
**User's
Manual**

OpreX™ Pressure Transmitter

**EJX S series
HART Communication Type**

IM 01C33A10-01EN



OpreX Pressure Transmitter

EJX S series

HART Communication Type

IM 01C33A10-01EN 1st Edition

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1. Introduction

Thank you for purchasing the DPharp EJX S series pressure transmitter (“transmitter”).

The transmitters are precisely calibrated at the factory before shipment.

To ensure both safety and efficiency, please read this manual carefully before operating the instrument.

This manual describes the HART protocol communication functions of the transmitter and explains how to set the parameters for the transmitters using the HART configuration tool.

For information on the installation, wiring, and maintenance of the transmitters, please refer to the user’s manual of each model. The following manuals can be downloaded from our company website. Some of them are attached to the product upon shipment.

Our company Website Address

<https://www.yokogawa.com/solutions/products-and-services/measurement/field-instruments-products/>

Document Name	Document Number	Shipping Attachment/Download
EJXS Series Read Me First	IM 01C33A01-01Z1	Attached upon shipment
EJX110S, 310S, 430S, 510S, 530S Hardware	IM 01C33B01-01EN	Download from Web
EJX S Series HART Communication Type (This book)	IM 01C33A10-01EN	Download from Web
EJX S Series PROFINET Communication Type	IM 01C33A11-01EN	Download from Web
EJX S series Explosion Protection for ATEX and IECEx	IM 01C33A20-01EN	Attached upon shipment (when approval code -K*1, -S*1 or -VU1 is selected)
EJX S series Explosion Protection for USA and CANADA	IM 01C33A21-01EN	Attached upon shipment (when approval code -F*1 or -C*1, or -VU1 is selected)

NOTE

When using this transmitter for safety instrumented systems (SIS) use, be sure to observe the instructions and procedures described in the Functional Safety Manual (document number: TI01 C33A01-01 ZN) in order to maintain the safety integrity of this transmitter. The Functional Safety Manual can be downloaded from our company website.

After installing the transmitter, make sure that the range and units are set correctly. Calibrate the transmitter after setting up parameters.

■ **Regarding This Manual**

- This manual should be provided to the end user.
- The contents of this manual are subject to change without prior notice.
- All rights reserved. No part of this manual may be reproduced in any form without Yokogawa's written permission.
- Yokogawa makes no warranty of any kind with regard to this manual, including, but not limited to, implied warranty of merchantability and fitness for a particular purpose.
- If any question arises or errors are found, or if any information is missing from this manual, please inform the nearest Yokogawa sales office.
- The specifications covered by this manual are limited to those for the standard type under the specified model number break-down and do not cover custom-made instruments.
- Please note that changes in the specifications, construction, or component parts of the instrument may not immediately be reflected in this manual at the time of change, provided that postponement of revisions will not cause difficulty to the user from a functional or performance standpoint.
- The following safety symbols are used in this manual:



WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

IMPORTANT

Indicates that operating the hardware or software in this manner may damage it or lead to system failure.

NOTE

Draws attention to information essential for understanding the operation and features.

1.1 Abbreviation and Marking

The following models are applied in this manual.

■ Applied models

- The following expression is used instead of model name.

EJX S series

[Model: EJX110S, EJX310S, EJX430S, EJX510S, EJX530S]

■ Trademarks

- Trademark symbols such as TM and [®] are not displayed for company trademarks or registered trademarks mentioned in this manual.
- Other company names and product names are trademarks or registered trademarks of their respective companies.

2. Connection

This chapter offers basic information about the Start-up flow and configuration tool which is used for setting parameters of the transmitter. Figure 2.1 shows the start-up flow from installation to shut down. Refer to the EJX S series Hardware manual for hardware handling related to mounting, piping of the conductive pipe, wiring, calibration, fault detection, and shutdown.

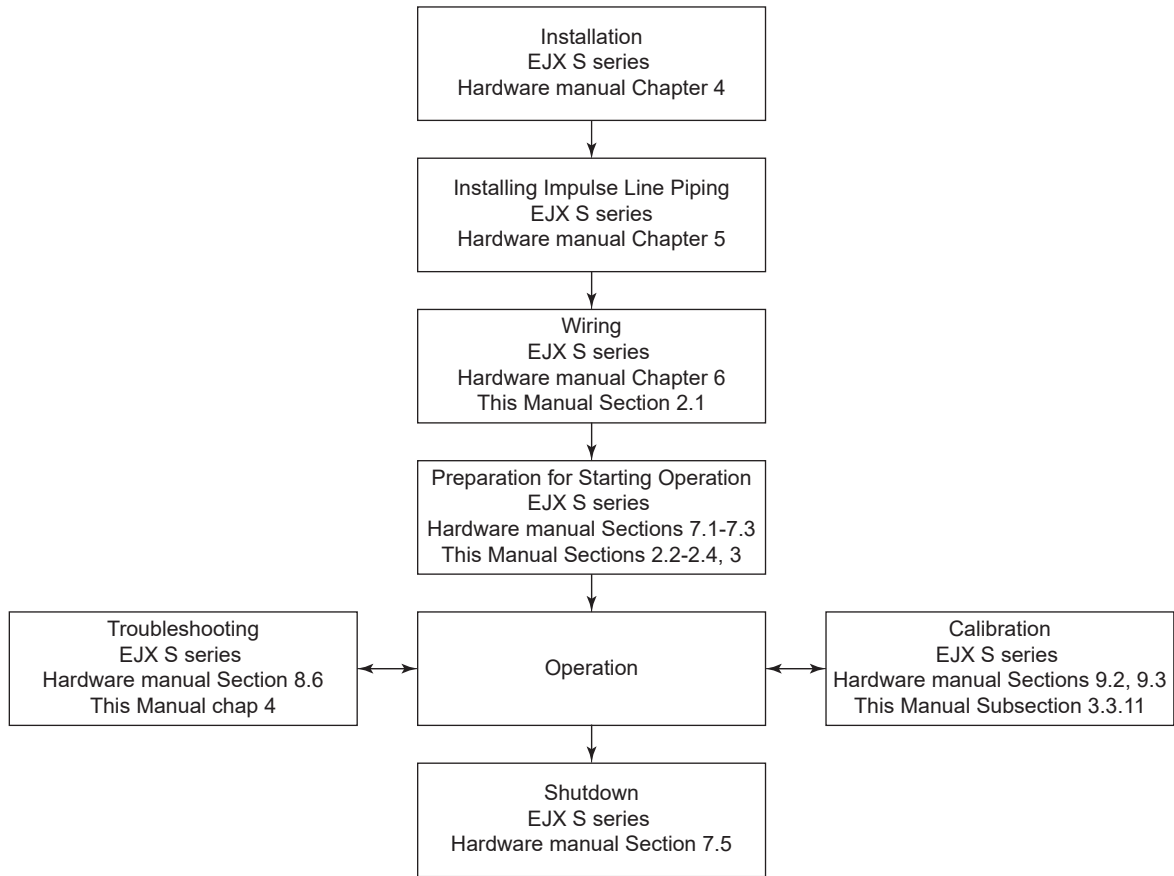


Figure2.1 Start-up Flow

F0201.ai

2.1 Connecting the EJX S series and the Configuration Tool

If there is a load resistance of 250 Ω or more between the connection terminal of the configuration tool and the power supply, it can be connected to any relay terminal in the instrument room, transmitter terminal box, or transmission loop.

The configuration tool is connected in parallel with the transmitter. Polarity does not matter.

An example of connection is shown below.

For explosion-proof equipment, please refer to the corresponding explosion-proof manual.

NOTE

Although a menu path description may be included in the explanation of each configuration item, depending on the configuration tool used, some menu names and hierarchical structures below the root menu may differ.

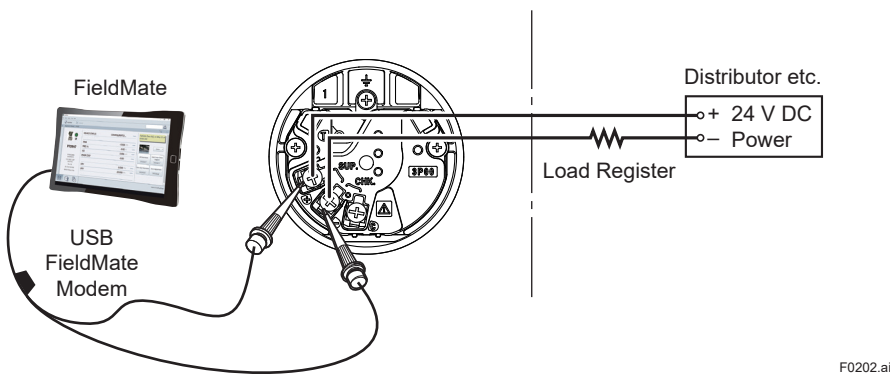
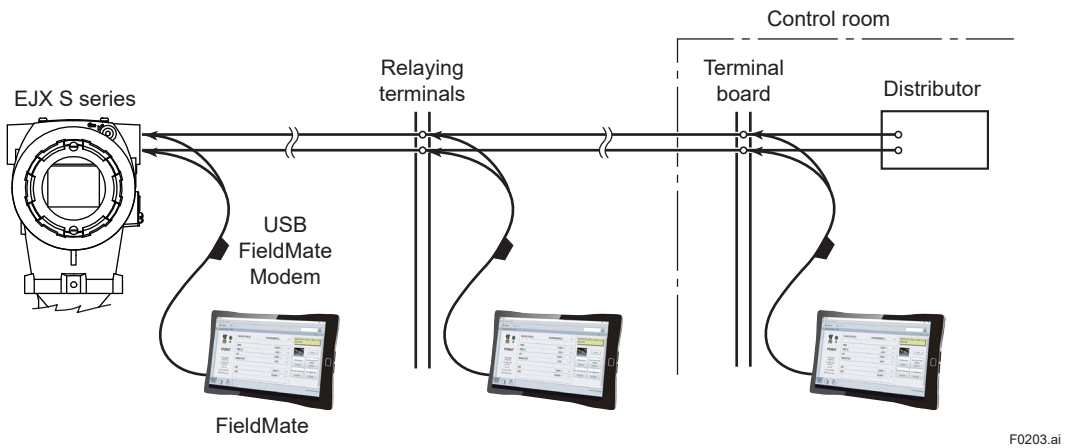


Figure 2.2 Example of Connection with Terminal Block



* Only one FieldMate can be connected.

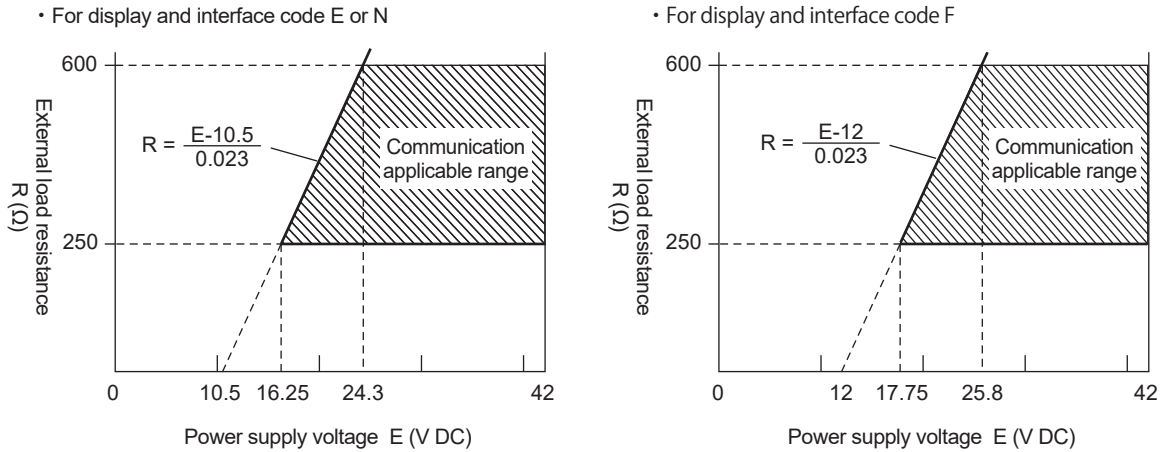
Figure 2.3 Example of Connection at Relay Terminal

2.1.1 Power Supply Voltage and Load Resistance

When configuring the loop, make sure that the external load resistance is within the range in the figure below.

IMPORTANT

With an intrinsic safe transmitter, external load resistance includes safety barrier resistance.



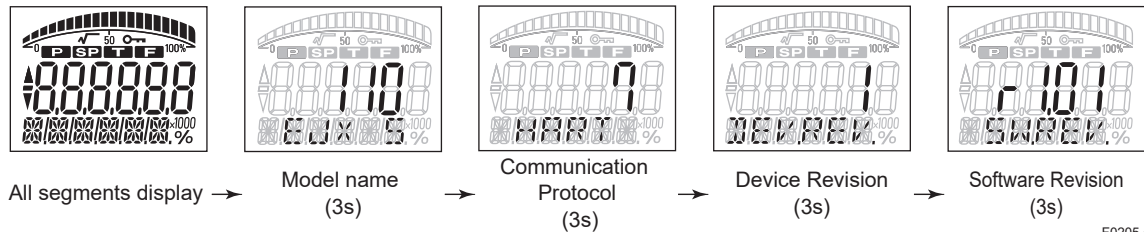
F0204.ai

Figure 2.4 Relationship between Power Supply Voltage and External Load Resistance

2.2 Display at Power-on

When the power supply is turned on, all the segments on the display are shown if the display is attached. After that, the display changes in order of model name, communication protocol, device revision, and software revision. Following is an example of the display.

For LCD display



F0205.ai

For Graphic display



F0206.ai

Figure 2.5 Example of Display

NOTE

The display can be set to “All segments display” only for LCD display or “logo display” only for Graphic display.

Menu Path

[Root Menu] → Device Settings → Detailed Setup → Display Condition → Display Condition → Power On Info	
Enabled	After power-on, it sequentially displays all segments display, model name, communication protocol, device revision and software revision.
Disabled	For LCD display: Show all segments display when powering on. For Graphic display: Show logo display only when powering on.

2.3 Configuration Tool

FieldMate, PC-based configuration software, is available as a configuration tool for parameter configuration of EJX S series. Use FieldMate version R3.04.60 or later. For more information on FieldMate, refer to “FieldMate Versatile Device Management Wizard (IM 01R01A01-01E).”

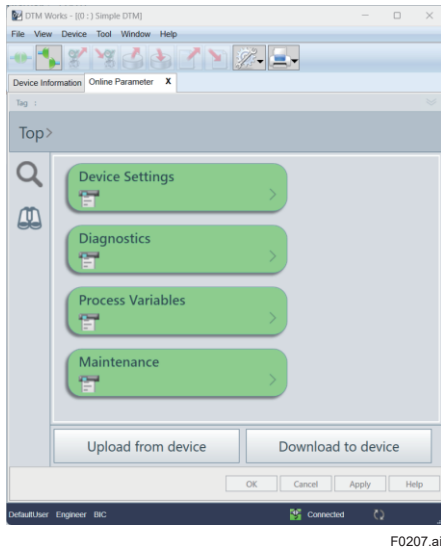


Figure 2.6 FieldMate Screen

NOTE

If you cannot open DTM, make sure that your Device Files are up to date. The latest Device Files are available from the FieldMate User Site. FieldMate User Site <<https://partner.yokogawa.com/global/fieldmate/index.htm>>

NOTE

If using a setup tool other than FieldMate, install FDI Device Packages registered with the FieldCommGroup (FCG). FieldCommGroup <<https://www.fieldcommgroup.org/>>

2.4 Replacing Instrument

- **Replacing an EJX S series to an EJX S series**

Perform the following operations using FieldMate’s Parameter Manager.

1. Upload and save the parameters from the device before replacement.
2. Replace the device.
3. Download the parameters uploaded in step 1 to the new device.

For information on how to upload and download parameters, see the FieldMate instruction manual IM 01R01A01-01E.

- **Replacing an EJX A Series or EJA E Series with an EJX S series**

Use FieldMate to write the parameter values read from the EJX A/EJA E to the corresponding EJX S parameters. See the table below for parameter correspondence.

1. Read and record parameters from the EJX A Series or EJA E Series.
2. Replace the device.
3. Write the values read in step 1 to the corresponding EJX S series parameters.

Parameter List

No	EJX A/EJA E Parameter Name	EJX S Parameter Name
1	Tag	Tag
2	Long tag	Long tag
3	PV LRV	Lower Range Value
4	PV URV	Upper Range Value
5	Unit	Unit
6	Pres damp	Pres Damp
7	Descriptor	Descriptor
8	Message	Message
9	Xfer fnctn	Transfer Function

Please transfer other parameters if needed.

3. Parameter Setting

3.1 Signal Flow

This section describes the flow of each process and the parameter settings. If you wish to configure the processing settings, please refer to the target chapter.

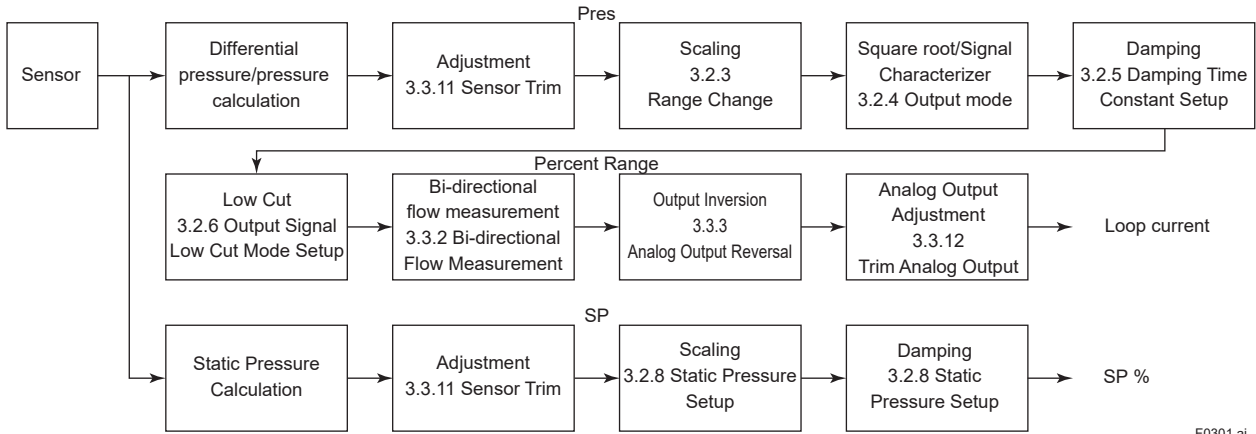


Figure 3.1 Signal Flow

F0301.ai

3.2 Basic Setup

IMPORTANT

When you change the settings of this instrument, do not turn off the power of the instrument for 10 seconds after the setting change.
If you turn off the power immediately after changing the setting, the setting may not be saved.

3.2.1 Tag and Device Information

If there are specified Tag or related device information when ordering, the desired Tag No. and device information are set and shipped. Tag No. and device information can be checked as follows. At the time of shipment, unused fields of string-type parameters are filled with spaces.

Menu path

[Root Menu] → Device Settings → Basic Setup → Device Information →
Tag, Long Tag, Descriptor, Message, Date

When the Tag No. and device information are changed, input them based on the following limitations.

Item	Limitations
Tag	Up to 8 characters or numbers (*1)
Long tag	Up to 32 characters or numbers (*2)
Descriptor	Up to 16 characters or numbers (*1)
Message	Up to 32 characters or numbers (*1)
Date	mm/dd/yyyy - mm: month (2-digit numbers) - dd: days (2-digit numbers) - yyyy: years (4-digit numbers)

- *1: The characters bounded by the thick line in the following table can be used.
- *2: All characters in the following table can be used.

SP	!	"	#	\$	%	&	'	()	*	+	,	-	.	/
0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
P	Q	R	S	T	U	V	W	X	Y	Z	[\]	^	_
`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
p	q	r	s	t	u	v	w	x	y	z	{		}	~	

*: SP shows one-byte space

3.2.2 Unit

The units for differential pressure/pressure specified at the time of order are set and shipped. Units can be checked and changed by the procedure below.

Menu path

[Root Menu] → Device Setting → Basic Setup → Units →	
Unit	Select one from the list shown in below.

Note that the Yokogawa default setting for the standard temperature is 4°C (39.2°F). For the units of mmH₂O, inH₂O, and ftH₂O, the pressure varies according to the standard temperature definition. Select the appropriate unit with @68degF when a standard temperature of 20°C (68°F) is required.

Available pressure units are shown below.

inH ₂ O@68degF	mmHg	g/cm ²	torr	mmH ₂ O
inHg	psi	kg/cm ²	atm	ftH ₂ O
ftH ₂ O@68degF	bar	Pa	MPa	hPa
mmH ₂ O@68degF	mbar	kPa	inH ₂ O	

3.2.3 Range Change

The range values are factory-set as specified by the customer. To change the range value, follow the steps below.

(1) Keypad input — LRV and URV

The measurement span is determined by the upper and lower range values. In this method, the upper and lower range values can be set independently, and the span changes according to the range limit values sent to the transmitter.

Menu path

[Root Menu] → Device Settings → Basic Setup → Pres Setup →	
Lower Range Value	Lower range value (0% point)
Upper Range Value	Upper range value (100% point)

The measurement range setting is used for correlating the 4 to 20 mA signal with the pressure value, therefore setting the measurement range in the safety instrumentation system is the setting of safety related parameters, and entering incorrect values may lead to dangerous events. When the pressure is over the range, output signal is saturated only within the normal operation range between the upper range value (URV) and the lower range value (LRV), and the 4 to 20 mA output does not enter the burnout state. Behaviors under “pressure over range” are not intended for behavior in safety instrumented systems. “Pressure over range” of EJX S series is available as an alarm, not related to safety, via communication function or a display.

NOTE

If the lower range value (LRV) is set to a value greater than upper range value (URV) (LRV>URV), the 4 to 20 mA output signal will be reversed.

At this time, lower range value and upper range value must be set so that the range span is equal to or greater than the minimum span within the range between lower sensor limit (LSL) and upper sensor limit (USL).

$$\begin{aligned} \text{Conditions: } & \text{LSL} \leq \text{LRV} \leq \text{USL} \\ & \text{LSL} \leq \text{URV} \leq \text{USL} \\ & |\text{URV} - \text{LRV}| \geq \text{Min Span} \end{aligned}$$

LSL: Lower sensor limit of range setting
 USL: Upper sensor limit of range setting

Also, change the display setting to match the 4 to 20 mA output signal.

(2) Apply values — changing the ranges while applying an actual pressure

Set the applied pressure value as lower limit or upper limit of the measurement range.

The measurement span is determined from upper limit and lower limit, but when lower limit is changed, upper limit is automatically changed to keep the span constant. On the other hand, when upper limit is changed, lower limit will not be changed and the span will be changed. Therefore, when using this function, always make lower limit settings first.

Menu path

[Root Menu] → Device Settings → Detailed Setup → Sensors → Pressure Sensor → Pres Range → Apply Values	
4 mA, 20 mA	When the actual pressure is applied, set 4 mA (Lower limit) and 20 mA (Upper limit).

When [Apply Values] is called, “4 mA” and “20 mA” are displayed.

To change lower limit, select “4 mA” and apply a pressure equivalent to lower limit to the transmitter. When the pressure has stabilized, press [Confirm].

Similarly, to change upper limit, select “20 mA” and apply a pressure equivalent to upper limit to the transmitter. When the pressure has stabilized, press [Confirm].

3.2.4 Output Mode

The mode setting for the output signal and the integral indicator can be performed independently.

For display setting, refer to 3.3.6.

The output mode for the output signal is set as specified in the order when the instrument is shipped. Follow the procedure below to change the mode. When selecting “Signal Characterizer”, please also refer to 3.3.15 Signal Characterizer.

Menu path

[Root Menu] → Device Settings → Basic Setup → Pres Setup →	
Transfer Function	Select “Linear”, “Square Root” or “Signal Characterizer”

3.2.5 Damping Time Constant Setup

The damping time constant is set to 2.0 seconds.

If the Option Code/CA or /CJ is specified, the damping time constant is set as specified at the time of the order.

You can set the damping time constant to any value in the range of 0.00 to 100.00 (seconds).

To change the damping time constant, follow the procedure below.

Menu path

[Root Menu] → Device Settings → Basic Setup → Pres Setup →	
Pres Damp	Any value in the range 0.00 to 100.00 Damping time constant

NOTE

The damping time constant set in this section applies only to the transmitter software. For the damping time constant including the transmitter capsule, refer to the GS (General Specifications) response time for each model.

3.2.6 Output Signal Low Cut Mode Setup

The output signal can be low cut to stabilize the output signal near the zero point.

The low cut is available either for Linear, Square root, or signal characterizer output mode.

The **Low Cut** value can be set to 0 to 20% of the output. There is a hysteresis of ±10% (fixed) to the set value. Refer to Table 3.1 for the factory settings.

There are two Low Cut modes; “Linear” which set the output below the **Low Cut** value to proportional mode, and “Zero” which set the output below the **Low Cut** value to zero. The factory default setting is “Linear.”

See Figure 3.2 for the relationship between the **Low Cut Mode** and **Low Cut** value settings and output.

To change the **Low Cut** value and **Low Cut Mode**, follow the procedure below.

Menu path

[Root Menu] → Device Settings → Basic Setup → Pres Setup →	
Low Cut	Set from 0 to 20% of output
Low Cut Mode	Select “Linear” or “Zero”

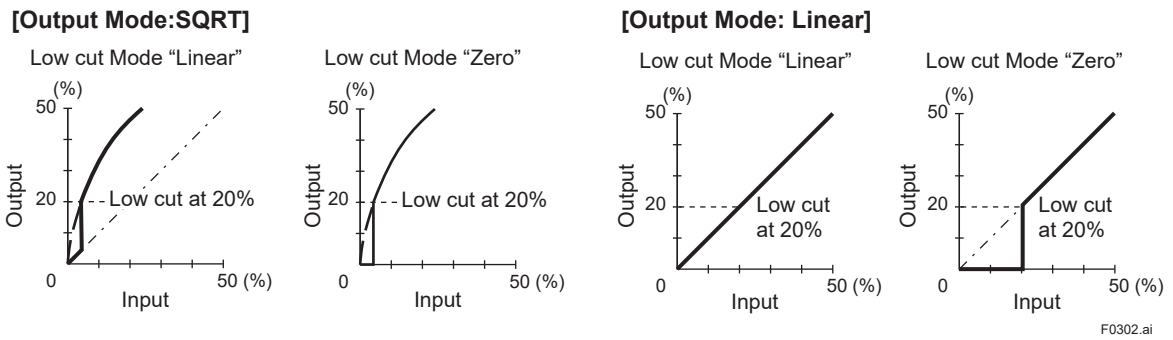


Figure 3.2 Low Cut Mode

Since the low cut function has hysteresis, the actual operation is as shown below. The hysteresis range is $\pm 10\%$ (fixed) of the low cut value.

(Example) When proportional output, **Low Cut Mode** = Zero and **Low Cut** value = 20%, when the output signal changes from 20% to less than 18%, the low cut is performed, and when the output signal changes from 20% to more than 22%, the proportional output is returned.

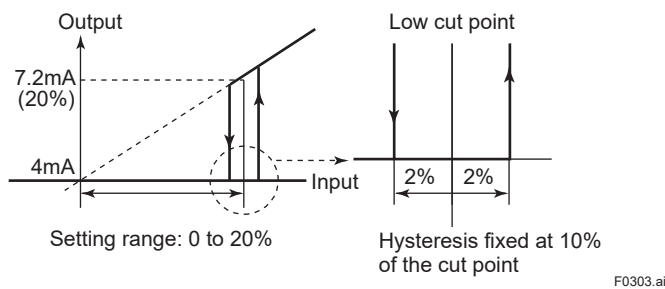


Figure 3.3 Hysteresis for Low Cut 20%

Low Cut output values and display value depend on the combination of output mode (**Transfer Function**) and **Disp Pres% Function** mode ("Display mode", in below.)

Table 3.1 Low Cut Factory Settings and Low Cut Values for Output and Display

Combination of output mode and display mode	Low Cut Setting upon shipment		output signal	Low cut value for display
#	Output mode	Display mode		
1)	Linear	Linear	10%	10%
2)	Square Root	Square Root	10%	10%
3)	Linear	Square Root	1%	10%
4)	Square Root	Linear	10%	No Low Cut

The default setting is 10%. However, if Linear is selected as the output mode and Square Root is selected as the display mode, the default setting for **Low Cut** is 1%. In this case, the **Low Cut** value for the output signal is set to 1%, the **Low Cut** value for the LCD display is set to 1%, and the **Low Cut** value for the LCD display is set to 10%, which is the square root of the **Low Cut** value. If Square Root is specified for the output mode and Linear is specified for the display direction, the Low Cut function will apply to the output signal, but will not apply to the display.

3.2.7 Impulse Line Connection Orientation Setup

Reverse connection of the impulse piping can be performed for differential pressure transmitter. This function is used when the low-pressure side and high-pressure side of the impulse piping are connected incorrectly.

To change the direction of impulse piping connection of the differential pressure transmitter from right high (left high) to left high (right high), follow the procedure below.

IMPORTANT

Do not use this function for EJX110S with capsule range code -V or -3, as the correct measurement cannot be obtained when reversing High/Low side for those products. This function is also not applicable for a gage/absolute pressure transmitter. When this function is set, the H/L sign on the capsule body and the code which shows left/right side high-pressure in the MS code will remain unchanged. Please ensure that any modifications are clearly documented by the customer and that visual indicators are provided to make the changes easily identifiable.

Menu path

[Root Menu] → Device Setting → Basic Setup → Pres Setup →	
H/L Swap	Select "Normal" or "Reverse"

3.2.8 Static Pressure Setup

The differential pressure transmitter can also measure and display the static pressure.

When selecting EJX110S capsule range code -E, this function is not available.

(1) Setting of the unit for static pressure

Follow the procedure below to change the static pressure unit.

Menu path

[Root Menu] → Device Settings → Basic Setup → Units →	
SP Unit	Select the unit for static pressure (Refer to subsection 3.2.2 Unit)

(2) Setting of the measuring range for static pressure

Follow the procedure below to change the lower range value (SP LRV) and upper range value (SP URV) for static pressure. Damping time constant can also be set for SP value.

Menu path

[Root Menu] → Device Settings → Basic Setup → SP setup →	
SP LRV	Set the lower range value (0 %) of static pressure
SP URV	Set the upper range value (100 %) of static pressure

As an alternative method for setting the static pressure range, **SP Apply Values** allows the lower and upper SP range values to be setup automatically with the actual pressure applied. If the lower range value is set, **SP URV** and **SP LRV** are changed at the same time, with keeping span value. Please also refer to 3.2.3 (2).

Menu path

[Root Menu] → Device Settings → Detailed Setup → Sensors → SP Sensor → SP Range →	
SP Apply Values	Automatically set up lower and upper SP range with the actual input applied.

Damping time constant can also be set for Static Pressure.

Menu path

[Root Menu] → Device Settings → Basic Setup → SP Setup →	
SP Damp	Set the damping time constant to a value in the range of 0.00 to 100.00 (units: seconds).

3.3 Detailed Setup

IMPORTANT

If you change the settings of this instrument, do not turn off the power of this instrument for 10 seconds after the setting change.
If you turn off the power immediately after changing the setting, the setting may not be saved.

3.3.1 Static Pressure Detailed Setup

(1) Selection of gauge or absolute pressure

Either a gauge pressure or absolute pressure can be selected to be displayed on the display. Absolute pressure is selected when the transmitter is shipped. When selecting “Gauge”, the gauge pressure is calculated with using the absolute pressure and fixed atmospheric pressure value (**Atm. Pres Value**) set by user.

