

For your safety, please read the following before using.

- Suggest to connect, install, and set up by professional technicians.
- Do not drop, hit or allow excessive shock. Even if switch body appears undamaged, internal components may be broken and can cause malfunction.
- Turn power off before connecting wiring. Wrong wiring or short circuit will damage and/or cause malfunction.
- Do not use in environment containing steam or oil vapor.
- This product is not explosion-proof rated. Do not use in atmosphere containing flammable or explosive gases.
- Wiring for pressure sensor should avoid power source line and high voltage line. If use in the same circuit, noise may cause malfunction.
- Sensors at end-of-life must be disposed of in accordance with E-Waste regulations of the country/region, NOT disposed of with regular garbage.

A. SPECIFICATIONS

MODEL		EP4□0E																	
Sensor Type (※1)		S0	S01	S02	S03	S04	S05	S06	S07	S08	S09	S10	S11	S12	S13	S14	S15	S16	S17
Display Range (※1)		Self-Setting (※2)	0 ┆ 1000.0 kPa	-100.0 ┆ 100.0 kPa	0 ┆ -101.3 kPa	0 ┆ 10.000 MPa	0 ┆ 25.00 MPa	0 ┆ 300.0 mL	0 ┆ 500.0 mL	0 ┆ 1000.0 mL	0 ┆ 5.000 L	0 ┆ 10.000 L	-300 ┆ 300 mL	-500 ┆ 500 mL	-1000 ┆ 1000 mL	-5.00 ┆ 5.00 L	-10.00 ┆ 10.00 L	0 ┆ 10 V	4 ┆ 20 mA
Set Resolution (※1)	kPa	Self-Setting	0.1	0.1	0.1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	MPa		0.0001	0.001	0.001	0.001	0.01	—	—	—	—	—	—	—	—	—	—	—	
	kgf/cm ²		0.001	0.001	0.001	0.01	0.1	—	—	—	—	—	—	—	—	—	—	—	
	bar		0.001	0.001	0.001	0.01	0.1	—	—	—	—	—	—	—	—	—	—	—	
	psi		0.01	0.01	0.01	0.1	1	—	—	—	—	—	—	—	—	—	—	—	
	inHg		0.1	0.1	0.1	1	1	—	—	—	—	—	—	—	—	—	—	—	
	mmHg		1	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	
	mmAq (mmH ₂ O)		1 (※3)	1 (※3)	1 (※3)	—	—	—	—	—	—	—	—	—	—	—	—	—	
	mL		—	—	—	—	—	0.1	0.1	0.1	1	1	1	1	1	—	—	—	
	L		—	—	—	—	—	0.0001	0.0001	0.0001	0.001	0.001	0.001	0.001	0.001	0.01	0.01	—	
mA	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.01		
V	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.001	—	
Pirani Gauge Brand and Model		Self-Setting			INFICON - VGC501			Leybold - TTR 91 N			Edwards - APG100/200			Edwards - WRG200					
Formula		10 ^{(((V-a)/b))}																	
Formula and Parameter (※4)	Parameter a - mbar	5.000 ~ 8.083			6.143			6.143			6			8					
	Parameter a - pa	5.000 ~ 8.083			3.572			3.572			4			6.666666666					
	Parameter a - Torr	5.000 ~ 8.083			6.304			6.304			6.125			8.0833333					
	Parameter b	1.000 ~ 1.286			1.286			1.286			1			0.666667					
Power Supply Voltage		15 ~ 24 V DC, Ripple (P-P) ≤ 10 %																	
Current Consumption		≤ 40 mA (with no load)																	
Sensor Input		KP400E : 0 ~ 10V / KP410E : 0 ~ 10V, 1 ~ 5V, 4 ~ 20mA selectable																	
Switch Output		2 NPN open collector outputs Max. Load Current : 150 mA Max. Supply Voltage : 30 V DC Residual Voltage : ≤ 1 V 2 PNP open collector outputs Max. Load Current : 150 mA Max. Supply Voltage : 24 V DC Residual Voltage : ≤ 1 V																	
Repeatability		± 0.1 % F.S. ± 1 digit (Ambient temperature : 25 ± 3 °C)																	
Hysteresis	OnePoint SetMode	Adjustable (※5)																	
	Hysteresis Mode																		
	Window Comparator Mode																		
Response Time of Digital Filter (※6)		oFF, 25 ms, 100 ms, 250 ms, 500 ms, 1000 ms, 1500 ms, 3000 ms selectable																	
Overcurrent Protection		Yes																	
Display		4 ½ digital, 7 segment LCD display (Red / White / Pink / Orange) (Sampling rate : 0.2, 0.5, 1 sec. / time)																	
Indicator Accuracy		± 0.5 % F.S ± 1digit (Ambient temperature : 25 ± 3 °C)																	
Switch on Indicator		Orange Indicator 1 : OUT1 & Orange Indicator 2 : OUT2																	
Analog Output (Voltage Output)		Output Voltage : 0 ~ 10 V ± 0.5 % F.S. Linearity : ± 0.5 % F.S. Output Impedance : 2 KΩ																	
Analog Output (Current Output) (※1)		Output Current : 4 ~ 20 mA ± 0.5 % F.S. Linearity : ± 0.5 % F.S. Max. Load Impedance : 250 Ω at power supply of 15 V, 600 Ω at power supply of 24 V Min. Load Impedance : 50 Ω																	
Environment	Enclosure	IP40																	
	Ambient Temp. Range	Operation : 0 ~ 50 °C ; storage : -10 ~ 60 °C (No condensation or freezing)																	
	Ambient Humidity Range	Operation / Storage : 35 ~ 85 % RH (No condensation)																	
	Withstand Voltage	1000 V AC in 1-min (between case and lead wire)																	
	Insulation Resistance	≥ 50 MΩ (at 500 V DC, between case and lead wire)																	
	Vibration	Total amplitude 1.5 mm or 10 G, 10 Hz ~ 150 Hz ~ 10 Hz scan for 1 minute, 2 hours each direction of X, Y and Z																	
	Shock	100 m/s ² (10 G), 3 times each in direction of X, Y and Z																	
Temperature Characteristic		± 0.5 % F.S. of detected pressure (25 °C) at temp. (Range of 0 ~ 50 °C)																	
Communication Interface (※7)		RS485 Modbus RTU																	
Lead Wire		Ø4 PVC - 26 AWG (0.15 mm ²) - 5 cores																	
Weight (with 2meter lead wire)		Approx. 67 g																	

- ※ 1. This function is only available for EP410E. The default setting of [F - 00] input type is 0 ~ 10V.
- ※ 2. S0 : Set the sensor range (-1999 ~ 15000) by self. The decimal place can be adjusted.
- ※ 3. Actual value is 10 times display value while pressure unit is mmAq.
- ※ 4. This function is only available for EP400E.
- ※ 5. Hysteresis value is adjustable within 1 ~ 8 digits for one point set mode and window comparator mode.
- ※ 6. When digital filter function is OFF, the response time is 4 ms ~ 6 ms.
- ※ 7. This function is only available for Output Specification 02R and 04R.

