16-point transistor sink output		SX5L-SBT16K1
PLC		24V DU	16-point transistor source output	<ul> <li>16 inputs, 16 outputs, or 8 in/8 out</li> <li>Start/stop control module is also available with 8 inputs and 8 outputs.</li> <li>Output and I/O modules contain virtual I/O functional blocks which can be used for Boolean operation (AND, OR, NOT) on bit data and for enabling/disabling output network variables.</li> </ul>	SX5L-SBT16S1
		24V DC	8-point transistor source input 8-point transistor sink output		SX5L-SBM16K1
	Digital I/O		8-point transistor source input 8-point transistor sink output (start/stop control)		SX5L-SBM16K2
	Digital I/O		8-point transistor sink input 8-point transistor source output		SX5L-SBM16S1
rfaces			8-point transistor sink input 8-point transistor source output (start/stop control)		SX5L-SBM16S2
perator Inter	Analog Input	24V AC/DC	4-point, 1 to 5V, 4 to 20mA	<ul> <li>4 analog input channels for 1 to 5V and 4 to 20mA DC inputs</li> <li>Network variable models can be changed to meet units of analog input data.</li> </ul>	SX5L-SBAN041
0	Analog Output	24V AC/DC	4-point, 4 to 20mA		SX5L-SBAT04X1
			4-point, 3-wire $Pt100\Omega$ resistance thermometer, 0 to $50^\circ\text{C}$	• 4 input channels for room temperature control	SX5L-SBPT04X1
re	Pt100Ω Input	24V AC/DC	4-point, 3-wire Pt100 $\Omega$ resistance thermometer, –20 to +80°C	(0 to +50°C) • 4 input channels for water temperature control (-20 to +80°C)	SX5L-SBPT04Y1
omation Softwar	Pulse Input	24V AC/DC	8-point pulse input	<ul> <li>8 inputs for counting input pulses (minimum pulse width 50ms)</li> <li>Maintains count of current values when power is interrupted.</li> <li>Counter current values can be changed by input variable.</li> </ul>	SX5L-SBCN081
Aut	Lighting Control	24V AC	8-point, remote-control relay control	<ul> <li>Controls 8 remote control relays for fluorescent and incandescent lamps.</li> <li>Remote-control relays on existing illumination systems can also be controlled</li> </ul>	SX5L-SBRR081

## Accessories

Name	9	Part Number
Terminal Block 1		SX9Z-SS1
Terminal Block 2	SX9Z-SS2	
Terminal Block 3	SX9Z-SS3	
Terminal Block 7		SX9Z-SS7
Terminal Block 9		SX9Z-SS9
Terminal Block 10		SX9Z-SS10
Terminal Block 11		SX9Z-SS11
Terminal Block 12		SX9Z-SS12
Terminal Block 13	SX9Z-SS13	
Terminal Block 14	SX9Z-SS14	
Terminal Block 16		SX9Z-SS16
DIN Roil (1m long)		BAA1000
Din nail (Thi lung)		BNDN1000
End Stop	BNL5	
Network Interface (	SX9Z-CN23	
lumpor <sup>2</sup>	Ring	BPJ-26B
Jumper	Spade	BPJ-26FB

# Applicable Terminal Blocks/Insertion Pin Positions

SX5L Module Part Number	Terminal Block Position	Terminal Block Part No.	Insertion Pin Positions
	Upper	SX9Z-SS10	BDFH
SADE-SDIVIODI	Lower	SX9Z-SS2	ACFH
SX5L-SBT16K1	Upper	SX9Z-SS1	BCEG
SX5L-SBT16S1	Lower	SX9Z-SS2	ADFH
SX5L-SBM16K1 SX5L-SBM16K2	Upper	SX9Z-SS1	BCFH
SX5L-SBM16S1 SX5L-SBM16S2	Lower	SX9Z-SS3	A D E G
	Upper	SX9Z-SS12	ADEH
3AJL-3DAI1041	Lower	SX9Z-SS9	BCFG
SX5L-SBPT04X1	Upper	SX9Z-SS13	BDEH
SX5L-SBPT04Y1	Lower	SX9Z-SS14	ACFG
	Upper	SX9Z-SS11	ACEH
SADE-SECINO	Lower	SX9Z-SS7	BCEH
	Upper	SX9Z-SS11	B D F G
2V2F-2044081	Lower	SX9Z-SS7	ADFG

Supplied with two mounting screws.
 For connecting terminals of an unused channel on analog input and Pt100Ω input modules.

296

Sensors

# IDEC

# Specifications

#### **General Specifications**

Models	SX5L-SBN16B1	SX5L-SBT16*1	SX5L-SBM16**	SX5L-SBAN041	SX5L-SBPT04*1	SX5L-SBCN081	SX5L-SBRR081
Voltage	24V DC			24V AC (50/60Hz) / 24V DC		24V AC (50/60Hz)	
Voltage Range	21.6 to 26	6.4V DC (including §	5% ripple)	21.6 to 26.	21.6 to 26.4V AC/DC (including 5% ripple)		21.6 to 26.4V AC (including 5% ripple)
Power Consumption	1.0W (24V DC)     1.2W (24V DC)     3.0 VA (24V AC), 1.8W (24V DC)     2.0 VA (24V AC)       1.0W (24V DC)     1.0W (24V DC)		2.0 VA (24V AC) 1.0W (24V DC)	1.8 VA (24V AC) (not including power con- sumption by remote- control relays)			
Inrush Current		$\ge$ 3A (24V DC)			$\geq$ 15A (24V AC/DC)		≥ 15A (24V AC)
Allowable Momentary Power Interruption			≥ 10	ms (at the rated pow	ver voltage)		
Dielectric Strength	1,000V AC, 1			minute between power and FG terminals			
Insulation Resistance	100 $M\Omega$ minimum between power and FG terminals (500V DC megger)						
Operating Temperature	0 to 55°C (no freezing)						
Operating Humidity	30 to 90% RH (non-condensing)						
Storage Temperature				–20 to +75°C (no freezing)			
Storage Humidity			30	) to 90% RH (non-condensing)			
Pollution Degree				2 (IEC60664)			
Corrosion Immunity			Atmo	sphere free from corrosive gases			
Altitude	Operation: 0 to 2,000m, Transport: 0 to 3,000m						
Vibration Resistance	10 to 57Hz amplitude 0.075mm, 57 to 150Hz acceleration 9.8 m/s <sup>2</sup> (1G) 2 hours per axis on each of three mutually perpendicular axes						
Shock Resistance	294 m/s <sup>2</sup> (30G), 11-ms sinusoidal half-wave pulse						
Mounting	DIN rail, direct panel mounting (M4 mounting screws)						
Weight (approx.)	240g 250g						

