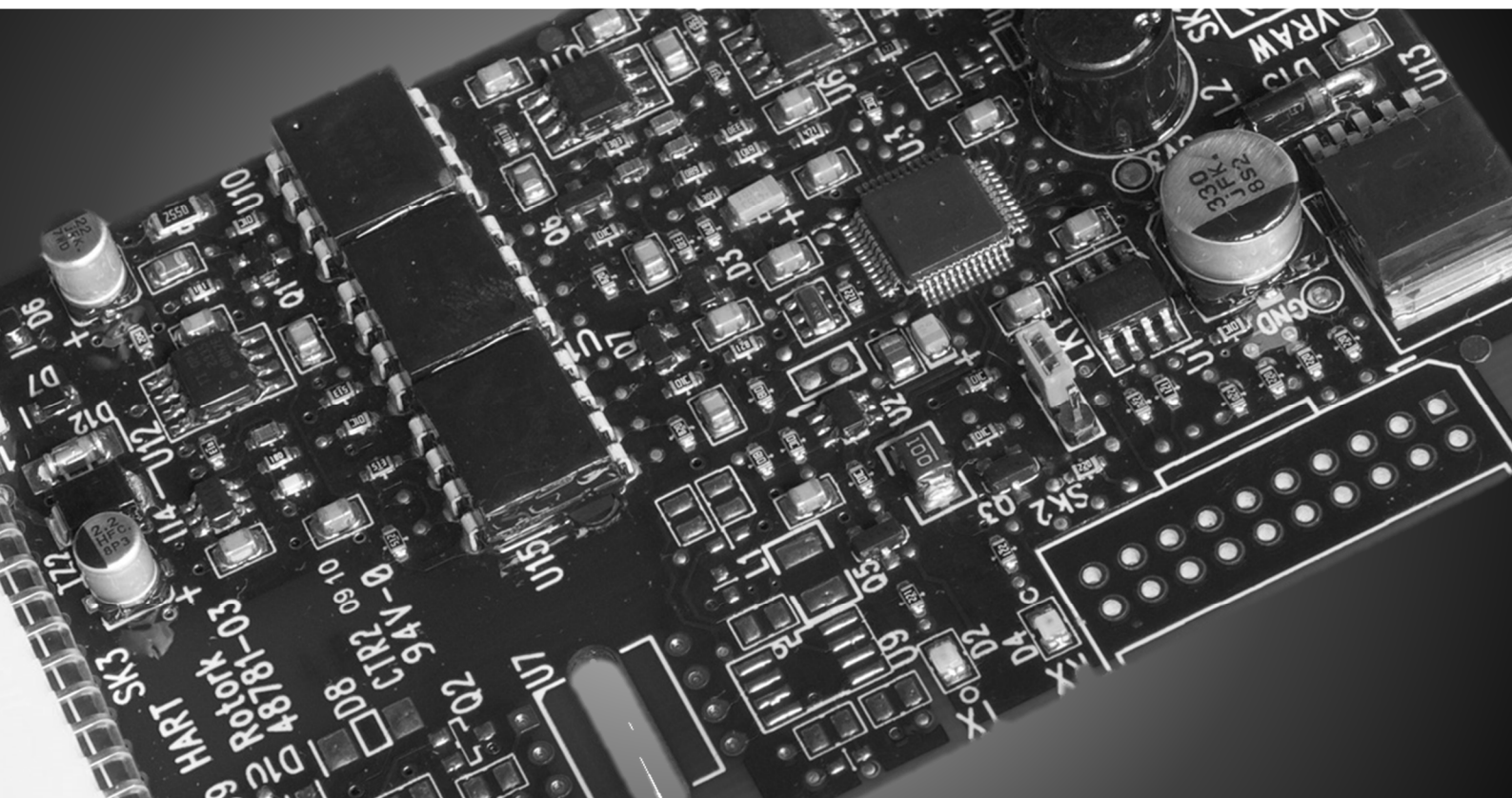


rotork®

Keeping the World Flowing
for Future Generations

C3XX EDD User Instruction



HART 
COMMUNICATION PROTOCOL

C3XX
Device Rev 2

Contents

A INTRODUCTION	3
A1 EDD FILE DOWNLOAD	4
A2 DEFINITION	8
B ONLINE MENU	9
B1 PROCESS VARIABLES	13
B1.1 <i>Dynamic Variables</i>	13
B1.2 <i>Loop Current</i>	13
B2 COMMISSIONING	14
B2.1 <i>SP(%)</i>	14
B2.2 <i>Control Mode</i>	14
B2.3 <i>Control Mode and SP Application</i>	14
B2.4 <i>AP(%)</i>	14
B2.5 <i>Deviation(%)</i>	14
B3 CONFIGURATION	14
B3.1 <i>Calibration</i>	14
B3.2 <i>Control Parameters</i>	16
B3.3 <i>Input Config</i>	16
B3.4 <i>Output Config</i>	19
B3.5 <i>Device Config</i>	20
B3.6 <i>HART Config</i>	20
B3.7 <i>Identify</i>	21
B4 DIAGNOSTICS	22
B4.1 <i>Status Monitoring</i>	23
B4.2 <i>Diagnostics Configuration</i>	28
B5 REVIEW	29
C DIAGNOSTICS	29
C1 PST	30
C1.1 <i>PST Execution</i>	31
C1.2 <i>PST Information</i>	31
C1.3 <i>PST Config</i>	31
D OFFLINE MENU	32

A INTRODUCTION

EDD (Electronic Device Description) provided for C330 / C340 Smart Positioner by the company must be required for the **Rotork YTC Limited's** automatic calibration, diagnosis function and control parameter configuration, etc.

UI (User Interface) and technical information of C3XX EDD User Manual are explained based on the FDI development tools provided by FieldComm Group.

EDD files are installed in many Host Systems including Asset Management System of AMS Device Manager, PDM, etc. and as each Host System may differently interpret UI of EDD, there might be some differences from the description from the C3XX EDD User Manual. However, the same functions are provided because they use the same EDD.

For inquiries regarding Host System technicality or EDD installation, you can contact your Host System company.

A1 EDD FILE DOWNLOAD

- How to download the file from the website of Rotork YTC Limited.

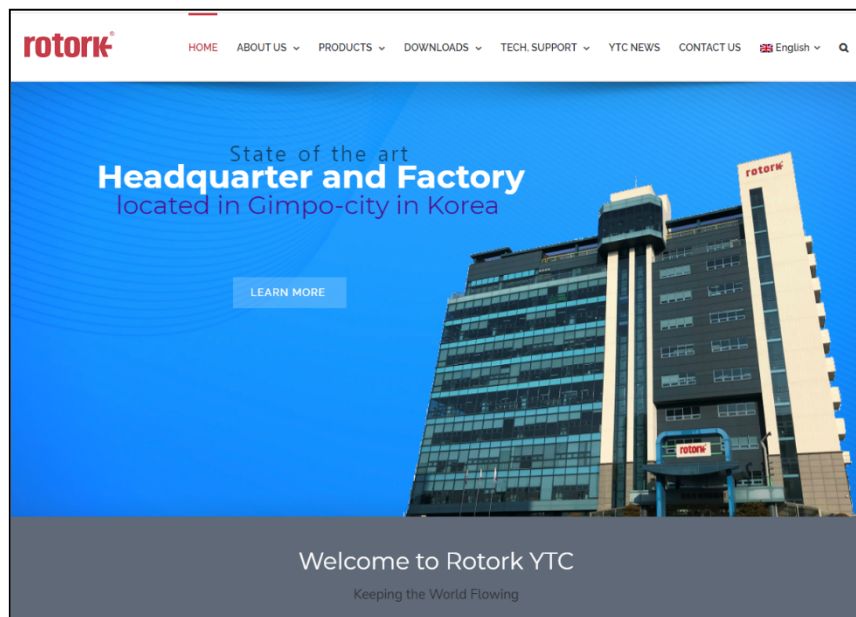


Figure 1 Rotork YTC Limited's website

1-1. Go to <http://www.ytc.co.kr>.

