

Wireless digital spirit level

SELN-131BM

INSTRUCTION MANUAL

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Please be sure to read this section for safety.

! Cautions

- ◎ This device uses 4 AA batteries as power source.

When used on a desk for long periods of time, it can be used with the AC adapter still connected. The DC plug of the dedicated adapter is connected to the DC jack of the unit. Insert the DC plug of the dedicated adapter into the DC jack of the unit.

After confirming that the DC plug is securely plugged in, insert the AC plug into a AC 100 V outlet. After confirming that the plug is securely plugged in, insert the AC plug into a 100 V outlet.

- ◎ Use the genuine AC adapter for this device. By use of a non-genuine adapter may damage the unit.

Also, abnormal voltage may be applied to the battery, causing it to overheat.

- ◎ Handle the sensor carefully to avoid applying force or shock.

Also, be careful not to scratch the ground surface of the sensor.

If the sensor is subjected to load, shock, or scratches, it may not display accurate data values.

If the sensor is accidentally subjected to a load and the data value is abnormal, please contact us.

- ◎ We are not responsible for any modification of the product by the customer, as our warranty does not cover such modification.

- ◎ Please confirm that the actual product is as ordered.

Addition

- The contents of this instruction manual are subject to change without notice.
- This instruction manual will not be reissued, so please keep it in a safe place not lose it.
- Unauthorized copying of part or all of this instruction manual is prohibited.
- The contents of this instruction manual have been prepared with the utmost care, but please contact us in the event of any errors or omissions.

Introduction

Please check the contents of the packaging.

Contents of the packing.

SELN-131BRM Monitor (Receiver)	1
SELN-131BTM Sensor (Transmitter)	1
AA Battery (1.5V)	4
AC adapter for SELN-131BRM	1
Warranty card	1
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SELN-131BRM Monitor
(Receiver)



SELN-131BTM Sensor
(Transmitter)



Instruction Manual



AA Battery (1.5V)



AAA Battery (1.5V)



Warranty card



AC adapter
for SELN-131BRM



Ferrite core



Micro SD Card
(with SD card adapter)



Digital Spirit level SELN-131BRM

Monitor (Receiver)

§ 1 Name of each part.

Please refer to the attached appearance drawing.

① Graphic LCD display (touch panel)

480x272 dot graphic LCD displays setting and measurement screens.

The touch panel screen can be operated by touching it directly.

The LED backlight allows the unit to be used in dark locations.

※ The touch panel is used for input operation of this instrument. When inputting data, touching the screen with anything other than a stylus (ballpoint pen or tool) may damage the touch panel. Also, please note that applying strong force to the touch panel may damage the touch panel.

② Power Switch

This switch turns the power of this device ON and OFF. Each press alternately cycles ON and OFF.

③ Battery cover

Lid cover for 4 AA batteries.

④ DC input Jack

DC jack to connect the genuine AC adapter of the unit.

⑤ MicroSD slot

A slot to insert a microSD for storing data.

⑥ USB connector

An I/F for outputting data externally in real time.

Digital spirit level SELN-131BTM

Sensor (Transmitter)

⑦ Power switch

A switch to turn on/off the power supply on the sensor (transmitter).

By pressing the switch long time, the switch goes to off.

⑧ USB connector

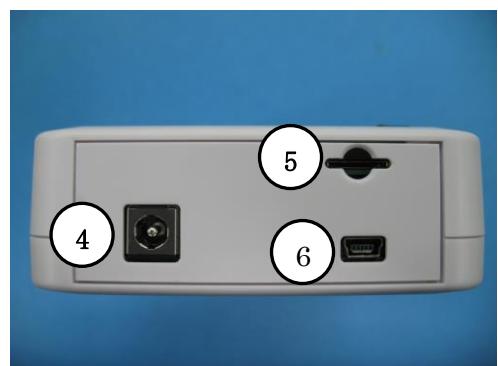
External output power supply on the sensor (transmitter). Internal power supply uses 3 AAA batteries.

When the battery powers are low, the blue LED blinks faster. Replace the batteries.

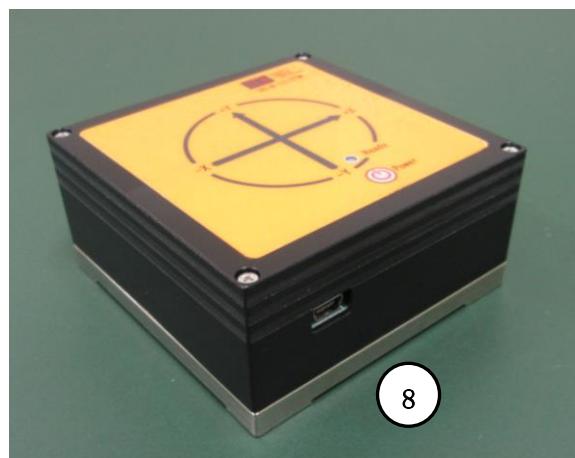
External view SELN-131BRM Monitor (Receiver)



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External view SELN-131BTM Sensor (Transmitter)



Digital Spirit level SELN-131BM

Operation manual

1 . Explanation of each screen

1-1. Title Screen



Initial screen when power is turned on. Company name, product name, and software Ver are displayed.

- Product name :Displays the product name (fixed)
- Software Ver: Displays the Ver of the program.

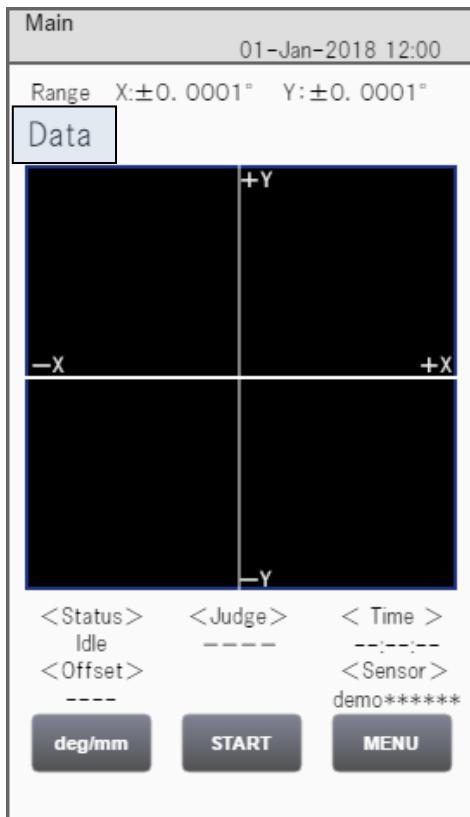
After a certain period of time, the screen automatically transitions to the next screen.