B. ORDERING INFORMATION

E P 4 **1 0** E - **0 1 0**

Input Specifications

0 : Pirani gauge
1 : Voltage or current input

Output Channel

0 : 1 Channel

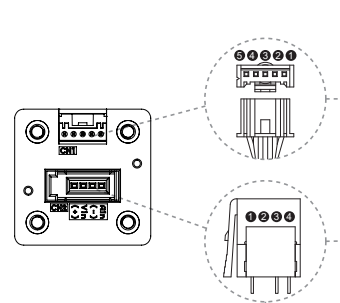
Output Specifications

010 : 2 NPN outputs & Analog output (0 ~ 10 V)
011 : 2 NPN outputs & Analog output (4 ~ 20 mA) (only for KP410E)
030 : 2 PNP outputs & Analog output (0 ~ 10 V)
031 : 2 PNP outputs & Analog output (4 ~ 20 mA) (only for KP410E)
02R : 1 NPN output + RS485
04R : 1 PNP output + RS485

Optional Parts

BT-18 : Mounting bracket
BT-19 : Mounting bracket
PA-C : Panel adapter
PA-D : Panel adapter + Front protective lid
CN-0046A : Sensor connector Ø0.8 ~ Ø1.0 mm, 26 ~ 24AWG
CN-0046B : Sensor connector Ø1.0 ~ Ø1.2 mm, 26 ~ 24AWG
CN-0046C : Sensor connector Ø1.2 ~ Ø1.6 mm, 26 ~ 24AWG

C. CONNECTOR



•CN1 : Cable

PIN NO.	Wire color & Content
1	Brown : DC(+)
2	Orange : Analog output or RS485 (B+)
3	White : OUT2 or RS485 (A-)
4	Black : OUT1
5	Blue : DC(-)

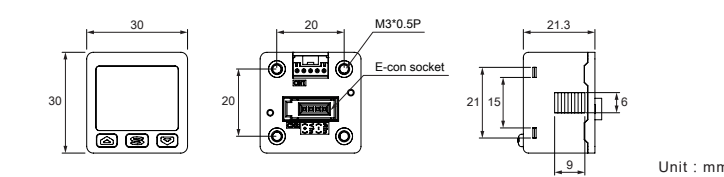
•CN2 : Sensor connector

PIN NO.	Content
1	DC(+)
2	Vin
3	DC(-)
4	Ain

•Appended Table (Lead wire : 24 ~ 26 AWG)

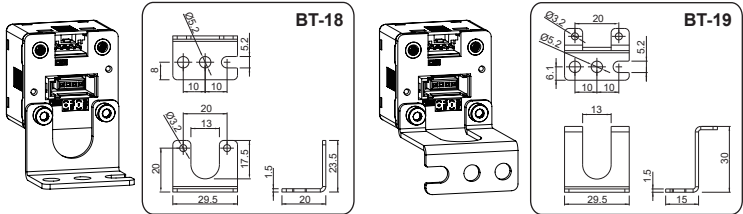
Product No.	Diameter (mm)	3M Product No.
CN-0046A	Ø 0.8 ~ Ø 1.0	37104-3101-000FL
CN-0046B	Ø 1.0 ~ Ø 1.2	37104-3122-000FL
CN-0046C	Ø 1.2 ~ Ø 1.6	37104-3163-000FL

D. DIMENSIONS

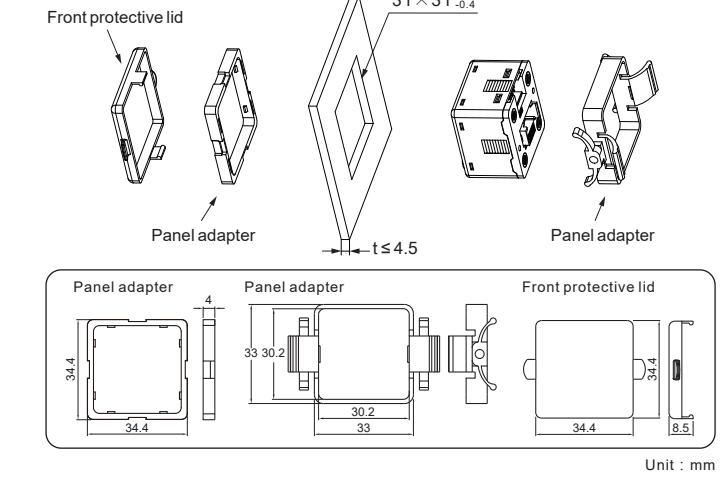


E. OPTIONAL PARTS DIMENSIONS

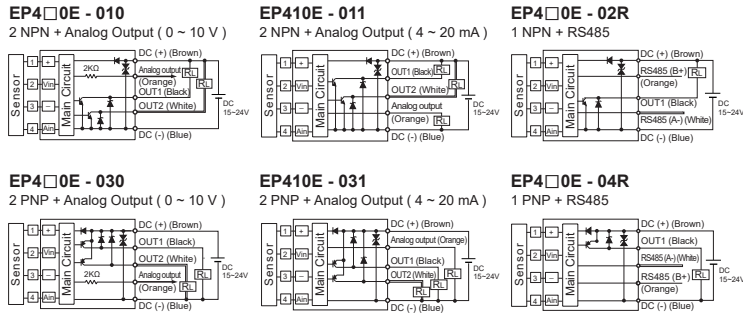
① Mounting bracket



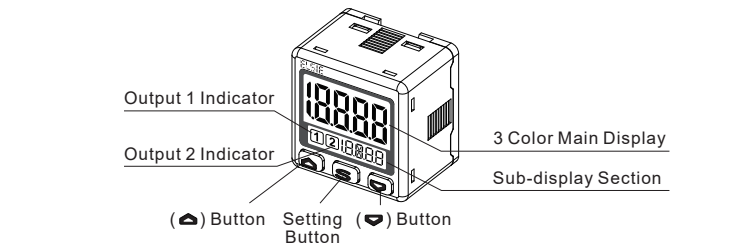
② Panel Mounting



F. OUTPUT CIRCUIT WIRING DIAGRAMS



G. PANEL DESCRIPTION



H. OUTPUT MODE

(1) One point set mode :

Normal open mode

Normal close mode

(2) Hysteresis mode :

Normal open mode

Normal close mode

(3) Window comparator mode :

Normal open mode

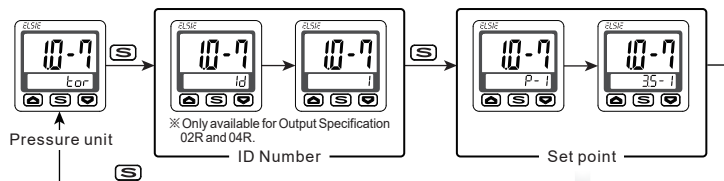
Normal close mode

EP400E OPERATION INSTRUCTIONS OF PIRANI GAUGE

K. SUB-DISPLAY DISPLAY SETTING

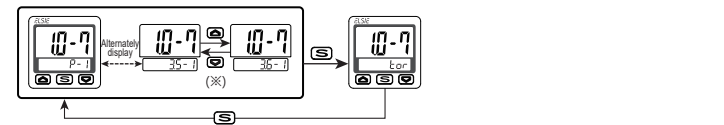
※ When selecting the **voltage** unit, the display will be the same as KP410E.