# **Communication Specifications**

Communication System		LON® system
Transceiver		FTT-10A
<b>Connection Top</b>	pology	Bus topology, free topology
Transmission Speed		78 kbps
Transmission	Bus Topology	1,400m (when using only FTT-10A transceivers) (Level 4, 22AWG cable)
Distance	Free Topology	500m total, 400m between nodes (Level 4, 22AWG cable)
Neuron Chip		TMPN3120FE5M (Toshiba)

#### **Removable Finger-safe Terminal Block**

Rated Insulation Voltage	250V
Terminal Screw	M3 (on 7.62-mm centers)
No. of Poles	10 poles
Rated Thermal Current	7A
Insertion/Removal Durability	100 times

#### **Communication Status LEDs**

Name	Color	Description
PWR	Green	Remains on while power is supplied.
RUN	Green	Goes on when, after powerup, self-diagnosis has completed and application starts.
ERR	Red	Goes on when, after application has started, output network vari- able update failed. Goes off when output network variable is updated successfully.
RES	—	Reserved (does not go on)
SER	Yellow	Goes on when application program is not configured yet. Flashes when network information is not configured yet.

#### **Network Interface Connector**

	Receptacle in Module Housing	Connector for Cable
Phoenix Contact Part Numbers	MSTBV2.5/2-GF-5.08	FKC2.5/2-STF-5.08
IDEC Part Numbers	—	SX9Z-CN23
Insertion/Removal Durability	100 t	imes

#### Dimensions



## Mounting Hole Layout



## Features

#### **Spring-up Terminals**

The spring-loaded screws make installation as easy as pushing down and turning with a screwdriver. Installation time is cut in half since the screws do not need to be backed out to install wiring. Screw terminals accept bare wire, ring or fork connectors.



#### Finger-safe Terminal Cover

After connecting wires, screw terminals are finger-safe.



#### **Removable Terminal Block**

The terminal block can be removed simply by squeezing both latches on the top of the block inward to unlock the block from the socket. To reattach the terminal block, place the block in the socket with the latches opened and press the block until it snaps.

Wiring can be done with the terminal block removed, so installation in tight spaces is easy.



#### **Keyed Terminal Blocks**

Insertion pins are positioned on the base of the terminal block and inside the socket to prevent insertion of an incorrect terminal block into the socket. The pins are keyed to ensure correct terminal blocks and sockets, and to prevent swapping of upper and lower terminal blocks.



**Automation Software** 

**PLCs** 

# System Setup Examples

#### **Bus Topology**

Nodes are connected to one trunk line. The trunk line can be extended up to 1,400 meters.

Terminators are needed at both ends of the network.



#### Free Topology

The network can also be connected in a star, loop, bus, or combination of these configurations. The network can be expanded and modified.

One terminator is needed on the network and it can be located anywhere.



Maximum distance between nodes:

Quantity of Nodes (FTT-10A Transceiver Nodes)

A maximum of 64 nodes can be connected to one channel. When connecting more than 64 nodes, a router or repeater is needed.

A router is regarded as one node. Consequently, when using one router, the maximum number of nodes connected to one channel will reduce to 63.



400 meters

#### **Parts Description**



DIN Rail Mounting Clamp

#### **Network Interface Connector**

The network interface connector features spring-clamp terminals. Push in the orange pin to open the cable hole using a flat screwdriver and insert a cable into the cable hole. LonWORKS network cables can be connected to the two terminals in either polarity.



#### **Software Common Specifications**

#### **Network Variables**

A network variable is data that a particular device application program expects to get from another device on a network (an input network variable) or expects to make available to other devices on a network (an output network variable). Examples are temperature, switch values and actuator position settings.

I/O	Name	Туре
Input Network Variable	nviRequest	SNVT_obj_request
Output Network Variable	nvoStatus	SNVT_obj_status

When receiving nviRequest, the SX5L sends out nvoStatus in reply. This functionality makes it possible for the network to confirm that the responding node is in an on-line status.

#### **Configuration Property**

Configuration property is a data value used to determine initial values and parameters, such as maximum values, minimum values and time, for a particular LONWORKS device.

	Name	Туре
Configuration Property	nciPwrup	SCPTpwrUpDelay
configuration Froperty	nciMaxStsSendT	SCPTmaxSndT

The SX5L sends output network variable nvoStatus to the network within 3 seconds after powerup. The delay depends on a random number based on the Neuron ID and differs on each node.

The sending time can be delayed by changing the nciPwrup value. At system startup, if the SX5L sends nvoStatus before the addressee device is ready to receive communication, set the nciPwrup to a larger value.

The preset value for nciPwrup can be between 0 and 60 seconds (0.1-sec increments). The sending time is determined by the sum of the nciPwrup value and a random number.

After the first transmission of output network variable nvoStatus, the SX5L sends nvoStatus repeatedly at intervals designated by nciMaxStsSendT. When the nciMaxStsSendT value is 0, heartbeat transmission is disabled.

The configuration type of nciMaxStsSendT is SNVT\_elapsed\_tm (day, hour, minute, second, millisecond). When a value over 12 hours is set, the interval is designated as 12 hours 00 minutes 00 seconds.

#### **Network Management Tool**

When setting up a LonWorks network system using SX5L modules, a network management tool is needed, such as LonBuilder or LonMaker.

