
User's Manual

Model EJA Series HART Protocol



IM 01C22T01-01E

vigilantplant®

CONTENTS

| | |
|---|------------|
| PRELIMINARY | ii |
| 1. ZERO POINT ADJUSTMENT | 1-1 |
| 1.1 Zero Point Adjustment | 1-1 |
| 1.1.1 Using the HART Communicator | 1-2 |
| 1.1.2 Using the Transmitter Zero-adjustment Screw | 1-2 |
| 1.2 Auto LRV (Change Low Range Value) | 1-3 |
| 1.2.1 Using Model 275 — Apply Values | 1-3 |
| 1.2.2 Setting the Range Using the Range-setting Switch | 1-3 |
| 2. HART COMMUNICATOR OPERATION | 2-1 |
| 2.1 Conditions of Communication Line | 2-1 |
| 2.1.1 Interconnection Between DPharp and HART Communicator | 2-1 |
| 2.1.2 Communication Line Requirements | 2-1 |
| 2.2 Basic Operation of the HART Communicator (Model 275) | 2-2 |
| 2.2.1 Keys and Functions | 2-2 |
| 2.2.2 Display | 2-3 |
| 2.2.3 Calling Up Menu Addresses | 2-3 |
| 2.2.4 Entering, Setting, and Sending Data | 2-4 |
| 2.3 Parameters | 2-5 |
| 2.3.1 Parameter Usage and Selection | 2-5 |
| 2.3.2 Menu Tree | 2-6 |
| 2.3.3 Setting Parameters | 2-7 |
| (1) Tag No. | 2-7 |
| (2) Unit | 2-7 |
| (3) Range Change | 2-7 |
| (4) Output Mode (Linear/Sq root) | 2-8 |
| (5) Damping Time Constants | 2-9 |
| (6) Output Signal Low Cut Mode Setup | 2-9 |
| (7) Bi-directional Flow Measurement | 2-10 |
| (8) Change Output Limits | 2-10 |
| (9) Integral Indicator Display Mode | 2-10 |
| (10) Integral Indicator Scale | 2-10 |
| (11) Unit for Displayed Temperature | 2-12 |
| (12) Unit for Displayed Static Pressure | 2-12 |
| (13) Test Output | 2-13 |
| (14) Sensor Trim | 2-13 |
| (15) Trim Analog Output | 2-14 |
| (16) Burst Mode | 2-16 |
| (17) Multidrop Mode | 2-17 |
| (18) External Switch Mode | 2-17 |
| (19) Software Write Protect | 2-18 |
| (20) Hardware Write Protect and Burnout Direction (with Optional code /F1) | 2-19 |
| (21) H ₂ O Unit Select | 2-19 |
| 2.4 Self-Diagnostics | 2-20 |
| 2.4.1 Checking for Problems | 2-20 |
| (1) Identify Problems with HART Communicator | 2-20 |
| (2) Checking with Integral Indicator | 2-21 |
| 3. PARAMETER LISTS | 3-1 |

REVISION RECORD

PRELIMINARY

This manual describes the function, performance, and operating procedures of the DPharp EJA Series with HART protocol. The DPharp EJA Series with HART protocol uses the same pressure sensing element as in DPharp EJA with BRAIN protocol. Therefore, this manual describes only the functions unique to HART Communicator operating procedures which are not covered in the DPharp EJA with BRAIN protocol instruction manual. For the items listed below which are common to both the HART protocol and BRAIN protocol, see the applicable user's manuals listed in Table 1.

Contents of Individual User's Manuals

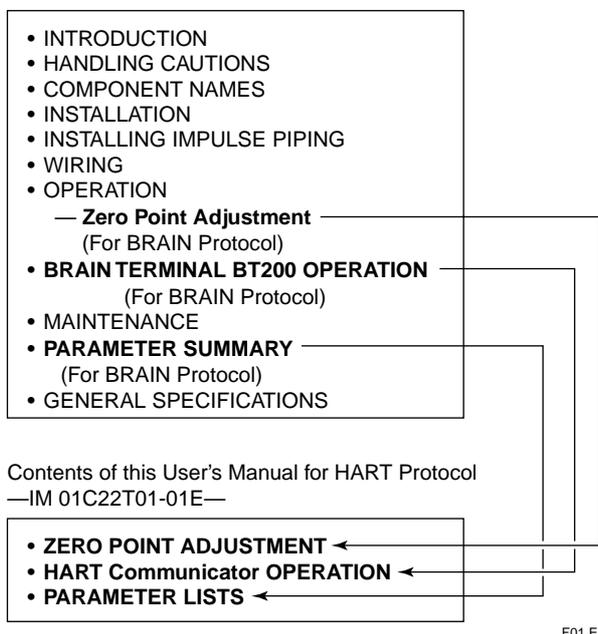


Figure 1. Relationship between Individual Manuals and HART Manual Contents

Table 1. Individual User's Manuals

| Model | Manual No. |
|---------------------------|-----------------|
| EJA110A, EJA120A, EJA130A | IM 01C21B01-01E |
| EJA210A, EJA220A | IM 01C21C01-01E |
| EJA310A, EJA430A, EJA440A | IM 01C21D01-01E |
| EJA510A, EJA530A | IM 01C21F01-01E |
| EJA110, EJA120 | IM 01C22B01-01E |
| EJA210, EJA220 | IM 01C22C01-01E |
| EJA310, EJA430 | IM 01C22D01-01E |
| EJA118W, EJA118N, EJA118Y | IM 01C22H01-01E |
| EJA438W, EJA438N | IM 01C22J01-01E |
| EJA115 | IM 01C22K01-01E |

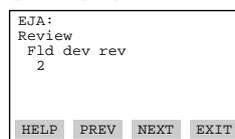
T01.EPS

CAUTION

Matching of communicator DD and instrument DD
 Before using model 275 HART communicator, check that the DD(Device Description) installed in the communicator matches to that of instruments to set up. To check the DD in the instrument or the HART communicator, follow the steps below. If the correct DD is not installed in the communicator, you must upgrade the DD at the HART official programming sites. For communication tools other than Model 275 HART communicator, contact vendors of each for upgrade information.

1. Checking the DD in the instrument
 - 1) Connect the communicator to the instrument to set up.
 - 2) Call "Device setup" and press [→].
 - 3) Call "Review" and press [→].
 - 4) By pressing [NEXT] or [PREV], find "Fld dev rev" to show the DD of the instrument.

[Example]

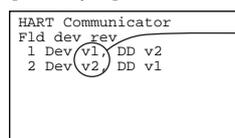


"The instrument DD is Version 2."

F02.EPS

2. Checking the DD in Model 275 HART communicator
 - 1) Turn on the communicator alone.
 - 2) Call "Utility" from main menu and press [→].
 - 3) Call "Simulation" and press [→].
 - 4) Select "YOKOGAWA" from manufacturers list by pressing [↓] and press [→].
 - 5) Select the model name of the instrument(i.e. EJA) by pressing [↓] and press [→] to show the DD of the communicator.

[Example]



Version 1 and 2.

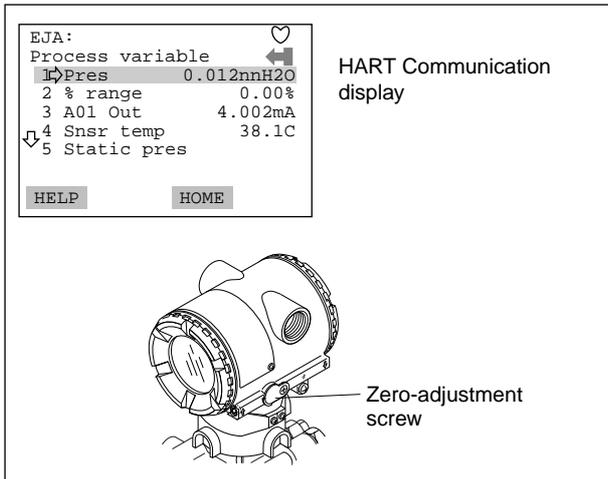
"The communicator DD supports Version 1 and 2."

F03.EPS

1. ZERO POINT ADJUSTMENT

After operating preparation is completed, adjust the zero point. The zero point adjustment can be made using either of the following two methods.

For output signal checking, display the parameter **% rnge** in the HART Communicator.



F0101.EPS

■ Using the Transmitter Zero-adjustment Screw

Before using the zero-adjustment screw outside the transmitter case, confirm the following.

- **Ext SW mode** must be **ENABLE**. See Subsection 2.3.3 (17) for the setting procedure.
- Use a slotted screwdriver to turn the zero-adjustment screw. Turn the screw clockwise to increase the output or counterclockwise to decrease the output, the zero point adjustment can be adjusted with a resolution of 0.01% of the setting range. The degree of zero adjustments varies with the screw turning speed. Therefore, turn the screw slowly for fine adjustment and quickly for coarse adjustment.



CAUTION

Do not turn off the power to the transmitter immediately after a zero adjustment. Powering off within 30 seconds after a zero adjustment will return the adjustment back to the previous settings.

■ Using the HART Communicator

Zero point can be adjusted by simple key operation of the HART Communicator.

Select parameter **Zero Trim**, and press the **OK (F4)** key twice. The zero point will be adjusted automatically to the output signal 0% (4 mA DC). Confirm that the setting value displayed for the parameter **% rnge** is **0.0%** before pressing the **OK (F4)** key. See Subsection for HART Communicator operating procedures.

1.1 Zero Point Adjustment

The DPharp supports several adjustment methods.

Select the method best suited for conditions matching the state of the site.

Note that output signal can be checked by HART Communicator.

| Adjustment Method | Description | |
|---|---|--|
| Zero adjustment using the HART Communicator | Set the present input to 0%. P.1-2 'Zero trim' | Adjust for 0% output at input level of 0%. |
| | Adjust output to the reference value obtained using other means. P.1-2 'Lower sensor trim' | If the input level cannot easily be made 0% (because of tank level, etc.), adjust output to the reference value obtained using other means, such as a glass gauge. |
| Zero adjustment using the external zero-adjustment screw | Adjust zero point using the zero-adjustment screw on the transmitter. This permits zero adjustment without using the HART Communicator. Accurately adjust the output current to 4mA DC or other target output value using an ammeter that accurately reads output currents. | |

T0101.EPS

1.1.1 Using the HART Communicator

(1) Zeroing — Zero trim



Zero trim carries out the zero adjustment and sets the input values at present, equal to 0 mmH₂O. Use this setting to set LRV = 0 mmH₂O.

1. Device setup
2. Diag/Service
3. Calibration
3. Sensor trim
1. Zero trim

1

EJA:
WARN-LOOP should be removed from automatic control

ABORT OK

F4
(OK)

Press **OK (F4)**.

2

EJA:
WARN-This will affect sensor calibration

ABORT OK

F4
(OK)

Press **OK (F4)**.

