Field Communication Software

Model: CFS100

Instruction Manual
(MagneW^{TM} 3000 FLEX$^+$/PLUS$^+$ Smart Electromagnetic Flow Meter Edition)

Azbil Corporation

NOTICE

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Instruction Manuals
Safety-related precautions, general operating procedures, and other general information related to Model CFS100 (CommStaff) can be found in the Common Edition manual (No. CM2-CFS100-2001). For information on the operation of a device used with Model CFS100, consult the manual for that particular device.

The Common Edition manual for Model CFS100, as well as the manuals for individual devices, are included in electronic form (as PDF files) on the CommStaff installation CD-ROM

Devices Covered by This Manual
This manual pertains to Smart electromagnetic flow meter/Smart converter MagneW™ 3000 FLEX⁺/PLUS⁺ Models: MGG10C, MGG14C

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Chapter 1. Overview

1.1 Introduction

Model CFS100 (CommStaff) is a software tool designed to communicate with and configure Azbil Corporation's smart field devices (DSTJ Smart Transmitters, etc.). CommStaff runs on Windows-based PCs. It establishes communication when the USB port of a PC and the communication port of an Azbil Corporation smart device are connected via the communication interface.

CommStaff supports both Azbil Corporation's SFN/DE and HART protocols.

Note: HART® is a registered trademark of FieldComm Group.

This manual describes how to use the MGG version of CommStaff. For specifications and instructions that are not particular to a smart device, but are common for all versions of CommStaff, such as CommStaff installation instructions, see *Field Communication Software Model: CFS100 (Common Edition) User's Manual.* Before reading this manual, be sure to read the manual mentioned above.

1.2 Important Notes

- When changing the connected device

  CommStaff continuously communicates with the device to update the display of dynamic values such as pressure. Accordingly, if the communication cable is removed during communications in order to change the device, a communication error will occur. Exit CommStaff before detaching the communication cable from the device.

  Then restart CommStaff after connecting the communication cable to the new device.

- Write protection

  If the write protection level of the electromagnetic flowmeter is 3, CommStaff cannot communicate with it. To establish communications, set the level to 2 or lower.

- Local settings card

  Some of the electromagnetic flowmeter settings are associated with other device settings. If such settings are changed, an error may occur because the values do not match. The local settings card allows users to correct a mistaken setting easily. Using it to change settings is recommended.

- Device status check after changing settings or when receiving an error message via communications.

  Before returning to normal operation after changing settings, or if an error message is received after changing settings via communications, check the status according to the method shown in section 3.1, "Device status check." If a status error occurs, change the settings so that the problem does not occur, referring to chapter 4.

Chapter 2.   Device Setup

2.1   Menu tree

To show the menu selection, right-click Online on the menu tree in the left pane of the CommStaff window. Select Expand to expand the entire menu tree.

The parameters displayed in gray (PV, PV AO, PV LRV, PV URV in the figure below) in the right pane cannot be modified.
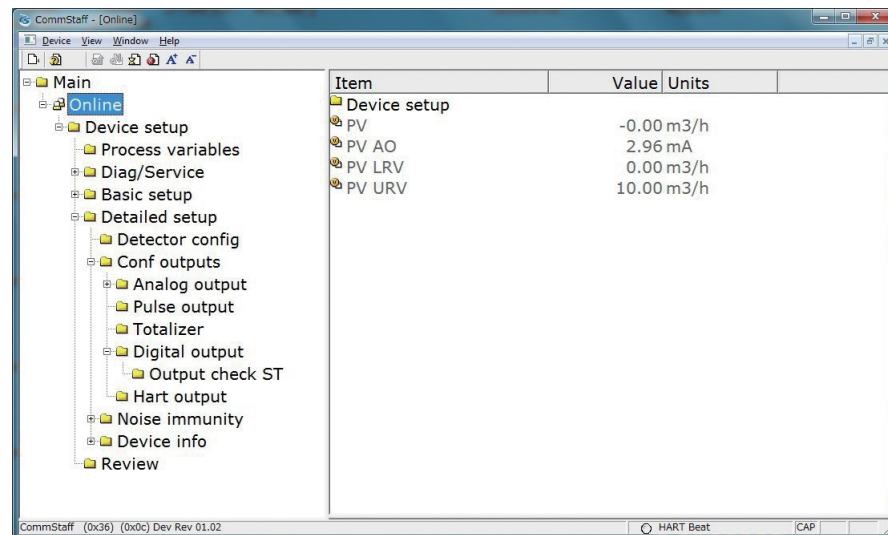
Note.   The PV URV value on the Online menu is displayed with the value it had when CommStaff started up. It does not reflect any change in the value that is made on another menu. Also, in the case of a double range, the range that is selected when CommStaff starts up is displayed.

A detailed menu tree is shown below.

```
1 Device setup  →  Process variables  →  PV
2 PV                                      PV % rnge
3 PV AO  *4                               AO  *4
4 PV LRV                                  Totlizer display
5 PV URV                                  Puls scaling

                   Diag/Service       →  Device Status   →  Status group 1
                                                             Status group 2
                                                             Status group 3

                                          Loop test       →  Output check AO
                                                             Output check Pls
                                                             Output check EX
                                                             Output check ST   →  Output check DO
                                                                                  Output check DI

                                          Calibration     →  D/A trim  *4
                                                             Auto zero trim
                                                             Gain trim
                                                             CAL EX current
                                                             Manual zero trim
                                                             Shipping RCVR

                   Basic setup        →  Tag
                                          PV unit
                                          PV URV
                                          Gravity
                                          PV Damp
                                          Auto zero trim
                                          Disp function   →  Disp select
                                                             Decimal place     →  Decimal place 1
                                                                                  Decimal place 2
                                          Func set
                                          Coefficient

                   Detailed setup     →  Detector config →  Tube size
                                                             Detector type
                                                             Change detector type  *2
                                                             EX value
                                                             DUMMY

                                          Conf outputs    →  Analog output   →  PV unit
                                                                                PV URV
                                                                                PV URV2
                                                                                Hysteresis
                                                                                I.out range
                                                                                I.out limit
                                                                                Lo flo cutoff     →  Lo flo cutoff
                                                                                                     LFC value
                                                                                Flow direction
                                                                                Burn out AO
                                                                                Output check AO

                                                             Pulse output    →  Puls out unit
                                                                                Puls scaling
                                                                                Pulse width
                                                                                Drop out
                                                                                Burn out Pls
                                                                                Output check Pls

                                                             Totalizer       →  Totalizer display
                                                                                Total restart val
                                                                                Reset totalizer
                                                                                Total preset val

                                                             Digital output  →  Func set
                                                                                Hi alarm1
                                                                                Low alarm1
                                                                                Hi alarm2
                                                                                Low alarm2
                                                                                Burn out DO1
                                                                                Burn out DO2
                                                                                Output check ST   →  Output check DO
                                                                                                     Output check DI

                                                             Hart output  *1 →  Poll addr  *1
                                                                                Num req preams  *1
                                                             COMM output  *1

                                          Noise immunity  →  PV Damp
                                                             Spike cut       →  Spike cut
                                                                                Spike cut time
                                                                                Spike cut level

                                                             Moving average  →  Moving average
                                                                                Mvng av time

                                                             Lo flo cutoff   →  Lo flo cutoff
                                                                                LFC value

                                                             Drop out
```
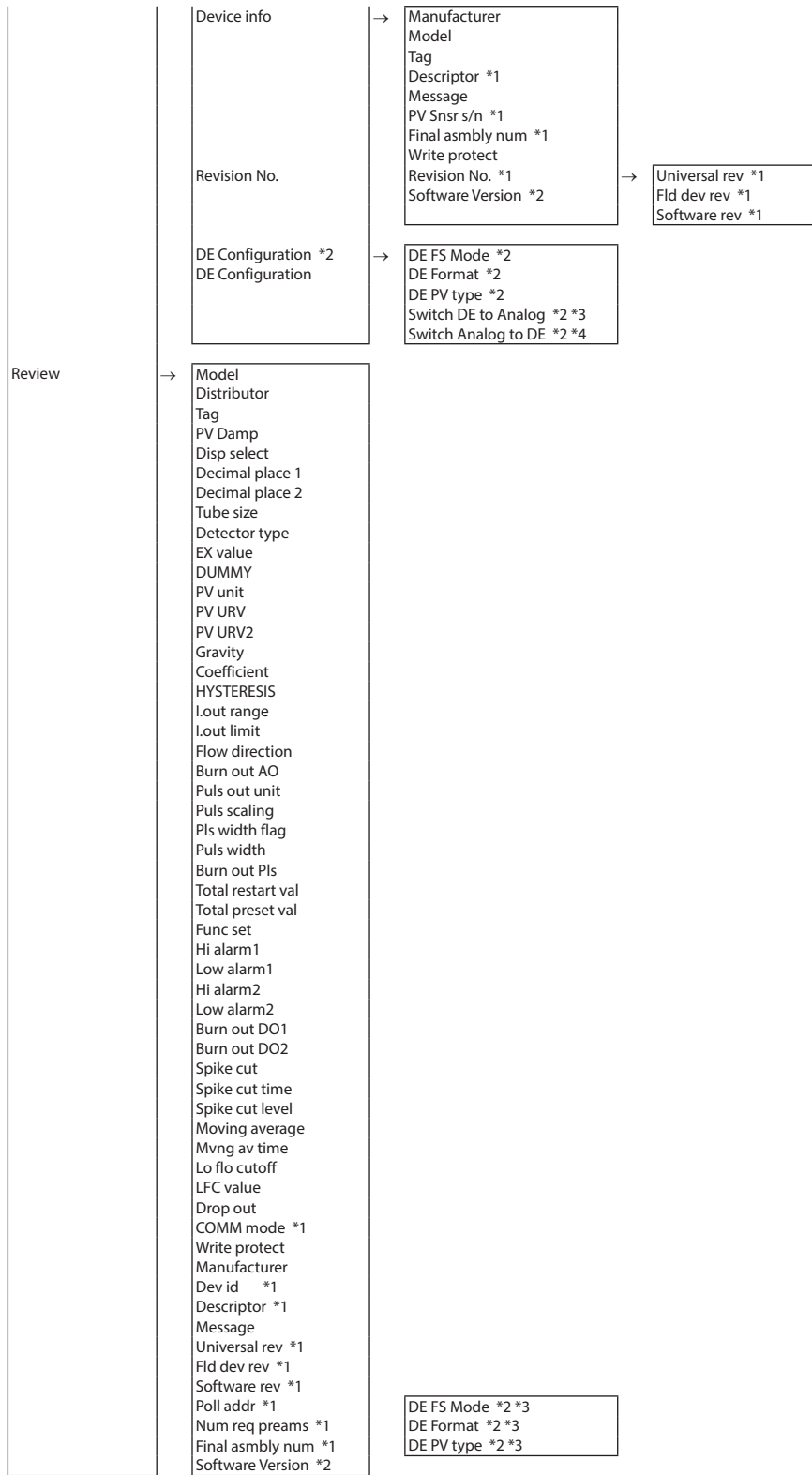
3

```
                        Device info        →   Manufacturer
                                               Model
                                               Tag
                                               Descriptor  *1
                                               Message
                                               PV Snsr s/n  *1
                                               Final asmbly num  *1
                                               Write protect
                        Revision No.           Revision No.  *1          →   Universal rev  *1
                                               Software Version  *2          Fld dev rev  *1
                                                                            Software rev  *1

                        DE Configuration  *2   DE FS Mode  *2
                        DE Configuration   →   DE Format  *2
                                               DE PV type  *2
                                               Switch DE to Analog  *2 *3
                                               Switch Analog to DE  *2 *4

Review   →   Model
             Distributor
             Tag
             PV Damp
             Disp select
             Decimal place 1
             Decimal place 2
             Tube size
             Detector type
             EX value
             DUMMY
             PV unit
             PV URV
             PV URV2
             Gravity
             Coefficient
             HYSTERESIS
             I.out range
             I.out limit
             Flow direction
             Burn out AO
             Puls out unit
             Puls scaling
             Pls width flag
             Puls width
             Burn out Pls
             Total restart val
             Total preset val
             Func set
             Hi alarm1
             Low alarm1
             Hi alarm2
             Low alarm2
             Burn out DO1
             Burn out DO2
             Spike cut
             Spike cut time
             Spike cut level
             Moving average
             Mvng av time
             Lo flo cutoff
             LFC value
             Drop out
             COMM mode  *1
             Write protect
             Manufacturer
             Dev id     *1
             Descriptor  *1
             Message
             Universal rev  *1
             Fld dev rev  *1
             Software rev  *1
             Poll addr  *1              DE FS Mode  *2 *3
             Num req preams  *1         DE Format  *2 *3
             Final asmbly num  *1       DE PV type  *2 *3
             Software Version  *2
```

*1. Not displayed if communication protocol is SFN or DE.

*2. Not displayed if communication protocol is HART.

*3. Not displayed if communication protocol is SFN.

*4. Not displayed if communication protocol is DE.

2.2 Basic setup

2.2.1 Tag setup

The section explains how to input and change a tag No. In the menu tree in the left pane of the window, select [Device setup] → [Basic setup] → [Tag].

Double-click Tag to display the settings screen. Enter the desired tag No. and then click the Set button. The tag is highlighted in yellow. Click the Send button to send the new tag to the device.
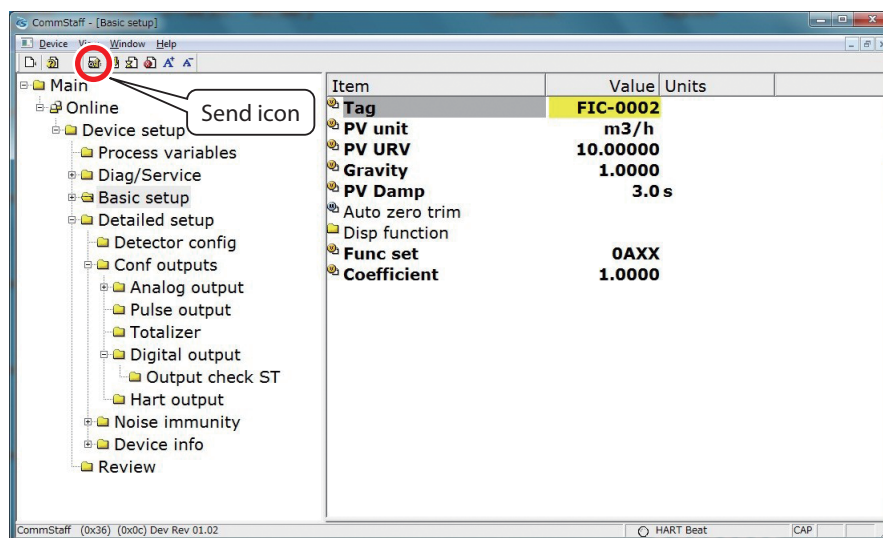
2.2.2 Flow rate unit of measurement

Since this setting may cause a configuration error, be sure to read chapter 4 before setting.

After changing the setting, check the status according to the method shown in section 3.1, "Device status check," and make sure that there is no configuration error.

This section explains how to set the unit of measurement for flow rate. In the menu tree in the left pane of the window, select [Device setup] → [Basic setup] → [PV unit].

Set the flow rate unit.

Selectable units:

m3/d, m3/h, m3/m, m3/s, l/d, l/h, l/m, l/s, cm3/d, cm3/h, cm3/m, cm3/s, t/d, t/h, t/m, t/s, kg/d, kg/h, kg/m, kg/s, g/d, g/h, g/m, g/s

BPD, BPH, BPM, BPS, kGPD, kGPH, kGPM, kGPS, IGPD, IGPH, IGPM, IGPS, KIGPD, KIGPH, KIGPM, KIGPS, mIGPD, mIGPH, mIGPM, mIGPS, GPD, GPH, GPM, GPS, mGPD, mGPH, mGPM, mGPS, lb/d, lb/h, lb/m, lb/s
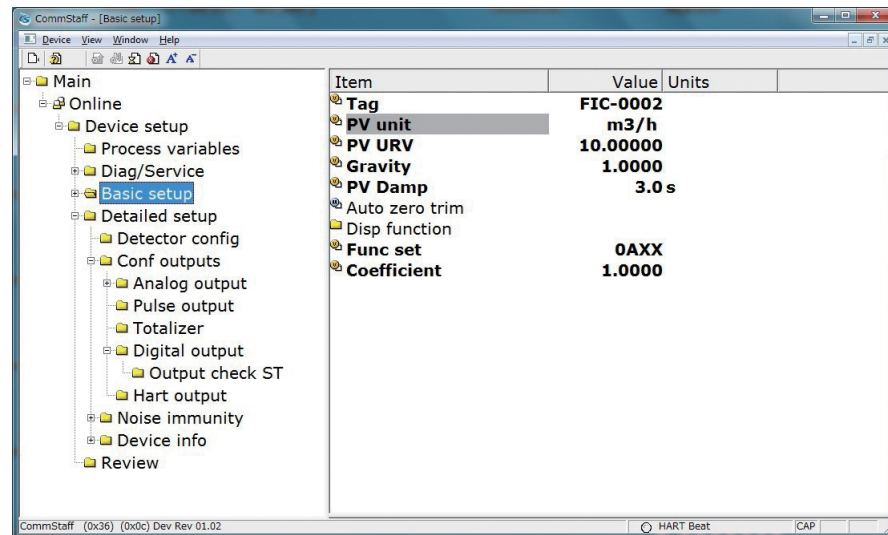
If a configuration error occurs.

When the flow rate unit is changed, a configuration error like the one in the figure below may occur. A message like SPAN OVER ERROR or PULSE SCALE ERROR will appear in the message box.

See chapter 4, and correct the error by changing the flow rate unit.
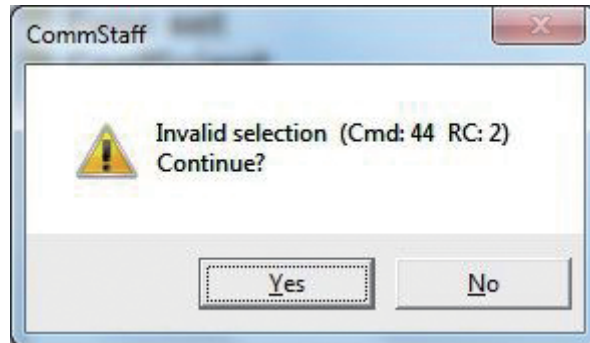
Sample procedure for changing the setting (from m3/h to m3/min)

- Change the flow rate unit from m3/h to m3/min.
- An error like the one above occurs.
- If the dialog box asks "Continue?" select Yes.
  (At this point, m3/h and m3/min are displayed alternately.)
- See chapter 4 and correct the error.
- Change the flow rate unit back to m3/h from m3/min. (At this point, an error may occur again. Continue the procedure anyway.)
- Change the flow rate unit from m3/h to m3/min again. If there is no configuration error, the setting has been successfully changed.

2.2.3 Range URV

This section explains how to set the flow rate range. In the menu tree in the left pane of the window, select [Device setup] → [Basic setup] → [PV URV].

Enter a range value. The setting range is from 0 to 12 m/s (flow speed).

(Guaranteed accuracy is from 0 to 10.0 m/s.)

If the value is out of range, an error indication is displayed. Enter another value.

After changing the setting, check the status according to the method shown in section 3.1, "Device status check," to make sure that there is no configuration error.
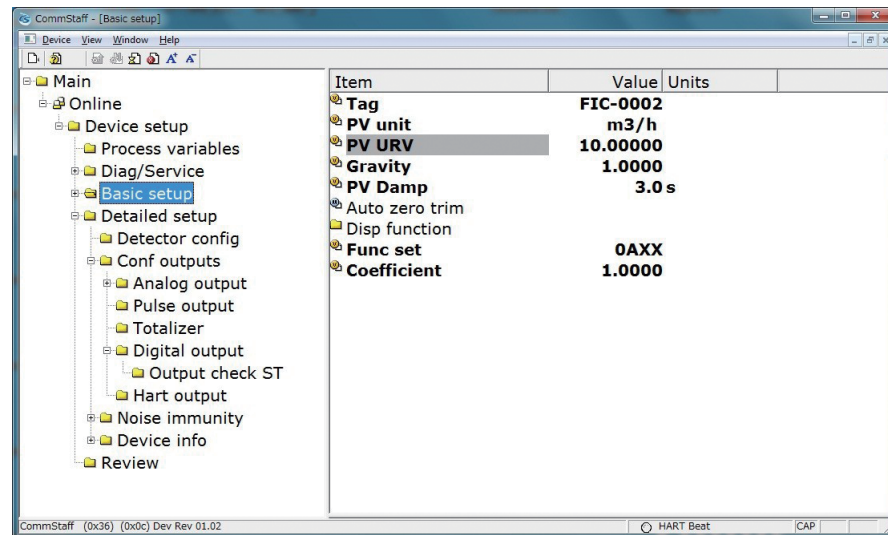
2.2.4 Specific gravity

This section explains how to set the unit of measurement for specific gravity. In the menu tree in the left pane of the window, select [Device setup] → [Basic setup] → [Gravity].

