

FSD23 Series

DISPLACEMENT SENSOR



Specification

| Part number | Analog current 4-20mA | FSD23-15-AA | FSD23-35-AA | FSD23-100-AA |
|-----------------------------------|-----------------------|--|---------------------|---------------------|
| Center of measurement range | | 15mm | 35mm | 100mm |
| Measurement range | | ±5mm | ±15mm | ±50mm |
| Light source | | Red laser Diode (wave length 650nm) | | |
| Laser class | | Max. output: 390 μW | | |
| Spot size #1 | | 500 * 700μm | 450 * 800μm | 600 * 700μm |
| Linearity | | ±0.1%ofF.S. | ±0.1%ofF.S. | ±0.1%ofF.S. |
| Repeatability #2 | | 1μm | 6μm | 20μm |
| Sampling period | | 500μs / 1000μs / 2000μs / 4000μs / AUTO | | |
| Temperature drift (typical value) | | ±0.02% / °C of F.S. | ±0.02% / °C of F.S. | ±0.05% / °C of F.S. |
| Indicator | | Laser indicator: Green / Zero reset indicator: Red Output indicator: Orange / Mode indicator: Red | | |
| MF (multiple function) Input | | Laser OFF, Teaching, Sample & Hold, One shot, Zero reset | | |
| Control Output | | NPN/PNP max.100mA/DC30V ((Residual voltage 1.8 V max.) | | |
| Current consumption | | 70mA max. including Analog output current | | |
| Protection circuit | | Reverse connection protection, Over current protection | | |
| Protection category | | IP67 including connection part | | |
| Operating Temp./Humid. | | -10 ~ 50°C / 35 ~ 85% RH without freazing or condensation | | |
| Storage Temp./Humid. | | -20 ~ 60°C / 35 ~ 85%/RH | | |
| Ambient illuminance | | Sun light: 20,000 lx max. / Incandescent lamp: 3,000 lx max. | | |
| Vibration resistance | | 10 ~ 55Hz, Double amplitude 1.5mm, X,Y,Z for 2 hours | | |
| Shock resistance | | 500mm/s ² (approx. 50G) X,Y,Z 3 times each | | |
| Material | | Case: Aluminum/SUS316, Front lens: PPSU, Display: PET | | |

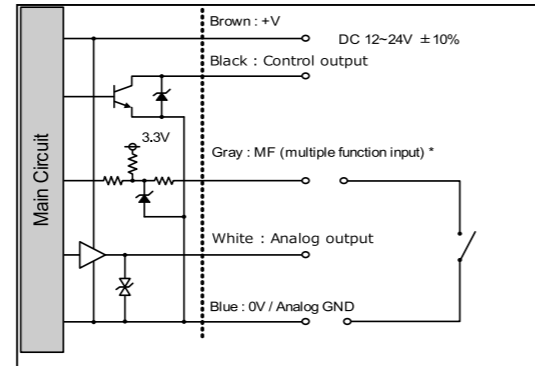
The specifications are based on the condition unless otherwise designated: Ambient temperature: 23°C, Supply voltage: 24VDC, Sampling period: 500μs, Averaging: 64, Measuring distance: Center of the range, Testing object: White ceramic
 ※ 1 Defined with center strength 1/e²(13.5%) at the center. There may be leak light other than the specified spot size. The sensor may be affected when there is a highly reflective object close to the detection area.
 ※ 2 512 averaging time

Specifications per output

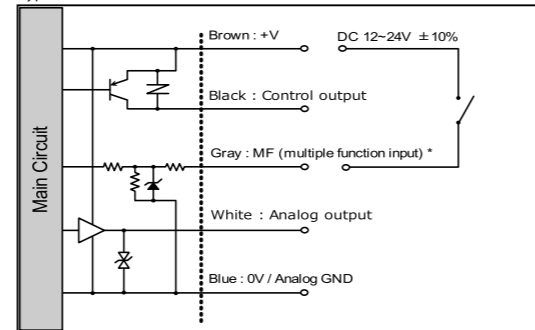
| Part number | FSD23-□□-AV | FSD23-□□-AA | FSD23-□□-RS485 |
|------------------------|----------------|----------------|----------------|
| Type | Voltage output | Current output | RS-485 type |
| Analog output range | 0 ~ 10V | 4 ~ 20mA | — |
| Maximum load impedance | — | 300Ω | — |
| Output impedance | 100Ω | — | — |
| Power supply | DC18-24V±10% | DC12-24V ±10% | — |

