

SELF-SYNCH TRANSMITTER
(2 channel, PC programmable)MODEL **M1EXS-2****CONTENTS**

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BEFORE USE

Thank you for choosing M-System. Before use, please check contents of the package you received as outlined below.

If you have any problems or questions with the product, please contact M-System's Sales Office or representatives.

■ PACKAGE INCLUDES:

Self-synch transmitter (body).....(1)

■ MODEL NO.

Confirm Model No. marking on the product to be exactly what you ordered.

■ OPERATING MANUAL

This manual describes detailed operation regarding settings.

The M1EXS-2 is programmable using a PC. For detailed information on the PC configuration, refer to the M1ECFG users manual (EM-5981).

The M1ECFG Configurator Software is downloadable at M-System's web site: <http://www.m-system.co.jp>

POINTS OF CAUTION

■ CONFORMITY WITH EU DIRECTIVES

- This equipment is suitable for Pollution Degree 2 and Installation Category II (transient voltage 2500V). Reinforced insulation (signal input or output to power input: 300V) and basic insulation (signal input to output: 300V) are maintained. Prior to installation, check that the insulation class of this unit satisfies the system requirements.
- Altitude up to 2000 meters.
- The equipment must be mounted inside a panel.
- The equipment must be installed such that appropriate clearance and creepage distances are maintained to conform to CE requirements. Failure to observe these requirements may invalidate the CE conformance.
- The actual installation environments such as panel configurations, connected devices, connected wires, may affect the protection level of this unit when it is integrated in a panel system. The user may have to review the CE requirements in regard to the whole system and employ additional protective measures to ensure the CE conformity.
- Install lightning surge protectors for those wires connected to remote locations.

■ POWER INPUT RATING & OPERATIONAL RANGE

- Locate the power input rating marked on the product and confirm its operational range as indicated below:

100 – 120V AC rating: 85 – 132V, 47 – 66 Hz, ≤ 7VA

■ GENERAL PRECAUTIONS

- Before you remove the unit from its base or mount it, turn off the power supply and input signal for safety.

■ ENVIRONMENT

- Indoor use.
- When heavy dust or metal particles are present in the air, install the unit inside proper housing with sufficient ventilation.
- Do not install the unit where it is subjected to continuous vibration. Do not subject the unit to physical impact.
- Environmental temperature must be within -5 to +55°C (23 to 131°F) with relative humidity within 10 to 85% RH in order to ensure adequate life span and operation.
- Be sure that the ventilation slits are not covered with cables, etc.

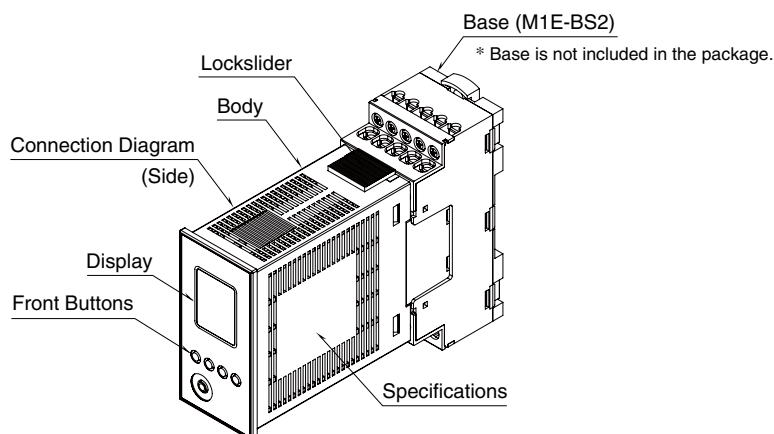
■ WIRING

- Do not install cables close to noise sources (relay drive cable, high frequency line, etc.).
- Do not bind these cables together with those in which noises are present. Do not install them in the same duct.

■ AND

- The unit is designed to function as soon as power is supplied, however, a warm up for 10 minutes is required for satisfying complete performance described in the data sheet.
- With voltage output, do not leave the output terminals shortcircuited for a long time. The unit is designed to endure it without breakdown, however, it may shorten appropriate life duration.

COMPONENT IDENTIFICATION



■ TERMINAL ASSIGNMENTS

1	2	3	4	5
6	7	8	9	10
[Display Area]				
11	12	13	14	15
16	17	18	19	20

No.	FUNCTION	No.	FUNCTION
1	Unused	11	Ch1 Output +
2	Unused	12	Ch1 Output -
3	Ch1 Self-synch input S1	13	Unused
4	Ch1 Self-synch input S2	14	Ch2 Output +
5	Ch1 Self-synch input S3	15	Ch2 Output -
6	Unused	16	Unused
7	Unused	17	Unused
8	Ch2 Self-synch input S1	18	Unused
9	Ch2 Self-synch input S2	19	Power U
10	Ch2 Self-synch input S3	20	Power V

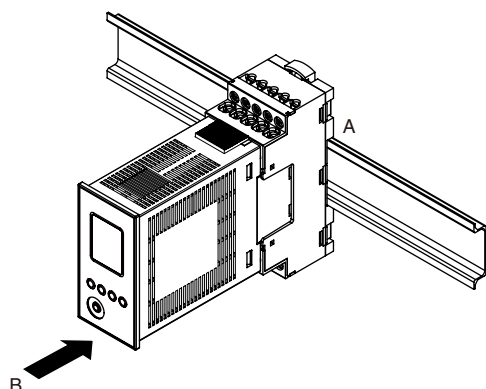
INSTALLATION

Pulling out the base while pushing the lockslider on the top of the unit enables to remove the base from the unit (base is not included in the package).

■ DIN RAIL MOUNTING (SIDE)

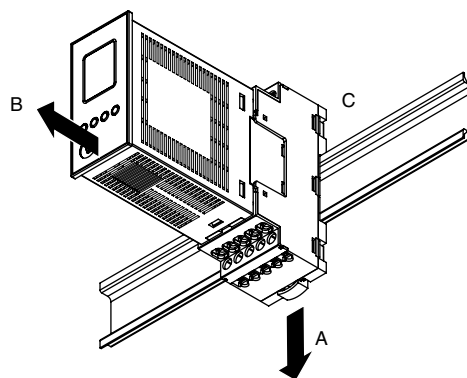
• Mounting the unit

- Hang the upper hook at the rear side of unit on the DIN rail.
- Push the lower part of the unit in the direction of the arrow until the unit is firmly fixed to the DIN rail.



• Removing the unit

- Push down the DIN rail adaptor using a minus screw-driver.
- Pull out the lower part of the unit.
- Remove the upper part from the DIN rail.



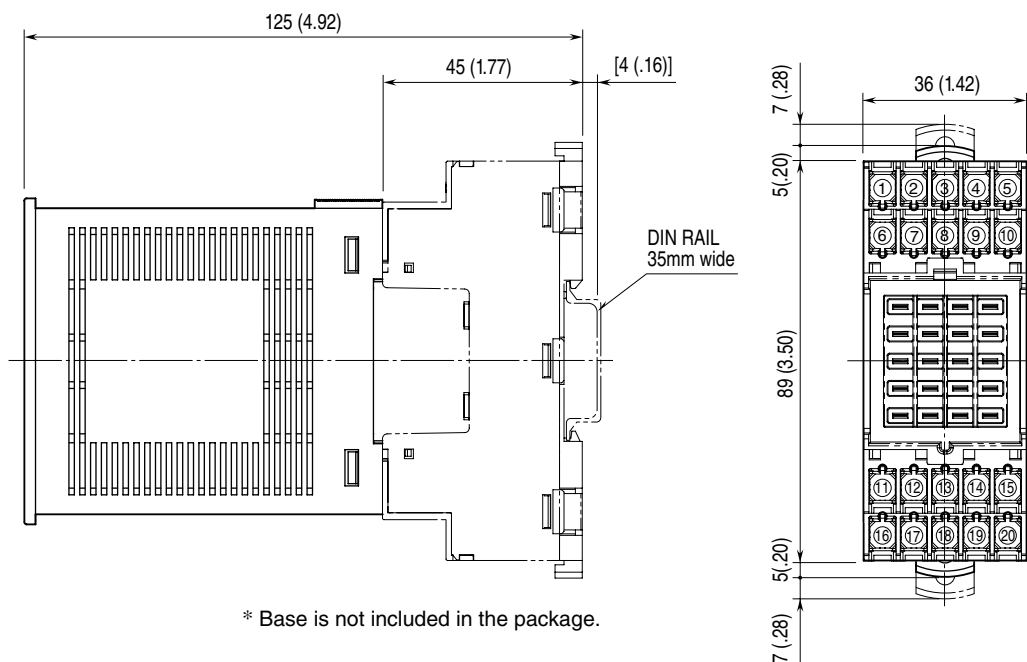
■ WALL MOUNTING

Referring to "MOUNTING REQUIREMENTS unit: mm (inch)" on page 4, pull out the upper and lower sliders of the unit and fix them with M4 screws (Torque: 1.4 N·m).

