CKD

ME-PPXPC No.0095-16V

INSTRUCTION MANUAL

PARECT PRESSURE SWITCH
PPX series

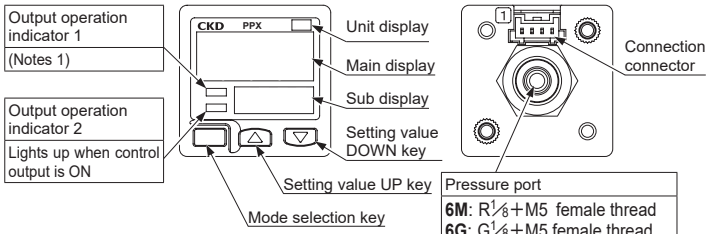
IO-Link

Read this instruction manual carefully before using this product, particularly the section describing safety. Retain this instruction manual with the product for further consultation whenever necessary.

⚠ WARNING

- Never use this product as a sensing device for personnel protection.
- In case of using sensing devices for personnel protection, use products which meet laws and standards, such as OSHA, ANSI or IEC etc., for personnel protection applicable in each region or country.
- This product is designed for use with non-corrosive gas. It cannot be used for liquid or corrosive gas.
- This product is intended for use in Japan conforms to the Japanese Measurement Act. Do not use a product intended for use overseas in Japan.

1 PART DESCRIPTION



Notes: 1)

	During IO-Link non communication	During IO-Link communication
Function	Lights up when comparative output is ON (Notes 2)	Flashes

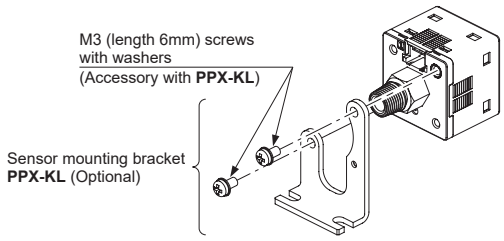
Notes: 2) Synchronized with output operation indicator 2

2 PIPING

- When connecting a commercial coupler to the pressure port, attach a 12mm spanner (14mm for 6G type) to the pressure port's hexagon section to fix the port, and then tighten with a tightening torque of 9.8N·m or less (M5 female: 1N·m or less). The commercial coupler or pressure port section will be damaged if the tightening torque is excessive.
  Wrap sealing tape around the coupler when connecting to prevent leaks..

3 MOUNTING

- The sensor mounting bracket **PPX-KL** is available as an option. When mounting the sensor onto the sensor mounting bracket, etc., the tightening torque should be 0.5N·m or less.

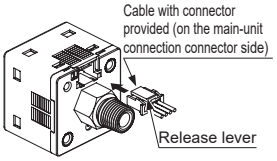


- The panel mounting bracket **PPX-KHS** (optional), as well as the front cover **PPX-KCB** (optional) are also available.
- For mounting of the panel mounting bracket, refer to the Instruction Manual enclosed with **PPX-KHS**.

4 WIRING

Connection method

- Insert the cable with connector (included in this product) into the connection connector section of this product as shown in the figure to the right.



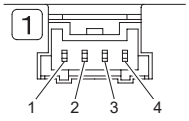
Disconnection method

- Pressing the release lever of the cable with connector, pull out the connector.

<Recommended product>
Contact: SPHD-001T-P0.5
Housing: PAP-04V-S
[JST Mfg. Co., Ltd.]

Note: Do not pull by holding the cable without pressing the release lever, as this can cause cable break or connector break.

