





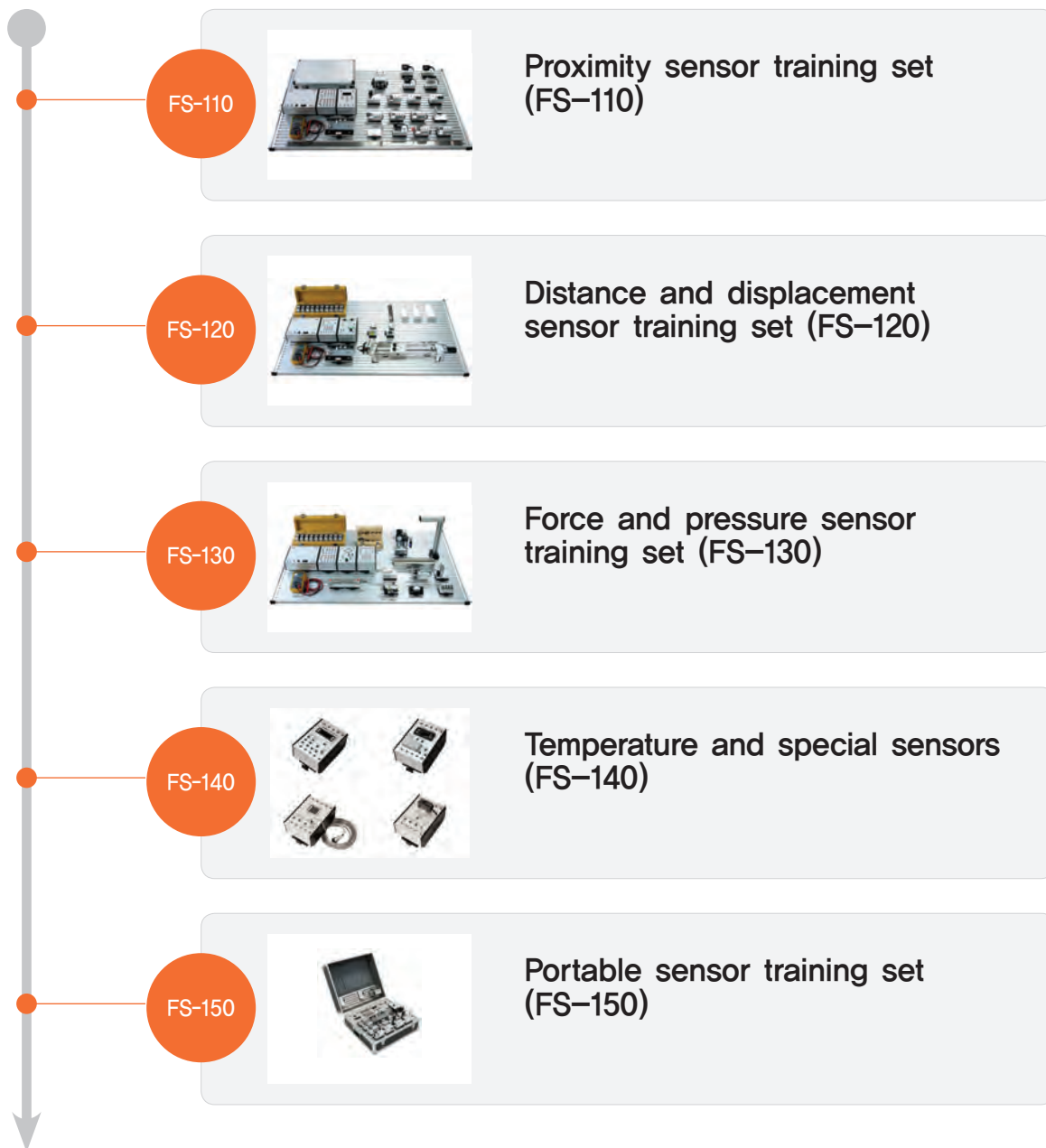
CHAPTER

03

SENSOR TRAINING SET

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SENSOR TRAINING SET



SENSOR TRAINING SET

Introduction

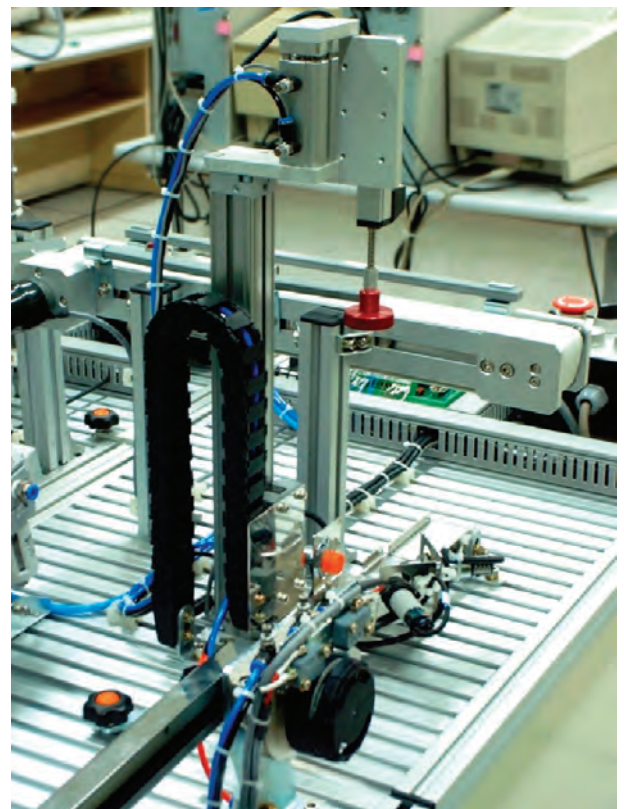
Sensors are crucial in improving productivity in an automatic production system.

The aim of this training set is recognizing the importance of sensor control technology in an automation system. Students must be able to identify and select the proper sensor in a system and becoming proficient in using it.

The FESTECH sensor training set was developed to teach the principles and usage methods of various sensors.

All of the sensors are module type. They can be used individually or with other training sets.

Connection, operation, and signal processing are all optimized for total sensor control training.



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Apprentices for sensor training set

- Electric/electronics expert
- Electric-mechanics expert
- Process control operator
- Mechanical engineer
- Data acquisition and control engineer
- Device and building control engineer

Classification and application of sensor



ON/OFF type sensor

- Limit switch
