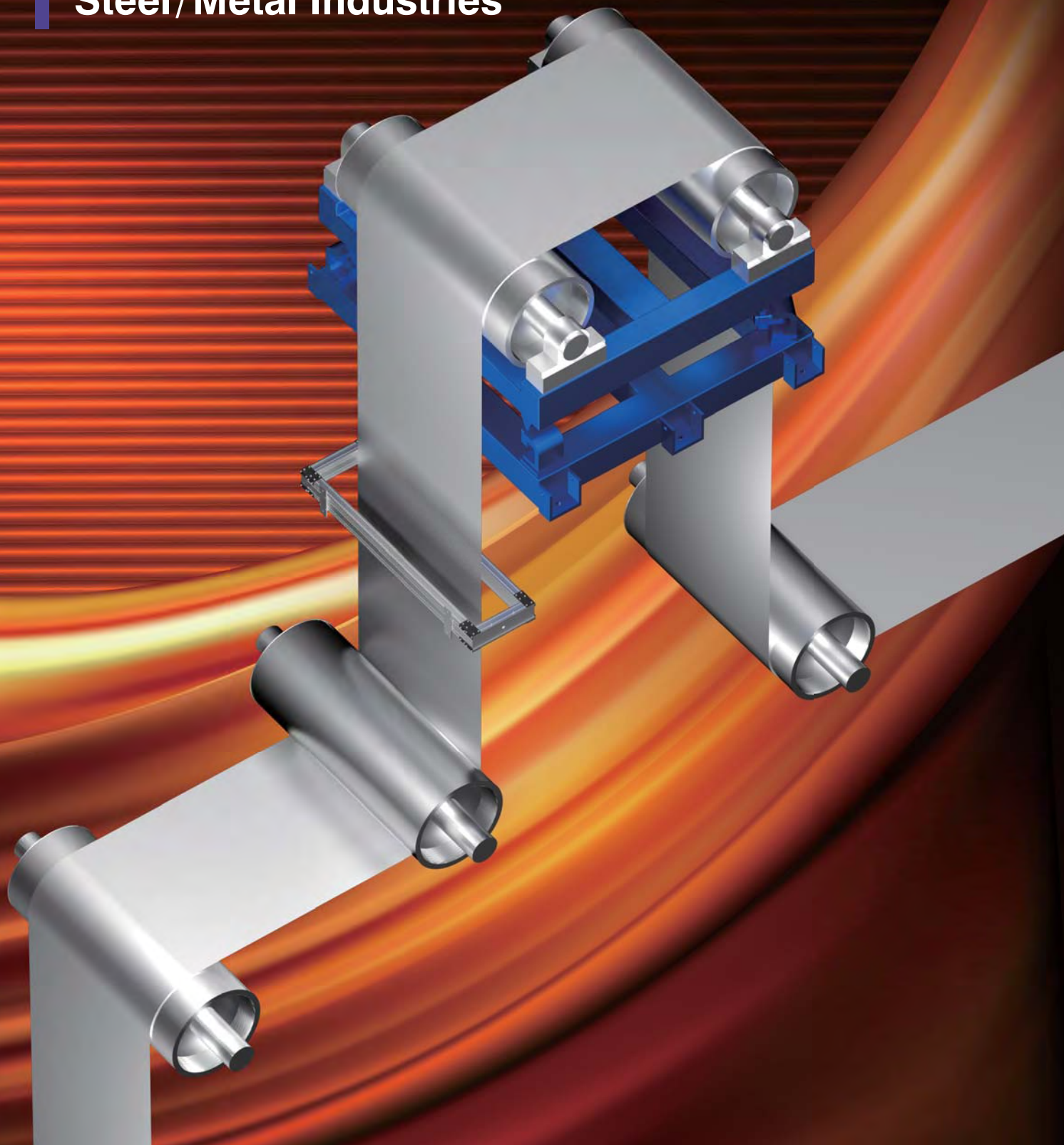


HEAVY DUTY

EPC®/CPC Catalog for
Steel/Metal Industries



HEAVY DUTY

EPC[®]/CPC

EPC[®] is a registered trademark of Nireco Corporation and stands for "Edge Position Control."

EPC is a control system that automatically and uniformly aligns the edges of products (strips) during processes such as rolling, heat treatment, pickling and surface treatment. These strips can be thin or thick plates.

CPC (Center Position Control), which controls the center position of the strip, is also widely used as an application of EPC

CONTENTS

- 01 OUTLINE OF EPC[®]/CPC
- 02 SENSORS
- 03 CONTROLLERS
- 04 CONTROL UNITS
- 05 POSITION TRANSMITTERS

01

OUTLINE OF EPC[®]/CPC

01 OUTLINE OF EPC[®]/CPC

02 SENSORS

03 CONTROLLERS

04 CONTROL UNITS

05 POSITION TRANSMITTERS

OUTLINE OF EPC[®]/CPC

What are EPC[®] and CPC?

EPC[®] (Edge Position Control) is widely used in industry

EPC stands for Edge Position Control. EPC controls any deviation in the position of the edges of product sheets that always occurs when they are being wound into rolls or unwound from rolls.

1. Iron and steel industry
2. Light metal industry
3. Copper and copper alloy industry
4. Printing and bookbinding industry
5. Plastic and film industry
6. Rubber and chemical industry
7. Paper industry
8. Fiber and textile industry

These are just some of the industries that use EPC in their product manufacturing processes. Nireco EPC is highly regarded in these sectors.

This catalog covers the application of EPC in sectors 1 to 3 of the list above; namely the steel and metal industries.

CPC (Center Position Control)

CPC stands for Center Position Control. CPC controls the position of the center of a strip so that it remains constant. This control process is able to control the center line of the strip so that it remains in a constant position without the need to change the position of the sensor when the strip is continuously in motion, even if there are changes in the width of the strip (large changes, such as at a join or splice in the strip).

EPC[®]/CPC features

EPC and CPC are leading Nireco technologies that our rivals cannot match, and are actively supported throughout industry.

■ Precise control

EPC and CPC control the edge position or center position to a high level of precision.

■ Sensing element does not touch the strip

Can detect without physical contact.

■ Easy maintenance

Since the system has a simple and robust mechanical structure, it is trouble-free. (Nireco systems have been in continuous use in some plants for over 40 years at present.) Even if a problem occurs, trouble-shooting can be done easily at the installation site.

■ High stability

Since the system employs hydraulic technology, the influence of friction and inertia is negligible. Continuous control of the operation is possible and frequency response characteristics are excellent.

■ High speed with heavy loads

A 200-mm diameter hydraulic work cylinder operating with a hydraulic pressure of 10 MPa can exert a force of slightly less than 30 tons and yet have a low running cost.

■ High-speed operation

A speed of up to 50 mm/sec is available within the safety limits. Correct operation is guaranteed at high speeds.

■ Unaffected by power fluctuations

■ Uses integral action

Since an integral action is used as the basic action of the system, operating speed is in proportion to deviation, so deviation offset is eliminated.

EPC[®] is automatic control with feedback and constantly compares the actual position with a reference position

When a human operator performs some action, they look at the result and then adjust or correct the input (the principle of feedback). Similarly, Nireco Corporation's EPC also uses feedback in its operation. To achieve its goal of constantly keeping the edge of the strip in the proper position, EPC measures the amount of discrepancy, compares this amount with the reference value, and then corrects the edge position by the difference between the two.

**Labor-saving in manufacturing
EPC® is a necessary system for your plant**

EPC eliminates unevenness in the strip edge and protects the side surfaces of coils. Operations such as surface finishing, laminating, marking and cutting the strip can be performed at the desired position with minimal waste, so production and labor costs can be reduced. In recent years, many plants have introduced continuous production lines and higher line speeds to increase productivity. The EPC system is indispensable for these factories.

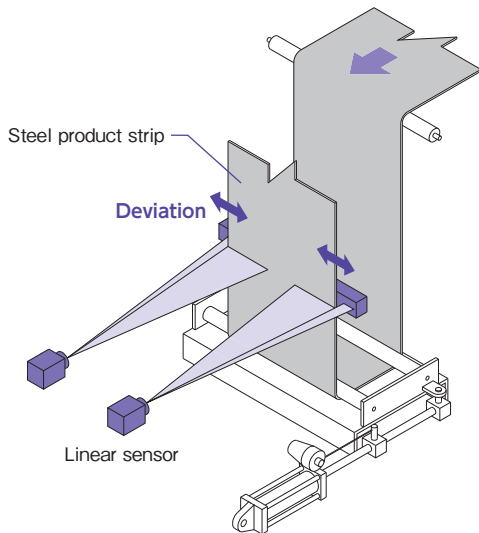


A strip rolled up without EPC
Post-processing required

A strip rolled up with EPC
The roll can proceed straight on to the next step in the manufacturing process

CPC sensor detects strip deviation

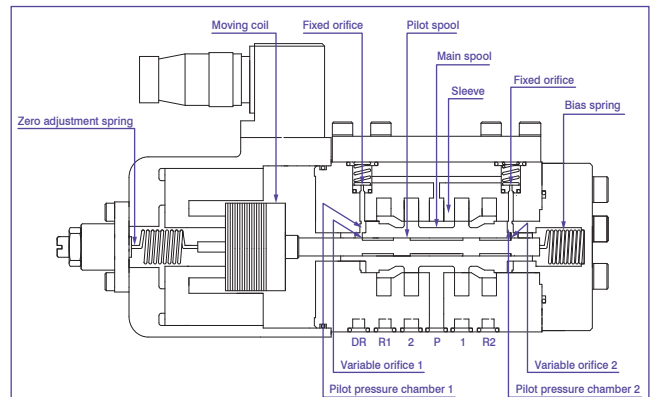
The sensor detects the amount of deviation by the center of the strip. An amplifier boosts the detection signal from the sensor and the control unit operates to make the correction.



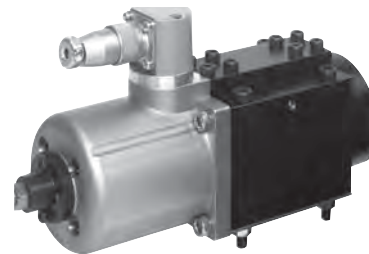
Detection of strip deviation

Electrical signals converted into hydraulic signals

The amplified deviation signal is compared with the reference value that has been set up in the system. A moving coil in the control unit converts this difference into a hydraulic signal that will move the position of the spool.



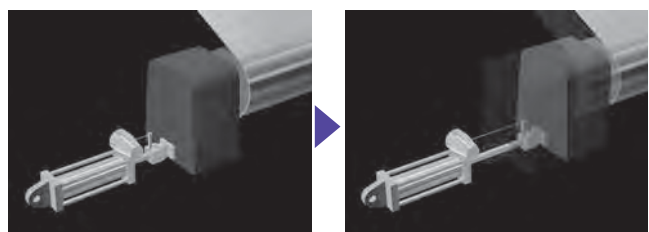
Internal structure of the Powerguide



Industrial servo valve Power Guide

Correction is performed by the work cylinder

The amplified deviation signal is compared with the reference value that has been set up in the system. A moving coil in the control unit converts this difference into a force that changes the position of the jet pipe (or spool, in the case of a servo valve).



Work cylinder corrective action

OUTLINE OF EPC[®]/CPC

The 3 basic methods of EPC[®]/CPC

There are three basic systems that are used in EPC and CPC. These are: **Payoff reel CPC (unwinding reel control system)**, **Steering roller CPC (intermediate guide roller control system)** and **Tension reel CPC (winding reel control system)**.

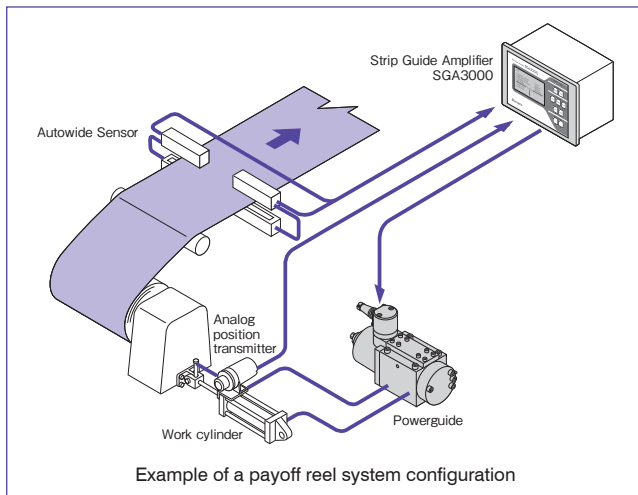
(Note) When you are planning to install EPC or CPC systems (regardless of the basic system) please carefully consider how you can reduce the "time lag" in the control system. The shorter the time lag, the better the control. There are practical constraints that need to be taken into account. For example, movement of the reel may create wrinkles in the strip. Be sure to carefully consider the physical characteristics of the strip, the operating conditions within the plant and other factors, so that you select the appropriate system.

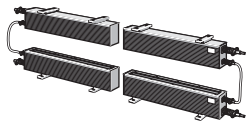
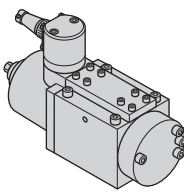
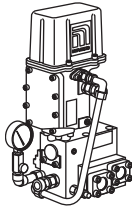
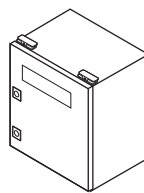
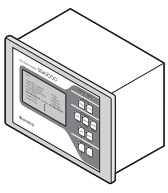
1 Payoff reel CPC (unwinding reel control system)

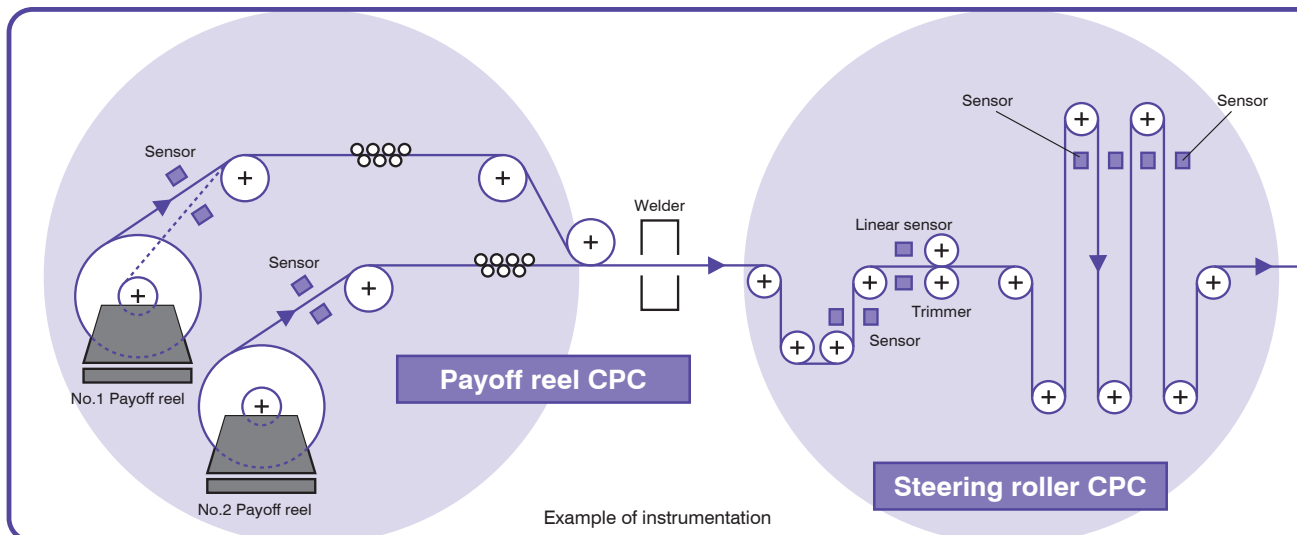
In various processing lines, when a coil is unwound into the line, it is necessary to feed the strip with its edge or center in a constant position.

As the coil is unwound, the strip center (CPC) position is controlled by moving the payoff reel. The sensor needs to be located as close to the payoff reel as possible. This enables the control system to ensure stable control. In EPC and CPC, unless the detector position and roll arrangement are correct and the strip tension is maintained at an appropriate value, the control cannot be expected to be effective. It is also necessary

to determine the correct selections for machine trestle mass, coil mass, reel movement speed and atmospheric conditions, as well as to select the correct unit.



SENSORS	 <p>Autowide sensor AWL</p>	
CONTROLS UNITS	 <p>Power Guide</p>	 <p>PILOTJET</p>
CONTROLLERS	 <p>Modular Strip Guide system controller MGC1000</p>	 <p>Strip Guide Amplifier SGA3000</p>



2 Steering roller CPC (intermediate guide roller control system)

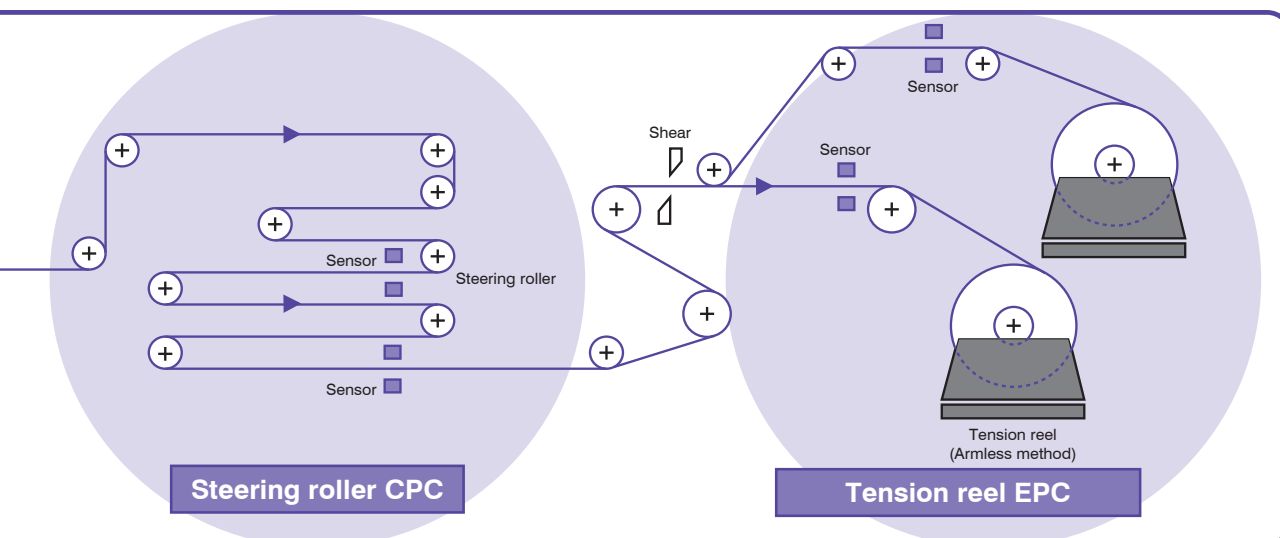
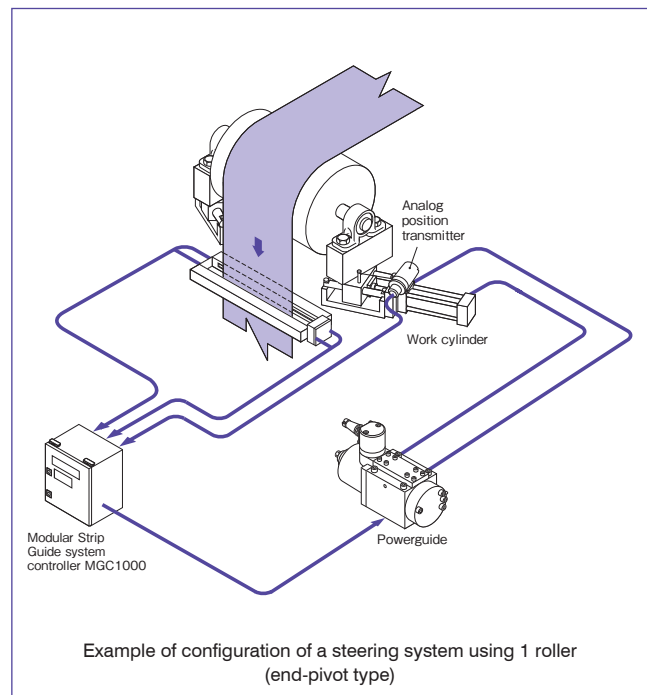
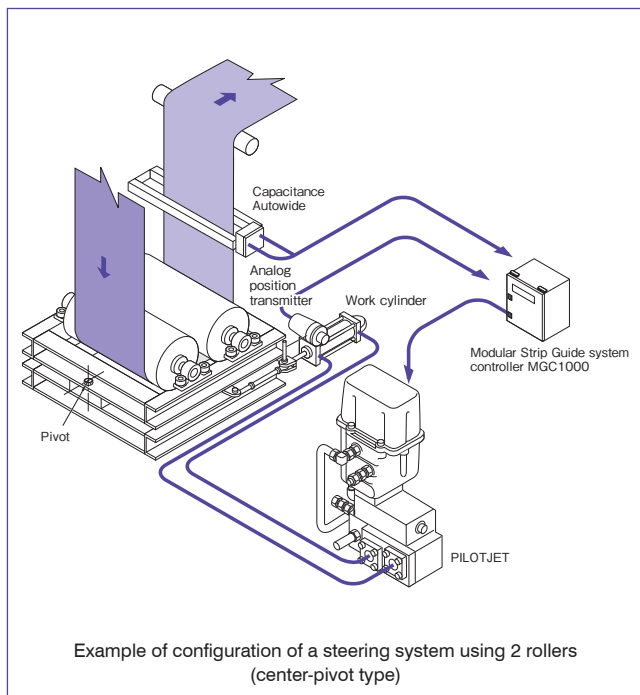
In all types of line processing, it is necessary to correct the meandering of the running strip. CPC applied by a steering roller mechanism moves the strip towards the direction of inclination of the roller and aligns the strip center with the line center. Steering methods can be classified into the following 2 categories.