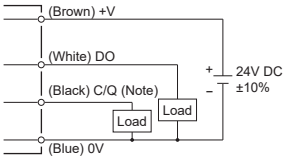
<Connection connector pin arrangement>



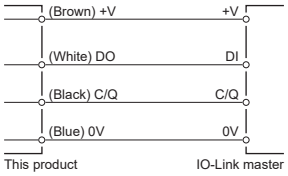
Connector pin No.	Wiring color/ M12 connector Terminal No.	Terminal name
1	Brown / 1	+V
2	Black / 4	IO-Link communication (C/Q)
3	White / 2	Control output (DO)
4	Blue / 3	0V

5 CONNECTION

- **When used as general-purpose sensor**



- **When connected to IO-Link master**



<Terminal arrangement of M12 connector cable>

Terminal No.	Terminal name
1	+V
2	Control output (DO)
3	0V
4	IO-Link communication (C/Q) (Note)

Note: When the product is used as a general-purpose sensor, the IO-Link communication (C/Q) is generated in the same way as control output (DO)

- M12 connector cable is sold separately as an option.

Model no.	Cable length
PPX-CN1	1m
PPX-CN2	2m
PPX-CN3	3m

6 LIST OF FUNCTIONS

Function	Setting on main unit	IO-Link communication setting (Note)
Control output mode setting	Select from EASY mode / Hysteresis mode / Window comparator mode	Index61_2
Threshold value setting	EASY mode : Threshold value Hysteresis mode / Window comparator mode : Lo side	Index60_1
	Hysteresis mode / Window comparator mode : Hi side	Index60_2
Zero-adjust setting	Execute / Cancel	Index2
Key lock	Set / release	Index12
Peak / bottom hold function	Setting	Index82_4
Control output mode setting	N.O. / N.C.	Index61_1
Response time setting	Select from 10 steps	Index66
Displayed color of the main display selection	Select from 4 modes	Index82_1
Pressure unit selection	Select from MPa / kPa / kgf / bar / psi / mmHg / inchHg <Configurable unit list> • For inside of Japan/Low pressure type:kPa • For inside of Japan/High pressure type:MPa, kPa • For outside of Japan/Low pressure type:kPa, kgf, bar, psi, mmHg, inchHg • For outside of Japan/High pressure type:MPa, kPa, kgf, bar, psi	Index83
Display setting of Sub-display selection	Select from 5 modes	Index82_2
	No. display setting (Set within a range of 01 to 99.)	Index84_1
	Custom display setting	Index84_2
Display speed selection	Select from 3 steps	Index82_3
Hysteresis fixed value selection	Select from 8 steps	Index61_3
Eco mode setting	Select from 3 modes	Index80
Setting check code	8 digit indication	-
Reset setting	Execute	Index2
Remote zero-adjust setting	-	Index2 (Notes: 2)
Zero-adjust execution notification	-	Index85
Auto-reference setting	-	Index2 (Notes: 2)
Operating time	-	Index163
Number of data save operations	-	Index164
Notification Flag Setting	-	Index168
Notification Event Code	-	Index169

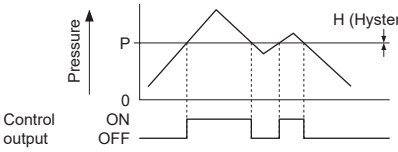
Notes: 1) For the IO-Link communication setting, refer to the attached sheet, "Index List."(IMJE-PPXPCINDEX)
2) Do not configure the remote zero-adjustment setting and auto-reference setting simultaneously.
3) Do not configure the main unit settings and IO-Link communication setting simultaneously.

7 OUTPUT MODE AND OUTPUT OPERATION

- The EASY mode, hysteresis mode or window comparator mode can be selected as the output mode for control output.
  Refer to "9 **MENU SETTING MODE**" for details.

EASY mode

- ON / OFF of the control output is controlled in this mode.

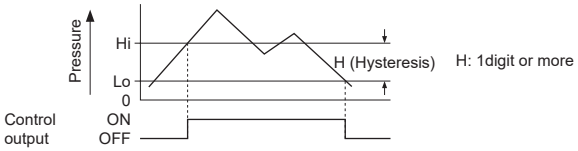


H: Hysteresis fixed (Note)

Note: Hysteresis can be fixed in 8 steps.
Refer to **<Hysteresis fixed value selection>** in "10 **PRO MODE**" for setting.

