

INSTRUCTION MANUAL

WDS-190AS1E

WDS-191AS1E

COMPACT DIGITAL INDICATOR



KYOWA

INSTRUCTION MANUAL

WDS-190AS1E

WDS-191AS1E

COMPACT DIGITAL INDICATOR

Thank you for purchasing KYOWA's product WDS-190AS1E/WDS-191AS1E Compact Digital Indicator.

Read this Instruction Manual carefully in order to make full use of the high performance capabilities of the product.

Do not use the product in methods other than described in this Manual.

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SAFETY PRECAUTIONS

(Do not forget to read the safety precautions prior to use.)

PRIOR TO USE

For safe use of the product, do not forget to read the "Safety Precautions" prior to use.

Kyowa Electronic Instruments Co., Ltd. assumes no liability for any damage resulting from the user's failure to comply with the safety precautions.

SAFETY SYMBOLS

For safety operation of the product, the following symbol marks are used in the Instruction Manual.

 WARNING	Improper operation of the system may result in death or severe injury of the operator.
---	--

 CAUTION	Improper operation of the system may result in injury of the operator and physical damage of the system.
---	--

In addition, items in  CAUTION may lead to serious consequences. Take special attention to the Safety Symbols.

The following symbols are used in the product to call operator's attention when operating the product.

 WARNING
(1) After turning OFF the power switch, wait more than 3 seconds to execute installations and wiring works. Or, it may cause electric shock or trouble. (2) To prevent the risk of fire hazard or explosion, do not use the product in environment with inflammable gas, vapor, or dust. Or, it may cause fire hazard. (3) When the product is faulty, emitting smoke or offensive odor, or producing abnormal sound, immediately turn OFF the power. Or, it may cause fire hazard or electric shock. Contact Kyowa or our representatives. (4) Do not put water or foreign matters into the product. In case if any foreign matters are entered, immediately turn OFF the power. Or, it may cause fire hazard or electric shock. Contact Kyowa or our representatives. (5) Use the specified batteries. Or, it may cause fire hazard or electric shock. (6) Do not operate the product in environment with excessive moisture, dust or oil dust. Or, it may cause fire hazard or electric shock. (7) Do not disassemble the product. Or, it may cause trouble and malfunction. When the product is faulty, contact Kyowa or our representatives.

 CAUTION
(1) Before wiring, check the rated voltage and terminal array. (2) Special care should be taken when using the product in environment with excessive vibration. When operating the product at a location with excessive vibration or with continuous vibration, it may cause measurement error and/or failure of the instrument. Take care not to drop the product during transportation and avoid applying strong impact. Or, it may cause trouble. (3) Basically, the product is designed to be used by connecting a strain gage transducer to the input terminal. Before connecting the other transducers, contact Kyowa or our representatives. (4) Do not use the product in an environment exceeding the specifications. Or, it may cause trouble and malfunction.

1 OUTLINE

The WDS-190AS1E/WDS-191AS1E is a compact and lightweight digital indicator specified for strain gage transducers. The WDS-190AS1E/WDS-191AS1E indicates physical quantities, measures initial values (in “ $\mu\epsilon$ ” or “mV/V”) of transducers, and executes sensitivity registrations automatically by connecting TEDS-compatible transducers.

The WDS-191AS1E records data and saves CSV files in text format.

To read the CSV files, use commercially available software (Microsoft Excel).

The WDS-190AS1E/WDS-191AS1E is able to be used in wide application such as for checking transducers and simplified measurement.

NOTE:

The WDS-190AS1E/WDS-191AS1E uses “ $\mu\epsilon$ ” as the “ 10^{-6} strain” and “ $\mu\text{m/m}$.”

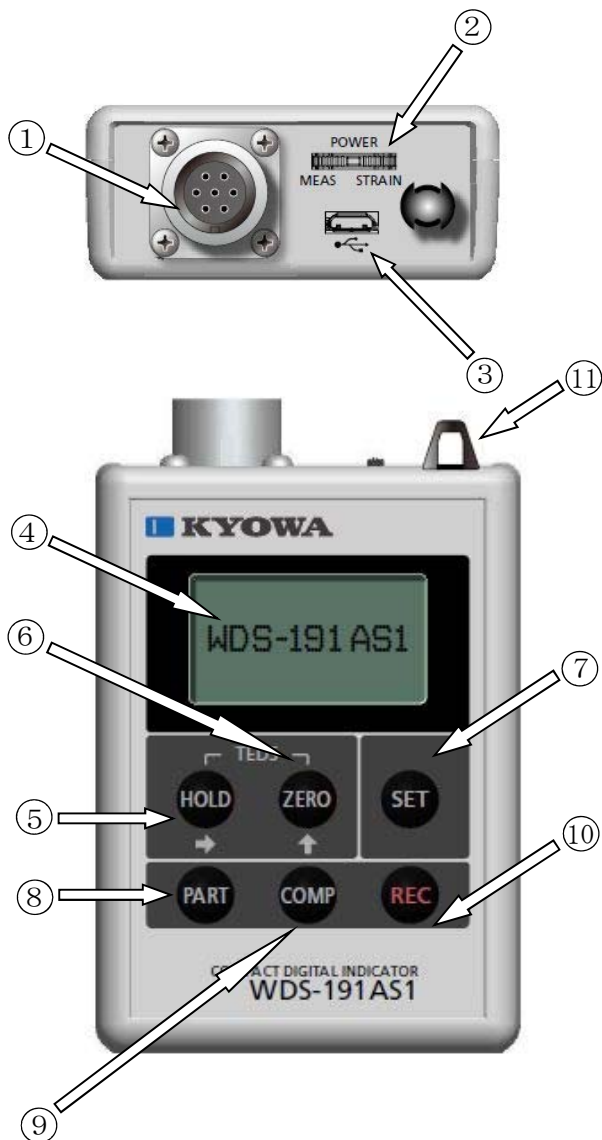
2 FEATURES

- Measures original values (in “ $\mu\epsilon$ ” or “mV/V”) of transducers.
- Converts raw outputs into physical quantities based on the LOAD ADJ (actual load calibration)/ENROLMNT ADJ (sensitivity registering calibration).
- Executes sensitivity registrations automatically and measures data immediately by connecting TEDS-compatible transducers
- Records and saves data with commercially available software.
- Light weight and small enough to put in chest pockets.
- Operates up to 72 hours continuously with commercially available AA size alkali batteries (2)

3 CONFIGURATION

Compact digital indicator	1
AA size battery	2
Strap ring	1
Instruction Manual	1
Product Warranty	1

4 CONTROLS AND INDICATORS



- ① Input connector
Connects a strain gage transducer.
- ② [POWER] switch
POWER: Turns ON/OFF the power.
Turns ON/OFF the backlight.
STRAIN: STRAIN mode
MEAS: MEAS mode
Converts raw outputs of strain gage transducers into physical quantities.
- ③ USB connector (WDS-191AS1E)
Connects a PC via an USB cable for retrieving recorded data.
- ④ LCD
Measured values and statuses appear.
- ⑤ [HOLD] key
Changes functions, digits, decimal point positions, and executes the peak hold function.
- ⑥ [ZERO] key
Changes numbers, executes the digital zero function, confirms FUNCTION SELECTING modes.
- ⑦ [SET] key
Confirms functions.
- ⑧ [PART] key (WDS-191AS1E)
Selects part names and count values while recording data.
- ⑨ [COMP] key (WDS-191AS1E)
Selects the [HI] limit value.
- ⑩ [REC] key (WDS-191AS1E)
Records data.
- ⑪ Insert clip
Attach the strap ring.

