



Installation and Maintenance Manual

3-points preset counter

Series CEU1*-*

1 Safety Instructions

- This manual contains essential information for the protection of users and others from possible injury and/or equipment damage.
- Read this manual before using the product, to ensure correct handling, and read the manuals of related apparatus before use.
- Keep this manual in a safe place for future reference.
- These instructions indicate the level of potential hazard by label of "DANGER", "WARNING" or "CAUTION", followed by important safety information which must be carefully followed.
- To ensure safety of personnel and equipment the safety instructions in this manual and the product catalogue must be observed, along with other relevant safety practices.

⚠ DANGER	In extreme conditions, there is a possibility of serious injury or loss of life.
⚠ WARNING	If instructions are not followed there is a possibility of serious injury or loss of life.
⚠ CAUTION	If instructions are not followed there is a possibility of injury or equipment damage.

⚠ WARNING

- The compatibility of pneumatic equipment is the responsibility of the person who designs the pneumatic system or decides its specifications.**
Since the products specified here can be used in various operating conditions, their compatibility with the specific pneumatic system must be based on specifications or after analysis and/or tests to meet specific requirements.
- Only trained personnel should operate pneumatically operated machinery and equipment.**
Compressed air can be dangerous if an operator is unfamiliar with it. Assembly, handling or repair of pneumatic systems should be performed by trained and experienced personnel.
- Do not service machinery/equipment or attempt to remove components until safety is confirmed.**
 - Inspection and maintenance of machinery/equipment should only be performed after confirmation of safe locked-out control positions.
 - When equipment is to be removed, confirm the safety process as mentioned above. Switch off air and electrical supplies and exhaust all residual compressed air in the system.
 - Before machinery/equipment is re-started, ensure all safety measures to prevent sudden movement of cylinders etc. (Supply air into the system gradually to create back pressure, i.e. incorporate a soft-start valve).
- Do not use this product outside of the specifications. Contact SMC if it is to be used in any of the following conditions:**
 - Conditions and environments beyond the given specifications, or if the product is to be used outdoors.
 - Installations in conjunction with atomic energy, railway, air navigation, vehicles, medical equipment, food and beverage, recreation equipment, emergency stop circuits, press applications, or safety equipment.
 - An application which has the possibility of having negative effects on people, property, or animals, requiring special safety analysis.

⚠ CAUTION

- Ensure that the air supply system is filtered to 5 microns.

1 Safety Instructions (continued)

Operating and Storage Environments

⚠ WARNING

- Environments to avoid**
Avoid using or storing the products in the following environments which may cause failures. If the products need to be used or stored in these environments, take necessary measures.
 - Place where ambient temperature exceeds the range of 0 °C to 50 °C.
 - Place where ambient humidity exceeds the range of 35% to 85% RH.
 - Place where condensation occurs due to sudden temperature change.
 - Place where atmosphere containing corrosive gas, flammable gas or organic solvent.
 - Place where atmosphere containing conductive powder such as dust, iron chips, oil mist, salt, or organic solvent, or splashing cutting chips, dust and cutting oil (water, liquid) over the products.
 - Place where the products are exposed to direct sunlight or radiated heat.
 - Place where strong electromagnetic noise is generated (place where strong electric field, strong magnetic field or surge is generated).
 - Place where static electricity is discharged or condition that the products have electrostatic discharge.
 - Place where strong high frequency is generated.
 - Place where damage by lightning is possible.
 - Place where vibration or impact is directly given to the products.
 - Condition that the products are deformed by force or weight applied.

This product is class A equipment that is intended for use in an industrial environment.

Installation

⚠ CAUTION

- Maintenance space**
When installing the product allow space for maintenance.