- Proximity sensor (inductive, capacitive, reed switch)
- Optical sensor (diffuse, through beam, reflect, fiber)
- Pressure switch

Applications of ON/OFF type sensor

- Position detection
- Objects detection
- Sequence control in producing system
- Safety system
- Status alarm of machine
- Error detection
- Test and recognition of part
- Quality control



Analog sensor

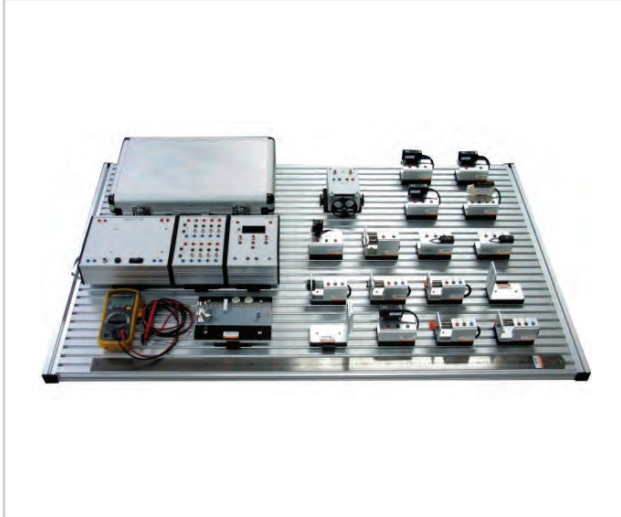
- Pressure sensor
- Color sensor
- Temperature sensor
- Level sensor
- Displacement sensor
- Weight sensor

Application of analog sensor

- Automatic control system
- Data acquisition
- Process control system
- Quality control
- Error detection
- Value measurement



Proximity sensor training set (FS-110)



Order number : 21100

Training contents

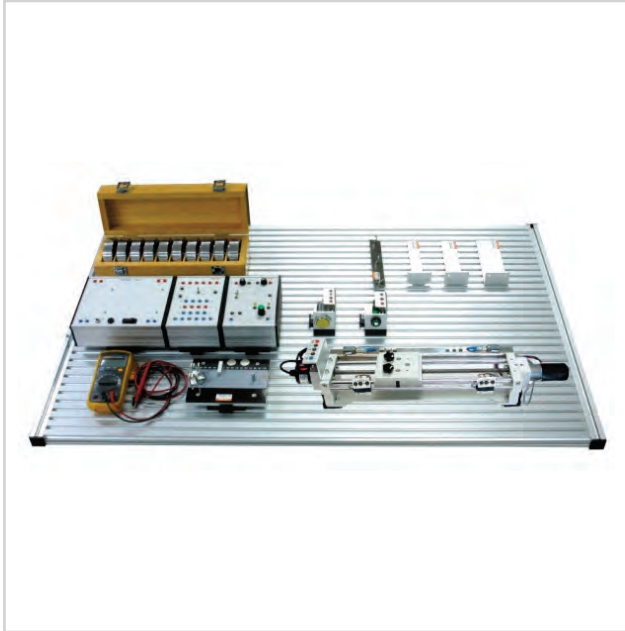
- Feature of proximity sensor and reed switch
- Response curve of inductive sensor
- Types and application of optical sensors
- Response feature of capacitive sensor
- Application of ultra sonic sensor
- Practice of rotary unit and counter unit
- Speed measuring with penetrative sensor
- Analysis of technology data
- Electrical wiring
- Composing control circuit
- Configuration and calibration of sensor
- Actual example in real field

