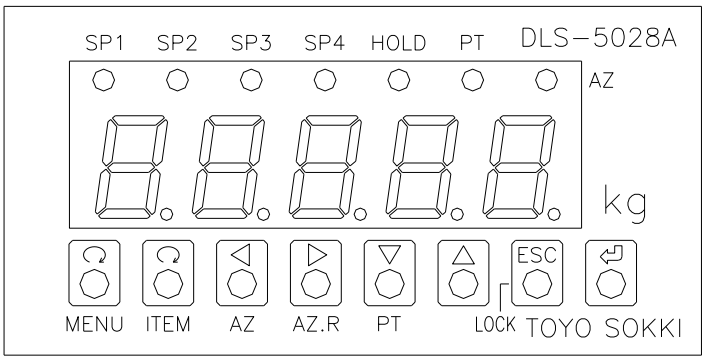
DIGITAL INDICATOR

MODEL D L S – 5 0 2 8 A

OPERATION MANUAL



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This document is translated from MA4-187-R3 (Japanese)

§1. Safety Notice

Please read this manual carefully to ensure the safety use of this unit.
Precautions in this chapter help to prevent any injury or damage to the user and other personnel, so please read the following precautions carefully.

Precaution on general

⚠ WARNING

① Do not disassemble or modify this unit. Which may cause fire, injury, electric shock, malfunction, etc.
② Keep liquids away from this unit. Otherwise, it may cause overheating, electric shock, malfunction, etc.
③ Use a specified power supply. Using an improper power supply may cause overheating, fire, malfunction, etc.

Precaution on wiring

⚠ CAUTION

① Turn power OFF of this unit before wiring.
② Wire to the terminal correctly and firmly.

Precaution on installation

⚠ CAUTION

Do not install this unit to the following places.
① Place where exists direct sunlight.
② Place where exists condensation.
③ Place where exists exceeded temperature or humidity of specified value.
④ Place where exists much dust.
⑤ Place where exists inflammable gas or inflammable steam.
⑥ Place where exists an extensive vibration or impact.
⑦ Place where exists strong electromagnetic fields.
⑧ Place where exists other expected hazards

Warranty
This unit is covered by one year warranty from original delivery date against design and manufactural failure under normal and safe use of this unit.
Any repair or exchange has to be paid even during warranty period if the following cases is applied.

- Failure due to wrong usage, disassembly, improper power supply, accident or acts of God.
- Failure due to services or repair by a person other than TOYO staff.

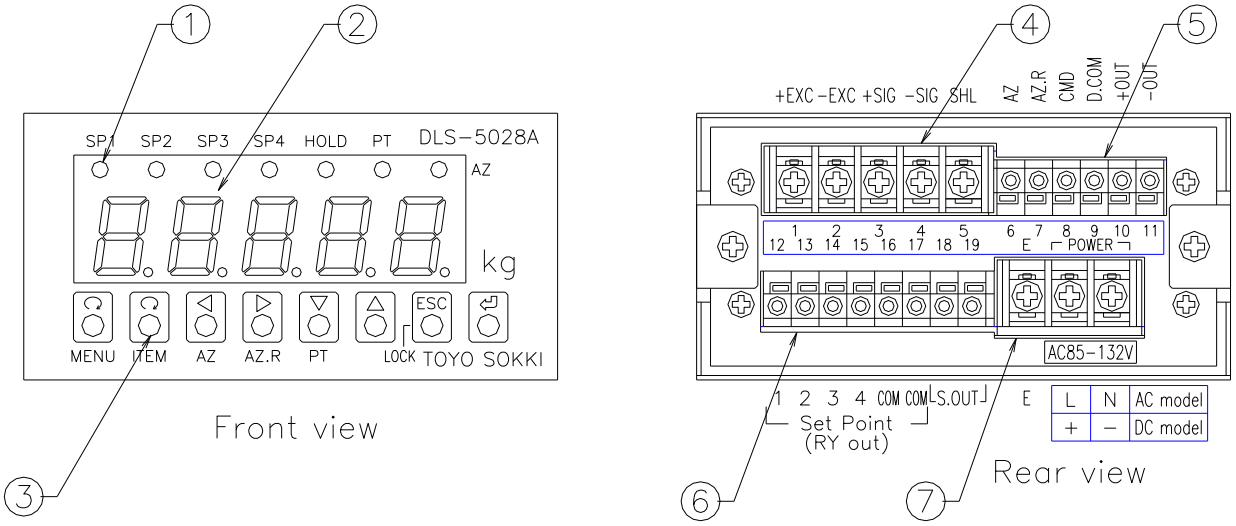
Warranty does not cover an equipment connected to this unit. We are exempted from failure of the connected equipment.

§2. Summary

The model DLS-5028A is a digital indicator equipped with Auto Zero (AZ), Zero Tracking (ZT), comparator function etc. which is designed specifically for strain gage type transducers and is most suitable for weighing systems using platform and tank/hopper scales.
The comparator has 4 channels, with fall corrections and has selection of both high and low limit operations. Setting values can easily be done by a button operation.
This model is equipped with a current loop output which able to connect TOYO's peripheral equipment. Furthermore, it is able to output RS-232C serial data as option when specified at the time of order.
An isolated current or voltage output which converted from analog signal is optionally available when specified at the time of order.
Power supplied voltage is AC85 to 132V (standard) or DC20 to 27V (option).

§3. Appearance and Each part name

Appearance of the unit



①	Status LEDs	SP1 to SP4	: Corresponding to comparator 1 to 4 Turn ON while each comparator is ON
		HOLD	: Turn ON while HOLD is in operation
		PT	: Turn ON while Preset Tare is in operation
		AZ	: Turn ON while Auto Zero is in operation
②	Measured value indicator	Display the measured value in Measuring Mode Display guide characters and setting value in Function Mode	
③	Button switch	8 button switches to set various functions [MENU↺],[ITEM↺],[AZ◁],[AZ.R▷],[PT▽],[△],[LOCKESC],[↵]	
④	Terminal block	7.62mm pitch screw terminals for Load Cell or a sensor	
⑤	Terminal block	5mm pitch screw-less terminals for external command input and optional output	
⑥	Terminal block	5mm pitch screw-less terminals for Relay output and current loop output	
⑦	Terminal block	7.62mm pitch screw terminals for power line	

§4. Operation

This digital indicator has the following three modes.

4 – 1) Measuring Mode

- The measured value is displayed on the measured value indicator.
- Press [ESC] button for 2 seconds to lock / unlock the buttons. Locking buttons helps to prevent wrong operation.
- Press [◁][AZ] button for 1 second to operate Auto Zero. Press [▷][AZ.R] button for 1 second to cancel Auto Zero. Status LED [AZ] is lighted up while in AZ operation.
- Press [▽][PT] button for 1 second to set the preset tare value.
  Press [◁][▷] button to select the digit and [△][▽] button to increase and decrease the value to set the preset tare value. Press [↵] button to memorize the value after indicating [SET]. Status LED [PT] is lighted up while the preset tare value is other than zero.

4 – 2) Function Mode

There are three classifications of Function Mode.

Comparator setting [c.SET]
- Press [MENU] button once in Measuring Mode to enter this mode.
- To set Quantitative value, Fall value and Hysteresis value of comparator.
- Press [ITEM] button to display setting item and value in turn to confirm and modify.
- Press [◁][▷] button to select the digit and [△][▽] button to increase and decrease the value.
- Press [↵] button to memorize the value after indicating [SET].

Function setting [Func]
- Press [MENU] button twice in Measuring Mode to enter this mode.
- To set Comparator judgement, Analog output conditions, External command input, shift to Test Mode.
- Press [ITEM] button to display setting item and value in turn to confirm and modify.
- To enter Test Mode, press [▷] button to let [TEST] blinking and press [↵] button 3 times.

Calibration setting [CAL]
- Press [MENU] button 3 times in Measuring Mode to enter this mode.
- To calibrate and set Calibration conditions, Digital Filter, Zero Tracking, etc.
- Press [ITEM] button to display setting item and value in turn to confirm and modify.
- Unlock calibration-lock before calibration. Display [Loc] and disable to calibrate span amount if calibration is locked.

4 – 3) Test Mode

- Turn power ON while pressing [↵] button or press [↵] button 3 times within 3 seconds right after powered ON. Also possible to enter in Function Mode.
- To check whether hardware of this unit is operated normally and correctly.

Operation Hints



When the value or characters are blinking (7 segment LED), the setting will be changed by pressing ⏎ button. If it is not blinking, it will not be changed.

During setting (the value or characters are blinking), if you press ESC button, setting value or item is not changed and the blinking stops and it return to Function Mode. This can also be used as CANCEL during setting.