Wiring

⚠ WARNING

- Preparation for wiring**
Shut off the power before wiring (including insertion and removal of connectors). Mount a protective cover on the terminal block after wiring.
- Check the power**
Make sure the power has sufficient capacity and voltages are within the specified range before wiring.
- Grounding**
Ground terminal block F.G. (Frame Ground). Do not ground it with devices generating strong electromagnetic noise.
- Separation of signal line from power line**
Avoid common or parallel wiring of signal and power lines to prevent malfunction due to noise.
- Wiring check**
Incorrect wiring may cause damage or malfunction of the products. Make sure the wiring is correct before operation.
- Wiring arrangement and fitting**
Avoid bending cables sharply at the connector part or electrical entry in the wiring assembly.
Incorrect assembly may cause disconnection which in turn causes malfunction. Fix cables close enough so as not to exert excessive force on to the connector.

Operation

⚠ WARNING

- Terminal block protective cover.**
Key operation should be done with the condition that the terminal block protective cover is mounted. If human body touches the terminal block accidentally, an electric shock may be a result.
- Prohibition of operation with wet hands.**
Do not perform key operation with wet hands, which may cause an electric shock and/or failure of the products and other devices.

1 Safety Instructions (continued)

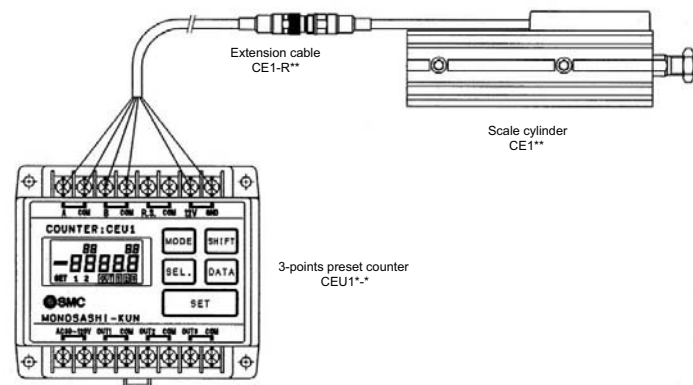
Maintenance

⚠ CAUTION

- Performing regular check.**
Check regularly that the product does not operate with faults. Trained and experienced operators should do check.
- Prohibition of disassembly and modification**
To prevent accidents such as failures and electric shocks, do not remove the cover to perform disassembly or modification. If the cover has to be removed, shut off the power before removal.
- Disposal**
Request a special agent for handling industrial waste to dispose the products.

2 Product Summary

The 3-point preset counter (CEU1) is a product to indicate travel distance of cylinder by 0.1 mm and used in connection with the scale cylinder (CE1). It has 3 independent preset output functions and produces a preset output when the counted value and preset value are the same.



Scale cylinder wire colours	Counter terminal base
White	A
Blue	COM
Yellow	B
Brown	COM
Red	12 V
Black	GND
Shield	Frame Ground (FG)

Features of 3-points preset counter

- Mounting on DIN rail is available.
- Number of output points is 3.
- Fast response (follow up 2 m/s at maximum cylinder speed)
- 3 selectable output modes (1-shot, Hold & Compare)
- Possible to specify tolerance ($\pm \Delta X$ mm)

How to order

Four variations of CEU1 are available for different functions.

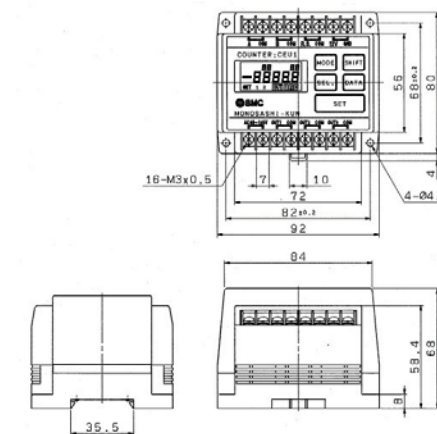
3-points preset counter

CEU1 ※ - ※

Supply voltage	Nil 80 - 120 Vac
	D 24 Vdc
Output transistor type	Nil NPN open collector
	P PNP open collector

