SONY ®

Counter Unit
LY51-T10

Read all the instructions in the manual carefully before use and strictly follow them.
Keep the manual for future references.

Instruction Manual

This counter unit adds changes to the operating software for the standard LY51.
As a result, the only possible operating procedures are described starting on the next page.
Please also take note of the precautions below.

The modification is in the software only. All other components are identical to the standard product. For components other than the modified software, please refer to the instruction manual for the supplied standard component.

Precautions

① **Installing the LZ51-KT03 (Required)**
To use the counter unit, the special specification LZ51-KT03 must be installed.
The counter unit will not work properly unless the LZ51-KT03 is installed.
This instruction manual describes operation when the LZ51-KT03 is installed.
Therefore, operation of the LZ51-KT03 is also included in the descriptions in this manual.

② **Usage of other expansion units is prohibited**
Installation of standard expansion units (LZ51-*) is prohibited.
If one of these is installed, the counter unit may not work or may malfunction.

③ **Measuring unit input resolution setting**
There is no automatic setting function for automatic identification and input resolution of the measuring unit in the standard LY51.
When replacing the measuring unit, be sure to always check the input resolution setting and use it at the correct resolution.

Checking the initial setting parameters

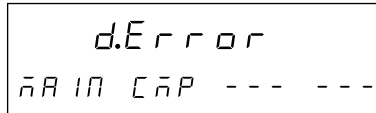1. **Turn on the power while holding down the RESET key (RESET).**

   Main display

   Sub-display | 冚A IΠ ⳍП⌐P --- ---
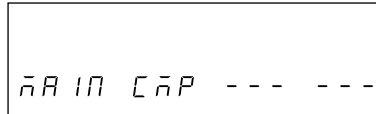
   When the power is turned on for the first time, or if a storage data error occurs:

   Main display | d.Error

   Sub-display | 冚A IΠ ⳍП⌐P --- ---

Checking the LY51 unit parameters

2. **Press ENTER while "MAIN" is flashing.**

   Main display | Π.SE771⳥

   Sub-display | AU7O 冚AΠUAL ⳝE⌐
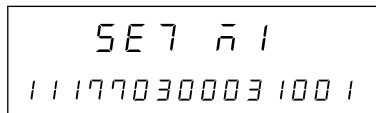
3. **Press ENTER while "AUTO" is flashing.**

   Check that the parameter settings are correct.
   If any of them are wrong, use the cursor movement keys ◁ ▷ to move to the digit, and then use the – + keys to change the number.

   Main display | SE7 Π l

   Sub-display | l l l770⌐3000⌐3 l00 l

   2 l l770⌐3000⌐3 l00 l

   - Displayed when power is on (2: 2-count display) (Fixed value)
   - Input scale (1: 1 axis)
   - Main display (1: 1st axis)
   - Sub-display (77: Comparator judgement display)
   - 1st axis input resolution (Change these settings according to the input scale resolution.)
   - 2nd axis input resolution (not used)
   - 1st axis display resolution (Change if necessary.)
   - 1st axis display polarity (1: +, 2: −) (Change if necessary.)
   - 2nd axis display resolution (Not used)
   - 2nd axis display polarity (Not used)
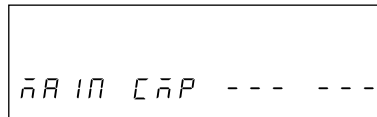
   Input resolution/Display resolution

03: 0.0005 mm
04: 0.001 mm
05: 0.002 mm
06: 0.005 mm
07: 0.01 mm
08: 0.02 mm

   After checking all items, press ENTER .

4. **This completes checking of the LY51 unit parameters.**

Main display

Sub-display

| ﾊA Iﾊ CﾊP --- --- |

Checking the LZ51-K parameters

5. **Press [ENTER] while "CMP" is flashing.**

   (Use the cursor movement keys [◁] [▷] to move there.)

