OMRON

Contact Displacement Sensor

D5V

Built-in Amplifier Ensures Ease of Use and Saves Wiring Effort. Sensor Operates with a Low Force in a Wide Range of Applications.

- Works with a low operating force (30 gf) to detect a wide variety of objects including glass, plastic, and rubber
- Models with digital output for the B7A or 4- to 20-mA linear output corresponding to the 0- to 5-mm travel distances of the actuator are available
- Models with ball-, flat-, or pin-type actuators are available for a wide variety of objects
- Approved Standards
  ASTA, BSEN61010-1, EN50081-1, prEN50082-2, ASTA Licence No. 332

⚠ **Refer to the *Precautions Section.***

Ordering Information

■ MODEL NUMBER LEGEND

D5V - □ -3 □ 1
1 2

1. Output
A: 4- to 40-mA linear output
M: B7A serial communications output

2. Actuator
B: Ball type
P: Pin type
F: Flat type

Travel Distance	Output	Appearance	Actuator	Resolution	**Part Number**
5 mm	4 to 20 mA		Ball type	10 μm	**D5VA-3B1**
			Pin type		**D5VA-3P1**
			Flat type		**D5VA-3F1**

Travel Distance	Output	Appearance	Actuator	Resolution	Part Number
5 mm	B7A serial communications output (see note)		Ball type	1 μm	**D5VM-3B1**
			Pin type		**D5VM-3P1**
			Flat type		**D5VM-3F1**

Note: Use the D5VM-3□1 in combination with the 16-point B7A Output Link Terminals with a standard transmission delay (i.e., a transmission delay of 19.2 ms). No high-speed B7A Output Link Terminals can be used with the D5VM-3□1.

Specifications

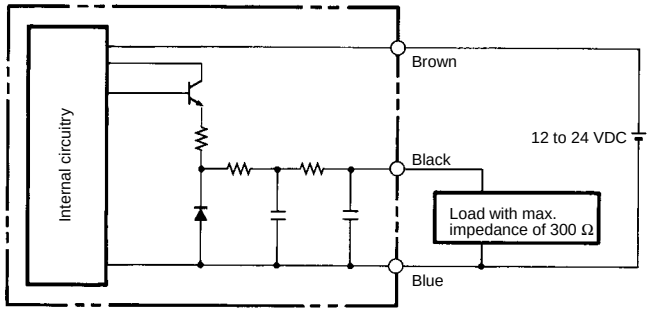
Part number		D5VA-3□1	D5VM-3□1
Supply voltage		12 to 24 VDC±10% (see note 1)	
Current consumption		100 mA max.	
Measurement range		5 mm	
Max. actuator travel distance		Approx. 5.7 mm (0.22 in)	
Offset adjustment range		±0.25 mm	
Resolution		10 μm	1 μm
Linearity		±0.5% FS max.	
Repeat accuracy		±5 μm max.	
Response speed		6 ms max.	37 ms max. including transmission delay
Operating force		0.3 N (30 gf) max.	
Output		4- to 20-mA linear current output	B7A serial communications output (see note 2) (BCD and multipoint output modes (see note 3)
Mounting method		M4 x 2	
Indicator		Power and overtravel indicators	Power, overtravel, setting, and output indicators
Life expectancy		Mechanical: 10,000,000 times min.	
Temperature influence		±0.04% FS/°C max.	
Ambient temperature	Operating	−10°C to 55°C (14°F to 131°F) with no icing	
	Storage	−25°C to 65°C (−13°F to 149°F) with no icing	
Ambient humidity	Operating	35% to 85%	
Insulation resistance		100 MΩ min. at 100 VDC	
Dielectric strength		1,000 VAC, 50/60 Hz for 1 min.	
Noise resistance		1.5 kV with a pulse width of 100 ns to 1 μs	
Vibration resistance		10 to 55 Hz, 0.75-mm double amplitude	
Shock resistance		196 m/s {20 G}	
Cable		2 m	
Weight		Approx. 80 g without cord	
Material		ABS and PC polymer alloy	
Enclosure Rating		IP40	

Note:
1. If power is supplied to both the D5VM-3□1 and B7A Output Link Terminals from a single power supply, the supply voltage must be 24 VDC±10%.
2. Use the D5VM-3□1 in combination with the 16-point B7A Output Link Terminals with a standard transmission delay (i.e., a transmission delay of 19.2 ms). No high-speed B7A Output Link Terminals model can be used with the D5VM-3□1.
3. The BCD or multipoint output mode can be selected with the mode selector.

