AD-4532B

Digital Indicator

INSTRUCTION MANUAL

A&D Company, Limited

1WMPD4001683B

WARNING DEFINITIONS

The warnings described in this manual have the following meanings:

⚠WARNING	A potentially hazardous situation which, if not avoided, could result in death or serious injury.
⚠CAUTION	A potentially hazardous situation which, if not avoided, may result in minor or moderate injury or damage to the instrument.
	This symbol indicates caution against electrical shock. Do not touch the part where the symbol is placed.
	This symbol indicates the ground terminal.
	This symbol indicates information useful to the user for operation of the device.

The contents of this manual and the specifications of the instrument covered by this manual are subject to change for improvement without notice.

CONTENTS

1. INTRODUCTION

Thank you for purchasing the AD-4532B, Digital Indicator.

This manual describes how the AD-4532B works and how to get the most out of it in terms of performance. Please read this manual completely before using the AD-4532B.

1-1 Features

The AD-4532B has the following features.

□ High-speed conversion

A 2000 times-per-second high-speed A/D converter is used for inputs from sensors.

A 2000 times-per-second high-speed D/A converter is used for analog outputs.

□ Calibration without actual load (Digital span mode)

Keying in the sensor's rated output voltage (mV/V) allows calibration to be performed without using an actual load.

□ Various input sources

Upper and lower limit values can be input with front panel keys or by using the Modbus RTU interface with an external computer.

The front panel keys, contact signals on the rear panel, and the Modbus port can be used for zero adjustment and peak holding.

□ Hold function

Sample, peak, bottom and bipolar peak values can be held by using the hold mode.

□ Comparison function

Comparison results (HI, OK and LO) are output as display data and also as contact signals. 5-level comparison (2D comparator mode) is available using the comparator mode. The LED color depends on the comparison result in the 2D comparator mode.

□ Various data output terminals

Analog amplifier output (AAO), D/A voltage output (DAV) and comparator output are provided as standard with the AD-4532B.

Available options include BCD output, RS-232C serial interface, analog voltage output (DAV)/analog current output (DAI) and Ethernet interface

□ 3-colored LED display

The 3-colored LED display, that varies with the mode or setting, is used for easier viewing.

2. PRECAUTIONS

The AD-4532B is a precision instrument. To get the most from your AD-4532B, observe the following precautions.

2-1 Unpacking

Unpack the AD-4532B carefully and confirm that everything is contained. Keep the packing material if you want to transport the indicator again in the future.

2-2 Precautions Before Use

- □ Avoid water and moisture.
- □ Avoid vibration, shock, extremely high temperature and humidity, direct sunlight, dust, and air containing salt or sulfurous gases.
- □ Avoid places where inflammable gases or vapors are present.
- □ The operating temperature is -5°C to +40°C.
- □ The power requirement is 85 VAC to 250 VAC. Use a stable power supply free from instantaneous dropout or noise. Avoid sharing with the power line.
- □ Connect a grounding wire to the ground terminal. Do not share grounding with other units that create electrical noise.
- □ Keep cables sensitive to electrical noise away from power cables and other sources of electrical noise.
- □ Connect a non-inductive load of 5 kΩ or more to the analog output terminals.
- □ Use 6-wire shielded cables to connect sensors. If 4-wire cables are used, connecting long cables to the sensors will increase the total cable resistance and cause measurement errors. Keep these cables away from power cables and other electrically noisy cables
- □ Do not connect the AD-4532B to the power supply before installation is completed. The AD-4532B has no switch to disconnect the power supply.
- □ Use shielded input/output cables. Connect the cable shield to the FG terminal or the indicator housing.

2-3 Precautions During Use

□ The AD-4532B is a precision instrument that measures the microvolt output from sensors. Prevent noise sources such as power lines, radios, electric welders or motors from affecting the instrument.

□ Do not try to modify the AD-4532B.

□ In any hold mode, the hold data is saved in a digital manner, causing no drooping of the value displayed on the display panel or the analog output. Note that the hold function is disabled when the AD-4532B is disconnected from the power supply.

□ During calibration, both no-load and actual load input must be stable. If the inputs are unstable from the moment the [↵] key is pressed to the moment the next data is displayed, a calibration error will occur.

⚠WARNING
Disconnect from the power supply before removing the cover ■ When removing the cover, make sure that the power is off.


Do not touch the instrument immediately after it is disconnected from the power supply. ■ To avoid electrical shock, do not touch the internal part of the instrument within ten seconds after the power is off.

⚠CAUTION
Be sure to fasten all the screws completely. ■ Loose screws may come off during operation and a short circuit may occur. Or measurement errors may occur due to noise.

3. SPECIFICATIONS

□ Number of measurement points 1

□ Sensor type Strain gauge sensors (Output resistance: 10kΩ or less)

□ Sensor power supply (Applied voltage: To be switched by the function setting.)

(1) 5 VDC 350Ω sensor: Up to four sensors can be connected.

(1) 2.5 VDC 120Ω sensor: Up to two sensors can be connected.

350Ω sensor: Up to eight sensors can be connected.

□ Calibration method Digital span: Method not using an actual load

Actual load calibration

□ Measurement ranges Zero calibration range: ±50% of the calibrated span range

Span calibration range: ±0.25 to 3 mV/V

Minimum guaranteed input sensitivity: 0.6 μV/d

Minimum guaranteed display sensitivity: 0.12 μV/d

□ Maximum display ±999999

□ Linearity 0.02%F.S. ± 1 digit

□ A/D conversion 2000 times per second

□ Temperature characteristics Zero: ±0.5 μV/°C typ.

Span: ±30 ppm/°C typ.

□ Display panel Main display: 7-segment, 3-colored (red, orange, green), 6-digit LED screen with 14-mm character size

17 status indicators

Sub-displays: 7-segment, 5-digit green LED screen with 9-mm character size

Number of keys: Six

□ Functions Comparator function: Allows upper and lower limits to be set, and HI, OK and LO signals to be output from the rear panel contacts.

5-level comparator (2D comparator)

Contact capacity: 0.1 A at 250 VAC or 0.5 A at 30 VDC (Semi-conductor relay)

Hold function: Select from sample hold, peak hold, bottom hold or bipolar peak hold.

Analog amplifier output: ±10 V at ±3.2 mV/V

Linearity: 0.05%F.S.

Temperature coefficient: 100 ppm/°C typ.

DAV output: Max. ±10 V (Scaling is available by the function setting.)

Output resolution: 1/10000

Temperature coefficient: 100 ppm/°C typ.

Modbus: Modbus RTU

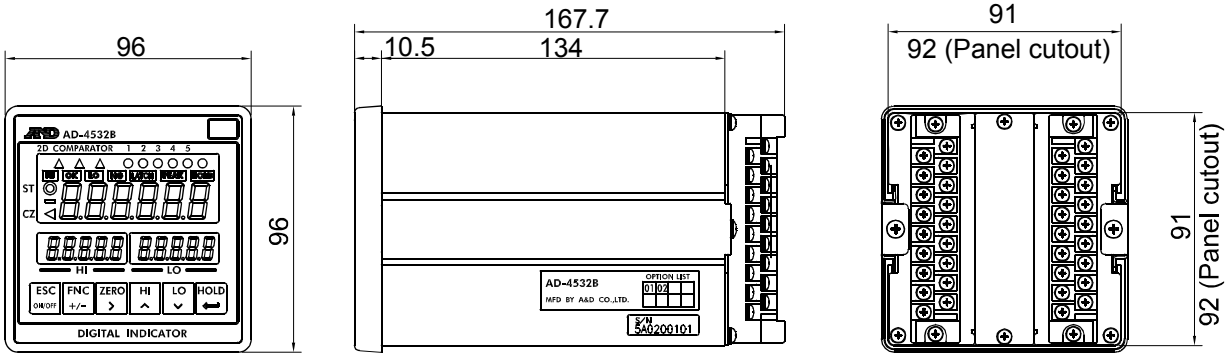
Others: Zero adjustment, key disabling function and LATCH function

□ Options

AD-4532B-01: BCD output
AD-4532B-04: RS-232C serial interface
AD-4532B-07: DAV/DAI (analog voltage output/analog current output)
AD-4532B-08: Ethernet interface
Note: Only one of the options can be installed in the AD-4532B at a time.

□ General specifications

Power requirement: 85 VAC to 250 VAC, 50/60 Hz, Approx. 20 VA
Operating temperature: -5°C to +40°C
Operating humidity: Max. 85% RH (non-condensing)
External dimensions: 96 x 96 x 155 mm (W x H x D)
Panel cutout: 92 x 92 mm
Weight: Approx. 900 g

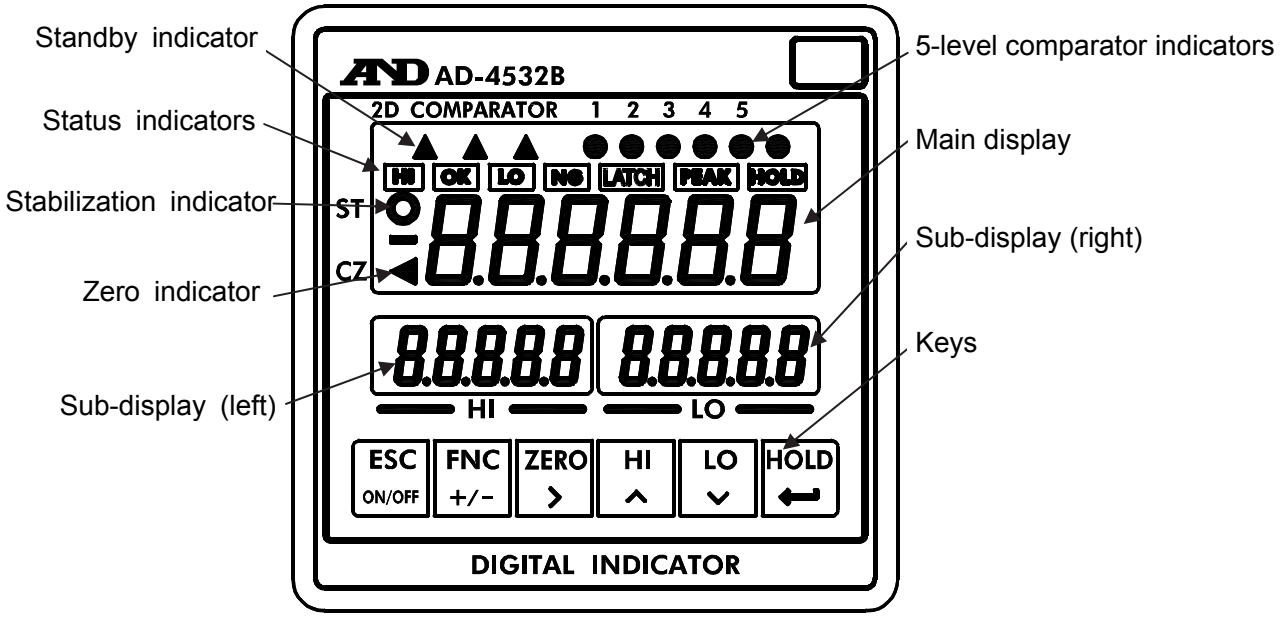


Front panel　　Side　　Rear panel and panel cutout

□ Accessories

1 instruction manual (this document)
1 unit seal
2 short bars
2 terminal block covers (already on the rear panel)

4. FRONT PANEL



Main display	Displays a measured value or set value. To set the decimal point position, use function mode F-00.
Sub-displays	Displays an upper limit value (left side) or lower limit value (right side), or displays the set value.
Status indicators	HI : Turns on when the measured value exceeds the upper limit value (HI). OK : Turns on when the measured value is as shown below. Lower limit value ≤ measured value ≤ upper limit value LO : Turns on when the measured value does not reach the lower limit value (LO). NG : Turns on when the comparison result of the 2D comparator mode is no good. LATCH : Turns on when the LATCH function is being performed. PEAK : Turns on when the hold function is started. HOLD : Turns on when the value is being held.
5-level comparator indicators	Displays each level and the result when the 2D comparator mode is in operation.
Stabilization indicator	Turns on when the measured value is stable.
Zero indicator	Turns on when the measured value is at the zero point.

Keys	**ESC** ON/OFF	When this key is pressed for more than three seconds, the display will turn on or off. Even during the display-off state, the power is supplied to the indicator and the standby indicator turns on. Pressing this key in each mode cancels the current state and returns to the previous state.
	FNC +/−	When this key is pressed for more than three seconds, the indicator will enter the function selection mode. This key selects a polarity sign when setting a value.
	ZERO >	When this key is pressed for more than one second, the current measured value is assumed to be at the zero point and the displayed value is reset to zero. (zero adjustment) This key selects a digit when setting a value.
	HI ∧	Pressing this key will display the set upper limit value. This key increases the value of a selected digit by one when setting a value.
	LO ∨	Pressing this key will display the set lower limit value. This key decreases the value of a selected digit by one when setting a value.
	HOLD ↵	Pressing this key will start the hold function and pressing this key again will stop the hold function. This key confirms the data input and saves it when setting a value.

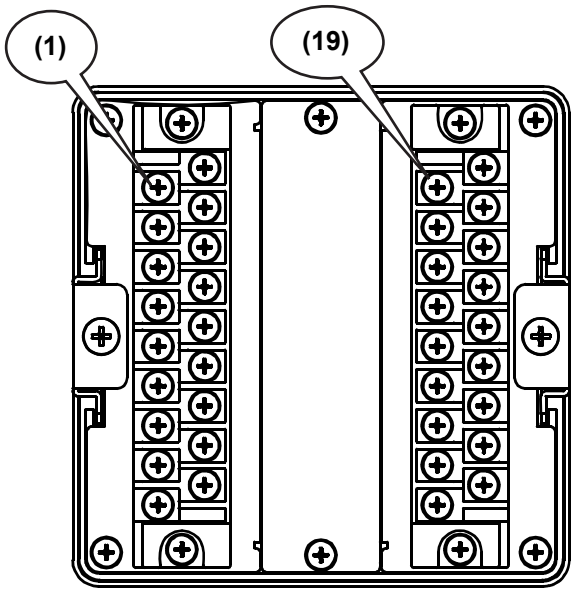
Storing the upper/lower limit values

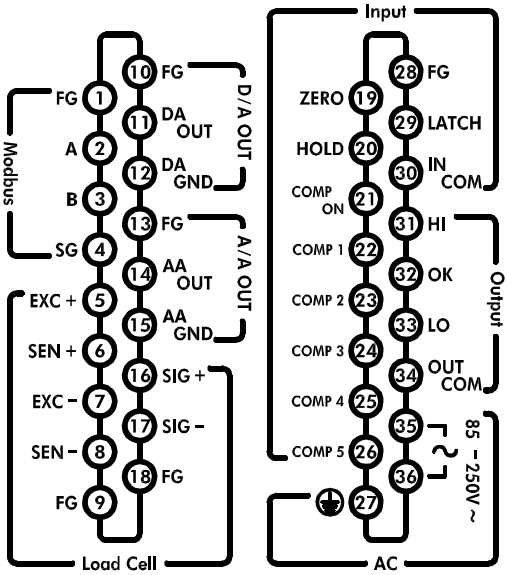
- The upper/lower limit values saved, even if the power is off, are maintained in non-volatile memory.

5. REAR PANEL

This chapter explains the terminals on the rear panel and how to connect sensors.

For the position of each terminal, see the illustration below.





Terminal numbers that are printed on the top of the indicator casing

⚠CAUTION
Confirm the terminal numbers when making connections ■ When making connections, confirm the terminal numbers printed on the side of the terminal block and on the top of the indicator casing.

5-1 Description of Each Terminal

5-1-1 Ground terminal (27) and AC input terminals (35) (36)

(27) Ground terminal

Be sure to connect a grounding wire to avoid electrical shock and prevent static electricity from affecting measurements.

(35) (36) AC power input terminals

Connects the AC power cord. The power requirement is 85 VAC to 250 VAC, 50/60 Hz.

⚠CAUTION
When making connections ■ Switch off the power of all the instruments used. ■ Keep cables sensitive to electrical noise away from power cables and other sources of electrical noise. ■ Connect the ground terminal to earth ground with a relatively heavy cable to protect the terminal circuits against surges.

5-1-2 Comparator output terminals (31) (32) (33) (34)

(31) HI output terminal

Outputs HI when the measured value exceeds the upper limit value.

(32) OK output terminal

Outputs OK when the measured value is as shown below.
Lower limit value ≤ measured value ≤ upper limit value

(33) LO output terminal

Outputs LO when the measured value does not reach the lower limit value.

(34) Output COM terminal

Comparator output COMMON terminal

⚠CAUTION
Comparator output ■ To prevent damage, the rated capacities of the output relays should not be exceeded. To protect the output relays, use a varistor, CR circuits or diodes.

5-1-3 Control input terminals (19) - (26), (28) - (30)

(19) ZERO input terminal

Inputs the zero correction signal.

(20) HOLD input terminal

Inputs the hold signal.

(21) COMP ON input terminal

When this terminal is turned ON, the comparator functions and outputs the results.

(22)-(26) COMP 1 to COMP 5 input terminals

Input terminals for the 2D comparator mode (one for each of the 5 levels of comparison).

(28) FG terminal

Frame ground terminal for the input terminal. Connect the input cable shield here.

(29) LATCH input terminal

Latching terminal for the function settings and outputs.

(30) IN COM terminal

Input COMMON terminal.

5-1-4 Modbus RTU terminals (1) - (4)

(1) FG terminal

Frame ground terminal for Modbus. Connects the Modbus cable shield here.

(2) (3) RS-485 terminals

A and B terminals for the RS-485, that the Modbus RTU uses.

(4) SG terminal

Signal ground terminal for the RS-485.

5-1-5 Sensor input terminals (5) - (9), (16) - (18)

(5) Sensor power supply + output terminal (EXC+)

Positive excitation terminal for the sensors.

(6) Remote sensing + input terminal (SEN+)

Connects to EXC+ when 4-wire sensors are used.

(7) Sensor power supply - output terminal (EXC-)

Negative excitation terminal for the sensors.

(8) Remote sensing - input terminal (SEN-)

Connects to EXC- when 4-wire sensors are used.

(9) (18) FG terminals

Frame ground terminals for the sensor input. Connect the sensor cable shield here.

(16) Sensor + input terminal (SIG+)

Positive signal input terminal for the sensors.

(17) Sensor - input terminal (SIG-)

Negative signal input terminal for the sensors.

⚠CAUTION
Connecting the sensors ■ Use 6-wire shielded cables to connect sensors. If 4-wire sensors are used, connecting long cables to the sensors will increase the total cable resistance and cause measurement errors. Keep these cables away from power cables and other electrically noisy cables. **Connecting the 4-wire sensors** ■ When connecting the 4-wire sensors, be sure to make a connection between EXC+ and SEN+, and between EXC- and SEN-. Without these connections, measurement will not be performed.

5-1-6 DAV output terminals (D/A voltage output) (10) - (12)

(10) FG terminal

Frame ground terminal for the DAV output. Connects the DAV output cable shield here.

(11) DAV output terminal

DAV output is –10 V to +10 V. Scaling is available by the function setting.

(12) DAV output ground terminal

5-1-7 Analog amplifier output terminals (13) - (15)

(13) FG terminal

Frame ground terminal for the analog amplifier output. Connects the analog amplifier output cable shield here.

(14) Analog amplifier output terminal

Analog amplifier output is –10 V to +10 V at ±3.2 mV/V. Amplifies the sensor inputs in an analog manner and outputs the amplified signal.

(15) Analog amplifier output signal ground terminal

⚠CAUTION
Loading the analog output ■ Connect a non-inductive load of 5 kΩ or more to the analog output terminals.


DAV and analog amplifier output ■ The sensor's analog signals are amplified 625 times and the analog amplifier output (AAO) outputs the amplified signal directly. Therefore, scaling is not available. The DAV output is the measured value in digital format, converted to an analog output voltage. Scaling is available. A 2000 times-per-second output is available.

5-2 Sensor (Load Cell) Connection

Sensor cables require high insulation and shielding qualities. Use shielded cables with high insulation resistance materials such as Teflon or polyethylene.