   Main display

   | C.SE77IC |

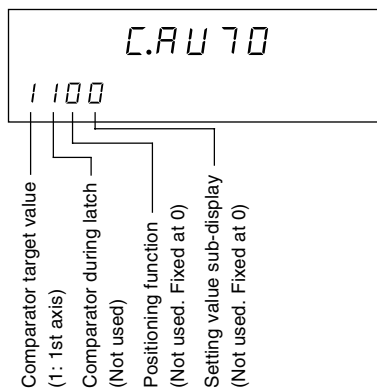   Sub-display

   | AU7O ﾊAﾊUAL ﾚEr |

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6. **Press [ENTER] while "AUTO" is flashing.**

   Check that the parameter settings are correct.
   If any of them are wrong, use the cursor movement keys [◁] [▷] to move to the digit, and then use the [–] [+] keys to change the number. (Note the item in bold face.)

   After checking all items, press [ENTER].

   Main display

   | C.AU7O |

   Sub-display

   | 1 100 |

   - Comparator target value (1: 1st axis)
   - Comparator during latch (Not used)
   - Positioning function (Not used. Fixed at 0)
   - Setting value sub-display (Not used. Fixed at 0)

---

7. **This completes checking of the LZ51-K parameters.**

   Either turn off the power, or press the RESET key ([RESET]) to start measurement.

   Main display

   Sub-display

   | ﾊA Iﾊ CﾊP --- --- |
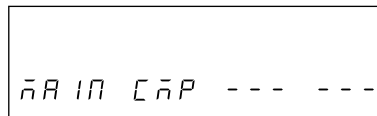
Entering the master value and other settings

1. **Turn on the power while holding down the RESET key ([RESET]), and then press the RESET key ([RESET]).**

   (At first, *no dAtA* is displayed because no values are entered. When a value is entered, the judgement display is shown.)

   Main display   `0.0000`
   Sub-display   `02 __no_dAtA___`

Entering the master value

2. **Press [F] .**

   Main display   `FUNC`
   Sub-display   `MASTEr COMP End`

3. **Press [ENTER] when "MASTEr" is flashing.**

   Enter the master value.
   Use the cursor movement keys [◁] [▷] to move to the digit, and then use the [−] [+] keys to change the number.

   Main display   `MASTEr`
   Sub-display   `M= 000.0000`

4. **After entering the value, press [ENTER] .**

   This returns to the display before the master value input operation.

   Main display   `0.0000`
   Sub-display   `___no_dAtA_____`

Entering sets of setting values including sub-master and other values

5. **Press [F] when the count display is shown.**

   Main display   `FUNC`
   Sub-display   `MASTEr COMP End`

6. **Press [ENTER] while "COMP" is flashing.**

   The setting menu is shown.
   From the left:

   SEL .... Select the set number to be entered.
   INP .... Enter the setting value.
   CHK ...... Check the setting value that was entered.
   End ...... This exits the menu and returns to the original display.

   The set number is shown in the main display.
   The [−] [+] keys can be used to change the set number.

   Main display   `SET C02`
   Sub-display   `SEL INP CHK End`

Entering the set number selection

7. **Press** ⏎ **while "SEL" is flashing.**

    The set number is shown. Use the
    ⊟ ⊞ keys to change the number.

    Main display

    Sub-display

    ```
    5E7  CñP
    5E7 ñ0. = 0 1
    ```

8. **Press** ⏎ **.**

    This finalizes the set number.

    Main display

    Sub-display

    ```
    5E7  C0 1
    5EL  IñP CHᴉ End
    ```

Entering the sub-master value, difference value, and other values

9. **After setting the set numbers,**
   press ⏎ **while "INP" is flashing.**

    The set number is displayed at the right
    edge of the main display.
    The sub-display changes to the input
    display for the sub-master values.