1-2. Wireless Pairing Screen

Initial screen after displaying the Title screen.

In the wireless type, communication is enabled by pairing the target child unit and the parent unit respectively.

The pairing procedure at the parent unit is as follows.

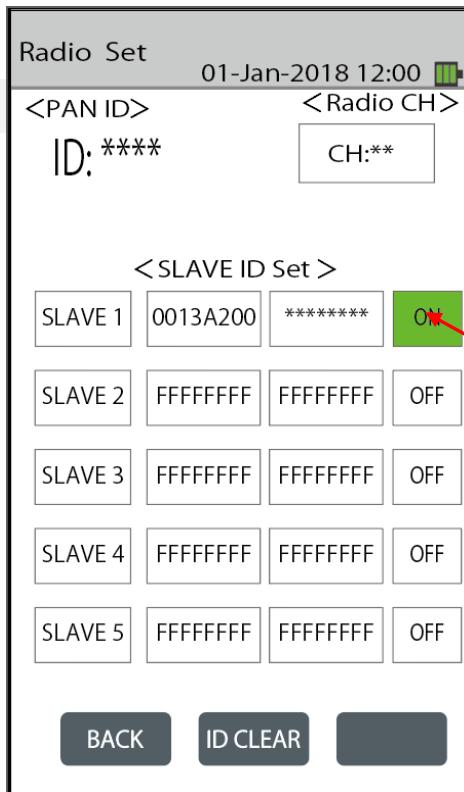


• From main screen to menu screen



Long press of the blank button moves to the wireless function

• From menu screen to wireless function setting screen



As shown in the image on the left, the parent unit can register up to 5 child IDs (SLAVE IDs).

If you register your ID on this screen in advance, you can freely switch communication targets from a maximum of five.

* It is not possible to communicate with plural child unit at the same time.

(To be supported when polling function is added.)

Only IDs marked "ON" are communicated with.
(ex) The state is to communicate only with the child unit with ID:000002.

The parent unit can register up to 5 child IDs (SLAVE ID).

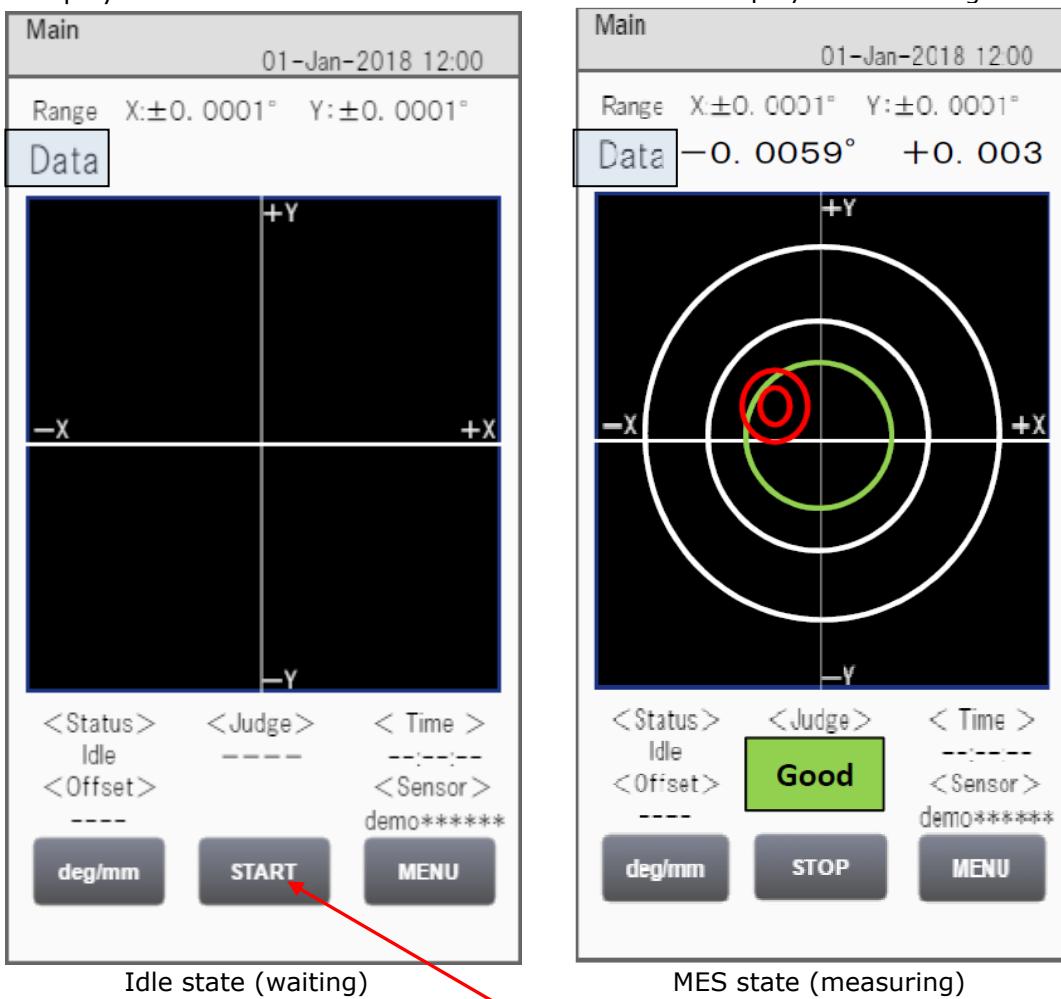
The registered child ID is retained until it is overwritten or cleared by pressing "ID CLEAR".

* CH(channel) caution

• When using plural wireless digital spirit levels at the same time, use the device with different wireless CHs.
Measurements are not affected, but the signal may be interrupted.

1-3. Main Screen

This screen is displayed on the initial screen after the title screen is displayed and during measurement.



- Press START button to start measurement

Press START button to start measurement

< Description of display items >

- Range : The value for setting the pass range is displayed.
- Data : Current sensor readings (deg/mm) are displayed.
- Status : Current status display/ Idle (waiting) MES (measuring)
- Judge : "GOOD" if within the acceptance range, "NG" if outside the range, and "----" for Idle
- Time : Display of elapsed measurement time (in 1-second increments) / "----" displayed when idle
- Offset : Offset Adjust setting status is displayed as "ON" or "OFF", "----" is displayed for Idle.
- Sensor : Displays the name of the correction data when Sensor's correction data is valid.