Engineering Data

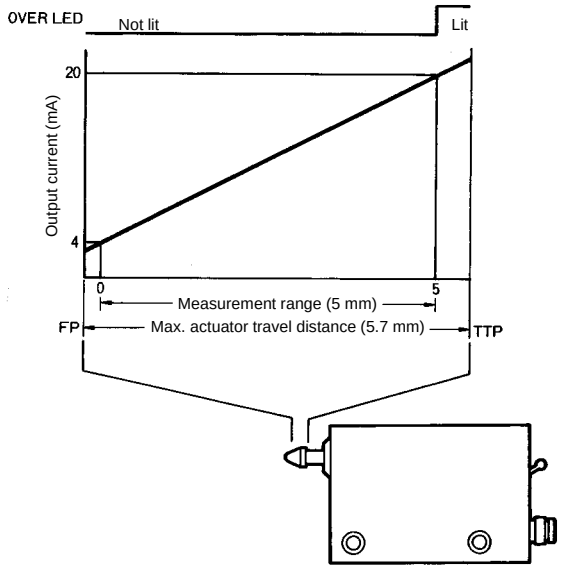
■ OUTPUT CHARACTERISTICS

D5VA Output Circuit Diagram



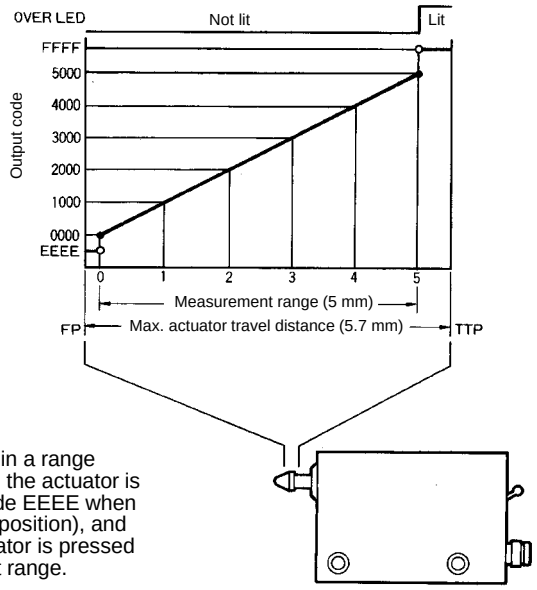
D5VA Output Characteristics

A current within a range between 4 and 20 mA is output according to the measurement range between 0 and 5 mm.



D5VM BCD Output Characteristics

A 16-bit BCD is output according to the measurement range between 0 and 5 mm.



The D5VM outputs codes within a range between 0000 and 5000 when the actuator is in the operating range, the code EEEE when the actuator is at the FP (free position), and the code FFFF when the actuator is pressed in excess of the measurement range.

D5VM Multipoint Output Characteristics

The following four types of signals are output according to the set value of the D5VM.

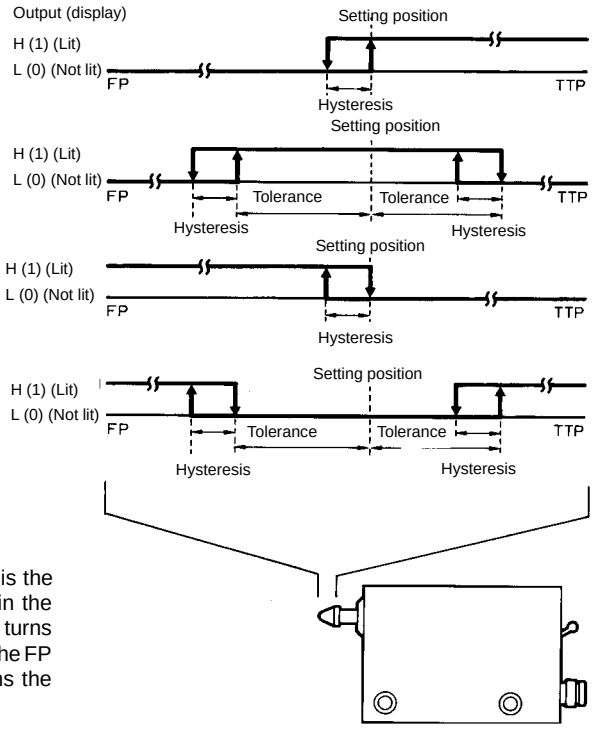
1. **ON/OFF Output**
   Turns ON or OFF according to the set value as shown in the timing chart.