Hysteresis mode

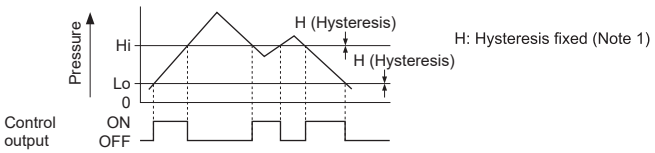
- This mode controls ON / OFF by arbitrarily setting the hysteresis of the control output.



Note: "Hi - 1" or "Lo - 1" is displayed on the sub-display.

Window comparator mode

- In this mode, the ON or OFF state of the control output is controlled with a pressure in the set range.

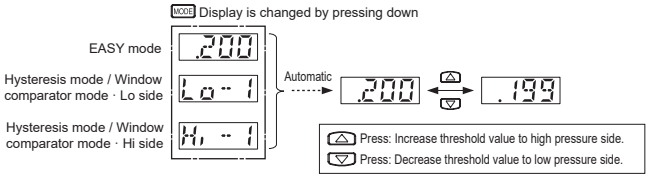


Notes: 1) Hysteresis can be fixed in 8 steps.
Refer to **<Hysteresis fixed value selection>** in "10 **PRO MODE**" for setting.
2) "Hi - 1" or "Lo - 1" is displayed on the sub-display.
3) Set the interval between the Lo side and Hi side to hysteresis fixed value or more.

8 RUN MODE

Setting the threshold value

- Refer to **<Control output mode setting>** in "9 **MENU SETTING MODE**" for setting conditions.
- The Sub display conducts the threshold value. Main display does not changed.



Note: If the set pressure range is exceeded, "UP" (exceeds the upper limit) or "DOWN" (exceeds the lower limit) will appear on the sub display. "DOWN" will also appear if the Hi side threshold value exceeds the Lo side threshold value when setting the "hysteresis mode / window comparator mode" threshold value.

Zero-adjustment function

- The zero-adjustment function forcibly sets the pressure value to "zero" when the pressure port is opened.

Key lock function

- The key lock function prevents key operations so that the conditions set in each setting mode are not inadvertently changed.

<Key lock set>

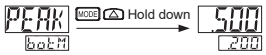
<Key lock released>

Peak / bottom hold function

- The peak / bottom hold function display the peak value and bottom value of the fluctuating pressure.
- The peak value is displayed on the main display and the bottom value is displayed on the sub-display.
- The higher pressure side indicates the peak value, while the lower pressure side indicates the bottom value.

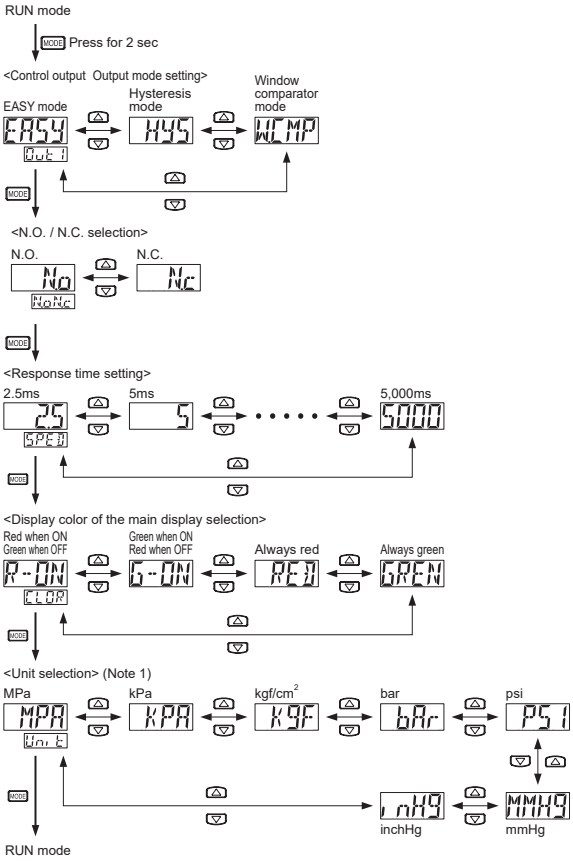
<Peak / bottom hold set>

<Peak / bottom hold released>



9 MENU SETTING MODE

- The mode will change to RUN mode when the mode selection key is held down during this setting process. In doing so, changed items before holding down the mode selection key have been set.