2 Product summary (continued)

Outline dimensions



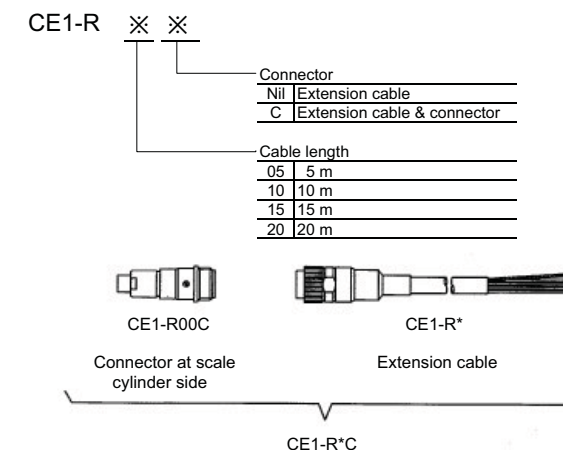
Options

Scale cylinder

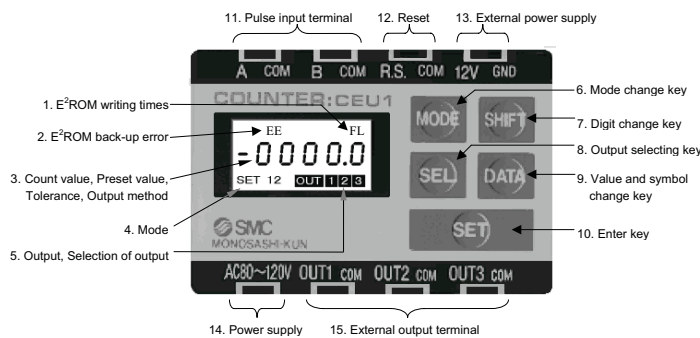
Mounting Type	B Double end tapped	L Foot type	F Front flange type	G Rear flange type	D Double clevis type	Bore size	12 12 mm	20 20 mm	32 32 mm	40 40 mm	50 50 mm	63 63 mm	Auto-switch suffix (Qty.)	Nil 2 pcs.	S 1 pc.	n n pcs.	Auto-switch type	Nil Without auto-switch	Refer to auto-switch catalogue for details	Cable	Nil 0.5 m	L 3 m	Connector	Nil With connector	Z Without connector	Cushion (applicable bore size ø40 to ø60)	Nil Double side cushion	N Without cushion	R Front cushion	H Rear cushion
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Bore size	Stroke (mm)											
	25	50	75	100	125	150	175	200	250	300	400	500
12	*	*	*	*	*	*	*	*	*	*	*	*
20	*	*	*	*	*	*	*	*	*	*	*	*
32	*	*	*	*	*	*	*	*	*	*	*	*
40	*	*	*	*	*	*	*	*	*	*	*	*
50	*	*	*	*	*	*	*	*	*	*	*	*
63	*	*	*	*	*	*	*	*	*	*	*	*

Extension cable



3 Description



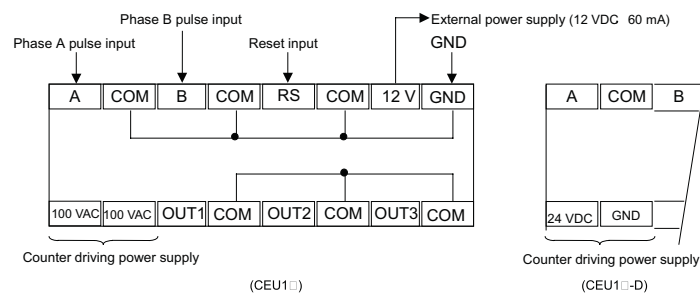
No.	Summary
1	Displays "FL" when E2ROM is written approx. 65,000 times.
2	Displays "EE" when memorized data has an error.
3	Counted value, preset value, tolerance and output type is displayed.
4	Turns off in count mode and flashes or lights up in setting mode.
5	Displays number where output comes in count mode and output number to be set in setting mode.
6	Switches between count mode and setting mode.
7	Changes digit in setting mode.
8	Changes output - OUT1, OUT2 and OUT3 in setting mode.
9	Changes number or symbol in setting mode.
10	Retains set data in setting mode.
11	Connects pulse output from scale cylinder
12	Clears screen and output.
13	Power supply for scale cylinder (12 VDC, 60 mA)
14	Power supply to drive counter. (80 to 120 VAC or 21.6 to 26.4 VDC)
15	Turns output on and off corresponding to set data.

