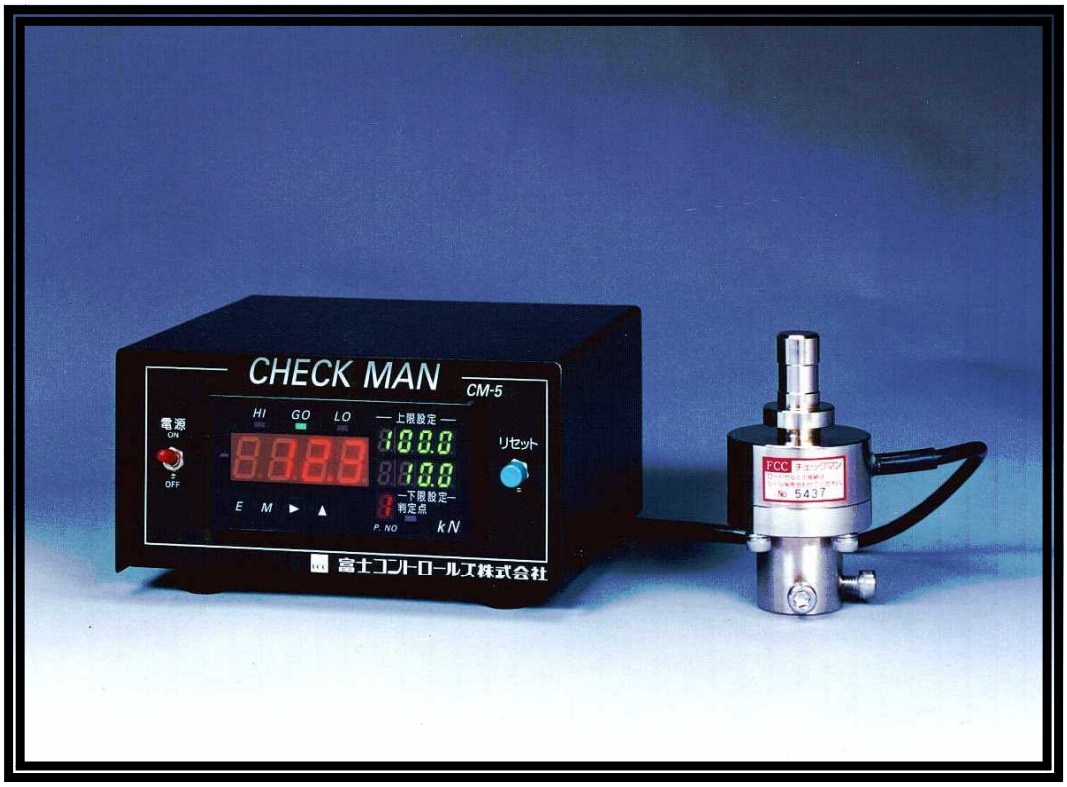
LOAD CHECKING DEVICE

CHECK MAN

Model : CM－5

Instruction manual
(Ver. 4)



Make sure to read this manual before using this unit. Then, keep it in a safe location. The specifications of the system may be changed without prior notice.

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Thank you for purchasing our CHECK MAN/CM-5.

This instruction manual describes the basic functions and precautions in simple terms, so that even people who are unfamiliar with this system can learn how to use it safely. Before using this unit, read this manual thoroughly in order to get the maximum performance from the CHECK MAN/CM-5. However, since this unit may be used in a wide variety of situations, this instruction manual may not cover every case. If you are unclear about any detail, please feel free to contact us. Make sure to store this manual in a handy place for future reference.

☞In this manual, the following types of messages are used to warn of potential hazards:

⚠ **DANGER**	If you disregard this information, there is a likelihood of death or at least serious injury.
⚠ **WARNING**	If you disregard this information, there is a possibility of death and a likelihood of serious personal injury and/or damage to property.
⚠ **CAUTION**	If you disregard this information, there is a possibility of injury and a likelihood of damage to the equipment or other property.

NOTE: This contains special information that should be understood to operate the machine effectively.

⚠ **DANGER**	The specified power is 100 VAC, 50/60 Hz. Never connect the unit to any other voltage, since it is likely to cause a fire.
⚠ **WARNING**	This system is designed and manufactured to perform press fitting operations. If you use this system for any other purpose, the functions and performance of the system are not guaranteed and it may be dangerous.
⚠ **WARNING**	Do not place any voltage across the output relay terminals. If you do, the machine will be damaged and the warranty will be void.
⚠ **WARNING**	Never touch the terminal block on the back of the main housing. Otherwise, you may get an electrical shock.
⚠ **CAUTION**	Never modify, disassemble, or repair this system. If the machine needs to be serviced, please contact us. We will not be responsible for malfunctions or other problems caused by unauthorized service or repairs.
⚠ **CAUTION**	Always make sure to disconnect the power supply before touching the terminal block, since you can get an electrical shock and damage the system.
⚠ **CAUTION**	Use this machine at ambient temperatures between 0 and 50℃. Do not place the system in direct sunlight and or near hot air. Use of the machine in conditions other than those specified may cause a malfunction.
⚠ **CAUTION**	This system is designed on the assumption that it will be used inside Japan. If you use the system outside Japan, please make sure you observe all of the safety regulations in the country of use.
⚠ **CAUTION**	If you loan this machine to someone else, make sure to attach this instruction manual to the machine.

CHECK MAN/CM-5 features

● The CHECK MAN/CM-5 senses the load imposed by the press in press fitting operations and compares it with the upper and lower limits that were specified by the operator. It decides whether the press fitted workpiece is acceptable（GO）or unacceptable, because of too little or too much pressure（HIGH-NG, LOW-NG）. The result of the decision is shown on the digital load display and by the NG

"Indicator." It will also use the relay contacts to provide an external signal whether the press fitting was good or not.

● The CM-5 can store 8 pairs of upper and lower limit values in memory. To change workpiece types easily, just enter the values for each type before starting the operation. This will help prevent setting errors. This machine also has a "Prohibiting changes" function. This feature allows only the assigned operator to change the upper and lower limit settings and registration patterns. And, it also prevents accidents caused by an unauthorized changes in the preset values.

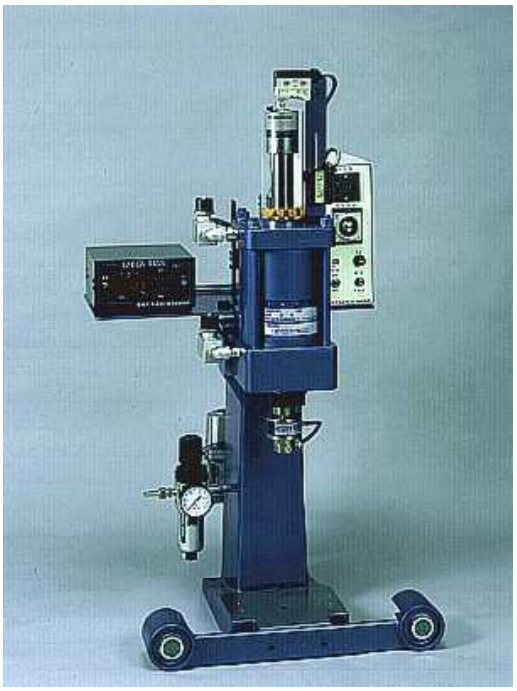
APPLICATIONS

PRESS FITTING: ①Motor gears and pulleys ②VTR parts ③CD parts ④FDD parts ⑤HDD parts ⑥ CD-ROM parts ⑦DVD parts ⑧MO parts ⑨Flywheels ⑩Ball seals on ABS（Anti-lock Brake System）assemblies

CAULKING: ①Speaker terminals ②Coaxial connectors ③Switches ④Ball point pen tips ⑤Motor housings

TESTS AND EXPERIMENTS: ①Material destruction tests（ceramics, clean metal, etc.） ②The feel of switches, and keyboards ③Strength of solder joint（capacitors, resistors, ICs, etc.）

INSTALLATION EXAMPLES



Installed on a pneumatic press

Installed on a hand press

When opening the shipping package

The following items should have been packed in the box. Please open the box as soon as possible and make sure all of the items were packed inside. Make sure there are no missing items. Make sure that none of the items is damaged.

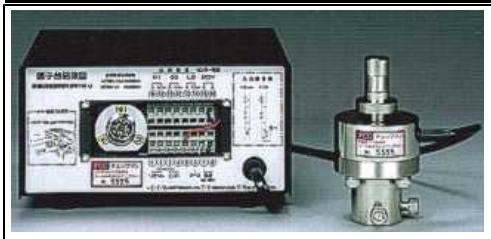
The housing for the measurement device and the load cell* were adjusted as a pair before delivery. They have the same serial number on the red stickers attached to the both components（see the photos below）. Make sure that the numbers on these stickers are the same.

＊ LOAD CELL: Load cell means Strain Gauge Transducer.

☐ Measurement device housing（Serial No. ）
☐ Load cell（Serial No. ）
☐ Instruction manual

● If you ordered optional items :
☐ Load measurement complete sensor
☐ Evaluation mechanism parts
☐ Others（ ）

Location of the serial number



Load cell

Back of the measurement device housing

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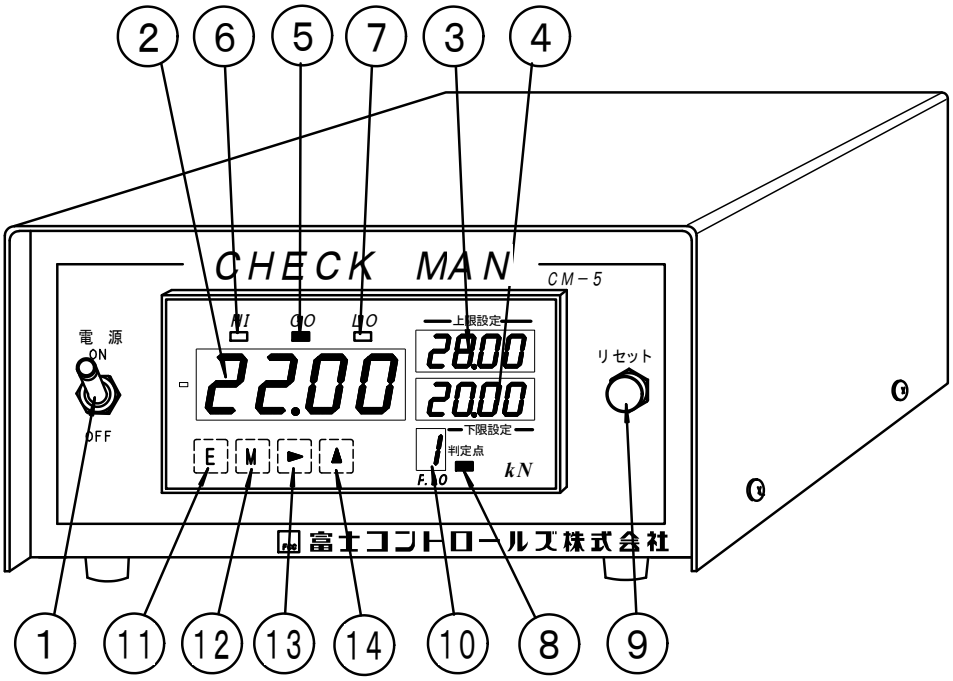
Name and function of each part on the measurement device housing



① Power switch

This is a toggle switch. Flip the lever up to turn the power ON, and flip it down to turn OFF the power. After turning ON the power, all of the LEDs will be lit for about three seconds. During this three seconds the system will check the condition of the internal microcomputer RAM and ROM. If they are operating properly, the load display will show 0 ("0.0", "0.00" or "0.000" depending on the model). This means the system is ready to start measuring. If a ROM error is detected, an error number will be displayed. If this happens, see the "Troubleshooting" section on page 25.

② Digital load display (red LED characters)

The digital load display will show the maximum load imposed on the load cell during a certain period of time. That maximum load is referred to as the "peak value." Normally the period of time runs from the start of the measurement operation until the system receives **the load measurement complete signal***. The system will update this peak value continuously during this time (only positive values will be displayed). So, if the current load is larger than the peak value already being displayed, the display will be updated. The display will be refreshed either 12.5 times (at 50 Hz) or 15 times (at 60 Hz) per second. However, the system is constantly measuring the actual value with an analog circuit. Since the special, internal sample and hold circuit detects and stores the peak load whenever it occurs, the system can always measure the actual peak load accurately, even though the digital display is still showing the previous peak value. When the constant load measurement mode is selected (see "Method for selecting the measurement mode" on page 22) and the load measurement complete signal is received, the system will take the highest analog value stored in **the special analog sample and hold circuit*** and convert it into a digital reading, which is then displayed as the peak value. This is how the system is able to accurately detect the highest load experienced, without being influenced by the digital display update interval. This digital display can show numbers up to 3000. If it detects a load greater than the display can handle, the readout will show "o.L.".