1-2. Click ② "DTM/DD" from the ① "DOWNLOADS" menus.

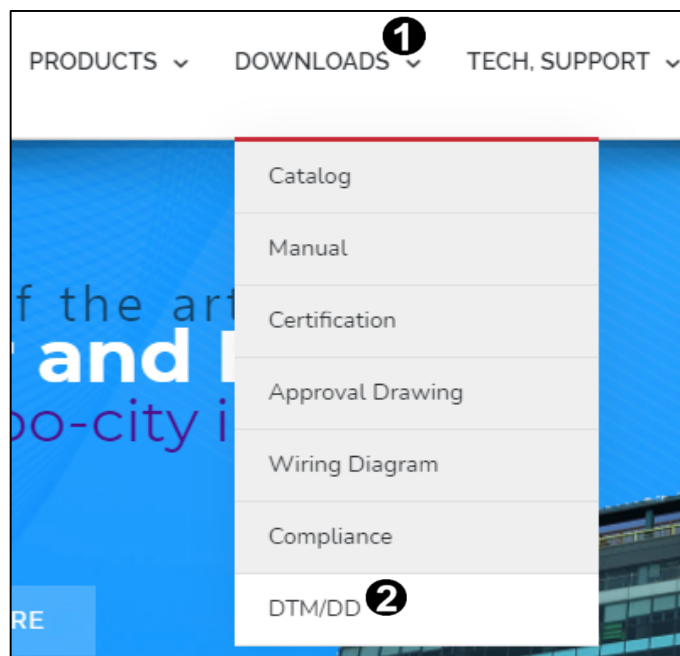
















Figure 2 EDD file download path in website.

1-3. Check ❶ **“Model”** which EDD needs and ❷ **“TYPE”**, then click ❸ **“Download”** icon on the right side of the applicable line to start downloading the file.

English

Search

No.	Model	TYPE	HART Version	Revision	Download
1	YT-2500	EDD	5	204	
2	YT-2500	EDD for 475 communicator	5	204	
3	YT-2600	EDD	5	204	
4	YT-2600	EDD for 475 communicator	5	204	
5	YT-2700	EDD	5	204	
6	YT-2700	EDD for 475 communicator	5	204	
7	YT-3300	EDD	5	204	
8	YT-3300	EDD for 475 communicator	5	204	
9	YT-3400	EDD	7	0B03	
10	YT-3400	EDD for 475 communicator	7	0B03	
11	YT-3300/3400	DTM	7	15.0.51	
12	YT-3700	EDD	7	101	
13	YT-3700	EDD for 475 communicator	7	101	
14	YT-3700	DTM	7	1.0.0.264	

Showing 1 to 14 of 14 Entries

Figure 3 EDD/DTM file provided by Rotork YTC Limited

■ How to download file on FieldComm Group

- 1-1. Go to <https://www.fieldcommgroup.org/registered-products>
- 1-2. Select **①** “HART” from the Protocol, and **②** “Rotork YTC Limited” from Manufacturer as same as the below.
- 1-3. If you click **③** “Search”, it displays EDD currently registered on the FieldComm as shown on the **[Figure 5]**.

Registered Products

Search by Product Name

Protocol

☐ Any

☐ FOUNDATION Fieldbus

☒ HART **①**

Category **+**

Manufacturer **—**

☐ Rockwell Automation

☐ Ronan Engineering

☐ Rotork Controls

☒ Rotork YTC Limited **②**

☐ Sage Metering, Inc.

☐ SAMSON AG

☐ Satron Instruments Inc.

☐ Schneider Electric

☐ Show only FDI Device Packages

③

Search Reset

Figure 4 Search for EDD on FieldComm Group Website

1-4. Click **4** “C3XX” on the screen.

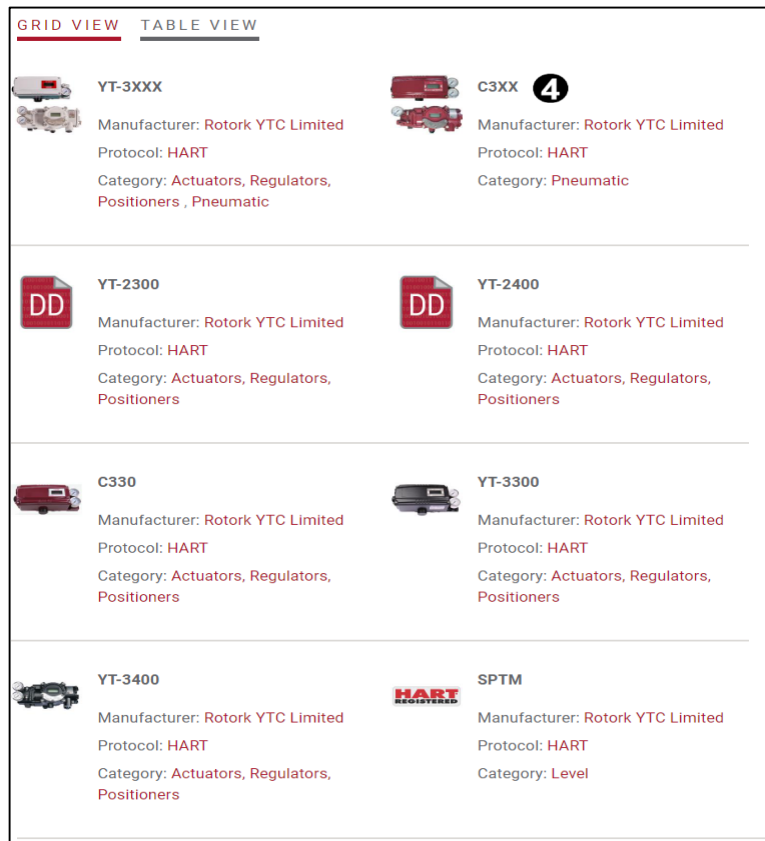


Figure 5 EDD registered in FieldComm Group

1-5. Select **5** “VERSION”, and then click **6** “EDD DOWNLOAD” to download an EDD file.



Device	Software Revision (Device: SOFT REV)	EDD Version
C330, C340,	1 (3.X.XX less)	11
	12 (More than 4.2.00)	2

Figure 6 EDD 파일 다운로드

A2 DEFINITION

- **SP(Set Point [%])** : Indicates Input signals in Positioner in [%].
- **AP(Actual Position[%])** : Indicates valve opening in [%].
- **TP(Target Position[%])** : Indicates target opening in [%].
- **Temp(Temperature[°C])** : Indicates Internal temperature of Positioner in [°C].
- **MV(Manipulate Value)** : Indicates input values applied to Positioner Torque Motor in Raw Data.
- **IV(Integral Value)** : Indicates I value of PID Control used for Positioner.
- **Tvl Acum(Travel Accumulator)** : Accumulation of valve travel (%)
- **Cycle Cnt(Cycle Count)** : The accumulated number of times the valve has changed its direction. It is accumulated only when the valve change direction while Cycle Count Deadband is exceeded.
- **Oper Cnt(Operating Count)** : Counts Torque Motor Operation in Positioner.