4 Specification

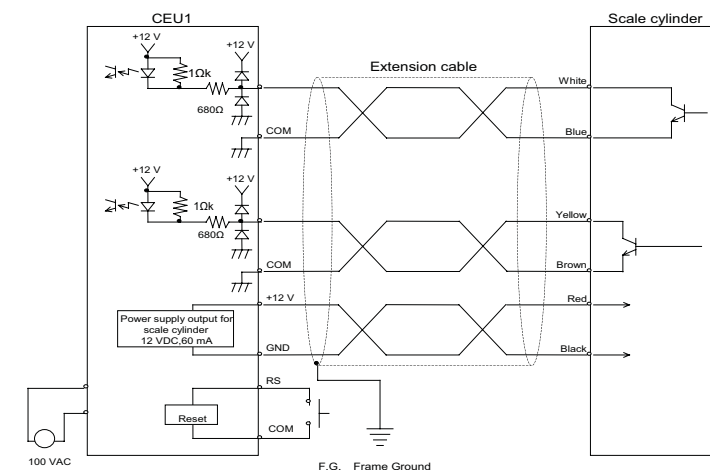
Model	CEU1	CEU1P	CEU1-D	CEU1P-D
Type	3-points preset counter			
Mounting	Surface mount (with DIN rail or set screws)			
Operation	Addition and subtraction			
Operating mode	Operation mode, Preset data setting mode			
Reset	External reset terminal			
Display	LCD (with back-light)			
Number of digits	5 digits (-9999.9 to 9999.9)			
Memory backup media	Preset data (held all the time) E2ROM (warning sign: FL when written to approx. 65,000 times)			
Input signal	Count input, Reset input			
Count input	No-voltage pulse input			
Pulse signal input	90° phase difference input (A/B quadrature input)			
Counting speed	20 kHz			
Reset input	Conduction between RS and COM terminal for 10 ms or more (pulse input)			
Sensor power supply	10.8 to 13.2 VDC, 60 mA			
Output signal	Preset output			
Preset output	Compare, hold, one-shot (fixed at 100 ms)			
Output time lag	5 ms or less			
Output transistor mode	NPN	PNP	NPN	PNP
Power supply voltage	80 to 120 VAC, 50/60 Hz		21.6 to 26.4 VDC	
Power consumption	10 VA or less		5 W or less	
Withstand voltage	Between case and AC line: 1500 VAC, 1 minute Between case and signal ground: 500 VAC, 1 minute			
Insulation resistance	Between case and AC line: 500 VDC, 50MU or more			
Ambient temperature	0 to +50° C (Without freezing)			
Ambient humidity	35 to 85% RH (Without condensation)			
Noise resistance	Square wave noise by noise simulator (pulse width: 1 μs) between power supply terminals: ±1500 V, input/output line: ±600 V			
Vibration resistance	Durable to 10 Hz to 55 Hz and amplitude of 0.75 mm in X, Y and Z directions for 2 hours each.			
Impact resistance	Durable to 10 G in X, Y and Z directions for three times each.			
Weight	Approx. 250 g			