After the load measurement complete signal is received, the display will continue to display the peak load reading until the next reset (start) signal is received.

NOTE: The display details will vary, depending on the model. The decimal point position is different for each model (see the "Digital load display" section on page 27).

＊**Load measurement complete signa**l: After the system receives this signal, it will stop measuring loads and compare the measured value with the preset upper and lower limits. At the same time, the system will let you know the result of the comparison using the display and by outputting a signal on the relay contacts.

＊**Special analog sample and hold circuit**: In the usual digital sampling and display method, if the sampling rate is less than 3,500 times per second while press fitting, the system will take a relatively long time to convert the analog value into a digital one. If the load changes during this conversion, then even though the system can measure the change, it cannot display the new reading right away. The special analog sample and hold circuit in these units overcomes this problem. It is constantly measuring the load, even while the system is converting the most recent value from analog to digital. In the peak load measurement mode（method used to display the peak load during a certain period of time）, the system stores new load values throughout the interval as analog voltages, in preparation for the next conversion of the peak value. In the constant measurement mode（method for displaying changes in the load as they happen）, the system will store the current measured load, and simply display the current load when the load measurement complete signal is input. Then the system will compare these values with the specified limits.

Since this system is equipped with a high-speed analog sample and hold circuit, it can accurately identify the peak load and measure the constantly changing load with precision regardless of the digital display operation.

③ Load upper-limit digital display (green LED characters)

This display shows the upper limit that will be used as the criterion for evaluating the actual load.

④ Load lower-limit digital display (green LED characters)

This display shows the lower limit that will be used as the criterion for evaluating the actual load.

＊When entering the upper or lower limits, or when any function is selected, the names of the items to select will be displayed in these displays, in alphabetical order.

⑤ GO indicator (green LED)

After the system receives a load measurement complete signal, if the load shown on the digital load display is between the specified upper and lower limits, this LED indicator will light.

Upper limit value ≧ Measured load value ≧ Lower limit value

At the same time, terminals ⑪ and ⑫ （"a" contacts: normally open） on the terminal block（on the back） will be shorted together until the next reset（start） signal is input or until the system is manually reset.

⑥ HIGH-NG indicator (red LED)

When the system has received a load measurement complete signal, if the measured load（displayed on the digital load display） exceeds the preset upper limit, this LED indicator will light.

Upper limit value ＜ Measured load value

At the same time, terminals ⑨ and ⑩ （"a" contacts: normally open） on the terminal block（on the back） will be shorted together until the next reset（start） signal is input or until the system is manually reset.

⑦ LOW-NG indicator (red LED)

When the system has received a load measurement complete signal, if the measured load（displayed on the digital load display） is less than the preset lower limit, this LED indicator will light.

Measured load value ＜ Lower limit value

At the same time, terminals ⑬ and ⑭ ("a" contacts: normally open) on the terminal block (on the back) will be shorted together until the next reset (start) signal is input or until the system is manually reset.

⑧ Judgment point indicator for the load measurement complete signal (red LED)

This indicator will flash while the load measurement complete signal sensor is waiting for a signal (terminals ③ and ④ on the terminal block on the back, "b" contact: normally closed).

＊This LED indicator will be steadily lit when the sensor is activated (when terminals ③ and ④ are open, which occurs when the load measurement complete signal is input).

⑨ Manual reset push button

Press this button to clear the display, initialize the judgment signals, and perform an automatic zero of the machine. If a reset (start) signal is present (terminals ① and ② are shorted), this button will not function. When you reset the system manually, make sure not to leave any pressure applied to the load cell by the press. However, you can press this button while a jig is installed on the load cell.

After turning ON the power, all of the LEDs will light for about three seconds. During this three seconds the system will check the condition of the internal microcomputer RAM and ROM. If the digital load display shows any characters other than zeroes or dashes (－－－－), press this button.

(If any letters are displayed, a ROM error has occurred. If this happens, see the "Troubleshooting" section on page 25.)

⑩ Pair number display (red LED)

Eight pairs of user set upper and lower limits can be stored in memory. This display shows the number of the currently selected pair (item numbers ③ and ④ in the illustration on the previous page).

＊For details about selecting a different pair, see the section, "Method for selecting a pair of upper and lower limits," on page 20.)

⑪,⑫,⑬,⑭ These are membrane switches used for various settings, changing specified values, and to select functions.

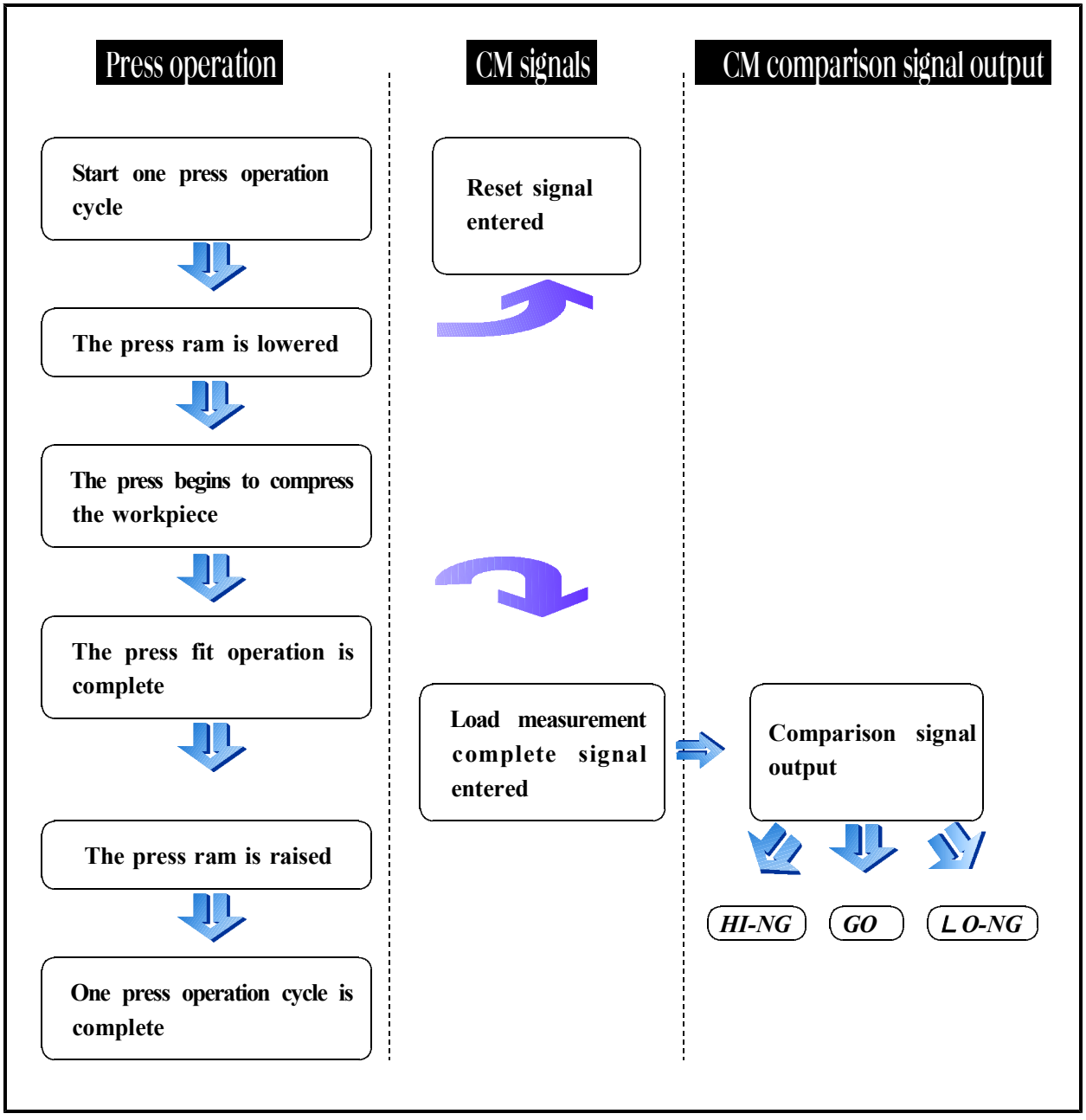
Specify and change the settings by using the four keys in different combinations. This system employs **a double-key safety function*** method that requires you to press two keys simultaneously to enter the operation mode. (For details about each of **the settings and changes**, see the respective sections on pages 13 to 23.)

⑪ **ENTER** key
In the descriptions from here on, this key is just referred to as [E].
⑫ **MODE** key
In the descriptions from here on, this key is just referred to as [M].
⑬ **SHIFT** key
In the descriptions from here on, this key is just referred to as [▶].
⑭ **INCREMENT** key
In the descriptions from here on, this key is just referred to as [▲].

＊ **Double-key safety function**: Press both the [E] and [▲], the [▶] and [▲], or the [E] and [M] keys at the same time to enter the operation mode. Make sure to press the [E] or [▶] key first in the examples above.

Operating Chart

After receiving a reset (start) signal, the CM-5 will measure load values continuously until a load measurement complete signal is received. Then it will compare the results with the user specified limits.



Comparisons and results

To make comparisons and present the results, both a **"Reset signal"** and a **"Load measurement complete signal"** are required.

The following types of signals should be supplied: ① No-voltage contact signal (relay contact, output contact from a programmable controller I/O module, or micro-switch contacts); or ② Voltage signal (open collector signals such as a photo switch, or output from a programmable controller I/O module).

1. Reset signal

A reset signal is created when terminals ① and ② are shorted, ("a" type contact) or when the voltage drops to logical 0.

NOTE: Make sure to supply a reset signal after starting a cycle and at least 0.2 seconds before

starting a pressing operation.

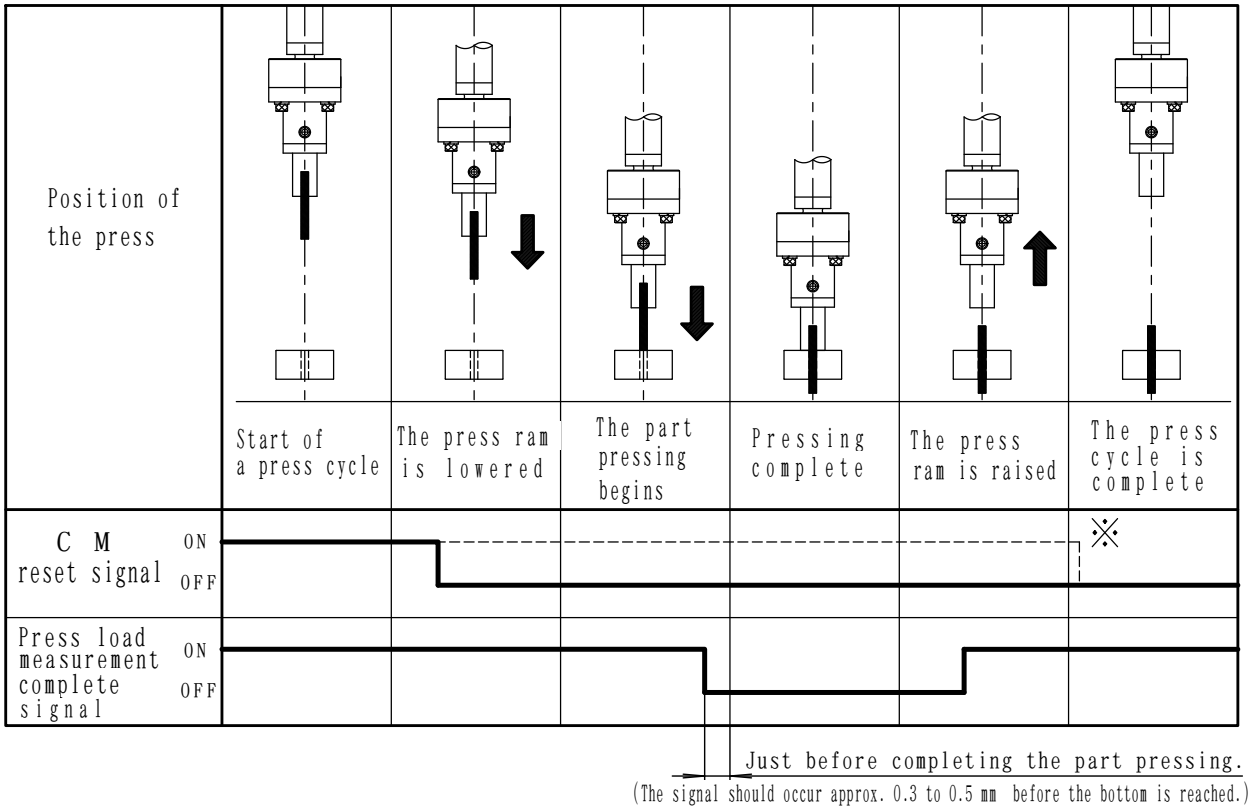
2. Load measurement complete signal

A load measurement complete signal is created when terminals ③ and ④ are opened, ("b" type contact) or the voltage level rises to logical 1. The system responds to the rising edge when the shorted terminals are opened (when the level changes from "0" to "1").