Enter a specific gravity value. The setting range for specific gravity is from 0.1000 to 9.9999.
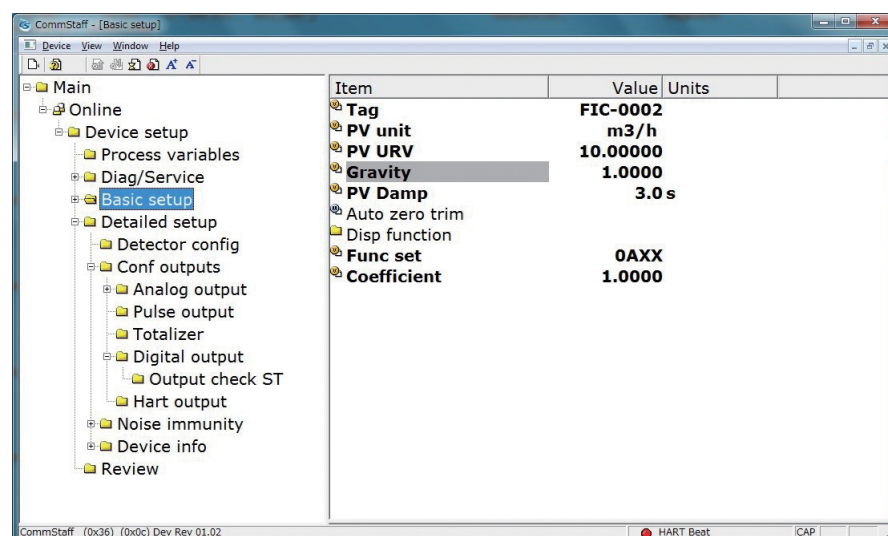
2.2.5   Damping time constant

This section explains how to set the damping time constant. In the menu tree in the left pane of the window, select [Device setup] →[Basic setup] → [PV Damp].

Enter a damping time constant. The setting range for damping time constant is from 0.1 to 199.9 s.
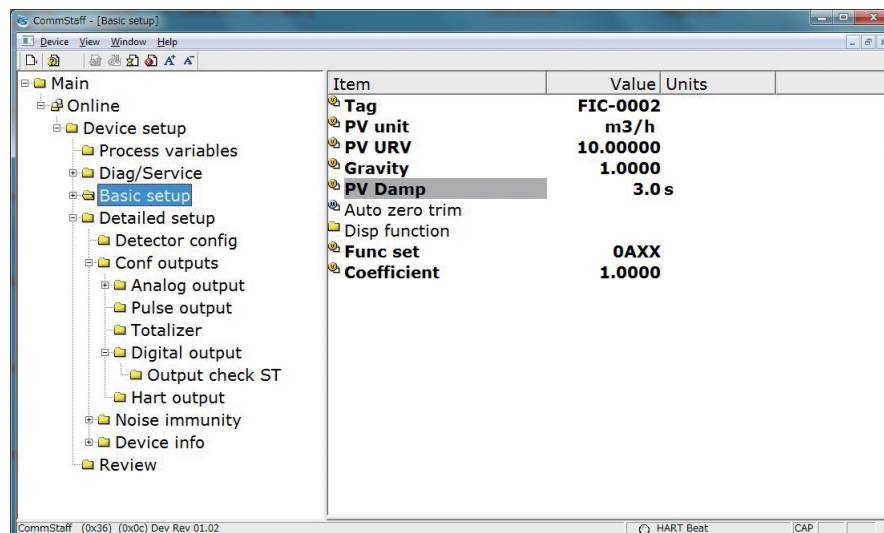
2.2.6   Auto zero adjustment

This section explains how to execute auto zero adjustment. In the menu tree in the left pane of the window, select [Device setup] → [Basic setup] → [Auto zero trim].

Adjustment procedure

- Stop the flow of the fluid in the flowmeter completely.

- A dialog box appears saying "Confirm flow rate is zero, wait 100s." If automatic zero adjustment is desired, click OK. If ABORT is clicked, adjustment of the zero point is aborted.

- A dialog box appears saying "Waiting for auto zero to complete." If automatic zero adjustment is desired, click OK.

- After about 100 seconds, when a dialog box appears saying "Auto zero complete," automatic zero adjustment is complete. Click OK to close the dialog box.
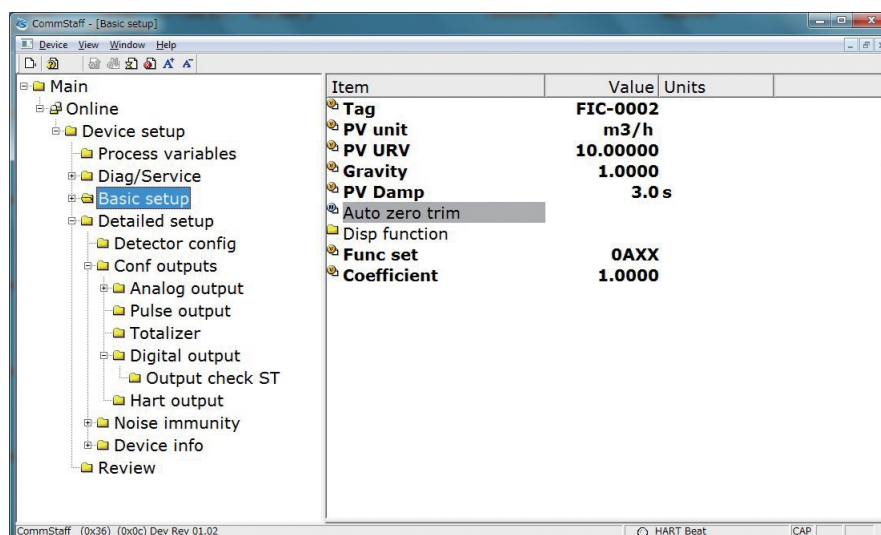
2.2.7   Selection of display type

This section explains how to set the display. In the menu tree in the left pane of the window, select [Device setup] → [Basic setup] → [Disp function] → [Disp select].

Specify a display method. The available display methods are %, RATE, and TOTAL.
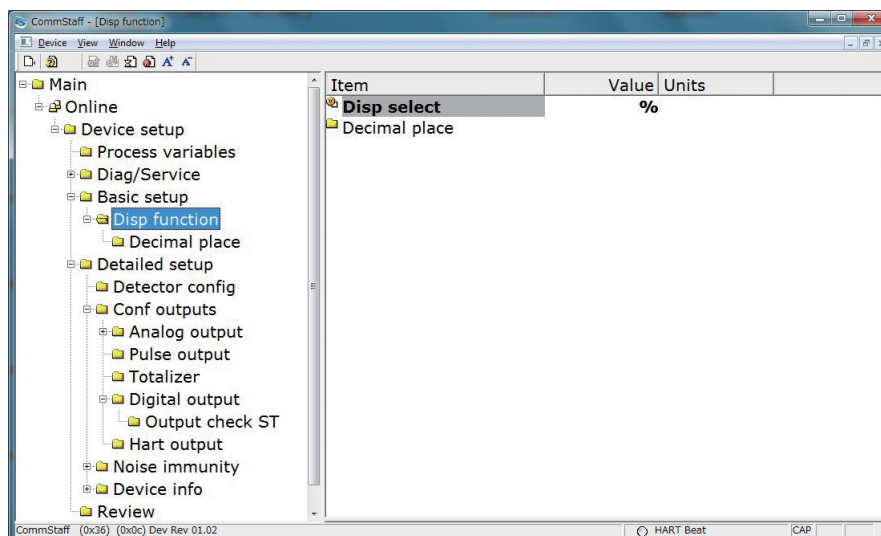
2.2.8   Decimal point position

This section explains how to set the decimal point position for display. In the menu tree in the left pane of the window, select [Device setup] → [Basic setup] → [Disp function] → [Decimal place].

Select Decimal place 1 or Decimal place 2 and set the number of digits displayed after the decimal point. 0 to 4 can be selected.

Decimal place 2 is the setting for the second range when a double range is used.

This setting is enabled when Disp Select is RATE.
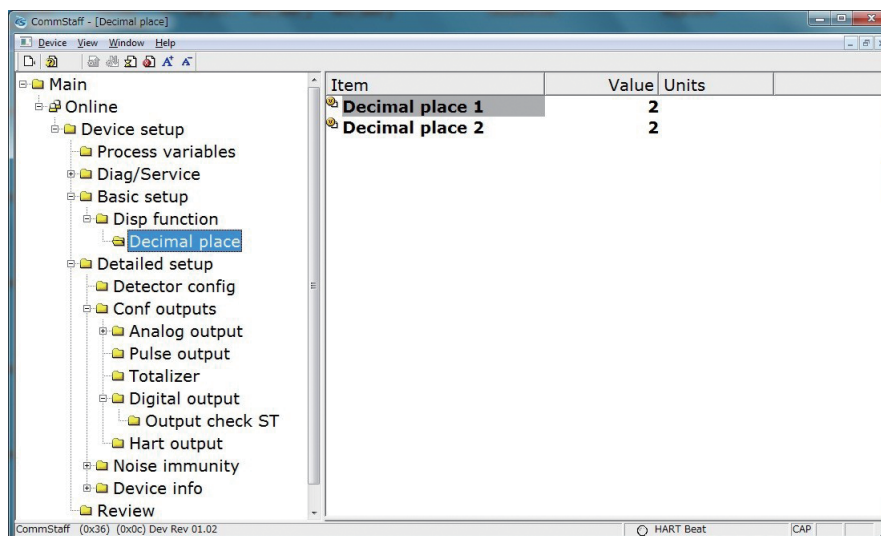
Note. The range of possible decimal point position settings depends on the size of the URV, as shown below. The engineering unit of the URV has no connection to the decimal point setting.

URV value	Allowable decimal point position settings
Less than 10	0–4
10 or more and less than 100	0–3
100 or more and less than 1000	0–2
1000 or more and less than 10000	0–1
10000 or more and less than 100000	0

2.2.9   Function setup

This section explains how to configure the function setup. In the menu tree in the left pane of the window, select [Device setup] →[Basic setup] → [Func set].

Enter a function setup value.
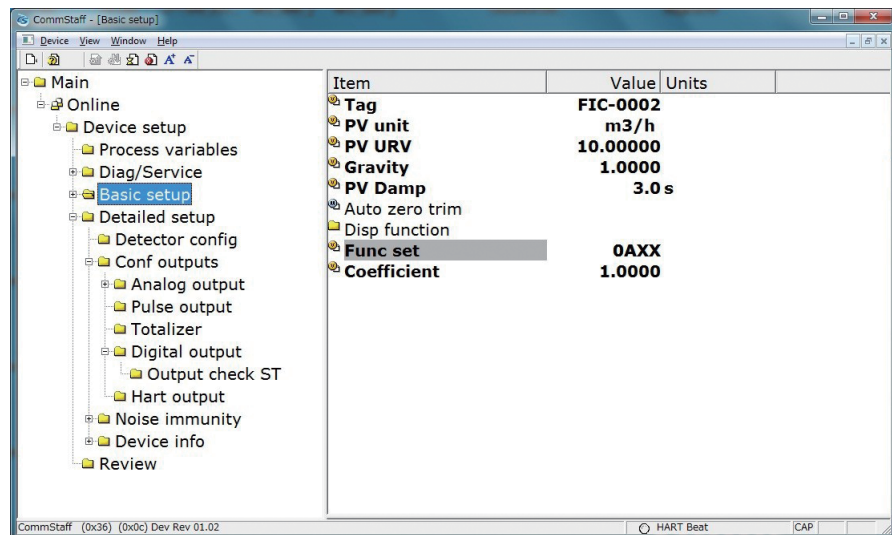
The setting range for function setup varies depending on the combination of contact inputs and outputs, as shown below.

1 input, 1 output
(DI/DO) – O A X X

0	A	X/1/2/4	X/1/4/5/6
	B	X/1/2/4	3
1	A	X/1/2/4	2
2	A	3	X/1/2/4/5/6
	B	3	3
3	A/C	X/1/2/4	2
4	A/C	3	X/1/2/4/5/6
	B	3	3

2 inputs, 0 outputs
(DI/DI) – O A X X

0	A	X/1/2/4/5/7/9	X
2	A	3/6/8/A	X
4	A/C	3/6/8/A	X

0 inputs, 2 outputs
(DO/DO) – O A X X

0	A	X	X/1/4/5/6/E/I/J/K
	B	X	3/D/F/G/H
1	A	X	2/7/8/9/A/C
	B	X	B
3	A	X	2/7/8/9/A/C
	B	X	B
	C	X	2/7/8/9/A/C

2.2.10   Correction factor

This section explains how to set up the correction factor for flow rate calculations. In the menu tree in the left pane of the window, select [Device setup] → [Basic setup] →[Coefficient].

Enter a correction factor. The setting range is from 0.1000 to 9.9999.
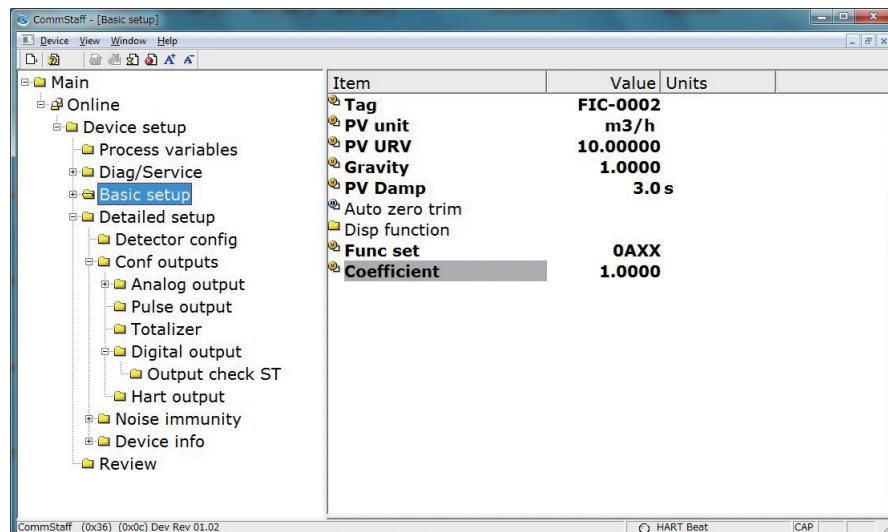
2.3 Detector setting

2.3.1 Detector tube size

Since this setting may cause a configuration error, be sure to read chapter 4 before setting.

After changing the setting, check the status according to the method shown in section 3.1, "Device status check," to make sure that there is no configuration error.
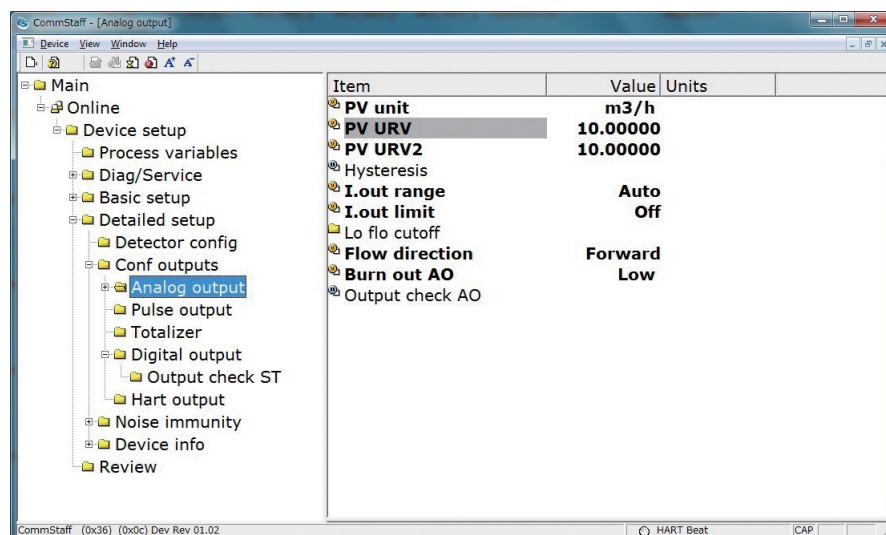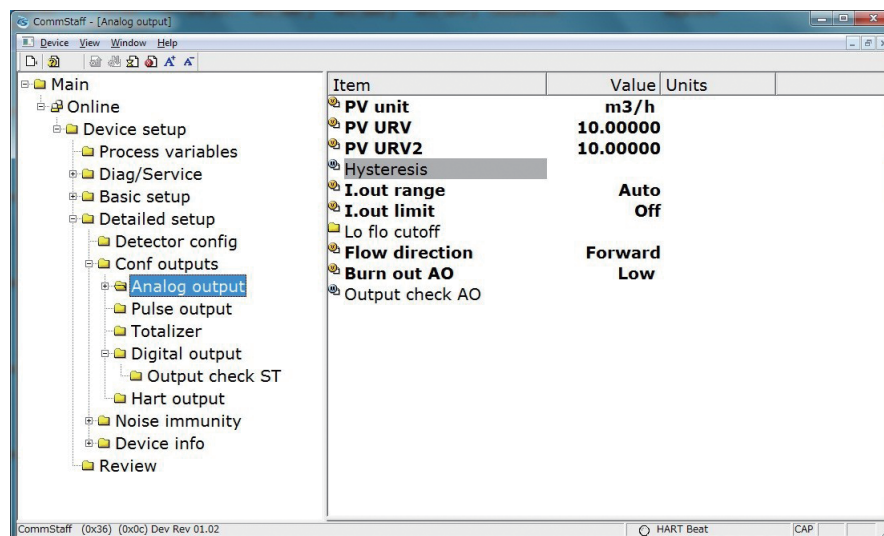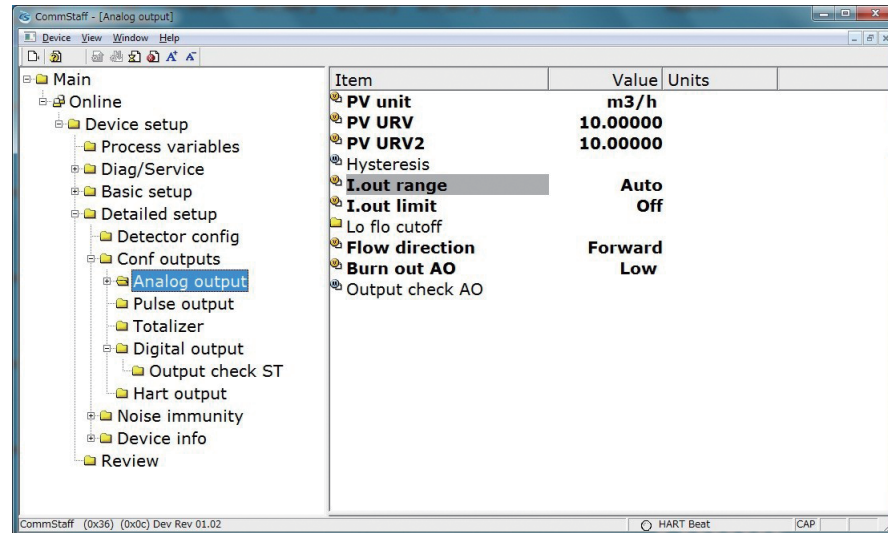
This section explains how to set the detector tube size. In the menu tree in the left pane of the window, select [Device setup] → [Detailed setup] → [Detector config] → [Tube size].

Enter a detector tube size.
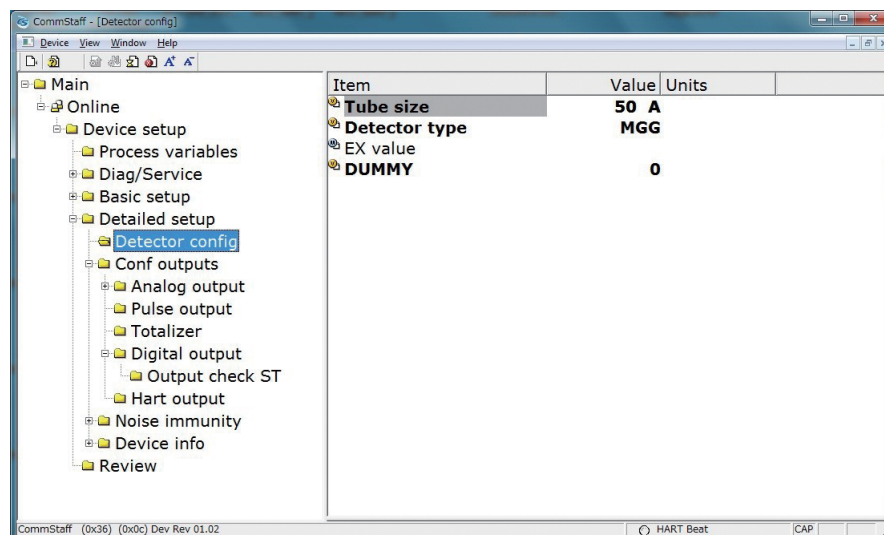
Note. If the tube size is changed, the URV (flow rate) will be converted to flow speed (m/s) and the flow rate unit will change as shown in the table below. Restart CommStaff and connect it to the flowmeter.