B ONLINE MENU

■ Hierarchy of Online menus

Process Variables <i>(Page 13)</i>	PV	
	SV	
	TV	
	QV	
	Loop Current	
	Trend	
Commissioning <i>(Page 14)</i>	SP	
	Cotrol Mode	
	Control Mode and SP Application	
	AP	
	Deviation	
Configuration	Calibration <i>(Page 14 >> B3.1 Calibration)</i>	Auto Calibration
		Analog Input Trim
		Acting Type
		Travel Zero
		Travel End
		Analog Input Zero
		Analog Input End
	Control Parameters <i>(Page 16 >> B3.2 Control Parameters)</i>	Deadband
		KP UP
		KP DN
		TI UP
		TI DN
		KD UP
		KD DN
		GAP
		GP
		GI
		GD
		Auto Deadband
		Performance
	Input Config <i>(Page 16 >> B3.3 Input Config)</i>	Signal Direction
		Split Range Mode
		Custom Zero
		Custom End

	Tight Shut Close
	Tight Shut Open
	SP Ramp Rate UP
	SP Rame Rate DN
	Transfer Function
	User Char 5P
	User Char 21P
Output Config <i>(Page 19 >> B3.4 Output Config)</i>	PTM Direction
	Analog Output Zero
	Analog Output End
	HT Direction
	Back Calculation
	DO 1 Function
	DO 1 Logic
	DO 2 Function
	DO 2 Logic
Device Config <i>(Page 20 >> B3.5 Device Config)</i>	Action
	ITP
	Write Protect
	Device reset
	Factory Defaults
	Reset Configuration Changed
	Lock Device Status
	Lock/Unlock Device
HART Config <i>(Page 20 >> B3.6 HART Config)</i>	HART Dynamic Var
	Polling Address
	Number Responsse Preambles
	Loop Current Mode

Identify
(Page 21 >> B3.7 Identify)

Device Image

Device Type

Model Name

Device Identifier

HART Protocol Revision

Device Revision

Software Revision

Hardware Revision

Tag

Long Tag

Date

Descriptor

Message

Final Assembly Number

Diagnostics

Read Event Log
(Page 22 >> Read Event Log)

PST Results
(Page 22 >> PST Results)

Self Test
(Page 23 >> Self test)

Status Monitoring
(Page 23 >> B4.1 Status Monitoring)

Monitoring

FieldDevice Status

Standardized Status 0

Standardized Status 1

Process Status

Device Status

Reset Alarm Bit

Diagnostics Configuration
(Page 28 >> B4.2 Diagnostics Configuration)

Limit

Review
(Page 29 >> B5 Review)

Manufacturer
Device Type
Model Name
Device Identifier
Configuration Change Counter
Tag
Long Tag
Date
Descriptor
Message
Final Assembly Number
Number Request Preambles
Number Response Preambles
HART Protocol Revision
Device Revision
Software Revision
Hardware Revision
Feedback Sensor Type
Valve Open Time
Valve Close Time
Acting Type
Lever Type

B1 PROCESS VARIABLES

→ The function to monitor process status is included.

Process Variables

SP ①	0.0 %
AP ②	13.3 %
Deviation ③	-13.4 %
MV ④	0 %
Loop current	4.0 mA
Trend ⑤	

Figure 7 Process Variables

B1.1 Dynamic Variables

It provides 4 variables of ①Primary Variable (PV), ②Secondary Variable (SV), ③Tertiary Variable (TV), ④Quaternary Variable (QV). They correspond to Dynamic Variables of the HART Communication Protocol. Except PV, the rest of the dynamic variables can be changed to Device Variables which are provided by C330 / C340 and used mapping with the dynamic variables.

(Please, refer to Online → Configuration → HART Config → [<B3.6.2>](#))

B1.2 Loop Current

Loop Current is DC analog input signal (4-20mA), which is the value of input signal (4-20mA) flowing between Control System and Field Device.

B1.3 Trend ⑤

- **Trend:** It displays SP(Set Point) and AP(Actual Position) on real-time trend chart.

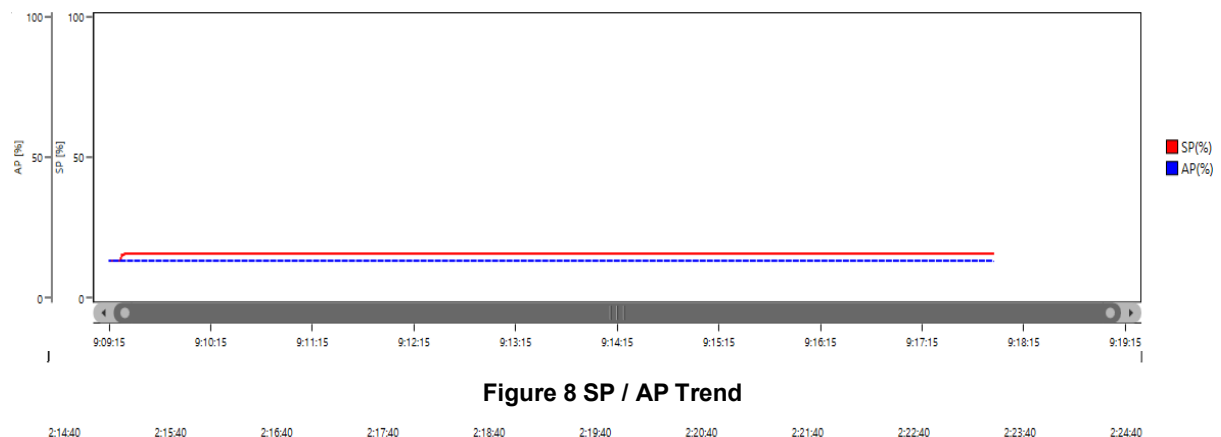


Figure 8 SP / AP Trend

B2 COMMISSIONING


→ It includes functions to use for commissioning.

B2.1 SP(%)

It can read or write input signal input supplied to Positioner in [%].

To use write function, Control Mode should be set in **<Fixed Value>** .

B2.2 Control Mode

	Ensure to match the actual acting type with the currently operating Actuator Type to avoid functional problems if the actual acting type of Actuator is different from the setting values.
---	--

Control Mode	Description
Normal	It is normal Control Model, positioner can be controlled by receiving analog signal of 4-20mA.
Fixed Value	It is remotely controlled, and positioner can be controlled by entering [%] values to <B2 → 1.SP> . ※ When it is in the status of Fixed Value, it cannot be controlled by analog signal of external 4-20mA.

Figure 9 Control Mode

B2.3 Control Mode and SP Application

it applies the current settings of SP (Clause 1) and Control Mode (Clause 2) to the product.

B2.4 AP(%)

It Indicates the current opening of a valve in [%].

B2.5 Deviation(%)

It indicates the difference between the Current Target Position (TP) and the Actual Position (AP) in [%].


B3 CONFIGURATION

B3.1 Calibration

→ It includes functions related to positioner calibration.

B3.1.1 Auto Calibration

→ Positioner automatically sets parameters to control valves.