This unit keeps measuring and the comparator is working even in Function Mode.
Once pressing ⏎ button to memorize the setting, this unit operates function with the changed setting.

In Function Mode, it return to Measuring Mode without changing the setting by pressing ESC button at least two times.

4 – 4) Function of each button

① [MENU] button
Press this button once in Measuring Mode to enter the comparator setting in Function Mode.
Press this button twice in Measuring Mode to enter the function setting in Function Mode.
Press this button 3 times in Measuring Mode to enter the calibration setting in Function Mode.
This button is also used to select a function in order in Function Mode.

② [ITEM] button
Press this button to display an item of function in order in Function Mode.

③ [BACK/AZ] button
Press this button for 1 second in Measuring Mode to operate Auto Zero function.
This button is also used to select a digit toward left in the setting numerical value in Function Mode.

④ [NEXT/AZ.R] button
Press this button for 1 second in Measuring Mode to cancel Auto Zero function.
This button is also used to select a digit toward right in the setting numerical value in Function Mode.

⑤ [DOWN/PT] button
Press this button for 1 second in Measuring Mode to set the Preset Tare value.
This button is also used to decrease the numerical value of the selected digit, or choose an item or the value in selecting a candidate in reverse order in Function Mode.

⑥ [UP] button
This button has no operation in Measuring Mode.
This button is used to increase the numerical value of the selected digit, or choose an item or the value in selecting a candidate in order in Function Mode.

⑦ [ESCAPE] button
Press this button for 2 seconds in Measuring Mode to lock / unlock the buttons
Pressing this button in Function Mode, it return to Measuring Mode.
Pressing this button at setting value or choosing item in Function Mode, it stops setting or choosing.
Turn power ON while pressing this button or press this button 3 times within 3 seconds right after powered ON to enter Cal-Lock setting.

⑧ [ENTER] button
This button has no operation in Measuring Mode.
Pressing this button while the value or character is blinking in Function Mode, it memorizes the setting and updates a function.
After the setting has been completed, SET is displayed for 2 seconds and it returns to Function Mode.
If the setting is invalid, an error Err is displayed for 2 seconds and it returns to Function Mode and the setting is ignored.
If this button is pressed while the value or character is not blinking in Function Mode, nothing happens.

4 – 5) Comparator setting : [c.SEt]

[ ] is guide character

Item list

① Quantitative value of comparator

Ch.1 Quantitative value	[1.]	polarity+4 digit	(+9999 at the time of shipment)
Ch.2 Quantitative value	[2.]	polarity+4 digit	(+9999 at the time of shipment)
Ch.3 Quantitative value	[3.]	polarity+4 digit	(+9999 at the time of shipment)
Ch.4 Quantitative value	[4.]	polarity+4 digit	(+9999 at the time of shipment)

※Specify polarity after setting the value. Polarity is canceled if the setting value becomes zero.

② Fall value of comparator

Ch.1 Fall correction value	[1.c]	3 digit	(000 at the time of shipment)
Ch.2 Fall correction value	[2.c]	3 digit	(000 at the time of shipment)
Ch.3 Fall correction value	[3.c]	3 digit	(000 at the time of shipment)
Ch.4 Fall correction value	[4.c]	3 digit	(000 at the time of shipment)

③ Hysteresis value of comparator

Common to Ch.1-Ch.4	[H.]	2 digit	(00 at the time of shipment)

4 – 6) Function setting : [FUnc.]

[ ] is guide character

Item list

① Judgement of comparator

Ch.1 Judgement	[1.]	Select a candidate	(UPnt at the time of shipment)
Ch.2 Judgement	[2.]	Select a candidate	(UPnt at the time of shipment)
Ch.3 Judgement	[3.]	Select a candidate	(UPnt at the time of shipment)
Ch.4 Judgement	[4.]	Select a candidate	(UPnt at the time of shipment)

Candidates:
oFF :No judgement,
UPnt:Upper limit of Net value, dnnt:Lower limit of Net value,
UPGS:Upper limit of Gross value, dnGS:Lower limit of Gross value

② Data type of analog output [d.A.]
Select a candidate (nEt at the time of shipment)
Candidates:
nEt:Net value, GrS:Gross value

③ Zero scale of analog output [Z.] polarity+4 digit (0000 at the time of shipment)

④ Full scale of analog output [F.] polarity+4 digit (5000 at the time of shipment)

⑤ Resolution of analog output [d.A.] Select a candidate (dSP at the time of shipment)
Candidates:
dSP:Linked to displayed value resolution, int:Internal maximum resolution

⑥ Allocate a function to external command input (Terminal #8) [c.]
Select a candidate (HoLd at the time of shipment)
Candidates:
HoLd:Display Hold, 0Add:Zero correction

⑦ Shift to Test Mode [tESt]
Press ▷ button to blink [tESt] and press ↵ button 3 times to enter Test Mode.

4 – 7) Calibration setting [CAL]

[ ] is guide character

Item list

① Zero calibration [0.AdJ]
No setting value nor candidate
Press [◁][▷] button to blink [0.AdJ] and press [↵] button to calibrate zero

② Span calibration [SPAn] polarity+4 digit (5000 at the time of shipment)

③ Minimum scale division [S.d.] Select a candidate (1 at the time of shipment)
Candidates: 1,2,5 or 10

④ Strength of Digital filter [d.F.] Select a candidate (5 at the time of shipment)
Candidates: 1(weak), 2, 3, 4, 5, 6, 7, 8, 9 or 10(strong)

⑤ Range to stop moving average [A.c.]
Select a candidate (oFF at the time of shipment)
Candidates: oFF, 0.5 to 10.0 step 0.5 (unit is scale division)

⑥ Number of times of moving average [A.u.]
Select a candidate (4 at the time of shipment)
Candidates: 1, 2, 4, 8, 16, 24 or 32 (unit is times)

⑦ Range of zero tracking to be effective [0c.]
Select a candidate (oFF at the time of shipment)
Candidates: oFF, 0.5 to 10.0 step 0.5 (unit is scale division)

⑧ Working time of zero tracking [0t.]
Select a candidate (2.0 at the time of shipment)
Candidates: 0.2 or 0.5 to 5.0 step 0.5 (unit is second)

⑨ Decimal point position [d.P.] Select a candidate (0 at the time of shipment)
Candidates: 0(0), 1(0.0), 2(0.00) or 3(0.000)

⑩ Polarity of zero equivalent input value [0.PoL.]
Select a candidate (P. at the time of shipment)
Candidates: P.(plus '+') or n.(minus '–')

⑪ Zero equivalent input value [E.0.AdJ] 5 digit (0.0000 at the time of shipment)
Set the input voltage (mV/V) from Load Cell with no load

⑫ Display value of span equivalent input [E.SPAn]
4 digit (5000 at the time of shipment)

⑬ Polarity of span equivalent input value [S.PoL.]
Select a candidate (P. at the time of shipment)
Candidates: P.(plus '+') or n.(minus '–')

⑭ Span equivalent input value [E.S.AdJ] 5 digit (1.0000 at the time of shipment)
Set the input voltage (mV/V) from Load Cell with rated load

Whichever the actual load calibration or equivalent input calibration, the last calibration is effective and memorized. Calibration menu which is not supposed to use should be skipped using [∩] [ITEM] button.

Zero equivalent input calibration is effective after ⑩ and ⑪ have been set both together.
Span equivalent input calibration is effective after ⑫,⑬ and ⑭ have been set all together.

§5. Function

5 – 1) Zero Tracking function (ZT)

If the measured value is kept below than the specified value and period, judge as zero drift phenomena and set the measured value to be zero.

Range of zero tracking to be effective	0.c.	OFF, 0.5 to 10.0 step 0.5 as scale width
Working time of zero tracking	0t.	0.2, 0.5 to 5.0 step 0.5 as second

※Caution of using zero tracking when loading the materials or ingredients into a large tank or scale, if the measured value varies slowly within the range of preset condition of zero tracking, the measured value keeps to indicate zero. In that case, please set the condition of zero tracking to 'OFF'.

5 – 2) Preset Tare function (PT)

Press ▽ [PT] button for 1 second in Measuring Mode to display t. and setting value.
After setting Preset Tare value, this unit always subtract preset Tare value from the measured value. This is used to measure an object which has a known container weight.
LED [PT] is lighted ON when Preset Tare value is set to other than 0.
After zero calibration or span calibration has been done, Preset Tare value will be reset to zero.

Preset Tare value t. polarity+4 digit (0000 at the time of shipment)

5 – 3) Auto Zero function (AZ)

Press ◁ [AZ] button for 1 second in Measuring Mode, after memorizing the measured value as the offset vale, displayed value is set to be zero, and from that point display the amount of increase and decrease as Net value. (Display the value subtracted the offset level from Gross value).
Different from zero calibration, it is possible to operate AZ in all the rage of measured value.
Cancellation (return to Gross value) is also possible.
LED [AZ] will be lighted up when AZ is operated.
Press ▷ [AZ.R] button for 1 second in Measuring Mode to cancel (reset) AZ function.
AZ and AZ.R are also operated by external command input.