Selected unit	Tube size	
	50A or more	Less than 50A
Mass flow unit	t/h	kg/min
Volumetric flow unit	m3/h	l/min

If a configuration error occurs.

If the tube size is changed, the URV (flow rate) will be converted to flow speed (m/s) and the flow rate unit will change. Accordingly, the following configuration error may occur.

See chapter 4, correct the error, and set the tube size again.
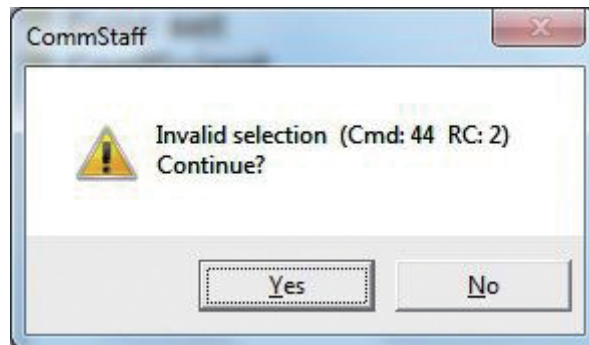
Sample procedure (for changing 50A to 100A)

- Change 50A to 100A.
- An error like the above occurs.
- If the dialog box above asks "Contunue ?,"select Yes.
  (At this point, 100A is displayed on CommStaff. However, setting has not been completed yet.)
- See chapter 4 and correct the error.
- Change the tube size back to 50A from 100A. (At this point, another error may occur. Continue the procedure anyway.)
- Change the tube size from 50A to 100A again. If there is no configuration error, the settings change is complete.

The table below shows the availability of tube + detector combinations.

DIA	MGG	KID	NNM	NNK
2.5	○	○	×	×
5.0	○	○	×	×
8.0	○	×	×	×
10.0	○	○	×	×
13.0	○	×	×	×
15.0	○	○	×	×
20.0	○	×	×	×
25.0	○	○	○	×
32.0	○	×	×	×
40.0	○	○	○	×
50.0	○	○	○	○
65.0	○	×	×	×
80.0	○	○	○	×
100.0	○	○	○	○
110.0	○	×	×	×
125.0	○	○	×	×
150.0	○	○	○	×
200.0	○	○	○	○
250.0	○	○	○	×
300.0	○	○	○	×
350.0	○	○	○	×
400.0	○	○	○	○
450.0	○	×	×	×
500.0	○	○	○	×
600.0	○	○	○	○
700.0	○	×	○	×
800.0	○	×	×	×
900.0	○	×	×	○
1000.	○	×	×	×
1100.	○	×	×	×
1200.	○	×	×	×
1300.	○	×	×	×
1350.	○	×	×	×
1400.	○	×	×	×
1500.	○	×	×	×
1600.	○	×	×	×
1800.	○	×	×	×
2000.	○	×	×	×
2200.	○	×	×	×
2400.	○	×	×	×
2600.	○	×	×	×

Table 1   Availability of tube + detector combinations
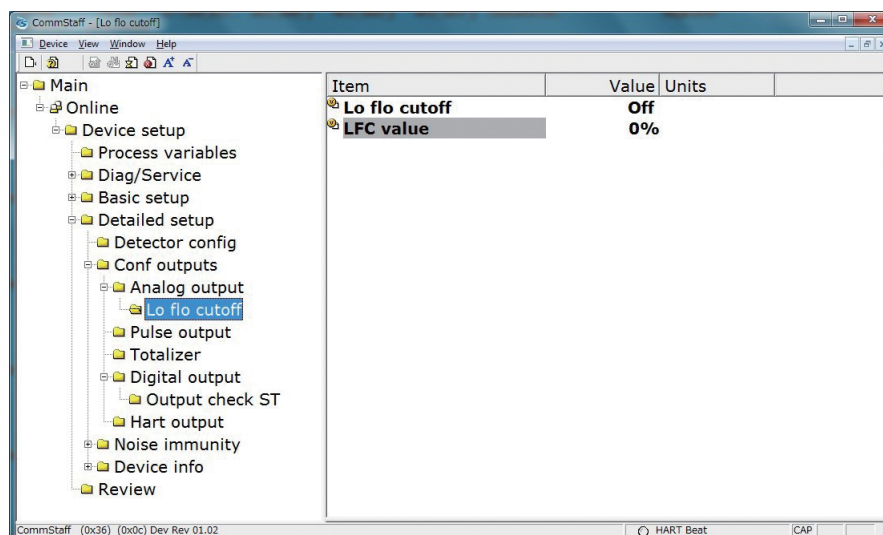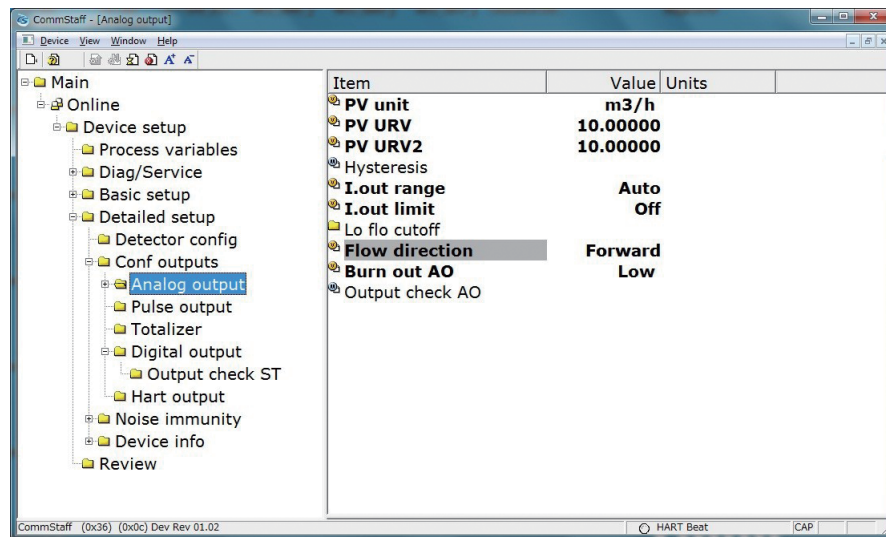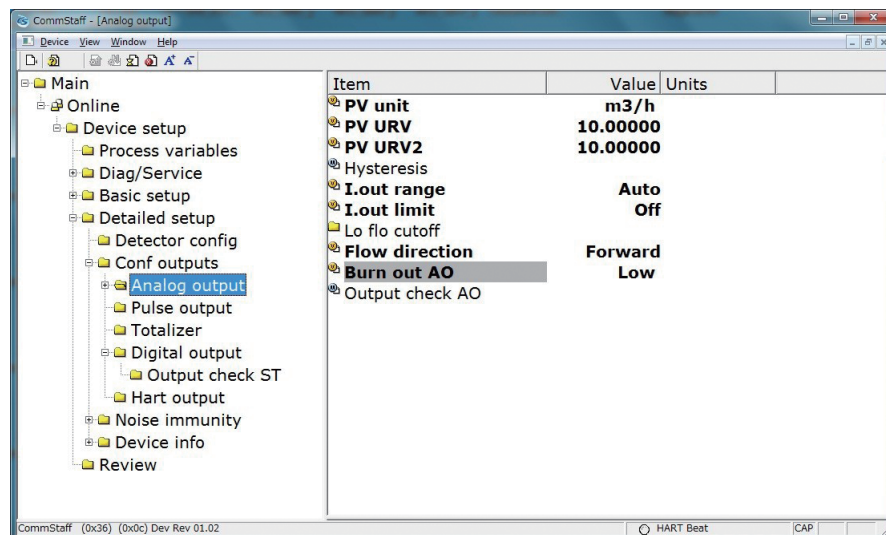
2.3.2 Detector type (for HART)

This section explains how to set the detector type. In the menu tree in the left pane of the window, select [Device setup] → [Detailed setup] → [Detector config] → [Detector type].

Enter a detector type. The detector types that can be set are KID, NNM, NNK, MGG, and MGB.
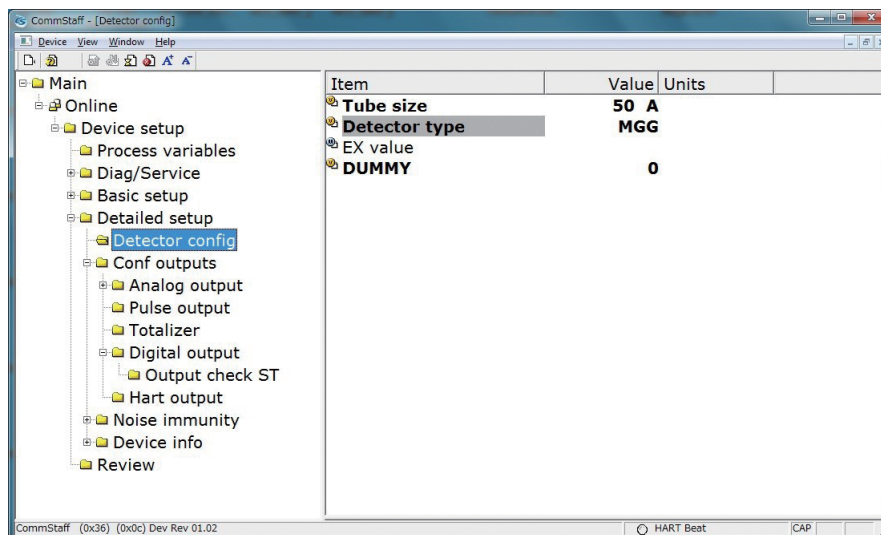
Note.   If the detector type is changed from NNK to another type, the number of DUMMIES is 0.

2.3.3 Detector type (for SFN or DE)

This section explains how to set the detector type. In the menu tree in the left pane of the window, select [Device setup] → [Detailed setup] → [Detector config] → [Change detector type].

Enter a detector type. The detector types that can be set are KID, NNM, NNK, MGG, and MGB.
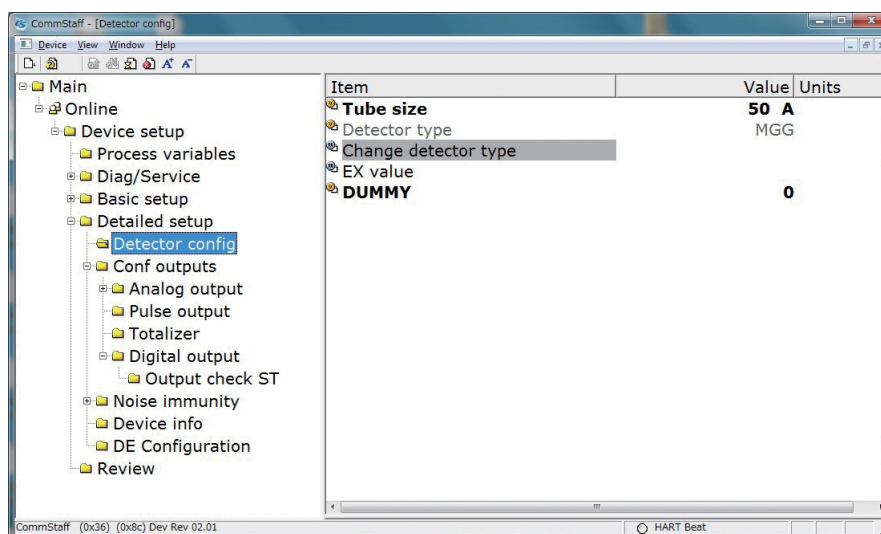
Note.   If the detector type is changed from NNK to another type, the number of DUMMIES is 0.

2.3.4 Detector constant

This section explains how to set the detector constant. In the menu tree in the left pane of the window, select [Device setup] → [Detailed setup] → [Detector config] → [EX value].

Enter the detector constant (EX value) that is etched on the detector's nameplate.

The detector can be set to a value from 100.0 to 999.9.
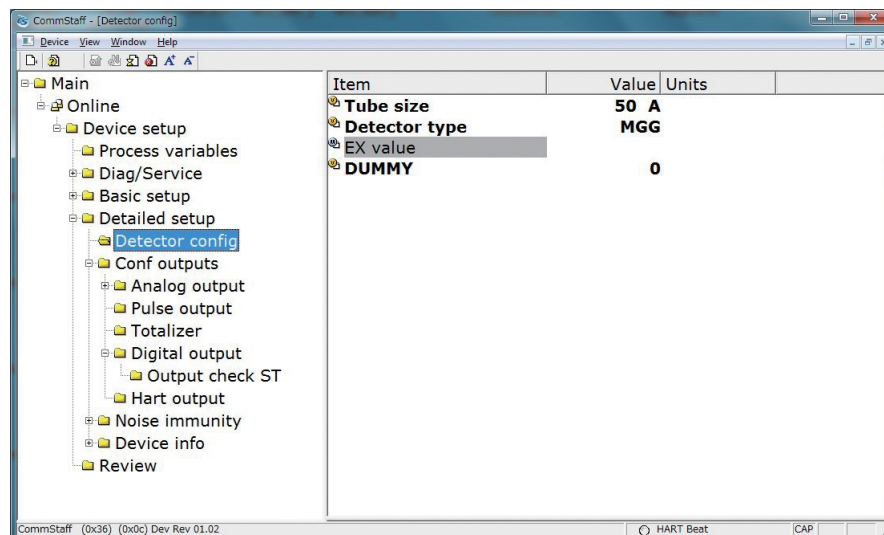
2.3.5 DUMMY

This section explains how to configure the DUMMY setting. In the menu tree in the left pane of the window, select [Device setup] → [Detailed setup] → [Detector config] → [DUMMY].

Enter the number of DUMMIES. The setting range is from 0 to 9.

A DUMMY can be set only if the detector type is NNK.
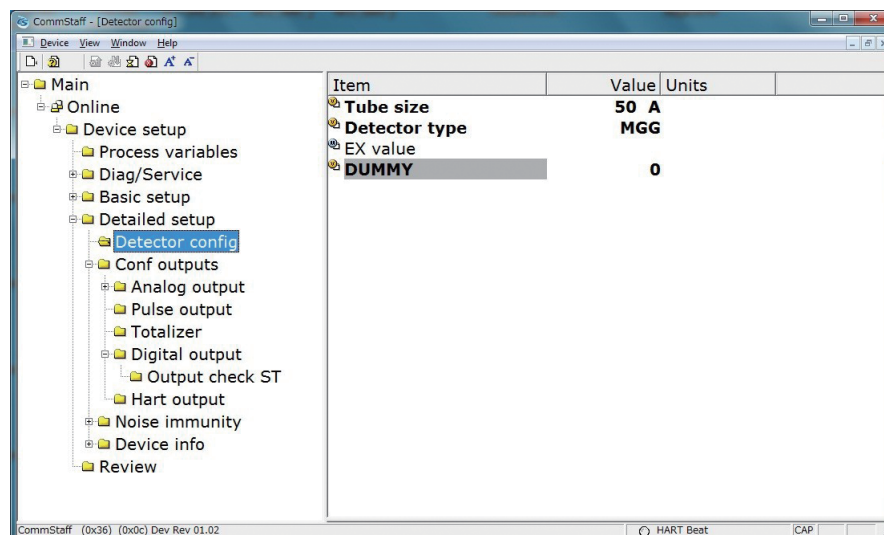
2.4 Analog output setting

2.4.1 Flow rate unit

This section explains how to set the unit of measurement for flow rate. In the menu tree in the left pane of the window, select [Device setup] → [Detailed setup] → [Conf outputs] →[Analog output] → [PV unit]. For details, refer to section 2.2.2.
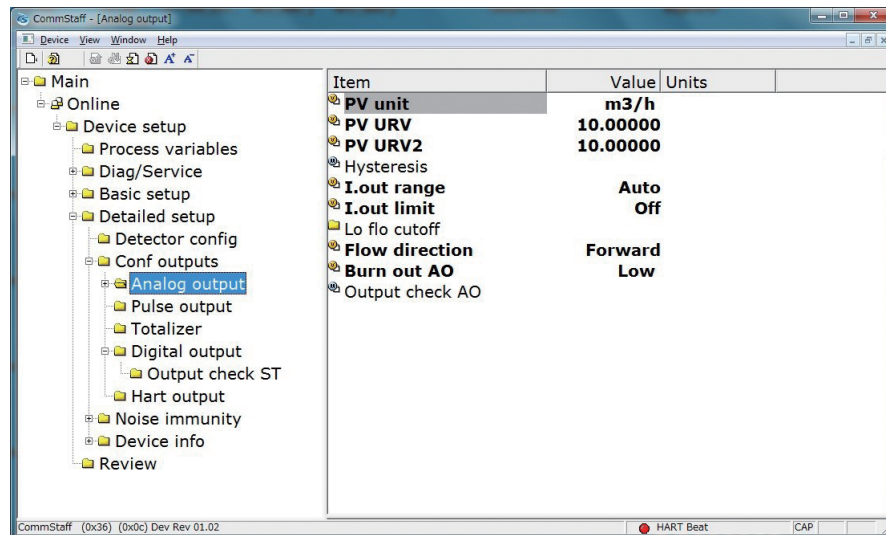
2.4.2 Range URV

This section explains how to set the flow rate range. In the menu tree in the left pane of the window, select [Device setup] → [Detailed setup] → [Conf outputs] → [Analog output] → [PV URV].

For details, refer to section 2.2.3.

2.4.3   Range URV2

This section explains how to set the second range for a double range. In the menu tree in the left pane of the window, select [Device setup] → [Detailed setup] → [Conf outputs] → [Analog output] → [PV URV2].

Enter a range value. The setting range is from 0 to 12 m/s (flow speed).

If the value is out of range, an error indication is displayed. Enter another value.
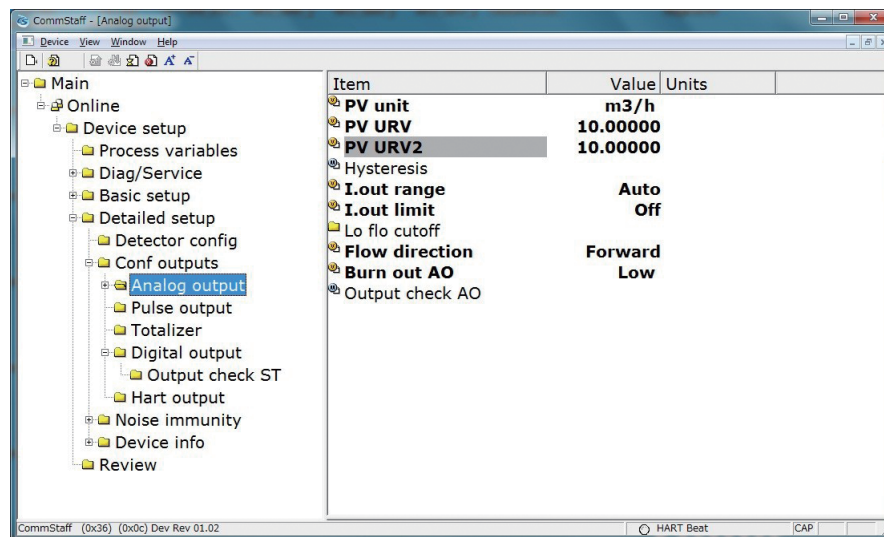
2.4.4   Hysteresis

This section explains how to set the hysteresis. In the menu tree in the left pane of the window, select [Device setup] → [Detailed setup] → [Conf outputs] → [Analog output] → [Hysteresis].

Set a value for hysteresis. The setting range is from 0 to 20 %.

This setting is enabled only for automatic double ranges.

2.4.5   I.out range

This section explains how to set the I.out range. In the menu tree in the left pane of the window, select [Device setup] → [Detailed setup] → [Conf outputs] → [Analog output] → [I.out range].

Set the I.out range. It can be set only to Auto or Wide.

This setting is enabled only for double ranges.