	The execution of this operation affects the currently running process. Therefore, it must be carried out by authorized personnel under a commissioning situation where normal operation is stopped, or when the safety of the entire process is secured.
---	--

<i>Parameters</i>	<i>Description</i>
Auto Calibration 1	It sets the Zero Point and the End Point of valves.
Auto Calibration 2	It re-sets all parameters necessary to operate valves. ※For the initial installation, it is recommended to use Auto Calibration 2.

Figure 10 Auto Calibration


B3.1.2 Analog Input Trim

➔ It includes functions to calibrate analog input signal of positioner.

1. **Analog Input Zero Trim** : it sets the Zero Point of analog input signal. It must be executed when 4mA is entered in positioner.
2. **Analog Input End Trim** : it sets the End Point of analog input signal. It must be executed when 20mA is entered in positioner .

B3.1.3 Acting Type

➔ It is used to change the settings of the positioner to Single or Double, depending on the actuator Type.

	<p>If the actual operation method of the actuator and the set value are different, performance problems may occur, so please match the operation method of the actuator being used.</p>
--	---

B3.1.4 Travel Zero / End

➔ It can manually set the Zero Point and the End Point of valves.

B3.1.5 Analog Input Zero / End

➔ It functions the same with the Section <3. *Analog Input Trim*>, which can manually maneuver the Zero Point and End Point of analog input.

B3.2 Control Parameters

➔ It includes parameters and functions related to Positioner Control.

B3.2.2 Control Parameters

Parameter	Description	Default value	Limits
Deadband	It indicates the size of the allowable deviation that is set near the target position.	0.3 %	0.1-10.0 %
KP UP	Forward proportional control parameter	1	0.1-50.0
KP DN	Reverse proportional control parameter	1	0.1-50.0
TI UP	Forward integral control time	1 s	0.1-50.0 s
TI DN	Reverse integral control time	1 s	0.1-50.0 s
KD UP	Forward derivative control gain	1	0.1-50.0
KD DN	Reverse derivative control gain	1	0.1-50.0
GAP	It sets the range of control (%) in which Gap Control operates. <Target Position (%) of the valve – the current position (%) of the valve = GAP (%)>	1	0.1-5.0 %
GP	When entering in the control range of GAP, $KP \times GP$	1	0.1-5.0
GI	When entering in the control range of GAP, $TI \times GI$	1	0.1-5.0
GD	When entering in the control range of GAP, $KD \times GD$	1	0.1-5.0
Auto Deadband	It is used to adjust the deadzone size automatically when a hunting occurs due to valve friction.	Disabled	Disabled, Enabled
Performance	Valve control performance is set to the following three modes. <i>Fast, Normal, Stable</i>	Normal	Fast, Normal, Stable

Figure 11 Control Parameters

B3.3 Input Config

Loop Current which is input to positioner is finally converted to TP (Target Position) through signal converters as the below Block Diagram so to control valves.

Input Config menu can set parameters of input signal converters as shown as [Figure 12].

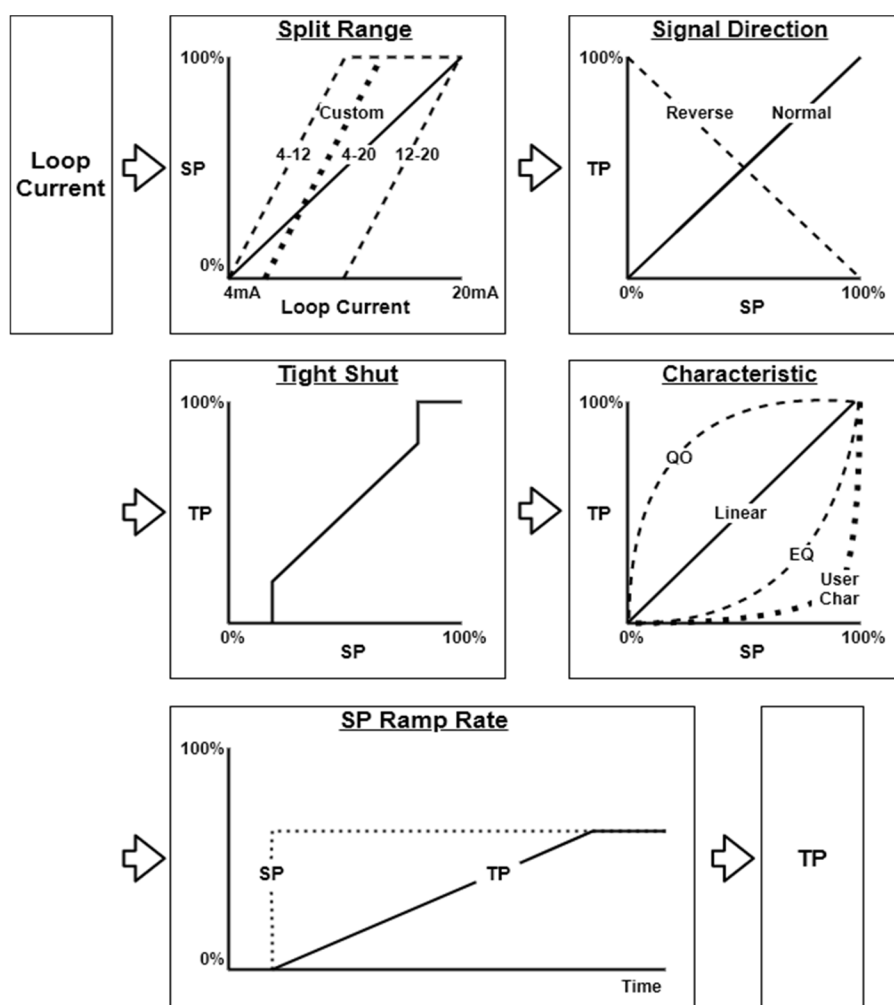


Figure 12 Input signal converter.

B3.3.1 Input Config Parameters Composition for models

Parameter	C330	C340
Signal Direction	<input type="checkbox"/>	<input type="checkbox"/>
Split Range Mode	<input type="checkbox"/>	<input type="checkbox"/>
Custom Zero	<input type="checkbox"/>	<input type="checkbox"/>
Custom End	<input type="checkbox"/>	<input type="checkbox"/>
Tight Shut Close	<input type="checkbox"/>	<input type="checkbox"/>
Tight Shut Open	<input type="checkbox"/>	<input type="checkbox"/>
SP Ramp Rate UP	<input type="checkbox"/>	<input type="checkbox"/>
SP Ramp Rate DN	<input type="checkbox"/>	<input type="checkbox"/>
Transfer Function	<input type="checkbox"/>	<input type="checkbox"/>
User Char 5P	<input type="checkbox"/>	<input type="checkbox"/>
User Char 21P	<input type="checkbox"/>	<input type="checkbox"/>

