

USB BUTTON LOAD CELL FOR FORCE MEASUREMENT

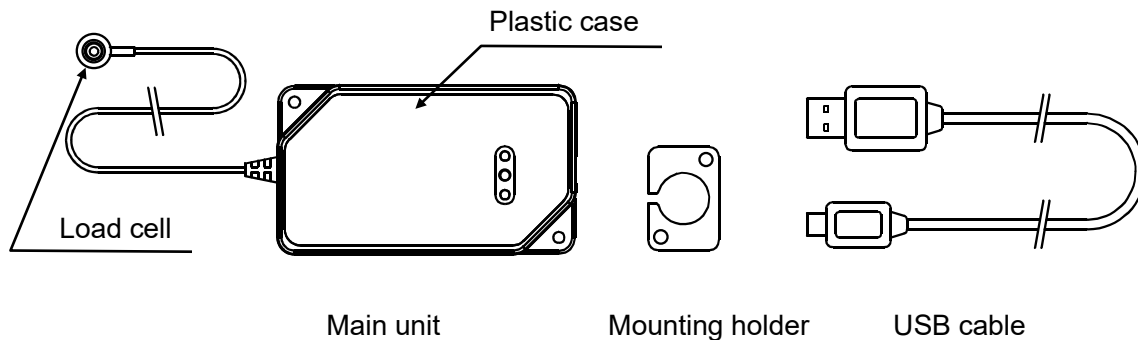
LCCU21 SERIES

LCCU21N100/LCCU21N200/LCCU21N500/LCCU21KN001

1. OUTLINE

Check the following packing contents before use.

- Main unit (load cell, cable, and plastic case) 1
- Mounting holder { APX-4036220: For LCCU21N100 and LCCU21N200 } 1
 { APX-4036221: For LCCU21N500 and LCCU21KN001 }
- USB cable 1
- Instruction manual 1



2. INTRODUCTION

The LCCU21 series is a compact and light compression digital load cell for force measurement. These can be used for the load distribution measurement, compression measurement and etc. Also, connecting the load cell to a computer using the USB cable allows for easy measurement.

3. SOFTWARE FOR THE MEASUREMENT

By using the “WinCT-DLC” software for measurement, the measurement data can easily be confirmed on a computer.

“WinCT-DLC” can be downloaded from A&D’s website (<https://www.aandd.jp>).

4. SPECIFICATIONS

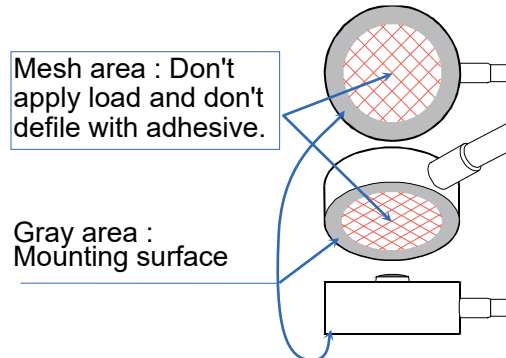
| Model No. | LCCU21N100 | LCCU21N200 | LCCU21N500 | LCCU21KN001 |
|--------------------------------|---|------------------------|------------------------|-----------------------|
| Rated capacities | 100 N (10.20 kg) | 200 N (20.39 kg) | 500 N (50.99 kg) | 1 kN (102.0 kg) |
| Rated output | 100.00 ±0.50 (0.5%) | 200.00 ±1.00 (0.5%) | 500.00 ±2.50 (0.5%) | 1000.0 ±5.0 (0.5%) |
| Combined error | 0.5 % of R.O. | | | |
| Power | Supply voltage | DC 5 V (USB bus power) | | |
| | Average current consumption *1 | Less than 50 mA | | |
| Zero balance | ±2 % of R.O. | | | |
| Temperature effect on zero | 0.6% of R.O. / 10°C | | | |
| Temperature effect on span | 0.6% of LOAD / 10°C | | | |
| Compensated temperature range | 0 °C to 70 °C | | | |
| Permissible temperature range | -10 °C to 80 °C | | | |
| Maximum safe overload | 150 % of R.C. | | | |
| A/D conversion rate | 100 times / s | | | |
| Digital filter | Select from None, 0.7, 1.0, 1.4, 2.0, 2.8, 4.0, 5.6, 8.0, 11.0 Hz (default value: 1.0 Hz) | | | |
| Resonance frequency *1, *2 | 45 kHz | 55 kHz | 30 kHz | 35 kHz |
| Cables | From load cell to case: φ2 mm, 2 m length USB cable (accessory): φ4 mm, 1.5 m length | | | |
| Dustproof / waterproof *2 | IP64 compliant | | | |
| Weight *3 | Approx. 50 g | | Approx. 55 g | |
| Communications standard | Conformant to USB Ver. 2.0 Full Speed | | | |
| USB connector | micro-B type | | | |
| Commu- nication settings | Baud rate | 38400 bps | | |
| | Character bit length | 8 bit | | |
| | Parity | Even | | |
| | Stop bit length | 1 bit | | |
| | Terminator | CR LF | | |
| Code | ASCII | | | |