3

EJA:
Apply 0 input to sensor

ABORT OK

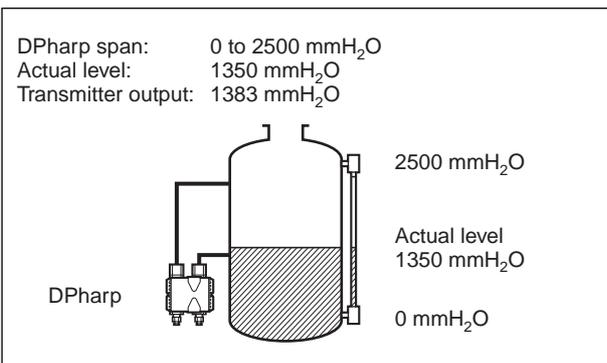
F4
(OK)

A pressure of 0 mmH₂O is applied. Press **OK (F4)** after the pressure has become stable.

F0102.EPS

(2) Arbitrary Level Adjustment — Lower Sensor Trim

This zero adjustment applies to tank level measurements, etc. where the actual tank level cannot be set to zero. For this adjustment, use the actual tank level obtained with a glass gauge or the like to meet the DPharp output.



F0103.EPS

1. Device setup
2. Diag/Service
3. Calibration
3. Sensor trim
2. Lower Sensor Trim

1

EJA:
Apply low pressure

ABORT OK

F4
(OK)

Check the tank level at present, and press **OK (F4)**.

2

EJA:
Press OK when pressure is stable

ABORT OK

F4
(OK)

Press **OK (F4)**.

3

EJA:
ENTER applied
Pressure Value
0.000 mmH2O
0.000

HELP DEL ABORT ENTER

'1 3 5 0'
F4
(ENTER)

Enter the value of the actual level (1350 mmH₂O), and press **ENTER (F4)**.

F0104.EPS



Lower Sensor trim adjusts the input value at present. See Fine Input Adjustment for detail.

1.1.2 Using the Transmitter Zero-adjustment Screw

Turn the zero-adjustment screw on the outside of the transmitter case using a slotted screwdriver. Turn the screw to the right to increase the zero point or to the left to decrease the zero output; the zero adjusts in increments of 0.01% of the range setting.

Note that the amount of adjustment to the zero point changes according to the speed at which the screw is turned. To make fine adjustments, turn the screw slowly; to make coarse adjustments, turn the screw quickly.

Note: When a zero point adjustment has been made do not turn of the transmitter less than 30 seconds after adjustment.

1.2 Auto LRV (Change Low Range Value)

1.2.1 Using Model 275 — Apply Values

Display the Apply Values display, and adjust the zero point as follows:

1. Device setup
 ↓
3. Basic setup
 ↓
3. Re-range
 ↓
2. Apply values

1

EJA:
 WARN-LOOP should be removed from automatic control

F4
(OK)

Press **OK (F4)**.

2

EJA:
 Set the:
 1 4mA
 2 20mA
 3 Exit

F4
(ENTER)

Select **4 mA**, and press **ENTER (F4)**.

3

EJA:
 Apply New 4ma input

F4
(OK)

Apply a pressure corresponding to 0% of the measurement range.

'Pressure stabilizing'

4

EJA:
 Current applied
 Process value:
 0.06 mmH₂O
 1 Set as 4mA value
 2 Read new value
 3 Leave as found

F4
(ENTER)

LRV (0%) is read as -0.06 mmH₂O. Select **Set as 4mA value**, and press **ENTER (F4)**.

F0105.EPS

1.2.2 Setting the Range Using the Range-setting Switch

With actual pressure(s) being applied to the transmitter, the range-setting switch (push-button) attached to the integral indicator plate and the external zero-adjustment screw allow users to change the lower- and upper-range values for the measurement range (LRV and URV) without the use of a HART Communicator. However, a change in the display settings (scale range and engineering unit) for the integral indicator requires a HART Communicator.

Follow the procedure below to change the LRV and URV settings.

Example: Rerange LRV to 0 and HRV to 20 kPa.

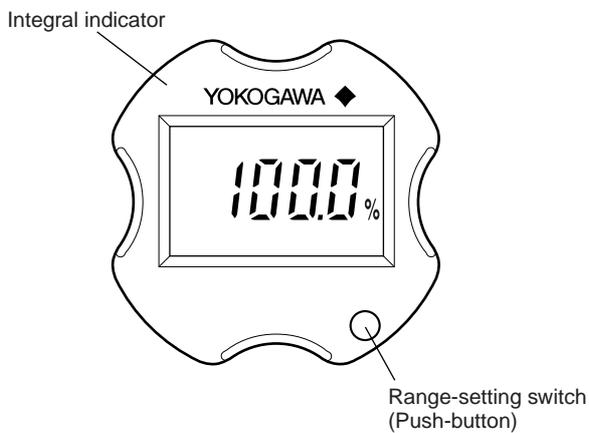
- 1) Connect the transmitter and allow them to warm up for at least five minutes.
- 2) Press the range-setting push-button.
The integral indicator then displays **LSET**.
- 3) Apply a pressure of 0 kPa (atmospheric pressure) to the high-pressure side of the transmitter. ^(Note 1)
- 4) Turn the external zero-adjustment screw (either in the output-increase or -decrease direction).
The integral indicator displays the output signal (in %). ^(Note 2)
- 5) Adjust the output signal to 0% (1 V DC) by rotating the external zero-adjustment screw. Doing so completes the LRV setting.
- 6) Press the range-setting pushbutton.
The integral indicator then displays **USET**.
- 7) Apply a pressure of 20 kPa to the high-pressure side of the transmitter. ^(Note 1)
- 8) Turn the external zero-adjustment screw (either in the output-increase or -decrease direction).
The integral indicator displays the output signal (in %). ^(Note 2)
- 9) Adjust the output signal to 100% (5 V DC) by rotating the external zero-adjustment screw. Doing so completes the URV setting.
- 10) Press the range-setting pushbutton.
The transmitter then switches back to the normal operation mode while maintaining the measurement range at 0 to 20 kPa.

Note 1: Wait until the pressure inside the pressure-detector section has stabilized before proceeding to the next step.

Note 2: If the pressure applied to the transmitter exceeds the previous LRV (or URV), the integral indicator may display error number "Er.07" (In this case, the output signal percent and "Er.07" are displayed alternately every two seconds). Although "Er.07" is displayed, there is no need to worry and you may proceed to the next step. However, should any other error number be displayed, take the appropriate measure in reference to Section 2.4 Self-Diagnostics, "Errors Messages."

**IMPORTANT**

1. Do not turn off the power to the transmitter immediately after completion of the change in the LRV (and/or URV) setting(s). Note that powering off within thirty seconds after setting will cause a return to the previous settings.
2. Changing LRV automatically changes URV to the following value.
$$\text{URV} = \text{previous URV} + (\text{new LRV} - \text{previous LRV})$$
3. If the range-setting push-button and external zero-adjustment screw are not touched during a range-change operation, the transmitter automatically switches back to the normal operation mode.



Note: Use a thin bar which has a blunt tip, e.g., a hexagonal wrench, to press the range-setting push-button.

F0106.EPS

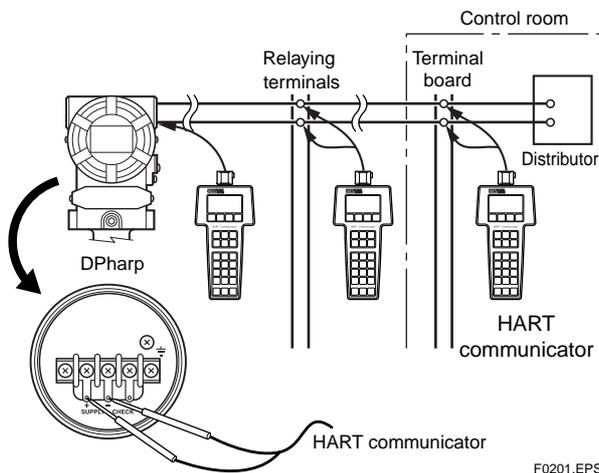
Figure 1.2.1 Range-setting Switch

2. HART COMMUNICATOR OPERATION

2.1 Conditions of Communication Line

2.1.1 Interconnection Between DPharp and HART Communicator

The HART Communicator can interface with the transmitter from the control room, the transmitter site, or any other wiring termination point in the loop, provided there is a minimum of 250 Ω between the connection and the power supply. To communicate, it must be connected in parallel with the transmitter; the connections are non-polarized. Figure 2.1.1 illustrates the wiring connections for direct interface at the transmitter site for the DPharp. The HART Communicator can be used for remote access from any terminal strip as well.



F0201.EPS

Figure 2.1.1 Interconnection Diagram

2.1.2 Communication Line Requirements

Specifications for Communication Line:

Supply voltage(general use type); 16.4 to 42 V DC
Load resistance; 250 to 600 Ω (Including cable resistance)

Minimum cable size; 24 AWG, (0.51 mm diameter)
Cable type; Single pair shielded or multiple pair with overall shield

Maximum twisted-pair length; 10,000 ft (3,048 m)

Maximum multiple twisted-pair length; 5,000 ft (1,524 m)

Use the following formula to determine cable length for a specific application;

$$L = \frac{65 \times 10^6}{(R \times C)} - \frac{(C_f + 10,000)}{C}$$

Where: L = length in feet or meters.

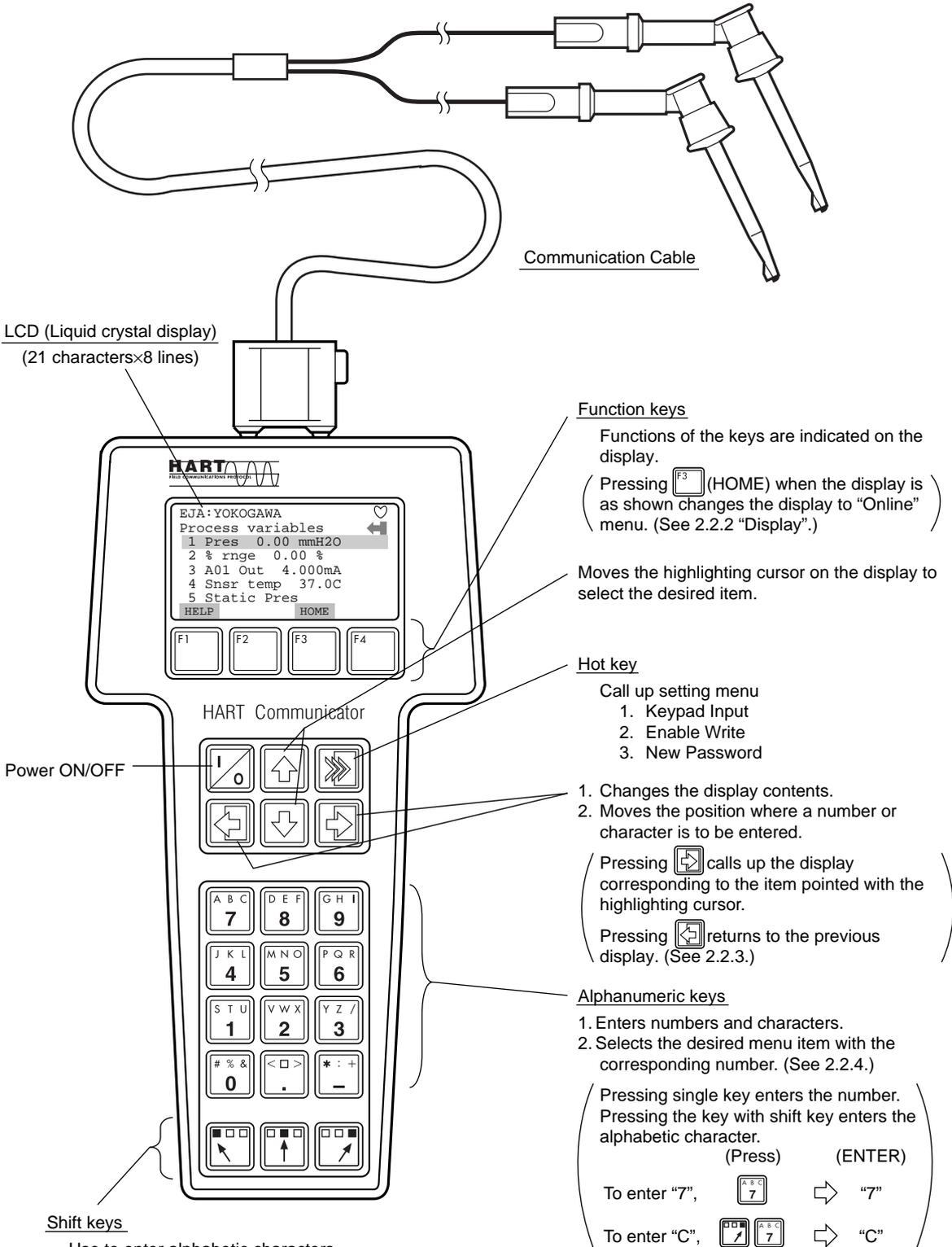
R = resistance in ohms, current sense resistance plus barrier resistance.