Automation Software

PLCs

# IDEC

# Digital Input Module SX5L-SBN16B1



- 16 digital inputs can be connected with either negative or positive common wiring.
- Used for transmitting digital signals to the network such as alarm signals from local sensors.

#### **General Specifications**

Voltage	24V DC
Voltage Range	21.6 to 26.4V DC (including 5% ripple)
Power Consumption	1.0W (24V DC)
Inrush Current	3A maximum (24V DC)
Weight (approx.)	240g

#### **Digital Input Specifications**

Input Points	16 points
Input	No-voltage input (DC 2-wire sensor, 3-wire sensor, no-voltage contact)
Input Voltage	24V DC
Input Voltage Range	0 to 26.4V DC
Input Impedance	Approx. 4.0 kΩ
Input Current	6mA/point (24V DC)
No. of Common Circuits	1
Input Common Polarity	Positive and Negative common compatible
Input Delay Time	250 ms
Input Turn ON Voltage	15V min. (between input and COM terminals)
Input Turn OFF Voltage	5V max. (between input and COM terminals)
Input OFF Current	1mA maximum
Isolation from Power Line	Photocoupler isolation
Dielectric Strength	500V AC, 1 minute between input and FG or power terminals
Insulation Resistance	100 $M\Omega$ minimum between input and FG or power terminals (500V DC megger)

# **Network Variables**

Output Network Variable

Name	Туре	Description		
nvoDI[0] to [15]	SNVT_switch	Correspond to inputs 0 through 15		
Configuration Property				
Name	Туре	Description		
nciMaxStsSendT [0] to [15]	1 SCPTmaxSnd	T nvoDI[0] to [15] heartbeat transmission interval		

## Wiring Diagram and Internal Circuit

#### Negative Common Wiring



#### Positive Common Wiring



# **Terminal Arrangement**

Upper Terminal Block (SX9Z-SS10)

Marking	COM	COM	0	1	2
Name	Input C	ommon	Input O	Input 1	Input 2
Marking	3	4	5	6	7
Name	Input 3	Input 4	Input 5	Input 6	Input 7
	-				



## Lower Terminal Block (SX9Z-SS2)

Marking	POWER+	POWER-	8	9	10
Nomo	Power Terminals		la aut 0	la aut 0	Input 10
Name	24V DC	OV	input 8	input 9	input io
Marking	11	12	13	14	15
Name	Input 11	Input 12	Input 13	Input 14	Input 15

PLCs

**Operator Interfaces** 

**Automation Software** 

## Digital Output Modules SX5L-SBT16K1/SX5L-SBT16S1



- 16 transistor outputs for either negative or positive common wiring.
- Each module contains 6 virtual I/O functional blocks with 2 input and 2 output network variables.

#### **General Specifications**

Voltage	24V DC
Voltage Range	21.6 to 26.4V DC (including 5% ripple)
Power Consumption	1.2W (24V DC)
Inrush Current	3A maximum (24V DC)
Weight (approx.)	240g

#### **Transistor Output Specifications**

Models	SX5L-SBT16K1	SX5L-SBT16S1	
Output Points	16 points		
Output	N-MOS open drain (NPN transistor output)	P-MOS open drain (PNP transistor output)	
Load Voltage	24V DC		
Load Voltage Range	21.6 to 26.4V DC		
Maximum Load Current	500mA per point, 6A per common line		
<b>Output Common Polarity</b>	Positive common Negative common		
Voltage Drop (ON Voltage)	0.8V maximum (voltage between power – terminal and output terminals when output is on)	0.8V maximum (voltage between power + terminal and output terminals when output is on)	
Leakage Current	1mA maximum		
Isolation from Power Line	Photocoupler isolation		
Dielectric Strength	500V AC, 1 minute between output and FG or power terminals		
Insulation Resistance	100 $M\Omega$ minimum between output and FG or power terminals (500V DC megger)		

# Wiring Diagram and Internal Circuit



SX5L-SBT16S1: Negative Common Wiring



#### Terminal Arrangement Upper Terminal Block (SX9Z-SS1)

Marking 0 2 + 1 Load Power Name Output 0 Output 1 Output 2 24V DC 0V 7 Marking 3 4 5 6 Output 3 Output 5 Name Output 4 Output 6 Output 7 Lower Terminal Block (SX9Z-SS2) Marking POWER+ POWER-8 9 10 **Power Terminals** Name Output 8 Output 9 Output 10 24V DC 0V



Name	Туре	Description
nvoDI[0] to [15]	SNVT_switch	Correspond to inputs 0 through 15

For details about network variables and virtual I/O functional block, see user's manual SX9Z-B901.

## Virtual I/O Functional Block

Two output network variables (nvoSWA[0] to [5], nvoSWB[0] to [5]) can be programmed togenerate results of inversion, AND, or OR operation of two input network variables (nviSWA[0] to [5], nviSWB[0]

to [5]) by changing configuration properties (nciAndOr[0] to [5].



nviSWA[0] nvoSWA[0]

nviSWB[0] nvoSWB[0]



## Digital I/O Modules SX5L-SBM16K1, -SBM16K2, -SBM16S1, -SBM16S2



- 8 digital inputs and 8 transistor outputs for either negative or positive common wiring.
- SX5L-SBM16K1 and -SBM16S1 contain 3 virtual I/O functional blocks with 2 input and 2 output network variables.
- SX5L-SBM16K2 and -SBM16S2 are designed for start/stop control of 4 channels.

