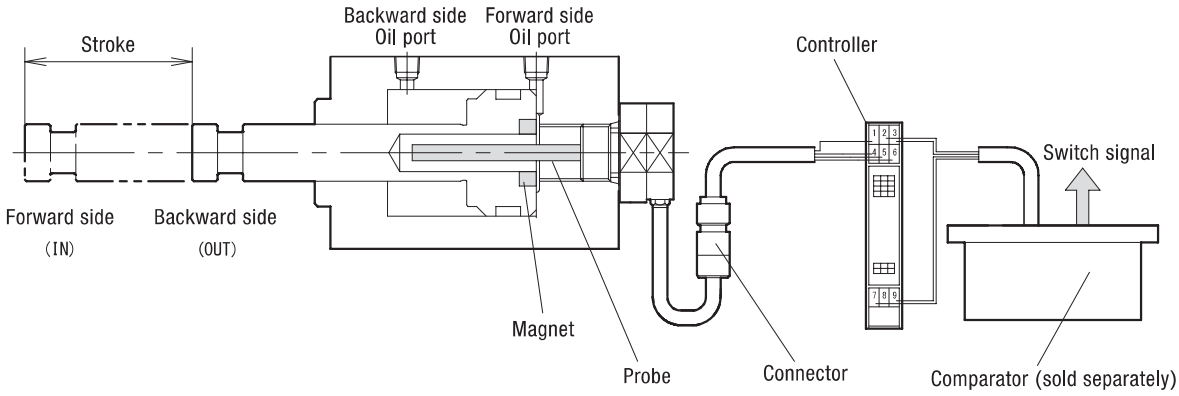
Caution for handling the Magnetostrictive Sensor Built-in Type

What is a magnetostrictive sensor cylinder ?

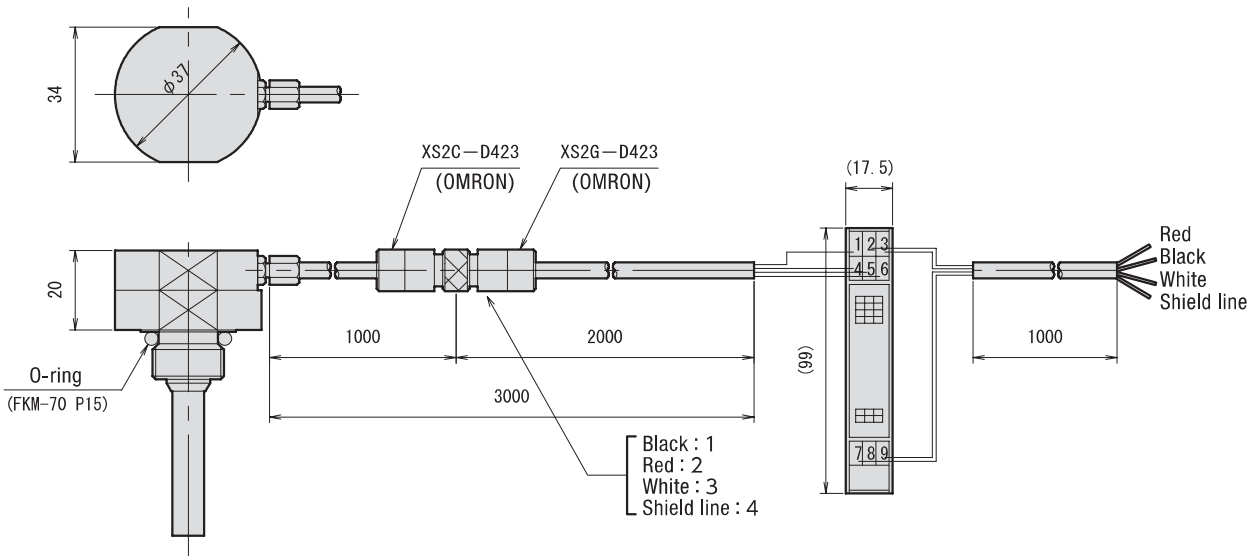
By fitting existing cylinders with a magnetostrictive sensor, as opposed to a sleeve sensor, it has been possible to reduce overall cylinder length and to adjust the outlet orientation of the cord at 360°. Moreover, water-resistance is also improved and costs can be reduced since a controller can be applied at the same stroke.



Repeating accuracy	0.05 mm or less
Temperature characteristics	±200ppmFS/°C ＊1
Output	1 ~ 5V(DC)
Scanning frequency	Approx. 1 kHz
Pressure proof	35MPa(Sensor rod part)
Operating temperature range	Probe −5°C ~ +100°C
	Controller 0°C ~ +60°C
Range of storage temperatures	Probe −40°C ~ +100°C
	Controller −40°C ~ +80°C
Quake-proof	6G (or 40 Hz 2 mmpp)
Crash-proof	50G
Protection standard	IP67
Probe cable	Black ø3.9 shielded cable 0.216 mm^2

＊1 In the case of 15st

Diagram of magnetostrictive sensor's overall dimensions



Caution for handling the Magnetostrictive Sensor Built-in Type

Caution for handling the Magnetostrictive Sensor

1. Outline
Magnetostrictive sensors are displacement sensors for industrial use which take advantage of magnetostrictive phenomena. They make it possible to know the absolute position of a piston moving along the sensor probe. The position of the piston is measured by measuring the propagation time of the twisting strain occurring on a special magnetostrictive wire inside the rod of the probe.

2. Connection
Place the cable from the probe after the controller as shown in the sequential table below.

Terminal No.	Terminal name	Connection
1	SHLD	Probe shield line
2	GND	Power source 0 V
3	24V	Power source DC 24 V
4	W	Probe white line
5	B	Probe black line
6	R	Probe red line
7	COM	COM
8	I	Current output (option)
9	V	Voltage output (intra-COM output)

＊The COM and GND terminals have been sequentially placed in the internal controller.

■ Specifications for the controller phase connector

Lead wire strip length : 7 mm
Connecting lead cable diameter : 0.2 ~ 2.5 mm^2
Screw tightening torque : 0.5 ~ 0.6 Nm
Driver width : 3 mm
Note) The connector is plugged into the controller at the factory.

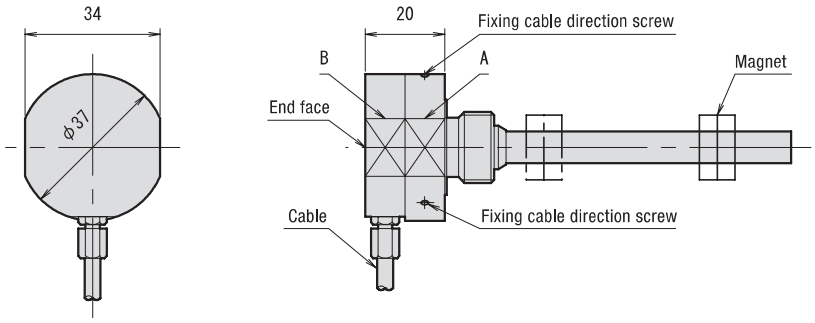
Attention : please ensure that all wiring has been done correctly.
(Incorrect wiring may cause malfunctioning.)