2. **Tolerance Output**
   Turns ON or OFF according to the tolerance of the set value as shown in the timing chart.

3. **ON/OFF Reverse Output**
   Turns ON or OFF according to the set value. The signal timing is reverse to the signal 1 timing as shown in the timing chart.

4. **Tolerance Reverse Output**
   Turns ON or OFF according to the tolerance of the set value. The signal timing is reverse to the signal 2 timing as shown in the timing chart.

Note: The hysteresis, which is 10 μm, is the difference between the position in the TTP direction where the actuator turns the output ON and the position in the FP direction where the actuator turns the output OFF.

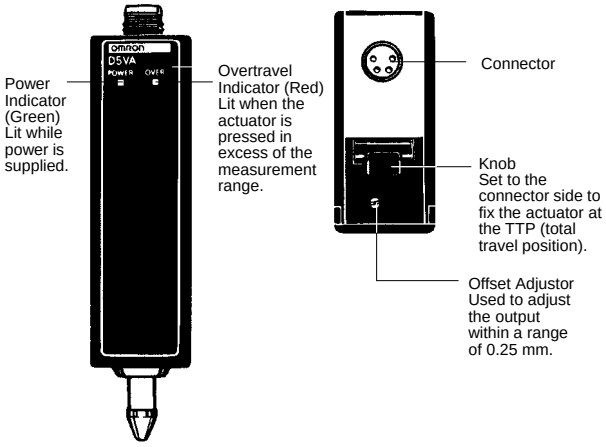


B7A Output Link Terminals Data

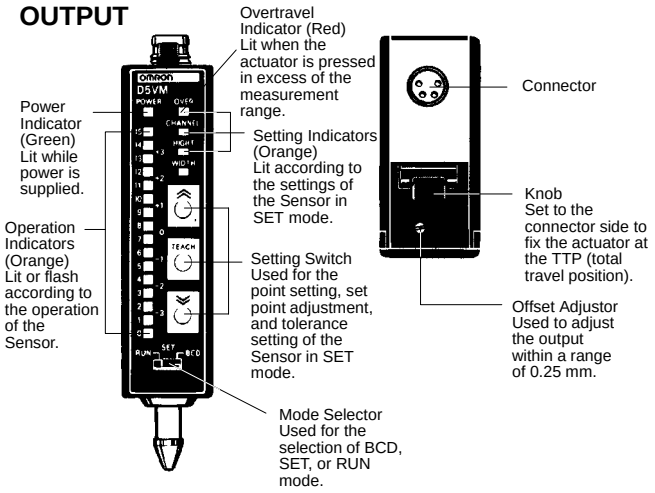
B7A OUT	BCD Output	Multipoint Output
#0	1's digit = 1	Point 0
#1	1's digit = 2	Point 1
#2	1's digit = 4	Point 2
#3	1's digit = 8	Point 3
#4	10's digit = 1	Point 4
#5	10's digit = 2	Point 5
#6	10's digit = 4	Point 6
#7	10's digit = 8	Point 7
#8	100's digit = 1	Point 8
#9	100's digit = 2	Point 9
#10	100's digit = 4	Point 10
#11	100's digit = 8	Point 11
#12	1000's digit = 1	Point 12
#13	1000's digit = 2	Point 13
#14	1000's digit = 4	Point 14
#15	1000's digit = 8	Point 15