1. Center pivot types

In center-pivot types, the center of rotation is the center of the planar extending surface of the strip on the side where it enters the steering roller. The steering configuration may involve 1 roller, 2 rollers or a Z-wrap. The amount of correction required is calculated by multiplying the external diameter of the roller by the tangent of the angle of deviation. This angle of correction can be between $\pm 5^\circ$. The inclination of the steering roller does not cause movement of the strip on the entry side.

2. End pivot type

This method of steering uses a single roller. The sensor is mounted as close to the steering roller as possible. The inclination of the roller is used to correct the meandering of the strip. A long span is needed on the side of the strip entering the roller, and the position of the strip on this side also changes over time.

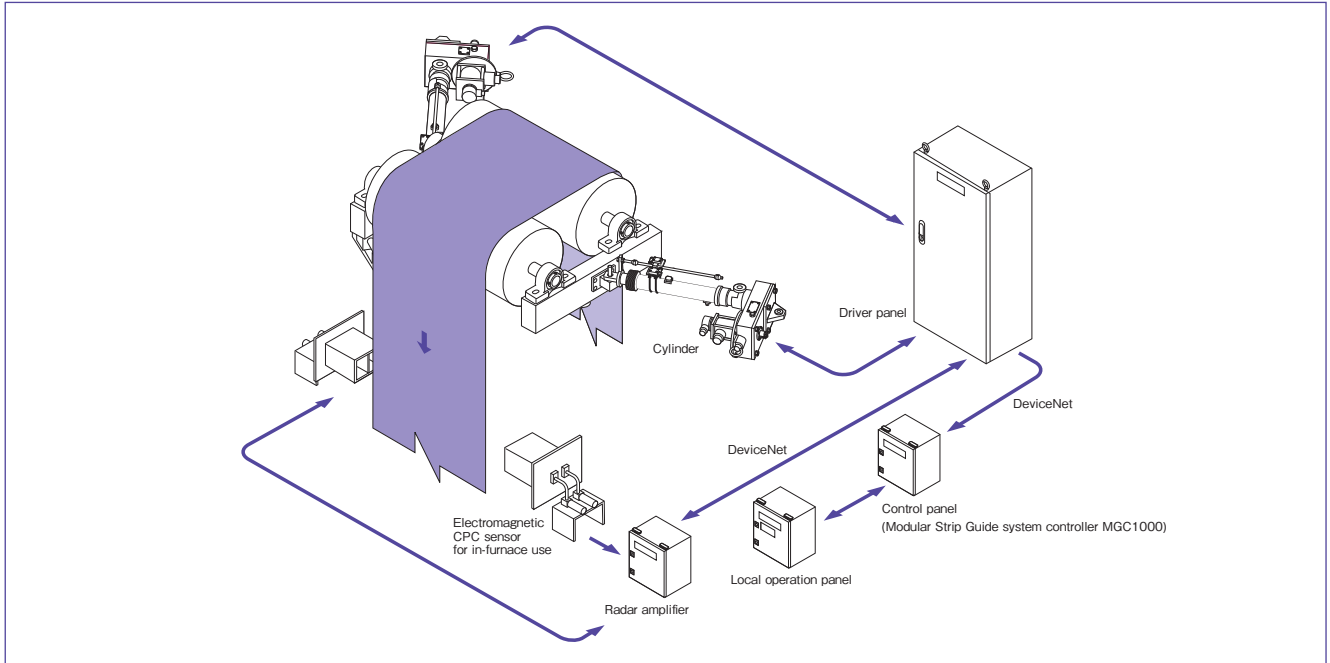


OUTLINE OF EPC[®]/CPC

The 3 basic methods of EPC[®]/CPC

■ Example of in-furnace steering CPC system configuration

Compensation for strip meandering in high-temperature environments such as the inside of furnaces uses a special sensor that can handle this heat (an electromagnetic in-furnace CPC sensor).

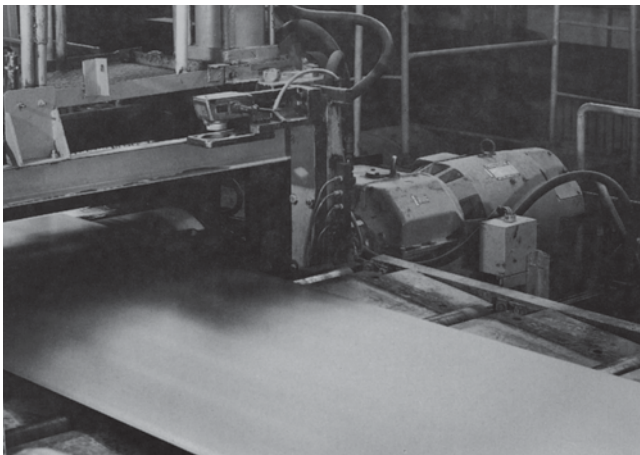


SENSORS					
	Capacitance Autowide	Autowide sensor AWL	Linear sensor	Electromagnetic Guidance NS-CPC sensor	Electromagnetic CPC sensor for in-furnace use
CONTROLLUNITS					
	Power Guide		PILOTJET		
CONTROLLERS					
	Modular Strip Guide system controller MGC1000		Strip Guide Amplifier SGA3000		

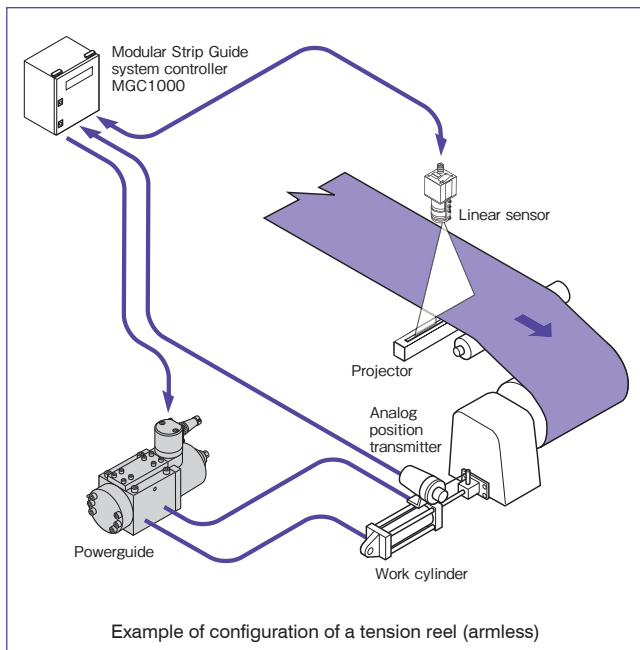
3 Tension reel EPC

In various processing lines, when the coil is wound up at the end of the line, EPC is applied by moving the tension reel while winding the strip up, to align the coil edge to a constant position during winding. The sensor is located as close to the deflector roller as possible.

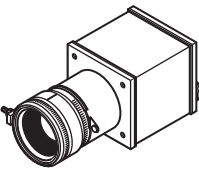

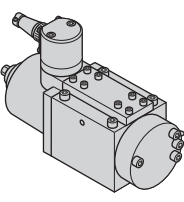
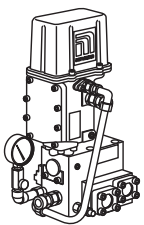
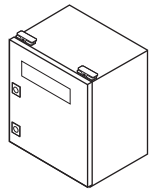
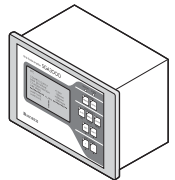
In EPC, it is necessary to determine the sensor position, roller arrangement, and strip tension. In addition, the correct machine trestle mass, coil mass, cylinder speed and ambient conditions must be considered when the machine is selected. In addition, the correct machine trestle mass, coil mass, cylinder speed and ambient conditions must be considered when the machine is selected.



Tension reel EPC (using a photohead)



Example of configuration of a tension reel (armless)

SENSORS		
	Linear sensor	Photohead
CONTROLLERS		
	Power Guide	PILOTJET
CONTROLLERS		
	Modular Strip Guide system controller MGC1000	Strip Guide Amplifier SGA3000

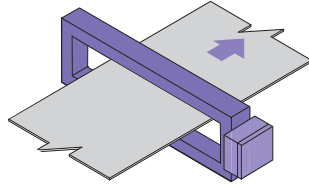
OUTLINE OF EPC[®]/CPC

EPC[®]/CPC system devices

SENSORS

1. Capacitance Autowide AWC

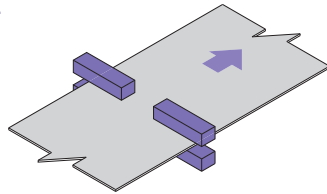
This is a sensor for CPC. It has a simple, maintenance-free structure, and utilizes the changes in capacitance in the space between the strip and the electrodes.



Capacitance Autowide AWC

2. Autowide sensor AWL

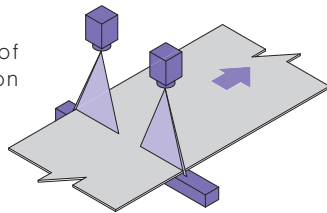
This is a sensor for CPC. Even if the strip width changes (for example, at strip seams) the system can control the strip center position.



Autowide sensor AWL

3. Linear sensor LSE

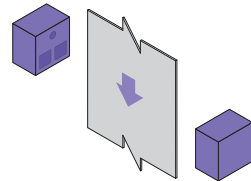
This sensor is capable of very precise strip position measurement.



Linear sensor LSE4096

4. Electromagnetic CPC sensor for in-furnace use

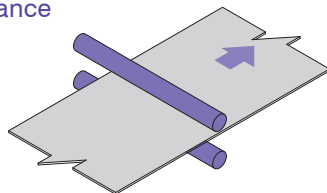
Radiates radio waves from its antennae then calculates the position of the strip based on the time taken for the waves reflected by the edge of the strip to return.



Electromagnetic CPC sensor

5. Electromagnetic guidance NS-CPC sensor

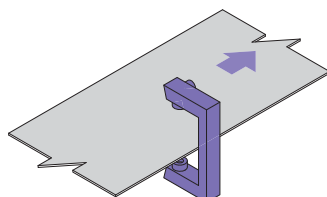
This CPC sensor can be used in atmospheres that contain steam or corrosive gases.



Electromagnetic guidance NS-CPC sensor

6. Photohead PH

The Photohead is a photoelectric EPC sensor.



Photohead PH

CONTROLLERS

**1. Modular Strip Guide system controller
MGC1000**

An EPC/CPC controller that can be connected by communications cables to the other devices in the system to enable a flexible system configuration.



**2. Strip Guide Amplifier
SGA3000**

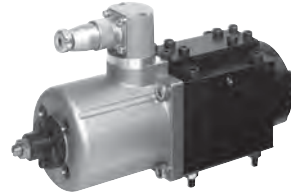
The Strip Guide Amplifier is a high-performance, microprocessor-equipped EPC/CPC amplifier. It offers advanced EPC/CPC controls such as stagger winding and cascading control which are unavailable from conventional analog amplifiers.



CONTROL UNITS

1. Power Guide PG

This is a spool-type, high-response, high-output servo valve.



2. PILOTJET PJ

This is a high-response, high-output hydraulic jet pipe-type dry servo valve.



POSITION TRANSMITTERS

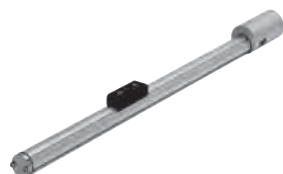
**1. Analog position transmitter
FW**

The FW is a wire position sensor with a built-in potentiometer that converts changes in the position of linear motion into resistance values. Output: 0 to 2 k Ω



**2. High-precision position transmitter
GYKM-LT**

The GYKM-LT is a high-precision position sensor that uses a magnetostrictive wire and slide magnet to achieve a linearity of less than 0.025% and a resolution of less than 0.01%. Output: 4 to 20mA



02

SENSORS

01 OUTLINE OF EPC®/CPC

02 SENSORS

03 CONTROLLERS

04 CONTROL UNITS

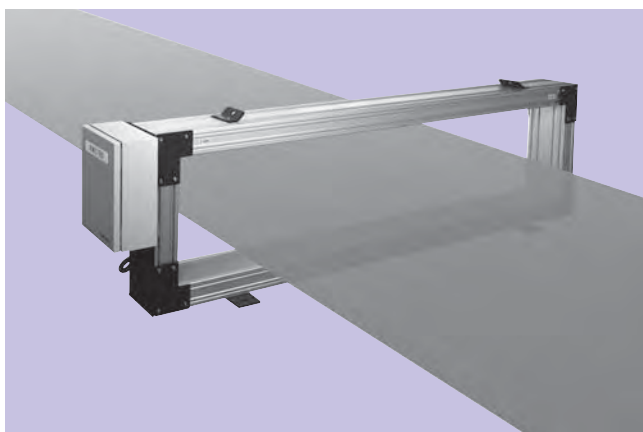
05 POSITION TRANSMITTERS

SENSORS

CAPACITANCE AUTOWIDE MODEL AWC SERIES

Models: AWC640/AWC790/AWC940/AWC1090

Continuous maintenance-free operation!



The Capacitance Autowide Sensor AWC is a sensor that provides continuous, contactless detection of the center position of a strip moving on a line, for use in Center Position Control (CPC).

Like our previous sensors, it is maintenance free and can be used continuously with no decline in sensitivity caused by wear over time, giving stable, long-term service. The sensor is easier to use, and no longer requires on-site calibration.

Features

- **No on-site calibration required**
- **Maintenance free**
In contrast to optical sensors, capacitance sensors require no maintenance at all.
- **Hardly affected by light**
Hardly affected by external light at all
- **The control unit is hardly affected at all by dust or scale, even under harsh environments.**

Operating principles

The Capacitance Autowide AWC series generates lines of electric force between electrodes situated on each side of the strip, and calculates the position of the strip from the change in the number of lines of force (see Figure 1). The sensor has two sets of transmission and reception electrodes that are installed opposite each other. The transmitter electrode generates electric force lines and the receiver receives them. When a strip enters the space between the transmission and reception electrodes, it blocks some of the lines of force from the transmission electrodes, causing a variation in the number of force lines received by the reception electrodes (see Figure 2). Therefore, by calculating the amount of change in the lines of electric force, the position of the strip can be accurately detected.

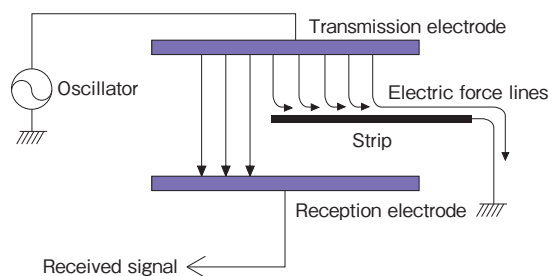


Figure 1. Operating principles

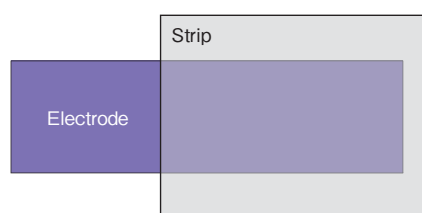


Figure 2. Electrodes

CAPACITANCE AUTOWIDE MODEL AWC SERIES

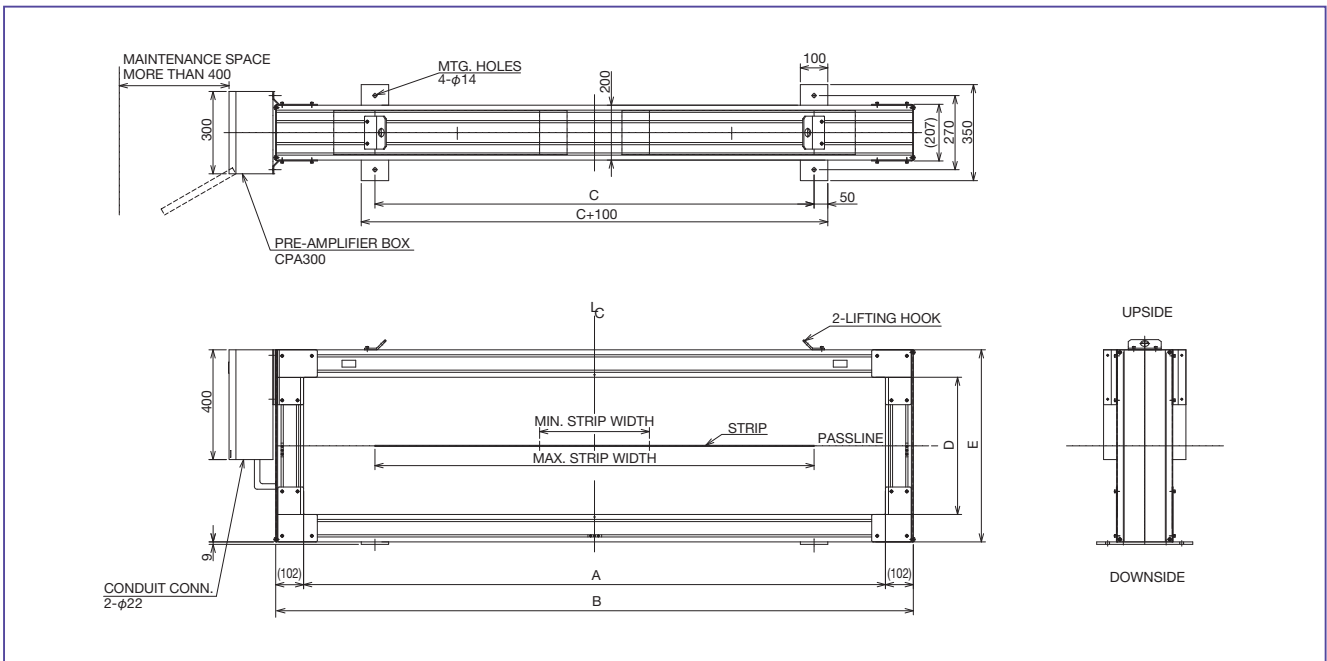
Specifications

	AWC***.*.*-N (Without pre-amp)	AWC***.*.*-P (With pre-amp)	L (Link type)
Power supply	AC85 V - AC264 V, 50/60 Hz		DC24 V 0.7 A
Sensor accuracy	Within ±5 mm		
Frequency response	5 Hz		
Ambient temperature	0°C to 60°C	0°C to 50°C	
Deviation output	±200 mm / ±5 VDC		±200 mm
Alarm outputs	"Healthy," "No strip," "Excess deviation" or "Roll out"		

* : When meandering is 0

Model No.	Strip width		External dimensions (mm)				Approx. mass (kg)
	Min width*	Max width*	A	B	C	D	
AWC640-3	400	1300	1820	2020	1300	300	63
AWC640-4	400	1300	1820	2020	1300	400	65
AWC640-5	400	1300	1820	2020	1300	500	66
AWC790-3	400	1600	2120	2320	1600	300	67
AWC790-4	400	1600	2120	2320	1600	400	69
AWC790-5	400	1600	2120	2320	1600	500	70
AWC940-3	400	1900	2420	2620	1900	300	72
AWC940-4	400	1900	2420	2620	1900	400	73
AWC940-5	400	1900	2420	2620	1900	500	75
AWC1090-3	400	2200	2720	2920	2200	300	76
AWC1090-4	400	2200	2720	2920	2200	400	77
AWC1090-5	400	2200	2720	2920	2200	500	79

External dimensions



SENSORS

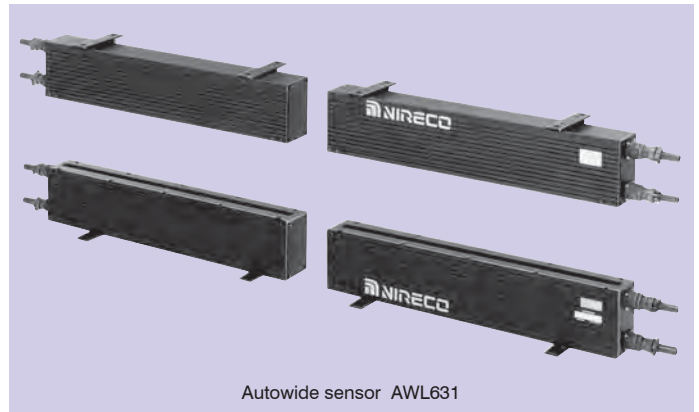
AUTOWIDE SENSOR AWL SERIES

Models: AWL631/AWL781/AWL931/AWL1081

LED light sources mean a long service life!