C = cable capacitance in pF/ft, or pF/m.

C_f = Maximum shunt capacitance of field devices in pF.

2.2 Basic Operation of the HART Communicator (Model 275)

2.2.1 Keys and Functions



F0202.EPS

Figure 2.2.1 The HART Communicator

2.2.2 Display

The HART communicator searches for a transmitter on the 4 to 20mA loop when it is turned on. When the HART communicator is connected to the transmitter, **Online** menu (Top menu) is started automatically and the following display appears. If no transmitter is found, you select **Online** menu.

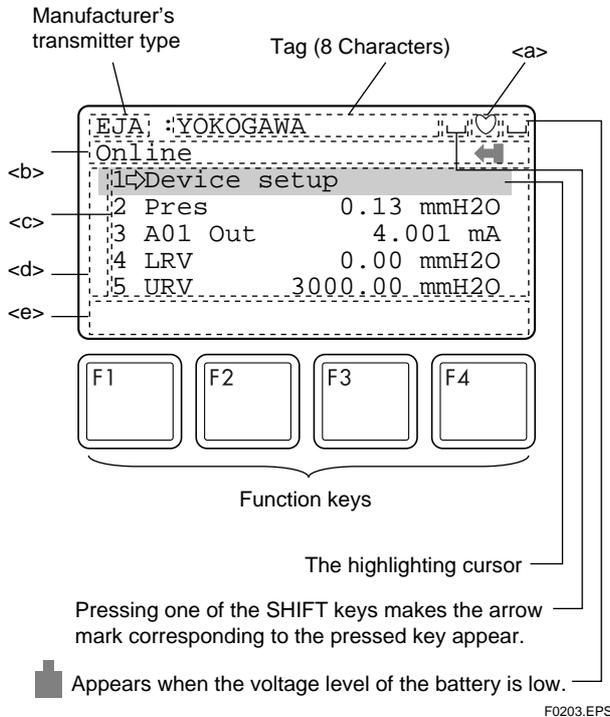


Figure 2.2.2 Display

- <a> ♥ appears and flashes during communication between the HART communicator and the transmitter. At Burst mode, ♥ appears.
- The menu items selected from the previous menu.
- <c> The items to be used from the menu of .
- <d> ↑ or ↓ appears when the item is scrolled out of the display.
- <e> The labels of function corresponding to each function key appears. These labels reflect currently available choices.

2.2.3 Calling Up Menu Addresses

Subsection 2.3.2 shows the configuration of all menu items available with the HART communicator. The desired item can be displayed with ease by understanding the menu configuration.

When the HART communicator is connected to the transmitter, **Online** menu will be displayed after power is turned on. Call up the desired item as follows:

Function Key Labels

| F1 | F2 | F3 | F4 |
|--|---|---|--|
| HELP access on-line help | ON/OFF activates or deactivates a binary variable | ABORT terminate current task | OK acknowledge information on screen |
| RETRY try to re-establish communication | DEL delete current character or Hot Key Menu item | ESC leave value unchanged | ENTER accept user-entered data |
| EXIT leave the current menu | SEND send data to device, or mark data to send | QUIT terminate session because of a communication error | NEXT leave the current menu |
| YES answer to yes/no question | PGUP move up one help screen | PGDN move down one help screen | NO answer to yes/no question |
| ALL include current Hot Key item on Hot Key Menu for all devices | PREV go to previous message in a list of messages | NEXT go to next message in the list of messages | SKIP do not mark variable to be sent in off-line configuration |
| SAVE save information to communicator | EDIT edit a variable value | HOME go to the top menu in the device description | ONE include Hot Key item for one device |
| SEND send data to device, or mark data to send | ADD add current item to Hot Key Menu | BACK go back to menu from which HOME was pressed | |

F0204.EPS

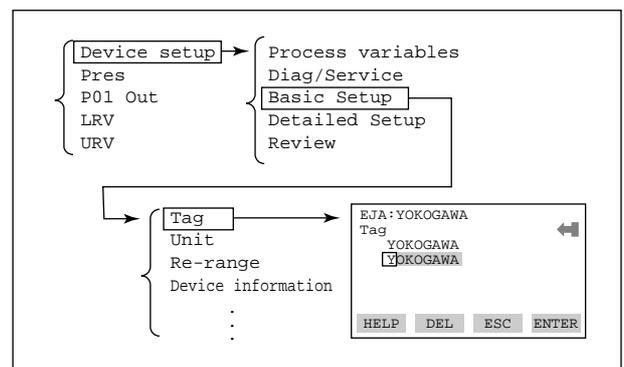
Key Operation

There are two choices to select the desired menu item.

1. Use the or key to select the desired item, and then press the key.
 2. Press the number displayed for the desired item.
- To return to the previous display, press the key.
- * If **ABORT**, **ESC** and **EXIT** are displayed, press the desired function key.

Example: Call up the **Tag** item, to change the tag.

Check to see where item **Tag** is located in the menu configuration. Then, call up **Tag** item on the display according to the menu configuration.



| Display | Operation |
|-----------------|--|
| <p>1</p> | <p>Display 1 appears when the HART Communicator is turned on. Select Device setup.</p> |
| <p>2</p> | <p>Select Basic setup.</p> |
| <p>3</p> | <p>Select Tag.</p> |
| <p>4</p> | <p>The display for Tag setting appears.</p> |

F0205.EPS

2.2.4 Entering, Setting, and Sending Data

The data input using the keys are set in the HART communicator by pressing **ENTER (F4)**. Then, by pressing **SEND (F2)**, the data is sent to the transmitter. Note that the data is not set in the transmitter if **SEND (F2)** is not pressed. All the data set with the HART communicator is held in memory unless power is turned off, every data can be sent to the transmitter at once.

Operation

Entering data on the **Tag** setting display.

Example: To change from Tag **YOKOGAWA** to **FIC-1A**.

Call up the **Tag** setting display.

1. Device setup
 ↓
 3. Basic setup
 ↓
 1. Tag

F0206.EPS

When the setting display shown above appears, enter the data as follows:

| Character to be entered | Operation | Display |
|-------------------------|-----------|-----------------|
| F | | F O K O G A W A |
| I | | F I K O G A W A |
| C | | F I C O G A W A |
| - | | F I C - G A W A |
| 1 | | F I C - 1 A W A |
| A | | F I C - 1 A W A |
| Deletes characters. | | F I C - 1 A |

F0207.EPS

| Display | Operation |
|-----------------|---|
| <p>5</p> | <p>(ENTER)</p> <p>After entering the data, set the HART communicator with the data entered by pressing ENTER (F4).</p> |
| <p>6</p> | <p>(SEND)</p> <p>Send the data to the transmitter by pressing SEND (F2).</p> |
| <p>7</p> | <p>* is flashed during communication. disappears, and the transmission is complete.</p> |

F0208.EPS

2.3 Parameters



NOTE

Do not turn off the transmitter as soon as HART Communicator settings (sending) have been made. If the transmitter is turned off less than 30 seconds after parameters have been set, the set data will not be stored and the terminal returns to previous settings.

2.3.1 Parameter Usage and Selection

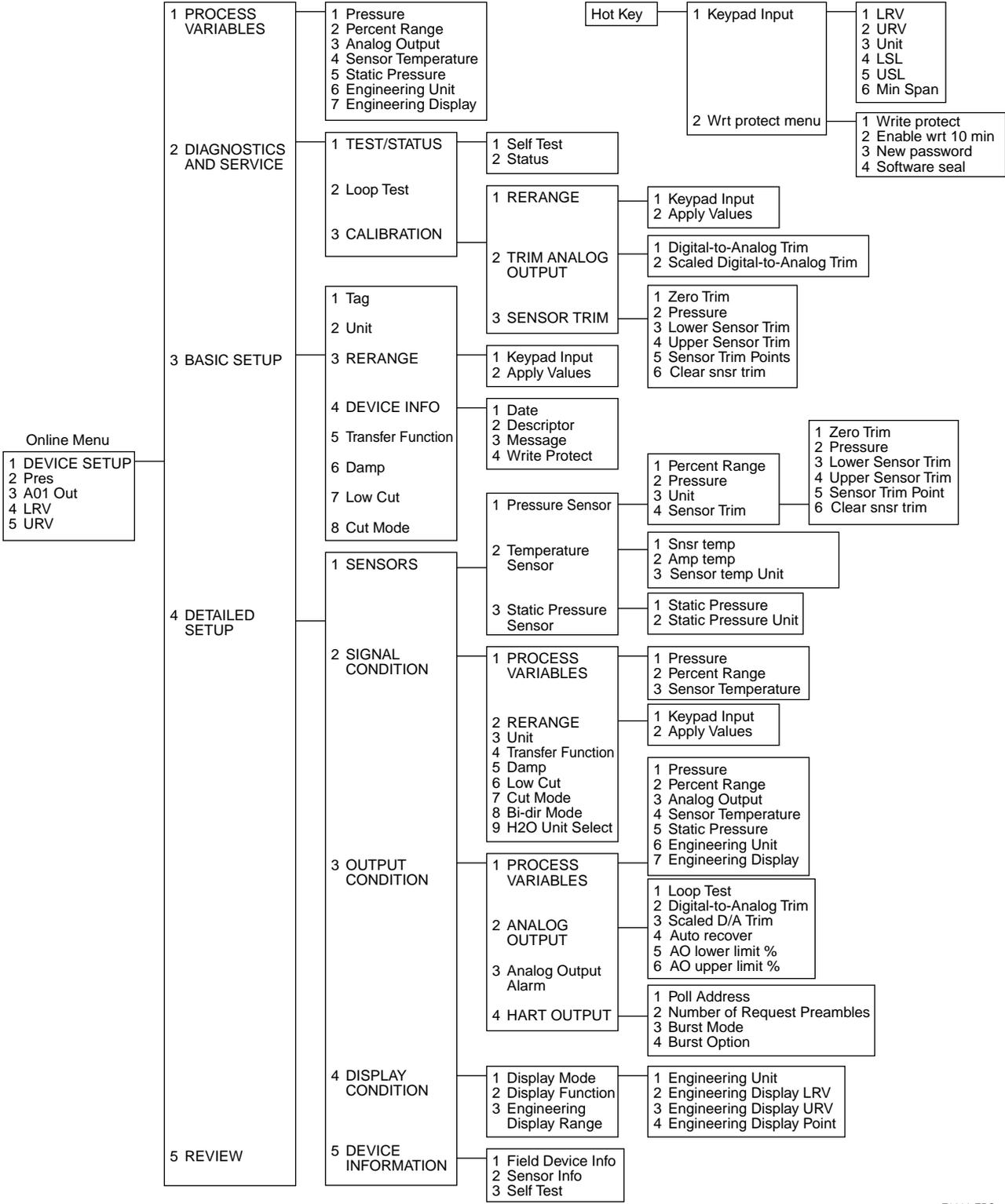
Before describing the procedure for setting parameters, we present the following table showing how the parameters are used and in what case.