Menu path

[Root Menu] → Device Setting → Detailed Setup → Sensors → SP Sensor → SP Range	
A/G Select	Select “Gauge” or “Absolute”
Atm. Pres Value	0.1013 MPa when the transmitter is shipped

(2) Selection of high or low pressure side

Either the high or low pressure side of capsule can be selected to monitor the static pressure. In general, high side is selected for flow measurement, and low side is selected for level measurement. High pressure side is selected when the transmitter is shipped.

Menu path

[Root Menu] → Device Setting → Detailed Setup → Sensors → SP Sensor → SP Range	
SP H/L Select	Select “High” or “Low”

3.3.2 Bi-directional Flow Measurement

Bi-directional flow measurement mode enables the output and display to be symmetrical in positive and negative directions, centered around the lower range value. With the output at 0% input set to 50% (12 mA), this is used when you want to measure both forward and reverse flow rates using a differential pressure transmitter.

Menu path

[Root Menu] → Device Setting → Detailed Setup → Signal Condition →	
Bi-dir Mode	Select “On” or “Off”

Set the **Bi-dir Mode** parameter to On. The default factory setting is Off.

NOTE

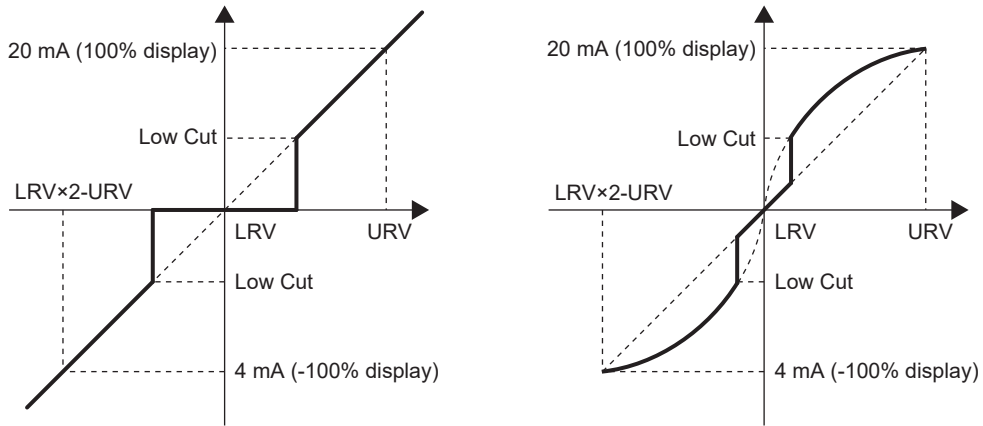
For instance, when bi-directional flow measurement is enabled for a measurement range of 0 to 10 kPa, the range is redefined as -10 to 0 to 10 kPa, corresponding to an output range of 0 to 50 to 100%.

However, the values of **LRV** (Lower Range Value) and **URV** (Upper Range Value) remain unchanged.

- Combining **Bi-dir mode** with **Xfer fnctn** provides a square root output computed independently for 0% to 50% output and for 50% to 100% output.
- The low cut function operates symmetrically around the 0% point.
- The upper and lower limits of the output current follow the settings in subsection 3.3.4 “Analog Output Signal Adjustable Range”.

Output Mode “Linear” and Low Cut Mode “Zero”

Output Mode “Square Root” and Low Cut Mode “Linear”



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Figure 3.4 Bi-directional Flow Measurement Settings

Table 3.2 shows the relationship between input values and each output value when the bi-directional flow measurement setting is enabled.

Table 3.2 Input and Output Relationship in Bi-directional Flow Measurement Mode

Input		LRV ×2 - URV	LRV	URV
Output	Current output	4 mA	12 mA	20 mA
	Percent of Range	0%	50%	100%
	Display PRES %	-100%	0%	100%
	User scale value	Engr LRV×2 -Engr URV	Engr LRV	Engr URV

3.3.3 Analog Output Reversal

The input and 4 to 20 mA output directions can be reversed. If the low cut function operates near the 0 point when the output is reversed, the output will be 20 mA.

Follow the procedure below to set the output reversal.

Menu path

[Root Menu] → Device Settings → Detailed Setup → Output Condition → Analog Output →	
Reverse Output	Select "Normal" or "Reverse"

In HART communication, reversing the 4 to 20 mA output is typically achieved by setting the upper range value lower than the lower range value (Upper Range Value < Lower Range Value). If you want to reverse the 4 to 20 mA output when ordering the product, specify the range lower limit (LRV) and range upper limit (URV) reversed. (LRV>URV)

On the other hand, in the BRAIN communication type of our old products like EJ or old EJA series, the range lower limit (LRV) and range upper limit (HRV) always had a relationship of LRV<HRV, and reversal of output was performed by setting the Normal/Reverse parameter. This **Reverse Output** parameter inherits that function.

If you are the user of the BRAIN communication type of the old models and would like to reverse the output using the same parameter settings, you can do so by changing the range value to **LRV<URV** after delivery of the product and setting this parameter to "Reverse." In that case, please note that there are the following differences from the case where the range value is reversed and set, and you may need to adjust the setting of other parameters.

Below is a setting example for inverting the output in the 0 to 100 kPa range.

The method to invert the output	Value correspondence	Display
LRV>URV	0 kPa: 100% (20 mA) URV 25 kPa: 75% (16 mA) 100 kPa: 0% (4 mA) LRV	Reversed
Reverse Output (this parameter)	0 kPa: 0% (20 mA) LRV 25 kPa: 25% (16 mA) 100 kPa: 100% (4 mA) URV	Display the value as they are

3.3.4 Analog Output Signal Adjustable Range

Output signal adjustable range at normal operating condition are set as shown below at the factory when the instrument is shipped, and an output signal is limited by these values.

	Lower limit	Upper limit
Without option code /C2	3.600 mA	21.600 mA
Option code /C2	3.808 mA	20.469 mA

Output signal range can be changed between 3.2 mA and 21.6 mA to match it to the receiving device.

Lower value is set at **AO Lower limit** and upper value is set at **AO Upper limit** respectively. Follow the procedure below to change the upper and lower values.

Menu path

[Root Menu] → Device Settings → Detailed Setup → Output Condition → Analog Output →	
AO Lower Limit	Set the lower value (mA)
AO Upper Limit	Set the upper value (mA)

Set the values as below.

Lower value < Upper value

3.3.5 Setting the Burnout

You can set the 4 to 20 mA current output burnout direction (**Analog Alarm Selection**) in the event of a hardware failure. If a hardware failure occurs, communication may not be possible. If the output circuit has an uncontrollable failure, it will burn out to the low or high side regardless of the setting. Which way it will burn out depends on the cause of the failure.

Use the following procedure to check the burnout setting.

The factory default setting for burnout direction is High.

Menu path

[Root Menu] → Device Setting → Detailed Setup → Output Condition → Analog output →	
Analog Alarm Selection	High or Low

The burnout current value is set at the time of shipment for both High and Low, regardless of the burnout direction. Even if the burnout direction is set to High, the **Lower AO Alarm Current Value** is set at the time of shipment. Therefore, regardless of the “burnout direction,” both the High and Low values of the burnout current value are set at the time of shipment.

Burnout direction	High	Low
Factory default settings	22.4 mA	3.2 mA

Burnout current setting can be changed within the adjustable range (3.2 to 23.0 mA) and set to match the receiving device.

Menu path

[Root Menu] → Device Settings → Detailed Setup → Output Condition → Analog Output →	
Lower AO Alarm Current Value	Set the lower value (mA)
Upper AO Alarm Current Value	Set the upper value (mA)

Set the values as below.

Lower value < Upper value

When changing the setting of the burnout current value (**Lower/Upper AO Alarm Current Value**), make sure that there is a space between the setting and the output range setting (**AO Lower Limit/AO Upper Limit**) so that the normal output value and the burnout current value can be distinguished.

3.3.6 Contents on Display

For the details of the display items, refer to the User's manual "EJX S series Hardware"(IM 01C33B01-01EN)."

3.3.7 Display Mode

The display mode (scale characteristics) of the display can be set to either "Linear" or "Sq root".

The display mode of the display is set to the mode specified at the time of order.

For details on the output mode of the output signal, refer to subsection 3.2.4. To change the display mode, follow the procedures below.

Menu path

[Root Menu] → Device Settings → Detailed Setup → Display Condition → Display Condition →	
Display Pres % Function	Select "Linear" or "Sq root"

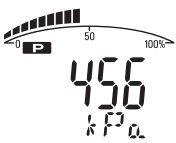

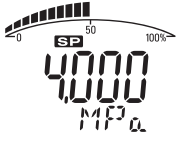

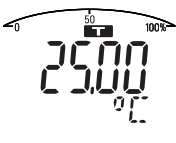

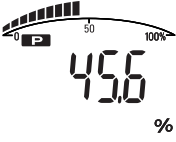

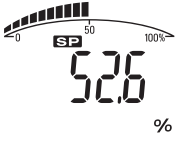



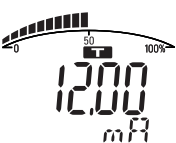

When the display mode is "Square Root" , the " $\sqrt{\quad}$ " symbol appears on the display.

3.3.8 Display Setting

Up to 4 variables can be selected from the following seven variables and displayed on the display.

- measured pressure
- Measured static pressure (*1)
- Sensor temperature
- % of pressure range
- % of static pressure range (*1)
- User set scale of measured differential pressure/pressure
- Output Current Value (mA)

*1: Applicable only for differential pressure transmitters.

LCD Display	Graphic Display	Description and related parameters
<p>Input pressure (PRES)</p> 		<p>Indicates values of input pressure with the indication limits -99999 to 99999.</p> <p>PRES 456 kPa</p>
<p>Input static pressure (*1) (SP)</p> 		<p>Indicates input static pressure with the indication limits -99999 to 99999. Reference pressure is factory-set in absolute.</p> <p>SP 4.000 MPa</p>
<p>Sensor Temperature Value (SNSR.T)</p> 		<p>Displays the sensor temperature value in the specified unit with a display range of -99999 to 99999.</p> <p>SNSR.T 25.00 °C</p>
<p>% of range (PRES %)</p> 		<p>Indicates input pressure in -2.5 to 110% range depending on the set range (LRV and URV).</p> <p>PRES % 45.6 %</p>
<p>% of static pressure range (*1) (SP %)</p> 		<p>Indicates input static pressure in -10 to 110% range depending on the set range (SP LRV and SP URV).</p> <p>SP % 52.6 %</p>
<p>User set scale (ENGR. PRES)</p> 		<p>Indicates values depending on the engineering range (Engr LRV and Engr URV) with the unit (Engr Unit).</p> <p>Engr LRV 0.0 Engr URV 20.0 Engr Unit m³/min Exponent Mode ×100 Display Point 1</p>
<p>Output Current Value (mA)</p> 		<p>Displays the current output value in mA.</p> <p>Analog Output 12.00 mA</p>

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*1: Applicable only for differential pressure transmitters.

Figure 3.6 Display

See (1) through (5) shown below for the setting procedures.

(1) Display Selection

At **Display Condition**, select the variable that the parameter **Display Out 1** will display on the display.

Menu path

[Root Menu] → Device Settings → Detailed Setup → Display Condition → Display 1 Setup →	
Display Out 1	Select the display content from the following options: <ul style="list-style-type: none"> • Pressure (Measured differential pressure / pressure) • Static Pressure (*1), • Sensor temperature • Pressure with % (% of range of differential pressure / pressure) • Pressure with % (% of static pressure range) (*1), • Pressure Engineer Units (Pressure in user set scale) • Analog Output (Output Current Value)

*1: Available only for differential pressure transmitters.

Set **Display Out 2**, **Display Out 3** and **Display Out 4** in the same way if necessary.

In addition to the above item, "Not used" is also displayed as a selection item for **Display Out 2 to 4**.

(2) Setting of display contents and order

Up to four variables can be displayed on the display in the following order cyclically;

Display Out 1 → Display Out 2 → Display Out 3 → Display Out 4.

Set the Display Out number corresponding to the order in which you want to display. If "Not used" is selected for **Display Out 2, 3, and 4**, the periodic display is skipped.

"Not used" cannot be selected for **Display Out 1**.

(3) Selection of information in lower character display

Configure the information displayed in the lower character section for each Display Out.

For each Display Out, the configured information is shown in the order of parameter name, unit, status.

Menu path

[Root Menu] → Device Settings → Detailed Setup → Display Condition →	
Display Info Select	Select one or more from the following. If nothing is selected, the display will remain blank. <ul style="list-style-type: none"> • Parameter • Unit • Status

(4) Decimal point position

User can change the position of decimal point for each Display Out.

Menu path

[Root Menu] → Device Settings → Detailed Setup → Display Condition → Display 1 Setup →	
Display Point 1	Select the decimal point position from the following: <ul style="list-style-type: none"> Integer (No decimal point) Down to 1 decimal place Down to 2 decimal places Down to 3 decimal places Down to 4 decimal places

Display Out 2 to 4 can be set in the same way, so please set them as necessary.

(5) Exponents for display

Change the display exponent setting. The exponent mode of **Display Out1** is set in **Exponent Mode1**. The exponents setting is only effective for differential pressure/pressure values, static pressure values, sensor temperature values, and user scale values.

Menu path

[Root Menu] → Device Settings → Detailed setup → Display condition → Display 1 Setup →	
Exponent Mode 1	Select from ×1, ×10, ×100, or ×1000

Display Out 2 to 4 can be set in the same way, so set them if necessary.

(6) User scale range and unit

Engr Display Range parameters allow the setting of the engineering unit and scale to be displayed. At **Set Engr Unit**, the following engineering units can be selected.

Menu path

[Root Menu] → Device Settings → Detailed Setup → Display Condition → Engr Display Range →	
Set Engr Unit	Select the engineering unit
Engr Unit	Enter a string of direct units
Engr LRV	Set the range
Engr URV	

Select the engineering unit from the list.

kPa	psia	mmWG	ftH ₂ O	atm	l/h	NI/min	SCFH	mm
MPa	mmH ₂ O	Torr	gf/cm ²	kg/h	l/min	Nm ³ /h	SCFM	in
mbar	mmHg	inH ₂ O	kgf/cm ²	t/h	kl/h	Nm ³ /min	GPH	ft
bar	mmHgA	inHg	kg/cm ² G	m ³ /h	kl/min	ACFH	GPM	kg/m ³
psi	mmAq	inHgA	kg/cm ² A	m ³ /min	NI/h	ACFM	m	g/cm ³

At **Engr Unit** parameter, user can set your own unit also.

NOTE

Up to eight alphanumeric characters, spaces or characters shown in subsection 3.2.1 below can be input at Engr Unit. At the time of shipment, unused fields of the parameter are filled with spaces.

To display “°”, enter “~”.

“-----” will be displayed in the following cases.

- If non-displayable character is included in the setting.
- “.” or “/” are entered consecutively.

[For LCD display]

Following characters can be displayed on the LCD.

- . _ / \ < > [] + = \$ % * ? ° { }

Only the first six characters are displayed on the display.

“.” or “/” is included, more than six characters may be displayed.

[For graphic display]

There're following rules;

- When “~” and “F” are entered consecutively, it will become “°F”.
- When “~” and “C” are entered consecutively, it will become “°C”.

(7) Custom unit

The unit displayed on the display can be set to any desired string. Setting can be checked and modified, using the following procedure.

Menu path

[Root Menu] → Device Settings → Detailed Setup → Display Condition → Display 1 Setup →	
Unit Selection 1	Select from "Auto" or "Custom." By selecting "Custom," the string configured in the Display Unit 1 will be shown as the unit.
Display Unit 1	Enter a string for unit. Refer to the NOTE in " (6) User Setting of Engineering Unit and Scale" for limitation.

Unit Selection 2 to 4 and **Display Out 2 to 4** can be set in the same way, so please set them as necessary.

(8) Bar indicator

This setting enables or disables the bar indicator display. When enabled, the bar indicator is shown for process variables other than sensor temperature, scaled according to either percentage values or **URV/LRV**.

NOTE

The bar indicator is not displayed when the bi-directional flow measurement is activated.

Menu path

[Root Menu] → Device Settings → Detailed Setup → Display Condition →	
Bar Indicator	Select "Enabled" or "Disabled."

(9) Display Switching Cycle Setting

The switching cycle for each display item can be configured to HIGH (fast), MID (medium), or LOW (slow)."

Menu path

[Root Menu] → Device Settings → Detailed Setup → Display Condition →	
Display Cycle	Select from "HIGH", "MID", or "LOW"

NOTE

In low ambient temperature environments, the switching cycle is automatically set to a speed slower than the LOW setting."

3.3.9 NAMUR NE 107 Settings

Four classification categories of NAMUR NE 107 can be displayed simultaneously when an alarm occurs.

Menu path

[Root Menu] → Device Settings → Detailed Setup → Display Condition → Display Condition →	
Display NE 107	Select the Normal or NE 107

The factory setting is Normal (No NAMUR NE 107).

When NAMUR NE 107 is enabled (NE 107), only the most important alarm is displayed, alternating with the alarm content. (Priority: Failure, Function check, Out of specification, Maintenance request)

The four alarm classifications can be changed by settings. See 4.1.1.3 for settings.

NAMUR NE 107 classification	Indicator display image	
	LCD display	Graphic display
Failure		
Function check		
Out of specification		
Maintenance request		

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Figure 3.7 Display Example of NAMUR NE107

3.3.10 Unit for Displayed Temperature

When the instrument is shipped, the temperature units are set to “deg C” (Centigrade). Follow the procedure below to change this setting.

Menu path

[Root Menu] → Device Setting → Detailed Setup → Sensors → Temp Sensor →	
Temp Unit	Select the temperature unit (°C, deg F, Kelvin (K))

3.3.11 Sensor Trim (Zero and Span Adjustment)

Although the instrument is precisely calibrated according to the specifications at the factory, slight errors may occur due to the installation environment or mounting position. The zero point/span adjustment function is provided to fine-tune these errors.

For details, refer to Section 7.3 “Zero Point Adjustment and Span Adjustment” in the User’s Manual “EJX S series Hardware (IM 01C33B01-01EN).”

3.3.12 Trim Analog Output

Fine current output adjustment is carried out with **D/A Trim** or **Scaled D/A Trim**.

(1) D/A Trim

D/A Trim is to be carried out if the calibration digital ammeter does not exactly read 4.000 mA and 20.0 mA with an output signal of 0% and 100%.

Menu path

[Root Menu] → Maintenance → Analog Output Trim → D/A Trim

(2) Scaled D/A Trim

The output amount can be scaled to any value and displayed and set. Follow the message that will be displayed and set the value accordingly.

Menu Path and Procedure of Scaled D/A Trim adjustment

Step 1	Calling up the Scaled D/A trim Parameter	
	[Route Menu] → Maintenance → Analog Output Trim → Scaled D/A Trim	
2	Select Scaling	Select Change
3	Low setting	Set the value to be converted (Example: 1)
4	Set High	Set the value to be converted (Example: 5)
5	Output adjustment performed	Select Proceed
6	Trim on the low side	Set reading value
7	Trim on the high side	Set reading value

Example) Scaling example : voltage value

When a receiving resistor of 250 Ω is connected to the current output loop and the voltage across both ends is measured with a digital voltmeter.

4 mA DC → 1 V

20 mA DC → 5 V

Connect a calibration device that measures the scaled measurement amount, measure the output value when a constant current of 4 mA and 20 mA is generated, and adjust by setting the reading.

3.3.13 External Zero-point Adjustment Mode

Follow the procedure below to enable or disable zero point adjustment by means of the zero-adjustment screw on the transmitter.

This is set to “Enabled” when the instrument is shipped. When option code /CJ is specified, the parameter is set to “Disabled” upon shipment.

Menu path

[Root Menu] → Device Setting → Detailed Setup → Device Information → Field Device Information →	
Local Operation Enable	Enabled or Disabled

3.3.14 Hardware Write Protection

The Write Protect function (Write Protection) can be set with the hardware write protection setting switch in the main module of this instrument. When the hardware write protection setting switch is set to ON, writing to the instrument's configuration values (see Chapter 5 "Parameter Summary") is disabled. When the hardware write protection setting switch is set to OFF, writing is enabled.

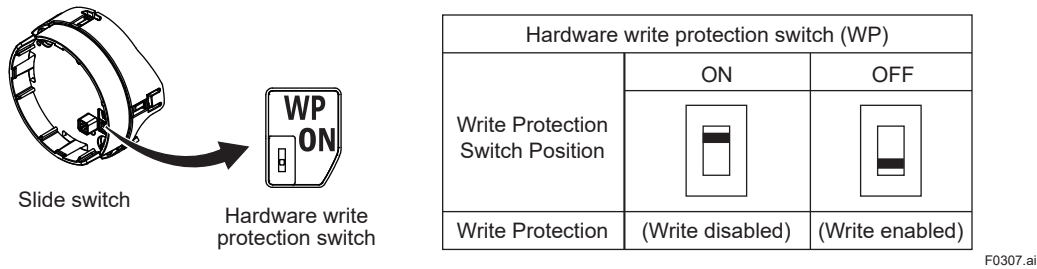


Figure 3.8 Hardware Write Protection Switch

3.3.15 Software Write Protection

The transmitter configured data is saved by using a write protection function. The write protection status is set to "Yes" when 16 alphanumeric characters are entered in the **Write Protect New Password** field and transferred to the transmitter. If the specified string is shorter than 16 characters, the required number of spaces are automatically inserted.

When write protection is set to "Yes," the transmitter does not accept parameter changes. When the same 16 alphanumeric string entered in the **Write Protect New Password** field is also entered in the **Write Protect Release Password** field and transferred to the transmitter, it will be possible to change transmitter parameters during a 10 minute period.

To change the transmitter from the write protection "Yes" status back to write protection "No" status, use **Write Protect Release Password** to first release the write protection function and then enter 16 spaces in the **Write Protect New Password** field.

Menu path

[Root Menu] → Device Settings → Detailed Setup → Write Protect Menu →	
Write Protect Status	Display current protect mode (Yes: protected, No: not protected)
Write Protect Release Password	Release the protect function for 10 min.
Write Protect New Password	Set: Put a new password with 16-digit. Release: Put 16 spaces.

NOTE

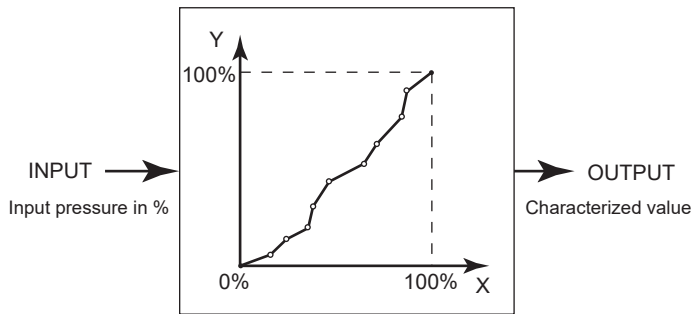
It may take more than one minute for the Write Protection Status in the configuration tool to update.

3.3.16 Signal Characterizer

The instrument performs linear approximation calculations based on the percentage value of differential pressure/pressure and outputs the result. This function is used when proportional output is required for level measurement in non-standard shaped tanks.

Up to 30 coordinate points can be configured within the 0 to 100% range. The input-output characteristics are interpolated linearly between each point. The coordinates for 0% and 100% are fixed and cannot be configured.

When setting coordinates, ensure that the parameter **Transfer Function** is not set to “Signal Characterizer” (linear approximation function). After completing the coordinate settings, set the **Transfer Function** parameter to Signal Characterizer.



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Figure 3.9 Signal Characterizer

Each X and Y coordinate of the breakpoints must be configured to follow a monotonically increasing order. Monotonic increase means that the coordinates satisfy the following conditions (excluding unused coordinates based on the **Num Of Points** setting):

X Coordinates: $0\% < X1 < X2 < X3 < \dots < X28 < X29 < X30 < 100\%$

Y Coordinates: $0\% < Y1 < Y2 < Y3 < \dots < Y28 < Y29 < Y30 < 100\%$

• **Conditions for Configuration Rejection**

If the X or Y coordinates of the breakpoints are not monotonically increasing, the instrument will display alarm AL-070 “SC.CFG” as a configuration error and operate in Linear (proportional) mode.

Follow the steps below to configure the line approximation function:

<1> Set the number of breakpoint coordinates

Menu path

[Root Menu] → Device Settings → Detailed Setup → Signal Condition → S.C. Menu →	
Num of points	Set the number between 1 and 30

Enter a value between 1 and 30 for the number of breakpoints using the **Num of Points** parameter.

The number of breakpoints is counted as pairs of X and Y values. The instrument uses the specified number of pairs starting from the lowest-numbered coordinates among “X1 to X30” and “Y1 to Y30.”

<2> Set the coordinates

Menu path

[Root Menu] → Device Setting → Detailed Setup → Signal Condition → S.C. Menu →	
XY Values	Set the coordinates (X-axis, Y-axis)

Enter values for the X and Y coordinates using the **XY Values** parameter.

The parameters **X Start** and **Y Start** represent the starting point at 0%, while **X End** and **Y End** represent the endpoint at 100%. These are fixed values and cannot be modified. Additionally, they are not included in the count specified by the **Num of Points** parameter but are always used as the start and end points of the line approximation curve.

<3> Apply the settings

After setting the coordinate values, the line approximation function becomes active when the **Transfer Function** (output mode) is set to Signal Characterizer. Once activated, the data in **Num of Points** and **XY Values** can no longer be modified.

Menu path

[Root Menu] → Detailed Setup → Signal Condition → S.C. Menu →	
Transfer Function	Select Signal Characterizer.

Select Signal Characterizer from the three available options—Linear, Square Root, and Signal Characterizer—in the **Transfer Function** parameter.

3.3.17 Process Alarm

The function is used to display the alarm codes when the input pressure exceeds the specified value within the calibration range. The same is available for the static pressure and the sensor temperature on the pressure sensor. Refer to table 4.6 “Alarm Message Summary” for the specific alarm code to be generated.

(1) Alarm Setting

Select the process variable at **Process Alarm** which the alarm is set, then set the alarm mode for that value.

Menu path

[Root Menu] → Device Settings → Detailed Setup → Output Condition → Process Alarm →	
Selection of the process variable for alarm	Pres Alarm → Pres Alarm Mode: Pressure / differential pressure
	SP Alarm → SP Alarm Mode: Static pressure
	Temp Alarm → Temp Alarm Mode: Sensor temperature
Selection of Alarm mode	Off: Disable the alarm function
	Hi Alarm Detect: High side alarm detection
	Lo Alarm Detect: Low side alarm detection
	Hi/Lo Alarm Detect: High and Low side alarm detection

(2) Threshold Level Setting

Set the threshold of high and low alert value for alarm generation.

Menu Path (for pressure alarm)

[Root Menu] → Device Settings → Detailed Setup → Output Condition → Process Alarm → Pres Alarm →	
Pres Hi Alarm Value	Set the threshold value of upper side for pressure
Pres Lo Alarm Value	Set the threshold value of lower side for pressure

Menu Path (for SP alarm)

[Root Menu] → Device Settings → Detailed Setup → Output Condition → Process Alarm → SP Alarm →	
SP Hi Alarm Value	Set the threshold value of upper side for static pressure
SP Lo Alarm Value	Set the threshold value of lower side for static pressure

Menu Path (for temperature alarm)

[Root Menu] → Device Settings → Detailed Setup → Output Condition → Process Alarm → Temp Alarm →	
Temp Hi Alarm Value	Set the threshold value of upper side for sensor temperature
Temp Lo Alarm Value	Set the threshold value of lower side for sensor temperature

3.3.18 Test Output, Simulation, and Squawk

IMPORTANT

Fixed current output and Simulation Function continue for a given holding time, then is released automatically. Even if the HART configuration tool power supply is turned off or the communication cable is disconnected, the test output will continue for that time. The holding time can be selected from 10 min*, 30 min, 60 min, 3 hour, 6 hour or 12 hour.

*: Default value.

Menu Path

[Root Menu] → Diagnostics → Test → Test Auto Release Time

(1) Fixed current output

A constant current can be output within the range of 3.2 mA (-5.0%) to 23.0 mA (119%) for loop checking. When this function is operating, the following will be displayed on the LCD display.

Top: Bar graph of Output (%)

Main numeric display: Output value (%) (4 mA: 0.00, 12 mA: 50.0, 20 mA: 100.00)

Lower character display: word "TEST"

Supplementary characters: % is lit.

To perform a test output for DD, call up the test output parameter (**Force Loop Current**) and select one of the following three types.

Menu path

[Root Menu] → Diagnostics → Test →	
Force Loop Current	4 mA: Output a 4 mA DC signal
	20 mA: Output a 20 mA DC signal
	Other: Set a desired output signal value
	End : Exit

(2) Device Variable Simulation Function

Using the simulation function, the output signal can be confirmed by setting any value and status to the selected device variable.

Call up the parameter and follow the message shown. After completing the step 4, the simulation starts.

The display shows output value and alarm (AL-091) alternately.

Menu Path and Procedures of Enabling Device Variable Simulation

Step	[Route Menu] → Diagnostics → Test → Enable Device Variable Simulate	
1	Selection of Device Variable	Select one parameter from the list below: Differential pressure / pressure (PV) Static pressure (SV) Sensor temperature (TV)
2	Setting of Value	Input the simulate value
3	Setting of Data quality	Select one parameter from the list below: Bad Poor accuracy Manual / Fixed Good
4	Setting of Limit status	Select one parameter from the list below: Not limited Low limited High limited Constant

Menu Path and Procedures of Disabling Device Variable Simulation

Step	[Route Menu] → Diagnostics → Test → Disable Device Variable Simulate	
1	Selection of Device Variable	Select one parameter from the list below: Differential pressure/ pressure (PV) Static pressure (SV) Sensor temperature (TV)

NOTE

- All the simulations for pressure, static pressure, and sensor temperature are reflected to the output. Accordingly, the loop current, display, and communication output are directly corresponded to the simulate value.
The alarm output is also available according to the simulate value.

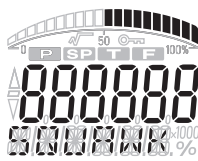
(3) Squawk

This feature can be used to identify the communicating transmitter by remotely, making the display to show the particular pattern as shown in the Figure 3.10. With the default setting value of 5, the display remains active for approximately 20 seconds. After that, the display is automatically cleared.

To extend the squawk showing time, enter a value greater than the value set for “Change Number of Squawks to make.”

Menu path

[Root Menu] → Diagnostics → Test → Squawk →	
Select Display Item	Contents
Change Number of squawks	Setting the squawks duration period
Squawk	Execute squawk (Squawk shown on the display.)
Exit	End of function



LCD display



Graphic display

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Figure 3.10 Squawk on the Display

3.3.19 Burst Mode

If the burst mode setting is enabled, the transmitter can continuously transmit up to 3 messages from DATA in Table 3.4 via HART communication.

In addition, if the burst mode setting is enabled, alarm signals can be continuously transmitted by detecting changes in device settings or changes in self-diagnosis.

To change the burst mode setting, make sure that the **Burst Mode** parameter is set to Off. Default setting of burst mode is OFF (disabled).

(1) Burst Message

The transmitter can transmit three burst messages at the maximum.

The parameters for **Burst Message** are as follows.