3. Zero point and gain adjustment
When output needs to be finely regulated, this can be done through the two trimmers【ZERO, GAIN】on the front of the controller. Adjustments should be performed following a warm-up period of about 15 minutes after power-up.

■ Adjustment procedure (in case of 1 V ~ 5 V voltage output)

① Move the cylinder to the backward limit.
② Turn the【ZERO】trimmer for adjusting the zero point and adjust output to 1 V.
③ Move the cylinder to the forward limit.
④ Turn the【GAIN】trimmer for adjusting gain and adjust output.
Output should be adjusted to the values calculated below.
Output V={4×(Cylinder position in mm)÷(Effective length of sensor in mm)}+1
Ex : In case of a cylinder position of 13 mm and a sensor's effective length of 15mm, output shall be 4.467 V.
⑤ Even though adjustment is completed, steps ① through ④ should be repeated just in case.
Note) the full-scale point (forward limit) must be adjusted only after the zero point (backward limit) has been previously adjusted.

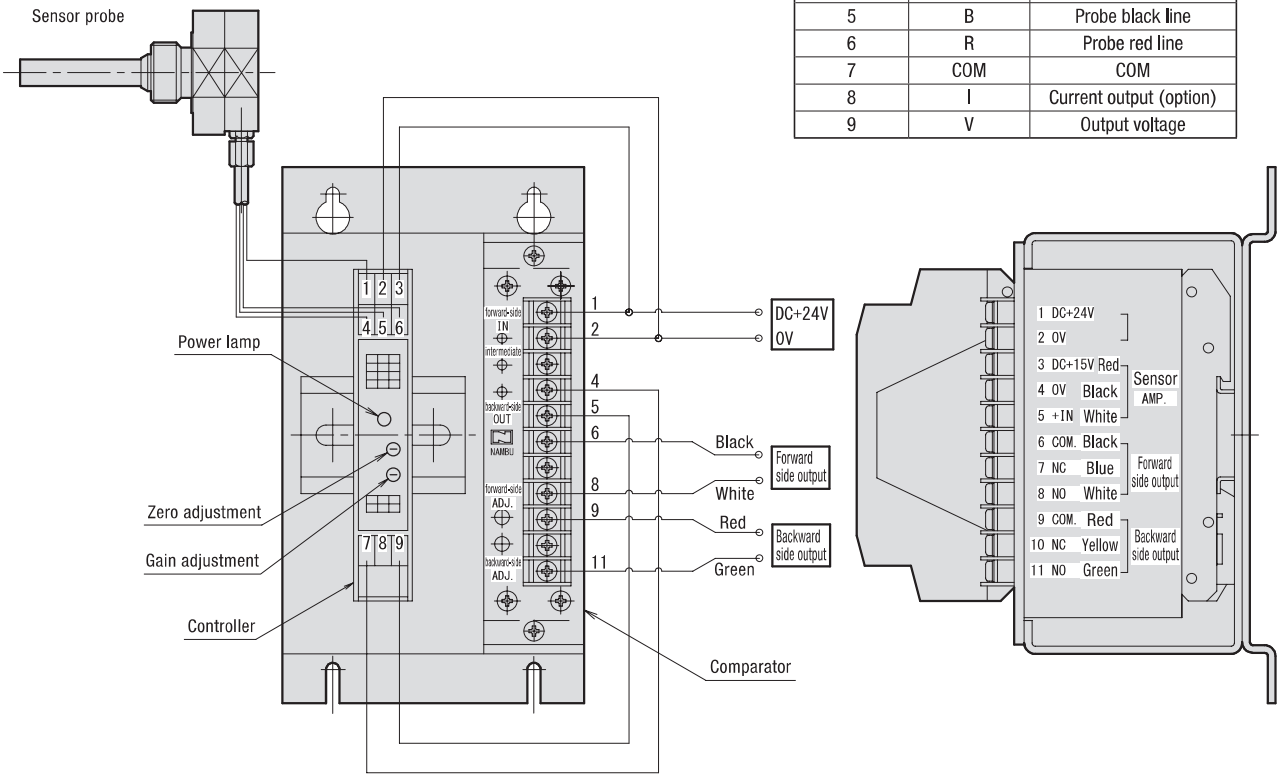
4. Caution on handling
① When handling the probe, special care should be taken not to pull the probe cable too strongly as this may cause disconnection. In particular, remove the probe from the cylinder and pay special attention not to twist the cable if this is already attached. (Screw the probe and the cable onto the cylinder while turning them together.)
② Remove the probe from the cylinder and, when screwed in, reliably fix in place with a wrench the probe head section for the width across flat (34 mm) shown in figure A below. Special care should be taken not to turn only the width across flat shown in figure B, as this may result in malfunctioning.
③ After mounting the probe onto the cylinder, if changing the output direction of the cable, always turn the width across flat shown in figure B after loosening the 2 screws (M3) which fix the direction of the probe head section's cord. After the output direction of the cable has been determined, tighten the two screws which fix the direction of the cord while pressing the end face of the probe head in the direction of the probe tip.
④ If wishing to change the combination of the probe and controller, re-adjustment is required. When combining items with different serial numbers, re-adjustment of zero point and gain is required.
⑤ For magnets, please use designated magnets whose combination has been adjusted.
⑥ Since the proper torque value for installing the magnetostrictive sensor onto the cylinder body is set at 49.0 N/m (5.0 kgf/m), keep this in mind when performing this operation.
⑦ Please refrain from peeling off the seal either.