    At first, no values are entered, and so
    an underline display appears. Once a
    value is entered, the value entered
    previously is shown.
    Use the cursor movement keys ◁ ▷
    to move to the digit, and then use the
    ⊟ ⊞ keys to change the number.
    Pressing the RESET key (RESET) erases
    the value and shows the underline
    display. Be careful since values entered
    later can also be erased. Other values
    are entered the same way.

    Main display

    Sub-display

    ```
    5E7  C0 1
    C 1= _ _ _ _ _ _ _ _  End
    ```

10. Finalize the value, and then press [ENTER] **.**

Main display | `5E7 [01`
Sub-display | `[2: _____ End`

(When a value has already been entered, to change the positive-side difference value only, select "End" and then press [ENTER] to complete the input operation. ⇨ Step 13
However, if a difference value is entered that is larger than the boundary value on the judgement display, it is entered as the boundary value.
⇨ Step 12)

Input is made for the judgement difference value for the negative side. At first, no values are entered, and so an underline display appears. Once a value is entered, the value entered previously is shown.
Use the cursor movement keys [◁] [▷] to move to the digit, and then use the [–] [+] keys to change the number.

For positive-side judgement values, be sure to enter with a + sign.
If a negative value or zero is entered, the entry is ignored, and the value is erased.

11. Finalize the value, and then press [ENTER] **.**

Main display | `5E7 [01`
Sub-display | `[3: _____ End`

(When a value has already been entered, to change the positive-side difference value only, select "End" and then press [ENTER] to complete the input operation. ⇨ Step 13
However, if a difference value is entered that is larger than the boundary value on the judgement display, it is entered as the boundary value.
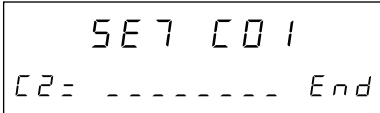⇨ Step 12)

Input is made for the judgement difference value for the negative side. At first, no values are entered, and so an underline display appears. Once a value is entered, the value entered previously is shown.
Use the cursor movement keys [◁] [▷] to move to the digit, and then use the [–] [+] keys to change the number.

For negative-side judgement values, be sure to enter with a − sign.
If a positive value or zero is entered, the entry is ignored, and the value is erased.

12. Finalize the value, and then press [ENTER] .

(When a value has already been entered, to change the negative-side difference value only, select "End" and then press [ENTER] to complete the input operation. ⇒ Step 13
However, if a difference value is entered that is larger than the boundary value on the judgement display, it is entered as the boundary value.
⇒ Continue with this step.)

Input is made for the boundary value (absolute value) of the judgement display.
At first, no values are entered, and so an underline display appears. Once a value is entered, the value entered previously is shown.
Use the cursor movement keys [◁] [▷] to move to the digit, and then use the [−] [+] keys to change the number.

For the boundary values, be sure to always enter positive values and values that are larger than the difference value. If a negative value or value smaller than the difference value is entered, the entry is ignored, and the value is erased.

Main display

Sub-display

```
    5E7 C0 1
C 4 _  _ _ _ _ _ _ _   End
```

13. Finalize the value, and then press [ENTER] .

This returns to the setting menu.

Main display

Sub-display

```
   5E7 CñP
5EL  IñP CHľ End
```

Entering the sub-master value, difference value, and other values

14. When entry of the setting values is complete, press ⏎ while "CHK" flashing.

The entered sub-master value is displayed.

Main display

Sub-display

```
    5E7  C0 1
C 1=    2 1.0000  End
```

15. Press ⊟ ⊞ or ◁ ▷.

The ⊟ ⊞ keys can be used to cycle through the values when checking.

+ : C 1→C2→C3→C4→C 1···

− : C 1→C4→C3→C2→C 1···

Use the ◁ ▷ keys to change the set number.

Main display

Sub-display

```
    5E7  C0 1
C2 =    0.1000  End
```

16. Press ⏎ .

This completes the check and returns to the menu display.