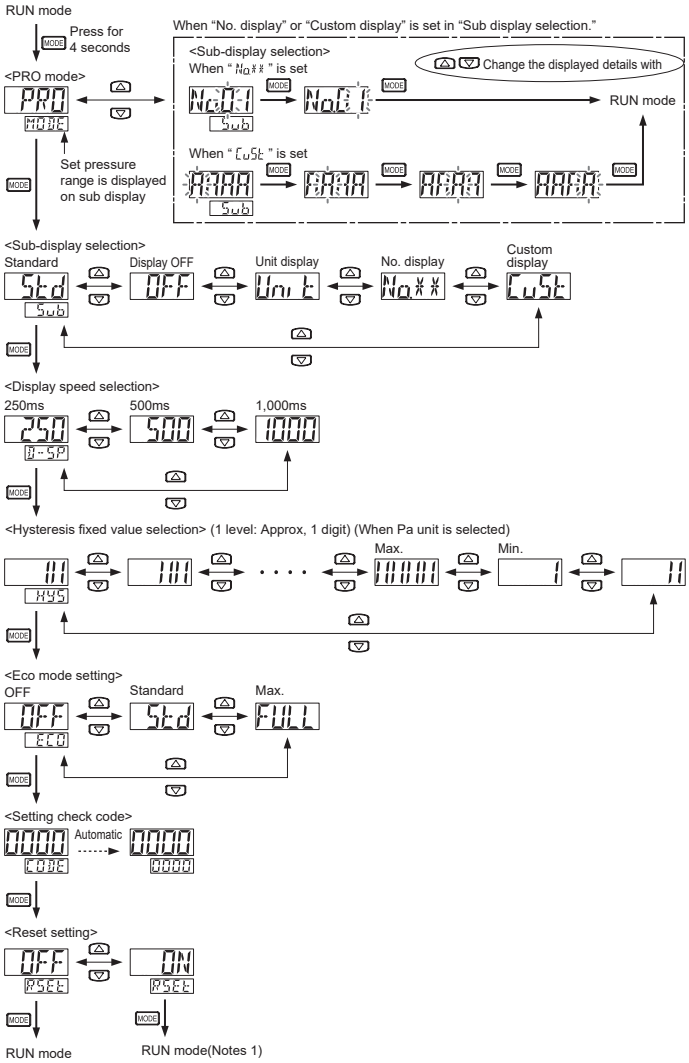


Setting item (Note 2)	Factory setting	Description
Control output Output mode setting	EASY	Sets the output operation of control output
N.O. / N.C. selection	Low pressure type: Nc High pressure type: No	Normal open (N.O.) or normal close (N.C.) can be selected.
Response time setting	2.5	Sets the response time. The response time can be selected from 2.5ms, 5ms, 10ms, 25ms, 50ms, 100ms, 250ms, 500ms, 1,000ms or 5,000ms
Displayed color of the main display selection	R-ON	Displayed color of the main indicator can be changed.
Pressure unit selection (Note 1)	Low pressure type: kPA High pressure type: MPA	Pressure unit can be changed. <Configurable unit list> • For inside of Japan/Low pressure type: kPa • For inside of Japan/High pressure type: MPa, kPa • For outside of Japan/Low pressure type: kPa, kgf, bar, psi, mmHg, inchHg • For outside of Japan/High pressure type: MPa, kPa, kgf, bar, psi

Notes: 1) PPX series is available in different types: for use in Japan, for use outside Japan, low pressure type and high pressure type. Note that the selectable pressure units vary depending on the model.
2) Settings can be configured via IO-Link communication.

10 PRO MODE

- The mode will change to RUN mode when the mode selection key is held down during this setting process. However, changed items before holding down the mode selection key have been set.



