CSM\_K3SC\_DS\_E\_4\_2

# A compact converter that allows communications between RS-232C/USB and RS-422/485 devices. Ideal for industrial applications.

- Allows communications between RS-232C/USB (Universal Serial Bus) and RS-422/485 devices.
- Applicable in FA environments: Has passed environment resistance tests equivalent to those for control devices.
- CE marking (except for USB).
- UL/CSA certification (mark license recognition).
- Compact 30-mm-wide body supports both screw-mounting and DIN track mounting.
- Operation either with or without echoback available.
- Functionality to convert between USB and RS-232C communications added.
- USB driver providing virtual communications port for USB communications is available.

**Note:** To use USB communications, the USB driver for the K3SC must be downloaded from the OMRON web site.

#### **Application Examples**

- Data can be transferred between computers (using the USB port if there is no RS-232C port) and field devices.
- Using two K3SC Units enables long-distance communications between devices connected via RS-232C.







Refer to Safety Precautions on page 8.

# **Ordering Information**

## **■** List of Models

Appearance	Size (mm)	Power supply voltage	Model		
30 de 10 de	30 × 80 × 78 (W × H × D)	100 to 240 VAC	K3SC-10 100 to 240 VAC		
<b>選 2</b>		24 VAC/VDC	K3SC-10 24 VAC/VDC		

# ■ Accessories (Order Separately)

# Adapter for RS-232C Serial Cable and K3SC (D-Sub, 9-pin, male)

Appearance		Wirir	ng dia	Model		
	_	D-S	Sub, 9-pii	K32-23209		
	İ	Pin	Signal		M3.5 terminals	
1. 50	Send data	3	SD		■ SD (orange)	
50	Receive data	2	RD		RD (white)	
	Signal ground	5	SG		SG (gray)	
	Request to send	7	RS		 	
	Clear to send	8	CS		 	
	Data set ready	6	DR	$\neg$	 	
	Data terminal ready	4	ER		 	
					1	

# **Specifications**

# **■** Ratings

1	Item	K3SC-10	0 100 to 240 VAC	K3SC-10 24 VAC/VDC			
Supply voltage		100 to 240 VAC 50	/60 Hz	24 VAC 50/60 Hz, 24 VDC			
Operating voltage ra	nge	85% to 110% of power supply voltage					
Power consumption		5 VA max.		3 VA max./3 W max.			
	communications format rmats listed on the right .)						
Communications me	thod	Start-stop synchronization					
Ambient operating	RS-232C	−10 to 55 °C (with no icing)					
temperature	USB	0 to 55 °C (with no icing)					
Ambient operating humidity		25% to 85% (with no condensation)					
Ambient storage tem	perature	–20 to 65 °C					