5 CONNECTING TRANSDUCERS

- Connect a transducer to the input connector.
- Applicable connector: PRC03-12A10-7M10 (TAJIMI ELECTRONICS CO., LTD.)
- Pin numbers of the connector are as follows. (Cable colors are Kyowa's standard color codes.)
 - A: + side of the bridge excitation (Red)
 - B: - side of the bridge output (White)
 - C: - side of the bridge excitation (Black)
 - D: + side of the bridge output (Green)
 - E: Shield wire
 - F: TEDS (+)
 - G: TEDS (-)



NOTE:

Be sure to connect TEDS signals only into the TEDS terminals.

When connecting a transducer (excluding TEDS-compatible transducer), connect nothing.

- Use as short as possible shielded cable for wiring the transducer.
Locate the product far apart from power lines and wirings interfered with noise.
- The bridge excitation is approx. 2 V.
Check the recommended excitation voltage of the transducer is 2 V or more.

6 INSTALLING AND REMOVING BATTERIES

Push down and open the battery case cap on the WDS-190AS1E/WDS-191AS1E rear. Locate and correctly insert accessory or commercially available size AA batteries in the battery case center band mentioned on the battery case. Correctly insert batteries.

Pull out the band to remove the batteries. The batteries automatically come out.



NOTE:

Customers are required to remove used batteries or batteries when not using the WDS-190AS1E/WDS-191AS1E for a long period of time.

- The maximum operating time of alkali batteries is approx. 72 hours (350 ohm transducer, backlight OFF, 25°C).
- We recommend using the F-5 “LOW POWER”, which prevents unnecessary consumption of batteries from turning ON the [POWER] switch and backlight for too long. The initial values are as follows.
 - PWR OFF: 0 minute
 - BKL OFF: 10 seconds

NOTE:

The accessory manganese batteries are for checking operations.

Before operating the WDS-190AS1E/WDS-191AS1E, install the alkali batteries.

7 OPERATIONS AND FUNCTIONS

The WDS-190AS1E/WDS-191AS1E has 2 modes; STRAIN mode and MEAS mode.

The "STRAIN mode" measures raw outputs of strain gage transducers.

The "MEAS mode" converts raw outputs of strain gage transducers into physical quantities.

Tips!!

Basically the WDS-190AS1E/WDS-191AS1E operates by clicking.

Some operations require press and hold.

7-1 [POWER] SWITCH

1) To turn ON/OFF the WDS-190AS1E/WDS-191AS1E

To turn ON the WDS-190AS1E/WDS-191AS1E:

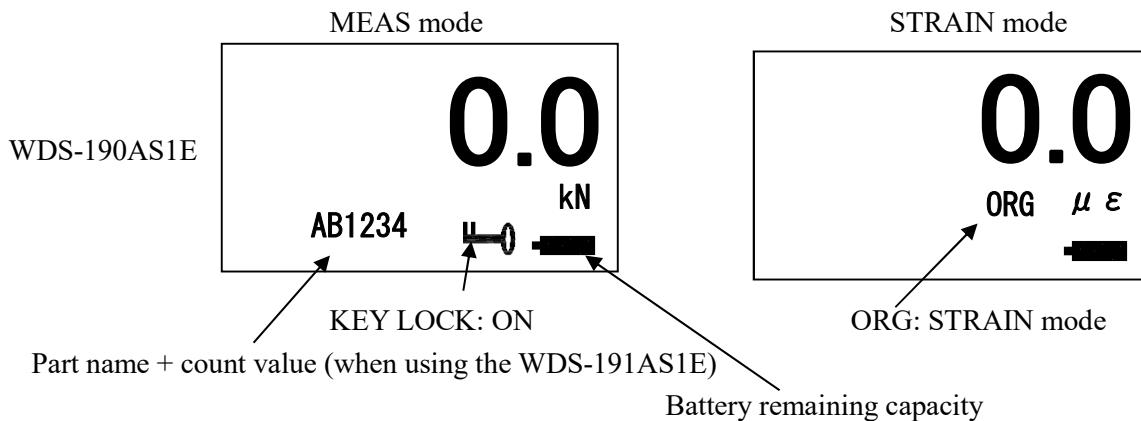
Click the [POWER] switch.

To turn OFF the WDS-190AS1E/WDS-191AS1E:

Press and hold the [POWER] switch.

- The startup screen appears. The model and version No. appear for approx. 2 seconds.
- Then the measuring window appears.
The measuring status is before turning OFF the power.
Note that the peak hold function has been cleared.

<Measuring windows>



2) To select the STRAIN/MEAS mode

To select the STRAIN mode:

Moves the [POWER] switch to the STRAIN position.
The "ORG" and "mV/V" (or "μ ε") appear.

To select the MEAS mode:

Moves the [POWER] switch to the MEAS position.
The pre-set unit appears.

3) To turn ON/OFF the backlight.

To turn ON the backlight, click the [POWER] switch.

To turn OFF the backlight, click the [POWER] switch again.

4) To use the KEY LOCK

The KEY LOCK prevents wrong operations and changing. The initial setting is OFF.

To use the KEY LOCK, select ON on the F-15 “KEY LOCK.”

For details, see “9 FUNCTION SELECTING MODES.”

KEY LOCK: ON

When the KEY LOCK is ON, the WDS-190AS1E/WDS-191AS1E starts with the locked status and the key mark  appears.

Locked keys

WDS-190A SET key: Locked
 HOLD key: Available
 ZERO key: Available

WDS-191A SET key: Locked
 PART key: Locked
 COMP key: Locked
 HOLD key: Available
 ZERO key: Available
 REC key: Available

To clear the locked status

Press and hold the HOLD key and SET key at the same time (for approx. 3 seconds).

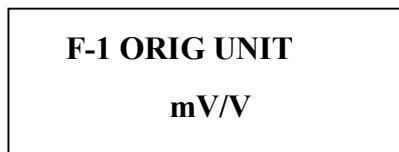
The locked status clears and the key mark  disappears.

7-2 ORIG UNIT (F-1)

The WDS-190AS1E/WDS-191AS1E indicates outputs of strain gage transducers in “ $\mu\epsilon$ ” or “mV/V”.
(“ $\mu\epsilon$ ” = “ 10^{-6} strain” = “ $\mu\text{m}/\text{m}$ ”)

The WDS-190AS1E/WDS-191AS1E uses the units for STRAIN mode and ENROLMNT ADJ (F-3).
Before operating the WDS-190AS1E/WDS-191AS1E, select “ $\mu\epsilon$ ” or “mV/V”.

- To select units, go to the FUNCTION SELECTING mode F-1.
- FUNCTION SELECTING mode: Press and hold the **SET** key.
The “F-1” appears.
- Change units: Click the **SET** key.
The pre-set unit blinks.
Select the target by using the **→** key and **↑** key.