- Burst Command
- Update Period and Max Update Period
- Burst Msg Trigger Mode

Table 3.4 Burst Parameters

Command parameter	Burst Command	Burst Msg Trigger Mode	Burst Trigger Source	Burst Trigger Units
PV (Pressure / Differential Pressure)	Cmd 1: Read Primary Variable	Continuous	---	---
		Window	PV	Depend on the assigned variable to PV
		Rising		
		Falling		
		On-change		
Percent Range/Loop Current (Percent of range, Loop current)	Cmd 2: Read Percent Range/ Current	Continuous	---	---
		Window	% range	%
		Rising		
		Falling		
		On-change		
Process vars/current (Loop current, Pressure / Differential Pressure, Static Pressure, Sensor temperature)	Cmd3: Read Dynamic Variables/ Current	Continuous	---	---
		Window	PV	Depend on the assigned variable to PV
		Rising		
		Falling		
		On-change		
PV/SV/TV/Percent Range/Loop Current with status (*1) (Up to 8 selectable from Burst Device Variables)	Cmd 9: Read Device Variables with Status	Continuous	---	---
		Window	Top of Burst Device Variables	Depends on mapping of Burst Device Variables
		Rising		
		Falling		
		On-change		
Self Diagnosis Information	Cmd48:Read Additional Device Status	Continuous	---	---
		On-change	All status	---

*1: Output the data with time and status.

(2) Burst mode setting procedure

Call **Burst Message 1, 2, or 3** of the burst mode parameters and set the parameters according to the following flowchart.

Menu path

[Root Menu] → Device Setting → Detailed Setup → Output Condition → HART Output → Burst Condition → Burst Message 1,2 or 3 → Burst Command

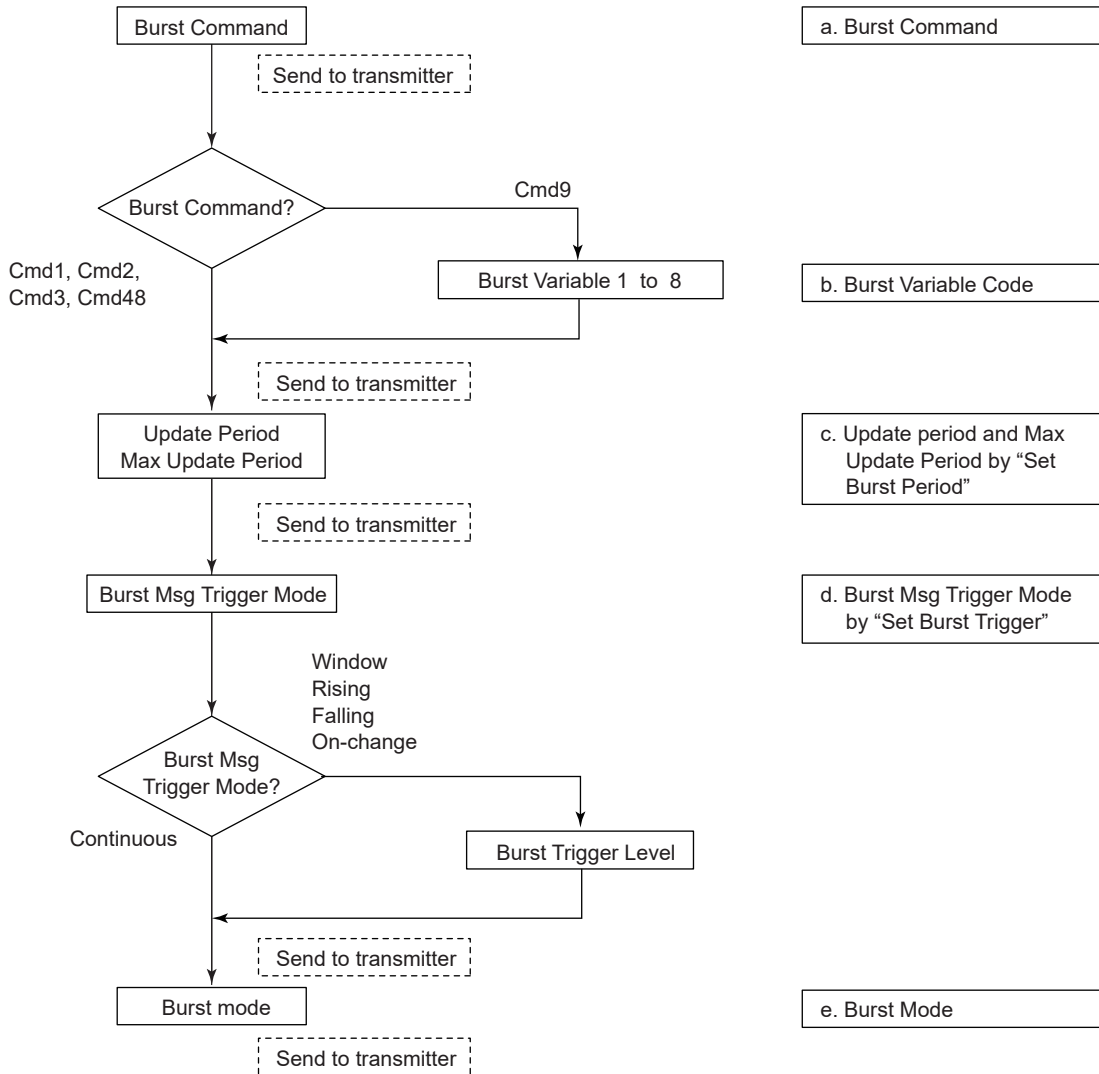


Figure 3.11 Burst Mode

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a) Burst Command

Select the transmission data at **Burst Command** parameter.

Burst Command	Command parameter
Cmd 1: Read Primary Variable	PV (Pressure / Differential Pressure)
Cmd 2: Read Percent Range/Current	% range/current (Percent of range, Loop current)
Cmd3: Read Dynamic Variables/Current	Process Variables/Loop Current (Loop current, Pressure / Differential Pressure, Static Pressure, Temperature)
Cmd 9: Read Device Variables with Status	PV/SV/TV/% rnge/Loop Current with status (*1) Up to 8 selectable from Burst Device Variables.(*2)
Cmd48: Read Additional Device Status	Self Diagnosis Information

*1: Output the data with time and status. when burst from the transmitter.
 *2: Select up to 8 from Burst Device Variables.

b) Burst Variable Code/Device Variable Code

This parameter need to be set when **Burst Command** is Cmd9:Read Device Variables with Status (up to eight items). In the case of conditional burst transmission, the first device variable set will be the trigger source.

Menu path

[Root Menu] → Device Setting → Detailed Setup → Output Condition → HART Output → Burst Condition → Burst Message 1,2 or 3 → Burst Device Variables → Burst Variable 1 to 8 →

Display Item	Contents
PV	Select the pressure
SV	Select the static pressure
TV	Select the sensor temperature
Percent Range	Select the % output
Loop current	Select the output current
Not Used	–

c) Update period and Max Update Period

Set to **Update Period** and **Max Update Period**.

The Burst Trigger Source is checked with a period of Update Period, and when it fulfills the condition of Burst Message Trigger Mode, the data is updated. When it does not fulfill the condition of the Trigger Mode with a period of Update Period, the data is updated forcibly with **Max Update Period**.

When the period that is earlier than the operation period of each process value was set, it is set automatically to become bigger than an operation period of the transmitter.

For **Update Period**, set the value that is smaller than **Max Update Period**.

Menu path

[Root Menu] → Device Settings → Detailed Setup → Output Condition → HART output → Burst Condition → Burst Message 1, 2 or 3 → Set Burst Period

Burst Message 1, 2 or 3 Update Period / Burst Message 1, 2 or 3 Max Update Period	0.5 s
	1 s
	2 s
	4 s
	8 s
	16 s
	32 s
	1 min
	5 min
	10 min
	15 min
	30 min
	45 min
	60 min

d) Burst Msg Trigger Mode

Set the **Burst Msg Trigger Mode** from the parameters shown below.

When **Burst Msg Trigger Mode** is Window, Rising or Falling, set the **Burst Trigger Level**.

Menu path

[Root Menu] → Device Settings → Detailed Setup → Output Condition → HART Output → Burst Condition → Burst Message 1,2 or 3 →	
Set Burst Trigger	Continuous: Burst Message is transmitted continuously.
	Window: Detects and transmits device variable values that exceed the amount of change set in Burst Trigger Level.
	Rising: Detects and transmits device variable values that exceed the upper limit set in Burst Trigger Level.
	Falling: Detects and transmits device variable values that exceed the lower limit set in Burst Trigger Level.
	On-change: Transmits when it detects that the device variable value has changed from the output value at the start of burst transmission.

e) Burst Message Mode

When the **Burst Message 1, 2, or 3 Mode** is set to “ON”, the transmitter starts to send the data.

Menu path

[Root Menu] → Device Settings → Detailed Setup → Output Condition → HART output → Burst Condition → Burst Message 1,2 or 3 →	
Burst Message 1 / 2 / 3 Mode	Select Off or On

(3) Event Notification

When a setting change and a change of the Self-diagnostics occur, device detect it as an event and can transmit an alarm signal continuously.

Up to four events that occurred can be stored.

When using this function, set to **Burst mode** as “Wired HART Enabled”.

(3-1) Set Event Notification

Menu path

[Root Menu] → Device Setting → Detailed Setup → Output Condition → HART output → Event Notification →	
Event Mask	Set the status to detect
Event Notification → Set Event Notification Timing	
→ Event Update Period (Event Retry Rate)	Set the retry time when the event occur.
→ Event Max Update Period (Event Max Update Rate)	Set the update time when the event does not occur.
→ Event Debounce Interval	The setting of the minimum event duration
Event Mode	Stop the event monitor: Off Shift to the monitor state: On (Wired)

<1> Event Mask

Set the status to detect in the **Event Mask** parameter.

Device Status Mask
Extended Device Status Mask
Standardized Status 0 to 1 Mask
Status Group 1 Mask to 10 Mask

When changing the configuration of the device, Configuration Changed (0x40) Flag (refer to Table 4.8.) of Device Status is set, and Configuration Change Counter (refer to Table 5.1 "Parameters List," Number 27 - 33) is also incremented.

Configuration changed flag detection can be masked by the Device Status Mask, but it is impossible to mask the Configuration Change Counter.

Therefore, the configuration changes to the device are always detected as an event regardless of the setting of the Device Status.

<2> Event Update Period/ Event Max Update Period/ Event Debounce Interval

Set to Event Retry Rate, Event Max Update Rate and Event Debounce Interval.

For Event Retry Rate, set the value that is smaller than Event Max Update Rate.

Event Retry Rate/Event Max Update Rate	Event Debounce Interval
---	Off
0.5 s	0.5 s
1 s	1 s
2 s	2 s
4 s	4 s
8 s	8 s
16 s	16 s
32 s	32 s
1 min	1 min
5 min	5 min
10 min	10 min
15 min	15 min
30 min	30 min
45 min	45 min
60 min	60 min

<3> Event Notification Control

Select "ON (Wired)" in the Event Mode parameter to shift to the monitor state.

(3-2) Acknowledge Event Notification

Event acknowledgement from the configuration tool is not recommended in the HART standard. Therefore, event acknowledgement from FieldMate is not possible. Please use the host device's functions to approve events.

Only Event Status can be checked.

Menu path

[Root Menu] → Device Setting → Detailed Setup → Output Condition → HART Output → Event Notification → Acknowledge →	
Event Status	The contents of pending events can be confirmed.

3.3.20 Multidrop Mode

Up to 63 devices configured in multi-drop mode can be connected on a single communication transmission line. To activate multidrop communication, the transmitter address must be changed to a number from 1 to 63. If it sets to multidrop mode, in order to transmit all the data in digital one, it is necessary to change a setup of the analog output signal of 4 to 20 mA.

Confirm the setting of mutidrop mode by following procedures.

(1) Polling Address

Menu path

[Root Menu] → Device Settings → Detailed Setup → Output Condition → HART Output →HART Output→	
Polling Address	Enter the number from 1 to 63



CAUTION

When the same polling address is set for two or more transmitters in multidrop mode, communication with these transmitters is disabled.

(2) Analog Output Signal Setting

Set Disabled to **Loop Current Mode** and fix an analog output signal to 4 mADC. It becomes impossible in this case, to also use a burnout output.

However, in the case of the application which receives and operates an analog output signal, an analog output signal can be used for one loop. In this case, set Enabled to **Loop Current Mode**.

Menu path

[Root Menu] → Device Setting → Detailed Setup → Output Condition → Analog Output →	
Loop Current Mode	Enable: 4 to 20 mA analog signal output mode enabled.
	Disable: 4 to 20 mA analog signal output mode disabled. (4 mA DC fixed mode)

(3) Enabling the Multidrop Mode of Configuration Tool

About the polling setting of a configuration tool (receiver device), please refer to the User's Manual of each configuration tool.

(4) Communication when set in multidrop mode

- The HART configuration tool searches for a transmitter that is set in multidrop mode when it is turned on. When the HART configuration tool is connected to the transmitter, the polling address and the tag will be displayed.
- Select the desired transmitter. After that, normal communication to the selected transmitter is possible. However, the communication speed will be slow.

(5) Release of multidrop mode

To release multidrop mode, call up the **Polling Address** parameter and set the address to "0". Return **Loop Current Mode** to Enable. See (1).

3.3.21 Event Log Function

Startup events, alarm events, and write events can be referenced.

The maximum number of events that can be recorded is 4 for startup events, 13 for alarm events, and 6 for write events.

Historical data is saved in 10-minute cycles. When the power is turned off, up to 10 minutes of recordings are not saved and disappear.

The event logs cannot be reset.

Operating time is the total time accumulated while the power is turned ON.

Menu path

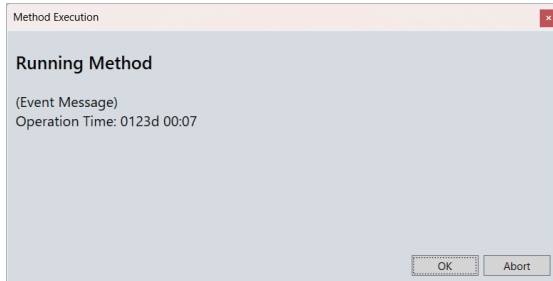
[Root Menu] → Diagnostics → Event Log →	
Startup Event Log View	Cumulative operating time when the power is ON is displayed.
Alarm Event Log View	Alarm details and cumulative operating hours at the time of occurrence is displayed.
Write Event Log View	Following parameters and cumulative operating time when parameter was changed is displayed. Transfer Function, Pres Damp, Upper Range Value, Lower Range Value, Pres Zero Trim Deviation, Pres Span Trim Deviation, Trim Clear

NOTE

When a method is executed, it may take some time before the method screen appears. Please wait without operating until the method screen appears.

Example of Startup Event

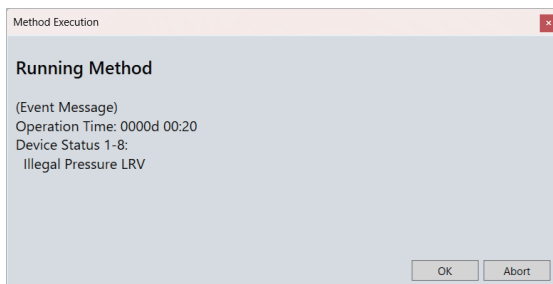
This “0123d 00:07” means that the device started at a cumulative operation time 123 days, 0 hours and 7 minutes.



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Example of Alarm Event

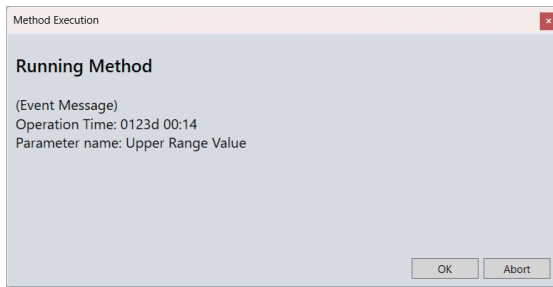
This “0000d 00:20” means that the LRV setting error occurred at a cumulative operation time 0 days, 0 hours and 20 minutes.



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Example of Write Event

This “0123d 00:14” means that the Upper Range Value was changed at a cumulative operation time 123 days, 0 hours and 14 minutes.



F0313.ai

4. Diagnostics

4.1 Self-Diagnostics

4.1.1 Identify Problems by Using Configuration Tool

Using a configuration tool, you can check the self-diagnosis result of this instrument from the SelfTest method or the status parameter. You can also check the status classified according to NAMUR NE 107 (NE107 status) from Parameter.

An error message is also displayed if an inappropriate operation is performed during parameter setup.

4.1.1.1 How to Check the Self-diagnosis Result Using the SelfTest Method

The **Self Test** and **Status** commands are available for self-diagnostics. When **Self Test** is run, the display shows an error code and alarm message if the transmitter detects any illegal parameter settings or functional faults. See Table 4.6 "Alarm Message Summary" for probable cause and countermeasures.

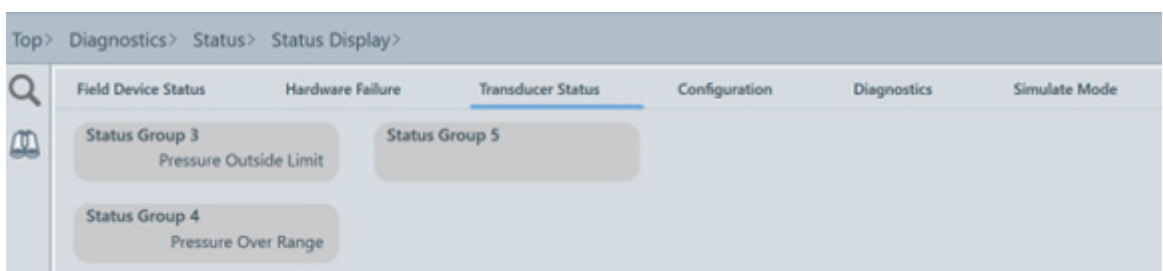
Menu path

[Root Menu] → Diagnostics → Test → Self Test
If no abnormality is detected, "Self Test OK" is displayed.
If an error is detected, an error message is displayed. Refer to Table 4.6 "Alarm Message Summary" for error messages.

4.1.1.2 Checking the Self-diagnosis Results with the Status Parameter

Menu path

[Root Menu] → Diagnostics → Status → Status Display
You can view the parameter that indicates the device status.
If an error is detected, an error message is displayed in one of Status Group 1-10.
For details about Status Group classifications and error messages, see Table 4.6 "Alarm Message Summary."



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Figure 4.1 Example of Display on the Configuration Tool

4.1.1.3 NE107 Checking the Status

If the specific diagnostic item is known for the check, you can directly call up the item by using the **Status** command.

The status is categorized from 1 to 10. See Table 4.6 to determine the status group.

Show an example below to confirm the status of Status group 1.






Menu path

[Root Menu] → Device Settings → Basic Setup → Device Information → Overview Status
If no abnormality is detected, Normal is displayed. If an abnormality is detected, "Failure," "Function check," or "Out of specification"/"Maintenance request" is displayed based on NE107 status classification (Table 4.1).

Table 4.1 NE107 Status Classification Definitions (in Descending Order of Priority)

NE107 Status Group	Device Status
F Failure	Output signal is error due to parts failure or device failure.
C Function check	Output signal temporarily invalid due to the input of an incorrect setting value.
S Out of specification	The device is operating outside the specifications. The measured value is undefined due to improper process or environment.
M Maintenance request	Maintenance is required in the near future or in a certain amount of time.

The current status of the device is indicated by an icon corresponding to NE107 Status (Figure 4.2) in [Root Menu] → Device Settings → Basic Setup → Device Information.

-  Normal
-  Failure
-  Function check
-  Out of specification
-  Maintenance request

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Figure 4.2 Icons of NE107 Status

The default NE107 Status classification is as shown in Table 4.6, or you can change it from “[Root Menu] → Diagnostics → Condensed Status Map → Status Map.”

NOTE

The FieldMate NE107 Field Diagnostic function, which is a FieldMate NE107 display, is not supported.

4.1.1.4 Error Message When Setting Parameter

An error message appears when an improper operation is performed while setting each parameter. For the error messages, refer to Table 4.7 “HART Configuration Tool Error Messages.”

4.1.2 Checking with Display

If there is an error in the self-diagnosis result, an alarm is displayed on the LCD.

For the alarm indication, refer to the column “AL number/AL display” in Table 4.6 “Alarm Message Summary.”

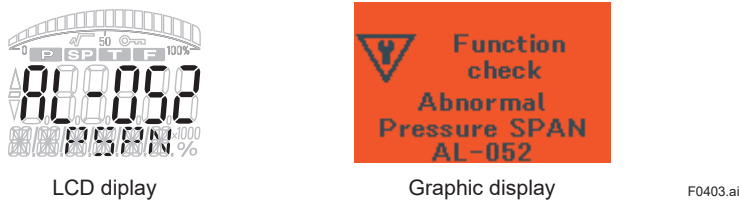


Figure 4.3 Alarm Display

NOTE

If multiple errors occur simultaneously, the display behavior is as shown in Table 4.2.

Table 4.2 Alarm Display when Multiple Errors Occur

NAMUR NE 107 Display setting (Display NE107)	Alarm display behavior
Normal (disabled)	Displays all occurring alarms at 3 second intervals.
NE 107 (enabled)	Displays only the most important alarm. Below the alarm number, a string indicating the alarm contents and NE107 Status classification (Table 4.1) are displayed alternately at 3 second intervals.

4.2 Advanced Diagnostics

4.2.1 Multi-sensing Process Monitoring

Multi-sensing process monitoring function (option code: /DG1) provides the advanced diagnostics to detect the abnormal conditions in process environment such as an impulse line etc. by using the EJX S series multi-sensing technology (differential pressure, static pressure, sensor temperature) and its unique algorithm. There are following two functions.

■ Impulse Line Blockage Detection (ILBD)

The fluctuation change of differential pressure and static pressure is monitored by a silicone resonant sensor and detects a potential blockage condition. The differential pressure transmitter gives also a result of which pressure-side was plugged.

■ Heat Trace Monitoring

The temperature sensor built in the transmitter calculate the flange temperature, and the change of which enables to detect the heat trace breakage or the abnormal temperature due to the failure.

4.2.2 Impulse Line Blockage Detection (ILBD)

ILBD is carried out by using statistical analysis based on the measured values of process fluctuations that exist in a fluid. An alarm on the transmitter LCD display or an analog alert is generated if blockage reaches a certain level. The transmitter provides the following results as blockage detection.

(1) A Blocking and B Blocking

These are blockage detections based on the fluctuation value change of differential pressure/pressure. With a differential pressure transmitter, each result indicates that both or single side is plugged.

(2) L Side Blocking

It is a low-pressure side blockage detection based on the change of **BlkF (*)** or low-pressure-side fluctuation value.

(3) H Side Blocking

It is a high-pressure side blockage detection based on the change of **BlkF (*)** or high-pressure-side fluctuation value.

*: **BlkF** indicates blockage degree characterized by a comparison of the high- and low-pressure-side fluctuation values. For the details, refer to subsection 4.2.2.2.

IMPORTANT

- The pressure fluctuation amplitude in fluids must be sufficiently large for blockages to be detected.
- If the pressure fluctuation amplitude is too low for a reference value to be obtained, blockages detection operation cannot be performed with an alarm that the reference value is invalid.
- The pressure fluctuation amplitude may decrease due to other causes unrelated with a blockage according to process condition. In above case, a false alarm of an impulse line blockage may be generated. Before taking action in response to a blockage alarm, consider the plant operating conditions.

■ Notes for Pressure or Level Measurement

With pressure or level measurement, the pressure fluctuation amplitude may reduce especially for the following cases.

● Pressure Measurement

- Operational pressure is near outside of diagnostic range.
- Even though pressure is constant, the flow decreases than that under normal condition.
- A source of pressure fluctuation (pump, compressor, blower, etc.) is shut down. As a result, the pressure fluctuation amplitude decreases.

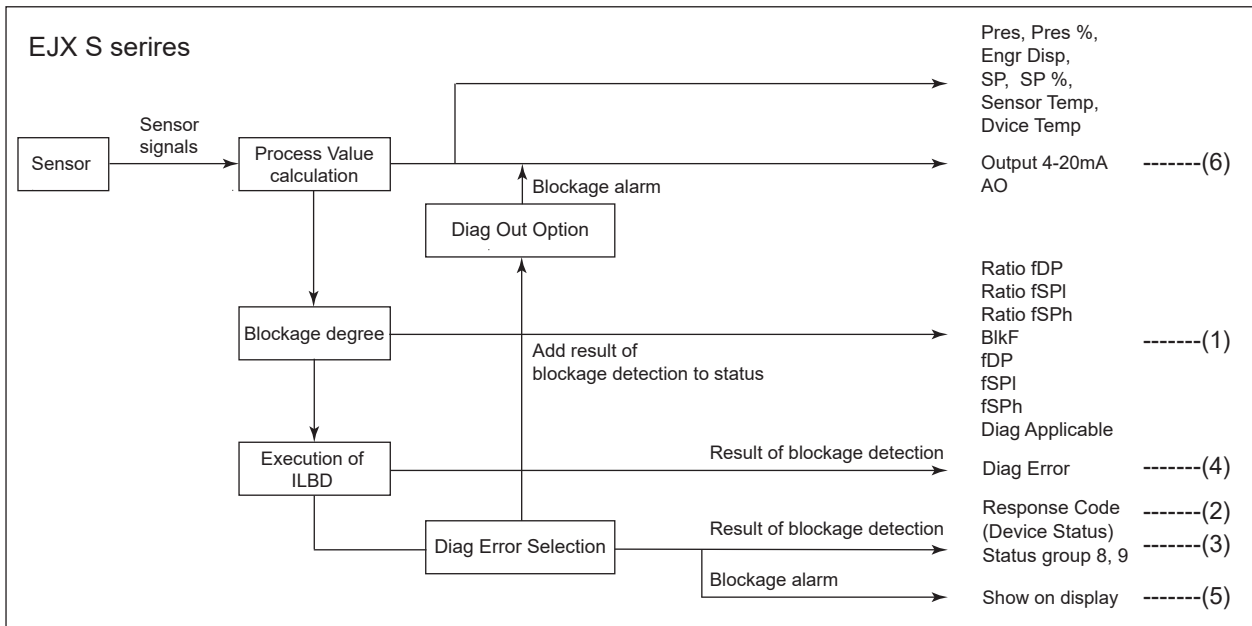
● Level Measurement

- A transmitter is used to measure tank level and the flow of fluid into or out of the tank comes to a stop.
- The agitator in the tank is shut down.
- A source of pressure variation (a compressor, etc.) that controls the internal pressure of a sealed (closed) tank is shut down.

Before taking action in response to a blockage alarm, consider the plant operating conditions.

■ Functional block diagram

The figure below shows the functional block diagram of ILBD.



F0404.ai

Figure 4.4 Functional Block Diagram of ILBD

The following outputs are given for the ILBD results.

Table 4.3 List of Outputs for ILBD

#	OUTPUT Parameter name	Remarks
(1)	Ratio fDP	Parameters based on the fluctuation value and blockage degree. A value obtained by comparing the root mean square (RMS) of differential pressure and pressure fluctuation. Used to determine whether a blockage has been detected. There are two output methods depending on the setting of Diag Dpcomp (flow rate compensation flag). [Diag DPComp: Non-Compensation] $\text{Ratio fDP} = \sqrt{\frac{\text{fDP}}{\text{Ref fDP}}}$ [Diag DPComp: : Compensation] $\text{Ratio fDP} = \sqrt{\frac{\text{fDP}}{\text{Ref fDP}}} \times \left \frac{\text{Ref DPavg}}{\text{DPavg}} \right $
	Ratio fSPI	A value obtained by comparing the root mean square of the low pressure side static pressure fluctuation. It is used to judge whether a blockage is detected. $\text{Ratio fSPI} = \sqrt{\frac{\text{fSPI}}{\text{Ref fSPI}}}$
	Ratio fSPh	A value obtained by comparing the root mean square of the high pressure side static pressure fluctuation. It is used to judge whether a blockage is detected. $\text{Ratio fSPh} = \sqrt{\frac{\text{fSPh}}{\text{Ref fSPh}}}$
	BIKF	Blockage degree characterized in comparison of high-pressure side and low-pressure side pressure fluctuation value.
	fDP	Average value of the sum of squares of differential pressure fluctuations.
	fSPI	Average value of the sum of squares of low-pressure side static pressure fluctuation.
	fSPh	Average value of the sum of squares of high-pressure side static pressure fluctuation.
	Diag Applicable	After the reference value is obtained, the applicable blockage deflection and the status of abnormal fluctuation are displayed on this parameter.
(2)	Response Code Device Status	When an impulse line blockage is detected, "More Status Available" is generated in Response Code Device Status .
(3)	Status Group 8, 9	When a impulse line blockage is detected, the blockage detection result (alarm status) is displayed in Status Group 8, 9 .
(4)	Diag Error	When an impulse line blockage is detected, the results of the blockage detection (alarm status) is displayed in Diag Error .
(5)	Show on display	When impulse line blockage is detected, an alarm status is displayed on the display.
(6)	Analog Output	When impulse line blockage is detected, an alarm status is output on 4 to 20 mA.
(7)	Digital Output	When impulse line blockage is detected, an alarm status is output on Status output.

4.2.2.1 Blockage Detection

■ **Limit parameter**

When parameters based on pressure fluctuations exceed preset thresholds, the transmitter determines that there is a blockage and triggers an alarm. The thresholds used for this determination are set in the Limit parameters shown in the table below.

Menu path

[Root Menu] → Diagnostics → Diag Parameters → ILBD Parameters → Configuration → Diag Lim →

Limit Parameter

#	Parameter	Threshold value
[1]	Lim fDPmax	Threshold to detect "A Blocking" by using Ratio fDP
[2]	Lim fDPmin	Threshold to detect "B Blocking" by using Ratio fDP
[3]	Lim fSPImax	Threshold to detect "Large Fluct L" by using Ratio fSPI
[4]	Lim fSPImin	Threshold to detect "L Side Blocking" by using Ratio fSPI
[5]	Lim fSPHmax	Threshold to detect "Large Fluct H" by using Ratio fSPH
[6]	Lim fSPHmin	Threshold to detect "H Side Blocking" by using Ratio fSPH
[7]	Lim BlkFmax	Threshold to detect "H Side Blocking" by using BlkF
[8]	Lim BlkFmin	Threshold to detect "L Side Blocking" by using BlkF
[9]	Lim DPAvgmax	Threshold to detect "ILDB over range" by using DPAvg and to detect "Invalid Ref xx" by using Ref DPAvg
[10]	Lim DPAvgmin	Threshold to detect "ILDB over range" by using DPAvg and to detect "Invalid Ref DP" by using Ref DPAvg

Table 4.4 shows the default values at the factory setting.

NOTE

- When ILBD is performed for the first time, use the default value. If the pressure fluctuation amplitude is low or a false alarm is often generated after ILBD is performed, change the values of Limit parameters according to the procedure described in subsection 4.2.2.10. Tuning

Table 4.4 Default Values of Limit Parameters

#	Parameter	Differential pressure transmitter		Absolute pressure transmitter	Gauge pressure transmitter	Gauge/ Absolute pressure transmitter
		EJX110S Capsule Range code Except for E	EJX110S Capsule Range code E	EJX310S	EJX430S	EJX510S EJX530S
[1]	Lim fDPmax	3	3	10000	10000	10000
[2]	Lim fDPmin	0.3	0.3	0.3	0.3	0.3
[3]	Lim fSPImax	5	10000	10000	10000	10000
[4]	Lim fSPImin	0.5	0	0	0	0
[5]	Lim fSPHmax	5	10000	10000	10000	10000
[6]	Lim fSPHmin	0.5	0	0	0	0
[7]	Lim BlkFmax	0.6	10	10	10	10
[8]	Lim BlkFmin	-0.6	-10	-10	-10	-10
[9]	Lim DPAvgmax (*1)	1	1	1	1	1
[10]	Lim DPAvgmin (*1)	0.05	0.2	0.05	0.05	0.05

*1: Shows threshold of ILBD over range. See Appendix 4.2.2.5.

■ **A/B Blocking Detection**

“A Blocking” and “B Blocking” are blockage detection results determined based on the difference in pressure fluctuations between the high-pressure side and the low-pressure side.