*1: Reference value *2: Load cell only *3: Main unit (load cell, cable, plastic case)

5. INSTALLATION

5.1. ATTACHING THE LOAD CELL

- Attach the load cell to a rigid and flat base (the fixed surface). If there is slope or distortion on a part of the base, it affects the measurement accuracy.
- The mounting surface is gray area on the bottom of the load cell in the figure. Do not apply load to the concavity of the center of the bottom (mesh area). Don't defile with adhesive on mesh area.



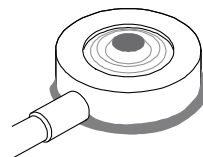
- Clean the mounting surface before attaching the load cell.
- Fix the position of the load cell using adhesive or the mounting holder.

Adhesive used

- Use the cyanoacrylate adhesive.
- Push gently the load cell so as to keep the position. Paste the adhesive to the place contacting the fixed surface and outer circumference of the load cell. Hold the load cell until maintaining the position. Do not apply excessive load and don't defile with adhesive on mesh area.
- Peel and shave adhesive using cutter and etc. when removing the load cell. Don't hit and shock to the load cell when removing it. Note injury and damage of the load cell in removing it.

Example of the load cell installation Adhesive used

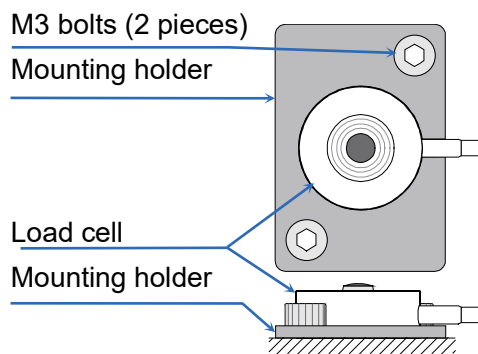
Paste the adhesive to the place contacting the fixed surface and outer circumference of the load cell.



Mounting holder used

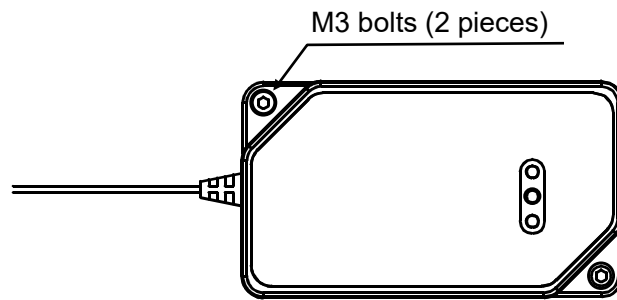
- Put the load cell into the mounting holder. Fix them.
- Note** M3 bolts are not included in accessories.