Setting item (Notes 2)	Factory setting	Description
Sub-display selection	Std	Changes the indication of the sub-display. " Std " : Displays threshold. " OFF " : Displays nothing. " Unit " : Presently selected pressure unit is displayed. " No## " : Desired No. can be shown. " CuSt " : Desired numbers, alphabets (some of them cannot be displayed) and signs can be shown.
Display speed selection	250	Changes the speed of the displayed pressure value on the main display.
Hysteresis fixed value selection	11	Sets hysteresis of the EASY mode and the window comparator mode. (8 steps)
Eco mode setting	OFF	Current consumption can be lowered. " OFF " : Normal operation (ECO mode is off.) " Std " : If any key operation is not carried out for approx. 5 sec. in RUN mode, the display becomes dark. " FULL " : If any key operation is not carried out for approx. 5 sec. in RUN mode, the display is turned off. Press any key to temporarily show the normal indication.
Setting check code	Low pressure type: 0100 High pressure type: 0000	Current setting contents can be checked. For codes. Refer to "**Code table**".
Reset setting	OFF	Returns to default settings (factory settings). By pressing down mode key when " ON " mode, becomes default settings (factory settings).

Notes: 1) The mode is reset to RUN mode with all settings restored to default settings (factory settings).
2) Settings can be configured via IO-Link communication.

Code table

- **Main display (1st digit form left)**

Code	1st digit	2nd digit	3rd digit	4th digit
	Control output output mode	N.O. / N.C. selection	Threshold display	Displayed color of the main display
0	EASY	N.O.	EASY mode : Threshold value, Hysteresis mode / Window comparator mode : Lo side	Red when ON and Green when OFF
1	Hysteresis	N.C.	Hysteresis mode / Window comparator mode : Hi side	Green when ON and Red when OFF
2	Window comparator	—	—	Always red
3	—	—	—	Always green
4	—	—	—	—
5	—	—	—	—
6	—	—	—	—
7	—	—	—	—

- **Sub-display (5th digit from left)**

Code	5th digit	6th digit	7th digit	8th digit
	Response time	Unit selection	Display speed	Eco mode
0	2.5ms	MPa	250ms	OFF
1	5ms	kPa	500ms	Std
2	10ms	kgf/cm^2	1,000ms	Full
3	25ms	bar	—	—
4	50ms	psi	—	—
5	100ms	mmHg	—	—
6	250ms	inchHg	—	—
7	500ms	—	—	—
8	1,000ms	—	—	—
9	5,000ms	—	—	—

11 ERROR INDICATION

Error message	Cause	Corrective action
E-1	The load is short-circuited causing an over current to flow.	Turn the power OFF and check the load.
E-3	When the zero-adjustment function is implemented, pressure is applied.	Reset the voltage applied to the pressure port to the atmospheric pressure and implement the zero-adjustment function again.
E-4	External input is carried out outside the rated pressure range.	Applied pressure range should be brought within the rated pressure range.
10.0	The applied pressure exceeds the upper limit of the display pressure range.	Applied pressure range should be brought within the rated pressure range.
-10.0	The applied pressure exceeds the lower limit of the display pressure range.	

When other error massage is displayed, contact us.

12 SPECIFICATIONS

- **Model**

PPX-R[1][2]-[3]-[4]-[5]

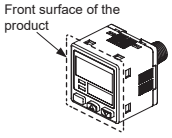
[1]: **01**: Low pressure type, **10**: High pressure type
[2]: **PC**: PNP output type and IO-Link
[3]: **6M**: R1/8+M5 female thread, **6G**: G1/8+M5 female thread, **6N**: NPT1/8+female thread
[4]: **None**:Cable with a connector, 2m long
[5]: **KA**: For outside of Japan, **None**: For inside of Japan