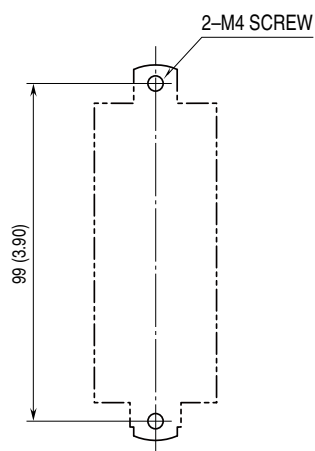
TERMINAL CONNECTIONS

Connect the unit as in the diagram below or refer to the connection diagram on the side of the unit.

EXTERNAL DIMENSIONS unit: mm (inch)

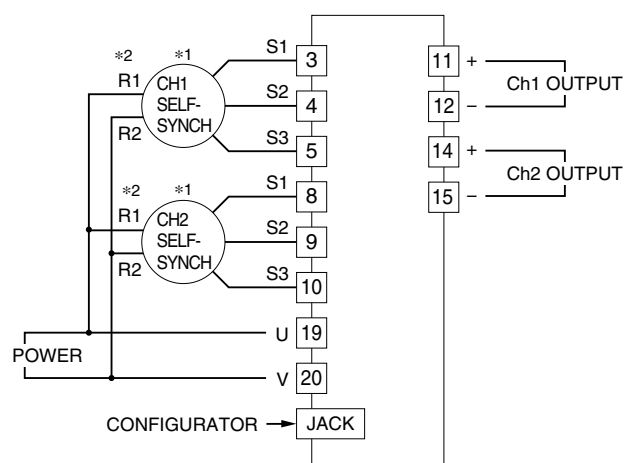


MOUNTING REQUIREMENTS unit: mm (inch)



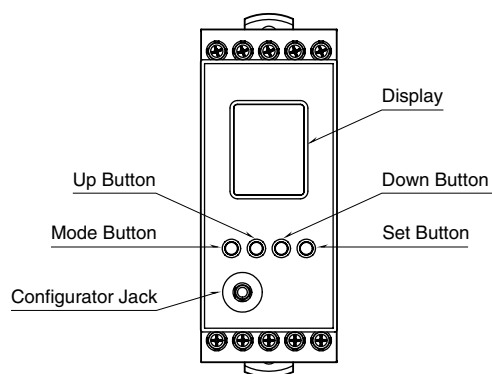
* Mounting requirements for base.

CONNECTION DIAGRAM



- *1. The input engineering unit value increases when the self-synch rotates clockwise. For changing the operation to counterclockwise and increase, set the ITEM 08, 108 'Rotating direction' to CCW.
- *2. The power input of the unit has polarity. Be sure that the connection for R1 and R2 of the self-synch.

EXTERNAL VIEWS



COMPONENT	FUNCTION
Display	Indicates present values, setting values and abnormal information. Two types of present values at upper and lower are displayed by setting.
Mode button	Used to shift from measuring mode to each setting mode. Destination to shift is changed by the time pressing and holding the button. Used to return from each setting mode to measuring mode (press and hold for 2 sec. or more).
Set button	Used to change setting value of setting parameter. When at setting changeable state, used to enter (save) the setting value. Used to move on through digits of setting value at setting changeable state.
Up button	Used to shift through setting parameter, and to increase or select setting value.
Down button	Used to shift through setting parameter, and to decrease or select setting value.
Configurator Jack	Used to configure with M1E configurator software (model: M1ECFG). At the same time, set the lockout setting of the unit to 'lock'.

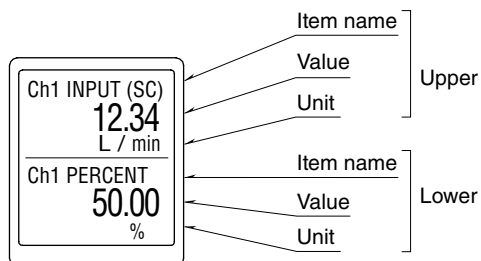
SCREEN DISPLAY

■ DISPLAY IN MEASURING MODE

• Double tiered display

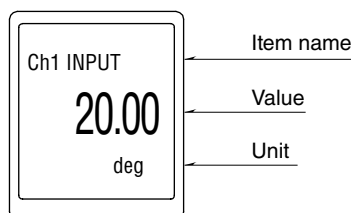
The unit can select and display any two items out of input engineering value of each channel, input scaling value, % value*, output engineering value, and output scaling value.

* Percent value for input.



• Single tiered display

When displayed item is one, it is available to show big characters in single tiered display.

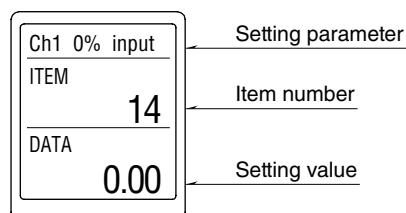


Refer to the Display setting of the Advanced mode for settings.

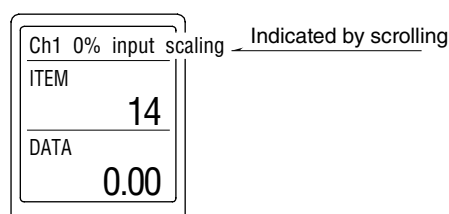
■ DISPLAY IN EACH SETTING MODE

For each setting, current values of setting parameter, ITEM number and setting value are indicated. During setting, '(Setting)' is indicated at the side of 'DATA' display.

If the power is mistakenly shut down during setting, setting values are discarded (Return to the value before setting change). Setting display previously displayed before power shutdown is indicated at next power up.



The long setting parameter is indicated by scrolling.

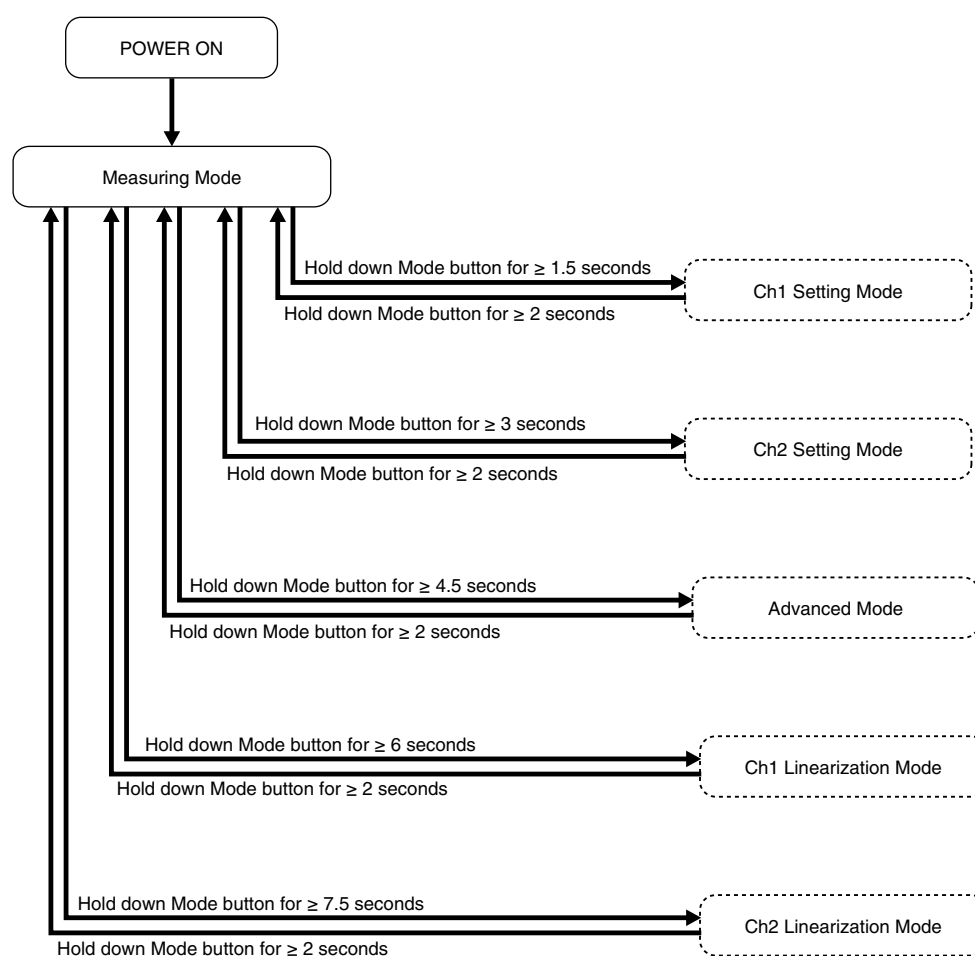


■ DISPLAY TIMEOUT

When there is no operation within the setting time of display timeout, display is turned off. Pressing Mode, Set, Up or Down button or occurring error enables to return from display off. Set '0' to display 'always on'.