The ratio fDP , which is the square root of fDP relative to Ref fDP , $SQRT(fDP / Ref\ fDP)$, is used to determine blockage.

Ref fDP is the root mean square value of the differential pressure and pressure fluctuation obtained during steady-state operation, and serves as the reference value for comparison with the value at the time of diagnosis (fDP).

When Ratio fDP exceeds the set value of Lim fDP_{max} , it is determined as “A Blocking,” and when it falls below the set value of Lim fDP_{min} , it is determined as “B Blocking.”

When blockage progresses simultaneously on both the high-pressure and low-pressure sides of the differential pressure transmitter, the value of fDP decreases, resulting in a ‘B Blocking’ diagnosis. If blockage progresses on either the high-pressure or low-pressure side alone, it is diagnosed as “A Blocking.”



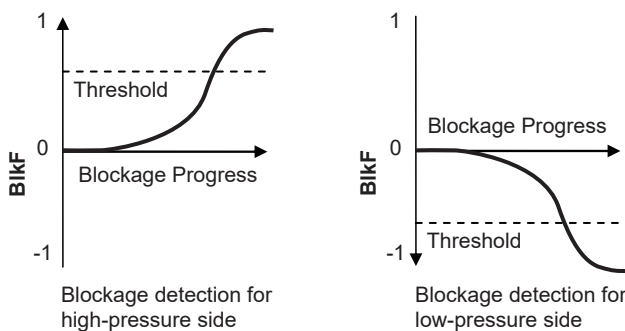
CAUTION

A single-side impulse line blockage may generate “B blocking” under the condition where the fluctuation amplitude is much different between high- and low-pressure sides.

In addition, if a transmitter is used to measure pressure or liquid level, only “B Blocking” will be judged.

■ **H/L Blocking Detection**

Differential pressure transmitter enables to detect both-, a high-, or low-pressure-side blockage. The blockage degree characterized by a comparison of high-pressure side and low-pressure-side fluctuation values, **BikF**, is used to detect it. The value changes within a range of -1 to $+1$. As **BikF** approaches $+1$, the high-pressure-side blockage progresses. On the other hand, if it approaches -1 , the low-pressure-side blockage progresses.



F0405.ai

Figure 4.5 Relation between Blockage Progress and BikF

If the **BikF** value exceeds the Lim **BikF_{max}** setting, it is determined to be “H Side Blocking (high pressure side blockage)”.

If the **BikF** value falls below the Lim **BikF_{min}** setting, it is determined to be “L Side Blocking (low pressure side blockage)”.

■ L Side Blocking Detection

The determination of low-pressure side blockage is prioritized based on the **BlkF** value. However, if the **BlkF** blockage degree is insufficient, the **Ratio fSPI**, i.e., the square root of **fSPI** relative to **Ref fSPI** ($\text{SQRT}(\text{fSPI}/\text{Ref fSPI})$), is used for determining low-pressure side blockage.

Ref fSPI is the root mean square value of the low-pressure side static pressure fluctuation obtained during steady-state operation, and serves as the reference value for comparison with the value at the time of diagnosis (**fSPI**).

When **Ratio fSPI** falls below the set value of **Lim fSPImin**, it is determined as “L Side Blocking.”

On the other hand, when **Ratio fSPI** exceeds the set value of **Lim fSPImax**, it is determined as “Large Fluct L (abnormal low-pressure side static pressure fluctuation value).”

■ H Side Blocking Detection

The determination of high-pressure side blockage is prioritized based on the **BlkF** value. However, when the **BlkF** blockage degree is insufficient, the **Ratio fSPH**, i.e., the square root of **fSPH** divided by **Ref fSPH** ($\text{SQRT}(\text{fSPH}/\text{Ref fSPH})$), is used for determining high-pressure side blockage.

Ref fSPH is the root mean square value of high-pressure side static pressure fluctuations obtained during steady-state operation and serves as the reference value for comparison with the current value (**fSPH**) during diagnosis execution.

If the **Ratio fSPH** falls below the set value of **Lim fSPHmin**, it is determined as “H Side Blocking.”

On the other hand, if the **Ratio fSPH** exceeds the set value of **Lim fSPHmax**, it is determined as “Large Fluct H (abnormal high-pressure side static pressure fluctuation value).”

■ Large Fluctuation Detection

When the process state changes abruptly due to the startup of pumps or compressors, pressure fluctuations increase sharply. If pressure fluctuations become too large, they may affect the detection results. If “Large Fluct L” or “Large Fluct H” occurs, check whether the pressure-transmitting pipe is functioning properly or verify the process conditions.

Threshold values for detecting abnormally large pressure fluctuations are set to **Lim fSPImax** and **Lim fSPHmax**. These values are set to sufficient levels to detect abnormally large pressure fluctuations, so there is little need to change them.

4.2.2.2 Combination of Reference Value and Result and Blockage Detection

■ Diag Applicable

The transmitter can detect four modes of impulse line blockage: both-sides, high-pressure side, low-pressure side, and/or single-side and abnormal fluctuation when all the reference values are properly measured. However, the detectable alarm mode combination is limited when some of the reference values are invalid. Available Blockage Detection are shown in the below figure.



CAUTION

- **Ref fDP** must be larger than the specified level shown in Table 4.5 (refer to subsection 4.2.2.6). No blockage can be detected when **Ref fDP** is not large enough.
- The plausibility of blockage detection needs to be confirmed by blockage simulation test. The simulation test can be performed by the appropriate manifold operation (refer to subsection 4.2.2.8).

[Differential pressure measurement]

Fluctuation Parameters	Simulation Test	Available Blockage Detection
Ref fDP: OK Ref fSPI: OK Ref fSPH: OK Ref BlkF: OK	• Test for low-pressure side • Test for high-pressure side • Test for both-pressure sides	• A/B Blocking detection (by using fDP and Ratio fDP) • L Side Blocking detection (by using fSPI and Ratio fSPI) • H Side Blocking detection (by using fSPH and Ratio fSPH) • H/L Side Blocking detection (by using BlkF)
Ref fDP: OK Ref fSPI: OK Ref fSPH: OK Ref BlkF: NG	• Test for low-pressure side • Test for high-pressure side • Test for both-pressure sides	• A/B Blocking detection (by using fDP and Ratio fDP) • L Side Blocking detection (by using fSPI and Ratio fSPI) • H Side Blocking detection (by using fSPH and Ratio fSPH)
Ref fDP: OK Ref fSPI: NG Ref fSPH: OK Ref BlkF: NG	• Test for high-pressure side	• A/B Blocking detection (by using fDP and Ratio fDP) • H Side Blocking detection (by using fSPH and Ratio fSPH)
Ref fDP: OK Ref fSPI: NG Ref fSPH: NG Ref BlkF: NG	• Test for both-pressure sides	• A/B Blocking detection (by using fDP and Ratio fDP)

* When H/L Side Blocking can be detected using BlkF, the result "A Blocking" will not be output or displayed.

[Gauge/absolute pressure and level measurement]

Fluctuation Parameters	Simulation Test	Available Blockage Detection
Ref fDP: OK	• Test for high-pressure side	• B Blocking detection (by using Ratio fDP)

4.2.2.3 Operation Parameters

■ Diag Mode

Diag Mode gives the directive for the ILBD operation. There are following three modes.

Menu path

[Root Menu] → Diagnostics → Diag Parameters → ILBD Parameters → Configuration → Set Diag Mode →

Diag Mode

Mode	Function
Stop	The blockage detection operation is stopped.
Calculation	The blockage detection operation is performed. Alarms are generated along with the result.
Reference	Reference values for the blockage detection are obtained and updated to the latest. After sampling reference values, this mode changes to "Calculation".

When the blockage detection operation is performed, set "Calculation" to **Diag Mode**. "Stop" must be set when you change a threshold value or set an alarm. "Reference" is set in order to obtain the reference fluctuation values under the normal configuration.

■ Diag Period

The values such as **Ratio fDP** and **BlkF** are averaged based on several hundreds of pressure fluctuation values in constant time. **Diag Period** defines the sampling time is. The default value at the shipment is set to 180 seconds.

Menu path

[Root Menu] → Diagnostics → Diag Parameters → ILBD Parameters → Configuration → Diag Period →

For the information on how to change the sampling period, refer to subsection 4.2.2.10.

■ Diag Supp Count

When the value as **Ratio fDP** or **BlkF** exceeds the threshold value for several times in a row, it is estimated that the impulse line is plugged. **Diag Supp Count** defines the number of times to estimate blockage detection.

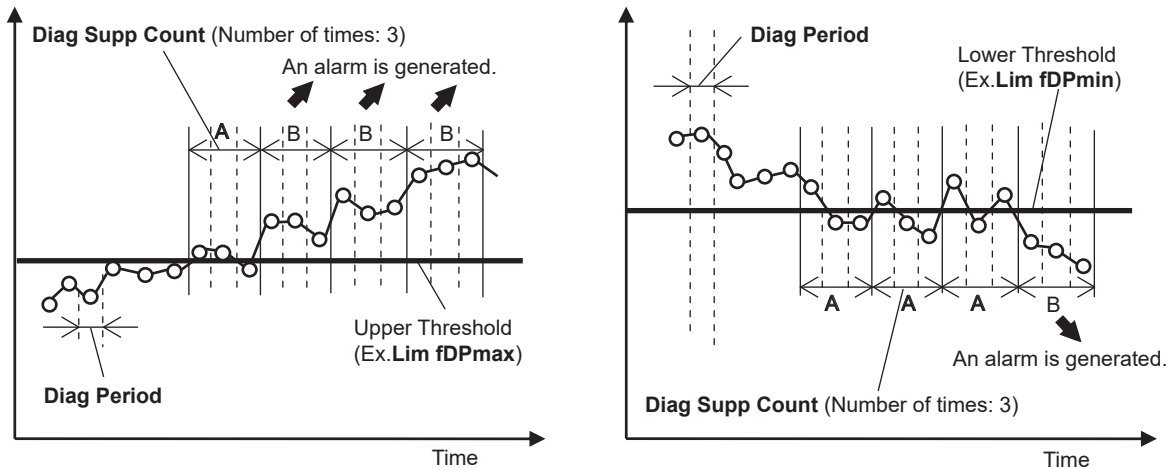
Menu path

[Root Menu] → Diagnostics → Diag Parameters → ILBD Parameters → Configuration → Diag Supp Count →

If **Diag Supp Count** is set to three times, an alarm is not generated at part “A” in Figure 4.6.

Because the first and second values only exceeded consecutively the threshold.

When the value exceeds consecutively the threshold value three times, an alarm is generated (see part “B” in Figure 4.6).



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Figure 4.6 Relationship of Diag Supp Count and Alarm

The number of detection to give an alarm is set for each blockage detection function. The default value at the shipment is set to three times.

If fluctuating around the threshold value, an alarm may be often generated. In this case, change the threshold value (Limit parameter) or the sampling time (**Diag Period**) to enhance the accuracy of the blockage detection. Refer to subsection 4.2.2.10.

4.2.2.4 Operating Procedure

The basic flow of the ILBD operation is as follows.

- 1) Initial setting
- 2) Condition check
- 3) Start up
- 4) Perform the ILBD algorithm.

If an alarm is often generated or the process condition changed in the ILBD operation, do tuning to change the alarm setting, or to reset the reference values.

Fill out the information to the checklist, at the process shown in below figure. (Refer to the Appendix 2. ILBD Check List)

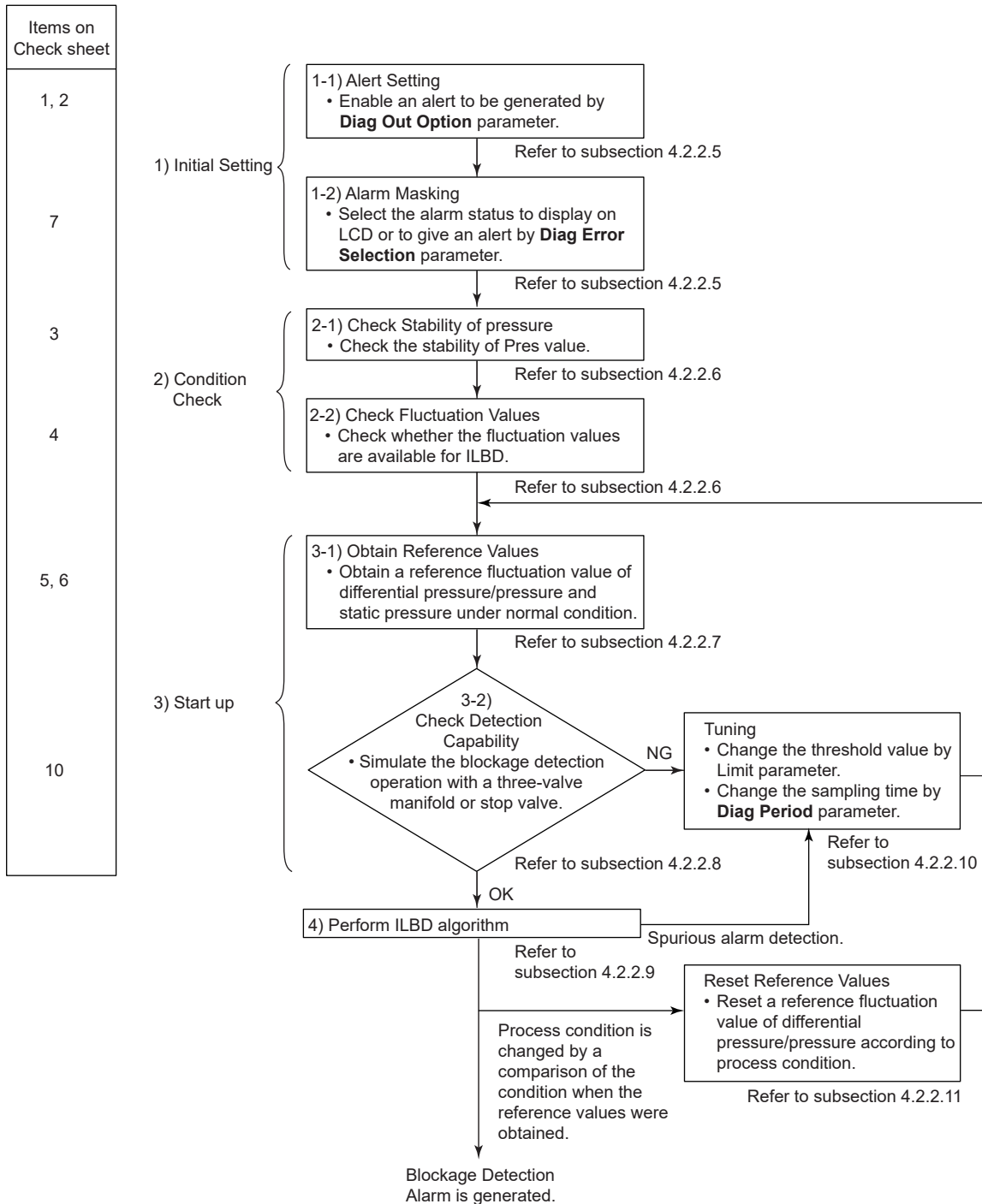
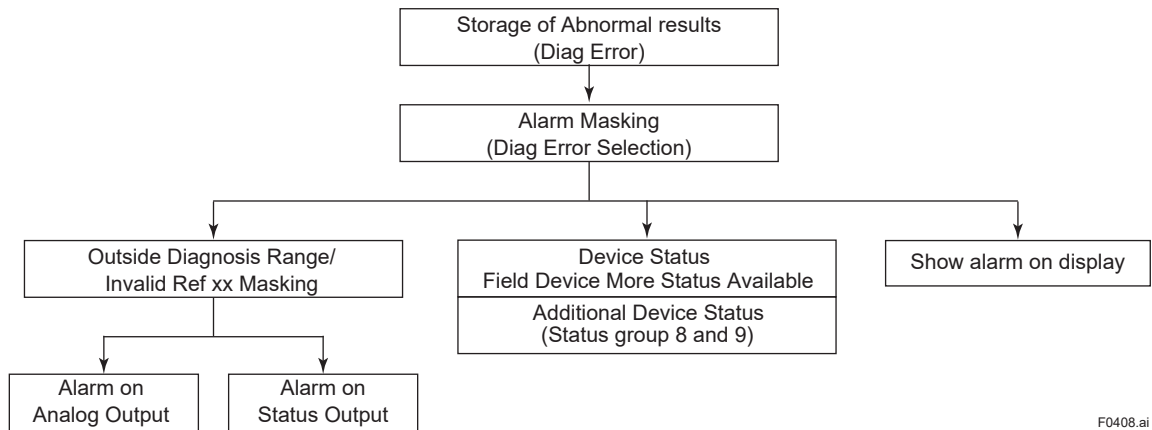


Figure 4.7 Flow Chart of ILBD Operation

F0407.ai

4.2.2.5 Alarm Setting

The abnormal results as the blockage detection and high/low flange temperature (heat trace monitoring) are given through an analog alarm or the display of alarm status. Before performing the ILBD operation, it is necessary to set the alarm according to the following procedure.



F0408.ai

Figure 4.8 Alarm Setting

■ Alarm Status

When the algorithm of ILBD and Heat trace monitoring detect the abnormality, the result is stored in **Diag Error**. The alarm status based on the detected abnormality is displayed to **Diag Error**.

Menu path

[Root Menu] → Diagnostics → Diag Parameters → Status/Config → Diag Error →

Bit	DD	Category	
0	Not used	ILBD	
1	Not used		
2	A Blocking		
3	Large Fluct L		
4	Large Fluct H		
5	L Side Blocking		
6	H Side Blocking		
7	B Blocking		
8	Invalid Ref F		
9	Invalid Ref SPH		
10	Invalid Ref SPL		
11	Invalid Ref DP		
12	ILBD over range		
13	FT low alarm		Heat trace monitoring
14	FT high alarm		
15	Not used		

Note: FT indicates the flange temperature.

● **ILBD over range (Outside Diagnosis Range)**

Upper and lower threshold values can be configured to determine whether the differential pressure and pressure readings fall within the detectable range.

Menu path

[Root Menu] → Diagnostics → Diag Parameters → ILBD Parameters → Configuration → Diag Lim →

1) **Lim DPAvgmax**

Lim DPAvgmax is the upper limit of the diagnostic capability range. The limit value can be changed when **Diag Mode** is “Stop”.

DPAvg indicates the ratio of the average of differential pressure to the maximum span regarded as 1. When **DPAvg** exceeds this limit, “ILBD over range” is generated so that the blockage detection becomes impossible.

2) **Lim DPAvgmin**

Lim DPAvgmin is the lower limit of the diagnostic capability range. The limit value can be changed when **Diag Mode** is “Stop”.

When **DPAvg** is below this limit, “ILBD over range” is generated so that the blockage detection becomes impossible.

<Example>

When the level range that can be measured by the transmitter with 100 kPa span is -80 to 80 kPa, the limits are set as follows.

- **Lim DPAvgmax:** 0.80
- **Lim DPAvgmin:** -0.80

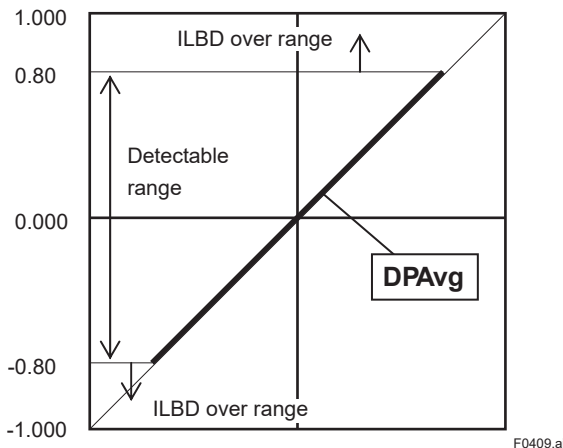


Figure 4.9 DPAvg

● **Invalid Ref F, SPH, SPL, or DP**

This alarm indicates that the reference value under normal condition is invalid. If **Ref F** is invalid, the blockage detection excluding **BikF** is carried out. If blockage detection function based on **BikF** is required, obtain the reference value again.

Also when **Ref DPAvg** is below **Lim DPAvgmin** or exceeds **Lim DPAvgmax**, all reference value becomes invalid so that “Invalid Ref DP”, “Invalid Ref SPL”, “Invalid Ref SPH”, and “Invalid Ref F” are generated.

■ Alarm Masking

● Diag Error Selection

The alarms linked to an analog alert and display are selected by **Diag Error Selection**.

Menu path

[Root Menu] → Diagnostics → Diag Parameters → Status/Config → Diag Error Selection →

The bit of **Diag Error Selection** is corresponding to that of **Diag Error**. The following alarms are set at the factory setting, which is corresponding to hexadecimal 0x08FC.

Diag Error Selection (at time of shipment)
A Blocking
Large Fluct L
Large Fluct H
L Side Blocking
H Side Blocking
B Blocking
Invalid Ref DP

To Link the alarm to an analog alert and display, follow the procedure below.

- 1) Set "Stop" to **Diag Mode**.
- 2) Check each checkbox of the alarm, which is selectable from bit 2 to 14.

Note: Set to "Calculation" after setting the parameter.

■ Alert Setting

● Diag Out Option

When an alert regarding the impulse line blockage or high/low flange temperature is generated, the output value of 4 to 20 mA analog signal can be changed.

Mode	Function
Off	Keeping PV measurement. The alert is not reflected to 4 to 20 mA analog signal.
Burnout	The analog signal is shifted to the value of AO upper limit or AO lower limit when an alert is generated. The shifted direction follows Burnout switch setting.
Fall back	The analog signal is hold to the specific value, Diag Fixed Out Value , when an alert is generated.

Menu path

[Root Menu] → Diagnostics → Diag Parameters → Status/Config → Diag Output → Diag Out Option →

● Diag Fixed Out Value

This parameter is used when "Fall back" is selected to **Diag Output Option**.

When an alert is generated, the 4 to 20 mA analog signal is held on the value specified by this parameter.

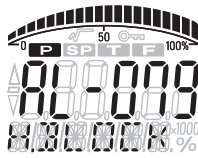
The value can be entered within 3.2 to 23.0 mA.

Menu path

[Root Menu] → Diagnostics → Diag Parameters → Status/Config → Diag Output → Diag Fixed Out Value →

■ Alarm Display on LCD

If the ILBD algorithm detects the abnormality, the content of the detected result is displayed with “AL-73 to AL-083” on the display. “AL-073 to AL-077” indicates that condition is not applicable for the abnormality detection and “AL-78 to AL-083” indicates the abnormality is detected.



LCD display



Graphic display

F0410.ai

Figure 4.10 Display Example of H Side Blocking

The alarm display on LCD regarding the advanced diagnostic is described in Table 4.6.

NOTE

The alarms of “Invalid Ref xx” and “ILBD over range” do not link to the 4 to 20 mA analog signal and Status output.

4.2.2.6 Condition Check

After the transmitter was installed, it is necessary to confirm if Pres is stable under the normal operating condition or if fluctuation amplitude under the normal operating condition is large enough to detect the blockage.

■ Stability of Pressure Value

- 1) Observe the value change of Pres under the normal operating condition for 10 minutes.
- 2) Confirm that the value change is less than 10%.

Menu path

[Root Menu] → Process Variables → Field Device Variables → Pres

If the value change is more than 10%, the error influences pressure fluctuation value so that the blockage detection becomes impossible. Consider the plant operating conditions.

■ Fluctuation Value

NOTE

The blockage detection may not be carried out correctly when pressure fluctuation amplitude especially with the pressure and level measurement, is small. When measuring tank levels or pressure, or when the fluid is gas, pressure fluctuations may be small.

Confirm that each value of **fDP**, **fSPI**, **fSPH**, and **BlkF** is more than the value specified in the below table.

Menu path

[Root Menu] → Diagnostics → Diag Parameters → ILBD parameters → Status → Fluct Variables → fDP/fSPI/fSPH

Menu path

[Root Menu] → Diagnostics → Diag Parameters → ILBD parameters → Status → Diag Variables → BlkF

Table 4.5 Requirements to Apply ILBD

	Condition
fDP	7×10^{-10} or more
fSPI	1×10^{-10} or more
fSPh	1×10^{-10} or more
BIkF	-0.5 to 0.5

- **fDP is not enough.**

No blockage can be detected if **fDP** is not larger than the specified value.

- **Only fDP is enough.**

“A Blocking” or “B Blocking” can be detected if **fSPI** and **fSPh** are not larger than specified values.

- **fDP and fSPI are enough.**

“H Side Blocking” and “Large Fluct H” can not be detected if **fSPh** is not larger than specified value.

- **fDP and fSPh are enough.**

“L Side Blocking” and “Large Fluct L” can not be detected if **fSPI** is not larger than specified value.

- **fDP, fSPI and fSPh are enough.**

All alarm modes can be detected even if **BIkF** is not within the specified values.

4.2.2.7 Obtain Reference Values

The pressure fluctuation values are reduced when the impulse line is plugged. Therefore, the reference value is required to determine the degree of reduction.

IMPORTANT

- If the impulse line is about to be plugged at the time when a reference value is obtained, blockages cannot be detected accurately. The impulse lines on both the high-pressure and low-pressure sides need to be cleaned before a reference value is obtained.
- All air bubbles need to be adequately purged before a reference value is obtained.
- Reference values must be obtained under operating condition.

■ Start of Sampling

The sampling of reference value is carried out for 180 seconds, which is the default value set to **Diag Period**.

- 1) Confirm that the sampling period (**Diag Period**) is set to 180 seconds.
- 2) Set “Reference” to **Diag Mode**. The sampling starts soon after the setting.

IMPORTANT

- For the each parameter, the one value is given. If Reference is set to **Diag Mode** again, the value is updated and overwritten.
- If the power supply is shut down during the sampling, **Diag Mode** becomes “Stop”. Set “Reference” to **Diag Mode** in order to carry out the sampling again.

■ End of Sampling

After about 180 seconds, the sampling automatically finishes. The “Reference” setting of **Diag Mode** moves automatically to “Calculation”.

Confirm that the setting of **Diag Mode** moves to “Calculation”.

■ Reference Values

Confirm the latest values are obtained into the following parameters.

- Ref fDP
- Ref fSPI
- Ref fSPH
- Ref BlkF
- Ref DPavg

Menu path

[Root Menu] → Diagnostics → Diag Parameters → ILBD parameters → Status → Diag Reference → Ref fDP/Ref fSPI/Ref fSPH/Ref BlkF/RefDPavg

■ Invalid Ref F, SPH, SPL, or DP

When the enough reference fluctuation value is not obtained, an alarm of invalid reference value for each parameter is generated and also the ILBD operation is not carried out.

Confirm the alarm of **Invalid Ref F, SPH, SPL, or DP** is not displayed in **Diag Error**.

If an alarm of **Invalid Ref F, SPH, SPL, or DP** is generated, consider the process condition or obtain the reference fluctuation values again.



CAUTION

When an alarm of **Invalid Ref F, SPH, SPL, or DP** is generated, even if the Diag Mode parameter is set to Calculation, the detection function is not performed.

4.2.2.8 Capability Test of Blockage Detection Operation

Before performing the ILBD operation, check the capability of the blockage detection operation. The simulation test is performed by closing motion of a three-valve manifold or stop valve. When simulated blockage occurs, confirm that an alarm is generated.



CAUTION

The fluctuation amplitude of atmospheric pressure is nearly zero with pressure or level measurement. In such case, simulate the blockage detection by closing the valve where the fluctuation existed.

■ Simulation of High-pressure Side Blockage

- 1) Close the high-pressure-side valve.
- 2) Confirm the value of **Pres** is stable. If not, open the valve a little.
- 3) Set "Calculation" to **Diag Mode** so as to start blockage detection operation.
- 4) Check that an alarm of "H Side Blocking" is generated after the time that consists of **Diag Period** and **Diag Supp Count** passed.
- 5) Check also the operation of the analog alert if an analog alert is set.
- 6) Open the valve completely and check that there are no alarms.

■ Simulation of Low-pressure Side Blockage

- 1) Close the low-pressure-side valve.
- 2) Confirm the value of **Pres** is stable. If not, open the valve a little.
- 3) Set "Calculation" to **Diag Mode** so as to start blockage detection operation.
- 4) Check that an alarm of "L Side Blocking" is generated after the time that consists of **Diag Period** and **Diag Supp Count** passed.
- 5) Check also the operation of the analog alert if an analog alert is set.
- 6) Open the valve completely and check that there are no alarms.

■ Simulation of Both-pressure Side Blockage

- 1) Close the both-pressure-side valves.
- 2) Confirm the value of **Pres** is stable. If not, open the valve a little.
- 3) Set "Calculation" to **Diag Mode** so as to start blockage detection operation.
- 4) Check that an alarm of "B Blocking" is generated in the **Diag Error** after the time that consists of **Diag Period** and **Diag Supp Count** passed.
- 5) Check also the operation of the analog alert if an analog alert is set.
- 6) Open the valve completely and check that there are no alarms.

4.2.2.9 Start ILBD Operation

If process condition and capability to detect a blockage are confirmed, you can start the ILBD operation according to the following procedure.

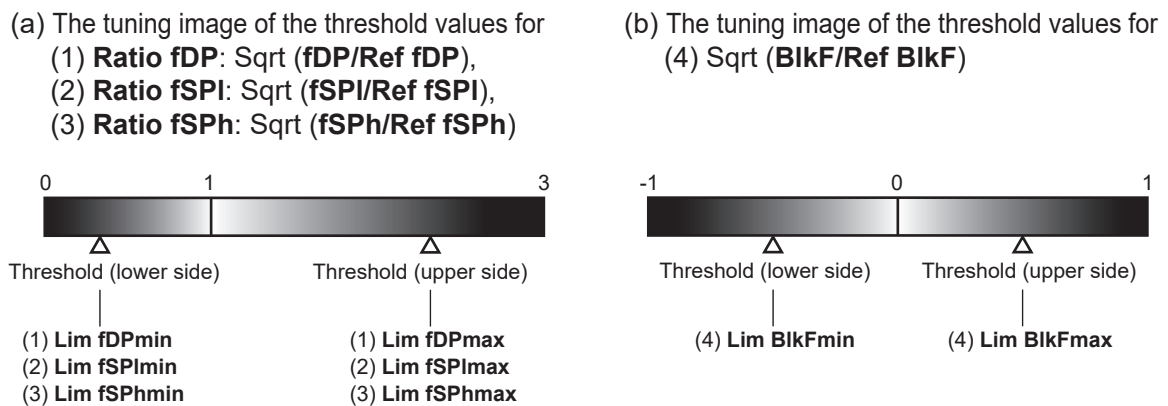
- 1) Check the value of sampling period (**Diag Period**).
- 2) Check the number of times that detect the blockage consecutively in order to give an alarm (**Diag Supp Count**). The default value at the shipment is set to 3 times.
- 3) Set "Calculation" to **Diag Mode**.
If the reference value has not yet been obtained, set "Reference" to **Diag Mode**. After obtained the reference values, the ILBD starts automatically. At the same time, **Diag Mode** changes automatically from "Reference" to "Calculation".

4.2.2.10 Tuning

When the pressure fluctuation amplitude in fluids is not sufficiently large or an alarm is often generated according to the process condition, tune up by changing the threshold for the blockage detection (Limit parameters) or the sampling period (**Diag Period**) to enhance the accuracy of the blockage detection. The ILBD operation must be stopped to tune up. Set "Stop" to **Diag Mode**.

■ Threshold Value

The figure below shows the image of tuning effect with a monochrome bar.



F0411.ai

Figure 4.11 Tuning Image of Threshold Value

● **Move the threshold toward the white.**

- It becomes increasingly likely to give a false alarm due to the disturbance from environment change.
- If flow/differential pressure is below **Lim DPavgmin** or exceeds **Lim DPavgmax**, pressure fluctuation is likely too small or too large to detect the blockage.