5 Wiring

Terminal block arrangement



Connection with scale cylinder

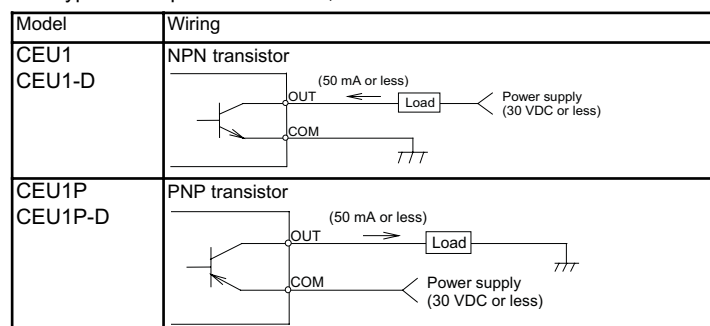


Noise countermeasures

- Follow the instructions to prevent malfunction due to noise.
- Use SMC extension cable CE1-R** for wiring the scale cylinder to the CEU1.
 - Use a shielded cable of 5 meters or less for wiring the control input and output signals.
 - Keep signal wires away from the power cables (motor, welding machine) in wiring looms.
 - When cables may cause radiation noise, mount a ferrite core on the signal cable.
 - (Ex.: Kitagawa Industries, SFC-10).
 - Use another stable power source for CEU1 power supply, separate from motor and solenoid valve for AC type.
 - Mount a noise filter to reduce noise effects from the power source (100 VAC).
 - (Ex.: TDK, ZGB2203-01U).
 - Mount a varistor between output terminals of power supply for scale cylinder.
 - (Ex.: Panasonic, ERZV10D220).
 - Keep relays at least 10 cm away from CEU1 when they are installed.
 - Power supply voltage 24 VDC type of CEU1*-D will conform to EMC directive.
 - Please use a CE marked power supply.
 - Ensure the power supply cable is less than 10 m.

Wiring the output

Two types of output are available, NPN and PNP.

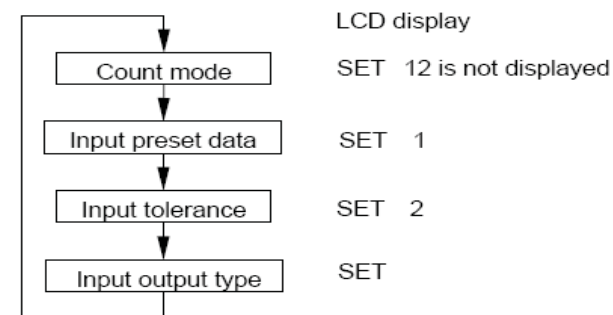


6 Operation

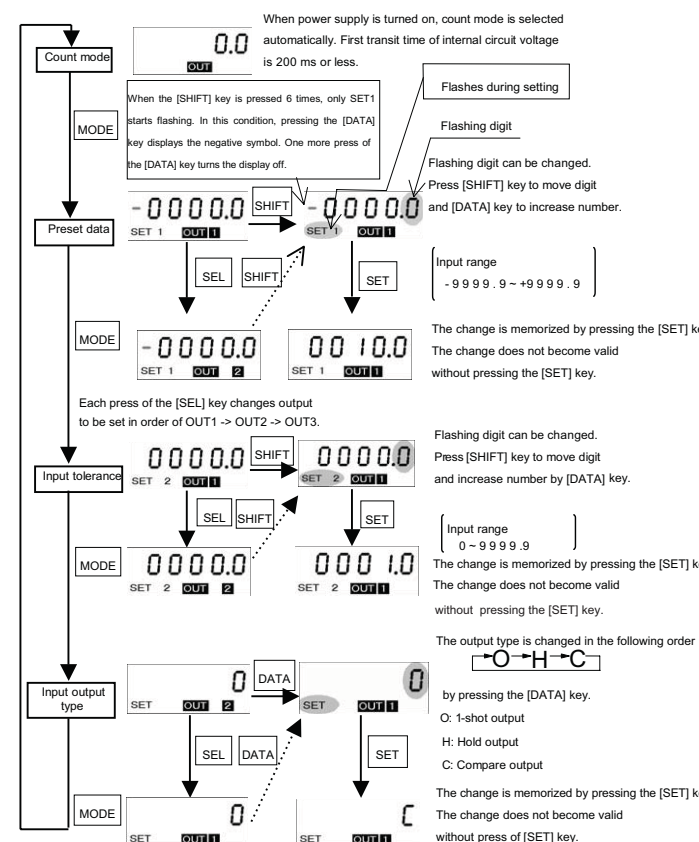
Description and function of keys

Description	Function
MODE	Switches between count mode and setting mode.
SHIFT	Changes digit when preset data or tolerance is input. Flashing digit moves left when pressed.
SEL	Changes output terminal to be set in setting mode. Each press changes in order of OUT1, OUT2 and OUT3.
DATA	Changes number and symbol in setting mode. The number is increased one by one per press. The display of "-" is lit and turned off.
SET	Retain set content in setting mode. This key is pressed to memorize the set data when setting is changed. If [MODE] and [SEL] keys are pressed without pressing [SET] key to change the screen, the data is not retained.