Table 2.3.1 Parameter Usage and Selection

| Item | | HART Communicator | Description | Page |
|------------------------------------|------------------------------------|---|---|--------|
| Memory | | Tag | Tag number, Up to 8 characters | P.2-7 |
| | | Descriptor | Up to 16 characters | |
| | | Message | Up to 32 characters | |
| | | Date | xx/yy/zz | |
| Transmitter | Engineering unit | Unit | inH ₂ O, inHG, ftH ₂ O, mmH ₂ O, mmHG, psi, bar, mbar, g/cm ² , kg/cm ² , Pa, kPa, MPa, torr, atm | P.2-8 |
| | Range | LRV/URV | Set the calibration range by the keypad | |
| | | Apply values | Range for 4 to 20 mA DC signal is set with actual input applied. | |
| | Output mode | Xfcr fnctn | Sets mode for output signal to "linear mode" (proportional to input differential pressure) or to "Square root mode" (proportional to flow). | P.2-9 |
| | Damping time constant | Damp | Adjust the output response speed for 4 to 20 mA DC. 0.2, 0.5, 1, 1.5, 2, 4, 6, 8, 16, 32 (sec) | |
| | Output signal low cut mode | Low cut | Used mainly to stabilize output near 0 if output signal is the square root mode. Two mode are available: forcing output to 0% for input below a specific value, or changing to proportional output for input below a specific value. | P.2-10 |
| | | Cut mode | Linear or Zero | |
| | Bi-direction flow measurement mode | Bi-dire mode | Used to measure bi-directional flows. | P.2-10 |
| | H ₂ O unit selection | H ₂ O Unit select | at 4°C (39.2°F)/at 20°C (68°F) | P.2-19 |
| Unit for displayed temperature | Snsr temp unit | Sets a unit for temperature displayed on the model 275. | P.2-12 | |
| Unit for displayed static pressure | Static pres unit | Sets a unit for static pressure displayed on the model 275. | | |
| Display | Integral indicator display mode | Display fnctn | Sets mode for integral indicator to "linear mode" (proportional to input differential pressure) or to "Square root mode" (proportional to flow). | P.2-10 |
| | | Display mode | Set the following 5 types of integral indicator scale ranges and unit: "% scale indicator", "use set scale indicator", "alternate indication of user set scale and % scale", "input pressure display" and "alternate indication of input pressure and % scale." | P.2-11 |
| | Integral indicator scale | Engr disp range | Engr unit/Engr disp LRV/Engr disp URV/Engr disp point. | P.2-10 |
| HART output | Burst mode | Burst option | Selection of the data to be sent continuously (Pres/% rnge/A01 out). | P.2-16 |
| | | Burst mode | ON/OFF switching of burst mode. | |
| | Multi-drop mode | Poll addr | Setting the polling address (1 to 15). | |
| | | Auto poll | ON/OFF switching of multi-drop mode. | |
| Monitoring | | Pres | Pressure variable | — |
| | | % rnge | % output variable | |
| | | A01 out | 4 to 20 mA output variable | |
| | | Snsr temp | Sensor temperature | |
| | | Static pres | Static pressure | |
| | | Engr display | Displays output as on an LCD. settable in the engr disp range. | |
| Maintenance | Test output | Loop test | Used for loop checks. Output can be set freely from -5% to 110% in 1% step. | P.2-12 |
| | Self-diagnostics | Self test | Check using the self-test command. If an error is detected, the corresponding message is displayed. | P.2-19 |
| | | Status | Display of the result of self-test, calibration of transmitter. | |
| | Output when CPU error has occurred | A01 Alarm typ | Display the status of 4 to 20 mA DC output when a failure | — |
| | External volume protect/permit | Ext SW mode | Display/set the external volume protect/permit for LRV (URV) setting. | P.2-17 |
| | Software Write Protect | Write protect | Displays the permit/protect status of setting changes depending on communications. | |
| | | Enable write | Write protect status is released for 10 minutes when the password is entered. | |
| | New password | Setting a new password. | | |
| Adjustment | Zeroing | Zero trim | Set the current input value to 0 kPa. | P.1-2 |
| | Sensor trim | Lower/Upper sensor trim | Adjust only measured pressure variable. | P.2-13 |
| | Analog output trim | D/A trim, Scaled D/A trim | Adjust the output value at the points of 4 mA and 20 mA. | P.2-14 |

T0201.EPS

2.3.2 Menu Tree



F0209.EPS

2.3.3 Setting Parameters

(1) Tag No.

To change the Tag No., see section 2.2.4 Entering, Setting, and Sending Data.

Up to 8 characters can be set with **Tag**. The maximum number of characters to be set for other items is as shown below. With Option code /CA, the Descriptor is filled in at the factory as specified in the order.

| Item | The Number of Characters |
|------------|--------------------------|
| Tag | 8 |
| Descriptor | 16 |
| Message | 32 |
| Date | 2/2/2 |

T0202.EPS

Example: To change from Tag **YOKOGAWA** to **FIC-1A**.

Call up the **Tag** setting display.

1. Device setup
↓
3. Basic setup
↓
1. Tag

EJA: YOKOGAWA
Tag
YOKOGAWA
YOKOGAWA

HELP DEL ESC ENTER

F0210.EPS

See Section 2.2.4.

(2) Unit

The unit is set at the factory before shipment if specified at the time of order. Follow the procedure below to change the unit.

Example: To change the unit from **mmH₂O** to **inH₂O**

1

EJA: Hot Key
1 Keypad input
2 Enable Write
3 New Password

→

↩

Press Hot key and call up **Range values**.

2

EJA: keypad input
1 LRV 0.00 mmH2O
2 URV 3000.00 mmH2O
3 Unit mmH2O
4 LSL -3500 mmH2O
5 USL -3500 mmH2O

V Z /

3

Select the **Press Unit** item to set the units of pressure.

3

EJA: Pressure unit
mmH2O
mmHg
psi
bar

↑ ×3

F4

(ENTER)

Select the desired engineering unit and press **ENTER (F4)**.

F0211.EPS

4

EJA: keypad input
1 LRV 0.00 mmH2O
2 URV 3000.00 mmH2O
3 Unit inH2O
4 LSL -3500 mmH2O
5 USL 3500 mmH2O

F2

(SEND)

Press **SEND (F2)** to send the new unit to the transmitter memory.

5

EJA: keypad input
1 LRV 0.00 inH2O
2 URV 118.000 inH2O
3 Unit inH2O
4 LSL -140.0 inH2O
5 USL 140.0 inH2O

Check that **SEND** disappears.

F0211.EPS

(3) Range Change

Ranges are factory-set as specified by the customer. To rerange, change the settings as follows:

(a) Keypad — LRV, URV

Example: To change the range from **0 to 2500 mmH₂O** to **500 to 3500 mmH₂O**

1

EJA: Online
1 Device setup
2 Pres
3 A01 Out
4 LRV
5 URV

J K L

4

Select the **4. LRV** item.

2

EJA: 1 LRV 0.0 mmH2O
2 URV 2500 mmH2O

↩

To set the Lower Range Valve, select the **LRV** item.

3

EJA: LRV
0.0 mmH2O
0.0

'5 0 0'

F4

(ENTER)

Enter **500**, and press **ENTER (F4)**.

4

EJA: 1 LRV 500 mmH2O
2 URV 3000.0 mmH2O

V W X

2

To change the Upper Range Valve, select the **URV** item.

5

EJA: URV
2500.0 mmH2O
2500.0

'3 5 0'

F4

(ENTER)

Enter **3500**, and press **ENTER (F4)**.

6

EJA: 1 LRV 500.0 mmH2O
2 URV 3500.0 mmH2O

F2

(SEND)

Press **SEND (F2)** to send the changed data to the transmitter. Check that **SEND** disappears.

F0212.EPS



NOTE

It is possible to set $LRV > URV$. This setting reverses the 4 to 20 mA output signal.

Conditions: $LSL \leq LRV \leq USL$
 $LSL \leq URV \leq USL$

$|URV - LRV| \geq \text{Min. Span}$

The 4 to 20 mA output does not correspond to the scale of the indicator under the following conditions in which;

- the equipment with standard specification is used with the setting changed to the above setting.
- the customer specified equipment (with the above factory-setting) is used with the setting changed to the normal (standard) setting.

In the cases above, replace the scale with one which corresponds correctly to the 4 to 20 mA.

(b) Changing the Ranges While Applying an Actual Input — Apply values

This feature allows the lower and upper range values to be setup automatically with the actual input applied. If the upper and lower range values are set, “**URV**” and “**LRV**” are changed at the same time.

The measurement span is determined by the upper and lower range valves. Changing the lower range value results in the upper range value change automatically, keeping the span constant.

Example: To change the range from **0 to 2500 mmH₂O** to **500 to 3000 mmH₂O**

Call up the **Apply Values** display.

1. Device setup
3. Basic setup
3. Re-range
2. Apply values

1

EJA:
WARN-Loop should be removed from automatic control

F4

(OK)

Press **OK (F4)**.

2

EJA:
Set the:
1 4mA
2 20mA
3 Exit

F4

(ENTER)

To set the lower range value, select **4mA** and press **ENTER (F4)**.

3

EJA:
Apply new 4ma input

F4

(OK)

Apply the pressure of 500mmH₂O. After obtaining a stable pressure, press **OK (F4)**.

F0213.EPS

4

EJA:
Current applied
process value:
500.01 mmH₂O
1 Set as 4mA value
2 Read new value
3 Leave as found

F4

(ENTER)

The LRV to be changed is 500.01 mmH₂O.

- Selecting item 1 sets LRV to 500.01 mmH₂O.
- Selecting item 2 reads LRV again. To set LRV = 500.01, select item 1 and press **ENTER (F4)**.