Main display

Sub-display

```
    5E7  C0 1
5EL  INP  CHK  End
```

17. Press the RESET key (RESET), or select "End" and then press ⏎ .

This returns to the count display.

Main display

Sub-display

```
    0.0000
```

7

Operating procedures

(1) Aligning the master when the power is turned on

When the power is turned on, the master alignment mode is always displayed first.
The counter unit cannot be used unless master alignment is performed. Be sure to always perform master alignment before usage.

1. Turn on the power, and then rotate the external rotary switch to select the first set group. This switches to master alignment mode.	Main display Sub-display	*5ONY* *01 PSH rEF=nAS7r*

2. Perform master alignment, and then press REF **.** This completes the master alignment, and the master value is displayed. The REF key can be pressed repeatedly. (If an error occurs, see the note "When an *Error* is displayed" below.)	Main display Sub-display	*20.0000* *01 nAS7Er SE7*

3. Rotate the external rotary switch, and then set the set number to a setting other than the first set to exit master alignment mode.	Main display Sub-display	*0.0000* *02*

Note: When an *Error* is displayed

When the power is turned on, the master alignment mode display is shown even if an error has occurred.
If the error status can be reset, master alignment is possible by following the procedure above by pressing REF .
If the error status cannot be reset, use the procedure shown below.

2. Perform master alignment, and then press REF **.** The error is not reset, and so the *Error* display is shown. Turn off the power, and check that the connected measuring unit is operating properly.	Main display Sub-display	*Error* *01 nAS7Er SE7*

(2) Master alignment during operation

The procedure below can be used to perform master alignment again when operation is in progress. Because master alignment is necessary when an $Error$ is displayed during operation, use the procedure below. (This is identical to the above note when the error status is not reset.)

1. **Rotate the external rotary switch to select the first set group.**

   This sets to master alignment mode.

   Main display   `0.0000`

   Sub-display   `01  MASTEr  SET`

2. **Perform master alignment, and then press** `REF`**.**

   This completes the master alignment, and the master value is displayed.
   The `REF` key can be pressed repeatedly.

   Main display   `20.0000`

   Sub-display   `01  MASTEr  SET`

3. **Rotate the external rotary switch, and then set the set number to a setting other than the first set to exit master alignment mode.**

   Main display   `0.0000`

   Sub-display   `02`

(3) Measurement judgement operation

---

4. Rotate the external rotary switch.

The judgement operation starts based on the numerical values that were set for each set. The set number is displayed at the left edge.

The result obtained by subtracting the sub-master value is shown in the main display.

When the numerical value in the main display is less than "sub-master value − boundary value":

Main display

Sub-display

```
 -2.0 125

02
```

When the numerical value in the main display is less than "sub-master value + negative-side difference value":

Main display

Sub-display

```
 -0.5 100

02  --  No  Good  --
```

When the numerical value in the main display is less than "sub-master value + positive-side difference value":

Main display

Sub-display

```
  0.0 100

02  ---  Good  ---
```

When the numerical value in the main display is less than "sub-master value + boundary value":

Main display

Sub-display

```
  0.5050

02  --  No  Good  --
```

When the numerical value in the main display is greater than "sub-master value + boundary value":

Main display

Sub-display

```
  3.5050

02
```

Supplementary Document 1

1. Model name

LY51-T10

2. Overview

The counter unit LY51 was designed to incorporate many types of I/O expansion units for enabling in-line measurement, desktop measurement, and a wide range of different measurements and control.

Operation is possible by installing only the necessary expansion units for meeting the requirements of a wide range of measurement sites at a minimum of labor and cost. Even if the measurement environment is changed, expansion units can be added later for incorporating new functions as needed.

