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OMRON

Model S3A-D□K
S3A-DAK-A

LINEAR SENSOR CONTROLLER

INSTRUCTION MANUAL

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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.)

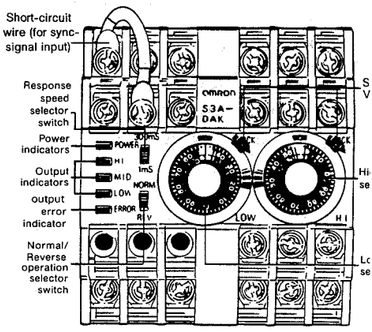
■ SPECIFICATIONS

● RATINGS

Item		S3A-DAK/-A	S3A-DVK
AC input	Supply voltage	100/110/200/220VAC +10%, −15%, 50/60Hz	
	Power consumption	Approx. 8VA	
DC output for sensor power supply	Voltage	12VDC ±10%	
	Ripple	3%p-p max.	
	Maximum current	80mA(55℃)MAX. 100mA(45℃)MAX. (Short-circuit protection provided. *1	
Input	Linear input	4 to 20mA DC	1 to 5V DC
	Synchronous input *2	NPN open collector input, contact input.	
Output	Contact	250VAC 3A (cosϕ-1) SPST-NO (HI, MID, and LOW)	
	Transistor	30VDC 80mA (HI, MID, LOW, and ERROR)	
Minimum set value		1/500 of full-scale value	
Ambient temperature		Operating : −10° to 55℃, Storage : −25° to 65℃	
Humidity		35 to 85% RH	
Weight		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 sesor 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 receives no external input and delivers no output.
If an external input is short-circuited or "0" volt, the device detects such input and delivers the output accordingly.

■ NAME OF RESPECTIVEPARTS

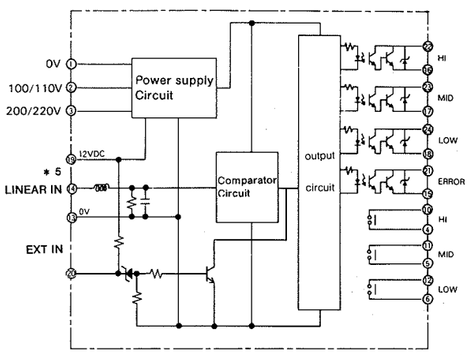


CHARACTERISTICS

Type		S3A-DAK	S3A-DAK-A	S3A-DVK
Setting accuracy		±1%FS	±3%FS	±1%FS
Differential (hysteresis)		±0.4%FS	±0.95%FS	±0.4%FS
Response time		open collector output	1ms or 300ms selectable	
		contact output	open collector output Response time+20ms MAX.	
Protection against power failure		20ms max.		
Noise immunity *3	operating power supply	±1500Vp-p min. Pulse width : 1μsec *4		
	input/output	±1000Vp-p min. Pulse width : 1μsec *4		
Synchronous input	ON	0~2V		
	OFF	5~12V		
	Short circuit current	2.0mA Typ (2.5mA MAX.)		
	Responce time	1ms or less (open collector output) 21ms or less (contact output)		
Linear input	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	DC1.6mA±0.8mA	DC0.5V±0.2V
	Sensor over-input detection	DC22mA±1.2mA	DC30mA±4.2mA	DC5.5V±0.3V
Insulation resistance		50MΩmin. (at 500VDC)		
Dielectric strength		2,000VAC min. for 1 minute (between current-carrying terminal section and housing)		
Vibration		Mechanical and malfunction durability : 10 to 55Hz, 0.3mm double amplitude (in X, Y, Z directions, respectively for 10 minutes).		
Shock		Mechanical durability : 100m/s² (approx. 10G in X, Y, Z directions, respectively 3 times) Malfunction durability : 50m/s² (approx. 5G in X, Y, Z directions, respectively 3 times)		

■ BLOCK DIAGRAM (Circled numbers denote terminal numbers)

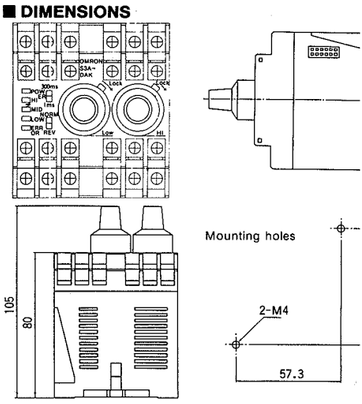
S3A-DAK/-A
S3A-DVK } I/O circuitry



*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 :

■ DIMENSIONS



■ HINTS ON CORRECT USE

- Input response time may be set to either 1m 300ms using the selector switch on the top of S3A-□ controller. However, in an excessively r environment, use of the controller at 300ms is rec mended.
- When using an electrical device that is likel generate electrical noise in the relay output loa the S3A-□ controller, be sure to provide noise pression measures. For example, when using a s noid valve that generates a noise of 1,200V or m connect a surge suppressor parallel to the coil of device. When a DC load is used, be sure to conne diode parallel to the coil of the device.
- Wire the I/O lines of the S3A-□ controller sepa from the motor power lines.
- Provide a distance of more than 200mm between motor power line (through which a large cur flows) and the S3A-□ controller.
- Any load consuming more than 80mA (or 100m case of the temperature lower than 45℃) 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 200/220 (plus 10% or 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 b or other type of sensor whose response is slower that of S3A-□ series, the output is momenta turned ON, which must be noted.
  ① When the sensor is driven by the sensor po supply of S3A-□,
  S3A-DAK/-A :
  S3A-DVK : F2U-V30
  ② When the sensor is drive by the power su other than that of S3A-□,
  S3A-DAK/-A : E4M
  S3A-DVK :
  Turn ON the sensor power supply at first, then, in a short interval (time required for se to respond) turn ON the S3A-□ power suppl that the output may not be momentarily tu 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 S3A-□), turn ON the power supply for sensor first, and then, in a short interval (time required sensor to respond) turn ON the S3A-□ power su otherwise S3A-□ output might be turned ON.
- Type S3A-□ does not operate for 1.5sec. (ma sec.) after it is turned ON, which must be noted.
- When the S3A-□ power supply is turned OFF output might be momentarily turned ON, which be noted.