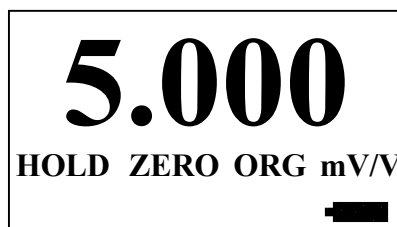
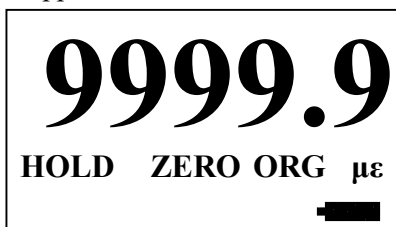


To confirm the unit, click the **SET** key.
To measure data, click the **ZERO** key.

7-3 STRAIN MODE

The "STRAIN mode" measures raw outputs of strain gage transducers.

- 1) To turn ON the WDS-190AS1E/WDS-191AS1E, click the [POWER] switch.
Move the [POWER] switch to the STRAIN position.
The "ORG" appears.
 - The "STRAIN mode" measures raw outputs of strain gage transducers in “ $\mu\epsilon$ ” or “mV/V”.
In case you have executed the digital zero function before turning OFF the power, “0” appears.
To cancel or shift the indicating value to "0," see the following item 2).
“ $\mu\epsilon$ ”: By 0.1 $\mu\epsilon$ steps.
Example: 9999.9
“mV/V”: The decimal point appears at the 5th digit from the right.
Example: 5.0000
- 2) To execute the digital zero function, click the **ZERO** key.
The “ZERO” appears on the LCD and indicating value changes to 0.
To cancel, click the **ZERO** key again.
The digital zero function clears and the “ZERO” on the LCD disappears.
The indicating value is the "original value (real output of the transducer)".
- 3) To execute the peak hold function, click the **HOLD** key.
The “HOLD” appears on the LCD and the maximum value appears.
To cancel, click the **HOLD** key again. The peak hold function clears and the “HOLD” on the LCD disappears.



4) The STRAIN mode is able to use the following FUNCTION SELECTING modes.

F-1 ORIG UNIT

F-4 SMOOTH AVERAGE, MIN-VAL, NEAR-ZR

F-5 LOW POWER

For details, see "9 FUNCTION SELECTING MODES."

NOTE 1:

After turning OFF the power, the peak hold function clears.

NOTE 2:

You are not able to execute TEDS functions during the STRAIN mode.

7-4 MEAS MODE

The "MEAS mode" converts raw outputs of strain gage transducers into physical quantities.

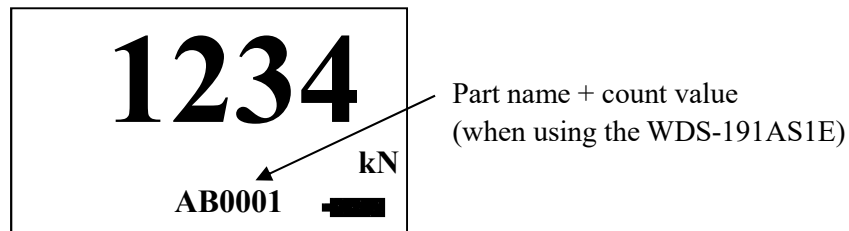
7-4-1 Calibration

This section describes how to register conversion coefficients for converting the transducer outputs into physical quantities.

Be sure to execute the LOAD ADJ (F-2) or ENROLMNT ADJ (F-3).

7-4-2 Preparation for calibration

- Connect transducers: Connect a strain gage transducer.
- Turn ON the power: To turn ON the WDS-190AS1E/WDS-191AS1E, click the [POWER] switch. Move the [POWER] switch to the MEAS position. The "ORG" disappears.



In case the key mark  appears, press and hold the **[HOLD]** key and **[SET]** key at the same time (for approx. 3 seconds). Make sure the key mark  disappears.

Press and hold the **[HOLD]** key and **[SET]** key at the same time (for approx. 3 seconds).

- Execute digital zero functions:
Click the **[ZERO]** key with no load applied to the transducer.
The WDS-190AS1E/WDS-191AS1E saves the "zero" value.

NOTE:

Before calibrations, be sure to execute the digital zero function.

Since the "zero" value is equivalent to the calibration value, the WDS-190AS1E/WDS-191AS1E saves the "zero" value in the internal memory.

7-4-3 LOAD ADJ (F-2)

The F-2 calibrates data by applying the known load actually.

- Apply load: Apply the known load to the transducer.
- FUNCTION SELECTING mode: Press and hold the **SET** key.
The “F-1” appears.
- LOAD ADJ: Click the **→** key.
The “F-2” appears.
Click the **SET** key.
The pre-set highest-order digit blinks.
Select the applied load (ignore the decimal point) by using the **→** key and **↑** key.
Click the **SET** key.
- Select the decimal point: Move the decimal point position by using the **→** key.
Click the **SET** key.
- End settings: The “F-2” appears.
To measure data, click the **ZERO** key.

F-2 LOAD ADJ
+2000.0
kN

- To select units, go to the FUNCTION SELECTING mode F-12.
For details, see “7-5 MEAS UNIT (F-12).”

Tips!!

Rated outputs of strain gage transducers, described on test data sheets, have following units.

$$1.000[\text{mV/V}] = 1000 [\mu\text{V/V}] = 2000 [\mu\epsilon] = 2000 [10^{-6} \text{ strain}] = 2000 [\mu\text{m/m}]$$

7-4-4 ENROLMNT ADJ (F-3)

The F-3 registers the "Rated output" and "Rated capacity" of transducers for calibration.

- **FUNCTION SELECTING mode:** Press and hold the **SET** key.
The "F-1" appears.
- **ENROLMNT ADJ:** Click the **→** key.
The "F-3" appears.
- **Rated output (RO):** Click the **SET** key.
The pre-set value blinks.
Select the value on the test data sheet by using the **→** key and **↑** key.
Click the **SET** key.
- **Rated capacity (RC):** Select the value on the test data sheet (ignore the decimal point) by using the **→** key and **↑** key.
Click the **SET** key.
- **Select the decimal point:** Move the decimal point position by using the **→** key.
Click the **SET** key.
- **End settings:** The "F-3" stop blinking.
To measure data, click the **ZERO** key.

F-3 ENROLMNT ADJ
RO : +5.0000 mV/V
RC : +2000.0 kN

F-3 ENROLMNT ADJ
RO : +2500.0 $\mu\epsilon$
RC : +2000.0 kN

NOTE

Coefficients for the rated capacity (RC)/rated output (RO) should be within 0.009 to 110.

Make sure the coefficients are within 0.009 to 110.

Or, "CcErr" appears and "EA" appears on the bottom left.

If the coefficients are not within 0.009 to 110, the WDS-190AS1E/WDS-191AS1E calculates the rated capacity (RC) by ignoring the decimal point and calculates the rated output (RO) in " $\mu\epsilon$."

7-5 MEAS UNIT (F-12)

This section describes how to select units for the MEAS mode.

You are able to create custom units.