5 – 4) Button Lock function

This function prevents wrong operation by means of disabling button input.
Press ESC button for 2 seconds in Measuring Mode to lock the buttons. Indicate Loc. for 2 seconds when any button except ESC is pushed and ignore the input.
To unlock the buttons, Push ESC button for 2 seconds in the button locked status.

5 – 5) Calibration Lock function (Cal-Lock)

This function prevents to alter the calibration value from wrong operation.

①Turn power ON while pressing ESC button or press ESC button 3 times within 3 seconds right after powered ON to enter Cal-Lock function.
②Press △▽ button to alternates to display as follows
cAL. : Cal-Lock disable, Span calibration permitted.
Loc. : Cal-Lock enable, Span calibration prohibited.
③After selecting desired Call-Lock status, press ↵ button to memorize. After displaying SEt for 2 seconds, this unit is reset and return to Measuring Mode.

If trying span calibration during Cal-Lock status, Loc. is displayed instead of SEt and return to Measuring Mode. Span calibration value will not be changed.
In case of delivering this unit after calibrated at our factory, there is a case of Cal-Lock being enabled. If this unit is already comprised in a system and the power cannot be turned OFF, enter Test Mode once. Press ▷ button 3 times when displaying program version in Test Mode to reset this unit. Press ESC button 3 times within 3 seconds right after reset, it is able to enter Cal-Lock function.

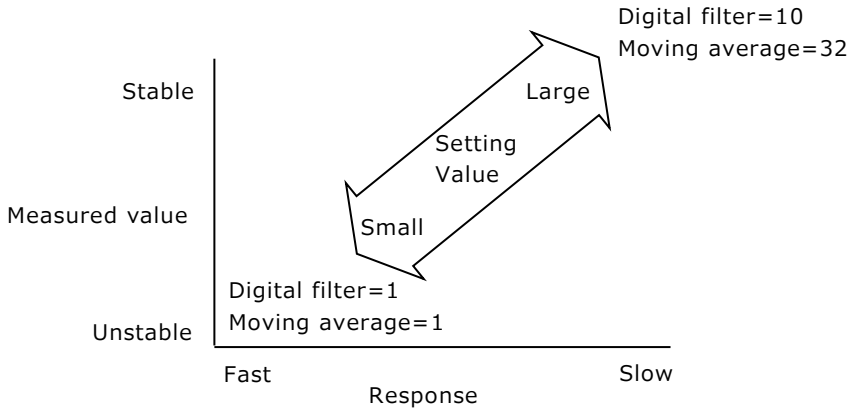
5 – 6) Digital filer and Moving average function

These functions make the measured value be stable when an external vibration is applied to Load Cell or a sensor. It becomes more stable when the value of Digital filter or Moving average sets larger.

Strength of Digital filter [d.F.]: 1 to 10, 1 step

Number of times of Moving average [A.u.]: 1(OFF), 2, 4, 8, 16, 24, 32

When the strength of Digital filter or the number of times of Moving average is larger, response of indicating the measured value is slower. Choose an appropriate value according to the nature of a signal input from Load Cell or a sensor.



If the measured value is stable but need the fast response, there is one method of using a condition of stop moving average [A.c.]. If the measured value exceeds the preset value of [A.c.], stop moving average and make the response fast temporarily, and back to moving average once the measured value decreases to be within the preset value of [A.c.].

Range to stop moving average [A.c.]: OFF, 0.5 to 10.0 step 0.5 x scale division

When selected 'OFF', it is kept on moving average.

5 – 7) Minimum Scale function

By setting the minimum scale (scale division), it is able to change the displayed scale interval to 1, 2, 5, 10.

Even if minimum scale has been changed, span volume will not be changed. In case of decreasing minimum scale, if the displayed resolution is insufficient, it will be an error.

When span calibration is carried out, if the resolution cannot meet the requirement of minimum scale, it will change minimum scale automatically and secures the resolution.

After span calibration, please confirm the setting value of minimum scale.

Quantitative value of comparator can be set with no relation of minimum scale but it compares with the displayed value with specified minimum scale.

5 – 8) Scaling of analog output (available when analog output OP-1, 2 or 5 installed)

This is a function of scaling analog output of current / voltage against the preset value set at [L.] or [F.], regardless of zero or span of calibrated value.

Set a display value to output 4mA or 0V at [L.] and to output 20mA, +5V or 10V at [F.].

Analog output corresponding to Net value or Gross value is selected at [d.A.].

5 – 9) External command input

This unit has three external input, AZ, AZ.R, and user selected command. User can select a command of HOLD or Zero correction at [c.] in Function Mode.

AZ/AZ.R command

AZ or AZ.R is enabled when the terminal #6 or #7 are electrically short to the terminal #9 for 0.2 second respectively. Status LED [AZ] is lighted up while Auto Zero is in operation.

HOLD command

HOLD is enabled during the terminal #8 are electrically short to the terminal #9 and LED [HOLD] is lighted up. The measured value is held during HOLD operation but the comparators keep to work against the measured value and output a result to Rely.

Zero Correction command

Zero calibration value is corrected when the terminal #8 are electrically short to the terminal #9 for 0.2 second.

When measuring a weight of multiple materials, operating Zero correction instead of AZ before loading the first material, more accurate measurement will be done by operate AZ.R after the last material loaded.

5 – 1 0) Comparator function

This unit has 4 independent comparators which compare with Net value or Gross value and can output through Relay1 to Relay4 respectively.
Comparison to Gross value is suitable for a tank or a hopper application.
Comparison to Net value is suitable for measurement of multiple materials charged / discharged application.
When Relay1 to Relay4 output is MAKE, corresponding LED [SP1] to [SP4] is lighted up.
Also comparators have Fall correction (independent) value and Hysteresis value (common).

1). Range of setting value

Quantitative value	1, 2, 3, 4	−9999 to +9999
Fall correction value	1.c, 2.c, 3.c, 4.c	0 to 999
Hysteresis value	H.	0 to 99

2). Judgement type

Data type of each quantitative value is selected from Net value or Gross value. To monitor charging/discharging materials, upper limit judgement or lower limit judgement is selected at each comparator independently. These setting is selected from candidates as follows at 1, 2, 3, 4 in Function Mode

Candidates:

oFF :No judgement,
UPnt :Upper limit of Net value, dnnt :Lower limit of Net value,
UPGS :Upper limit of Gross value, dnGS :Lower limit of Gross value

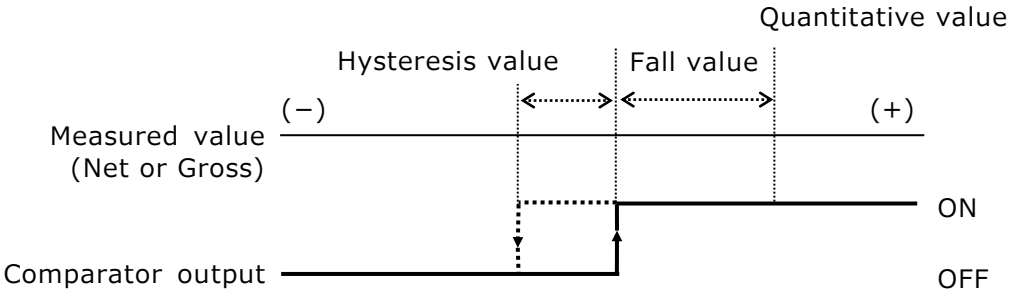
3). Explanation of each judgement

① Upper limit judgement

In case of charging control, use this mode.

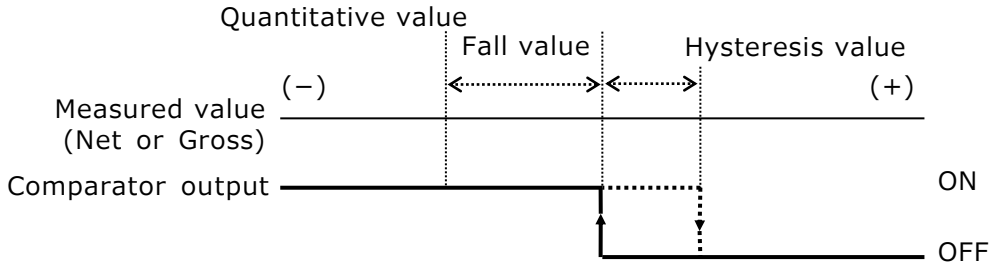
Judgment of comparison

Output ON :Measured value ≧ Quantitative value − Fall value
Output OFF :Measured Value ＜ Quantitative value − Fall value − Hysteresis value



② Lower limit judgement
In case of discharging control, use this mode.