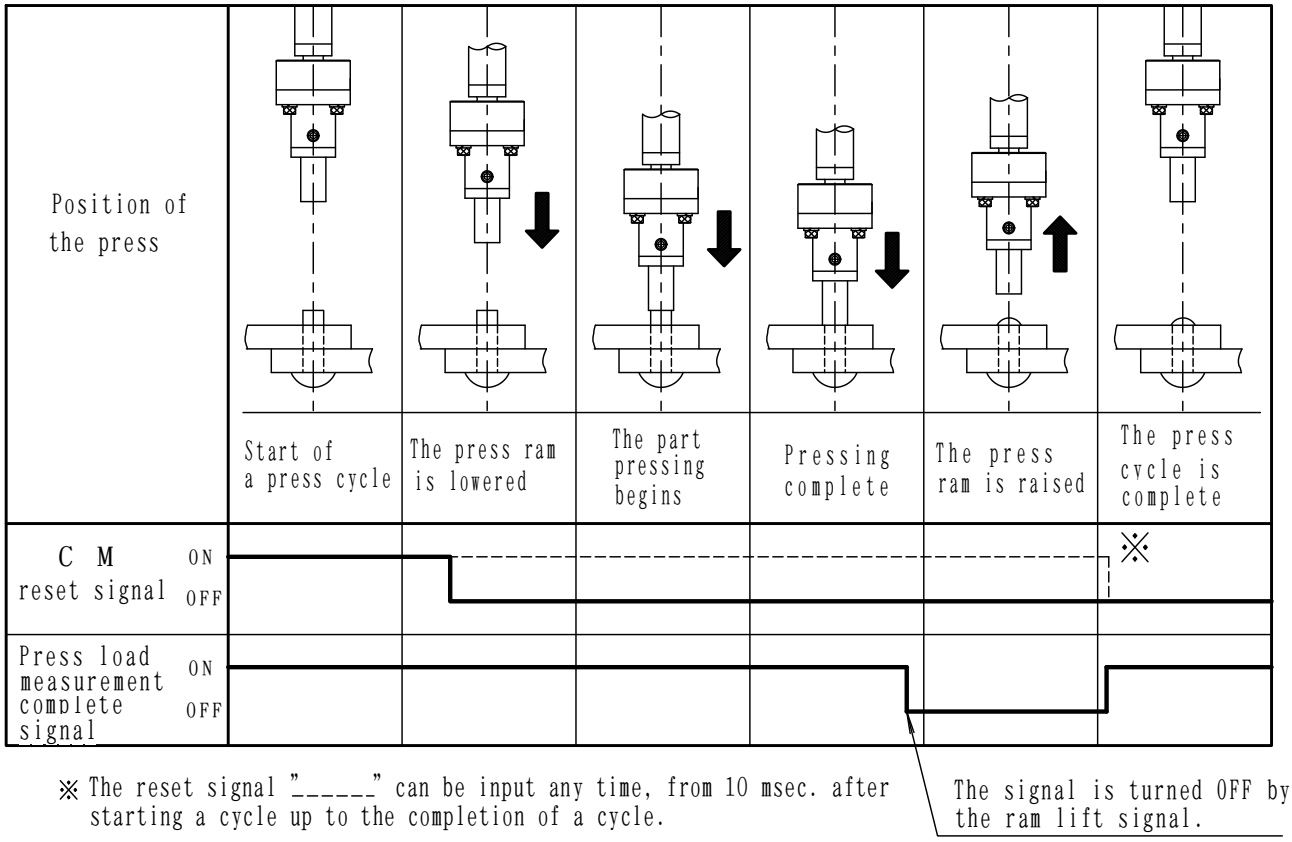
● **Logical "0":** 0 to 1.5 V ● **Logical "1":** 3.5 to 5 V ● **Input current:** 2 mA or less

NOTE: Use "b" type contacts for this signal. Since the system uses the change from a short circuit to an open (ON to OFF) as a timing signal, you should make sure that the terminals are shorted and then opened after the measurement is complete. When a reset signal is input, the contacts for the load measurement complete signal should be shorted.

Press fit operation



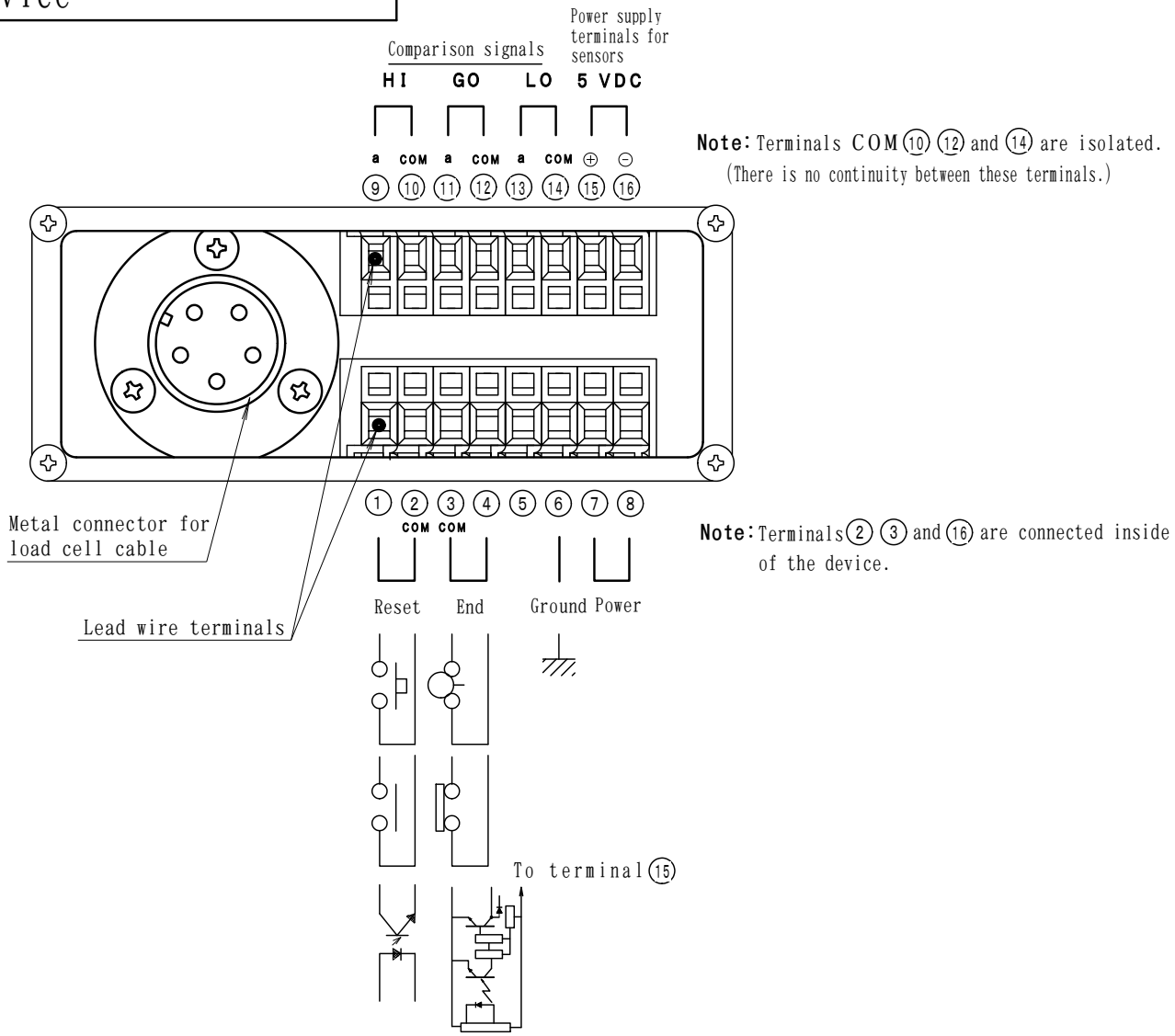
Press output control, such as a caulking operation



※ The reset signal "_____" can be input any time, from 10 msec. after starting a cycle up to the completion of a cycle.

External connection terminals and their functions

Terminal block on the back of the measurement device



Terminals

①－②: Reset (start) signal terminals

This signal is used to clear the display values, release the judgment signals, and initiate the automatic zero function. Enter the signal after starting a press cycle. The signal can be entered any time, from 10 msec. after starting the cycle until the cycle is complete. Since the system regards the change from an open to a short circuit（OFF to ON） as a valid signal, make sure that the signal does not drop prematurely. Either a no-voltage contact or an open collector signal are acceptable.

③－④－⑮: Load measurement complete signal terminals

Terminal ⑮ is a 5 VDC + power source that is used for a photo sensor. When you will be using no-voltage contacts, make sure to connect only terminals ③ and ④. An open collector can also be used. The system regards the change from a short to an open circuit（ON to OFF） as a valid timing input signal. Before entering a reset signal, make sure to short the load measurement complete terminals. You can check the current status of these terminals by watching the flickering of the judgment point indicator on the front panel of the measuring device.

⚠ CAUTION	**Terminals ①, ②, ③, ④ and ⑮ must only be connected to a 5 VDC circuit. Be careful not to connect them to 100 VAC.（The internal circuits may catch fire.）**

⑤: Manual reset terminal

The manual reset terminal is connected to the reset switch on the front side of the measurement device. It is connected internally to terminal ①.

⑥: Ground terminal

Connect only to a class 3 or better ground. Never share the ground for this system with other power source devices or electric motors.（Doing so may cause electric noise.）

⑦－⑧: Power source

These terminals are connected to the power switch on the front.

⑨－⑩: HIGH-NG signal output terminals ("a" type contact, continuous signal)

When there is an upper limit failure（HIGH-NG）, these terminals will be shorted. They will be opened again when the next cycle starts or when the manual reset button is pressed.

Upper limit value ＜ Measured load value

Contact rating: 120 VAC/0.5A, 28 VDC/1A（resistance load）

⑪－⑫: GO signal output terminals ("a" type contact, continuous signal)

When the evaluation is OK（GO）, these terminals will be shorted. They will be opened again when the next cycle starts or when the manual reset button is pressed.

Upper limit value ≧ Measured load value ≧ Lower limit value

Contact rating: 120 VAC/0.5A, 28 VDC/1A（resistance load）

⑬－⑭: LOW-NG signal output terminals ("a" type contact, continuous signal)

When there is a lower limit failure（LOW-NG）, these terminals will be shorted. They will be opened again when the next cycle starts or when the manual reset button is pressed.