Item \ Type	Low pressure type	High pressure type
Pressure type	Gauge pressure	
Rated pressure range	-100 to +100kPa	-0.1 to +1.0MPa
Set pressure range	-101.0 to +101.0kPa	-0.101 to +1.010MPa
Withstand pressure	500kPa	1.5MPa
Applicable fluid	Non-corrosive gas	
Supply voltage	12 to 24V DC ±10%	
Power consumption	Normal operation: 720mW or less (current consumption 30mA or less at 24V supply voltage) ECO mode (STD): 480mW or less (current consumption 20mA or less at 24V supply voltage) ECO mode (FULL): 360mW or less (current consumption 15mA or less at 24V supply voltage)	
IO-Link communication (C/Q) (Notes 1)	IO-Link specification: Ver1.1	
Baud rate	COM3 (230.4kbps)	
Process data length	PD : 4byte	
Control output (DO) (Notes 2)	PNP open-collector transistor • Maximum source current: 50mA • Applied voltage: 30V DC or less (between control output and +V) • Residual voltage: 2V or less (at 50mA source current) (Notes 3)	
Output operation	Selectable either N.O. or N.C., with key operation	
Short-circuit protection	Incorporated	
Hysteresis fixed values	Selectable from 8 different levels (Approx.1 to 8digit) (Notes 4)	
Repeatability	±0.1% F.S. ± within 2 digits	±0.2% F.S. ± within 2 digits
Response time	2.5ms, 5ms, 10ms, 25ms, 50ms, 100ms, 250ms, 500ms, 1.000ms or 5,000ms selectable with key operations	
Over voltage category	I	
Pollution degree	2	
Operating altitude	2,000m or less (Notes 5)	
Ambient temperature	-10 to +50°C (No dew condensation or icing allowed), Storage: -10 to +60°C	
Ambient humidity	35 to 85% RH, Storage: 35 to 85% RH	
Temperature characteristics	Within ±0.5% F.S. (at +20°C reference)	Within ±1% F.S. (at +20°C reference)
Material	Enclosure: PBT (with glass fiber), LCD display: Acrylic, Pressure port: Stainless steel (SUS 303) Mounting screw section: Brass (nickel-plated), O-ring: H-NBR, Key part: Silicon rubber	
Weight	Approx. 40g (Main body only)	
Accessories	Cable with a connector (2m long / one-side discrete wire type) Unit switching label: 1 pc. (for outside of Japan only)	

Notes: 1) For the IO-Link communication setting, refer to the attached sheet, "**Index List.**" (IMJE-PPXPCINDEX)
2) When the product is used as a general-purpose sensor, the IO-Link communication (C/Q) is generated in the same way as control output (DO).
3) This value is applicable when the cable length is 2m.
4) It becomes a fixed value（Approx 1 digit）when using Hysteresis mode.
5) Do not use or store in an environment pressurized to atmospheric pressure or higher at an altitude of 0m.

13 CAUTIONS

- This product has been developed / produced for industrial use only.
- This product is suitable for indoor use only.
- Use within the rated pressure range.
- Do not apply pressure exceeding the pressure withstand ability value. The diaphragm will get damaged and correct operation shall not be maintained.
- Make sure that the power supply is off while wiring.
- Take care that wrong wiring will damage the sensor.
- Verify that the supply voltage variation is within the rating.
- If power is supplied from a commercial switching regulator, ensure that the frame ground (F.G.) terminal of the power supply is connected to an actual ground.
- In case noise generating equipment (switching regulator, inverter motor, etc.) is used in the vicinity of this sensor, connect the frame ground (F.G.) terminal of the equipment to an actual ground.
- Do not use during the initial transient time after the power supply is switched on.
- Extension up to total 20m or less, is possible with more than 0.3mm^2 of electric conductor cross-sectional area cable.
- Do not run the wires together with high-voltage lines or power lines or put them in the same raceway. This can cause malfunction due to induction.
- The specification may not be satisfied in a strong magnetic field.
- Avoid dust, dirt, and steam.
- Take care that the sensor does not come in direct contact with water, oil, grease, or organic solvents, such as, thinner, etc.
- Do not insert wires, etc, into the pressure port. The diaphragm will get damaged and correct operation shall not be maintained.
- Do not operate the keys with pointed or sharp objects.
- Make sure that stress by forcible bend or pulling is not applied directly to the sensor cable joint.
- Do not drop the product or otherwise subject to strong shock. Otherwise, the product may be damaged.
- Do not apply an excessive load to the front surface or corners of the product. Otherwise, the product may be damaged.