< Description of buttons and setting items >

- deg / mm button : Switches to display of measured value (angle or distance)
- "START"or "STOP" button : Start or Stop of measurement
- Menu button : Switch to menu screen
- GOOD(Pass range only) : Buzzer sound temporarily stops when buzzer setting is enabled

* When the measurement data is within the acceptable range, a buzzer sounds if the Buzzer setting is ON. At this time, the buzzer can be paused by pressing "GOOD" in the "Judge" item. The buzzer pause will be released when the data is out of the acceptable range, and the buzzer will sound again when the data is within the acceptable range again. The pause can be used as many times as necessary.

※ If no sensor is connected, measurement will not start.

In this case, the buzzer will sound three times and "----" will be displayed as data.

1-4. Menu Screen

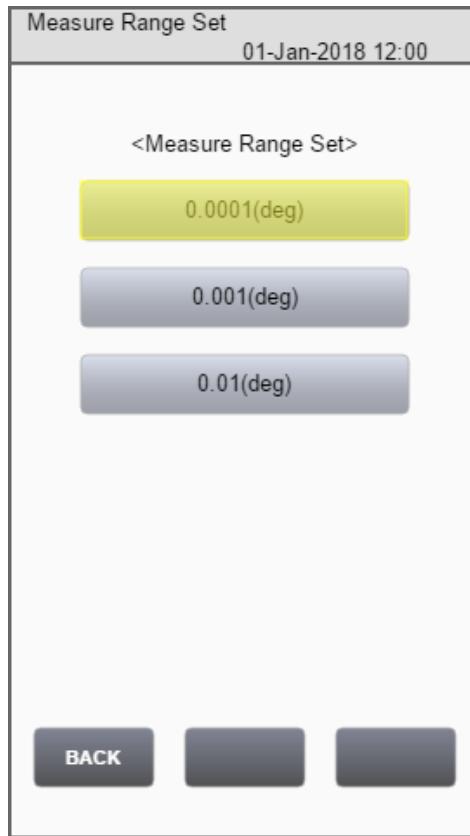


This screen is used to make various settings for the spirit level.

<Description of buttons and setting items >

- Measure Range Set : Sets the unit for angle display during measurement.
- Good Range Set : Sets the pass range during measurement.
- Offset Adjust Set : Offset adjustment.
- Date / Time : Sets the current time.
- Buzzer ON/OFF : Set buzzer sound notification settings within the pass range.
- File Set : Configure settings for saving data to a file.
- BACK : Return to the Main screen.

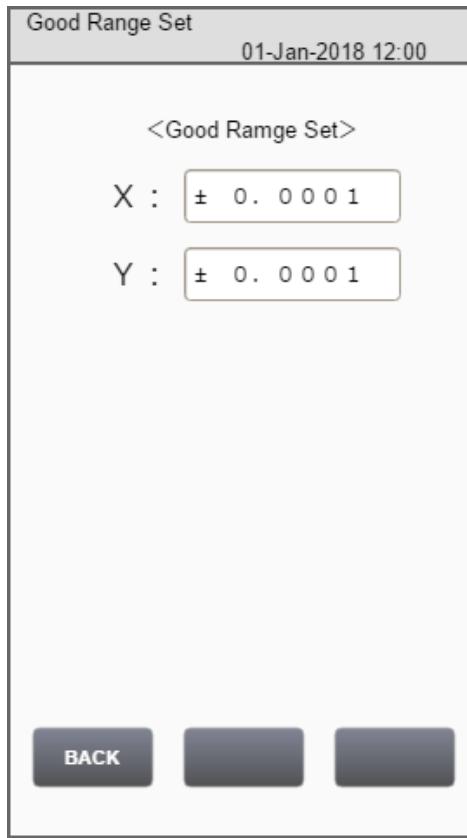
1-5. Measure Range Set Screen



<Description of buttons and setting items >

- 0.0001(deg) : Displays up to 1/10000 of a unit (deg). (1/1000 when displaying in mm)
- 0.001(deg) : Displays up to 1/1000 of a unit (deg). (1/100 when displaying in mm)
- 0.01(deg) : Displays up to 1/100 of a unit (deg). (1/10 when displaying in mm)
- BACK : Return to Menu screen.

1-6. Good Range Set Screen



Sets the range of angles to be passed during measurement. If the angle data falls within this set value, GO OD is displayed in the Judge section of the Main screen and a buzzer sound is notified (optional setting).

The acceptance range is set in the range of 0.0000~0.3000°(deg).

* Since X and Y are usually used with the same value, the Y axis is also updated with the same value when the X axis pass range is entered.

When setting the threshold values for the X and Y axes individually, set them in the order of X-axis → Y-axis.

<Description of buttons and setting items >

- X: Pass Range button : Moves to the numerical value input screen and sets the passing range. (When X is entered, Y value is automatically updated.)
- Y: Pass Range button : Moves to the numerical value input screen and sets the passing range. (Only Y value is updated.)
- BACK : Return to Menu screen.

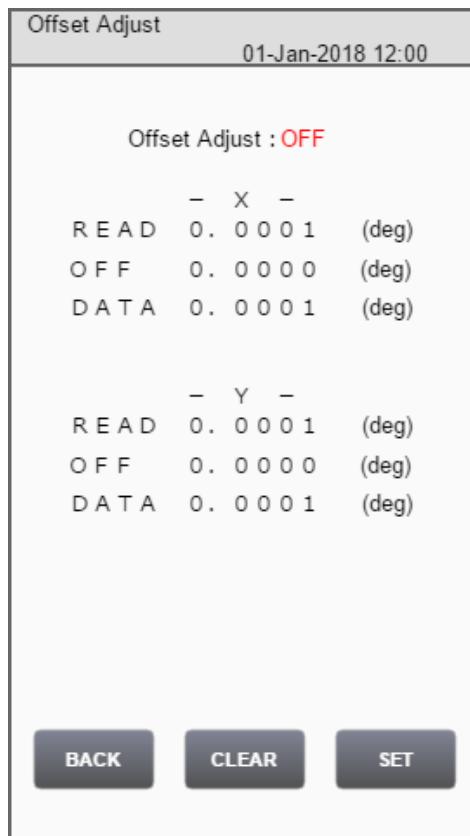
Display accuracy	Setting range
0.0001	0.0001~0.3000
0.001	0.001~0.300
0.01	0.01~0.30

※1. "Good" angle range cannot be set in units (mm/m).