## ■ Characteristics

	Ite	em		Specification									
	RS-232C interface	Maximum t distance	ransmission	15 m									
Master device	(See note 1.)	Maximum number of connectable Units		1 Unit									
ster d	USB interface (See note 2.)	Maximum t distance	ransmission	5 m; hub delay time + cable delay time ≤ 70 ns									
Ma		Maximum i connectab		1 Unit									
		USB stand	ard	V1.1									
o l	RS-485 interface	Maximum t distance	ransmission	500 m									
device		Maximum i		31 Units (for multi-drop connection)									
Slave device	RS-422 interface	Maximum t	ransmission	500 m									
S		Maximum i		1 Unit									
Baud ra	ate	•		1,200/2,400/4,800/9,600/19,200/38,4 Default setting: 9,600	100 (bps)								
Data le	ngth			7/8 bits Default setting: 7									
Stop bi	t length			1/2 bits Default setting: 2									
Commu	ınications parity			None/even/odd Default setting: Even									
Echoba	ick selection			Echoback: With/without Default setting: Without									
Selection	on switch respon	se delay		Approx. 30 ms									
Insulati	on resistance			20 M $\Omega$ min. measured at 500 VDC between the following: External terminals $\leftrightarrow$ casing RS-232C terminals and USB port $\leftrightarrow$ RS-422/485 terminals $\leftrightarrow$ power supply terminals									
		Isolation method	Communi- cations	Phototransistor coupler									
			Power supply	Isolating transformer									
Dielect	ric strength			1,500 VAC for 1 minute measured between the following: External terminals ↔ casing RS-232C terminals, USB port, RS-422 terminals, and RS-485 terminals ↔ power supply terminals									
				500 VAC for 1 minute measured between the following: RS-232C terminals and USB port $\leftrightarrow$ RS-422 terminals and RS-485 terminals									
Noise i	mmunity			AC power supply terminals, normal/common mode: $\pm 1,500 \text{ V}$ AC/DC power supply terminals, normal mode: $\pm 480 \text{ V}$ ; common mode: $\pm 1,500 \text{ V}$ Square wave with 1-ns rising edge $\pm 1 \mu s$ , $\pm 100 \text{ ns}$									
Vibratio	on resistance	Malfunctio	n	10 to 55 Hz, 0.5-mm single amplitude for 10 minutes each in X, Y, and Z directions									
		Destructio	n	10 to 55 Hz, 0.75-mm single amplitude for 2 hours each in X, Y, and Z directions									
Shock	resistance	Malfunctio	n	98 m/s $^2$ 3 times each in X, Y, and Z of									
		Destruction	n	294 m/s <sup>2</sup> 3 times each in X, Y, and Z directions									
Weight		1_		Approx. 150 g									
Degree (See no	of protection te 3.)	parts	l operation	Conforms to IEC standards, equivalent to IP20 (when terminal cover mounted)									
		Terminals		Equivalent to VDE 0106/100 (when t									
EMC				(EMI) Emission Enclosure: Emission AC Mains: (EMS) Immunity ESD:	CISPR 11 Group 1 c EN61326-1 EN61000-4-2:	Industrial electromagnetic environment lass A: CISRP16-1/-2 lass A: CISRP16-1/-2 Industrial electromagnetic environment 4 kV contact discharge (level 2) 8 kV air discharge (level 3)							
				Immunity RF-interference: Immunity Fast Transient Noise: Immunity Burst Noise: Immunity Surge:	EN61000-4-3: EN61000-4-4: EN61000-4-5:	10 V/m (amplitude-modulated, 80 MHz to 1 GHz) (level 3) 2 kV (power line) (level 3) 1 kV line to line (l/O signal line) 1 kV line to line							
				Immunity Conducted Disturbance Immunity Voltage Dip/Interrupting	EN61000-4-6: EN61000-4-11:	2 kV line to ground (power line) 3 V (0.15 to 80 MHz) (level 2) 0.5 cycles, 0, 180°, 100% (rated voltage)							
Approv	ed standards			UL508, Conforms to EN61326-1, EN61010-1 (IEC61010-1)									
Memor	y protection			· · · · · · · · · · · · · · · · · · ·	. ,	ed for power interruptions during communications.)							
	•	· · · · · · · · · · · · · · · · · · ·		run mode is supported for SD ar	•	· · · · · · · · · · · · · · · · · · ·							

- Note: 1. With RS-232C communications, free-run mode is supported for SD and RD but not for any other signal lines.
  - 2. To use USB communications, the USB driver for the K3SC must be downloaded from the OMRON web site. http://www.fa.omron.co.jp/
  - 3. The enclosure ratings do not apply when USB is used.
  - 4. The CE marking does not apply when the K3SC is used for USB.

# **Connections**

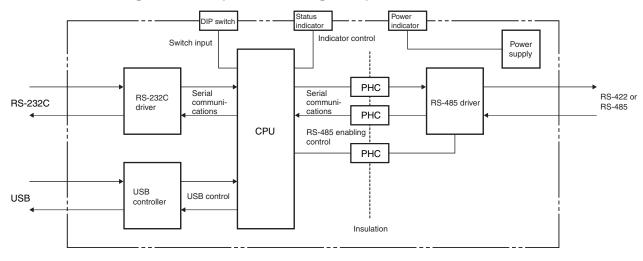
# **■** Terminal Specifications

Be sure to check the input and output specifications for the signal pins of connected devices before connecting the terminals.