2-1. Modifications and usage precautions

This model is a special function model for Toyota Motor Corporation that adds the modifications below to the standard LY51. As a result, please be aware some of the standard functions are limited, and it differs from the standard product.

| Modifications |

① Used in combination with the expansion unit LZ51-KT03
  Basically, this unit is used by installing the expansion unit LZ51-KT03 for Toyota Motor Corporation. If the LZ51-KT03 is not installed, some special functions for this counter unit will not work.

② No master value saving function or preset function
  The preset function in the standard LY51 is not included. The master value is saved in the storage memory for the preset function. The master value is entered in the same way as the preset values. The master value is called "M0" below.

③ Master alignment operation (operation is possible only when "set number = 1st set")
  Master alignment can be performed when the power is turned on and during operation. For the specific operation, refer to the operation description appearing later. This section describes calculation of the measurement values performed by the master alignment operation.

  When the master is measured, and the REF key is pressed, the master alignment is performed, and the measurement value (=current value) in the counter unit becomes "M0". When this happens, the main display also shows the master value "M0".
  During master alignment, the LZ51-KT03 comparator function does not work.

  Example: When M0 = 20, master alignment performs the operations below.
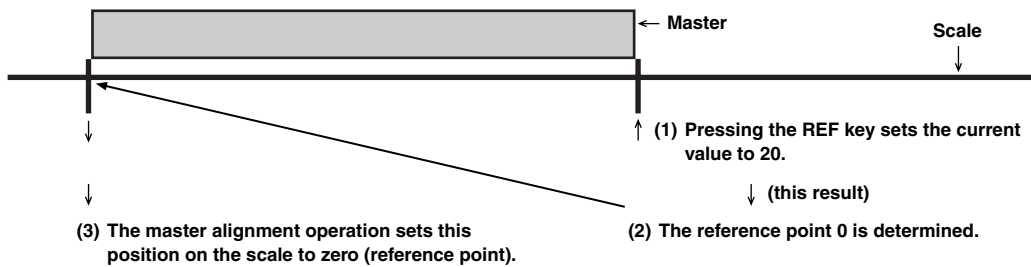
④ Measurement mode main display
  The difference between the sub-master value stored in the LZ51-KT03 and the current value is shown in the main display. The reference point position (zero) is determined precisely for the current value after master alignment in the previous step ③ is completed. Therefore, using Mn as the sub-master value (n: set number from 1 to 16),

  Main display = $S_n - M_n$ (S_n: Length of the measured object based on the sub-master M_n)

  In other words, even if there is no sub-master M_n, the same result is obtained as for measurement after master alignment is performed with the sub-master.

  Example: For sub-master $M_n = 21$, if the measured object $S_n = 21.1$,

  Main display = $21.1 - 21 = 0.1$

  However, if the LZ51-KT03 unit is not installed, the sub-master value M_n is unknown, and the measured value is displayed without conversion ("21.1" in this example).

⑤ Sub-display during measurement mode
The sub-display during measurement mode is controlled by the LZ51-KT03.
Because it is outside the control scope of this counter unit, please refer to the LZ51-KT03 specifications for further details.

Notes

⑥ Usage of standard expansion units is prohibited
Because the functions of this unit were modified for the special expansion unit LZ51-KT03, it is not compatible with some operations of standard expansion units. Therefore, operation is not guaranteed when these units are installed. Malfunctions can occur.

⑦ No zero point function
This key operation is used for master alignment as described in ③ above, and so the zero point function cannot be used.

⑧ Modified reset function
The reset key can only be used to cancel error displays. The standard reset key function where the display is cleared to zero is not available.

⑨ No automatic setting of scale unit input resolution
The input resolution is not set automatically if the scale type is changed. Therefore, when the scale type is changed, be sure to reset the input resolution before using.

⑩ Fixed values for some initial setting parameters
Some of the initial setting parameters have fixed values. Please be aware that these cannot be changed. Also, all of the parameters in the second screen have fixed values, and so they are not displayed. The parameters that are set at factory shipping are shown below.