※2. If the "Good" range data for the XY axis is the same, the "Good" range is set as a circle.

※3. When setting the "Good" range in units (mm/m), convert the units (mm/m) to (deg.) using the attached conversion table.

1-7. Offset Adjust Set



Offsets the current angle value to 0.0000 on the display. When offset is enabled, the angle data displayed during measurement also reflects the offset value.

This offset function sets the data in the measurable range to 0.0000 on the display. When this function is enabled, OVER is displayed if the internally calculated measurable range is exceeded.

Do not use the device in an extremely off-horizontal position, as this may cause accuracy problems.

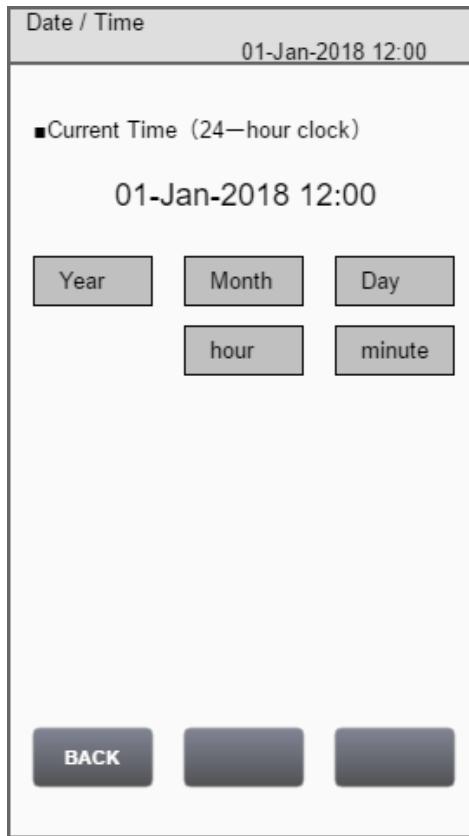
< Explanation of display items > The contents of both X and Y axes are identical.

- Offset Adjust : Display the status of offset function/ OFF (disabled), ON (enabled)
- READ : Angle data before offset value is reflected
- OFF : Offset value currently being set (0.0000 if function is OFF)
- DATA : Angle data after reflecting the offset value (This data is displayed during measurement.)

< Description of buttons and setting items >

- SET button : Set offset with current measured value (updatable)
- CLEAR button : Clears the offset setting.
- BACK : Back to Menu Screen.

1-8. Date / Time



Set the date, time, and hour. The seconds display will be set to 00 seconds when either setting is updated.

< Description of display items >

- Displays the current time.

<Description of each button and setting item >

- Year button : Set the year. (Western calendar year)
- Month button : Set the month.
- Day button : Set the day.
- hour button : Set the hour. (24-hour display)
- minute button : Set the minute.
- BACK : Return to Menu screen.

* If the date, time, and time are corrupted each time the power is turned on, the internal battery voltage may be low, and the battery should be replaced.

1-9. Buzzer



Set the buzzer notification when the angle is within the pass range during measurement.

<Description of buttons and setting items>

- Buzzer ON : A buzzer sounds when the measured value is within the acceptable range.
- Buzzer OFF : The buzzer does not sound even if the measured value is within the pass range.
- BACK : Return to Menu screen.

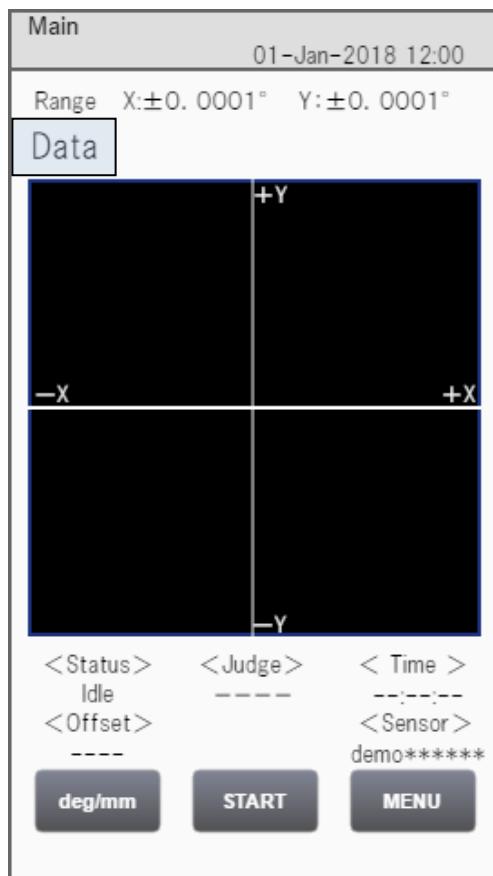
1-10. Data storage



Select File Set from the Menu screen to enter the File Set screen.

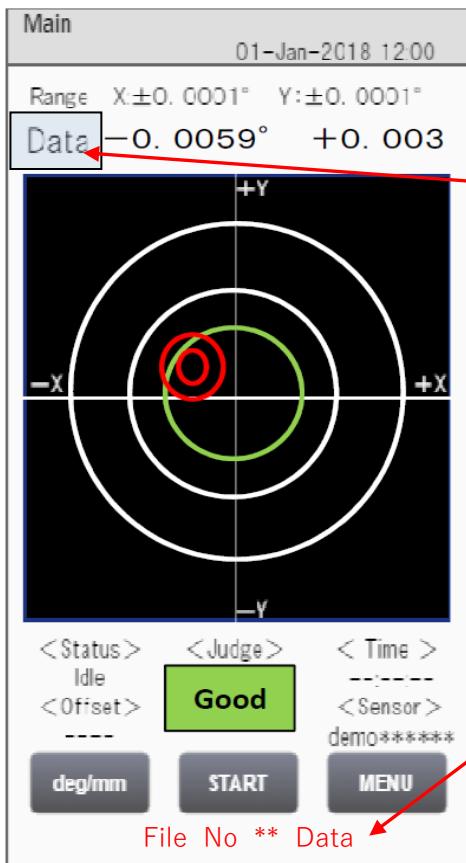
On the file selection screen, select the file No. to be saved.