5

EJA:
Set the
1 4mA
2 20mA
3 Exit

↓ ×2

F4

(ENTER)

Select **Exit** and press **ENTER (F4)**. Check the value after completing the range change with **URV** and **LRV**.

* The span is maintained the same as when changing LRV with **Apply values**. In this case, if LRV is changed from 0 to 500, URV is changed automatically to 3000.

F02131.EPS

(4) Output Mode (Linear/Sq root)

The output mode has already been set to a Linear output (**Linear**). Follow the procedure below to change the mode.

Example: To change the mode from **Linear** to **Sq root**.

Call up the **Xfer fcnctn** display.

1. Device setup
3. Basic setup
5. Xfer fcnctn

1

EJA:
Transfer function
Linear
Linear
Sq root

↓

F4

(ENTER)

[1] Select **Sq root**, and press **ENTER (F4)**.

[2] Press **SEND (F2)** to send the data to the transmitter, then check to confirm that **SEND** disappears.

F0214.EPS

The output mode is set as specified in the order when the instrument is shipped.

If the instrument is equipped with an integral indicator and Transfer function is sq root, “√” is displayed on the integral indicator.

(5) Damping Time Constants

The damping constant is set to 2.0 seconds at the factory. When changing the damping constant, proceed as follows:

Example: To change from **2.0** seconds to **0.2** seconds

Call up the **Damp** display.

1. Device setup
3. Basic setup
6. Damp

1

EJA:
Damping
2.00 s
2.00

HELP DEL ESC ENTER

'0.2'

F4
(ENTER)

Enter **0.2** and press **ENTER (F4)**.

2

EJA:
Basic Setup
1 Unit kPa
2 Re-range
3 Device information
4 Xfer fncfn Linear
5 Damp 0.20s

HELP SEND HOME

F2

Press **SEND (F2)** to send the data to the transmitter.

3

EJA:
Set to nearest possible value occurred writing Pres damping Press OK...

OK

F4
(OK)

A confirmation display appears. Press **OK (F4)**, then check to confirm that **SEND** disappears.

F0215.EPS

NOTE

1. Only the damping constants listed in Table 2 are available. When a value not listed in Table 2 is entered, the value in Table 2 nearest the entered value is set.
2. The damping constant set with the procedure here is of the damping constant in the transmission part (electric circuit). The damping constant of the capsule assembly shall be added to obtain the overall damping constant of the transmitter.

Table 2

| |
|----------|
| 0.2 Sec |
| 0.5 Sec |
| 1.0 Sec |
| 2.0 Sec |
| 4.0 Sec |
| 8.0 Sec |
| 16.0 Sec |
| 32.0 Sec |
| 64.0 Sec |

T0203.EPS

(6) Output Signal Low Cut Mode Setup

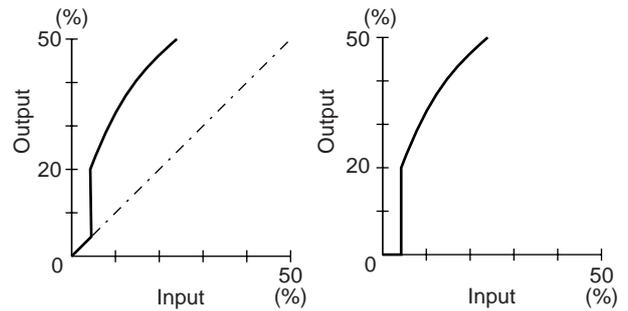
Low cut can be used on the output signal to stabilize the output near the zero point.

The low cut point can be set in a range from 0 to 20% of output. (Hysteresis of cut point: $\pm 1\%$)

Either **LINEAR** or **ZERO** can be selected as the low cut mode.

Unless otherwise specified, the cut mode is set to **LINEAR** at the factory.

Example: To set the low cut range to 20% and the cut mode to **ZERO**, proceed as follows:



For low cut in linear mode \Rightarrow For low cut in zero mode

F0216.EPS

Figure 2.2.2 Low Cut Mode

1. Device setup
3. Basic setup
7. Low Cut, 8. Cut mode

1

EJA:
Low cut
10.00%
10.00

DEL ESC ENTER

'20'

F4
(ENTER)

Call up the **Low cut**, and set to 20%.

2

EJA:
Cut mode
Linear
Linear
Zero

ESC ENTER

F4
(ENTER)

Select the **Cut mode**, and set to **Zero**.

3

EJA:
Basic Setup
4 Device information
5 Xfer factn Linear
6 Damp 0.50s
7 Low cut 20.00 %
8 Cut mode Zero

SEND HOME

F2
(SEND)

Press **SEND (F2)** to send the date, then check to confirm that **SEND** disappears.

F0217.EPS

(7) Bi-directional Flow Measurement

(a) **Bi-dir mode** enables selection of 50% output at an input of 0 mmH₂O.

Example: If measurement range is 0 to 3000mmH₂O (LRV = 0 mmH₂O, URV = 3000 mmH₂O)

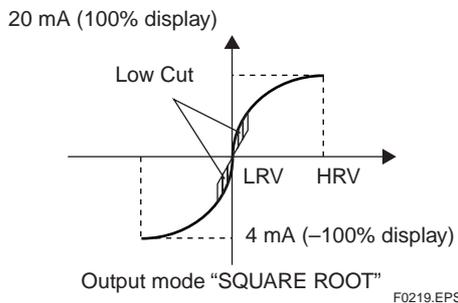
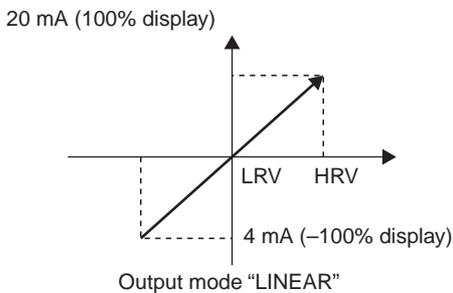
1. Device setup
 ↓
 4. Detailed setup
 ↓
 2. Signal condition
 ↓
 8. Bi-dir mode

Call up the **Bi-dir mode** Display Select **on**, and press **ENTER (F4)**. Press **SEND (F2)** to send the data to the transmitter, then check to confirm that **SEND** disappears.

Note: The measurement range changes to -3000 to 0 to 3000mmH₂O (output 0% to 50% to 100%). Note that **LRV** and **URV** are not changed.

F0218.EPS

(b) 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.



(8) Change Output Limits

The range of normal output is preset at factory from -5.0 to 110.0% unless otherwise specified or conditioned, and the output is limited with these upper and lower values. This output range can be changed, for example, to meet the requirements of NAMUR, within the settable range. Set the lower limit with **AO lower limit %** and upper limit with **AO Upper Limit %**.

Settable range : -5.0 to 110.0 (%)

Upper limit > Lower limit

(9) Integral Indicator Display Mode

Example: Change from **Linear** to **Sq root**

1. Device setup
 ↓
 4. Detailed setup
 ↓
 4. Display condition
 ↓
 2. Display fnctn

Select **Square Root** and press **ENTER (F4)**. Press **SEND (F2)** to send data.

F0220.EPS

(10) Integral Indicator Scale

| Display Mode | Display | Related Parameters | Description |
|--------------|---------|--|--|
| NORMAL % | | % range 45.6% | Indicates -5 to 110% range depending on the set range (LRV, URV). |
| USER SET | | Engr disp range 20.0M | Displays values depending on engr disp LRV and engr disp URV Units set using engr disp unit are not indicated. |
| USER & % | | % range 45.6% Engr disp range 20.0M | Indicates user set and % alternately in 3 second intervals. |
| INP PRES | | Pres 456 kPa | Indicates input pressure. |
| PRES & % | | % range 45.6% Pres 456 kPa | Indicates input pressure and % alternately in 3 second intervals. |

* The number of lines displayed on the LCD is determined by the number of LRV and URV lines set on the brain terminal.

T0204.EPS

See (a) through (c) for each setting procedure.

| | |
|---|--|
| % indication and input pressure indication | User-set engineering unit display |
| <p>Normal % Input press Input press & %</p> | <p>User set User set & %</p> <p>Set for user-set engineering unit display.</p> |
| <p>Transmitter is set for "NORMAL %" when shipped.</p> | <p>Engr disp unit</p> <p>Set a unit to be displayed on the HART communication.</p> |
| <p>For % display, set this parameter only.</p> | <p>Engr disp LRV</p> <p>Set a numeric value for engineering unit for 4 mA output (LRV).</p> |
| | <p>Engr disp URV</p> <p>Set a numeric value for engineering unit for 20 mA output (HRV).</p> |

F0221.EPS

(a) Display Mode

Follow the instructions given to the below to change the range of integral indication scale. When **USER SET** is selected, the user set values of integral indication.

Example: Set the integral indicator scale to engineering units display

1. Device setup
4. Detailed setup
4. Display condition
1. Display mode

EJA:
Display mode
Normal %
Normal %
User set
User set & %
Input press

ESC ENTER (ENTER)

F4 (ENTER)

F2 (SEND)

Select **User set** and press **ENTER (F4)**. Press **SEND (F2)** to send the data to the transmitter.

F0222.EPS

(b) Setting User-set Engineering Unit

Engr unit allows entry of the engineering units to be displayed on the HART communicator. When the instrument is shipped, this is set as specified in the order. Follow the procedure below to change this setting.

Since these units are not displayed on the integral indicator, use the adhesive labels provided **Engr unit** need not be set for % display.

Example: Set an engineering unit **M**.

1. Device setup
4. Detailed setup
4. Display condition
3. Engr disp range
1. Engr unit

EJA:
Engr unit
M
5

DEL ESC ENTER (ENTER)

F4 (ENTER)

F2 (SEND)

Set **M**, and press **ENTER (F4)**.

F0223.EPS

(c) Lower and Upper Range Value Setup in Engineering Unit

Engr disp LRV and **Engr disp URV** are used to set the lower and higher range values for the engineering unit display. When the instrument is shipped, these are set as specified in the order. Note that these items need not be set for % display.

Example: Set low range value (LRV) to **-50** and upper range value (URV) to **50**.

1. Device setup
 ↓
 4. Detailed setup
 ↓
 4. Display condition
 ↓
 3. Engr disp range
 ↓
 2. Engr disp LRV, 3. Engr disp URV

EJA:
 Engr disp LRV
 0.0
 0.0
 DEL ESC ENTER

'-50'
 F4
 (ENTER)
 Set **-50**, and press **ENTER (F4)**.

EJA:
 Engr disp range
 1 Engr unit
 2 Engr disp LRV
 3 Engr disp URV
 4 Engr disp point
 SEND HOME

Press **F3** to select engr disp URV.

EJA:
 Engr disp URV
 0.0
 0.0
 DEL ESC ENTER

'50'
 F4
 (ENTER)
 F2
 (SEND)
 Set **50**, and press **ENTER (F4)**.
 Press **SEND (F2)** to send data.

F0224.EPS

(11) Unit for Displayed Temperature

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

The unit changed here corresponds the unit for **Snsr temp**.

Example: Change the unit for the temperature display.

1. Device setup
 ↓
 4. Detailed setup
 ↓
 1. Sensors
 ↓
 2. Temp sensor
 ↓
 2. Snsr temp unit

EJA:
 Snsr temp unit
 C
 C
 F
 ESC ENTER

↓
 F4
 (ENTER)

Select **F** (Fahrenheit), and Press **ENTER (F4)**.