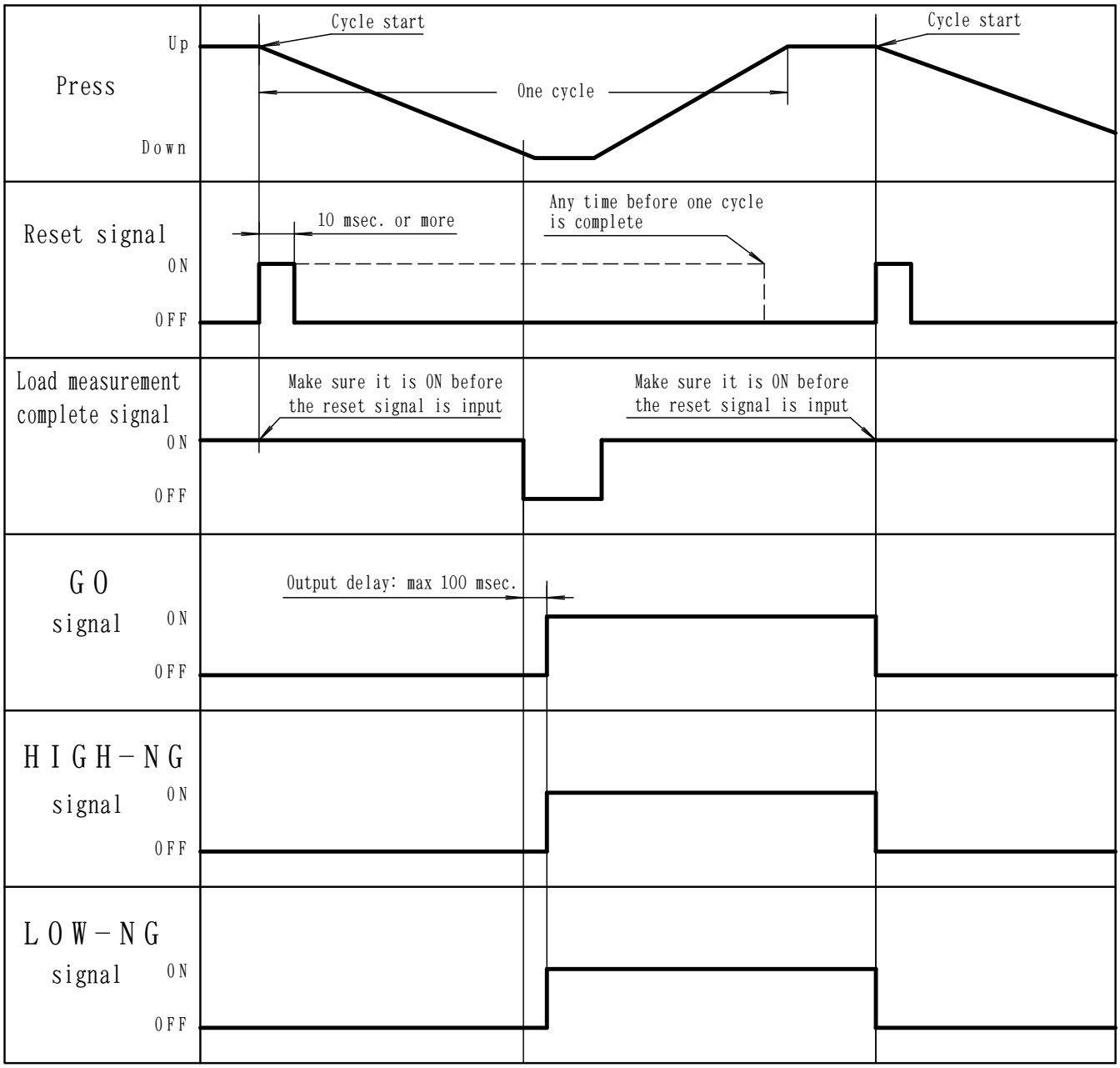
Measured load value ＜ Lower limit value

Contact rating: 120 VAC/0.5 A, 28 VDC/1 A（resistance load）

⑮－⑯: Sensor power supply

These are the DC power terminals used for a photo sensor. Terminal ⑯ is connected to the reset switch on the front of this measurement device.

Power specifications: 5 VDC ± 10 %, MAX 25 mA

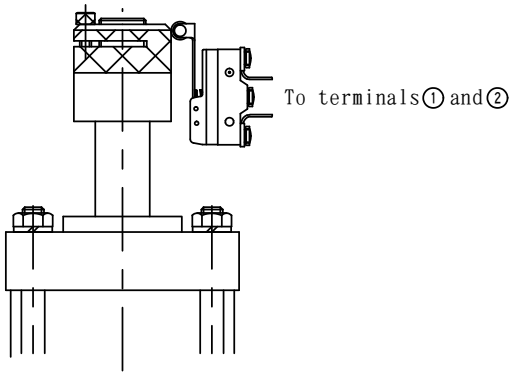


Note: Either a GO, HIGH-NG or LOW-NG signal will be output as the result of the comparison.
There may be a delay in the output of the comparison signal, depending on the comparison circuit and relay operating time. The load will stop being read when the load measurement complete signal is input.

Connection examples

1. Reset (start) signal

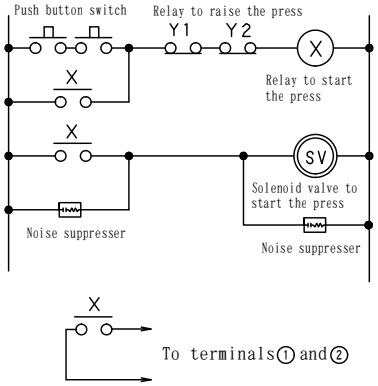
■ When using the press ram movement as trigger input signel for this system



The system uses the movement of the press ram to send the reset (start) signal for the CM-5 measurement device. Connect the micro-switch "b" type contacts to terminals ① and ② on the back of the CM measurement device.

＊Be careful to adjust it so that the micro-switch does not chatter when the press returns to the upper position, otherwise the load reading will be "0."

■ When using the press start signal as trigger input signal for this system

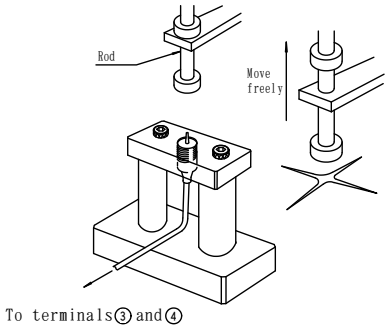


The system uses the start signal from the solenoid valve for lowering the press as a reset (start) signal for the CM-5 measurement device.
The contact should be designed so that the start signal level will not drop, even if the operator presses the push button twice in one cycle. Make sure to connect a noise suppressing capacitor to the solenoid valve. (See the circuit on the left.)

2. The load measurement complete signal (Examples of press fitting operations)

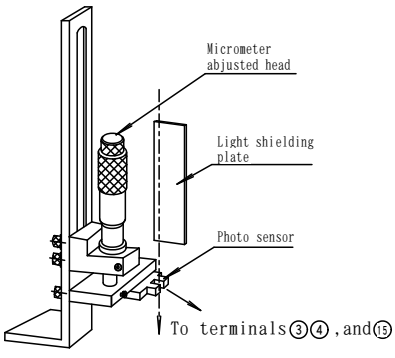
Especially when using the CM-5 for press fitting, we recommend that you use a sensor with high repeatability. Adjust the sensor so that it is triggered approximately 0.3 mm before the pressure ram completion point.

■ Example using a contact swich



The drawing on the left shows an example using a contact switch that has ceramic parts and gold contacts. Make sure to install a rod whose movement is linked with the press. Design the mechanism so that the rod can move up to prevent damage to the contact switch if the press malfunctions and doesn't stop, as shown in the figure on the left.

■ Example using a photo sensor

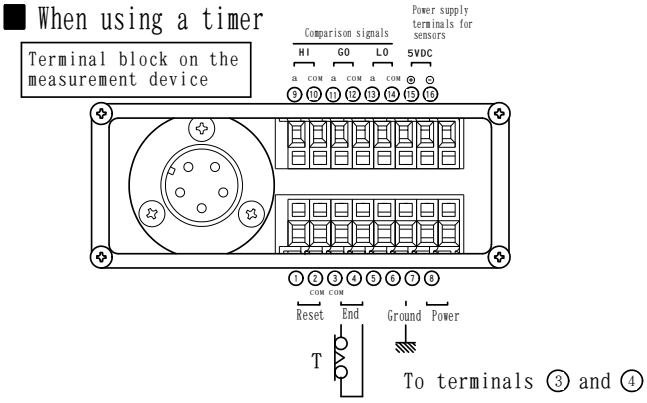


The example on the left shows a micrometer adjusted head, so that it can be finely adjusted. The light shielding plate which moves together with the press is used to trigger the photo switch that is installed on the tip of the micrometer adjusted head.
Make sure to use a 5 VDC photo switch.

Example: Model"EE-SX470" made by OMRON Corporation

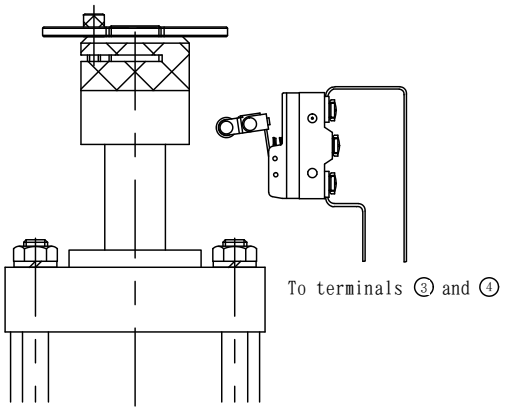
3. Load measurement complete signal (Examples for caulking)

■ When using a timer



Shown on the left is an example for checking a caulking load using the timer "b" contacts from the press timer for press fitting operations. Please make sure to design the circuit so that the timer contact is reset at the upper end of the press' stroke. Make sure to install noise suppressers across the coil of the solenoid valve that drives the press, and the timer contacts used for driving the press. No noise suppresser is required between terminals ③ and ④.

■ Example using a one way micro-switch

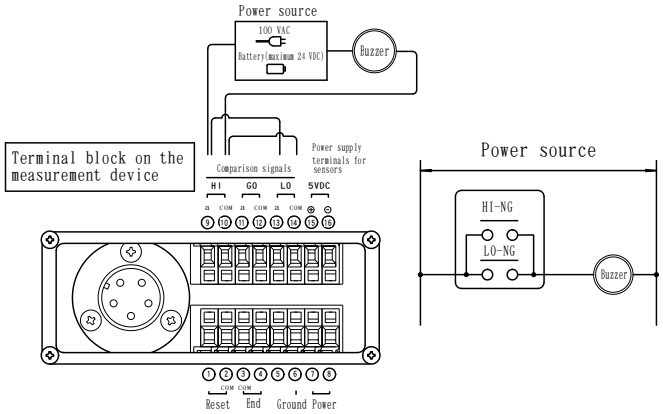


This is useful for checking a caulking load and to construct a destructive test system using a press stop. Enter a signal while the press is rising.

＊Make sure you only use this arrangement in the peak load mode.

4. Use the comparison results for outputting signals

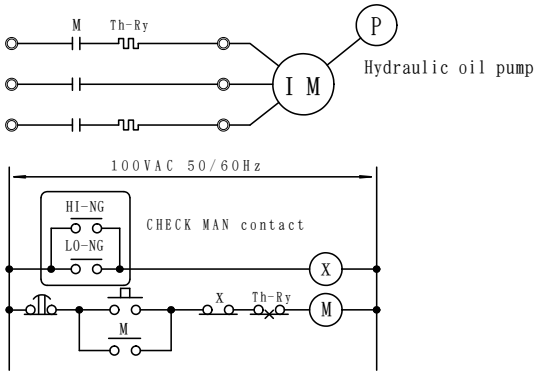
■ ⑨-⑩⑬-⑭:Example of a buzzer sounded by an NG signal



This circuit sounds a buzzer to let the operator know that an NG occurred. Make sure to use a buzzer that can handle 20 mA of current, or less.

Example: Model"EB2136" made by Matsushita Electric Works, Ltd.

■ ⑨-⑩⑬-⑭:Example using an NG signal to the machine



This circuit can be used to stop the movement of the hydraulic press instantly when an NG occurs, or in an emergency.

Connection procedures

1. Installing a load cell

① Install the load cell on the shank on the press, or on the center of the jig（see the dimension drawings on pages 28 and 29）. When installing a load cell that was designed to be mounted on the ram shank（003, 03, 10U, 20U）, make sure to secure it at two points, so that the diagonally shaded area（the loaded face） shown in the dimension drawings contacts the press shank properly.

- Do not pull on the load cell cable. When securing the cable, allow enough cable length so that it still has some slack when the press is at bottom dead center.
- Although the load cell is sealed, be careful not to pour organic solvents such as a thinner, water, or machine oil directly on it.

② Connect the load cell cable to the 5P connector on the back of the CM-5 housing, and lock it securely in place.

2. When installing a jig (a load cell that is designed to be mounted on a ram shank)

Insert the upper part of the jig into the ram shank designed for the load cell. Tighten the two bolts evenly while being careful to align each side perfectly parallel.

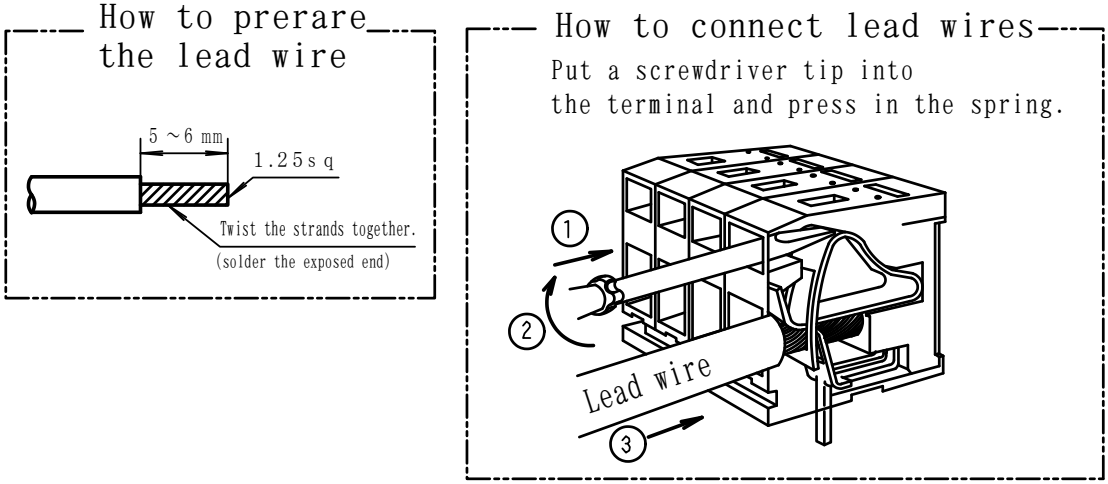
3. CM-5 measurement device installation

There are two holes on the bottom of the CM-5 housing（see the "Measurement device dimension drawings" on page 28）. Use these holes for attach the CM-5 to a mounting plate. Do not insert screws that go deeper than 10 mm inside the CM-5 housing.

