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OMRON

Model S3A-DK S3A-DAK-A

LINEAR SENSOR CONTROLLER

INSTRUCTION MANUAL

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CHARACTERISTICS

Type	SSA-DAK	SSA-DAK-A	SSA-DVK	SSA-DAK/-A	SSA-DVK
Setting accuracy	±1%FS	±3%FS	±1%FS	±3%FS	±1%FS
Differential (hysteresis)	±0.4%FS	±0.95%FS	±0.4%FS	±0.95%FS	±0.4%FS
Response time	open collector output contact output	1ms or 300ms selectable	1ms or 300ms selectable	1ms or 300ms selectable	1ms or 300ms selectable
Protection against power failure	±1500Vp-p min. Pulse width: 1µsec *4	20ms max.	±1500Vp-p min. Pulse width: 1µsec *4	20ms max.	±1500Vp-p min. Pulse width: 1µsec *4
Response immunity	±1000Vp-p min. Pulse width: 1µsec *4	0~2V	±1000Vp-p min. Pulse width: 1µsec *4	0~2V	±1000Vp-p min. Pulse width: 1µsec *4
Synchronous input	ON	5~12V	ON	5~12V	ON
Short circuit current	OFF	2.0mA Typ (2.5mA MAX.)	OFF	2.0mA Typ (2.5mA MAX.)	OFF
Response time		1ms or less (open collector output) 2ms or less (contact output)		1ms or less (open collector output) 2ms or less (contact output)	
Current or voltage		DC4~20mA Allowable max. input current DC70mA max.		DC1~5V Allowable max. input voltage DC11V max.	
Impedance		Below 30Ω		Above 1MΩ	
Sensor burnout detection		DC2mA±0.8mA		DC0.5V±0.2V	
Sensor over-input detection		DC22mA±1.2mA		DC0.5V±0.3V	
Insulation resistance		50MΩmin. (at 500VDC)			
Dielectric strength		2,000VAC min. for 1 minute (between current-carrying terminal section and housing)			
Mechanical durability		10 to 55Hz, 0.3mm double amplitude (in X, Y, Z directions, respectively for 10 minutes).			
Mechanical durability		100m/s ² (approx. 10G in X, Y, Z directions, respectively 3 times)			
Mechanical durability		50m/s ² (approx. 5G in X, Y, Z directions, respectively 3 times)			

HI/LOW OUTPUT SETTING

Set the HI or LOW output setting VR to the value determined in the following formula:

$$\text{Setting scale} = \frac{V_s - V_{\min}}{V_{\max} - V_{\min}} \times 100$$

where,
 V_s : set value
 V_{\min} : minimum value (2 mA)
 V_{\max} : maximum value (22 mA)
 For example, when Type E2CA-X5A Linear Proximity Sensor is used, i.e., where V_d is 2 mm.) the setting scale is:
 $\frac{8 - 2}{22 - 2} \times 100 = 30$

Therefore, set the HI or LOW output setting VR to the value 30% (the setting scale range is from 00 to 99).

CONNECTIONS

Any linear output type sensor can be connected as the linear input to the S3A-DAK provided that the sensor current output is within a range of 4 to 20 mA.

Connection with linear photoelectric sensor (E3SA, E3XA)

• Connection to inductive proximity switch (E2CA)

• Connection to linear output sensor with built-in amplifier

• Connection to one linear output sensor to two S3A-DAK controllers.

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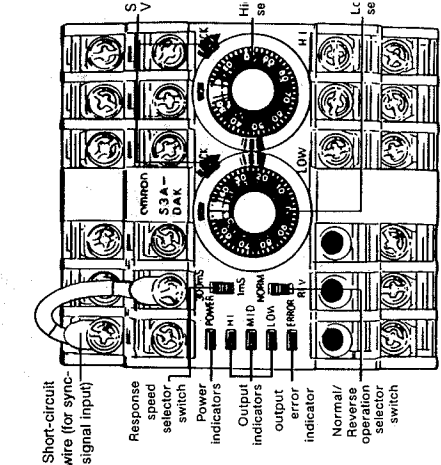
AVAILABLE TYPES

Input	Current input 4 to 20 mA	Voltage input 1 to 5 V
Type	S3A-DAK/-A	S3A-DVK

FUNCTIONS

Main functions	• Discrimination between analog input values • Power supply for sensor
Auxiliary functions	• Response speed selection • Input reversal • Input diagnosis (shorting, disconnection, synchronous input etc.)

NAME OF RESPECTIVE PARTS



SPECIFICATIONS

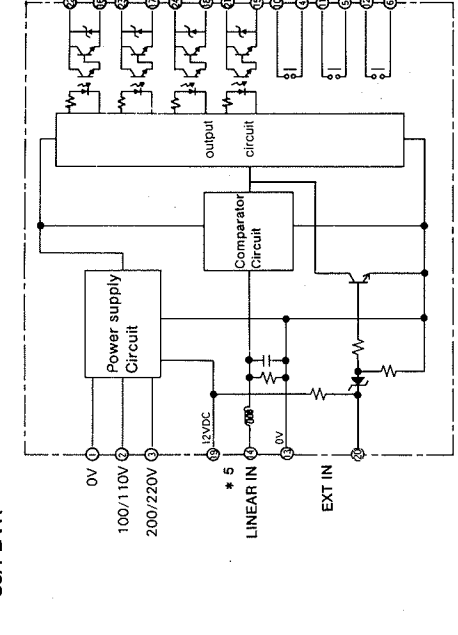
RATINGS

Item	SSA-DAK/-A	S3A-DVK
AC input	100/110/200/220VAC +10%, -15%, 50/60Hz	100/110/200/220VAC +10%, -15%, 50/60Hz
DC output for sensor power supply	80mA/45°C MAX 100mA/45°C MAX	80mA/45°C MAX 100mA/45°C MAX
Input	4 to 20mA DC	1 to 5V DC
Output	Contact Transistor	Contact Transistor
Minimum set value	1/500 of full-scale value	1/500 of full-scale value
Ambient temperature	Operating: -10° to 55°C, Storage: -25° to 65°C	Operating: -10° to 55°C, Storage: -25° to 65°C
Humidity	35 to 85% RH	35 to 85% RH
Weight	Approx. 500g	Approx. 500g