(e.g.; Touch the top file "01-xx-xxx-xxx-xxx--" to select it)



Press the BACK to return to the Menu screen, and press the BACK again to return to the Main screen.

1-11. Saving data to a file



When the file function is enabled (when a file is selected), this part of the screen is used as a button for importing data.
*When a file is not used, the display is as usual and cannot be touched.

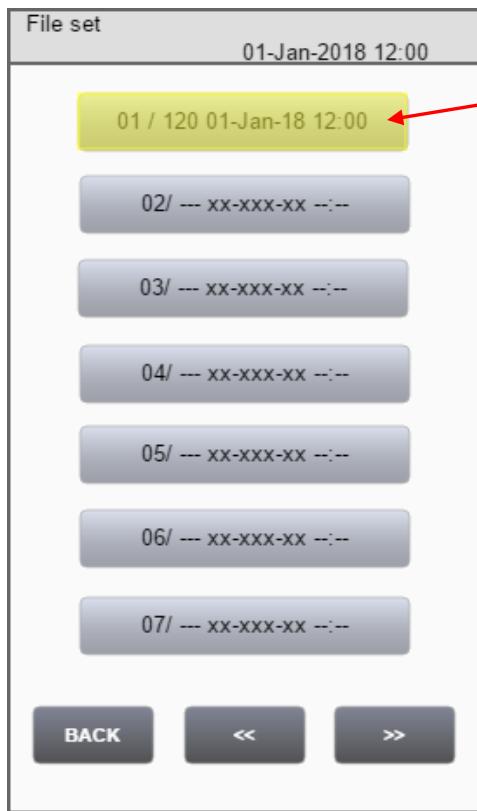
No. of the currently selected file and the number of data currently stored are displayed here.
*Not displayed when no file is currently being used.

Press START to start measurement.

Press "Data" at the top of the screen to save the current data to the selected file.

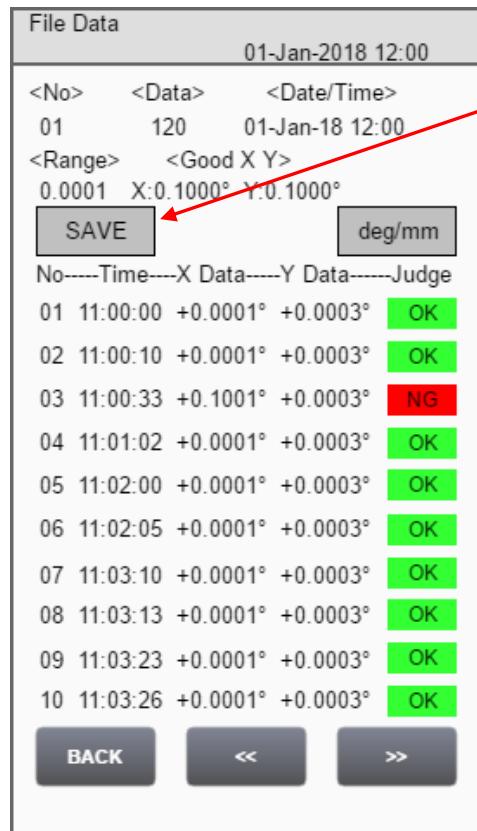
If measurement data is already recorded in the file at this time, a message window will be displayed to ask the user to execute the overwrite or a message will appear.

1-12. Check file contents & output data externally



Long press: File details
(only when there is data)

ファイル選択画面にてデータ有りのファイル項目で長押し。



Output CSV file to SD card.

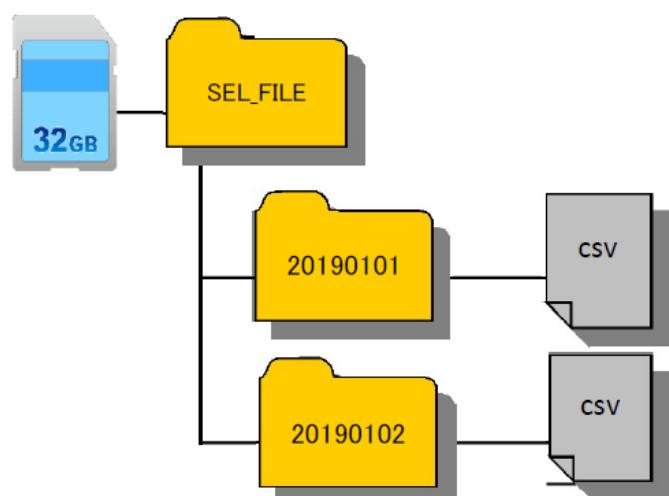
<Flow of CSV file creation>

When the save button is pressed, create a folder in the

SD card with the date of the save.

Create a file (file No. + hours, minutes, seconds).csv in the above folder

Display content can be switched according to the current deg/mm setting.

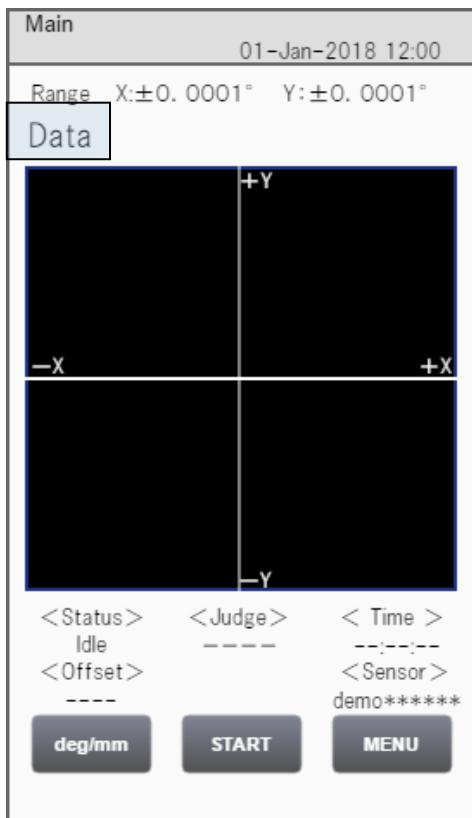


The detail screen appears and the contents of the data saved so far can be checked.

1-13. Horizon CAL Screen

Absolute zero compensation should be performed on a leveling plate adjusted to within $\pm 0.05^\circ$ approximately.