Figure 13 Input Config Parameter Composition for models

B3.3.2 Input Config Parameters

Parameter	Description	Default value	Limits
Signal Direction	It can be set to increase (Normal) or decrease (Reverse) the TP value as the SP value increases.	Normal	Normal, Reverse
Split Range Mode	It is used to set the range of the input signal to control the entire stroke of the valve.	4-20	4-20, 4-12, 12-20, Custom
Custom Zero	It is used to set the origin of Custom Range when Split Range Mode is set to Custom.	4 mA	4-20 mA
Custom End	It is used to set the end of Custom Range when Split Range Mode is set to Custom.	20 mA	4-20 mA
Tight Shut Close	When SP below the set value is detected, the valve is operated to close fully.	0.3 %	0-100 %
Tight Shut Open	When SP above the set value is detected, the valve is operated to open fully.	100 %	0-100 %
SP Ramp Rate UP	It is used to adjust the speed at which the TP value increases according to the change in the SP value.	0 %/s(OFF)	0-100 %/s
SP Ramp Rate DN	It is used to adjust the speed at which the TP value decreases according to the change in the SP value.	0 %/s(OFF)	0-100 %/s
Transfer Function	Set valve characterization curve	Linear	Linear, EQ, QO, User Char5 ⁵ , User Char21 ⁶
User Char 5P	It can set 5 points at intervals of 4mA (25%).	UChar5P(1) : 0 % UChar5P(2) : 25 % UChar5P(3) : 50 % UChar5P(4) : 75 % UChar5P(5) : 100 %	0-100%
User Char 21P	It can set 21 points at intervals of 0.8mA (5%).	UChar21P(1) : 0 % UChar21P(2) : 5 % UChar21P(3) : 10 % ... UChar21P(20) : 95 % UChar21P(21) : 100%	0-100%

Figure 14 Input Config Parameters

1. When the signal input is detected active, the valve moves to a fully position.
2. When the signal input is detected active, the valve moves to a fully closed position.
3. When the signal input is detected active, PST starts.
4. When the signal input is detected active, PST in progress stops.
5. User characteristic curves of 5 points can be set from 0% to 100% in 25% increments.
6. User characteristic curve of 21 points can be set from 0% to 100% in 5% increments.

B3.4 Output Config

→ It can set parameters related to analog and digital signals from which positioner outputs.

B3.4.1 Output Config Parameter Composition for models

Parameter	C330	C340
PTM Direction	O	O
Analog Output Zero	O	O
Analog Output End	O	O
HT Direction	O	O
Back Calculation	O	O
DO 1 Function	X	Δ^1
DO 1 Logic	X	O
DO 2 Function	X	Δ^1
DO 2 Logic	X	O

Figure 15 Output Config parameter composition for models

1. C340 DO 1/2 Function is supported for only 3 functions of Travel Hi/Lo Limit and Disabled.

B3.4.2 Output Config Parameters

Parameter	Description	Default value	Limits
PTM Direction	It is used to determine to set whether the PTM output will increase from 4 mA to 20 mA (Normal) or decrease from 20 mA to 4 mA (Reverse) when the current AP value increases.	Normal	Normal, Reverse
Analog Output Zero	Setting origin corresponding to 4 mA of PTM output		0 – 4095
Analog Output End	Setting endpoint corresponding to 20 mA of PTM output		0 – 4095
HT Direction	Setting the direction of increase or decrease of AP values delivered to the master by HART communication	Normal	Normal, Reverse
Back Calculation	This function can recalculate the output AP(<i>Actual Position</i>) value which is changed by the flow characteristics (B3.3.2. <i>Input Config Parameters</i> → <i>Transfer Function</i>) setting mode to display it linearly in proportion to actual input current.	Disabled	Disabled, Enabled
DO 1 Function	This function can set a specific status to output a signal to Digital Output. * For the Status category, please refer to the sections of B4.1.2.4 on page 26	C330	Not Applied
		C340	Disabled, Travel Hi Limit, Travel Lo Limit
DO 1 Logic	This function can set a signal logic to be output from DO 1 Function port if an event set in DO 1 Function happens.	Hi	Hi, Lo
DO 2 Function	This function can set a specific status to output a signal to Digital Output. * For the Status category, please refer to the sections of B4.1.2.4 on page 26	C330	Not Applied
		C340	Disabled, Travel Hi Limit, Travel Lo Limit

DO 2 Logic	This function can set a signal logic to be output from Digital Output port if an event set in DO 2 Function happens.	Hi	Hi, Lo
------------	--	----	-----------

Figure 16 Output Config Parameters

B3.5 Device Config

B3.5.1 Device Config Parameters

Parameter	Description	Default value	Limits
Action	Set the valve operating direction	Direct	Direct, Reverse
ITP	Interpolation mode setting to compensate the linearity and accuracy for a linear actuator	Disabled	Disabled Enabled
Write Protect	It enables (Yes) or disables (No) the lock for the parameters.	No	No, Yes

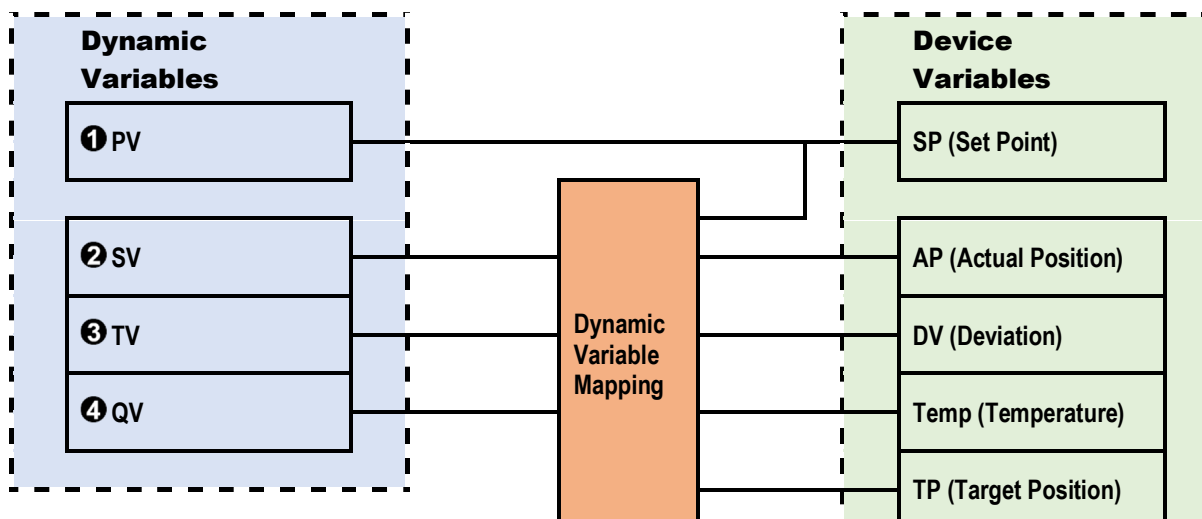
Figure 17 Device Config Parameters

Device Reset	It resets positioner.
Factory Default	It resets all parameters stored in the positioner to initial factory setting.
Reset Configuration Changed	It is used to clear the Configuration Changed bit in the HART field device status.
Lock/Unlock Device	This locks the positioner so that other masters in the local or network cannot change the positioner's parameters or use diagnostics.

B3.6 HART Config

B3.6.1 Mapping of HART Dynamic Variables

For the three (3) Dynamic Variables except PV, each of seven (7) Device Variables provided by C330 / C340 can be mapped to configure process variables to the customer demands. To change configuration, you can set the values of the parameters listed in the below table as the dynamic variable.