NOTE: If a screw is inserted deeper than 10 mm, it will contact the components inside of the case and damage the device.

4. Reset (start) signal

Referring to the figures below, connect the lead wire for the start signal to terminals ① and ②(reset). (Make sure that the terminals are shorted when the press starts moving.)



⚠ CAUTION	**1. Before connecting the lead wire, be sure to unplug the power cord at the wall.** **2. Make sure that the wire you are connecting does not contact any other terminals.**

5. Load measurement complete signal (sensor END)

Connect the lead wire from the load measurement complete signal sensor to terminals ③ and ④ (end). (See the "Load measurement complete signal terminals" on page 7.)

6. Power plug

Plug the power cord into a standard wall outlet.（**100 VAC, 50/60 Hz**）

⚠ CAUTION	**When making connections to the terminal block, be careful not to mis-wire the 100 VAC circuit（GO, NG contact terminal）. Mis-wiring may destroy the internal circuits.**

Entering and changing each setting using the membrane switches

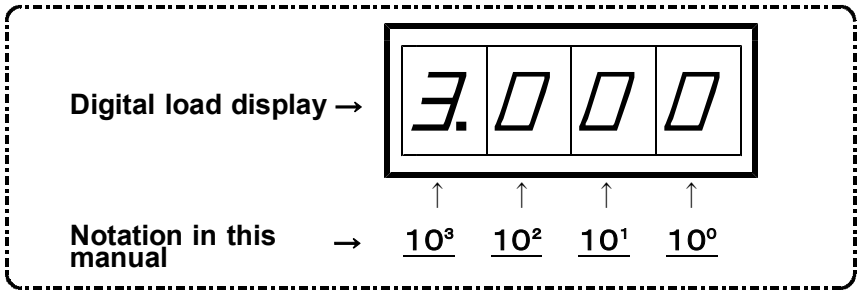
First, enter or change the settings using the double-key function. Use the four membrane keys in the bottom row (E、M、▶ and ▲) on the front panel of the CM-5. The items that you can specify (such as the names of data settings) will be displayed in alphabetical order in the "Load lower-limit digital display." (In the descriptions below, the phrase "Load lower-limit digital display" becomes just the "Lower-limit display.") The value for each of the current settings will be displayed in the "Digital load display."

For details about each procedure for entering and changing the settings, see the following pages. This page describes only an outline of the general procedure.

1. Display of the user settable items

In the setting mode, each of the user settable item names will be displayed in the Lower-limit display, in alphabetical order, and the current value for that item will be displayed in the Digital load display. The decimal point will flash. (When selecting a different pair of user specified upper and lower limits for use in making comparisons, the decimal point in the limit pair number display will flash. You can change the setting in the display whose decimal point is flashing.)

The "Digital load display" displays numbers and letters. When it displays four digits, a decimal point will flash next to the digit which can be specified at that time. On the following pages, the use of each digit is described as follows.



2. Initial setting

Press the ▲ key while holding down the E key. The Lower-limit display will show the word "PASS." This means you have to select a setting mode. There are four modes, "01", "02", "03", and "99". The table below describes each. ("01" is selected when the system is delivered.)

MODE	FUNCTIONS
01	① Modify and store upper and lower limit comparison values. ② Select a different pair of upper and lower limit values.
02	① Load calibration mode.
03	① Select a measurement mode (peak value mode or end value mode). ② Enter the power supply frequency (50 or 60 Hz).
99	① Prohibit making entries or changes to the settings. (You can still view the values of the pairs of upper and lower limits.)

① Mode: 01

After pressing the E and M keys, the Lower-limit display will show "P--". This is the display used for selecting a pair of limits. The pair display shows the number of the currently selected limit pair (1 to 8), and the decimal point will be flashing in the display. In this situation, you can change the upper and lower limit values that are assigned to the pair number currently being displayed. (See pages 17 to 21.)

② Mode: 02

One of two types of load calibrations can be selected: actual value calibration and equal value calibration.

To perform an equal value calibration, you need the latest data for the load cell that you will be using. If your load cell is not new, its actual data characteristics may be different from the initial data characteristics that it had when it was delivered from the factory, depending on its condition and how long it has been used. Fresh data is required to calibrate loads correctly.

③ Mode: 03

Each time you press the Ⓜ key, the "Lower-limit display" will display the next user settable data name from the following list: "PASS → P-F → cYcL → bAnd → PASS"

Call up the data name that you want to specify data for, and then enter or change the settings.（See pages 20 and 23.）

Then, turn to the "Change and select each set value" selection from the following pages. These pages describe the operating procedures for the items below.

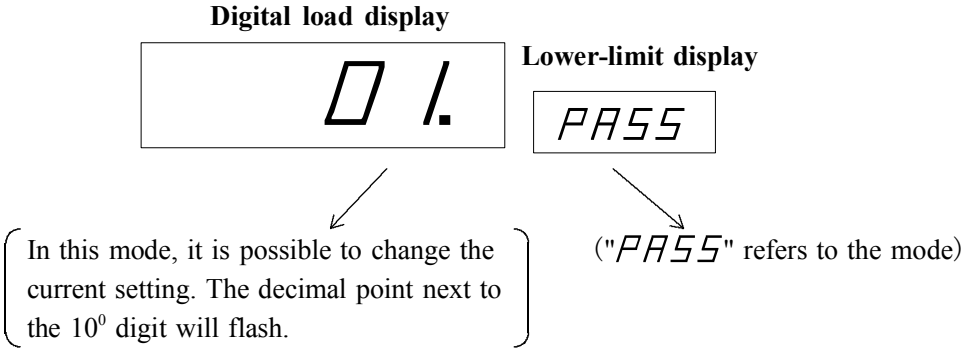
- Prohibiting changes
- Changing and storing upper and lower limit comparison values
- Method for selecting a pair of upper and lower limits
- Setting the power source frequency（IF THE UNIT WILL BE USED WITH A 60 HZ POWER SUPPLY YOU MUST READ THIS SECTION.）
- Method for selecting the measurement mode

⚠ **CAUTION**	**If your power company supplies you with 60 Hz power, make sure to change power frequency setting from 50 to 60. The device is set to 50 Hz at delivery.**

Prohibiting changes

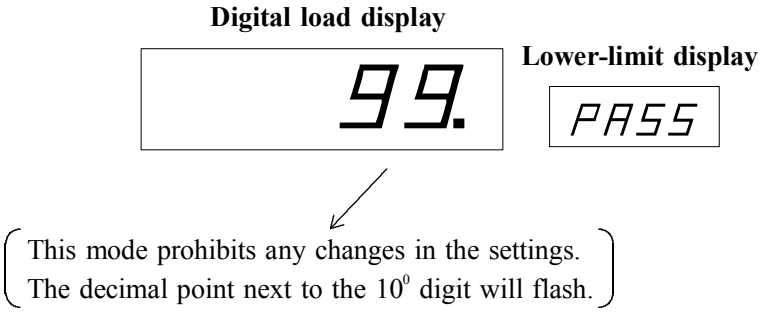
Prohibiting changes: This mode prevents the upper and lower values, and the selected pair of limit values from being changed by pressing the keys.

1. Press the E and ▲ keys. (Press the E key, first.) ..... During this operation, you cannot measure loads.

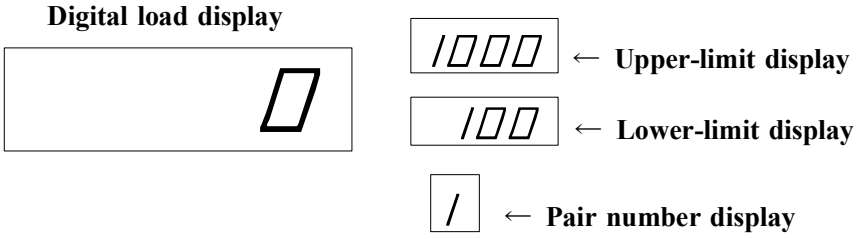


2. Press the ▲ key.

Each time you press the ▲ key, the numbers shown in the load display will cycle in the following order: "01. → 02. → 03. → 99. → 01." When "99." is showing, release the key.



3. Press the E key. ..... Now, you can measure loads.



4. That completes this setting operation. No one will be able to change the upper and lower limit values, or the selected limit pair by pressing a key.

REFERENCES

The changes prohibited mode still allows you to view the value of each of the upper and lower limits, for each of the eight pairs, by following the procedure below. (You cannot change the values.)

① Press and hold the E and M keys for approximately one second. (Press the E key, first.)

② Each time you press the ▲ key, the pair number will change in the following order:

"0 → 1 → 2 → 3 → 4 → 5 → 6 → 7 → 8 → 9 → 0".

(The pair number display shows the number of the currently selected pair.)

③ Display the pair number whose values you want to check.
④ Then, press the M key repeatedly to display the limit type in the lower-limit display. The limit types will be displayed in the following order:

"(P– –) → (S–HI) → (S–Lo) → (P– –) "

When "S–HI " or "S–Lo" is displayed, the respective upper or lower value for that pair will be displayed in the digital load display.

To change the upper and lower values of a pair, or to change which pair is specified for use, select the "0 1." mode in step 2 on the previous page. (When you want to change the settings on the following pages, first make sure that you have selected mode "0 1.".)

Changing and storing upper and lower comparison values

You can change the upper and lower values that are used for comparing with the measured load. Up to eight pairs of upper and lower values can be stored in memory. The values in the table below are already stored as default values. (On the CM-5-003 model, a decimal point will be displayed next to the 10^1 digit.)

● **Table of default upper and lower limit values** ●

Pair number	Upper value	Lower value
1	1000	100
2	1100	200
3	1200	300
4	1300	400
5	1400	500
6	1500	600
7	1600	700
8	2000	1000

1. Press and hold the [E] and [M] keys for approximately one second. (Press the [E] key, first.) --- The system will be in the pair number selection mode.

Digital load display

Lower-limit display

P- - ←"P" means "pair."

1. ← **Pair number display** … This display shows you that **Pair 1** is specified.

To change which pair is selected, press the [▲] key. The pair number will change in the following order: "1→2→3→4→5→6→7→8→1". Select the pair that you want to change.

2. Press the [M] key. --- The display will change to show the upper-limit.

Digital load display

1.000

The digit next to a flashing decimal point can be changed.

Lower-limit display

S-H1 ←"S-H1" means that you can now change the upper-limit value.

1 ← **Pair number display**

Now for practice, try to change the current upper-limit value for pair 1. Change the current value "1000" to "2250."

※ Depending on the model, the position of the decimal point will vary. It will either be next to the 10^1 or the 10^2 digit. See the section, "Digital load display," on page 27.

3. First, change the value of the 10^3 digit.

Each time you press the [▲] key, the number shown in the 10^3 digit place (next to the flashing decimal point) will change, in the following order: "2→3→0→1→2". (The maximum number available in the 10^3 digit place is "3.") Change this digit to "2."

4. Press the ▶ key. --- Then you can change the value of the 10^2 digit.
The ▶ key is used to select a different digit place. Press this key once and the decimal point next to the 10^2 digit will flash.

5. Next, press the ▲ key.
Each time you press the ▲ key, the number in the currently selected digit will change, in the following order: "0 → 1 → 2 → 3 → 4 → 5 → 6 → 7 → 8 → 9 → 0" Change this digit to "2."

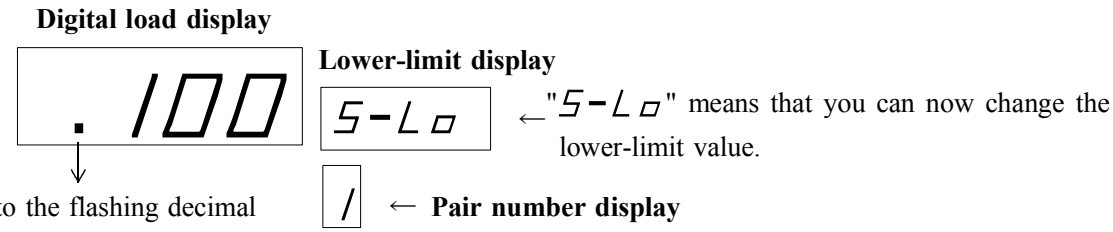
6. Then, press the ▶ key. --- Now you can change the value of the 10^1 digit.
Press this key once and the decimal point next to the 10^1 digit will flash.