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CKD

IMJE-PPXPCINDEX No.0092-49V

INSTRUCTION MANUAL

PPX series INDEX LIST

IO-Link

IO-Link setting file (IODD) can be downloaded from our website (https://www.ckd.co.jp).

1 PHYSICAL LAYER

Communication protocol	IO-Link	
Communication protocol Version	V1.1	
Baud rate	COM3(230.4kbps)	
Port	Class A	
Process data length (input)	4byte	
Process data length (output)	0byte	
Minimum cycle time	1ms	
Data storage	15byte	
SIO mode support	Exist	
Vendor ID	855	
Device ID	**PPX-R01PC-6M**	2179072
	PPX-R10PC-6M	2179073
	PPX-R01PC-6M-KA	2179074
	PPX-R01PC-6N-KA	2179075
	PPX-R01PC-6G-KA	2179076
	PPX-R10PC-6M-KA	2179077
	PPX-R10PC-6N-KA	2179078
	PPX-R10PC-6G-KA	2179079

2 PROCESS DATA(PD)

	bit 7	6	5	4	3	2	1	0
PD0	Upper byte of pressure data							
PD1	Lower byte of pressure data							

PD2 bit	Assignment	Remarks
7 6 5 4 3 2 1 0	Control Output (DO)	0 : OFF 1 : ON
	Fixed	0
	Fixed	0
	Fixed	0
	Fixed	0
	Information Notification	0 : No notification 1 : Notified
	Error level	0 : Normal 1 : Caution 2 : Fault

PD3	Scale Low pressure sensor : -1 High pressure sensor : -3 (when select MPa) 0

	PD0 (31-24bit)	PD1 (23-16bit)
Low pressure	Pressure value[Pa] (-1010~1010)	
High pressure	Pressure value[Pa] (-100~1010)	