F0225.EPS

(12) Unit for Displayed Static Pressure

Follow the procedure to change the static pressure unit.

Changing this parameter also changes the unit for the static pressure display.

Example: Change the static pressure unit from **mmH₂O** to **kPa**.

1. Device setup
 ↓
 4. Detailed setup
 ↓
 1. Sensors
 ↓
 3. Static Pres sensor
 ↓
 2. Static Pres unit

EJA:
 Static Pres unit
 mmH2O
 mmH2O
 mmHg
 psi
 bar
 ESC ENTER

↓
 F4
 (ENTER)

↓
 F2
 (SEND)

Select **kPa** and Press **ENTER (F4)**.
 Select **SEND (F2)** to send the data.

inH₂O
 inHg
 ftH₂O
 mmH₂O
 mmHg
 psi
 bar
 mbar
 g/cm²
 kg/cm²
 Pa
 kPa
 torr
 atm

F0226.EPS

(13) Test Output

This feature can be used to output a fixed current from 3.2 mA (-5%) to 21.6 mA (110%) for loop checks.

Example: To output 12 mA (50%)

1. Device setup
2. Diag/Service
2. Loop test

1

EJA:
 WARN-loop should be removed from automatic control

F4
(OK)

ABORT OK

Set the control loop in manual mode, and press **OK (F4)**.

2

EJA:
 Choose analog output level

1 4mA
 2 20mA
 3 Other
 4 End

ABORT ENTER

↓ x2
 F4
 (ENTER)

Select **Other**, and press **ENTER (F4)**.
 Supplementary explanation.

1. 4 mA: Outputs a 4 mA current signal
2. 20 mA: Outputs a 20 mA current signal
3. Other: Sets a desired output using the alphanumeric keys
4. End: Exits

3

EJA:
 Output

4.000

HELP DEL ABORT ENTER

'1 2'
 F4
 (ENTER)

Enter **12**, and press **ENTER (F4)**.
 A fixed current of 12 mA is output.

4

EJA:
 Fld dev output is fixed at 12.000 mA

F4
(OK)

ABORT OK

Press **OK (F4)**.

5

EJA:
 Choose analog output level

1 4mA
 2 20mA
 3 Other
 4 End

ABORT ENTER

↓ x3
 F4
 (ENTER)

To finish the loop test, select **End**, and press **ENTER (F4)**.

6

EJA:
 NOTE-loop may be returned to automatic control

F4
(OK)

OK

Press **OK (F4)**.

F0227.EPS

CAUTION

1. Test output is held for approximately 10 minutes, and then released automatically after the time has elapsed. Even if the HART Communicator power supply is turned off or the communication cable is disconnected during test output, it is held for approximately 10 minutes.
2. Press the  (OK) key to release test output immediately.

(14) Sensor Trim

Each DPharp EJA Series Transmitter is factory characterized. Factory characterization is the process of comparing a known pressure input with the output of each transmitter sensor module over the entire pressure and temperature operating range. During the characterization process, this comparison information is stored in the transmitter EEPROM. In operation, the transmitter uses this factory-stored curve to produce a process variable output (PV), in engineering units, dependent on the pressure input. The sensor trim calibration procedure allows you to make corrections to the calculated process variable.

There are two ways to trim the sensor: full sensor trim and zero trim. A full sensor trim is a two point process, in which two accurate end-point pressures are applied (equal to or greater than the range values), and all output is linearized between them. A zero trim is a one-point adjustment typically used to compensate for mounting position effects or zero shifts caused by static pressure. (See section 1.1.1)

Example 1: For the range of 1000 to 3000 mmH₂O

1. Device setup
2. Diag/Service
3. Calibration
3. Sensor Trim

1

EJA:
 Sensor trim

1 zero trim
 2 Pres
 3 Lower sensor trim
 4 Upper sensor trim
 5 Sensor trim points

HELP HOME

←
 3
 Select the **Lower Sensor trim**.

2

EJA:
 Apply low pressure

F4
(OK)

ABORT OK

Apply a standard pressure of 1000 mmH₂O to the transmitter. After obtaining a stable pressure, press **OK (F4)**.

F02281.EPS

3

EJA:
 Press OK when
 pressure is stable

F4
 (OK)

Press **OK (F4)**.

4

EJA:
 Enter applied
 pressure value
 0.00 mmH₂O
0.00

F4
 (ENTER)

Enter **1000**, and press **ENTER (F4)**.
Remove pressure appears for a while.
 Fine input adjustment (0%) is complete.

F02282.EPS

SPAN adjustment shall be carried out with **Upper Sensor trim**. After selecting **Upper Sensor trim**, apply a pressure of 3000 mmH₂O (corresponding to 100% of the measurement range). Then, proceed the same as for the operations for **Lower Sensor trim**.

1

EJA:
 Sensor trim
 1 Zero Trim
 2 Pres
 3 Lower sensor trim
 4 Upper sensor trim
 5 Sensor trim points

J K L
4

Select the **Upper Sensor trim** item.

2

EJA:
 Apply hi pressure

F4
 (OK)

Apply a standard pressure of 300 mmH₂O to the transmitter. After obtaining a stable pressure, press **OK (F4)**.

3

EJA:
 Press OK when
 pressure is stable

F4
 (OK)

Press **OK (F4)**.

4

EJA:
 Enter applied
 Pressure value
 0.00 mmH₂O
0.00

F4
 (OK)

Enter **3000**, and press **ENTER (F4)**.
Remove pressure appears for a while.
 Fine input adjustment (100%) is complete.

F0229.EPS

(15) Trim Analog Output

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

- **D/A Trim**
D/A trim is to be carried out if the calibration digital ammeter does not read 4.000 mA and 20.000 mA exactly with the output signal of 0% and 100%.
- **Scaled D/A Trim**
Scaled D/A trim is to be carried out if the output is adjusted using a voltmeter or other types of meters or using a meter whose the scale unit is 0 to 100%.

Example 1: For the adjustment using an ammeter ($\pm 1\mu\text{A}$ is measurable)

1. Device setup
 ↓
2 Diag/Service
 ↓
3. Calibration
 ↓
2. Trim analog output

1

EJA:
 Trim analog output
 1 D/A trim
 2 Scaled D/A trim

↔

Select the **D/A trim** item.

2

EJA:
 WARN-LOOP should be
 removed from
 automatic control

F4
 (OK)

Press **OK (F4)**.

3

EJA:
 Connect reference
 meter

F4
 (OK)

Connect the ammeter ($\pm 1\mu\text{A}$ is measurable), and press **OK (F4)**.

4

EJA:
 Setting fld dev
 output to 4mA

F4
 (OK)

Press **OK (F4)**, and the transmitter outputs the output signal of 0%.

5

EJA:
 Enter meter value
4.000

F4
 (ENTER)

'4.115'
 Ammeter reading: 4.115

Enter the read value **4.115** of the ammeter, and press **ENTER (F4)**. (The output of the transmitter changes.)

F0230.EPS

6

EJA:
 fld dev output 4.000
 mA equal to reference
 meter?
 1 Yes
 2 No

(ENTER)

Ammeter reading: 4.000

Because the reading on the ammeter is 4.000 mA, select **YES** and press **ENTER (F4)**. If the reading is not 4.000 mA, select item 2. **NO**. Repeat steps **4** and **5** until the ammeter reads 4.000 mA.

7

EJA:
 Setting fld dev
 output to 20mA

(OK)

Press **OK (F4)**, and the transmitter outputs the output signal of 100%.

8

EJA:
 Enter meter value
 20.000

(ENTER)

Ammeter reading: 19.050

Carry out the same procedures as those described under **4** and **5**.

9

EJA:
 fld dev output 20.000
 mA equal to reference
 meter?
 1 Yes
 2 No

(ENTER)

Ammeter reading: 20.000

Returning fld dev to original output appears.

10

EJA:
 NOTE-Loop may be
 returned to automatic
 control

(OK)

Press **OK (F4)**.

F0231.EPS

Example 2: To adjust using a voltmeter

1

EJA:
 Trim analog output
 1 D/A trim
 2 Scaled D/A trim

(ENTER)

Select the **Scaled D/A trim** item.

2

EJA:
 WARN-Loop should be
 removed from
 automatic control

(OK)

Press **OK (F4)**.

3

EJA:
 Trim will be scaled
 from 4.000 to 20.000
 1 Proceed
 2 Change

(ENTER)

Select **Change**, and press **ENTER (F4)**. The same operations as for **D/A trim** are required when selecting item 3. **Proceed**.

4

EJA:
 Set scale- Lo output
 value
 4

(ENTER)

Enter the value read on the meter when the signal is 4 mA. In this case, Enter the value of the voltage across a 250 Ω resistor (1 V), and press **ENTER (F4)**.

5

EJA:
 Set scale- Hi output
 value
 20

(ENTER)

Enter the value read on the meter when the signal is 20 mA. Then, enter **5**, and press **ENTER (F4)**.

6

EJA:
 Trim will be scaled
 from 1.000 to 5.000
 1 Proceed
 2 Change

(ENTER)

Select **Proceed** and press **ENTER (F4)**.

7

EJA:
 Connect reference
 meter

(OK)

Connect the voltmeter, and press **OK (F4)**.

8

EJA:
 Setting fld dev
 output to 4mA

(OK)

Press **OK (F4)**. The output signal of 0% is output.

F0232.EPS

9

```
EJA:
Enter meter value
 1.000
HELP DEL ABORT ENTER
```

'1.01'

F4
(ENTER)

Voltmeter reading: 1.010

Enter the reading of the voltmeter (1.010), and press **ENTER (F4)**. (The output of the transmitter changes.)

10

```
EJA:
Scaled output: 1.000
equal readout
device?
1 Yes
2 No
ABORT ENTER
```

F4
(ENTER)

Voltmeter reading: 1.000

Because the reading on the voltmeter is 1.000, select **Yes** and press **ENTER (F4)**.
If the reading is not 1.000, select **No**. Repeat steps **8** and **9** until the voltmeter reads 1.000 V.

11

```
EJA:
Setting fld dev
output to 20mA
ABORT OK
```

F4
(OK)

Press **OK (F4)**. The output signal of 100% is output.

12

```
EJA:
Enter meter value
 5.000
HELP DEL ABORT ENTER
```

'5.21'

F4
(ENTER)

Voltmeter reading: 5.210

Enter the reading of the voltmeter (5.210), and press **ENTER (F4)**.

13

```
EJA:
Scaled output: 5.000
equal readout
device?
1 Yes
2 No
ABORT ENTER
```

F4
(ENTER)

Voltmeter reading: 5.000

"Returning fld dev to original output"

Select **Yes** and press **ENTER (F4)**.

14

```
EJA:
NOTE-Loop may be
returned to automatic
control
OK
```

F4
(OK)

Press **OK (F4)**.

F0233.EPS

(16) Burst Mode

The transmitter continuously sends the data stored in it when the burst mode is set on. Either one of measured pressure variable, % output value, or 4 to 20 mA output value can be selected and sent. The data is sent intermittently as a digital signal at 75 ms intervals when the transmitter is set in the burst mode. Therefore, communication by the HART simultaneous communicator is also possible.