● **Move the threshold toward the black.**

- It enables to be insusceptible to disturbance such as environment change and to detect the blockage easier.
- It becomes giving an alarm of the blockage after the blockage has been progressed.

Menu path

[Root Menu] → Diagnostics → Diag Parameters → ILBD parameters → Configuration → Diag Lim →

The default values at the factory setting are the values of **Lim fDPmax** to **Lim BlkFmin** shown in Table 4.4.

Change the threshold value to solve your problem according to the above image.

- 1) Set “Stop” to **Set Diag Mode**.
- 2) Change the unsuitable value of **Diag Lim** parameters corresponding to the each blockage detection.

Note: Set to “Calculation” after setting the parameter.

Limit parameter

#	Parameter	Threshold value
[1]	Lim fDPmax	Threshold to detect “A Blocking” by using Ratio fDP
[2]	Lim fDPmin	Threshold to detect “B Blocking” by using Ratio fDP
[3]	Lim fSPImax	Threshold to detect “Large Fluct L” by using Ratio fSPI
[4]	Lim fSPImin	Threshold to detect “L Side Blocking” by using Ratio fSPI
[5]	Lim fSPHmax	Threshold to detect “Large Fluct H” by using Ratio fSPH
[6]	Lim fSPHmin	Threshold to detect “H Side Blocking” by using Ratio fSPH
[7]	Lim BlkFmax	Threshold to detect “H Side Blocking” by using BlkF
[8]	Lim BlkFmin	Threshold to detect “L Side Blocking” by using BlkF

■ **Sampling Period**

If fluctuating around the threshold value, an alarm maybe often generated. When the above phenomenon happens, the sampling time (**Diag Period**) can be changed so as to enhance the accuracy of the blockage detection.

The longer the sampling time, better the expected accuracy.

- (1) Set “Stop” to **Diag Mode**.
- (2) Enter the value to **Diag Period** within the range of 20 to 65535 (seconds).

Note: Set to “Calculation” after setting the parameter.

Also, the accuracy can be improved by increasing the number of **Diag Supp Count**.

■ ILBD Range Setting

When DPAvg exceeds DPAvgmax or falls below the DPAvgmin threshold, the transmitter generates an “ILBD over range” alarm.

If flow/differential pressure is less than the default threshold value of **Lim DPAvgmin**, pressure fluctuation is not large enough to detect the blockage. To prevent the fault blockage detection, the threshold should be changed to larger value.

- (1) Set “Stop” to **Diag Mode**.
- (2) Enter the value to **Lim DPAvgmin** or **Lim DPAvgmax**.

Note: Set to “Calculation” after setting the parameter.

Menu path

[Root Menu] → Diagnostics → Diag Parameters → ILBD parameters → Configuration → Diag Lim →

■ Ratio fDP Compensation

When the flow change is too large or small, an alarm maybe often generated. When the above case happens, the Ratio fDP can be compensated so as to enhance the accuracy of the blockage detection.

● Diag DPComp

When “Compensation” is selected in **Diag DPComp**, **Ratio fDP** is compensated by following formula and used as treatable monitoring value, **CRatio fDP**.

$$\text{CRatio fDP} = \sqrt{\frac{\text{fDP}}{\text{Ref fDP}}} \times \left| \frac{\text{Ref DPAvg}}{\text{DPAvg}} \right|$$

On the other hand, if the compensation is not necessary, “Non-compensation” is selected in **Diag DPComp** and **Ratio fDP** is used as **NRatio fDP**.

$$\text{NRatio fDP} = \sqrt{\frac{\text{fDP}}{\text{Ref fDP}}}$$

Menu path

[Root Menu] → Diagnostics → Diag Parameters → ILBD parameters → Status → Diag Vriables →
CRatio fDP/NRatio fDP

4.2.2.11 Reset of Reference Value

When there are large flow change or the change of fluid conditions, obtain the reference value again. If flow change by a comparison of the reference value is $\pm 25\%$ or more, obtain the reference value again. When resetting the reference value, follow the procedure described in Section 4.2.2.7.

4.2.2.12 ILBD Parameter List

#	Parameter name	Default value	Explanation
1	Diag Error	0x0000	The results detected by ILBD or Heat trace monitoring are stored into this parameter. Also the condition abnormality in the diagnostic process is stored as an error.
2	Diag Error Selection	0x08FC	The masking in this parameter enable to display each error message and the status to the output signal or LCD. The error assigned to each bit is corresponding to that of Diag Error . Writable only when Diag Mode is "Stop".
3	Diag Out Option	Off	Output mode of 4 to 20 mA when an advanced diagnostic alarm is generated. There are following three output modes; Off, Burnout, or Fall back.
4	Diag Fixed Out Value	22.40 mA	Parameter for "Fall back" function in the Diag Out option. The output value of 4 to 20 mA analog signal is specified when an alarm is generated. The value can be entered within 3.2 to 23.0 mA.
5	Diag Mode	Stop	The operation mode of ILBD is set. Stop: The blockage detection is stopped. Calculate: The blockage detection is carried out. The alarms are generated along with the detected result. Reference: The reference values are obtained and the update values are overwritten. After setting, this mode moves automatically to "Calculation".
6	Diag Period	180 (s)	The data acquisition period for ILBD is set within 20 to 65535 (s). If the process fluctuation values are unsteady, this value is changed to the longer to enhance the accuracy of the blockage detection. Writable only when Diag Mode is "Stop".
7	Diag Supp Count	3	Detection count to generate an alarm. When the statistical value as Ratio fDP and BlkF exceeds consecutively the threshold by number of times preset to this parameter, it is estimated that the impulse line is plugged.
8	Diag Description		Memo field. 32 alphanumerics
9	fDP		Average value of the sum of squares of differential pressure fluctuation.
10	fDP Status		Status of fDP (ILBD Status 1)
11	fSPI		Average value of the sum of squares of low-pressure-side static pressure fluctuation. For gauge/absolute pressure transmitter, 0 is set.
12	fSPI Status		Status of fSPI (ILBD Status 1)
13	fSPh		Average value of the sum of squares of high-pressure-side static pressure fluctuation. For gauge/absolute pressure transmitter, 0 is set.
14	fSPh Status		Status of fSPh (ILBD Status 1)
15	BlkF		Blockage degree characterized in comparison of high- and low-pressure side pressure fluctuation value.
16	BlkF Status		Status of BlkF (ILBD Status 1)
17	DPAvg		Ratio of the average of differential pressure/pressure to the maximum span of an EJX transmitter.
18	DPAvg Status		Status of DPAvg (ILBD Status 1)
19	Ratio fDP		CRatio fDP or NRatio fDP is used by Diag Comp setting. fDP decreases and this parameter is used to determine whether one or both sides are plugged.
20	Ratio fDP Status		Status of Ratio fDP (ILBD Status 2)
21	Ratio fSPI		SQRT (fSPI/Ref fSPI). fSPI decreases and this parameter is used to determine whether low- pressure-side is plugged.
22	Ratio fSPI Status		Status of Ratio fSPI (ILBD Status 2)

#	Parameter name	Default value	Explanation
23	Ratio fSPh		SQRT (fSPh/Ref fSPh). fSPh decreases and this parameter is used to determine whether high- pressure-side is plugged.
24	Ratio fSPh Status		Status of Ratio fSPh (ILBD Status 2)
25	Ref fDP		Value of fDP obtained under normal condition.
26	Ref fDP Status		Status of fDP obtained under normal condition. (ILBD Status 2)
27	Ref fSPI		Value of fSPI obtained under normal condition.
28	Ref fSPI Status		Status of fSPI obtained under normal condition. (ILBD Status 2)
29	Ref fSPh		Value of fSPh obtained under normal condition.
30	Ref fSPh Status		Status of fSPh obtained under normal condition. (ILBD Status 2)
31	Ref BlkF		Value of BlkF obtained under normal condition.
32	Ref BlkF Status		Status of BlkF obtained under normal condition. (ILBD Status 2)
33	Ref DPAvg		Value of DPAvg obtained under normal condition.
34	Ref DPAvg Status		Status of DPAvg obtained under normal condition. (ILBD Status 2)
35	Lim fDPmax	Refer to Table 4.4	Upper limit for Ratio fDP to detect the blockage. Writable only when Diag Mode is "Stop".
36	Lim fDPmin		Lower limit for Ratio fDP to detect the blockage. Writable only when Diag Mode is "Stop".
37	Lim fSPImax		Upper limit for Ratio fSPI to detect the blockage. Writable only when Diag Mode is "Stop".
38	Lim fSPImin		Lower limit for Ratio fSPI to detect the blockage. Writable only when Diag Mode is "Stop".
39	Lim fSPHmax		Upper limit for Ratio fSPh to detect the blockage. Writable only when Diag Mode is "Stop".
40	Lim fSPHmin		Lower limit for Ratio fSPh to detect the blockage. Writable only when Diag Mode is "Stop".
41	Lim BlkFmax		Upper limit for BlkF to detect the blockage. Writable only when Diag Mode is "Stop".
42	Lim BlkFmin		Lower limit for BlkF to detect the blockage. Writable only when Diag Mode is "Stop".
43	Lim DPAvgmax		Upper limit for DPAvg . Writable only when Diag Mode is "Stop".
44	Lim DPAvgmin		Lower limit for DPAvg . Writable only when Diag Mode is "Stop".
45	Ref Lim fDPmin	7.00E-10	Lower limit to judge whether Ref fDP is available for ILBD operation. Writable only when Diag Mode is "Stop".
46	Ref Lim fSPmin	1.00E-09	Lower limit to judge whether Ref fSPI and Ref fSPh are available for ILBD operation. Writable only when Diag Mode is "Stop".
47	Ref Lim BlkFmax	0.5	Upper limit to judge whether Ref BlkF is available for ILBD operation. Writable only when Diag Mode is "Stop".
48	Status group 8		Refer to Table 4.3.
49	Status group 9		Refer to Table 4.3.
50	CRatio fDP		Ratio fDP is compensated by following formula and used as treatable monitoring value when the flow change is too large or small. $\text{Sqrt}(\text{fDP} / \text{Ref fDP}) \times \text{Ref DPAvg} / \text{DPAvg} $ When compensation is selected in Diag DP Comp , CRatio fDP is used as monitoring value.
51	CRatio fDP Status		Status of CRatio fDP (ILBD Status 2)
52	NRatio fDP		When Non-compensation is selected in Diag DP Comp , NRatio fDP is used as monitoring value. $\text{NRatio fDP} = \text{Sqrt}(\text{fDP} / \text{Ref fDP})$
53	NRatio fDP Status		Status of NRatio fDP (ILBD Status 2)
54	Diag DPComp	0: Compensation	Whether fDP is referred by CRatio fDP or NRatio fDP is selected.
55	Diag Applicable		After the reference value is obtained, the applicable blockage detection is displayed on this parameter.

ILBD Status 1

Status	Contents
Sensor Failure	Sensor is failed.
Device Failure	Device is failed.
Uncertain	Differential pressure/pressure/Static pressure is out of specification.
Good	No abnormality occurs.

ILBD Status 2

Status	Contents
Sensor Failure	Sensor is failed.
Device Failure	Device is failed.
Uncertain	Differential pressure/pressure/Static pressure is out of specification.
Invalid Ref	The value is outside of the detectable range.
Good	No abnormality occurs.

4.2.3 Heat Trace Monitoring

The transmitter with Heat trace monitoring function calculates the flange temperature by using the two temperature sensors built in the transmitter.

An analog alert is generated if the temperature reached to the preset level.

The flange temperature is based on the following parameters and calculation formula.

[Parameters]

Parameter name	Explanation
Sensor Temp (CT)	Measured capsule temperature value
Device Temp (DT)	Measured amplifier temperature value
Flange Temp (FT)	Flange temperature value (Calculated value)
Flange Temp Coef (CF)	Coefficient to calculate flange temperature
Flange Temp Hi Alarm Value	Threshold to generate FT high alarm
Flange Temp Lo Alarm Value	Threshold to generate FT low alarm

[Calculation formula]

$$Flange\ temp\ (FT) = CT + Cf \times (CT - DT)$$

If the flange temperature exceeds the value preset to **Flange Temp Hi Alert Val** or **Flange Temp Lo Alert Val**, an alert is generated.



CAUTION

The flange temperature is calculated by the calculation formula assumed that the capsule part of the transmitter is heated up or kept warm by an electrical heater or steam. In the case of an atmosphere temperature or less, the difference of temperature of approximately 3 to 4°C, may occur because the amplifier temperature becomes higher than the capsule temperature.

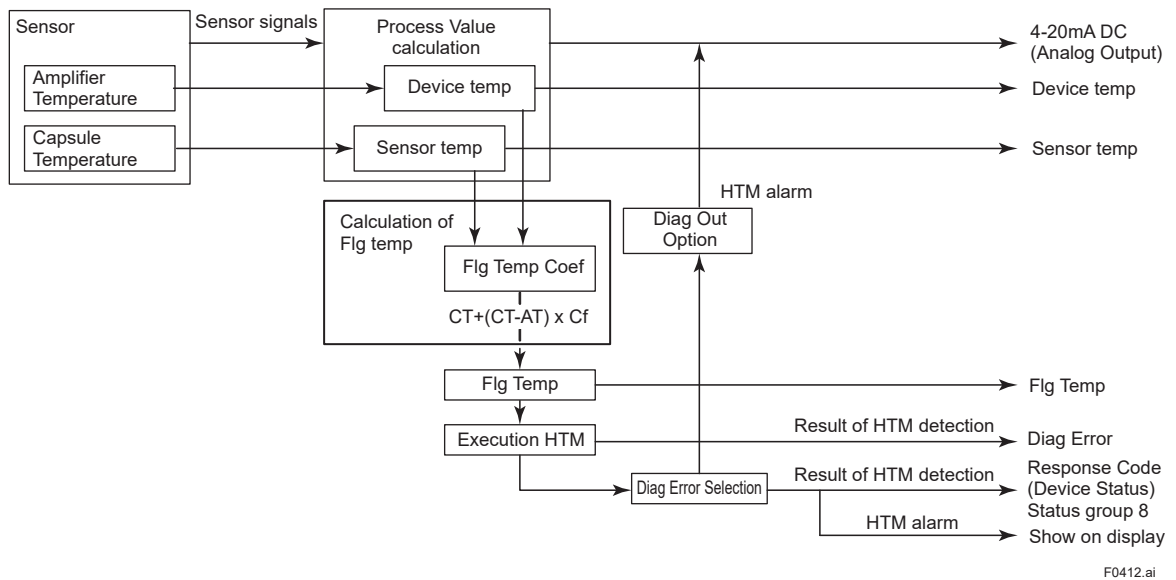


Figure 4.12 Functional Block Diagram of Heat Trace Monitoring (HTM)

4.2.3.1 Flange Temp Coef Setting

The value calculated according to the following procedure is set to **Flange Temp Coef**.

- To enhance the calculation accuracy of the flange temperature, measure the actual flange temperature by using the temperature sensor etc.
- Calculate the ratio of the Sensor temperature to the capsule temperature minus the amplifier temperature from the two temperature values measured by the transmitter.
- Derive the **Flange Temp Coef** from the measured flange temperature and the ratio of the sensor temperature to the amplifier temperature in accordance with the following calculation formula.

$$\text{Flange Temp Coef (Cf)} = \frac{(\text{Actual measured value of Flange temperature}) - CT}{CT - AT}$$

Menu Path (Flange Temp Coef)

[Root Menu] → Diagnostics → Diag Parameters → HT Parameters → Flange Temp Coef

4.2.3.2 Out of Temperature Measurement Range

When the flange temperature is out of measurement range, the alarm or alert is generated. For the detail of alarm and alert setting, refer to subsection 4.2.2.5.

The measurement range is set to **Flange Temp Hi Alert Val** and **Flange Temp Lo Alert Val**, which values can be specified within -50 to 130 deg C.

Menu Path (Flange Temp Hi Alarm Value/Flange Temp Lo Alarm Value)

[Root Menu] → Diagnostics → Diag Parameters → HT Parameters → Flange Temp Hi Alarm Value/Flange Temp Lo Alarm Value

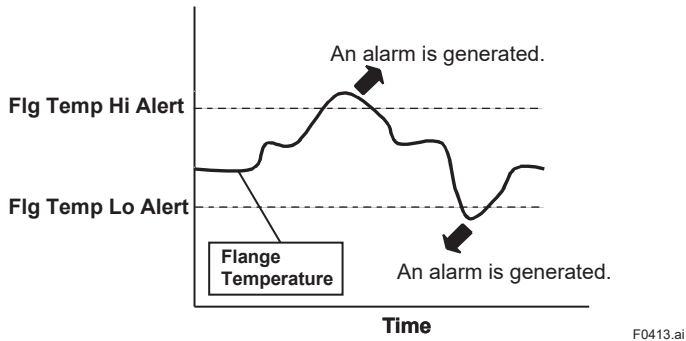


Figure 4.13 Alarm Generation in Heat Trace

4.2.3.3 Parameter Lists for Heat Trace Monitoring

#	Parameter name	Default value	Explanation
1	Diag Error		The results detected by ILBD or Heat trace monitoring are stored into this parameter. Also the condition abnormality in the diagnostic process is stored as an error.
2	Diag Diag Mask	0x08FC	The masking in this parameter enable to display each error message and the status to the output signal or LCD. The error assigned to each bit is corresponding to that of Diag Error. Writable only when Diag Mode is "Stop".
3	Diag Out Option	Off	The error status can be output by 4 to 20 mA analog signal or display. There are following three output modes; Off, Burnout, or Fall back.
4	Diag Fixed Out Value	22.4 mA	Parameter for "Fall back" function in the Diag Out option. The output value in 4 to 20 mA analog signal is specified when an alarm is generated. The value must be entered within 3.2 to 23.0 mA.
5	Sensor Temp		Measured sensor temperature value
6	Device Temp		Measured body temperature value
7	Flange temp	(*1)	Calculated flange temperature value
8	Flange Temp Coef	0.0	Coefficient to calculate flange temperature (Cf: Rt_1/Rt_2) Rt_1 : Thermal resistance between the flange and capsule. Rt_2 : Thermal resistance between the capsule and amplifier.
9	Flange Temp Hi Alart Val	130.00 °C	Upper limit of Flange temp
10	Flange Temp Lo Alart Val	-50.00 °C	Lower limit of Flange temp

*1: The **Flange Temp Coef** is 0 at the shipment so that the **Flange temp** outputs the same value as that of **Sensor Temp**.

4.3 Alarms and Countermeasures

Based on NE107, alarm information is classified into four categories as follows:

NE107 Status		Status of the instrument
F	Failure	The output signal is abnormal due to a component or equipment failure.
C	Function check	The output signal is temporarily abnormal due to an incorrect setting being entered.
S	Out of specification	Process or environmental factors are causing the instrument to operate outside of its specifications. Reliability of the output signal is not guaranteed.
M	Maintenance request	Maintenance is required in the near future or at least some time into the future.

Table 4.6 Alarm Message Summary

NE107 (*1)	Configuration Tool Display		Status of the output signal		Indicator display (*5)		Cause	Countermeasure
	Status group	Status display	4 to 20 mA (*2)	HART Digital Signals (Value, Status) (*3)(*4)	AL No. AL Display	AL display (Graphic display)		
F	1	Pressure Sensor Module Error	Burnout	[Pres, SP, Sensor Temp] Value: Hold Status: Bad, Constant [Percent Range, Loop Current] Value: Hold Status: Bad, High/Low limit	AL-001 SENSOR	Pressure Sensor Module Error	Pressure Sensor Module problem.	Contact the nearest sales office or service center.
F	1	Main Module CPU 1 Error	Ditto	Ditto	AL-002 MAIN	Main Module Error	Main Module problem.	Replace the main module or contact sales office or service center.
F	1	Main Module CPU 1 EEPROM Error	Ditto	Ditto	Ditto	Ditto		
F	2	Device Temp Sensor Error	Ditto	Ditto	Ditto	Ditto		
F	1	Main Module CPU 2Error	Ditto	Ditto	Ditto	Ditto		
F	1	Main Module CPU 2 EEPROM Error	Ditto	Ditto	Ditto	Ditto		
F	2	Sensor Module Comm Error	Ditto	Ditto	AL-010 SNS.COM.	Sensor Comm. Error	Sensor Module communication problem.	Take measures to reduce communication noise. If the problem does not resolve, contact your nearest sales or service center.
F	2	Main Module Internal Comm Error	Ditto	Ditto	AL-011 IN.COM.	Main Internal Comm. Error	Main Module internal communication problem.	Take measures to reduce communication noise. If the problem does not resolve, replace the main module. Contact your nearest sales and service center.

NE107 (*1)	Configuration Tool Display		Status of the output signal		Indicator display (*5)		Cause	Countermeasure
	Status group	Status display	4 to 20 mA (*2)	HART Digital Signals (Value, Status) (*3)(*4)	AL No. AL Display	AL display (Graphic display)		
-	2	-	Measured Value	[Pres, SP, Sensor Temp, Percent Range, Loop Current] Value: Measured Value Status: Good, Non Limited	AL-012 IND.COM.	Indicator Comm. Error	Indicator communication problem.	Take measures to reduce communication noise. If the problem does not resolve, contact your nearest sales or service center.
S	3	Pressure Outside Limit	Fixed in Upper limit or Lower limit	[Pres, SP] Value: Measured Value Status: Poor, Not Limited [Sensor Temp] Value: Measured Value Status: Good, Not Limited [Percent Range, Loop Current] Value: Measured Value Status: Poor, Not Limited	AL-020 PRESS.	Pressure Outside Limit	Differential pressure/ pressure exceeds limit.	Check the input.
S	3	Static Pressure Outside Limit	Measured Value	Ditto	AL-021 ST.PRES.	Static Pressure Outside Limit	Static pressure exceeds limit.	Check the input.
S	3	Sensor Temperature Outside Limit	Ditto	[Pres, SP, Sensor Temp, Percent Range, Loop Current] Value: Measured Value Status: Poor, Non Limited	AL-022 SNSR.T.	Sensor Temp. Outside Limit	Sensor temperature is outside range.	Check the input. Apply thermal insulation or heating as necessary to ensure that the instrument remains within its specified temperature range.
S	3	Device Temperature Outside Limit	Measured Value	Ditto	AL-023 DEV.T.	Device Temp. Outside Limit	Device temperature is outside range.	Check the input. Apply thermal insulation or heating as necessary to ensure that the instrument remains within its specified temperature range.
S	4	Pressure Over Range	Ditto	[Pres, SP, Sensor Temp] Value: Measured Value Status: Good, Not Limited [Percent Range, Loop Current] Value: Hold Status: Bad, High/Low limit	AL-030 P.RNGE	Pressure Over Range	Differential pressure/ pressure exceeds specified range.	Check the input value and the set range and change the value.

NE107 (*1)	Configuration Tool Display		Status of the output signal		Indicator display (*5)		Cause	Countermeasure
	Status group	Status display	4 to 20 mA (*2)	HART Digital Signals (Value, Status) (*3)(*4)	AL No. AL Display	AL display (Graphic display)		
S	4	Static Pressure Over Range	Ditto	[Pres, SP, Sensor Temp, Percent Range, Loop Current] Value: Measured Value Status: Good, Not Limited	AL-031 SP.RENGE	Static Pressure Over Range	Static pressure exceeds specified range.	Check the input value and the set range and change the value.
N	5	Pressure High Alarm	Ditto	Ditto	AL-040 P.HI.	Pressure High Alarm	Differential pressure/ pressure exceeds specified threshold.	Check the input value.
N	5	Pressure Low Alarm	Ditto	Ditto	AL-041 P.LO.	Pressure Low Alarm	Differential pressure/ pressure exceeds specified threshold.	Check the input value.
N	5	Static Pressure High Alarm	Ditto	Ditto	AL-042 SP.HI.	Static Pressure High Alarm	Static pressure exceeds specified threshold.	Check the input value.
N	5	Static Pressure Low Alarm	Ditto	Ditto	AL-043 SP.LO.	Static Pressure Low Alarm	Static pressure exceeds specified threshold.	Check the input value.
N	5	Sensor Temperature High Alarm	Ditto	Ditto	AL-044 TMP.HI.	Sensor Temp. High Alarm	Sensor temperature exceeds specified threshold.	Check the input value.
N	5	Sensor Temperature Low Alarm	Ditto	Ditto	AL-045 TMP.LO.	Sensor Temp. Low Alarm	Sensor temperature exceeds specified threshold.	Check the input value.
C	6	Illegal Pressure LRV	Ditto	[Pres, SP, Sensor Temp] Value: Measured Value Status: Good, Not Limited [Percent Range, Loop Current] Value: Hold Status: Bad, Constant	AL-050 P.LRV	Abnormal Pressure LRV	Specified value is outside of setting range.	Check the specifications and change the setting.
C	6	Illegal Pressure URV	Ditto	Ditto	AL-051 P.URV	Abnormal Pressure URV	Specified value is outside of setting range.	Check the specifications and change the setting.
C	6	Illegal Pressure SPAN	Ditto	Ditto	AL-052 P.SPAN	Abnormal Pressure SPAN	Specified value is outside of setting range.	Check the specifications and change the setting.
C	6	Illegal Static Pressure LRV	Ditto	[Pres, SP, Sensor Temp, Percent Range, Loop Current] Value: Measured Value Status: Good, Not Limited	AL-053 SP.LRV	Abnormal Static Pressure LRV	Specified value is outside of setting range.	Check the specifications and change the setting.

NE107 (*1)	Configuration Tool Display		Status of the output signal		Indicator display (*5)		Cause	Countermeasure
	Status group	Status display	4 to 20 mA (*2)	HART Digital Signals (Value, Status) (*3)(*4)	AL No. AL Display	AL display (Graphic display)		
C	6	Illegal Static Pressure URV	Ditto	Ditto	AL-054 SP.URV	Abnormal Static Pressure URV	Specified value is outside of setting range.	Check the specifications and change the setting.
C	6	Illegal Static Pressure SPAN	Ditto	Ditto	AL-055 SP.SPAN	Abnormal Static Pressure SPAN	Specified value is outside of setting range.	Check the specifications and change the setting.
C	7	Bournout Config Error	Measured value	[Pres, SP, Sensor Temp, Percent Range, Loop Current] Value: Measured value Status: Good, Not Limited	AL-059 BO.CFG	Burnout Config Error	Burnout is set within the normal output range.	Set the Burnout to outside of normal output range.
C	6	Pressure SPAN Trim Error	Ditto	[Pres, Percent Range, Loop Current] Value: Measured Value Status: Poor, Not Limited [SP, Sensor Temp] Value: Measured Value Status: Good, Not Limited	AL-060 P.ADJ.	Pressure SPAN Trim Error	Specified value is outside of Span Trim.	Adjust so that it is within the specification range.
C	6	Pressure ZERO Trim Error	Ditto	Ditto	AL-061 P.ADJ.	Pressure ZERO Trim Error	Specified value is outside of Zero Trim.	Adjust so that it is within the specification range.
C	7	Static Pressure SPAN Trim Error	Ditto	[Pres, Sensor Temp, Percent Range, Loop Current] Value: Measured Value Status: Good, Not Limited [SP] Value: Measured Value Status: Poor, Not Limited	AL-062 SP.ADJ.	St. Pressure SPAN Trim Error	Specified value is outside of Span Trim.	Adjust so that it is within the specification range.
C	7	Static Pressure ZERO Trim Error	Ditto	Ditto	AL-063 SP.ADJ.	St. Pressure ZERO Trim Error	Specified value is outside of Zero Trim.	Adjust so that it is within the specification range.
C	7	Signal Characterizer Config Error	Ditto (Linear)	[Pres, SP, Sensor Temp] Value: Measured Value Status: Good, Not Limited [Percent Range, Loop Current] Value: Measured Value (Linear) Status: Bad, Not Limited	AL-070 SC.CFG	Signal Charac. Config. Error	Set points of signal characterization do not increase monotonically.	Set the value so that it increases monotonically.

NE107 (*1)	Configuration Tool Display		Status of the output signal		Indicator display (*5)		Cause	Countermeasure
	Status group	Status display	4 to 20 mA (*2)	HART Digital Signals (Value, Status) (*3)(*4)	AL No. AL Display	AL display (Graphic display)		
M		Flange Temperature High Alarm	Follow the settings of Diag Out Option	[Pres, SP, Sensor Temp] Value: Measured Value Status: Good, Not Limited [Percent Range, Loop Current] Value: Follow the settings of Diag Out Option Status: Follow the settings of Diag Out Option	AL-071 FLF.HI.	Flange Temp. High Alarm	Flange temperature exceeds specified threshold.	Check whether the heater is damaged or disconnected. Check the temperature of the sensor and the temperature of the unit. Adjust the Flange Temp Coef value.
M		Flange Temperature Low Alarm	Measured Value	Ditto	AL-072 FLG.LO.	Flange Temp. Low Alarm	Flange temperature exceeds specified threshold.	Check whether the heater is damaged or disconnected. Check the temperature of the sensor and the temperature of the unit. Adjust the Flange Temp Coef value.
C	8	Invalid Ref fDP	Ditto	[Pres, SP, Sensor Temp, Percent Range, Loop Current] Value: Measured Value Status: Good, Not Limited	AL-073 REF.FDP	Invalid Ref. fDP	Differential pressure fluctuation does not reach the reference level required to blockage detection so that no blockage detection is carried out.	Revise the process conditions. Re-acquire the reference value.
C	8	Invalid Ref fSPI	Ditto	Ditto	AL-074 REF.SPL	Invalid Ref. fSPI	Low-pressure-side fluctuation does not reach the reference level required to blockage detection.	Revise the process conditions. Re-acquire the reference value.
C	8	Invalid Ref fSPh	Ditto	Ditto	AL-075 REF.SPH	Invalid Ref. fSPh	High-pressure-side fluctuation does not reach the reference level required to blockage detection.	Revise the process conditions. Re-acquire the reference value.
C	8	Invalid Ref BlkF	Ditto	Ditto	AL-076 REF.F	Invalid Ref. BlkF	Blocking factor can not be used for blockage detection.	Revise the process conditions. Re-acquire the reference value.
N	8	ILBD Over Range	Ditto	Ditto	AL-077 ILBD.OV	ILBD Over Range	Appointed the diagnosis range outside.	Revise the process conditions. Re-acquire the reference value.

NE107 (*1)	Configuration Tool Display		Status of the output signal		Indicator display (*5)		Cause	Countermeasure
	Status group	Status display	4 to 20 mA (*2)	HART Digital Signals (Value, Status) (*3)(*4)	AL No. AL Display	AL display (Graphic display)		
M	9	B Blocking	Follow the settings of Diag Out Option	[Pres, SP, Sensor Temp] Value: Measured Value Status: Good, Not Limited [Percent Range, Loop Current] Follow the settings of Diag Out Option	AL-078 B.BLOCK	B Blocking	B blocking (both-side blockage) is detected.	Check the status of the target process and the piping blockage. If there is a large change in the flow rate, set the reference value again.
M	9	High Side Blocking	Ditto	Ditto	AL-079 H.BLOCK	High Side Blockage	High-pressure-side blockage is detected.	Check the status of the target process and the blockage of the piping (high-pressure side). If there is a large change in the flow rate, set the reference value again.
M	9	Low Side Blocking	Ditto	Ditto	AL-080 L.BLOCK	Low Side Blockage	Low-pressure-side blockage is detected.	Check the status of the target process and the blockage on the piping (low-pressure side). If there is a large change in the flow rate, set the reference value again.
M	9	Large Fluctuation of High Side	Ditto	Ditto	AL-081 H.LARGE	Large Fluctuat. of High Side	High-pressure-side fluctuation amplitude is large.	Check the status of the target process. If there is a large change in the flow rate, set the reference value again.
M	9	Large Fluctuation of Low Side	Ditto	Ditto	AL-082 L.LARGE	Large Fluctuat. of Low Side	Low-pressure-side fluctuation amplitude is large.	Check the status of the target process. If there is a large change in the flow rate, set the reference value again.
M	9	A Blocking	Ditto	Ditto	AL-083 A.BLOCK	A Blocking	A blocking (single-side blockage) is detected.	It depends on the Diag Out Option setting. Off: Continue to operate and output. Burnout: Outputs AO upper limit or AO lower limit. Fall back: Outputs Diag Out Fixed Val.