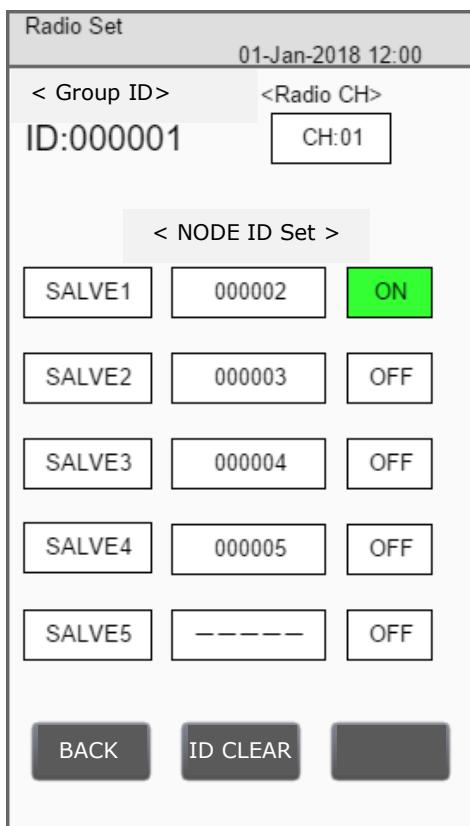
Move to Horizon CAL Screen.



By long press, the blank button to go to the radio function setting screen.

• Go to menu screen from main screen

• Menu screen to radio function setting screen



Example
When "SLAVE1" is touched, a status confirmation command is sent to ID:000002 (the same applies to other SLAVEs.), and the Horizon CAL setup screen (Status Confirmation Screen) is displayed.

Touch the name of the SLAVE whose status is to be checked on the wireless setting screen.

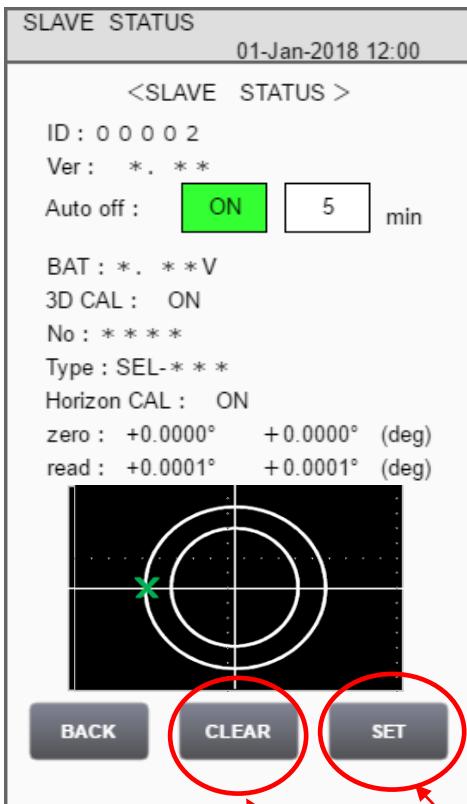
If a response is received from the handset, the status check screen for each handset is displayed.

- At this time, if there is no response from the target SLAVE, the screen does not move to the next screen.
- The SLAVE button is invalid when pressed unless the ID is already set.
- Status confirmations are sent regardless of whether the communication setting by ID is ON or OFF.

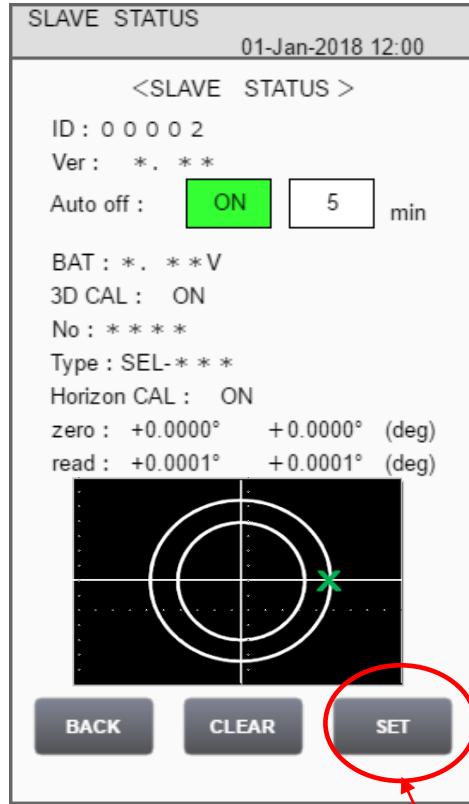
Wireless function setting screen

Horizon CAL Setup Screen (Status Check Screen)

Screen before pressing SET button for the first time.



Screen after pressing SET button for the second time.



※After pressing SET button for the first time, rotate the sensor unit (transmitter) 180 degrees, and press SET button for the second time after the data value is stable.

The following information on the child unit is acquired and displayed by the status check command.

- Soft Version
- Enable/Disable auto power off setting (setting can be changed)
- Auto power off time setting (setting can be changed)
 - Auto power off is effective only when not communicating
- Battery voltage (real time update)
- 3D correction Enable/Disable
- 3D correction data No.
- 3D correction data type
- Absolute zero correction enable/disable
- Current angle data (updated in real time)

Set the sensor and press SET button for the 1st time after the level sensor Read data has stabilized

Set the sensor and press SET button for the 1st time after the level sensor Read data has stabilized

Used for setting absolute zero correction.
By long time press "CLEAR" to clear the correction and reset it.

<Display Item Description> The contents are the same for both X and Y axes.

- Horizon CAL : Displays the status of the correction function OFF (disabled), ON (enabled)
- read : Correction value Angle data before reflection
- zero : Correction value currently being set (0.0000 if function is OFF)
- DATA : Angle data after reflecting the correction value (This data is displayed even during measurement.)