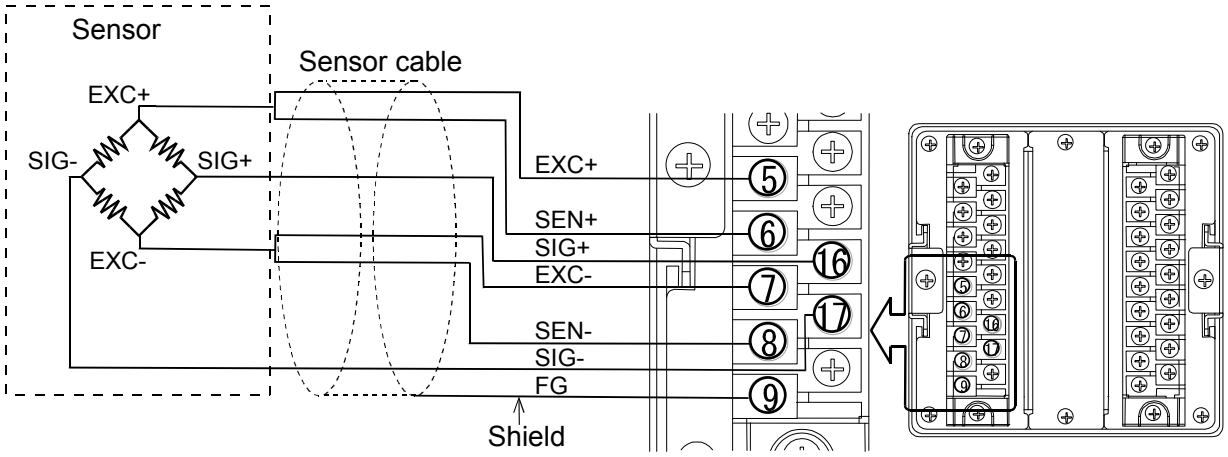
Connect the shielded sensor cables only to the FG terminals of the AD-4532B.

Do not ground between the sensor and the AD-4532B, in principle. Because multiple grounding points cause a ground loop in the wiring path, and disturbances such as high-frequency noise will be easily introduced.

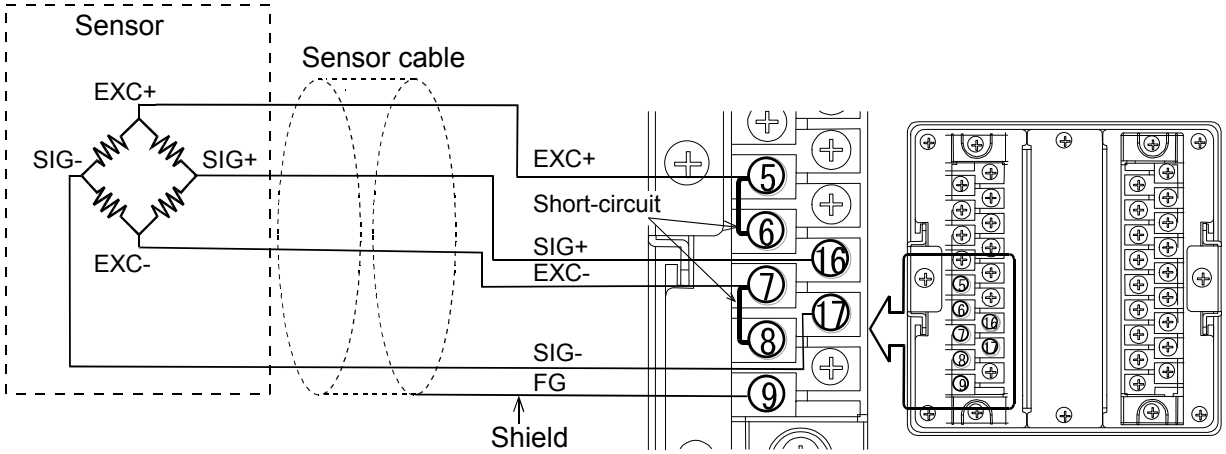
5-2-1 Sensor connection methods

There are two methods to connect sensors: The 6-wire connection and the 4-wire connection.

We recommend connecting using the 6-wire connection for optimum accuracy and stability.



(A) 6-wire connection



(B) 4-wire connection

Sensor connection methods

Method	Merit	Demerit	Description
6-wire connection (recommended)	Even if sensor cables are lengthened or thin cables are used, error margins are kept low. Error margins are also kept low when multiple sensors are used.	Wiring is somewhat difficult.	When using a summing box, we strongly recommend the 6-wire connection.
4-wire connection	Wiring is easy.	The temperature coefficient will be negatively affected by the lead resistance of the sensor cable. Contact resistance from the connector etc. will also have an effect.	Errors become more likely when using lengthened sensor cables or multiple sensors.

⚠CAUTION

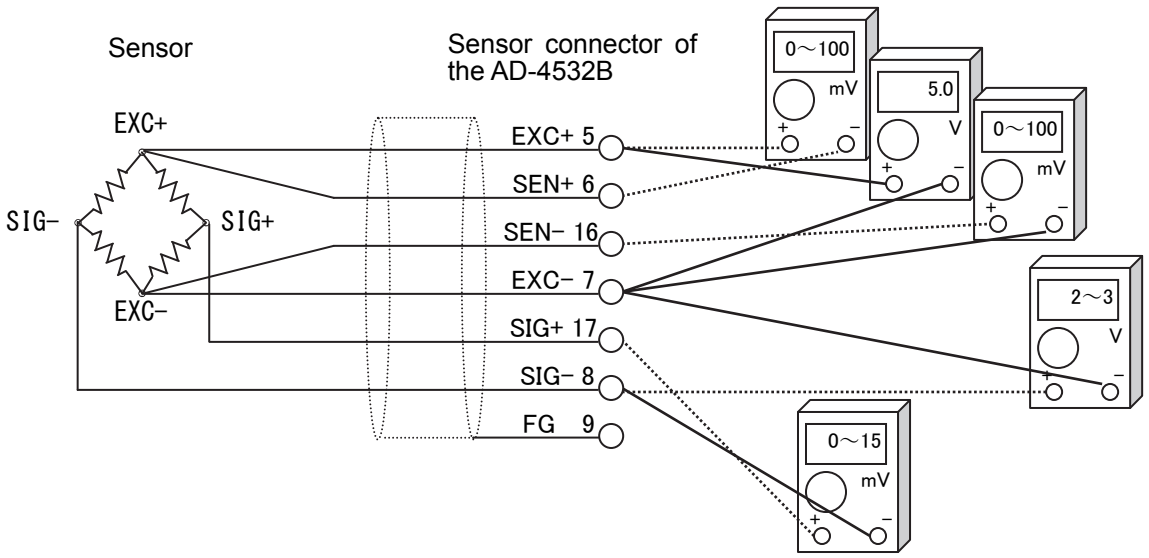
When connecting the 4-wire sensors

- Be sure to short-circuit between EXC+ and SEN+, and between EXC- and SEN-.
- When lengthening sensor cables, use a cable with a large cross-sectional area as much as possible. Also, minimize the cable length.

5-2-2 Confirming the sensor connection with a digital multimeter

The sensor connection can be checked easily by using a digital multimeter.

The following illustration shows measurement points to confirm the sensor connection. When a summing box is used, the same measurement must be performed in the box.



Method to confirm the sensor connection

The following table shows voltages to be measured for confirmation of the sensor connections.

The values shown below are when the applied voltage is 5V. Those will be the half values with 2.5V.

Measurement points		Voltage to be measured	Judging the voltage
EXC+ 5	SEN+ 6	Decrease in voltage on the EXC+ side of the sensor cable	Normally 100 mV or less. However, it may exceed 1 V when an extremely long sensor cable is used. For the 4-wire connection, it must be 0 V.
EXC+ 5	EXC- 7	Sensor applied voltage	It is normal within the range of 4.75 to 5.25 V.
SEN- 8	EXC- 7	Decrease in voltage on the EXC- side of the sensor cable	Normally 100 mV or less. However, it may exceed 1 V when an extremely long sensor cable is used. For the 4-wire connection, it must be 0 V.
SIG- 17	EXC- 7	Center point voltage of the sensor	Should be about 2.5 V, approximately half of applied voltage.
SIG+ 16	SIG- 17	Output voltage of the sensor	Compare with theoretical values obtained from the sensor rated capacity, actual load, and applied voltage. Generally within the range of 0 to 15 mV.

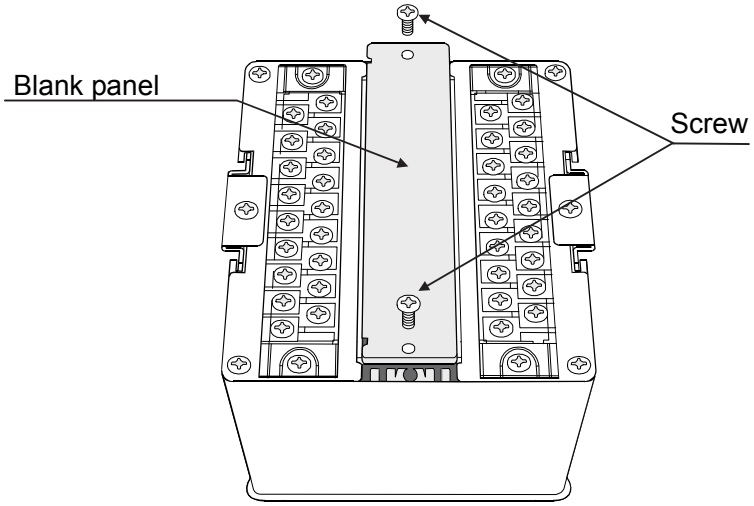
When the AD-4532B does not operate properly, write the required items in the table below and contact your local A&D dealer.

Item	User's usage circumstances (model number, rating, measurement value etc.)	Description
Sensor connection method	☐ 4-wire connection ☐ 6-wire connection	When using the 4-wire configuration, it is necessary to connect a jumper between EXC+ and SEN+, and between EXC- and SIG-.
Model number of sensor used		
Rated capacity of the sensor	[Unit]	
Rated output of the sensor	[mV/V]	
Allowable overload of the sensor	[%]	
Number of sensors used		
Use of summing box		
Initial load on the weighing instrument	[Unit]	
Minimum division of the weighing instrument	[Unit]	Write all digits including decimal figures. Example: 0.002kg
Rated capacity of the weighing instrument	[Unit]	Write all digits including decimal figures. Example: 10.000kg
Sensor output during initial load (when no load is applied)	[mV/V]	From -0.1 mV/V to rated sensitivity value (With the initial load)
Sensor output when loaded to the rated capacity (Or when a mass of choice is loaded)	Sensor output at Load [Units] [mV/V]	When loaded to rated capacity: "the output value of the initial load" + "the rated output value of the sensor" (Must be within the allowable overload)

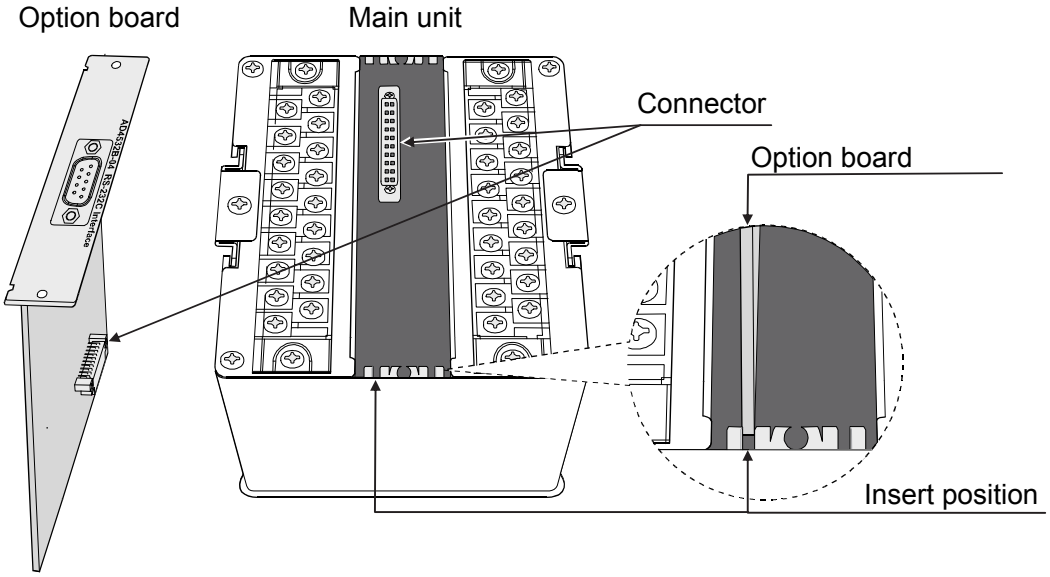
Measurement points		Voltage to be measured	Measurement result
EXC+ 5	SEN+ 6	Decrease in voltage on the EXC+ side of the sensor cable	[mV]
EXC+ 5	EXC- 7	Sensor applied voltage	[V]
SEN- 8	EXC- 7	Decrease in voltage on the EXC- side of the sensor cable	[mV]
SIG- 17	EXC- 7	Center point voltage of the sensor	[V]
SIG+ 16	SIG- 17	Output voltage of the sensor	[mV]

5-3 Options Installation

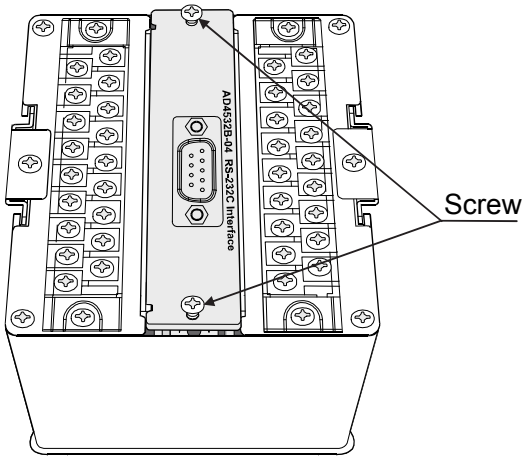
1. Remove the blank panel screws and take the blank panel off from the rear panel of the AD-4532B.



2. Check the positions of the connector in the main unit and the connector on the option board, and then insert the board in a position where the connectors can be connected.



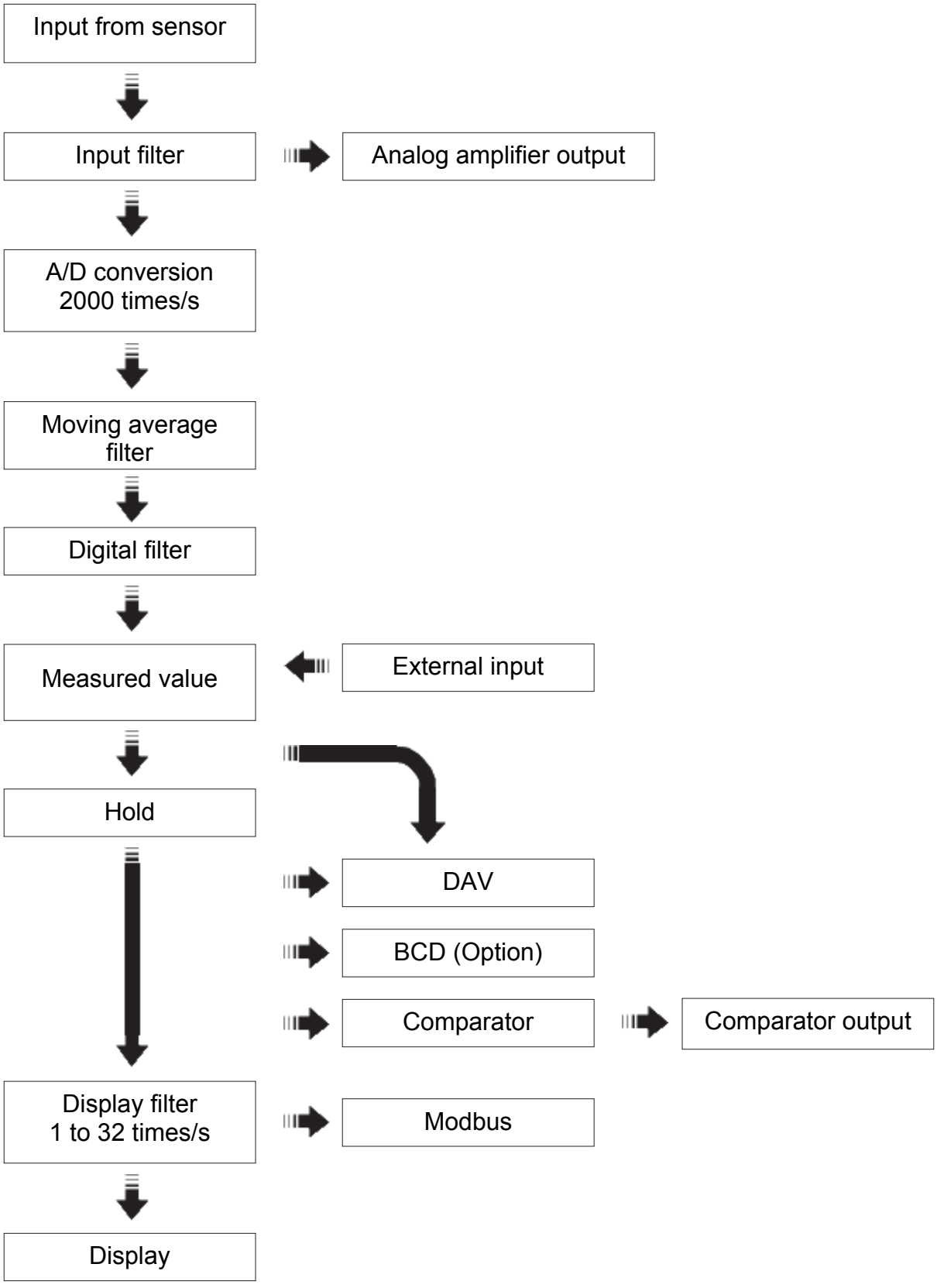
3. Tighten the screws of the inserted optional board to complete the installation.



6. COMPONENTS AND FUNCTIONS

The following flowchart shows how the functions of the AD-4532B are executed.

6-1 Flowchart



6-2 Description of Functions

6-2-1 Input filter

An analog low pass filter which removes noise in the inputs from the sensors. A pass band can be selected from 3 Hz, 10 Hz, 30 Hz, 100 Hz, 300 Hz and 1 kHz in function mode F-01.

6-2-2 Analog amplifier output

The sensor's analog signals are amplified 625 times and the analog amplifier output (AAO) outputs the amplified signal directly. Therefore, scaling is not available.

Output example — When the applied voltage is 5 V and the sensor output is 3.2 mV/V, the analog output value will be:
3.2 mV/V x 5 V x 625 ≈10 V.

⚠CAUTION

Analog output errors

- As scaling is not available for the analog output, the output value varies depending on the indicator. Before use, be sure to check the output values of the sensors.

6-2-3 Moving average filter

Filter which averages the measured values converted from analog to digital. The number of moving average is set in function mode F-02. The maximum number of moving average is 254.

Select a small value when high-speed measurements are required, and a large value when stable measurements are required.

6-2-4 Digital filter

A high-speed processor controlled, high-performance digital filter. The cutoff frequency value is set in function mode F-03.

Select a high frequency when high-speed measurements are required and a low frequency when stable measurements are required.

6-2-5 External input

The AD-4532B has nine external inputs, ZERO, HOLD, LATCH, COMP ON, COMP 1 to COMP 5 (5-level comparator). Maintain the inputs for more than 10 ms.

6-2-6 Hold

As digital filtered data is used, high-speed hold is enabled. A hold mode can be selected from sample hold, peak hold, bottom hold and bipolar peak hold in function mode F-14.

6-2-7 DAV output

The DAV output is the measured value in digital format, converted to an analog output voltage.

A DAV output mode can be selected from output without holding or output after holding in function mode F-24. Scaling is available in function modes F-22 and F-23.

6-2-8 BCD output

The BCD output is the measured value converted into a BCD format. The output logic can be selected from positive or negative in function mode F-32. An output rate can be selected from 1 time/s, 10 times/s, 100 times/s, 1000 times/s or 2000 times/s in function mode F-33.

6-2-9 Comparator and comparator output

The comparator judges the measured values using the upper/lower limit values and the comparator output outputs the comparison results.

A comparator mode can be selected in function mode F-16.

A zero band setting can be selected in function mode F-17.

The comparator has a comparator hysteresis function and the values used can be set in function modes F-19 to F-21.

6-2-10 Modbus RTU

The AD-4532B has Modbus RTU protocol. The values that the AD-4532B indicates and the AD-4532B status can be read and the set values of the AD-4532B can be written, using Modbus RTU.

This is used, for example, to read measured values or change the settings when connecting the AD-4532B to a personal computer, PLC or programmable display

7. CALIBRATION

The AD-4532B measures voltage signals from sensors and displays the values. Calibration is performed on the AD-4532B so that it performs correctly.

7-1 Description of Calibration

Calibration has the following setting items and operations.

Minimum division setting	Selects the minimum division.
Rated capacity setting	Sets the rated capacity.
Zero calibration	Adjusts the indicator so that the measured value will be zero when no load is applied to the load cell.
Span calibration	Adjusts the indicator so that it can correctly measure the change in the input voltage generated by loading the load cell.