PROGRAMMING

■ SETTING FLOWCHART



■ OPERATION IN EACH SETTING MODE

• Basic operation

Mode button:	In measuring mode, holding down Mode button for ≥ 1.5 seconds, ≥ 3 seconds, ≥ 4.5 seconds, ≥ 6 seconds or ≥ 7.5 seconds enables to move on to each setting mode. Holding down Mode button for ≥ 2 seconds at each setting item display enables to return to measuring mode. Holding down Mode button for ≥ 2 seconds while changing settings ('(Setting)' is displayed next to 'DATA') enables to discard setting value in changing, and to return to the state before change settings ('(Setting)' next to 'DATA' is off).
Set button:	Pressing Set button at each setting parameter enables to blink setting value and changing settings is ready ('(Setting)' is displayed next to 'DATA'). Pressing Set button while changing settings enables to save (enter) setting value and change from blinking to on.
Up button:	Press Up button to move through setting parameters. Selecting setting value while changing settings, increasing a setting value to set value. Keeping pressing Up button enables to increase the value continuously.
Down button:	Press Down button to move through setting parameters. Selecting setting value while changing settings, decreasing a setting value to set value. Keeping pressing Down button enables to decrease the value continuously.

Note: DO NOT press 2 or more buttons simultaneously.

• Operation of input setting parameter

Angle offset is set by teach.

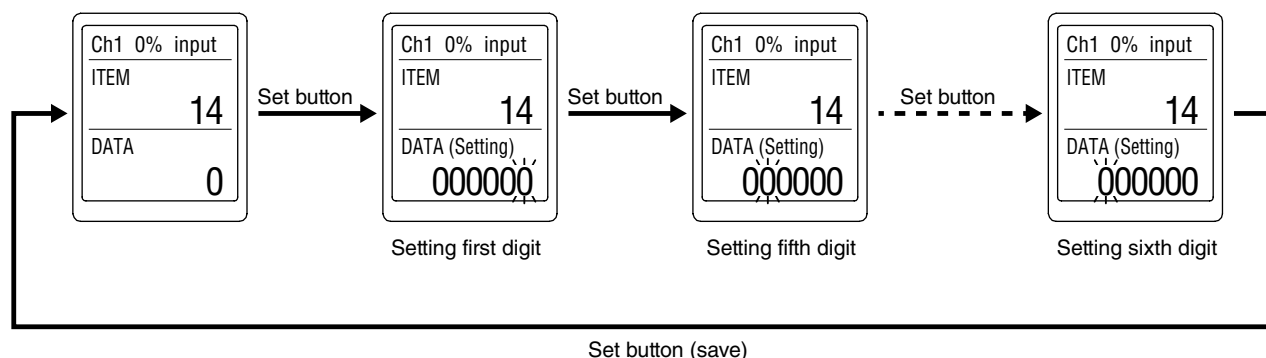
The present input value is displayed by pressing set button. With input value desired as 0% is entered, pressing set button again enables to fix the setting.

Angle span sets width used.

Angle for 0% = angle offset, angle for 100% = angle offset + angle span

• Numerical value setting parameter

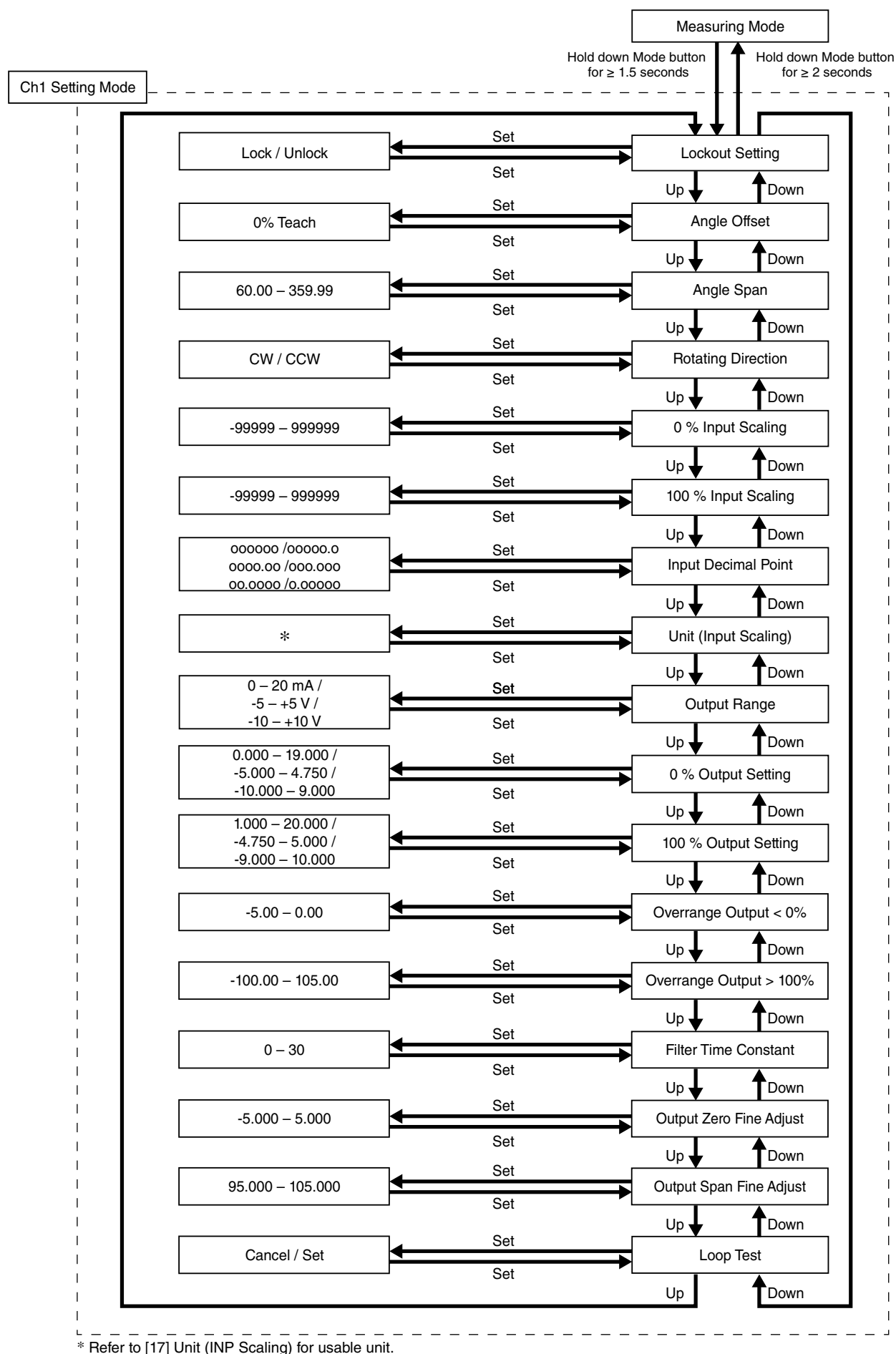
For Numerical value setting parameter, set values digit by digit. Pressing Set button enables to move blinking digit. Adjust blinking digit to set numerical value with Up and Down button. Holding down Up or Down Button each digit blinking, which enable to increase and decrease from most number to least number of numerical value at parameter. Blinking digit moves from least significant digit with pressing Set button. At most significant digit, pressing Set button again enables to turn on and determine the setting value. During setting, press and hold Mode button for ≥ 2 seconds to discard the setting value.



• Lockout setting

'Lockout setting' is available for the unit. When unlocking the lockout setting, indicate 'Lockout Setting' of 'ITEM 01' in each setting mode and set 'Unlock'. To enable lockout setting again, set 'Lock'. Even when lockout setting is enabled, it is available to confirm the each setting value. 'DATA (Locked)' is indicated in that case.

■ CH1 SETTING MODE



• Parameters

MODE	ITEM	SETTING PARAMETER	RANGE	UNIT	INITIAL VALUE
Ch1 Setting	01	Lockout setting	Lock/Unlock	—	Lock
	06	Ch1 Angle offset	—	Deg.	0.00
	07	Ch1 Angle span	60.00 – 359.99	Deg.	270.00
	08	Ch1 Rotating direction	CW / CCW	—	CW
	14	Ch1 0 % Input scaling	-99999 – 999999	—	0.00
	15	Ch1 100 % Input scaling	-99999 – 999999	—	100.00
	16	Ch1 Input decimal point	No decimal point The number of decimal places: 1 – 5	—	2 places of decimals
	17	Ch1 Unit (INP Scaling)	Choose from 68 types*	—	%
	18	Ch1 Output range	0 – 20 mA -5 – 5 V -10 – +10 V	—	0 – 20 mA
	19	Ch1 0 % Output setting	0.000 – 19.000 -5.000 – 4.750 -10.000 – 9.000	mA V V	4.000
	20	Ch1 100 % Output setting	1.000 – 20.000 -4.750 – 5.000 -9.000 – 10.000	mA V V	20.000
	28	Ch1 Overrange output < 0%	-5.00 – 0.00	%	-5.00
	29	Ch1 Overrange output > 100%	-100.00 – 105.00	%	105.00
	79	Ch1 Filter time constant	0 – 30	sec.	0
	82	Ch1 Output zero fine adjust	-5.000 – 5.000	%	0.000
	83	Ch1 Output span fine adjust	95.000 – 105.000	%	100.000
	89	Ch1 Loop test	-5.00 – 105.00	%	Cancel

[01] Lockout setting

Set Lock / Unlock of lockout setting.