7. Press the ▲ key.
Each time you press the ▲ key, the number in the currently selected digit will change, in the following order:
"0 → 1 → 2 → 3 → 4 → 5 → 6 → 7 → 8 → 9 → 0" Change this digit to "5.".

That completes the operation to change the upper-limit value to "2550." If you enter a wrong number, move the flashing decimal point to the digit that you want to correct using the ▶ key. Then enter the correct number by using the ▲ key.

- If you want to change the lower-limit value, go to step 8.
- If you don't need to change the lower-limit value, press the E key. Then the change will be complete and the system will return to the measurement mode.

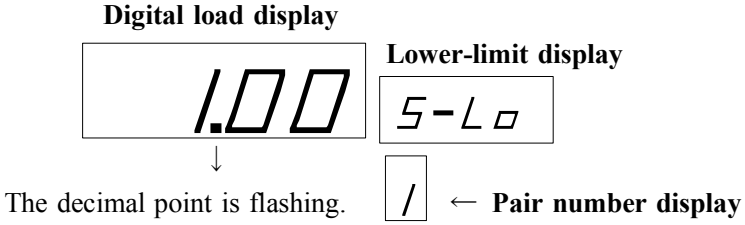
8. Press the M key. --- The display will change to show the lower-limit.



Now, try changing the current lower-limit value specified for pair 1, using the same procedures as before. Change the current value from "100" to "225."

＊ On the CM-5-003 model, a fixed decimal point is displayed next to the 10^1 digit. →"10.0"

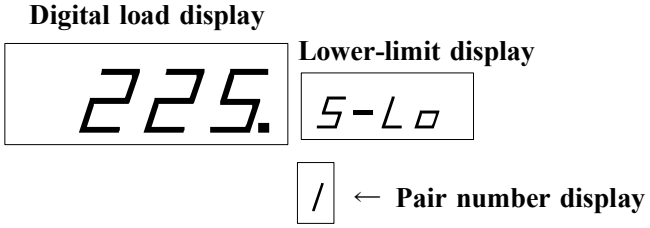
9. Press the ▶ key.
The decimal point will flash next to the 10^3 digit. To change the value of the 10^2 digit, press the ▶ key twice to move the flashing decimal point to the 10^2 digit.



10. Press the ▲ key.

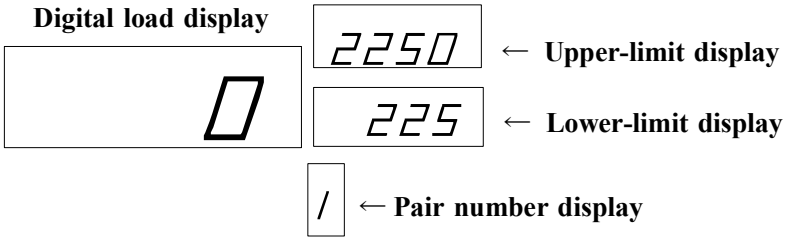
Each time you press the ▲ key, the number in the 10^2 digit location will change in the following order:
"0 → 1 → 2 → 3 → 4 → 5 → 6 → 7 → 8 → 9 → 0"
Change this digit to "2."

11. Repeat the operations in steps 8 and 9 on the previous page. Set the values of the 10^1 and 10^0 digits to "2" and "5" respectively. ..... After all the settings are complete, the displays will look like the following.



The initial value of "100" is changed to "225."

12. Press the E key. --- Now, you can measure loads.



The procedure above changes the upper and lower limits for pair 1. By referring to this set of steps, you can change the upper and lower values for each pair to meet your actual work requirements.

NOTE: **① The display is designed to ignore attempts to make the upper limit larger than 3000. If you enter a number larger than 3000, the system will change it to back 3000.**

② If you enter a number for the upper-limit value that is smaller than the lower-limit value, or any value for the lower-limit that is larger than the upper-limit value, "Err" will be displayed. Then, approximately three seconds later, the system will let you correct the error setting. Reenter a correct value.

③ Anytime you want to stop changing the settings, press the E key. The system will return to the measurement mode immediately.

Method for selecting a pair of upper and lower limits

This section describes the method for selecting pairs of upper and lower limits when the system is part of an actual production line. (Up to 8 pairs of limits can be stored in memory.) If the mode is set to "0 /" (to allow the values to be changed), a different limit pair can be specified by following the steps below.
("Pair 1" is selected when the system is delivered. You cannot change the limit pair when the mode is not "0 /.")

1. Press the ▶ and ▲ keys. (Press the ▶ key, first.)

The pair number display will show successive limit pair numbers in the following order: "1 → 2 → 3 → 4 → 5 → 6 → 7 → 8 → 1". When the ▲ key, or both the ▶ and ▲ keys are released, the pair number currently displayed will be selected. (Once you release the ▲ key, you will not be able to change the number again by pressing the ▲ key. If you want to change the pair number, first release both of the keys. Then press the ▶ and ▲ keys in that order, again.)

Once a limit pair number has been selected, the upper and lower values stored in that pair will be displayed.

Setting the power supply frequency

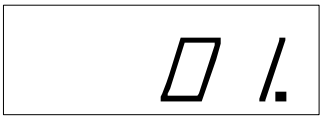
*If your power company supplies 50 Hz power, you will not need to change the factory setting.

The power supply frequency is set to 50 Hz when the system is delivered. If the power supply frequency system setting does not match the power company's specification, the measurement values may be incorrect.

1. Press and hold the E and ▲ keys for approximately 1 second. (Press the E key, first.)

In this condition you cannot measure loads. When done, press the E key again to return to the measurement mode.

Digital load display



Lower-limit display

↓

The decimal point next to the 10^0 digit will flash.

"0 1." is the initial mode selected when the system is delivered. After you purchase the system and select the changes prohibited mode, "99." will be displayed.

2. Press the ▲ key.

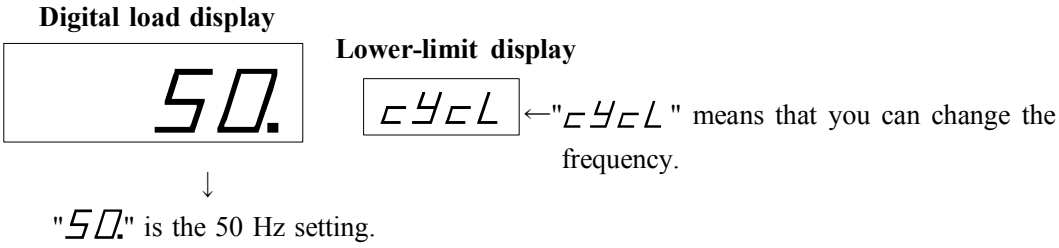
Each time you press the ▲ key, the digital load display will show the mode numbers in the following order: "0 1.→02.→03.→99.→0 1.". Select the "03." mode on this display.

Digital load display

Lower-limit display

3. Press the M key twice.

The lower-limit display will indicate that the frequency can be set, as shown below.



4. Press the ▲ key.

Each time you press the ▲ key, the digital load display will alternate between "50." and "60.". If you are using the system in an area with 60 Hz power, select "60.".

5. Press the E key.

That completes the power frequency setting. Now, the system is ready to make measurements.

6. Reset the "PASS" to the original mode number.

Select "01." (allows changes in the upper and lower limit values, and you can select the limit pair) or "99." (prohibit all changes) as described in steps 1 and 2 on the previous page. After the setting is changed, press the E key.

Method for selecting the measurement mode

This section describes the method for selecting either one of the measurement modes used to compare the measured load with the upper and lower limit values. You can select either the peak value mode* **or** the end value mode*.

* **Peak value mode**.....This is selected as the default mode when the system is delivered.
- The system will sample the measured values in real time and update the peak value. The highest peak value is displayed, until the load measurement complete signal is input.
- After the load measurement complete signal is input, the system will store the highest value between the reset signal input and the load measurement complete signal input. Then the system compares that value with the upper and lower values that were specified beforehand. Finally, it decides whether the measured value is acceptable or unacceptable.

* **End value（constant load measurement） mode**
- This mode releases the peak hold function. If you want to avoid the extreme load readings caused by the shock when workpieces hit each other, select this mode.
- The system samples and displays the load constantly. If the load decreases to zero while making a measurement, the display will also show zero.
- After the load measurement complete signal is input, the system will store the current value. Then the system compares the stored value with the upper and lower limits that were specified beforehand. Finally, it decides whether the measured value is acceptable or unacceptable.

1. Press and hold the E and ▲ keys for approximately 1 second. (Press the E key, first.)

At this time, you cannot measure loads. Press the E key again when you want to return to the measurement mode.

Digital load display

Lower-limit display

↓

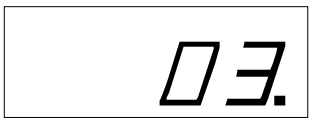
The decimal point next to the 10^0 digit will flash.

"0 1." is the default mode when the system is delivered. If you select the mode which prohibits changes, "99." will be displayed.

2. Press the ▲ key.

Each time you press the ▲ key, the digital load display will show the mode numbers in the following order: "0 1.→02.→03.→99.→0 1.". Select "03." on this display.

Digital load display

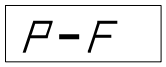


Lower-limit display

3. Press the M key once.

Digital load display

Lower-limit display



←"P-F" means that you can select the measurement function type.

↓

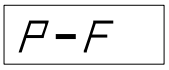
"PEAH." means that the peak measurement mode is selected.

4. Press the ▲ key.

Each time you press the ▲ key, the digital load display will alternate between "FrEE." and "PEAK.". Select "FrEE." on this display.

Digital load display

Lower-limit display



↓

"FrEE." means that the end measurement mode is selected.

5. Press the E key .....That completes the measurement mode change.

If the digital load display shows only dashed lines (– – – –), press the reset push button.

6. Change the "PASS" operation mode back to its original setting.

Select "0 1." or "99." for the mode using steps 1 and 2 described on the previous page. Then press the E key.

Maintenance

1.Installation precautions

① Do not install this system in a place subject to high temperatures or direct sunlight, or near a ventilator or a heat exhaust opening.

② Do not install the system in a place with high humidity or oily mist in the air.

③ The specified power is 100 VAC（50/60 Hz）. Never connect the machine to any other voltage.

⚠ WARNING	**Never connect the system to voltages other than 100 VAC（such as 200 VAC, 400 VAC etc.）as the inside of the system may catch fire.**

④ Never expose the inside of the housing. If the system needs to be serviced, please contact us. We are not responsible for malfunctions or other problems caused by unauthorized service or repairs.

② If smoke or smells come from the system, turn OFF the power immediately. Then please contact the sales shop or us.

■ FUJI CONTROLS CO., LTD.／ Technical Department :

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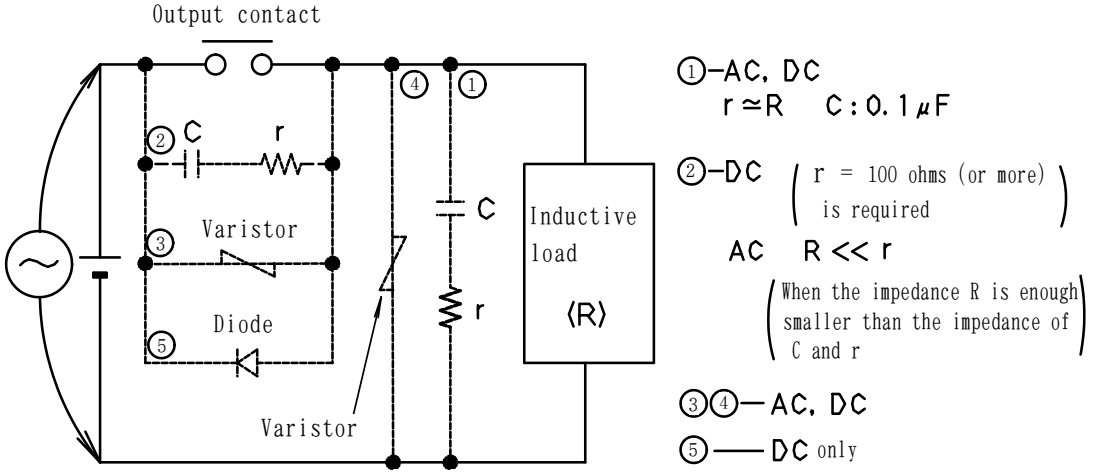
2.If a malfunction occurs

① If you supply a no-voltage contact for the reset signal, the system may malfunction by chattering and the voltage may drop a lot. If this happens, arrange to open the reset signal contacts after each cycle is complete.