STRAIN	$\mu\epsilon$,	$\mu\text{m/m}$,	$\mu\text{V/V}$,	mV/V
FORCE	mN ,	N ,	kN ,	MN
MASS	mg ,	g ,	kg ,	ton
PRESSUR	Pa ,	hPa ,	kPa ,	MPa
TORQUE	$\text{mN} \cdot \text{m}$,	$\text{N} \cdot \text{m}$,	$\text{kN} \cdot \text{m}$,	$\text{MN} \cdot \text{m}$
DSPLACE	μm ,	mm ,	cm ,	m
ACCELER	m/s^2 ,	G ,	Gal ,	No unit
CUSTOM	***** (USERDEF)			

7 characters

Lowercase: abcdefghijklmnopqrstuvwxyz

Uppercase: ABCDEFGHIJKLMNOPQRSTUVWXYZ

Special characters: $\mu\epsilon\Omega/ \cdot \% 0^{23} \text{ }^{\circ}\text{C}$ - ("-" indicates space.)

1) Select units

- **FUNCTION SELECTING mode:** Press and hold the **SET** key.
The "F-1" appears.
- **Select units:** Click the **→** key.
The "F-12" appears.
The pre-set unit appears.
- **Select physical quantity:** Click the **SET** key.
The "F-12" and unit group blink.
Select unit groups by using the **→** key.
As you click the **→** key, the target changes.

[STRAIN] → [FORCE] → [MASS] → [PRESSUR] → [TORQUE] → [DSPLACE] →
[ACCELER] → [CUSTOM]

- Click the **SET** key.
The target unit blinks.
Select the target by using the **↑** key.
Click the **SET** key.
The "F-12" stop blinking.
To measure data, click the **ZERO** key.

F-12 MEAS UNIT

FORCE mN

● End settings:

2) Create custom units

- **Create custom units:** Click the **→** key.
The "CUSTOM" appears.
Click the **SET** key. All unit characters blink.
Click the **SET** key. The leftmost character blinks.
Select the target by using the **→** key and **↑** key.
Click the **SET** key.

● End settings:

- The "F-12" stop blinking.
To measure data, click the **ZERO** key.

F-12 MEAS UNIT

CUSTOM kgf/cm²

7-6 SMOOTH (F-4)

The F-4 function decreases the variation of indicating values to read data easily.

- 1) AVERAGE: Select the number of moving average data.
The sampling rate is 50 times/sec.
Suppose the sampling rate is 64 times, the AVERAGE is 1.28 sec.
- 2) MIN-VAL: Increases/decreases the indicating value by steps.
Select changes of the smallest digit (ignore the decimal point)

[Setting]	[Example]
1:	0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11
2:	0, 2, 4, 6, 8, 10, 12
5:	0, 5, 10, 15,
- 3) NEAR-ZR: Indicates 0 when measured values are within the range.
Select the smallest digit range that indicates 0 (ignore the decimal point).

[Setting]	[Example]
0:	-5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5,
1:	-5, -4, -3, -2, 0, 0, 0, 2, 3, 4, 5,
2:	-5, -4, -3, 0, 0, 0, 0, 0, 3, 4, 5,

- FUNCTION SELECTING mode: Press and hold the **SET** key.
The “F-1” appears.
- SMOOTH: Click the **→** key.
The “F-4” appears.
- AVERAGE: Click the **SET** key.
The pre-set average value blinks.
Select the target from 0, 2, 4, 8, 16, 32, 64, 128 by using the **↑** key.
- MIN-VAL: Click the **SET** key.
The pre-set value blinks.
Select the target from 1, 2, 5, 10, 20, 50, 100 by using the **↑** key.
- NEAR-ZR: Click the **SET** key.
The pre-set value blinks.
Select the target within 0 to 9 by using the **↑** key.
Click the **SET** key.
- End settings: The “F-4” stop blinking.
To measure data, click the **ZERO** key.

F-4 SMOOTH	
AVERAGE	1
MIN-VAL :	1

Appears one after another.



F-4 SMOOTH	
NEAR-ZR:	0

7-7 LOW POWER (F-5)

The F-5 has PWR OFF and BKL OFF. The F-5 prevents unnecessary consumption of batteries from turning ON the [POWER] switch and backlight for too long.

- 1) PWR OFF: Prevents unnecessary consumption of batteries from turning ON the [POWER] switch for too long.
The power turns OFF the pre-set minutes after the last key operation.
Range: 00 to 99 min.
- 2) BKL OFF: Prevents unnecessary consumption of batteries from turning ON the backlight for too long.
The backlight turns OFF the pre-set seconds after the last key operation.
Range: 00 to 99 sec.
- FUNCTION SELECTING mode: Press and hold the **SET** key.
The “F-1” appears.
Click the **→** key.
The “F-5” appears.
- PWR OFF: Click the **SET** key.
The pre-set value blinks.
Select the target within 00 to 99 (min) by using the **→** key and **↑** key.
Click the **SET** key.
- BKL OFF: Select the target within 00 to 60 (sec) by using the **→** key and **↑** key.
Click the **SET** key.
- End settings: The “F-5” stop blinking.
To measure data, click the **ZERO** key.

Tips!!

When not using the PWR OFF and BKL OFF, select “00 (min)” and “00 (sec)”.

7-8 DIGITAL ZERO FUNCTION

The digital zero function changes the current indicating value to 0.

- To execute the digital zero function, click the **ZERO** key.
The “ZERO” appears on the LCD and indicating value changes to 0.
- To cancel, click the **ZERO** key again.
The digital zero function clears and the “ZERO” on the LCD disappears.

Tips 1!!

STRAIN mode: The “original value” appears.

MEAS mode: Physical quantities appear based on the “zero” value, obtained in “7-4-2 Preparation for calibration.”

Tips 2!!

You are not able to execute the digital zero function during the peak hold function.

NOTE

After turning OFF the power, the indicating value is "0 ".

7-9 PEAK HOLD FUNCTION

The peak hold function indicates the maximum value.

- To execute the peak hold function, click the **HOLD** key.
The “HOLD” and maximum value appear.
- To cancel, click the **HOLD** key again.
The peak hold function clears and the “HOLD” on the LCD disappears.

NOTE

After turning OFF the power, the peak hold function clears.

7-10 TEDS FUNCTION

The TEDS function executes the ENROLMNT ADJ automatically by connecting a TEDS-compatible transducer. The TEDS function includes the “ENROL BY TEDS (TEDS data sensitivity registration)” and “ENROL BY FILE (calibration file sensitivity registration)”.

1) ENROL BY TEDS

Reads the TEDS data (rated capacity, rated output, and unit), executes the sensitivity registering calibration automatically, calculates the decimal point position, and indicates physical quantities. Make sure no load is applied to transducers. Click the **HOLD** key and **ZERO** key at the same time (for approx. 1 second). The WDS-190AS1E/WDS-191AS1E executes the sensitivity registration automatically.

To select TEDS operations, go to the FUNCTION SELECTING mode F-7.

To measure data immediately, make sure the ZERO AT READ in the F-7 is ENA. After executing the ENROLMNT ADJ, the WDS-190AS1E/WDS-191AS1E executes the digital zero function automatically and changes the indicating value to “0.”

Note: Setting function of the "post-TEDS read zero run" is, software VER.0037 corresponding later.

2) ENROL BY FILE

Reads the K.S/N from the transducer TEDS data, find the same K.S/N file in the WDS-190AS1E/WDS-191AS1E calibration files, and registers the rated outputs, rated capacities, decimal point positions, units, “zero” values, and smooth items automatically.

After converting rated capacities or when unable to execute the digital zero function, execute the ENROL BY FILE to measure data easily.