2.4.6   I.out limit

This section explains how to set the I.out limit. In the menu tree in the left pane of the window, select [Device setup] → [Detailed setup] → [Conf outputs] → [Analog output] → [I.out limit]. Set to On or Off.
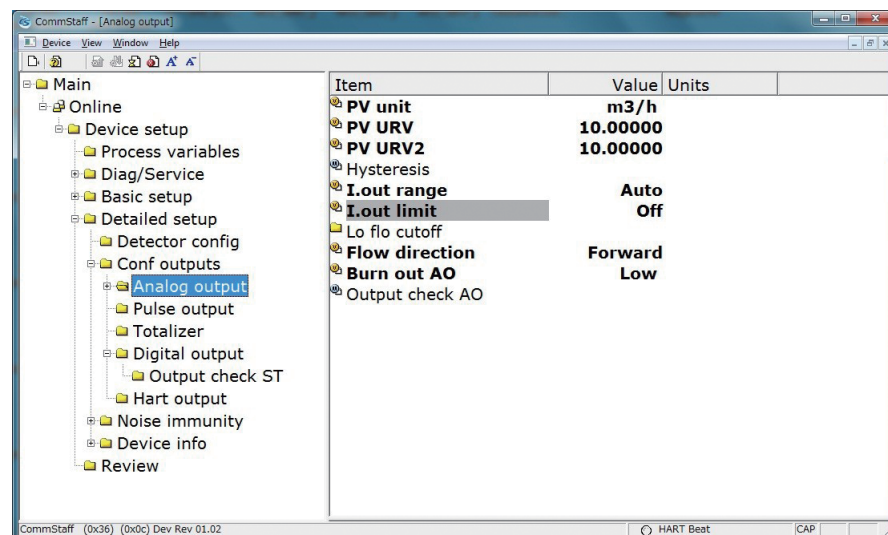
2.4.7　Low flow cutoff

2.4.7.1　Low flow cutoff

This section explains how to set the low flow cutoff. In the menu tree in the left pane of the window, select [Device setup] → [Detailed setup] → [Conf outputs] → [Analog output] → [Lo flo cutoff] → [Lo flo cutoff]. Set to On or Off.
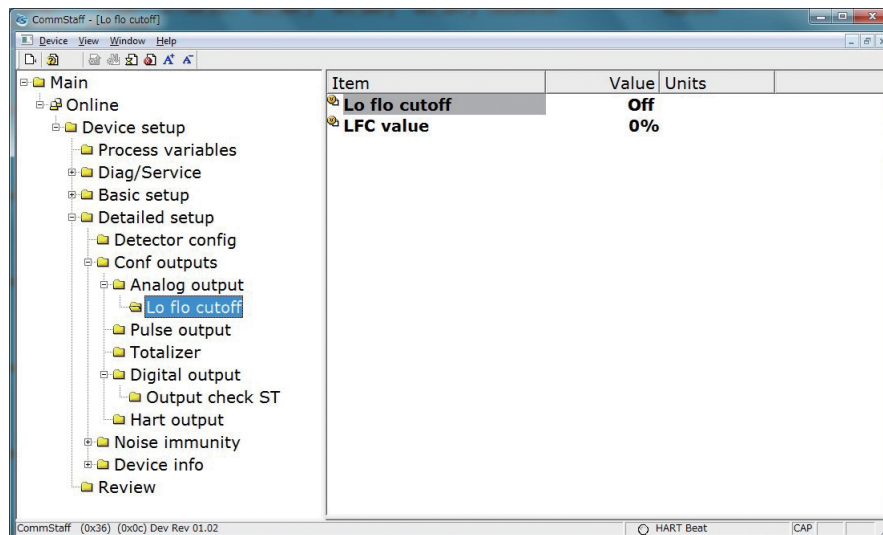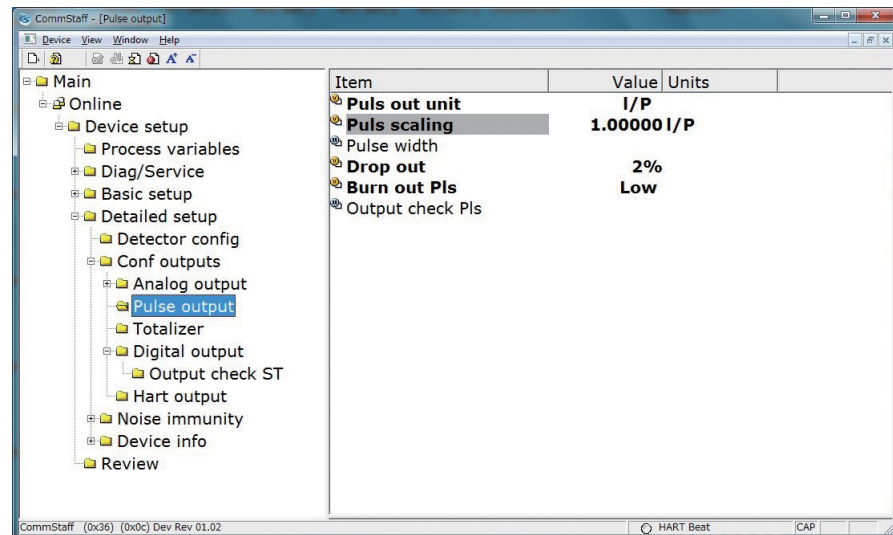

2.4.7.2　Low flow cutoff value

This section explains how to set the low flow cutoff value. In the menu tree in the left pane of the window, select [Device setup] → [Detailed setup] → [Conf outputs] → [Analog output] → [Lo flo cutoff] → [LFC value] Specify the low flow cutoff value. The setting range is from 0 to 10 %.

This setting is enabled only when the low flow cutoff is set to On.

2.4.8   Flow direction
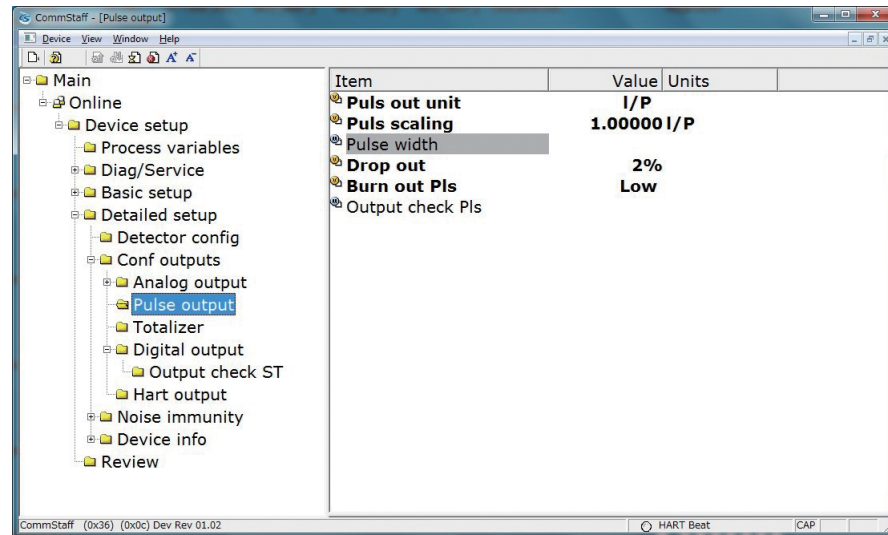
This section explains how to set the flow direction. In the menu tree in the left pane of the window, select [Device setup] → [Detailed setup] → [Conf outputs] → [Analog output] → [Flow direction]. Select Forward or Reverse.

2.4.9   Burnout setting (fail-safe behavior for analog output)

This section explains how to set the analog output behavior in case a hard failure occurs. In the menu tree in the left pane of the window, select [Device setup] → [Detailed setup] → [Conf outputs] → [Analog output] → [Burn out AO]. Select High, Low, or Hold.

2.4.10   Output check (analog output)

This section explains how to output a fixed-value analog current. In the menu tree in the left pane of the window, select [Device setup] → [Detailed setup] → [Conf outputs] → [Analog output] → [Output check AO].
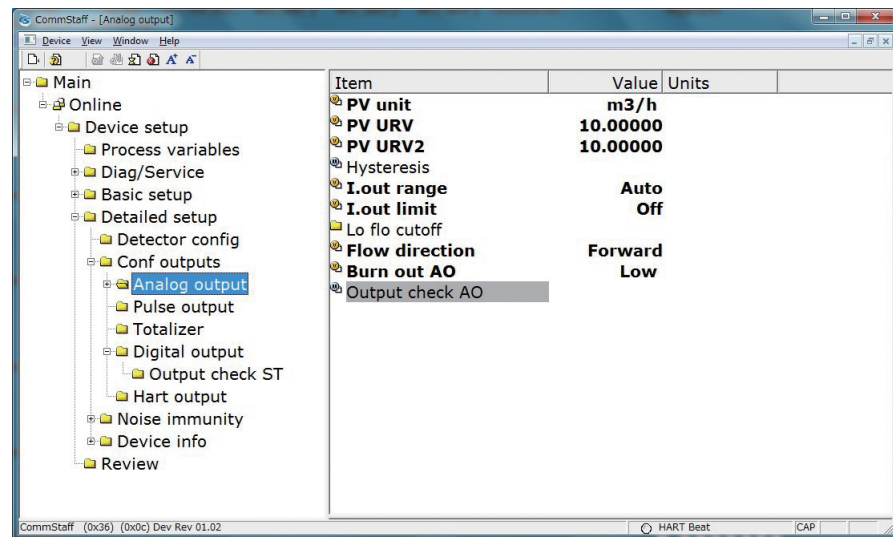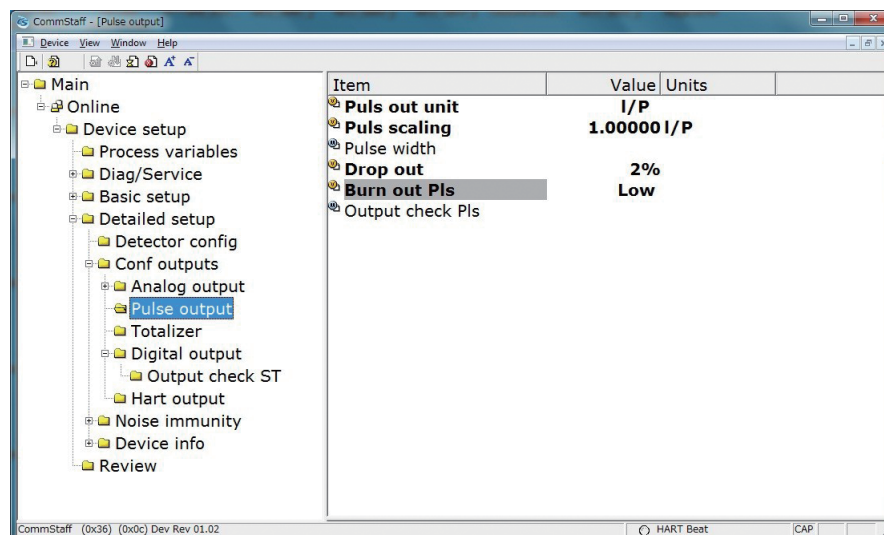

Output method

- The message "WARN-Loop should be removed from automatic control" appears. If a forced output change will not affect the control system, press OK. To abort the operation, press ABORT.

- The message "Choose output check analog current" appears. To check the output, select START and then press OK.

The following screen will be displayed.
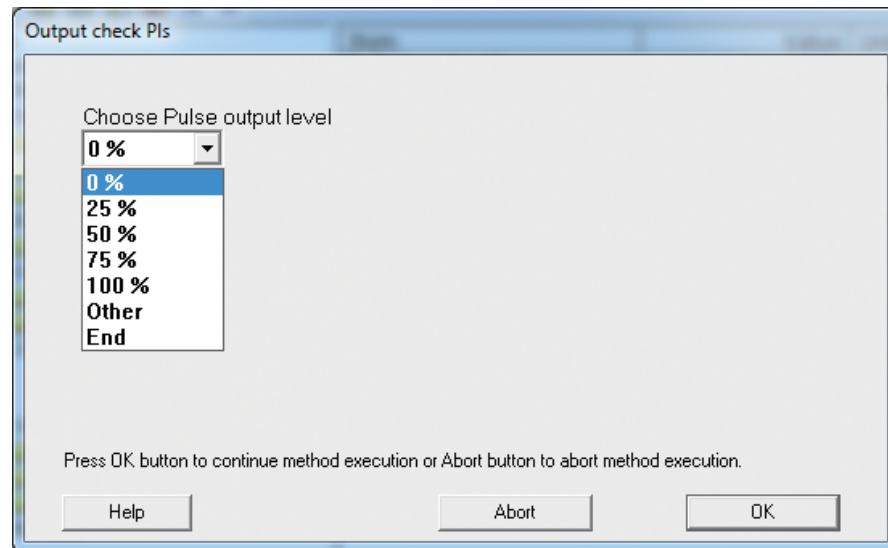
- SFN communication
  Select 0% and click OK. Output signals will be fixed at 0%.
  Select 25% and click OK. Output signals will be fixed at 25%.
  Select 50% and click OK. Output signals will be fixed at 50%.
  Select 75% and click OK. Output signals will be fixed at 75%.
  Select 100% and click OK. Output signals will be fixed at 100%.
  To input a different value, select Other and Click OK.
  If you select End and click OK, a message is displayed notifying you
  that normal output mode will resume.

- HART communication
  The message "Set another value" appears. Enter the desired fixed output value.
  The setting range is from 0 to +115 %

- To end the operation, press ABORT.

2.5　Pulse output setup

2.5.1　Pulse weight unit of measurement

Since this setting may cause a configuration error, be sure to read chapter 4 before setting.

After changing the setting, check the status according to the method shown in section 3.1, "Device status check," to make sure that there is no configuration error.

This section explains how to set the unit of measurement for pulse weight. In the menu tree in the left pane of the window, select [Device setup] → [Detailed setup] → [Conf outputs] → [Pulse output] → [Puls out unit].

Set a unit for the pulse weight.

　　m3/P, l/P, cm3/P, t/P, kg/P, g/P,B/P, kG/P, G/P, mG/P, IG/P, KIG/P, mIG/P, lb/P
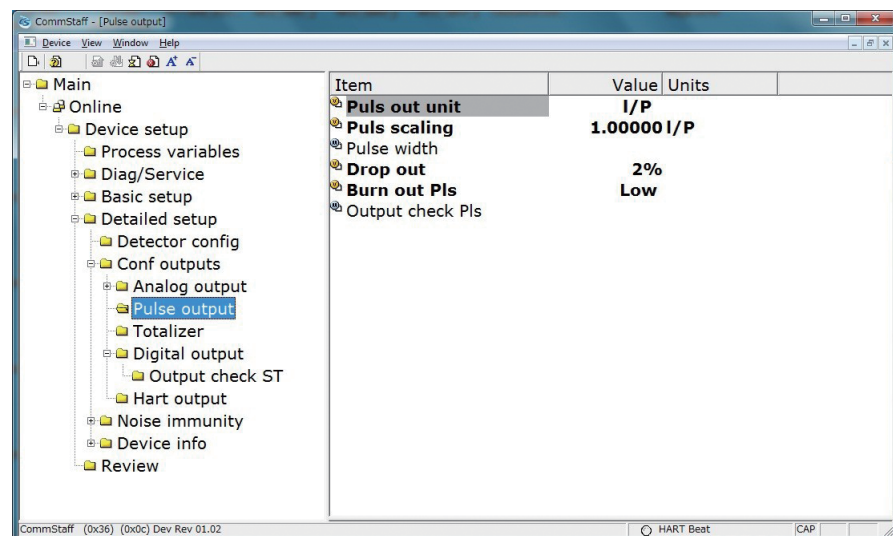
If a configuration error occurs.

If the pulse unit is changed, a setting error like the below may occur.

This is because a PULSE SCALE ERROR or the like occurs.

See chapter 4, correct the error, and set the pulse unit again.
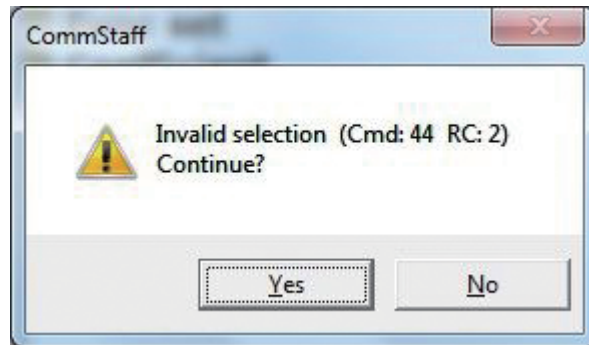
Example of procedure (for changing m3/p to l/P).

- Change the flow rate unit from m3/p to I/P.

- An error like the above occurs.

- If the dialog box above asks "Contunue ?,"select Yes.
  (At this point, I/P is displayed on CommStaff. However, setting has not been complete yet.)

- See chapter 4 and correct the error.

- Change the pulse unit back to m3/P from I/P. (At this point, an error may occur again. But continue the procedure.)

- Change the pulse unit from m3/p to I/P. If there is no setting error, setting is complete.

2.5.2   Pulse weight

This section explains how to set the pulse weight. In the menu tree in the left pane of the window, select [Device setup] → [Detailed setup] → [Conf outputs] → [Pulse output] → [Puls scaling].

Set the pulse weight.

The setting range for pulse weight is from 0.00006 to 3000 Hz.

If the value is out of range, an error indication is displayed. Enter another value.

2.5.3   Pulse width

This section explains how to set the pulse width. In the menu tree in the left pane of the window, select [Device setup] → [Detailed setup] → [Conf outputs] → [Pulse output] → [Pulse width].

Setting method

- If changing 50 % of duty to the real value, select YES and then press OK. If no change is needed, select NO.

- Enter the pulse width. The pulse width can be set to less than 70 % of duty.

Note. Display on the Review screen
During HART communications, even in case of 50 % of duty, the pulse width is displayed. (Default setting: 30 ms)
During SFN communications, in case of 50 % of pulse width duty, the pulse width is 0 ms.

2.5.4   Dropout

This section explains how to set the dropout. In the menu tree in the left pane of the window, select [Device setup] → [Detailed setup] → [Conf outputs] → [Puls output] → [Drop out].

Specify a dropout value. The setting range is from 0 to 10 %.
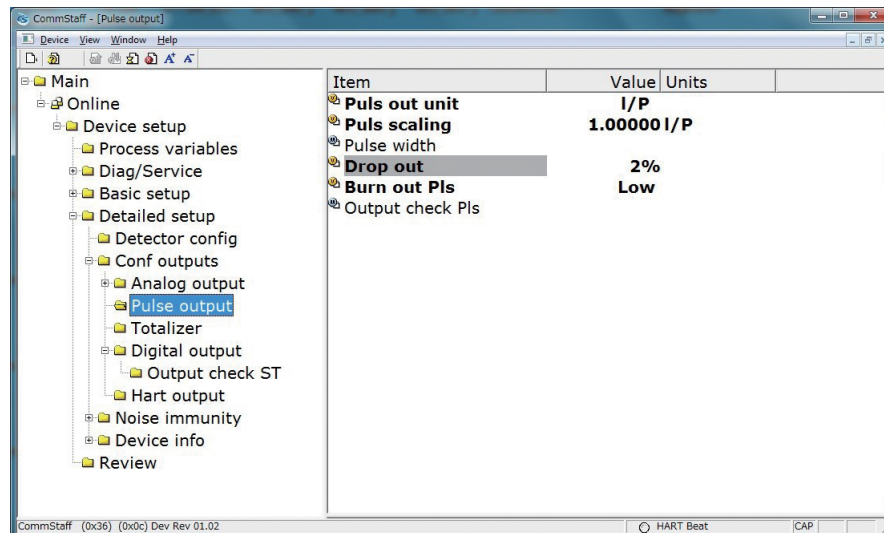
2.5.5   Burnout setting (fail-safe behavior for pulse output)

This section explains how to set the pulse output behavior in case a hard failure occurs. In the menu tree in the left pane of the window, select [Device setup] → [Detailed setup] → [Conf outputs] → [Pulse output] → [Burn out Pls].
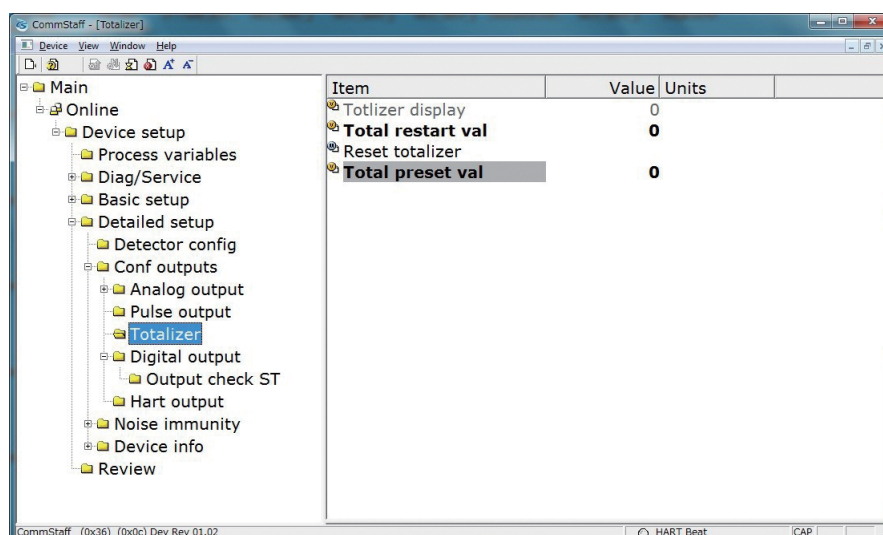
Select Low or Hold.