Component

No.	Component	Order number	Qty
1	Working table I	11001	1
2	Set of objects	21001	1
3	Graph paper pad	21002	1
4	Position slide	21003	1
5	Measuring scale	21004	1
6	Optic fiber with separated brackets	21102	2
7	Optic fiber with a bracket	21103	1
8	Lamp & buzzer unit	21106	1
9	Counter unit	21108	1
10	Magnetic proximity sensor	21110	1
11	Through-beam sensor, transmitter	21111	1
12	Optical fiber sensor	21112	2
13	Retro-reflective optical sensor	21113	1
14	Through-beam sensor, receiver	21114	1
15	Magnetic reed switch	21115	1

No.	Component	Order number	Qty
16	Rotary unit	21121	1
17	Diffuse optical sensor	21122	1
18	Diffuse optical sensor (M18)	21123	1
19	Reflector unit	21101	1
20	Inductive sensor (M12), flush type	21124	1
21	Inductive sensor (M18), flush type	21125	1
22	Inductive proximity sensor (M18), non-flush type	21126	1
23	Inductive sensor (M30), 2-wire type	21127	1
24	Capacitive sensor (M18)	21128	1
25	Cable set	13080	1
26	Cable hanger	13091	1
27	Power supply	13090	1
28	Digital multimeter	21012	1
29	Vernier caliper	21013	1

Distance and displacement sensor training set (FS-120)



Order number : 21200

Training contents

- Usage of distance and displacement sensor
- Distance measurement using inductive sensor, optical sensor and ultra sonic sensor
- Active and passive sensor
- Usage and feature of spindle drive
- Geared motor and displacement sensor control
- Usage of analog sensor
- Feature of analog ultra sonic sensor
- Material detection and position check using analog inductive sensor
- Speed and position detection using rotary encoder
- Motor control with position transducer
- Color separation with analog optical sensor
- Measurement reporting
- Analysis of sensor testing
- Practical measurement

Component

No.	Component	Order number	Qty
1	Working table I	11001	1
2	Set of weights	21000	1
3	Position slide	21003	1
4	Bending bar	21005	1
5	Spindle drive unit (ball screw)	21006	1
6	Mounting kit (vernier caliper)	21104	1
7	Analog terminal	21105	1
8	Motor control unit	21107	1
9	Analog optical sensor	21109	1
10	Linear potentiometer	21116	1
11	Analog ultrasonic sensor unit	21117	1
12	Analog inductive sensor unit	21118	1
13	Proximity sensor (magnetic)	21119	2
14	Vernier caliper for fixing	21201	1

No.	Component	Order number	Qty
15	Rotary encoder	21202	1
16	Middle plate	21203	1
17	High position adapter	21204	1
18	Base unit (spindle drive)	21205	1
19	Geared motor	21206	1
20	Reflector set	21207	1
21	Assembly profile-L	21208	1
22	Assembly profile-I	21209	1
23	Power supply	13090	1
24	Cable set	13080	1
25	Cable hanger	13091	1
26	Digital multimeter	21012	1
27	Vernier caliper	21013	1

Force and pressure sensor training set (FS-130)



Order number : 21300

Training contents

- Features of strain gauge, load cell, pressure, temperature sensor
- Force measurement with strain gauge
- Usage of industrial load cell
- Pneumatic and electrical wiring of pressure sensor
- Temperature measurement with temperature sensor and controller
- Measurement and signal converting with bridge circuit
- Understanding of amplifier circuit (OP AMP)
- Quarter, Half and Full Bridge circuit
- Friction force measurement with a pneumatic cylinder
- Pressure switch adjusting and hysteresis measurement
- Air tank leakage test
- Measurement technology and data recording
- Measurement initialization
- Measurement analysis

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Component

No.	Component	Order number	Qty
1	Working table I	11001	1
2	Set of weights	21000	1
3	Analog terminal	21105	1
4	Lamp & buzzer unit	21106	1
5	Assembly profile-L	21208	1
6	Set of weights (circular type)	21301	1
7	Strain gauge unit	21302	1
8	Load cell unit	21303	1
9	Bridge amplifier	21304	1
10	Double acting cylinder	21305	1
11	Service unit	12101	1
12	Air distributor	12201	1