7-10-1 To read TEDS data

To read TEDS data, see as follows.

- Key operation: Click the **HOLD** key and **ZERO** key at the same time (for approx. 1 second).
“- - - -” appears.
Then the following item appears.
- ENROL BY TEDS “Id_rd” appears for approx. 1 second.
- ENROL BY FILE “Id_calibration file No.” appears for approx. 1 second.
- The WDS-190AS1E/WDS-191AS1E executes the sensitivity registration automatically and measures data.
- To read TEDS data automatically after turning ON the power, go to “7-10-3-1 TEDS READ (F-7).”

Tips!!

- When not connecting a TEDS-compatible transducer, the “IdErr” error appears.
To cancel the error, click the **ZERO** key. The “ET” appears on the bottom left.
Connect a TEDS-compatible transducer and click the **HOLD** key and **ZERO** key at the same time (for approx. 1 second).
- When not connecting target TEDS-compatible transducer during the ENROL BY FILE, the “no_Id” appears.

7-10-2 TEDS FUNC (F-10)

This section describes how to select ENROL BY TEDS or ENROL BY FILE.

- **FUNCTION SELECTING mode:** Press and hold the **SET** key.
The “F-1” appears.
- **Calibration file operation:** Click the **→** key.
The “F-10” appears.
Click the **SET** key.
The pre-set value blinks.
TEDS data sensitivity registration
Calibration file sensitivity registration
Select the target by using the **↑** key.
Click the **SET** key.

ENROL BY TEDS:

ENROL BY FILE:

F-10 TEDS FUNC
ENROL BY TEDS

F-10 TEDS FUNC
ENROL BY FILE

- **End settings:** The “F-10” stop blinking.
To measure data, click the **ZERO** key.

7-10-3 ENROL BY TEDS

Enters the rated output, rated capacity, decimal point position, and unit automatically by reading the TEDS data.

7-10-3-1 TEDS READ (F-7)

This section describes how to select ENA/DIS of each function.

For details, see “9 FUNCTION SELECTING MODES.”

① PWR-ON READ

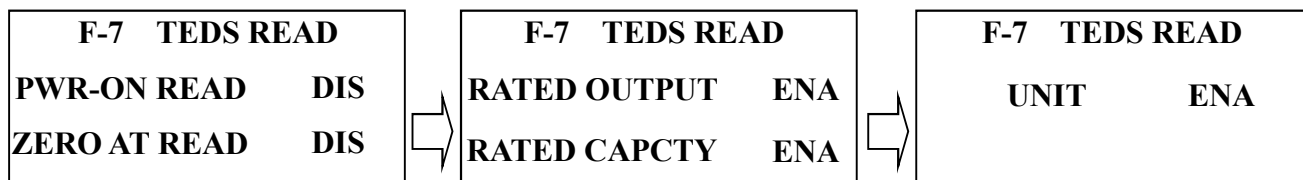
Reads TEDS data automatically after turning ON the power (MEAS mode only).

② ZERO AT READ

Executes the digital zero function after clicking the **HOLD** key and **ZERO** key at the same time (for approx. 1 second) and changes the indicating value to 0.

③ RATED OUTPUT, RATED CAPCTY, UNIT

Select ENA/DIS of each function.



NOTE 1

The value, obtained in ② ZERO AT READ, is equivalent to the “zero” value, obtained in “7-4-2 Preparation for calibration.”

The WDS-190AS1E/WDS-191AS1E uses the value, obtained in ② ZERO AT READ, as standards.

NOTE 2

Suppose the RATED OUTPUT is DIS and RATED CAPACITY is DIS.

The WDS-190AS1E/WDS-191AS1E uses the pre-set value in F-3.

7-10-4 ENROL BY FILE

Reads the K.S/N from the transducer TEDS data, find the same K.S/N file in the WDS-190AS1E/WDS-191AS1E calibration files, and registers the rated outputs, rated capacities, decimal point positions, units, “zero” value, and smooth items automatically.

Tips!!

After converting rated capacities or when unable to execute the digital zero function, execute the ENROL BY FILE to measure data easily.

7-10-4-1 To create calibration files

This section describes how to enter calibration values for correct measurements.

- Connect a TEDS-compatible transducer.
- Click the **ZERO** key with no load applied to the transducers.
The indicating value changes to 0.
- Change/enter calibration values by executing the ENROL BY TEDS, LOAD ADJ (F-2), or ENROLMNT ADJ (F-3).
Select F-4 and F-12 if necessary.
For details, see “7-10-3 ENROL BY TEDS” and “7-4 MEAS MODE.”

7-10-4-2 FILE MAINT (F-11)

The F-11 saves the current calibration values and setting values in files (file No. 1 to 32).

Target items are K.S/N, CAPACITY, rated output, decimal point position, unit, “zero” value, and smooth items. (You are also able to clear items in F-11.)

- FUNCTION SELECTING mode: Press and hold the **SET** key. The “F-1” appears.
- Calibration file operation: Click the **→** key.
The “F-11” appears.
Click the **SET** key.
The K.S/N and CAPCTY, saved in the file No. 01, appear.

(Registered) The K.S/N and CAPCTY appears alternately.

(Not registered)

F-11 FILE MAINT		F-11 FILE MAINT		F-11 FILE MAINT	
FILE No.	:01	FILE No.	:01	FILE No.	:01
K.S/N :	123456789	CAPCTY	+500.0	CAPCTY	-----

- Select calibration files: Select the FILE No. by using the  key.
Click the  key.
The “ESC” blinks.

(Registered)

F-11 FILE MAINT	
FILE No.	:01
ESC	DEL

(Not registered)

F-11 FILE MAINT	
FILE No.	:01
ESC	REG

- File operations: Select the target by using the  key.
ESC: Goes to the calibration file selection window.
DEL: Deletes the setting contents.
REG: Registers the setting contents. (Available when the file has no data.)

Click the  key.

The WDS-190AS1E/WDS-191AS1E executes the target item and goes to the calibration file selection window.

To register/delete data, select a calibration file again.

Click the  key.

- End settings: The “F-11” stop blinking.
To measure data, click the  key.

You are not able to register the same K.S/N data.

When the same K.S/N already exists, the FILE No. including the K.S/N blinks. In this case, delete the blinking file. After that, register data.

When a TEDS reading error occurs, the “IdErr” appears. The “ET” also appears on the bottom left. Re-set settings or turn OFF and ON the power. The “ET” disappears.

NOTE 1

Never connect/disconnect transducers while creating calibration files.

NOTE 2

To use the “zero” value as standards, make sure the ZERO AT READ is “1: DIS” in FUNCTION SELECTING mode F-7.

When the ZERO AT READ is “2: ENA”, the indicating value is 0.

NOTE 3

Do not connect multiple TEDS-compatible transducers at the same time.

The TEDS operations do not activate.

NOTE 4

You are not able to read the TEDS data while the battery is low. (Battery mark is blinking.)

You are also not able to change the FUNCTION SELECTING modes.

Replace the battery with a new one.

8 COMPARATOR FUNCTIONS AND RECORDING FUNCTIONS (WDS-191AS1E ONLY)

The WDS-191AS1E has a recording function that records the data, measured with the MEAS mode, in the internal memory and comparator function.

The WDS-191AS1E saves the recorded data in an internal memory as CSV files.