2.5.6   Output check (pulse output)

This section explains how to output a fixed pulse. In the menu tree in the left pane of the window, select [Device setup] → [Detailed setup] → [Conf outputs] → [Pulse output] → [Output check Pls].
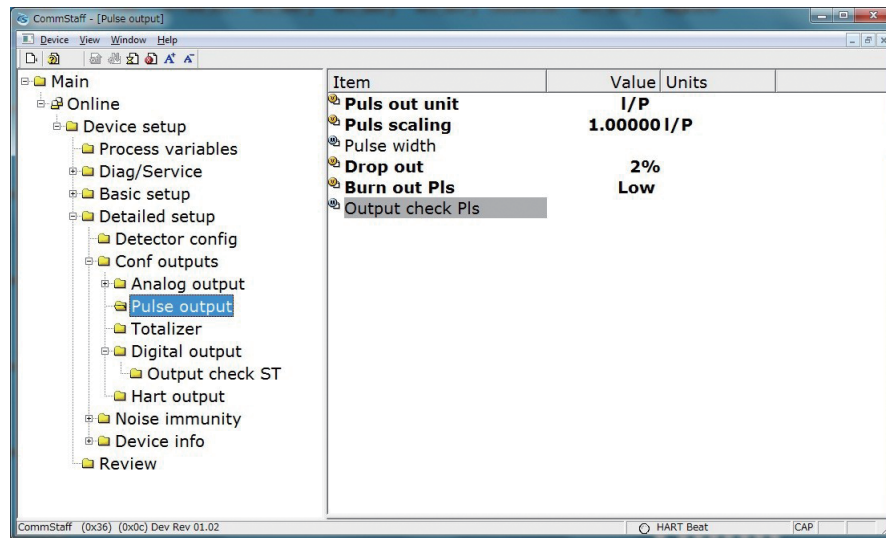

Output method

- The message "WARN-Loop should be removed from automatic control" appears. If a forced output change will not affect the control system, press OK. To abort the operation, press ABORT.

- The message "Choose output check pulse" appears. To check the output, select START and then press OK.

- The message "Select another Pulse" appears. Select Pulse 1 or 2. Pulse 2 is for the second range if a double range is set.

The following screen will be displayed.
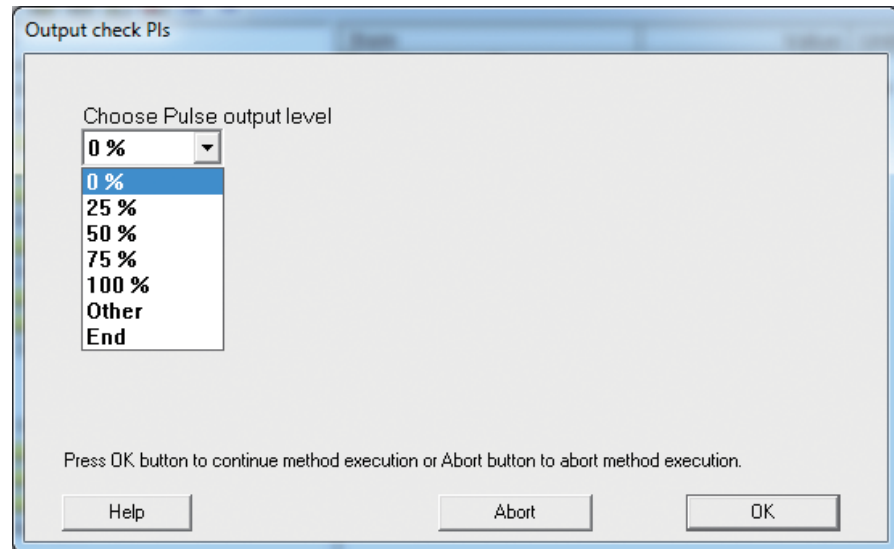
- SFN communication
  Select 0% and click OK. Output signals will be fixed at 0%.
  Select 25% and click OK. Output signals will be fixed at 25%.
  Select 50% and click OK. Output signals will be fixed at 50%.
  Select 75% and click OK. Output signals will be fixed at 75%.
  Select 100% and click OK. Output signals will be fixed at 100%.
  To input a different value, select Other and Click OK.
  If you select End and click OK, a message is displayed notifying you that normal output mode will resume.

- HART communication
  The message "Set another value" appears. Enter the desired fixed output value.
  The setting range is from 0 to +115 %

- To end the operation, press ABORT.

2.6 Totalizer setup

2.6.1 Displaying the totalized value

This section explains how to display the current totalized value. In the menu tree in the left pane of the window, select [Device setup] → [Detailed setup] → [Conf outputs] → [Totalizer] → [Totalizer display].
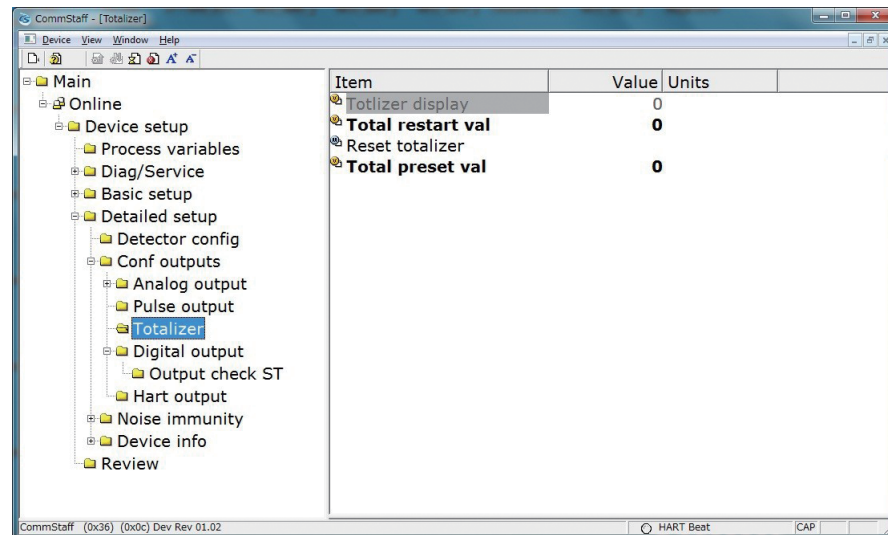
2.6.2 Totalizer restart value

This section explains how to set the value at which the totalizer is reset. In the menu tree in the left pane of the window, select [Device setup] → [Detailed setup] → [Conf outputs] → [Totalizer] → [Total restart val].

Enter the value at which the count will be reset (will restart from the initial value). The setting range for the totalized restart value is from 0 to 9,999,999,999.

In the case of totalized differential flow rate, a negative value can be set.
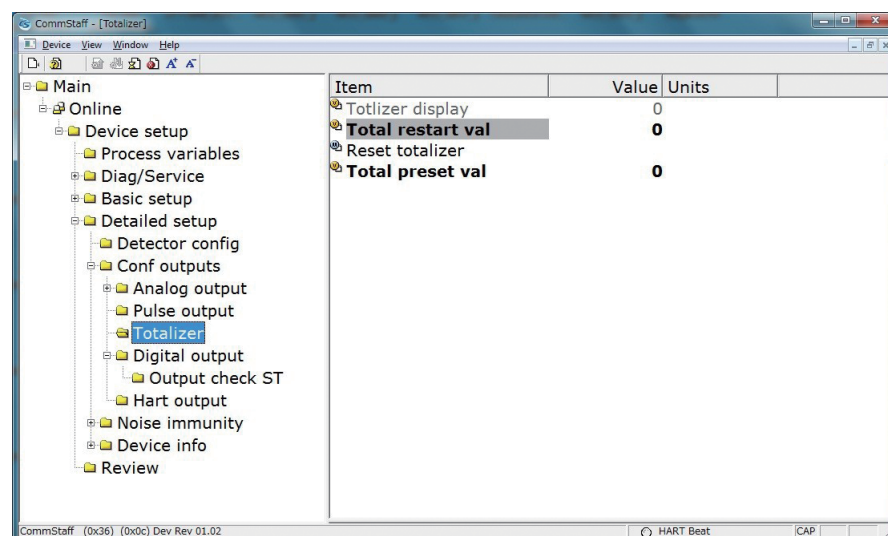
2.6.3 Resetting the totalized value

This section explains how to reset the totalized value. In the menu tree in the left pane of the window, select [Device setup] → [Detailed setup] → [Conf outputs] → [Totalizer] → [Reset totalizer].

To reset the totalized value, select YES and then press OK.
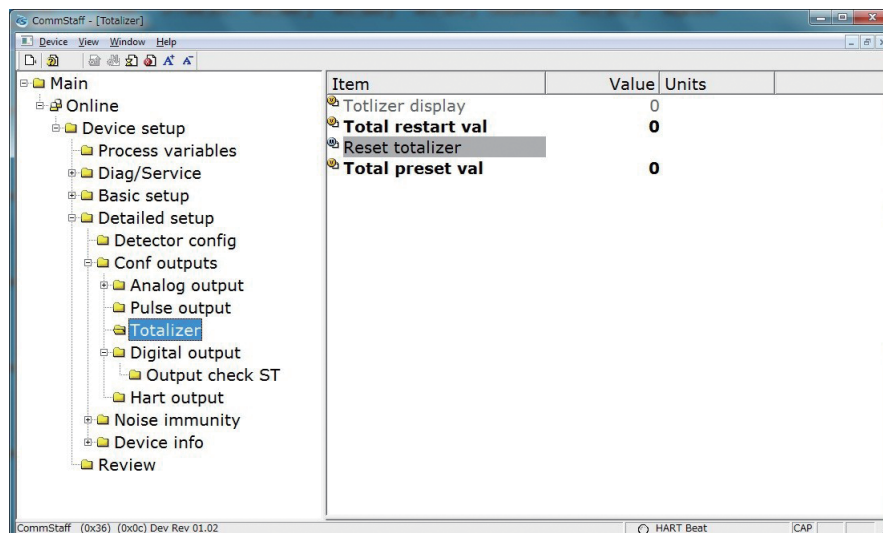
2.6.4 Totalized value preset

This section explains how to set the totalized preset value. In the menu tree in the left pane of the window, select [Device setup] → [Detailed setup] → [Conf outputs] → [Totalizer] → [Total preset val].

Enter the preset value to be used in totalization. The setting range for the totalized preset value is from 0 to 9,999,999,999.

2.7 Contact input/output setup

2.7.1 Function setting

This section explains how to set up functions. In the menu tree in the left pane of the window, select [Device setup] → [Detailed setup] → [Conf outputs] → [Digital output] → [Func set]. For details, refer to section 2.2.9.
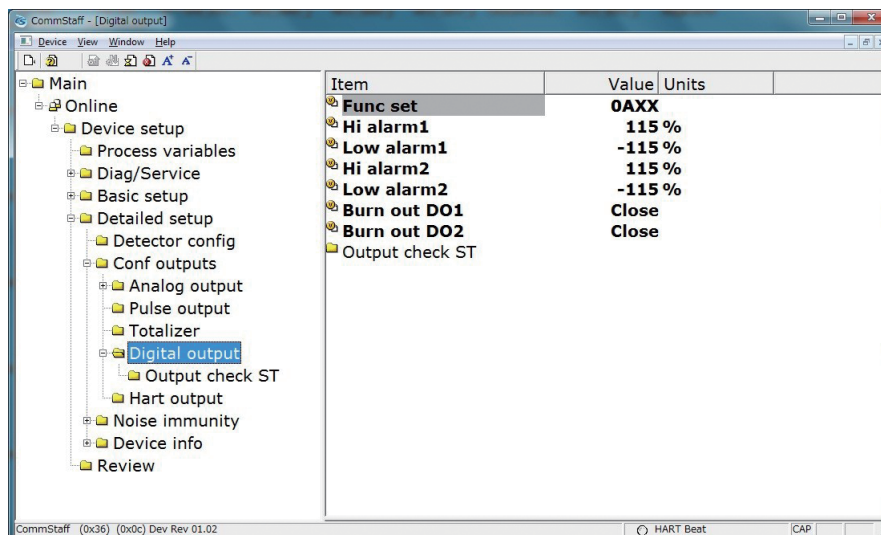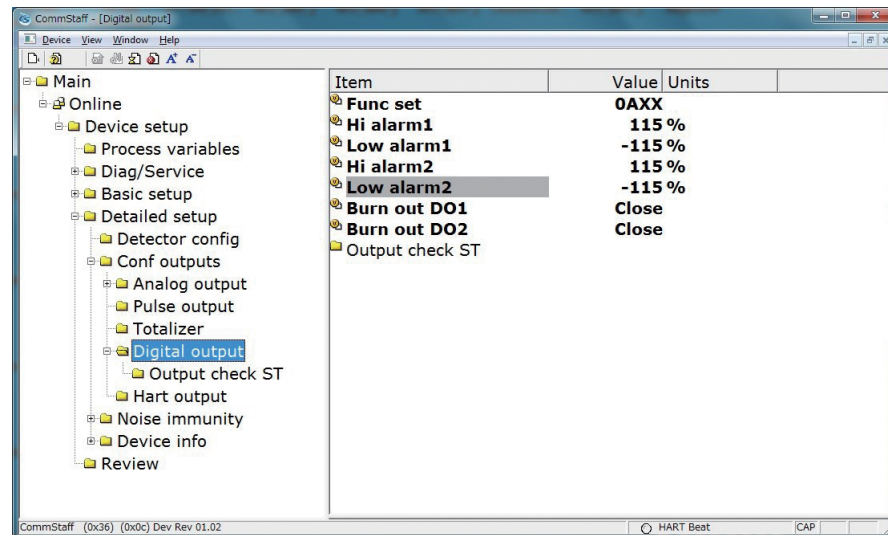

2.7.2 High limit alarm 1 setup

This section explains how to set up high limit alarm 1 for contact output. In the menu tree in the left pane of the window, select [Device setup] → [Detailed setup] → [Conf outputs] → [Digital output] → [Hi alarm1].

Enter a value for high limit alarm 1. The setting range for the high limit alarm is from -115 to +115 %.

Set the value so that high limit alarm 1 is larger than low limit alarm 1.

If the value does not meet the configuration conditions, an error indication is displayed. Enter another value.
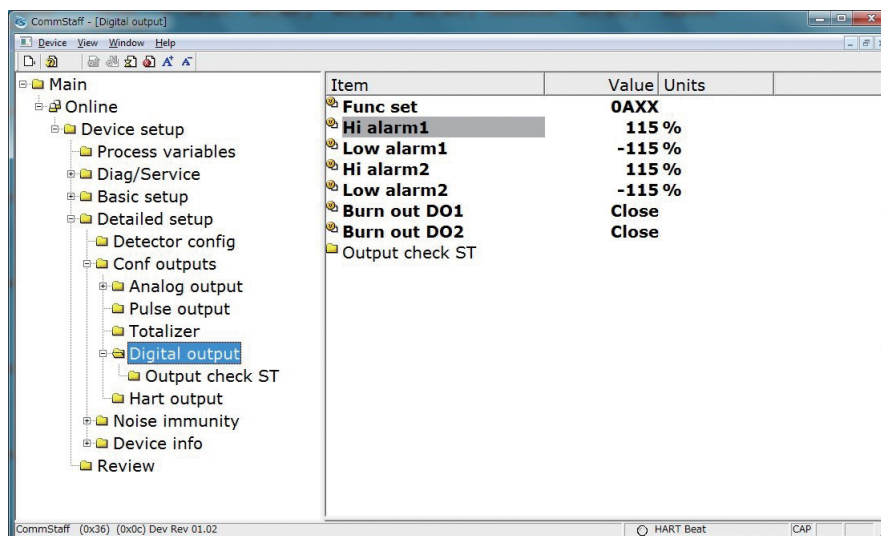
2.7.3　Low limit alarm 1 setup

This section explains how to set up low limit alarm 1 for contact output. In the menu tree in the left pane of the window, select [Device setup] → [Detailed setup] → [Conf outputs] → [Digital output] → [Low alarm1].

Enter a value for low limit alarm 1. The setting range for the low limit alarm is from -115 to +115 %.

Set the value so that high limit alarm 1 is larger than low limit alarm 1.

If the value does not meet the configuration conditions, an error indication is displayed. Enter another value.
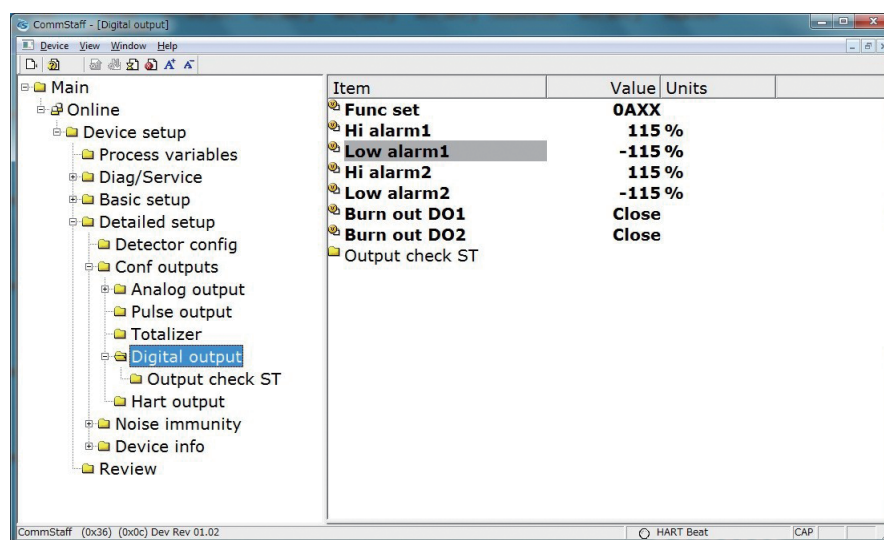
2.7.4　High limit alarm 2 setup

This section explains how to set up high limit alarm 2 for contact output. In the menu tree in the left pane of the window, select [Device setup] → [Detailed setup] → [Conf outputs] → [Digital output] → [Hi alarm2].

Enter a value for high limit alarm 2. The setting range for the high limit alarm is from -115 to +115 %.

Set the value so that high limit alarm 2 is larger than low limit alarm 2.

If the value does not meet the configuration conditions, an error indication is displayed. Enter another value.
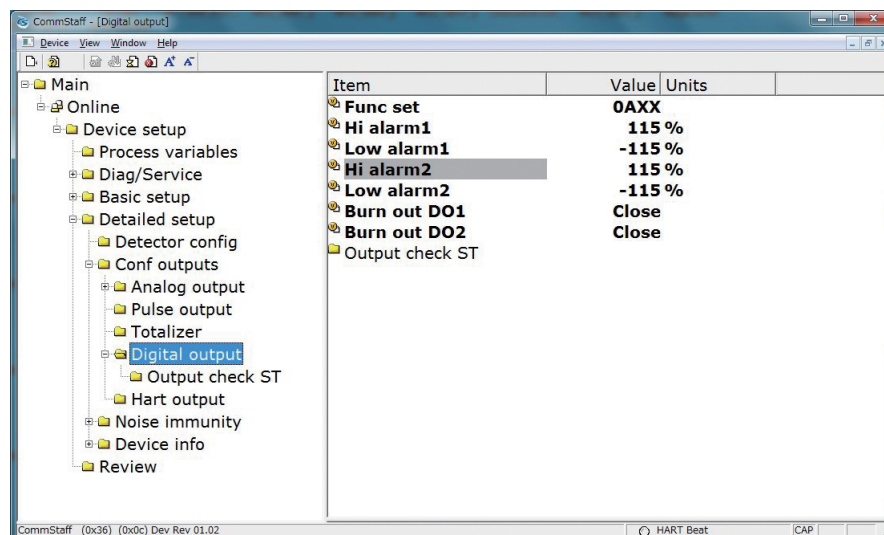
2.7.5   Low limit alarm 2 setup

This section explains how to set up low limit alarm 2 for contact output. In the menu tree in the left pane of the window, select [Device setup] → [Detailed setup] → [Conf outputs] → [Digital output] → [Low alarm2].

Enter a value for low limit alarm 2. The setting range for the low limit alarm is from -115 to +115 %.

Set the value so that high limit alarm 2 is larger than low limit alarm 2.

If the value does not meet the setting conditions, an error indication is displayed. Enter another value.

2.7.6   Burnout setting (fail-safe behavior setting) (DO1)

This section explains how to set contact output 1 so that it opens/closes in an abnormal situation. In the menu tree in the left pane of the window, select [Device setup] → [Detailed setup] → [Conf outputs] → [Digital output] → [Burn out DO1].