NE107 (*1)	Configuration Tool Display		Status of the output signal		Indicator display (*5)		Cause	Countermeasure
	Status group	Status display	4 to 20 mA (*2)	HART Digital Signals (Value, Status) (*3)(*4)	AL No. AL Display	AL display (Graphic display)		
C	10	Pressure Simulate Mode Active	Simulate-Value A value measured from the set value	[Pres] Follow the settings of Simulation [SP, Sensor Temp] Value: Measured Value Status: Good, Not Limited [Percent Range, Loop current] Follow the settings of Simulation	AL-090 P.SIM.	Press. Simulate Mode Active	Under simulation mode for device variable.	Check the simulation mode.
C	10	Static Pressure Simulate Mode Active	Measured Value	[Pres, Sensor Temp, Percent Range, Loop current] Value: Measured Value Status: Good, Not Limited [SP] Follow the settings of Simulation	AL-091 SP.SIM.	St. Press. Sim. Mode Active	Under simulation mode for device variable.	Check the simulation mode.
C	10	Sensor Temperature Simulate Mode Active	Measured Value	[Pres, SP, Percent Range, Loop current] Value: Measured Value Status: Good, Not Limited [Sensor Temp] Follow the settings of Simulation	AL-092 ST.SIM.	Sens. Temp.Sim. Mode Active	Under simulation mode for device variable.	Check the simulation mode.
C	10	Analog Output Simulate Mode Active	Measured Value	[Pres, SP, Sensor Temp] Value: Measured Value Status: Good, Not Limited [Percent Range, Loop current] Follow the settings of Simulation	AL-093 AO.SIM.	Analog Output Sim. Mode Active	Under simulation mode for device variable.	Check the simulation mode.
N	-	-	Measured Value	[Pres, SP, Sensor Temp, Percent Range, Loop current] Value: Measured Value Status: Good, Not Limited	AL-094 STS.SIM.	Status Simulate Mode Active	Under simulation mode for status.	Check the simulation mode.
-	-	-	-	-	All lights on	EEPROM Error	The indicator is faulty or the instrument is faulty.	Contact the nearest sales office or service center.

- *1: You can change NE107 Status classification setting to the status display unit. about the settings refer to 4.1.1.3. "N" indicates No effect. Use this setting if you do not want to classify the status as "F," "C," "S," or "M." "-" indicates that the setting is not applicable.
- *2: The burnout direction can be either high-side or low-side. For details on the setting, see subsection 3.3.5.
- *3: Value: Hold indicates that the most recent value when Status is not Bad is maintained.
- *4: Status is a status display based on the HART standard.
- *5: NE107 classification setting for the status display unit is reflected in the LCD display. When multiple statuses occur, the classification with the higher priority takes priority. NE107 Status classification priorities are F (Failure) — C (Function check) — S (Out of specification) — M (Maintenance request) in descending order.

Table 4.7 HART Configuration Tool Error Messages

Error message	Probable cause	Countermeasure
Invalid selection	—	Change the setting.
Value was too high	Set value is too high.	
Value was too low	Set value is too low.	
Too few data bytes received	The communication data amount does not match	—
In write protect mode	Operation is set in the Write Protect mode.	—
Lower range value too high	LRV set point is too high.	Change the range.
Lower range value too low	LRV set point is too low.	
Upper range value too high	URV set point is too high.	
Upper range value too low	URV set point is too low.	
Span too small	Set span is too small.	
Applied process too high	Applied pressure is too high.	Adjust the applied pressure.
Applied process too low	Applied pressure is too low.	
New lower range value pushed upper range value over upper sensor limit	The shift of URV according to the new LRV setting exceeds USL.	Change the URV setting within the range of USL.
Excess correction attempted	Amount of correction is too much.	Adjust the amount.
Lower conversion not succeeded	Characters are not convertible. e.g. %	Correct the setting.
Not in fixed current mode	The fixed current mode is desired but not set in that mode.	Set the fixed current mode.
In multidrop mode	Operation is set in the multi-drop mode.	—
Not write protect mode	Operation is set without a password.	—
Lower range value and upper range value out of limits	URV and LRV are out of range limits.	Change the setting.

Table 4.8 Device Status

Item	NE107 (Default Value)	Description
Field Device Malfunction (0x80)	N	Field device has malfunctioned due to a hardware error or failure.
Configuration Changed (0x40)*	N	A modification has been made to the configuration of the field device.
Cold Start (0x20)	N	A reset of the field device has occurred, or power has been removed and reapplied.
More Status Available (0x10)	N	Field device has more status available.
Loop Current Fixed (0x08)	N	Analog output and its digital representation are in fixed mode, and not responsive to input changes.
Loop Current Saturated (0x04)	S	Analog output and its digital representation are outside the operating range limits, and not responding to input.
Non-Primary Variable Out of Limits (0x02)	S	Process applied to the non-primary variable is outside the operating limits of the field device.
Primary Variable Out of Limits (0x01)	S	Process applied to the primary variable is outside the operating limits of the field device.

*: This flag can be reset with the Reset Configuration Change Flag method. See Chapter 5, 27-34.

Table 4.9 Extended Device Status

Extended Device Status (Ext dev Status)	NE107 (Default Value)	Description
Maintenance Required (M) (0x01)	N	Field device requires maintenance
Device Variable Alert (0x02)	S	Any device variable is in an alarm or warning state.
Critical Power Failure (0x04)	F	Not Used
Failure (F) (0x08)	N	One or more device variables are invalid due to a malfunction in the field device.
Out of Specification (S) (0x10)	N	Deviations from the permissible ambient or process conditions have been detected that may compromise measurement or control accuracy.
Function Check (C) (0x20)	N	One or more device variables are temporarily invalid due to ongoing work on the device.

Table 4.10 Diagnostic Status (Standardized Status 0)

Diagnostic Status 0	NE107 (Default Value)	Description
Device Variable Simulation Active (0x01)	C	The device is in simulation mode and one or more of its device variables are not representative of the process.
Non-Volatile Memory Defect (0x02)	F	The Non-Volatile memory check is invalid or maybe corrupt.
Volatile Memory Defect (0x04)	F	Not used
Watchdog Reset Executed (0x08)	F	Not used
Power Supply Conditions Out of Range (0x10)	S	Not used
Environmental Conditions Out of Range (0x20)	S	An internal or environmental condition is beyond acceptable limits.
Electronic Defect (0x40)	F	A hardware problem not related to the sensor has been detected.
Device Configuration Locked (0x80)	N	Device is in write-protect or is locked.

Table 4.11 Diagnostic Status (Standardized Status 1)

Diagnostic Status 1	NE107 (Default Value)	Description
Status Simulation Active (0x01)	N	The device is in simulation mode and the status are not representative of the actual status.
Discrete Variable Simulation Active (0x02)	C	Not used
Event Notification Overflow (0x04)	N	Not used

Table 4.12 Information of Device Variable

Data Quality	Description
Good	The value may be used in control.
Poor Accuracy	The quality of the value is less than normal, but the value may still be useful.
Manual / Fixed	In manual mode or the value is fixed.
Bad	The value is not useful.

Limit Status	Description
Constant	The value is fixed.
Low Limited	The value reaches the low limit.
High Limited	The value reaches the high limit.
Not Limited	The value is within the normal range.

Property	Description
Variable is not calculated by device	The calculation results are not reflected in the device variables.
Variable is being simulated	The simulation results are reflected in the device variables.

Table 4.13 Relationship between Configuration Tool Display and HART Status

Display on Configuration Tool		HART Status		
Status Group	Status	Device Status	Extended Device Status	Standardized Status 0
1	Pressure Sensor Module Error	Device Malfunction (0x80)	Failure (0x08)	—
1	Main Module CPU 1 Error	More Status Available (0x10)		Electronic Defect (0x40)
1	Main Module CPU 1 EEPROM Error			Non-Volatile Memory Defect (0x02)
1	Main Module CPU 2 Error			Electronic Defect (0x40)
1	Main Module CPU 2 EEPROM Error			Non-Volatile Memory Defect (0x02)
2	Device Temperature Sensor Error			—
2	Sensor Module Comm Error			Electronic Defect (0x40)
2	Main Module Internal Comm Error			
3	Pressure Outside Limit		More Status Available (0x10) Primary Variable Out of Limits (0x01)	Out of Specification (0x10) Device Variable Alert (0x02)
3	Static Pressure Outside Limit	More Status Available (0x10)	Out of Specification (0x10)	
3	Sensor Temperature Outside Limit	Non-Primary Variable Out of Limits (0x02)	Device Variable Alert (0x02)	
3	Device Temperature Outside Limit		Environmental Conditions Out of Range (0x20)	
4	Pressure Over Range	More Status Available (0x10) Loop Current Saturated (0x04)	Function Check (0x20)	—
4	Static Pressure Over Range	More Status Available (0x10)		
5	Pressure High Alarm			
5	Pressure Low Alarm			
5	Static Pressure High Alarm			
5	Static Pressure Low Alarm			
5	Sensor Temperature High Alarm			
5	Sensor Temperature Low Alarm			
6	Illegal Pressure LRV			
6	Illegal Pressure URV			
6	Illegal Pressure SPAN			
6	Illegal Static Pressure LRV			
6	Illegal Static Pressure URV			
6	Illegal Static Pressure SPAN			
6	Pressure SPAN Trim Error			
6	Pressure ZERO Trim Error			
7	Static Pressure SPAN Trim Error			

Display on Configuration Tool		HART Status		
Status Group	Status	Device Status	Extended Device Status	Standardized Status 0
7	Static Pressure ZERO Trim Error			
7	Signal Characterizer Config Error			
7	Burnout Config Error			
8	Flange Temperature High Alarm			
8	Flange Temperature Low Alarm			
8	Invalid Ref fDP			
8	Invalid Ref fSPI			
8	Invalid Ref fSPh			
8	Invalid Ref BlkF			
8	ILBD Over Range			
9	B Blocking			
9	High Side Blocking			
9	Low Side Blocking			
9	Large Fluctuation of High Side			
9	Large Fluctuation of Low Side			
9	A Blocking			
10	Pressure Simulate Mode Active	More Status Available (0x10) Loop Current Fixed (0x08)	Function Check (0x20)	Device Variable Simulation Active (0x01)
10	Static Pressure Simulate Mode Active	More Status Available (0x10)		
10	Sensor Temperature Simulate Mode Active			
10	Analog Output Simulate Mode Active	More Status Available (0x10) Loop Current Fixed (0x08)		

Integral Indicator	HART configuration tool display	Device Status	Extended Device Status	NE107 (Default Value)	Value and Status (Data Quality and Limit Status)				
					Differential Pressure (DP)	Static Pressure (SP)	Temperature (T)	% range	Loop current
AL.91 P.SIM	P Simulate Mode	---	Device Variable Alert (0x02)	C	Value and Status: Pressure simulation value	Value: Measured value Status: Good and Not Limited		According to the setting of simulation	
AL.91 SP.SIM	SP Simulate Mode			C		Value and Status: Static Pressure simulation value		Value: Measured value Status: Good and Not Limited	
AL.91 T.SIM	T Simulate Mode			C	Value: Measured value Status: Good and Not Limited		Value and Status: Temperature simulation value		
AL.92 STS.SIM	Status Sim Mode		---	N	Value: Status: Good, Not Limited				

5. Parameter Summary

The R/W columns mean: R: display only, R/W: display and setting, M: method (operation command).

Table 5.1 Parameter List

No.	Label	Item	Contents	R/W	Default Value	Unit	Refer
Tag and Device Information							
Device Settings ▶ Basic Setup ▶ Device Information							
Device Settings ▶ Detailed Setup ▶ Device Information ▶ Field Device Information							
1-1	Tag	Tag	8 characters (uppercase alphabet, numbers, symbols)	R/W	Ordering Information	—	3.2.1
1-2	Long Tag	Long Tag	32 characters (alphabet, numbers, symbols)	R/W	Ordering Information	—	3.2.1
1-3	Date	Date as device information	1900/01/01 to 2155/12/31	R/W	1900/1/1	—	3.2.1
1-4	Descriptor	Device Information	16 characters (uppercase alphabet, numbers, symbols)	R/W	Space 16 Characters or additional specifications Order when /CA time-specified matter	—	3.2.1
1-5	Message	Memo as Device Information	32 characters (uppercase alphabet, numbers, symbols)	R/W	Space 32 Characters or additional specifications Order when /CA time-specified matter	—	3.2.1
Process Variables							
Process Variables ▶ Field Device Variables							
2-1	Pres	Differential Pressure / Pressure Value	—	R	— (*2)	Unit setting value	—
2-2	SP	Static pressure value	—	R	— (*2)	SP Unit setting value	—
2-3	Sensor Temp	Sensor section temperature value	—	R	— (*2)	Temp Unit setpoint	—
Process Variables ▶ PV							
2-4	Pres	Differential Pressure / Pressure Value	—	R	— (*2)	Unit setting value	—
2-5	Percent Range	4 to 20 mA output value % value	-5. to 110.0	R	—	%	—
2-6	Loop Current	4 to 20 mA output value	3.2 to 22.4	R	—	mA	—
Process Variables ▶ Engineering Variables							
Device Settings ▶ Detail Setup ▶ Output Condition ▶ Process Variables							
2-7	Engr Value	User Scale Value	—	R	—	—	—
2-8	Engr Unit	User Scale Value Unit	8 characters (alphabetic, numeric, symbols)	R	Ordering Information	—	—
Process Variables ▶ Device Variables and Status							
2-9	Pressure(PV)	Differential Pressure / Pressure Value	—	R	— (*2)	As of Unit setting	—
2-10	Static Pressure	Static pressure value	—	R	— (*2)	As of SP Unit setting	—
2-11	Sensor Temperature	Sensor section temperature value	—	R	— (*2)	As of Temp Unit setting	—

No.	Label	Item	Contents	R/W	Default Value	Unit	Refer
2-12	Percent Range	Differential Pressure / Pressure % Value	—	R	—	%	—
2-13	Loop Current	4 to 20 mA output value	—	R	—	mA	—
Device Settings ▶ Detailed Setup ▶ Sensors ▶ Pressure Sensor							
Device Settings ▶ Detailed Setup ▶ Output condition ▶ Process variables							
2-14	Pres	Differential Pressure / Pressure Value	—	R	— (*2)	As of Unit setting	—
2-15	Percent Range	4 to 20 mA output value % value	-5.0 to 110.0	R	—	%	—
Device Settings ▶ Detailed Setup ▶ Output condition ▶ Process variables							
2-16	Loop Current	4 to 20 mA output value	3.2 to 22.4	R	—	mA	—
Device Settings ▶ Detailed Setup ▶ Sensors ▶ SP Sensor							
Device Settings ▶ Detailed Setup ▶ Output condition ▶ Process variables							
2-17	SP	Static pressure value	—	R	— (*2)	As of SP Unit setting	—
2-18	SP %	Static pressure % value	—	R	—	%	—
Device Settings ▶ Detailed Setup ▶ Sensors ▶ Temp Sensor							
Device Settings ▶ Detailed Setup ▶ Output condition ▶ Process variables							
2-19	Sensor Temp	Sensor section temperature value	—	R	— (*2)	As of Temp Unit setting	—
2-20	Device Temp	Main unit temperature value	—	R	— (*2)	As of Temp Unit setting	—
Unit							
Device Settings ▶ Basic Setup ▶ Units							
Device Settings ▶ Basic Setup ▶ Pres Setup							
Device Settings ▶ Detailed Setup ▶ Sensors ▶ Pressure Sensor							
Diagnostics ▶ Maintenance ▶ Pres Range							
Maintenance ▶ Pres Range							
3-1	Unit	Unit of differential pressure / pressure value.	kPa	R/W	Ordering Information	—	3.2.2
			MPa				
			hPa				
			Pa				
			mbar				
			bar				
			atm				
Device Settings ▶ Basic Setup ▶ Units							
Device Settings ▶ Basic Setup ▶ SP Setup							
Device Settings ▶ Detailed Setup ▶ Sensors ▶ SP Sensor							
3-2	SP Unit	Unit of static pressure value	kPa	R/W	— (*1)	—	3.2.2
			MPa				
			hPa				
			Pa				
			mbar				
			bar				
			atm				
Device Settings ▶ Basic Setup ▶ Units							
Device Settings ▶ Detailed Setup ▶ Sensors ▶ Temp Sensor							
3-3	Temp Unit	Unit of temperature value	°C	R/W	Ordering Information	—	3.3.10
			K (Kelvin)				
Measurement Range							
Device Settings ▶ Basic Setup ▶ Pres Setup							
Device Settings ▶ Detailed Setup ▶ Sensors ▶ Pressure Sensor							
Diagnostics ▶ Maintenance ▶ Pres Range							
Maintenance ▶ Pres Range							

No.	Label	Item	Contents	R/W	Default Value	Unit	Refer
4-1	Lower Range Value	Lower limit of differential pressure / pressure range value	By LSL and USL	R/W	Ordering Information*2	As of Unit setting	3.2.3
4-2	Upper Range Value	Upper limit of differential pressure / pressure range value	By LSL and USL	R/W	Ordering Information*2	As of Unit setting	3.2.3
4-3	Pres LSL	Lower setting limit of differential pressure / pressure range.	—	R	— (*1) (*2)	As of Unit setting	3.2.3
4-4	Pres USL	Upper setting limit of differential pressure / pressure range.	—	R	— (*1) (*2)	As of Unit setting	3.2.3
4-5	Pres Min Span	Minimum setting span of differential pressure / pressure	—	R	— (*1) (*2)	As of Unit setting	3.2.3
Device Settings ▶ Less than 0.1% of URL ▶ Sensors ▶ Pressure Sensor							
Diagnostics ▶ Maintenance ▶ Pres Range							
Maintenance ▶ Pres Range							
4-6	Apply values	Differential Pressure / Pressure Range Setting adoption		M	—	—	3.2.3
Output Mode							
Device Settings ▶ Basic Setup ▶ Pres Setup							
Device Settings ▶ Detailed Setup ▶ Signal Condition ▶ Signal Condition							
Device Settings ▶ Detailed Setup ▶ Signal Condition ▶ S.C. Menu							
5-1	Transfer Function	Differential pressure/ pressure output mode	Linear	R/W	Linear or SqRoot can be selected as an Ordering Information.	—	3.2.4 3.3.16
			Square Root				
			Signal Characterizer				
Damping Time Constant							
Device Settings ▶ Basic Setup ▶ Pres Setup							
Device Settings ▶ Detailed Setup ▶ Sensors ▶ Pressure Sensor							
6-1	Pres Damp	Differential Pressure / Damping of pressure values Time constant	0.00 to 100.00	R/W	2.00 (*1)	s	3.2.5
Output Low Cut							
Device Settings ▶ Basic Setup ▶ Pres Setup							
Device Settings ▶ Detailed Setup ▶ Signal Condition ▶ Signal Condition							
7-1	Low Cut	Output low-cut threshold value	0.00 to 20.00	R/W	10	%	3.2.6
7-2	Low Cut Mode	Output operation setting for low cut operation	Linear	R/W	Linear	—	3.2.6
			Zero				
Setting of Pressure Conduit Connection Direction							
Device Settings ▶ Basic Setup ▶ Pres Setup							
Device Settings ▶ Detailed Setup ▶ Signal Condition ▶ Signal Condition							
8-1	H/L Swap	H/L Invert function setting	Normal	R/W	Normal	—	3.2.7
			Reverse				
Detailed Settings for Static Pressure Signal							
Device Settings ▶ Basic Setup ▶ SP Setup							
Device Settings ▶ Detailed Setup ▶ Sensors ▶ SP Sensor							
9-1	SP LRV	Lower limit of static pressure range	0	R/W	0.0 (*1) (*2)	As of SP Unit setting	3.2.8

No.	Label	Item	Contents	R/W	Default Value	Unit	Refer
9-2	SP URV	Upper limit of static pressure range	—	R/W	25.0 (*1) (*2)	As of SP Unit setting	3.2.8
9-3	SP Min Span	Configurable static pressure range Min. span	—	R	— (*1) (*2)	As of SP Unit setting	3.2.8
9-4	SP Damp	When damping static pressure values constant	0.00 to 100.00	R/W	2	s	3.2.8
Device Settings ▶ Basic Setup ▶ SP Setup							
Device Settings ▶ Detailed Setup ▶ Sensors ▶ SP Sensor							
Device Settings ▶ Detailed Setup ▶ Output Condition ▶ Process Alarm ▶ SP Alarm							
9-5	SP LSL	Lower setting limit of static pressure range	—	R	— (*1) (*2)	As of SP Unit setting	
9-6	SP USL	Upper setting limit of static pressure range.	—	R	— (*1) (*2)	As of SP Unit setting	
Device Settings ▶ Detailed Setup ▶ Sensors ▶ SP Sensor							
9-7	SP Apply Values	Applying static pressure range setting	—	M	—	—	3.2.8
9-8	A/G Select	Static pressure display settings	Gauge, Absolute	R/W	Absolute	—	3.3.1
9-9	Atmosphere Pres	Value of Atmospheric pressure at location of use	—	R/W	0.1013 (*2)	As of SP Unit setting	3.3.1
9-10	SP H/L Select	Static pressure adoption setting (high pressure side/low pressure side)	High, Low	R/W	High	—	3.3.1
Positive and Reverse Flow Measurement Settings							
Device Settings ▶ Detailed Setup ▶ Signal Condition ▶ Signal Condition							
10-1	Bi-dir Mode	Setting for the flow-measurement direction	Off: Forward direction only On: Both forward and reverse directions	R/W	Off	—	3.3.2
Analog Signal Variable Range Setting							
Device Settings ▶ Detailed Setup ▶ Output Condition ▶ Analog Output							
11-1	AO Lower Limit	Lower limit of current output	3.20 to 21.60	R/W	—	mA	3.3.4
11-2	AO Upper Limit	Upper limit of current output	3.20 to 21.60	R/W	—	mA	3.3.4
11-3	Lower AO Alarm Current Value	Current output low-side burnout value	3.20 to 3.80	R/W	3.2	mA	3.3.5
11-4	Upper AO Alarm Current Value	Current output high-side burnout value	20.20 to 23.00	R/W	22.4	mA	3.3.5
11-5	Reverse Output	Output inversion setting	Normal, Reverse	R/W	Normal	—	3.3.3
Display Setting							
Device Settings ▶ Detailed Setup ▶ Display Condition ▶ Display Condition							
12-1	Display Pres % Function	Differential pressure/pressure % display setting	Linear, Square Root	R/W	Linear	—	3.3.7
12-2	Display Info Select	Select Display Information	Parameter, Unit, Status	R/W	Parameter	—	3.3.8
12-3	Bar Indicator	Bar indicator display On/Off	Enabled, Disabled	R/W	Enabled	—	3.3.8
12-4	Display Cycle	Display cycle	HIGH, MID, LOW	R/W	HIGH	—	3.3.8
12-5	Power On Info	Information display on/off at power-on	Enable, Disable	R/W	Enable	—	2.2

No.	Label	Item	Contents	R/W	Default Value	Unit	Refer
12-6	Display NE 107	Switching of NE 107 display / Normal display	Normal, NE 107	R/W	Normal	—	3.3.9
Device Settings ▶ Detailed Setup ▶ Display Condition ▶ Display 1, 2, 3, 4 Setup							
12-7	Display Out	Display output setting	Pressure, Static Pressure, Sensor Temperature, Pressure with %, Static Pressure with %, Pressure Engineer Units, Analog Output	R/W	1 Pressure with % (*1)	—	3.3.8
					2 Not Used *1		
					3 Not Used		
					4 Not Used		
12-8	Unit Selection	Display unit setting	Auto, Custom	R/W	Auto	—	—
12-9	Display Unit	Custom unit display characters	8 characters (alphabetical, numeric, symbols)	R/W	""	—	—
12-10	Exponent Mode	Exponent for the displayed value	x1, x10, x100, x1000	R/W	Ordering Information	—	3.3.8
12-11	Display Point	Number of decimal places in the displayed value	Integer, Down to 1 decimal places to Down to 4 decimal places	R/W	1 Down to 2 decimal places*1	—	3.3.8
					2 Down to 2 decimal places*1		
					3 Down to 2 decimal places		
					4 Down to 2 decimal places		
Device Settings ▶ Detailed Setup ▶ Display Condition ▶ Engr Display Range							
12-12	Engr LRV	Minimum value of user scale	—	R/W	—	—	3.3.8
12-13	Engr URV	Maximum value of user scale	—	R/W	Ordering Information	—	3.3.8
12-14	Engr Unit	User Scale Value Unit	—	R/W	Ordering Information	—	3.3.8
12-15	Set Easy Engr Unit	Simple setting of user scale value unit	—	M	—	—	3.3.8
Zero and Span Adjustment							
Diagnostics ▶ Maintenance ▶ Pres Sensor Trim							
Maintenance ▶ Pres Sensor Trim							
13-1	Pres Trim Unit	Unit of Adjustment	—	R/W	PRES UNIT	—	3.3.11
13-2	Pres Zero Trim	Zero point adjustment by equalizing pressure	—	M	—	—	3.3.11
13-3	Pres Trim	Automatic or manual adjustment	—	M	—	—	3.3.11
13-4	Pres Zero Trim Point	Lower trim point of automatic adjustment	—	R	— (*2)	Pres Trim Unit	3.3.11
13-5	Pres Span Trim Point	Upper trim point of automatic adjustment	—	R	— (*2)	Pres Trim Unit	3.3.11
13-6	Pres Zero Trim Deviation	Lower trim value of manual adjustment	—	R	— (*2)	Pres Trim Unit	3.3.11
13-7	Pres Span Trim Deviation	Upper trim value of manual adjustment	—	R	— (*2)	Pres Trim Unit	3.3.11
13-8	Pres Zero Trim Deviation at Factory	Lower trim value of manual adjustment at factory	—	R	— (*2)	Pres Trim Unit	3.3.11

No.	Label	Item	Contents	R/W	Default Value	Unit	Refer
13-9	Pres Span Trim Deviation at Factory	Upper trim value of manual adjustment at factory	—	R	— (*2)	Pres Trim Unit	3.3.11
13-10	Clear Pres trim	Clear Adjustment Value	—	M	—	—	3.3.11
13-11	Factory Reset Pres Trim	Restore factory adjusted values	—	M	—	—	3.3.11
Diagnostics ► Maintenance ► SP Sensor Trim							
Maintenance ► SP Sensor Trim							
13-12	SP Trim Unit	Unit of Adjustment	—	R/W	PRES UNIT	—	
13-13	Static Pres Trim	Automatic or manual adjustment	—	M	—	—	
13-14	SP Zero Trim Point	Lower trim point of automatic adjustment of static pressure.	—	R	— (*2)	SP Trim Unit	
13-15	SP Span Trim Point	Upper trim point of automatic adjustment of static pressure.	—	R	— (*2)	SP Trim Unit	
13-16	SP Zero Trim Deviation	Lower trim value of manual adjustment of static pressure.	—	R	— (*2)	SP Trim Unit	
13-17	SP Span Trim Deviation	Upper trim value of manual adjustment of static pressure.	—	R	— (*2)	SP Trim Unit	
13-18	Clear SP trim	Clear Adjustment Value	—	M	—	—	
Diagnostics ► Maintenance ► Trim info.							
Maintenance ► Trim Info							
13-19	Trim Who	Person who made the adjustment	8 characters (alphanumeric characters, symbols)	R/W	—		
13-20	Trim Date	Date of adjustment	1900/01/01 to 2155/12/31	R/W	1900/1/1		
13-21	Trim Loc	Location of adjustment	8 characters (alphanumeric characters, symbols)	R/W	—		
13-22	Trim Description	Memo information on adjustments	16 characters (alphanumeric characters, symbols)	R/W	—		
Analog Output Adjustment							
Device Settings ► Detailed Setup ► Output Condition ► Analog Output							
Diagnostics ► Maintenance ► Analog Output Trim							
Maintenance ► Analog Output Trim							
14-1	D/A Trim	Trim adjustment of current output at two points, 4 mA and 20 mA.	—	M	—	—	3.3.12
14-2	Scaled D/A Trim	Trim adjustment of current output at any two points.	—	M	—	—	3.3.12
14-3	Clear D/A trim	Clear of current output trim adjustment value.	—	M	—	—	
Device Settings ► Detailed Setup ► Output Condition ► Analog Output							
14-4	Analog Channel Function	Displays information on current output channels as defined by the HART communication standard	—	R	0x00	—	

No.	Label	Item	Contents	R/W	Default Value	Unit	Refer
External switch mode							
Device Settings ▶ Detailed Setup ▶ Device Information ▶ Field Device Information							
15-1	Local Operation Enable	Local operation enable setting	Enable/Disable	R/W	Disable	—	3.3.13
CPU Abnormal Burnout Switch							
Device Settings ▶ Detailed Setup ▶ Output Condition ▶ Analog Output							
16-1	Analog Alarm Selection	Current output burnout direction setting	High, Low	R/W	High	—	3.3.5
Software Write Protect							
Device Settings ▶ Basic Setup ▶ Device Information							
Device Settings ▶ Detailed Setup ▶ Device Information ▶ Field Device Information							
Device Settings ▶ Detailed Setup ▶ Write Protect Menu							
17-1	Write Protect Status	Write-protect state	Yes, No	M	No	—	3.3.15
Device Settings ▶ Detailed Setup ▶ Protect Menu							
17-2	Write Protect Release Password	10-minute write permission setting	16 characters (alphanumeric, symbols)	M	—	—	3.3.15
17-3	Write Protect New Password	Password for write permission	16 characters (alphanumeric, symbols)	M	—	—	3.3.15
17-4	Write Protect Software Seal	Write-Protect break History	Keep	R	Keep	—	
			Break				
Setting Up a Line Approximation Function							
Device Settings ▶ Detailed Setup ▶ Signal Condition ▶ S.C. Menu							
18-1	X Start	Starting point of the X-coordinate of line approximate function	0	R	0	%	3.3.16
18-2	X End	Ending point of the X-coordinate of line approximate function	100	R	100	%	3.3.16
18-3	Y Start	Starting point of the Y-coordinate of line approximate function	0	R	0	%	3.3.16
18-4	Y End	Ending point of the Y-coordinate of line approximate function	100	R	100	%	3.3.16
18-5	Num of Points	Number of points used in line approximation	1 to 30	R/W	19		3.3.16
Device Settings ▶ Detailed Setup ▶ Signal condition ▶ S.C. Menu							
Device Settings ▶ Detailed Setup ▶ Signal condition ▶ S.C. View							
18-6	X 1 to X 30	Points 1 to 30 of the line approximation X-coordinate setting	0.00 to 100.00	R/W	—	%	3.3.16
18-7	Y 1 to Y 30	Points 1 to 30 of the line approximation Y-coordinate setting	0.00 to 100.00	R/W	—	%	3.3.16
Alarm Setting							
Device Settings ▶ Detailed Setup ▶ Output condition ▶ Process Alarm ▶ Pres Alarm							
19-1	Pres Alarm Mode	Alarm mode	Off	R/W	Off	—	3.3.17
			Hi Alarm Detect				
			Lo Alarm Detect				
			Hi/Lo Alarm Detect				
19-2	Pres Hi Alarm Value	Differential Pressure / Pressure High Alarm Threshold	Pres LSL-10% to Pres USL+10%	R/W	— (*2)	As of Unit setting	3.3.17