In measure mode (※), press **[S]** button to switch pressure unit / ID Number / set point, and set the set point. ※ EP400E is power-on and not in the function setting or checking state.



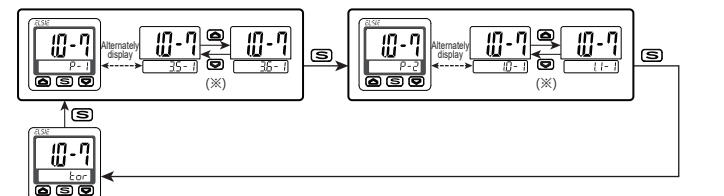
Setting Condition 1

OUT 1 : " oP5 " (One point set mode)
OUT 2 : " oFF " (Not used)



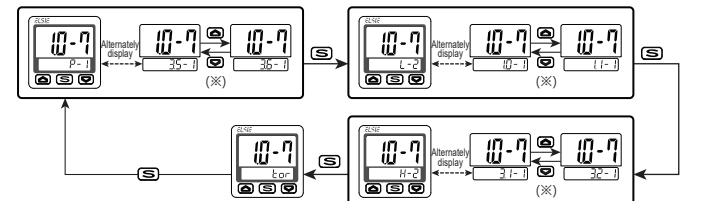
Setting Condition 2

OUT 1 : " oP5 " (One point set mode)
OUT 2 : " oP5 " (One point set mode)



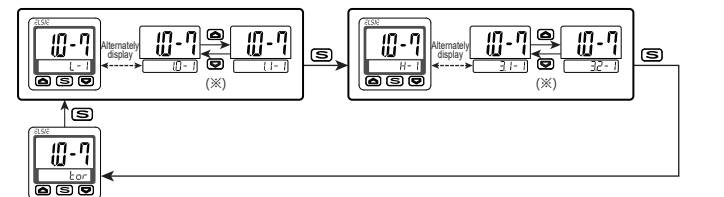
Setting Condition 3

OUT 1 : " oP5 " (One point set mode)
OUT 2 : " HYS " (Hysteresis mode) or " Win " (Window comparator mode)



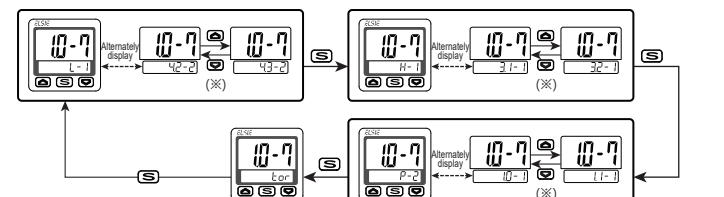
Setting Condition 4

OUT 1 : " HYS " (Hysteresis mode) or " Win " (Window comparator mode)
OUT 2 : " oFF " (Not used)



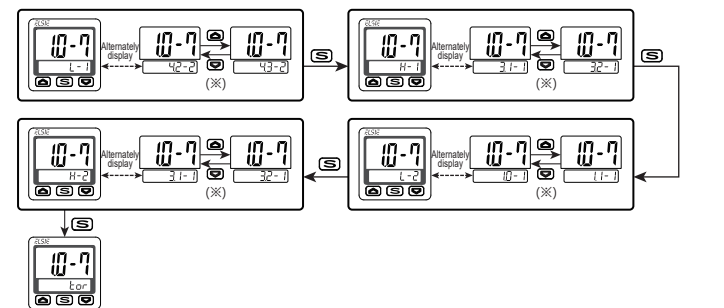
Setting Condition 5

OUT 1 : " HYS " (Hysteresis mode) or " Win " (Window comparator mode)
OUT 2 : " oP5 " (One point set mode)



Setting Condition 6

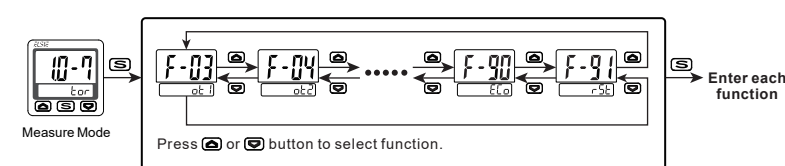
OUT 1 : " HYS " (Hysteresis mode) or " Win " (Window comparator mode)
OUT 2 : " HYS " (Hysteresis mode) or " Win " (Window comparator mode)



L. OPERATION INSTRUCTIONS

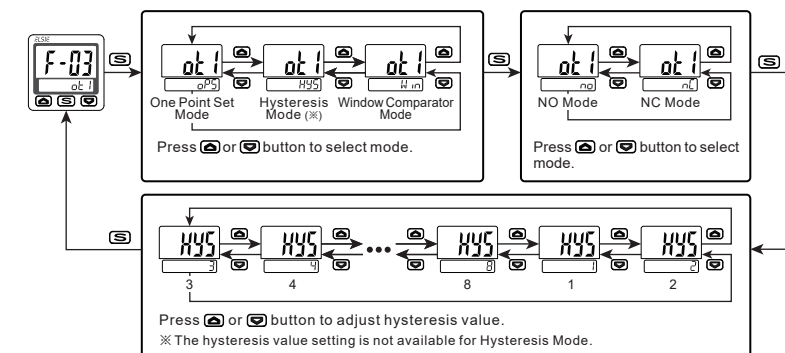
Function Selection

In Measure Mode, press **[S]** button for more than 3 sec. to display [F-00] [rnP]. Press **[S]** for 3 sec. to return to Measure Mode.



[F-03] OUT1 Setting

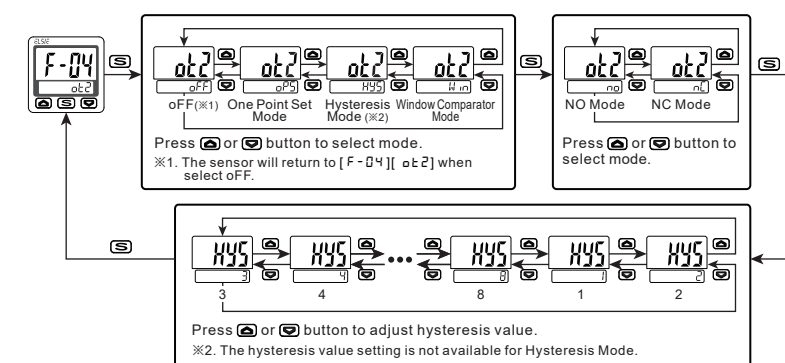
Press **[S]** or **[V]** button at Function Selection to [F-03] [oP1].