Setting of Burst Mode

1. Device setup
4. Detailed setup
3. Output condition
4. HART output
3. Burst mode, 4. Burst option

```
EJA:
Burst option
*****
PV
% range/current
Process vars/crnt
HELP ESC ENTER
```

F4
(ENTER)

Call up the **Burst option**, and set the data to be sent.

- Pressure variable (PV)
- % output value (% range/current)
- 4 to 20 mA output value (Process vars/crnt)

```
EJA:
Burst mode
Off
On
Off
ESC ENTER
```

F4
(ENTER)

F2
(SEND)

Call up the **Burst mode** and set to **On**. Then, Press **SEND (F2)**.

F0234.EPS

To Release from the Burst Mode:

Call up the **Burst mode** display, and set to **OFF**.

(17) Multidrop Mode

“Multidropping” transmitters refers to the connection of several transmitters to a single communications transmission line. Up to 15 transmitters can be connected when set in the multidrop mode. To activate multidrop communication, the transmitter address must be changed to a number from 1 to 15. This change deactivates the 4 to 20 mA analog output, sending it to 4 mA. The alarm current also is disabled.

Setting of Multidrop Mode

1. Device setup
↓
4. Detailed Setup
↓
3. Output condition
↓
4. HART Output
↓
1. Poll addr

EJA:
Poll addr
0

HELP DEL ESC ENTER

Call up the **Poll addr** and set the polling address. (a number from 1 to 15)
And press **SEND (F2)** to send the data.

Online
↓
Utility
↓
Auto Poll

HART Communicator
Auto Poll
No
No
Yes

ESC ENTER



 (ENTER)

Call up the **Auto Poll** and set to Yes.

F0235.EPS



NOTE

1. When the address is set and the multi-drop mode is set to “No” at the same time, Online menus cannot be called up and displayed. Be sure to turn the multidrop mode to “Yes” after setting the address with “Poll addr.”
2. When the same polling address is set for two or more transmitters in multidrop mode, communication with these transmitters is disabled.

Example: Communication when set in the multi-drop mode

1

HART Communicator
Online
1 EJA110-1
2 EJA110-2
3 EJA110-3

2

EJA:EJA110-1:
Online
Device setup
2 Pres 0.00 mmH2O
3 A01 Out .000 mA
4 LRV 0.00 mmH2O
5 URM 3500.00 mmH2O

3

HART Communicator
1 Offline
2 Online
3 Transfer
4 Frequency Device
5 Utility

(1) The HART communicator searches for the transmitter that is set in the multi-drop mode when the HART communicator is turned on. When the HART communicator is connected to the transmitter, the manufacturer's x'ter type code and the tag will be displayed (display **1**).

(2) Select the desired transmitter. After that, normal communication to the selected transmitter is possible. However, the communication speed is slow in this case (display **2**).

(3) To communicate with another transmitter, turn off the power once and then turn on it again, or call up display **3**, and select **Online**.

(4) Display **1** will appear. Select the desired transmitter.

F0236.EPS

To Release the Multi-drop Mode:

Follow the procedure below.

1. Call up the **Poll addr** display, and set the address to 0.
2. Call up the **Auto Poll** display, and set to **No**.

(18) External Switch Mode

- Enabling/inhibiting zero point adjustment using the external zero-adjustment screw on the transmitter. Follow the procedure below to enable or inhibit zero point adjustment from the zero-adjustment screw on the transmitter. This is set to **ENABLE** when the instrument is shipped.

Example: Inhibiting zero adjustment by the external zero-adjustment screw

1. Device setup
↓
4. Detailed setup
↓
5. Device information
↓
1. Field device info
↓
7. Ext SW mode

EJA:
Ext SW mode
Enable
Enable
Inhibit

ESC ENTER



 (ENTER)


 (SEND)

Select **Inhibit** and press **ENTER (F4)**.
Press **SEND (F2)** to send the data.

F0237.EPS

(19) Software Write Protect

EJA configured data is saved by the write protect function. Write protect status is set to **YES** when 8 alphanumeric characters are entered in the **New password** field and transferred to the transmitter. In write protect **YES** status, the transmitter does not accept parameter changes. When the 8 alphanumeric string entered in the **New password** field is also entered in the **Enable write** field and transferred to the transmitter, it will be possible to change transmitter parameters during a 10 minute period.

To change the transmitter from Write protect **YES** status back to Write protect **NO** status, enter 8 spaces in the New password field after Write protect has been released using enable write.

(a) Setting Password

Example: Set the password to 1 2 3 4 1 2 3 4

EJA:
Hot key
1 Keypad input
2 Enable Write
3 New password




Press **Hot key**.
Select the **New password**.

EJA:
Enter New Password

DEL ABORT ENTER


 (ENTER)
 Set 1 2 3 4 1 2 3 4 and press
ENTER (F4).

S T U
1

V W X
2

Y Z /
3

J K L
4

S T U
1

V W X
2

Y Z /
3

J K L
4

EJA:
Re-Enter New Password
12341234
12341234

DEL ABORT ENTER


 (ENTER)
 Press **ENTER (F4)**.

EJA:
Set New Password OK

ABORT OK


 (OK)
 Press **OK (F4)**.
Write Protect status changes from NO to YES.

EJA:
Method Aborted

ABORT OK


 (OK)
 Press **OK (F4)**.

F0238.EPS

(b) Changing the Password

Example: To change the password from 1 2 3 4 1 2 3 4 to 6 7 8 9 A B C D

EJA:
Input password

DEL ABORT ENTER



 1 2 3 4 1 2 3 4

 (ENTER)
 Press Hot key and call up **Enable Write**.
 Enter the password and press **ENTER (F4)**.

EJA:
Write enable in 10 minutes

ABORT OK


 (OK)
 Press **OK (F4)**.
 Write protect status is released for 10 minutes.

EJA:
Method Aborted

ABORT OK


 (OK)
 Press **ENTER (F4)**.

EJA:
Hot key
1 Keypad input
2 Enable write
3 New password


 Select the **New password**.

EJA:
Enter New Password

DEL ABORT ENTER

6 7 8 9 A B C D

 (ENTER)
 Set **6 7 8 9 A B C D**.

EJA:
Re-Enter New Password
6789ABCD
6789ABCD

DEL ABORT ENTER


 (OK)
 Press **ENTER (F4)**.

EJA:
Set New Password OK

ABORT OK


 (OK)

EJA:
Method Aborted

ABORT OK

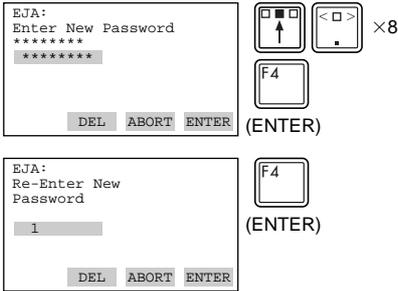

 (OK)
 Press **OK (F4)**.

F0239.EPS



NOTE

1. **Enable Wrt 10 min** releases Write Protect status for 10 minutes. While Write Protect status is released, enter a new password in the **New Password** field. It will not be possible to set a new password when 10 minutes have elapsed.
2. To release Write Protect status completely, enter 8 spaces in the New Password field according to the instructions given in (b), **Changing the Password**. This causes **Write Protect** status to change from **YES** to **NO**.

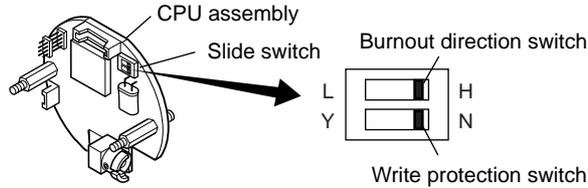


* "Joker password" and "Software Seal"
 When you lose the password that has been registered, it is possible to release the mode for 10 minutes by using a joker password. Enter "YOKOGAWA" to release Write protect status for 10 minutes. If this joker password is used, the status shown in the parameter "Software seal" is changed from "Keep" to "Break." Press Hot key and select "2. Wrt Protect menu." Current status is shown in "4. Software seal." This status will be returned from "Break" to "Keep" by registering a new password.

F0240.EPS

(20) Hardware Write Protect and Burnout Direction(with Optional code /F1)

This function prohibits parameter changes through a slide switch on a CPU assembly board. In the case the hardware write protection switch is set to YES, none of the communication method including the handheld terminal such as model 275 is allowed for the alteration of parameters. The write protection switch is factory set to NO(N position in the figure below).



| Hardware write protection switch | | |
|----------------------------------|--------|--------|
| Write Protection Switch Position | L Y | H N |
| Write Protection | NO | YES |

| Burnout direction switch | | |
|-----------------------------------|--------|--------|
| Burnout Direction Switch Position | L Y | H N |
| Burnout Direction | HIGH | LOW |

F02F1.EPS

(21) H₂O Unit Select

When mmH₂O, inH₂O or ftH₂O is set, the pressure varies with the standard temperature definition. The Yokogawa default setting for the standard temperature is 4°C (39.2°F). Use the procedure described below when a standard temperature of 20°C (68°F) is required.

Call up the **H₂O Unit select**.

1. Device setup
 4. Detailed setup
 2. Signal condition
 9. H₂O Unit select

Select @20C (68F) and press **ENTER (F4)**.
 Press **SEND (F2)** to send data.

F0241.EPS

2.4 Self-Diagnostics

2.4.1 Checking for Problems

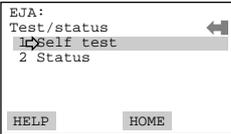
(1) Identify Problems with HART Communicator

Self-diagnostics of the transmitter and check of incorrect data setting can be carried out with the HART communicator. There are two methods for self-diagnosis of the transmitter, self-diagnosis for every transmission and manually executing the SELF TEST command. When an error message appears, follow “ERROR MESSAGES”.

Diagnostic by “self test”

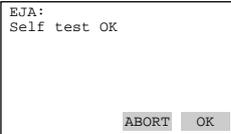
1. Device setup
 2. Diag/Service
 1. Test/Status

1



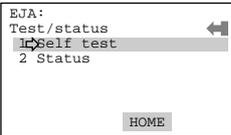
Call up the **Test/Status**, and select **Self test**.

2



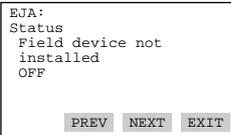
If there is no error detected, **Self test OK** will be displayed. When an error occurs, an error message appears, and the results of self-diagnosis appear in the Status item.

1



Call up the **Status** item.

2



(NEXT)
 If there is no error, the result of diagnostics is indicated as **OFF**. If **ON** is indicated, a countermeasure for that error is necessary.