⚠CAUTION

Notes on calibration

- The setting range of output resolution is less than 10000. Even if a value exceeds 10000, it will be displayed.
- Perform a periodic check to confirm that the indicator measures correctly. And perform calibration as necessary.
- When the installation site is changed, confirm that the indicator measures correctly, and perform calibration as necessary.
- When performing span calibration using a calibration weight, use a weight having a mass of more than two-thirds of the maximum measured value to minimize calibration errors.
- Wait for the indicator to stabilize before calibration to ensure correct measurements.
- To use the decimal point, use function mode F-00.

7-2 Calibration Modes

There are three calibration modes.

□ Digital span mode (d-SP)

The sensor's rated output voltage is keyed in. Calibration is performed without using an actual load.

□ Calibration mode (CAL)

Zero and span calibration are carried out using an actual load.

□ Full calibration mode (FCAL)

Zero and span calibration are carried out using an actual load after minimum division and rated capacity have been set.

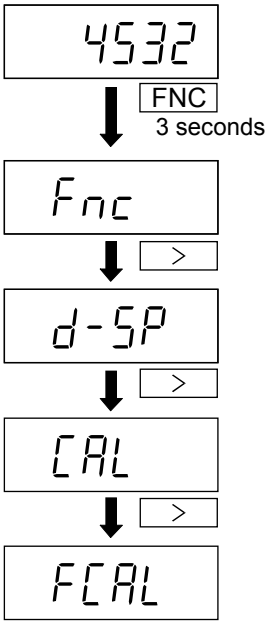
7-2-1 Selecting or changing the calibration mode

1. In the measurement mode, press the FNC key for three seconds or more to enter the function selection mode.

2. Press the > key to display d-SP (digital span mode).

3. With d-SP displayed, press the > key to display CAL (calibration mode).

4. With CAL displayed, press the > key to display FCAL (full calibration mode).



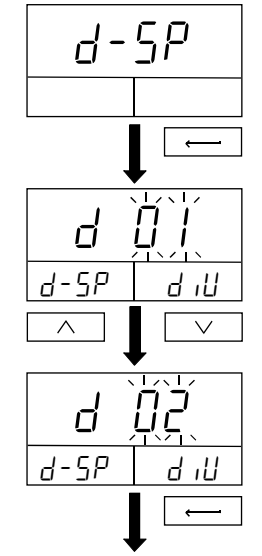
7-3 Digital Span Mode

The sensor's rated output voltage is keyed in. Calibration is performed without using an actual load.

7-3-1 Setting the minimum division

1. With [d-SP] displayed, press the [↵] key to go to the digital span mode.

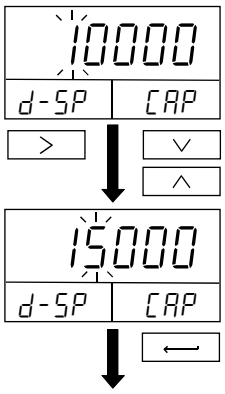
2. When [d 01] is displayed, setting the minimum division is enabled. Use the following keys to set the minimum division.
   - [∧] Increases the value.
   - [∨] Decreases the value.
   - [↵] Saves the minimum division and goes to step 3.
   - [ESC] Cancels the operation and returns to the [d-SP] display.



To set the rated capacity

7-3-2 Setting the rated capacity

3. Use the following keys to set the rated capacity.
   - [>] Selects the digit to set.
   - [∧] Increases the value.
   - [∨] Decreases the value.
   - [↵] Saves the rated capacity and goes to step 4.
   - [ESC] Cancels the operation and returns to the [d-SP] display.



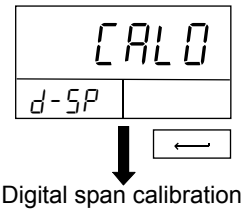
Zero calibration

7-3-3 Zero calibration

4. With nothing placed on the load cell, press the [↵] key.

   [↵] Performs zero calibration and goes to step 5.

   [ESC] Cancels the operation and returns to the [d-SP] display.



Digital span calibration

7-3-4 Digital span calibration

5. Use the following keys to enter the sensor's rated output voltage.

   [>] Selects the digit to set.

   [∧] Increases the value.

   [∨] Decreases the value.

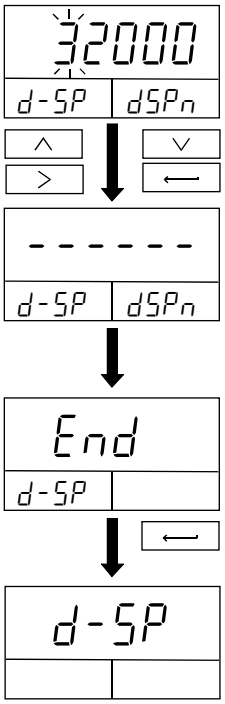
   [↵] Saves the rated output voltage and goes to step 6.

   [ESC] Cancels the operation and returns to the [d-SP] display.

6. [End] is displayed. Press the [↵] key to return to the [d-SP] display.

   Press the [>] key to go to the calibration mode.

   Press the [ESC] key to return to the measurement mode.



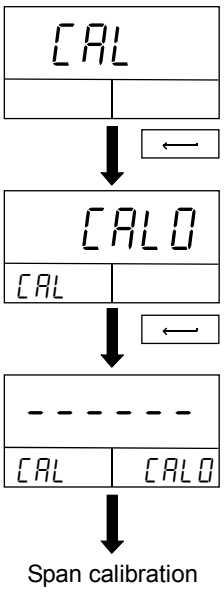
7-4 Calibration Mode

Zero and span calibration are carried out using an actual load.

7-4-1 Zero calibration

1. With [CAL] displayed, press the [↵] key to enter the calibration mode.

2. With nothing placed on the load cell, press the [↵] key.
   - [↵] Performs zero calibration and goes to step 3.
   - [ESC] Cancels the operation and returns to the [CAL] display.

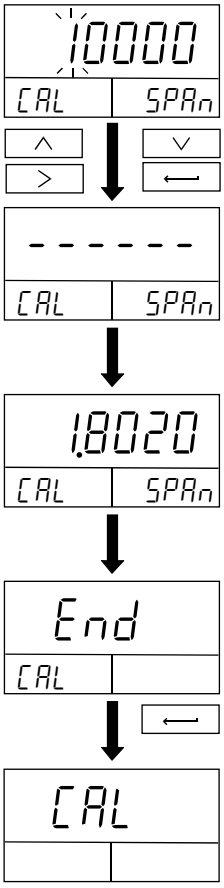


Span calibration

7-4-2 Span calibration

3. Place a weight on the load cell.
   Use the following keys to enter the value of the actual weight used.
   Wait for the value to stabilize and press the [↵] key.
   - [>] Selects the digit to set.
   - [∧] Increases the value.
   - [∨] Decreases the value.
   - [↵] Performs span calibration and goes to step 4.
   - [ESC] Cancels the operation and returns to the [CAL] display.

4. After the span value is saved, the value is displayed for two seconds.
   When the calibration is completed, [End] is displayed. Press the [↵] key to return to the [CAL] display.
   Press the [>] key to go to the full calibration mode.
   Press the [ESC] key to return to the measurement mode.



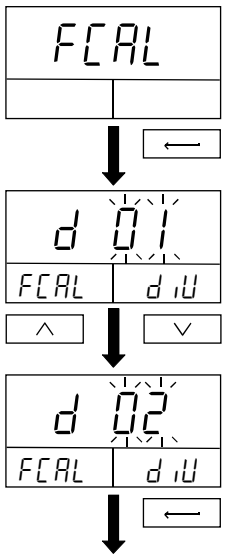
7-5 Full Calibration Mode

Zero and span calibration are carried out using an actual load after minimum division and rated capacity have been set.

7-5-1 Setting the minimum division

1. With [FCAL] displayed, press the [↵] key to enter the full calibration mode.

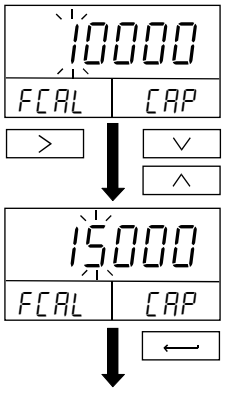
2. When [d 01] is displayed, setting the minimum division is enabled. Use the following keys to set the minimum division.
   - [∧] Increases the value.
   - [∨] Decreases the value.
   - [↵] Saves the minimum division and goes to step 3.
   - [ESC] Cancels the operation and returns to the [FCAL] display.



To set the rated capacity

7-5-2 Setting the rated capacity

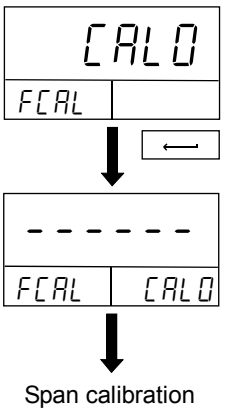
3. Use the following keys to set the rated capacity.
   - [>] Selects the digit to set.
   - [∧] Increases the value.
   - [∨] Decreases the value.
   - [↵] Saves the rated capacity and goes to step 4.
   - [ESC] Cancels the operation and returns to the [FCAL] display.



Zero calibration

7-5-3 Zero calibration

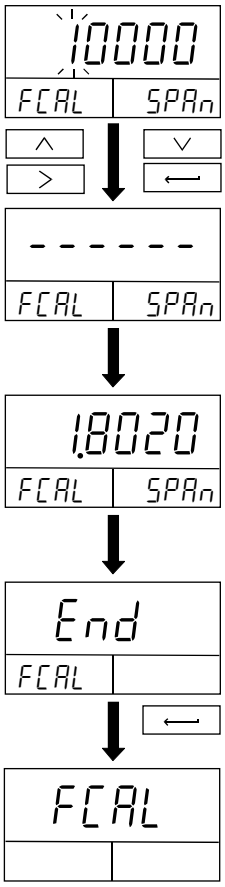
4. With nothing placed on the load cell, press the [↵] key.
   - [↵] Performs zero calibration and goes to step 5.
   - [ESC] Cancels the operation and returns to the [FCAL] display.



Span calibration

7-5-4 Span calibration

5. Place a weight on the load cell.
   Use the following keys to enter the value of the actual weight used.
   Wait for the value to stabilize and press the [↵] key.
   - [>] Selects the digit to set.
   - [∧] Increases the value.
   - [∨] Decreases the value.
   - [↵] Performs span calibration and goes to step 6.
   - [ESC] Cancels the operation and returns to the [FCAL] display.
6. After the span value is saved, the value is displayed for two seconds.
   When the full calibration is completed, [End] is displayed. Press the [↵] key to return to the [FCAL] display.
   Press the [ESC] key to return to the measurement mode.



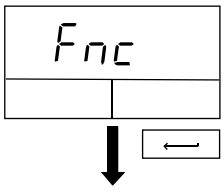
8. FUNCTION MODE

By selecting the function mode, various functions and data can be set. The set values saved, even if the power is off, are maintained in non-volatile memory.

8-1 Setting a Function

8-1-1 Starting the function mode

1. In the measurement mode, press the FNC key for three seconds or more to enter the function selection mode. Press the ↵ key to enter the function mode.



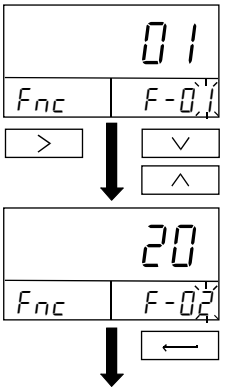
To select a function item number

8-1-2 Selecting a function item number

2. F-xx (xx=function number) is displayed in the right side of the sub-display. And the value corresponding to the function number is displayed in the main display.

   Use the following keys to set the function item.

   - > Selects the digit to set.
   - ∧ Increases the value.
   - ∨ Decreases the value.
   - ↵ Saves the selected function number and goes to step 3.
   - ESC Cancels the operation and returns to the Fnc display.

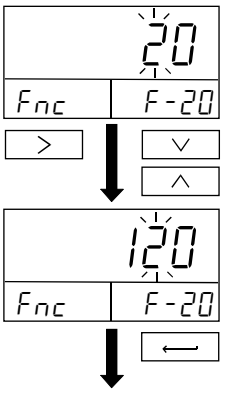


To change the value

8-1-3 Changing the value

3. Use the following keys to change the value.

   - > Selects the digit to set.
   - ∧ Increases the value.
   - ∨ Decreases the value.
   - ↵ Saves the value and returns to step 2.
   - ESC Cancels the operation and returns to the Fnc display.



To select a function item number

8-2 Description of the Function Items

	Item and Parameter		Description	
Decimal point	F-00 Decimal point position	▪ 0	No decimal point	e.g.: 123456
		1	1 decimal place	e.g.: 12345.6
		2	2 decimal places	e.g.: 1234.56
		3	3 decimal places	e.g.: 123.456
		4	4 decimal places	e.g.: 12.3456
Filter	F-01 Input filter	0	3 Hz	Selects a pass band for the input analog low pass filter.
		▪ 1	10 Hz	
		2	30 Hz	
		3	100 Hz	
		4	300 Hz	
		5	1 kHz	
	F-02 Moving average filter	0 | 254	0: No moving average filter 1 to 254 : Number of moving average 0 : Factory setting	
	F-03 Digital filter	0 | 220	0: No digital filter 14 to 220 : Specified cutoff frequency (-3dB) selected from 14, 20, 28, 40, 56, 80, 110, 160, 220 Hz. 14 : Factory setting	
Applied voltage	F-04 Applied voltage	▪ 0	5 V	Selects the voltage supplied to the sensor.
		1	2.5 V	
Display	F-05 Display update rate	1	1 time/second	Display rewriting speed of the measured value.
		2	2 times/second	
		4	4 times/second	
		8	8 times/second	
		▪ 16	16 times/second	
		32	32 times/second	
Zero adjustment	F-06 Zero adjustment range	0 | 100	Expressed in percent of the rated capacity with the calibration zero point as the center 30 : Factory setting	
Stability	F-07 Stability detection time	0 | 99	0: No stability detection 1 to 99 : 0.1 second to 9.9 seconds 10 : Factory setting	
	F-08 Stability detection band	0 | 99	0: No stability detection 1 to 99 : 1 digit to 99 digits 5 : Factory setting	
Zero racking	F-09 Zero tracking time	▪ 0 | 99	0: No zero tracking 1 to 99 : 0.1 second to 9.9 seconds	
	F-10 Zero tracking band	▪ 0 | 99	0: No zero tracking 1 to 99 : 1 digit to 99 digits	
	F-11 Overflow	▪ 0	Rated capacity +8 digits	
		1	AD conversion overflow	

▪ : Factory settings.

	Item and Parameter		Description
Keys	F-12 Inhibit by key	▪ 0000	0 0 0 0 0: Permit 1: Inhibit To permit or inhibit zero adjustment by the ZERO key. To permit or inhibit the hold function by the HOLD key. To permit or inhibit monitoring the upper/lower limit values. To permit or inhibit changing the upper/lower limit values. e.g.: 0 1 0 1 Inhibits zero adjustment by the ZERO key and inhibits monitoring the upper/lower limit values.
LATCH	F-13 LATCH function	▪ 0000	0 0 0 0 0: Not available 1: Available To latch the displayed value. To latch the comparator output. To latch the DAV output. To latch options. e.g.: 0 1 0 1 Latches the displayed value and the DAV output while external LATCH is input.
Hold	F-14 Hold mode	▪ 0	Sample hold
		1	Peak hold
		2	Bottom hold
		3	Bipolar peak hold
	F-15 Holding time after releasing hold	▪ 0 | 99	0: No holding time 1 to 99 : 0.1 second to 9.9 seconds
Comparator	F-16 Comparator mode	Simple 0	Comparison when the measured value is stable, excluding the zero band
		Simple 1	Comparison when the measured value is stable
		Simple 2	Continuous comparison, excluding the zero band
		Simple ▪ 3	Continuous comparison
		2D 4	5-level comparison excluding the zero band, by rear panel COMP 1-5 input terminals
		2D 5	5-level continuous comparison, by rear panel COMP 1-5 input terminals
		2D 6	5-level comparison excluding the zero band, by time control
		2D 7	5-level continuous comparison, by time control
	F-17 Zero band	▪ 0 | 20000	Sets the value for the zero band to be used for comparison.

▪ : Factory settings.

	Item and Parameter		Description	
Comparator (continued)	F-18 COMP ON	▪ 0	Not used	COMP ON by control input is not required. Always COMP ON
		1	Used	Select this when the 2D comparator mode is used.
	F-19 Hysteresis mode	0	Upward 2-level judgment	
		▪ 1	Upper/lower limit judgment	
		2	Downward 2-level judgment	
	F-20 Hysteresis time	▪ 0 | 99	0: Hysteresis mode not used. 1 to 99 : 0.1 second to 9.9 seconds	
	F-21 Hysteresis width	▪ 0 | 9999	0: Hysteresis mode not used. 1 to 9999 : Hysteresis width	
DAV	F-22 Measured value at 0-V output	-999999 | 999999	Sets the measured value that corresponds to DAV output value of 0 V. 0 : Factory setting	
	F-23 Measured value at 10-V output	-999999 | 999999	Sets the measured value that corresponds to DAV output value of 10 V. 10000 : Factory setting	
	F-24 DAV mode	▪ 0	Outputs DAV value without holding the measured value.	
		1	Outputs DAV value without holding the measured value, after holding or latching the measured value.	
Modbus	F-25 Baud rate	1200	1200 bps	
		2400	2400 bps	
		4800	4800 bps	
		▪ 9600	9600 bps	
		19200	19200 bps	
		38400	38400 bps	
	F-26 Data bit length	7	7 bits	
		▪ 8	8 bits	
	F-27 Parity	▪ 0	None	
		1	Odd	
		2	Even	
	F-28 Stop bit	▪ 1	1 bit	
		2	2 bits	
	F-29		Reserved internally	
	F-30 Address	▪ 0 | 99	0: No address 1 to 99 : Address	

▪ : Factory settings.

	Item and Parameter		Description
	F-31		Reserved internally
BCD	F-32 BCD output logic	0	Positive
		▪ 1	Negative
	F-33 BCD output rate	0	1 time/s
		1	10 times/s
		2	100 times/s
		3	1000 times/s
		4	2000 times/s
		▪ 5	In sync with the display update rate, F-05.
DAV DAI	F-34 Measured value at 0V/4mA output	-999999 | 999999	Sets the measured value that corresponds to DAV/DAI output value of 0V/4mA. 0 : Factory setting
	F-35 Measured value at 10V/20mA output	-999999 | 999999	Sets the measured value that corresponds to DAV/DAI output value of 10V/20mA. 10000 : Factory setting
	F-36 DAV/DAI mode	▪ 0	Outputs DAV/DAI value without holding the measured value.
		1	Outputs DAV/DAI value without holding the measured value, after holding or latching the measured value.
RS-232C	F-37 Baud rate	1200	1200 bps
		▪ 2400	2400 bps
		4800	4800 bps
		9600	9600 bps
		19200	19200 bps
		38400	38400 bps
	F-38 Data bit length	▪ 7	7 bits
		8	8 bits
	F-39 Parity	0	None
		1	Odd
		▪ 2	Even
	F-40 Stop bit	▪ 1	1 bit
		2	2 bits
	F-41 Communication mode	0	Stream mode
		▪ 1	Command mode
	F-42 Output unit	▪ 0 | 15	0: None 1: g 2: kg 3: t 4: N 5: Pa 6: mm 7: Nm 8: kgf 9: G 10: kgfcm 11: kgfm 12: mmHg 13: mmH_2O 14: m/s/s 15: kfg/cm/cm
Ethernet	F-43 Communication mode	0	Stream mode
		▪ 1	Command mode
	F-44 Output unit	▪ 0 | 15	0: None 1: g 2: kg 3: t 4: N 5: Pa 6: mm 7: Nm 8: kgf 9: G 10: kgfcm 11: kgfm 12: mmHg 13: mmH_2O 14: m/s/s 15: kfg/cm/cm

▪ : Factory settings.

9. HOLD FUNCTION

The AD-4532B has four hold modes; sample hold, peak hold, bottom hold and bipolar peak hold. A hold mode can be selected in function mode F-14.

9-1 Basic Operation

9-1-1 Starting a hold mode

Four methods to start a hold mode are available.

□ Using the HOLD key

Pressing the HOLD key will start the hold function and display the held value.
Pressing the HOLD key again will stop the hold function and display the measured value.

□ Using the external HOLD input terminal on the rear panel

Turning ON (contact input) the HOLD input terminal will start the hold function.
Turning OFF the HOLD input terminal will stop the hold function.

□ Using Modbus

Activating the Modbus coil address 1 will start the hold function.
Activating the Modbus coil address 2 will stop the hold function.

□ Using the optional RS-232C command

The RS-232C hold ON command "H $_{CR\,LF}$" will start the hold function.
The RS-232C hold OFF command "C $_{CR\,LF}$" will stop the hold function.