Nomenclature

■ D5VA-□□WITH LINEAR OUTPUT



■ D5VM-□□ WITH B7A SERIAL COMMUNICATIONS OUTPUT



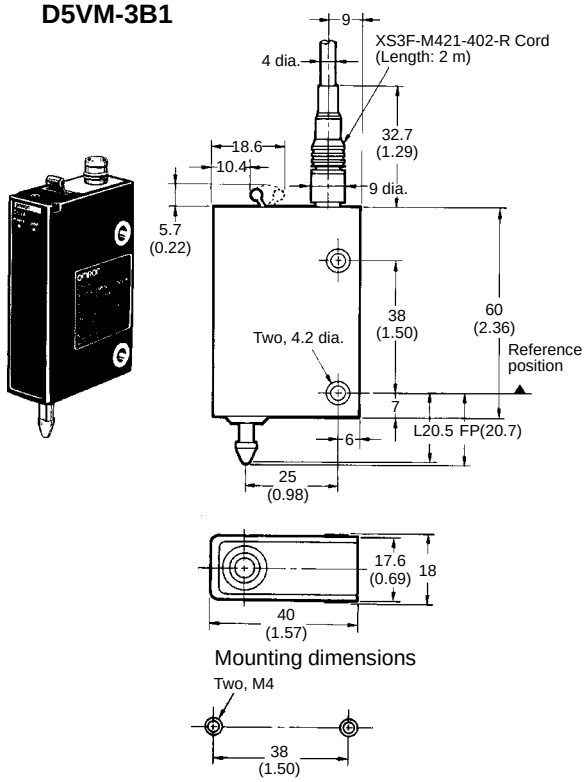
Operation Indicators

BCD	Lit according to the travel distance of the actuator.	
Set	Channel	Indicators corresponding to all points that have been set are lit. At the time of point setting, an indicator corresponding to the point that is being set flashes
	Height	The adjustment value is displayed at the time of position adjustment
	Width	The output status and tolerance are displayed at the time of tolerance setting
Run	The output statuses of points 0 to 15 are displayed	

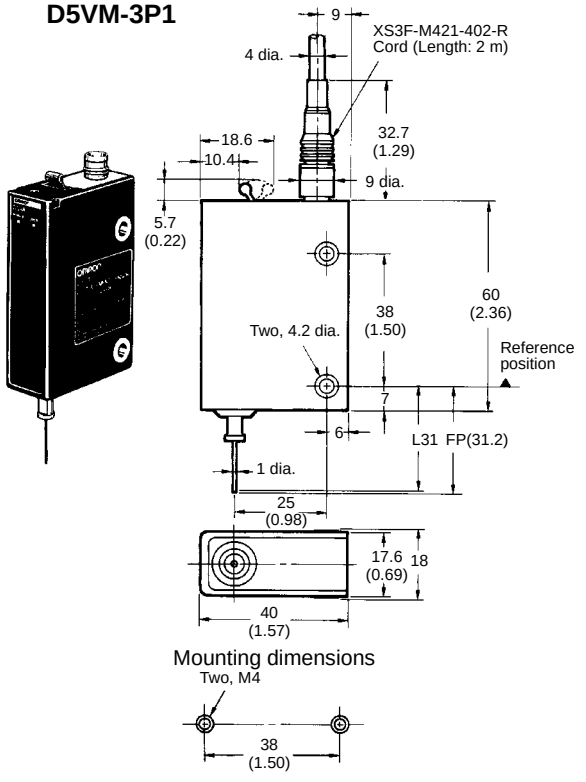
Dimensions

Unit: mm (inch)