Example of the load cell installation Mounting holder used



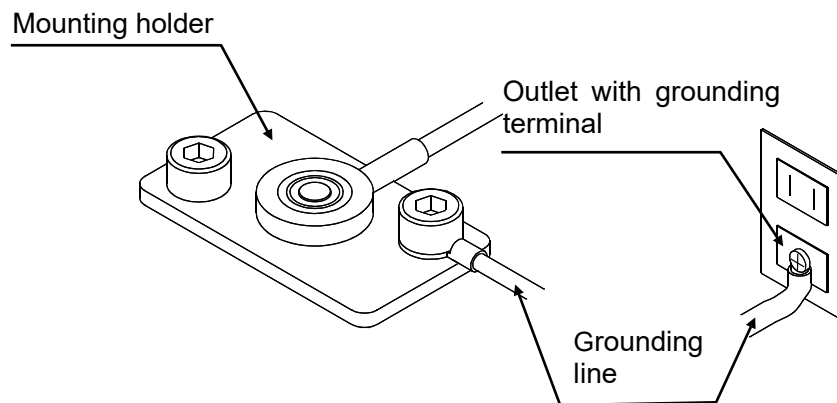
- When using the load cell by securing the plastic case, secure it as shown in the figure below using the two installation holes.

Note M3 bolts are not included in accessories.



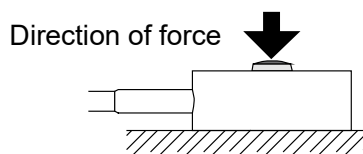
- Use the load cell with the load cell and computer at the same potential. Charging with the load cell may cause malfunctions. Specifically, take measures such as grounding the load cell.

Grounding example



5.2. LOADING TO THE LOAD CELL

- Load a vertical load to the load cell indicated in the figure below. Avoid eccentric load, horizontal force and moment.



- Apply load to the load cell through a rigid surface.

5.3. CAUTIONS

- Avoid a shock and excessive force to the load cell.
- Keep a constant temperature using insulation, when the load cell is installed in a place exposed to direct sunlight or radiant heat.
- Handle the load cell cable gently. Do not pull it when using the load cell.
- Prevent the plastic case from getting wet.
- Only the provided USB cable should be used with this load cell. Using a USB cable other than the provided USB cable may prevent the load cell from making proper measurement due to the effect of noise.

6. CONNECTING TO THE COMPUTER

6.1. OPERATION PROCEDURE

- 1) Connect the device to the computer using the provided USB cable.
- 2) Select the Device Manager on the computer.
- 3) Click the "Ports (COM & LPT)".
- 4) Confirm the COM Port number displayed. The numerical value indicated by x in "USB Serial Port (COM x)" indicates the COM Port number.

If multiple load cells are simultaneously connected to the computer without confirming the COM Port number, COM Port identification becomes difficult. Confirm the COM Port number one by one beforehand when connecting.

6.2. IF THE DRIVER CANNOT BE INSTALLED SUCCESSFULLY

By connecting the load cell to the computer, the driver installation is automatically installed over a period of a few minutes, and then the COM port number is displayed. If the COM port number is not refreshed even after some time has passed, that may indicate a failure in installing the driver. If such an error occurs, refer to the website of Future Technology Devices International. Ltd. to install the driver.

6.3. CHANGING THE COMMUNICATION LATENCY TIMER

The LCCU21 series are capable of sampling at a rate of 100 times/s (10ms period). When the communication latency timer is set above 10ms, a communication delay may occur. To avoid this, set the communication latency timer as follows. The system may be unstable depending on the PC environment. In that case, change the setting to the previous one.

- 1) As is done in "6.1 OPERATION PROCEDURE", select the "USB Serial Port (COM x)" in the "Device Manager" and open the "Properties".
- 2) Select the "Port Settings" tab and then select the "Advanced".
- 3) Set the Latency Timer (msec) in the "BM Options" under 10 (recommended value is 3).