Caution for handling the Magnetostrictive Sensor Built-in Type

Wiring diagram of Magnetostrictive sensor

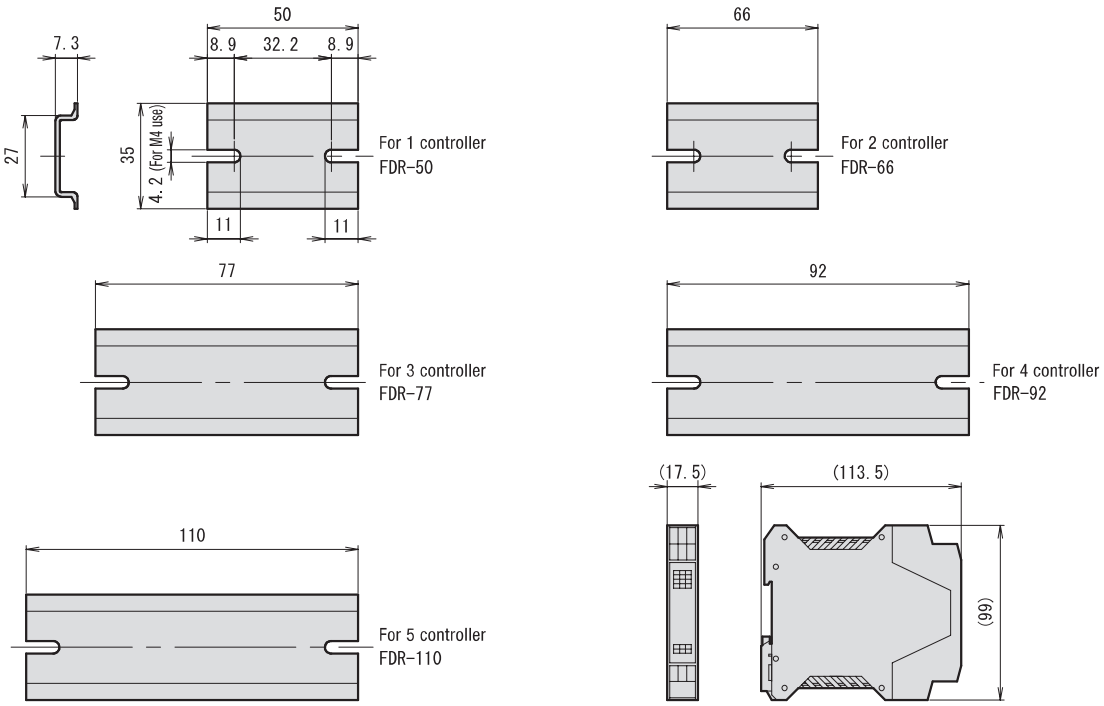
(Wiring diagram of sensor probe, controller and comparator)



Terminal No. for controller

Terminal No.	Terminal name	Function
1	SHLD	Probe shield line
2	GND	Power source 0 V
3	24V	Power source 24 VDC
4	W	Probe white line
5	B	Probe black line
6	R	Probe red line
7	COM	COM
8	I	Current output (option)
9	V	Output voltage

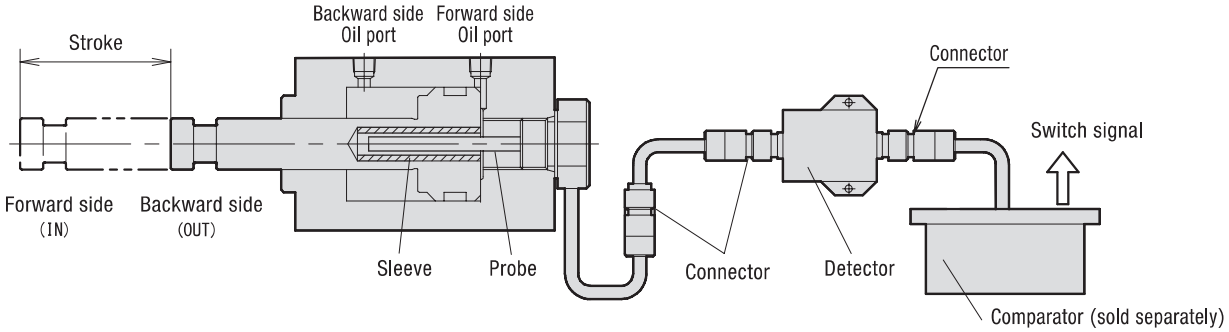
DIN rail dimension table for controller



Caution for handling the Sleeve Sensor Built-in Type

What is a sleeve sensor cylinder ?

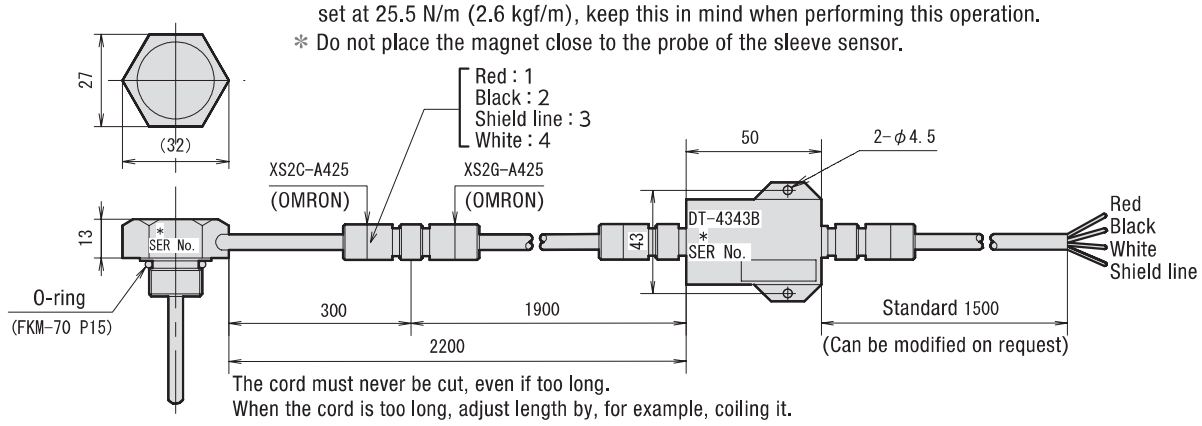
Sleeve sensor cylinders are existing cylinders which have been fitted with a sleeve sensor, thus making the cylinder section extremely compact in comparison with conventional limit switches. Moreover, since the sensor and the operating unit are separated, by using the comparator (sold separately) it will be possible to perform adjustments at a distance from the cylinder. Finally, repeating accuracy is extremely high at within 0.05 mm, and it is not affected by magnetic fields nor vibrations.