[F-04] OUT2 Setting

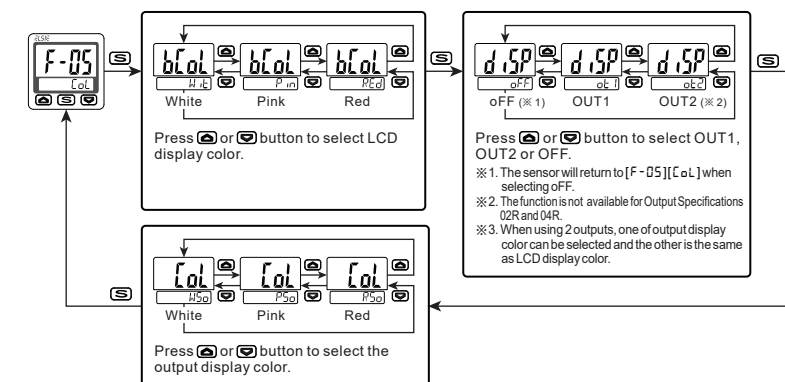
※ Not available for Output Specification 02R and 04R.

Press **[S]** or **[V]** button at Function Selection to [F-04] [oP2].



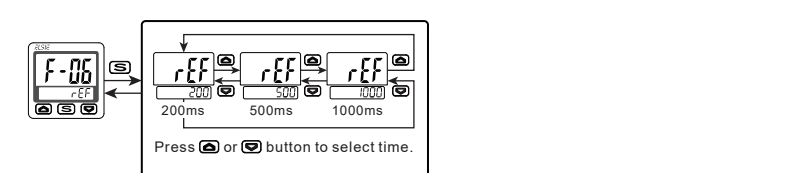
[F-05] LCD Display Color Setting

Press **[S]** or **[V]** button at Function Selection to [F-05] [CoL]. The color of LCD display and output display can be different.



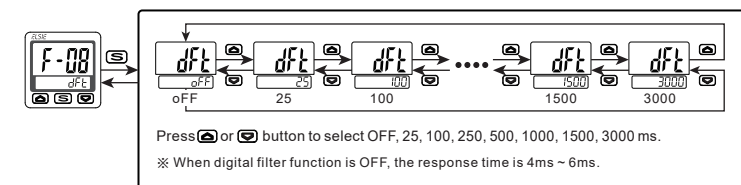
[F-06] Sampling Rate Setting

Press **[S]** or **[V]** button at Function Selection to [F-06] [rEF].



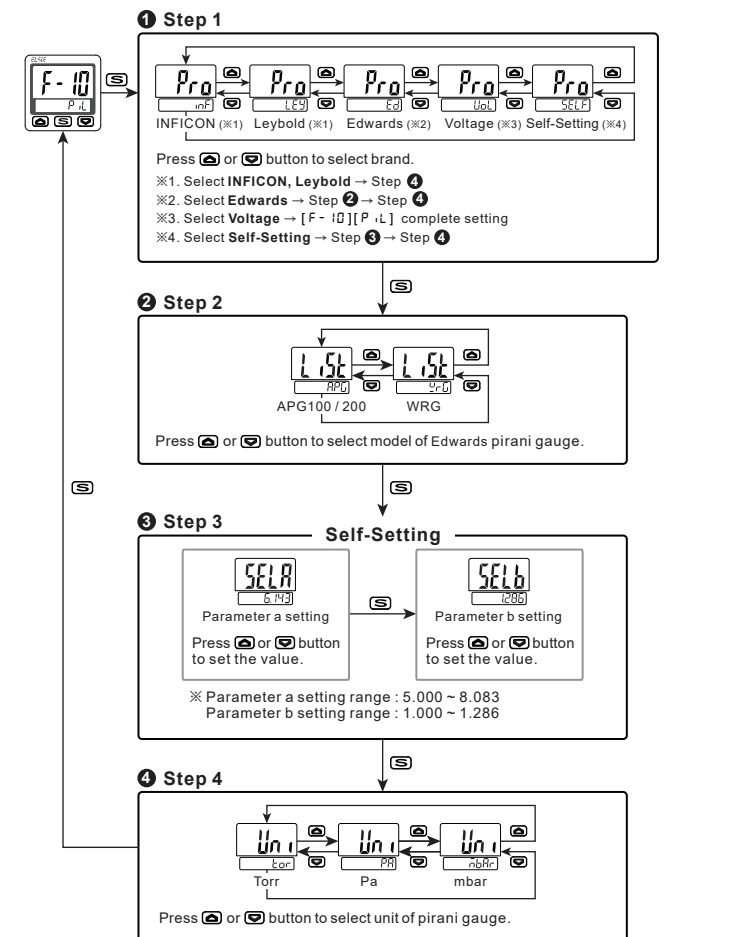
[F-08] Response Time of Digital Filter Setting

Press **[S]** or **[V]** button at Function Selection to [F-08] [dFt].



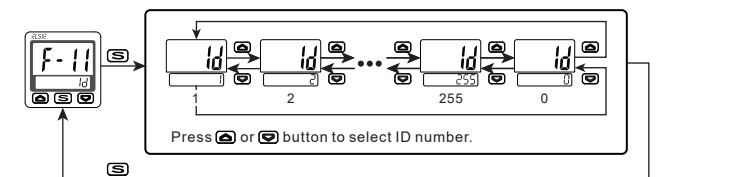
[F-10] Pirani Gauge Unit And Brand Setting

Press **[S]** or **[V]** button at Function Selection to [F-10] [P .L].



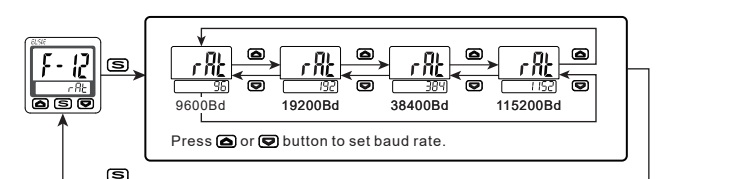
[F-11] RTU ID Number Setting

Press **[S]** or **[V]** button at Function Selection to [F-11] [Id].