Select Open or Close.
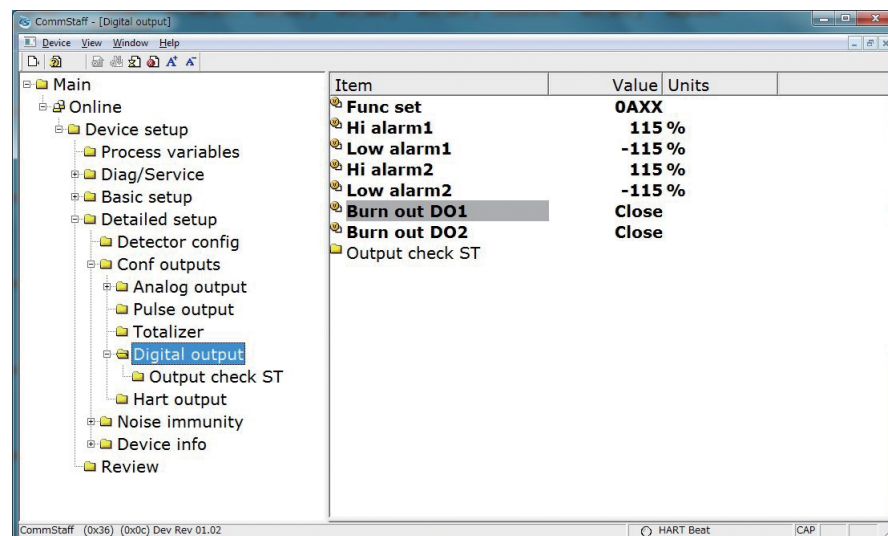
2.7.7 Burnout setting (fail-safe behavior setting) (DO2)

This section explains how to set contact output 2 so that it opens/closes in an abnormal situation. In the menu tree in the left pane of the window, select [Device setup] → [Detailed setup] → [Conf outputs] → [Digital output] → [Burn out DO2].

Select Open or Close.
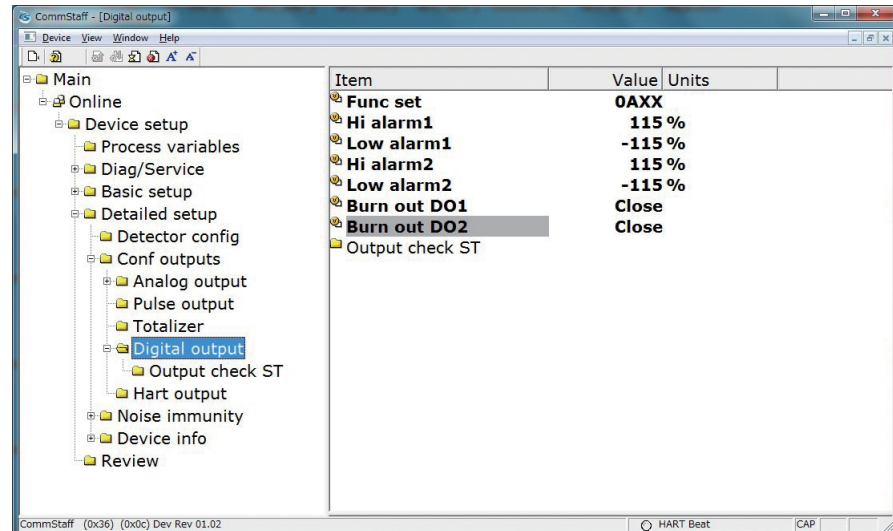
2.7.8   Output check (contact output)

This section explains how to switch open/close of the contact output. In the menu tree in the left pane of the window, select [Device setup] → [Detailed setup] → [Conf outputs] → [Digital output] → [Output check ST] → [Output check DO].

Output method

- The message "WARN-Loop should be removed from automatic control" appears. If a forced output change will not affect the control system, press OK. To abort the operation, press ABORT.

- The message "Choose output check DO" appears. Select ST.OUT1 or ST.OUT2, and then press OK.

- The message "Select another value" appears. Select Open or Close.

- To end the operation, press ABORT.
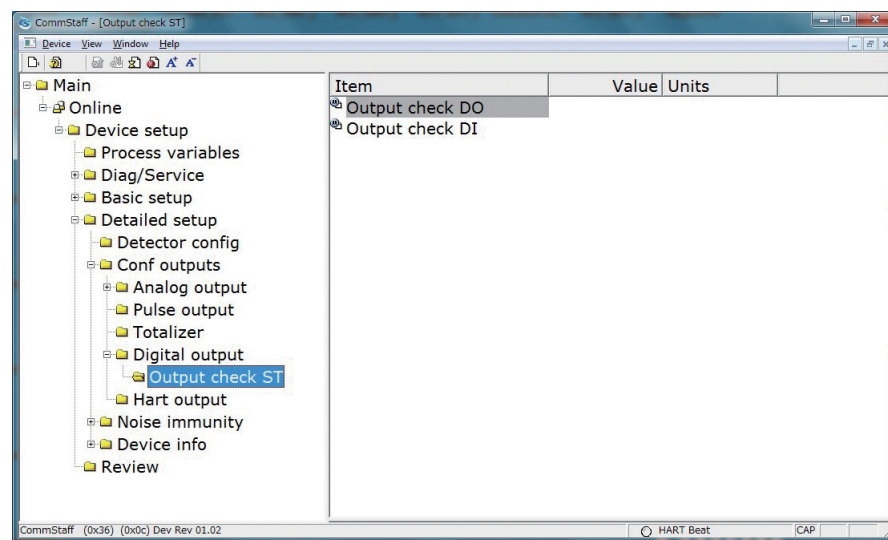
2.7.9 Output check (contact input)

This section explains how to check the contact input. In the menu tree in the left pane of the window, select [Device setup] → [Detailed setup] → [Conf outputs] → [Digital output] → [Output check ST] → [Output check DI].

How to check the contact input

- The message "WARN-Loop should be removed from automatic control" appears. If a forced output change will not affect the control system, press OK. To abort the operation, press ABORT.
- The message "Choose output check DI" appears. Select ST.INT1 or ST.IN2, and then press OK.
- The display shows "ST.IN1 is close," or "ST.IN1 is open,"depending on the status of ST.IN.
- To end the operation, press ABORT.
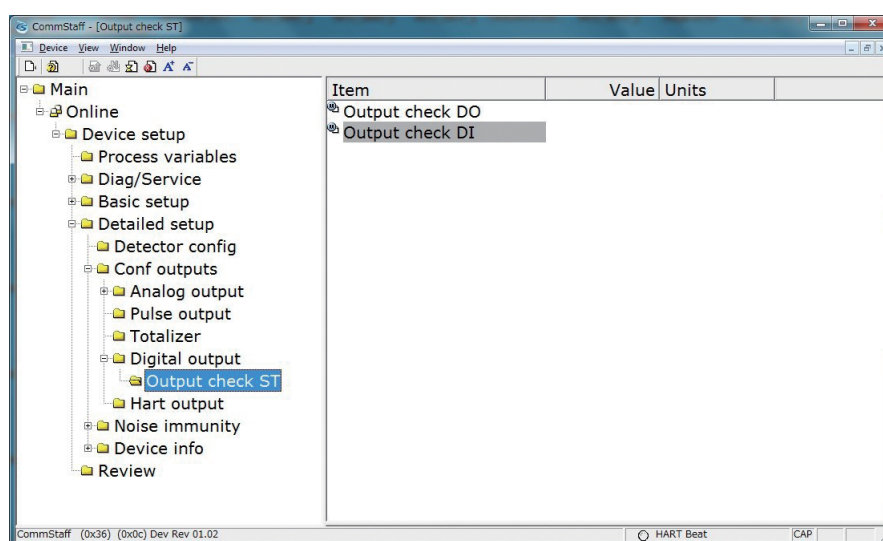
Note. With HART communication, the result of the first contact check may be shown as "Close" regardless of the actual contact state. Be sure to do the check two or more times, and use the result of the second or later check.

2.8   Noise suppression

2.8.1   Damping time constant

This section explains how to set the damping time constant. In the menu tree in the left pane of the window, select [Device setup] → [Detailed setup] → [Noise immunity] → [PV Damp]. For details, refer to section 2.2.5.
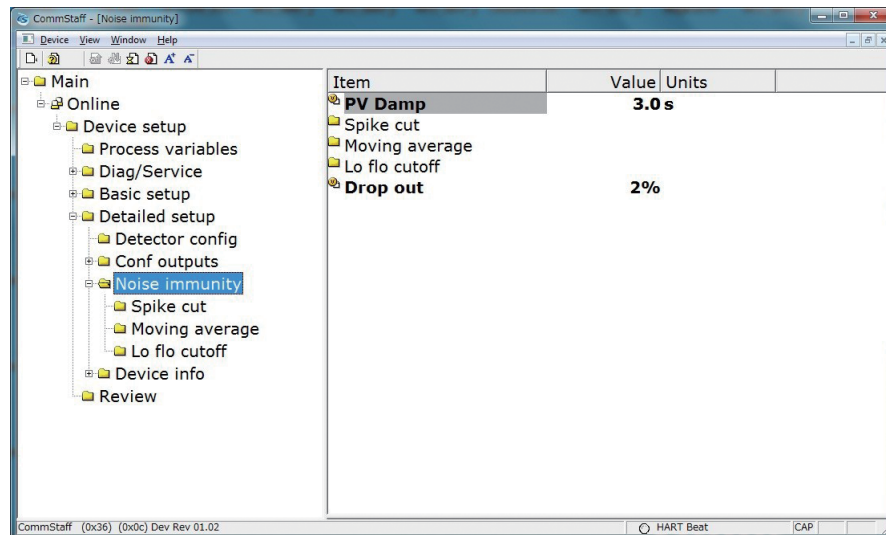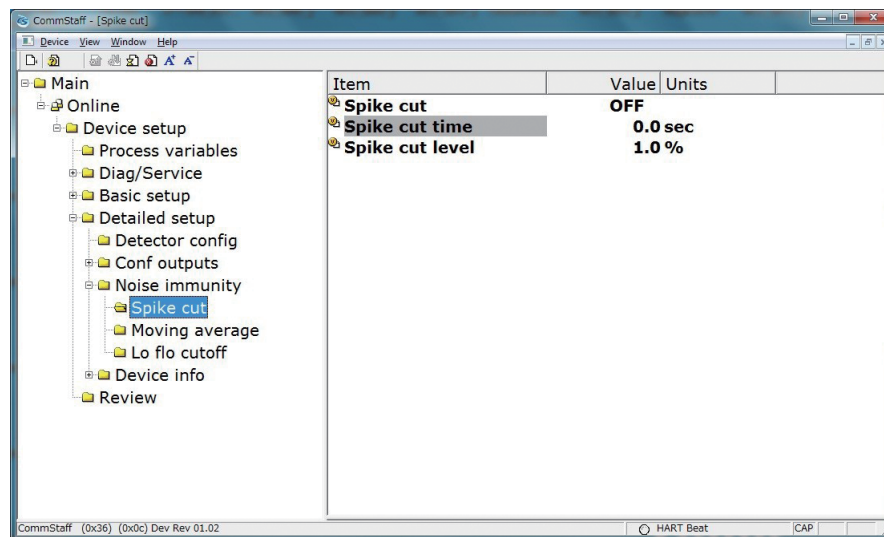

2.8.2   Spike cut

2.8.2.1. Spike cut mode

This section explains how to set up spike cut mode. In the menu tree in the left pane of the window, select [Device setup] → [Detailed setup] → [Noise immunity] → [Spike cut] → [Spike cut].

Select AUTO, MANUAL, or OFF for the spike cut mode.
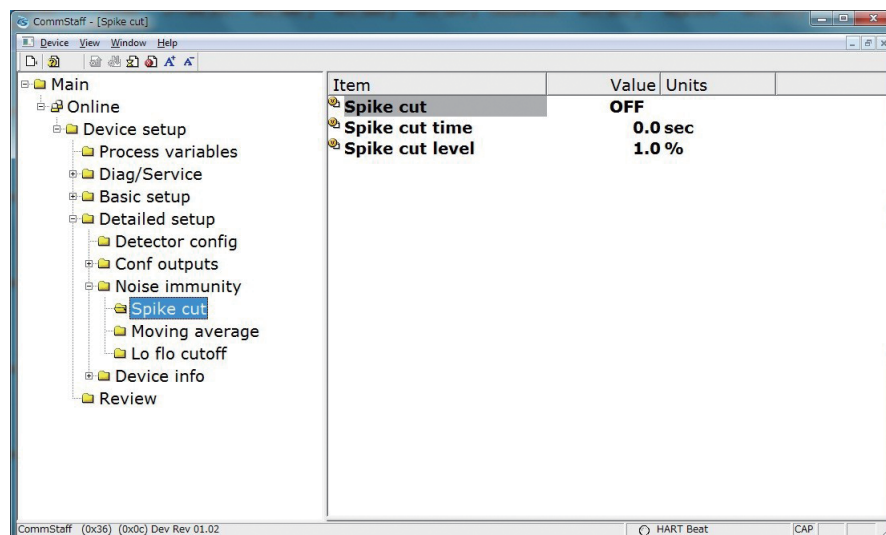
2.8.2.2 Spike cut time

This section explains how to set up the spike cut time. In the menu tree in the left pane of the window, select [Device setup] → [Detailed setup] → [Noise immunity] → [Spike cut] → [Spike cut time].

Set a spike cut time. The setting range is from 00.0 to 99.9 s.

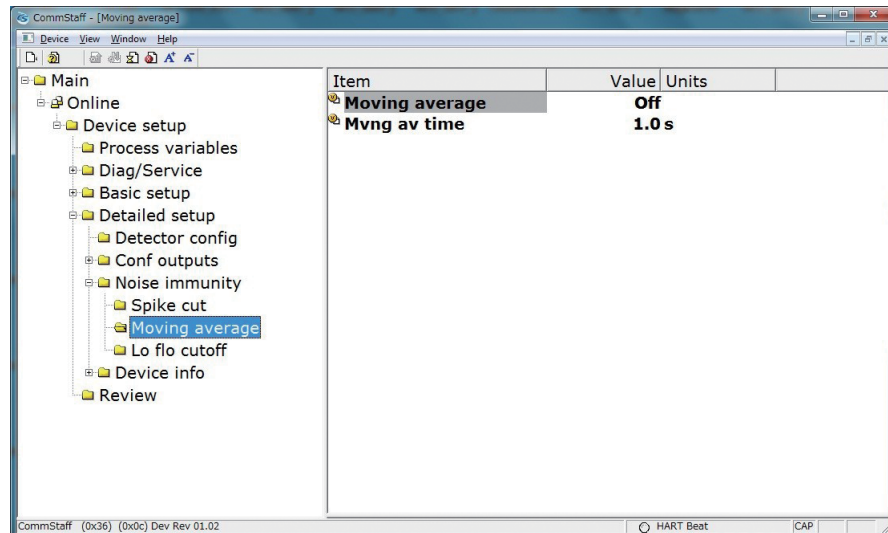This setting is enabled only if spike cut mode is set to MANUAL.

2.8.2.3 Spike cut level

This section explains how to set the spike cut level. In the menu tree in the left pane of the window, select [Device setup] → [Detailed setup] → [Noise immunity] → [Spike cut] → [Spike cut level].

Set a spike cut level. The setting range is from 01.0 to 99.9 %.

This setting is enabled only if spike cut mode is set to MANUAL.
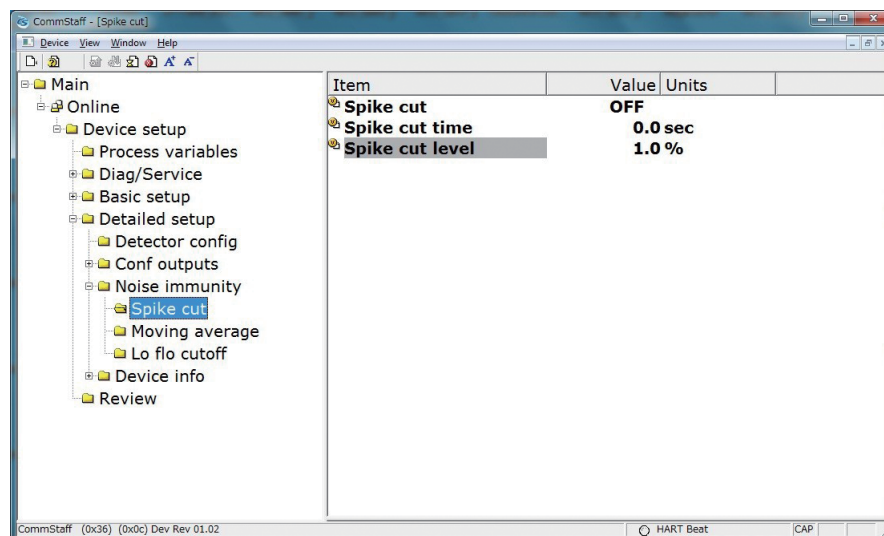
2.8.3 Moving average processing setup

2.8.3.1 Moving average processing

This section explains how to set up moving average processing on/off. In the menu tree in the left pane of the window, select [Device setup] → [Detailed setup] → [Noise immunity] → [Moving average] → [Moving average].

Select On or Off for moving average processing.

2.8.3.2 Moving average processing time setup

This section explains how to set up the moving average processing time. In the menu tree in the left pane of the window, select [Device setup] → [Detailed setup] → [Noise immunity] → [Moving average] → [Mvng av time].

Set a moving average processing time. The setting range is from 1.0 to 30.0 s.

This setting is enabled only if moving average processing is set to On.
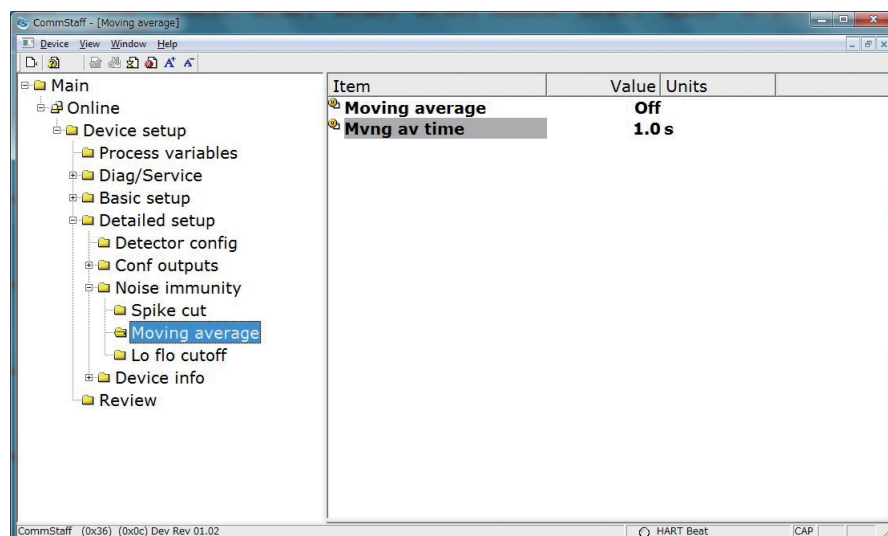
2.8.4　Low flow cutoff

2.8.4.1　Low flow cutoff

This section explains how to set up the low flow cutoff. In the menu tree in the left pane of the window, select [Device setup] → [Detailed setup] → [Noise immunity] → [Lo flo cutoff] → [Lo flo cutoff]. For details, refer to section 2.4.7.
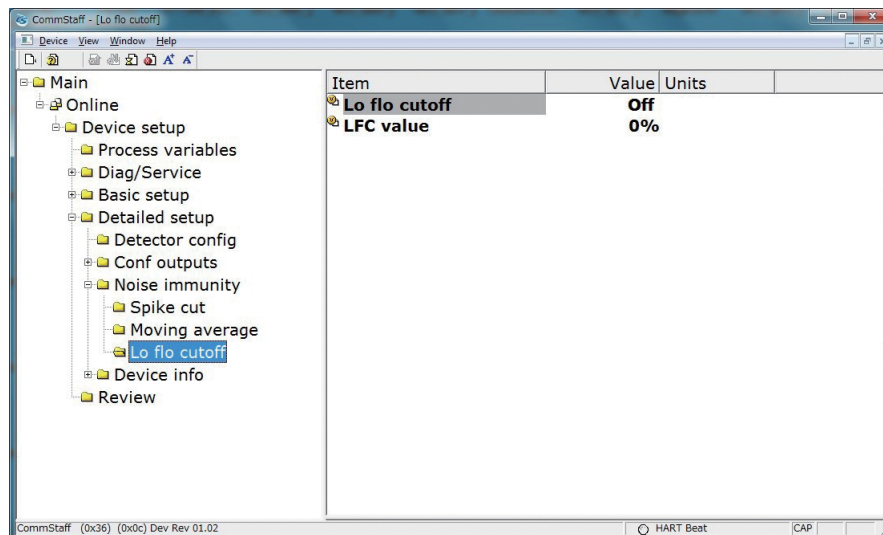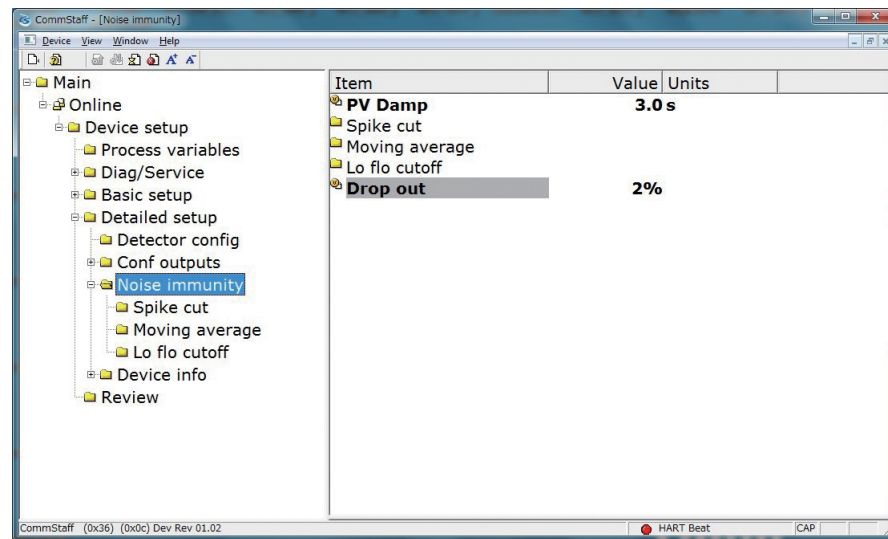