#### **General Specifications**

-	
Voltage	24V DC
Voltage Range	21.6 to 26.4V DC (including 5% ripple)
Power Consumption	1.2W (24V DC)
Inrush Current 3A maximum (24V DC)	
Weight (approx.)	240g

#### **Transistor Output Specifications**

Models	SX5L-SBM16K1 SX5L-SBM16K2 (NPN Input Type)	SX5L-SBM16S1 SX5L-SBM16S2 (PNP Input Type)	
Input Points	8 p	oints	
Input Type	No-voltage input (DC 2-wire sensor, 3-wire sensor, no-voltage contact)		
Input Voltage	24	/ DC	
Input Voltage Range	0 to 26.4V DC		
Input Impedance	Approx. 4.0 kΩ		
Input Current	6mA/point (24V DC)		
No. of Common Circuits		1	
Input Common Polarity	Positive common	Negative common	
Input Delay Time	250	) ms	
Input Turn ON Voltage	15V min. (between inp	out and COM terminals)	
Input Turn OFF Voltage	5V max. (between inp	ut and COM terminals)	
Input OFF Current	1mA m	aximum	
Isolation from Power Line	Photocoupler isolation		
Dielectric Strength	500V AC, 1 minute between input and FG or power terminals		
Insulation Resistance	100 $M\Omega$ minimum between input and FG or power terminals (500V DC megger)		

# Network Variables

iiipu			
	Name	Туре	Description
	nviDO[0] to [7]	SNVT_switch	Correspond to outputs 0 through 7
_			

# Output Network Variable

Name	Туре	Description
nvoDI[0] to [7]	SNVT_switch	Correspond to inputs 0 through 7

Configuration Property		
Name	Туре	Description
nciMaxStsSendT1 [0] to [7]	SNVT_switch	nvoDI[0] to [7] heartbeat transmission interva

For details about network variables and virtual I/O functional block, see user's manual SX9Z-B801.

#### **Transistor Output Specifications**

Models	SX5L-SBM16K1 SX5L-SBM16K2 (NPN Output Type)	SX5L-SBM16S1 SX5L-SBM16S2 (PNP Output Type)	
Output Points	8 pc	vints	
Output Type	N-MOS open drain (NPN transistor output)	P-MOS open drain (PNP transistor output)	
Load Voltage	24V DC		
Load Voltage Range	21.6 to 26.4V DC		
Maximum Load Current	500mA per point, 4A per common line		
<b>Output Common Polarity</b>	Positive common	Negative common	
Voltage Drop (ON Voltage)	0.8V maximum (voltage between power – terminal and output terminals when output is on)	0.8V maximum (voltage between power + terminal and output terminals when output is on)	
Leakage Current	1mA maximum		
Isolation from Power Line	Photocoupler isolation		
Dielectric Strength	500V AC, 1 minute between output and FG or power terminals		
Insulation Resistance	100 M $\Omega$ minimum between output and FG or power terminals (500V DC megger)		

PLCs

**Operator Interfaces** 

**Automation Software** 

**Power Supplies** 

# **Communication & Networking**

#### Start/Stop Control

#### SX5L-SBM16K2 / SX5L-SBM16S2

Depending on the statuses of input variables nviDO and nviOVR, a start or stop output pulse isgenerated or suppressed. For DIO[0] as an example, the following charts summarize the relationships of input variables nviDO[0] and nviOVR[0] with start or stop output pulsegeneration (pulse widths 1 sec) from output terminal 0 or 1, respectively.

#### While nviOVR[0] is off

nviDO[0] (state) Received Data	
Start 0 Pulse (Output terminal 0)	
Stop 0 Pulse (Output terminal 1)	
While nviOVR[0] is on	
nviDO[0] (state) Received Data	
Start 0 Pulse (Output terminal 0)	
Stop 0 Pulse (Output terminal 1)	

# While nviDO[0] is on

nviOVR[0] (state) Received Data			
Start 0 Pulse (Output terminal 0)			

Stop 0 Pulse (Output terminal 1)

#### While nviDO[0] is off

nviOVR[0] (state) Received Data \_\_\_\_\_ Start 0 Pulse (Output terminal 0) \_\_\_\_\_

Stop 0 Pulse (Output terminal 1) .



#### Virtual I/O Functional Block

#### SX5L-SBM16K1 / SX5L-SBM16S1

Two output network variables (nvoSWA[0] to [2], nvoSWB[0] to [2]) can be programmed togenerate results of inversion, AND, or OR operation of two

nviSWA[0] nvoSWA[0] nviSWB[0] nvoSWB[0] VIO

input network variables (nviSWA[0] to [2], nviSWB[0] to [2]) by changing configuration properties (nciAndOr[0] to [2]).

## Network Variables SX5L-SBM16K2 / SX5L-SBM16S2

Input Network Variables

Name	Туре	Description
nviDO[0]	SNVT_switch	Sends start/stop pulses from Start 0 and Stop 0 (output terminals 0 and 1)
nviDO[1]	SNVT_switch	Sends start/stop pulses from Start 1 and Stop 1 (output terminals 2 and 3)
nviDO[2]	SNVT_switch	Sends start/stop pulses from Start 2 and Stop 2 (output terminals 4 and 5)
nviDO[3]	SNVT_switch	Sends start/stop pulses from Start 3 and Stop 3 (output terminals 6 and 7)
nviOVR[0] to [3]	SNVT_switch	Sends stop pulses from Stop 0 to Stop 3 (output terminals 1, 3, 5, 7) and disables nviDO[0] to [3]

#### Input Network Variables

Name	Туре	Description
nvoDI[0], [2], [4], [6]	SNVT_switch	Sends Status 0, 1, 2 and 3 to the network
nvoDI[1], [3], [5], [7]	SNVT_switch	Sends Alarm 0, 1, 2 and 3 to the network
nvoOVR[0] to [3]	SNVT_switch	Sends the received nviOVR[0] to [3] values to the network

#### Input Network Variables

Name	Туре	Description
nciMaxStsSendT1[0]	SCPTmaxSndT	nvoDI[0] and [1] heartbeat transmission interval
nciMaxStsSendT1[1]	SCPTmaxSndT	nvoDI[2] and [3] heartbeat transmission interval
nciMaxStsSendT1[2]	SCPTmaxSndT	nvoDI[4] and [5] heartbeat transmission interval
nciMaxStsSendT1[3]	SCPTmaxSndT	nvoDl[6] and [7] heartbeat transmission interval