Repeating accuracy	0.05 mm or less	
Maximum effective length	200mm	
Power supply voltage	DC+10 ~ 30V Ripple (P-P) : 2% or less	
Consumption current	25 m A or less	
Output voltage	+1 ~ +5V	(Within effective range)
Output linearity	± 2.0%FS	(Within effective range)
Input impedance	Approx. 100 Ω	
Resonance frequency	800Hz (–3db)	
Temperature drift	300 ppm/°C for FS (0 ~ +60°C) (Changes in temperature of the probe alone occur at detector's constant temperature conditions)	
Insulation resistance	More than 100 MΩ By DC500 V mega tester Between probe/detector case and power source/output	
Range of usable temperature	Probe	–10 ~ +120°C (No freezing)
	Detector	–10 ~ +60°C (No freezing)
Range of storage temperature	–20 ~ +70°C (No freezing)	
Range of usable humidity	30 ~ 95% (No condensation)	
Range of storage humidity	25 ~ 95%RH (No condensation)	
Protection standard	Probe and connector joint part	IP-67 (IEC standard)
	Other	IP-54 (IEC standard)
Normal operating pressure	Oil pressure (dynamic)	20.6MPa
	Oil pressure (static)	30.9MPa
Hydraulic oil	General mineral oil and water glycol compound hydraulic oil	
Probe cable	with ϕ 3.4FEP shield	0.18mm^2
Relay cable	with ϕ 3.4FEP shield	0.18mm^2
In/Out cable	with ϕ 3.4FEP shield	0.18mm^2
Maximum cable bend radius	R17mm	
In/Out content	Reed line Red	DC+10 ~ 30V
	Reed line Black	0V
	Reed line White	Output voltage +1 ~ +5V
	Shield line	0V

Outline dimension

* Please use sensors and detectors with matching serial numbers (SER.No).
* Since the proper torque value for installing the magnetostrictive sensor onto the cylinder body is set at 25.5 N/m (2.6 kgf/m), keep this in mind when performing this operation.
* Do not place the magnet close to the probe of the sleeve sensor.



The cord must never be cut, even if too long.
When the cord is too long, adjust length by, for example, coiling it.

Precautions for handling the Comparator

What is a comparator ?

Comparators convert the continuous signal output from the sensor (voltage output) into signal output of the two [forward and backward] points. By using sensor cylinders and comparators, it is possible to output forward and backward signals to the machine side.

Specifications for comparator

Input voltage range	DC+24V ± 10%		
Input current	Less than 50 m A		
Input current output format	Relay output/a, b contact point each 1		
Relay content	Rated current flow	Less than	AC 0.5A (100V) DC1A (24V)
Operating temperature range	0 ~ 50°C		

1. Securely attach the sensor cylinder to the specified location where it is to be used.
   * Attention should be paid not to damage the sensor's cord, connectors, etc.
   * When fixing the cord avoid to forcibly bend it or pull it.
2. Connect the cord to the sensor, controller and (detector) comparator in this order.
   * Attention should be paid not to mistake the connection direction of the detector.
   * In order to avoid the influence of noise on the detector, this should be installed as far away as possible from power sources.
3. Connect the comparator to the DC24V power source.
   (If using AC100V, a separately sold power source is required.)
4. Verify that only one of the 3 light indicators (backward-side OUT, intermediate, forward-side IN) is on.
5. Make the cylinder move to back and forth several times by hydraulic or pneumatic pressure to ensure that it's operating normally.
   * This should initially be done at low pressure.
6. Place the rod in the prescribed backward-side position and slowly turn the backward-side adjustment knob (backward-side ADJ) all the way to the right.
   * Verify that only the "intermediate" light is on at this point.
   * The motion range of the backward-side adjustment knob (backward-side ADJ) is 270°.
7. Turn this knob slowly to the left in order to turn on the "backward-side OUT" light.
   * The trick to doing this consists in finely turning the knob to the left and to the right several times.
8. Next, place the rod in the prescribed forward-side position and turn the forward-side adjustment knob (forward-side ADJ) all the way to the right. Turn this knob slowly to the left in order to turn on the "forward-side IN" light.
   * The motion range of the forward-side adjustment knob (forward-side ADJ) is 270°.
   * If two or more lights (backward-side OUT, intermediate, forward-side IN) are on, or if no light is on, this should be considered as a sign of lack of adjustment or of abnormalities.
     In such cases, after checking once again the wiring, the connection method, etc., please contact us.
9. Activate the stroke of the cylinder several times and verify that the three lights (backward-side OUT, intermediate, forward-side IN) turn on sequentially in the prescribed locations. If the lights are not on in the prescribed locations, after removing the unit for inspection and maintenance, repeat the adjustment once again from step 5.

Name of each comparator's part

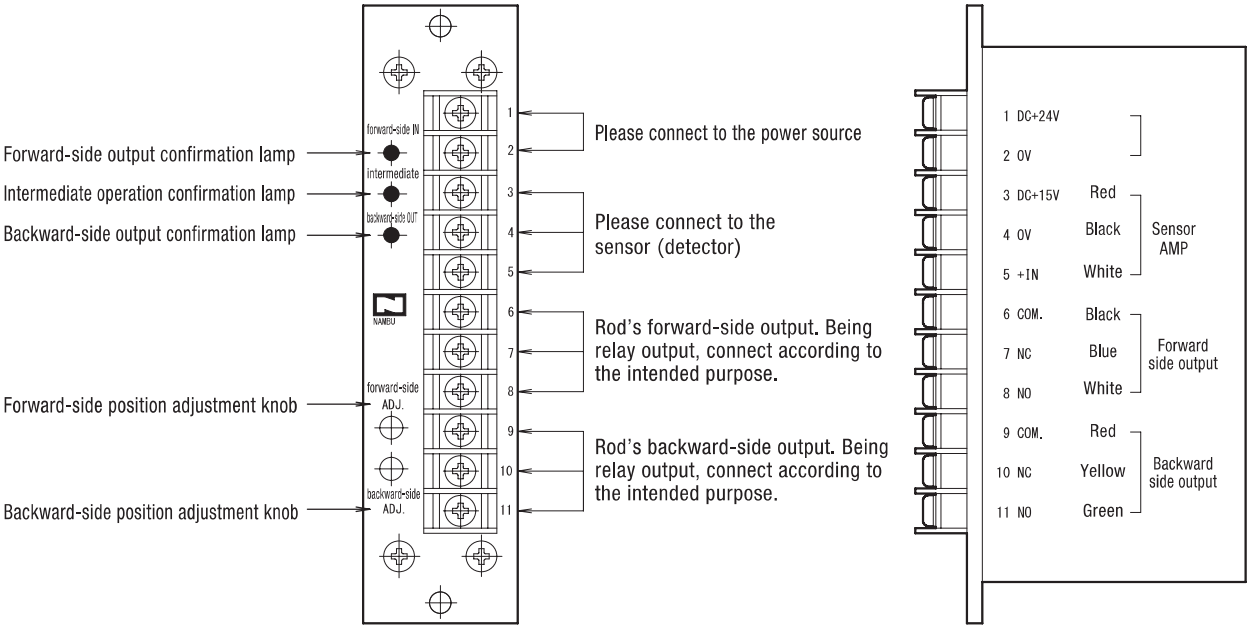
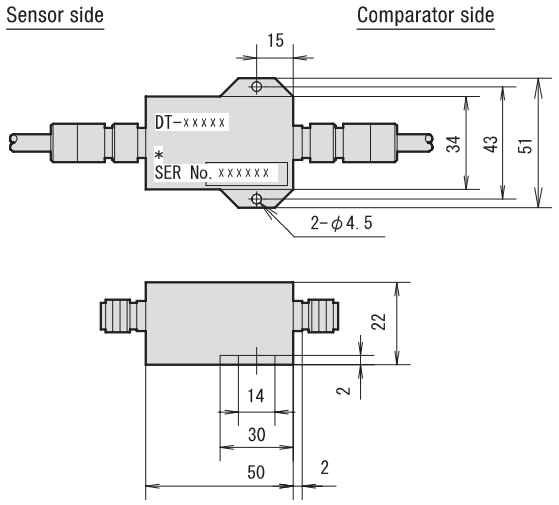
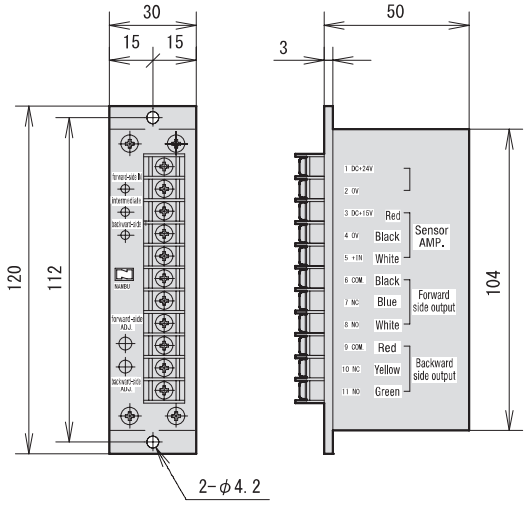