No.	Label	Item	Contents	R/W	Default Value	Unit	Refer
19-3	Pres Lo Alarm Value	Differential Pressure / Pressure Low Alarm Threshold	Pres LSL-10% to Pres USL+10%	R/W	— (*2)	As of Unit setting	3.3.17
Device Settings ▶ Detailed Setup ▶ Output condition ▶ Process Alarm ▶ SP Alarm							
19-4	SP Alarm Mode	Alarm mode	Off	R/W	Off	—	3.3.17
			Hi Alarm Detect				
			Lo Alarm Detect				
			Hi/Lo Alarm Detect				
19-5	SP Hi Alarm Value	Static pressure High alarm threshold	SP LSL-10% to SP USL+10%	R/W	— (*2)	As of SP Unit setting	3.3.17
19-6	SP Lo Alarm Value	Static pressure Low alarm threshold	SP LSL-10% to SP USL+10%	R/W	— (*2)	As of SP Unit setting	3.3.17
Device Settings ▶ Detailed Setup ▶ Output condition ▶ Process Alarm ▶ Temp Alarm							
19-7	Temp Alarm Mode	Alarm mode	Off	R/W	Off	—	3.3.17
			Hi Alarm Detect				
			Lo Alarm Detect				
			Hi/Lo Alarm Detect				
19-8	Temp Hi Alarm Value	Sensor section temperature High alarm threshold	—	R/W	— (*2)	As of Temp Unit setting	3.3.17
19-9	Temp Lo Alarm Value	Sensor section temperature Low alarm threshold	—	R/W	— (*2)	As of Temp Unit setting	3.3.16
Setting Up Density Correction Function for Capillary Sealed Liquid							
Device Settings ▶ Detailed Setup ▶ Signal Condition ▶ Signal Condition							
20-1	T.Z. Cmp Mode	Temperature zero compensation mode setting (with diaphragm seal)	Off, On	R/W	Off	—	
20-2	T.Z. Cmp Coefficient	Compensation factor in temperature zero compensate mode	-100.0 to 100.0	R/W	0	—	
Test Output, Simulation, Squawk							
Diagnostics ▶ Status ▶ Others							
21-1	Status Simulate	Simulates arbitrary status of equipment.	—	M	—	—	
Device Settings ▶ Detail Setup ▶ Output Condition ▶ Analog Output							
Diagnostics ▶ Test							
21-2	Force Loop Current	Current output (4 to 20 mA) Test output of	—	M	—	—	3.3.18
Diagnostics ▶ Test							
21-3	Squawk	Running Squawk	—	M	—	—	3.3.18
21-4	Enable Device Variable Simulation	Simulate device variables Execution of	—	M	—	—	3.3.18
21-5	Disable Device Variable Simulation	Simulate device variables Release of	—	M	—	—	3.3.18
21-6	Test Auto Release Time	Loop test, Simulate, Status simulate, and The automatic release time of the test	10 min	R/W	10 min	—	3.3.18
			30 min				
			60 min				
			3 hour				
			6 hour				
			12 hour				

No.	Label	Item	Contents	R/W	Default Value	Unit	Refer
Burst Mode							
Device Settings ▶ Detailed Setup ▶ Output condition ▶ HART output ▶ Burst Condition ▶ Update Time Period							
22-1	PV Update Period	Pres update on HART communication cycle	—	R	200	s	3.3.19
22-2	SV Update Period	SP update laps on HART communication period	—	R	200	s	3.3.19
22-3	TV Update Period	Temp reopening on HART communication new cycle	—	R	1000	s	3.3.19
Device Settings ▶ Detailed Setup ▶ Output Condition ▶ HART Output ▶ Burst Condition ▶ Burst Message 1, 2, 3							
22-4	Burst Mode	The burst message ON/OFF	Off, On	R/W	Off	—	3.3.19
22-5	Burst Message 1,2,3 Command	Sent in burst messages Commands to be trusted	Cmd 1: Read Primary Variable, Cmd 2: Read Percent Range/Current, Cmd 3: Read Dynamic Variables/Current, Cmd 9: Read Device Variables with Status Cmd 48: Read Additional Device Status	R/W	Cmd 1: Read Primary Variable	—	3.3.19
22-6	Burst Variable 1	Slot settings for commands to be sent in burst message 1	PV, SV, TV, Percent Range, PercentRange, Loop Current	R/W	PV		3.3.19
22-7	Burst Variable 2	Slot settings for commands to be sent in burst message 1	PV, SV, TV, Percent Range, PercentRange, Loop Current, Not Used	R/W	Not Used		3.3.19
22-8	Burst Variable 3	Slot settings for commands to be sent in burst message 1	same as above	R/W	Not Used		3.3.19
22-9	Burst Variable 4	Slot settings for commands to be sent in burst message 1	same as above	R/W	Not Used		3.3.19
22-10	Burst Variable 5	Slot settings for commands to be sent in burst message 1	same as above	R/W	Not Used		3.3.19
22-11	Burst Variable 6	Slot settings for commands to be sent in burst message 1	same as above	R/W	Not Used		3.3.19
22-12	Burst Variable 7	Slot settings for commands to be sent in burst message 1	same as above	R/W	Not Used		3.3.19
22-13	Burst Variable 8	Slot settings for commands to be sent in burst message 1	same as above	R/W	Not Used		3.3.19
22-14	Set Burst Trigger	Set the trigger mode and trigger level for burst message 1	—	M	—	—	3.3.19

No.	Label	Item	Contents	R/W	Default Value	Unit	Refer
22-15	Set Burst Period	Set the transmission period and maximum transmission period of burst message 1	—	M	—	—	3.3.19
22-16	Burst Message 1, 2, 3 Trigger Mode	Burst mode for burst message 1	Continuous	R	Continuous	—	3.3.19
			Window				
			Rising				
			Falling				
			On-change				
22-17	Burst Message 1, 2,3 Trigger Level	Trigger mode level	—	R	NaN	Trigger mode level units	3.3.19
22-18	Burst Message 1, 2,3 Trigger Units	Trigger mode level units	—	R	Not used	—	3.3.19
22-19	Burst Message 1, 2,3 Trigger Update Rate	Trigger transmission period	0.5 s, 1 s, 2 s, 4 s, 8 s, 16 s, 32 s, 1 min, 5 min, 10 min, 15 min, 30 min, 45 min, 60 min	R	0.5 s	—	3.3.19
22-20	Burst Message 1, 2,3 Trigger Max Update Rate	Maximum transmission period in trigger mode	0.5 s, 1 s, 2 s, 4 s, 8 s, 16 s, 32 s, 1 min, 5 min, 10 min, 15 min, 30 min, 45 min, 60 min	R	60 s	—	3.3.19
Device Settings ▶ Detailed Setup ▶ Output Condition ▶ HART Output ▶ Event Notification ▶ Event Notification							
22-21	Event Mode	Event notification function Enable/Disable	Off, On	R/W	Off	—	3.3.19
22-22	Set Event Notification Timing	Setting the frequency for sending events	—	M	—	—	3.3.19
22-23	Event Retry Rate	The period for sending an event when an event change is detected	0.5 s, 1 s, 2 s, 4 s, 8 s, 16 s, 32 s, 1 min, 5 min, 10 min, 15 min, 30 min, 45 min, 60 min	R	60 s	1/32 ms	3.3.19
22-24	Event Max Update Rate	The period for sending events regardless of whether an event has changed	0.5 s, 1 s, 2 s, 4 s, 8 s, 16 s, 32 s, 1 min, 5 min, 10 min, 15 min, 30 min, 45 min, 60 min	R	60 s	1/32 ms	3.3.19
22-25	Event Debounce Interval	Event function debounce setting	—	R	1 s	1/32 ms	3.3.19
Device Settings ▶ Detailed Setup ▶ Output Condition ▶ HART Output ▶ Event Notification ▶ Event Mask							
22-26	Device Status Mask	Event detection bit setting	—	R/W	All the bits except for More Status Available, Cold Start, and Configuration Changed are set.	—	3.3.19
22-27	Extended Device Status Mask	Event detection bit setting	—	R/W	Set all Mask bits	—	3.3.19
22-28	Standardized Status 0 Mask	Event detection bit setting	—	R/W	Set all Mask bits	—	3.3.19
22-29	Standardized Status 1 Mask	Event detection bit setting	—	R/W	Set all Mask bits	—	3.3.19
22-30	Status Group 1 Mask	Event detection bit setting	—	R/W	Set all Mask bits	—	3.3.19

No.	Label	Item	Contents	R/W	Default Value	Unit	Refer
22-31	Status Group 2 Mask	Event detection bit setting	—	R/W	Set all Mask bits	—	3.3.19
22-32	Status Group 3 Mask	Event detection bit setting	—	R/W	Set all Mask bits	—	3.3.19
22-33	Status Group 4 Mask	Event detection bit setting	—	R/W	Set all Mask bits	—	3.3.19
22-34	Status Group 5 Mask	Event detection bit setting	—	R/W	Set all Mask bits	—	3.3.19
22-35	Status Group 6 Mask	Event detection bit setting	—	R/W	Set all Mask bits	—	3.3.19
22-36	Status Group 7 Mask	Event detection bit setting	—	R/W	Set all Mask bits	—	3.3.19
22-37	Status Group 8 Mask	Event detection bit setting	—	R/W	Set all Mask bits	—	3.3.19
22-38	Status Group 9 Mask	Event detection bit setting	—	R/W	Set all Mask bits	—	3.3.19
22-39	Status Group 10 Mask	Event detection bit setting	—	R/W	Set all Mask bits	—	3.3.19
Device Settings ▶ Detailed Setup ▶ Output Condition ▶ HART Output ▶ Event Notification ▶ Acknowledge							
22-40	Event Status	Unauthorized event types	Configuration, changed event pending, Device status event pending, More status available event pending	R	0x00	—	3.3.19
Multidrop Mode							
Device Settings ▶ Detailed Setup ▶ Output Condition ▶ HART Output ▶ HART Output							
23-1	Polling Address	Polling address defined by the HART communication standard	0 to 63	R/W	0	—	3.3.20
Device Settings ▶ Detailed Setup ▶ Output Condition ▶ Analog Output							
Device Settings ▶ Detailed Setup ▶ Output Condition ▶ HART Output ▶ HART Output							
23-2	Loop Current Mode	Current output fixed at 4 mA	Disable, Enable	R/W	Enable	—	3.3.20
Self-diagnosis							
Device Settings ▶ Detailed Setup ▶ Output Condition ▶ Auto Recovery							
24-1	Auto Recovery	<p>Sets the automatic recovery operation when the cause of the sensor error is cleared.</p> <p>Off: The transmitter fault state will not be cleared even if the cause of the sensor error is cleared.</p> <p>On: When the cause of the sensor error is cleared, the transmitter failure state is released and normal measurement is resumed.</p>	Off/On	R/W	On	—	—
Diagnostics ▶ Test							
24-2	Self Test	Running a self-test	—	M	—	—	4.1.1.1
Diagnostics ▶ Status ▶ Status Display ▶ Field Device Status							
24-3	Device Status	Basic stator of equipment information	See Alarm List	R	—	—	4.3

No.	Label	Item	Contents	R/W	Default Value	Unit	Refer
24-4	Extended Device Status	Extended status information of the device information	See Alarm List	R	—	—	4.3
24-5	Standardized Status 0	Diagnostic status of equipment	See Alarm List	R	—	—	4.3
24-6	Standardized Status 1	Diagnostic status of equipment	See Alarm List	R	—	—	4.3
Diagnostics ▶ Status ▶ Status Display ▶ Hardware Failure							
24-7	Status Group 1	Equipment hardware e racing status	See Alarm List	R	—	—	4.3
24-8	Status Group 2	Equipment hardware e racing status	See Alarm List	R	—	—	4.3
Diagnostics ▶ Status ▶ Status Display ▶ Transducer Status							
24-9	Status Group 3	Abnormal process value of equipment (out of specification range) Status	See Alarm List	R	—	—	4.3
24-10	Status Group 4	Device process value abnormality (outside the set range) status	See Alarm List	R	—	—	4.3
24-11	Status Group 5	Device process value abnormality (alarm) status	See Alarm List	R	—	—	4.3
Diagnostics ▶ Status ▶ Status Display ▶ Configuration							
24-12	Status Group 6	Device setting abnormal status	See Alarm List	R	—	—	4.3
24-13	Status Group 7	Device setting abnormal status	See Alarm List	R	—	—	4.3
Diagnostics ▶ Status ▶ Status Display ▶ Diagnostics							
24-14	Status Group 8	Device diagnostic abnormal status	See Alarm List	R	—	—	4.3
24-15	Status Group 9	Device diagnostic abnormal status	See Alarm List	R	—	—	4.3
Diagnostics ▶ Status ▶ Status Display ▶ Simulate Mode							
24-16	Status Group 10	Equipment Simulation Status	See Alarm List	R	—	—	4.3
Process Variables ▶ Device Variables and Status							
24-17	Pres Data Quality	Differential pressure/pressure data quality	Good, Poor Accuracy, Manual/Fixed, Bad	R	—	—	4.3
24-18	Pres Limit Status	Differential pressure/pressure limit status	Constant, Low Limited, High Limited, Not Limited	R	—	—	4.3
24-19	SP Data Quality	Static pressure data quality	Good, Poor Accuracy, Manual/Fixed, Bad	R	—	—	4.3
24 to 20	SP Limit Status	Static pressure limit status	Constant, Low Limited, High Limited, Not Limited	R	—	—	4.3
24-21	Temp Data Quality	Sensor temperature data quality	Good, Poor Accuracy, Manual/Fixed, Bad	R	—	—	4.3
24-22	Temp Limit Status	Sensor temperature limit status	Constant, Low Limited, High Limited, Not Limited	R	—	—	4.3

No.	Label	Item	Contents	R/W	Default Value	Unit	Refer
24-23	Percent Range PDQ	Differential pressure/pressure percentage data quality	Good, Poor Accuracy, Manual/Fixed, Bad	R	—	—	4.3
24-24	Percent Range Limit Status	Differential pressure/pressure percentage limit status	Constant, Low Limited, High Limited, Not Limited	R	—	—	4.3
24-25	Loop Current PDQ	4 to 20 mA output data quality	Good, Poor Accuracy, Manual/Fixed, Bad	R	—	—	4.3
24-26	Loop Current Limit Status	4 to 20 mA output limit status	Constant, Low Limited, High Limited, Not Limited	R	—	—	4.3
Device Settings ▶ Detailed Setup ▶ Device Information ▶ Original Device Status							
24-27	Original Device Status 1	Device status that is the basis for HART communication	See Alarm List	R	0x00	—	4.3
24-28	Original Device Status 2	Device status that is the basis for HART communication	See Alarm List	R	0x00	—	4.3
24-29	Original Device Status 3	Device status that is the basis for HART communication	See Alarm List	R	0x00	—	4.3
24-30	Original Device Status 4	Device status that is the basis for HART communication	See Alarm List	R	0x00	—	4.3
24-31	Original Device Status 5	Device status that is the basis for HART communication	See Alarm List	R	0x00	—	4.3
24-32	Original Device Status 6	Device status that is the basis for HART communication	See Alarm List	R	0x00	—	4.3
24-33	Original Device Status 7	Device status that is the basis for HART communication	See Alarm List	R	0x00	—	4.3
24-34	Original Device Status 8	Device status that is the basis for HART communication	See Alarm List	R	0x00	—	4.3
Diagnostics ▶ Status ▶ Others							
24-35	Current Date	Number of days equipment is in operation	1900/01/01 to 2155/12/31	R	1900/1/1	—	—
24-36	Current Time	Equipment uptime	00:00 to 23:59:59:999	R	0	1/32 ms	—
24-37	Operation Time	Cumulative operating hours of equipment	ASCII	R	00000d 00:00	—	—
Pressure Conduction Tube Blocking Detection Function (Optional Code/DG1 is Selected)							
Diagnostics ▶ Diag Parameters ▶ Status/Config ▶ Status/Config							

No.	Label	Item	Contents	R/W	Default Value	Unit	Refer
25-1	Diag Error	Results of pressure conduit obstruction detection and heat trace monitoring	FT high alarm	R	—	—	4.2.2
			FT low alarm				
			ILBD over range				
			Invalid Ref DP				
			Invalid Ref SPL				
			Invalid Ref SPH				
			Invalid Ref F				
			B Blocking				
			H Side Blocking				
			L Side Blocking				
			Large Fluct H				
			Large Fluct L				
A Blocking							
25-2	Diag Error Selection	Masking of pressure conduit obstruction detection and heat trace monitoring results	FT high alarm	R/W	0x08FC	—	4.2.2
			FT low alarm				
			ILBD over range				
			Invalid Ref DP				
			Invalid Ref SPL				
			Invalid Ref SPH				
			Invalid Ref F				
			B Blocking				
			H Side Blocking				
			L Side Blocking				
			Large Fluct H				
			Large Fluct L				
A Blocking							
Diagnostics ▶ Diag Parameters ▶ Status/Config ▶ Diag Output							
25-3	Diag Out Option	Abnormal condition on current output	Off,	R/W	Off	—	4.2.2
			Burnout, Fall back (Outputs the current output value set in Diag Fixed Out Val when an alarm occurs.)				
25-4	Diag Fixed Out Value	Current value output when Fall back is selected in Diag Out Option	3.200 to 23.000	R/W	22.400	mA	4.2.2
Diagnostics ▶ Diag Parameters ▶ ILBD Parameters ▶ Current Condition							
25-5	Diag Mode	ILBD Operation Modes	Stop	R	Stop	—	4.2.2
			Calculation				
			Reference				
25-6	Diag Applicable	Blocking and abnormal oscillation	B Blocking	R	(Off)	—	4.2.2
			H Side Blocking				
			L Side Blocking				
			Large Fluct H				
			Large Fluct L				
A Blocking							
Diagnostics ▶ Diag Parameters ▶ ILBD Parameters ▶ Status ▶ Diag Variables							
25-7	Ratio fDP	Differential pressure /root mean square of pressure oscillation compared	—	R	—	—	4.2.2
25-8	Ratio fDP Status	Ratio fDP Status Information	Sensor Failure	R	—	—	4.2.2
			Device Failure				
			Uncertain				
			Invalid Ref				
			Good				

No.	Label	Item	Contents	R/W	Default Value	Unit	Refer
25-9	Ratio fSPi	Value comparing rootmean-square of lowpressure side static pressure oscillation	—	R	—	—	4.2.2
25-10	Ratio fSPI Status	Status of Ratio fSPI information	Sensor Failure	R	—	—	4.2.2
			Device Failure				
			Uncertain				
			Invalid Ref				
Good							
25-11	Ratio fSPh	Comparison of rootmean-square values of static pressure oscillation on the high pressure side	—	R	—	—	4.2.2
25-12	Ratio fSPh Status	Status of Ratio fSPh information	Sensor Failure	R	—	—	4.2.2
			Device Failure				
			Uncertain				
			Invalid Ref				
Good							
25-13	BlkF	Value indicating "degree of blocking"	—	R	—	—	
25-14	BlkF Status	Status Information on BlkF	Sensor Failure	R	—	—	4.2.2
			Device Failure				
			Uncertain				
			Good				
25-15	DPAvg	Average differential pressure expressed as a ratio of the average value of the measured differential pressure when the maximum measurement span is regarded as 1	—	R	—	—	4.2.2
25-16	DPAvg Status	Status Information on DPAvg	Sensor Failure	R	—	—	4.2.2
			Device Failure				
			Uncertain				
			Good				
25-17	CRatio fDP	fDP corrected for mean differential pressure	—	R	—	—	
25-18	CRatio fDP Status	Status Information on CRatio fDP	Sensor Failure	R	—	—	4.2.2
			Device Failure				
			Uncertain				
			Invalid Ref				
Good							
25-19	NRatio fDP	Uncorrected fDP value	—	R	—	—	4.2.2
25-20	NRatio fDP Status	Status information on NRatio fDP	Sensor Failure	R	—	—	4.2.2
			Device Failure				
			Uncertain				
			Invalid Ref				
Good							

Diagnostics ► Diag Parameters ► ILBD Parameters ► Status ► Diag Reference

No.	Label	Item	Contents	R/W	Default Value	Unit	Refer
25-21	Diag Description	Concerning pressure conduit detection field of notes	32 characters (alphanumeric, numeric, symbols)	R/W	—	—	4.2.2
25-22	Ref fDP	fDP, the criterion for detecting blockage, obtained during steady operation	—	R	—	—	4.2.2
25-23	Ref fDP Status	fDP status obtained during steady operation, which is the criterion for detecting blockage	Sensor Failure	R	—	—	4.2.2
			Device Failure				
			Uncertain				
			Invalid Ref				
25-24	Ref fSPI	fSPI, the criterion for detecting blockage, obtained during steady operation	—	R	—	—	4.2.2
			—				
			—				
			—				
25-25	Ref fSPI Status	fSPI status obtained during steady operation, which is the criterion for detecting blockage	Sensor Failure	R	—	—	4.2.2
			Device Failure				
			Uncertain				
			Invalid Ref				
25-26	Ref fSPH	fSPH, the criterion for detecting blockage, obtained during steady operation	—	R	—	—	4.2.2
			—				
			—				
			—				
25-27	Ref fSPH Status	fSPH status obtained during steady operation, which is the criterion for detecting blockage	Sensor Failure	R	—	—	4.2.2
			Device Failure				
			Uncertain				
			Invalid Ref				
25-28	Ref BlKF	BlKF, the criterion for detecting blockage, obtained during steady operation	—	R	—	—	4.2.2
			—				
			—				
			—				
25-29	Ref BlKF Status	The status of BlKF obtained during steady operation, which is the basis for detecting blockages	Sensor Failure	R	—	—	4.2.2
			Device Failure				
			Uncertain				
			Invalid Ref				
25-30	Ref DPavg	DPavg obtained during steady-state operation	—	R	—	—	4.2.2
			—				
			—				
			—				
25-31	Ref DPavg Status	DPavg status obtained during steady-state operation	Sensor Failure	R	—	—	4.2.2
			Device Failure				
			Uncertain				
			Invalid Ref				
Diagnostics ▶ Diag Parameters ▶ ILBD Parameters ▶ Status ▶ Fluct Variables							
25-32	fDP	Differential pressure/Average sum of squares of pressure fluctuation	—	R	—	—	4.2.2
25-33	fDP Status	Status of differential pressure/average square sum of pressure fluctuation	Sensor Failure	R	—	—	4.2.2
			Device Failure				
			Uncertain				
			Good				

No.	Label	Item	Contents	R/W	Default Value	Unit	Refer
25-34	fSPI	Squared mean value of low pressure side static pressure fluctuation	—	R	—	—	4.2.2
25-35	fSPI Status	Status of the squared mean value of the low pressure side static pressure fluctuation	Sensor Failure	R	—	—	4.2.2
			Device Failure				
			Uncertain				
			Good				
25-36	fSPH	Squared mean value of low pressure side static pressure fluctuation	—	R	—	—	4.2.2
25-37	fSPH Status	Status of the squared mean value of the low pressure side static pressure fluctuation	Sensor Failure	R	—	—	4.2.2
			Device Failure				
			Uncertain				
			Good				
Diagnostics ▶ Diag Parameters ▶ ILBD Parameters ▶ Configuration ▶ Configuration							
25-38	Set Diag Mode	ILBD Operation Modes	—	M	—	—	4.2.2
25-39	Diag Period	Sumprimg time per Count (Diag Supp Count)	20 to 65535	R/W	180	s	4.2.2
25-40	Diag Supp Count	Detection count to generate an alarm	1 to 255	R/W	3	—	4.2.2
25-41	Diag DP Comp	Setting of correction for pressure fluctuation parameter Ratio fDP. Compensation: Ratio fDP with correction Non-Compensation: Ratio fDP without correction	Compensation,	R/W	Compensation	—	4.2.2
			Non-Compensation				
Diagnostics ▶ Diag Parameters ▶ ILBD Parameters ▶ Configuration ▶ Diag Lim							
25-42	Lim fDPmax	Upper limit for Ratio fDP to detect the blockage.	—	R/W	— (*1)	—	4.2.2
25-43	Lim fDPmin	Lower limit for Ratio fDP to detect the blockage.	—	R/W	— (*1)	—	4.2.2
25-44	Lim fSPImax	Upper limit for Ratio fSPI to detect the blockage.	—	R/W	— (*1)	—	4.2.2
25-45	Lim fSPImin	Lower limit for Ratio fSPI to detect the blockage	—	R/W	— (*1)	—	4.2.2
25-46	Lim fSPHmax	Upper limit for Ratio fSPH to detect the blockage.	—	R/W	— (*1)	—	4.2.2
25-47	Lim fSPHmin	Lower limit for Ratio fSPH to detect the blockage.	—	R/W	— (*1)	—	4.2.2
25-48	Lim BlkFmax	Upper limit for BlkF to detect the blockage.	—	R/W	— (*1)	—	4.2.2

No.	Label	Item	Contents	R/W	Default Value	Unit	Refer
25-49	Lim BlkFmin	Lower limit for BlkF to detect the blockage.	—	R/W	— (*1)	—	4.2.2
25-50	Lim DPAvgmax	Upper limit for DPAvg.	—	R/W	— (*1)	—	4.2.2
25-51	Lim DPAvgmin	Lower limit for DPAvg.	—	R/W	— (*1)	—	4.2.2
Diagnostics ▶ Diag Parameters ▶ ILBD Parameters ▶ Configuration ▶ Diag Reference							
25-52	Diag Description	Memo feild on detecting blockages in impulse lines	32 characters (alphanumeric,numeric, symbols)	R/W	space 32 characters	—	4.2.2
25-53	Ref fDP	fDP value obtained during steady operation, which is the criterion for detecting blockage	—	R/W	0.0	—	4.2.2
25-54	Ref fSPI	The value of fSPI obtained during steady operation, which is the criterion for detecting blockage	—	R/W	0.0	—	4.2.2
25-55	Ref fSPh	The value of fSPh obtained during steady operation, which is the criterion for detecting blockage	—	R/W	0.0	—	4.2.2
25-56	Ref BlkF	The value of Blkf obtained during steady operation, which is the criterion for detecting blockage	—	R/W	0.0	—	4.2.2
25-57	Ref DPAvg	The value of DPavg obtained during steady operation, which is the criterion for detecting blockage	—	R/W	0.0	—	4.2.2
Diagnostics ▶ Diag Parameters ▶ ILBD Parameters ▶ Configuration ▶ Diag Ref Lim							
25-58	Ref Lim fDPmin	Lower limit of the average sum of squares of differential pressure fluctuation (Ref fDP) obtained by the reference value measurement Can be set when Diag Mode is Stop	—	R/W	7.0E-1.0	—	4.2.2
25-59	Ref Lim fSPmin	Lower limit of static pressure fluctuation squared mean (Ref fSPI, fSPh) obtained by reference value measurement Can be set when Diag Mode is Stop	—	R/W	1.00E-09	—	4.2.2

No.	Label	Item	Contents	R/W	Default Value	Unit	Refer
25-60	Ref Lim BlkFmax	Upper limit of F value (Ref BlkF) obtained by reference value measurement	—	R/W	0.5	—	4.2.2
		Can be set when Diag Mode is Stop					
Pressure Conduction Tube Blocking Detection Function (Optional Code/DG1 is Selected)							
Diagnostics ▶ Diag Parameters ▶ HT Parameters							
26-1	Sensor Temp	Sensor temperature value	—	R	—	As of Temp Unit setting	4.2.3
26-2	Device Temp	Main unit temperature value	—	R	—	As of Temp Unit setting	4.2.3
26-3	Flange temp	Flange temperature value	—	R	—	As of Temp Unit setting	4.2.3
26-4	Flange Temp Coef	Sets coefficients for calculating flange temperature	—	R/W	0.0	—	4.2.3
26-5	Flange Temp Hi Alarm Value	Set the upper limit for judging the flange to be abnormally high temperature	—	R/W	130.00	As of Temp Unit setting	4.2.3
26-6	Flange Temp Lo Alarm Value	Set the lower limit for judging the flange to be abnormally low temperature	—	R/W	-50.00	As of Temp Unit setting	4.2.3
Device Information							
Device Settings ▶ Basic Setup ▶ Device Information							
27-1	Model	Model	16 characters (alphabet, numbers, symbols)	R/W	"EJX S"		
Device Settings ▶ Detailed Setup ▶ Device Information ▶ Field Device Information							
27-2	Model and Suffix Codes 1	MS Code 1	32 characters (alphabet, numbers, symbols)	R	— (*1)	—	—
27-3	Model and Suffix Codes 2	MS Code 2	32 characters (alphabet, numbers, symbols)	R	— (*1)	—	—
27-4	Model and Suffix Codes 3	MS Code 3	32 characters (alphabet, numbers, symbols)	R	— (*1)	—	—
27-5	HART Protocol Revision	Revision of HART Communication	7	R	7	—	—
27-6	Device Revision	Device Revision	1	R	1	—	—
27-7	Main Module Comm SW Revision	Software revision of the main module communication section	16 characters (alphabet, numbers, symbols)	R	—	—	—
27-8	Main Module HW Revision	Main module hardware revision	8 characters (alphabet, numbers, symbols)	R	—	—	—
Device Settings ▶ Detailed Setup ▶ Device Information ▶ Additional Information							
27-9	Style No	Device Style Number	8 characters (alphabet, numbers, symbols)	R	—	—	—

No.	Label	Item	Contents	R/W	Default Value	Unit	Refer
27-10	Serial No	Device serial number	16 characters (alphabet, numbers, symbols)	R	—	—	—
27-11	Manufacture Date	Date of manufacture of the device	1900/01/01 to 2155/12/31	R	—	—	—
27-12	Special Order ID	Special Order No.	32 characters (alphabet, numbers, symbols)	R	—	—	—
27-13	Main Module Parts No	Main Module Parts Number	16 characters (alphabet, numbers, symbols)	R	—	—	—
27-14	Main Module Serial No	Main Module Serial No	16 characters (alphabet, numbers, symbols)	R	—	—	—
27-15	Main Module Manufacture Date	Manufacturing date of the main module	1900/01/01 to 2155/12/31	R	—	—	—
27-16	Main Module HW Revision	Main module hardware revision	8 characters (alphabet, numbers, symbols)	R	—	—	—
27-17	Main Module Comm SW Revision	Main module communication section software revision	16 characters (alphabet, numbers, symbols)	R	—	—	—
27-18	Main Module SC SW Revision	Main module: Vision with software for conversion	16 characters (alphabet, numbers, symbols)	R	—	—	—
27-19	Indicator Module SW Revision	Indicator Module Software Revision	16 characters (alphabet, numbers, symbols)	R	—	—	—
27-20	DPharp Sensor Module Parts No	DPharp Sensor Module Parts No	16 characters (alphabet, numbers, symbols)	R	—	—	—
27-21	DPharp Sensor Module Serial No	DPharp Sensor Module Serial No	16 characters (alphabet, numbers, symbols)	R	—	—	—
27-22	DPharp Sensor Module Manufacture Date	DPharp Sensor Module Manufacture Date	1900/01/01 to 2155/12/31	R	—	—	—
27-23	DPharp Sensor Module HW Revision	DPharp Sensor Module Hardware Revision	8 characters (alphabet, numbers, symbols)	R	—	—	—
27-24	DPharp Sensor Module SW Revision	DPharp Sensor Module Software Revision	16 characters (alphabet, numbers, symbols)	R	—	—	—
27-25	Sensor Serial No	DPharp Sensor Serial No	16 characters (alphabet, numbers, symbols)	R	—	—	—
27-26	Sensor Manufacture Date	DPharpSensor Manufacture Date	1900/01/01 to 2155/12/31	R	—	—	—
27-27	Final Assembly Number	Device number defined by the HART communication standard	0 to 16777215	R/W	—	—	—