7. COMMANDS LIST

7.1. READING COMMANDS

| Items | Host side transmission command | LCCU21 side response command |
|--|--------------------------------|--|
| Floating point type measurement value reading | RFMV<CR><LF> | RFMVXXXXXXXX<CR><LF> (XXXXXXXX is the floating point type measurement value (HEX)) Response example: When measurement value is 100N RFMV42C80000<CR><LF> (42C80000=100 (Decimal digit)) |
| Floating point type measurement value sequential reading | RCFM<CR><LF> | RCFMXXXXXXXX<CR><LF> (XXXXXXXX is the floating point type measurement value (HEX)) - Keep outputting until the sequential reading stops or the power is turned off. - Only the stop sequential reading command can be received while outputting. - Output rate is confirmed by the number of output updates. Response example: When measurement value is 100N RCFM42C80000<CR><LF> (42C80000=100 (Decimal digit)) |
| Floating point type section peak reading | RFPK<CR><LF> | RFPKXXXXXXXX<CR><LF> (XXXXXXXX is the floating point type section peak value (HEX)) *4 Response example: When section peak value is 100N RFPK42C80000<CR><LF> (42C80000=100 (Decimal digit)) |
| Floating point type section bottom reading | RFBT<CR><LF> | RFBTXXXXXXXX <CR><LF> (XXXXXXXX is the floating point type section bottom value (HEX)) *5 Response example: When section bottom value is 100N RFBT42C80000<CR><LF> (42C80000=100(Decimal digit)) |
| Fixed point type measurement value reading | RLMV<CR><LF> | US,XXXXXXXXXX□□N<CR><LF> (XXXXXXXXXX is the fixed point type measurement value (DEC), and □ is a space (0x20)) Response example: *6 When measurement value is 100N US,+0100.000□□N<CR><LF> |

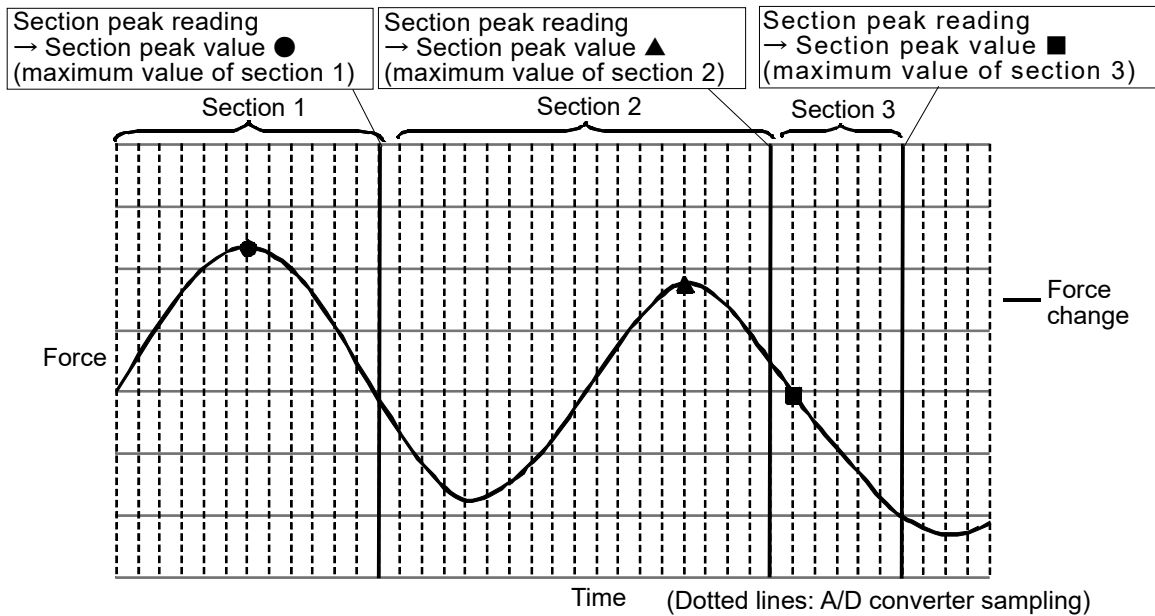
| Items | Host side transmission command | LCCU21 side response command |