The mode is changed in the following sequence for each press of the [MODE] key.



Counter activation



- Each output terminal from 1 to 3 can be set individually.
- Tolerance is displayed with both positive and negative values in CEU1. (A function, which enables different values for upper and lower limits respectively, is provided only for CEU5.)

6 Operation (continued)

Setting example.

When counted value is in the range 99.5 to 100.5 mm, an ON signal is obtained from the external output terminal, OUT2.
Transistor contact between OUT2 and COM terminals is ON.

- Turn power supply ON. The count mode display appears.
- Press [MODE] key once. The display for preset data input appears.
- Press [SEL] key once. Output terminal display changes to OUT 2.
- Press [SHIFT] key 4 times and then select the setting digit. Then press [DATA] key once to display preset.
- Press [SET] key once. Set preset data is entered.



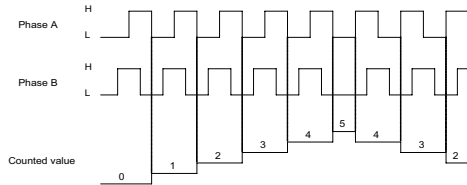
- Press [MODE] key once. The tolerance input display appears.
- Press [SHIFT] key once and select setting digit. Then, press [DATA] key 5 times to display tolerance of 0.5.
- Press [SET] key once. Set tolerance is entered.
- Press [MODE] key once. The display to input the output type appears.
- Press [DATA] key 3 times and select C for compare output.
- Press [SET] key once. Set output type is entered.
- All settings are finished. Press [MODE] key once to return the display to count mode.



- Tolerance: 0.5 - Output terminal OUT2
- Output type: C - Compare output

7 Input and Output

• Input pulse and counted value



• Operation of each output mode

• 1-Shot - LCD display "0"

Without tolerance	With tolerance
Output is ON for 100 ms when the count exceeds the preset value.	Output is ON for 100 ms when the count exceeds the preset value + tolerance.

• Hold - LCD display "H"

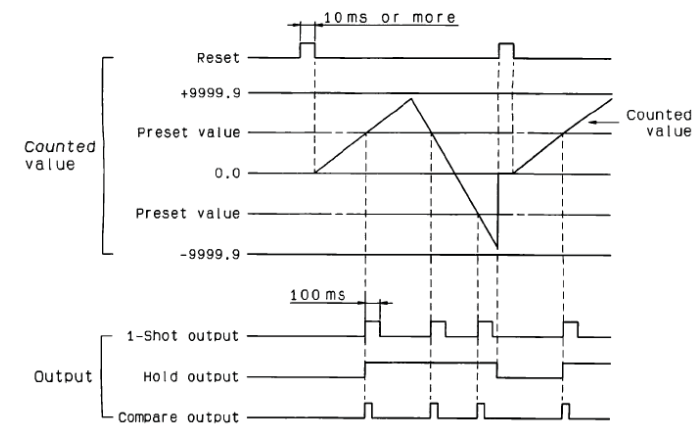
Without tolerance	With tolerance
Output is ON when the count exceeds the preset value and the ON state is maintained until output is released. Output is released by either power shut down, reset signal input or set value change.	Output is ON when the count is within the range of the preset value + tolerance and the ON state is maintained even when the count is outside the set range. Output is released by either power shut down, reset signal input or set value change.

Compare - LCD display "C"

Without tolerance	With tolerance
When the count matches the preset value the output is ON. When they are different, output is OFF	When the count is within the range of the preset value + tolerance, output is ON. When the count is outside the set range, output is OFF.