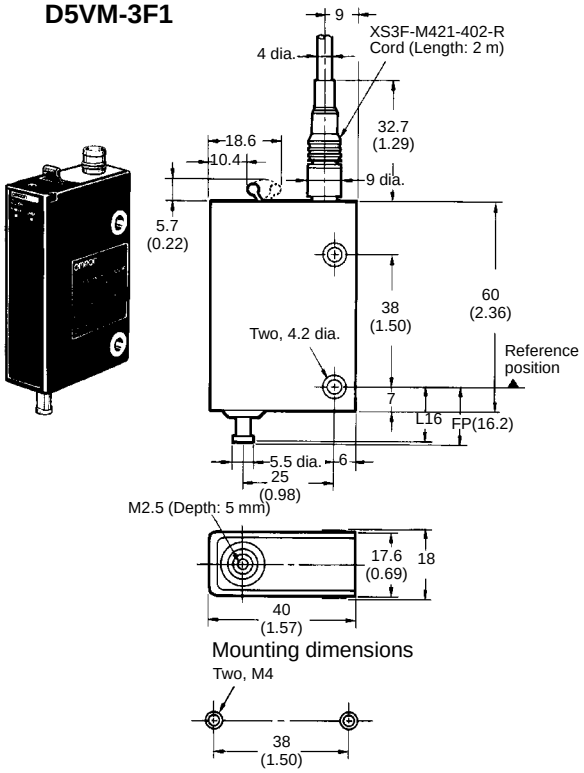
■ D5VA-3B1
D5VM-3B1



■ D5VA-3P1
D5VM-3P1



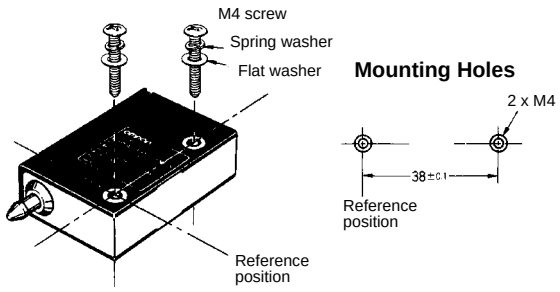
■ **D5VA-3F1**
D5VM-3F1



Note: The lower limit of the effective output range of the D5VA is factory-set to 4 mA.
The lower limit of the effective output range of the D5VM in BCD mode is factory-set to 0000. The D5VM outputs EEEE when the actuator is at the FP (free position) and FFFF when the actuator is pressed in excess of the measurement range.

Installation

■ MOUNTING

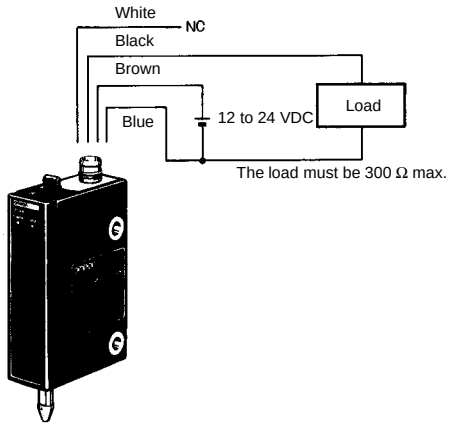


Note: 1. Refer to the *Dimensions Section* for the distance between the reference position and the measurement range.

2. Mount the D5V with M4 screws, flat washers, and spring washers securely. Tighten each M4 screw to a torque of 1.18 to 1.47 N • m (12 to 15 kgf • cm).

■ CONNECTIONS

D5VA and Load

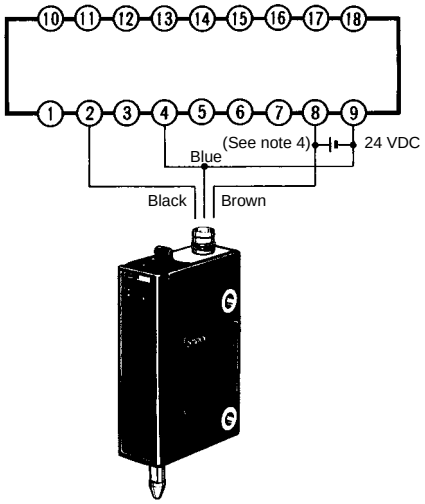


- Be sure to turn off the D5VA when wiring the cable connected to the D5VA or connecting or disconnecting the connector to or from the D5VA, otherwise the D5VA or load may malfunction or be damaged.
- The cable resists normal bending and twisting force. Do not bend, twist, or pull the cable with extreme force.
- Separate the cable from power lines or equipment that may generate electrostatic noise.
- The white lead wire of the cable is not used. Insulate the end of the white cable so that it will not come in contact with other lead wires.