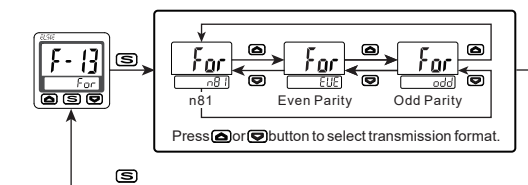
[F-12] RTU Baud Rate Setting

Press **[S]** or **[V]** button at Function Selection to [F-12] [rBt].



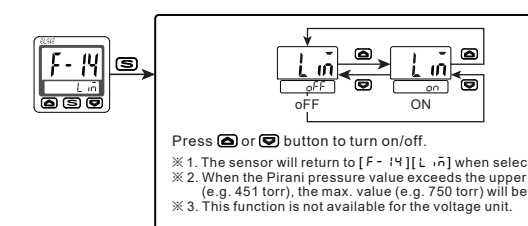
[F-13] RTU Transmission Format Setting

Press **[S]** or **[V]** button at Function Selection to [F-13] [For].



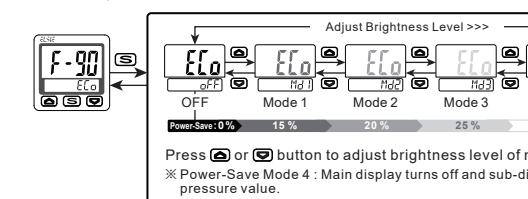
[F-14] Pirani Gauge Display Limit Setting

Press **[S]** or **[V]** button at Function Selection to [F-14] [L .n].



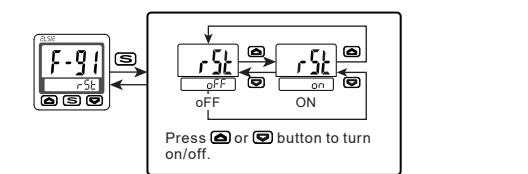
[F-90] Power-Save Mode Setting

Press **[S]** or **[V]** button at Function Selection to [F-90] [ECa]. When Power-Save Mode turns on, 1. the main-display will be into the selected mode (Mode1 ~ 4), if no buttons are pressed after 30 seconds. 2. the output indicator may not sync, but the sensor still work functionally. 3. press any button back to measure mode.

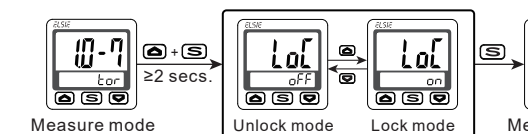


[F-91] Reset to Default Setting

Press **[S]** or **[V]** button at Function Selection to [F-91] [rSt].



M. KEY LOCK/UNLOCK MODE



- Use key lock mode to prevent unauthorized or accidental tampering setting values.
- When lock mode is selected, panel will display " LoL ".

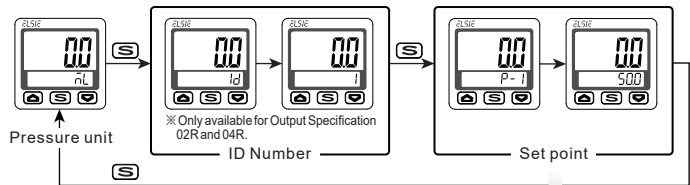
N. COMMUNICATION PROTOCOL (Modbus RTU)

Function Code	Description	Operation
0000	ID Number (Range : 0 ~ 255)	Read Write
0002	Voltage value (Range : 0 ~ 10000)	Read
0003	Unit setting (0 : mbar , 1 : torr , 2 : pa , 3 : mV)	Read Write
0005	Switch output mode (0 : OPS , 1 : HYS , 2 : WIN)	Read Write
0006	Switch output mode (0 : NO , 1 : NC)	Read Write
0007	Response time of digital filter (0 : OFF , 1 : 25ms , 2 : 100ms , 3 : 250ms , 4 : 500ms , 5 : 1000ms , 6 : 1500ms , 7 : 3000ms)	Read Write
0008	Display color selection (0 : White , 1 : Red , 2 : Pink)	Read Write
0009	Hysteresis value (Range : 0 (1 digit) ~ 7 (8 digits))	Read Write
000A	Power-Save mode (0 : OFF , 1 : Mode 1 , 2 : Mode 2 , 3 : Mode 3 , 4 : Mode 4)	Read Write
000C	Baud rate (0 : 9600 bps , 1 : 19200 bps , 2 : 38400 bps , 3 : 115200 bps)	Read Write
000D	Transmission format (0 : n81 , 1 : Even , 2 : Odd)	Read Write
000E	Communications protocol (0 : RTU)	Read
000F	Reset to default setting (0 : ON)	Write
0010	Switch set point (P-1 or L-1) (Range : 0 ~ 10000 mV)	Read Write
0011	Switch set point (H-1) (Range : 0 ~ 10000 mV)	Read Write
0012	Switch output state (0 : OFF , 1 : ON)	Read
0013	Key lock/unlock mode (0 : Unlock , 1 : Lock)	Read Write
0014	Switch output type (0 : NPN , 1 : PNP)	Read
0015	Sampling rate (0 : 200ms , 1 : 500ms , 2 : 1000ms)	Read Write
0018	Real numbers of Pirani display value (Range : 10 (1.0) ~ 99 (9.9))	Read
0019	Exponent of Pirani display value (Range : -9 ~ 19)	Read
001A	Limit switch of pilani gauge (0 : OFF , 1 : ON)	Read Write
001B	Pilani gauge brand (0 : INFICON , 1 : Leybold , 3 : Edwards , 4 : Voltage)	Read Write
001C	Model of Edwards pirani gauge (0 : Edwards-APG , 1 : Edwards-WRG)	Read Write
001D	Real numbers of Pirani set point (L1) (Range : 10 (1.0) ~ 99 (9.9))	Read Write
001E	Exponent of Pirani set point (L1) (Range : -9 ~ 19)	Read Write
001F	Real numbers of Pirani set point (H1) (Range : 10 (1.0) ~ 99 (9.9))	Read Write
0020	Exponent of Pirani set point (H1) (Range : -9 ~ 19)	Read Write
0021	LCD display color output selection (0 : OFF , 1 : OUT1)	Read Write
0022	Output LCD display color selection (0 : White , 1 : Red , 2 : Pink)	Read Write

EP410E OPERATION INSTRUCTIONS

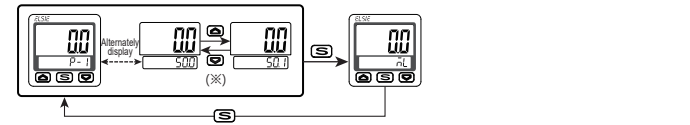
K. SUB-DISPLAY DISPLAY SETTING

In measure mode (※), press **[S]** button to switch pressure unit / ID Number / set point, and set the set point. ※ EP410E is power-on and not in the function setting or checking state.