SETTING VALUE	DESCRIPTION	INITIAL VALUE
Lock	Lockout setting enable	Lock
Unlock	Lockout setting disable	

Even when setting is 'Lock', it is available to move on to each setting mode and confirm the setting value of each setting parameter. In each setting parameter display, when 'Lock', 'DATA (Locked)' is indicated, when 'Unlock', 'DATA' is indicated.

[06] Ch1 Angle offset

Set the position for 0% input entered to the unit. Setting is performed by teach. Press set button to display the present input value. With input value desired as 0% is entered, pressing set button again enables to fix the setting. The value entered the setting is displayed as 'INPUT' in measuring mode.

[07] Ch1 Angle span

Set the Angle span.

SETTING RANGE	INITIAL VALUE
60 – 359.99	270.00

[08] Ch1 Rotating direction

Set the rotating direction of input value.

SETTING VALUE	DESCRIPTION	INITIAL VALUE
CW	Clockwise	CW
CCW	Counter-clockwise	

[14] Ch1 0 % Input scaling

Set the display value of 0 % input setting.

SETTING RANGE	INITIAL VALUE
-99999 – 999999	0.00

[15] Ch1 100 % Input scaling

Set the display value of 100 % input setting.

SETTING RANGE	INITIAL VALUE
-99999 – 999999	100.00

[16] Ch1 Input decimal point

Set the decimal point position of [14] 0 % and [15] 100 % input display scaling.

SETTING VALUE	DESCRIPTION	INITIAL VALUE
000000	Decimal point: None	2 places of decimals
00000.0	Number of decimal places: 1	
0000.00	Number of decimal places: 2	
000.000	Number of decimal places: 3	
00.0000	Number of decimal places: 4	
0.00000	Number of decimal places: 5	

[17] Ch1 Unit (INP scaling)

Set the unit to display input scaling.

Available units are following 68 types.

DC, AC, mV, V, kV, μ A, mA, A, kA, mW, W, kW, var, kvar, Mvar, VA, Hz, Ω , k Ω , M Ω , cm, mm, m, m/sec, mm/min, cm/min, m/min, m/h, m/s², inch, L, L/s, L/min, L/h, m³, m³/sec, m³/min, m³/h, Nm³/h, N·m, N/m², g, kg, kg/h, N, kN, Pa, kPa, MPa, t, t/h, °C, °F, K, %RH, J, kJ, MJ, rpm, sec, min, min⁻¹, pH, %, ppm, deg, (blank), User

Selecting 'User' enables to move on to user's unit setting display. A unit can be created by using any characters. Up to 13 characters available.*1 Up and Down button enables to move on selected characters. Set button enables to select a character. While setting, pressing Mode button enables to delete a character, pressing and holding Mode button enables to discard the settings. Pressing and holding Set button enables to determine the setting and return to setting display of [17] Unit (INP Scaling). The unit is indicated by 'INPUT (Scaling)' at measuring mode display.

If turning power off while setting, it returns to setting display of [17] Unit (INP Scaling) (The setting value is discarded).

*1. Settable characters

0 - 9 A - Z a - z ! " # \$ % & ' ()
= - + * ^ | @ ` [] { } ; : < > ?
_ , . /

The unit is displayed [Ch1 INPUT (Scaling)] at that time of measuring mode.

Initial value: %

[18] Ch1 Output range

Set the range of output signal of the unit.

SETTING VALUE	DESCRIPTION	INITIAL VALUE
0 – 20 mA	Output: 0 – 20 mA DC	0 – 20 mA
-5 – +5 V	Output: -5 – +5 V DC	
-10 – +10 V	Output: -10 – +10 V DC	

[19] Ch1 0 % Output setting

Set the 0 % output setting.

OUTPUT RANGE	SETTING RANGE	MIN. SPAN	INITIAL VALUE
0 – 20 mA	0.000 – 19.000	1.000	4.000
-5 – +5 V	-5.000 – 4.750	0.250	-5.000
-10 – +10 V	-10.000 – 9.000	1.000	-10.000

Set as follows.

[19] 0 % output setting < [20] 100 % output setting

The value is indicated by 'OUTPUT' at measuring mode.

[20] Ch1 100 % Output setting

Set the 100 % output setting.

OUTPUT RANGE	SETTING RANGE	MIN. SPAN	INITIAL VALUE
0 – 20 mA	1.000 – 20.000	1.000	20.000
-5 – +5 V	-4.750 – 5.000	0.250	5.000
-10 – +10 V	-9.000 – 10.000	1.000	10.000

Set as follows.

[19] 0 % output setting < [20] 100 % output setting

The value is indicated by 'OUTPUT' at measuring mode.

[28] Ch1 Overage output < 0 %

Set the overrange output < 0 %.

Available range between -5.00 – 0.00 %.

Initial value: -5.00

[29] Ch1 Overage output > 100 %

Set the overrange output > 100 %.

Available range between 100.00 – 105.00 %

Initial value: 105.00

[79] Ch1 Filter time constant

Set filter time constant of the first order lowpass filter.

The first order lowpass filter is available with setting time.

When '0' is set to this parameter, the first order lag filter is not available (Response time: ≤ 0.5 sec. (0 $\rightarrow$ 90 %)).

The first order lag filter is equivalent to general CR filter.

The setting time constant is the time to follow until about 63 %, when input varies from 0 % to 100 %.

It is available to set the range between 0 – 30 seconds.

Initial value: 0

* It is not entered to input engineering value display.

[82] Ch1 Output zero fine adjust

Perform fine adjustment of output signal. Available range between -5.000 – +5.000 %.

Initial value: 0.000

[83] Ch1 Output span fine adjust

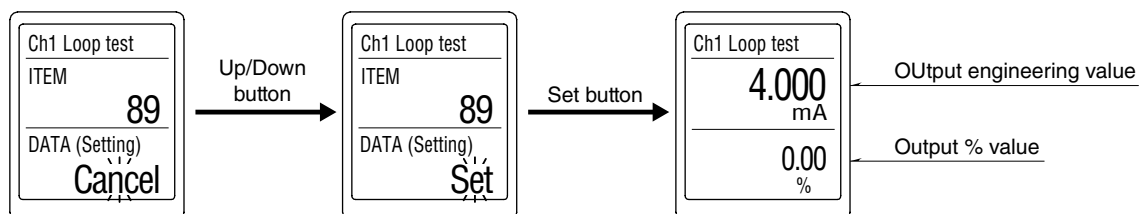
Perform fine adjustment of output signal. Available range between 95.000 – 105.000 %.

Initial value: 100.000

[89] Ch1 Loop test

As pressing Set button enables to blink 'Cancel', changing to 'Set' by pressing Up or Down and pressing 'Set' allows to indicate Loop Test display. Present value is indicated. Increase or decrease it by pressing Up and Down button. Press and hold them enables to change value continuously.*1

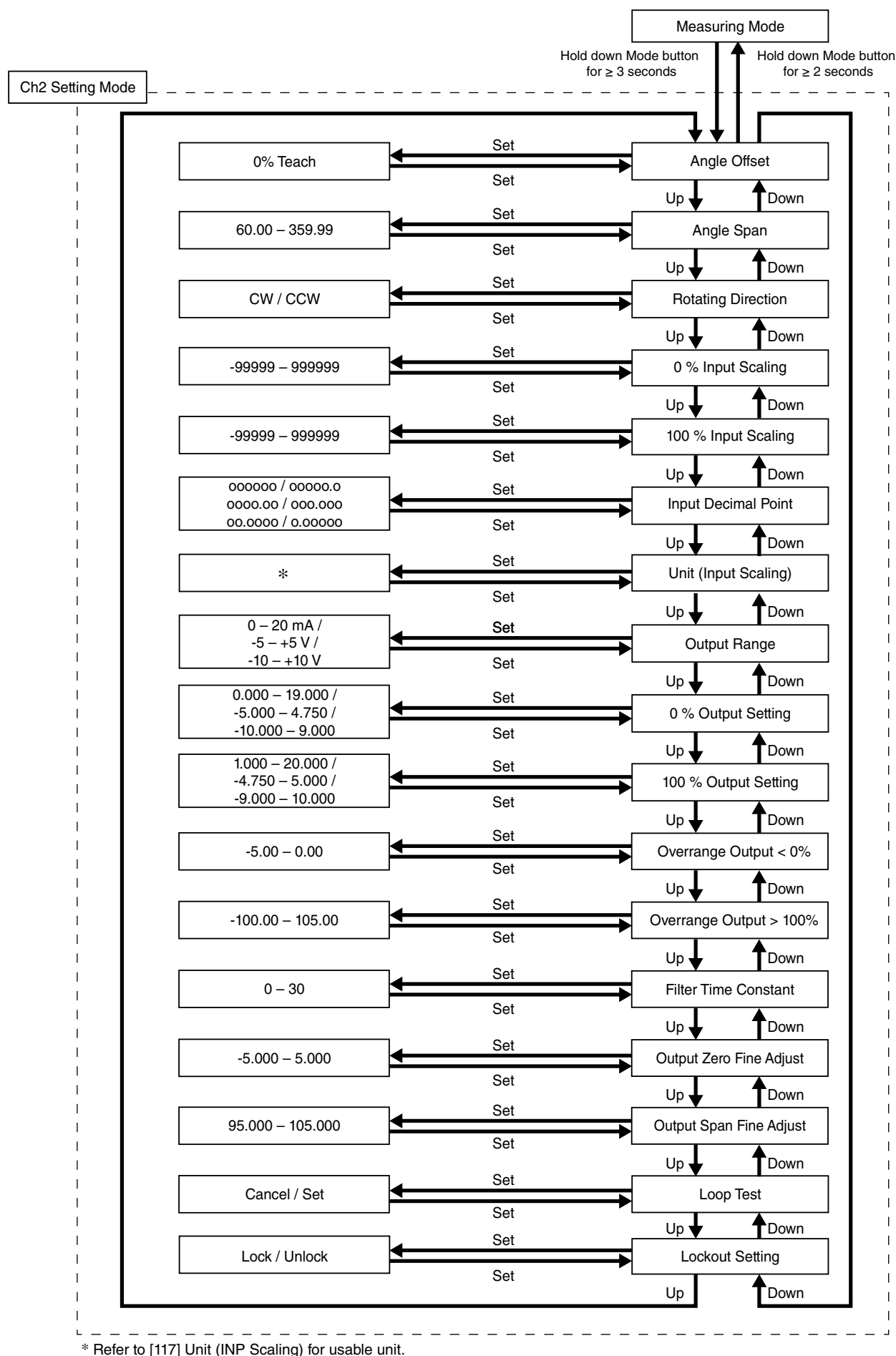
Pressing and holding Mode button more than 2 seconds or turning off the power enable to exit loop test.