8-1 COMPARATOR FUNCTIONS

The WDS-191AS1E has one HI comparator. When a value is larger than the pre-set value, the “HI” appears.

- Limit value window: Press and hold the **COMP** key while measuring data.
The current limit value appears.
(To go to the measuring window, click the **ZERO** key.)
- Change limit values: Click the **SET** key.
The highest-order digit of the current limit value blinks.
Select numbers by using the **→** key and **↑** key.
- Limit value window: To go to the limit value window, click the **SET** key.
- End settings: To go to the measuring window, click the **ZERO** key.

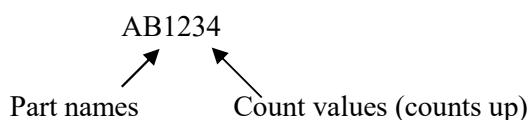
8-2 PART NAMES AND COUNT VALUES

The WDS-191AS1E adds part names and count values to each recorded data. You are able to identify the measured locations, products, etc. by using the part names and count values.

Part names: 2 characters.

Count values: 4-digit numbers (Uppercase only)

As you click the **REC** key, the WDS-191AS1E counts up the count values, starting from the pre-set number.

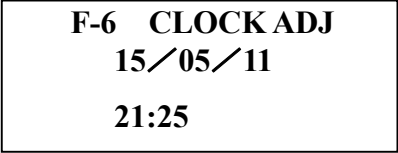


- Part name/count value window: Press and hold the **PART** key while measuring data.
The current part names and count values appear.
(To go to the measuring window, click the **ZERO** key.)
- Change part names/count values: Click the **SET** key.
The highest-order digit of the part names/ count values blink.
Select part names/count values by using the **→** key and **↑** key.
- Part names/count values window: To go to the part name/count value window, click the **SET** key.
- End settings: To go to the measuring window, click the **ZERO** key.

8-3 CLOCK ADJ (F-6)

This section describes how to adjust date and time, saved in the data.

- **FUNCTION SELECTING mode:** Click the **SET** key.
The “F-1” appears.
- **Adjust the time:** Click the **→** key.
The “F-6” appears.
Click the **SET** key.
The highest-order digit of the current time blinks.
- **Year/month/day/hour/minute:** Select the year/month/day/hour/minute by using the **→** key and **↑** key.
Click the **SET** key.
- **End settings:** The “F-6” appears.
To measure data, click the **↑↑** key.



Year: Last 2 digits of the year

Tips!!
Although the clock settings are year/month/day/hour/minute, the data includes year/month/day/hour/minute/second.
The WDS-191AS1E clock uses batteries.
After removing/replacing batteries, adjust date and time.

8-4 RECORDING FUNCTIONS

As you click the **REC** key, the WDS-191AS1E records measured values in the internal memory.

Data is comma-delimited CSV files.

To read the CSV files, use commercially available software (Microsoft Excel).

1) To create files

- The internal memory has no file.
Click the **REC** key.
The WDS-191AS1E creates files automatically and saves data in it.
- The internal memory has files. (Create new files.)
Press and hold the **REC** key.
The WDS-191AS1E creates files automatically and saves data in it.
- The count value exceeds 9999.
The WDS-191AS1E creates files automatically and saves data in it.

File name

DATA + year/month/day/hour/minute/second.CSV

File name appears.

After the WDS-191AS1E creates new files, the new file name appears for approx. 1 second.

Although the part names are the same, the WDS-191AS1E clears the count values into "0000."

NEW FILE
DATA150512135539

2) To record data

Operations

As you click the **REC** key, the WDS-191AS1E adds data to the latest file.

Data

Year/month/day, hour/minute/second, part name, count value, measured value, unit, limit value, ON/OFF

<Item>	<Description>	<Example>
Year/month/day	Christian era	150512
Hour/minute/second	24 hours	135539
Part name	2 characters	AB
Count value	4 digits (counts up)	1234
Measured value	5 digits	-54321 (real number)
Unit	Pre-set unit	kN
Limit value	Setting value	-50000
Comparator ON/OFF	ON=1, OFF=0	0

Tips!!

The number of recorded files is 511 (max).

Since the number of data per file is 10000 (max), the number of total data is approx. 5110000.

3) To check/delete data

This section describes how to check/delete the latest recorded data.

- Check data.

Click the **SET** key and **REC** key at the same time (for approx. 1 second).

The latest recorded data appears.

RECORD MAINTENANCE

Year/month/day	hour/minute/second
Part name	Count value (counts up)
Measured value	Unit
Limit value	ON/OFF(1/0)

- Delete data.

Click the **SET** key.

The “ESC” and “DEL ”appears.

Select the “DEL ” by using the **→** key.

Press the **SET** key.

The “DELETING” appears while deleting data.

Then the measuring window appears.

- Go to the measuring window.

To go to the measuring window, click the **ZERO** key during operations.

The WDS-191AS1E stops the operation and the measuring window appears.

Tips!!

When you delete data, the WDS-191AS1E also deletes the part names and count values. It means that some part names and count values will be missed through the series of data. To recover the part names and count values, re-set them.

8-5 RETRIEVING FUNCTIONS

You are able to treat the recorded files in the same manner as the USB memory files.

After turning OFF the power, connect the WDS-191AS1E and PC via an USB cable and read the CSV files by using software (Microsoft Excel).

Since the PC supplies power through the USB port, the WDS-191AS1E startups automatically.

USB STORAGE

The backlight lights up.

Recommended USB cable

USB 2.0 micro USB cable (optional)

KU-2AMCB10 (1 m, SANWA SUPPLY INC.) or equivalent

Recorded data <Example>

Year/month/day, hour/minute/second, part name, count value, measured value, unit, limit value, ON/OFF

	A	B	C	D	E	F	G	H	I
1	date	time	part	count	measurements	unit	comparator	on/off	
2	151021	151403	AB	0	0.1	N	1	0	
3	151021	151421	AB	1	1.2	N	1	1	
4	151021	151446	AB	2	1.31	N	1	1	
5	151021	151525	AB	1003	1.41	N	1	1	
6	151021	151542	AB	1004	2.41	N	1	1	
7									

9 FUNCTION SELECTING MODES

- Press and hold the **SET** key (for approx. 2 seconds) while measuring data.
The FUNCTION SELECTING mode “F-1” appears.
- To change the FUNCTION SELECTING mode, click the **→** key.
- To check the setting contents, click the **SET** key.
The “F-**” blinks and the setting contents appear.
Select setting contents while the “F-**” is blinking.
- To confirm settings, make sure the “F-**” is not blinking.
Click the **ZERO** key.
The measuring window appears.

NOTE:

You are not able to execute the above operations while the battery is low. (Battery mark is blinking.)
Replace the battery with a new one.