Judgment of comparison
Output ON :Measured value ≦ Quantitative value + Fall value
Output OFF : Measured value ＞ Quantitative value + Fall value + Hysteresis value



5 – 1 1) Current Loop serial output

This function is a serial interface dedicated for a TOYO's peripheral equipment. If TOYO's CV-3010(serial to BCD converter) is connected to this interface, the measured value of this unit can be output as parallel BCD signal. Also an external indicator or a printer of TOYO can be connected to this interface.
This interface is isolated from an inner circuit and connected to an external equipment through 4 to 20mA current loop signal, thus less effected from noise and a cable can be extended up to 100m.
CV-3010 can be connected through RS-232C, but if the distance between this unit and CV-3010 is more than 15m, current loop interface should be used.

There is no function setting of this interface. Use a two-core cable and connect from output 'S-out' of this unit to input 'C/L' of external equipment. Two-core can be connected whichever as there is no polarity of them.
There is no use of a shielded cable in short distance, but wire apart from a power line or a drive motor line with noise.

§6. Option (Provided at the time of shipment)

6 – 1) 4mA to 20mA current output [OP-1] −5V to +5V voltage output [OP-2]
0 to 10V voltage output [OP-5]

This option enables to output analog signal which is converted from digital to analog and isolated from input signal from Load Cell. Output signal is based on Net value or Gross value which is selected at [d.A.] in Function Mode.

It is possible to scale an analog output of current / voltage against the preset value set at [L.] or [F.], regardless of zero or span of calibrated value.
Resolution of analog output [d.A.] is selected in Function Mode
When dSP is selected, resolution of analog output is linked to displayed value resolution.
When int is selected, resolution of analog output becomes internal maximum resolution.

Except OP-2, analog output is unipolar output, but it is able to output minus side slightly, which amounts to about 2% of full scale of output. Also it is able to output exceeding the range of plus side about 2% of it. Analog output is isolated from the inner circuit.

1). Adjustment and setting
① Zero and sensitivity of analog output is already adjusted at the time of shipment. But re-adjustment is possible in Test Mode. Please refer to [dc.] section §9 Test Mode.
② Select data type of analog output [d.A.] in Function Mode.
net : Output Net value
Grs : Output Gross value
③ Scale analog output at [L.] and [F.] in Function Mode.
Set displayed value when output 4mA or 0V at [L.] in Function Mode.
Set displayed value when output 20mA, +5V or 10V at [F.] in Function Mode.
④ Select a resolution of analog output [d.A.] in Function Mode.
dSP : Linked to displayed value resolution
int : No relation with displayed value resolution, internal maximum resolution

2). Confirmation
It is able to check analog output 1.6mA step in current output and 1V step in voltage output at [do.] of Test Mode. It may help to check the linearity of analog output.

6 – 2) RS-232C serial data output [OP-3]
This option enables to output serial data of displayed value through interface RS-232C, which is isolated from internal circuit. No command accepted from the receiver.

1). Specifications

Data	Displayed value (without unit)
Data output	Stream data per sampling
Data format	Numeric and alphabet capital letter

	1	2	3	4	5	6	7	8	9	10	11	12
with decimal point	W	T	,	±	0	1	2	3	.	4	CR	LF
without decimal point	W	T	,	±	0	0	1	2	3	4	CR	LF
when over load	O	L	,	±	9	9	9	9	.	9	CR	LF

(CR=0DH, LF=0AH)

Interface standard	RS-232C conformity (isolated output)
Speed	2400 bps
Protocol	Start-Stop Synchronous (Asynchronous) type
Format	Data bit: 7 bit, Stop bit: 2bit, Parity: EVEN, Data: ASCII code
Communication distance	Maximum 15m

2). Setting
No setting of RS-232C is required. Please set at the receiver side.

§7. Calibration

Calibration is performed by “Actual Load Calibration” using a weight or other article with a known weight as a reference, or by “Equivalent Input Calibration” using numerical value which is input by buttons.
This unit is calibrated with the last calibration of whichever “Actual Load Calibration” or “Equivalent Input Calibration”.
“Actual Load Calibration” is recommended to calibrate, but it depends on the environment or conditions surrounding of this unit.
In case of purchasing this unit together with Load Cell as a combination, there is a case where calibration has already been done in TOYO factory.
When calibration has being done, the value of preset Tare becomes zero.

The followings are methods of setting calibration in Function Mode from Measuring Mode.
Press [ESC] button several times to leave Function Mode to Measuring Mode.

7 – 1) Necessary setting before calibration
In case of buttons locked, unlock the buttons first to press [ESC] button for 2 seconds.
In case of Cal-Lock status, unlock the Cal-Lock first.
Please refer to 5-5) Cal-Lock function for the method of unlock.

7 – 2) Actual Load Calibration
1). Remove a load from Load Cell and perform zero point calibration.
①Press [MENU] button 3 times. Enter Function Mode. CAL is displayed.
②Press [ITEM] button once. 0.Add is displayed.
③Press [◁][▷] button. Indication of 0.Add start blinking.
④Press [↵] button to calibrate zero point and memorize the calibration value.
When calibration performed successfully, SET is displayed for 2 seconds and proceed to the setting of span calibration. Err is indicated if it exceeds the range of zero point calibration.

2). Place a weight or other article with a known weight on Load Cell and perform span (sensitivity) calibration.
①Press [MENU] button 3 times. Enter Function Mode. CAL is displayed.
②Press [ITEM] button twice. SPAn and setting value is displayed alternatively.
③Press [◁][▷] button to select a digit and [△][▽] button to change the value to set a known weight.
Polarity “−” is set at the left end digit using [△][▽] button. Notice that polarity “−” is canceled if the setting value becomes zero.
④Press [↵] button to calibrate span and memorize the span value. When calibration performed successfully, SET is displayed for 2 seconds and proceed to the setting of minimum scale division.
Err is indicated if it exceeds the range of span calibration or span amount is not enough to fulfill the resolution based on minimum scale division.
To interrupt this procedure, press [ESC] button while the value is blinking, the blinking will be stopped, press [ESC] button again, it shall return to Measuring Mode.

3). Unload a weight or other article from Load Cell.

4). Set a minimum scale division
The preset value at the time of shipment is 1.
Due to A/D converter in this unit has high sensitivity, If the specified minimum scale division exceeds the sensitivity 0.5 μV/division, Error might not occur but fluctuation may become larger. In that case, set the value of minimum scale division larger until the fluctuation is not noticeable.
Minimum scale division (number of skips) is selected from 1, 2, 5 or 10.

Even if the minimum scale division is changed, span amount will not be changed.
In case resolution cannot be achieved at the minimum scale which set at Function Mode, the minimum scale will automatically be changed in order to achieve the resolution. Therefore please check the setting of minimum scale after span calibration.

5). Press [ESC] button twice to return to Measuring Mode.

6). Check whether the measured value is zero.
If the measured value is other than zero, please repeat the procedures from 1).

7). Set digital filter, moving average, zero tracking and decimal point position, if needed.

8). It is able to perform zero correction in Test Mode. When a zero deviation is known, this unit can perform zero correction even if there is a load on Load Cell.

7 – 3) Equivalent Input Calibration

1). Polarity of zero equivalent input value
①Press [MENU] button 3 times. Enter Function Mode. [CAL.] is displayed.
②Press [ITEM] button 10 times. [0.POL.] and a pre-selected polarity is displayed.
③Press [△▽] button to select a polarity P. or n..
④Press [↵] button to memorize the setting and [SET] is displayed for 2 seconds and proceed to setting the value of zero equivalent input.

2). Zero equivalent input value
①Press [MENU] button 3 times. Enter Function Mode. [CAL.] is displayed.
②Press [ITEM] button 11 times. [E.0.Adj] and setting value is displayed alternatively.
③Press [◁▷] button to select a digit and [△▽] button to change the value to set input voltage (mV/V) from Load Cell with no load.
④Press [↵] button to calibrate zero point and memorize the calibration value.
When calibration performed successfully, [SET] is displayed for 2 seconds and proceed to the setting the displayed value of span amount. [Err] is indicated if it exceeds the range of zero point calibration.

3). Displayed value of span amount
①Press [MENU] button 3 times. Enter Function Mode. [CAL.] is displayed.
②Press [ITEM] button 12 times. [E.SPAn] and setting value is displayed alternatively.
③Press [◁▷] button to select a digit and [△▽] button to change the value to set the displayed value of span amount.
Polarity "–" is set at the left end digit using [△▽] button. Notice that polarity "–" is canceled if the setting value becomes zero.
④Press [↵] button to memorize the value and [SET] is displayed for 2 seconds and proceed to the setting the polarity of span equivalent input value.