The Autowide Sensor AWL series of sensors are used mainly for CPC (Center Position Control) to detect the center line of a strip (web). These can continuously maintain the center line in a constant position without the need to change the position of the sensor each time the width of the strip changes (large changes such as seams etc.).

The AWL series are a new generation of sensors which use high-frequency LEDs in the projector, and SPDs (silicon photo diodes) in the detector.



Autowide sensor AWL631

Features

- The LED light source ensures a longer service life.
- The SPD in the detecting element ensures a higher response than conventional sensors.
- The light source is lit at a high frequency and is synchronized. There is almost no effect from peripheral light (less than 1/50, compared with fluorescent lamp Autowide sensors).
- The sensor gap can be set as desired.

Combinations of Autowide (AWL) and amplifier

AWL	—	CPC Amplifier SA600
	—	Strip Guide Amplifier SGA3000
	—	Modular Controller MGC1000

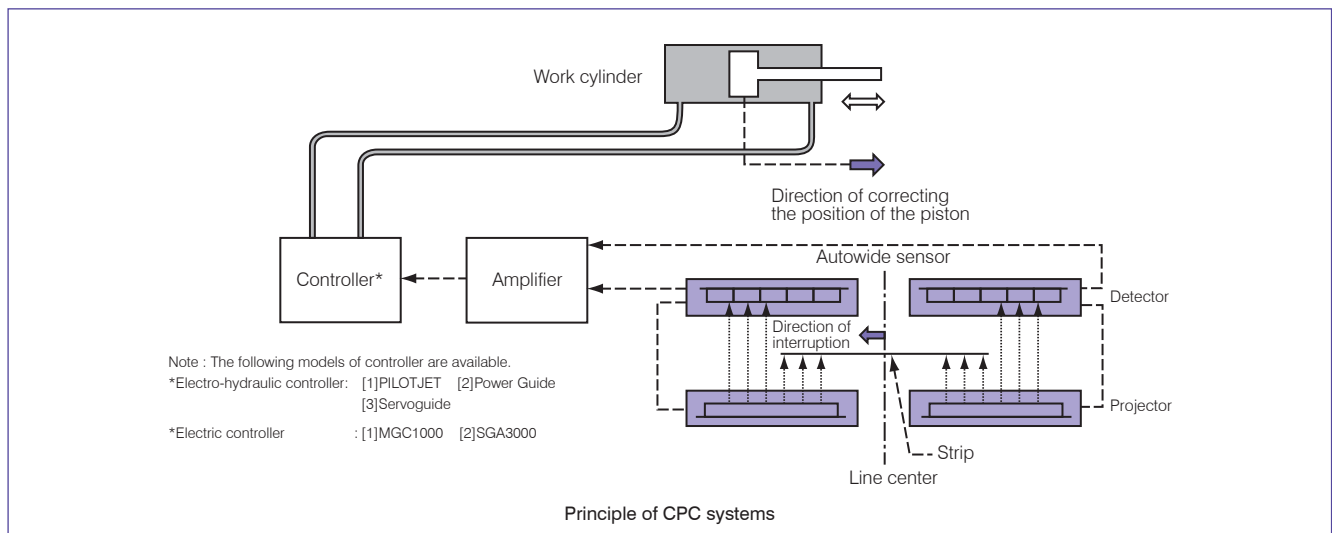
AUTOWIDE SENSOR AWL SERIES

Operating principle

The operating principle is illustrated below. The right and left detectors detect the deviation of the strip edges from the center line, and send signals the amplifier. The amplifier amplifies the difference between the right and left signals and sends the signal to the hydraulic controller or electric controller to perform CPC.

When a strip travels with its center coincident to the center

of the line, the signal from the amplifier is zero. In this state, the work cylinder is at its center position. When a strip deviates either to the right or to the left, the positive or negative signal (which is determined by the direction for correction) is transmitted to the controller, and the cylinder moves in the appropriate direction to correct the displacement of the strip.



Specifications

Model	AWL631	AWL781	AWL931	AWL1081
Effective detecting length (mm)	450	600	750	900
Strip width (mm)	265 (305) or more	315 (355) of more		
Power consumption (VA)	28×2 = 56	30×2 = 60	32×2 = 64	34×2 = 68
Mass (1set) (kg)	(5.2+5.8)×2 = 22	(6.8+7.2)×2 = 28	(9.1+9.5)×2 = 37	(9.1+9.5)×2 = 37
Air purge rate* m ³ /min	2	3	4	4
Sensor gap (mm)	Type T : 300 to 1200 mm ; Type M : 1200 to 3000 mm			
Detecting element	SPD (Silicon Photo Diode)			
Light source	LED			
Frequency response	15 Hz			
Resolution	0.2 mm			
Linearity	±1.5% of full scale (effective detection length)			
Effect of peripheral light	Almost none			
Power supply	100/110 VAC ±10% 50/60 Hz			
Ambient temperature	0 to +50 °C			
Painted color	Black			

Note: 1. The values in parentheses are for model equipped with an air-purge mechanism.

2. *: When an air-purge mechanism is provided, an air source is required. The air purge flow rates listed correspond to an air pressure of 50 kPa.

3. The weights in parentheses are shown in the order of projector and detector.

4. Use type M if the path line fluctuates greatly.

SENSORS

AUTOWIDE SENSOR AWL SERIES

Model codes

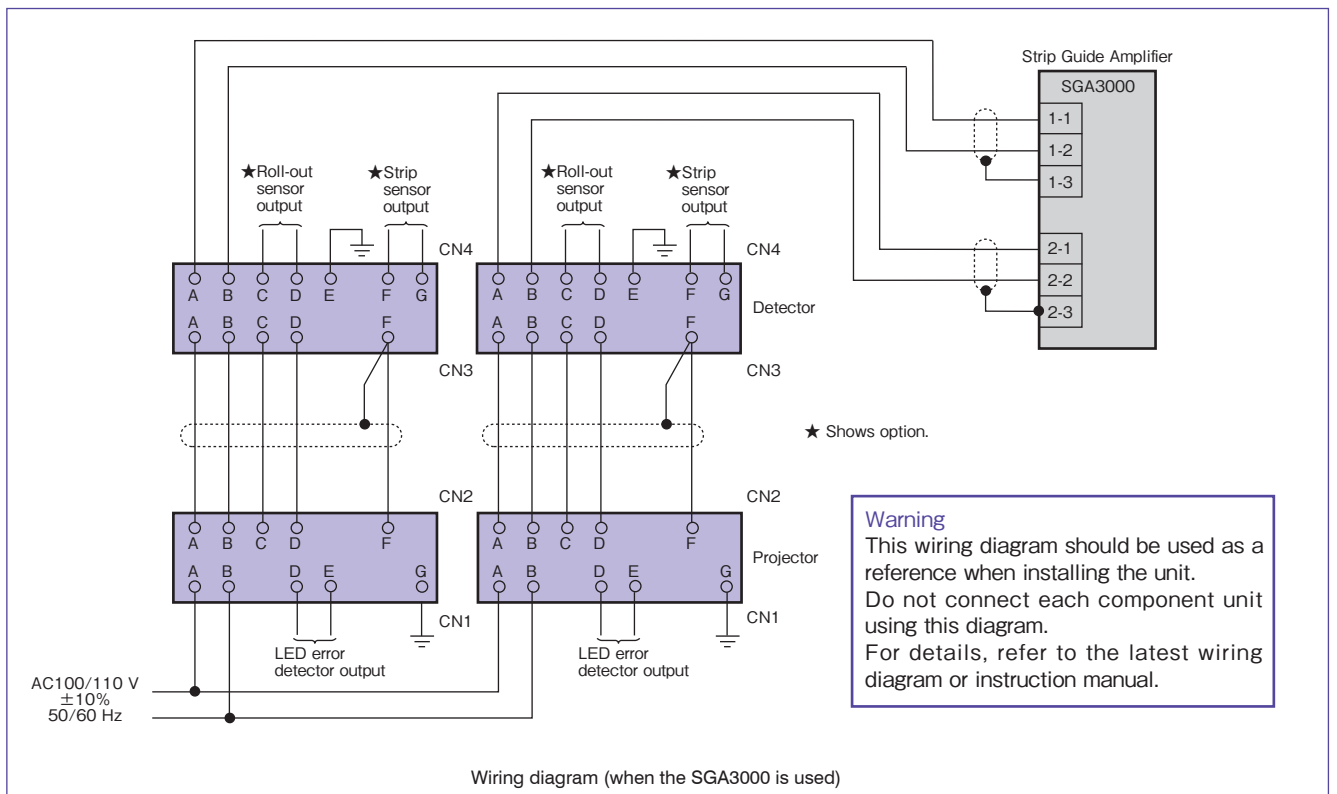
AWL			AWLS		
631	450 mm	Effective detecting length	451N	150 to 450 mm	Effective detecting length
781	600 mm		751N	150 to 750 mm	
931	750 mm		T	300 to 1200 mm	Sensor gap
1081	900 mm		M	1200 to 3000 mm	
T	300 to 1200 mm	Sensor gap	N	Not provided	Air purge mechanism
M	1200 to 3000 mm				
N	Not provided	Air purge mechanism	AA	Provided (Detector and projector)	
AA	Provided (Detector and projector)		AD	Provided (Detector)	
AD	Provided (Detector)		AP	Provided (Projector)	
AP	Provided (Projector)				
I			I		
N	Not provided	Roll-out sensor	N	Not provided	Roll-out sensor
R	Provided				
N	Not provided	Strip sensor	R	Provided	Roll-out sensor
S	Provided				
C	With connector	Connector	C	With connector	Connector
Y			Y		
Y			Y		

Y "Y" is affixed for special specifications.

Y "Y" is affixed for special specifications.

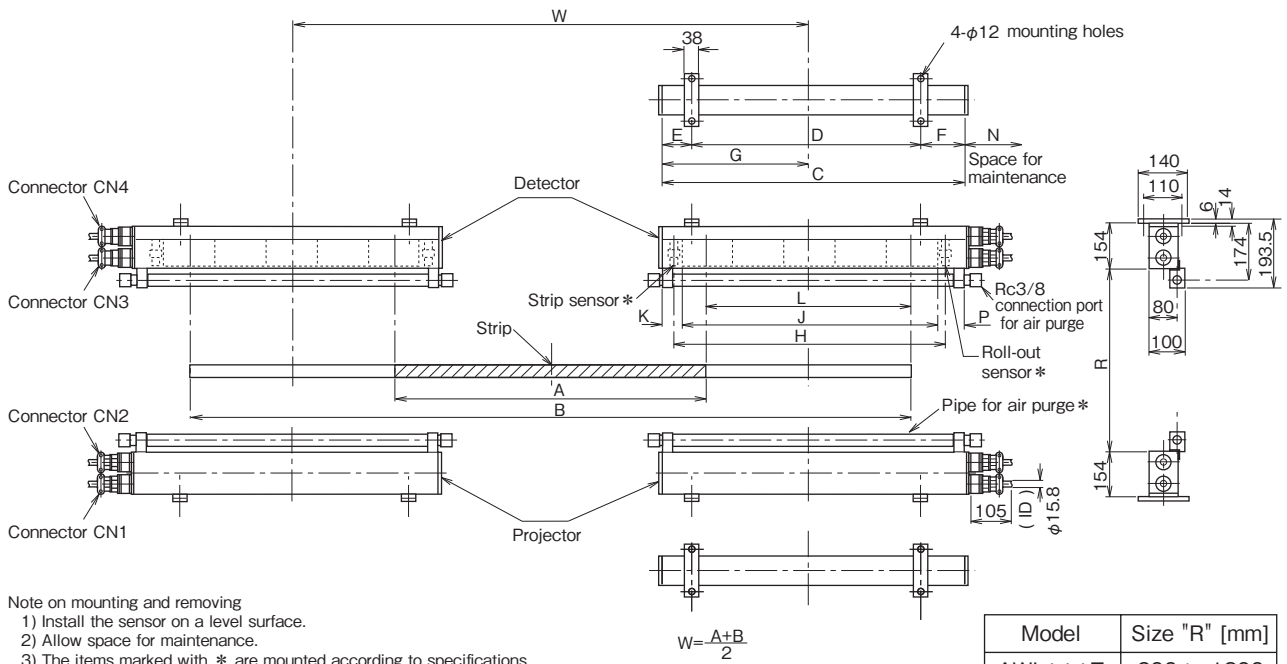
For details about our AWLS (single light source type), please contact our sales representative or service agent.

Wiring diagram



AUTOWIDE SENSOR AWL SERIES

External dimensions



AWL

Model	Size "R" [mm]
AWL***T	300 to 1200
AWL***M	1200 to 3000

Table of dimensions [mm]

Model	Effective detecting length L	Projecting length	Min. strip width A		Max. strip width B	C	D	E	F	G	H	J	K	N	P
			Air purge												
			None	Provided											
AWL631	450	530	265	305	A+900	740	500	100	140	350	655	621	39.5	800	79.5
AWL781	600	730	315	355	A+1200	940	700	100	140	450	809	775	62.5	1000	102.5
AWL931	750	1098	315	355	A+1500	1310	1000	135	175	527	962	928	63	1350	319
AWL1081	900	1098	315	355	A+1800	1310	1000	135	175	603	1115	1081	63	1350	166

SENSORS

LINEAR SENSOR

Model: LSE4096

Strip position is detected with a high degree of accuracy Uses a one-dimensional image sensor

Examples of applications

- CPC before a trimmer
- Tension reel EPC

Features

■ Simple operation

- Operates on a single power line (DC+15 V).
- Simply connect the power supply and the sensor outputs a voltage (0 to 5 V) proportional to the measurement count (the number of illuminated pixels).
- The measurement count (the number of illuminated pixels) is displayed on an LED counter, so it is easy to check the operational status.

■ Wide scanning time range

The scanning time setting can be changed within the range of 2 msec to 20 msec.

■ Compact

The volume of the device is approximately one third that of our previous models.

Note: Not including the lens tube.

■ Environmentally resistant

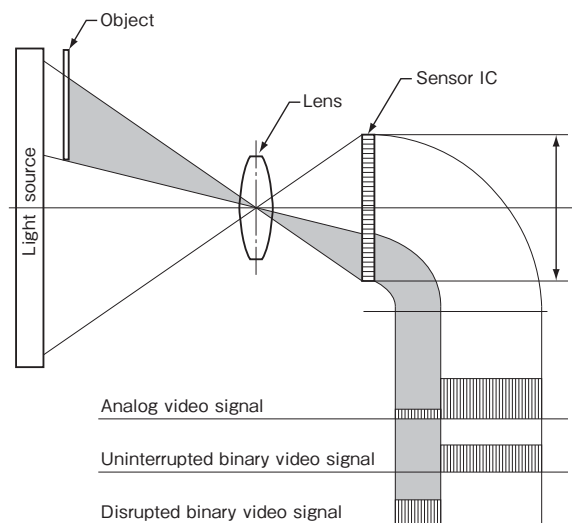
Operates stably in an ambient temperature range of 0 to 50°C.

Operating principle

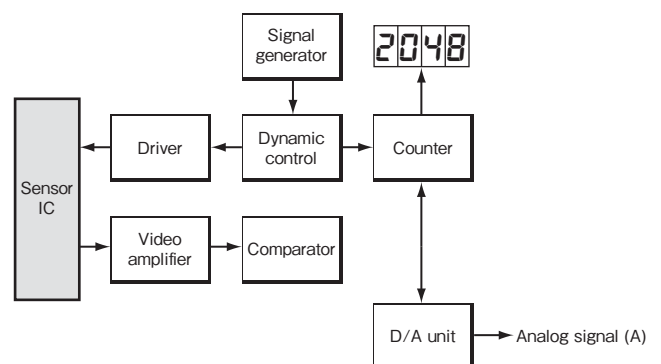
The receptor is a CCD linear image sensor with 4,096 pixels, i.e., a fixed imaging element with 4,096 photo cells arrayed in rows at intervals of 7 μm .

Light that is partially shaded by the subject passes through the lens to form an image on the photo cells. Pulse signals are output with varied levels proportional to the amount of light falling on each cell. This video signal is output as a time series of pulse signals.

Based on this video signal, the number of pulse signals exceeding a certain level is measured, and an analog voltage (0 to 5 V) proportional to that measurement (equivalent to the bright portion that receives light) is output.



Optical signal and signal waveform of linear sensor



Block wiring diagram of linear sensor

LINEAR SENSOR LSE4096

Specifications

Receptor	CCD linear image sensor
Effective pixels	4,096 pixels
Scan time	2 - 20 msec/line
Data rate	3 MHz (2 msec/line -) 750 kHz (7 msec/line -)

Output signals	Analog voltage DC0 - 5 V Load resistance at least 2 kΩ
Power supply	DC +15 V ±10%, 0.3 A
Display unit	Decimal, 4-digit, 7-segment LED display
Lens mounting	Nikon F mounting
Operating ambient temperature range	0 to 50°C

Table of model codes

Linear sensor

LSE	Model	4096	4,096 pixels (CCD)	No. of elements	Body
-	Lens	01	f = 35 mm F2	Wide-angle lens	
		03	f = 50 mm F1.8 (Standard)	Standard lens	
		04			
		05	f = 85 mm F1.8	Telephoto lens	
		06	f = 105 mm F2.8		
		10	f = 55 mm F2.8 macro		
	N	None			
	-	Close-up ring	1	12 mm	
			2	20 mm	
			3	36 mm	
4			Special close-up ring		
-	Mounting base	N	None		
		1	Provided		
		2	Provided		
-	Conversion cable	N	None		
		1	Provided		
/	Special specification	Y	"Y" is affixed for special specifications.		

Projector

FL	Model	030A	AC 100 V 30 W	Power capacity
		032A	AC 100 V 32 W	
		040A	AC 100 V 40 W	
		110A	AC 100 V 110 W	Air purge mechanism
		N	None	
	A	Provided		
-	Conversion cable	5	50 Hz	
		6	60 Hz	
		N	None	
-	Connector	C	Provided	
/	Special specification	Y	"Y" is affixed for special specifications.	

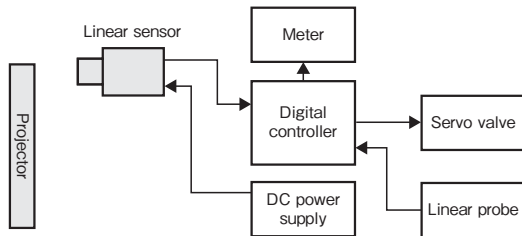
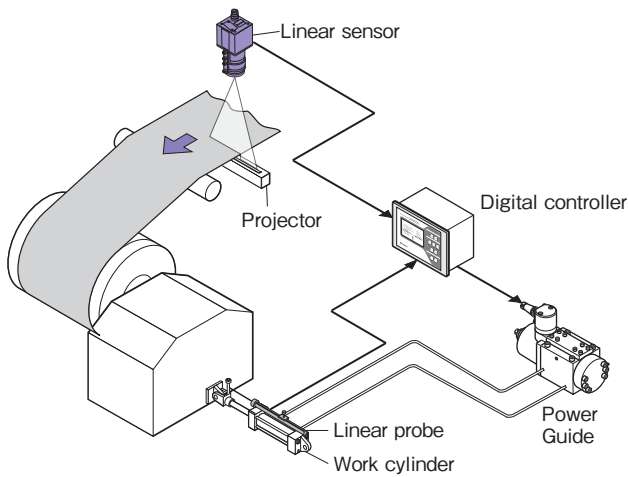
FLR	Model	030A	AC 100 V 30 W Equivalent LED lamp	LED lamp
		032A	AC 100 V 32 W Equivalent LED lamp	
		040A	AC 100 V 34 W Equivalent LED lamp	
		N	None	Air purge mechanism
		A	Provided	
-	Power supply frequency	5	50 Hz	
		6	60 Hz	
		N	None	
-	Connector	C	Provided	
/	Special specification	Y	"Y" is affixed for special specifications.	