D5VA and K3TX

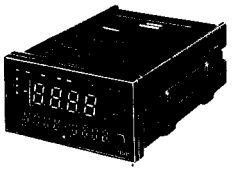
Unit	Intelligent Signal Processor
Appearance	
Part Number	K3TX-AD□□□-□□
Feature	Highly accurate with an error rate of just ±0.1% Five-step comparison is available Models with BCD output are available

Connection Example

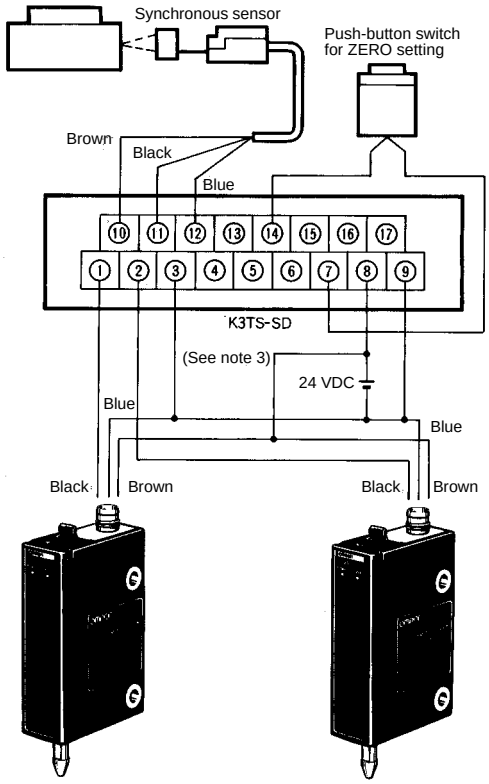


Note:
1. The K3TX must be a DC input model.
2. Various K3TX output models are available. Select the model most suited to the application.
3. Refer to the *K3TX Data Sheet* for more information.
4. Connect an AC power supply to the K3TX and a DC power supply to the D5VA if the K3TX is an AC input model.

D5VA and K3TS

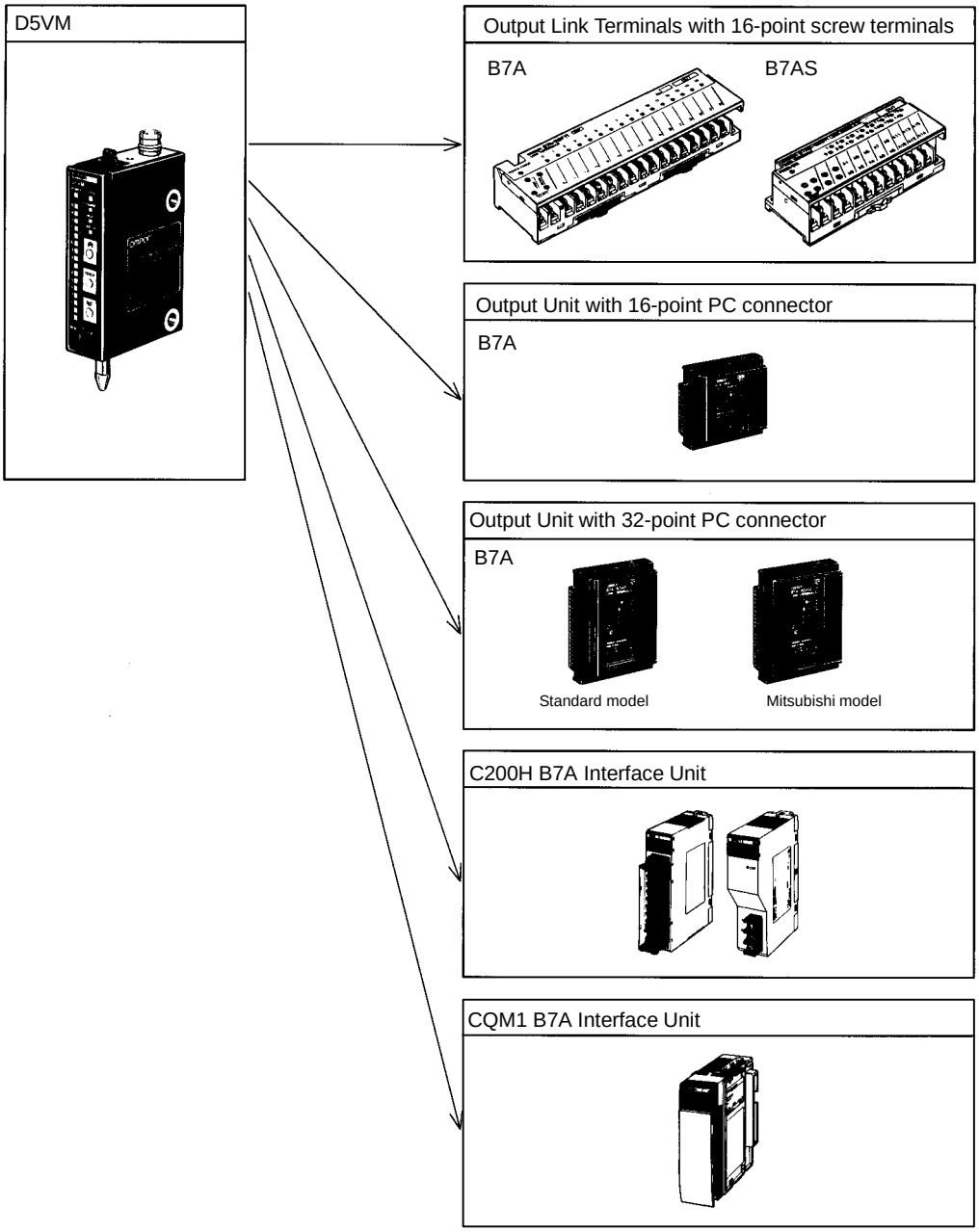
Unit	Linear Sensor Intelligent Signal Processor
Appearance	
Part Number	K3TS-SD□□□-□□
Feature	A 1.04-ms high sampling speed Processes two inputs Incorporates versatile functions, such as a forced ZERO function