No.	Label	Item	Contents	R/W	Default Value	Unit	Refer
27-28	Device Identifier	Device ID defined by the HART communication standard	0x000001 to 0xFFFFF	R	—	—	—
27-29	Distributor	Distributor	—	R	Yokogawa	—	—
27-30	Last Device Variable	Maximum value of identifier for device variables in HART standard	—	R	2	—	—
27-31	Device Profile	HART Standard Device Profile	—	R	Process Automation Device	—	—
27-32	Option Password	Password for adding features	—	R/W	—	—	—
Diagnostics ▶ Status ▶ Others							
27-33	Configuration Change Counter	Number of times device settings have been changed	0 to 65535	R	0	—	—
27-34	Reset Configuration Change Flag	Resets the configuration change flag defined by the HART communication standard.	—	M	—	—	—
Device Settings ▶ Detailed Setup ▶ Device Information ▶ Sensor Information							
27-35	Process Connection Type	Flange type	Conventional	R/W	— (*1)	—	—
			Remote seal				
			Level				
			Thread				
			Unknown				
			Spcl				

No.	Label	Item	Contents	R/W	Default Value	Unit	Refer
27-36	Process Connection Size	Flange size	ANSI3, C150	R/W	— (*1)	—	—
			ANSI3, C300				
			ANSI3, C600				
			ANSI4, C150				
			ANSI4, C300				
			ANSI2, C150				
			ANSI2, C300				
			ANSI2, C600				
			DIN80, PN10/16				
			DIN80, PN25/40				
			DIN80, PN64				
			DIN100, PN10/16				
			DIN100, PN25/40				
			DIN50, PN10/16				
			DIN50, PN25/40				
			DIN50, PN64				
			ANSI 150				
			ANSI 300				
			ANSI 600				
			DIN 10/16				
			DIN 25/40				
			DIN 64				
			1/2NPT Female				
			1/4NPT Female				
			Rc 1/2 Female				
			1/2NPT Male				
G 1/2 Male							
M2O * 1.5 Male							
R 1/2 Male							
None							
Unknown							
Spcl							
27-37	Process Connection Material	Flange Material	Carbon Steel	R/W	— (*1)	—	—
			316 SST				
			Hast-C				
			Monel				
			316L SST				
			Duplex SST				
			Unknown				
			Spcl				
27-38	Isolator Material	Material of capsule	Hast-C	R/W	— (*1)	—	—
			Monel				
			Tantalum				
			316L SST				
			Unknown				
			Spcl				
27-39	Gasket Material	Gasket Material	PTFE	R/W	— (*1)	—	—
			316L SST				
			Unknown				
			Spcl				
27-40	Drain and Vent Plug Material	Bent Plug Material Information	316 SST	R/W	— (*1)	—	—
			Hast-C				
			Monel				
			316L SST				
			Duplex SST				
			None				
			Unknown				
Spcl							

No.	Label	Item	Contents	R/W	Default Value	Unit	Refer
27-41	Fill Fluid	Material of sealed liquid	Si Oil	R/W	— (*1)	—	—
			F Oil				
			Unknown				
			Spcl				
27-42	Number of Remote Seal	Number of diaphragm seals	One seal	R/W	— (*1)	—	—
			Two Seals				
			None				
			Unknown				
27-43	Remote Seal Type	Diaphragm Seal Types Information	Wafer	R/W	— (*1)	—	—
			Extension				
			HTV-W				
			HTV-E				
			None				
			Unknown				
Spcl							
27-44	Remote Seal Material	Diaphragm Seal Material	316 SST	R/W	— (*1)	—	—
			Hast-C				
			Monel				
			Tantalum				
			Titanium				
			316 L SST				
			None				
			Unknown				
			Spcl				
27-45	Remote Seal Fill Fluid	Diaphragm seal seal liquid material	Silicone	R/W	— (*1)	—	—
			SH704				
			SH705				
			Ethy Gly/H2O				
			Prop Gly/H2O				
			None				
			Unknown				
Spcl							
Diagnostics ▶ Event log							
27-46	Startup Event Log View	View the startup event log	—	M	—	—	3.3.21
27-47	Alarm Event Log View	View the alarm event log	—	M	—	—	3.3.21
27-48	Write Event Log View	View the log of write events	Target specific parameters only	M	—	—	3.3.21
27-49	Operation Time for Service	Information for maintenance	—	R	—	—	—
27-50	Internal Data 0 to 600	Information for maintenance	—	R	—	—	—
Device Settings ▶ Detailed Setup ▶ Output Condition ▶ HART Output ▶ HART Output							
27-51	Number Request Preambles	Number of preambles required for reception	—	R	2	—	—
27-52	Number Response Preambles	Number of preambles used in transmission	—	R	5	—	—
NE107 Status Information							
Device Settings ▶ Basic Setup ▶ Device Information							
28-1	NE107 Status	NE107 Status	Failure	R	—	—	4.1.1.3
			Function Check				
			Out of Specification				
			Maintenance Required				
Diagnostics ▶ Condensed Status Map ▶ Status Map ▶ Field Device Status ▶ Device Status							

No.	Label	Item	Contents	R/W	Default Value	Unit	Refer
28-2	Primary Variable Out of Limits Map	NE107 status setting when differential pressure/pressure value is outside normal range	See Alarm List	R/W	Out of specification	—	4.3
28-3	Non-Primary Variable Out of Limits Map	NE107 status setting when a process value other than the differential pressure/pressure value is outside the normal range	See Alarm List	R/W	Out of specification	—	4.3
28-4	Loop Current Saturated Map	NE107 status setting when the current value is at the upper or lower limit	See Alarm List	R/W	Out of specification	—	4.3
28-5	Loop Current Fixed Map	Sets the NE107 status when the current value is fixed	See Alarm List	R/W	No effect	—	4.3
28-6	More Status Available Map	NE107 Status setting when there is an unconfirmed device status	See Alarm List	R	No effect	—	4.3
28-7	Cold Start Map	NE107 status setting when equipment cold start occurs	See Alarm List	R	No effect	—	4.3
28-8	Configuration Changed Map	NE107 status settings when settings are changed	See Alarm List	R	No effect	—	4.3
28-9	Device Malfunction Map	NE107 Status setting when device failure occurs	See Alarm List	R/W	No effect	—	4.3
Diagnostics ▶ Condensed Status Map ▶ Status Map ▶ Field Device Status ▶ Extended Device Status							
28-10	Maintenance Required Map	NE107 status setting indicates that maintenance is required in the near or some future future	See Alarm List	R	No effect	—	4.3
28-11	Device Variable Alert Map	NE107 status setting when there is a problem with the device variable state	See Alarm List	R/W	Out of specification	—	4.3
28-12	Failure Map	NE107 Status setting when part failure, equipment failure or total failure occurs	See Alarm List	R	No effect	—	4.3
28-13	Out of Specification Map	NE107 status setting when the device is operating outside of specifications or is in an undefined state due to the process or environment	See Alarm List	R	No effect	—	4.3

No.	Label	Item	Contents	R/W	Default Value	Unit	Refer
28-14	Function Check Map	NE107 status setting when the output signal is temporarily abnormal due to local operation or manual input value being input	See Alarm List	R	No effect	—	4.3
Diagnostics ▶ Condensed Status Map ▶ Status Map ▶ Field Device Status ▶ Device Diagnostic Status 0							
28-15	Device Variable Simulation Active Map	NE107 Status setting when one or more device variables are in simulation state	See Alarm List	R/W	Function check	—	4.3
28-16	Non-Volatile Memory Defect Map	NE107 Status setting when non-volatile memory is abnormal	See Alarm List	R/W	Failure	—	4.3
28-17	Environmental Conditions Out of Range Map	NE107 Status setting when the internal or external environment of the device is out of tolerance	See Alarm List	R/W	Out of specification	—	4.3
28-18	Electronic Defect Map	NE107 Status setting when there is an abnormality in hardware other than the sensor	See Alarm List	R/W	Failure	—	4.3
28-19	Device Configuration Locked Map	NE107 status setting when write-protected	See Alarm List	R/W	No effect	—	4.3
Diagnostics ▶ Condensed Status Map ▶ Status Map ▶ Field Device Status ▶ Device Diagnostic Status 1							
28-20	Status Simulation Active Map	NE107 Status setting during status simulation	See Alarm List	R	No Effect	—	4.3
28-21	Event Notification Overflow Map	NE107 Status setting when the event holding queue generated by the Event Notification function overflows	See Alarm List	R/W	No Effect	—	4.3
Diagnostics ▶ Condensed Status Map ▶ Status Map ▶ Hardware Failure ▶ Status Group 1							
28-22	Pressure Sensor Module Error Map	NE107 Status setting when pressure sensor is abnormal	See Alarm List	R/W	Failure	—	4.3
28-23	Main Module CPU 1 Error Map	NE107 status setting when an error occurs in CPU1 of the main module	See Alarm List	R/W	Failure	—	4.3
28-24	Main Module CPU 1 EEPROM Error Map	NE107 status setting when there is an abnormality in the non-volatile memory used by CPU1 of the main module	See Alarm List	R/W	Failure	—	4.3
28-25	Main Module CPU 2 Error Map	NE107 status setting when there is an error in CPU2 of the main module	See Alarm List	R/W	Failure	—	4.3

No.	Label	Item	Contents	R/W	Default Value	Unit	Refer
28-26	Main Module CPU 2 EEPROM Error Map	NE107 status setting when there is an abnormality in the non-volatile memory used by CPU2 of the main module	See Alarm List	R/W	Failure	—	4.3
Diagnostics ▶ Condensed Status Map ▶ Status Map ▶ Hardware Failure ▶ Status Group 2							
28-27	Device Temperature Sensor Error Map	NE107 Status setting when there is an abnormality in the main body temperature sensor	See Alarm List	R/W	Failure	—	4.3
28-28	Sensor Module Comm Error Map	NE107 status setting when there is an error in communication with the sensor module	See Alarm List	R/W	Failure	—	4.3
28-29	Main Module Internal Comm Error Map	NE107 Status setting when there is an error in the communication inside the main module	See Alarm List	R/W	Failure	—	4.3
28-30	No Device ID Map	NE107 Status Settings when Device ID is not set	See Alarm List	R/W	Failure	—	4.3
Diagnostics ▶ Condensed Status Map ▶ Status Map ▶ Transducer Status ▶ Status Group 3							
28-31	Pressure Outside Limit Map	NE107 Status setting when differential pressure/pressure value exceeds specification range	See Alarm List	R/W	Out of specification	—	4.3
28-32	Static Pressure Outside Limit Map	NE107 Status setting when static pressure value exceeds specification range	See Alarm List	R/W	Out of specification	—	4.3
28-33	Sensor Temperature Outside Limit Map	NE107 Status setting when the sensor temperature exceeds the specified range (-50 to 130°C)	See Alarm List	R/W	Out of specification	—	4.3
28-34	Device Temperature Outside Limit Map	NE107 status setting when the body temperature exceeds the specified range (-50 to 95°C)	See Alarm List	R/W	Out of specification	—	4.3
Diagnostics ▶ Condensed Status Map ▶ Status Map ▶ Transducer Status ▶ Status Group 4							
28-35	Pressure Over Range Map	NE107 Status setting when differential pressure/pressure value exceeds the set range	See Alarm List	R/W	Out of specification	—	4.3
28-36	Static Pressure Over Range Map	NE107 Status setting when static pressure value exceeds the set range	See Alarm List	R/W	Out of specification	—	4.3

No.	Label	Item	Contents	R/W	Default Value	Unit	Refer
Diagnostics ▶ Condensed Status Map ▶ Status Map ▶ Transducer Status ▶ Status Group 5							
28-37	Pressure High Alarm Map	NE107 Status setting when the differential pressure/pressure value exceeds the set upper threshold	See Alarm List	R/W	No effect	—	4.3
28-38	Pressure Low Alarm Map	NE107 Status setting when the differential pressure/pressure value is below the set lower threshold	See Alarm List	R/W	No effect	—	4.3
28-39	Static Pressure High Alarm Map	NE107 Status setting when static pressure value exceeds the set upper threshold	See Alarm List	R/W	No effect	—	4.3
28-40	Static Pressure Low Alarm Map	NE107 Status setting when static pressure value is below the set lower threshold	See Alarm List	R/W	No effect	—	4.3
28-41	Sensor Temperature High Alarm Map	NE107 Status setting when the sensor temperature exceeds the set upper threshold	See Alarm List	R/W	No effect	—	4.3
28-42	Sensor Temperature Low Alarm Map	NE107 Status setting when the sensor temperature is below the set lower threshold	See Alarm List	R/W	No effect	—	4.3
Diagnostics ▶ Condensed Status Map ▶ Status Map ▶ Configuration ▶ Status Group 6							
28-43	Illegal Pressure LRV Map	NE107 Status setting when the differential pressure/pressure LRV setting is outside the setting range	See Alarm List	R/W	Function check	—	4.3
28-44	Illegal Pressure URV Map	NE107 Status setting when differential pressure/pressure URV setting value is outside the setting range	See Alarm List	R/W	Function check	—	4.3
28-45	Illegal Pressure SPAN Map	NE107 Status setting when differential pressure/pressure span setting value is outside the setting range	See Alarm List	R/W	Function check	—	4.3
28-46	Pressure SPAN Trim Error Map	NE107 Status setting when the span adjustment amount of differential pressure/pressure adjustment is outside the adjustable range	See Alarm List	R/W	Function check	—	4.3

No.	Label	Item	Contents	R/W	Default Value	Unit	Refer
28-47	Pressure ZERO Trim Error Map	NE107 Status setting when the zero point adjustment amount of the differential pressure/pressure adjustment is outside the adjustable range	See Alarm List	R/W	Function check	—	4.3
28-48	Illegal Static Pressure LRV Map	NE107 Status setting when static pressure LRV setting value is outside the setting range	See Alarm List	R/W	Function check	—	4.3
28-49	Illegal Static Pressure URV Map	NE107 Status setting when static pressure URV setting value is outside the setting range	See Alarm List	R/W	Function check	—	4.3
28-50	Illegal Static Pressure SPAN Map	NE107 Status setting when static pressure span setting value is outside the setting range	See Alarm List	R/W	Function check	—	4.3
Diagnostics ▶ Condensed Status Map ▶ Status Map ▶ Configuration ▶ Status Group 7							
28-51	Static Pressure SPAN Trim Error Map	NE107 Status setting when the static pressure span adjustment amount is outside the adjustable range	See Alarm List	R/W	Function check	—	4.3
28-52	Static Pressure ZERO Trim Error Map	NE107 Status setting when the static pressure zero point adjustment amount is outside the adjustable range	See Alarm List	R/W	Function check	—	4.3
28-53	Signal Characterizer Config Error Map	NE107 Status setting when the set value of the broken line approximation is not monotonically increasing	See Alarm List	R/W	Function check	—	4.3
28-54	Burnout Config Error Map	NE107 Status setting when the burnout setting is out of range	See Alarm List	R/W	Function check	—	4.3
Diagnostics ▶ Condensed Status Map ▶ Status Map ▶ Diagnostics ▶ Status Group 8							
28-55	Flange Temperature High Alarm Map	NE107 Status setting when flange temperature exceeds upper limit	See Alarm List	R/W	Maintenance request	—	4.3
28-56	Flange Temperature Low Alarm Map	NE107 Status setting when flange temperature is below lower limit	See Alarm List	R/W	Maintenance request	—	4.3

No.	Label	Item	Contents	R/W	Default Value	Unit	Refer
28-57	Invalid Ref fDP Map	NE107 status setting when the differential pressure/pressure fluctuation is insufficient for blocking detection and blocking detection is not performed	See Alarm List	R/W	Function check	—	4.3
28-58	Invalid Ref fSPI Map	NE107 status setting when the fluctuation of the low pressure side static pressure is not sufficient for blockage detection and blockage detection is not performed	See Alarm List	R/W	Function check	—	4.3
28-59	Invalid Ref fSPH Map	NE107 status setting when the fluctuation of the high-pressure side static pressure is not sufficient for blockage detection and blockage detection is not performed	See Alarm List	R/W	Function check	—	4.3
28-60	Invalid Ref BlkF Map	NE107 Status Setting When BlkF Cannot Be Used for Blockage Detection	See Alarm List	R/W	Function check	—	4.3
28-61	ILBD Over Range Map	NE107 Status Setting when the DPavg value is outside the range of values that can detect blockage	See Alarm List	R/W	No effect	—	4.3
Diagnostics ▶ Condensed Status Map ▶ Status Map ▶ Diagnostics ▶ Status Group 9							
28-62	B Blocking Map	NE107 Status setting when Blocking (both sides blocked) is detected	See Alarm List	R/W	Maintenance request	—	4.3
28-63	High Side Blocking Map	NE107 Status setting when a blockage is detected on the high pressure side	See Alarm List	R/W	Maintenance request	—	4.3
28-64	Low Side Blocking Map	NE107 Status setting when a blockage is detected on the low pressure side	See Alarm List	R/W	Maintenance request	—	4.3
28-65	Large Fluctuation of High Side Map	NE107 Status setting when the high pressure side pressure fluctuation is too large	See Alarm List	R/W	Maintenance request	—	4.3

No.	Label	Item	Contents	R/W	Default Value	Unit	Refer
28-66	Large Fluctuation of Low Side Map	NE107 Status setting when the pressure fluctuation on the low pressure side is too large	See Alarm List	R/W	Maintenance request	—	4.3
28-67	A Blocking Map	NE107 Status setting when A Blocking (one-side blockage) is detected	See Alarm List	R/W	Maintenance request	—	4.3
Diagnostics ▶ Condensed Status Map ▶ Status Map ▶ Simulate Mode ▶ Status Group 10							
28-68	Pressure Simulate Mode Active Map	NE107 Status Settings when Differential Pressure/ Pressure Device Variable Simulation is Running	See Alarm List	R/W	Function check	—	4.3
28-69	Static Pressure Simulate Mode Active Map	Static Pressure Device Variables NE107 Status Settings when Simulation is Running	See Alarm List	R/W	Function check	—	4.3
28-70	Sensor Temperature Simulate Mode Active Map	Sensor Temperature Device Variable NE107 Status Settings when Simulation is Running	See Alarm List	R/W	Function check	—	4.3
28-71	Analog Output Simulate Mode Active Map	NE107 Status Settings when 4 to 20 mA output simulation is running	See Alarm List	R/W	Function check	—	4.3
Diagnostics ▶ Condensed Status Map ▶ Others							
28-72	Reset Condensed Status Map	Condensed Status Map Restore settings to default	—	M	—	—	—
Internal Device Information							
Device Settings ▶ Detailed Setup ▶ Device Information ▶ Service Information							
29-1	Info 01-15	Information for maintenance	—	R	0	—	—
29-16	Test Key	Information for maintenance	—	M	—	—	—
Functional safety							
Device Settings ▶ Basic Setup ▶ Device Information							
Device Settings ▶ Detailed Setup ▶ Device Information ▶ Field Device Information							
30-1	Functional Safety Mode	Functional safety mode setting	On/Off	R/W	Off	—	—

*1: It depends on the order specifications or specified suffix and option code.

*2: It is converted according to units.

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Appendix 1. Installation of Safety Instrumented Systems

When using this transmitter as a Safety Instrumented Systems (SIS) application, be sure to observe the instructions and procedures described in the following Functional Safety Manual in order to maintain the safety level of this transmitter.

Model	Document Number	Certification Authority
EJX S series	TI 01C33A01-01Z1	TUV Rheinland

The Functional Safety Manual can be downloaded from our company website.

Address on our company website:

<https://www.yokogawa.com/solutions/products-platforms/field-instruments/>

In this case, it is necessary to set the range and unit using the setting tool corresponding to the HART communication type. For details, refer to the section on setting the measurement range.

After installing the transmitter, make sure that the range and unit are set correctly. Calibrate the transmitter after setting Parameter.

Appendix 2. ILBD Check List

Fill out the below checklist according to the operation flow of the ILBD in order to keep the important information for the blockage detection.

Checklist (1/5)

No.	Items	Parameters	Result	Example
1	4 to 20 mA Analog Signal Setting • Select the output mode when an alarm is generated.	Diag Out Option	Off: <input type="checkbox"/>	<input checked="" type="checkbox"/>
			Burnout: <input type="checkbox"/>	<input type="checkbox"/>
			Fall back: <input type="checkbox"/>	<input type="checkbox"/>
		Diag Fixed Out Value	mA	22.4 mA
2	Stability of Pres (differential pressure/pressure) under normal condition • Check that the status of Pres is "GOOD". • Check the maximum and minimum values of Pres .	Status		Good
		Pres	Max.: Min.:	Max.: 12.3 kPa Min.: 12.1 kPa
3	fDP under normal condition • Check that the value of fDP is more than 7×10^{-10} .	fDP	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4	Start to obtain Reference values • Set "Reference" to Diag Mode .	Diag Mode	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5	End of Reference Value Sampling • Check that Diag Mode is "Calculation" after the time set to "Diag Period" passed.	Diag Mode	<input type="checkbox"/>	<input checked="" type="checkbox"/>
6	Alarm setting • Record the status of Checkbox in Diag Error Selection .	Diag Error Selection		
		A Blocking	<input type="checkbox"/>	<input checked="" type="checkbox"/>
		Large Fluct L	<input type="checkbox"/>	<input checked="" type="checkbox"/>
		Large Fluct H	<input type="checkbox"/>	<input checked="" type="checkbox"/>
		L Side Blocking	<input type="checkbox"/>	<input checked="" type="checkbox"/>
		H Side Blocking	<input type="checkbox"/>	<input checked="" type="checkbox"/>
		B Blocking	<input type="checkbox"/>	<input checked="" type="checkbox"/>
		Invalid Ref F	<input type="checkbox"/>	<input checked="" type="checkbox"/>
		Invalid Ref SPH	<input type="checkbox"/>	<input type="checkbox"/>
		Invalid Ref SPL	<input type="checkbox"/>	<input type="checkbox"/>
		Invalid Ref DP	<input type="checkbox"/>	<input checked="" type="checkbox"/>
ILBD over range	<input type="checkbox"/>	<input type="checkbox"/>		
7	Alarm status • Check the alarm status shown in Diag Error . • Check that the alarm status of "ILBD over range" is not shown in Diag Error .	Diag Error		
		A Blocking	<input type="checkbox"/>	<input type="checkbox"/>
		Large Fluct L	<input type="checkbox"/>	<input type="checkbox"/>
		Large Fluct H	<input type="checkbox"/>	<input type="checkbox"/>
		L Side Blocking	<input type="checkbox"/>	<input type="checkbox"/>
		H Side Blocking	<input type="checkbox"/>	<input type="checkbox"/>
		B Blocking	<input type="checkbox"/>	<input type="checkbox"/>
		Invalid Ref F	<input type="checkbox"/>	<input checked="" type="checkbox"/>
		Invalid Ref SPH	<input type="checkbox"/>	<input type="checkbox"/>
		Invalid Ref SPL	<input type="checkbox"/>	<input type="checkbox"/>
		Invalid Ref DP	<input type="checkbox"/>	<input type="checkbox"/>
		ILBD over range	<input type="checkbox"/>	<input type="checkbox"/>

No.	Items	Parameters	Result	Example
8	ILBD parameters • Record the values of parameters for ILBD operation. • Check the status of parameters for ILBD operation. *: Record the value after checked that the status of each parameter is "GOOD"	Diag Period		180
		Lim fDPmax		3.000000
		Lim fDPmin		0.300000
		Lim fSPlmax		5.000000
		Lim fSPlmin		0.500000
		Lim fSPHmax		5.000000
		Lim fSPHmin		0.500000
		Lim BlkFmax		0.600000
		Lim BlkFmin		-0.600000
		Lim DPAvgmax		1.000000
		Lim DPAvgmin		0.050000
		Diag Supp Count		3
		Ref fDP*		7.43245E-09
		Ref fSPl*		7.25765E-09
		Ref fSPH*		7.18374E-09
		Ref DPAvg*		5.36425E+00
		fDP*		7.48562E-09
		fSPl*		7.23277E-09
		fSPH*		7.14085E-09
		BlkF*		-0.287259
DPAvg*		0.055957		

Go to the following step according to the result of "Invalid Ref xx" shown in the Diag Error of 8th check item.

Diag Error		
Invalid Ref SPH	Invalid Ref SPL	Invalid Ref DP
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

→
→

Check item
9-a
9-b

- : The alarm is generated.
- : The alarm is not generated.

No.	Items	Parameters	Result	Example
9-a	Simulation of Blockage detection operation <ul style="list-style-type: none"> H Side Blocking: 9-a-1 L Side Blocking: 9-a-2 Both Side Blocking: 9-a-3 			
9-a-1	H Side Blocking <ul style="list-style-type: none"> Close the high-pressure side valve completely. 			
	<ul style="list-style-type: none"> Record the values in the right column after the certain time, (Diag Period X Diag Supp Count), passed. *: Record the value after checked that the status is "GOOD".	fDP*		3.74856E-08
		fSPI*		6.23277E-09
		fSPh*		1.51409E-10
		BlkF		0.8658873
	<ul style="list-style-type: none"> Record the status of Checkbox in Diag Error Selection. Check that the alarms status of "A Blocking" and "H Side Blocking" are set. Note: If the alarm of "ILBD over range" is generated, the valve may be closed too much tightly. Open valve a little and record the updated status of the parameters.	Diag Error Selection		
		A Blocking	<input type="checkbox"/>	<input checked="" type="checkbox"/>
		Large Fluct L	<input type="checkbox"/>	<input type="checkbox"/>
		Large Fluct H	<input type="checkbox"/>	<input type="checkbox"/>
		L Side Blocking	<input type="checkbox"/>	<input type="checkbox"/>
		H Side Blocking	<input type="checkbox"/>	<input checked="" type="checkbox"/>
		B Blocking	<input type="checkbox"/>	<input type="checkbox"/>
		Invalid Ref F	<input type="checkbox"/>	<input type="checkbox"/>
		Invalid Ref SPH	<input type="checkbox"/>	<input type="checkbox"/>
Invalid Ref SPL		<input type="checkbox"/>	<input type="checkbox"/>	
Invalid Ref DP	<input type="checkbox"/>	<input type="checkbox"/>		
ILBD over range	<input type="checkbox"/>	<input type="checkbox"/>		
<ul style="list-style-type: none"> Check that the alarm of "H Side Blocking" is generated. Check that the alarm of "L Side Blocking" is not generated. 	Diag Error			
	L Side Blocking	<input type="checkbox"/>	<input type="checkbox"/>	
	H Side Blocking	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
9-a-2	L Side Blocking <ul style="list-style-type: none"> Close the low-pressure side valve completely. 			
	<ul style="list-style-type: none"> Record the values in the right column after the certain time, (Diag Period X Diag Supp Count), passed. *: Record the value after checked that the status is "GOOD".	fDP*		6.48562E-08
		fSPI*		2.23277E-10
		fSPh*		7.01528E-09
		BlkF		-0.827259
	<ul style="list-style-type: none"> Record the status of Checkbox in Diag Error Selection. Check that the alarms status of "A Blocking" and "L Side Blocking" are set. Note: If the alarm of "ILBD over range" is generated, the valve may be closed too much tightly. Open valve a little and record the updated status of the parameters.	Diag Error Selection		
		A Blocking	<input type="checkbox"/>	<input checked="" type="checkbox"/>
		Large Fluct L	<input type="checkbox"/>	<input type="checkbox"/>
		Large Fluct H	<input type="checkbox"/>	<input type="checkbox"/>
		L Side Blocking	<input type="checkbox"/>	<input checked="" type="checkbox"/>
		H Side Blocking	<input type="checkbox"/>	<input type="checkbox"/>
		B Blocking	<input type="checkbox"/>	<input type="checkbox"/>
		Invalid Ref F	<input type="checkbox"/>	<input type="checkbox"/>
		Invalid Ref SPH	<input type="checkbox"/>	<input type="checkbox"/>
Invalid Ref SPL		<input type="checkbox"/>	<input type="checkbox"/>	
Invalid Ref DP	<input type="checkbox"/>	<input type="checkbox"/>		
ILBD over range	<input type="checkbox"/>	<input type="checkbox"/>		
<ul style="list-style-type: none"> Check that the alarm of "L Side Blocking" is generated. Check that the alarm of "H Side Blocking" is not generated. 	Diag Error			
	L Side Blocking	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	H Side Blocking	<input type="checkbox"/>	<input type="checkbox"/>	

No.	Items	Parameters	Result	Example
9-a-3	Both Side Blocking			
	<ul style="list-style-type: none"> Close the both-pressure side valves completely. 			
	<ul style="list-style-type: none"> Record the values in the right column after the certain time, (Diag Period X Diag Supp Count), passed. 	fDP*		1.48562E-10
		fSPI*		1.72328E-10
		fSPh*		1.14085E-10
	*: Record the value after checked that the status is "GOOD".	BIKF		-0.387451
	<ul style="list-style-type: none"> Record the status of Checkbox in Diag Error Selection. Check that the alarms status of "H Side Blocking", "L Side Blocking", and "B Blocking" are set. 	Diag Error Selection		
		A Blocking	<input type="checkbox"/>	<input type="checkbox"/>
		Large Fluct L	<input type="checkbox"/>	<input type="checkbox"/>
		Large Fluct H	<input type="checkbox"/>	<input type="checkbox"/>
		L Side Blocking	<input type="checkbox"/>	<input checked="" type="checkbox"/>
		H Side Blocking	<input type="checkbox"/>	<input checked="" type="checkbox"/>
		B Blocking	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Note: If the alarm of "ILBD over range" is generated, the valve may be closed too much tightly. Open valve a little and record the updated status of the parameters.	Invalid Ref F	<input type="checkbox"/>	<input type="checkbox"/>
	Invalid Ref SPH	<input type="checkbox"/>	<input type="checkbox"/>	
	Invalid Ref SPL	<input type="checkbox"/>	<input type="checkbox"/>	
	Invalid Ref DP	<input type="checkbox"/>	<input type="checkbox"/>	
	ILBD over range	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> Check that the alarm of "B Blocking" is generated. 	Diag Error			
	B Blocking	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
9-b	Simulation of Blockage detection operation			
	<ul style="list-style-type: none"> Close completely the valve for the side where the alarm of Invalid Reference Value is not generated. 			
	For the case that the high-pressure side valve is closed;	fDP*		5.48562E-08
		fSPh*		7.14085E-11
	<ul style="list-style-type: none"> Record the values in the right column after the certain time, (Diag Period X Diag Supp Count), passed. 			
	*: Record the value after checked that the status is "GOOD".			
	For the case that the low-pressure side valve is closed;	fDP*		3.48562E-08
		fSPI*		1.12328E-10
	<ul style="list-style-type: none"> Record the values in the right column after the certain time, (Diag Period X Diag Supp Count), passed. 			
	*: Record the value after checked that the status is "GOOD".			
	<ul style="list-style-type: none"> Record the status of Checkbox in Diag Error Selection. Check that the alarms status of "B Blocking" is set. 	Diag Error Selection		
		A Blocking	<input type="checkbox"/>	<input type="checkbox"/>
		Large Fluct L	<input type="checkbox"/>	<input type="checkbox"/>
		Large Fluct H	<input type="checkbox"/>	<input type="checkbox"/>
	L Side Blocking	<input type="checkbox"/>	<input type="checkbox"/>	
	H Side Blocking	<input type="checkbox"/>	<input type="checkbox"/>	
	B Blocking	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	Invalid Ref F	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	Invalid Ref SPH	<input type="checkbox"/>	<input type="checkbox"/>	
	Invalid Ref SPL	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	Invalid Ref DP	<input type="checkbox"/>	<input type="checkbox"/>	
	ILBD over range	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> Check that the alarm of "B Blocking" is not generated. 	Diag Error			
	B Blocking	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

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