Wiring Diagram

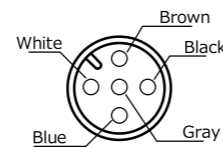
NPN type



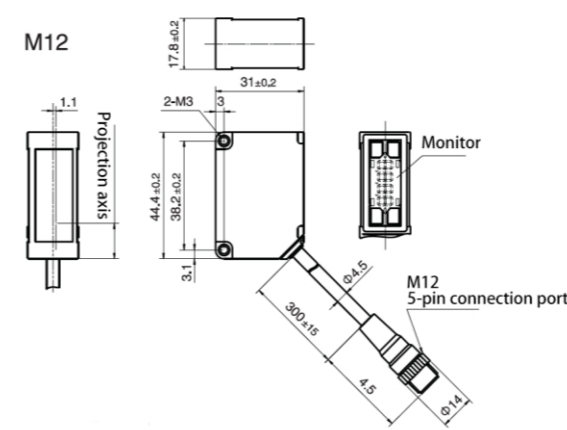
PNP type



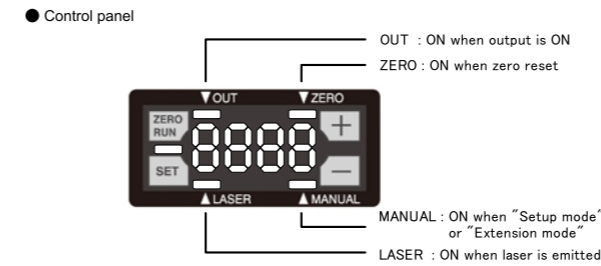
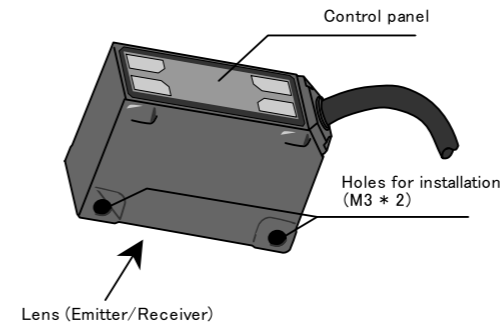
Pins configuration (sensor side)



Dimensions

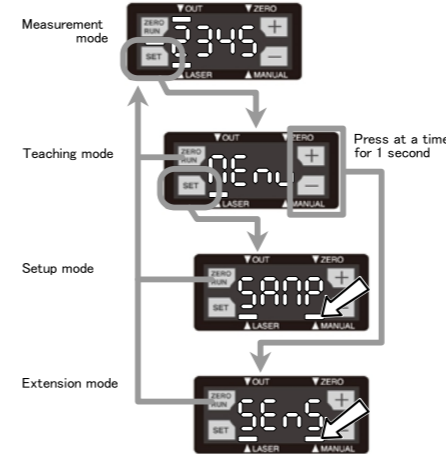


Functions of Components



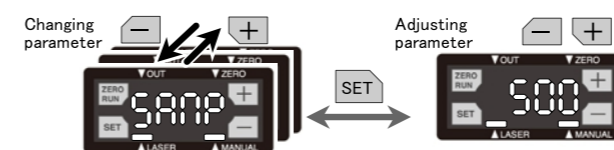
Setup

Changing mode
 While it's "Teach mode", "Setup mode" or "Extension mode", you can change the mode to "Measurement mode" by pressing "ZERO/RUN" button.
 While it's "Setup mode" or "Extension mode", the LED "MANUAL" is lit.