HOLD indicator

When the hold function is started, the HOLD indicator turns on to indicate that the hold function is activated. In the hold modes other than the sample hold mode, the PEAK indicator turns on when the peak value (or bottom value) is reached.

Priority

The priority of the hold input using the external HOLD input terminal is higher than the other methods.

Holding time after releasing hold

The AD-4532B has a function to hold the value for a certain period of time after the hold function is stopped. To set the holding time, use function mode F-15.

During the holding time, the HOLD indicator blinks.

When the set holding time is elapsed, the display switches to the currently measured value.

When starting the hold function during the holding time, the indicator holds the new value.

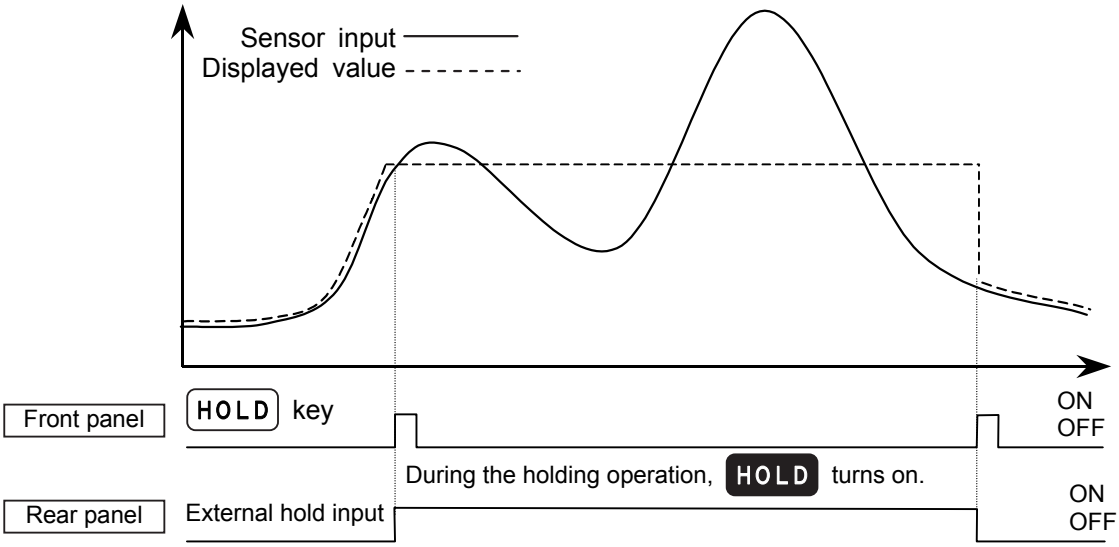
Using the holding time

- Use this function to confirm the held value.
  While the displayed value is held, the indicator continues other operation using the latest measured value.

9-2 Hold Modes

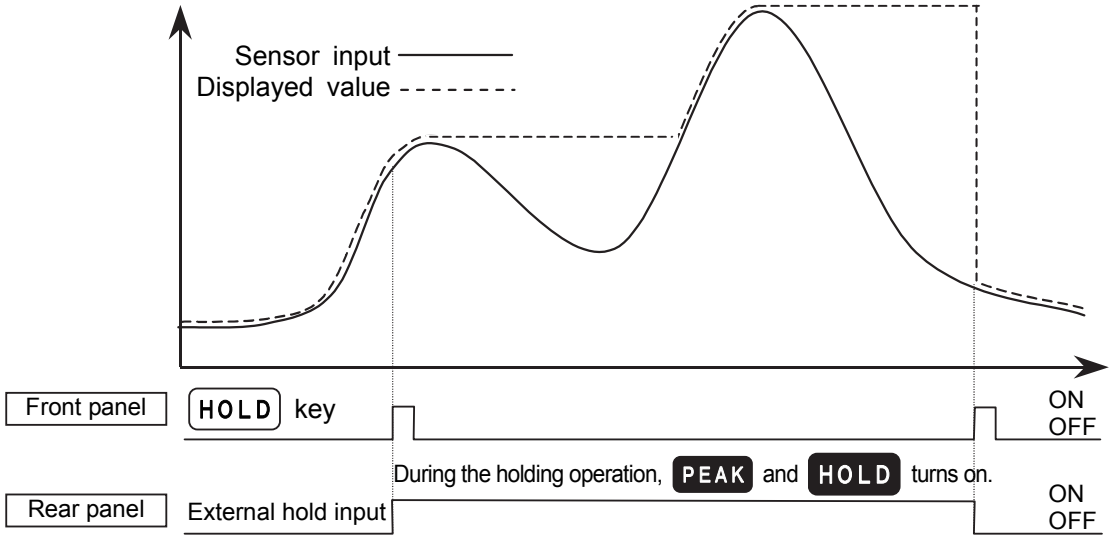
9-2-1 Sample hold mode

Holds the display and output when receiving the hold input.



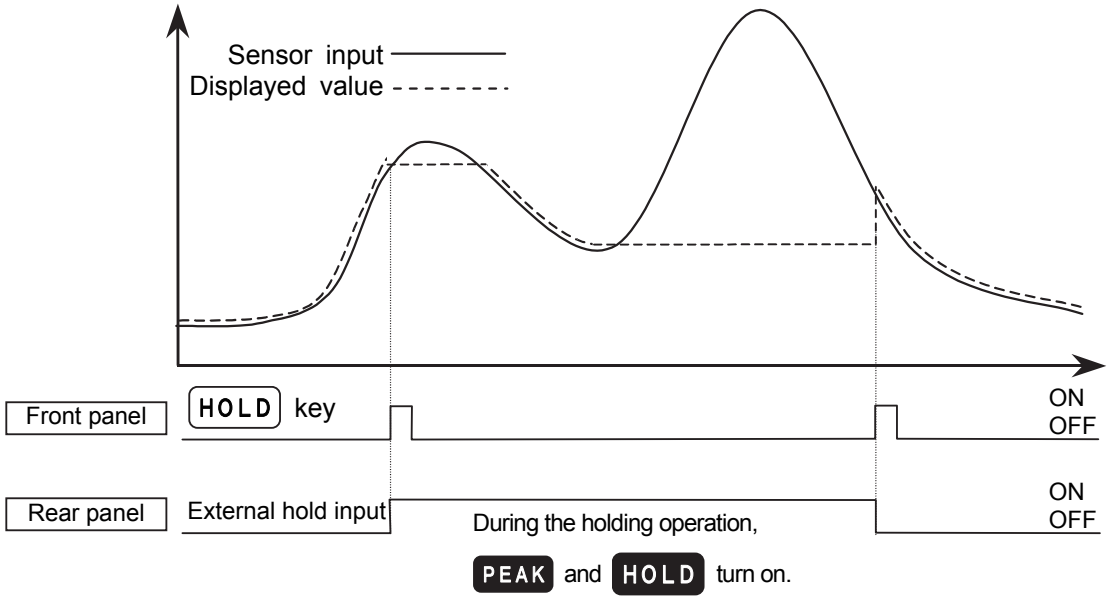
9-2-2 Peak hold mode

Holds the peak value when receiving the hold input.



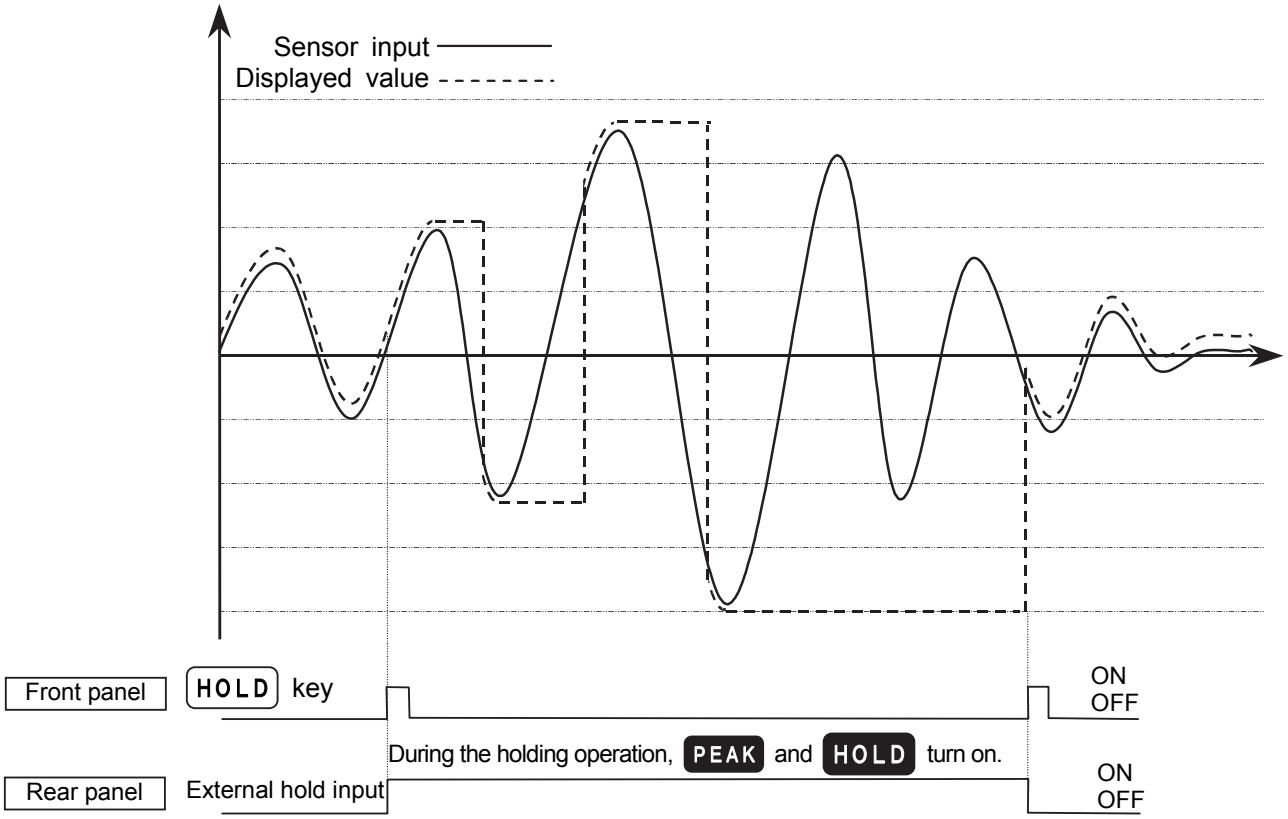
9-2-3 Bottom hold mode

Holds the bottom value when receiving the hold input.



9-2-4 Bipolar peak hold mode

Holds the absolute peak value when receiving the hold input.



10. COMPARATOR FUNCTION

The AD-4532B has two comparator modes; simple comparator and 2D (Two dimensional) comparator. A comparator mode can be selected in function mode F-16. F-17 to F-21 are also comparator-related function modes.

The comparator function compares the measured value against the set value and outputs the comparison results (HI, OK or LO) from the rear panel comparator output terminals.

10-1 Simple Comparator Mode

Compares the measured value against the upper or lower limit value and outputs the comparison results from the rear panel comparator output terminals.

The operation of the simple comparator mode can be set using the parameters 0 to 3 of function mode F-16.

10-1-1 Detailed description of the simple comparator mode

□ The relation between the output results and the output condition is as shown below:

Comparator output terminal	Output condition
HI	Upper limit < Measured value
OK	Lower limit ≤ Measured value ≤ Upper limit
LO	Measured value < Lower limit

□ When function mode F-18 (COMP ON) is set to "0 (Not used)", the comparator functions according to the F-16 parameter setting (0 to 3).

When function mode F-18 (COMP ON) is set to " 1 (Used)", connect the COMP ON input terminal to the IN COM terminal to enable the comparator.

□ The upper/lower limit values saved, even if the power is off, are maintained in non-volatile memory.

□ Upper limit and lower limit values can be negative.

For example, if the upper limit value is -1000 and the lower limit value is -2000, HI is output for the measured value of -500 and LO is output for the measured value of -2500.

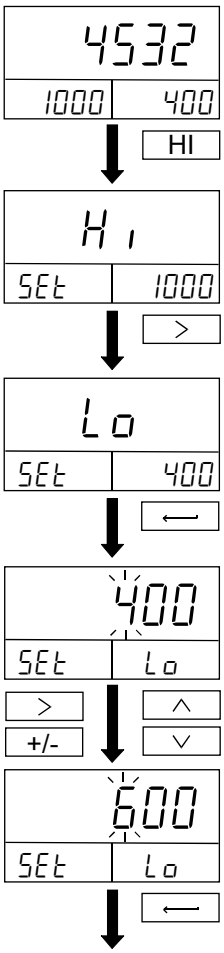
□ Make sure that the upper limit value is greater than the lower limit value.

10-1-2 Setting the upper and lower limit values

1. In the measurement mode, press the HI key or LO key to check the upper limit value or lower limit value.

2. In the main display, Hı or Lo appears. And in the right side of the sub-display, the upper limit or lower limit value that is currently set appears.
   - > Switches between the upper limit and lower limit value.
   - ↵ Selects the item to be changed and goes to step 3.
   - ESC Cancels the operation and returns to the measurement mode.

3. The value blinks indicating that changes are available. Use the following keys to change the value.
   - > Selects the digit to set.
   - ∧ Increases the value.
   - ∨ Decreases the value.
   - +/- Changes the polarity sign
   - ↵ Saves the changed value and returns to step 2.
   - ESC Cancels the operation and returns to the measurement mode.



To return to step 2.

⚠CAUTION

Number of digits available in the display

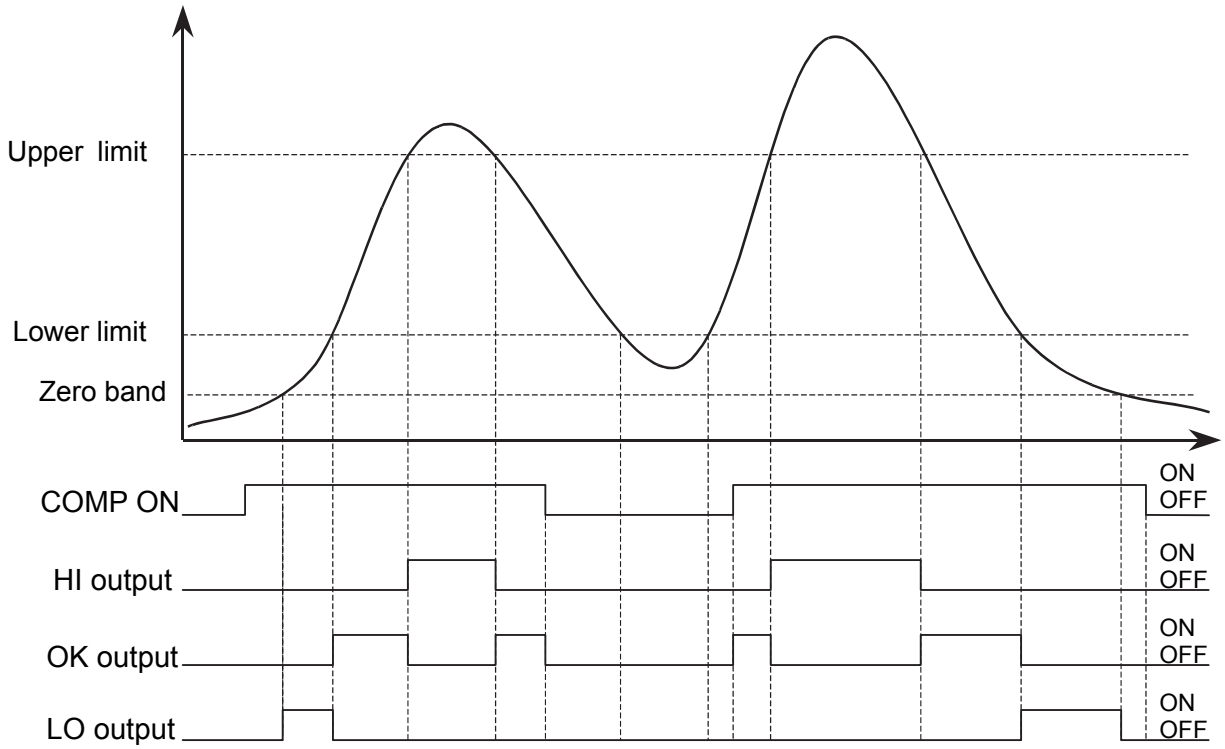
- Each sub-display is a five-digit display. Therefore, it can not display the complete value if the upper limit or lower limit value has six digits (or five digits for the negative value).
  To check the upper limit or lower limit value, follow the procedure above to display the value in the main display, a six-digit display.

Zero band value

- Set the zero band value in function mode F-17.
  The zero band ranges from 0 to ±(absolute zero band value).

10-1-3 Example of the simple comparator mode

Example: F-16 2 (Continuous comparison, excluding the zero band)



⚠CAUTION

COMP ON input and output

- HI, OK or LO output is available only when the COMP ON input terminal is ON (when the COMP ON input terminal is connected to the IN COM terminal). When the COMP ON input terminal is OFF, no comparison nor result output is performed. To make a continuous comparison, set the function mode F-18 (COMP ON) to "0 (Not used)".

Zero band and output

- When the measured value is less than the zero band value, HI, OK or LO output is not available even if the COMP ON input terminal is ON.
  The zero band ranges from 0 to ±(absolute zero band value) that is set in function mode F-17.
  For example, when F-17 is set to 200, the zero band is from –200 to 200.

10-2 2D Comparator Mode

The 2D (Two dimensional) comparator mode performs a two dimensional comparison by switching the 5-level comparator with the upper and lower limit values that are preset for each level.

10-2-1 Switching the comparator

Two switching methods are available.

□ By COMP 1 to COMP 5 inputs (F-16 4 or 5)

Switching is performed by the change in position.

Connect the position detection switch to the COMP 1 to COMP 5 input terminals. Set function mode F-16 (Comparator mode) to "4" or "5".

□ By time control (F-16 6 or 7)

Switching is performed by the change in time.

In addition to the upper and lower limit values, set the starting and ending time to each level of the comparator. Set function mode F-16 (Comparator mode) to "6" or "7".

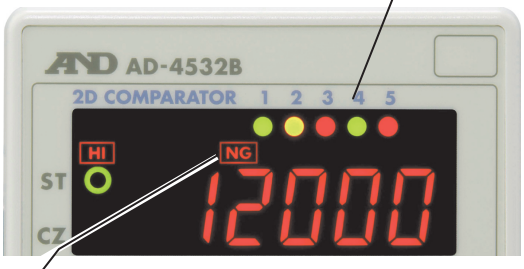
10-2-2 Detailed description of the 2D comparator mode

□ Turn the COMP ON input terminal ON to start a comparison. With the COMP ON input terminal turned OFF, no comparison or result output is performed. To use the COMP ON input terminal, set the function mode F-18 (COMP ON) to "1 (Used)".

□ The relation between the output results, the indicator color and the output condition for each level is as shown below:

Comparator output terminal	Comparator indicator	Output condition
HI	● Red	Upper limit < Measured value
OK	● Green	Lower limit ≤ Measured value ≤ Upper limit
LO	● Orange	Measured value < Lower limit

Front panel (part)



5-level comparator indicators
A number is written above each ● to indicate the level.

When the COMP ON input terminal is turned ON, the ● indicator, at the level where the comparison is performed currently, starts to blink. Then, the indicator turns to red for HI, green for OK and orange for LO. When the comparison moves to another level, the indicator stops blinking and illuminates in the color of the result.

NG indicator
In the 2D comparator mode, the NG indicator turns on when any one of the 5-level comparison results is HI or LO.
The NG indicator is red when HI, and orange when LO. When the comparison results of levels 1 through 5 have HI and LO, it will be red.

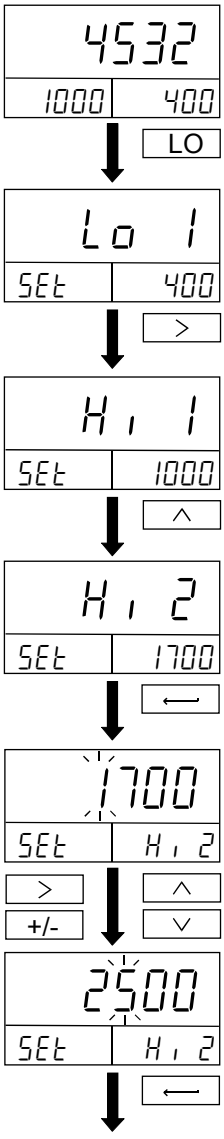
10-3 2D Comparator Mode (By COMP 1 to 5 inputs)

10-3-1 Setting the upper and lower limit values for each level

1. In the measurement mode, press the HI key or LO key to check the upper limit value or lower limit value.

2. In the main display, Hi 1 or Lo 1 appears. And in the right side of the sub-display, the upper limit or lower limit value that is currently set for the level appears. The corresponding ● indicator turns on.
   - > Switches between the upper limit and lower limit value.
   - ∧ Increases the level.
   - ∨ Decreases the level.
   - ↵ Selects the item to be changed and goes to step 3.
   - ESC Cancels the operation and returns to the measurement mode.