Function	Terminal number	Name	Signal direction	Explanation					
For connecting the operating power supply	1 and 4	PWR		The input power supply specifications vary with the model. A 100 to 240-VAC model and a 24-VAC/VDC (no-polarity) model are available.					
Connection terminals for	3	SG		Connect to signal ground.					
RS-232C communications with	5	SD	Input	Receives data from SD of the master device.					
master device (DIP switch pin 8: OFF)	6	RD	Output	Sends data to RD of the master device.					
Used for RS-485	8	RDA(-)	Input/output	SD and RD for RS-485 (cold side)					
communications with slave device	9	SDA(-)		Terminals 8 and 9 are connected internally when pin 9 of DIP switch is set to OFF.					
(DIP switch pin 9: OFF)	11	RDB(+)	Input/output	SD and RD for RS-485 (hot side)					
	12	SDB(+)		Terminals 11 and 12 are connected internally when pin 9 of the DIP switch is set to OFF.					
Used for RS-422	7	SG		Connect to signal ground.					
communications with slave device	8	RDA(-)	Input	Receives RS-422 data and outputs it to the master side.					
(DIP switch pin 9: ON)	9	SDA(-)	Output	Converts data received via RS-232C from the master device to RS-422 data and outputs the data.					
	11	RDB(+)	Input	Receives RS-422 data and outputs it to the master side.					
	12	SDB(+)	Output	Converts data received via RS-232C from the master device to RS-422 data and outputs the data.					

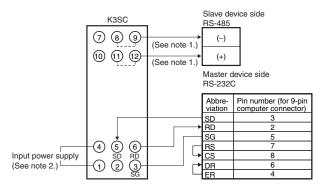
Note: Terminals 2 and 10 are not used.

# ■ Internal Configuration (Block Diagram)



## **■** External Connections

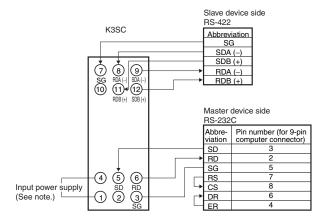
## **RS-485 Connection**



Note: 1. If RS-485 is selected as the communications method (i.e., pin 9 of the DIP switch is set to OFF), terminals 8 and 9, and terminals 11 and 12 are connected internally.

2. Either a 100 to 240-VAC or 24-VAC/VDC (no polarity) input power supply is used.

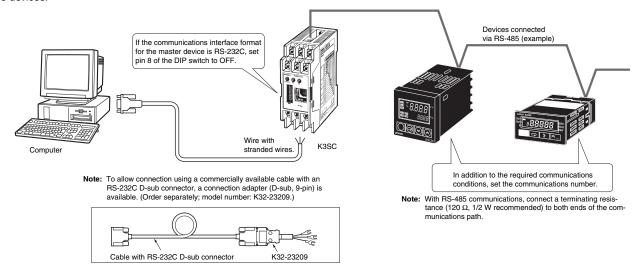
## **RS-422 Connection**



Note: Either a 100 to 240-VAC or 24-VAC/VDC (no polarity) input power supply is used.

## Connecting an RS-232C or USB Master Device to an RS-422/485 Slave Device

First set the same communications conditions (baud rate, stop bits, data length, and parity) for the master device, the Interface Converter, and slave devices.



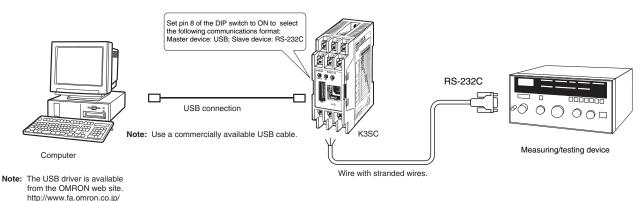
Note: 1. 1-to-N connection via OMRON NT Link communications is not supported.

2. If the communications interface format for the master device is USB, obtain a commercially available USB cable and download the USB driver for the K3SC from the OMRON web site.

## Connecting a USB Master Device to an RS-232C Slave Device

First set the same communications conditions (baud rate, stop bits, data length, and parity) for the master device, the Interface Converter, and slave devices.

Note: There is no isolation between the USB and RS-232C sides.



# **Operation**

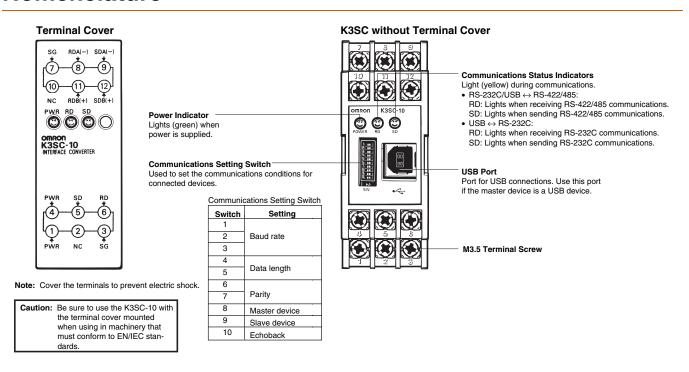
## **■** Communications Settings Switch

Use this switch to set the communications conditions for the K3SC to those used by connected devices.