No.	Component	Order number	Qty
13	3/2-way push-button valve (Normally close)	12320	1
14	One-way flow control valve	12302	1
15	Air tank	12416	1
16	Plastic hose (1M)	12290	30
17	Hose cutter	12291	1
18	Pressure switch	13020	1
19	Analog pressure sensor 1	21306	1
20	Power supply	13090	1
21	Cable set	13080	1
22	Cable hanger	13091	1
23	Digital multimeter	21012	1
24	Compressor (for sensor)	21313	1

Temperature and special sensor training set (FS-140)



COMPONENT

No.	Component	Order number	Qty
1	Temperature sensor & controller	21307	1
2	Humidity sensor and controller	21308	1
3	Vibration sensor and controller	21311	1
4	Color mark sensor	21312	1

Portable sensor training set (FS-150)



Order number : 21400




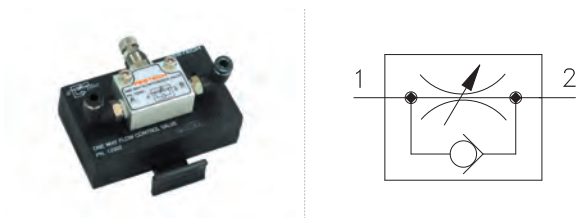
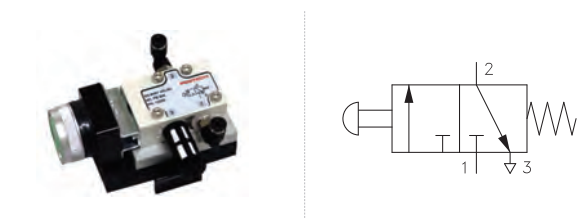
TRAINING CONTENTS

- Features of proximity switch and reed switch
- Types and response curve of inductive sensor
- Types and application of optical sensor
- Operating principle and response of capacitive sensor
- Usage of rotary unit and counter unit
- Speed measurement using through-beam sensor
- Monitor program usage of GUI controller
- Control training using GUI controller
- Measurement technology and date
- Electric wiring
- Circuit composition
- Adjustment and application limit of sensor
- Actual example in real fields

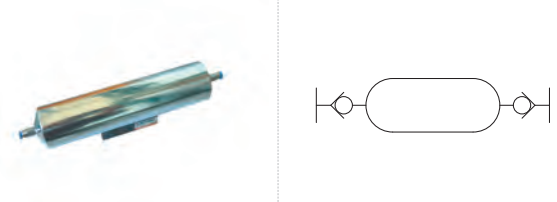
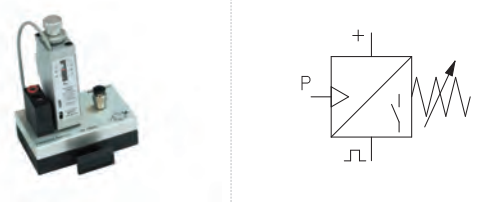


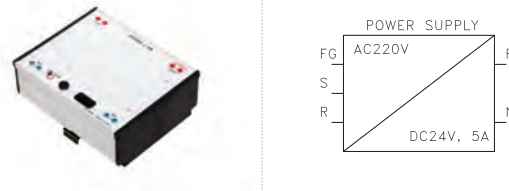
COMPONENT

No.	Component	Qty
1	Main frame	1
2	Sensor GUI Controller (option)	1
3	Motor drive unit	1
4	Motor speed controller	1
5	Position slide	1
6	Set of objects	1
7	Magnetic reed switch	1
8	Inductive sensor (M12), flush type	1
9	Inductive sensor (M18), flush type	1
10	Inductive sensor (M18), non-flush type	1
11	Rotary unit	1
12	Capacitive sensor (M18)	1
13	Through-beam sensor, transmitter	1
14	Retro-reflective optical sensor	1
15	Through-beam sensor, receiver	1
16	Optical fiber sensor	1
17	Diffuse optical sensor	1
18	Pulse generator module	1
19	Vernier calipers	1