3. The value blinks indicating that changes are available. Use the following keys to change the value.
   - > Selects the digit to set.
   - ∧ Increases the value.
   - ∨ Decreases the value.
   - +/- Changes the polarity sign
   - ↵ Saves the changed value and returns to step 2.
   - ESC Cancels the operation and returns to the measurement mode.

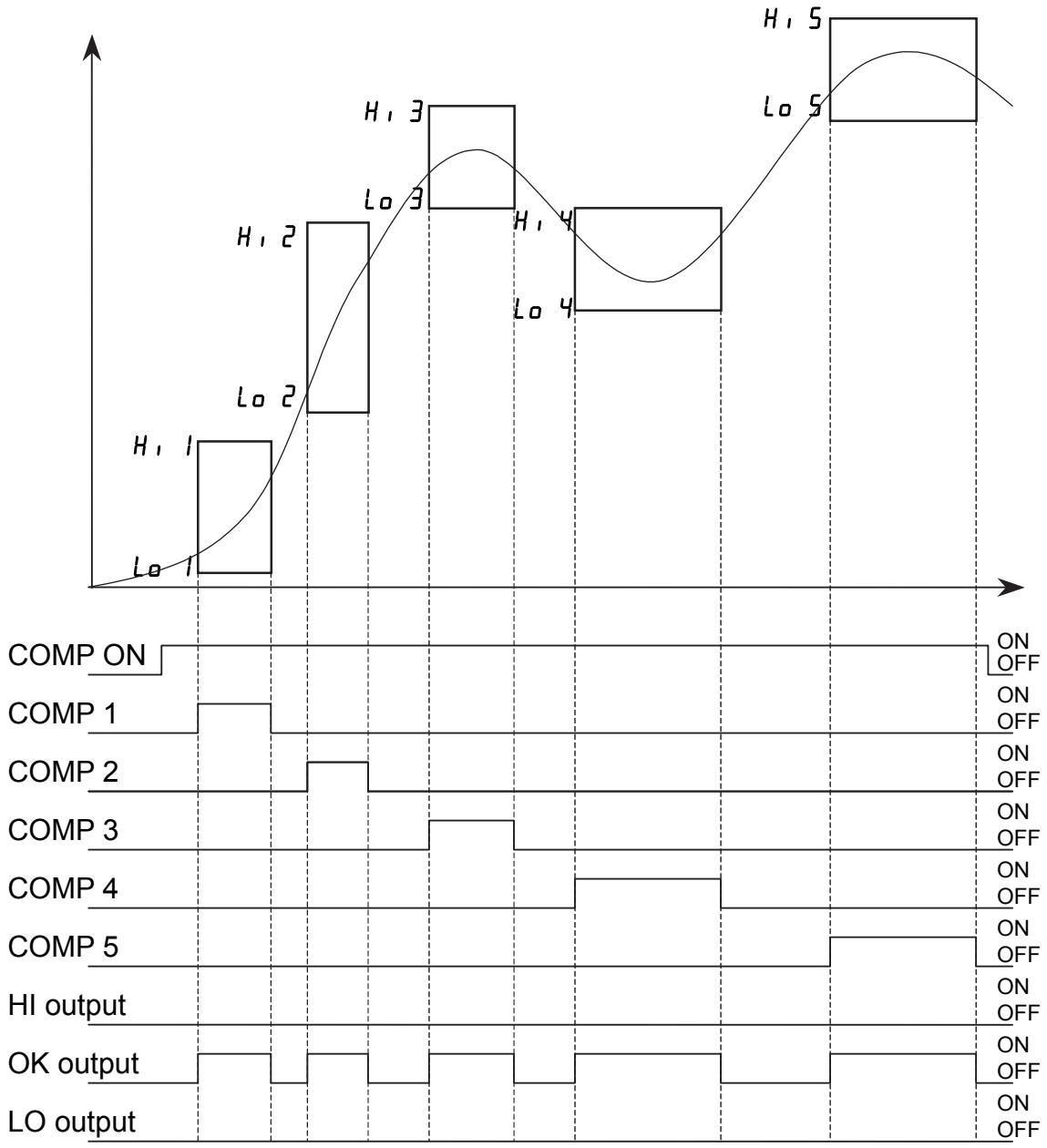


To return to step 2

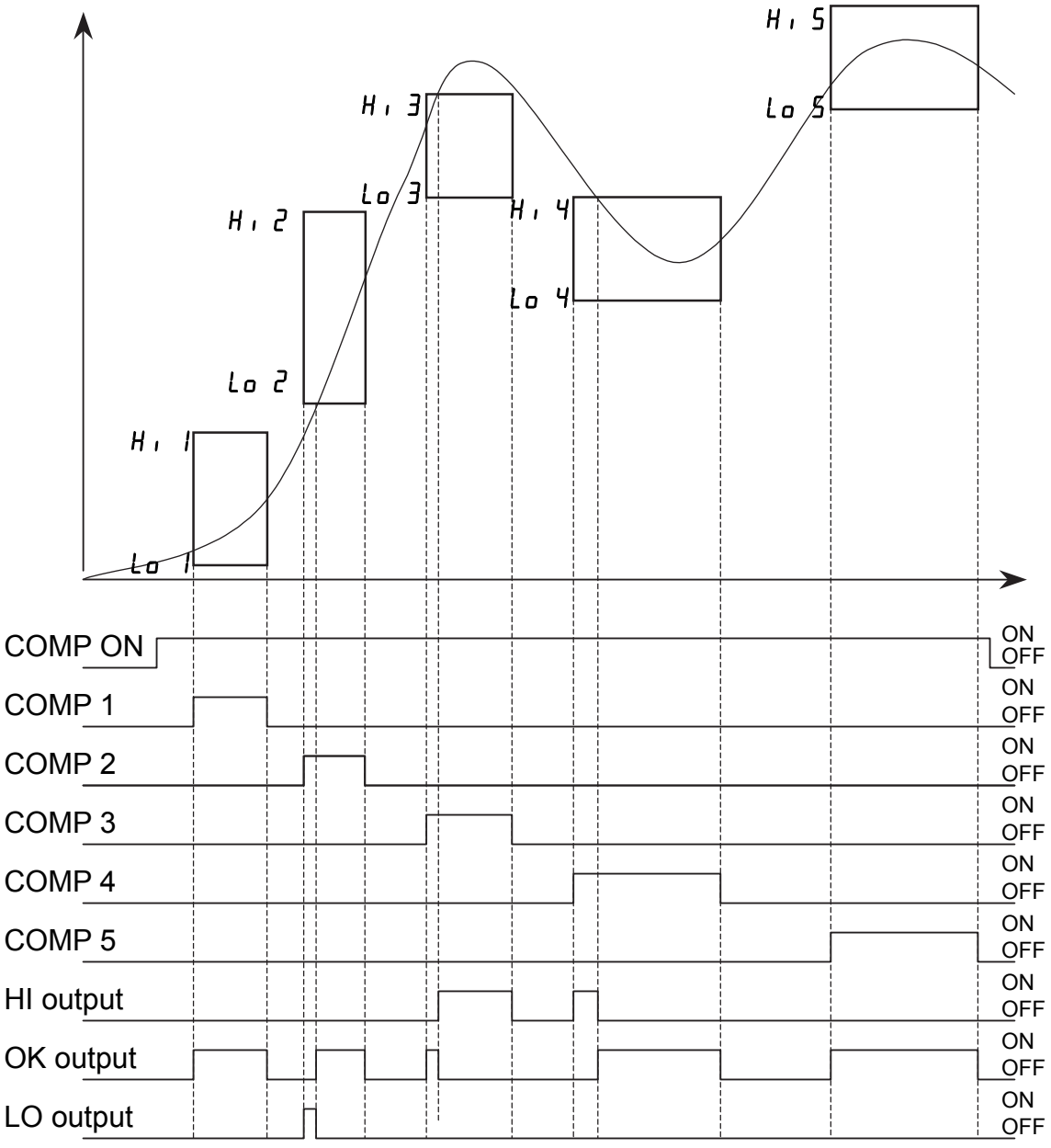
10-3-2 Example of the 2D comparator mode (By COMP 1 to 5 inputs)

Example: F-16 5 (5-level continuous comparison)

When the judgment result is OK:



When the judgment result is NG:



10-4 2D Comparator Mode (By time control)

10-4-1 Setting the upper and lower limit values for each level

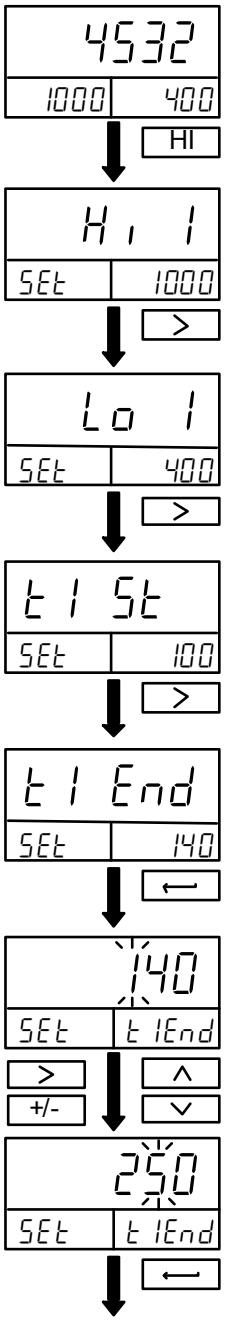
1. In the measurement mode, press the HI key or LO key to check the upper limit value or lower limit value.

2. In the main display, Hi 1 or Lo 1 appears. And in the right side of the sub-display, the upper limit or lower limit value that is currently set for the level appears. The corresponding ● indicator turns on.
   t1 St indicates the starting time. t1 End indicates the ending time.

>	Switches among the upper limit value, lower limit value, starting time and ending time.
∧	Increases the level.
∨	Decreases the level.
↵	Selects the item to be changed and goes to step 3.
ESC	Cancels the operation and returns to the measurement mode.

3. The value blinks indicating that changes are available. When the negative value is set for the time, the comparison at the corresponding level will not be performed. The time unit is ms.
   Use the following keys to change the value.

>	Selects the digit to set.
∧	Increases the value.
∨	Decreases the value.
+/-	Changes the polarity sign
↵	Saves the changed value and returns to step 2.
ESC	Cancels the operation and returns to the measurement mode.



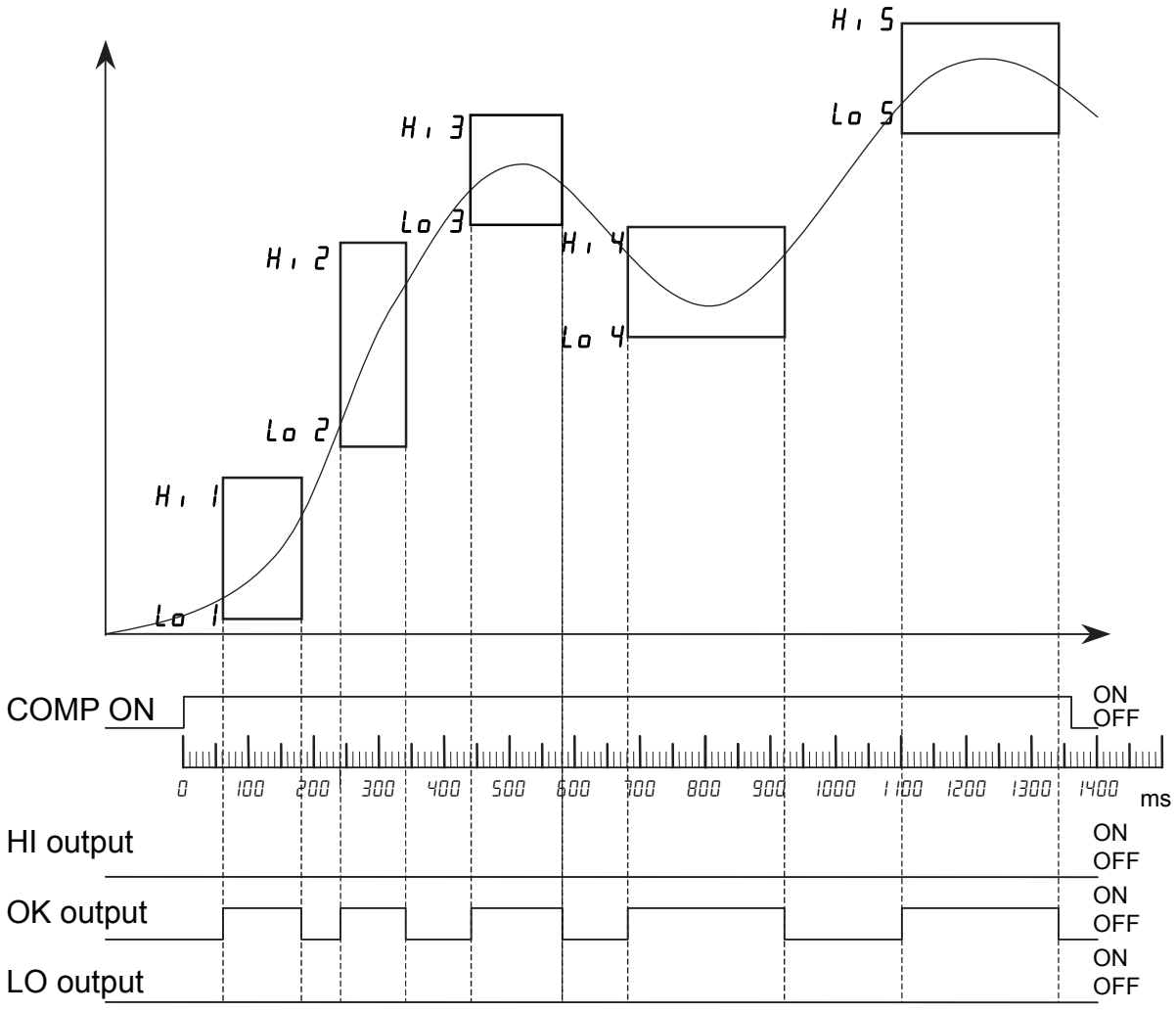
To return to step 2

10-4-2 Example of the 2D comparator mode (By time control)

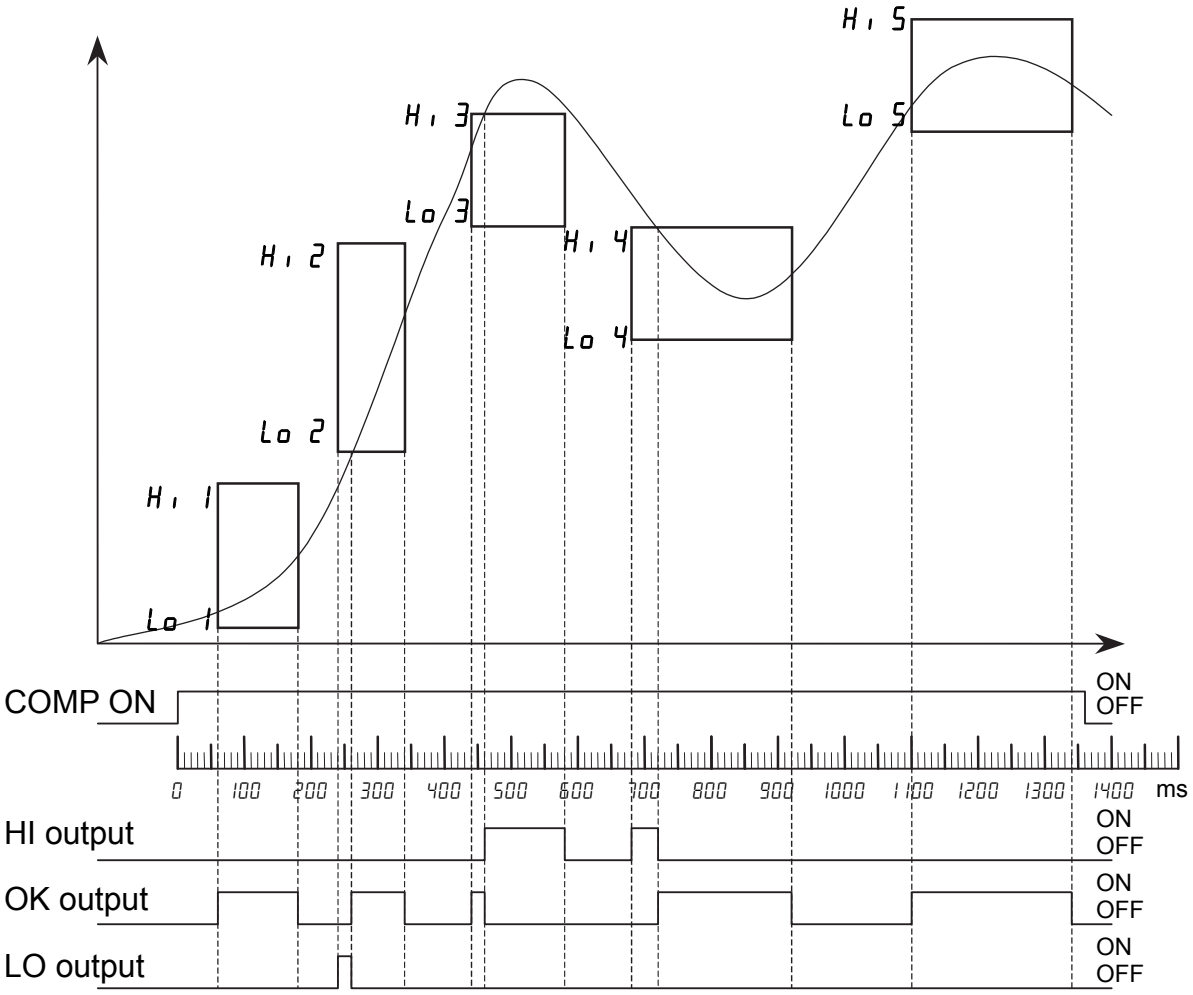
Example: F-16 7 (5-level continuous comparison) with the starting and ending time for each level that are set as below.

Level 1	t1 St	60	t1 End	180	Unit: ms
Level 2	t2 St	240	t2 End	340	
Level 3	t3 St	440	t3 End	580	
Level 4	t4 St	680	t4 End	920	
Level 5	t5 St	1100	t5 End	1340	

When the judgment result is OK:



When the judgment result is NG:

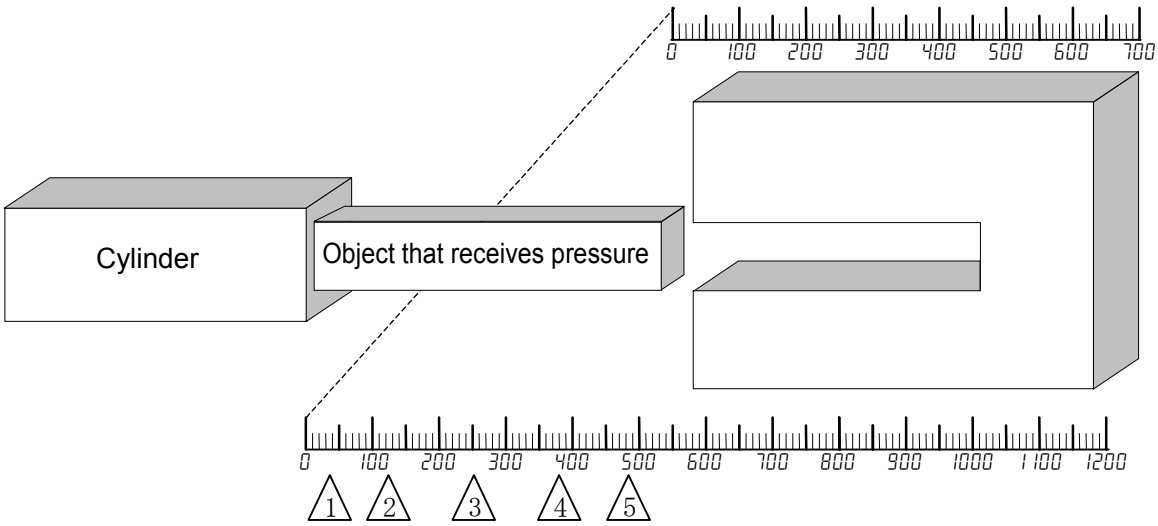


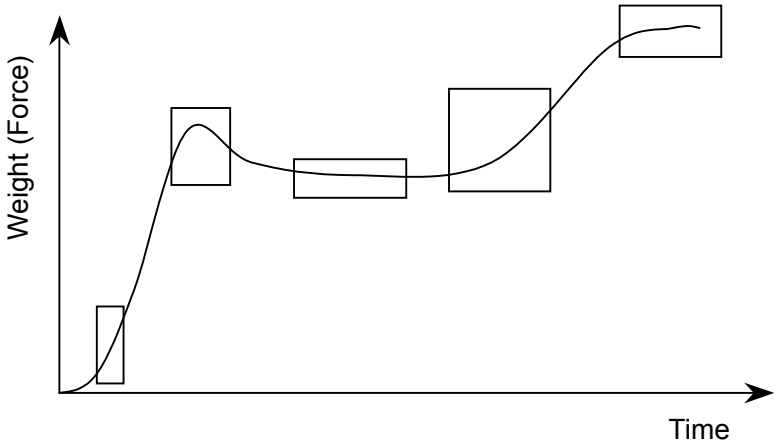
10-5 2D Comparator Mode (Additional Explanation)

While the conventional comparison method detects and judges the maximum or minimum value only during measurement, the 2D comparator mode uses contact inputs from the rear panel terminals or elapsed time to make a comparison at various levels.