• Factory shipping settings
In the display of the shipping settings, Main = 1st axis current value, Sub-display = comparator judgement result (both right and left). Also, input axis = 1st axis only (Please be aware that even if a 2nd axis measuring unit is added, automatic setting of the input resolution is not performed.)
The codes for the shipping settings are shown below.

1st screen

2	Display at power on	: Count display (fixed value)
1	Input axis/Addition axis	: 1 axis only
1	Main display	: 1st axis current value
7	Sub-display left	: Comparator judgement result (fixed value)
7	Sub-display right	: Comparator judgement result (fixed value)
XX ...	1st axis input resolution	: Varies depending on scale type. (Please make this setting before using.)
00	2nd axis input resolution	: None
XX ...	1st axis display resolution	: Same as the 1st axis input resolution. (Please make this setting before using.)
1	1st axis display polarity	: + (positive)
00	2nd axis display resolution	: None
1	2nd axis display polarity	: + (positive) Disabled since there is no display resolution.

2nd screen (This is not displayed.)

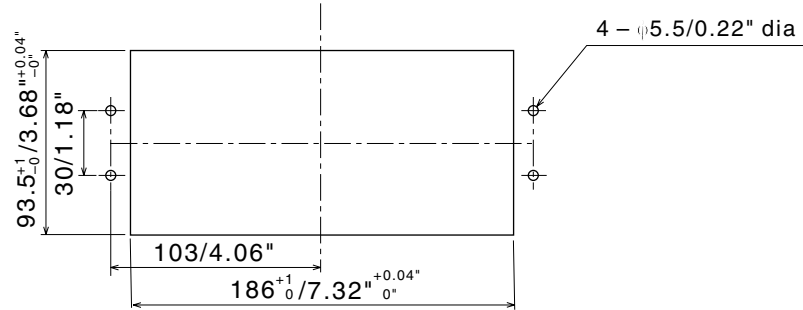| 0	1st axis linear compensation	: None (fixed value)
0	2nd axis linear compensation	: None (fixed value)
1	General-purpose input	: Restart (fixed value)
1	General-purpose output 1	: Display mode (fixed value)
2	General-purpose output 2	: Alarm (fixed value)
2	Key lock	: None (fixed value)
2	Saving of the current value	: None (fixed value)
1	A/B output signal	: 1st axis A/B signal (Enabled when the LZ51-H is added. Fixed value)

3. Panel mounting

(Unit: mm/inch)

220/8.66"
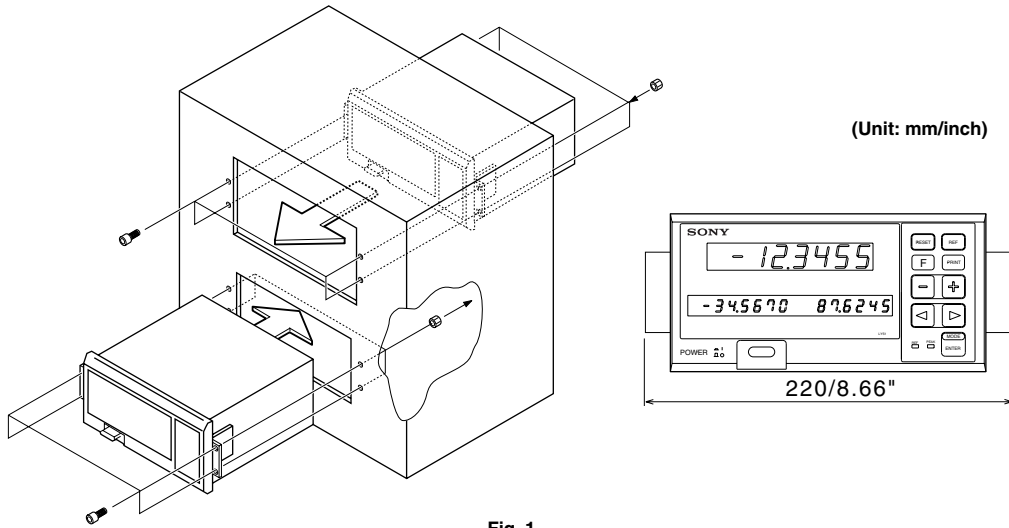
Fig. 1

Panel cut-out diagram

[Mounting the display unit from the panel front]