*1. While loop test is performing, actual input is disregarded.

While loop test is performing and 'Display timeout' is enabled to display off, return to the display on by pressing a front button.

■ CH2 SETTING MODE



• Parameters

MODE	ITEM	SETTING PARAMETER	RANGE	UNIT	INITIAL VALUE
Ch2 Setting	106	Ch2 Angle offset	—	Deg.	0.00
	107	Ch2 Angle span	60.00 – 359.00	Deg.	270.00
	108	Ch2 Rotating direction	CW / CCW	—	CW
	114	Ch2 0 % input scaling	-99999 – 999999	—	0.00
	115	Ch2 100 % input scaling	-99999 – 999999	—	100.00
	116	Ch2 Input decimal point	No decimal point The number of decimal places: 1 – 5	—	2 places of decimals
	117	Ch2 Unit (INP Scaling)	Choose from 68 types*	—	%
	118	Ch2 Output range	0 – 20 mA -5 – +5 V -10 – +10 V	—	0 – 20 mA
	119	Ch2 0 % output setting	0.000 – 19.000 -5.000 – 4.750 -10.000 – 9.000	mA V V	4.000
	120	Ch2 100 % output setting	1.000 – 20.000 -4.750 – 5.000 -9.000 – 10.000	mA V V	20.000
	128	Ch2 Overrange output < 0%	-5.00 – 0.00	%	-5.00
	129	Ch2 Overrange output > 100%	100.00 – 105.00	%	105.00
	179	Ch2 Filter time constant	0 – 30	sec.	0
	182	Ch2 Output zero fine adjust	-5.000 – 5.000	%	0.000
	183	Ch2 Output span fine adjust	95.000 – 105.000	%	100.000
	189	Ch2 Loop test	-5.00 – 105.00	%	Cancel
	01	Lockout setting	Lock/Unlock	—	Lock

[106] Ch2 Angle offset

Set the position for 0% input entered to the unit. Setting is performed by teach. Press set button to display the present input value. With input value desired as 0% is entered, pressing set button again enables to fix the setting. The value entered the setting is displayed as 'INPUT' in measuring mode.

[107] Ch2 Angle span

Set the Angle span.

SETTING RANGE	INITIAL VALUE
60 – 359.99	270.00

[108] Ch2 Rotating direction

Set the rotating direction of input value.

SETTING VALUE	DESCRIPTION	INITIAL VALUE
CW	Clockwise	CW
CCW	Counter-clockwise	

[114] Ch2 0 % Input scaling

Set the display value of 0 % input setting.

SETTING RANGE	INITIAL VALUE
-99999 – 999999	0.00

[115] Ch2 100 % Input scaling

Set the display value of 100 % input setting.

SETTING RANGE	INITIAL VALUE
-99999 – 999999	100.00

[116] Ch2 Input decimal point

Set the decimal point position of [114] 0 % and [115] 100 % input display scaling.

SETTING VALUE	DESCRIPTION	INITIAL VALUE
000000	Decimal point: None	2 places of decimals
00000.0	Number of decimal places: 1	
0000.00	Number of decimal places: 2	
000.000	Number of decimal places: 3	
00.0000	Number of decimal places: 4	
0.00000	Number of decimal places: 5	

[117] Ch2 Unit (INP scaling)

Set the unit to display input scaling.

Available units are following 68 types.

DC, AC, mV, V, kV, μ A, mA, A, kA, mW, W, kW, var, kvar, Mvar, VA, Hz, Ω , k Ω , M Ω , cm, mm, m, m/sec, mm/min, cm/min, m/min, m/h, m/s², inch, L, L/s, L/min, L/h, m³, m³/sec, m³/min, m³/h, Nm³/h, N·m, N/m², g, kg, kg/h, N, kN, Pa, kPa, MPa, t, t/h, °C, °F, K, %RH, J, kJ, MJ, rpm, sec, min, min⁻¹, pH, %, ppm, deg, (blank), User

Selecting 'User' enables to move on to user's unit setting display. A unit can be created by using any characters. Up to 13 characters available.*1 Up and Down button enables to move on selected characters. Set button enables to select a character. While setting, pressing Mode button enables to delete a character, pressing and holding Mode button enables to discard the settings. Pressing and holding Set button enables to determine the setting and return to setting display of [117] Unit (INP Scaling). The unit is indicated by 'INPUT (Scaling)' at measuring mode display.

If turning power off while setting, it returns to setting display of [117] Unit (INP Scaling) (The setting value is discarded).

*1. Settable characters

0 - 9 A - Z a - z ! " # \$ % & ' ()
= - + * ^ | @ ` [] { } ; : < > ?
_ , . /

The unit is displayed [Ch2 INPUT (Scaling)] at that time of measuring mode.

Initial value: %

[118] Ch2 Output range

Set the range of output signal of the unit.

SETTING VALUE	DESCRIPTION	INITIAL VALUE
0 - 20 mA	Output: 0 - 20 mA DC	0 - 20 mA
-5 - +5 V	Output: -5 - +5 V DC	
-10 - +10 V	Output: -10 - +10 V DC	

[119] Ch2 0 % Output setting

Set the 0 % output setting.

OUTPUT RANGE	SETTING RANGE	MIN. SPAN	INITIAL VALUE
0 - 20 mA	0.000 - 19.000	1.000	4.000
-5 - +5 V	-5.000 - 4.750	0.250	-5.000
-10 - +10 V	-10.000 - 9.000	1.000	-10.000

Set as follows.

[119] 0 % output setting < [120] 100 % output setting

The value is indicated by 'OUTPUT' at measuring mode.

[120] Ch2 100 % Output setting

Set the 100 % output setting.

OUTPUT RANGE	SETTING RANGE	MIN. SPAN	INITIAL VALUE
0 - 20 mA	1.000 - 20.000	1.000	20.000
-5 - +5 V	-4.750 - 5.000	0.250	5.000
-10 - +10 V	-9.000 - 10.000	1.000	10.000

Set as follows.

[119] 0 % output setting < [120] 100 % output setting

The value is indicated by 'OUTPUT' at measuring mode.

[128] Ch2 Overrange output < 0 %

Set the overrange output < 0 %.

Available range between -5.00 - 0.00 %.

Initial value: -5.00

[129] Ch2 Overrange output > 100 %

Set the overrange output > 100 %.

Available range between 100.00 - 105.00 %

Initial value: 105.00

[179] Ch2 Filter time constant

Set filter time constant of the first order lowpass filter.

The first order lowpass filter is available with setting time.

When '0' is set to this parameter, the first order lag filter is not available (Response time: ≤ 0.5 sec. (0 $\rightarrow$ 90 %)).

The first order lag filter is equivalent to general CR filter.

The setting time constant is the time to follow until about 63 %, when input varies from 0 % to 100 %.

It is available to set the range between 0 - 30 seconds.

Initial value: 0

* It is not entered to input engineering value display.

[182] Ch2 Output zero fine adjust

Perform fine adjustment of output signal. Available range between -5.000 - +5.000 %.

Initial value: 0.000

[183] Ch2 Output span fine adjust

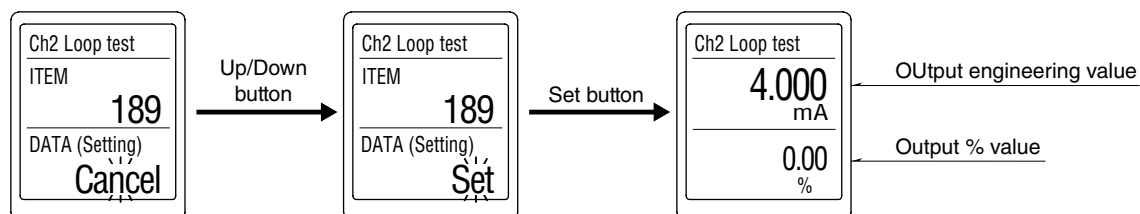
Perform fine adjustment of output signal. Available range between 95.000 - 105.000 %.