This type of comparison is useful for an operation such that the pressure increases rapidly at the pressurization starting time and changes in pressure occur during the pressurization process.

Using this mode, an erroneous situation such as the fall over of a rivet which receives the pressure or assembling error due to the wrong mounting holes can be detected accurately.





10-6 Comparator Hysteresis Function

A hysteresis width and time is provided for the output relay on/off timing to prevent the output terminals from chattering.

When the measured value exceeds the set value, the relay is turned on. If the measured value falls below the set value and it is further reduced by the hysteresis width, or if the hysteresis time has elapsed, the relay is turned off.

The hysteresis mode, time and width can be set in function modes F-19, F-20 and F-21.

10-6-1 Upward 2-level judgment (F-19 0)

□ Relation between OK and HI

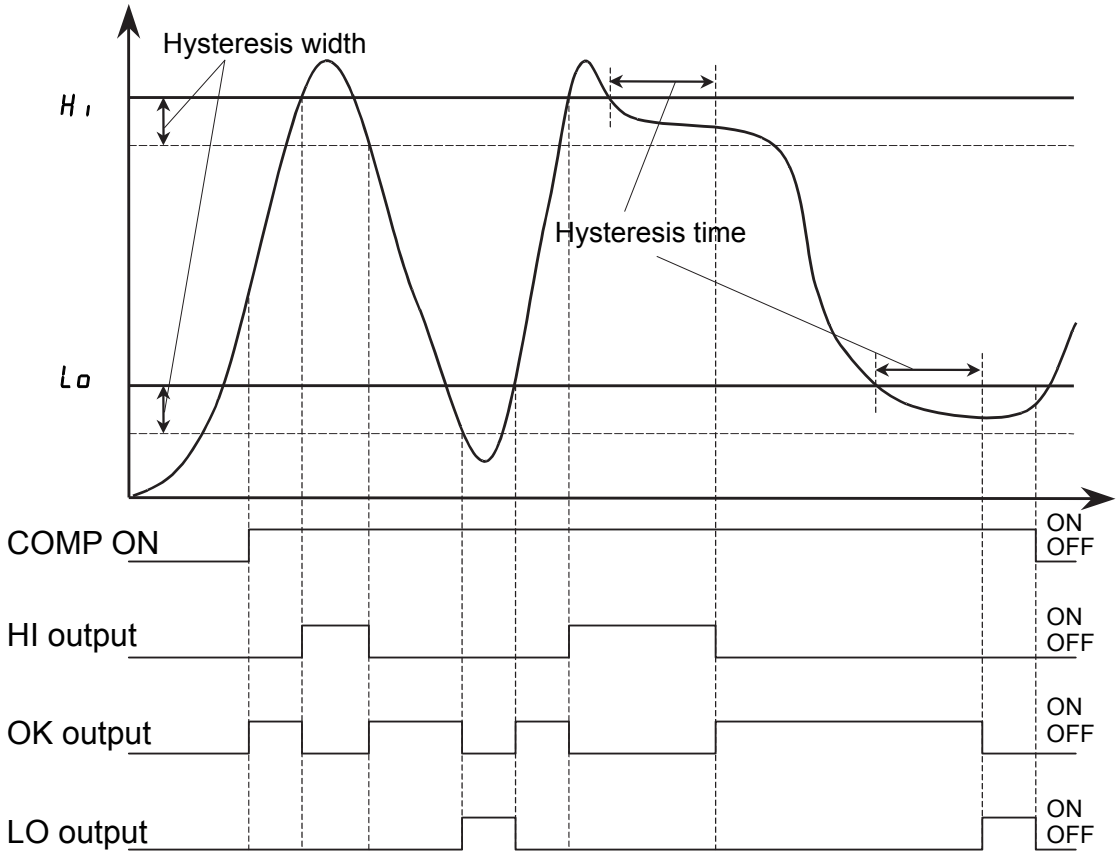
When the measured value exceeds the set upper limit value, HI is output. Even if the measured value falls below the upper limit value after that, OK is not output immediately. OK will be output when the measured value is reduced by the hysteresis width, or when the hysteresis time has elapsed.

□ Relation between OK and LO

Even if the measured value falls below the set lower limit value, LO is not output immediately. LO will be output when the measured value is reduced by the hysteresis width, or when the hysteresis time has elapsed.

When the measured value returns above the lower limit value, OK is output immediately.

Judgment example



10-6-2 Upper/lower limit judgment (F-19 1)

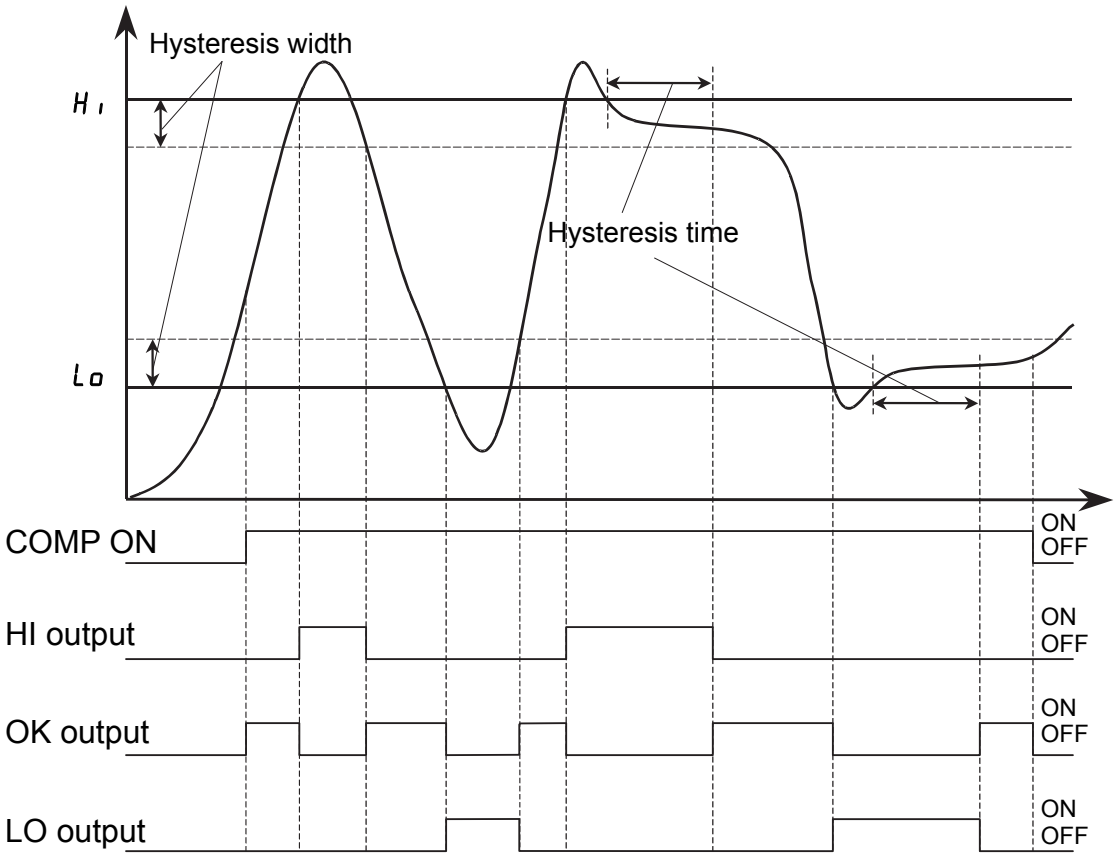
□ Relation between OK and HI

When the measured value exceeds the set upper limit value, HI is output. Even if the measured value falls below the upper limit value after that, OK is not output immediately. OK will be output when the measured value is reduced by the hysteresis width, or when the hysteresis time has elapsed.

□ Relation between OK and LO

When the measured value falls below the set lower limit value, LO is output. Even if the measured value returns above the lower limit value after that, OK is not output immediately. OK will be output when the measured value is increased by the hysteresis width, or when the hysteresis time has elapsed.

Judgment example



10-6-3 Downward 2-level judgment (F-19 2)

□ Relation between OK and HI

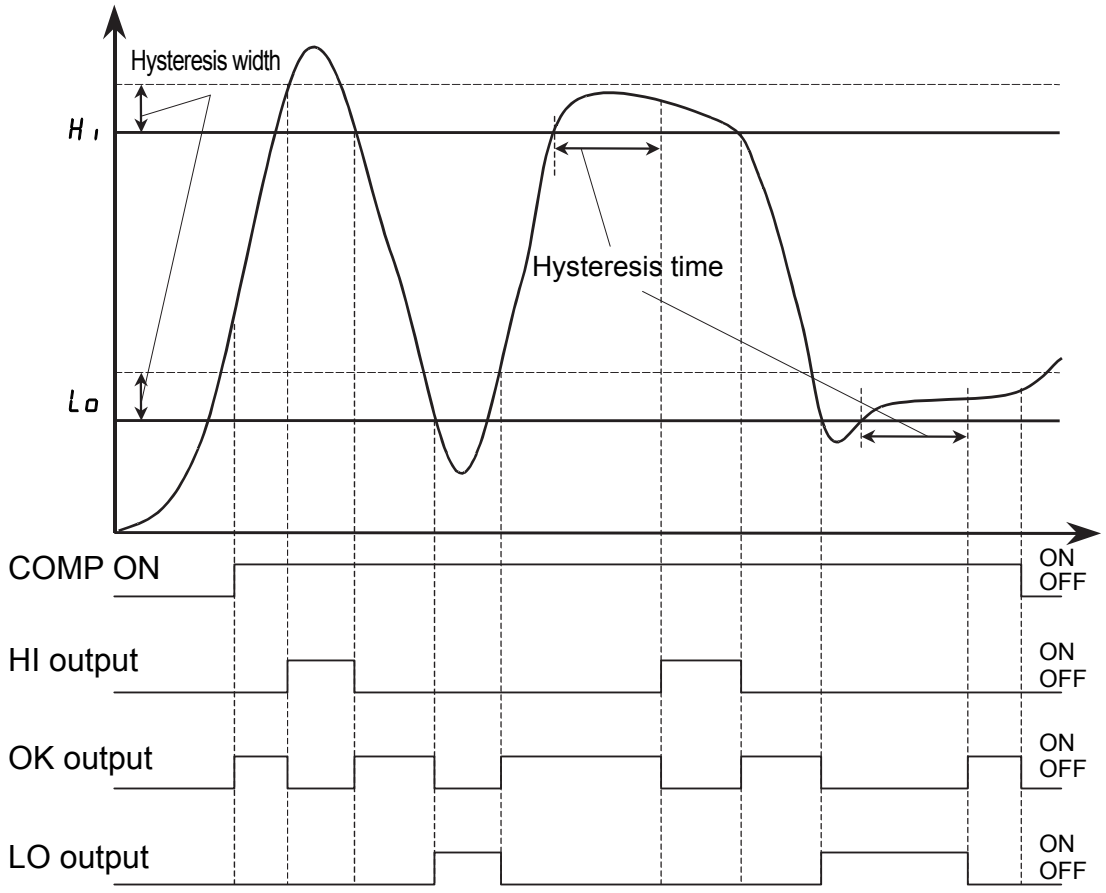
Even if the measured value exceeds the set upper limit value, HI is not output immediately. HI will be output when the measured value is increased by the hysteresis width, or when the hysteresis time has elapsed.

When the measured value falls below the upper limit value, OK is output immediately.

□ Relation between OK and LO

When the measured value falls below the set lower limit value, LO is output. Even if the measured value returns above the lower limit value after that, OK is not output immediately. OK will be output when the measured value is increased by the hysteresis width, or when the hysteresis time has elapsed.

Judgment example



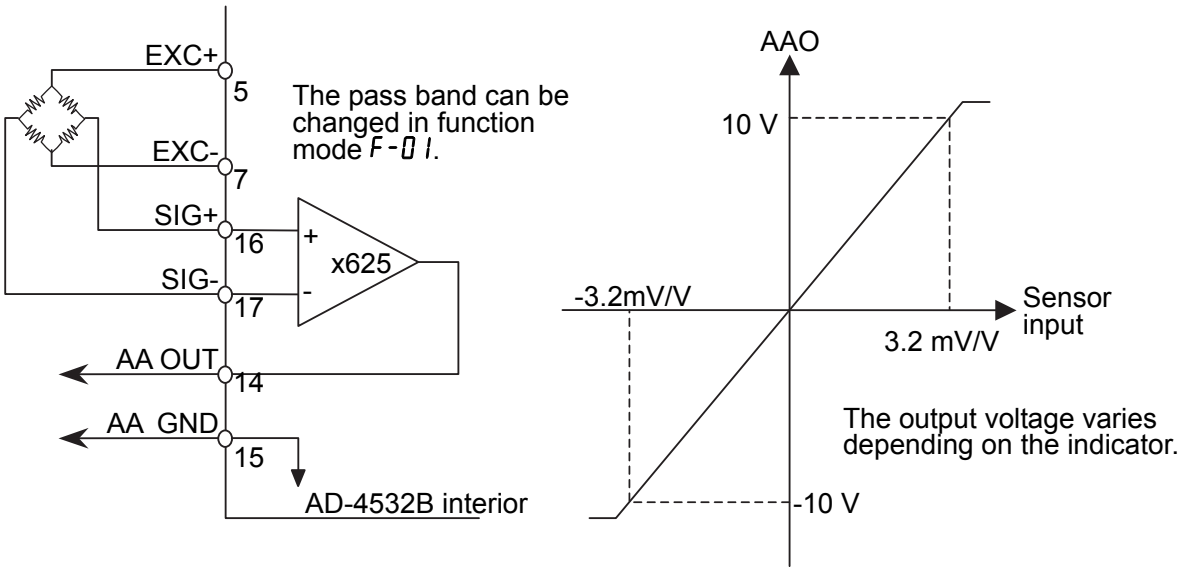
11. ANALOG OUTPUT

The AD-4532B has two types of analog output; the analog amplifier output (AAO) that amplifies the sensor's analog signals and outputs the amplified signal, and the digital to analog voltage output (DAV) that processes the measured values from the sensors according to the values set in function mode, and outputs the processed signal as a voltage after D/A conversion.

These outputs are used to observe the voltage waveform from the sensors by connecting a recorder to the analog output terminal.

11-1 Analog Amplifier Output (AAO)

Amplifies the sensor's analog signals 625 times and outputs the amplified signal. The output voltage range is from –10 V to +10 V. The pass band can be changed in function mode F-01.



Output example

When the applied voltage is 5 V and the sensor rated output is 3.2 mV/V,

the analog output value will be:

Sensor output voltage = 3.2 mV/V x 5 V = 16 mV.

Analog amplifier output voltage = 16 mV x 625 ≈10 V.

Note: The output voltage varies depending on the indicator. Before use, be sure to check the output values of the sensors.

11-2 Digital to Analog Voltage Output (DAV)

Processes the measured values from the sensors according to the values set in function modes F-22 to F-24, and outputs the processed signal as a voltage after D/A conversion. The output voltage range is from –10 V to +10 V. Scaling is available in function modes F-22 and F-23.

11-2-1 Specifications

Rated output range	–10 V to +10 V (Non-inductive load of 5 kΩ or more)
Maximum output range	–11.0 V to +11.0 V
D/A conversion speed	2000 times per second
Output resolution	1/10000
Zero drift	±1 mV/°C typ.
Gain drift	±100ppm/°C typ.
Linearity	±0.05%F.S. (Drift in the sensor input unit not included)
Load resistance	5 kΩ or more

11-2-2 Fine adjustment of zero and span

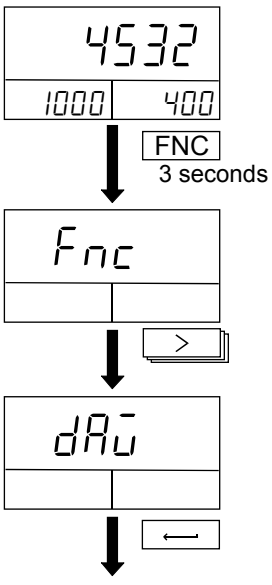
⚠CAUTION

Note on using this function

- Use this mode only when adequate accuracy can not be obtained by the regular scaling set in function modes F-22 and F-23. This mode uses the internal correction factor and requires a high-precision digital multimeter. If a low-precision multimeter is used, it may adversely affect the indicator performance and the output voltage accuracy.

1. In the measurement mode, press the FNC key for three seconds or more to enter the function selection mode.

2. Press the > key several times to display dAU. Press the ↵ key to enter the DAV adjustment mode.

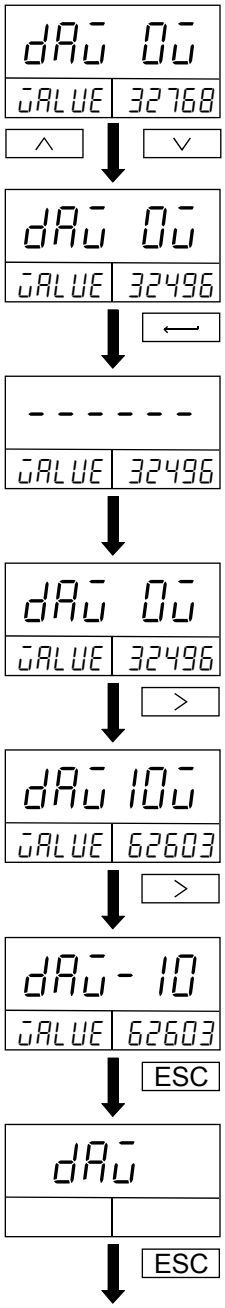


3 . When [dAU 0U] is displayed, adjusting 0V is enabled.

In the right side of the sub-display, the internal correction factor for the DAV output appears.

Use the following keys to adjust the output voltage while looking at the digital multimeter.

[>]	Switches among 0 V, 10 V and –10 V.
[∧]	Increases the output voltage value. Also increases the correction factor. When kept pressed, increases the correction factor by ten.
[∨]	Decreases the output voltage value. Also decreases the correction factor. When kept pressed, decreases the correction factor by ten.
[↵]	Saves the adjusted value.
[ESC]	Cancels the operation and returns to the [dAU] display.



To return to
the measurement mode

Note: Before fine adjustment, the color of the main display is green. It changes to orange when fine adjustment is performed and the correction factor is changed. (When the correction factor is restored to the previous value, the display color returns to green.) Press the [↵] key to save the result of fine adjustment.

This mode directly changes the DAV output factory setting values. The correction factor varies depending on the indicator. Before changing the value, record the factory setting values.

12. Modbus RTU INTERFACE

The Modbus RTU interface reads the measured values or status from the AD-4532B, or writes the settings to the AD-4532B.

Using the Modbus RTU interface, a personal computer, PLC or programmable display can be connected to the AD-4532B.

12-1 Specifications

12-1-1 Specifications

Communications protocol	Modbus RTU
Transmission system	RS-485
Transmission distance	1.2 km or less
Transmission form	Synchronous, half duplex
Baud rate	1200 bps, 2400 bps, 4800 bps, 9600 bps, 19200 bps, 38400 bps
Number of indicators to be connected	Max. 32 (Including one master indicator)
Data bit length	7 bits, 8 bits (8 bits for the Modbus RTU interface)
Parity	None, Odd, Even
Stop bit	1 bit, 2 bits

The items above can be set in function modes F-25 to F-30.