② The load cell operates at low voltages between a few milli-volts and a few tens of milli-volts. The measurement device has a microcomputer and an EEPROM inside. Make sure to use the device in a place that not near high frequency electrical noise or induction noise sources（like large electric motors）, and/or take the necessary noise-prevention steps to limit noise sources.

⚠ CAUTION	**When connecting the ground terminal on this device, use only a class 3 ground. Never share the ground for this system with any other devices or electric motors.（Failure to do may cause noise interference and malfunction.）**

Refer to the example below to connect a noise suppresser, capacitor, or other noise control devices.



3.Wiring checks

Periodically you must make sure to check for missing lead wires or wires sticking out of the terminal block.

4.Checking the location of the load measurement complete sensor

In particular, if you are using the system for pressure fittings, make sure to check periodically whether or not the sensor has moved from its original position. You can monitor the sensor operation by checking the judgment point indicator on the front of the measurement device.

Troubleshooting

1. Load cell

> **If a load exceeding the rated value is imposed on the load cell, or a horizontal load is imposed on it, it will be permanently distorted, and one or more of the symptoms listed below will occur.**

- The digital load display will read "□. L.". --- **This probably means that load cell is damaged and should be replaced.** (It displays "□. L.", even when a small load is applied.)
- The displayed load value is extremely low. --- **The load cell may be distorted toward the negative.**
- The display seems unable to show values beyond a certain level. --- **The load cell may be distorted toward the positive.**
- The display does not read zero, even when you press the reset button.

If the load cell is damaged, we will repair it, or we will replace it at cost shown in the table below. In this case, we will also need you to send your measurement device in order to calibrate the two items at our factory.

Load cell rating	Replacement and calibration fee
3kN {306kgf}	\ 1 3 0 , 0 0 0 .-
30kN {3060kgf}	\ 1 3 0 , 0 0 0 .-
10kN {1020kgf}	\ 1 3 0 , 0 0 0 .-
0.2kN {20kgf}	\ 1 3 0 , 0 0 0 .-
100kN {10.2tf}	\ 1 8 0 , 0 0 0 .-
200kN {20.4tf}	\ 2 2 0 , 0 0 0 .-

NOTE: The units shown in curly brackets "{ }" are for reference purposes only.

2. Measurement device

- The digital display doesn't work properly. --- **Some LEDs may be faulty.**

You can find faulty LEDs during the ROM check procedure when turning ON the power. At that time the device will light all the LED segments for checking.

- If the contents of the EEPROM have been damaged by electrical noise, the display will show one of the following displays while checking the ROM, depending on the cause.

ⓐ **Display:** The digital load display reads "dAt-" or "dAt '".
Problem: The memory contents have been damaged.
Remedy : Please send us the device as soon as possible. We will examine the memory and correct it.

ⓑ **Display:** The digital load display reads "coNX", the lower-limit display reads "Lo5t", and all of the decimal points flash, then the character location marked "X" above will contain a pair limit number from 1. to 8.
Problem: The upper or lower limit data for pair limit "X" may be wrong. These values may be changed to "1000"(upper limit) or "500"(lower limit), which are the default values programmed into the microcomputer.
Remedy: Enter the limit values again using the membrane switches. If you do not, the system cannot operate properly.

ⓒ **Display:** The digital load display reads "cAL", the lower-limit display reads "Lo5t", and all of the decimal points flash.
Problem: Internal calibration data may be broken.
Remedy: Please send us both the measurement device and the load cell. We will recalibrate and send

them back to you.

ⓓ **Display:** The digital load display reads "cond", the lower-limit display reads "LoSt", and all of the decimal points flash. The pair limit display for the upper and lower limits is "1."

Problem: The condition data (cYcL, P-F, bAud) that were set with in mode "03", may be corrupt.

Remedy: Reenter the data using the membrane switches. If you do not, the system cannot operate properly.

3. Malfunctions not mentioned above

The measurement device displays nothing.	・Is the power cord plugged in? ・Is the power switch turned ON?
The display values cannot be changed.	・Is the cable connected properly to the 5 pin metal connector on the tip of the load cell? ・Is a reset signal input after a workpiece is evaluated?
The display does not continue to show a value.	・Is the load measurement complete signal sensor operating properly?
The system cannot reset the display.	・Is the reset signal held active? ・Is the wiring connected properly?
Comparison signals are not output.	・Is the load measurement complete signal sensor connected properly? ・Is the load measurement complete signal sensor connected to "b" type contacts? ・Is the load measurement complete signal sensor turned OFF after the reset signal is turned OFF?

<TROUBLESHOOTING CONTACT > TECHNICAL DEPARTMENT

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CHECK MAN and Load Cell Specifications

1.Specifications for the CHECK MAN CM-5 measurement device

MODEL	CM-5
Maximum value displayed	3000
Decimal point location	Any position
Constant load measurement	Standard feature
Peak load measurement	Standard feature
Number of load measurements	Constant analog load measurement (Special analog sample and hold circuit is built in.)
Load display update frequency	12.5 times per second (50 Hz) or 15 per second (60 Hz)
User settable upper and lower limits	Keys (membrane switches) enter values in 8 memory pairs and the alarm by watching the LED display
Zero position correction of the displayed load	Corrected automatically after each reset
Evaluation result output	LED display, relay output
Type of load cells that can be connected	Either 350 or 700 ohm types
Load measurement accuracy	Load cell range : 0.5 % F.S.± 1 digit (23 ± 3 ℃)
Weight	1.3 kg
Dimensions	160 (W) x 145 (D) x 89 (H) (protrusions are not included)
Power source	100 VAC (50/60 Hz), Approx. 10VA

2.Load cell specifications

NOTE: The units shown in curly brackets "{ }" are for reference purposes only.

	TYPE									
	RAM SHANK TYPE				ULTRA THIN TYPE		ULTRA SMALL TYPE		S TYPE	STATIONARY TYPE
MODEL	0003	03	10(U)	20(U)	003F1	03F1	003L	01L	0002	10(L)
RATED CAPACITY	3 kN {306kgf}	30 kN {3,060kgf}	100 kN {10.2tf}	200 kN {20.4tf}	3 kN {306kgf}	30 kN {3,060kgf}	3 kN {306kgf}	10 kN {1.02tf}	0.2 kN {20kgf}	100 kN {10.2tf}
MAXIMUM ACCEPTABLE OVERLOAD	150%	150%	120%	120%	120%	120%	120%	120%	150%	120%
I/O RESISTANCE	Approx. 350 ohms	Approx. 350 ohms	Approx. 700 ohms	Approx. 700 ohms	Approx. 350 ohms	Approx. 350 ohms	Approx. 350 ohms	Approx. 350 ohms	Approx. 350 ohms	Approx. 350 ohms
CABLE LENGTH	2 m	2 m	2 m	2 m	2 m	2 m	1.5 m	1.5 m	3 m	3 m
DIMENSIONS	See pages 19 and 20 in this manual.									
ACCURACY	Load cell and CM-5: 0.5 % F.S.± 1 digit (23 ± 3 ℃) ※ 1.0 % F.S.± 1 digit for 003L and 001L models.									
MINIMUM UNIT FOR DISPLAY*	0.001kN {0.1kgf}	0.01kN {1kgf}	0.1kN {0.01tf}	0.1kN {0.01tf}	0.001kN {0.1kgf}	0.01kN {1kgf}	0.001kN {0.1kgf}	0.01kN {1kgf}	0.001N {0.01kgf}	0.1kN {0.01tf}

*The display units shown above are correct when the load cell is connected to the CM-5 measurement device.

3.Digital load display

NOTE: The units shown in curly brackets "{ }" are for reference purposes only.

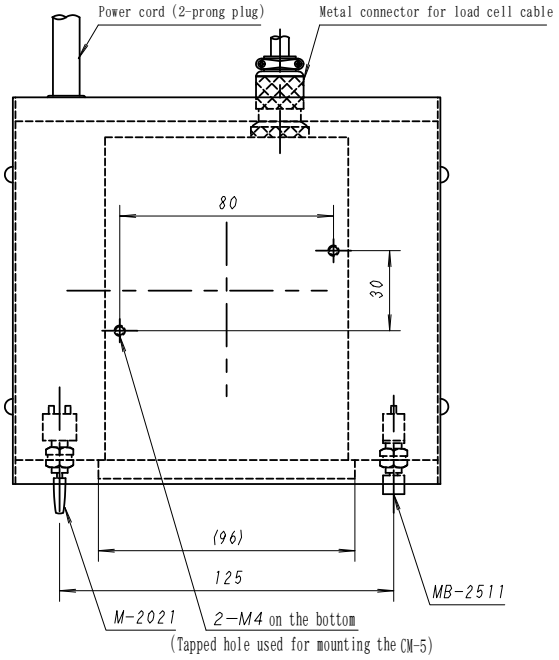
MODEL	MAXIMUM DISPLAY VALUE	MINIMUM DISPLAY VALUE	REMARKS
CM-5-03	30.00kN{3,060kgf}	0.00kN{0kgf}	The specifications are the same as for the 03F1 model.
CM-5-003	3.000kN{306kgf}	0.000kN{0.0kgf}	The specifications are the same as for the 003F1 and 003L models.
CM-5-10(U) or 10(L)	300.0kN{30.6tf}	0.0kN{0.00tf}	The maximum measurement value is 100.0 kN {10.2 tf}.
CM-5-20(U)	300.0kN{30.6tf}	0.0kN{0.00tf}	The maximum measurement value is 200.0 kN {20.4 tf}.
CM-5-01L	30.00kN{3,060kgf}	0.00kN{0kgf}	The maximum measurement value is 10.0 kN {1,020 kgf}.
CM-5-0002	300.0N{30.6kgf}	0.0N{0.00kgf}	The maximum measurement value is 200.0 N {20.4 kgf}.

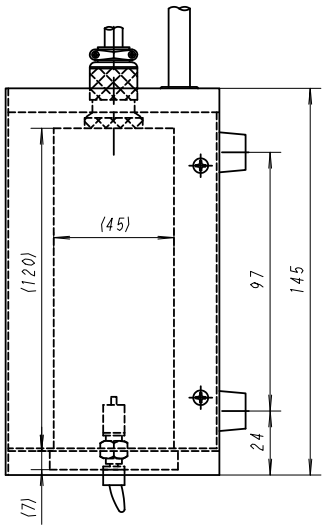
*The values for the upper and lower limit displays are the same as shown below.

4.Model type

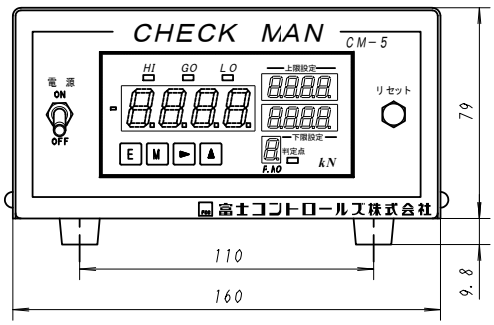
The CHECK MAN load control model is determined by the combination of measurement device and load cell.
For example, a combination of the CM-5 measurement device and the 3 kN{306kgf} ram shank model load cell (003) will be the "CM-5-003."
Or, a combination of the CM-5 measurement device and the 3 kN{306 kgf} ultra thin model load cell (003F1) will be "CM-5-003F1."

MEASUREMENT DEVICE DIMENSION DRAWING

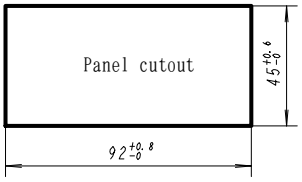




NOTE: The numbers in parenthese( )are for the main housing.
When mounting the main housing by using the tapped holes on the bottom, do not insert screws that go deeper than 10 mm inside the housing.



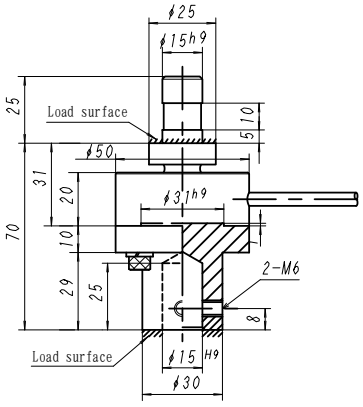
When you want to mount this housing on another panel, cut the panel using the dimensions given below.