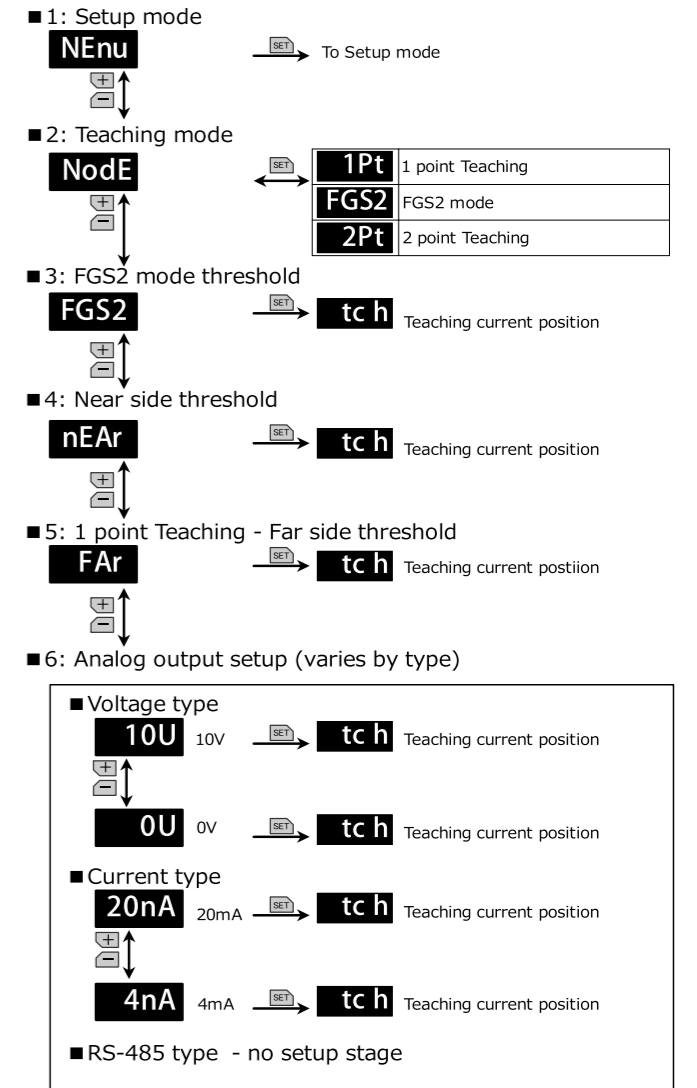


Changing parameters

You can choose and adjust the parameters by pressing "+" and "-" buttons. The mode will be changed to "Measurement mode" by pressing "ZERO/RUN" button.



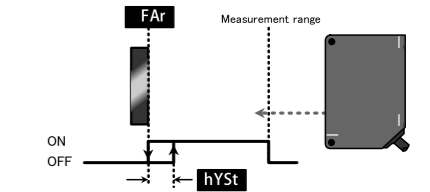
Teach Mode



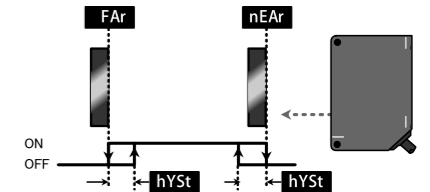
Measurement Mode

FSD23 has 3 measurement mode. The mode is chosen by "Teach mode". Output can be reversed by setting "Output polarity Act1". Following output shows its ON/OFF status as "Light ON L on".

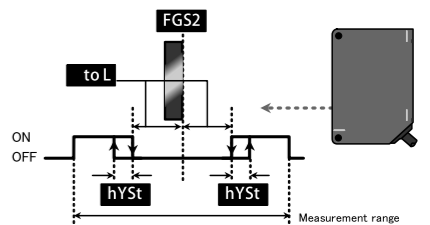
1 point Teaching
 Teaching is done at a position. When the measurement distance is closer than that position, the output will be ON.



2 point Teaching
 Teaching is done at 2 positions. While the measurement distance is between those positions, the output will be ON.