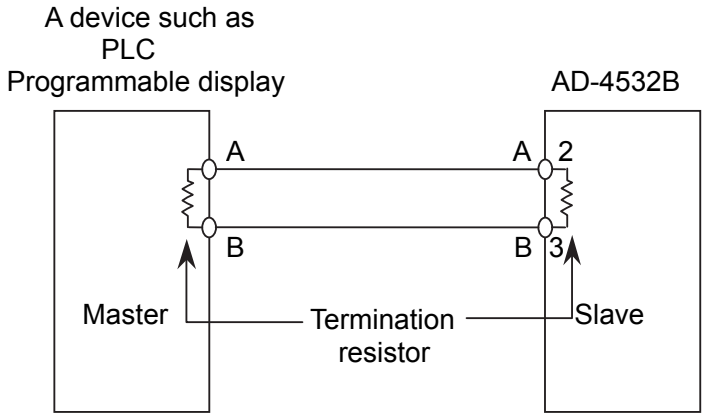
12-1-2 Data address

Data type	Address	Data	Data format
Coil 0XXXX	1	Hold	1 bit
	2	Release hold	
	3	Zero	
	4	Clear zero	
	5	Save settings in EEPROM	
Input status IXXXX	1	Hold	1 bit
	2	Stable	
	3	Zero band	
	4	Rated capacity overflow	
	5	AD conversion overflow	
	6	HI output	
	7	LO output	
	8	OK output	
	9	Level 1 HI output	
	10	Level 1 LO output	
	11	Level 1 OK output	
	12	Level 2 HI output	
	13	Level 2 LO output	
	14	Level 2 OK output	
	15	Level 3 HI output	
	16	Level 3 LO output	
	17	Level 3 OK output	
	18	Level 4 HI output	
	19	Level 4 LO output	
	20	Level 4 OK output	
	21	Level 5 HI output	
	22	Level 5 LO output	
	23	Level 5 OK output	
Input register 3XXXX	1	Decimal point position	0 to 4
	2	Unit	0 to 15
	3, 4	Measured value (In sync with the display)	32 bits with a polarity sign
	5, 6	Measured value (In sync with sampling)	32 bits with a polarity sign

Data type	Address	Data	Data format
Holding register 4XXXX	1, 2	Upper limit	32 bits with a polarity sign -999999 to +999999
	3, 4	Lower limit	
	5, 6	Level 1 upper limit	
	7, 8	Level 1 lower limit	
	9, 10	Level 2 upper limit	
	11, 12	Level 2 lower limit	
	13, 14	Level 3 upper limit	
	15, 16	Level 3 lower limit	
	17, 18	Level 4 upper limit	
	19, 20	Level 4 lower limit	
	21, 22	Level 5 upper limit	
	23, 24	Level 5 lower limit	
	25, 26	Level 1 starting time	
	27, 28	Level 1 ending time	
	29, 30	Level 2 starting time	
	31, 32	Level 2 ending time	
	33, 34	Level 3 starting time	
	35, 36	Level 3 ending time	
	37, 38	Level 4 starting time	
	39, 40	Level 4 ending time	
	41, 42	Level 5 starting time	
	43, 44	Level 5 ending time	
	45, 46	Digital offset	
	47, 48	Zero band (F-17)	
	49, 50	Hysteresis width (F-21)	
	51	Hysteresis time (F-20)	0 to 99
	52	Hysteresis mode (F-19)	0 to 2
	53	Hold mode (F-14)	0 to 3
	54	Holding time (F-15)	0 to 99
	55	Comparator mode (F-16)	0 to 7

12-2 Connection Procedure

12-2-1 When making a connection between a master device and one indicator

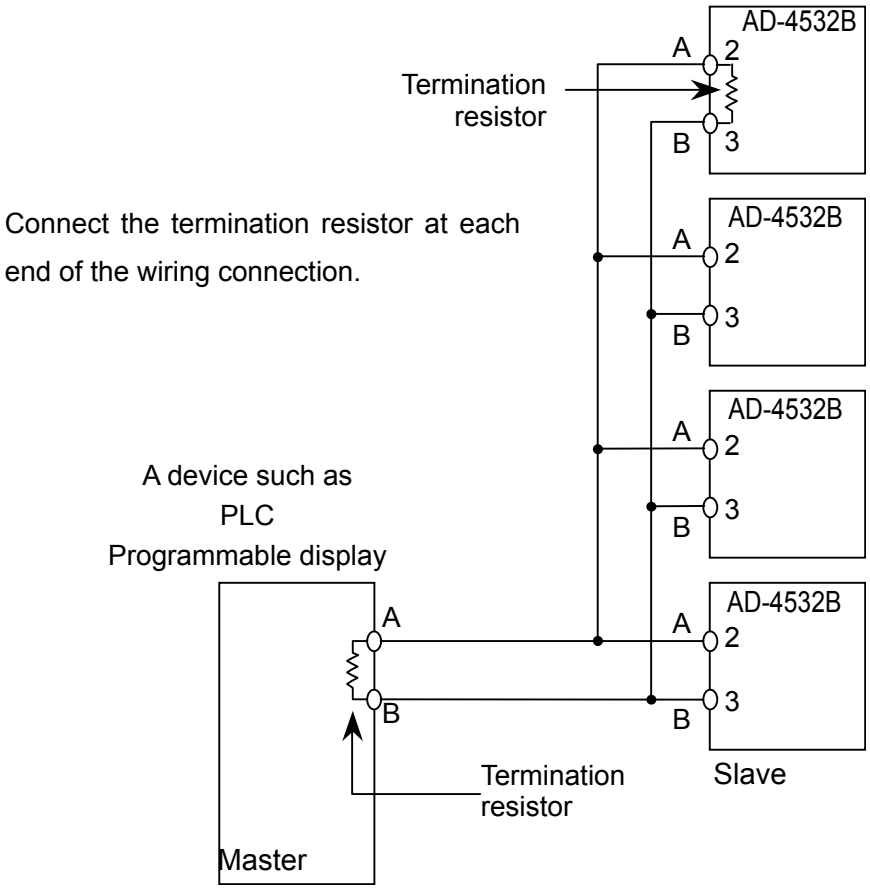


□ Use a shielded twisted pair cable to make a connection.

□ Connect termination resistors without fail. (100Ω to 120Ω, 1/2 W to 2 W)

□ The positions of A and B may be reversed for some master devices. If communication can not be enabled after connection, check all of the connections.

12-2-2 When making a connection between a master device and multiple indicators

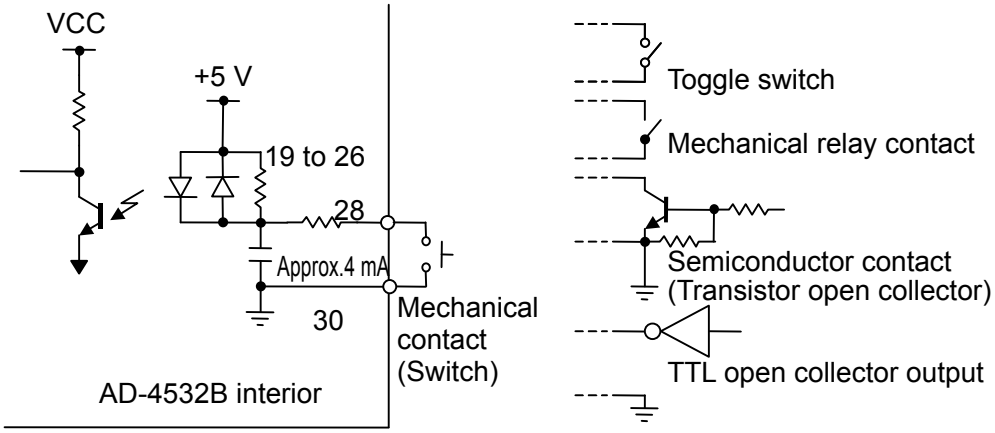


13. INPUT AND OUTPUT

The AD-4532B has nine input terminals and three output terminals.

13-1 Input Terminal

□ Equivalent circuit diagram



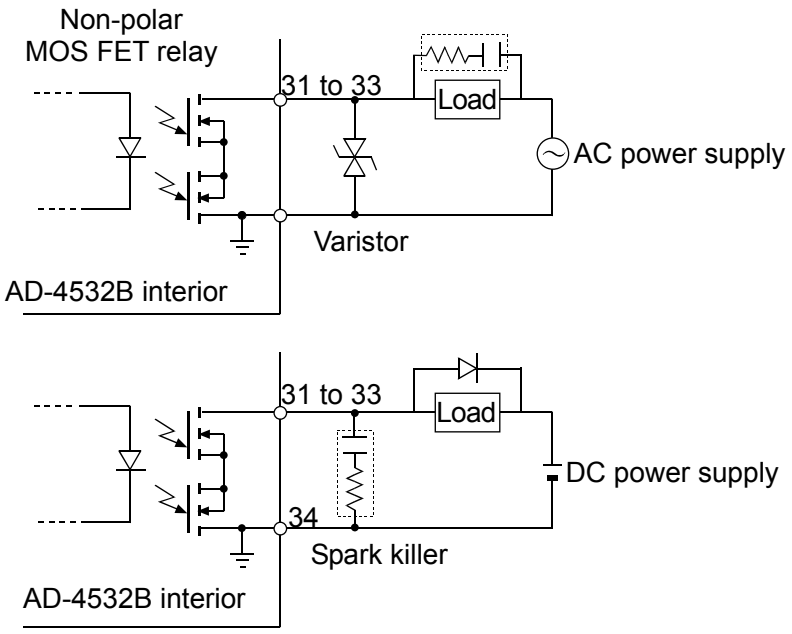
⚠CAUTION

Note on connecting input terminals

- Ensure to allow 5 ms or more for both the mechanical contact ON time and OFF time.
- The switch element is a no-voltage input (a mechanical contact or semiconductor contact).
- Leakage at the switch element when OFF should be 30 μA or less.

13-2 Output Terminal

□ Equivalent circuit diagram



Contact rating	
250 VAC	0.1 A
30 VDC	0.5 A

⚠CAUTION

Note on connecting output terminals

- Use a load within the specified rating to prevent over-voltage or over-current from destroying the MOS FET relay.
- Connect a spark killer to the load appropriate to AC/DC.
- Do not short-circuit the load. It may damage the MOS FET relay.

14. CHECK MODE

The AD-4532B has check modes to check the performance of input and output terminals as follows. Display check mode, analog output check mode, I/O check mode and key check mode.

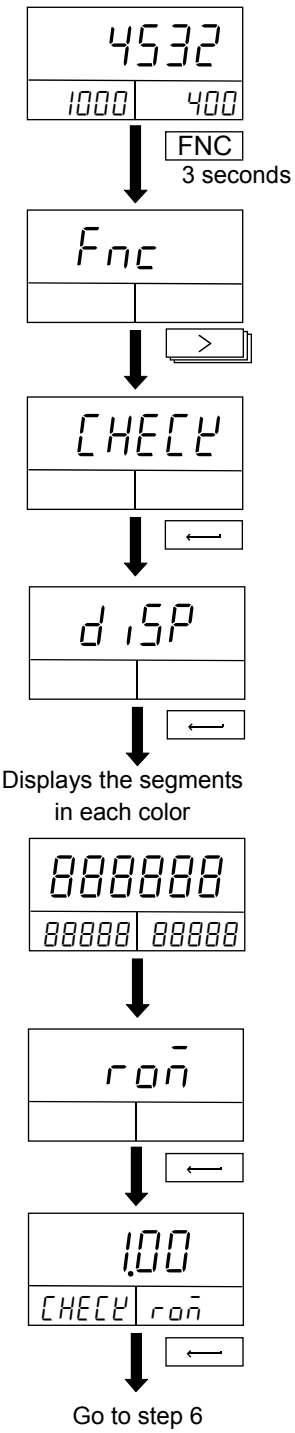
14-1 Check Mode Procedure

14-1-1 Entering a check mode

1. In the measurement mode, press the FNC key for three seconds or more to enter the function selection mode.

2. Press the [>] key several times to display [CHECK] (Check mode).

3. Press the [↵] key to go to the display check mode [diSP].



14-1-2 Display check mode

4. Press the [↵] key to check the display. All the display segments are turned on.
   After the display check, [ron] appears to indicate that the indicator has entered the ROM version check mode.
   - [>] Moves to the next check mode without performing the current check mode
   - [ESC] Returns to the [CHECK] display.

14-1-3 ROM version check mode

5. Press the [↵] key to check the ROM version. In the example display shown to the right, the ROM version is 1.00 [1.00].
   Press the [↵] key to enter the applied voltage check mode [voLt].
   - [>] Moves to the next check mode without performing the current check mode
   - [ESC] Returns to the [CHECK] display.

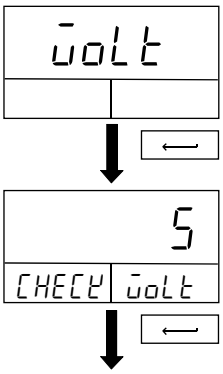
14-1-4 Applied voltage check mode

6. Press the [↵] key to check the applied voltage supplied to the sensor from the AD-4532B. In the example display shown to the right, the applied voltage is 5 V [5].

   Press the [↵] key to go to the DAV voltage check mode [dAU].

   [>] Moves to the next check mode without performing the current check mode

   [ESC] Returns to the [CHECK] display.



14-1-5 DAV voltage check mode

7. The DAV voltage check mode checks the D/A output voltage.

   [>] Moves to the next check mode without performing the current check mode

   [↵] Displays the DAV output voltage.

   [ESC] Returns to the [CHECK] display.

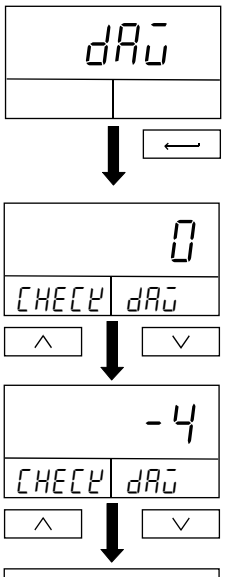
8. Connect a digital multimeter. Use the following keys to check the output voltage.

   [^] Increases the DAV output value by one.

   [v] Decreases the DAV output value by one.

   [↵] Finishes the DAV voltage check mode and enters the zero calibration mV/V value check mode [CAL 0].

   [ESC] Cancels the operation and returns to the [dAU] display.



14-1-6 Zero calibration mV/V value check mode

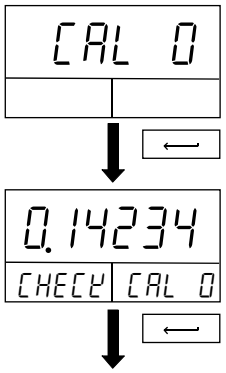
9. The zero calibration mV/V value check mode displays the mV/V value at zero calibration.

   Press the [↵] key to check the zero calibration mV/V value. In the example display shown to the right, the value at zero calibration is 0.14234 mV/V [0.14234].

   Press the [↵] key to go to the span calibration mV/V value check mode [SPAn].

   [>] Moves to the next check mode without performing the current check mode

   [ESC] Returns to the [CHECK] display.



Go to step 10

14-1-7 Span calibration mV/V value check mode

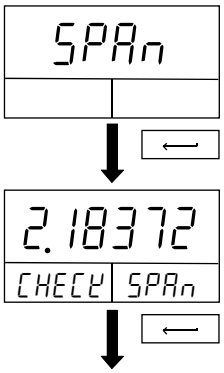
10. The span calibration mV/V value check mode displays the mV/V value at span calibration.

    Press the [↵] key to check the span calibration mV /V value. In the example display shown to the right, the value at span calibration is 2.18372 mV/V [2.18372].

    Press the [↵] key to go to the I/O check mode [tESt].

    [>] Moves to the next check mode without performing the current check mode

    [ESC] Returns to the [CHECK] display.



14-1-8 I/O check mode

11. The I/O check mode checks the control input and comparator output.

    [>] Moves to the next check mode without performing the current check mode

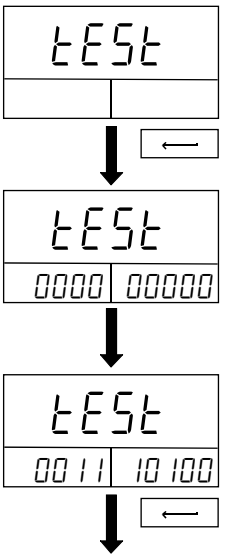
    [↵] Enters the I/O check mode and goes to step 12.

    [ESC] Returns to the [CHECK] display.

12. When an input occurs at the rear panel terminal, the corresponding digit in the sub-displays turns to "1". Connect an I/O unit to check the external output value.

    [↵] Finishes the I/O check mode and enters the key check mode [KEY]

    [ESC] Cancels the operation and returns to the [tESt] display.



Go to step 13

←Left Relation of the display and the input/output terminals Right→

Control input	Zero	Hold	COMP ON	Latch	COMP 5	COMP 4	COMP 3	COMP 2	COMP 1
Comparator output	-	-	-	-	-	-	LO	OK	HI

14-1-9 Key check mode

13. The key check mode checks the front panel keys.

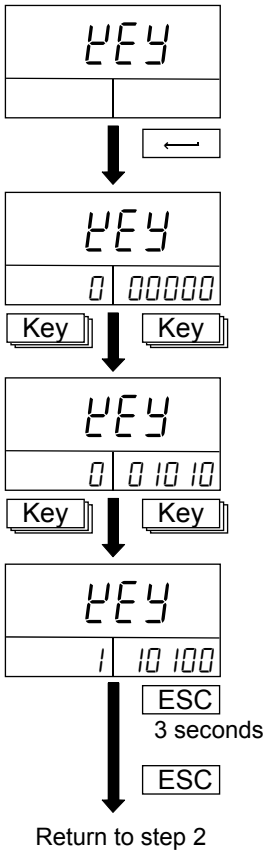
    [>] Moves to the initialization mode without performing the current check mode

    [↵] Enters the key check mode and goes to step 14.

    [ESC] Returns to the [CHECK] display.

14. When each key is pressed, the corresponding digit in the sub-displays turns to "1".

    Press the [ESC] key for three seconds or more, release it, then press the [ESC] key again to finish the key check mode and return to the [CHECK] display.



14-1-10 Initialization

15. Initialization restores the various settings to the factory setting values.

    [>] Moves to the display check mode without performing the initialization.

    [↵] Enters the initialization mode and displays [init F] in the main display.

    [ESC] Returns to the [CHECK] display.

16. Using the [>] key, select an item to be initialized. In the example display shown to the right, initialization of the calibration settings is selected.

    [init F] Initializes the function settings.

    [init C] Initializes the calibration settings.

    [initdA] Initializes the DAV settings.*Note

    [initOP] Initializes the option settings.*Note

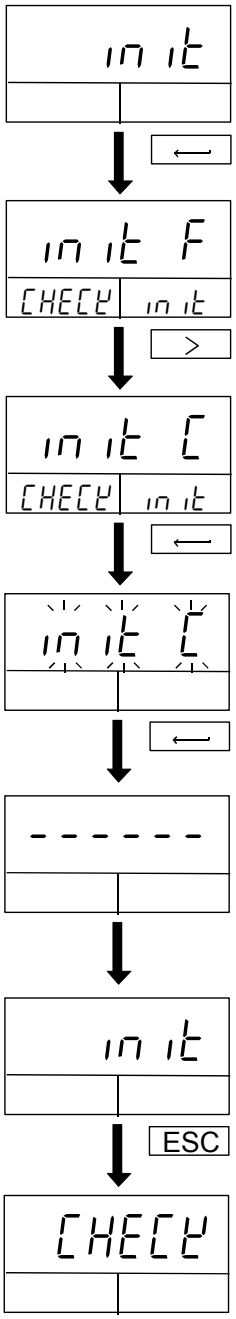
    [init A] Initializes all the settings.*Note

    *Note: All of the three initialization modes initialize the DAV settings. Thus, a high-precision digital multimeter is required.

    [>] Selects an item to be initialized.

    [↵] Performs initialization. During initialization, [------] appears.

    [ESC] Returns to the [CHECK] display.



15. OPTIONS

The AD-4532B has the following options available:

- □ AD-4532B-01 BCD output
- □ AD-4532B-04 RS-232C serial interface
- □ AD-4532B-07 DAV/DAI analog voltage output/analog current output
- □ AD-4532B-08 Ethernet interface

Only one of the options can be installed in the AD-4532B at a time.

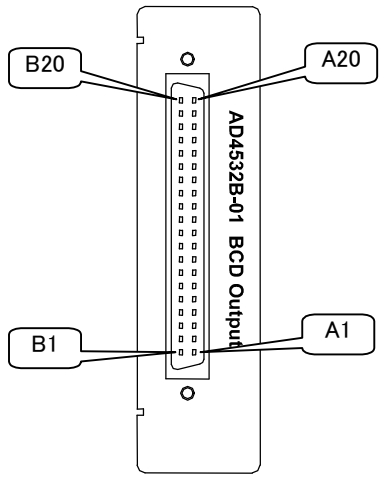
15-1 AD-4532B-01 BCD Output

The BCD output is an interface to convert measured values into a BCD format and output. Using this interface, the AD-4532B can be connected to a device such as a personal computer or a PLC to perform controlling, collection or recoding.