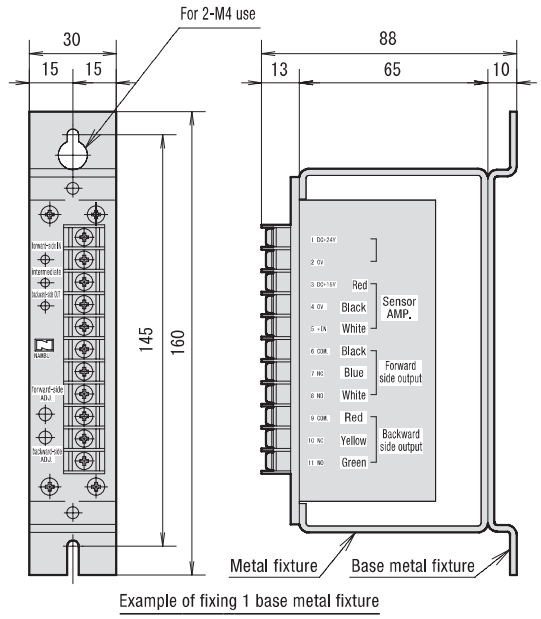
Table of Dimensions for Accessories of Sensor Built-in Type

Detector

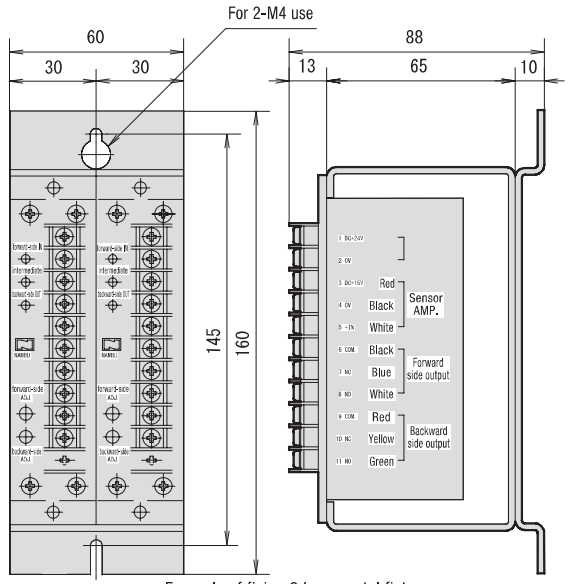


Comparator





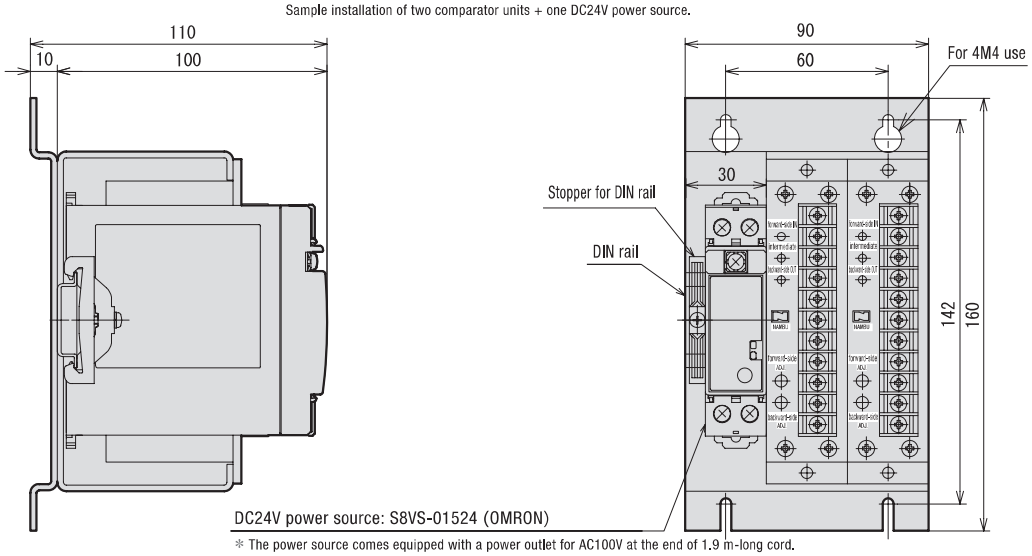
Example of fixing 1 base metal fixture



Example of fixing 2 base metal fixture

Example of fixing 3 base metal fixture

Sample installation of two comparator units + one DC24V power source.



DC24V power source: S8VS-01524 (OMRON)

* The power source comes equipped with a power outlet for AC100V at the end of 1.9 m-long cord.
* Power source (with 2 m cord) sold separately. Base metal fixture and DIN rail are not included: if required, please inquire separately.

Troubleshooting for Sensor Built-in Type

Before reading: check sensor, power source and machinery carefully for cord damage, disconnections and missing parts.

Check list when mounting

Symptom	Cause	Check/Action
None of the comparator's confirmation lights are on.	The comparator is probably not connected to the power source.	Ensure that DC24V is being supplied to terminals 1 and 2.
Two of the comparator's confirmation lights are on. (Backward side, forward side)	The output positions of the backward side and the forward side are probably overlapping.	Turn the backward-side adjustment knob all the way to the right; alternatively, turn the forward-side adjustment knob all the way to the right.
The power supply light of the DC24 V power supply is not on.	AC100V is probably not being supplied.	Verify that the power supply (outlet) is properly connected.