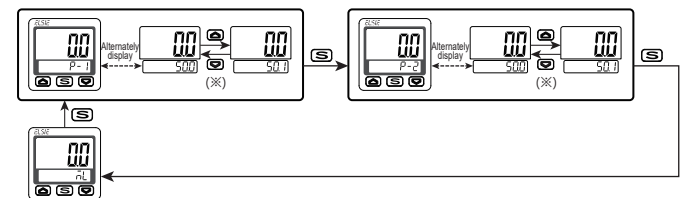
Setting Condition 1

OUT 1 : " oP5 " (One point set mode)
OUT 2 : " oFF " (Not used)



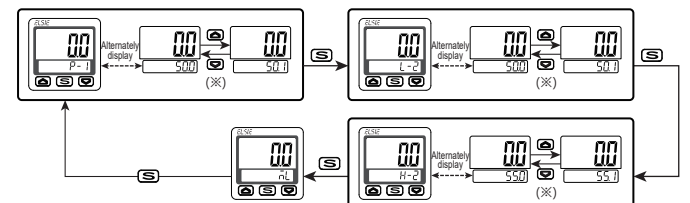
Setting Condition 2

OUT 1 : " oP5 " (One point set mode)
OUT 2 : " oP5 " (One point set mode)



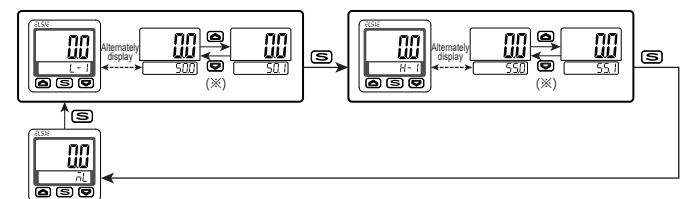
Setting Condition 3

OUT 1 : " oP5 " (One point set mode)
OUT 2 : " HYS " (Hysteresis mode) or " H n " (Window comparator mode)



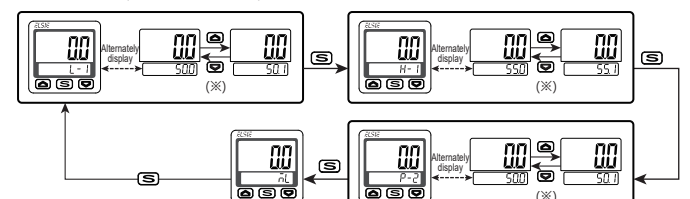
Setting Condition 4

OUT 1 : " HYS " (Hysteresis mode) or " H n " (Window comparator mode)
OUT 2 : " oFF " (Not used)



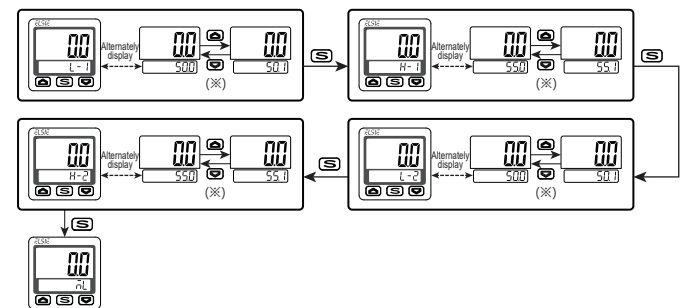
Setting Condition 5

OUT 1 : " HYS " (Hysteresis mode) or " H n " (Window comparator mode)
OUT 2 : " oP5 " (One point set mode)



Setting Condition 6

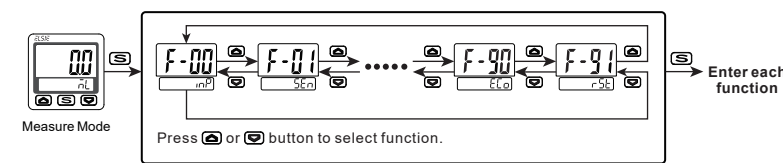
OUT 1 : " HYS " (Hysteresis mode) or " H n " (Window comparator mode)
OUT 2 : " HYS " (Hysteresis mode) or " H n " (Window comparator mode)



L. OPERATION INSTRUCTIONS

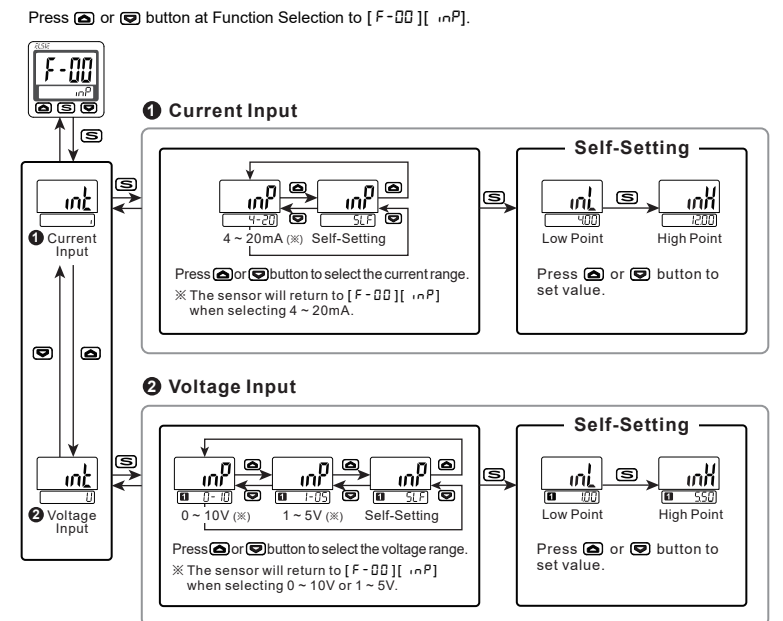
Function Selection

In Measure Mode, press **[S]** button for more than 3 sec. to display [F-00] [nP].
Press **[S]** for 3 sec. to return to Measure Mode.



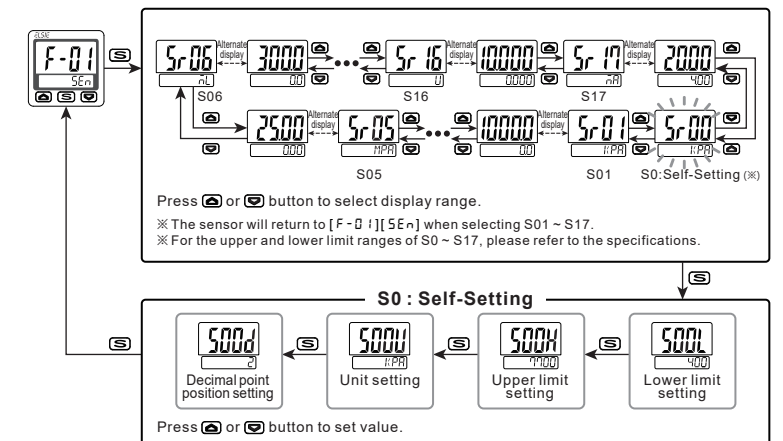
[F-00] Input Type Setting

※ The function is not available for S16 and S17.