Components

<p>Service unit</p>	<p>Order number : 12101</p>
	<ul style="list-style-type: none"> ● Pressure range : 0,5~12 bar ● Air filter, pressure regulator, lubricator ● Shut off valve ● Filter degree : 40μm ● Connection plastic hose : Outside diameter 6 mm ● Flow rate : 750 LPM
<p>Air distributor</p>	<p>Order number : 12201</p>
	<ul style="list-style-type: none"> ● Pressure range : 0~10 bar ● Input : 1 ea (6 mm) ● Output : 8 ea, check connector included (4 mm) ● One-touch connector
<p>Plastic hose (1M)</p>	<p>Order number : 23008</p>
	<ul style="list-style-type: none"> ● Operating temperature : -40$^{\circ}$C~60$^{\circ}$C ● Color : blue ● Size : outside 4mm
<p>One-way flow control valve</p>	<p>Order number : 12302</p>
	<ul style="list-style-type: none"> ● Pressure range : 0~10 bar ● 1(A)\rightarrow2(B) : 0~150 LPM ● 2(B)\rightarrow1(A) : 160/130 LPM
<p>3/2-way push-button valve (Normally closed)</p>	<p>Order number : 12320</p>
	<ul style="list-style-type: none"> ● Pressure range : 0~10 bar ● Push-button type ● Normally closed type valve ● Spring return ● Direct acting type






Components

<p>Air tank</p>	<p>Order number : 12416</p>
	<ul style="list-style-type: none"> ● One touch clamp ● Capacity : 400 ml
<p>Pressure switch</p>	<p>Order number : 13020</p>
	<ul style="list-style-type: none"> ● Pressure range : 0,5~10 bar ● Control setting pressure ● Pressure display
<p>Cable set</p>	<p>Order number : 13080</p>
	<ul style="list-style-type: none"> ● Color : red, blue, black ● Length : 1500mm, 1000mm, 500mm, 300mm, 100mm ● High elasticity and special coating
<p>Cable set (safety socket)</p>	<p>Order number : 113080</p>
	<ul style="list-style-type: none"> ● Color : red, blue, black ● Length : 1500mm, 1000mm, 500mm, 300mm, 100mm ● High elasticity and special coating ● Safety socket type
<p>Power supply</p>	<p>Order number : 13090</p>
	<ul style="list-style-type: none"> ● Power : AC 220 V, 50/60Hz ● Output Power : DC 24V ● Output Current : 5A



Components

<p>Set of weights</p>	<p>Order number : 21000</p>
	<ul style="list-style-type: none"> • Contents: 20g, 50g, 100g, 200g, 500g / ea • Case : wood
<p>Set of objects</p>	<p>Order number : 21001</p>
	<ul style="list-style-type: none"> • Various kinds of objects are contained in aluminum case • Magnetic, steel, stainless steel, aluminum, copper, rubber, plastic, bolt, cardboard etc.
<p>Graph paper pad</p>	<p>Order number : 21002</p>
	<ul style="list-style-type: none"> • Response curve marking for sensor test
<p>Position slide</p>	<p>Order number : 21003</p>
	<ul style="list-style-type: none"> • Sliding range : 150 mm • Scale : 1 mm • Rotary angle : $\pm 90^\circ$ • Rotary scale : 2° • Vernier scale : 0,2 mm • Max. fixture width : 5 mm
<p>Measuring scale</p>	<p>Order number : 21004</p>
	<ul style="list-style-type: none"> • Length : 1000 mm • Material : Stainless steel

Components

<p>Bending bar</p> 	<p>Order number : 21005</p> <ul style="list-style-type: none"> ● Weight load measurement
<p>Digital multimeter</p> 	<p>Order number : 21012</p> <ul style="list-style-type: none"> ● AC/DC current : 0,01 mA ~ 10 A ● AC/DC voltage : 0,1 mV ~ 1000 V ● Temperature : -40°C ~ +400°C (-40°F ~ +75°F) ● Diode measurement ● Frequency : 2 Hz ~ 100 kHz
<p>Vernier caliper</p> 	<p>Order number : 21013</p> <ul style="list-style-type: none"> ● Measuring distance : 150 mm ● Scale : Digital display
<p>Analog sensor display module</p> 	<p>Order number : 21015</p> <ul style="list-style-type: none"> ● Size : 60mm × 40mm ● Power : DC24V ● Voltage measurement range : 0~10V ● Current measurement range : 0~20mA ● Voltage measurement Display : square LED ● Current measurement Display : rotary LED
<p>Illuminance control unit</p> 	<p>Order number : 21016</p> <ul style="list-style-type: none"> ● Power : DC24V ● High bright LED ● Adjustable bright with knob ● Color filter