Check list when using the comparator

Symptom	Cause	Check/Action
The backward-side confirmation light is not on.	The adjusted output position has probably shifted.	Turn the backward-side adjustment knob slightly to the left (counter-clockwise).
The forward-side confirmation light is not on.	The adjusted output position has probably shifted.	Turn the forward-side adjustment knob slightly to the left (counter-clockwise).
The light does not come on even after turning the knob.	The detector has probably been attached in a reversed position. (When using the sleeve sensor)	Verify the position of the detector. (See the separate drawing).
	DC15V is probably not being supplied to the sensor.	Measure the voltage of terminals 3 and 4 and verify that it's DC + 15V.
	The sensor's output is probably not reaching the comparator.	Measure the voltage of terminals 4 and 5. Verify that the output is as per the attached table.
Relay output does not properly come through. (Light is on)	The passage of current in the relay output cord is probably interrupted.	Verify that the cord is properly connected and that conduction is taking place.

＊ In case correct functioning cannot be restored even by performing the above operations, please contact us.

Theoretical output table for Sensor Built-in Type

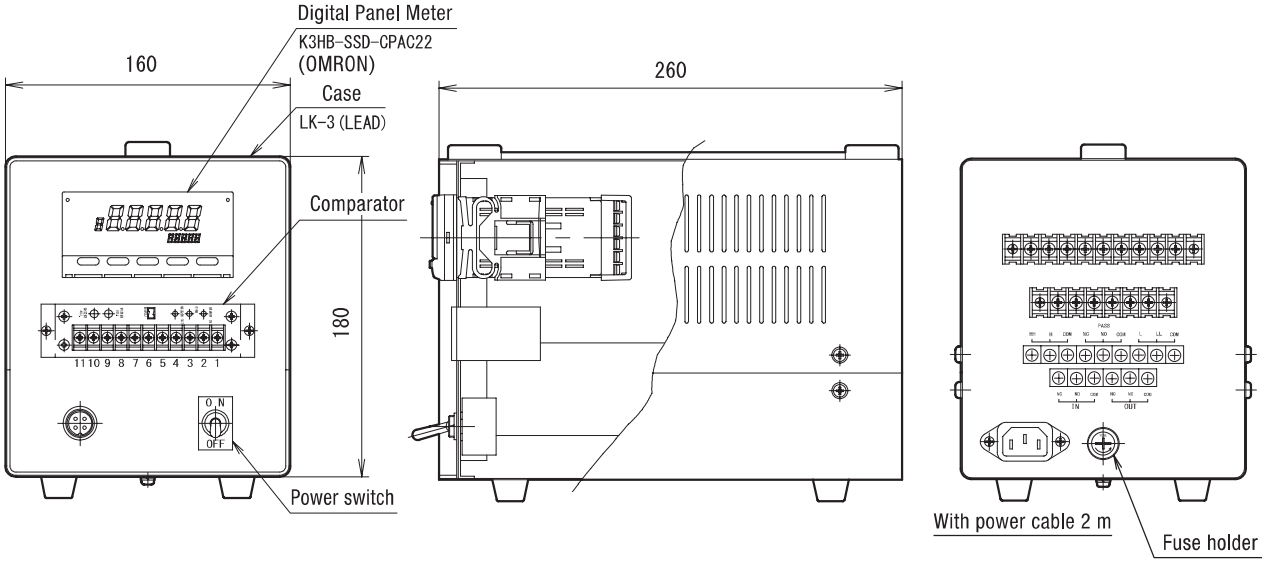
Effective length of sensor	Cylinder's stroke mm	Output of forward limit V	Output of backward limit V
15	5	2.3	1.0
	10	3.7	
	15	5.0	
30	20	3.7	1.0
	25	4.3	
	30	5.0	
50	35	3.8	1.0
	40	4.2	
	45	4.6	
	50	5.0	
75	60	4.2	1.0
	65	4.5	
	70	4.7	
	75	5.0	
100	60	3.4	1.0
	70	3.8	
	80	4.2	
	90	4.6	
	100	5.0	
125	105	4.4	1.0
	110	4.5	
	115	4.7	
	120	4.8	
	125	5.0	
150	130	4.5	1.0
	135	4.6	
	140	4.7	
	145	4.9	
	150	5.0	
175	155	4.5	1.0
	160	4.6	
	165	4.8	
	170	4.9	
	175	5.0	
200	180	4.6	1.0
	185	4.7	
	190	4.8	
	195	4.9	
	200	5.0	

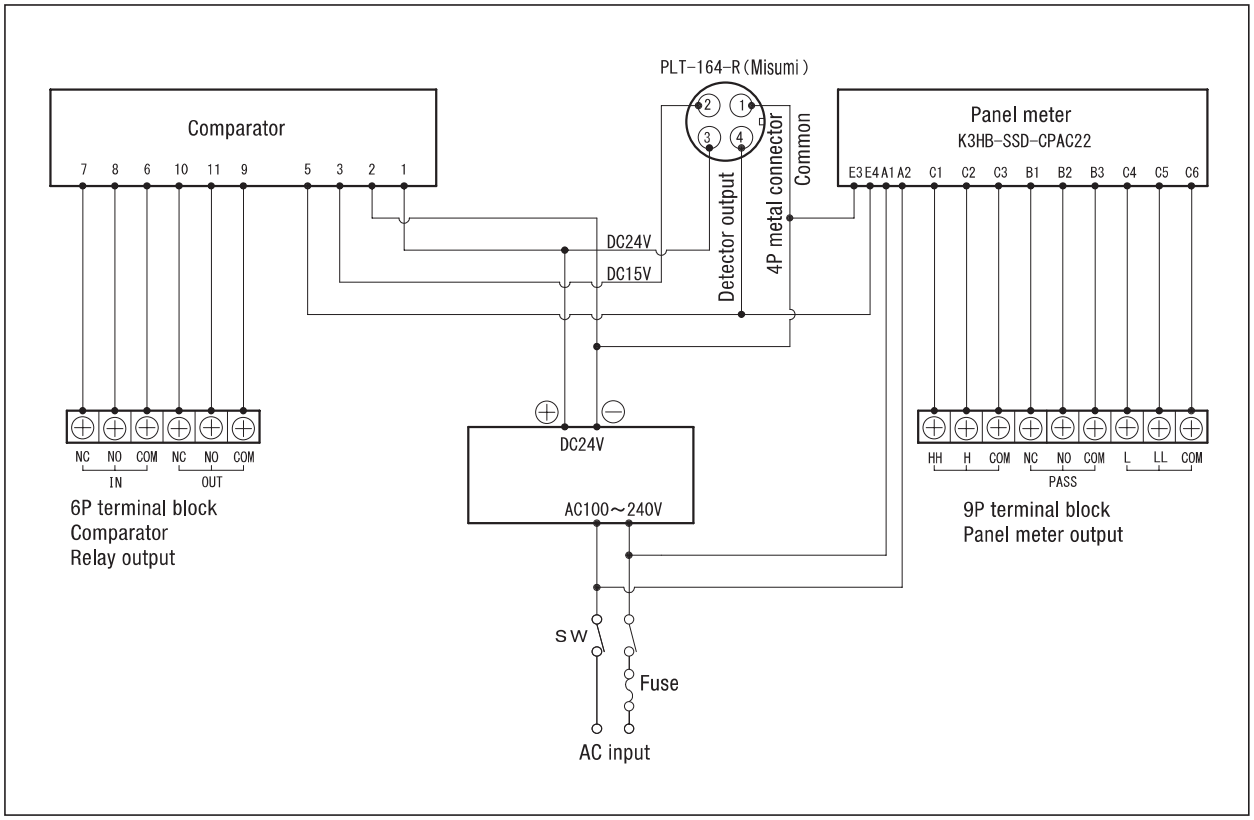
* This table shows approximate values and the difference with actual output is about ± 0.2V.
* Special care should be taken when handling the sleeve sensor as it may easily be damaged by sudden shocks, etc.