F0242.EPS

• Error Messages — HART Communicator

| Error Message | Probable Cause | Countermeasure |
|--------------------------------------|--|--|
| Pressure sensor error | Capsule problem | Replace capsule when error keeps appearing even after restart. |
| Temp (Cap) sensor error | | |
| EEPROM (Cap) failure | | |
| Sensor board not initialized | Amplifier problem | Replace amplifier. |
| Temp (Amp) sensor error | | |
| EEPROM (Amp) failure | | |
| Dev id not entered | | |
| CPU board not initialized | Change the setting. | |
| Invalid Selection | | |
| Parameter Too High | | |
| Parameter Too Low | Set value is too low. | |
| Incorrect Byte Count | | — |
| In Write Protect Mode | Operation is set in the Write Protect mode. | — |
| Set to Nearest Possible Value | Value is set to a nearest possible value. | — |
| 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. | Change the setting within the range of USL. |
| Upper Range Value too Low | URV set point is too low. | |
| Span too Small | Set span is too small. | |
| Applied Process Value too High | Applied pressure is too high. | Adjust the applied pressure. |
| Applied process Value too Low | Applied pressure is too low. | |
| New LRV pushed URV Over Sensor Limit | The shift of URV according to the new LRV setting exceeds USL. | |
| Excess Correction Attempted | Amount of correction is too much. | Adjust the amount of correction. |
| In Proper Current Mode | The fixed current mode is desired but not set in that mode. | Set in the fixed current mode. |
| In Multidrop Mode | Operation is set in the multi-drop mode. | — |

T0205.EPS

(2) Checking with Integral Indicator

If an error is detected in the self-diagnostic, an error number is displayed on the integral indicator. If there is more than one error, the error number changes at two-second intervals.

See Table 2.4.1 regarding the error numbers.



F0243.EPS

Figure 2.4.1 Identifying Problems Using the Integral Indicator

• Error Messages — DPharp Integral Indicator

| Integral Indicator Display | Description | Cause | Output Operation during Error | Countermeasure |
|----------------------------|------------------|---|---|---|
| None | GOOD | | | |
| ---- | ERROR | | | |
| Er. 01 | CAP MODULE FAULT | Capsule problem*1 | Outputs the signal according to status of burnout direction switch (High or Low). | Replace capsule when error keeps appearing even after resart.*1 |
| Er. 02 | AMP MODULE FAULT | Amplifier problem | Outputs the signal according to status of burnout direction switch (High or Low). | Replace amplifier. |
| Er. 03 | OUT OF RANGE | Input is outside measurement range limit of capsule. | Outputs high range limit value or low range limit value. | Check input. |
| Er. 04 | OUT OF SP RANGE | Static pressure exceeds specified range. | Displays present output. | Check line pressure (static pressure). |
| Er. 05 | OVER TEMP (CAP) | Capsule temperature is outside range (-50 to 130°C). | Displays present output. | Use heat insulation or make lagging to keep temperature within range. |
| Er. 06 | OVER TEMP (AMP) | Amplifier temperature is outside range (-50 to 95°C). | Displays present output. | Use heat insulation or make lagging to keep temperature within range. |
| Er. 07 | OVER OUTPUT | Output is outside high or low range limit value. | Outputs high or low range limit value. | Check input and range setting, and change them as needed. |
| Er. 08 | OVER DISPLAY | Displayed value is outside high or low range limit value. | Displays high or low range limit value. | Check input and display conditions and modify them as needed. |
| Er. 09 | ILLEGAL LRV | LRV is outside setting range. | Holds output immediately before error occurrence. | Check LRV and modify as needed. |
| Er. 10 | ILLEGAL URV | URV is outside setting range. | Holds output immediately before error occurrence. | Check URV and modify as needed. |
| Er. 11 | ILLEGAL SPAN | SPAN is outside setting range. | Holds output immediately before error occurrence. | Check SPAN and change as needed. |
| Er. 12 | ZERO ADJ OVER | Zero adjustment is too large. | Displays present output. | Readjust zero point. |

*1 : This error code appears at capsule problem or when an illegal overpressure is applied to the pressure sensor.

*2 : If the normal pressure is regained, the Er.01 will disappear according to the setting of the parameter of **Auto recover**. When the **Auto recover** is set to **ON**(default setting), the Er.01 will disappear automatically. When the Auto recover is set to **OFF**, restart the transmitter to cancel Er.01. If no error code appears then, perform necessary adjustments such as zero-adjustment to continue the operation. If the error code still appears, replace the capsule assembly.

T0206.EPS

3. PARAMETER LISTS

| Item | UHI | Description | Remarks |
|-----------------|--|--|--|
| | Tag | Tag number | Tag number, Up to 8 characters |
| | Descriptor | Descriptor | Up to 16 characters |
| | Message | Message | Up to 32 characters |
| | Date | Date | xx/yy/zz |
| Transmitter | Unit | Unit | inH ₂ O, inHg, ftH ₂ O, mmH ₂ O, mmHg, psi, bar, mbar, g/cm ² , kg/cm ² , Pa, kPa, MPa, torr, atm |
| | LRV URV | Lower range value Lower range value | Set the calibration range by the keypad |
| | Apply values | Apply values | Range for 4 to 20 mA DC signal is set with actual input applied. |
| | Damp | Damping time constant | 0.2, 0.5, 1, 1.5, 2, 4, 6, 8, 16, 32 sec |
| | Xfer fnctn | Transfer function | linear/Square root |
| | Low cut | Low cut | 0 to 20 % |
| | Cut mode | Cut mode | Linear/Zero |
| | Bi-dire mode | Bi-directional mode | On/Off |
| | H ₂ O Unit select | H ₂ O Unit select | @4°C/@20°C (68°F) |
| | Snsr temp unit | Sensor temperature unit | °C/°F |
| | AO lower limit % AO upper limit % | Analog output upper and lower limits | -5.0% to 110.0% |
| Auto recover | Auto recover mode | ON/OFF | |
| Display | Static pres unit | Static pressure unit | inH ₂ O, inHg, ftH ₂ O, mmH ₂ O, mmHg, psi, bar, mbar, g/cm ² , kg/cm ² , Pa, kPa, torr, atm |
| | Display mode | Display mode | Normal % , User set , User set & % , Inp pres , Pres & % |
| | Display fnctn | Display fnctn | linear/Square root |
| | Engr unit | Engineering unit | Up to 8 characters |
| | Engr disp LRV | Engineering display LRV | -19999 to 19999 |
| | Engr disp URV | Engineering display URV | -19999 to 19999 |
| Engr disp point | Engineering display decimal point | 0, 1, 2, 3 | |
| HART output | Poll addr | Polling address | 1 to 15 |
| | Auto poll | Auto poll | No/Yes |
| | Burst option | Burst mode option | Pres , % rng , A01 out |
| | Burst mode | Burst mode | ON/OFF |
| Monitoring | Pres % rng A01 out Snsr temp Static pres Engr display | Pressure variable % output variable 4 to 20 mA output variable Sensor temperature Static pressure Output (in Engr unit) | -3.2 mA to 21.6 mA -5.0% to 110.0% -19999 to 19999 |
| | Loop test | Test output % setting | -5.0% to 110.0% |
| | Self test | Self test | Check using the self-test command. |
| | Status | Status | Display of the result of self-test, calibration of transmitter. |
| Maintenance | A01 Alarm typ | Status of analog output alarm | High/Low |
| | Write Protect | Write Protect | Yes/No |
| | Enable Write | Enable Write | 8 characters |
| | New password | New password | 8 characters |
| | Ext SW mode | Ext SW mode | Enable/Inhibit |
| | Software seal | Software seal | Keep/Break |

T0301.EPS

3. PARAMETER LISTS

| Item | UHI | Description | Remarks |
|------------------------|--|---|--|
| Adjustment | Zero trim | Zero trim | Set the current input value to 0 kPa. |
| | Lower sensor trim Upper sensor trim | Lower sensor trim Upper sensor trim | Adjust only measured pressure variable. |
| | D/A trim Scaled D/A trim | Digital/Analog output trim Scaled D/A trim | Adjust the output value at the points of 4 mA and 20 mA. |
| Sensor information | Isoltr matl | Isolator material | Hast-C, Tantalum, 316L, Unknown, Special |
| | Fill fluid | Fill fluid | Silicone oil, F oil, Unknown, Special |
| | Gasket matl | gasket material | PTFE, 316L, Unknown, Special |
| | Flange matl | Flange material | Carbon Steel, Hast-C, 316L, Unknown, Special |
| | Drain vent matl | Drain vent material | 316SST, Hast-C, 316L, None, Unknown, Special |
| | Flange type | Flange type | Conventional, Remote seal, Level, Unknown, Special |
| | RS isoltr matl | Remote seal isolator material | 316 SST, Hast-C, Monel, Tantalum, 316L, Unknown, Special |
| | Flange size | Flange size | ANSI 150, ANSI 300, ANSI 600, None, Unknown, Special |
| | Num remote seal | Number of remote seal | One seal, Two seal, None, Unknown |
| | RS fill fluid | Remote seal fill fluid | Silicone oil, SH704, SH705, Ethy Gly/H ₂ O, Prop Gly/H ₂ O, None, Unknown, Special |
| | RS type | Remote seal type | Wafer, Nozzle, HTV-W, HTV-N, None, Unknown, Special |
| Additional information | Distributor | Distributor | YOKOGAWA EJA |
| | Dev type | Device type | |
| | Dev ID | Device ID | |
| | Final asmbly num | Final assembly number | |
| | Universal rev | Universal revision | |
| | Fld dev rev | Fld dev revision | |
| | Software rev | Software revision | |
| | Model | Model | |
| | Style | Style | |
| | LSL | Lower range limit | |
| | USL | Upper range limit | |
| | MIN SPAN | Minimum span | |
| | Manufacturer | Manufacturer | |
| | Lo snsr trim pt | Lower snsr trim pt | |
| Up snsr trim pt | Upper snsr trim pt | | |
| Serial No. | Serial Number | | |

T0302.EPS

REVISION RECORD

Title: Model EJA Series HART Protocol
Manual No.: IM 01C22T01-01E

| Edition | Date | Page | Revised Item |
|---------|-----------|------------------------------------|---|
| 1st | Nov. 1995 | – | New publication |
| 2nd | Mar. 1998 | 1 3 2-1 | <ul style="list-style-type: none"> • Add EJA-A Series IM numbers to Table 1. • Add REVISION RECORD 2.1.1 • Change the figure of terminal configuration |
| 3rd | Mar. 2000 | – 2-19 | Revised a book in a new format. The location of contents and the associated page numbers may not coincide with the one in old edition. 2.3.3(19) • Add Hardware Write Protect and Burnout Direction(with optional code /F1). |
| 4th | July 2000 | ii 2-6 2-18 3-1 | <ul style="list-style-type: none"> • Add Caution for matching communicator DD and instrument DD. • Add Software seal parameter. • Change NOTE for Write Protect. • Add software seal 2.3.2 2.3.3 3 |
| 5th | Oct. 2000 | 2-5 2-21 | 2.3.1 • Add "MPa" to engineering unit. • Correct the description of Output Operation during Error for Er.01 and Er. 02. |
| 6th | Apr. 2003 | 2-7 | 2.3.3 • Add Option code /CA. |
| 7th | Jan. 2008 | – | Miscellaneous corrections. |
| 8th | Oct. 2008 | 2-6 2-10 2-18 2-21 3-1 | <ul style="list-style-type: none"> • Add parameters AO upper/lower limits and Auto recover. • Add (8) Change Output Limits. • Change the example for a password. • Add descriptions for Er.01 and Auto recover function. • Add parameters AO upper/lowerr limits and Auto recover. 2.3.2 2.3.3 2.3.3 2.4.1 3 |