Initial value: 100.000

[189] Ch2 Loop test

As pressing Set button enables to blink 'Cancel', changing to 'Set' by pressing Up or Down and pressing 'Set' allows to indicate Loop Test display. Present value is indicated. Increase or decrease it by pressing Up and Down button. Press and hold them enables to change value continuously.*1

Pressing and holding Mode button more than 2 seconds or turning off the power enable to exit loop test.



*1. While loop test is performing, actual input is disregarded.

While loop test is performing and 'Display timeout' is enabled to display off, return to the display on by pressing a front button.

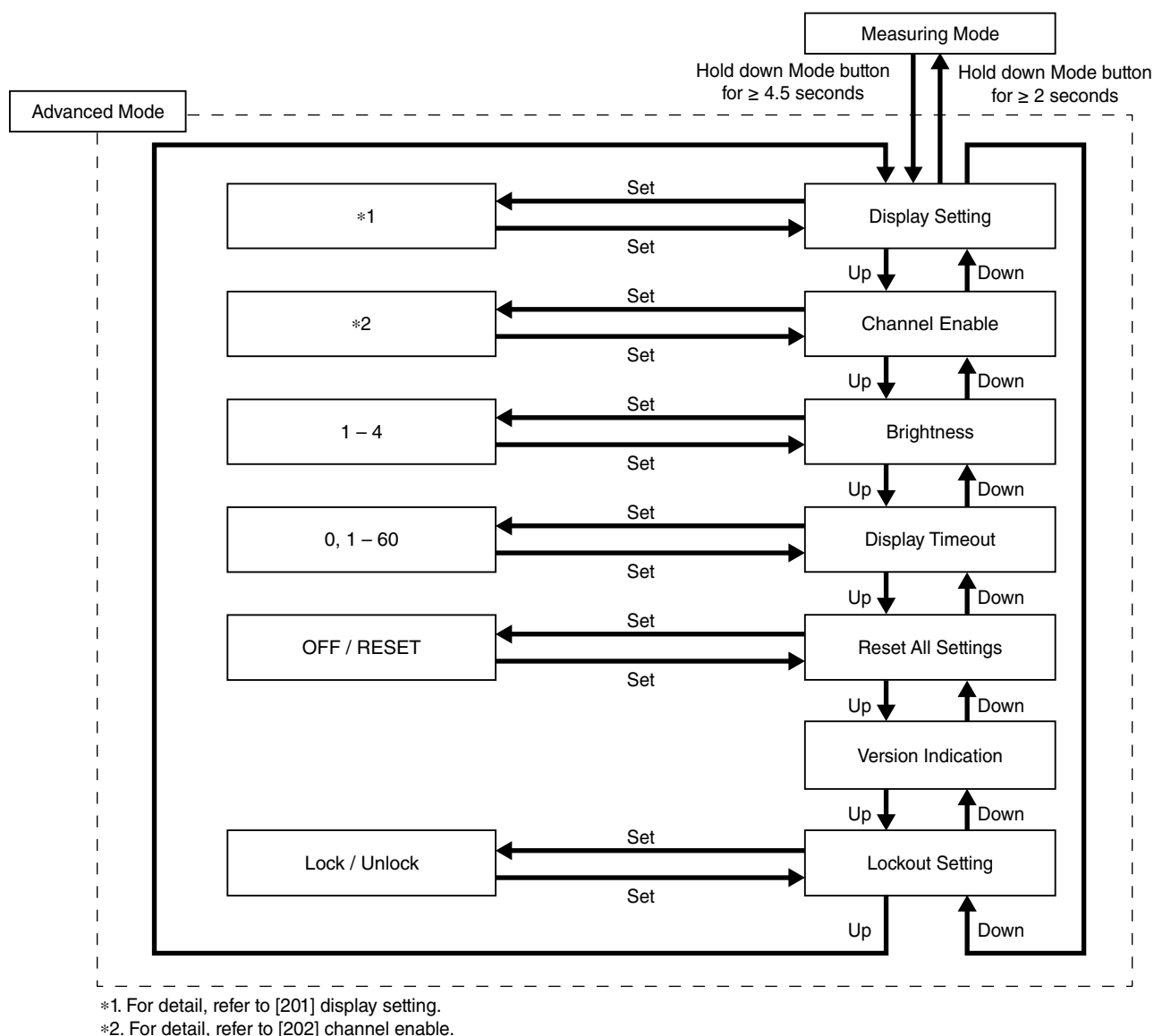
[01] Lockout setting

Set Lock / Unlock of lockout setting.

SETTING VALUE	DESCRIPTION	INITIAL VALUE
Lock	Lockout setting enable	Lock
Unlock	Lockout setting disable	

Even when setting is 'Lock', it is available to move on to each setting mode and confirm the setting value of each setting parameter. In each setting parameter display, when 'Lock', 'DATA (Locked)' is indicated, when 'Unlock', 'DATA' is indicated.

■ ADVANCED MODE



• Parameters

MODE	ITEM	SETTING PARAMETER	RANGE	UNIT	INITIAL VALUE
Advanced	201	Display setting	Upper: choose from 8 types Lower: choose from 9 types	—	Upper: INPUT Lower: INPUT
	202	Channel enable	Choose from 3 types	—	Ch1 enable Ch2 enable
	203	Brightness	1 (darkest) – 4 (brightest)	—	4
	204	Display timeout	0 (always on), 1 – 60	min.	10
	205	Reset all settings	OFF / RESET	—	OFF
	206	Version indication	—	—	—
	01	Lockout setting	Lock / Unlock	—	Lock

[201] Display setting

Set display setting in measuring mode. Display is divided, indicating item can be set for each upper and lower. Pressing Set button once is setting for upper, pressing again for lower, pressing once more for setting determined.

Upper

SETTING VALUE	DESCRIPTION	INITIAL VALUE
Ch1 INPUT	Ch1 Input engineering unit value	Ch1 INPUT (engineering value)
Ch1 INPUT (Scaling)*1	Ch1 Input scaling	
Ch1 PERCENT	Ch1 Percent value*2	
Ch1 OUTPUT	Ch1 Output engineering unit value	
Ch2 INPUT	Ch2 Input engineering unit value	
Ch2 INPUT (Scaling)*1	Ch2 Input scaling	
Ch2 PERCENT	Ch2 Percent value*2	
Ch2 OUTPUT	Ch2 Output engineering unit value	

Lower

SETTING VALUE	DESCRIPTION	INITIAL VALUE
Ch1 INPUT	Ch1 Input engineering unit value	Ch2 INPUT (engineering value)
Ch1 INPUT (Scaling)*1	Ch1 Input scaling	
Ch1 PERCENT	Ch1 Percent value*2	
Ch1 OUTPUT	Ch1 Output engineering unit value	
Ch2 INPUT	Ch2 Input engineering unit value	
Ch2 INPUT (Scaling)*1	Ch2 Input scaling	
Ch2 PERCENT	Ch2 Percent value*2	
Ch2 OUTPUT	Ch2 Output engineering unit value	
None	No display	

*1. Display at measuring mode is in case of Ch1, Ch1 INPUT (SC).

*2. Input percent value.

[202] Channel enable

Set the enable/disable of Ch1 and Ch2.

The channel which is set to disable does not display output signal and presence value in Measuring Mode.

SETTING VALUE	DESCRIPTION	INITIAL VALUE
Ch1 enable	Ch1 enable	Ch1 enable Ch2 enable
Ch2 enable	Ch2 enable	
Ch1 enable Ch2 disable	Ch1 enable Ch2 disable	
Ch1 disable Ch2 enable	Ch1 disable Ch2 enable	

For example, in case that Ch2 is disable, it enable to set of Ch2.

[203] Brightness

Adjust brightness of display. It is available to set the range between 1 (darkest) – 4 (brightest).

Initial value: 4

[204] Display timeout

Set the time to off the display when there is no operation within a certain time.

It is available to set the range between 0 – 60 minutes.

Set '0' to display 'always on'.

When error is occurred at display off, the display returns from off.

Initial value: 10

[205] Reset all settings

Return settings to initial value.

SETTING VALUE	DESCRIPTION
OFF	Not initialized.
RESET	Initialize all settings.*1

*1. When setting value is initialized, each parameters currently set are over written by initial value. 'COMPLETE' is indicated when initializing setting value is completed. Notice that it does not return to the setting value, which is specified by the option Ex-factory setting (/SET). Configure initialized value again with DIP switch with power off for output setting.

[206] Version indication

Indicate firmware version.