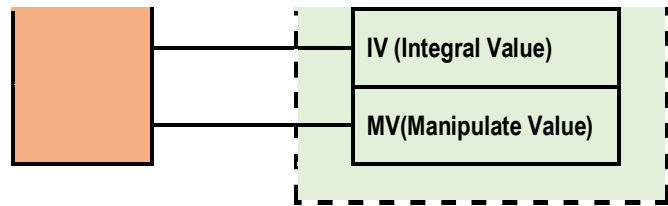


Figure 18 Dynamic Variable Mapping

B3.6.2 HART Config Parameters

Parameter	Description	Default value	Limits
PV is	Device Variable is mapping in PV.	SP	SP
SV is	Device Variable is mapping in SV.	AP	All
TV is	Device Variable is mapping in TV.	DV	All
QV is	Device Variable is mapping in QV.	Temp	All
Polling Address	It sets HART Polling Address.	0	0 - 63
Number Response Preambles	It sets HART Response Preambles.	5	5 - 20
Loop Current Mode	Loop Current Mode	Enabled	Disabled, Enabled

Figure 19 HART Config Parameters

B3.7 Identify

Parameter	Description
Device Image	It indicates an image of the product.
Device Type	It indicates the type of the product.
Model Name	It indicates the model of the product. (ex. In YT-3400L, In 'YT-3400L', 'L' is an abbreviation for Linear. L: Linear, R: Rotary)
Device Identifier	It indicates the unique identifier for the HART device. (Serial number)
HART Protocol Revision	It indicates HART Protocol Revision of the product
Device Revision	It indicates Field Device Revision of the product.
Software Revision	It indicates Software Revision of the product.
Hardware Revision	It indicates Hardware Revision of the product.
Tag	It indicates the tag of the field device. (up to 8 characters)
Long Tag	It indicates the long tag of the field device. (up to 32 characters)
Date	Date
Descriptor	It is additional description about the field device.
Message	User message
Final Assembly Number	It is intended to identify the specific device in relation to the devices installed on the entire site.

Figure 20 Identify

B4 DIAGNOSTICS

→ It can check the current status of Positioner or set in diagnosis-related parameters of Positioner.

■ Read Event Log

Read Event Log

Occurrence and clearance are recorded up to 20 events such as self-diagnosis activation, failure, or deviation from the set values in positioner. The latest event is automatically erased when the number of recorded events exceed 20

Event Log	
Operation Time(sec)	Log Message
595206	Event [Deviation Time out] occurred.
595182	Event [Zero Point Drift] occurred.
564745	Event [Deviation Time out] occurred.
564721	Event [Zero Point Drift] occurred.
534288	Event [Deviation Time out] occurred.
534264	Event [Zero Point Drift] occurred.
528365	Event [Zero Point Drift] removed.
524765	Event [Deviation Time out] occurred.

Figure 21 Event Log

Parameter	Description
Operation Time(sec)	The accumulated operating time after the positioner is turned on.
Log Message	Event occurred to positioner

■ PST Results

PST Results

It can display the records of operated PST (Partial Stroke Test).

It can keep the maximum one record of the most recent PST Baseline and the maximum 10 records of the most recent PSTs which are normally operated.

The latest event is automatically erased when recorded events exceed the maximum number.

PST Baseline Result				
Idx	Operation Time(sec)	Response Time(sec)	Dead Time(sec)	Result Message
0	65517	2.5	1.4	Passed.

Figure 22 PST Baseline Result

PST Results				
Idx	Operation Time(sec)	Response Time(sec)	Dead Time(sec)	Result Message
1	65661	1.9	0.8	Passed.
2	36683	0.7	0.2	Passed.

Figure 23 PST Results

Field Name	Description
Idx	It is a record Index
Operation Time	It is the time when the test was executed (based on Run Time).
Response Time	It is the time until the valve reaches the target value after the change of TP signal.
Dead Time	It is the time until the valve starts to operate after the change of TP signal.
Result Message	Test Result <i>Passed:</i> PST result is satisfied. <i>Time Over:</i> The response time exceeds certain time limit. <i>Out Of Tol:</i> The start position is out of tolerance. <i>PST Hunting:</i> Severe hunting occurs. <i>Abnormal Shutdown:</i> Positioner shuts down due to an abnormal operation. <i>Stop by AI:</i> PST stops by Analog Input signal. <i>Stop by DI:</i> PST stops by Digital Input signal.

Figure 24 PST Results Table Field Description

■ Self test

Self test

Fault diagnosis of positioner memory (RAM, NVM) and validity check of main parameters.


B4.1 Status Monitoring

B4.1.1 Monitoring

The C330 / C340 provides the users with various operational status or HART communication status which can impact a life or maintenance of valves, actuators, and positioners.

B4.1.1.1 NE107 Status

- ➔ When an alarm is set on to various failures or events with processes or devices on the site, alarms can be activated more than necessary, which may cause users to overlook critical alarms. C330 / C340 provides 4 statuses with key priorities in a simple form of Namur NE107 so that the information which must be conveyed to users can be easily understood. The NE107 statuses are “Failure”, “Function Check”, “Out of Specification”, “Maintenance Required” as in the priority, and they are shown in symbols as below to help users acknowledge the current status.

Symbol	Status	Description
	Normal	Normal state.





	Failure	A failure has occurred in which the positioner or control valve cannot operate normally.
	Function Check	It is performing an operation to check the function of the positioner or control valve.
	Out of Specification	A condition outside the set specification of the positioner or control valve was detected.
	Maintenance Required	It is in a state that requires maintenance.

Figure 25 NE107 Status

B4.1.1.2 Counters

Counter	Description
Tvl Acum	Accumulation of valve travel (%)
Cycle Cnt	Accumulation of the number of times the valve has changed direction. It is accumulated only when the valve change direction while Cycle Count Deadband is exceeded.
Oper Cnt	Total number of input change applied to I/P converter.
Full Open Cnt	Accumulated number of times the valve has been fully open.
Full Close Cnt	Accumulated number of times the valve has been fully closed.
STX Count	Accumulated number of messages coming from HART Master
ACK Count	Accumulated number of messages Positioner has responded to HART Master.
BACK Count	Accumulated number of messages that positioner has transmitted at HART Burst mode.
Run Time	Total time accumulated while positioner is turned on.

Figure 26 Counters

B4.1.1.3 Diag Variables Update

Diag Variables Update

It updates monitoring variables by retrieving the recent data from positioner.

B4.1.2 Status

- ➔ It displays the current operational status of positioner. Alarms of the applicable status must be activated for the below status Bits.

B4.1.2.1 Field Device Status

Status Bit	Description
Primary Variable Out of Limits	The variable mapping with PV ¹ deviated from Upper Limit or Lower Limit.
Non-Primary Variable Out of Limits	The variable mapping with SV ² , TV ³ , QV ⁴ deviates from Upper Limit or Lower Limit.
Loop Current Saturated	Loop Current ¹ reached to Upper Limit or Lower Limit.
Loop Current Fixed	Loop Current ¹ is kept in a fixed value and does not respond to extrinsic input.
More Status Available	It reads the additional status information on the device, and the additional information is displayed in Process & Device Status. <i>*C Self-test → Refer to the sections of C3 Status → Process Status / Device Status</i>
Cold Start	Positioner is reset or blackout occurs.
Configuration Changed	Configuration (parameter) of positioner is in the process of change.
Device Malfunction	Positioner detects a serious error in the operation.