<Explanation of buttons and setting items >

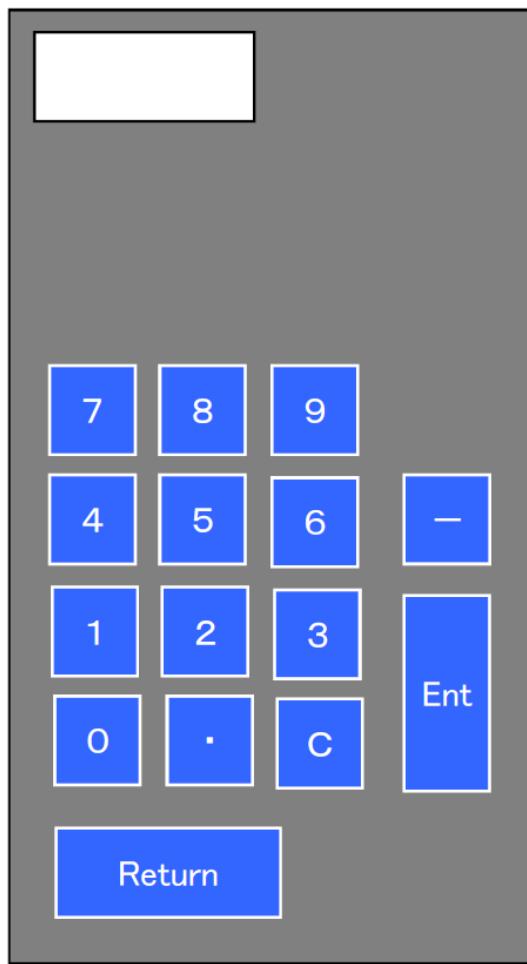
- SET button : Sets the correction with the current measured value (can be updated)
- CLEAR button : Clears the absolute zero compensation set value.
- BACK : Return to the Menu screen.

<Important>

A digital level does not have an absolute horizontal zero point. After turning on the power, the first numerical zero displayed does not necessarily correspond to the absolute horizontal zero point. (The digital level is generally aligned with the horizontal zero point at the time of shipment.) If a horizontal zero point is required for measurement, the absolute horizontal zero point must be set on the Horizon CAL screen once every time the power is turned on.

2 . Explanation of common screen operations

Common screen 1: Numerical value input screen



Enter numerical values.

Maximum number of input digits is 6 (including decimal point).

<Description of buttons and setting items >

- Numerical value (0-9) button: By touch this button to display the numeric value in the numeric entry field.
- Decimal point (.) button : By touch, the decimal point is displayed in the numeric entry field.
- Clear (C) button : Clears the value displayed in the numeric entry field.
- Ent : Confirms the value displayed in the numeric entry field.
If the value is within the range of the set value, it will return to the original screen after confirmation.
If a value outside the set value range is entered, a message is displayed in red text and the value must be re-entered.
- Return : Returns to the screen one screen before this screen. (The value is not updated.)

Common screen 2: Message display screen



<Screen Summary> Displays a message.

Depending on the message, a button for selecting "OK" or "Cancel" or a confirmation button for "OK" only is displayed.

<Description of buttons and setting items>

- "OK" button : Executes the message.
The content of execution varies depending on the message.
- "Cancel" button : The content of the message is not executed and the screen returns to the previous screen.

[List of displayed messages]

- Power off

The message is displayed when the power is turned off with the power switch.

- SD card cannot be found. Check the SD card slot.

Displayed when the SD card is not inserted when accessing the SD card.

- Update file version OK? Type:****→**** Ver :****→****

When the "Update Program" button is pressed, "OK": Executed, "Cancel": Not executed.

Displays when the target file cannot be found at the time of updating the program.

Displayed when updating the program.

- Update file not found. Please check the SD card.

Displayed when the target file cannot be found when updating the program.

- Updating the software. Do not turn off the power!

Displayed when the program is updated.

- Saving the font data. Do not turn off the power!

Displayed when writing font data.

- Saving the bitmap data. Do not turn off the power!
Displayed when bitmap (image) data is updated.
- Update is completed. Please restart this unit. (Do not remove the SD card.)
Displayed when program update is successfully completed.
- Setting data initialize. OK?
Initialize button initializes the display and various settings. OK": Execute, "Cancel": Not execute.
- ALARM: Low Battery. Exchange the battery.
The display indicates when the remaining battery voltage is low.
- Receiving calibration data. wait a moment. *Don't disconnect.
Displayed when correction data for sensors is captured.
- ERROR: Sensor cal data. Calibration mode canceled.
This message is displayed when there is an error in the sensor correction data when the power is turned on. At this time, the sensor correction function is temporarily disabled.
- Sensor disconnect. Check the sensor cord is connected.
Displayed when a sensor disconnection is suspected during measurement.
- Target No reply
ID: *****
Indicates when the transmitter is not receiving radio waves. Indicates when the transmitter is turned off.

3. Other

3-1. Basic Operation

- Operation is by input using a touch panel.
- Only the area where the button is displayed on each screen can be touched (the color of the touchable area changes when touched).
(The color of the touchable area changes when touched.) A button is considered to have been decided not at the moment it is pressed, but when the finger is released within the same button area after being pressed. If you accidentally touch a button that is not the target of the operation, the process will not be executed if you release your finger away from the button.

※The touch panel is used for input operation of this instrument. Touching the screen with anything other than a commercially available stylus (ballpoint pen or tool) may damage the touch panel. Also, please note that the touch panel may be damaged if strong force is applied to the touch panel.

- The currently selected setting button or other buttons on the settings screen, etc., will change color.
- Touching an item that requires numerical input switches to the numerical input screen of the common screen, enter a value, and press the decision button to reflect the value. If a value outside the input range is entered, a message will be displayed and the entered value will not be reflected when the "Decide" button is touched.
- A message window will appear when a confirmation or acknowledgement is requested, or when an error is notified. The message will be processed after a certain period of time or by pressing a button in the message box.
- About the remaining battery indication.



The battery voltage is displayed in three levels in the right corner of the title area (top of the screen) of each screen.

Green : The battery has enough remaining power. (Reference: 1 hour or more of continuous use is possible.)

Yellow : Battery power is low. (Reference: 20~30 minutes of continuous use is possible.)

Red : Battery power is insufficient. (The power may be turned off during use due to insufficient capacity.) After the power is turned on, a low voltage message is displayed when the remaining capacity becomes "red". When the message is displayed, it is recommended to replace the batteries.

* Depending on usage conditions, it may not be possible to continue the estimated operation time.

<Important>

- ※ **1. The sensor and monitor must be used in pairs.**
(The displayed value cannot be guaranteed even if another sensor of the same model or the monitor is used in place of the sensor or the monitor.)
- ※ **2. For precise measurement (3/1000° (deg) or less), warm up at least 30 minutes after power-on until the electronic circuit is stable before performing the measurement.**

3-2. Data communication (Real-time)

Real-time data communication (an additional function) keeps data flowing at 300 ms from the US B terminal.

- ※ We recommend that you connect it directly to the USB port of your PC within the maximum distance (5m) of USB standard.
If the product is connected via a USB extension device (USB hub, etc.), the PC may not recognize the product properly.