2.8.4.2　Low flow cutoff value

This section explains how to set the low flow cutoff value. In the menu tree in the left pane of the window, select [Device setup] → [Detailed setup] → [Noise immunity] → [Lo flo cutoff] → [LFC value]. For details, refer to section 2.4.7.
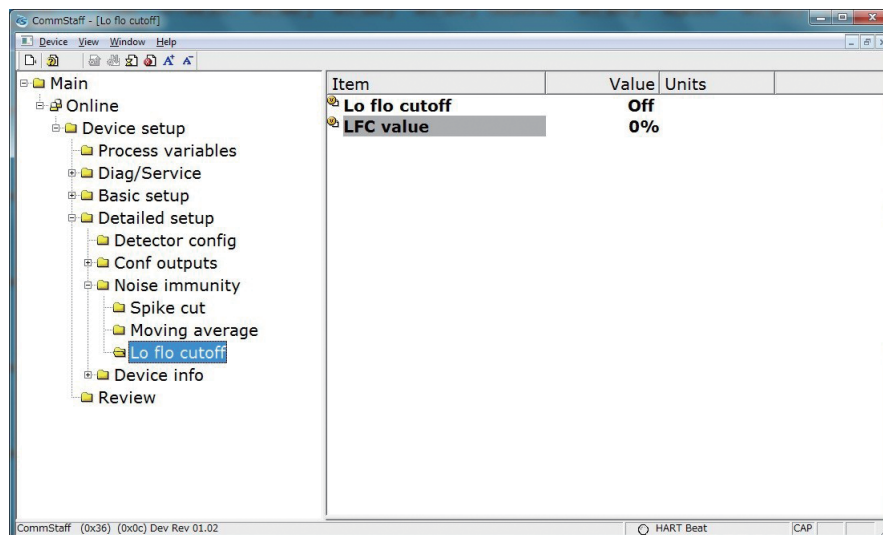
2.8.5   Dropout

This section explains how to set up the dropout. In the menu tree in the left pane of the window, select [Device setup] → [Detailed setup] → [Noise immunity] → [Drop out].
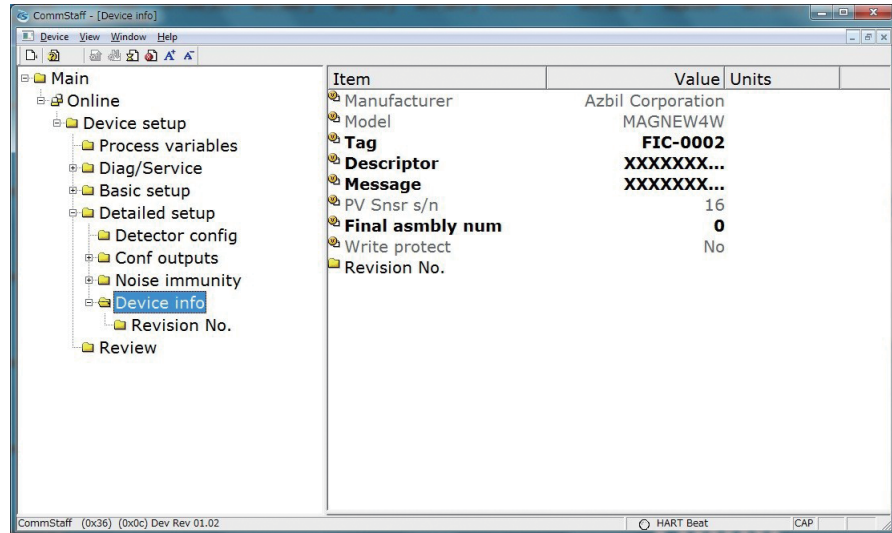
For details, refer to section 2.5.4.

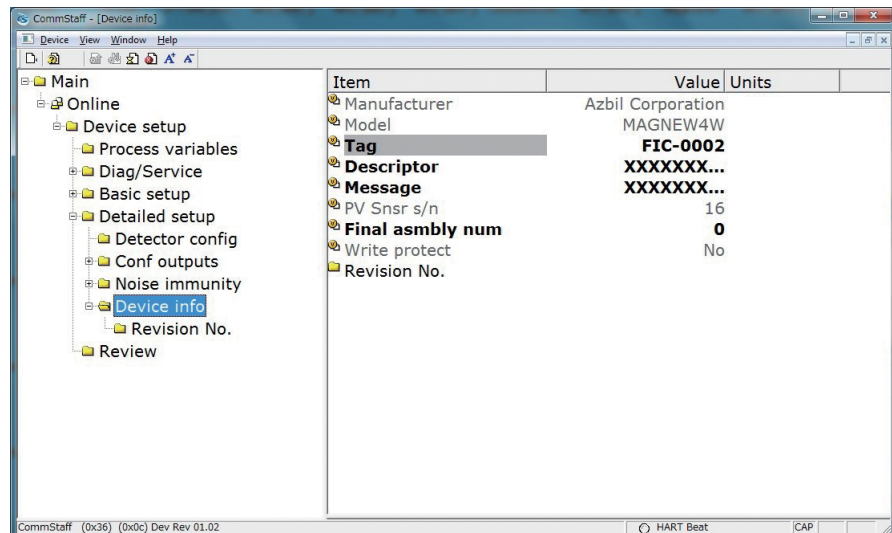## 2.9   Device information

2.9.1   Device information check

This section explains how to check the device information. In the menu tree in the left pane of the window, select [Device setup] → [Detailed setup] → [Device info].

### 2.9.2   Device information (Tag)

This section explains how to set up the device tag. In the menu tree in the left pane of the window, select [Device setup] → [Detailed setup] → [Device info] → [Tag].

For details, refer to section 2.2.1.

2.9.3   Device information (Message)

This section explains how to set up the device message. In the menu tree in the left pane of the window, select [Device setup] → [Detailed setup] → [Device info] → [Message]. Input a message.
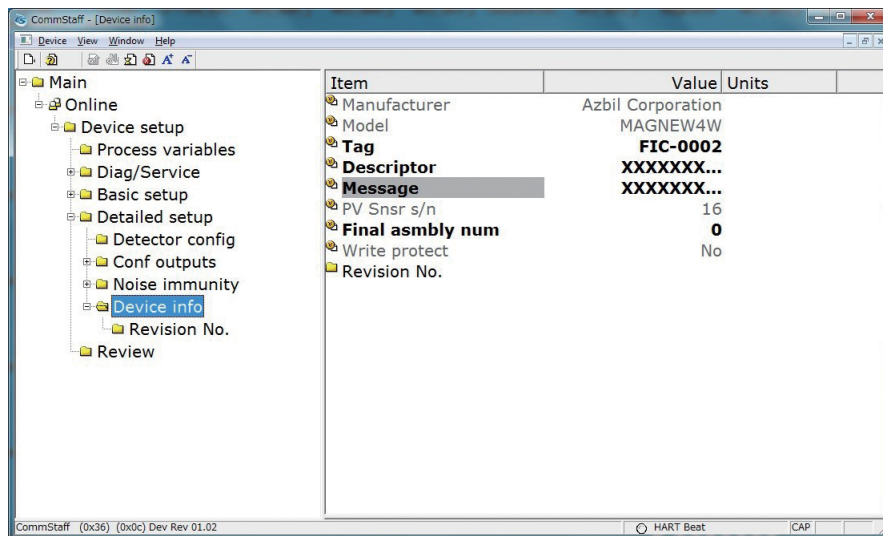
Chapter 3. Device Status Check and Adjustment

3.1 Device status check

This section explains how to check the converter's[a1] status. In the menu tree in the left pane of the window, select [Device setup] → [Diag/Service] → [Device Status].
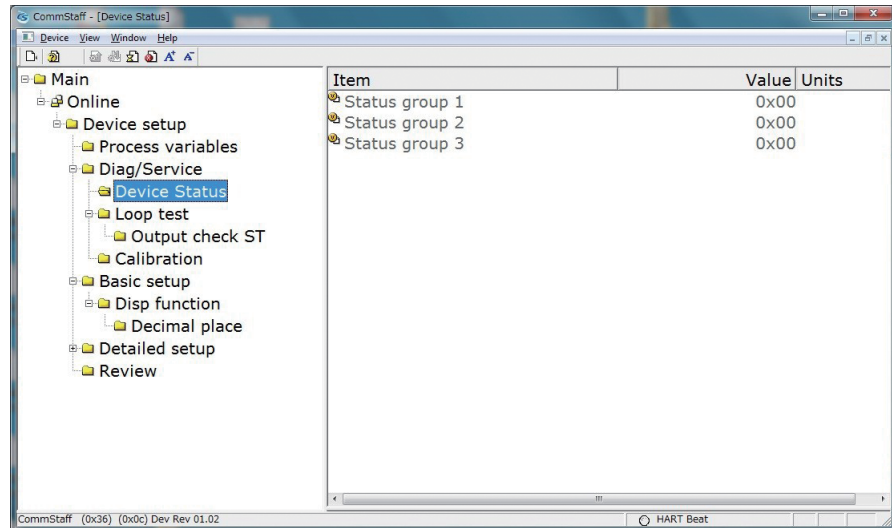
The following items can be checked on a group basis.

Group	Item
Group 1	EX FAULT
	NVM FAULT
	RAM FAULT
	ROM FAULT
	A/D FAULT
Group 2	DO OUTPUT MODE
	PLS OUTPUT MODE
	AO OUTPUT MODE
	IN CALIB MODE
	NOT CALIBRATED
	EX OUTPUT MODE
Group 3	EMPTY PIPE
	0% LOCK
	TYPE-DIA ERROR
	HI<LO ALM ERROR
	SPAN OVER ERROR
	PLS SCALE ERROR
	PLS WIDTH ERROR

3.2 Device check

3.2.1 Output check (analog output)

This section explains how to output a fixed-value analog current. In the menu tree in the left pane of the window, select [Device setup] → [Diag/Service] → [Loop test] → [Output check AO].
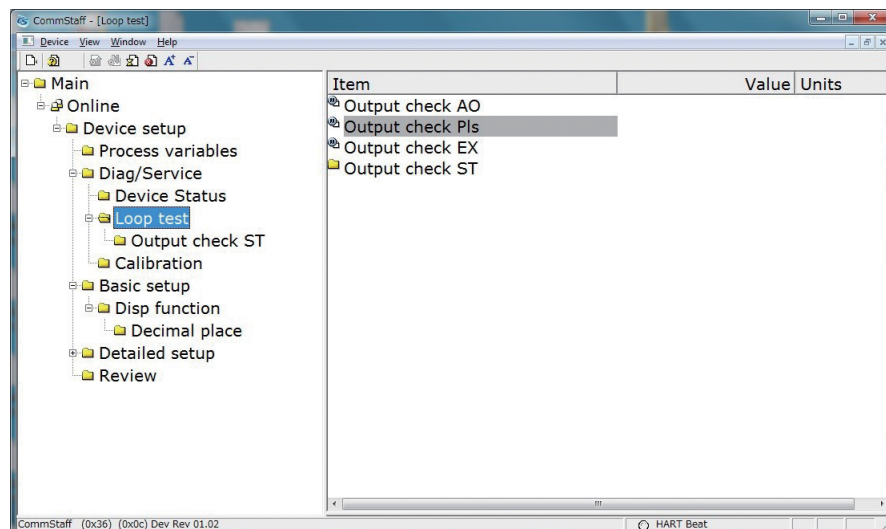
For details, refer to section 2.4.10.
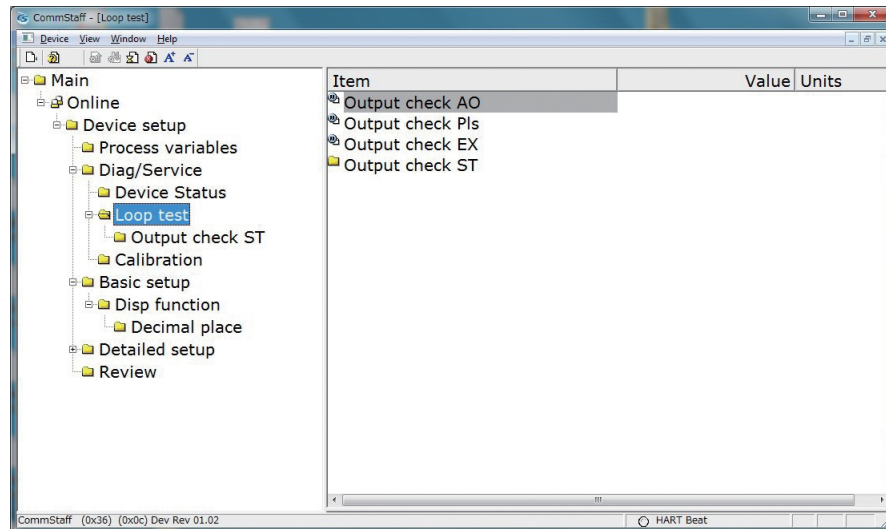
3.2.2 Output check (pulse output)

This section explains how to output a fixed pulse current. In the menu tree in the left pane of the window, select [Device setup] → [Diag/Service] → [Loop test] → [Output check Pls].
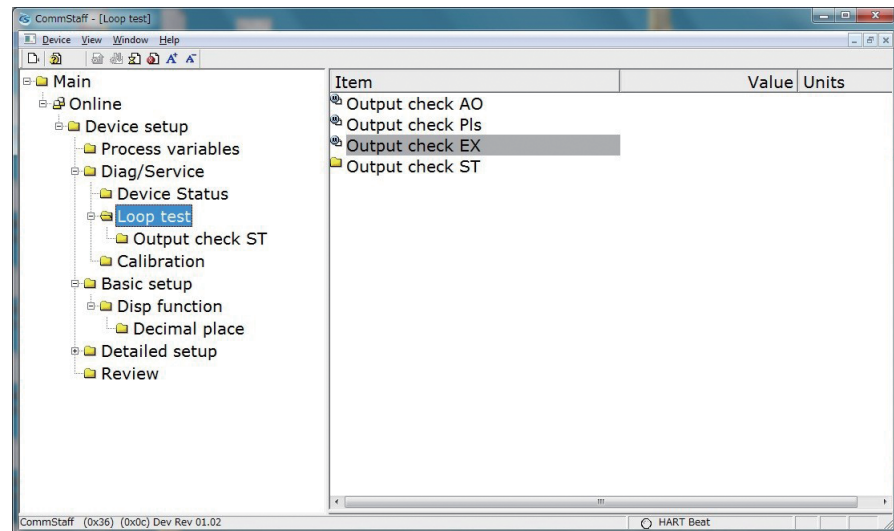
For details, refer to section 2.5.6.

3.2.3   Output check (EX)

This section explains how to output a fixed-value excitation current. In the menu tree in the left pane of the window, select [Device setup] → [Diag/Service] → [Loop test] → [Output check EX].

Output method

- The message "WARN-Loop should be removed from automatic control" appears. If a forced output change will not affect the control system, press OK. To abort the operation, press ABORT.

- The message "Choose output check EX" appears. If checking the output, select START and then press OK.

- The message "Select another EX" appears. Select EXX, EXY, or OFF.

- To end the operation, press ABORT.

Note. When an output check is executed, "0x00 No Enumeration" may be shown. Since this option is invalid, do not select it.

3.2.4 Output check (contact output)

This section explains how to switch open/close of the contact output. In the menu tree in the left pane of the window, select [Device setup] → [Diag/Service] → [Loop test] → [Output check ST] → [Output check DO].

For details, refer to section 2.7.8.
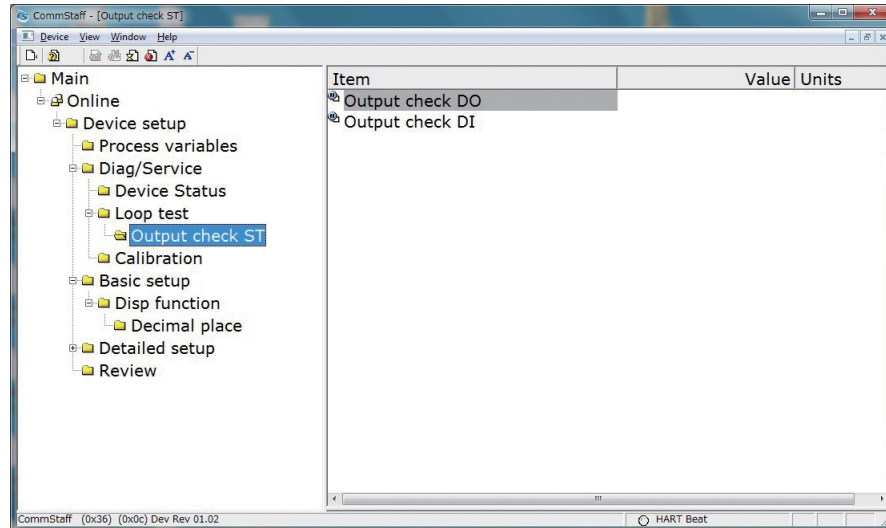
3.2.5 Output check (contact input)

This section explains how to check the contact input. In the menu tree in the left pane of the window, select [Device setup] → [Diag/Service] → [Loop test] → [Output check ST] → [Output check DI].
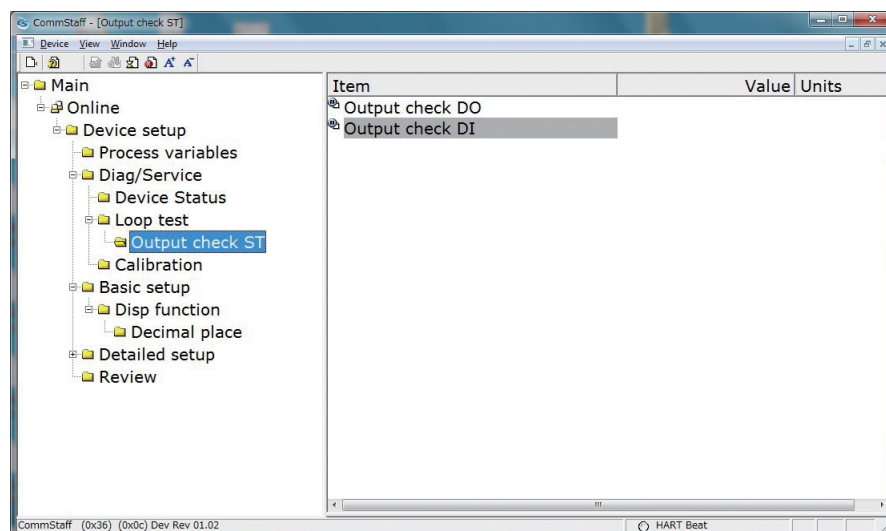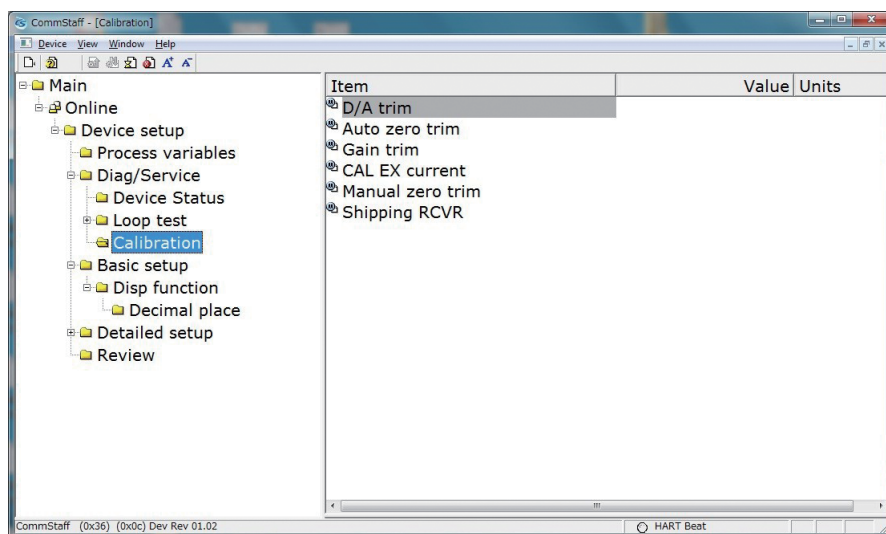
For details, refer to section 2.7.9.