4). Polarity of span equivalent input value
①Press [MENU] button 3 times. Enter Function Mode. [CAL.] is displayed.
②Press [ITEM] button 13 times. [S.POL.] and a pre-selected polarity is displayed.
③Press [△▽] button to select a polarity P. or n..
④Press [↵] button to memorize the setting and [SET] is displayed for 2 seconds and proceed to setting the value of span equivalent input.

5). Span equivalent input value
①Press [MENU] button 3 times. Enter Function Mode. [CAL.] is displayed.
②Press [ITEM] button 14 times. [E.S.Adj] and setting value is displayed alternatively.
③Press [◁▷] button to select a digit and [△▽] button to change the value to set input voltage (mV/V) from Load Cell with rated load.
④Press [↵] button to calibrate span amount and memorize the calibration value.
When calibration performed successfully, [SET] is displayed for 2 seconds and return to the top of menu. [Err] is indicated if it exceeds the range of span calibration.

6). Press [ESC] button to return to Measuring Mode.

§8. Troubleshooting

If this unit does not work properly, please take the following measures. If the trouble still cannot be solved, then please contact our company.
At query, please inform us the model name, product serial number, and conditions of this unit as detailed as possible. The model name of Load Cell or sensor connected to this unit should be also informed.

8 – 1) Basic check point

1). Please check if using a correct power supply.
This unit is supplied voltage with DC24V.

2). Please check that wires are connected to the terminal base properly and firmly.

8 – 2) Precautions at the time of calibration

1). Error occurs at the time of zero calibration.

・In case of exceeding the range of zero calibration.
To perform zero calibration, Load Cell output with no load should be in the range of -2.8～+2.8mV/V. Please call us if it is out of the range of ±2.8mV/V, when using Load Cell whose rated output is more than 3.3mV/V.

2). Error occurs at the time of span calibration, or display value is not correct as set in span calibration.

・This unit cannot measure in a system that the sum of initial tare value and measured value exceed 3.3mV/V. Please contact us when the rated output of Load Cell is more than 3.3mV/V.

・Input signal from Load Cell at span calibration is smaller than at zero calibration
This unit can be used when span amount value is lower than zero calibration value, where Load Cell output is minus when loaded. Please notice the polarity (±) of displayed value.

3). Fluctuation of indication

・If span amount is not enough to fulfill the resolution based on specified minimum scale division.

The input sensitivity of this unit is 0.5μV/digit and indication resolution is 1/5000 at 0.5mV/V input. If the resolution is more than this, fluctuation of indication becomes larger. In this case, please increase a minimum scale division in Function Mode until not to be noticeable of fluctuation.

8 – 3) Countermeasures for unusual display

1). The measured value is blinking (over load indication) when not overloaded
A part of Load Cell cable might be broken or a Load Cell itself might be defective. Please confirm the input voltage (mV/V) from Load Cell in Test Mode.

8 – 4) Judgement whether this unit has malfunction

1). Please confirm whether a sensor excitation voltage is correct. Disconnect a sensor from this unit and check the voltage by a tester between #1(+EXC) and #2(-EXC) of terminal block. Please check whether it is stable at 5V±0.5V.
If it is not stable, power circuit for a sensor in this unit is failure.

2). Short-circuit (Jumper between No.3 (+SIG)～No.4 (-SIG)) of input voltage from a sensor at terminal block and display input voltage (mV/V) in Test Mode. Then please check if the input voltage is stable nearest to zero.
If it is not stable, this unit is failure. If stable, please check a sensor side.

3). Checking digital input/output
Please check the external input/output in Test Mode.

8 – 5) Checking a sensor (Load Cell)
Good or bad rough judgement can be done by measuring input/output resistance and insulation resistance because Load Cell is structured by a bridge circuit. (Please make sure to power OFF this unit first and disconnect Load Cell before checking resistance)

1). Fault judging method by resistance of Load Cell
Check bridge resistance of Load Cell by a tester and confirm whether input/output resistance are correct.

2). Fault judging method by insulation resistance of Load Cell
Measure the insulation resistance between the shield line and other with voltage less than 50V. If the insulation resistance shows more than 1000MΩ, insulation of Load Cell is no problem.

§9. Test Mode

The response of external input/output and indication of display is different during Test Mode. Please take measures to the connected external equipment to keep it from abnormality. Test Mode confirms conditions of this unit by manual operation.

9 – 1) Basic Operation

1). To enter Test Mode, select [TEST] in Function Mode and press ▷ button let the indication blink and press ↵ button 3 times.
Also enter Test Mode by turn power ON while pressing ↵ button, or pressing ↵ button 3 times within 3 seconds right after powered ON.

To leave Test Mode, turn power OFF or press ▷ button 3 times during Model Name and Program Version.

2). The test item will proceed to the next by pressing ∩ [MENU] button and return to the previous by pressing ∩ [ITEM] button.

9 – 2) Each test item

Guide display	Test item	Contents
5028A	Model Name	Press ▷ button 3 times to return to Measuring Mode.
P.	Program Version	Display program version Example: 2.00 --- Version 2.00 Press ▷ button 3 times to return to Measuring Mode.
8.8.8.8.8.	Check LEDs	The order to check LEDs as follows 1. All LEDs are turned OFF 2. Each segment of all 7 segment LEDs and status LEDs are turned ON in order 3. All decimal point are turned ON 4. All segment of each 7 segment LEDs are turned ON from left side to right side 5. All status LEDs are turned ON 6. All LEDs are turned ON and back to 1.
U.	Check button	Display allocated number of buttons 1[MENU ∩], 2[ITEM ∩], 3[AZ ◁], 4[AZ.R ▷], 5[PT ▽], 6[△], 7[LOCK ESC], 8[↵] Proceed to the next item to press ∩ [MENU] twice. Return to the previous item to press ∩ [ITEM] twice.
r.	Check external output	Display Relay number and output to specified Relay 4 o o o-Relay 4 is MAKE/BREAK when pressing ◁ button o 3 o o-Relay 3 is MAKE/BREAK when pressing ▷ button o o 2 o-Relay 2 is MAKE/BREAK when pressing ▽ button o o o 1-Relay 1 is MAKE/BREAK when pressing △ button
c.	Check external input	Display external input o o 1-External input (AZ) is ON o 1 o-External input (AZ.R) is ON 1 o o-External input (CMD) is ON
dc.	Adjust analog output	Press ◁▷ button to adjust 4mA / 0V 4. ±xx: Press △▽ to increase/decrease 4mA (OP-1) 0. ±xx: Press △▽ to increase/decrease 0V (OP-2,5) Press ◁▷ button to adjust 20mA / 5V/ 10V 20. ±xx: Press △▽ to increase/decrease 20mA (OP-1) 5. ±xx: Press △▽ to increase/decrease 5V (OP-2) 10. ±xx: Press △▽ to increase/decrease 10V (OP-5) Press ◁▷ button to adjust -5V -5. ±xx: Press △▽ to increase/decrease -5V (OP-2) Press ↵ button to memorize
do.	Check analog output	Select analog output 11 steps Press △▽ button to increase/decrease analog output

		This function helps to confirm the linearity of analog output OP-1 (mA) / OP-5 (V) / OP-2 (V) 4.0 / 0.0 / -5.0 5.6 / 1.0 / -4.0 7.2 / 2.0 / -3.0 8.8 / 3.0 / -2.0 10.4 / 4.0 / -1.0 12.0 / 5.0 / 0.0 13.6 / 6.0 / 1.0 15.2 / 7.0 / 2.0 16.8 / 8.0 / 3.0 18.4 / 9.0 / 4.0 20.0 / 10.0 / 5.0
St. (Indicate for one second)	Check input voltage from Load Cell	Display input voltage (mV/V) from Load Cell Accuracy is ±5% at 1mV/V input Minus is indicated as status LEDs (SP1 to SP4) The value is blinking when A/D over Press ◁[AZ] button to set the value to be zero Press ▷[AZ.R] button to restore the value
0.Adj	Zero correction	Operate zero correction even if loaded on Load Cell. Press ▷ button to display the measured value. Press △▽ button to increase/decrease zero point. Press ↵ button to memorize the zero correction.

dc./do. is indicated only when OP-1, OP-2 or OP-5 is installed

§10. Installation and Connection method

10－1) Installation environment etc.

1). Operating temperature range is －10℃ to 40℃
Please install in a place not exposed to direct sunlight.

2). This unit is operated with power AC85 to 132V (standard) or DC20 to 27V (option)
If stable power supply for AC85 to 132V is not available, use of a constant-voltage transformer is recommended.