Connection Example



Note:
1. Various K3TS output models are available. Select the model most suited to the application.
2. Refer to the *K3TS Data Sheet* for more information.
3. The K3TS used in the above connection example is a DC input model. Connect an AC power supply to the K3TS and a DC power supply to the D5VA if the K3TS is an AC input model.

D5VM Combinations

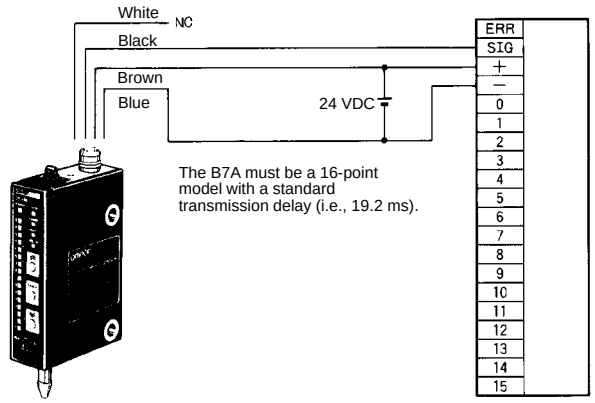


■ COMBINATION OF MODELS

Part Number	Connecting Unit	Remarks
D5VM-□□□	B7A-R6□□1 B7AS-R6□□1	Screw terminals (Output Unit)
	B7A-R□□□3-□	PC connector (Output Unit)
	C200H-B7A21 (see note 1) C200H-B7A22 (see note 1) C200H-B7AI1 C200H-B7A12 (see note 2)	C200H B7A Interface Unit (Input Unit)
	CQM1-B7A21 (see note 1) CQM1-B7A12 (see note 2) CQM1-B7A13 (see note 2)	CQM1 B7A Interface Unit (Input Unit)

Note: 1. Connect the D5VM to the input terminals of the above Units and make standard settings on the D5VM.
2. Make standard settings on the above Units.

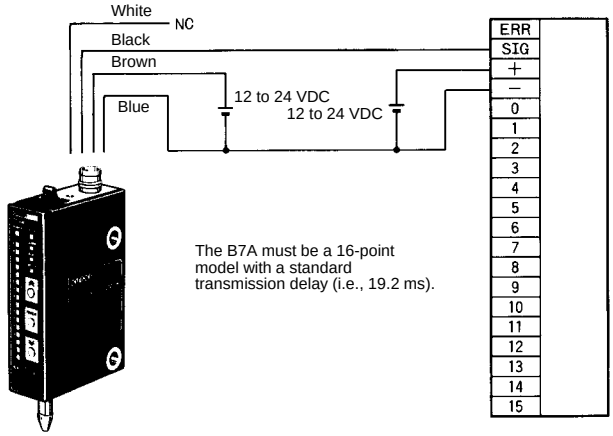
D5VM, B7A Output Link Terminals, and Single Power Supply