SENSORS

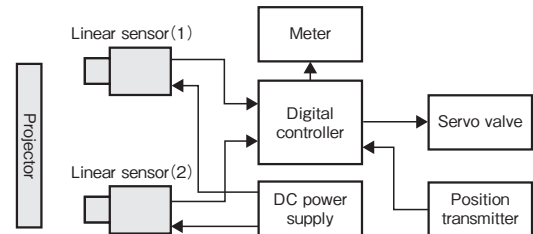
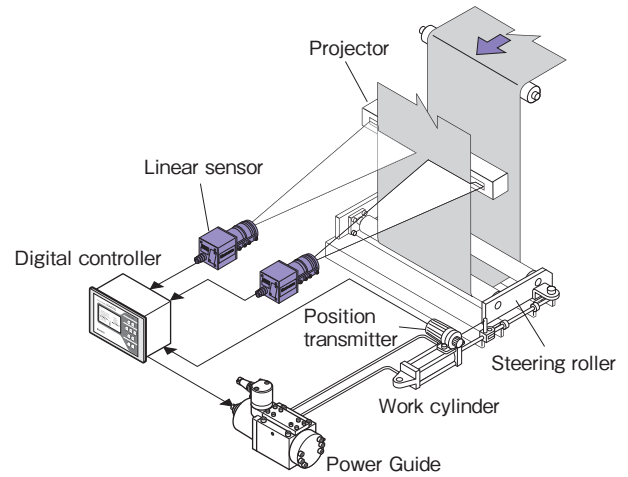
LINEAR SENSOR LSE4096

System configuration

EPC (Edge Position Control) system
Example of tension reel EPC (armless)



CPC (Center Position Control) system
Example of CPC before a trimmer



Wiring connections

Pin No.	Signal
1	DC +15 V $\pm 10\%$ 0.3 A Power supply
2	COM-P Ground for power supply
3	OUT (0 to 5 V) Voltage signal output
4	COM Signal ground

Note : The power supply ground (COM-P) and the signal ground (COM) wires are insulated. Connect the specific ground to each line.

LINEAR SENSOR LSE4096

External dimensions

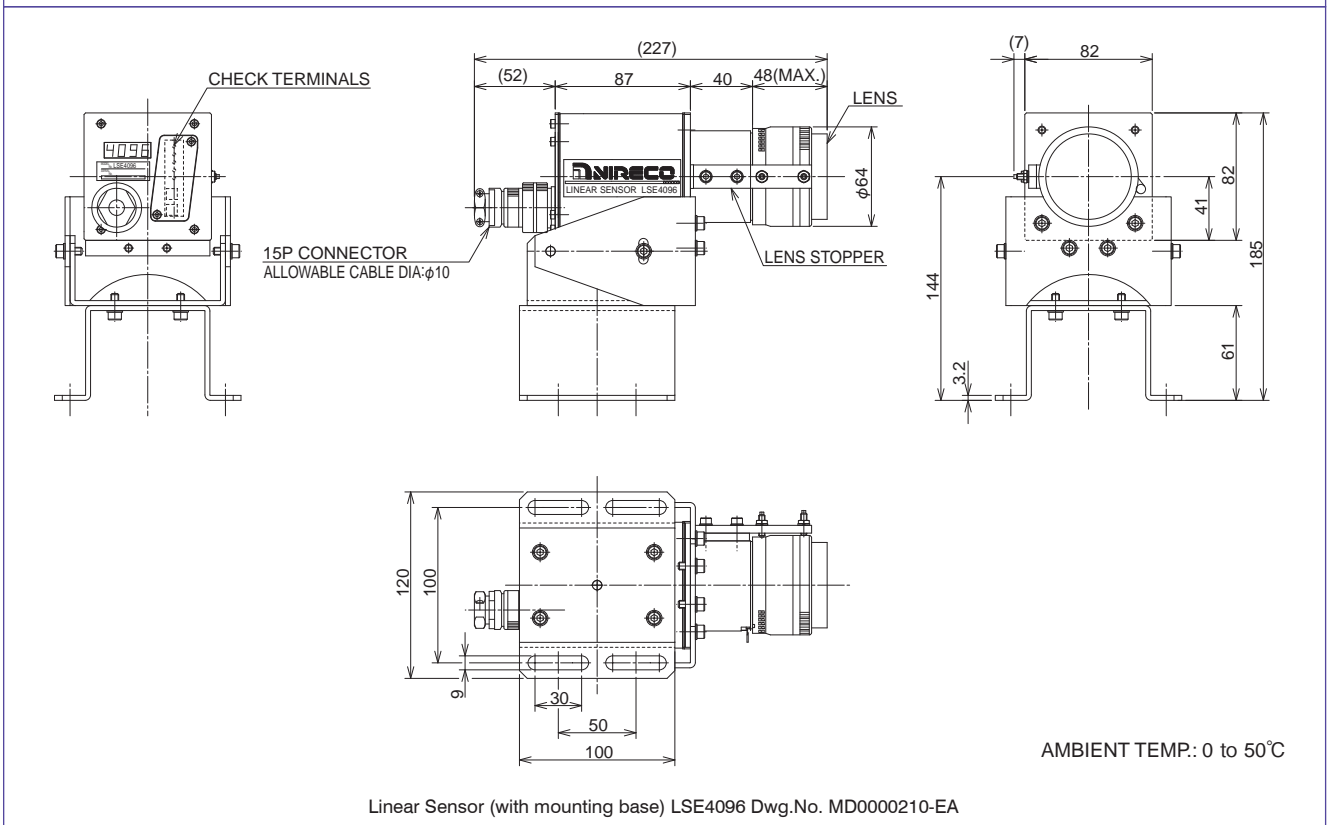
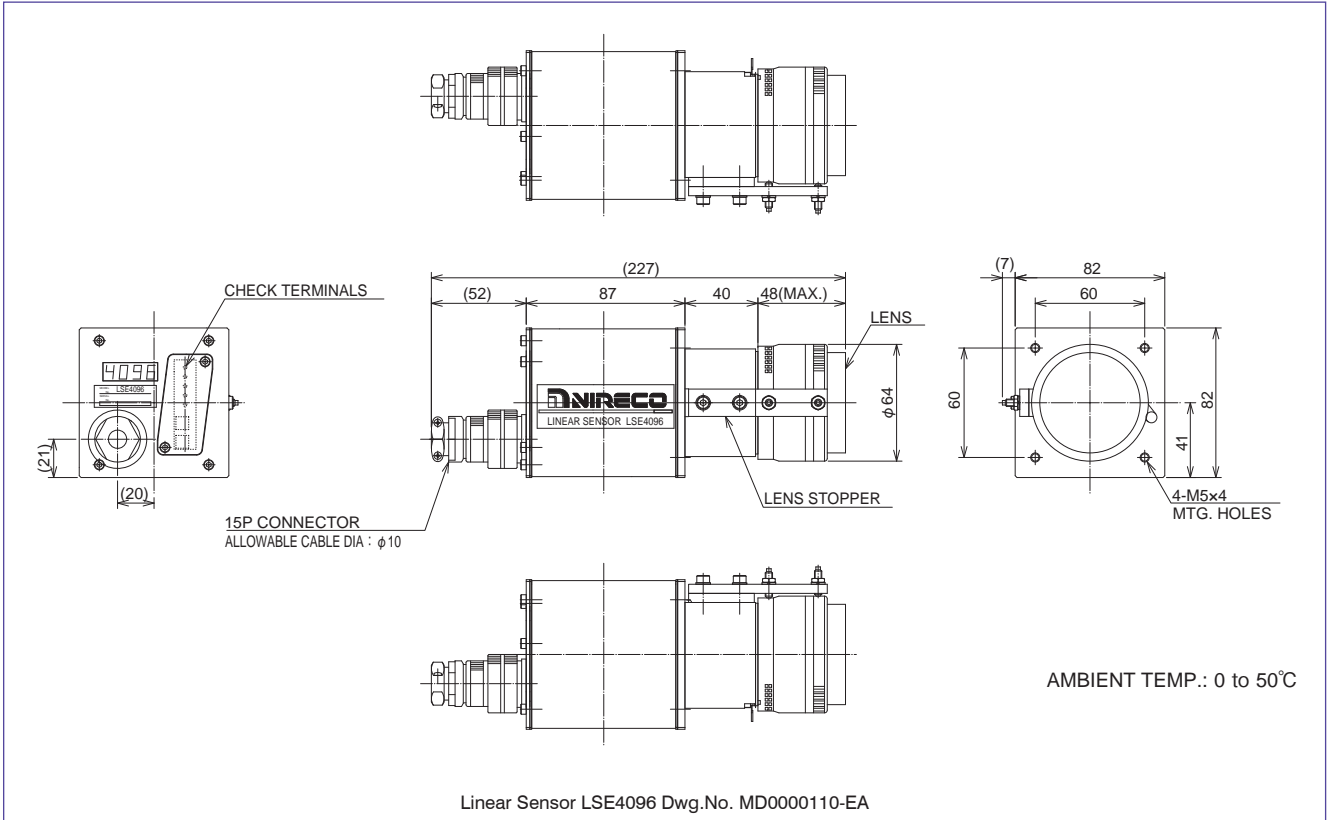
01 OUTLINE OF EPC®/CPC

02 SENSORS

03 CONTROLLERS

04 CONTROL UNITS

05 POSITION TRANSMITTERS



SENSORS

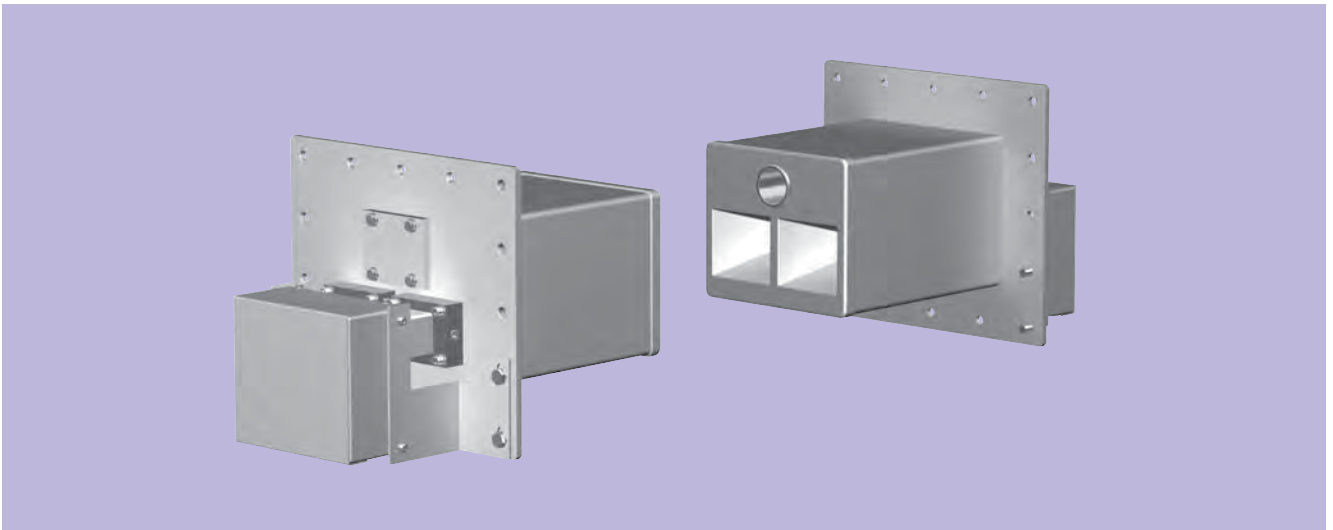
Electromagnetic CPC sensor for in-furnace use

Model: EMW

New concept: detection by radar

The furnace can operate safely because there is no need for sensors or other structures to be inside it.

Electromagnetic CPC sensors are a new kind of sensor. They emit electromagnetic (radar) waves from antennae embedded in the furnace wall. They measure the strip position based on the transmission time taken for the waves reflected from the strip edges to return to the antennae.



Features

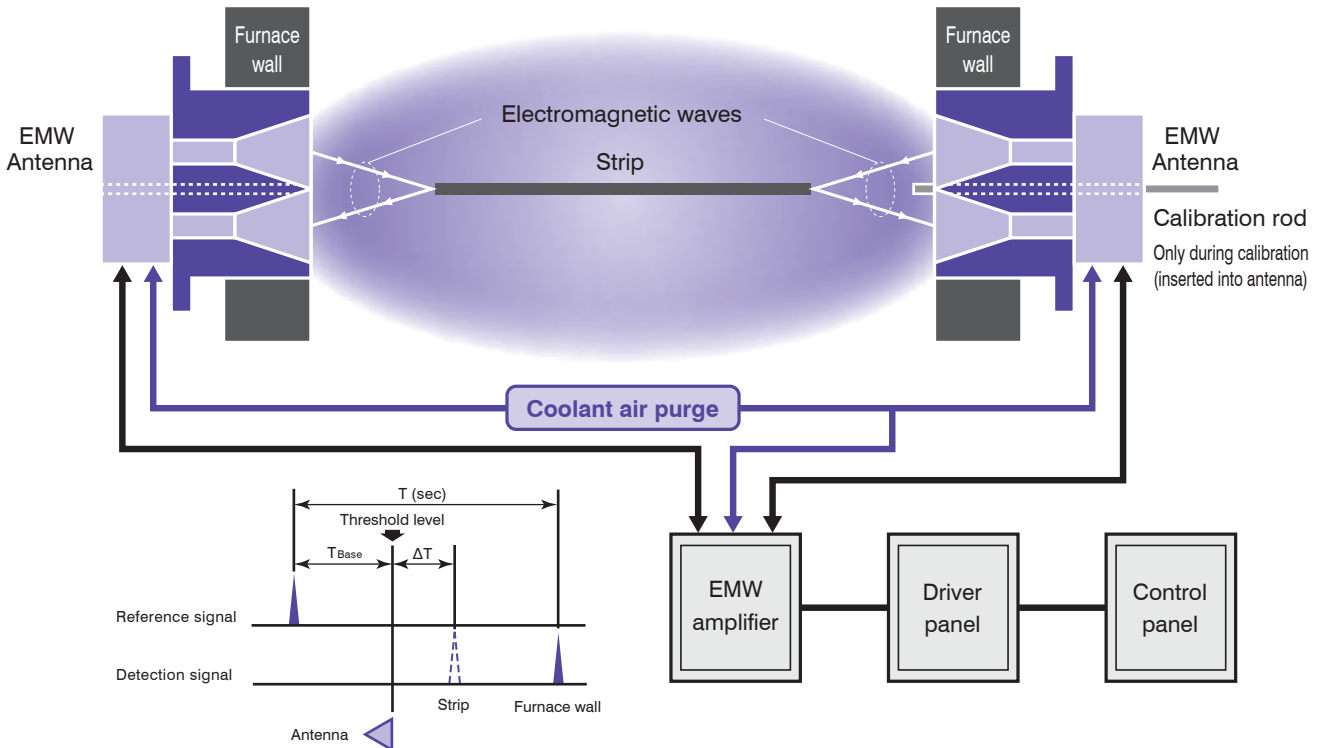
- The system operates safely because there is no interference with the strip and equipment inside the furnace.
- No maintenance is required.
- Dirt (dust and fumes) inside the furnace has no effect.
- There are no consumable parts.
- The calibration rod makes adjustments simple.
- The sensors are compact and light, for easy installation in confined spaces.
- Installation costs are low.



Electromagnetic CPC Sensor for In-furnace Use

Detection operating principles and equipment configuration

Electromagnetic waves from the antennae are reflected from the strip edges and the transmission time taken for the waves to return is used to measure the strip position. Even if dirt or other contaminants reduce the reception sensitivity, the transmission speed of the waves does not change, so measurements are unaffected.



L: Distance to strip edge
 C: wave speed (speed of light)
 T: Electromagnetic wave transmission time
 $L = C \times T$

Detection operating principles

Specifications

Carrier frequency	10 GHz
Measurement range	40 mm to 1200 mm
Linearity	±1 mm or less
Reproducibility	±1 mm or less
Resolution	0.2 mm
Minimum strip thickness	12 μm
EMW antennae	Pyramidal horn antennae
	Installation aperture 280 mm × 240 mm
	Cooling Connector AIR Q = 50 ℓ /min
	Ambient operating temperature 1,000°C (max) * For furnace temperatures of 1,000°C or greater, please talk to us first.

EMW amplifier	Wall mounted
	Power supply DC24 V
	Cooling air 40°C → 10 ℓ /min 50°C → 100 ℓ /min 60°C → 170 ℓ /min 70°C → 270 ℓ /min (max35°C)
	Ambient operating temperature 0°C - 70°C
Microwave cable	Special type L = 30 m (max)
EMW amplifier output	DeviceNet
Warning outputs	Trigger error
	Level error
	Roll out

SENSORS

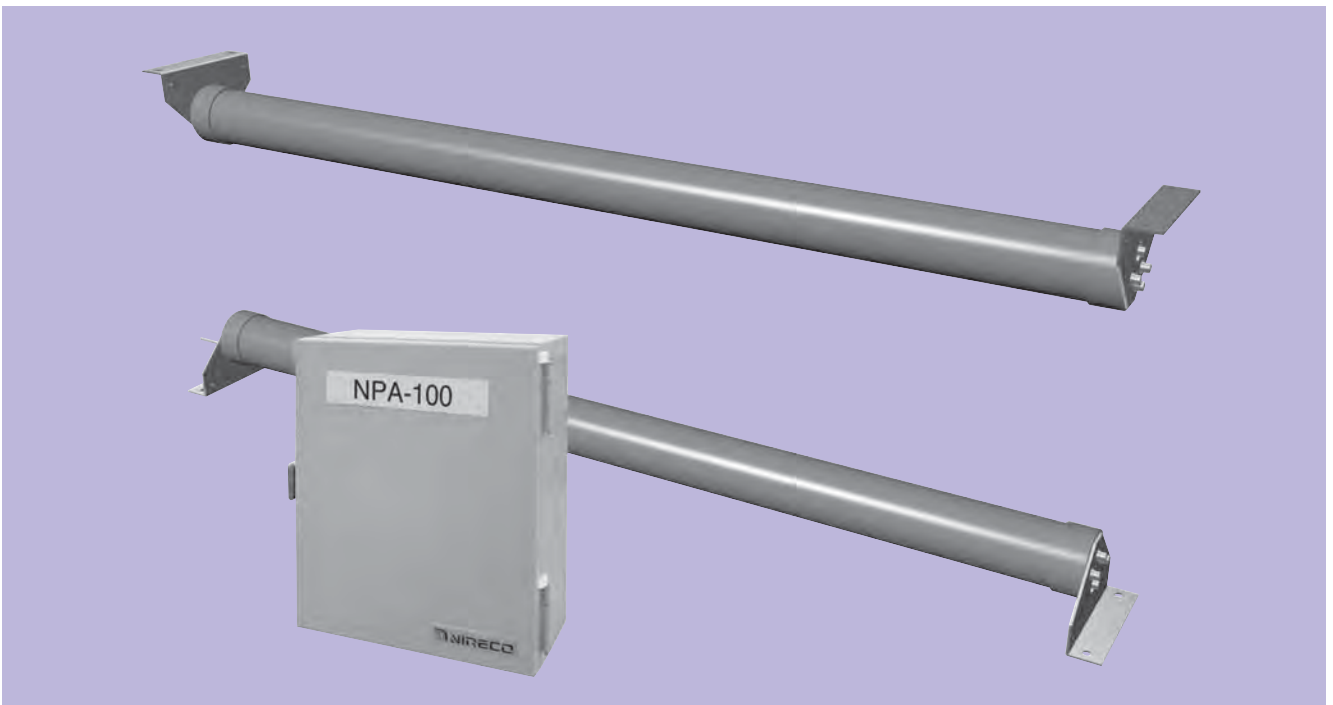
Electromagnetic Induction Sensor NS-CPC

Models: NS-130A/NS-160A/NS-190A/NS-220A

A maintenance-free sensor that can be used long-term in harsh environments

The NS-CPC sensor continuously detects the strip (steel sheet or metal plate) edge positions using electromagnetic induction and outputs any discrepancy in the strip center position as a deviation signal.

Because it uses electromagnetic induction, it is not affected by dust, steam, oil or other materials and its simple and robust structure allows it to be used reliably over long periods.



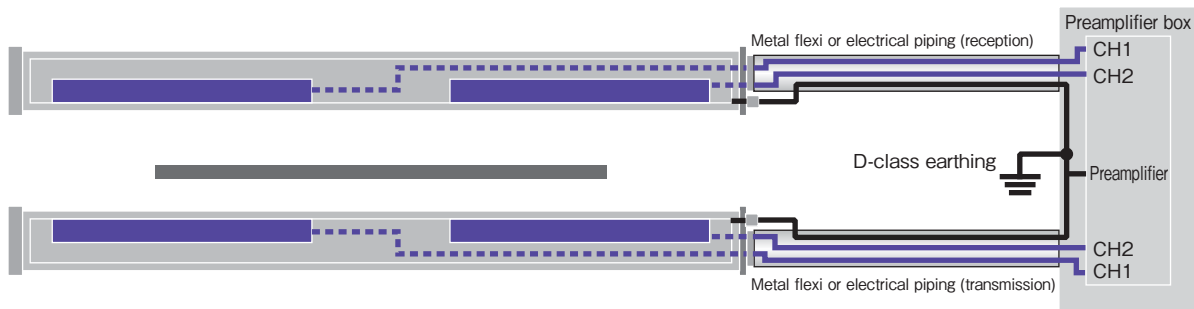
Features

- **Electromagnetic Induction: the sensor does not use light.**
- **Not affected by adhesion of dust, steam, oil or other materials.**
- **Simple design and durable structure.**
- **There are no consumable parts.**
- **No changes in detection performance with time.**
- **Truly maintenance free.**

Electromagnetic Induction Sensor NS-CPC

Signal circuit and cable specifications

The NS-CPC sensor consists of a preamplifier and sensor (including 2 transmission coils, 2 reception coils and a specialized cable). The sensor straddles and is positioned facing the strip. The high-frequency magnetic field emitted from the transmission coils generates induced voltage in the receiving coils. This induced voltage changes with the strip position so the variances in the voltage at the receiving coils can be used to calculate the strip center position.