3.3   Device adjustment

If a device adjustment mentioned in this chapter (except zero adjustment) is made incorrectly, the result may affect the accuracy of the flowmeter. For adjustment, please contact Azbil Corporation.

3.3.1   Adjustment of analog current output

If this adjustment is made incorrectly, the result may affect the accuracy of the flowmeter. For adjustment, please contact Azbil Corporation.
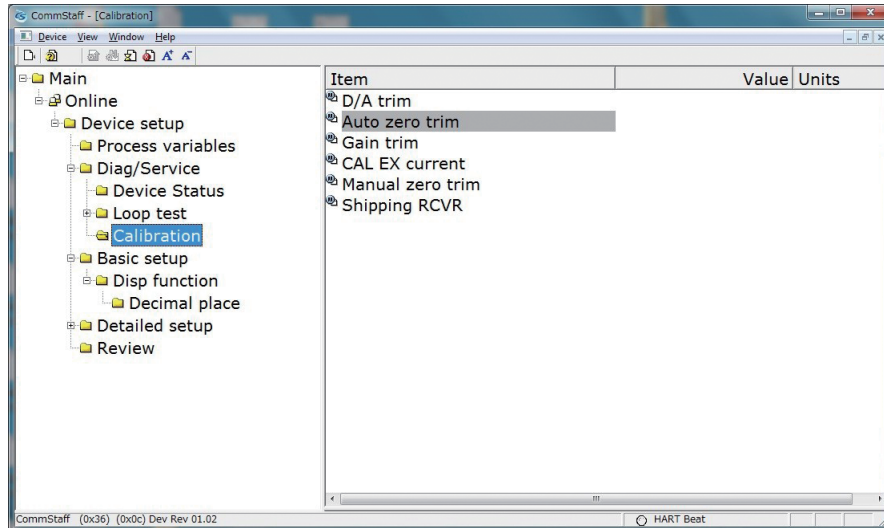
This section explains how to adjust the analog output (4 or 20 mA). In the menu tree in the left pane of the window, select [Device setup] → [Diag/Service] → [Calibration] → [D/A trim].

3.3.2　Auto zero adjustment

This section explains how to execute auto zero adjustment. In the menu tree in the left pane of the window, select [Device setup] → [Diag/Service] → [Calibration] → [Auto zero trim].
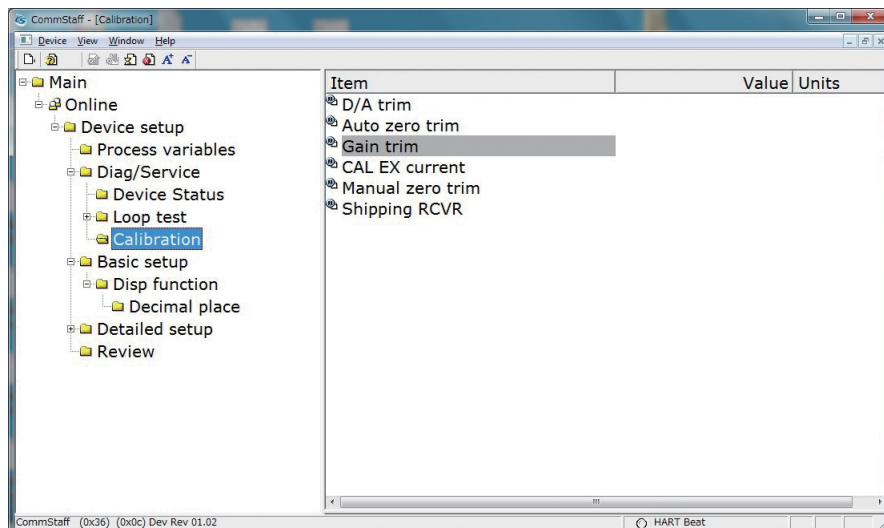
For details, refer to section 2.2.6.

3.3.3　Gain adjustment

If this adjustment is made incorrectly, the result may affect the accuracy of the flowmeter. For adjustment, please contact Azbil Corporation.
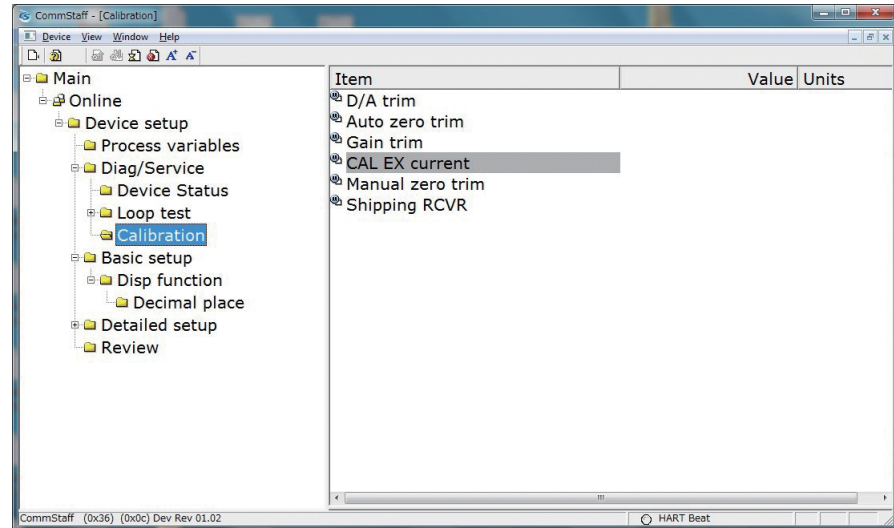
This section explains how to execute gain adjustment. In the menu tree in the left pane of the window, select [Device setup] → [Diag/Service] → [Calibration] → [Gain trim].

3.3.4 Excitation current adjustment

If this adjustment is made incorrectly, the result may affect the accuracy of the flowmeter. For adjustment, please contact Azbil Corporation.

This section explains how to execute excitation current adjustment. In the menu tree in the left pane of the window, select [Device setup] → [Diag/Service] → [Calibration] → [CAL EX current].

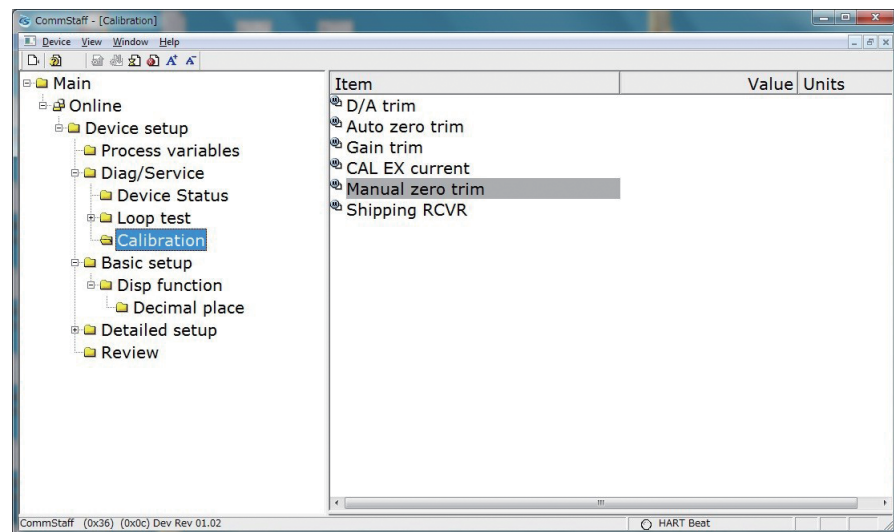### 3.3.5 Manual zero adjustment

This section explains how to execute manual zero adjustment. In the menu tree in the left pane of the window, select [Device setup] → [Diag/Service] → [Calibration] → [Manual zero trim].

Adjustment procedure

- The message "Change the zero adjust value" appears. Select the desired direction from Down, Up, and End, and then press OK.
- To end the operation, press ABORT.

3.3.6 Restoration of factory settings

This section explains how to reset settings to their factory default values. In the menu tree in the left pane of the window, select [Device setup] → [Diag/Service] → [Calibration] → [Shipping RCVR].

Procedure for implementation

- The message "Device will be reboot, please connect again" appears. If resetting all settings to default values and restarting the flowmeter will not affect the control system, press OK. To abort the reset, press ABORT.
- The message "Shipping data recovery Ready?" appears. To restore the default settings, select YES and then press OK.
- The message "CAUTION:Shipping data recovery will be soon, DO NOT RETRY. Quit and re-connect 20 seconds later" appears. The flowmeter restarts.
- Because CommStaff must read the data again, restart it and let it communicate with the flowmeter.
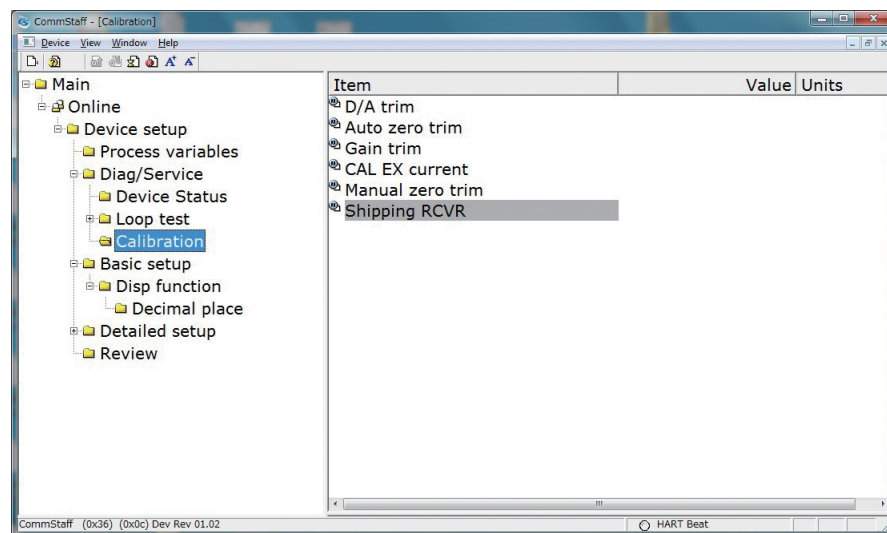
Chapter 4.   Setting errors

In an electromagnetic flowmeter, the flow rate unit of measurement, range URV. pulse weight unit, pulse weight, etc., are related to each other. If one of them is changed, an error may occur because the changed setting is inconsistent with others.

This chapter describes configuration errors.

Each of these errors can be checked by referring to status group 3 in section 3.1, "Device status check."

	EMPTY PIPE
	0% LOCK
	TYPE-DIA ERROR
Group 3	HI<LO ALM ERROR
	SPAN OVER ERROR
	PLS SCALE ERROR
	PLS WIDTH ERROR

4.1   TYPE-DIA ERROR

This error occurs in the following 2 cases.

- The detector constant setting is out of the setting range (100.0 to 999.9).
- The combination of the detector size and type is not available in table 1 in section 2.3.1.

Set an appropriate combination.

4.2   SPAN OVER ERROR

This error occurs when the range that is determined by the flow rate unit of measurement, range URV, and detector size exceeds 12 m/s in flow speed.

Change any of the settings so that the range is less than 12 m/s.

4.3   PLS SCALE ERROR

This error occurs in the following 2 cases.

- The pulse frequency that is determined by the range URV, pulse weight unit of measurement, and pulse weight is outside the range limits (0.00006 to 3000 Hz).
- The units for flow rate and pulse weight are not the same (volumetric/mass flow units).

Change any of the settings so that the pulse frequency is within the range.

4.4   PLS WIDTH ERROR

This error occurs when the pulse duty that is determined by the pulse frequency and pulse width exceeds 70 %.

Change either of them so that the duty is less than 70 %.

4.5   If the configuration error cannot be corrected

A configuration error arises from a mismatch between multiple settings. If the error cannot be corrected, take one of the following actions.

- Restart the flowmeter. The previous data will be restored. Restart CommStaff and connect it to the flowmeter.
- Change the settings using the data setting card.

Terms and Conditions

We would like to express our appreciation for your purchase and use of Azbil Corporation's products.

You are required to acknowledge and agree upon the following terms and conditions for your purchase of Azbil Corporation's products (system products, field instruments, control valves, and control products), unless otherwise stated in any separate document, including, without limitation, estimation sheets, written agreements, catalogs, specifications and instruction manuals.

1. Warranty period and warranty scope

   1.1 Warranty period

   Azbil Corporation's products shall be warranted for one (1) year from the date of your purchase of the said products or the delivery of the said products to a place designated by you.

   1.2 Warranty scope

   In the event that Azbil Corporation's product has any failure attributable to azbil during the aforementioned warranty period, Azbil Corporation shall, without charge, deliver a replacement for the said product to the place where you purchased, or repair the said product and deliver it to the aforementioned place. Notwithstanding the foregoing, any failure falling under one of the following shall not be covered under this warranty:

   (1) Failure caused by your improper use of azbil product (noncompliance with conditions, environment of use, precautions, etc. set forth in catalogs, specifications, instruction manuals, etc.);
   (2) Failure caused for other reasons than Azbil Corporation's product;
   (3) Failure caused by any modification or repair made by any person other than Azbil Corporation or Azbil Corporation's subcontractors;
   (4) Failure caused by your use of Azbil Corporation's product in a manner not conforming to the intended usage of that product;
   (5) Failure that the state-of-the-art at the time of Azbil Corporation's shipment did not allow Azbil Corporation to predict; or
   (6) Failure that arose from any reason not attributable to Azbil Corporation, including, without limitation, acts of God, disasters, and actions taken by a third party.

   Please note that the term "warranty" as used herein refers to equipment-only-warranty, and Azbil Corporation shall not be liable for any damages, including direct, indirect, special, incidental or consequential damages in connection with or arising out of Azbil Corporation's products.

2. Ascertainment of suitability

   You are required to ascertain the suitability of Azbil Corporation's product in case of your use of the same with your machinery, equipment, etc. (hereinafter referred to as "Equipment") on your own responsibility, taking the following matters into consideration:

   (1) Regulations and standards or laws that your Equipment is to comply with.
   (2) Examples of application described in any documents provided by Azbil Corporation are for your reference purpose only, and you are required to check the functions and safety of your Equipment prior to your use.
   (3) Measures to be taken to secure the required level of the reliability and safety of your Equipment in your use
      Although azbil is constantly making efforts to improve the quality and reliability of Azbil Corporation's products, there exists a possibility that parts and machinery may break down. You are required to provide your Equipment with safety design such as fool-proof design,[*1] and fail-safe design[*2] (anti-flame propagation design, etc.), whereby preventing any occurrence of physical injuries, fires, significant damage, and so forth. Furthermore, fault avoidance,[*3] fault tolerance,[*4] or the like should be incorporated so that the said Equipment can satisfy the level of reliability and safety required for your use.

      *1. A design that is safe even if the user makes an error.
      *2. A design that is safe even if the device fails.
      *3. Avoidance of device failure by using highly reliable components, etc.
      *4. The use of redundancy.

3. Precautions and restrictions on application

   3.1 Restrictions on application

   Please follow the table below for use in nuclear power or radiation-related equipment.

	Nuclear power quality[*5] required	Nuclear power quality[*5] not required
Within a radiation controlled area[*6]	Cannot be used (except for limit switches for nuclear power[*7])	Cannot be used (except for limit switches for nuclear power[*7])
Outside a radiation controlled area[*6]	Cannot be used (except for limit switches for nuclear power[*7])	Can be used

   *5. Nuclear power quality: compliance with JEAG 4121 required
   *6. Radiation controlled area: an area governed by the requirements of article 3 of "Rules on the Prevention of Harm from Ionizing Radiation," article 2 2 4 of "Regulations on Installation and Operation of Nuclear Reactors for Practical Power Generation," article 4 of "Determining the Quantity, etc., of Radiation-Emitting Isotopes,"etc.
   *7. Limit switch for nuclear power: a limit switch designed, manufactured and sold according to IEEE 382 and JEAG 4121.

   Any Azbil Corporation's products shall not be used for/with medical equipment.

   The products are for industrial use. Do not allow general consumers to install or use any Azbil Corporation's product. However, azbil products can be incorporated into products used by general consumers. If you intend to use a product for that purpose, please contact one of our sales representatives.

   3.2 Precautions on application

   you are required to conduct a consultation with our sales representative and understand detail specifications, cautions for operation, and so forth by reference to catalogs, specifications, instruction manual, etc. in case that you intend to use azbil product for any purposes specified in (1) through (6) below. Moreover, you are required to provide your Equipment with fool-proof design, fail-safe design, anti-flame propagation design, fault avoidance, fault tolerance, and other kinds of protection/safety circuit design on your own responsibility to ensure reliability and safety, whereby preventing problems caused by failure or nonconformity.

(1) For use under such conditions or in such environments as not stated in technical documents, including catalogs, specification, and instruction manuals

(2) For use of specific purposes, such as:
* Nuclear energy/radiation related facilities
  [When used outside a radiation controlled area and where nuclear power quality is not required]
  [When the limit switch for nuclear power is used]
* Machinery or equipment for space/sea bottom
* Transportation equipment
  [Railway, aircraft, vessels, vehicle equipment, etc.]
* Antidisaster/crime-prevention equipment
* Burning appliances
* Electrothermal equipment
* Amusement facilities
* Facilities/applications associated directly with billing

(3) Supply systems such as electricity/gas/water supply systems, large-scale communication systems, and traffic/air traffic control systems requiring high reliability

(4) Facilities that are to comply with regulations of governmental/public agencies or specific industries

(5) Machinery or equipment that may affect human lives, human bodies or properties

(6) Other machinery or equipment equivalent to those set forth in items (1) to (5) above which require high reliability and safety

4. Precautions against long-term use

Use of Azbil Corporation's products, including switches, which contain electronic components, over a prolonged period may degrade insulation or increase contact-resistance and may result in heat generation or any other similar problem causing such product or switch to develop safety hazards such as smoking, ignition, and electrification. Although acceleration of the above situation varies depending on the conditions or environment of use of the products, you are required not to use any Azbil Corporation's products for a period exceeding ten (10) years unless otherwise stated in specifications or instruction manuals.

5. Recommendation for renewal

Mechanical components, such as relays and switches, used for Azbil Corporation's products will reach the end of their life due to wear by repetitive open/close operations.

In addition, electronic components such as electrolytic capacitors will reach the end of their life due to aged deterioration based on the conditions or environment in which such electronic components are used. Although acceleration of the above situation varies depending on the conditions or environment of use, the number of open/close operations of relays, etc. as prescribed in specifications or instruction manuals, or depending on the design margin of your machine or equipment, you are required to renew any Azbil Corporation's products every 5 to 10 years unless otherwise specified in specifications or instruction manuals. System products, field instruments (sensors such as pressure/flow/level sensors, regulating valves, etc.) will reach the end of their life due to aged deterioration of parts. For those parts that will reach the end of their life due to aged deterioration, recommended replacement cycles are prescribed. You are required to replace parts based on such recommended replacement cycles.

6. Other precautions

Prior to your use of Azbil Corporation's products, you are required to understand and comply with specifications (e.g., conditions and environment of use), precautions, warnings/cautions/notices as set forth in the technical documents prepared for individual Azbil Corporation's products, such as catalogs, specifications, and instruction manuals to ensure the quality, reliability, and safety of those products.

7. Changes to specifications

Please note that the descriptions contained in any documents provided by azbil are subject to change without notice for improvement or for any other reason. For inquires or information on specifications as you may need to check, please contact our branch offices or sales offices, or your local sales agents.

8. Discontinuance of the supply of products/parts

Please note that the production of any Azbil Corporation's product may be discontinued without notice. After manufacturing is discontinued, we may not be able to provide replacement products even within the warranty period.

For repairable products, we will, in principle, undertake repairs for five (5) years after the discontinuance of those products. In some cases, however, we cannot undertake such repairs for reasons, such as the absence of repair parts. For system products, field instruments, we may not be able to undertake parts replacement for similar reasons.

9. Scope of services

Prices of Azbil Corporation's products do not include any charges for services such as engineer dispatch service. Accordingly, a separate fee will be charged in any of the following cases:

(1) Installation, adjustment, guidance, and attendance at a test run
(2) Maintenance, inspection, adjustment, and repair
(3) Technical guidance and technical education
(4) Special test or special inspection of a product under the conditions specified by you

Please note that we cannot provide any services as set forth above in a nuclear energy controlled area (radiation controlled area) or at a place where the level of exposure to radiation is equivalent to that in a nuclear energy controlled area.

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Azbil Corporation