Setting	Baud rate					Data	length	Stop	bits	Parity			Configuration			Echoback		
ON⇔OFF	1,200 bps	2,400 bps	4,800 bps	9,600 bps	19,200 bps	38,400 bps	7	8	2	1	Even	Odd	None	Master: USB	RS-	ster: 232C USB note.)	OFF (with- out)	ON (with)
														Slave: RS- 232C	Slave: RS- 485	Slave: RS- 422		
1 🔳	ON	OFF	ON	OFF	ON	OFF												
2 🔳	OFF	ON	ON	OFF	OFF	ON												
3 🔳	OFF	OFF	OFF	OFF	ON	ON												
4							OFF	ON										
5 🔳							•		OFF	ON								
6 🔳											OFF	ON	OFF					
7 🔳											OFF	OFF	ON					
8 🔳	ON OFF																	
9 🔳	OFF ON																	
0 🔳											OFF	ON						

- Note: 1. All pins are factory-set to OFF.
  - 2. When using RS-422 full-duplex communications, turn OFF pin 0.
  - 3. When using the communications configuration with RS-232C or USB set for the master device and RS-422 or RS-485 set for the slave device, use either RS-232C or USB (but not both) on the master device side.

## **Nomenclature**

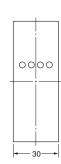


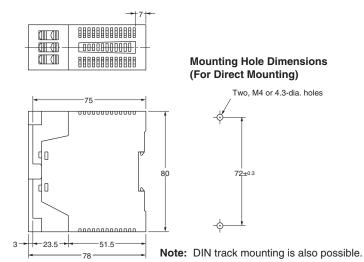
0

# **Dimensions**

## K3SC-10







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## **Safety Precautions**

## /!\ CAUTION

Do not touch any of the terminals while power is being supplied. Doing so may result in electric shock.



Do not allow metal objects or wire cuttings to enter the product. Doing so may result in electric shock, fire, or malfunction.



Do not attempt to disassemble, repair, or modify the product. Any attempt to do so may result in malfunction, fire, or electric shock.



Make sure that the power supply voltage is within the specified range. Otherwise, damage or burning may result.



Be sure to tighten the terminal screws to the specified torque. Loose screws may result in burning or malfunction. The recommended tightening torque is 0.78 N·m.



## ■ General Precautions

- Do not mount the product in the following places:
- 1. Locations subject to shock or vibration
- Outdoor locations or locations subject to direct sunlight, wind, or rain.
- Locations subject to temperatures or humidity outside the specified ranges
- 4. Locations subject to condensation or icing
- 5. Locations subject to large amounts of dust
- 6. Locations subject to flammable gases or objects
- Locations subject to corrosive gases (in particular sulfide or ammonia gases)
- Be sure to check power supply specifications, terminal numbers, and polarities before performing wiring.
- Turn OFF the power supply before performing installation or wiring.
- Turn OFF the power supply before removing the terminal cover.
   Accidentally touching the terminals may result in electric shock.
- · Do not connect anything to unused terminals.

## **■** Correct Use

- Perform wiring with crimp terminals that are suitable for M3.5 screws.
- Install the product as far away as possible from devices that generate strong high-frequency noise (e.g., high-frequency welders) or surges.
- Do not pull on the USB cable. Doing so may cause the cable to come loose.
- Almost all application programs run with the K3SC driver, which provides a virtual communications port for USB communications.
   Some application programs do not run, because this driver does not support all of the API functions.
- The K3SC-10 is not simply a voltage level converter.
   Communications data is converted by a built-in CPU. Depending on communications conditions, processing may not be able to keep up with communications, and occasionally data corruption or data omissions may occur. If necessary, reduce the baud rate or the frequency of communications, or take other suitable countermeasures.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

In the interest of product improvement, specifications are subject to change without notice.

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