*1 Short-circuiting protection does not work longer than the time specified (approx. 30 sec.)
 *2 Synchronized External Input (EXT IN)
 Before the sensor is connected to EXT IN, remove the jumper wire short-circuiting the terminals. Only the sensor with an NPN open-collector output may be connected.
 If an external input is open-circuited (NPN-transistor is turned OFF), the device detects such input and delivers the output accordingly.
 If an external input is short-circuited or "0" volt, the device detects such input and delivers the output accordingly.

BLOCK DIAGRAM (Circled numbers denote terminal numbers)

S3A-DAK/-A I/O circuitry
 S3A-DVK



*5 Type S3A-DAK/-A: 4~20mA input
 Type S3A-DVK: 1~5V input

*3 In case the response is set to 1ms, anti-noise characteristics will be degraded (when common-mode noise is applied).
 *4 In case the response is set to 300ms:

FUNCTION

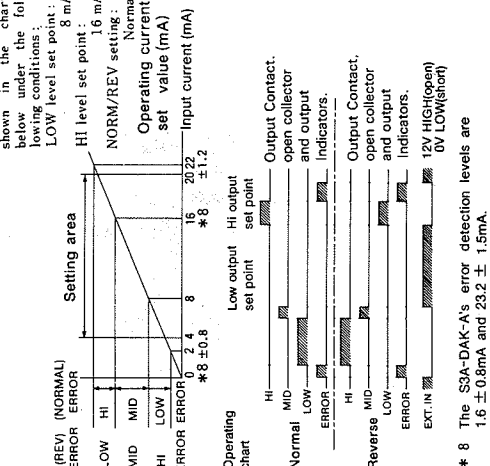
Mode selector switch

Name	Position	Function
Response time	300 ms	300 ms Response time
Input reversal switch	1 ms	1 ms Response time
	NORM	Normal Input
	REV.	Reversal Input

*When the Normal / Reverse operation Selector Switch is set to the "REV" position, HI and LOW outputs/indications will be reversed.

Vd (mm)	VS (mA)
1	4
2	8
3	12
4	16
5	20

The operation of the S3A-DAK will be as shown in the chart below under the following conditions:
 LOW level set point:



*8 The S3A-DAK-A's error detection levels are 1.6 ± 0.8mA and 23.2 ± 1.5mA.

HINTS ON CORRECT USE

- Input response time may be set to either 1ms or 300ms using the selector switch on the top of the S3A-□ controller. However, in an excessively noisy environment, use of the controller at 300ms is recommended.
- When using an electrical device that is likely to generate electrical noise in the relay output load, the S3A-□ controller, be sure to provide noise suppression measures. For example, when using a solenoid valve that generates a noise of 1,200V or more, connect a surge suppressor parallel to the coil of the device. When a DC load is used, be sure to connect a diode parallel to the coil of the device.
- Wire the I/O lines of the S3A-□ controller separately from the motor power lines.
- Provide a distance of more than 200mm between motor power line (through which a large current flows) and the S3A-□ controller.
- Any load consuming more than 80mA (or 100mA in case of the temperature lower than 45°C) should be connected to the sensor power supply, other damage might be caused.

PRECAUTIONS IN OPERATION

- Be sure to connect the power supply properly to right terminals for power supply input.
- Power supply must be 100/110VAC (plus 10% minus 15%) for terminals ①-②, or 200/220VAC (plus 10% minus 15%) for terminals ①-③.
- Avoid constant application of max. (+10%) or (-15%) voltage since they only show the upper lower limits.
- If the S3A-□ is coupled with our sensor shown in other type of sensor whose response is slower than that of S3A-□ series, the output is momentarily turned ON, which must be noted.
- When the sensor is driven by the sensor power supply of S3A-□:
 S3A-DAK/-A:
 S3A-DVK: F2U-V30
 S3A-DVK: F2U-V30
 S3A-DAK/-A: E4M
 S3A-DVK: F2U-V30
 S3A-DAK/-A: E4M
 S3A-DVK: F2U-V30
 Turn ON the sensor power supply at first, then, in a short interval (time required for sensor to respond) turn ON the S3A-□ power supply that the output may not be momentarily turned ON.
- The reset time of Type S3A-□ which supplies power to the sensor is 1.5sec. If the sensor with response slower than 1.5sec. is used, the S3A-□ output might be momentarily turned ON.
- When the sensor power supply of type S3A-□ is used (sensor driven by the power supply other than S3A-□), turn ON the power supply for sensor first, and then, in a short interval (time required for sensor to respond) turn ON the S3A-□ power supply. Otherwise S3A-□ output might be turned ON.
- Type S3A-□ does not operate for 1.5sec. (max) after it is turned ON, which must be noted.
- When the S3A-□ power supply is turned OFF, output might be momentarily turned ON, which must be noted.

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