Figure 17 Field Device Status

B4.1.2.2 Standardized Status 0

Status Bit	Description
Device Variable Simulation Active	The device is currently in simulation mode, and the current Device Variables do not represent the process.
Non-Volatile Memory Defect	Non-Volatile Memory test failed, or a defect occurred.
Volatile Memory Defect	Volatile Memory test failed, or a defect occurred.
Watchdog Reset Executed	Watchdog reset is executed.
Power Supply Conditions Out of Range	Power supply or voltage is out of the acceptable range.
Environmental Conditions Out of Range	Internal or environmental conditions are out of the acceptable range.
Electronic Defect	A hardware defect which is not related to sensors is detected.
Device Configuration Locked	The device is in status of Write-protect or locked.

Figure 28 Standardized Status 0

B4.1.2.3 Standardized Status 1

Status Bit	Description
Status Simulation Active	Status Simulation Mode is activated.
Discrete Variable Simulation Active	The device is in Simulation Mode and more than one Discrete Variable do not represent the process.
Event Notification Overflow	Event alarm is not recorded due to overflow.
Battery or Power Supply needs Maintenance	Changing or recharging batteries requires.

Figure 29 Standardized Status 1

B4.1.2.4 Process Status

→ It indicates actuator and valve status which impact on the process

Status Bit	Description
Cycle Count Limit	It is active if the accumulated cycle counter (Cycle Cnt) exceeds Cycle Count Limit (Cycle Cnt Limit).
Travel Accumulate Limit	It is active if the travel accumulator (Tvl Acum) exceeds Travel Accumulator Limit (Tvl Acum Limit).
Operating Count Limit	It is active if the number of operations (Oper Cnt) for I/P converter exceeds Operating Count Limit (Oper Cnt Limit).
Temperature High Limit	It is active if internal temperature of the device exceeds Temperature Upper (Temp Upper Limit).
Temperature Low Limit	It is active if internal temperature of the device is lower than Temperature Lower Limit (Temp Lower Limit).
Travel High Limit	It is active when the travel exceeds Travel Upper Limit (Tvl Upper Alarm Point).
Travel Low Limit	It is active when the travel falls below Travel Lower Limit (Tvl Lower Alarm Point).
Deviation Time Out	It is active when actual deviation greater than the preset Deviation (Deviation DB) persists longer than the preset Deviation Time.
Travel Cutoff High Limit	It is active when the travel exceeds the available high stroke of the valve/actuator. The available stroke is already set during auto calibration.
Travel Cutoff Low Limit	It is active when the travel is below the available low stroke of the valve/actuator. The available stroke is already set during auto calibration process.
Zero Point Drift	It is active if zero point is outside the value set at calibration when actuator has been fully vented.
End Point Drift	It is active if endpoint is outside the value set at calibration when actuator has been fully pressurized.
Full Close Count Limit	It is active if the valve exceeds Full Close Count Limit.
Full Open Count Limit	It is active if the valve exceeds Full Open Count Limit.
Loop Current High Limit	It is active if the input current exceeds 20.5 mA.
Loop Current Low Limit	It is active if the input current falls below 3.8 mA.

Figure 30 Process Status Bit

→ The Table of Process Status Function Operability by Model (O : Operable, X : Not operable)

Status Bit	C330	C340
Cycle Count Limit	X	X
Travel Accumulate Limit	X	X
Operating Count Limit	X	X
Temperature High Limit	X	X
Temperature Low Limit	X	X
Travel High Limit	O	O
Travel Low Limit	O	O
Deviation Time Out	O	O
Travel Cutoff High Limit	O	O
Travel Cutoff Low Limit	O	O
Zero Point Drift	X	X
End Point Drift	X	X
Full Close Count Limit	X	X
Full Open Count Limit	X	X
Loop Current High Limit	X	X
Loop Current Low Limit	O	O

Figure 31 Process Status Function Operability by Model

B4.1.2.5 Device Status

➔ It indicates status which impacts on the positioner performance.

Status Bit	Description
Local Operation Active	It indicates the positioner is being operated by manual operation through LUI (Local User Interface).
Auto Calibration Running	It is active when auto-calibration is in progress.
PST Running	It is active when Partial Stroke Test is in progress.
Diagnostics Running	It is active when diagnosis test such as Step Response Test, Stroke Time Test, and Trace Test is in progress.
Position Snsr High Limit	It is active when the value read from position sensor is out of range.
Position Snsr Low Limit	It is active when the value read from position sensor is out of range.
Critical NVM Fail	It is active if there is a failure in the NVM (Nonvolatile Memory) parameters which are important in the positioner operation.
Non Critical NVM Fail	It is active if there is a failure in the NVM (Nonvolatile Memory) parameters which are not related to the positioner operation.
Drive Signal Alert	It is active when non-valid input current to I/P converter is flowing for more than the pre-set time.
Drive Current Fail	It is active when input current to I/P converter is not normal.
Not Calibrated	It is active when auto-calibration has not done after installation.
Auto Calibration Fail	It is active when auto-calibration has failed.
Position Snsr Fail	Location sensors of positioner are not in normal operation.
Communication Error Limit	It is active if the number of HART related communication errors exceed the setting.
DI 1 Status ¹	It is active when the digital input 1 port has changed its status.
DO 1 Status ²	It is active when the digital output 1 port has changed its status.
DO 2 Status ³	It is active when the digital output 2 port has changed its status.
Diagnostics Fail ⁴	It indicates that the diagnosis test such as Large Step Test, Normal Step Test, Small Step Test, Stroke Time Test and Trace Test has failed.
PST Fail	It is active when Partial Stroke Test has failed.
Temperature Snsr Fail	It is active when internal temperature sensor has failed.
Adaptive Control Fail ⁵	It is active when adaptive control is not working properly.
Status Simulation Active	It is active when status simulation is in operation.

Figure 32 Device Status Bit

➔ The Table of Process Status Function Operability by Model (O : Operable, X : Not operable)

Status Bit	C330	C340
Local Operation Active	O	O
Auto Calibration Running	O	O
PST Running	O	O
Diagnostics Running	X	X
Position Snsr High Limit	O	O
Position Snsr Low Limit	O	O
Critical NVM Fail	O	O
Non Critical NVM Fail	O	O
Drive Signal Alert	X	X
Drive Current Fail	X	X
Not Calibrated	O	O
Auto Calibration Fail	O	O

Position Snsr Fail	O	O
Communication Error Limit	X	X
DI 1 Status	X	X
DO 1 Status	X	X
DO 2 Status	X	X
Diagnostics Fail	X	X
PST Fail	O	O
Temperature Snsr Fail	O	O
Adaptive Control Fail	X	X
Status Simulation Active	X	X

Figure 33 Device Status Function Operability by Model

B4.1.3 Reset Alarm Bit

→ The functions below can deactivate Status Bit.

Reset Auto Calibration Running

It deactivates Auto Calibration Running Status Bit.

Reset PST Running

It deactivates PST Running Status Bit.

Reset Critical NVM Fail

It deactivates Critical NVM Fail Status Bit.

Reset Non Critical NVM Fail

It deactivates Non Critical NVM Fail Status Bit.

Reset PST Fail

It deactivates PST fail Status Bit.

Reset Auto Calibration Fail

It deactivates Auto Calibration Fail Status Bit.

B4.2 Diagnostics Configuration

B4.2.1 Limit

→ It sets the limit of accumulated value of the status counter in positioner, the conditions of alarm activation, and whether there should be alarm or not.