Squeeze monitor set

What is a squeeze monitor set ?

When employing partial pressurization (squeeze) during die casting, the quality of the product is affected by the stroke of the cylinder, which makes it necessary to check the stroke after molding.
Squeeze monitors allow to verify during molding if sensor cylinders are operating in the prescribed range (width) and make it possible to output such position to the machine side.
Also, they make it possible to minutely check the operating status of the cylinder in conjunction with data integration software.





CAST VIEWER

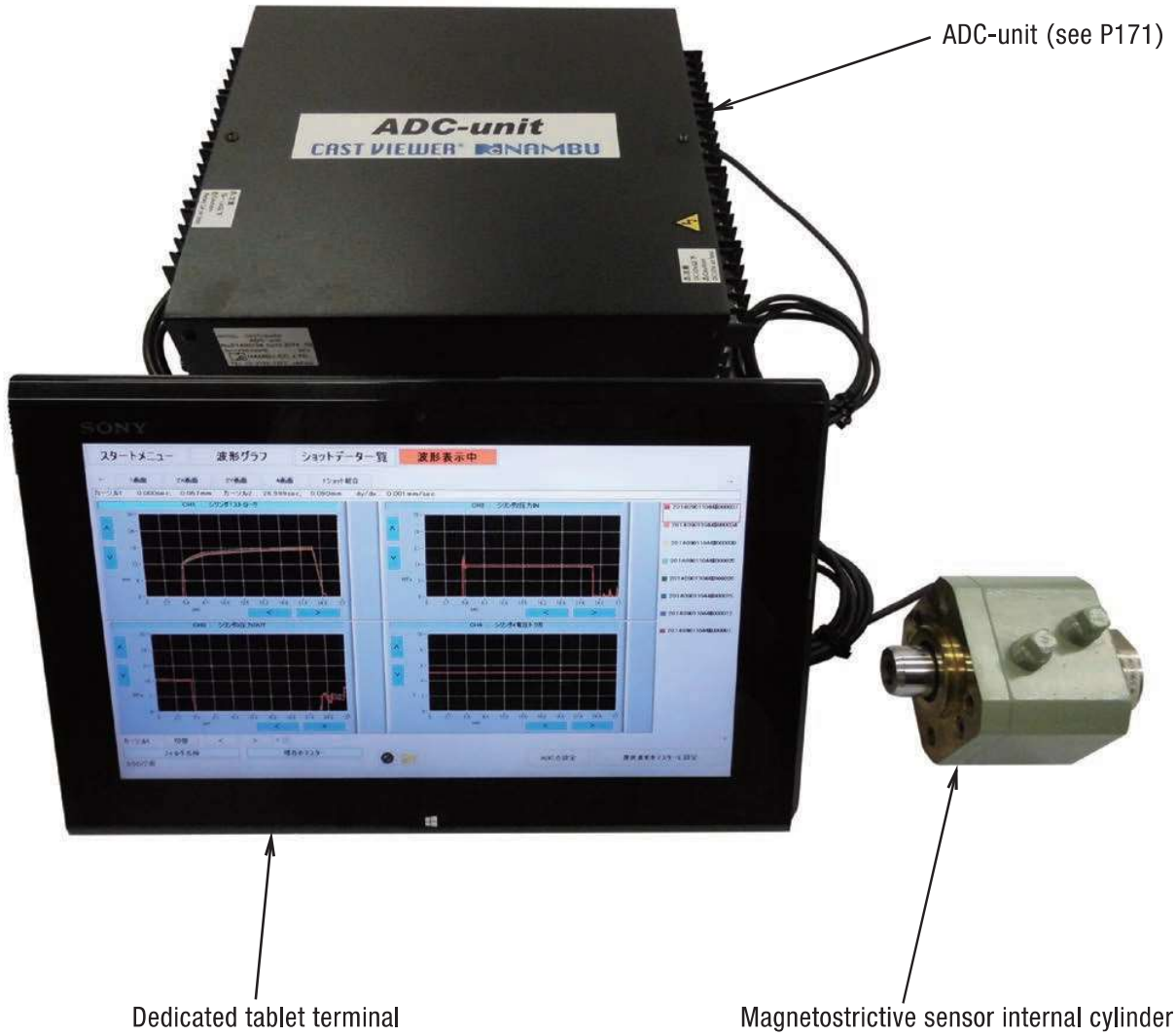
What is CAST VIEWER ?

It is a device consisting of a dedicated tablet terminal and an ADC-unit for “visualizing” as waveforms the voltage output by various sensors, like those monitoring cylinder operation, hydraulic pressure, temperature, etc. Since by using CAST VIEWER you can visualize and analyze casting conditions, it allows you to set the optimal conditions. It has 8 channels for both input and output and the waveforms of multiple sensors of different types can also be displayed at the same time. In addition, since a screen is assigned to each sensor, it is possible to check and monitor the operation of individual sensors in real time.
The saving, calling and superpositioning of the waveforms are easy to perform and, when configuring pass-fail range settings, it is possible to output a relay signal.

Features : Designed for ease of use and visualization, the CAST VIEWER can be easily operated from the touch panel screen without the need of consulting the operating manual.

- ✻ Measurement conditions are easy to set.
- ✻ You can select only the waveform you want to visualize and easily perform superposition.
- ✻ A different color is assigned to each waveform making them easy to distinguish. The print screen function makes it very convenient to create materials.
- ✻ It is possible to isolate minimum, maximum and average values for effective data analysis.