Specifications

Sensor

Sensor model and detection range	NS-130A	500 to 1300 mm
	NS-160A	500 to 1600 mm
	NS-190A	500 to 1900 mm
	NS-220A	500 to 2200 mm
Cable length	25 m MAX	
Transmission reception interval	400 mm (fixed)	
Detection range	±100 mm	
Installation air temperature	0 to 60 °C	
Case material	Rigid vinyl chloride (PVC)	

Drawing number

Sensor	NS-130A	MD0002520-JA
	NS-160A	MD0002530-JA
	NS-190A	MD0002540-JA
	NS-220A	MD0002550-JA
Preamplifier	NPA-100	MP0000370-JA
Wiring connection diagram	MD0002520-JC	

Preamplifier

Preamplifier type	NPA-100
Output signal	Strip variance ±5 VDC/±100 mm
Installation method	Attachment
Installation air temperature	0 to 40 °C
Mass	10 kg
Power supply	AC85 to 264 V 200 VA
Earthing	D-class earthing

Common items

Detection type	Electromagnetic guidance type
Detection accuracy	Within ±5 mm
Responsiveness	5 Hz

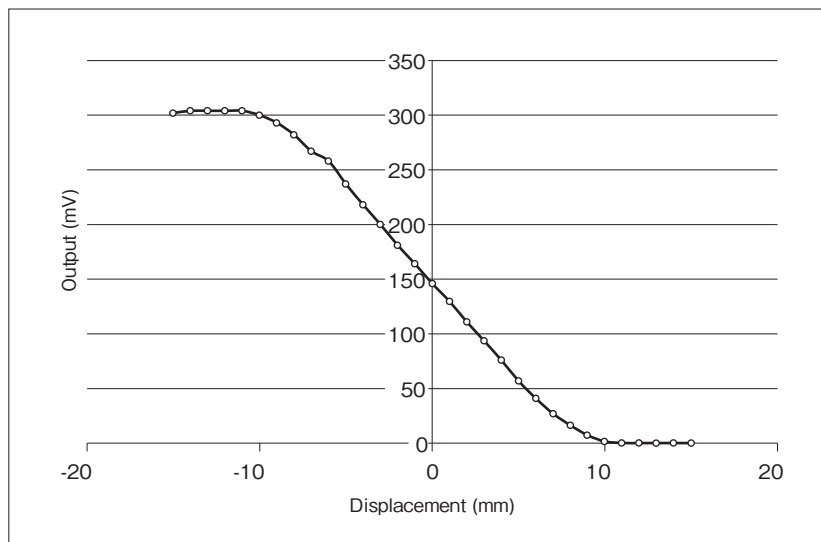
SENSORS

PHOTOHEAD PH SERIES

Models: PH30/PH31

Photoelectric detection of the strip edge

The Photohead is the Nireco sensor in an EPC (Edge Position Control) system. It uses photoelectric principles to detect the edge of the strip (web). The sensor signal is transmitted to an amplifier. The amplified output signal is sent to a hydraulic jet pipe-type regulator or a servo valve and the strip edge is controlled so that it remains in the determined position. Use a Photohead with an air purge specification if it is to be used in an environment where it will be exposed to dust or if there is the risk that oil or water droplets could fall onto the Photohead projector lens.



Example of Photohead PH31-6 characteristics

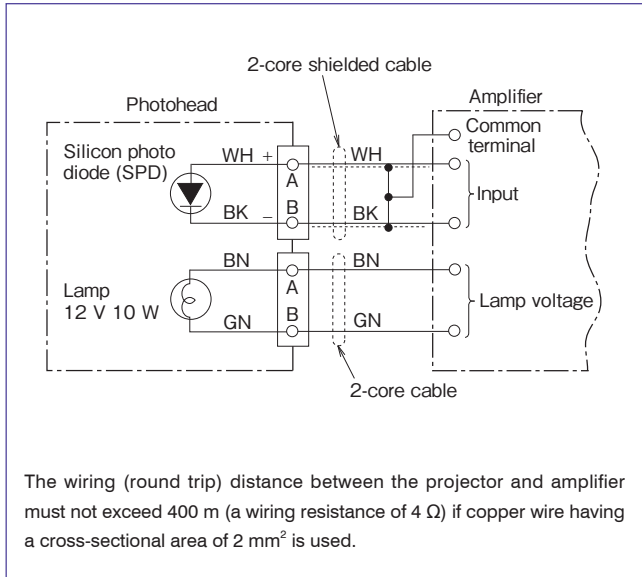


PHOTOHEAD PH Series

Specifications

Compatible amplifiers	1) Strip Guide Amplifier SGA3000 (used in combination with the Photohead) 2) EPC amplifier SA700 3) Web Guide amplifier EH322B	
Power supply	PH30	Lamp voltage 6 VDC max.
	PH31	Lamp voltage 12 VDC max.
Output	Voltage (in mV) proportional to change in amount of light of the silicon photodiode.	
Sensitivity	Capable of detecting a displacement of a strip or an opaque web of 0.1 mm.	
Air flow for air purging	400 N l /min (at 0.05 MPa)	
Painted color	Silver	
Ambient temperature	-10 to +60 °C	
Mass	PH30: 3 kg, PH31: Refer to the External dimensions.	
Effective detecting length	20 mm	
Body material	Aluminum alloy casting	
Light source	Tungsten-filament lamp 12V	

Wiring diagram



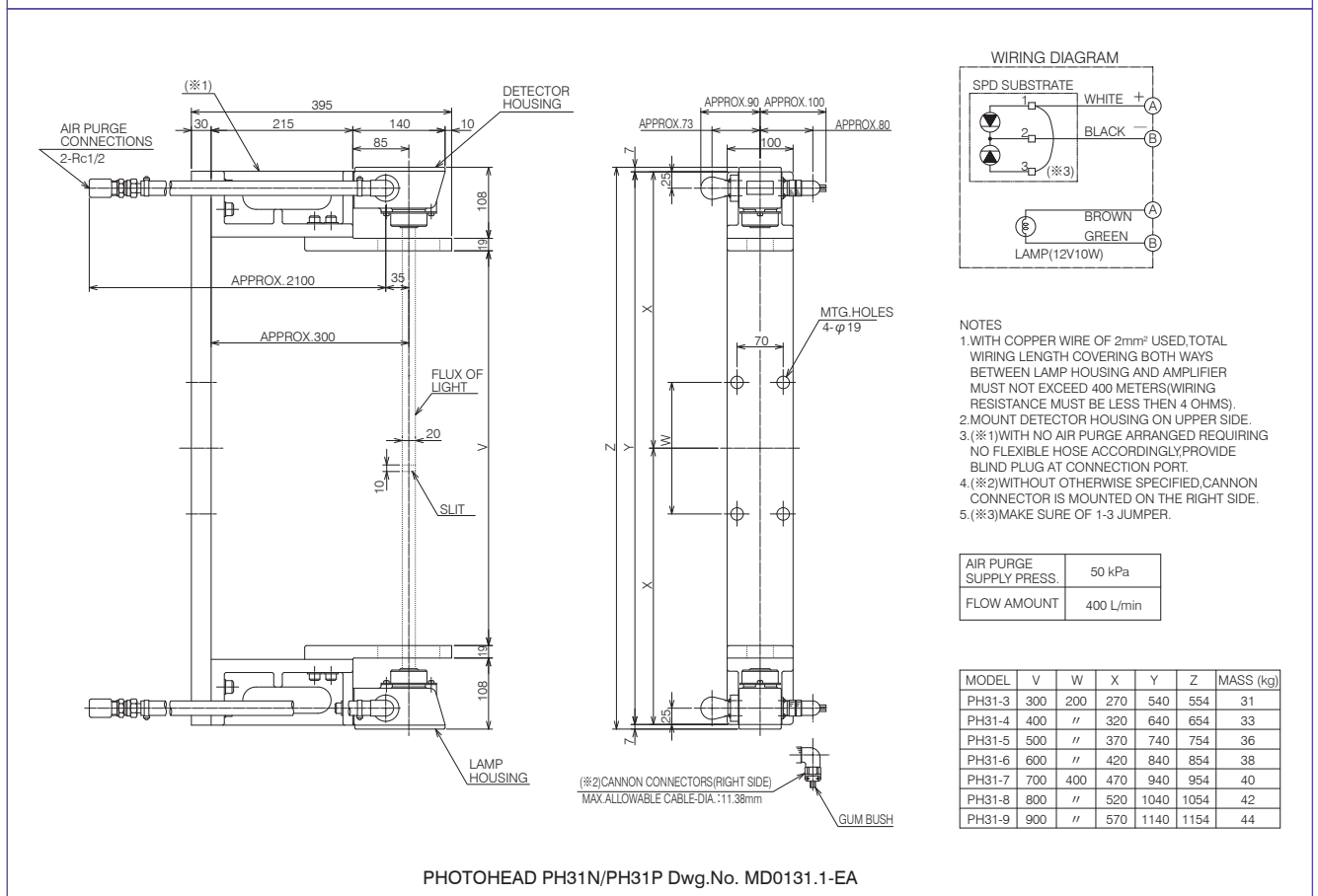
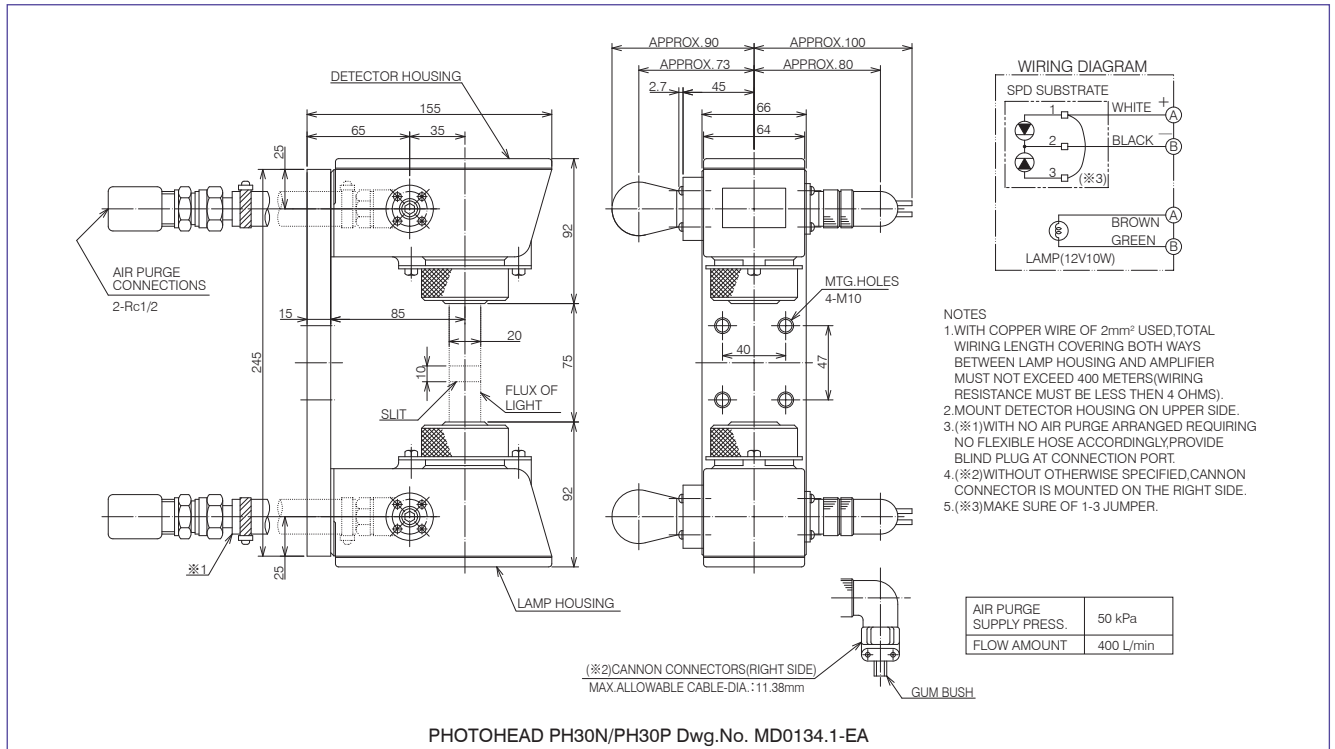
The wiring (round trip) distance between the projector and amplifier must not exceed 400 m (a wiring resistance of 4 Ω) if copper wire having a cross-sectional area of 2 mm² is used.

Model codes

PH	MODEL			
	30	PH30	Type of Photohead	
	31	PH31		
31G	PH31G (guarded)			
I	N	Not provided	Air purge mechanism	
	P	Provided		
I	Non	75mm	PH30	Sensor gap (The values in parentheses show the gap of PH31G.)
	3	300 (250) mm	PH31 (PH31G)	
	4	400 (350) mm		
	5	500 (450) mm		
	6	600 (550) mm		
	7	700 (650) mm		
	8	800 (750) mm		
	9	900 (850) mm		
	Y	"Y" is affixed for special specifications		

PHOTOHEAD PH Series

External dimensions



03

CONTROLLERS

01 OUTLINE OF EPC®/CPC

02 SENSORS

03 CONTROLLERS

04 CONTROL UNITS

05 POSITION TRANSMITTERS

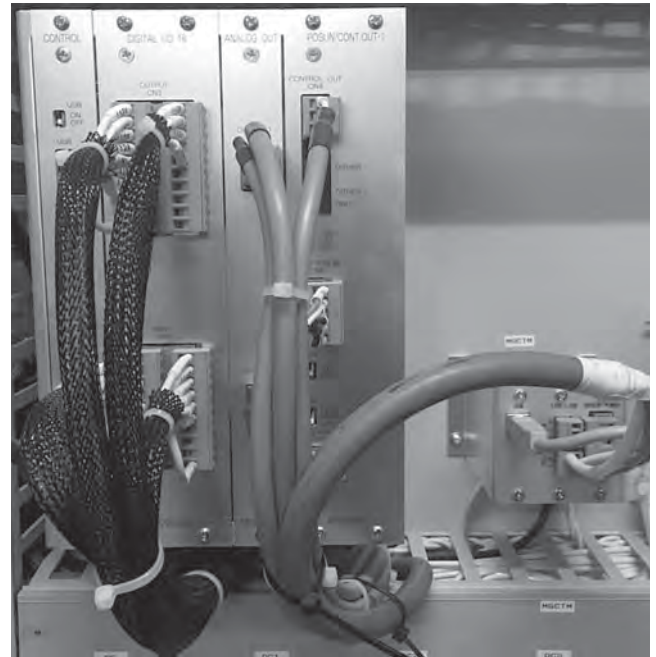
CONTROLLERS

Modular Strip Guide system controller MGC1000

Model: MGC1000

Achieves high responsiveness and precision, enabling fine PID control

The Modular Strip Guide system controller MGC1000 is an EPC/CPC controller that can be connected by communications cables to the other devices in the system to enable a flexible system configuration.



Features

- The boards that comprise the controller are available as modules for each function. By connecting these modules via communications cables, you can configure the optimal system for your needs. This modular architecture enables boards to easily be changed in case of emergencies. It also allows the functions of the system to be easily upgraded as specifications change.
- The system can be externally commanded to switch between control of a maximum of EPC 1 to 8, CPC 1 to 4, Cascade EPC 1 to 4, Cascade CPC 1 to 2.
- The system can simultaneously actuate two hydraulic cylinders for CPC. (In-furnace CPC)
- Control via P, I, PI, PD or PID controllers is possible.
- The system can use either a nonlinear output in which deviations cause the output gain to change, or a speed gain output function in which the speed of the line changes the output gain.
- By inputting the PLG signal, the staggered roll function and tracking output function can be used. (Can be used in combination)
- The system can be externally commanded to shift the control position or the centering position. (The centering position cannot be changed (shifted) during cascade control.)
- The sleeve alignment function can be used. (It cannot be used during cascade control.)
- PROFIBUS and other Fieldbus interfaces are supported.
- Input/output locations for the interface signals, including the analog signals and the Fieldbus communication signals, can be set by parameter input.
- One controller can control up to four steerings.
- Data logging can be performed. (Optional)

Modular Strip Guide system controller MGC1000

Specifications

Power supply voltage	DC24V
Power consumption	Listed on each circuit board
Ambient temperature range	0 to +40°C
Ambient humidity range	35% to 85% RH or less (with no condensation)
Inputs and outputs	<p>From the specifications of the circuit boards (Options are shown inside the brackets.)</p> <ul style="list-style-type: none"> · Control boards: RS232C, RS422 (· Fieldbus circuit board: PROFIBUS) (· PLG input board: open collector, voltage, line driver) · Digital I/O board: photo-coupler inputs 16, contact outputs 16 · Control output / Position input board 1: control output, solenoid valve actuation output, position transmitter input, filter blockage warning contact input (1 input) · Control output / Position input board 2: control output, position transmitter input · Analog output board: voltage output 2 · Analog input/output board: input 1, output 1 (isolator input/output) · CAN board: CAN port 1, RS232C port 1 · Analog sensor input board: sensor inputs 4, sensor alarm contact inputs 8

CONTROLLERS

Strip Guide Amplifier

Model: SGA3000

Compact and light, yet offering high performance Equipped with a microprocessor for advanced EPC

The Strip Guide Amplifier is a high-performance, microprocessor-equipped EPC/CPC amplifier.

It delivers advanced EPC/CPC control for staggered roll or cascade control that is unavailable from conventional analog amplifiers.

Its compact, lightweight construction means that it requires little space for installation.



Features

- The LCD screen makes it easy to check setting values and output signal status.
- All operations use the push buttons on the control panel for parameter settings.
- Control is possible by P, I or PI action.
- A line speed signal input enables automatic adjustment of control gain, to compensate for changes in line speed. PLG signal input enables stagger winding.
- Sensor signals can be taken from up to two sensor systems, enabling cascading control.