3 SERVICE DATA(SD)

Index	Sub index	Name	R/W	Back up target	Format	Data length	Default data	Description of settings
2	0	SystemCommand	W		UInteger	1byte		0x82 : Reset setting 0xA0 : Zero-adjustment setting 0xA1 : Remote zero-adjustment setting 0xA2 : Zero-adjust setting unset 0xA3 : Auto-reference setting
12	0	Device Access Locks	R/W		Record	2byte	0	Local User InterFace Lock 0 : UnLock , 8 : Lock Main unit : Linked with key lock
16	0	Vendor Name	R		String	63byte		
17	0	Vendor Text	R		String	63byte		
18	0	Product Name	R		String	63byte		
19	0	Product ID	R		String	63byte		
20	0	Product Text	R		String	63byte		
21	0	Serial Number	R		String	15byte		
22	0	Hardware Version	R		String	3byte		
23	0	Firmware Version	R		String	4byte		
24	0	Application Specific Tag	R/W	○	String	32byte		
37	0	Detailed Device Status	R		UInteger	12byte		
40	0	Process Data Input	R		UInteger	4byte		
60	1	Threshold Value Setting 1	R/W	○	Integer	2byte	**PPX-R01**: -500(-50.0) **PPX-R10**: 0500(0.500)	Threshold value of EASY mode Low-side threshold value of window comparator mode / hysteresis mode **PPX-R01** : 0xFC0E to 0x03F2 **PPX-R10** : 0xFF9B to 0x03F2
	2	Threshold Value Setting 2	R/W	○	Integer	2byte	**PPX-R01**: -495(-49.5) **PPX-R10**: 0505(0.505)	High-side threshold value of window comparator mode / hysteresis mode **PPX-R01** : 0xFC0E to 0x03F2 **PPX-R10** : 0xFF9B to 0x03F2
61	1	Output Operation Setting of C/Q Output	R/W	○	UInteger	1byte	**PPX-R01**:1 **PPX-R10**:0	0 : N.O. 1 : N.C.
	2	Sensing Output Setting of C/Q Output	R/W	○	UInteger	1byte	0x01	0x01 : EASY mode 0x02 : Hysteresis mode 0x03 : Window comparator mode
	3	Hysteresis Setting of C/Q Output	R/W	○	Integer	2byte	3	Hysteresis value 8-step setting : 1 to 8
63	1	Output Operation Setting of DO Output	R	○	UInteger	1byte		Linkage with Index61_1
	2	Sensing Output Setting of DO Output	R	○	UInteger	1byte		Linkage with Index61_2
	3	Hysteresis Setting of DO Output	R	○	Integer	2byte		Linkage with Index61_3
66	0	Response Time	R/W	○	UInteger	1byte	1	1 : 2.5ms 6 : 100ms 2 : 5ms 7 : 250ms 3 : 10ms 8 : 500ms 4 : 25ms 9 : 1,000ms 5 : 50ms A : 5,000ms
80	0	ECO Setting	R/W	○	UInteger	1byte	0	0 : OFF 1 : STD 3 : FULL
82	1	Display Color Setting of Main-display Selection	R/W	○	UInteger	1byte	0	0 : Red when ON,Green when OFF 1 : Green when ON,Red when OFF 2 : Always red 3 : Always green
	2	Display Setting of Sub-display Selection	R/W	○	UInteger	1byte	0	0 : Std (Displays threshold) 1 : OFF (Displays nothing) 2 : Unit (Presently selected pressure unit is displayed) 3 : No** (Desired No. can be shown) 4 : Cust (Desired numbers, alphabets and signs can be shown)
	3	Display Speed Set	R/W	○	UInteger	1byte	0	0 : 250ms 1 : 500ms 2 : 1000ms
	4	Peak / Bottom Hold Set	R/W		UInteger	1byte	0	0 : OFF 1 : ON
83	0	Pressure Unit Set	R/W	○	UInteger	1byte	**PPX-R01** : 2 **PPX-R10** : 1	1 : MPa 2 : kPa 3 : kgf 4 : bar 5 : psi 6 : mmHg 7 : inchHg <Configurable unit list> • **PPX-R01PC-**□ : 2 • **PPX-R10PC-**□ : 1, 2 • **PPX-R01PC-**□**-KA** : 2, 3, 4, 5, 6, 7 • **PPX-R10PC-**□**-KA** : 1, 2, 3, 4, 5
84	1	No** Display Set	R/W	○	String	2byte	01	Two half-width numeric characters : 01 to 99
	2	Custom Display Set	R/W	○	String	4byte	AAAA	Four half-width alphanumeric characters * Error is generated if any of the following characters is entered. T , j , k , m , p , s , x
85	0	Zero-adjust	R		UInteger	1byte		0 : Not executed 1 : In execution
163	0	Operating Time	R		UInteger	4byte		Operating time per 1-hour unit [h]
164	0	Number of Data Save Operations	R		UInteger	4byte		Number of times data is saved to non-volatile memory
168	0	Notification Flag Setting	R/W	○	UInteger	1byte		0 : Notify 1 : Do not notify
169	0	Notification Event Code	R		UInteger	2byte		Newest event code readout

4 EVENT FUNCTION

Error indication	Event code	Error level	State	
E-1	0x7710	Fault	Detection of output wire short-circuit / overcurrent	
Display of measured value	0x8D00	Caution	Operating time exceeded	
Display of measured value	0x8D01	Caution	Max. number of the nonvolatile memory save opera-tions exceeded	
E-3	0x8CB0	Normal	Pressure applied during zero-adjustment	Information Notification
E-4	0x8CB1	Normal	Outside the rated pressure range	
10 10	0x8CA1	Normal	The applied pressure exceeds the upper limit	
-10 10	0x8CA2	Normal	The applied pressure exceeds the lower limit	

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