3). This unit is designed to fix by a panel-mount.
Please make use of the attached metal fittings to fix it on.

10－2) Terminal Connection

1). Terminals for Load Cell
(Upper side of rear panel, 7.62mm pitch screw terminal)

No.	Signal connection	
1	+EXC	Excitation voltage to Load Cell (+)
2	－EXC	Excitation voltage to Load Cell (－)
3	+SIG	Input signal from Load Cell (+)
4	－SIG	Input signal from Load Cell (－)
5	SHL	Shield line of Load Cell cable

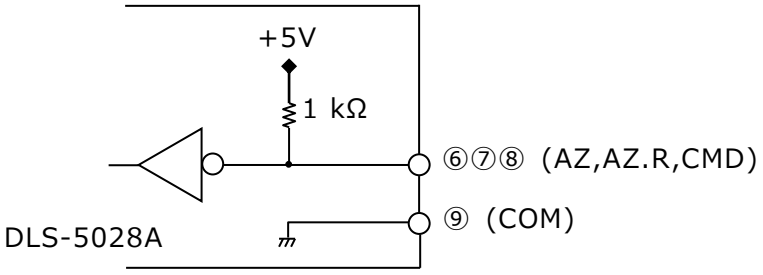
Use a 4-core shielded cable and wire apart from a power line or a motor drive line with noise to prevent malfunction.
The cable wiring color varies depending on the manufacturer or a model.
Refer to the Test Report attached to Load Cell, check the signal name and color, and connect correctly and firmly.
Applicable crimp spec.: M3 with a width of max. 6mm

2). Terminals for external command input and option output
(Upper side of rear panel, 5mm pitch screw-less terminal)

No.	Signal connection	
6	AZ	External command input (Auto Zero)
7	AZ.R	External command input (Auto Zero Reset)
8	CMD	External command input (Command)
9	COM	Common ground to No.6,7,8
10	OP +	Output signal of option (+)
11	OP －	Output signal of option (－)

Wire apart from a power line or a motor drive line with noise to prevent malfunction.
No.10 and 11 are analog signal output (OP-1/-2/-5) or RS-232C output (OP-3).

Applicable wire spec.: Strand wire = 0.2～1.25mm^2 (AWG24～16),
Peeled wire length = 11mm



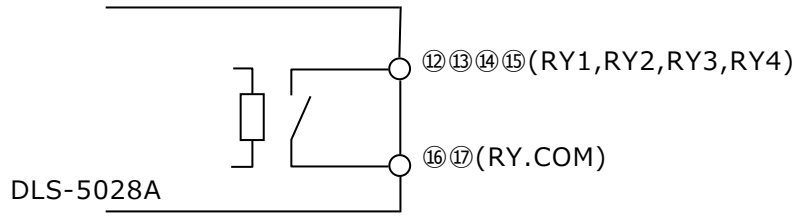
(External command input circuit)

3). Terminals for external output and current loop output
(Lower side of rear panel, 5mm pitch screw-less terminal)

No.	Signal connection	
12	RY1	Comparator 1 contact output
13	RY2	Comparator 2 contact output
14	RY3	Comparator 3 contact output
15	RY4	Comparator 4 contact output
16	RY.COM	Common ground to No.12,13,14,15
17	RY.COM	
18	C/L	Current Loop output (No polarity)
19	C/L	

Applicable wire spec.: Strand wire = 0.2～1.25mm^2 (AWG24～16),
Peeled wire length = 11mm

Relay contact spec. : Rated output DC24V 1A, AC125V 0.5A
BREAK when powered OFF
Take measures against noise. Add a diode when DC load or add a spark killer when AC load. Recommend to use DC load for reducing noise perspective.



(Comparator contact output circuit)

4). Terminals for power line
(Lower side of rear panel, 7.62mm pitch screw terminal)

No.	Signal connection			
20	E	Grounding		
21	L	AC85～132V (standard)	+	DC20～27V (option)
22	N		−	DC0V (option)

Applicable crimp spec.: M3 with a width of max. 6mm

A shield line of each cable should be grounded to the terminal of this unit or the external connected unit so not to emerge ground loop.

Please connect the terminal #20(E) to ground resistance 100Ω or less.

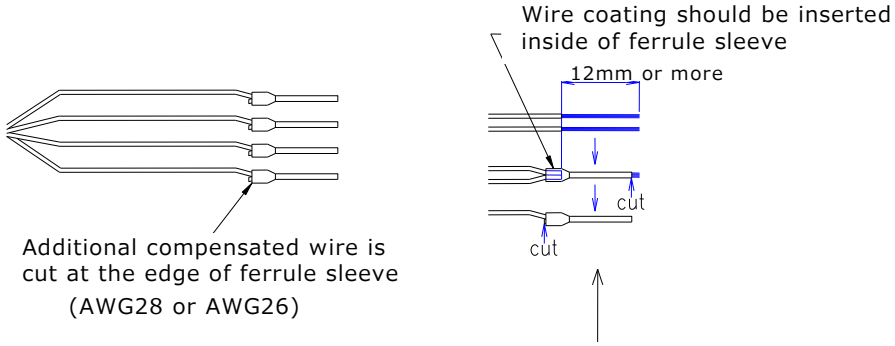
Power supplied voltage is AC85 to 132V (standard) or DC20 to 27V (option). Please check a name plate of this unit and confirm whether supplied voltage is correct.

This unit doesn't have a function of remote sensing. If connecting Load Cell with 6-core wire of remote sensing, connect +SEN together with +EXC and −SEN together with −EXC.

If a wire is thinner than AWG26, recommend to crimp a rod terminal to the tip of wire to fit the screw-less terminal better.

The screw-less terminal of this unit (SATO PARTS: ML-800 series) is not applicable to general rod terminal which is thick and short.
Use a ferrule with insulation sleeve, which conforms DIN (German Industry Standard), at the tip of wire.

Recommend to use a AI 0.25-12BU (Phoenix Contact), which is contact length 12mm (8mm is not applicable) and suitable for 0.25 square wire. Insert two AWG28 wires into this ferrule. Use a dedicated crimping tool ZA3 (Phoenix Contact) to crimp it.



Recommended ferrule: AI 0.25-12BU (sleeve color: blue), Phoenix Contact

§11. Specifications

11－1) Analog and A/D converter part

1).	Input sensitivity:	0.5μV/digit or more Display resolution: Max. 1/9,999 at 1.0mV/V input Display resolution: Max. 1/5,000 at 0.5mV/V input
2).	Non-linearity:	±0.03%FS±1 count
3).	Temperature characteristics:	Zero point ±0.005%FS/℃ Sensitivity ±0.005%Reading/℃
4).	Frequency characteristics:	approx. 1 Hz (−3dB)
5).	Transducer power supply:	DC5V±5%, 60mA (Four 350Ω type sensors can be connected)

11－2) Display part

1). Display element

①Measured value display:	LED 7-segment, 4-digit, Red, character height 14mm
②Status display:	LED, Red, 7 pcs

2). Measured value display

①Maximum reading:	±9999 (Zero suppress reading)
②Decimal point:	select 0 to 3 digit after decimal point (0, 0.0, 0.00, 0.000)
③Over indication:	All digit blink when the measured value exceeds ±9999 or input voltage exceeds ±3.3mV/V
④Unit:	kg Other unit is pasted by unit seal as the followings. kg, g, t, N, kN, N·m, kN·m, kPa, MPa, mm, %
⑤Sampling period:	240msec. (4.2 times/sec)

3). Status display: SP(Set Point)1 to 4, HOLD, PT(Preset Tare), AZ(Auto Zero)

11－3) Zero point and Sensitivity calibration

1).	Zero point calibration:	adjustable by input signal of −2.8～2.8mV/V
2).	Sensitivity calibration:	adjustable by span amount of −3.0～3.0mV/V
3).	Zero equivalent input cal.:	adjustable by button operation of −2.8～2.8mV/V
4).	Span equivalent input cal.:	adjustable by button operation of −3.0～3.0mV/V
5).	Displayed span amount:	±9999 by button operation
6).	Accuracy by equivalent input cal.:	±0.2%FS (at 1.0mV/V input)

※ The sum of initial Tare value (zero point input value) and maximum measured value (span amount) should not exceed ±3.3 mV/V.

11－4) I/O part

1). Operation button

①Button switch:	8 buttons Item select button : [MENU], [ITEM] Arrow button : [AZ], [AZ.R], [PT], [] Escape button: [LOCK ESC] Entry button: [↵]

2). External command input (3bit)

①Auto Zero (AZ):	One shot MAKE contact (pulse width 0.2sec)
②Auto Zero Reset (AZ.R):	One shot MAKE contact (pulse width 0.2sec)
③User selected command:	
a.) Display Hold	Continuous MAKE contact
b.) Zero correction	One shot MAKE contact (pulse width 0.2sec)

3). External output (4bit)

①Output signal:	Four Relay contact outputs, two commons Relay 1 to 4: OMRON G5V-1 'a' contact, (BREAK when powered OFF)
②Rated output:	DC24V 1A (Resistive load) AC125V 0.5A (Resistive load) Recommend to use DC.