Components

<p>Reflector unit</p>	<p>Order number : 21101</p>
	<ul style="list-style-type: none"> ● Size : 60mm × 40mm ● Material : plastic reflect mirror
<p>Optic fiber with separated brackets</p>	<p>Order number : 21102</p>
	<ul style="list-style-type: none"> ● Fiber cable diameter : 2,2 mm ● Length : 2000 mm ● Allowed flexibility : >30mm ● Min. detection distance : 1mm ● Size : M4
<p>Optic fiber with a bracket</p>	<p>Order number : 21103</p>
	<ul style="list-style-type: none"> ● Fiber cable diameter : 2,2 mm ● Length : 2000 mm ● Allowed flexibility : >30mm ● Min. detection distance : 0,03mm ● Size : M6
<p>Analog terminal</p>	<p>Order number : 21105</p>
	<ul style="list-style-type: none"> ● Analog input <ul style="list-style-type: none"> – Voltage range : -10 ~ +10V (Max, ±30V) – Input Impedance : 200 kΩ – Current range : 0 ~ 20mA ● Analog output <ul style="list-style-type: none"> – Voltage range : -10 ~ +10V (Max, ±30V) – Short protection circuit – Current : Max, 20mA
<p>Lamp & buzzer unit</p>	<p>Order number : 21106</p>
	<ul style="list-style-type: none"> ● Electrical distributor with lamp & buzzer ● Buzzer : 3 W ● Lamp : 4 W ● Power consumption : 1,2 W

Components

Motor control unit

Order number : 21107



- Geared motor controller
- Motor output : $\pm 20V$ DC/300 mA
- Remote control input : $\pm 10V$ DC
- Position input : 0 ~ 10V DC
- Proximity sensor input : 24V DC / 30mA
- Precision : $\pm 5\%$

Counter unit

Order number : 21108



- Input voltage : Max, $\pm 30V$ DC
- Input signal voltage : +15 ~ +24 V
- Power consumption : 1,2W
- Pulse output 100 pulses/s : $\pm 6\%$
- Pulse output 1000 pulses/s : $\pm 3\%$
- Internal clock : $\pm 3\%$
- 4 digit indicator
- Pulse count, Pulse frequency measurement

Analog optical sensor unit

Order number : 21109



- Power : 12 ~ 24V DC
- Response time : Max, 1 ms
- Measurement range : 8 ~ 40 mm
- Analog output : 4 ~ 20 mA
- Impedance : 20 M Ω
- Fiber unit included
- Reflective sensor with analog output

Magnetic proximity sensor

Order number : 21110



- Switching output : PNP, Normally open
- Precision : $\pm 0,1$ mm
- Deviation : $\pm 0,1$ mm
- Response range : 7 ~ 17 mm
- Hysteresis : 0,1 ~ 1,5 mm
- Max, switching current : 200 mA
- Max, switching frequency : 1000 Hz

Through-beam sensor, transmitter

Order number : 21111



- Optical : IR LED
- Nominal length : 3 m
- Response time : Max, 3 ms
- Power : 12 ~ 24V DC $\pm 10\%$
- Power consumption : Max, 45 mA
- Impedance : Min, 20M Ω (500V DC)

Components

<p>Optical fiber sensor</p>	<p>Order number : 21112</p>
	<ul style="list-style-type: none"> ● Optical : IR LED ● Power : 12 ~ 24V DC ±10% ● Output : PNP, Normally open / Normally closed ● Response time : Max, 1 ms ● Power consumption : Max, 40 mA ● Max, Current : 200 mA ● Operating temperature : -10 ~ +60 °C
<p>Retro-reflective optical sensor</p>	<p>Order number : 21113</p>
	<ul style="list-style-type: none"> ● Optical : IR LED ● Power : 10 ~ 30V DC ±10% ● Output : PNP, Normally open / Normally closed ● Response time : Max, 1 ms ● Power consumption : Max, 40 mA ● Max, Current : 200 mA ● Operating temperature : -10 ~ +60 °C
<p>Through-beam sensor, receiver</p>	<p>Order number : 21114</p>
	<ul style="list-style-type: none"> ● Optical : IR LED ● Power : 10 ~ 30V DC ±10% ● Output : PNP, Normally open / Normally closed ● Response time : Max, 1 ms ● Power consumption : Max, 40 mA ● Max, distance : 5 m ● Operating temperature : -10 ~ +60 °C
<p>Magnetic reed switch</p>	<p>Order number : 21115</p>
	<ul style="list-style-type: none"> ● Power : 12 ~ 27V AC/DC ● Precision : ±0,1mm ● Impedance : 100 MΩ ● Response time (bounce) : < 2 ms ● Max, switching frequency : 500 Hz ● Max, load : 40 W
<p>Analog ultrasonic sensor unit</p>	<p>Order number : 21117</p>
	<ul style="list-style-type: none"> ● Power : 24 V DC ±10% ● Detecting distance : 60 ~ 250 mm ● Output Current : 6 ~ 20 A ● Tolerance : ±5% FS ● Output voltage : 0 ~ 10 V DC ● Resolution : 2 mm ● Current consumption : 25 mA ● Ultra sonic frequency : 360 ±15 kHz