CONTROLLERS

Strip Guide Amplifier SGA3000

Model codes

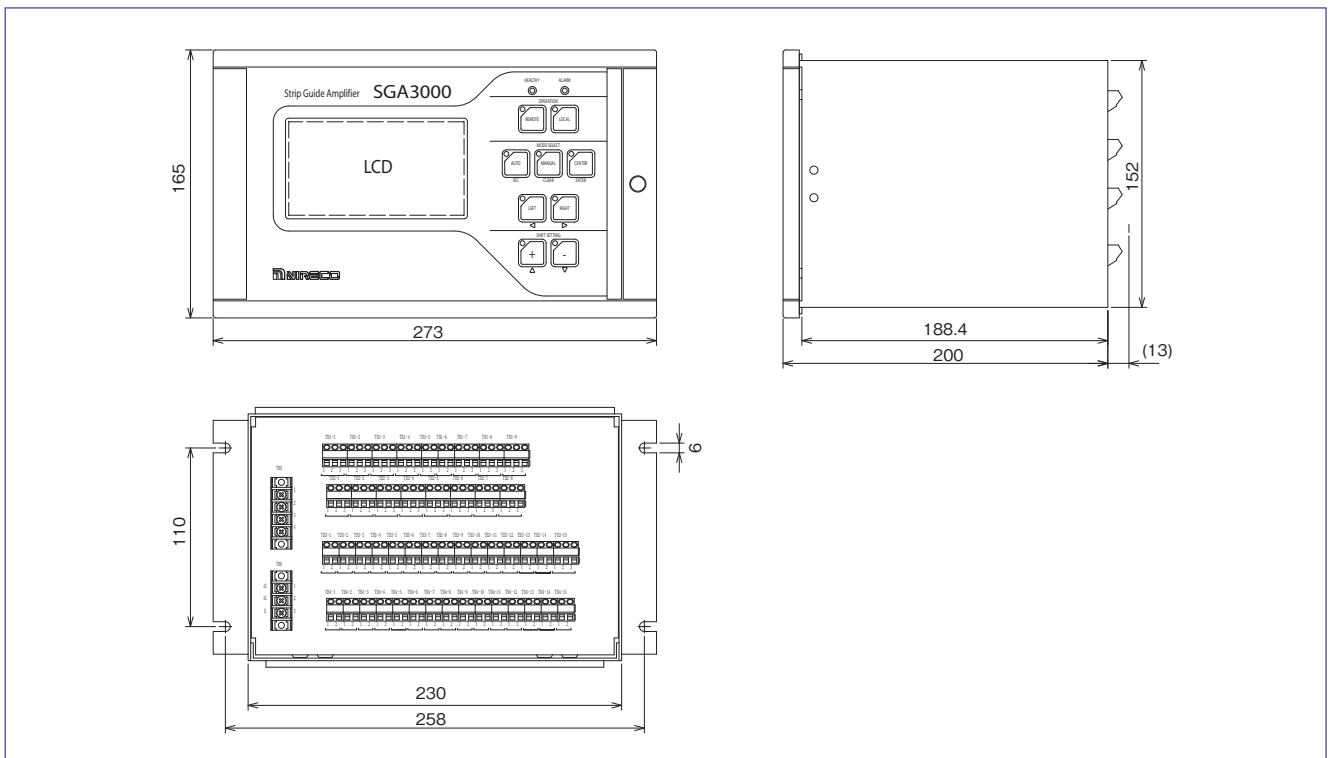
SGA3000 — / Y

Linear probe selection
N: Not used / L: Used

PROFIBUS selection
N: Not used / P: Used

Special specifications
(Details are specified separately)
Blank when specifications are standard

External dimensions



04

CONTROL UNITS

01 OUTLINE OF EPC®/CPC

02 SENSORS

03 CONTROLLERS

04 CONTROL UNITS

05 POSITION TRANSMITTERS

CONTROL UNITS

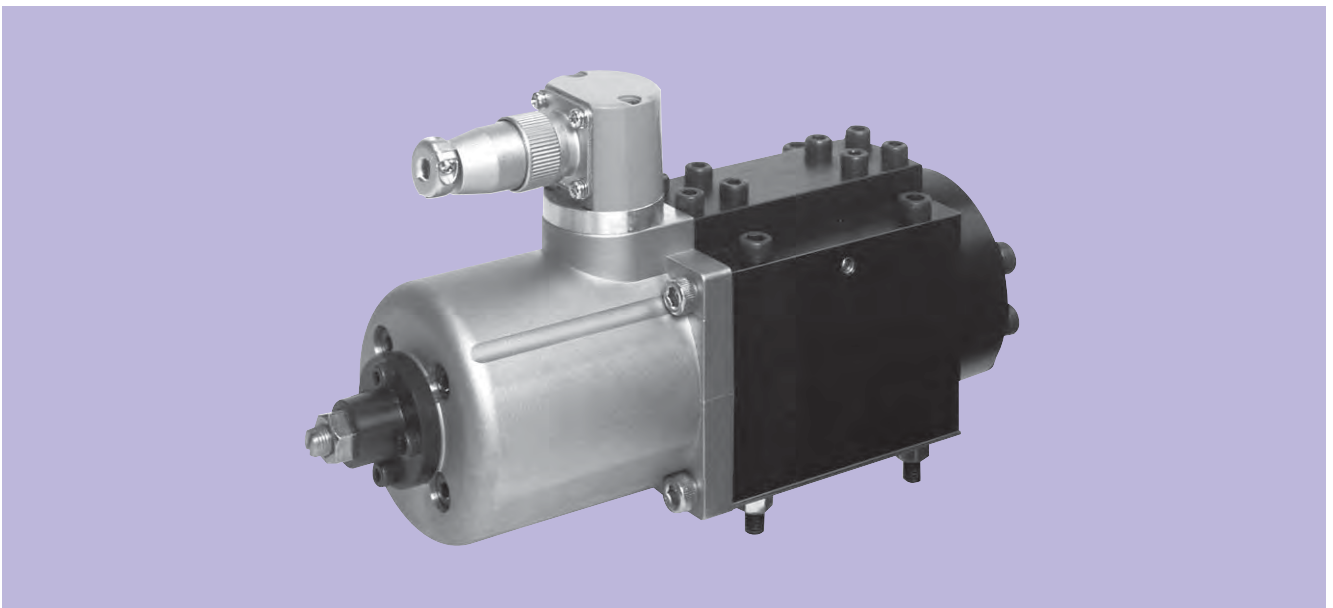
Power Guide (Industrial servo valves)

Models: PG300/PG500/PG800

High responsivity and greater compactness!

Power Guide models are industrial servo valves designed for general applications.

These lightweight, compact valves offer high performance and ease of use. Nireco Power Guides, which keep on going even with dirty hydraulic oil, are changing the image of industrial servo valves. The function of a Power Guide is to receive an input current signal from the amplifier and convert it into a hydraulic control signal.



Features

■ Compact

Smaller and lighter. The unit has only one fifth the volume of previous models.

■ High response

45 Hz/−3db

■ Power Guide servo valves feature high responsivity and high gain, with a low hysteresis, achieving high levels of precision in EPC and CPC.

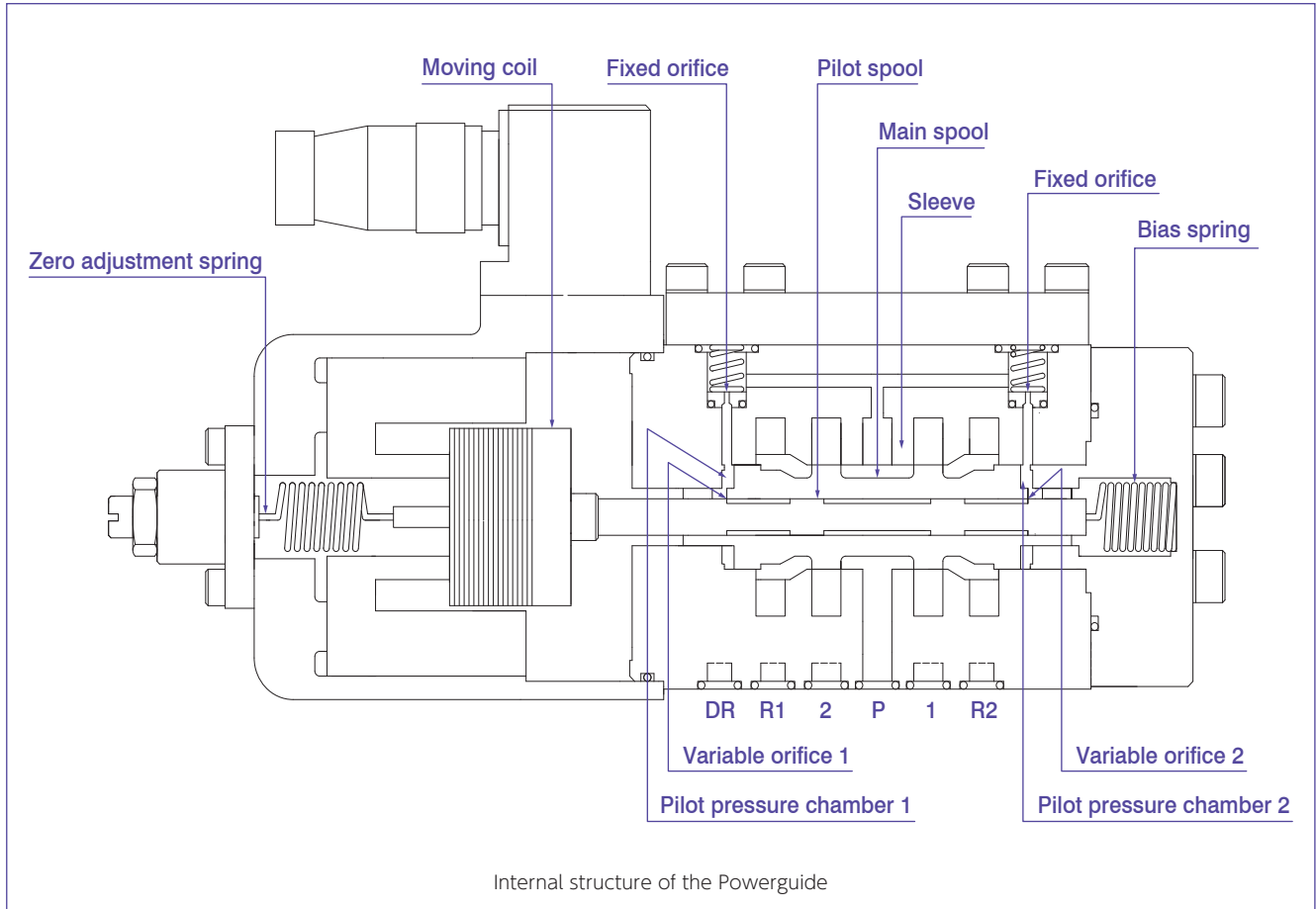
■ Power Guide servo valves use a double-pilot design, proven over long periods of use. The simple servo valve design will operate even with ordinary hydraulic oil*.

*: Hydraulic oil of NAS11 grade may be used, but there may be problems with NAS11 or lower if there is a high concentration of debris of 5 μm or smaller diameter.

■ Electrical signals are converted into hydraulic signals

The amplified deviation signal is compared with the reference value that has been set up in the system. A moving coil in the control unit converts this difference into a hydraulic signal that will move the position of the pilot spool.

Power Guide (Industrial servo valves)



Specifications

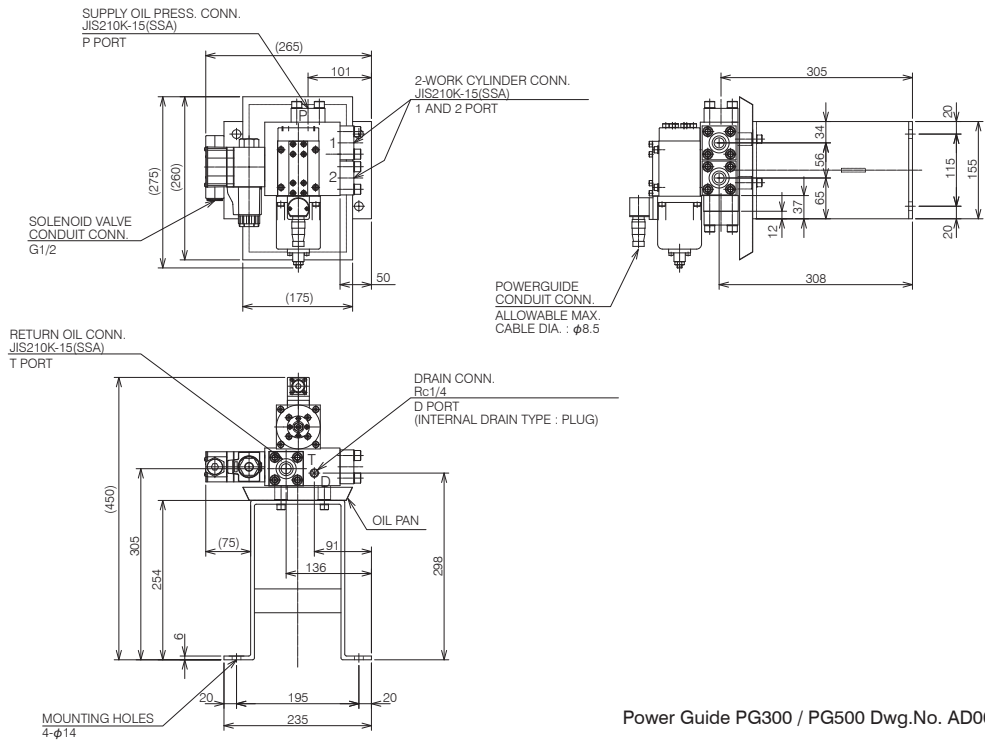
Model		PG300	PG500	PG800
Dimensions		114 × 224 × 70		
Rated pressure		2 to 14 MPa		
Rated flow	L / min	25	50	80
Return-side pressure resistance	Internal drain	1 MPa		
	External drain	3 MPa		
Internal leakage	L / min	3	3.5	4.5
Response of frequency		45 Hz /-3 dB		
Hysteresis		1 %		
Ambient operating temperature		0 to 50 °C		
Hydraulic oil temperature		10 to 60 °C (10 to 50 °C)		
Hydraulic oil contamination grade		NAS grade 11/ Mass grade 103		
Line filter		10 μm (β ₁₀ ≥ 200)		
Moving Coil resistance value		18.5 Ω (20 Ω)		
Rated current		±200 mA		
Recommended dither signal (100 Hz)		2 Vp-p		
Fixed orifice		ø0.4 mm (ø0.45 mm)		
Hydraulic oil		Mineral oil, water glycol, fatty acid ester, phosphate ester		

(Figures in brackets are for when water-glycol-based hydraulic fluids are used.)

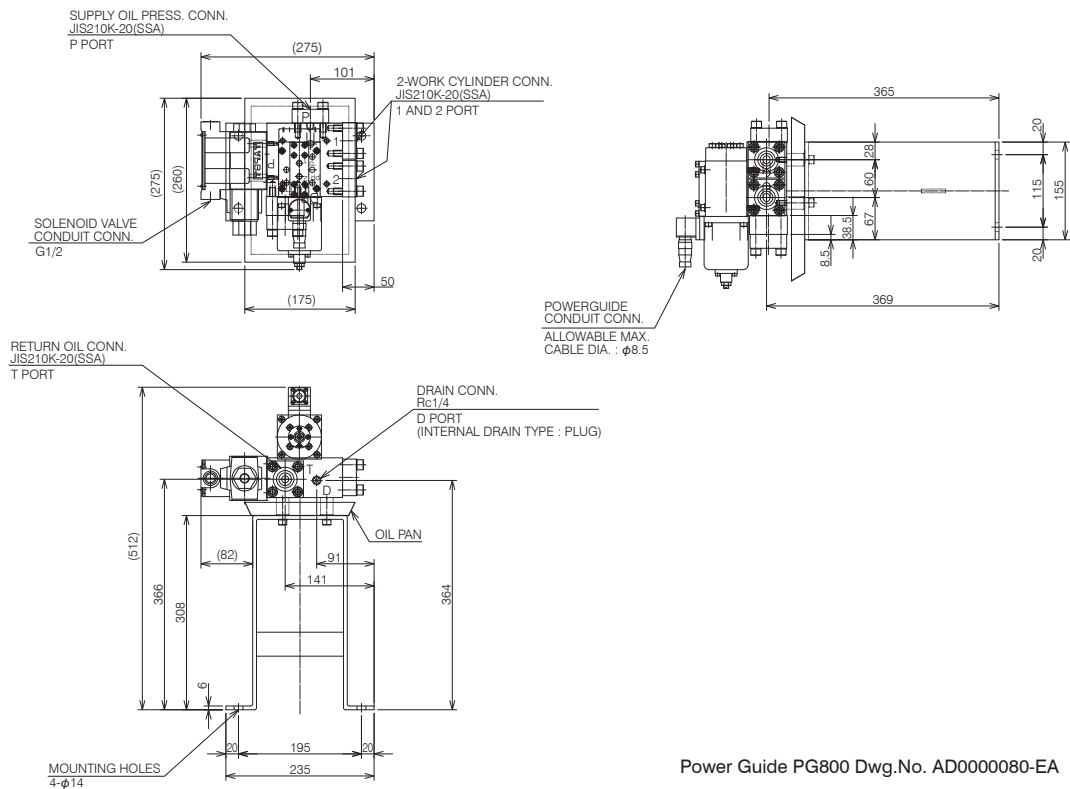
CONTROL UNITS

Power Guide (Industrial servo valves)

External dimensions



Power Guide PG300 / PG500 Dwg.No. AD0000070-EA



Power Guide PG800 Dwg.No. AD0000080-EA

CONTROL UNITS

PILOTJET

Model: PJ24

High quality and reliability while being user-friendly and simple to maintain

The PILOTJET is an industrial servo valve for converting electric signals (-200 to +200 mA DC) Please confirm with client. Into hydraulic signals, which is used mainly for EPC® in steel plants. The PILOTJET uses a highly reliable jet pipe system that has been extensively used, to ensure high operability and easy maintenance.

Features

- A dry detecting unit, that is not affected by magnetic dust in oil, reduces periodic maintenance.
- A jet pipe system with extensive experience of use provides hydraulic control.
- A servo mechanism for handling low to high flowrates is available in combination with a variety of gain boosters.
- A wide range of gain boosters is available with hydraulic pressures of 0.8 to 14 MPa.
- A simple structure allows for disassembly, reassembly, and adjustment in your plant.
- Easy operation and maintenance

Configuration

Controller

The PILOTJET controller consists of a moving coil detecting element, a jet pipe control unit whose sides are supported by special bearings, a spring acting against the detecting element through the jet pipe, and a zero-point adjusting unit with bias adjusting springs.

The moving coil detecting element consisting of a moving coil and a permanent magnet generates a force in proportion to a current according to Fleming's rule when an input current is applied to the moving coil in the magnetic field. This relation can be expressed by the following formula.



Relation between input and output signals:

$$F = 0.65\sqrt{W} = 0.65\sqrt{R \cdot I}$$

where, F = output (MPa)

W = input power (W)

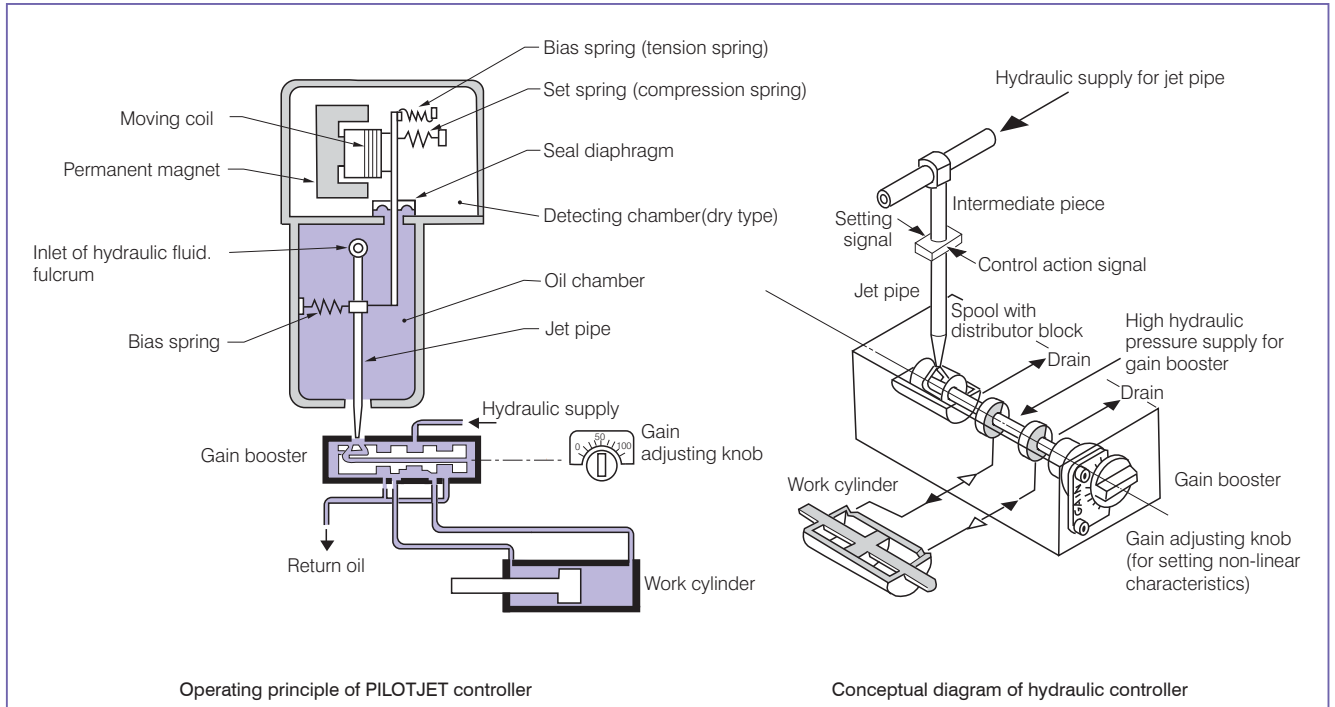
I = current of moving coil (A)

R = resistance of moving coil (Ω)

This force counteracts that of the spring on the opposite side of the jet pipe. Thus, the jet pipe moves to a position where the force generated by the input current is balanced by the spring's force.

CONTROL UNITS

PILOTJET



Gain booster

Hydraulic fluid supplied from the inlet is introduced into the jet pipe, and is discharged from the jet pipe nozzle toward the distributor block. The recovery pressures at both sides of the gain booster are balanced when the jet pipe nozzle faces the area mid-way between the two small orifices of the distributor block.

When the jet pipe moves to either side, the oil pressure at one side of the gain booster rises and the oil pressure at the other side falls. As a result, a differential pressure is generated between the two detecting units of the gain booster. This differential oil pressure changes the amount of the main oil needed to move the work cylinder piston.