CAST VIEWER’s structure



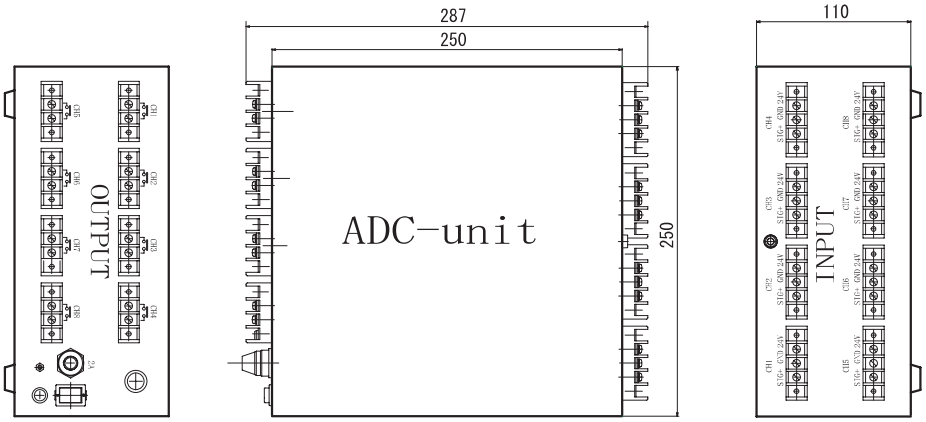
Note) The terminal shown in the above photo is used as dedicated tablet terminal. However, given the present speed of PCs’ model replacement cycles, please be aware that, in case the model in question is discontinued, an equivalent model will be supplied.

Sold as optional

- Stroke sensor (cylinder-inbuilt type)
- Pressure sensor
- Flow control valve
- K thermocouple
- Amplifier for K thermocouple (see P171)

Specifications in the catalog are subject to change without notice due to improvements in performance and quality.

ADC-unit

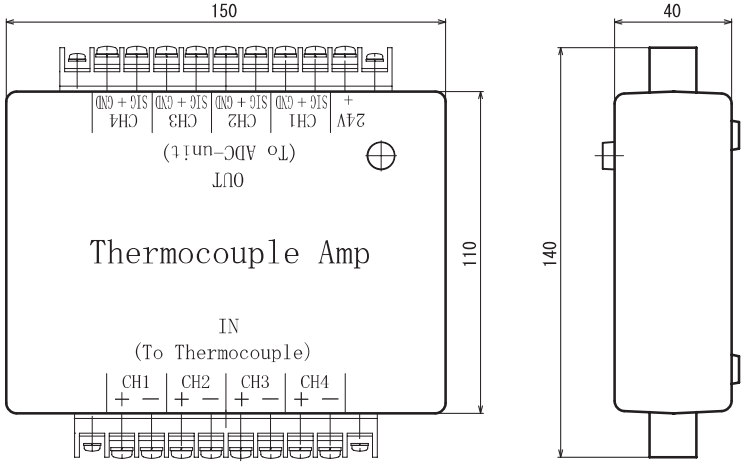


■ Input	Input analog	Input signal	DC 0 V ~ +10 V , single-ended
		Channel number	8CH
	A/D conversion unit	Input method	Single-ended
		Conversion method	△∑ Conversion method
		Input channel	8CH
		Input voltage range	DC 0 V ~ +10 V
		Input impedance	10 MΩ or more
		Resolution	16Bit
		Conversion rate	1ms
		Memory	65536 word ring buffer
		Conversion start	Soft trigger
		Conversion end	Soft trigger
	Communication	USB2.0	
	Input filter	Quintic 30 HZ low-pass active filter	
	Power supply	AC 100 V 50/60 Hz frequency sharing 2 A	

■ Output	Contact output	Output signal	Relay's dry contact
		Channel number	8CH
		Allowed current	1A
		Control method	Software

Note) When wiring the unit, make sure to turn off the power before working.

Amplifier for K thermocouple (sold as optional)



■ Input	Input signal	K-type Thermocouple
	Channel number	4CH
	Range of measurable temperatures	0°C ~ 1000°C
	Measurement accuracy	± 3°C
	Gain error	'1.5%

■ Output	Analog output	Temperature conversion voltage output based on temperature - voltage conversion table
	Channel number	4CH
	Power supply	+24V
	Supply current	10 mA or less

Note) Make sure to use a k-type thermocouple (non-ground type).
Note) Sold separately from the CAST VIEWER.

Specifications in the catalog are subject to change without notice due to improvements in performance and quality.

CAST VIEWER

Specifications discussion table

Your company's name : Name of the person in charge :

Time and date of consultation : Day Month Year

Measurement items	Detailed measurements supplied by user
Instruments used Ch1 to ch8 (when using ch 1 as trigger, measurement will be by ch7)	☐ Cylinder's stroke (place/s) ☐ Cylinder's mold temperature (place/s) ☐ Cylinder's entry pressure (place/s) ☐ Cylinder's temperature (place/s) ☐ Cylinder's return pressure (place/s) ☐ Accumulator's pressure ☐ Other ( )
Cylinder's specifications	☐ Manufacturing No : ( ) ☐ Number of units : ( ) ☐ Stroke voltage : Entry limit ( ) V / Return limit ( ) V ☐ Cylinder model : ( ) ☐ With sensor : Yes / No Sensor Type : A / G
Selection of trigger signal	☐ Accumulator's pressure → pressure sensor : Required / Not required ☐ High-speed injection signal → voltage generator : Required / Not required ☐ Size of mounting pipe : ( )
Pressure sensor/ extension cord, connector	☐ Pressure sensor (place/s) → ☐ Standard set (pressure sensor, gauge cock, joint, flat packing) ☐ Length of extension cord (m) (units) (up to 20 m. If required longer than 20 m, please consult.) ☐ Other pressure sensors (upon request)
Thermocouple	☐ K thermocouple Amplifier : Required / Not required ☐ K thermocouple (units) sheath outer diameter ( ) sheath length (mm) non-grounded ☐ Extension compensating lead wire (m) (units) ☐ Fittings : Yes / No
Flow control valve	☐ Yes / No ☐ Mounting method: hydraulic hose (units) with capacity to resist 20.5 Mpa pressure ☐ Coupler (Manufacturer : model number :) ☐ Other
Die-casting machine specifications	☐ Manufacturer : ( ) ; Model : ( ) Hydraulic machine/Electric machine
Name of mold/ components	
Does the sensor cord get in the way of replacement or maintenance of mold	
Setup instructions (dispatch request of our own workers)	☐ Installation Request/ Conducted in-house → Request : time and date of delivery (Day Month Year) Installation period : from Day Month to Day Month (days)
Location of CAST VIEWER	☐ Installation base Yes / No Environment of place of use