Components

Analog inductive sensor unit

Order number : 21118



- Voltage : 15 ~ 30 V DC $\pm 10\%$
- Measurement distance : 3 ~ 8 mm
- Min. Precision : $\pm 1\%$
- Operating temperature : $-10 \sim +70 \text{ }^\circ\text{C}$
- Output voltage : 0 ~ 10 V DC
- Output Current : 0 ~ 20mA

Rotary unit

Order number : 21121



- Power : 4 ~ 30V DC
- Current consumption : 100 mA
- Rotary speed range : 600 ~ 4900 rpm
- Speed adjustable : 2 buttons (increase, decrease)

Diffuse optical sensor

Order number : 21122



- Optical : IR LED
- Power : 12 ~ 24V DC $\pm 10\%$
- Output : PNP, NO
- Response time : Max, 1 ms
- Current consumption : Max, 40 mA
- Max, Current : 300 mA
- Operating temperature : $-10 \sim +60 \text{ }^\circ\text{C}$

Diffuse optical sensor (M18)

Order number : 21123



- Optical : IR LED
- Power : 12 ~ 24V DC $\pm 10\%$
- Output : PNP, NO
- Response time : Max, 1 ms
- Current consumption : Max, 40 mA
- Max, Current : 100 mA
- Operating temperature : $-10 \sim +60 \text{ }^\circ\text{C}$

Inductive sensor (M12), flush type

Order number : 21124



- Power : 10 ~ 30V DC $\pm 10\%$
- Output : PNP, NO
- Detection distance : 2mm $\pm 10\%$
- Hysteresis : 10% of Max, detection distance
- Power consumption : Max, 10 mA
- Max, switching frequency : 800 Hz
- Operating temperature : $-25 \sim +70 \text{ }^\circ\text{C}$

Components

Inductive sensor (M18), flush type Order number : 21125



- Power : 10 ~ 30V DC $\pm 10\%$
- Output : PNP, NO
- Detection distance : 5mm $\pm 10\%$
- Hysteresis : 10% of Max, detection distance
- Power consumption : Max, 10 mA
- Max, switching frequency : 350 Hz
- Operating temperature : $-25 \sim +70 \text{ }^\circ\text{C}$

Inductive sensor (M18), non-flush type Order number : 21126



- Power : 10 ~ 30V DC $\pm 10\%$
- Output : PNP, NO
- Detection distance : 8mm $\pm 10\%$
- Hysteresis : 10% of Max, detection distance
- Power consumption : Max, mA
- Max, switching frequency : 200 Hz
- Operating temperature : $-25 \sim +70 \text{ }^\circ\text{C}$

Inductive sensor (M30), 2-wire type Order number : 21127



- Power : 20 ~ 30V DC $\pm 10\%$
- Output : NO
- Detection distance : 10mm $\pm 10\%$
- Hysteresis : 10% of Max, detection distance
- Power consumption : Max, 0,9 mA
- Max, switching frequency : 250 Hz
- Operating temperature : $-25 \sim +70 \text{ }^\circ\text{C}$

Capacitive sensor (M18) Order number : 21128



- Power : 10 ~ 55V DC
- Detection distance : 8mm $\pm 10\%$
- Hysteresis : 20% of Max, detection distance
- Power consumption : Max, 15 mA
- Max, switching frequency : 50 Hz

Spindle drive unit (ball screw) Order number : 21006



- Size : 420×100×30mm
- Stroke : 280mm
- Spindle twin guide : $\varnothing 12$
- Spindle : pitch 3mm, $\varnothing 10$
- Type : ball screw
- Sensor guide attached
- Magnet attached

Components

Mounting kit (vernier caliper)

Order number : 21104



- Mounting kit for vernier caliper (ON, 21201) on the spindle drive

Linear potentiometer

Order number : 21116



- Power : 13 ~ 30 V DC
- Potentiometer register : 5 k Ω
- Measurement distance : 300 mm
- Output voltage : 0 ~ 10 V DC
- Max, allowed error : $\pm 0,07\%$ of full scale
- Resolution : 0,01 mm
- Control speed : < 10 ms

Proximity sensor (magnetic)

Order number : 21119



- Output : PNP, NO type
- Position Precision : $\pm 0,01$ mm
- Position Deviation : $\pm 0,1$ mm
- Response range : 7 ~ 17 mm
- Hysteresis : 0,1 ~ 1,5 mm
- Max, switching frequency : 1000 Hz
- Max, switching current : 200 mA
- 1 set : 2 ea