|---|--------------------------------|--|
| Fixed point type measurement value sequential reading | RCLM<CR><LF> | US,XXXXXXXXXX□□N<CR><LF> (XXXXXXXXXX is the fixed point type measurement value(DEC), and □ is a space (0x20)) - Keep outputting until the sequential reading stops or the power is turned off. - Only the stop sequential reading command can be received while outputting. - Output rate is confirmed by the number of output updates. Response example: *6 When measurement value is 100N US,+0100.000□□N<CR><LF> |
| Fixed point type section peak reading | RLPK<CR><LF> | US,XXXXXXXXXX□□N<CR><LF> (XXXXXXXXXX is the fixed point type section peak value (DEC), and □ is a space (0x20)) *4 Response example: *6 When section peak value is 100N US,+0100.000□□N<CR><LF> |
| Fixed point type section bottom reading | RLBT<CR><LF> | US,XXXXXXXXXX□□N<CR><LF> (XXXXXXXXXX is the fixed point type section bottom value (DEC), and □ is a space (0x20)) *5 Response example: *6 When section bottom value is 100N US,+0100.000□□N<CR><LF> |
| Digital filter setting reading | RDGF<CR><LF> | RDGFXX<CR><LF> (XX is the setting value of the digital filter) - Relationship between setting value and cutoff frequency Setting value: cutoff frequency 00: None 01: 11.0 Hz 02: 8.0 Hz 03: 5.6 Hz 04: 4.0 Hz 05: 2.8 Hz 06: 2.0 Hz 07: 1.4 Hz 08: 1.0 Hz (Default value) 09: 0.7 Hz Response example: When setting value is 1.0 Hz RDGF08<CR><LF> |
| Number of output updates setting reading | RSMR<CR><LF> | RSMRXX<CR><LF> (XX is the setting value of the number of output updates) - Relationship between setting value and number of output updates Setting value: Number of output updates 01: 1 time/s 02: 10 times/s (Default value) 03: 50 times/s 04: 100 times/s Response example: When setting value is 10 times/s RSMR02<CR><LF> |