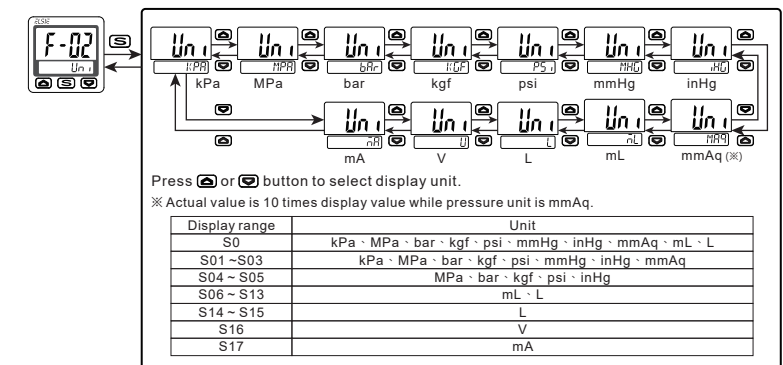
[F-01] Display Range Setting

Press **[A]** or **[B]** button at Function Selection to [F-01] [5En].



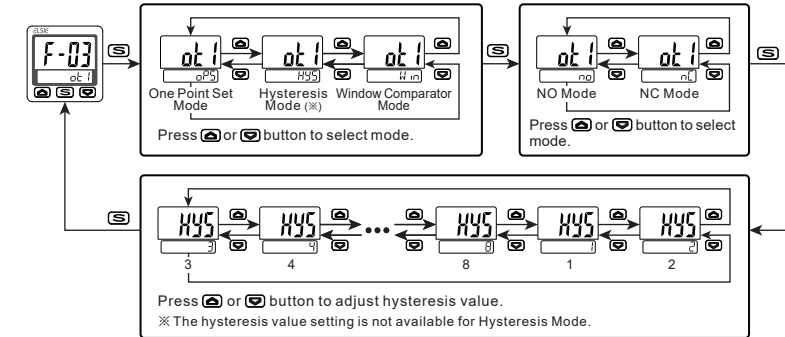
[F-02] Unit Setting

Press **[A]** or **[B]** button at Function Selection to [F-02] [nP].



[F-03] OUT1 Setting

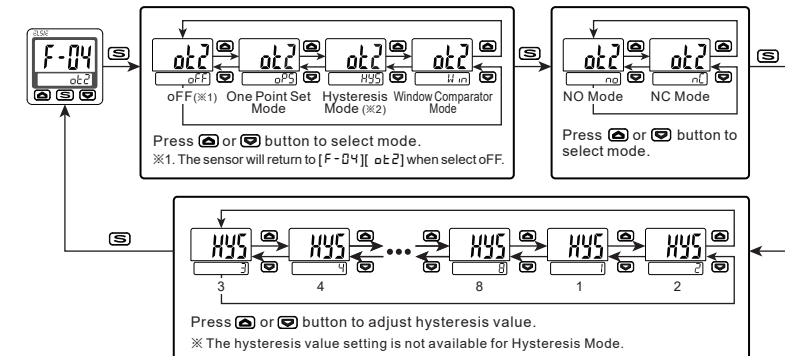
Press **[A]** or **[B]** button at Function Selection to [F-03] [oE1].



[F-04] OUT2 Setting

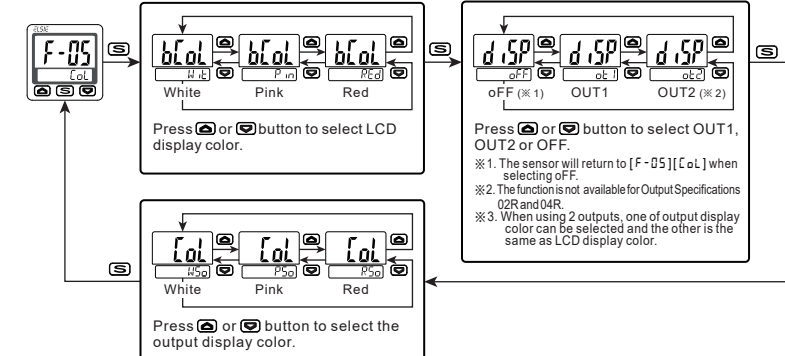
※ Not available for Output Specification 02R and 04R.

Press **[A]** or **[B]** button at Function Selection to [F-04] [oE2].



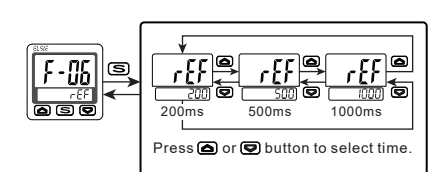
[F-05] LCD Display Color Setting

Press **[A]** or **[B]** button at Function Selection to [F-05] [CoL].



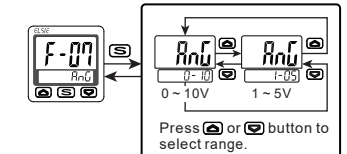
[F-06] Sampling Rate Setting

Press **[A]** or **[B]** button at Function Selection to [F-06] [rEF].



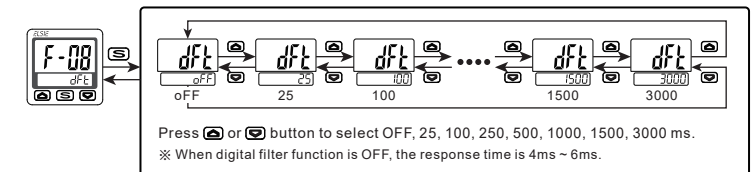
[F-07] Voltage Analog Output Range Setting

Press **[A]** or **[B]** button at Function Selection to [F-07] [RnG].



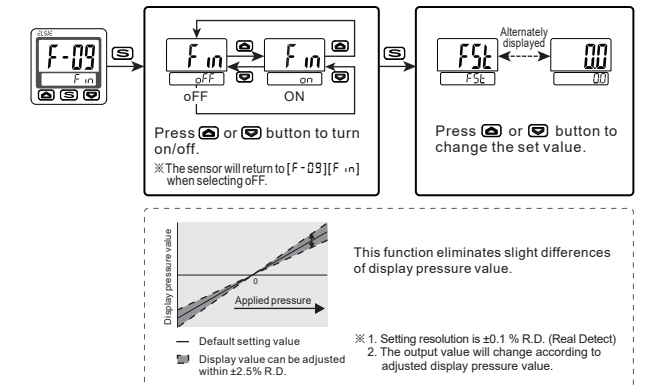
[F-08] Response Time of Digital Filter Setting

Press **[A]** or **[B]** button at Function Selection to [F-08] [dFt].