Vernier caliper for fixing

Order number : 21201



- Measurement distance : 150 mm
- Display : Digital display






Rotary encoder

Order number : 21202



- Power : 12 ~ 24 V DC
- Phase : A, B, Z
- Pulse : 100 pulse/r

Components

<p>Middle plate (for spindle drive)</p>	<p>Order number : 21203</p>
	<ul style="list-style-type: none"> ● Size : 90×90mm ● Fix hole : 4ea
<p>High position adapter (for spindle drive)</p>	<p>Order number : 21204</p>
	<ul style="list-style-type: none"> ● Size : 90×40×20mm ● Hole : 2ea
<p>Base unit (for spindle drive)</p>	<p>Order number : 21205</p>
	<ul style="list-style-type: none"> ● Length : 425mm ● Mounting clamping : 2ea
<p>Geared motor</p>	<p>Order number : 21206</p>
	<ul style="list-style-type: none"> ● Operating voltage : DC 24V ● Gear ratio : 20 ● Cable : safety socket 4mm
<p>Reflector set</p>	<p>Order number : 21207</p>
	<ul style="list-style-type: none"> ● Material : aluminum ● 1 set : 3 reflectors ● Size (1) : 60×180mm ● Size (2) : 40×180mm ● Size (3) : 30×180mm

Components

Assembly profile-L

Order number : 21208



- L-shape aluminum profile
- Size : 150×150mm

Assembly profile-I

Order number : 21209



- I-shape aluminum profile

Set of weights (circular type)

Order number : 21301



- Quantity : 10 ea (1,000g /ea)
- Case : wood

Strain gauge unit

Order number : 21302



- Measurement range : 0 ~ 5 N
- Over load : 130% of measurement range
- Type : Foil SG
- Register : 350 Ω
- Max. input allowed voltage : 10 V

Load cell unit

Order number : 21303



- Measurement range : 0 ~200 N
- Measurement tolerance : 1% of full-scale value
- Sensitivity (nominal) : 1 mV
- Allowed load : 130% of measurement range
- Limit load : 200% of measurement range
- Bridge register (Full bridge) : 350 Ω
- Allowed input voltage : 3 ~ 10V AC/DC

Components

Bridge amplifier

Order number : 21304



- Power consumption : 50 mA
- Register : 350 Ω
- Bridge input voltage : 5V DC
- Amplifying input range : ±10 mV
- Amplifying output range : ±5 V
- Amplifying rate : app. 500

Double acting cylinder

Order number : 21305



- Pressure : Max, 10 bar
- Cylinder inner diameter : 25mm
- Stroke : 100 mm
- Advance force at 6 bar : 267 N
- Return force at 6 bar : 220 N

Analog pressure sensor

Order number : 21306



- Pressure range : 0 ~ 10 bar
- Max, allowed pressure : 14 bar
- Power : 24 V DC
- Output voltage : 0 ~ 10 V
- Current : 0 ~ 20 mA
- Measurement tolerance : ±1%
- Max, measurement frequency : 100 Hz

Temperature sensor & controller

Order number : 21307



- Controller Power : 220V AC, 60Hz
- Output Current : 4 ~ 20 mA
- Thermocouple : KC 0,0 ~ 400,0 °C
- PID control
- Heating button
- Heater included
- PT-100 Ω sensor included
- Output : 1C relay

Humidity sensor and controller

Order number : 21308



- Power : 220V AC, 60Hz
- Relay output (1C)
- Measurement range : 20 ~ 99%RH
- Resolution : ±1%rdg ± 1digit

Components

Vibration sensor and controller

Order number : 21311



- Power : DC24V
- Vibration sensor
 - sensitivity : 5,1mV(m/s²)±20%
 - frequency range : 10 ~ 2000Hz
- Controller
 - Power : DC12 ~ 24V
 - Output : 4 ~ 20mA

Color mark sensor

Order number : 21312



- Power : DC 24V
- Optical : halogen lamp
- Response time : 1m/10ms switch selection
- Output : NPN open collector
- Protection circuit

Cable hanger

Order number : 13091



- Round plate diameter : 400mm
- Height : 1100 ~ 1800mm adjustable type
- Castor : 5 ea
- Cable hanger : 16 holes

Compressor (for sensor)

Order number : 21313



- Motor : 220V AC, 60Hz, 0,2HP
- Pressure : Max. 7bar
- Type : oil-less
- Tank Size : 3L
- Weight : 8,5kg

Sensor training set manual

Order number : 42041



- Exercise book
- FS-110
- FS-120
- FS-130

Memo