4 − φ5.5/0.22" dia

$93.5^{+1}_{0}/3.68"^{+0.04"}_{-0"}$

30/1.18"

103/4.06"

$186^{+1}_{0}/7.32"^{+0.04"}_{0"}$

[Mounting the display unit from the panel rear]

4 − φ5.5/0.22" dia

$97^{+1}_{0}/3.82"^{+0.04"}_{0"}$

30/1.18"

103/4.06"

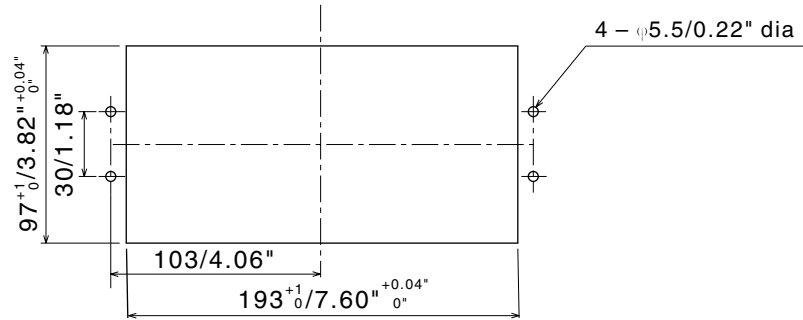$193^{+1}_{0}/7.60"^{+0.04"}_{0"}$

Fig. 2

Supplementary Document 2

1. Model name
LZ51-KT03

2. Overview
This expansion unit is a function expansion unit for the counter unit LY51-T10.
In addition to the current value, the maximum value, minimum value, and P-P value can be used as judgement data in the comparator function. The judged results are output by the open collector, and this enables control by a sequencer or other device.

2-1. Modifications and usage precautions
This model is a special function model for Toyota Motor Corporation that adds the modifications below to the standard LZ51-K. As a result, please be aware some of the standard functions are limited, and it differs from the standard product.

$\boxed{\text{Modifications}}$

① Used in combination with the LY51-T10
Basically, this unit is used by installing in the expansion unit LY51-T10 for Toyota Motor Corporation. If it is installed in a unit other than the LY51-T10, some special functions for this expansion unit will not work.

② Modified setting value input
Entry of the four comparator setting values for each set held by the standard LZ51-K is not possible. Instead of the setting values, the values below are entered. The procedures for entering and checking the values are identical to the standard product.

Setting value 1 $\rightarrow$ Sub-master value Mn (n = 1 to 16: Set number)
Setting value 2 $\rightarrow$ Difference value P(+)n
Setting value 3 $\rightarrow$ Difference value P(−)n
Setting value 4 $\rightarrow$ Boundary value (absolute value) Kn

The correspondence between the standard settings values and the above values is as shown below.

Setting value 1 $=$ Mn − Kn
Setting value 2 $=$ Mn + P(−)n
Setting value 3 $=$ Mn + P(+)n
Setting value 4 $=$ Mn + Kn

Example: Mn = 21, P(+) = 0.3, P(−) = −0.3, Kn = | 0.6 |

Setting value 1 $=$ 21 − | 0.6 | = 20.4
Setting value 2 $=$ 21 + (−0.3) = 20.7
Setting value 3 $=$ 21 + (+0.3) = 21.3
Setting value 4 $=$ 21 + | 0.6 | = 21.6

For the input operation for these setting values and other entries, see the LY51-T10 specifications.

③ Comparator judgement process and display
Based on ② above, the comparator judgement process operation is performed, but some of the judgement operations are modified. For a measurement value Sn, we obtain the values below.