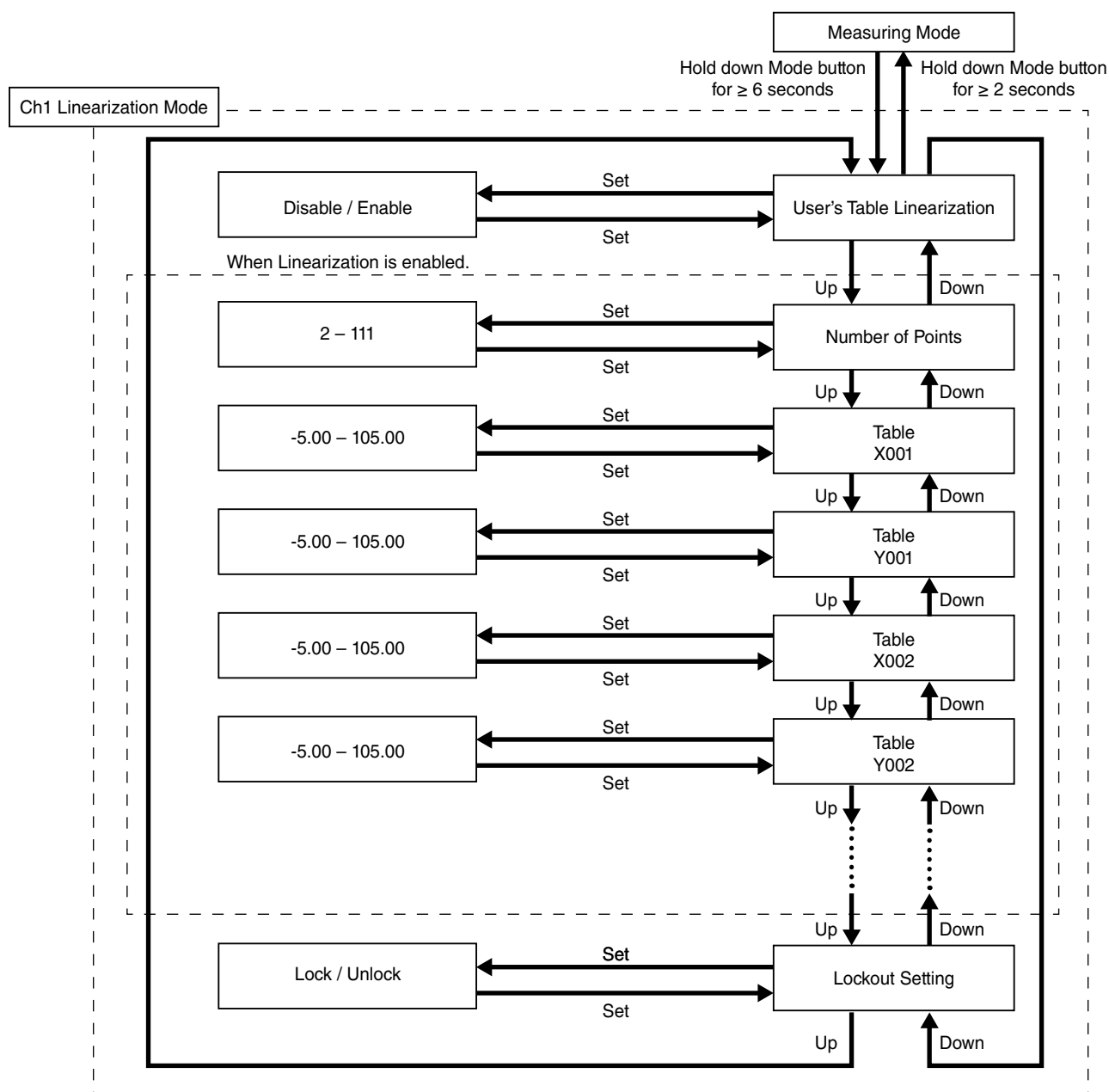
[01] Lockout Setting

Set Lock / Unlock of lockout setting.

SETTING VALUE	DESCRIPTION	INITIAL VALUE
Lock	Lockout setting enable	Lock
Unlock	Lockout setting disable	

Even when setting is 'Lock', it is available to move on to each setting mode and confirm the setting value of each setting parameter. In each setting parameter display, when 'Lock', 'DATA (Locked)' is indicated, when 'Unlock', 'DATA' is indicated.

CH1 LINEARIZATION MODE



• Parameters

MODE	ITEM	SETTING PARAMETER	RANGE	UNIT	INITIAL VALUE
Ch1 Linearization	210	Ch1 User's table linearization	Disable / Enable	—	Disable
	276	Ch1 Number of points	2 – 111	—	2
	277 – 498	Ch1 Table	-5.00 – 105.00	%	X001 -5.00 Y001 -5.00 X002 105.00 Y002 105.00
	01	Lockout setting	Lock / Unlock	—	Lock

[210] Ch1 User's table linearization

SETTING VALUE	DESCRIPTION	INITIAL VALUE
Disable	Linearization disable	Disable
Enable	Linearization enable	

When Enable is selected, input is converted to output by using user's table.

[276] Ch1 Number of points

Set number of points for user's table.

It is available to set the range between 2 – 111 points.

Initial value: 2

[277 – 498] Ch1 Table

For the conversion by using user's table, conversion input is searched from the table in which X corresponds to input (unit: %) and Y corresponds to output (unit: %) are paired, and Y, which corresponds output of matched table, is the output.

The range is available between -5 to +105 (%) for both X and Y. For X, it is required to set in ascending order from X001. Be sure that if it is set with other than ascending order, correct conversion is not carried out.

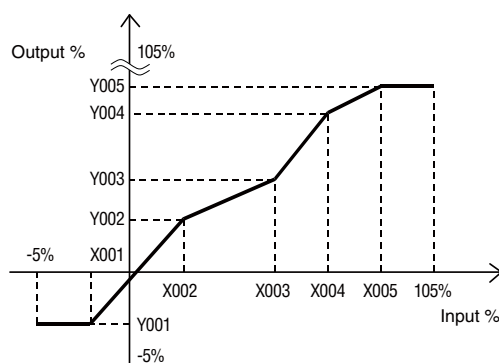
Initial value: X001 -5.00

Y001 -5.00

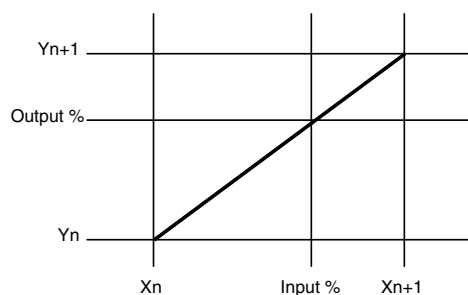
X002 105.00

Y002 105.00

[E.g.]



When the input is not defined in the user's table, two nearest value for each positive and negative are selected in written X. These two data are linearly interpolated and Y is obtained and output it.