Mode	Key operations	Functional description
F-1 ORIG UNIT (Initial value: $\mu\epsilon$)	As you click the → key and ↑ key, the target changes. “ $\mu\epsilon$ ”, “mV/V” Click the SET key.	Selects the output unit of transducers. “ $\mu\epsilon$ ”, “mV/V”
F-2 LOAD ADJ	Select the applied load (ignore the decimal point) by using the → key and ↑ key. Click the SET key. Move the decimal point position by using the → key. Click the SET key.	Calibrates data by applying the known load actually. Execute the following items in advance. ● Make sure no load is applied to transducers. Execute the digital zero function for changing the indicating value to 0. ● Apply the known load to the transducer.
F-3 ENROLMNT ADJ (Initial value: 9000.0 $\mu\epsilon$ Indicating value: 09000 Decimal point: None Unit: kN)	● Rated output (pre-set, RO) appears in “$\mu\epsilon$” or “mV/V.” Select the value on the test data sheet by using the → key and ↑ key. Click the SET key. ● Rated Capacity (pre-set, RC) appears. Select the value on the test data sheet (ignore the decimal point) by using the → key and ↑ key. Click the SET key. ● Decimal point (pre-set) blinks. Move the decimal point position by using the → key. Click the SET key. ● Unit (pre-set) blinks. To select units, go to the FUNCTION SELECTING mode F-12.	● The F-3 registers the "Rated output" and "Rated capacity" of transducers for calibration. Execute the following items in advance. ● Make sure no load is applied to transducers. Execute the digital zero function for changing the indicating value to 0.
F-4 SMOOTH (Initial value AVERAGE: 16 MIN-VAL: 1 NEAR-ZR: 0)	The pre-set value blinks. ● AVERAGE Select the target from 1, 2, 4, 8, 16, 32, 64, 128 by using the ↑ key. Click the SET key. ● MIN-VAL Select the target from 1, 2, 5, 10, 20, 50, 100 by using the ↑ key. Click the SET key. ● NEAR-ZR Select the target from 0 to 9 by using the ↑ key. Click the SET key.	● The F-4 function decreases the variation of indicating values to read data easily.

Mode	Key operations	Functional description
F-5 LOW POWER (Initial value PWR OFF: 0 MIN BKL OFF: 10 SEC)	The pre-set value blinks. ● PWR OFF Select the target from 00 to 99 min by using the  key and  key. Click the SET key. ● BKL OFF Select the target from 00 to 99 sec by using the  key and  key. Click the SET key.	● The PWR OFF prevents unnecessary consumption of batteries from turning ON the [POWER] switch for too long. ● When not using the PWR OFF, select “00 (min)”. ● The BKL OFF prevents unnecessary consumption of batteries from turning ON the backlight for too long. ● When not using the BKL OFF, select “00 (sec)”.
F-6 CLOCK ADJ (WDS-191AS1E)	The pre-set value blinks. Change the target by using the  key and  key. “Year” → “Month/day” → “Hour/minute/second” Click the SET key.	● After removing/replacing batteries, adjust date and time.
F-7 TEDS READ Initial value PWR-ON READ: DIS ZERO AT READ: DIS RATED OUTPUT: ENA RATED CAPACITY: ENA UNIT: ENA	The TEDS operations appear. ● PWR-ON READ ENA/DIS Select the target by using the  key. Click the SET key. ● ZERO AT READ ENA/DIS Select the target by using the  key. Click the SET key. ● RATED OUTPUT ENA/DIS Select the target by using the  key. Click the SET key. ● RATED CAPACITY ENA/DIS Select the target by using the  key. Click the SET key. ● Unit ENA/DIS Select the target by using the  key. Click the SET key. Tips!! As you click the  key, the “ENA” and “DIS” changes.	● The F-7 selects TEDS operations.
F-10 TEDS FUNC Initial value: ENROL BY TEDS	The pre-set value blinks. ENROL BY TEDS  ENROL BY FILE Select the target by using the  key. Click the SET key.	● The F-10 selects TEDS functions.

Mode	Key operations	Functional description
F-11 FILE MAINT	The “F-11” and following items appear alternately. FILE No.: 01 CAPACITY: ***** K.S/N: ***** ● To change calibration files... Change the FILE No. (1 to 32) by using the  key. Click the  key. ● When the file stores data... The “ESC” or “DEL” appears. Select the target by using the  key. Click the  key. ● When the file does not store data... The “ESC” or “REG” appears. Select the target by using the  key. Click the  key. The “F-11” appears. The registered CAPACITY and K.S/N appear. Click the  key.	● The F-11 saves the K.S/N, CAPACITY, rated output, decimal point position, unit, “zero” value, and smooth items in files (file No. 1 to 32). ● (You are not able to overwrite files.) Before registering data, delete data. NOTE: When selecting the “REG” without connecting a TEDS-compatible transducer, the “IdErr” appears.
F-12 MEAS UNIT Initial value: kN	The unit group blinks. Select unit groups by using the  key. [STRAIN]→[FORCE]→[MASS]→[PRESSUR] →[TORQUE]→[DSPLACE]→[ACCELER]→ [CUSTOM] Click the  key. The first unit lights up. Select the target by using the  key and  key. Click the  key.	● Available units are described as follows. STRAIN: $\mu\epsilon$, $\mu\text{m/m}$, $\mu\text{V/V}$, mV/V FORCE: mN, N, kN, MN MASS: mg, g, kg, ton, PRESSUR: Pa, hPa, kPa, MPa TORQUE: $\text{mN} \cdot \text{m}$, $\text{N} \cdot \text{m}$, $\text{kN} \cdot \text{m}$, $\text{MN} \cdot \text{m}$ DSPLACE: μm, mm, cm, m ACCELER: m/s^2, G, Gal, No unit CUSTOM: -----
F-12 (2) CUSTOM Initial value: USERDEF	Select the “CUSTOM” and click the  key. The custom unit blinks. Click the  key. The leftmost character blinks. Create units by using the  key and  key. Click the  key.	● Custom characters should be within 7 characters. ● Available characters are described as follows. 7 characters Lowercase: abcdefghijklmnopqrstuvwxyz Uppercase: ABCDEFGHIJKLMNOPQRSTUVWXYZ Special characters: $\mu\epsilon$ Ω / $\cdot$ % 0^2 3°C -

Mode	Key operations	Functional description
F-13 LANGUAGE Initial value: ENGLISH	The pre-set value blinks. ニホンゴ (Japanese) ⇔ ENGLISH Select the target by using the  key. Click the SET key.	The F-13 changes language (ニホンゴ or ENGLISH) on the WDS-190AS1E/WDS-191AS1E.
F-14 CONTRAST Initial value: 11	The pre-set value blinks. Range: 00 to 30 Select the target by using the  key. Click the SET key.	The F-14 changes contrast on the LCD.
F-15 KEY LOCK Initial value: OFF	The pre-set value blinks. OFF ⇔ ON Select the target by using the  key. Click the SET key.	When the KEY LOCK is ON, the WDS-190AS1E/WDS-191AS1E starts with the locked status and the key mark  appears. To clear the locked status, press and hold the HOLD key and SET key at the same time (for approx. 3 seconds).

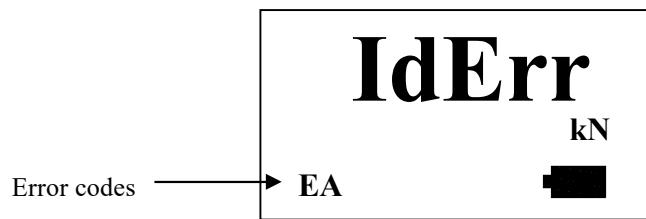
NOTE

To confirm the FUNCTION SELECTING mode, be sure to click the **ZERO** key and go to the measuring window.