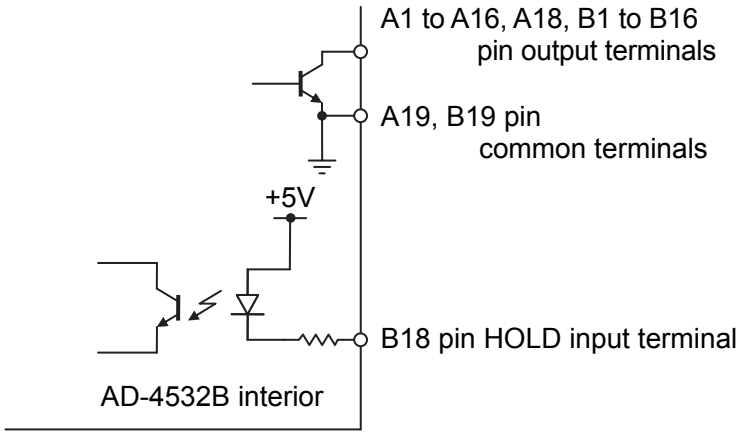
15-1-1 Specifications

Output circuit type	Open collector output
Withstand voltage	DC35 V
Maximum drive current	30 mA
Maximum ON voltage	0.7 V at 30 mA drive current
Input circuit type	DC input, source type
Input terminal open voltage	5 V ± 5 %
Maximum drive current	Max. 5 mA
Allowable residual voltage	Max. 1.5 V

15-1-2 Equivalent circuit diagram and connector pin assignment



External view and pin assignment



Equivalent circuit diagram

Pin No.	Direction	BCD code		Pin No.	Direction	BCD code	
A1	Output	1	10^0	B1	Output	2	10^0
A2	Output	4		B2	Output	8	
A3	Output	1	10^1	B3	Output	2	10^1
A4	Output	4		B4	Output	8	
A5	Output	1	10^2	B5	Output	2	10^2
A6	Output	4		B6	Output	8	
A7	Output	1	10^3	B7	Output	2	10^3
A8	Output	4		B8	Output	8	
A9	Output	1	10^4	B9	Output	2	10^4
A10	Output	4		B10	Output	8	
A11	Output	1	10^5	B11	Output	2	10^5
A12	Output	4		B12	Output	8	
A13	Output	OVER		B13	Output	Polarity	
A14	Output	STABLE		B14	Output	Zero band	
A15	Output	Decimal point 10^1		B15	Output	Decimal point 10^2	
A16	Output	Decimal point 10^3		B16	Output	Decimal point 10^4	
A17	NC	Not connected		B17	IC	Internal use	
A18	Output	STROBE		B18	Input	HOLD	
A19	COM	Input/output common terminal		B19	COM	Input/output common terminal	
A20	FG	Frame ground		B20	FG	Frame ground	

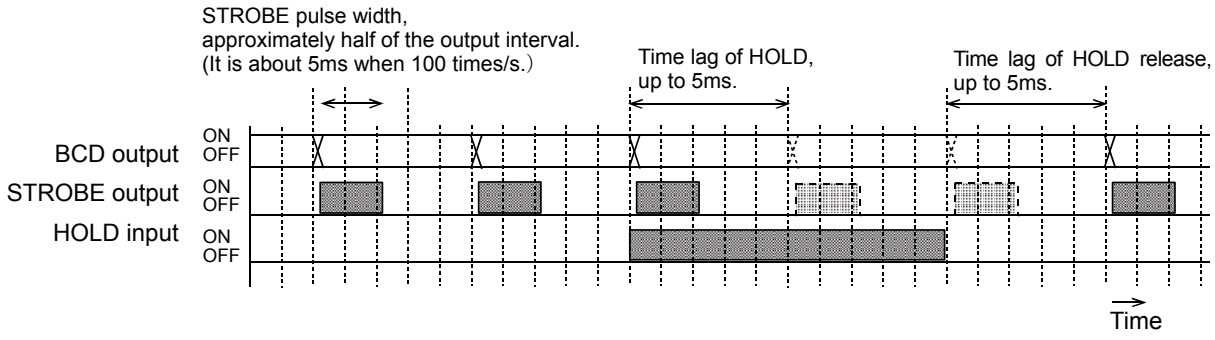
15-1-3 Settings

Settings are performed by the following function items.

Function No.	Name	Setting
F-32	BCD output logic	0: Positive logic 1: Negative logic (default)
F-33	BCD output rate	0: 1 time/s 1: 10 times/s 2: 100 times/s 3: 1000 times/s 4: 2000 times/s 5: In sync with the display update rate, F-05 (default)

15-1-4 Data output timing

Rewriting of BCD output data is detectedd by STROBE output.
The STROBE output turns ON when the BCD output data is rewritten. After that, the SRTOBE output turns OFF with the BCD output data is confirmed. To import the BCD output data from the connected device, capture the data at the falling edge when this STROBE output turns off. If the device needs time to import BCD data, use the HOLD input to stop rewriting the data.
In this explanation, F-32 (BCD output logic) is set to 1 (negative logic). In the case of positive logic, the STROBE output logic is reversed. The HOLD input logic does not change.



Time axis differs according to F-33, the BCD output rate.

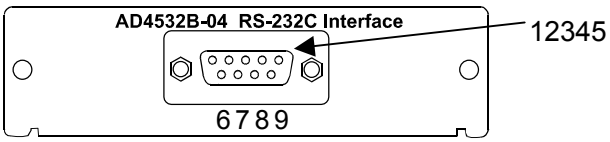
15-2 AD-4532B-04 RS-232C Serial Interface

The RS-232C serial interface can be connected to a device such as a personal computer, PLC or a programmable display, to output the values displayed by the AD-4532B and perform controlling, collection or recoding.

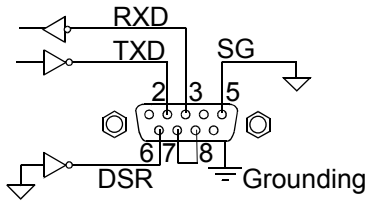
15-2-1 Specifications

Transmission form	Asynchronous, half duplex
Baud rate	1200, 2400, 4800, 9600, 19200, 38400bps
Data bits	7 bits, 8 bits
Parity	None, Even, Odd
Stop bit	1 bit, 2 bits
Code	ASCII
Terminator	CR LF (CR: 0DH, LF: 0AH)
Applicable connector	D-Sub 9-pin

15-2-2 Pin assignment and circuit



Pin No.	Signal name	Direction	Description
2	TXD	Output	Transmit data
3	RXD	Input	Receive data
5	SG	-	Signal ground
6	DSR	Output	Data set ready
7	RTS	-	Make a connection between pin 7 and pin 8.
8	CTS	-	
Others			No connection
Casing			Shield



D-Sub 9-pin connector (male)

External view and pin assignment

15-2-3 Format

Normal	W	T	,	±	0	1	2	3	.	4	5	CR	LF
Overflow	O	L	,	±	9	9	9	9	.	9	9	CR	LF

The value for all the digits when overflowing will be 9.

15-2-4 Command format

When a command is processed, the indicator transmits the received command or the data. If a command can not be processed, for example, when the indicator is in operation, the indicator transmits “I”.

Communication errors may occur due to external noise.

When the indicator receives an undefined command, it transmits “?”.

Command to request data

Outputs the displayed data immediately after receiving the command.

Command: R

Command example:

R	CR	LF

Response example

W	T	,	±	0	1	2	.	3	4	5	CR	LF

Zero command

Performs zero adjustment.

Transmits “I” if the zero adjustment range is exceeded.

Command: Z

Command example:

Z	CR	LF

Response example

Z	CR	LF

Hold ON command

Starts the hold function.

Command: H

Command example:

H	CR	LF

Response example

H	CR	LF

Hold OFF command

Stops the hold function.

Transmits “I” if I/O input can not stop the hold function.

Command: C

Command example:

C	CR	LF

Response example

C	CR	LF

Command to send the upper/lower limit values

Outputs the set upper and lower limit values including the values of the 2D comparator mode.

Command: S, Sx (Where x is the comparator level of the 2D comparator mode. For example, S1 means the setting value for the level 1.)

Command example:

S	CR	LF

S	1	CR	LF

Response example

S	,	±	0	1	2	.	3	4	5	,	±	0	1	2	.	3	4	5	CR	LF

S	1	,	±	0	1	2	.	3	4	5	,	±	0	1	2	.	3	4	5	CR	LF

Command to set upper/lower limit values

Sets upper and lower limit values including the values of the 2D comparator mode.

Command: S, [Lower limit value], [Upper limit value] ; Sx [Lower limit value], [Upper limit value] (Where x is the comparator level of the 2D comparator mode. For example, S1 means the setting value for the level 1.)

Command example:

S	,	±	0	1	2	.	3	4	5	,	±	0	1	2	.	3	4	5	CR	LF

S	1	,	±	0	1	2	.	3	4	5	,	±	0	1	2	.	3	4	5	CR	LF

Response example

S	,	±	0	1	2	.	3	4	5	,	±	0	1	2	.	3	4	5	CR	LF

S	1	,	±	0	1	2	.	3	4	5	,	±	0	1	2	.	3	4	5	CR	LF

Command to send the 2D comparator time axis

Outputs the 2D comparator time axis.

Command: Tx (Where x is the comparator level of the 2D comparator mode. For example, T1 means the time axis for the level 1.)

Command example:

T	1	CR	LF

Response example

T	1	,	±	1	2	3	4	,	±	1	2	3	4	CR	LF

Command to set the 2D comparator time axis

Sets the 2D comparator time axis.

Command: Tx, [Starting time], [Ending time]

(Where x is the comparator level of the 2D comparator mode. For example, T1 means the time axis for the level 1.)

Command example:

T	1	,	±	1	2	3	4	,	±	1	2	3	4	CR	LF

Response example

T	1	,	±	1	2	3	4	,	±	1	2	3	4	CR	LF

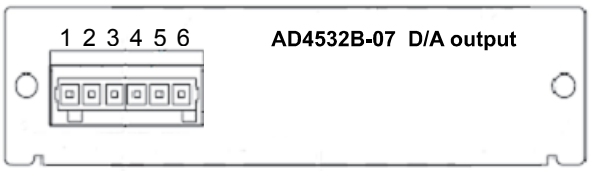
15-3 AD-4532B-07 Analog Voltage/Current Output (DAV/DAI)

The DAV/DAI analog voltage/current output is an interface to output the values displayed by the AD-4532B as an analog voltage or analog current. The analog output range for voltage is from –10 V to +10 V and for current, from 4 mA to 20 mA.

An analog voltage output from -10 V to +10 V or analog current output from 4 mA to 20 mA can be obtained according to the values set in function modes F-34 and F-35.

A fine adjustment is available for either one of DAV or DAI.

The output circuit is electrically isolated from the indicator circuit.



1: Voltage output
2: Signal ground
3: Shield
4: Current output
5: Signal ground
6: Shield

External view and pin assignment

15-3-1 Specifications

Analog voltage output (DAV)

Rated output range	-10 V to +10 V (Load resistance 5 kΩ or more)
D/A conversion rate	2000 times per second
Output resolution	1/10000
Maximum output range	-11.0 V to +11.0 V
Zero drift	1 mV/°C typ.
Gain drift	100ppm/°C typ.
Linearity	0.05%F.S. (Drift in the sensor input unit not included)

Analog current output (DAI)

Rated output range	4 mA to 20 mA (Load resistance 5 kΩ or more)
D/A conversion rate	2000 times per second
Output resolution	1/10000
Maximum output range	3.2 mA to 20.8 mA
Zero drift	1.6μA/°C typ.
Gain drift	100ppm/°C typ.
Linearity	0.05%F.S. (Drift in the sensor input unit not included)

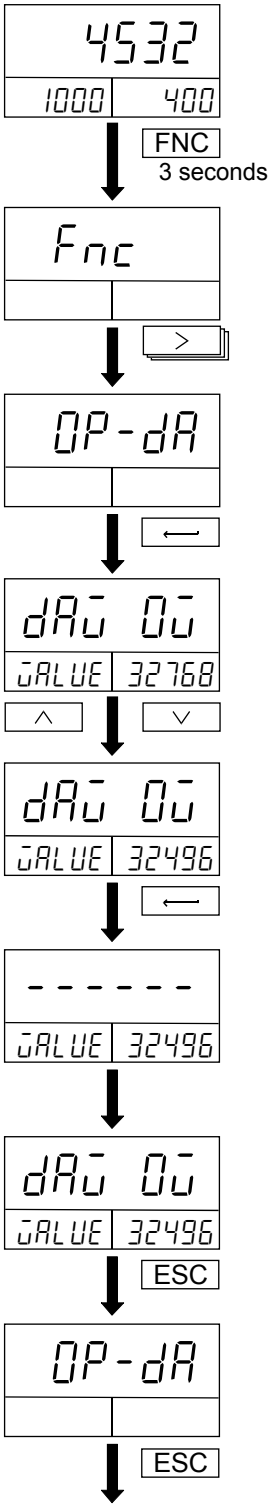
15-3-2 Fine adjustment of zero and span

⚠CAUTION

Note on using this function

- Use this mode only when adequate accuracy can not be obtained by the regular scaling set in function modes F-34 and F-35. This mode uses the internal correction factor and requires a high-precision digital multimeter. If a low-precision multimeter is used, it may adversely affect the indicator performance and the output voltage accuracy.

Zero and span adjustment of the AD-4532B DAV/DAI are not performed externally but internally in a digital manner. Voltage is used for adjustment. The adjustment points are 0 V, +10 V and -10 V. For current adjustment, adjust to 4 mA at 0 V and 20 mA at +10 V.
This mode will be displayed only when the DAV/DAI option is installed.



1. In the measurement mode, press the FNC key for three seconds or more to enter the function selection mode.

2. Press the [>] key several times to display [OP-dA].

3. Press the [↵] key to enter the DAV/DAI adjustment mode.

4. In the main display, [dAU 0U] appears, indicating that the 0-V fine adjustment mode is selected. And in the right side of the sub-display, the output digital value appears. Connect the digital multimeter to the DAV output terminal. Use the following keys to adjust the output voltage while looking at the digital multimeter.
   To adjust the current value, connect the digital multimeter to the DAI output terminal. Use the following keys to adjust the output current to 4 mA at 0 V and to 20 mA at +10 V while looking at the digital multimeter.

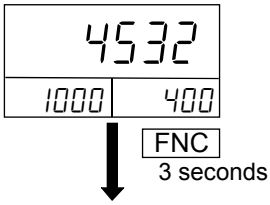
   [>] Switches the adjustment points among 0 V, 10 V and –10 V.
   [∧] Increases the output voltage (or current) value.
   When kept pressed, increases the value by ten.
   [∨] Decreases the output voltage (or current) value.
   When kept pressed, decreases the value by ten.
   [↵] Saves the adjusted value.
   [ESC] Cancels the operation and returns to the [OP-dA] display.

15-3-3 DAV/DAI voltage/current check

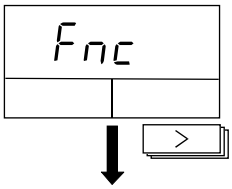
This mode allows the user to check the DAV/DAI value. To use this mode, first enter the check mode. Voltage is used for checking. To check the current value (DAI), the displayed value of 0 corresponds to 4 mA and the value of 10 corresponds to 20 mA. No negative values are available for the DAI values and the increase of the displayed value by one corresponds to the increase of the current value by 1.6 mA.

This mode will be displayed only when the DAV/DAI option is installed.

1. In the measurement mode, press the FNC key for three seconds or more to enter the function selection mode.



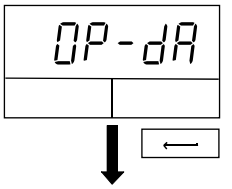
2. Press the [>] key several times to display [OP-dA].

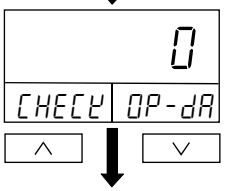


3. Press the [↵] key to enter the DAV/DAI check mode.

   [>] Moves to the display check mode without performing the DAV/DAI check mode.

   ESC Cancels the operation and returns to the [CHECK] display.





DAV: 0 V DAI: 4 mA

4. In the main display, the DAV output voltage is displayed, Connect the digital multimeter. Check the displayed value and output voltage value.

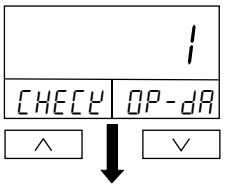
   To check the current value (DAI), the displayed value of 0 corresponds to 4 mA and the value of 10 corresponds to 20 mA. The increase of the displayed value by one corresponds to the increase of the current value by 1.6 mA.

   [^] Increases the output voltage value by one. After 10 V, 0 V appears. (Increases the output current value by 1.6.)

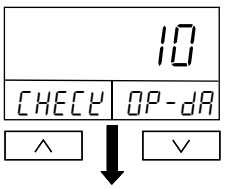
   [v] Decreases the output voltage value by one. After -10 V, 0 V appears. (Decreases the output current value by 1.6.)

   [↵] Finishes the DAV/DAI check mode and moves to the display check mode.

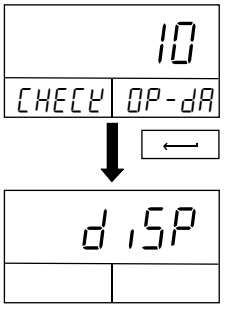
   ESC Cancels the operation and returns to the [OP-dA] display.



DAV: 1 V DAI: 5.6 mA



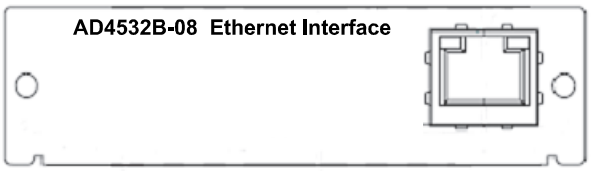
DAV: 10 V DAI: 20 mA



15-4 AD-4532B-08 Ethernet Interface

The Ethernet interface allows communication between the AD-4532B and a personal computer. The Windows Communication Tools for Ethernet, WinCT-Plus is provided with this option. The data format and commands are the same as those of the AD-4532-04 RS-232C serial interface.

15-4-1 Features



External view

- One personal computer can collect data from multiple indicators.
- Commands from a personal computer can control the indicators.
- Collected data can be transmitted directly to other application software such as Microsoft Excel.

⚠CAUTION
When using this option ■ Please refer to the AD-4532B-08 Ethernet interface instruction manual (1WMPD4001851) which is available on our website. Download the latest complete instruction manual at: URL: https://www.aandd.jp/

MEMO

MEMO

A&D Company,Limited
3-23-14 Higashi-Ikebukuro, Toshima-ku, Tokyo 170-0013, JAPAN
Telephone: [81] (3) 5391-6132 Fax: [81] (3) 5391-1566

A&D ENGINEERING, INC.
1756 Automation Parkway, San Jose, California 95131, U.S.A.
Telephone: [1] (408) 263-5333 Fax: [1] (408)263-0119

A&D INSTRUMENTS LIMITED
Unit 24/26 Blacklands Way, Abingdon Business Park, Abingdon, Oxfordshire OX14 1DY United Kingdom
Telephone: [44] (1235) 550420 Fax: [44] (1235) 550485

A&D AUSTRALASIA PTY LTD
32 Dew Street, Thebarton, South Australia 5031, AUSTRALIA
Telephone: [61] (8) 8301-8100 Fax: [61] (8) 8352-7409

A&D KOREA Limited 한국에이.엔.디(주)
서울특별시 영등포구 국제금융로6길33 (여의도동) 맨하탄빌딩 817 우편 번호 07331
(817, Manhattan Bldg., 33. Gukjegeumyung-ro 6-gil, Yeongdeungpo-gu, Seoul, 07331 Korea)
전화: [82] (2) 780-4101 팩스: [82] (2) 782-4264

OOO A&D RUS ООО "ЭЙ энд ДИ РУС"
121357, Российская Федерация, г.Москва, ул. Верейская, дом 17
(Business-Center "Vereyskaya Plaza-2" 121357, Russian Federation, Moscow, Vereyskaya Street 17)
тел.: [7] (495) 937-33-44 факс: [7] (495) 937-55-66

A&D INSTRUMENTS INDIA PRIVATE LIMITED **ऐ&डी इन्स्ट्रूमेन्ट्स इण्डिया प्रा0 लिमिटेड**
509, उद्योग विहार , फेस -5, गुड़गांव - 122016, हरियाणा , भारत
(509, Udyog Vihar, Phase-V, Gurgaon - 122 016, Haryana, India)
फोन : 91-124-4715555 फैक्स : 91-124-4715599