Digital level - External device communication specifications.

1. Communication Conditions

- Communication method Asynchronous
- Baud rate 9600bps
- Character length 8 bits
- Stop bit 1 bit
- Verity None

2. Transmission data

The spirit level transmits the following data every 0.3 seconds during measurement.
(Real-time communication)

X angle data	,	Y angle data	CR	LF
7		7	1	1

X / Y angle data.

- For minus (-) data, prefix the data with "-".
- For + over range, "+OVER" is sent.
- For - over range, "-OVER" is sent.
- Send "ERROR" in case of reception error*.

* A condition in which measurement data cannot be received normally from the transmitter.

※ The data being sent is 7 bytes of data for each axis.

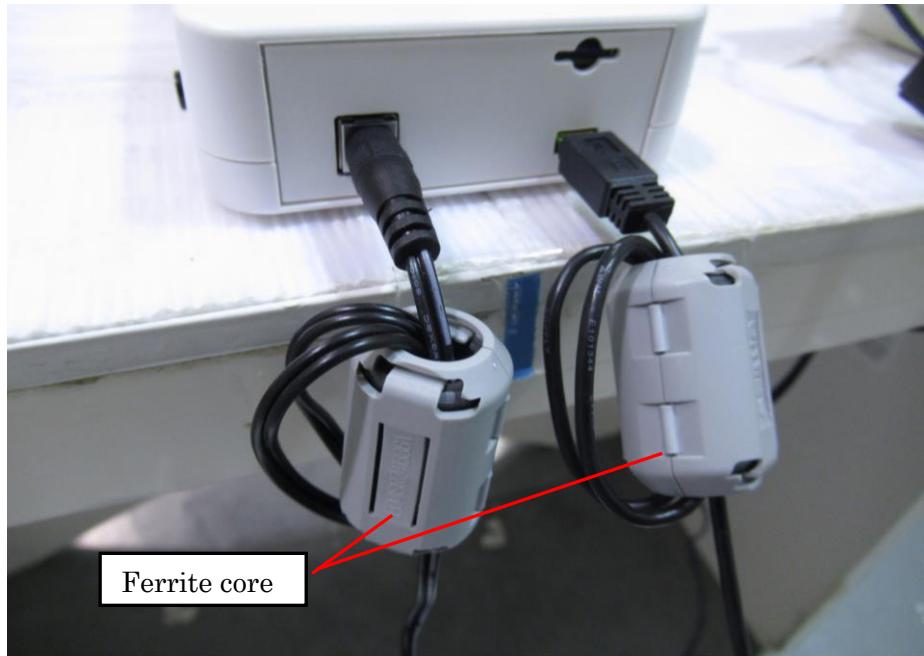
Polarity	DATA 1	DATA 2	DATA 3	DATA 4	DATA 5	DATA 6
. Decimal point means DATA 2						

Angle data 0. 0 0 0 0 ~ 0. 3 0 0 0 0

- A "space" is used for a plus sign and a "-" sign for a minus sign.
- If the angle is plus-over (when it exceeds 0.3 degrees), the polarity - DATA4 "+OVER" will be inserted in the polarity ~ DATA4.
- If the angle is minus-over (when it exceeds -0.3 degrees), the polarity - DATA4 "-OVER" will be inserted in the polarity ~ DATA4.
- In the case of a reception error, the word "ERROR" in polarity ~ DATA4 is inserted.
- Data is in ASCII characters.

4. Noise reduction

Real-time data communication with USB cable (not bundled) with AC adapter should be use two ferrite cores.



Digital spirit level Model SELN—131BM

SELN—131BM Product Specifications

	Specification
Sensor Linear-angle output Measurement resolution Zero point resolution Response speed Operating Temperature	X-direction ± 0.3 deg Y-direction ± 0.3 deg 0.0002 deg ± 0.001 deg. or less 50ms. Or less $-10^{\circ}\text{C} \sim +50^{\circ}\text{C}$
Monitor Microcomputer Measurement range A/D resolution Display Unit Passing range unit Range switching “OVER” indication	32 bit Microcomputer ± 0.3 deg 0.000025 deg 0.0001 deg 0.0001 deg 0.01/0.001/0.0001 0.3 deg. or more
Function Number of sensors Display Communication Frequency Measured data	1ch (Up to 5 transmitter registrations on the sensor) 4.3-inch color LCD touch panel 2.4GHz band (Zigbee) Save to file (max. 15 files, 120 points/file) Data external output function (SELN-131BR→Micro SD) Real-time data output: USB
Power	Genuine AC adapter: DC6V 2A Monitor(master) SELN-131BRM: 4pcs AA Batteries (1.5V) Sensor(slave) SELN-131BTM: 3pcs AAA Batteries (1.5V)
External dimensions Monitor Sensor unit	H145 × W96 × D36mm 390g H36 × W75 × D75 mm (Sensor base 75×75mm) Weight 240g (SUS base)、160g (AL base)

1st : 2024/3/19

FCC notices:

47CFR

2.1077 (a) Compliance Information

SUPPLIER'S DECLARATION OF CONFORMITY GUIDANCE

2.1077 (a) Unique Identifier

Product: Wireless digital spirit level

Brand: SAKAMOTO ELECTRIC MFG. CO., LTD.

Model: SELN-131BM

2.909 Responsible Party

Supplier's Declaration of Conformity

This Declaration of Conformity is hereby issued according to Chapter 1, Subpart A, Part 2 of Title 47 of the Code of Federal Regulations by:

SAKAMOTO ELECTRIC MFG. CO., LTD.
3-27-55, Wajiro Higashi-ku Fukuoka 811-0202
JAPAN

(SELN-131BM)
complies with the applicable requirements of FCC Rule Part 15/Part 18

U.S. CONTACT INFORMATION:

Americas Compliance Consulting LLC dba iCertifi
2445 NE Division Street, Suite 202
Bend, Oregon 97703 USA
FCC_sDoC@icertifi.com
icertifi.com

Signed:

By: Daisuke Aoki/ Member

Date: 3/31/2024



15.19(a)(3) Labeling requirements FCC Compliance Statement

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

15.21 Information to user Caution

Change or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

15.105 (a) Information to the user Class A

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation equipment in a residential area is likely to cause harmful interference of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Certified Transmitter Modules

Contains FCC ID: 2BE5W-SELN131