Measurement value Sn < Setting value 1 : Judgement operation stop, Sub-display = Blank

Setting value 1 $\leqq$ Measurement value Sn < Setting value 2 : Judgement operation execution, Sub-display = -- *No Good* --

Setting value 2 $\leqq$ Measurement value Sn < Setting value 3 : Judgement operation execution, Sub-display = --- *Good* ---

Setting value 3 $\leqq$ Measurement value Sn < Setting value 4 : Judgement operation execution, Sub-display = -- *No Good* --

Setting value 4 $\leqq$ Measurement value Sn : Judgement operation stop, Sub-display = Blank

The currently-selected set number is displayed at the left edge.
The main display displays the difference value at the LY51-T10 unit side. For details, refer to the LY51-T10 specifications.
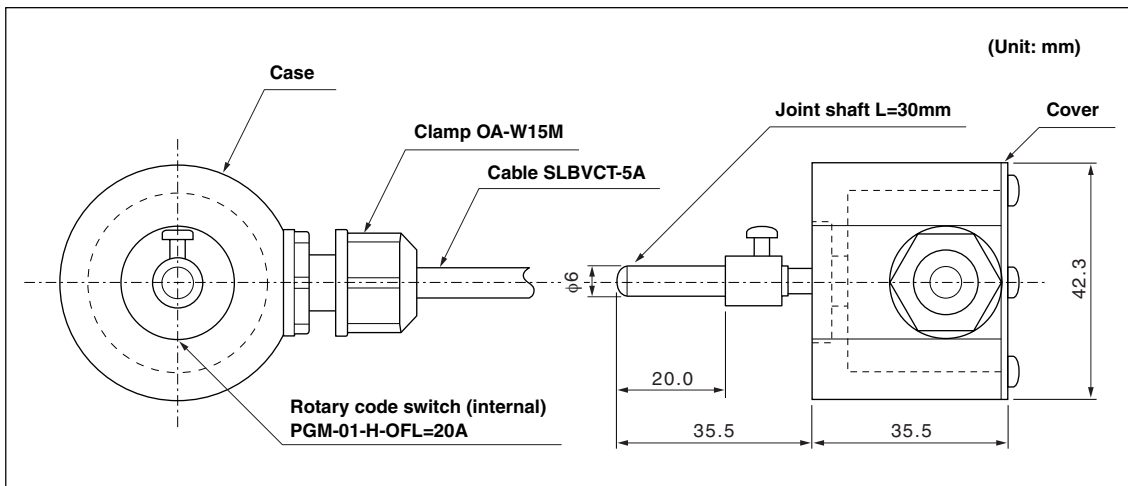
④ Measurement mode/Master alignment mode display

The main display is shown at the LY51-T10 side, but the sub-display varies depending on the mode. During measurement mode, the display shown in ③ above is shown. During master alignment mode, nothing is displayed. (The sub-display is used at the LY51-T10 side.)

Master alignment can be performed when set number = 1st set.

For details, refer to the LY51-T10 specifications.

⑤ The displayed characters change as shown in ③ above. As a result, the fourth item of the initial settings and the sub-display function of the setting values are disabled.

- Factory shipping settings

  The codes for the shipping settings are shown below.

  1 .... Comparator target value   : 1st axis current value (Disabled even if other selections are made.)
  1 .... Comparator during latch   : Latch data
  0 .... Positioning function   : None
  0 .... Setting value sub-display : None (However, disabled even if setting is made.)

LY51-T10 Comparator Selector Unit
Model Name: LYTA-51

(Unit: mm)

Case

Clamp OA-W15M

Cable SLBVCT-5A

Joint shaft L=30mm

Cover

φ6

42.3

20.0

35.5

35.5

Rotary code switch (internal)
PGM-01-H-OFL=20A

LY51-T10
CZ-T09