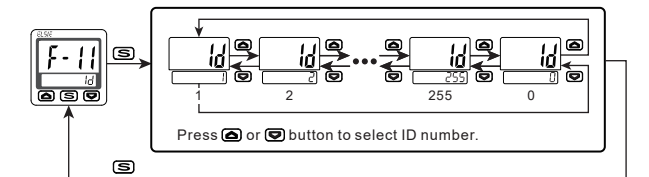
[F-09] Fine Adjustment Setting

Press **[A]** or **[B]** button at Function Selection to [F-09] [F n].



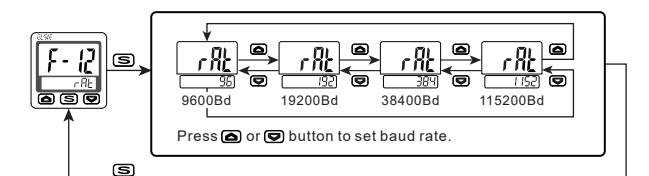
[F-11] RTU ID Number Setting

Press **[A]** or **[B]** button at Function Selection to [F-11] [Id].



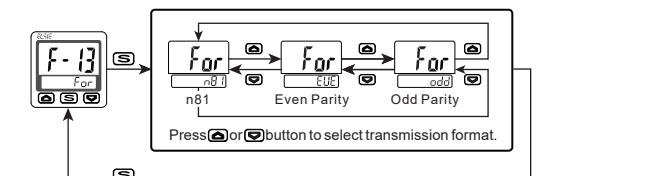
[F-12] RTU Baud Rate Setting

Press **[A]** or **[B]** button at Function Selection to [F-12] [rRt].



[F-13] RTU Transmission Format Setting

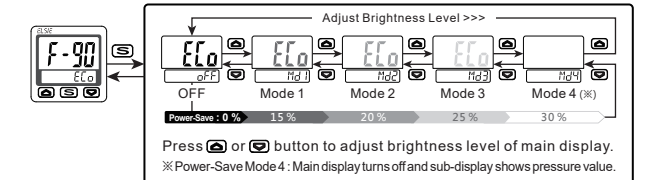
Press **[A]** or **[B]** button at Function Selection to [F-13] [For].



[F-90] Power-Save Mode Setting

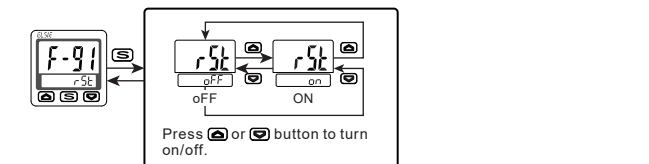
Press **[A]** or **[B]** button at Function Selection to [F-90] [ECa].

When Power-Save Mode turns on,
1. the main-display will be into the selected mode (Mode1 ~ 4), if no buttons are pressed after 30 seconds.
2. the output indicator may not sync, but the sensor still work functionally.
3. press any button back to measure mode.



[F-91] Default Setting

Press **[A]** or **[B]** button at Function Selection to [F-91] [rSt].



M. COMMUNICATION PROTOCOL (Modbus RTU)

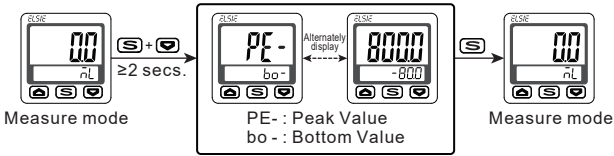
Function Code	Description	Operation
0000	ID Number (Range : 0 ~ 255)	Read Write
0001	Sensor type (1 : S01 , 2 : S02 , 3 : S03 , 4 : S04 , 5 : S05 , 6 : S06 , 7 : S07 , 8 : S08 , 9 : S09 , 10 : S10 , 11 : S11 , 12 : S12 , 13 : S13 , 14 : S14 , 15 : S15 , 16 : S16 , 17 : S17)	Read Write
0002	Pressure value (Range : -1999 ~ 15000)	Read
0003	Unit setting (0 : kPa , 1 : kgf/cm ² , 2 : bar , 3 : psi , 4 : inHg , 5 : mmHg , 7 : mmAq)	Read Write
0005	Switch output mode (0 : OPS , 1 : HYS , 2 : WIN)	Read Write
0006	Switch output mode (0 : NO , 1 : NC)	Read Write
0007	Response time of digital filter (0 : OFF , 1 : 25ms , 2 : 100ms , 3 : 250ms , 4 : 500ms , 5 : 1000ms , 6 : 1500ms , 7 : 3000ms)	Read Write
0008	Display color selection (0 : White , 1 : Red , 2 : Pink)	Read Write
0009	Hysteresis value (Range : 0 (1 digit) ~ 7 (8 digits))	Read Write
000A	Power-Save mode (0 : OFF , 1 : Mode 1 , 2 : Mode 2 , 3 : Mode 3 , 4 : Mode 4)	Read Write
000B	Fine adjustment (Range : -25 (-2.5%) ~ 25 (2.5%))	Read Write
000C	Baud rate (0 : 9600 bps , 1 : 19200 bps , 2 : 38400 bps , 3 : 115200 bps)	Read Write
000D	Transmission format (0 : n81 , 1 : Even , 2 : Odd)	Read Write
000E	Communications protocol (0 : RTU)	Read
000F	Reset to default setting (0 : ON)	Write
0010	Switch set point (P-1 or L-1) (Range : 0 ~ 10000 mV)	Read Write
0011	Switch set point (H-1) (Range : 0 ~ 10000 mV)	Read Write
0012	Switch output state (0 : OFF , 1 : ON)	Read
0013	Key lock/unlock mode (0 : Unlock , 1 : Lock)	Read Write
0014	Switch output type (0 : NPN , 1 : PNP)	Read
0015	Sampling rate (0 : 200ms , 1 : 500ms , 2 : 1000ms)	Read Write
0016	Zero point setting (0 : ON)	Write
0017	Sensor input (1 : 0 ~ 10V , 2 : 1 ~ 5V , 3 : 4 ~ 20mA)	Read Write
0018	LCD display color output selection (0 : OFF , 1 : OUT1)	Read Write
0019	Output LCD display color selection (0 : White , 1 : Red , 2 : Pink)	Read Write

O. ZERO POINT SETTING

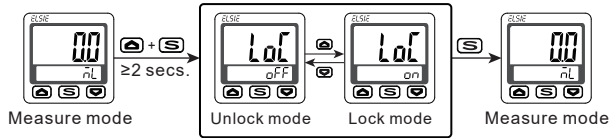
Press the  +  button at the same time until the "00" is shown.



P. PEAK/BOTTOM HOLD FUNCTION



Q. KEY LOCK/UNLOCK MODE



- Use key lock mode to prevent unauthorized or accidental tampering setting values.
- When lock mode is selected, panel will display " LoL ".