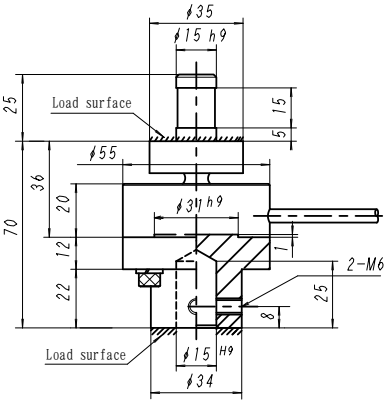


LOAD CELL MEASUREMENT DRAWINGS

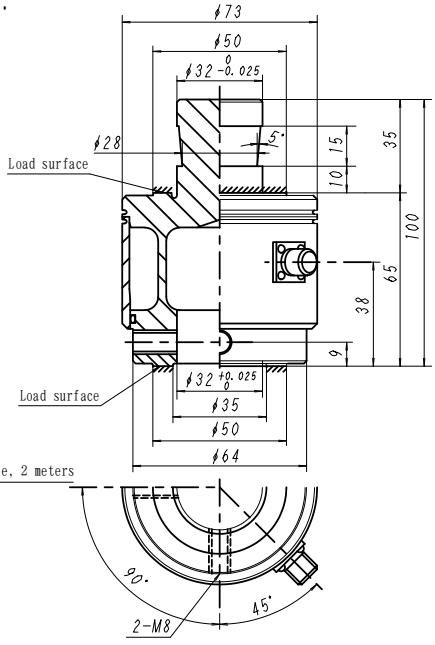
003(3kN{306kgf}) 03(30kN{3,060kgf})

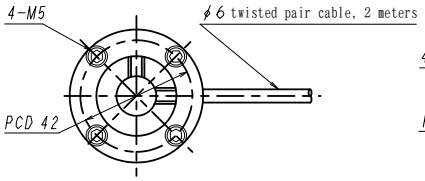
NOTE: The units shown in curly brackets"{ }" are for reference purposes only.

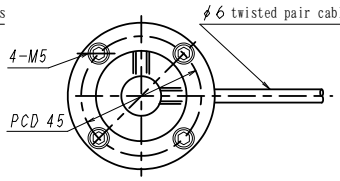




10(U)(100kN{10.2tf})
20(U)(200kN{20.39tf})

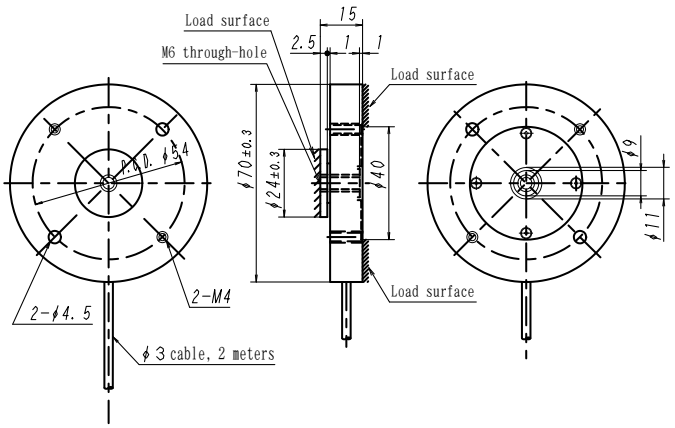




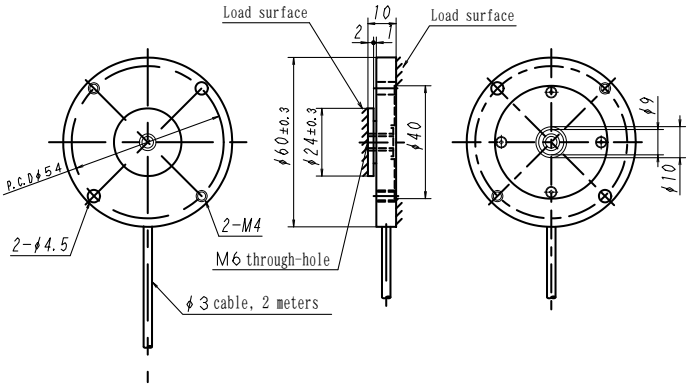


LOAD CELL MEASUREMENT DRAWINGS

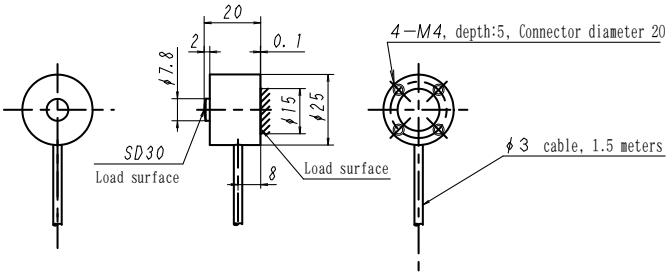
03F1(30kN{3,060kgf})



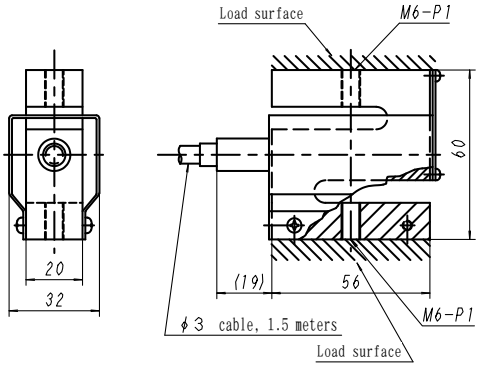
003F1(3kN{306kgf})



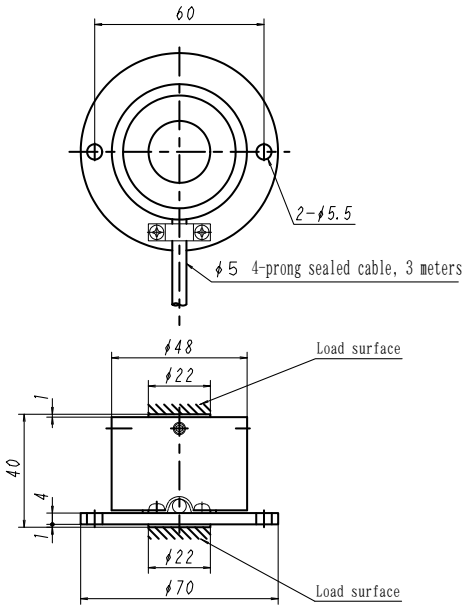
003L(3kN{306kgf})
01L(10kN{1,020kgf})



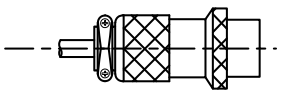
0002(0.2kN{20kgf})



10(L)(100kN{10.2tf})



Metal connector (plug) wiring
(commom for all load cell)



SCK-1605-P

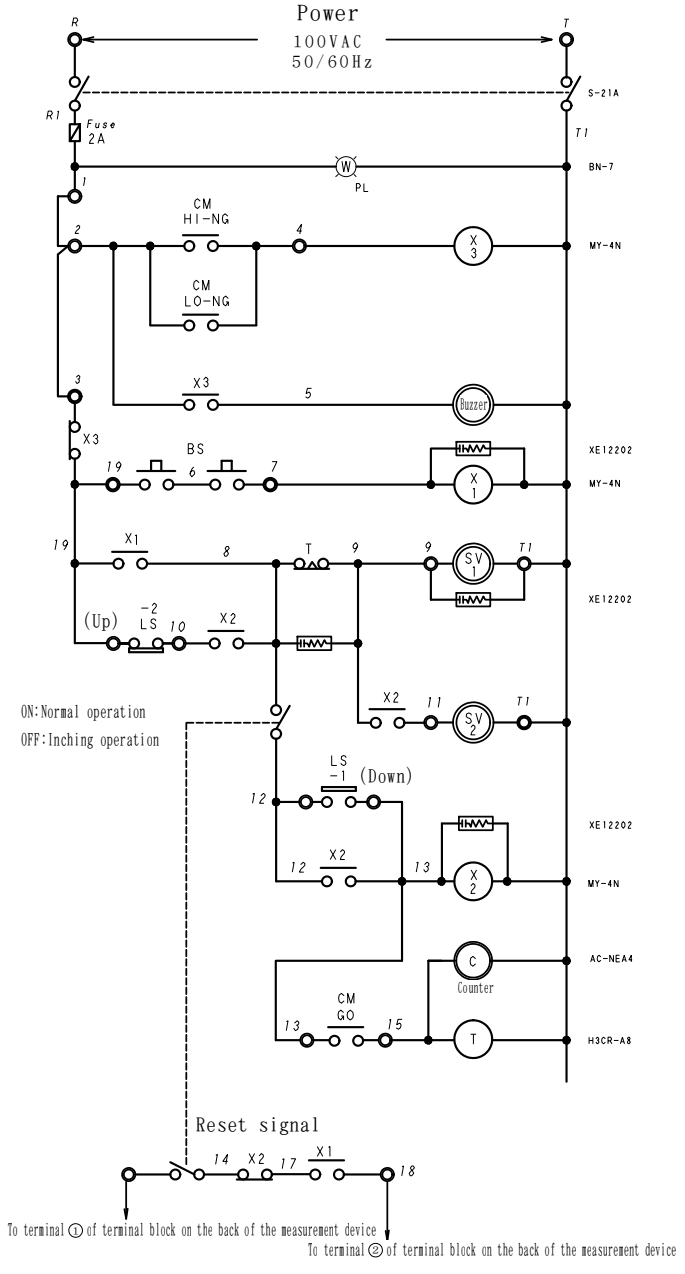
1 :	Input +
2 :	Output -
3 :	Output +
4 :	Input -
5 :	Shield

NOTE: The units shown in curly brakets "{ }" are for refence purposes only.

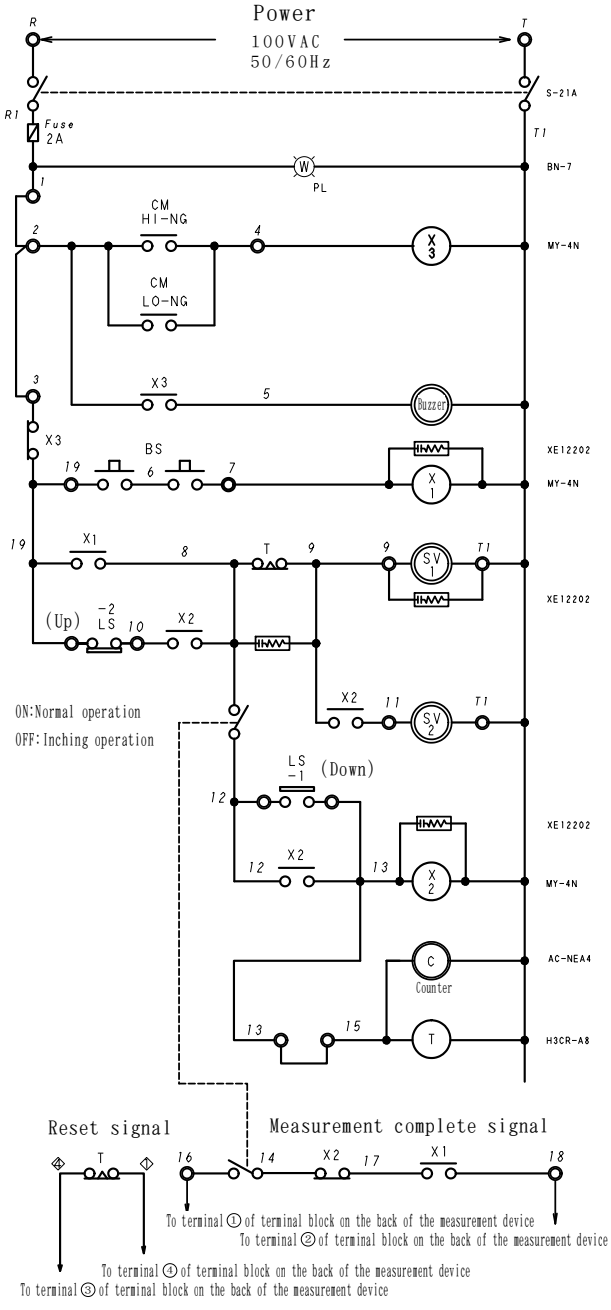
Circuit examples for connecting a timer box

The examples below show circuits for press fitting and caulking operations after the CHECK MAN connected to a pneumatic press, and how to control them using a timer box.

PRESS FITTING SPECIFICATIONS



CAUKING SPRECIFICATIONS



Micro-switch

LS-1 : ON at press lower limit

LS-2 : OFF at press upper limit

If you want to use an emergency stop push button, connect it to terminals 1 and 2. Normally, SV-2 is not used.(It is used for high and low speed, 2 speed feed.)

NOTE:"BS" are push button switches that must be pressed with both hands.