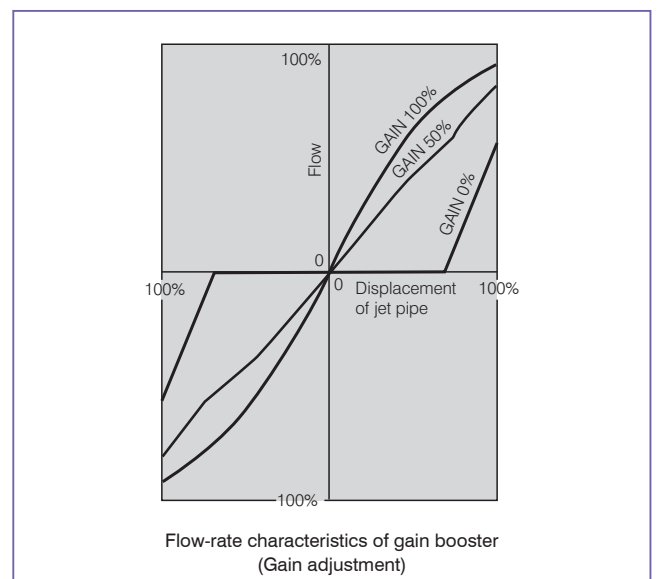
Thus, the amount of oil supplied to the work cylinder is proportional to change in the input signal.

The following graph shows the characteristics of the gain booster. The 0% gain shows a dead zone, which is a

characteristic found in pilot valves. The 100% gain shows a linear characteristic, and any gain between them shows a non-linear characteristic. This nonlinear characteristic is important for improving the stability of the EPC system.

Specifications of a single PILOTJET controller

Input signal	+200 to 0 - -200 mA DC (zero balance)
Resistance of moving coil	About 20 Ω
Supply oil pressure	0.8 to 1.2 MPa
Jet pipe capacity	About 3.5 l /min (at 1.2 MPa)
Hysteresis error	Less than 2 %
Fluctuation of neutral point	Less than 2 %



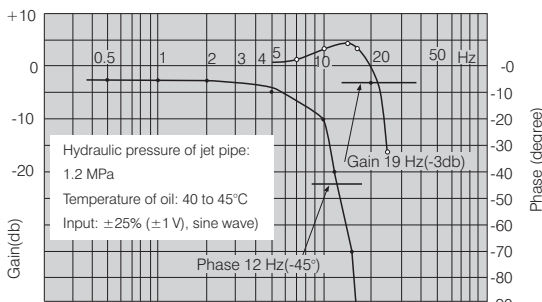
PILOTJET

Manifold controllers M4PJ240, M5PJ240, M6PJ240

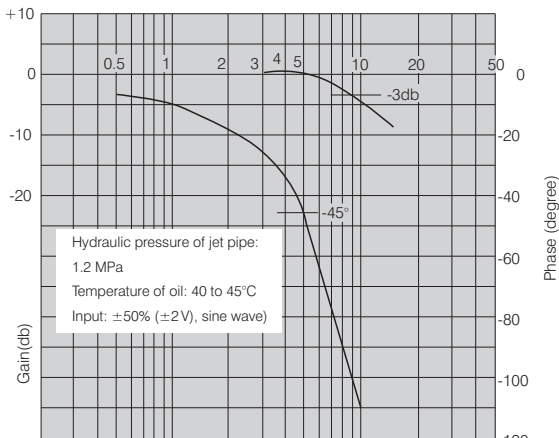
The manifold controller consists of a PILOTJET controller, which receives a strip edge position signal from the sensors as an electric signal and converts it into hydraulic pressure (an amount of oil); an adjustable gain booster, which amplifies the hydraulic signal; an automatic shut-off valve (solenoid controlled valve), which is automatically shut from a remote place; a reducing valve, which adjusts the hydraulic supply pressure to the PILOTJET controller; and an oil pressure gauge. These components are integrated into a manifold equipped with special hydraulic circuits.

Specifications of manifold controllers

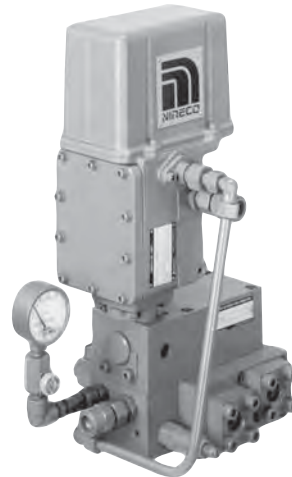
Model of manifold controller	M4PJ240	M5PJ240	M6PJ240
Gain booster	BO9M	BO9HM	BO10M
Maximum hydraulic pressure	5MPa	14MPa	10MPa
Flow-rate characteristics	See p. 42 top	p. 42 middle	p. 42 bottom
Mass kg	About 23	About 28	About 48
Hydraulic pressure of jet pipe	1.2MPa		
Permissible back pressure of return oil	0.1MPa		



Characteristic curve of a PILOTJET controller



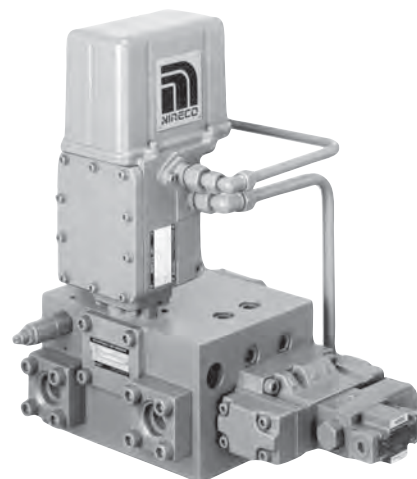
Characteristic curve of a PILOTJET controller with a gain booster



M4PJ240



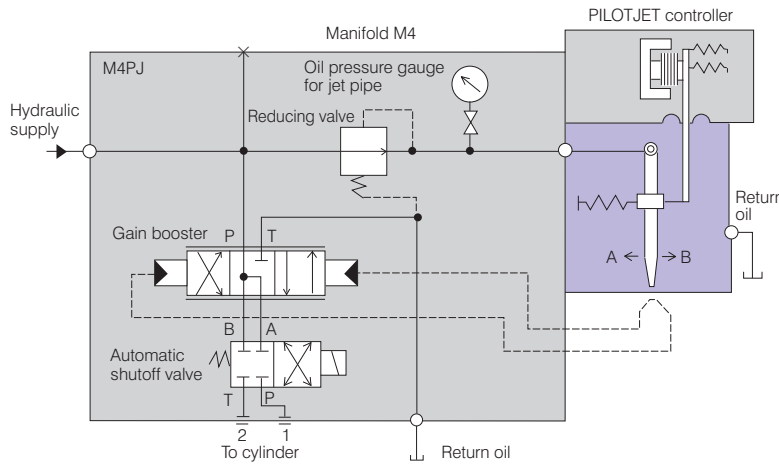
M5PJ240



M6PJ240

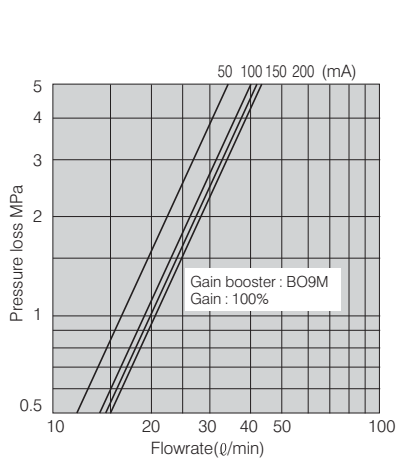
CONTROL UNITS

PILOTJET



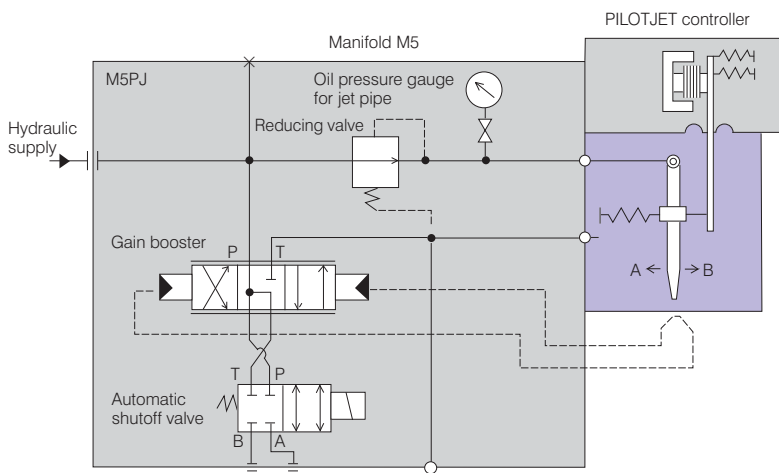
Hydraulic circuit diagram of M4SJ240

The diagram shows a hydraulic supply entering Manifold M4 (M4PJ) from the left. It passes through an oil pressure gauge for the jet pipe and a reducing valve. The line then splits: one path goes to a PILOTJET controller, and the other goes to a gain booster. The gain booster has ports P, T, and B. Port P is connected to the main line, and port B is connected to an automatic shutoff valve. The shutoff valve has ports T, P, and A. Port T is connected to the main line, and port A is connected to the PILOTJET controller. The main line continues to the cylinder (ports 2 and 1) and then to return oil.



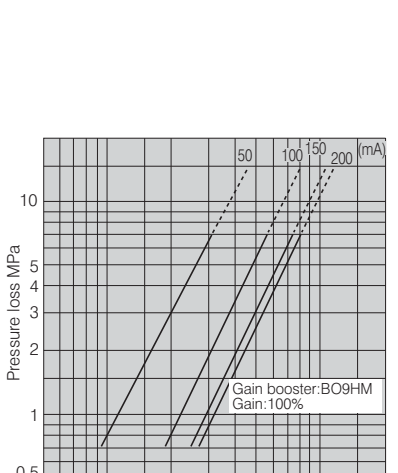
Flowrate characteristics of M4PJ240

This graph plots Pressure loss (MPa) on the y-axis (0.5 to 5) against Flowrate (l/min) on the x-axis (10 to 100). Three curves are shown for current values of 50 mA, 100 mA, and 150 mA. The gain booster is BO9M with a gain of 100%.



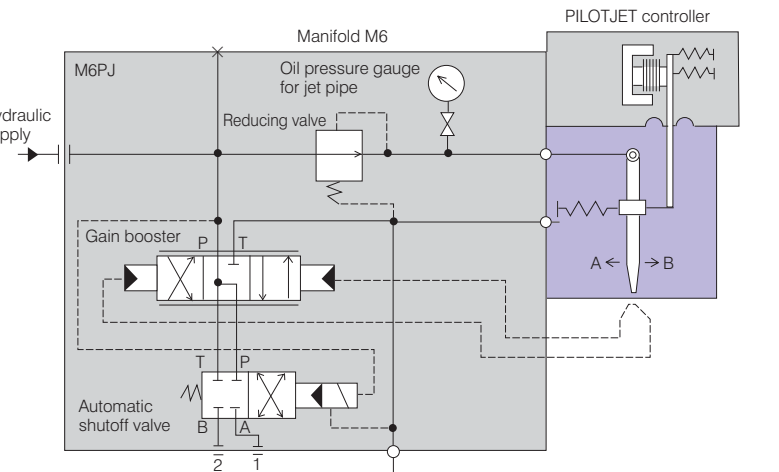
Hydraulic circuit diagram of M5PJ240

The diagram is similar to M4PJ but includes a gain booster with ports P, T, and B. Port P is connected to the main line, and port B is connected to an automatic shutoff valve. The shutoff valve has ports T, P, and A. Port T is connected to the main line, and port A is connected to the PILOTJET controller. The main line continues to the cylinder (ports 2 and 1) and then to return oil.



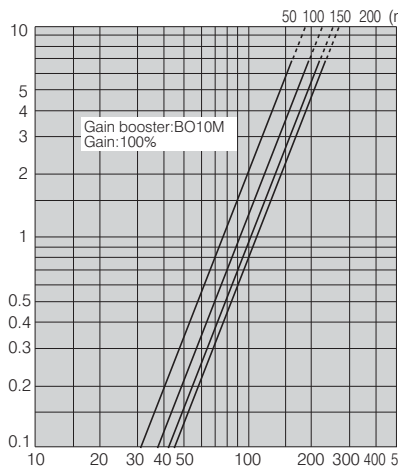
Flowrate characteristics of M5PJ240

This graph plots Pressure loss (MPa) on the y-axis (0.5 to 10) against Flowrate (l/min) on the x-axis (5 to 200). Three curves are shown for current values of 50 mA, 100 mA, and 150 mA. The gain booster is BO9HM with a gain of 100%.



Hydraulic circuit diagram of M6PJ240

The diagram is similar to M4PJ but includes a gain booster with ports P, T, and B. Port P is connected to the main line, and port B is connected to an automatic shutoff valve. The shutoff valve has ports T, P, and A. Port T is connected to the main line, and port A is connected to the PILOTJET controller. The main line continues to the cylinder (ports 2 and 1) and then to return oil.



Flowrate characteristics of M6PJ240

This graph plots Pressure loss (MPa) on the y-axis (0.1 to 10) against Flowrate (l/min) on the x-axis (10 to 500). Three curves are shown for current values of 50 mA, 100 mA, and 150 mA. The gain booster is BO10M with a gain of 100%.

Note: The flowrate characteristics of integrated manifold controllers are shown.

PILOTJET

External dimensions

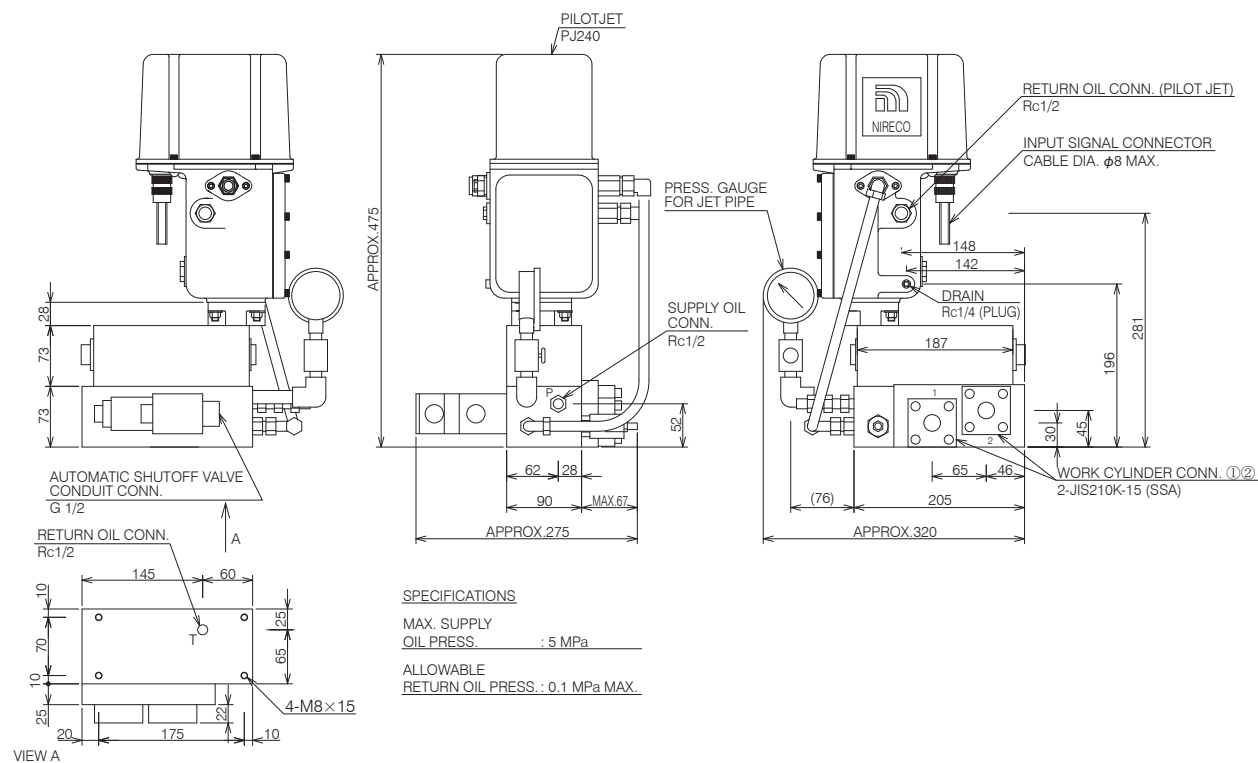
01 OUTLINE OF EPC®/CPC

02 SENSORS

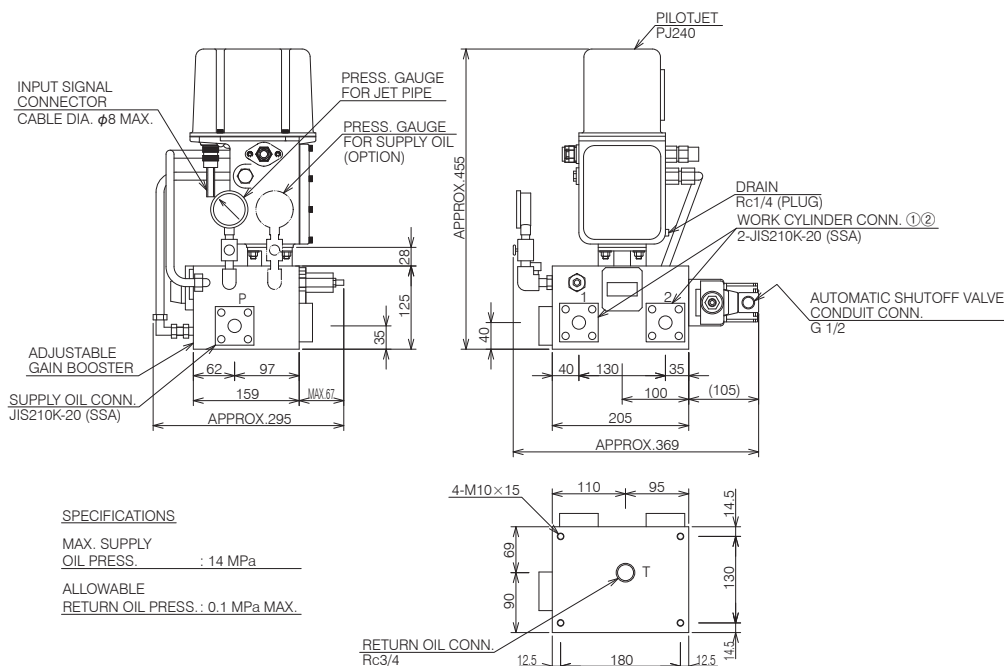
03 CONTROLLERS

04 CONTROL UNITS

05 POSITION TRANSMITTERS

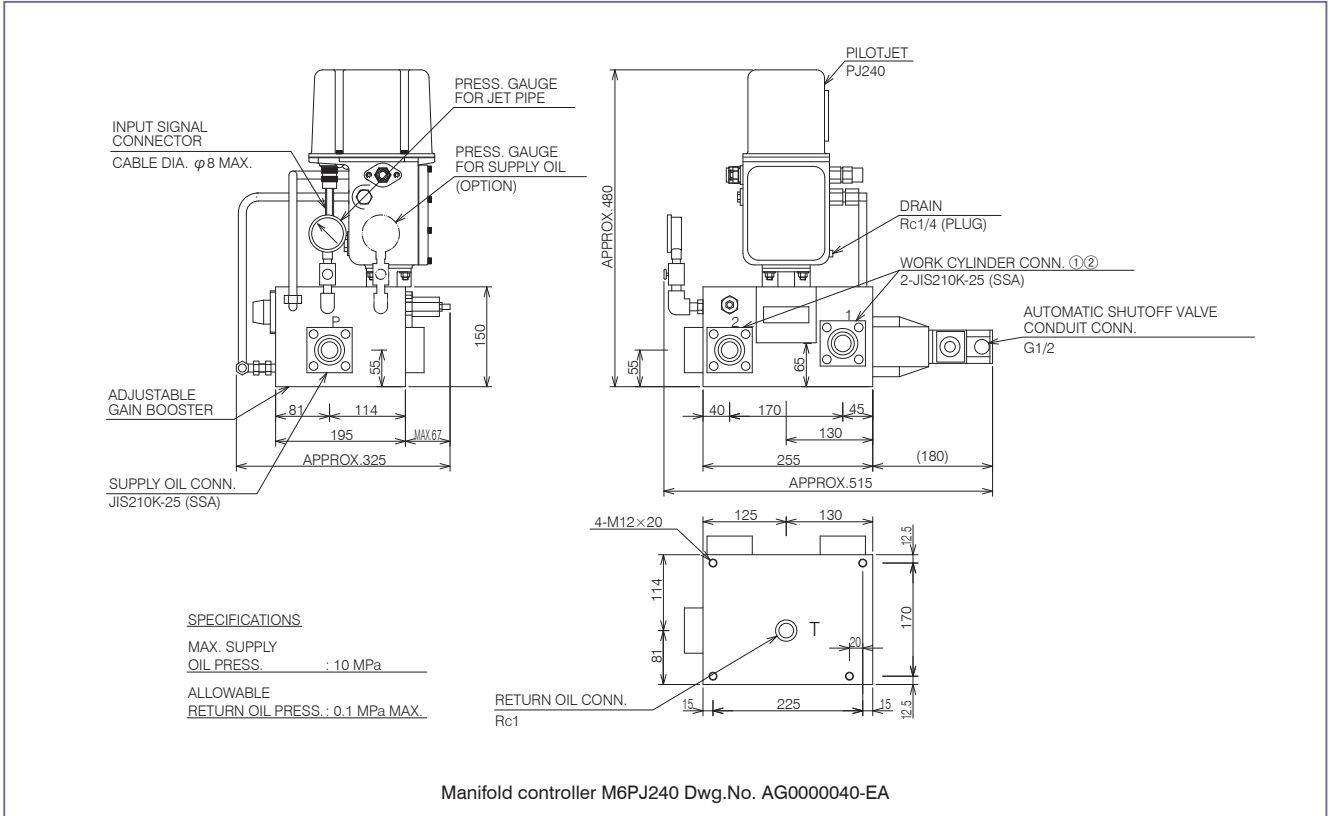


Manifold controller M4PJ240 Dwg.No. AG0000020-EA



Manifold controller M5PJ240 Dwg. AG0000030-EA

PILOTJET



Model codes

MODEL	Manifold	(None)	—
		M4	5 MPa MAX.
		M5	14 MPa MAX.
		M6	10 MPa MAX.
PJ24	Hydraulic oil	0	Mineral oil-based
		1	Phosphate ester oil-based
		2	Water/glycol-based
		3	Fatty acid ester oil-based
I	Power supply for solenoid valve (Automatic shut-off valve)	A	100V 50/60 Hz, 110 V 60 Hz
		C	200V 50/60 Hz, 220 V 60 Hz
		P	110 V 50 Hz
		Q	220 V 50 Hz
		D	DC 12 V
		E	DC 24 V
		F	DC 48 V
G	DC 100 V		