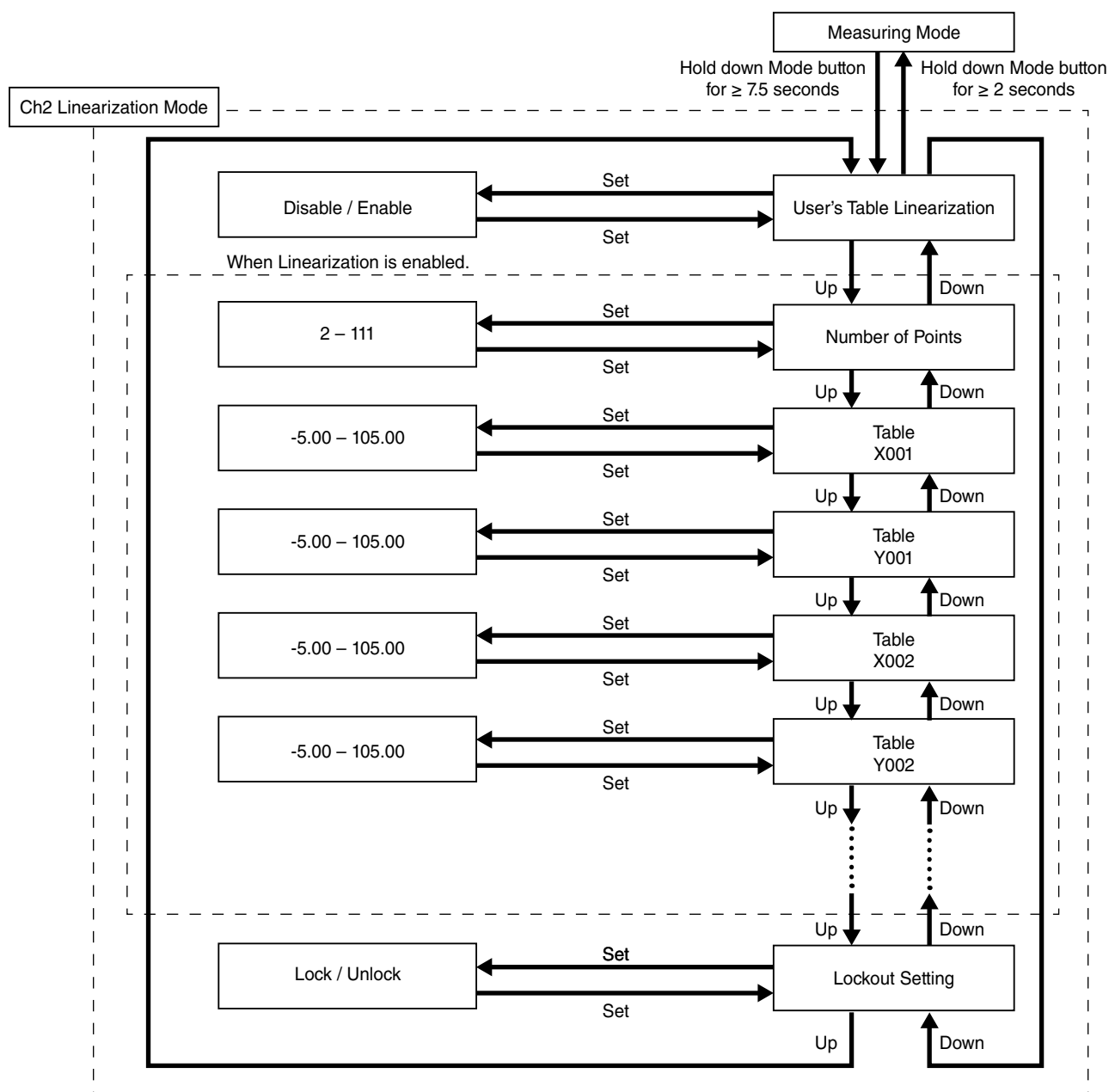
**[01] Lockout Setting**

Set Lock / Unlock of lockout setting.

SETTING VALUE	DESCRIPTION	INITIAL VALUE
Lock	Lockout setting enable	Lock
Unlock	Lockout setting disable	

Even when setting is 'Lock', it is available to move on to each setting mode and to confirm the setting value of each setting parameter. In each setting parameter display, when 'Lock', 'DATA (Locked)' is indicated, when 'Unlock', 'DATA' is indicated.

■ CH2 LINEARIZATION MODE



- **Parameters**

MODE	ITEM	SETTING PARAMETER	RANGE	UNIT	INITIAL VALUE
Ch2 Linearization	510	Ch2 User's table linearization	Disable / Enable	—	Disable
	576	Ch2 Number of points	2 – 111	—	2
	577 – 798	Ch2 Table	-5.00 – 105.00	%	X001 -5.00 Y001 -5.00 X002 105.00 Y002 105.00
	01	Lockout setting	Lock / Unlock	—	Lock

[510] Ch2 User's table linearization

SETTING VALUE	DESCRIPTION	INITIAL VALUE
Disable	Linearization disable	Disable
Enable	Linearization enable	

When Enable is selected, input is converted to output by using user's table.

[576] Ch2 Number of points

Set number of points for user's table.

It is available to set the range between 2 – 111 points.

Initial value: 2

[577 – 798] Ch2 Table

For the conversion by using user's table, conversion input is searched from the table in which X corresponds to input (unit: %) and Y corresponds to output (unit: %) are paired, and Y, which corresponds output of matched table, is the output.

The range is available between -5 to +105 (%) for both X and Y. For X, it is required to set in ascending order from X001. Be sure that if it is set with other than ascending order, correct conversion is not carried out.

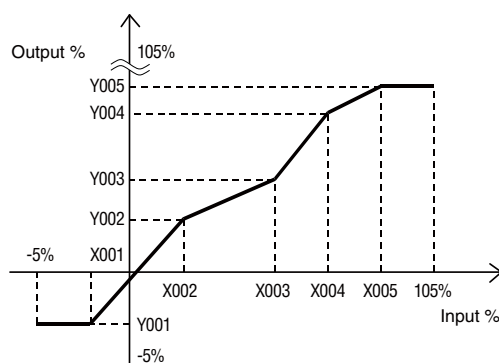
Initial value: X001 -5.00

Y001 -5.00

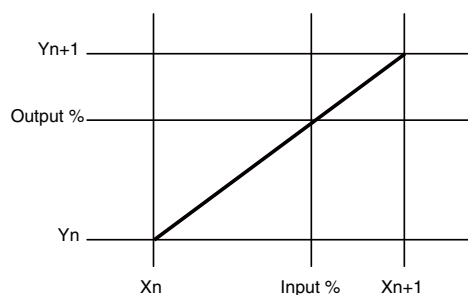
X002 105.00

Y002 105.00

[E.g.]



When the input is not defined in the user's table, two nearest value for each positive and negative are selected in written X. These two data are linearly interpolated and Y is obtained and output it.

**[01] Lockout Setting**

Set Lock / Unlock of lockout setting.

SETTING VALUE	DESCRIPTION	INITIAL VALUE
Lock	Lockout setting enable	Lock
Unlock	Lockout setting disable	

Even when setting is 'Lock', it is available to move on to each setting mode and to confirm the setting value of each setting parameter. In each setting parameter display, when 'Lock', 'DATA (Locked)' is indicated, when 'Unlock', 'DATA' is indicated.

ERROR MESSAGES

DISPLAY	ERROR DESCRIPTION	WHAT TO DO
OVER RANGE U	The input exceeds 105 %.	Return the input signal not exceed 105 %.
OVER RANGE D	The input exceeds lower limit of -5 %.	Return the input signal -5 % or more.
SCALING ERROR U	Input or output scaling value exceeds 999999 (upward).	Return the input or output signal not exceed 999999.
SCALING ERROR D	Input or output scaling value exceeds -99999 (downward).	Return the input or output signal not lower than -99999.
EEPROM I ERROR	Internal data error	Repair is needed if the display does not recover after the power is reset.
EEPROM R ERROR	Memory reading error	'Reset all settings' in advanced mode.*1
EEPROM W ERROR	Memory writing error	'Reset all settings' in advanced mode.*1

*1. All setting parameters are initialized. Repair is needed if it does not recover.

Indicated errors vary as follows depending on setting value of display setting.

Error is indicated blinking at upper or lower.

When multiple error occurs, only high priority error is displayed.

Order of priority is EEPROM ERROR, OVER RANGE, SCALING ERROR in descending order.

ERROR MESSAGES		DISPLAY SETTING		
		INPUT ENGINEERING UNIT VALUE	INPUT SCALING VALUE	PERCENT VALUE
	OVER RANGE U	✓	✓	—
	OVER RANGE D			
	SCALING ERROR U (INPUT)	✓	✓	—
	SCALING ERROR D (INPUT)			
	EEPROM I ERROR	✓		
	EEPROM R ERROR			
	EEPROM W ERROR			

WIRING INSTRUCTIONS FOR BASE

■ SCREW TERMINAL

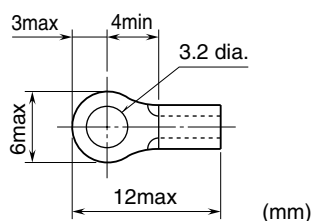
Torque: 0.5 N·m

■ SOLDERLESS TERMINAL

Refer to the drawing below for recommended ring tongue terminal size. Spade tongue type is also applicable.

Recommended manufacturer: Japan Solderless Terminal MFG.Co.Ltd, Nichifu Co.,ltd (Solderless terminals with insulation sleeve do not fit)

Applicable wire size: 0.25 to 1.65 mm²



CHECKING

- 1) Terminal wiring: Check that all cables are correctly connected according to the connection diagram.
- 2) Power input voltage: Check voltage across the terminal 19 – 20 with a multimeter.
- 3) Input signal and power input voltage: Check wiring across M1EXS-2 and self-synch as shown in connection diagram. The power input of the unit has polarity. Be sure that the connection for R1 and R2 of the self-synch.
- 4) Output: Check that the load resistance meets the described specifications.

MAINTENANCE

Regular calibration procedure is explained below:

■ CALIBRATION

Without linearization, warm up the unit for at least 10 minutes. Apply 0%, 25%, 50%, 75% and 100% input signal. Check that the output signal for the respective input signal remains within accuracy described in the data sheet. If the output signal is out of accuracy, when the input display value is out of accuracy, perform the input fine adjustment. When the input display value is correct but the output is out of accuracy, perform the output fine adjustment. Refer to this manual, when adjusting with front buttons. Refer to the M1ECFG users manual (EM-5981), when adjusting with M1E Configurator Software (model: M1ECFG). And then follow the procedure shown below.

• INPUT FINE ADJUSTMENT

- 1) Set the input signal to 0 %, and adjust the input to 0 % by [06]/[106] Angle offset adjust.
- 2) Adjust [07]/[107] Angle span if needed.

• OUTPUT FINE ADJUSTMENT

- 1) Set the simulated input to 0 %, and adjust the output signal to 0 % by [82]/[182] Output Zero fine adjust.
- 2) Set the simulated input to 100 %, and adjust the output signal to 100 % by [83]/[183] Output Span fine adjust.
- 3) Again set the simulated input to 0 %, confirm the output signal.
- 4) If output signal is shifted, repeat the procedure from 1) to 3).

LIGHTNING SURGE PROTECTION

M-System offers a series of lightning surge protector for protection against induced lightning surges. Please contact M-System to choose appropriate models.