4). Analog output (option-1, 2, 5)

①Output signal	Digital to analog conversion, Linked to displayed value, isolated output. 4 to 20mA (resistive load ≦ 510Ω) --- OP-1 −5 to +5V (resistive load ≧ 5kΩ) --- OP-2 0 to +10V (resistive load ≧ 5kΩ) --- OP-5 able to output additional 5%FS to lower/upper side
②Resolution	Linked to displayed value resolution or Internal resolution (maximum 1/10,000)
③Linearity	±0.1%FS (against displayed value)
④Temperature Characteristics	±0.02%FS/℃ (against Zero and Sensitivity)

5). Serial data output (option-3)

①Interface	RS-232C conformity (isolated)
②Speed	2400 bps
③Protocol	Start-Stop Synchronous (Asynchronous) type
④Format	Data bit: 7bit, Stop bit: 2bit, Parity: EVEN, Data: ASCII

11－5) General

1). Measures for power failure (backup of memory):	Each data is written in a non-volatile memory (EEPROM)
2). Power supplied voltage:	AC85 to 132V, 50/60Hz : standard DC20 to 27V : option
3). Power consumption:	approx. 20VA
4). Operating Temperature and Humidity range:	−10～+40℃, 20～85% R.H. (without condensation)
5). Mounting:	Panel mounting type
6). Mass:	approx. 1kg

§ 1 2 . List of Models and Accessories

1 2 – 1) Model

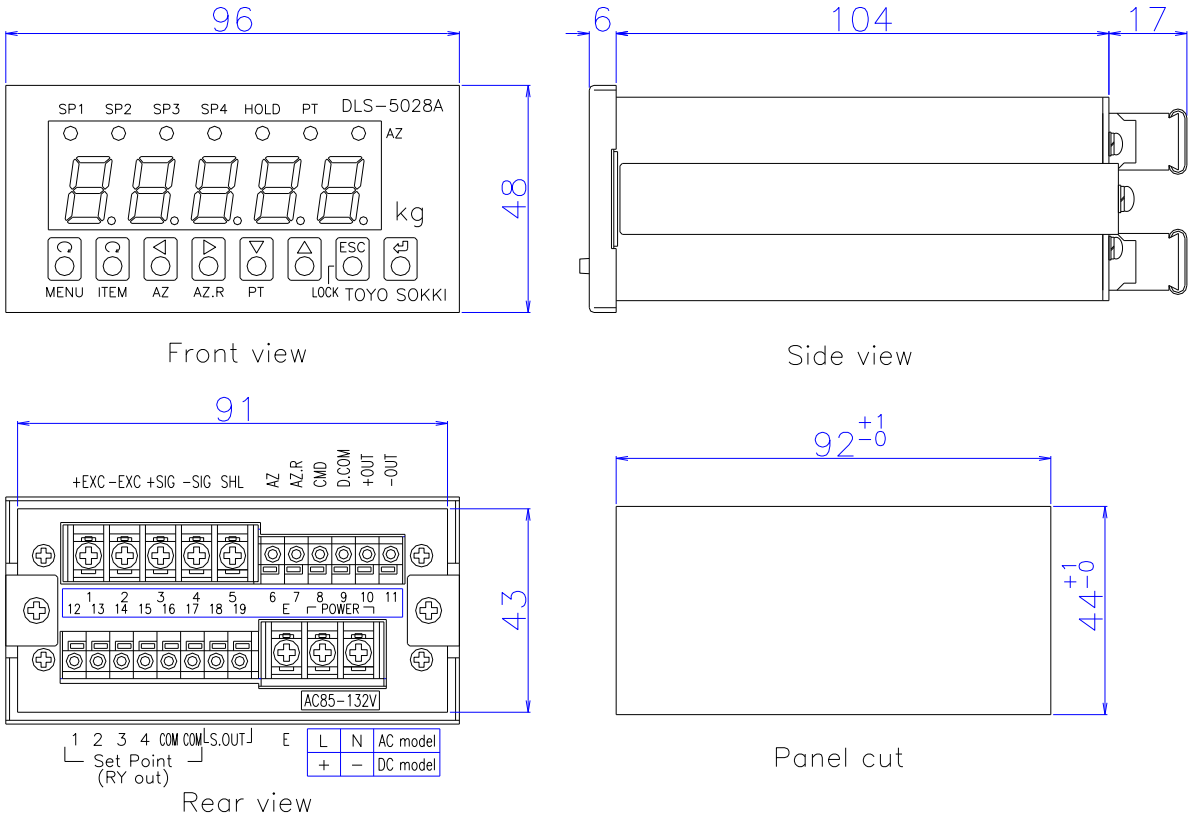
D L S – 5 0 2 8 A – 1 – D C

Power supplied voltage	blank	: AC100V as standard
	DC	: DC24V as option
Option	blank	: No option
	1	: Current output (4 to 20mA)
	2	: Voltage output (-5 to +5V)
	3	: RS-232C serial interface
	5	: Voltage output (0 to +10V)
Model name	Digital indicator DLS-5028A	

1 2 – 2) Accessories

1). Operation manual	1 copy
2). Unit seal	1 pc
3). Terminal base cover (attached)	2 pcs

§ 1 3 . Dimensional drawing



§14. Table of Functions and Operations

How to set a numerical value
Press ◁▷ button to select the digit (blinking while selected) and press △▽ button to change the value. Press ↵ button to memorize it.
The left end digit serves as a guide character also as a polarity. It is impossible to set a '−' polarity if the numeric value is '0000'. In that case, set a numeric value first.

How to select a candidate
Press △▽ button to select a candidate (blinking while selected). Press ↵ button to memorize it.

How to cancel, stop setting or selecting
Press ESC button.

Measuring Mode

Button	Content	Remark
MENU	Enter Function Mode	
ITEM	No operation	
AZ ◁ for 1 second	Auto Zero	Status LED[AZ] ON
AZ.R ▷ for 1 second	Cancel Auto Zero	Status LED[AZ] OFF
PT ▽ for 1 second	Preset Tare	Status LED[PT] ON
△	No operation	
ESCAPE ESC for 2 second	Lock / Unlock buttons	Indicate Loc. while locked
↵	No operation	

Calibration Lock setting
Turn power ON while pressing ESC button or press ESC button 3 times right after powered ON

Guide display	Content	Numeric value/ Candidate	Candidates	Default value
cAL.	Lock / Unlock calibration	Candidate	cAL.: Unlock Calibration Loc.: Lock Calibration	cAL.

Preset Tare setting
Press ▽ [PT] button for 1 second in Measuring Mode

Guide display	Content	Numeric value/ Candidate	Range of value	Default value
t.	Preset Tare setting	Numeric	−9999 to +9999	0000

Function Mode
Comparator setting [c.SEt]
Press MENU button once in Measuring Mode

Guide display	Content	Numeric value/ Candidate	Range of value/ Candidates	Default value
1.	Quantitative value of comparator 1	Numeric value	−9999 to +9999	+9999
2.	Quantitative value of comparator 2	Numeric value	−9999 to +9999	+9999
3.	Quantitative value of comparator 3	Numeric value	−9999 to +9999	+9999
4.	Quantitative value of comparator 4	Numeric value	−9999 to +9999	+9999
1.c.	Fall value of comparator 1	Numeric value	0 to 999	000
2.c.	Fall value of comparator 2	Numeric value	0 to 999	000
3.c.	Fall value of comparator 3	Numeric value	0 to 999	000
4.c.	Fall value of comparator 4	Numeric value	0 to 999	000
H.	Hysteresis value of comparator 1 to 4	Numeric value	0 to 99	00

Function Mode
Function setting [Func.]
Press MENU button twice in Measuring Mode

Guide display	Content	Numeric value/ Candidate	Range of value/ Candidates	Default value
1.	Judgement of comparator 1	Candidate	oFF:No judgement UPnt:Upper limit of Net value UPGS:Upper limit of Gross value dnnt:Lower limit of Net value dnGS:Lower limit of Gross value	UPnt
2.	Judgement of comparator 2	Candidate		UPnt
3.	Judgement of comparator 3	Candidate		UPnt
4.	Judgement of comparator 4	Candidate		UPnt
d.A.	Analog output data type	Candidate	nEt:Net value Gr S:Gross value	nEt
2.	Zero scale of analog output	Numeric value	−9999 to 9999 Set a display value to output 4mA or 0V	0000
F.	Full scale of analog output	Numeric value	−9999 to 9999 Set a display value to output 20mA, +5V or 10V	5000
d.A.	Resolution of analog output	Candidate	dSP: Linked to displayed value resolution int: Internal maximum resolution	dSP
c.	User selected command of external input	Candidate	HoLd:Display Hold, 0Add:Zero correction	HoLd
tESt	Shift to Test Mode	−	Blinked by ▷ and ↵ 3 times to shift Test Mode	−