FGS2 mode
 Teaching is done at a position. When the measurement distance is closer than the distance set by "Hysteresis to L" from the position that Teaching is done, the output will be ON. It works as FGS sensor.



Precautions

- Please make sure that the power supply voltage is within the rated voltage range before powering on
- The time from powering-on to normal detection of the sensor is 100ms, please ensure that the sensor is used after 100ms of powering-on
- When using different power sources for the sensor and load, be sure to turn on the power of the sensor first
- When the sensor is not used, it is recommended to cut off the power of the load first and then turn off the power of the sensor
- Do not subject the sensor to severe external forces (such as hammer hits, etc.) during installation, so as not to damage the sensor performance
- Avoid using thinner, alcohol or other organic solvents when cleaning

Safety Warning

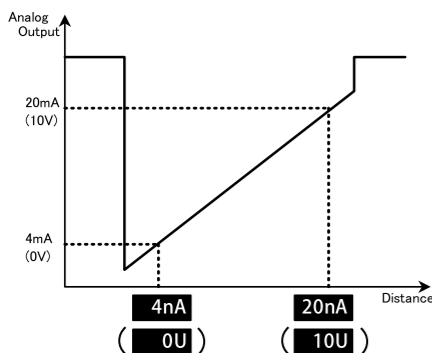
- Do not use in an environment with flammable, explosive or corrosive gases.
- Do not use in an environment with oil or chemicals.
- Do not use in an environment with high humidity.
- Do not use in direct sunlight.
- Do not use under other environmental conditions that exceed the rated value.
- Do not disassemble, repair or modify the product without permission.

End-of-life Disposal

When the product is disposed of, please dispose of it as industrial waste.

Analog Output

Analog Current or Analog Voltage type outputs Analog output according to the measurement distance. The distance range for Analog output is set in Teaching mode or Setup mode.



● Default value of each Analog output type

| Current (Voltage) | FSD23-15-□□ | FSD23-35-□□ | FSD23-100-□□ |
|-------------------|-------------|-------------|--------------|
| 4nA (0U) | - 5.000 | - 15.000 | - 50.00 |
| 20nA (10U) | 5.000 | 15.000 | 50.00 |

MF(Multi-Function) Input

Multiple function can be set at MF input. When it's set as "Teaching" or "Zero reset", The function varies by input period as follows.

Teaching

| MF input period (sec.) | What to teach (Teaching current position) |
|------------------------|---|
| 0 | Do nothing |
| 0.5 | Current output type : 4mA/ Voltage output type : 0V |
| 1.5 | Current output type : 20mA/ Voltage output type 10V |
| 2.5 | Near side threshold |
| 3.5 | Far side threshold |
| 4.5 | FGS2 threshold |

Zero reset

| MF input (sampling) | Function |
|-----------------------|--------------------|
| 0 | Zero reset |
| 2,000 | Release Zero reset |

Setup mode

Setup mode is chosen by pressing "SET" button from "Menu". (* means default value)

1: Analog output setup (varies by type)

■ Voltage type

10U 10V ← **0.123** Set the value

0U 0V ← **0.123** Set the value

■ Current type

20nA 20mA ← **0.123** Set the value

4nA 4mA ← **0.123** Set the value

■ RS-485 type - no setup stage

2: Near side threshold

nEAr ← **0.123** Set the value (Default: FSD23 -15□□ -1.000, FSD23 -35□□ -03.00, FSD23-100□□ -10.00)

3: 1 point Teaching - Far side threshold

FAr ← **0.123** Set the value (Default: FSD23 -15□□ 1.000, FSD23 -35□□ 03.00, FSD23-100□□ 10.00)

4: FGS2 mode threshold

FGS2 ← **0.123** Set the value (Default: FSD23 -15□□ 0.000, FSD23 -35□□ 00.00, FSD23-100□□ 00.00)

5: Teaching mode

Node ← **1Pt** 1 point Teaching

FGS2 FGS2 mode

2Pt 2 point Teaching *

6: FGS2 mode hysteresis

toL ← **0.123** Set the value (Default: FSD23 -15□□ 0.000, FSD23 -35□□ 00.00, FSD23-100□□ 00.00)