# IDEC

**PLCs** 

**Operator Interfaces** 

**Automation Software** 

# Wiring Diagram and Internal Circuit SX5L-SBM16K1 / SX5L-SBM16K2

Input: Negative Common Wiring Output: Positive Common Wiring



## **Terminal Arrangement**

Upper Terminal Block (SX9Z-SS1)

Marking	+		-	-
Name		Input Common	n / Load Power	
SBM16K1	24V	DC	OV (Input COM)	
SBM16S1	24V DC (Ir	nput COM)	OV	
SBM16K2	24V	DC	OV (Inpu	ut COM)
SBM16S2	24V DC (Ir	nput COM)	0	V
Marking	0	1	2	3
SBM16*1	Input 0	Input 1	Input 2	Input 3
SBM16*2	Status O	Alarm 0	Status 1	Alarm 1
Marking	4	5	6	7
SBM16*1	Input 4	Input 5	Input 6	Input 7
SBM16*2	Status 2	Alarm 2	Status 3	Alarm 3



#### SX5L-SBM16S1 / SX5L-SBM16S2



#### Lower Terminal Block (SX9Z-SS3)

Marking	POWER +	POWER -	0	1	2
SBM16*1	Power	Power	Output 0	Output 1	Output 2
SBM16*2	24V DC	OV	Start 0	Stop 0	Start 1
Marking	3	4	5	6	7
SBM16*1	Output 3	Output 4	Output 5	Output 6	Output 7
SBM16*2	Stop 1	Start 2	Stop 2	Start 3	Stop 3



#### Analog Input Module SX5L-SBAN041

**Configuration Property** 



- 4 analog input channels
- The types of network variables for processing analog data can be changed to meet the control requirements.
- Ideal for heating, ventilation and air-conditioning (HVAC) and other analog control applications.
- Voltage: 24V AC (50/60 Hz) / 24V DC compatible

#### **General Specifications**

Voltage	24V AC (50/60 Hz) / 24V DC
Voltage Range	21.6 to 26.4V AC/DC (including 5% ripple)
Power Consumption	3.0 VA (24V AC), 1.8W (24V DC)
Inrush Current	15A maximum (24V AC/DC)
Weight (approx.)	250g

#### **Analog Input Specifications**

Input Points	4 points		
Input	Voltage input: Current input:	1 to 5V DC 4 to 20mA DC	
Input Impedance	Voltage input: Current input:	1 MΩ 250Ω	
<b>Digital Resolution</b>	12 bits		
A/D Conversion Time	80 ms per point		
Sample Duration Time	300 ms per point		
Error	$\pm 0.6\%$ (at 25°C) $\pm 1.0\%$ (over the operating temperature range)		
Isolation between Input Channels	No isolation		
Dielectric Strength	500V AC, 1 minute between input and FG or power terminals		
Insulation Resistance	100 M $\Omega$ minimum between input and FG or power terminals (500V DC megger)		

#### **Network Variables**

Output Network Variables

Name	Туре	Description
nvoAl0	SNVT_lev_percent	Corresponds to channel O
nvoAl1	SNVT_lev_percent	Corresponds to channel 1
nvoAl2	SNVT_lev_percent	Corresponds to channel 2
nvoAl3	SNVT_lev_percent	Corresponds to channel 3

Name	Туре	Description
nciMaxStsSendT1	SCPTmaxSndT	nvoAl0 to nvoAl3 heartbeat transmission interval
nciMinSendT1	SCPTminSndT	nvoAl0 to nvoAl3 minimum transmission interval
nciMaxRng[0]	SCPTmaxRnge	Designates nvoAI0 maximum value
nciMaxRng[1]	SCPTmaxRnge	Designates nvoAl1 maximum value
nciMaxRng[2]	SCPTmaxRnge	Designates nvoAl2 maximum value
nciMaxRng[3]	SCPTmaxRnge	Designates nvoAl3 maximum value
nciMinRng[0]	SCPTminRnge	Designates nvoAl0 minimum value
nciMinRng[1]	SCPTminRnge	Designates nvoAl1 minimum value
nciMinRng[2]	SCPTminRnge	Designates nvoAl2 minimum value
nciMinRng[3]	SCPTminRnge	Designates nvoAl3 minimum value
nciMinDelta[0]	SCPTsndDelta	Minimum change to send nvoAl0
nciMinDelta[1]	SCPTsndDelta	Minimum change to send nvoAl1
nciMinDelta[2]	SCPTsndDelta	Minimum change to send nvoAl2
nciMinDelta[3]	SCPTsndDelta	Minimum change to send nvoAl3

#### **Transistor Output Specifications**

The type of output network variables nvoAl0 through nvoAl3 can be changed. To change the type of the output network variable, use LonMaker Browser. Among the Standard Network Variable Types (SNVT) approved by the LonMark Interoperability Association, a total of 99 SNVTs can be used for SX5L analog input modules. When changing the output network variable types, designate the configuration properties as shown in the example below:

Index	Туре	nciMinRng[0] to nciMinRng[3]	nciMaxRng[0] to nciMaxRng[3]
2	SVNT_amp_mil	4	20
44	SVNT_volt	1	5

#### Wiring Diagram and Internal Circuit



Note: Connect the terminals of an unused channel using an optional jumper BPJ-26B (ring type) or BPJ-26FB (spade type) or using wires.