The WDS-190AS1E/WDS-191AS1E does not confirm the FUNCTION SELECTING mode by clicking the **SET** key.

10 ERROR CODE

Error codes appear on the bottom left.



When an error appears, re-set settings or turn OFF and ON the power.

Error codes on the bottom left

EW: EEPROM writing error

EU: User setting area SUM error

EF: Fact setting area SUM error

ES: SD card error

EA: Calibration value setting error

ER: RTC error or require initialization

ET: TEDS reading error

Operation errors

CcErr: Calibration value setting error

IdErr: TEDS communication error, sensor cable connection error, etc.

IDERR: TEDS communication error while registering TEDS data

no-Id: Files having the K.S/N do not exist.

A/D conversion errors and measured value errors

oL: Indicating value is 99999 or larger.

-oL: Indicating value is -99999 or smaller.

Ad: Measuring range is 10000 $\mu\epsilon$ or larger.

-Ad: Measuring range is -10000 $\mu\epsilon$ or smaller.

11 SPECIFICATIONS

Model	WDS-190AS1E WDS-191AS1E (including the comparator function and recording function)
Applicable sensor	Strain gage transducer (input terminal resistance: 60 ohm to 1000 ohm)
Bridge excitation	2 VDC (constant)
Measuring range	$\pm 5.0000 \text{ mV/V}$ ($\pm 10000 \text{ }\mu\text{m/m}$) Including the zero adjustment range
Digital zero function	Executes digital zero function within the measuring range
Sampling rate	Approx. 50 times/sec
Calibration function	LOAD ADJ (actual load calibration) ENROLMENT ADJ (sensitivity registering calibration) TEDS functions ENROL BY TEDS (TEDS data only) ENROL BY FILES (TEDS data + calibration files)
Indication	LCD 128×64 dots, backlight (enable on/off) Range -99999 to 99999 (decimal point position: Sets to anywhere possible, MEAS mode only) Unit Any units
Indicating value accuracy	Within $\pm(0.05\%\text{rdg} + 5 \times 10^{-6}) \text{ m/m}$
Original units	“ μe ” or “mV/V”
Mode	STRAIN mode Measures raw outputs of strain gage transducers in “ μe ” or “mV/V.” MEAS mode Converts raw outputs of strain gage transducers into physical quantities.
Smoothing function	Moving average 1/2/4/8/16/32/64/128 Minimum scale 1, 2, 5, 10, 20, 50, 100 steps Zero-near-zero 0 to 9
Peak hold function	Digitally holds the maximum value during measurements.
Comparator function (WDS-191A)	HI comparator $\times 1$
Clock function (WDS-191A)	Year/month/day/hour/minute/second based on Christian era (Clock settings are year/month/day/hour/minute only.)
Recording function (WDS-191A)	As you click the REC key, the WDS-191AS1E records year/month/day/hour/minute/second, part names, count values, units, limit values, ON/OFF. Saves CSV files in text format.
I/F (WDS-191A)	USB2.0 (micro USB)
Low power function	PWR OFF 1 to 99 min or 00 (OFF) BKL OFF 1 to 99 sec or 00 (OFF)
Battery remaining capacity	Battery mark lights up 1/1, 1/2, 1/4, and battery mark blinks. When the battery mark blinks: Prohibit settings/calibrations/recordings
Operating temperature and humidity ranges	-10 to 40°C, 20 to 85% (noncondensing)
Power supply	AA size alkali battery $\times 2$
Operating time	Approx. 72 hours continuously (With alkali batteries, 350-ohm transducer connected, and backlight OFF at room temperature 25°C)

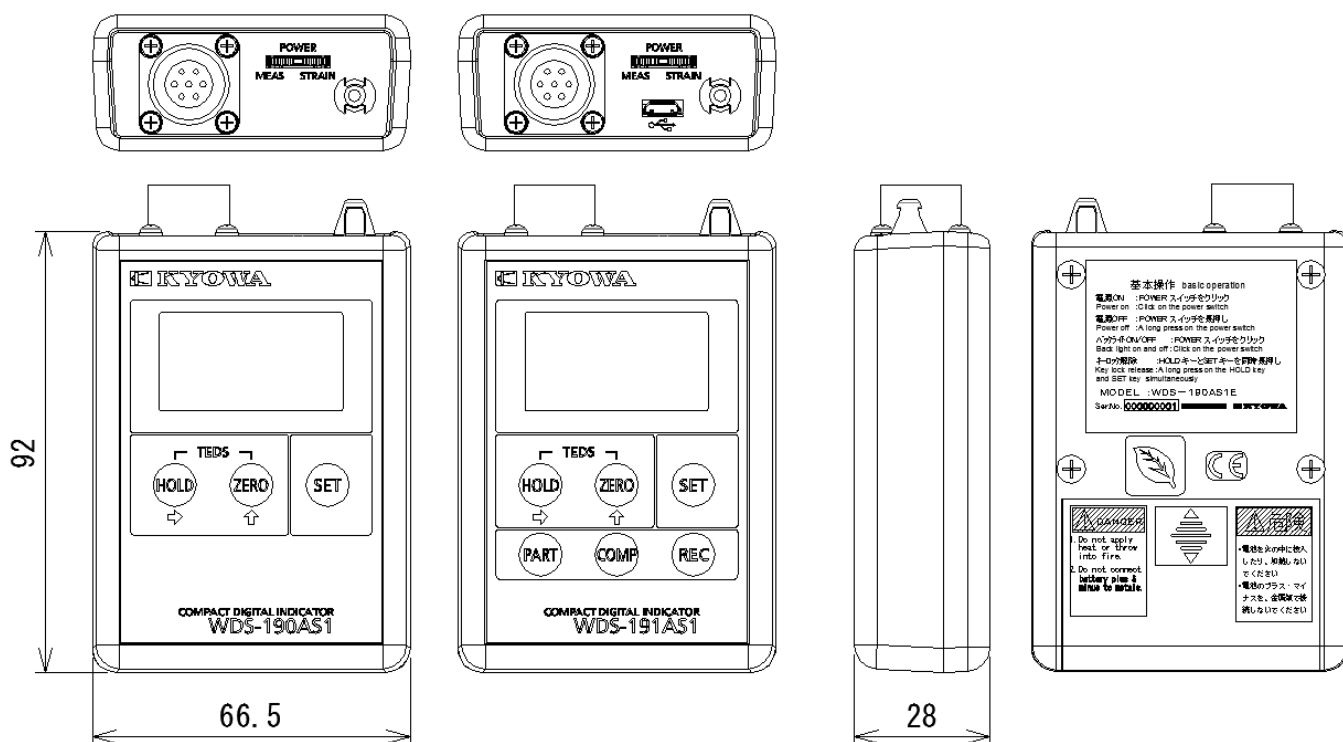
Dimensions	66.5 (W) × 92 (H) × 28 (D) mm (Excluding protrusions)
Weight	Approx. 110 g (excluding batteries)
EMC Directive	EN61326-1(IEC61000-4-2, IEC61000-4-3 only)
RoHS Directive	EN50581:2012
Options	Soft case WDS-500-CASE
	(With shoulder strap storing AA size battery × 2 and input cable U-16 × 1)
	Input cable U-16 0.5 m, alligator clip at one end



12 OUTSIDE DRAWING

WDS-190AS1

WDS-191AS1



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