HI/LOW OUTPUT SETTING

t the HI or LOW output setting VR to the value determined m the following formula :

$$\text{Setting scale} = \frac{Vs - Vmin.}{Vmax. - Vmin.} \times 100$$

where,
Vs : set value
Vmin : minimum value (2 mA)
Vmax : maximum value (22 mA)

r example, when Type E2CA-X5A Linear Proximity Sensor used (i.e., where Vd is 2 mm.) the setting scale is :

$$\frac{8-2}{22-2} \times 100 = 30$$

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

■ FUNCTION

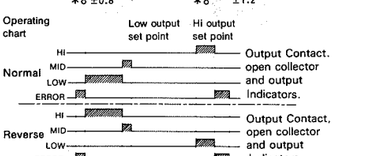
Mode selector switch

Name	Position	Function
Response time	300 ms	300 ms Response time
	1 ms	1 ms Response time
Input reversal switch	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.

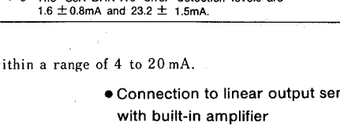
Vd (mm)	VS (mA)
1	4
2	8
3	12
4	16
5	20

Input reversal switch output



The operation of the S3D-DAK will be as shown in the chart below under the following conditions :
LOW level set point : 8 mA
HI level set point : 16 mA
NORM/REV setting : Normal
Operating current set value (mA)

Operating chart

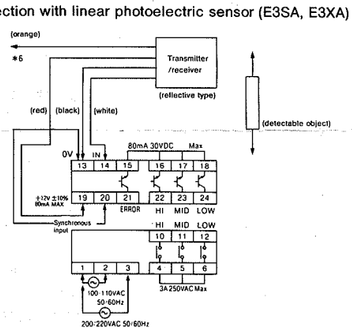


*8 The S3A-DAK-A's error detection levels are 1.6 ±0.8mA and 23.2 ± 1.5mA.

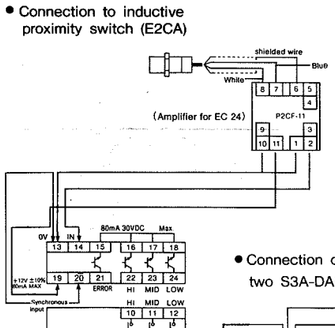
CONNECTIONS

y 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.

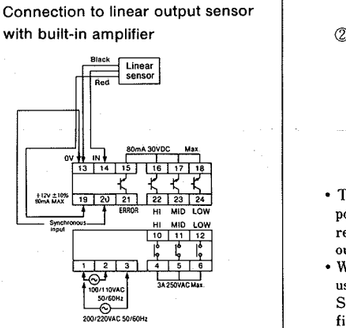
Connection with linear photoelectric sensor (E3SA, E3XA)



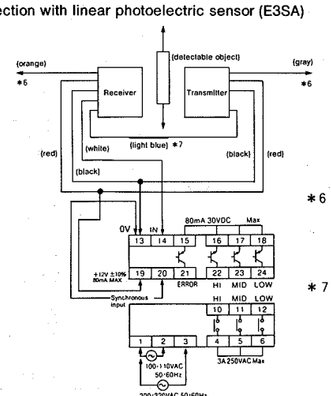
● Connection to inductive proximity switch (E2CA)



● Connection to linear output sensor with built-in amplifier



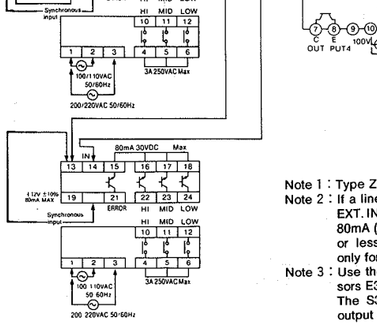
Connection with linear photoelectric sensor (E3SA)

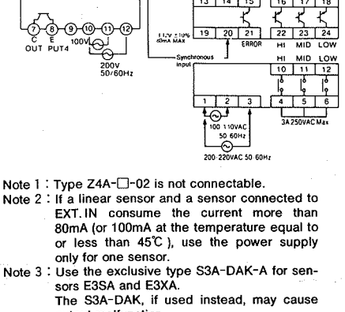


*6 For use of logic output (orange) and external diagnostic input, make the appropriate connections with due care not to cause any short-circuit with other leads.

*7 For transmissive type, connect the light-blue leads of the transmitter and receiver with each other.

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





Note 1 : Type Z4A-□-02 is not connectable.
Note 2 : If a linear sensor and a sensor connected to EXT. IN consume the current more than 80mA (or 100mA at the temperature equal to or less than 45℃), use the power supply only for one sensor.
Note 3 : Use the exclusive type S3A-DAK-A for sensors E3SA and E3XA.
The S3A-DAK, if used instead, may cause output malfunction.

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