**Operator Interfaces** 

PLCs

Lower Terminal Block (SX9Z-SS9)

# IDEC

# **Terminal Arrangement**

Upper Terminal I					
Marking	NC	NC			
Name	No Con	nection			
Marking	SLD	CO	10	V0	
Namo	Shiold		Channel O		
Name	Name Silieiu	Common	Current Input	Voltage Input	
Marking	SLD	C1	11	V1	
Nama	Shield		Channel 1		
Name	Sillelu	Common	Current Input	Voltage Input	

Marking	POWER L	POWER N			
Name	Power Te	erminals			
Marking	SLD	C2	12	V2	
Nama	Chield		Channel 2		
Ivame	Shield	Common	Current Input	Voltage Input	
Marking	SLD	С3	13	V3	
Nama	Shield		Channel 3		
INdifie	Silielu	Common	Current Input	Voltage Input	

**PLCs** 

USA: 800-262-IDEC	Canada: 888-317-IDEC

# Analog Output Module SX5L-SBAT04X1



- Used for transmitting analog signals to a network.
- 4 ouput analog channels

#### **General Specifications**

Voltage	24V AC (50/60Hz) 24V DC
Voltage Range	21.6 to 26.4V AC/DC (including 5% ripple)
Power Consumption	4.5W (24V DC)/7.0VA (24V AC)
Weight (approx.)	240g

#### **Analog Output Specifications**

Part Number	SX5L-SBT04X1
Output Points	4 points
Output	Current output: 4 - 20mA
Output Max Load Impedance	600Ω
Analog Resolution	12bit
Sampling Cycle	300ms 1 point
Tolerance	±0.5%
Isolation from Output	No isolation
Isolation from Power	Photocoupler isolation
Dielectric Strength	500V AC 1 minutes (between output and FG terminal) 500V AC 1 minutes (between output and power terminal)
Insulation Resistance	100 MΩ minimum (between output and FG terminal) 100 MΩ minimum (between output and power terminal)

#### **Terminal Arrangement**

Upper Terminal Block (SX9Z-SS15)

Terminal	NC	NC	SLD	CO	10	NC
Description	No Con	nection	Shield	CH0 Common	CHO Current Output	NC

#### Lower Terminal Block (SX9Z-SS16)

Terminal	Power L	Power N	SLD	C2	12	NC	SLD	С3	13	NC
Description	Pov	wer	Shield	CH2 Common	CH2 Current Output	NC	Shield	CH3 Common	CH3 Current Output	NC

SLD

Shield

C1

CH1 Common

11

CH1 Current Output

NC

NC

PLCs

Sensors

# IDEC

# Pt100Ω Input Modules SX5L-SBPT04X1 / SX5L-SBPT04Y1



- 4 input channels for air conditioning and other temperature control applications
- Two temperature ranges are available:
- 0 to +50°C and -20 to +80°C
- Voltage: 24V AC (50/60 Hz) / 24V DC compatible

#### **General Specifications**

Voltage	24V AC (50/60 Hz) / 24V DC
Voltage Range	21.6 to 26.4V AC/DC (including 5% ripple)
Power Consumption	3.0 VA (24V AC), 1.8W (24V DC)
Inrush Current	15A maximum (24V AC/DC)
Weight (approx.)	250g

## Pt100Ω Input Specifications

Part Numbers	SX5L-SBPT04X1	SX5L-SBPT04Y1		
Input Points	4 points			
Input Type	3-wire Pt100Ω resis	tance thermometer		
Temperature Measurement Range	0 to +50°C	-20 to +80°C		
Analog Resolution	12 b	pits		
Input Detection Current	1.0mA m	aximum		
A/D Conversion Time	80 ms pe	er point		
Sample Duration Time	1 si	ec		
Allowable Conductor Resistance	$100\Omega$ maximum (3 wires must have the same resistance)			
Burnout	Yes (data: +327.67°C)			
Error	±0.4% (full scale)			
Isolation between Input Channels	No iso	lation		
Dielectric Strength	500V AC, 1 minute be or power 1	etween input and FG terminals		
Insulation Resistance	100 MΩ minimum be or power terminals	tween input and FG (500V DC megger)		

# **Terminal Arrangement**

Upper Terminal Block (SX9Z-SS13)

Marking	NC NC		NC	bO		BO
Name		No Connection	n	Chann	el 0 Pt1000	ם Input
Marking	A0		NC	b1	B1	A1
Name	Channel O Pt100 $\Omega$ Input		No Connection	Chann	el 1 Pt1000	ם Input

# **Network Variables**

Output Network Variables

Name	Туре	Description
nvoPT[0]	SNVT_temp_p	Corresponds to channel O
nvoPT[1]	SNVT_temp_p	Corresponds to channel 1
nvoPT[2]	SNVT_temp_p	Corresponds to channel 2
nvoPT[3]	SNVT_temp_p	Corresponds to channel 3

#### Configuration Property

Name	Туре	Description
nciMaxStsSendT1	SCPTmaxSndT	nvoPT[0] to nvoPT[3] heartbeat transmission interval
nciMinSendT1	SCPTminSndT	nvoPT[0] to nvoPT[3] minimum transmission interval
nciMinDelta[0]	SCPTsndDelta	Minimum change to send nvoPT[0]
nciMinDelta[1]	SCPTsndDelta	Minimum change to send nvoPT[1]
nciMinDelta[2]	SCPTsndDelta	Minimum change to send nvoPT[2]
nciMinDelta[3]	SCPTsndDelta	Minimum change to send nvoPT[3]

#### Wiring Diagram and Internal Circuit





Connect the terminals of an unused channel using an optional jumper BPJ-26B (ring type) or BPJ-26FB (spade type) or using wires.

#### Lower Terminal Block (SX9Z-SS14)

Marking	POWER L	POWER N	NC	b2		B2
Name	Power Terminals		No Connection	Channel 2 Pt100Ω li		00Ω Input
Marking	А	2	NC	b3	B3	A3
Name	Channel 2 P	t100Ω Input	No Connection	Chann	el 3 Pt1	00Ω Input
L POWER N NC biz Biz Az NC bis Bis As D D D D D D D D D D D D D D D D D D D						

**PLCs** 

## Pulse Input Module SX5L-SBCN081



- 8 input terminals to count pulse inputs at 8 Hz up to a maximum of 9,999,999. Inputs can be connected in either negative or positive common wiring.
- Maximum counter current values can be designated using the configuration property. Counter current values are stored at power interruption.
- Applicable for counting pulse inputs from watthour meters.
- Voltage: 24V AC (50/60 Hz) / 24V DC compatible

#### **General Specifications**

Voltage	24V AC (50/60 Hz) / 24V DC	
Voltage Range	21.6 to 26.4V AC/DC (including 5% ripple)	
Power Consumption	2.0 VA (24V AC), 1.0W (24V DC)	
Inrush Current	15A maximum (24V AC/DC)	
Weight (approx.)	250g	