| Items | Host side transmission command | LCCU21 side response command |
|--------------------------|--------------------------------|---|
| Model name reading | RMOD<CR><LF> | RMODXXXXXXXXXXXXXXXXXX<CR><LF> (XXXXXXXXXXXXXXXXXX is the model name) Response example: Model name is LCCU21N100 RMODLCCU21N100□□□□□<CR><LF> □ is a space (0x20) |
| Rated capacity reading | RRAC<CR><LF> | RRACXXXXX<CR><LF> (XXXXXX is the rated capacity) Response example: Rated capacity is 100N RRAC000100<CR><LF> |
| Serial number reading | RSER<CR><LF> | RSERXXXXXXXXX<CR><LF> (XXXXXXXXXX is the serial number) Response example: Serial number is 6A7300000 RSER6A7300000<CR><LF> |
| Software version reading | RVER<CR><LF> | RVERXXX<CR><LF> (XXX is the software version) Response example: Software version is 100 RVER100<CR><LF> |

*4 About the section peak value

This is the maximum value of A/D converter sampling at a section between receiving the prior and next section peak reading commands. (The first time when turning the power on, a section from turning on the power to receiving the section peak reading command)

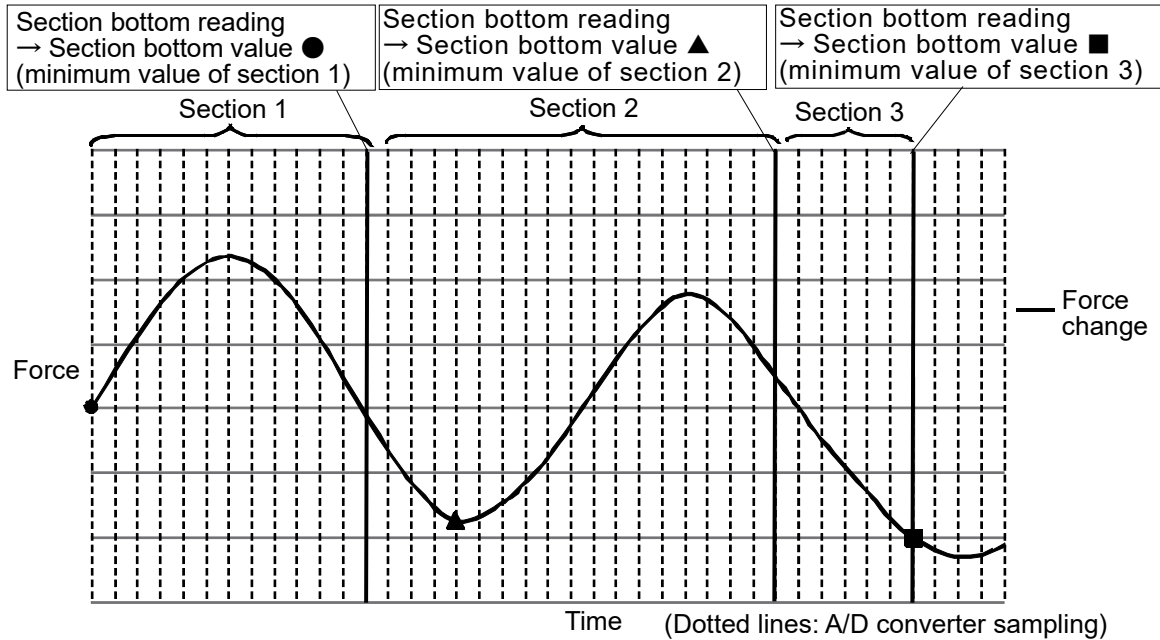
Example) Section peak reading



*5 About the section bottom value

This is the minimum value of A/D converter sampling at a section between receiving the prior and next section bottom reading commands. (The first time when turning the power on, a section from turning on the power to receiving the section bottom reading command)

Example) Section bottom reading



*6 Response of the fixed point type reading

Digit number of the decimal point is different depending on the rated capacity.

- When the rated capacity is 100N, 200N, or 500N, the number of the decimal point is 3 digits.

Response example:

When measurement value is 100N

US,+0100.000□□N<CR><LF>

- When the rated capacity is 1kN, the number of the decimal point is 2 digits.

Response example:

When measurement value is 100N

US,+00100.00□□N<CR><LF>

7.2. SETTING COMMANDS

| Items | Host side transmission command | LCCU21 side response command |
|---|--|--|
| Digital filter setting | SDGF \underline{XX} <CR><LF> (Write a setting value in \underline{XX}) - Relationship between setting value and cutoff frequency Setting value: cutoff frequency 00: None 01: 11.0 Hz 02: 8.0 Hz 03: 5.6 Hz 04: 4.0 Hz 05: 2.8 Hz 06: 2.0 Hz 07: 1.4 Hz 08: 1.0 Hz (Default value) 09: 0.7 Hz Transmission example: When setting value is 1.0 Hz SDGF08<CR><LF> | SDGF \underline{XX} <CR><LF> (\underline{XX} is the setting value) |
| Number of output updates setting | SSMR \underline{XX} <CR><LF> (Write a setting value in \underline{XX}) - Relationship between setting value and number of output updates Setting value: number of output updates 01: 1 time/s 02: 10 times/s (Default value) 03: 50 times/s 04: 100 times/s Transmission example: When setting value is 10 times/s SSMR02<CR><LF> | SSMR \underline{XX} <CR><LF> (\underline{XX} is the setting value) |
| Stop sequential reading (For stopping the output of floating point type measurement value sequential reading or fixed point type measurement value sequential reading) | STOP<CR><LF> | STOP<CR><LF> |

7.3. RESPONSE WHEN COMMAND ERROR OCCURS

| Items | LCCU21 side response command |
|---------------------|------------------------------|
| Format error | ? <CR><LF> |
| Setting value error | V<CR><LF> |