Function Mode
Calibration setting [CAL]
Press MENU button 3 times in Measuring Mode

Guide display	Content	Numeric value/ Candidate	Range of value/ Candidates	Default value
0.Adj	Zero calibration	–	Blinked by ◁▷ and press ↵ to calibrate zero	–
SPAn	Span calibration	Numeric value	Display value −9999 to 9999 Press ↵ to calibrate span	5000
S.d.	Minimum scale division	Candidate	1,2,5 or 10	1
d.F.	Strength of Digital Filter	Candidate	1(weak), 2, 3, 4, 5, 6, 7, 8, 9 or 10(strong)	5
A.c.	Range to stop moving average	Candidate	oFF, 0.5 to 10.0 step 0.5	oFF
A.u.	Number of times of Moving average	Candidate	1, 2, 4, 8, 16, 24 or 32	4
0.c.	Range of zero tracking to be effective	Candidate	oFF, 0.5 to 10.0 step 0.5	oFF
0.t.	Working time of zero tracking	Candidate	0.2 or 0.5 to 5.0 step 0.5	2.0
d.P.	Decimal point position	Candidate	0(0), 1(0.0), 2(0.00) or 3(0.000)	0
0.Pol.	Polarity of zero equivalent input value	Candidate	P.: plus '+' n.: minus '−'	P.
E.0.Adj	Zero equivalent input value	Numeric value	0.0000 to 9.9999	0.0000
E.SPAn	Display value of span equivalent input	Numeric value	−9999 to +9999	5000
S.Pol.	Polarity of span equivalent input value	Candidate	P.: plus '+' n.: minus '−'	P.
E.S.Adj	Span equivalent input value	Numeric value	0.0000 to 9.9999	1.0000

Test Mode

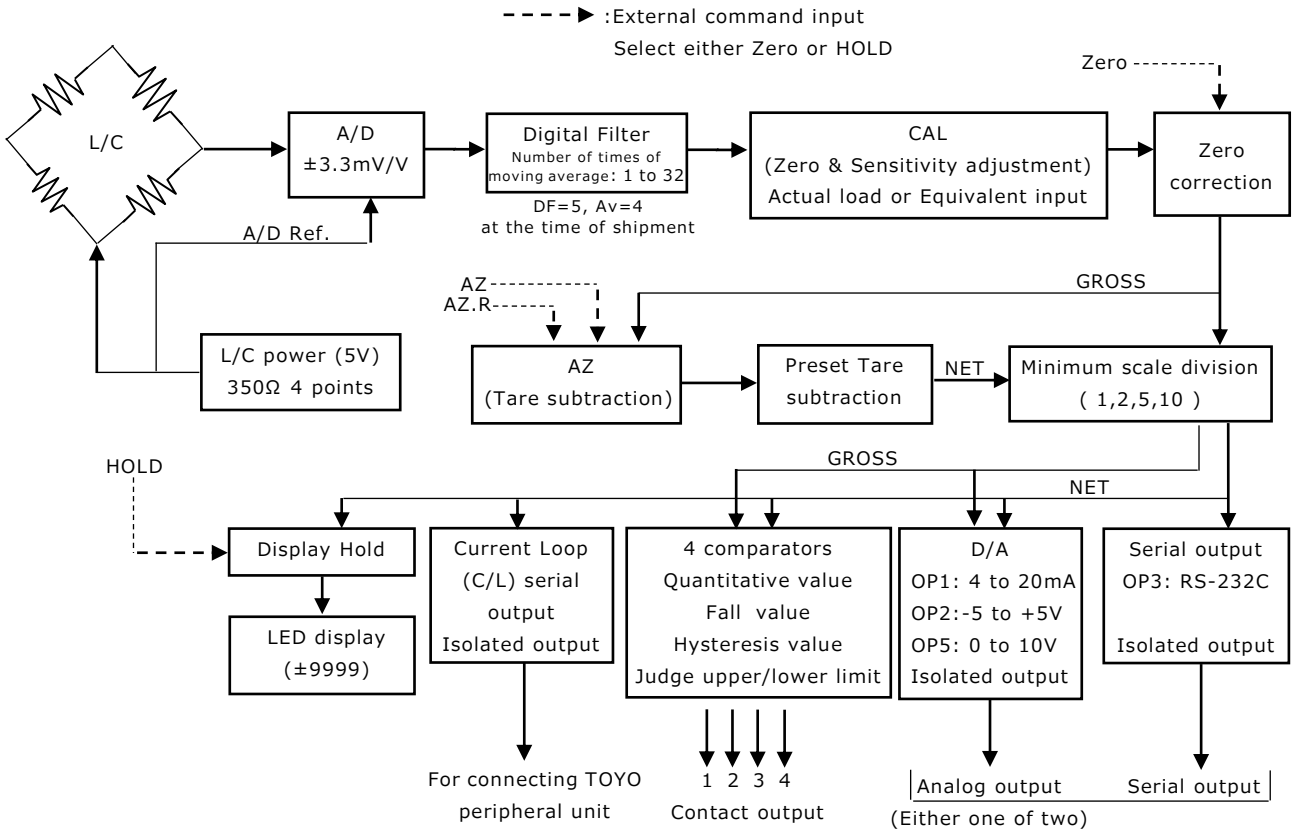
Turn power ON while pressing [↵] button or press [↵] button 3 times within 3 seconds right after powered ON. Also it is possible to enter in Function Mode.

Proceed to the next by [MENU] button and return to the previous by [ITEM] button.

Guide display	Test item	Contents
5028A	Model Name	Press [▷] button 3 times to return to Measuring Mode.
P.	Program Version	Display program version Press [▷] button 3 times to return to Measuring Mode.
8.8.8.8.8.	Check LEDs	The order to check LEDs as follows. 1. All LEDs are turned OFF 2. Each segment of all 7 segment LEDs and status LEDs are turned ON in order 3. All decimal point are turned ON 4. All segment of each 7 segment LEDs are turned ON from left side to right side 5. All status LEDs are turned ON 6. All LEDs are turned ON and back to 1.
E.	Check button	Display allocated number of buttons 1[MENU], 2[ITEM], 3[AZ], 4[AZ.R], 5[PT], 6[△], 7[LOCK], 8[↵] Proceed to the next item to press [MENU] twice. Return to the previous item to press [ITEM] twice.
r.	Check external output	Display Relay number and output to specified Relay 4 o o o-Relay 4 is MAKE/BREAK when pressing [◁] button o 3 o o-Relay 3 is MAKE/BREAK when pressing [▷] button o o 2 o-Relay 2 is MAKE/BREAK when pressing [▽] button o o o 1-Relay 1 is MAKE/BREAK when pressing [△] button
c.	Check external input	Display status of external input. o o 1-External input (AZ) is ON. o 1 o-External input (AZ.R) is ON. 1 o o-External input (CMD) is ON.
d c.	Adjust analog output	Press [◁][▷] button to adjust 4mA / 0V 4. ±xx: Press [△][▽] to increase/decrease 4mA (OP-1) 0. ±xx: Press [△][▽] to increase/decrease 0V (OP-2,5) Press [◁][▷] button to adjust 20mA / 5V/ 10V 20. ±xx: Press [△][▽] to increase/decrease 20mA (OP-1) 5. ±xx: Press [△][▽] to increase/decrease 5V (OP-2) 10. ±xx: Press [△][▽] to increase/decrease 10V (OP-5) Press [◁][▷] button to adjust -5V -5. ±xx: Press [△][▽] to increase/decrease -5V (OP-2) Press [↵] button to memorize
d o.	Check analog output	Select analog output 11 steps. Press [△][▽] button to increase/decrease analog output. This function helps to confirm the linearity of analog output.
St. (Indicate for one second)	Check output voltage from Load Cell	Display output voltage (mV/V) from Load Cell. Status LEDs (SP1 to SP4) are lighted up as minus. The value is blinking when A/D over. Press [◁][AZ] button to set the value to be zero. Press [▷][AZ.R] button to restore the value.
0.Adj	Zero correction	Operate zero correction even if loaded on Load Cell. Press [▷] button to display the measured value. Press [△][▽] button to increase/decrease zero point. Press [↵] button to memorize the zero correction.

d c./d o. is indicated only when OP-1, OP-2 or OP-5 is installed

§15. Functional Block Diagram



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