#### **Pulse Input Specifications**

Input Points	8 points		
Input Voltage	24V DC		
Voltage Range	0 to 26.4V DC		
Minimum Pulse Width	ON duration: OFF duration:	50ms 50ms	
Maximum Frequency Response	8 Hz		
Input Impedance	Approx. 3.4 kΩ		
Input Current	7mA/point (24V DC)		
No. of Common Circuits	1 common circuit/point		
Input Common Polarity	Positive and negative common compatible		
Input Turn ON Voltage	15V min. (between inpu	t and COM terminals)	
Input Turn OFF Voltage	5V max. (between input	and COM terminals)	
Isolation from Power Line	Photocoupler isolation		
Dielectric Strength 500V AC, 1 minute between input and FG, pow or input terminals		veen input and FG, power,	
Insulation Resistance	$100\ M\Omega$ minimum between input and FG, power, or input terminals (500V DC megger)		
Current Value Backup Times	10,000 times of current	value storage into the built- er interruption	

#### **Network Variables**

Input Network Variables

Name	Туре	Description
nviPreset[0] to [7]	SNVT_count_f	Receives counter new current value

**Output Network Variables** 

Name	Туре	Description
nvoCount[0] to [7]	SNVT_count_f	Sends counter current value

#### **Configuration Property**

0 1 7		
Name	Туре	Description
nciMaxStsSendT1	SCPTmaxSndT	Heartbeat transmission interval
nciMinSendT1	SCPTminSndT	Minimum transmission interval
nciDefaults	SCPTdefltBehave	Enable event-driven transmission
nciMaxRng [0] to [7]	SCPTmaxRnge	Maximum counter values

#### Wiring Diagram and Internal Circuit

Negative Common Wiring



Positive Common Wiring



**Operator Interfaces** 

PLCs
# **Communication & Networking**

# **Terminal Arrangement**

Upper Teri	minal Block (S>	(9Z-SS11)					
Marking	NC NC		0	CO	1		
Name	No Connection		Input 0	COM 0	Input 1		
Marking	C1	2	C2	3	C3		
Name	COM 1	Input 2	COM 2	Input 3	COM 3		

Lower Terr	minal Block (	SX9Z-SS7)				
Marking	POWER L POWER N		POWER N 4		5	
Name	Power Terminals		Input 4	COM 4	Input 5	
Marking	C5	6	C6	7	C7	
Name	COM 5	Input 6	COM 6	Input 7	COM 7	
$ \begin{array}{c} \begin{array}{c} \begin{array}{c} \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \\ \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \\ \end{array} \\ $						



PLCs

**Operator Interfaces** 

**Automation Software** 

# Remote-control Relay Control Module SX5L-SBRR081



- 8 output channels to turn on and off remote control relays for illumination control.
- Remote-control relay status is fed back to the network.
- Voltage: 24V AC (50/60 Hz) supplied from a remote-control transformer

#### **General Specifications**

-	
Voltage	24V AC (50/60 Hz) supplied from a remote-control transformer
Voltage Range	21.6 to 26.4V AC (including 5% ripple)
Power Consumption	1.8 VA (24V AC) not including power consumption by remote-control relay
Inrush Current	15A maximum (24V DC)
Weight (approx.)	250g

#### **Remote-control Relay Control Specifications**

Input Points	8 points
Input	Feedback input from remote control relays through output signal lines
Output	Remote-control relay output
Output Pulse ON Width	100 ms
Applicable Remote-control Relay	BR-12D, BR-22D, BR-1 (Mitsubishi Electric) WR6165 (Matsushita Electric Works)
Applicable Remote-control Transformer	BRT-10B, BRT-20B, BRT-1 (Mitsubishi Electric) WR2301 (Matsushita Electric Works)
Isolation from Power Line	Photocoupler isolation
Dielectric Strength	500V AC, 1 minute between remote-control relay control terminal and FG terminal
Insulation Resistance	100 $M\Omega$ minimum between remote-control relay control terminal and FG terminal (500V DC megger)

# **Network Variables**

Input Network Variables

Name	Туре	Description
nviLampValue[0] to [7]	SNVT_switch	Controls remote-control relay
Output Network Variable		
Name	Туре	Description
nvoLampValueFb[0] to [7]	SCPTmaxSndT	Sends feedback signal
Configuration Property		
Name	Туре	Description
nciMaxStsSendT1	SCPTmaxSndT	Heartbeat transmission interval
nciDefaults	SCPTdefltBehave	Enable event-driven transmission

#### Wiring Diagram and Internal Circuit





Note: Common terminals C0 through C7 and the POWER N terminal are connected together internally. Only one remote-control relay can be connected to each output circuit.

# Terminal Arrangement

Upper Terminal Block (SX9Z-SS11)

Marking	NC	NC	0	CO	1	
Name	No Connection		Output 0	COM 0	Output 1	
Marking	C1	2	C2	3	C3	
Name	COM 1	Output 2	COM 2	Output 3	COM 3	





Sensors

# IDEC

# SX5L Series Smart I/O (General Information)

# Wiring SX5L Cable Connector

• For wiring the communication cable connector on the SX5L, use a cable of 24 AWG to 14 AWG (0.2 to 2.5mm<sup>2</sup>). Strip the cable 7mm from the end as shown below. Each communication terminal can accommodate up to two cables.



- When connecting two cables to one terminal, use cables of 24 AWG to 16 AWG (0.2 to 1.5mm<sup>2</sup>).
- Do not solder the cable end for connection.
- Tighten terminal screws on the communication cable connector to a torque of 0.5 to 0.6 N-m.
- Tighten mounting screws on the communication cable connector to a torque of 0.3 to 0.5 N-m.
- When tightening the screws on the cable connector, use a thin, flat screwdriver.

# **Insertion Pin Positions**

When purchasing terminal blocks separately, set the insertion pins as shown below.