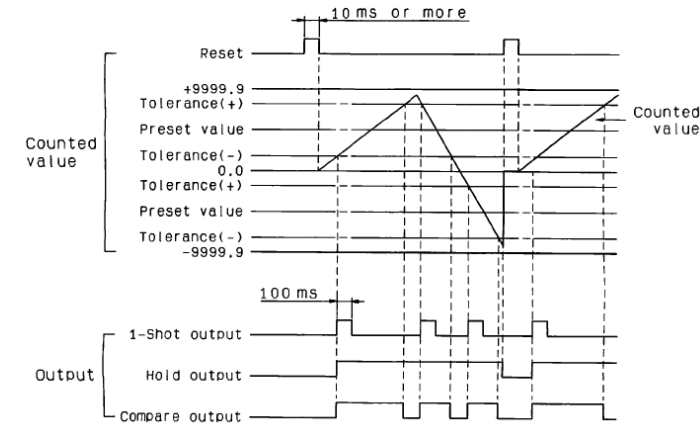
• Output timing chart

• Without tolerance



7 Input and Output (continued)

• With tolerance



8 Troubleshooting (continued)

• Manual check

- Manual check mode can be selected by pressing [MODE], [SHIFT] and [SEL] keys when power supply is turned on.
- When manual check is selected, "0" is displayed and flashes.
- Select check no. by pressing the [DATA] key. A check is performed on the item corresponding to the check number.
- Press [MODE] key to return to manual check screen.
- Input reset signal or turn power off and on to return to count mode.

Check no	Item	Content	LCD display
1	ROM	Normal	
2	RAM	Abnormal	
3	Key	Pressing a key other than [MODE] key displays the code corresponding to the pressed key on the display. Key SHIFT SEL. DATA SET Code 1 2 3 4	
4	LCD	Each segment flashes in order with a certain time interval. Pressing the [SHIFT] key enables check of other segments.	
5	Count	The count input pulse is the same as count mode.	
6	Output	Pressing the [SEL] key changes the OUT number on the display in order and turns the output on simultaneously.	
7	E2ROM	Normal "good" Abnormal "error" When this check is performed, the set value is automatically changed to the default value.	

8 Troubleshooting

• Troubleshooting

Failure	Cause	Countermeasure
Does not count	Is the counter connected to the scale cylinder correctly?	Correct the wiring with reference to section for wiring.
	Is count mode selected?	Select count mode by pressing [MODE] key. "SET" on the LCD display will turn off.
Miscount	Does the frequency of the output signal from the scale cylinder exceed the counting speed?	Decrease frequency of output signal from the scale cylinder by reducing speed, etc.
	Is scale cylinder cable separate from power line? If not, noise could influence the signal.	Keep power and signal cables separated as much as possible.

• Self-check

Self-check starts automatically when the power supply is turned on. If an error arises take the following actions.

LCD display	Check	Content	Output	Remarks
	ROM	ROM has an error when power supply is turned on. CPU stops.	OFF	Replace ROM.
	RAM	RAM has an error when power supply is turned on. CPU stops.	OFF	Replace RAM.
	E2ROM	Set value in the E2ROM has an error when power supply is turned on.	OFF	Press any key to reset. After reset the set value is reset to the default value*.
	E2ROM	Displayed when E2ROM is written to approx. 65,000 times.	No change	E2ROM needs replacing. When upper limit of writing is reached, the set value cannot be memorized.

*Preset value: 0.0

Tolerance: 0.0

Output mode: 1-Shot

9 Contact

AUSTRIA	(43) 2262-62 280	NETHERLANDS	(31) 20-531 8888
BELGIUM	(32) 3-355 1464	NORWAY	(47) 67 12 90 20
CZECH REP.	(420) 5-414 24611	POLAND	(48) 22 211 9600
DENMARK	(45) 70 25 29 00	PORTUGAL	(351) 21 471 1880
FINLAND	(358) 207 513513	SLOVAKIA	(421) 2 444 56725
FRANCE	(33) 1-64 76 1000	SLOVENIA	(386) 73 885 412
GERMANY	(49) 6103 4020	SPAIN	(34) 945-18 4100
GREECE	(30) 210 271 7265	SWEDEN	(46) 8-603 0700
HUNGARY	(36) 1-371 1343	SWITZERLAND	(41) 52-396 3131
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