Lock circuit	N	None	
	1	Supplied	
Supplied pressure	1	M4	5 MPa
	2	M5	to 5 MPa
	3		5 to 10 MPa
	4		10 to 14 MPa
	5	M6	to 5 MPa
	6		5 to 10 MPa
Supplied pressure meter	N	None	
	1	Supplied	
Throttle check valve	N	None	
	1	Supplied	
Stand	N	None	
	1	Supplied	
Oil pan	N	None	
	1	Supplied	
Terminal box	N	None	
	1	Supplied	

05

POSITION TRANSMITTERS

01 OUTLINE OF EPC®/CPC

02 SENSORS

03 CONTROLLERS

04 CONTROL UNITS

05 POSITION TRANSMITTERS

POSITION TRANSMITTERS

ANALOG POSITION TRANSMITTERS

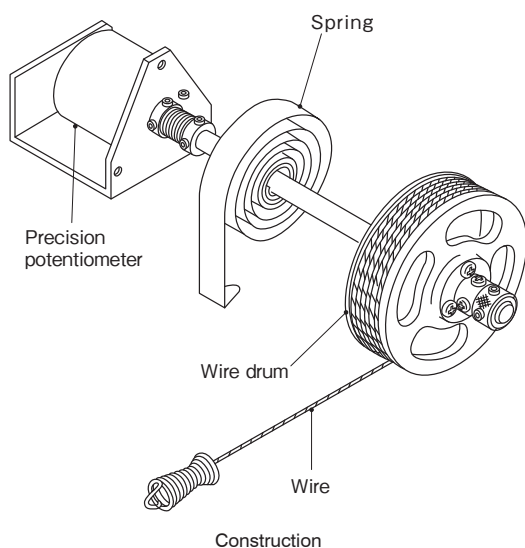
Models: FW22/FW31

Converts position, degree of opening, width, height and other variables into electrical signals

Wire Position Sensor

The analog position transmitter incorporates a precision potentiometer and converts the linear motion of an object being measured into electric resistance proportional to its position.

As shown in the structural diagram below, a stainless steel wire is wound around a wire drum which incorporates a spring. The shaft of the drum is connected to the shaft of the potentiometer.



Specifications

Output	0 to 2k Ω
Response speed	400 mm/sec
Wire tension	7 N (average)
Ambient temperature	-20 to +60°C (FW22 standard) -20 to +80°C (FW22 high-temp. specs only) -10 to +40°C (FW31)
Painted color	JIS7.5BG4/1.5
Installation Location	FW22: Indoors only FW31: Flameproof type Explosion-protection type: Flameproof: d2G Certification No.: 22828
Mass	FW22: 2 kg FW31: 4.4 kg

Model	Detecting length (mm)	Linearity (%)	Hysteresis (%)	Resolution (%)	Permissible power (W) (at 60°C)
FW22	270	± 0.5 (Note)	0.2	± 0.091	3.3
	840			± 0.052	2
	1405			± 0.031	2.5
FW31	270	± 0.5	0.2	± 0.091	3.3
	840			± 0.052	2
	1405			± 0.031	2.5
	270	—	Infinitesimal	1.5	

Note: The linearity of the ultra-high-precision class is $\pm 0.2\%$.

ANALOG POSITION TRANSMITTERS

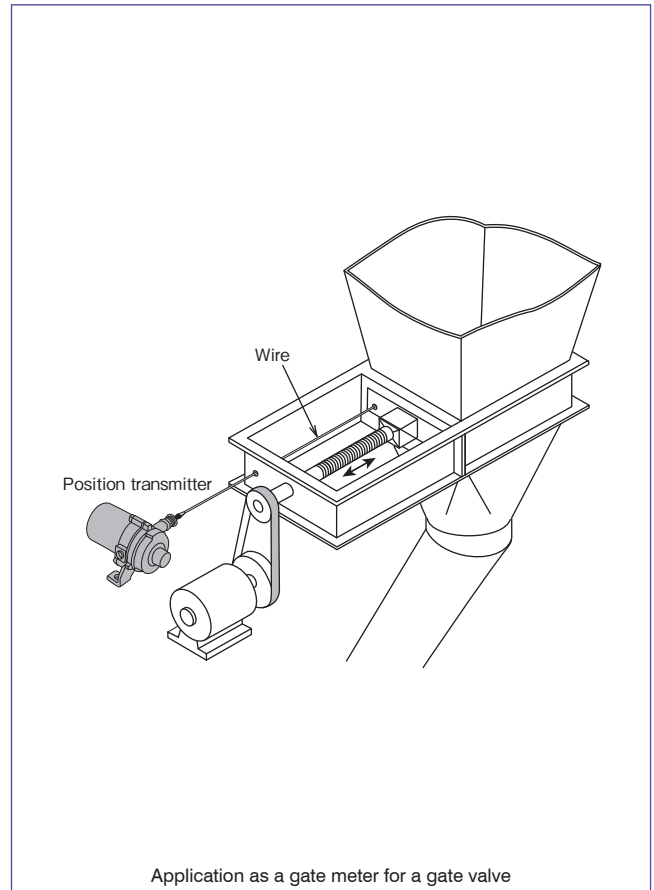
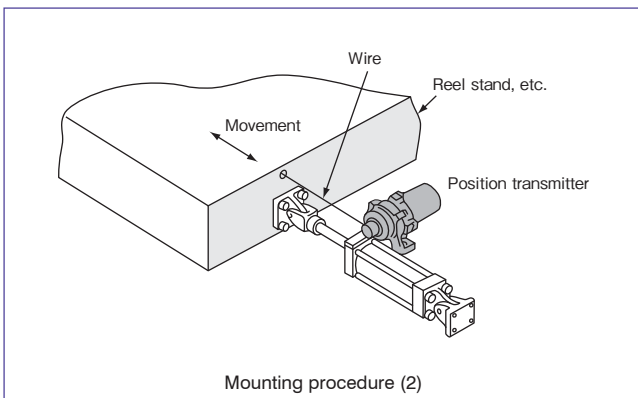
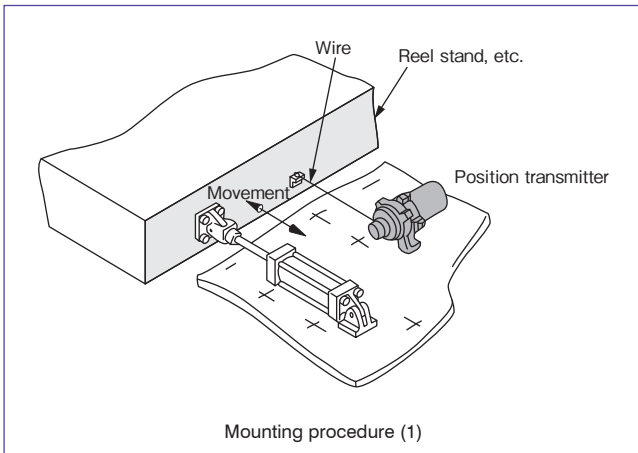
Model codes

Standard type

FW22.	01 / Y	Maximum detecting length	Potentiometer type
01	---	270 mm	Standard potentiometer
02	---	840 mm	
03	---	1405 mm	
11	---	270 mm	Oil-containing potentiometer
12	---	840 mm	
13	---	1405 mm	
21	---	270 mm	Ultra-precise potentiometer
31	---	270 mm	High-temperature potentiometer
32	---	840 mm	
33	---	1405 mm	
Y	"Y" is affixed for special specifications.		

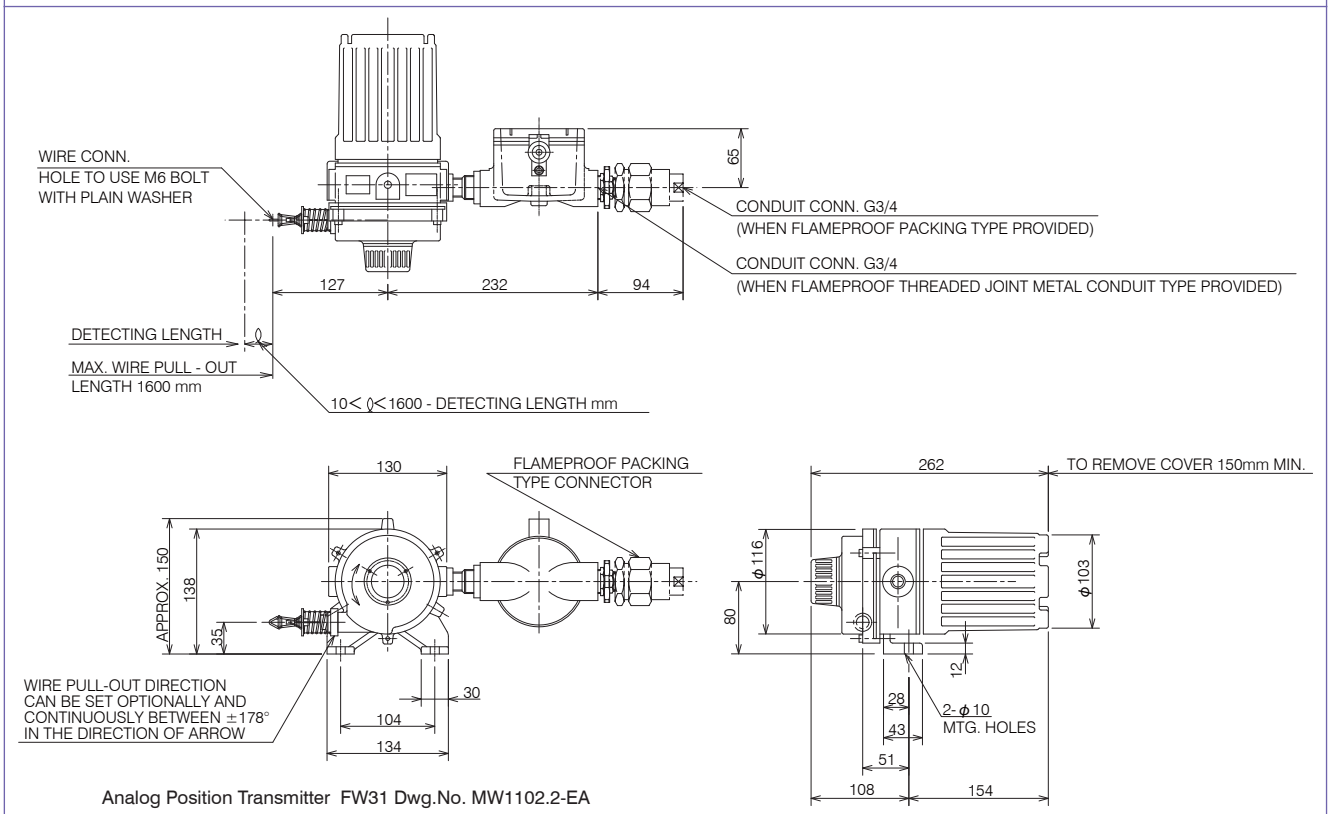
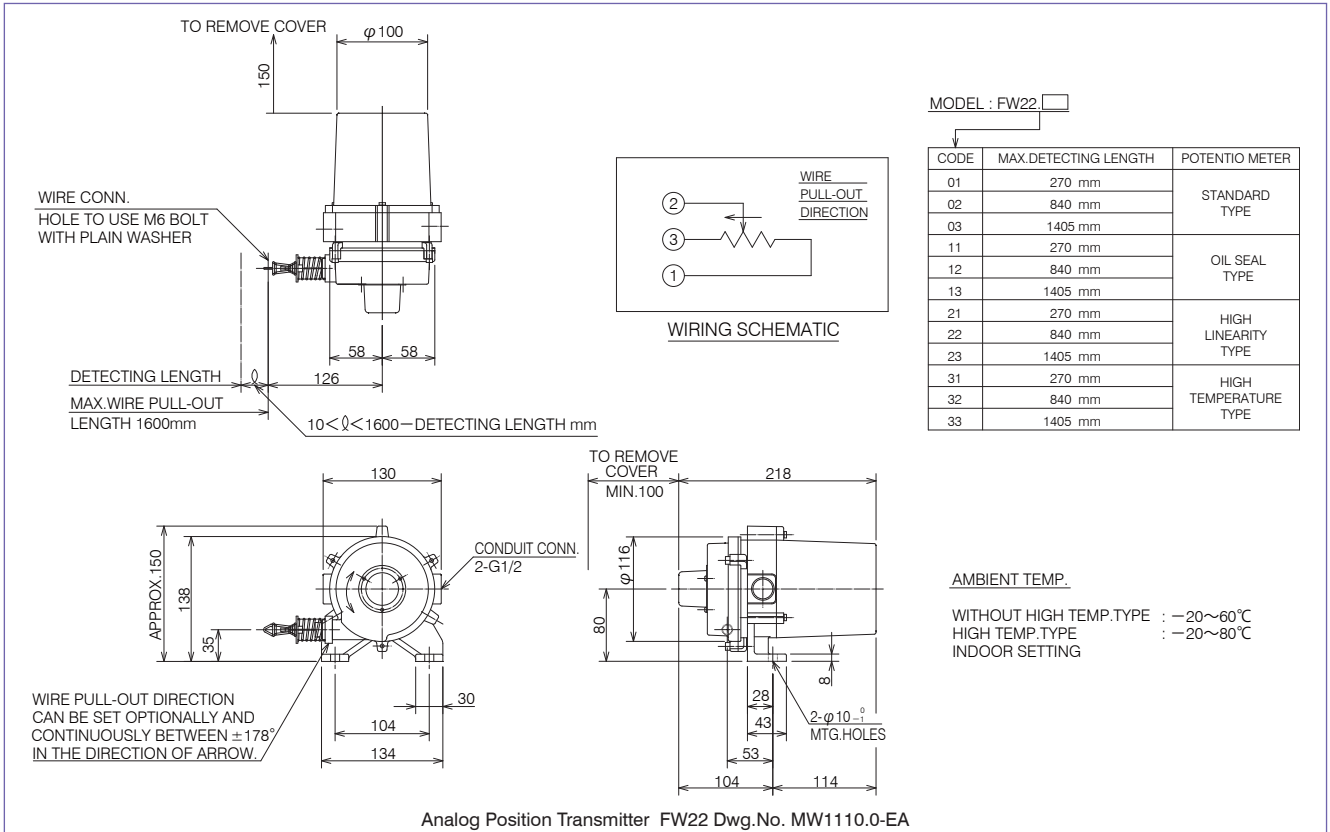
Flameproof construction

FW31.	01 0 / Y	Maximum detecting length	Potentiometer type
01	---	270 mm	Standard potentiometer
02	---	840 mm	
03	---	1405 mm	
11	---	270 mm	Oil-containing potentiometer
0	---	Conduit tube thread connection (standard)	External wire lead-in type
1	---	Pressure-resistant packing (semi-standard)	
Y	"Y" is affixed for special specifications.		



ANALOG POSITION TRANSMITTERS

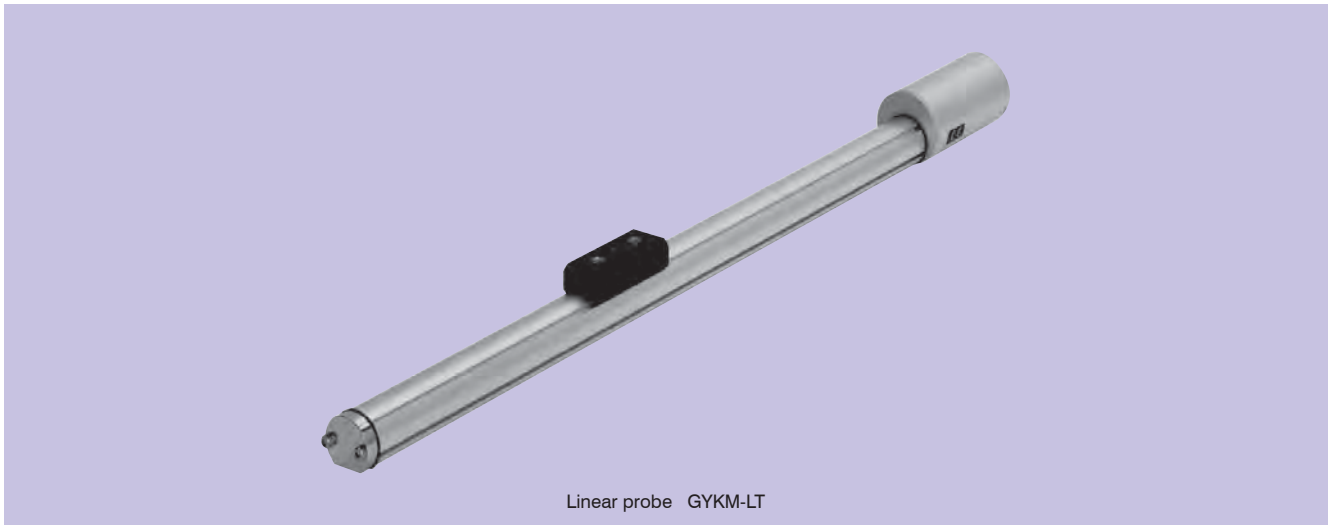
External dimensions



HIGH-PRECISION POSITION TRANSMITTER

Model : GYKM-LT

Converts position to an electrical signal with high precision



Features

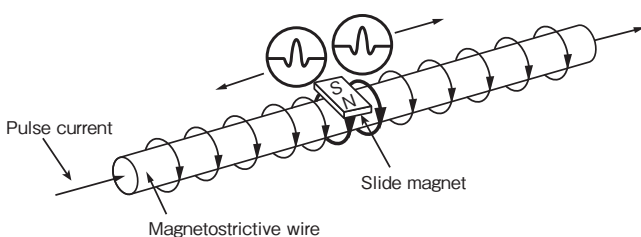
- There is no contact between the magnetostrictive wire and the slide magnet, so mechanical service life is maximized.
- Resolution not exceeding 0.01%, linearity not exceeding 0.025%

Operating principle

When a pulse signal flows in the magnetostrictive wire inside the transmitter of the high-precision position transmitter, a magnetic field is generated around the wire.

Placing a magnet in this field causes mechanical vibration in the magnetostrictive wire, and the vibration propagates along the wires at ultrasonic speed.

The time of propagation is measured to gauge the position of the slide magnet.



Specifications

Model	GYKM-LT
Stroke	350 mm
Output	4 - 20 mA Load resistance Max 500 Ω
Resolution	0.01 %FS or less
Linearity	±0.025 %FS or less
Sampling frequency	1kHz
Power supply	DC24 V ±2 V 0.05 A
Operating temperature	0 °C to +50 °C
Storage temperature	-20 °C to +60 °C
Vibration resistance	3 G
Protection standard	IP 65
Mass	3 kg

HEAVY DUTY

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