SX5L Part No.	<b>Terminal Block</b>	Type No.	Pin Positions
	Upper	SX9Z-SS1	B D F H
2X22RIV10.	Lower	SX9Z-SS2	ACEG
	Upper	SX9Z-SS4	B D E G
2X22RH08	Lower	SX9Z-SS5	ACFH
	Upper	SX9Z-SS1	BCEG
2Y22R110.	Lower	SX9Z-SS2	A D F H
	Upper	SX9Z-SS1	BCFH
2X2-2BIA10,	Lower	SX9Z-SS3	A D E G

# Safety Precautions

- Turn power off to the SX5L communication terminals before installation, removal, wiring, maintenance and inspection of the SX5. Failure to turn power off may cause electrical shocks or fire hazard.
- Wire the SX5L correctly. Improper wiring may cause malfunction, abnormal heat and fire.
- Use wires of a proper size to meet voltage and current requirements. Tighten the terminal screws to a proper tightening torque. A loose screw may cause abnormal heat and fire. Check periodically to see if the screws are tightened securely.
- All SX5L communication terminals are manufactured under IDEC's rigorous quality control system, but users must add a backup or fail safe provision to the control system using a SX5L communication terminal in applications where heavy damage or personal injury might result should the SX5L fail.

# **Terminal Symbols**

SX5*-SBR08	$\rightarrow$	+	-	0	CO	1	C1	2	C2	3	C3
SX5*-SBM16*	$\rightarrow$	+	-	0	1	2	3	4	5	6	7
SX5*-SBN16*/SBT16*	$\rightarrow$	+	-	0	1	2	з	4	5	6	7



# Mounting Hole Layout (Top view)



Sensors

# Input/Output Requirements

• When connecting DC two-wire sensors to the SX5, the sensors must meet the following specifications.

Operating voltage:	12 to 24V DC
Leakage current:	1mA maximum
Residual voltage:	6V maximum
ON output current:	5.5mA minimum (at 24V DC)

The sensor must have an ON output current of 4mA at the minimum. If the sensor does not meet this lower limit, connect a bleeder resistor as shown below. But if the residual voltage is 6V or less, the sensor can still be used although the ON output may be less than 3.5mA.



• Use the following formula for calculating the bleeder resistance if needed.  $\mathbf{R} (\mathbf{k} \mathbf{\Omega}) = \frac{\mathbf{Vcc} - \mathbf{6}}{\mathbf{C}}$ 

```
I = \frac{I}{I} - 4
Vcc: Power voltage
```

- I: Lower limit of DC two-wire sensor ON output (mA)
- Do not apply DC power voltage to the output circuit without connecting a load, otherwise internal elements will be damaged.
- When an overload or short circuit occurs, the protected source output shuts down the output immediately to protect the internal elements from permanent damage. When the cause of the overload or short circuit is removed, the SX5L will restore normal operation automatically.
- When the capacity of main power supply is small, the overcurrent protection of the main supply may reduce power supply to the SX5, then the SX5L will stop operation, causing a network error.
- When using the relay output in environments where extraneous noises exist or inductive loads are switched frequently,generating high back emf, connect contact protection elements to the output terminals and across the load as shown below.



#### Response Time

The response time of the SX5L system varies greatly depending on such factors as the quantity of modules and cable length. Response time can be confirmed on the actual network system.

# Terminators

LonWorks networks require terminators. For details about the terminators, see publications on LonWorks.

# Operating Instructions Installation and Wiring (All SX5L Modules)

- Turn power off to the SX5L before installing or removing the connector or the removable terminal block.
- Tighten the terminal screws to a torque of 0.6 to 1.0 N-m.
- When mounting the SX5L on a panel, tighten the mounting screws to a torque of 1.0 to 1.3 N-m. Recommended mounting screw: M4
- When mounting the SX5L on a DIN rail, put the SX5L on the DIN rail and press the SX5L towards the rail to lock. To remove, pull out the latch from the bottom of the module using a screwdriver and release the SX5. To re-attach, push back the latch into place and snap on the SX5L.
- The upper-right mounting hole has a FG terminal. Connect the FG terminal and control box. Use a wire of 4mm<sup>2</sup> at the minimum to connect the relay terminal block with the safety ground. When mounting on a DIN rail, a steel DIN rail is recommended for easy grounding.

# Mounting on Aluminum IDEC DIN Rail Part Number BNDN1000

• The upper-right mounting hole has a FG terminal. When mounting the SX5L on an aluminum DIN rail, connect the FG terminal to the panel using the attached M4 screw and nut, and connect the panel to a proper ground.

# **Panel Mounting**

- When mounting the SX5L on a panel surface, attach a crimping terminal of a ground wire to the FG terminal on the upper-right mounting hole of the SX5 and insert a screw through the mounting hole. Connect the ground wire to the panel and connect the panel to a proper ground.
- **Note:** For secure electrical connection, remove any coating from the ground area on the panel.

#### **Terminal Block**

The SX5L uses removable terminal blocks. To remove and attach the terminal block, follow the procedures below:

- To remove the terminal block, squeeze both latches on top of the block inward to unlock the block from the socket.
- To reattach the terminal block, place the block in the socket with the latches opened and press the block until it bottoms in the socket, then the latches snap outward to lock the terminal block.
- Insertion pins are positioned on the base of the terminal block and inside the socket to prevent insertion of invalid blocks into the socket. The pins are keyed to ensure correct matching of block and socket, and prevent swapping of upper and lower blocks.
- When the block does not fit into the socket properly, check to see if the pin
  positions on the block agree with the pin-slot arrangement in the socket. If
  the pins and the pin slots are in matching positions, check for any wire fragments and obstacles in the socket.
- When cutting cables or wires, keep the SX5L out of the way to prevent ingress of wire fragments.
- When wiring the screw terminals using crimping terminals, use crimping terminals of the dimensions shown below. Each screw terminal can accommodate up to two crimping terminals.



Note: Fork crimping terminals can also be used. (Dimensions are in mm)

Sensors

Automation Software

**Power Supplies** 

PLCS