7: Multiple function input

NF ← **oFF** MF OFF : Disable MF input *

LSr Laser OFF : Kill laser power when input is ON

tc h Teaching : Set current value as threshold

S h Sample hold : Keep the level when input is ON

onE One shot : Active when input is ON

2Er o Zero reset : Set current position as "0"

8: Sampling period

SANP ← **500** 500μs (2kHz) *

1000 1000μs (1kHz)

2000 2000μs (500Hz)

4000 4000μs (250Hz)

Auto AUTO (Sensor will optimize automatically)

9: Output polarity

Acti ← **L on** Light ON: ON when exceeds the threshold *

D on Dark ON: ON when less than the threshold

10: NPN/PNP selection

n_P ← **nPn** Set input/output as NPN *

PnP Set input/output as PNP

This parameter won't be change by reset

11: Averaging number

AUG ← **1** Once

8 8 times

64 64 times *

512 512 times

12: Alarm setting

ALrN ← **clNP** Clamp : display "9999" *

hoLD Hold : keep previous value

12-2: Alarm - Hold and Clamp

hdct ← **0000** Set sampling number to Hold

When Alarm is set as **hoLD**, measurement data will be as follows for Alarm

● "Hold and Clamp" is active

Keep the previous data for the period and clamp to "9999" after that.

● "Hold and Clamp" is not active (when it's set "0000")

Keep the previous data while it's Alarm status.

13: Reset (Initializing)

rES t ← **YES** Initialize the parameters to default setting

no Do nothing

14: Display setting

diS P ← **on** Activate the display while "Key lock" *

oFF Desable the display while "Key lock"

Extension mode

Extension mode is chosen by pressing "+" and "-" buttons at a time for 1 second. Parameters in Extension mode must be set correctly otherwise it might not work correctly. Please use with default setting when changing parameters is not needed. ("*" means default setting)

1: Hysteresis

hYSt ← **0.123** Set the value (Default: FSD23 -15□□ 0.250, FSD23 -35□□ 00.75, FSD23-100□□ 02.50)

2: Measurement point

NtoP ← **NAH** MAX : Maximum distance *

Pt 5 Pt5 : 5th point from sensor side

Pt 4 Pt4 : 4th point from sensor side

Pt 3 Pt3 : 3rd point from sensor side

Pt 2 Pt2 : 2nd point from sensor side

Pt 1 Pt1 : Closest point from sensor side

3: Threshold

thr E ← **bASE** Base : Set threshold to lowest level *

P400 P400 : Set threshold to upper level

P200 P200 : Set threshold to middle level

P100 P100 : Set threshold to lower level

4: Time out

tout ← **off** Disable Time out *

100N Time out in 100ms

SaNP Time out in sampling period

5: MF input filter

NFct ← **1** Once *

256 256 times

6: Zero shift

2Er o ← **0.123** Set the value

7: Sensitivity

SEnS ← **Auto** Auto : Adjust automatically *

N_6 6 : Maximum sensitivity

N_1 1 : Minimum sensitivity

Miscellaneous function

Zero reset function

Set Zero reset

While it's measurement mode, press **ZERO RUN** for 2 seconds.

Then, **0.000** will be shown. The position of decimal point varies by sensor type.

When setting Zero reset, the red indicator LED "ZERO" will be ON.

Release zero reset

While it's measurement mode, press **ZERO RUN** for 4 seconds to release Zero reset.

Key lock function

Activate Key lock

While it's measurement mode, press **+ -** at a time for 1 second. Then, **Loc** will be shown.

While **Loc** is shown, any access except "Releasing Key lock" will be neglected.

Release Key lock

While Key lock is activated, it will be released by pressing

+ - at a time for 3 seconds. Then, **uLoc** will be shown.

After this process, every access will be accepted.

Product specifications are subject to change without notice.
For more information or if you have any questions or suggestions about this product, please feel free to contact us.