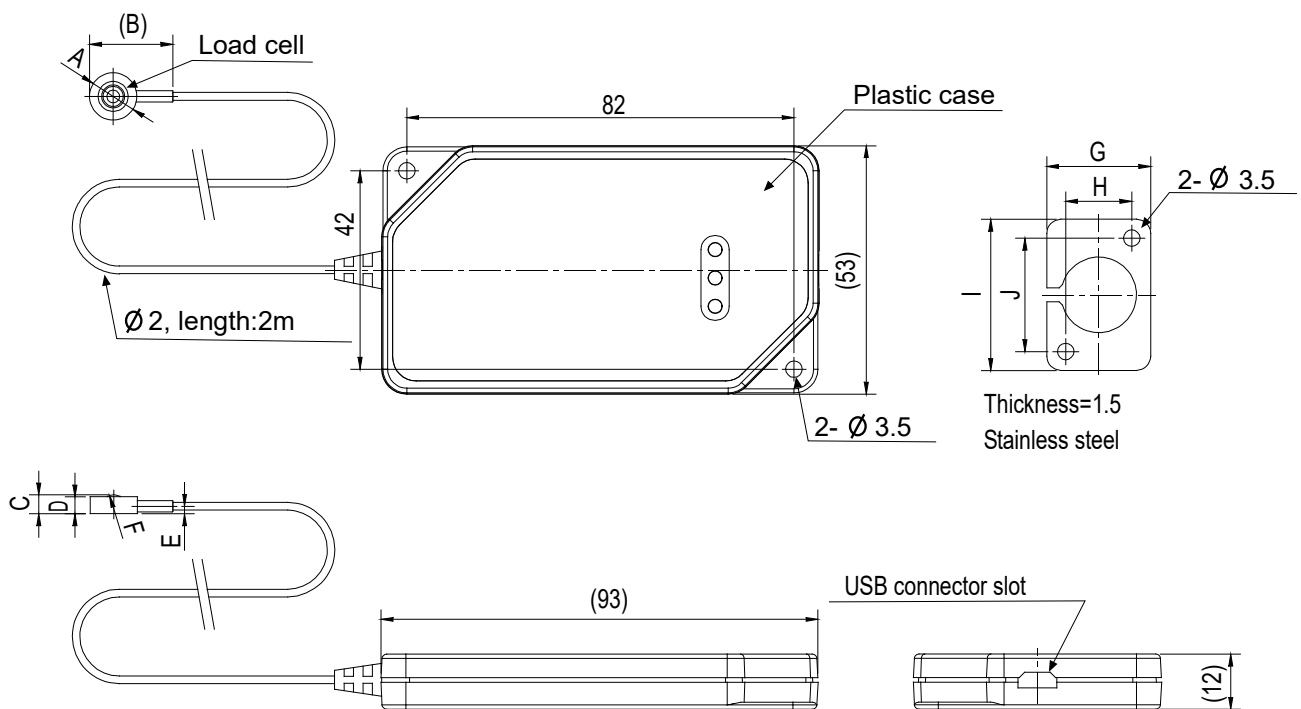
8. LED DISPLAY

Orange·····TX (sending), Yellow·····RX (receiving), Blue·····Power (power supply)

9. MAINTENANCE

- Remove all dirt and dust from the load cell, and always use it in a clean environment.
- When cleaning, use an air blower.

10. DIMENSION



Unit : mm

| Model No. | A | B | C | D | E | F | G | H | I | J |
|-------------|------|----|---|-----|-----|-----|----|----|----|----|
| LCCU21N100 | φ 10 | 18 | 4 | 3.6 | 1.6 | SR3 | 16 | 8 | 28 | 20 |
| LCCU21N200 | | | | | | | | | | |
| LCCU21N500 | φ 16 | 24 | 7 | 6 | 3 | SR6 | 22 | 14 | 32 | 24 |
| LCCU21KN001 | | | | | | | | | | |

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