Baud Rate	Transmission Distance
Standard	100 m

- Be sure to turn off the D5VM when wiring the cable connected to the D5VM or connecting or disconnecting the connector to or from the D5VM, otherwise the D5VM or load may malfunction or be damaged.
- The cable resists normal bending and twisting force. Do not bend, twist, or pull the cord with extreme force.
- Separate the cable from power lines or equipment that may generate electrostatic noise.
- The white lead wire of the cable is not used. Insulate the end of the white cable so that it will not come in contact with other lead wires.

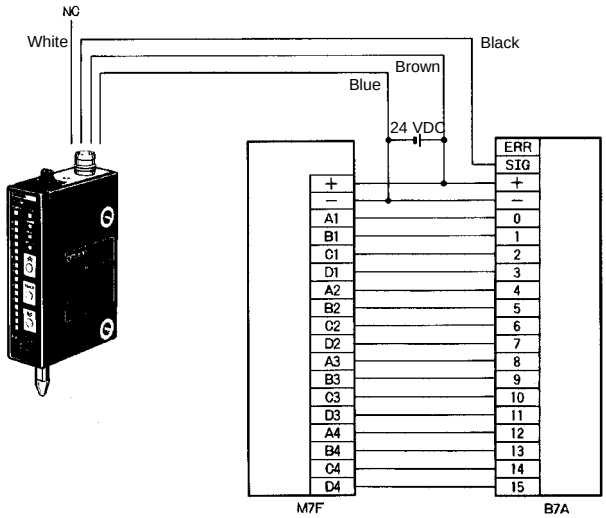
D5VM, B7A Output Link Terminals, and Independent Power Supplies



Baud Rate	Transmission Distance
Standard	500 m

- Be sure to turn off the D5VM when wiring the cable connected to the D5VM or connecting or disconnecting the connector to or from the D5VM, or the D5VM or load may malfunction or be damaged.
- The cable resists normal bending and twisting force. Do not bend, twist, or pull the cable with extreme force.
- Separate the cable from power lines or equipment that may generate electrostatic noise.
- The white lead wire of the cable is not used. Insulate the end of the white cable so that it will not come in contact with other lead wires.

D5VM, B7A Output Link Terminals, and M7F Digital Display



The B7A must be a 16-point output model with a standard transmission delay (i.e., 19.2 ms).

The M7F must be a static input model with a four-digit display.

Combination of B7A and M7F

B7A output configuration	NPN	PNP
M7F logic	Negative	Positive

Power supply	Independent power supplies	Single power supply
Supply voltage	12 to 24 V	24 V
Transmission distance	500 m max.	100 m max.

Precautions

■ CORRECT USE

⚠ Caution

The tip of a pin-type actuator is sharp. Be careful when handling the actuator to avoid injury.

- Do not disassemble the D5V, otherwise an electric shock or injury may occur or the D5V may malfunction.
- The D5V will have detection errors if the operating speed of the actuator exceeds the response time.
- The operating force of the actuator is 0.3 N (30 gf). Before using the D5V for detectable objects, make sure that the actuator will not damage the objects.
- The D5V will have large detection errors if the D5V is used near generators, motors, or other machines generating strong magnetic fields.
- Make sure that the overtravel indicator of the D5V in operation is not lit. The Sensor will be damaged if the actuator is pressed in excess of the measurement range.
- Do not impose horizontal loads on the actuator, or the actuator will deform and have difficulty in detecting objects correctly.
- The D5V is not of watertight or dust-tight construction. Do not use or store the D5V in an area with excessive humidity or dust or where water may be sprayed onto the D5V.
- An adapter may be attached to the flat-type actuator. The operating force may, however, change due to the weight of the adapter. Some types of adapters, such as roller-type adapters, may cause detection errors.
- The white lead wire of the cord is not used. Insulate the end of the white cord, so that it will not come in contact with other lead wires.
- The D5V will not detect objects correctly if the knob is set to the connector side to fix the actuator at the TTP.

NOTE: DIMENSIONS SHOWN ARE IN MILLIMETERS. To convert millimeters to inches divide by 25.4.

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