B4.2.2.6 Travel Hi/Lo Limit

Parameter	Description	Default value	Limits
AP	The current position of valve (%)	-	-
Tvl Lower Alarm Point	Lowest position to cause an alarm	0 %	-10-50 %
Tvl Lower Alarm	With this Enabled, Travel Low Limit Alarm is activated when actual valve position moves lower than the preset Tvl Lower Alarm Point.	Enabled	Disabled, Enabled
Tvl Upper Alarm Point	Highest position to cause an alarm	100 %	0-120 %

Tvl High Alarm	With this Enabled, Travel High Limit Alarm is activated when actual valve position moves higher than the preset Tvl Lower Alarm Point.	Enabled	Disabled, Enabled
----------------	--	---------	-------------------

Figure 34 Travel Hi/Lo Parameters

B5 REVIEW

Parameter	Description
Manufacturer	It indicates the manufacturer.
Device Type	It indicates the type of model.
Model Name	It indicates the model of the product. (ex. In C340L, It indicates 'L' of C340L is Linear. L: Linear, R: Rotary)
Device Identifier	The serial number of the field device
Configuration Change Counter	The number of which configuration (parameter) of the device is changed
Tag	Tag on the field device
Long Tag	Tag on the field device
Date	Date
Descriptor	Additional description on the field device.
Message	User Message
Final Assembly Number	It is intended to identify the specific device in relation to the devices installed on the entire site.
Number Request Preambles	Number of Request Preambles
Number Response Preambles	Number of Response Preambles, the number of Preambles to send to Host from the field device.
HART Protocol Revision	HART Protocol Revision of the product
Device Revision	Device Revision of the product
Software Revision	Software Revision of the product
Hardware Revision	Hardware Revision of product
Feedback Sensor Type	It indicates the type of position sensor. (NCS: Non-Contact Sensor, Potentiometer)
Valve Open Time	It is a value which is automatically recorded after Auto Calibration 2 is activated, it indicates that the time takes until the valve becomes fully open from full closed.
Valve Close Time	It is a value which is automatically recorded after Auto Calibration 2 is activated, it indicates that the time takes until the valve becomes fully closed from fully open.
Acting Type	Types of Valve actuation (Single, Double)
Lever Type	Types of levers (Standard, Adapter)

Figure 35 Review

C DIAGNOSTICS

- ➔ C3XX EDD supports Partial Stroke Test (PST) to check characteristics changes and the integrity of valves.

■ Entry to Diagnostics Menu

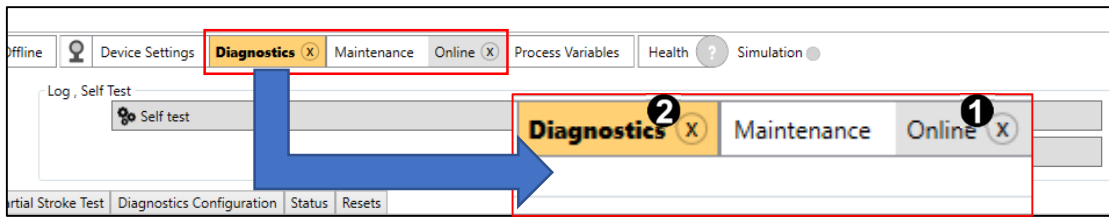


Figure 36 Diagnostics menu in FDI

Section B. Online menu describes the listed items of the menus appearing when clicking Online like **①**. To execute the **C diagnosis Section**, you can click **②** Diagnostics to enter to the menu like **<Figure 36 Diagnostics menu in FDI>**.

※<**Figure 36 Diagnostics menu in FDI**> is a development Tool provided from FieldComm Group, thus UI(User Interface) might appear differently on different Host System(AMS Device Manager, PDM).

C1 PST

Pathway: Diagnostics → Partial Stroke Test

Instead of the Full Stroke Test which can impact on process by implementing the full open/close cycle of the values which are required to keep open states or certain position like ESD (Emergency Shut Down) valve, PST (Partial Stroke Test) can be used to understand the operational status of valves and to avoid the possible adhesion of the valves which might be caused by maintaining in a certain position for long time.

C3XX EDD offers two ways to perform the PST in Scheduled Mode and Direct Execution Mode. The Scheduled Mode is to execute the PST periodically as set in, the value of PST Schd Enab parameter should be Enabled, and the desired cycle should be set in for Interval parameter. For the PST which is executed in Scheduled Mode, results including the Response Time and the Dead Time are stored in positioner.

You can always check the previous results from the PST Results (**B4 Diagnostics → PST Results**).

For the Direct Execution Mode, you have to put direct commands to execute PST when you want to perform the test. To perform PST in Direct Mode, You can go to Diagnostics → Partial Stroke Test → PST Execution **<Figure 37 PST Execution>** and click PST Base Test or PST Normal Test and then the test immediately starts.

C1.1 PST Execution

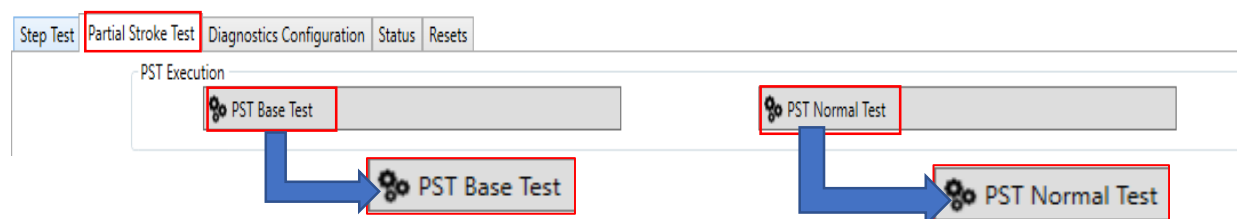


Figure 37 PST Execution

PST Base Test

It is used to create reference data (response time, dead time) to compare changes in valve characteristics. Usually, it runs when the valve is first installed.

PST Normal Test

It is the PST test normally executed PST of which the displayed result values can be compared to the result values of the PST base.

PST is performed by completing a cycle which make a round from the starting position to the target position, and it may take several seconds to minutes depending on the configurations of Hold Time and Limit Time. When the PST ends, the Response Time, Dead Time, and Result Data are displayed (it may take several seconds to minutes for the PST Result data to be displayed).

Ticks	31351 s	Dead Time	3.2 s
Response Time	7.6 s	Result	1(Passed)

Figure 38 PST test results

C1.2 PST Information

PST Results

It records the PST results.
For details, please refer to [<B4 Diagnostics → PST Results>](#).

PST Information

It displays the number of PST results recorded in positioner and the remaining time until the next PST is performed when the PST is being operated in Scheduled Mode.

Last test Result

It displays the latest PST result.

C1.3 PST Config

Parameter	Description	Default value	Limits
PST Schd Enab	It sets the PST Scheduled mode.	Disabled	Disabled, Enabled
Interval	The waiting time until the next PST is executed when the PST Scheduled Mode is enabled.	365 day	1-365 day
Tolerance	It is the acceptable tolerance between the actual position at the starting of the PST and the Start Position value. PST fails if it deviates from the acceptable tolerance.	5 %	0.1-10 %

Start Position	The position of which the valve track is required at the starting of the PST.	100 %	0-100 %
Target Position	The target position which the valve is required to reach during the PST.	90 %	0-100 %
Hold Time	The waiting time until the valve reaches to the target position and moves again.	10 s	1-60 s
Limit Time	The limit time which a valve is required to respond. If it exceeds the Limit Time, the PST fails.	60 s	1-300 s
PST Ramp UP	It sets the speed when the valve moves to a higher position than the current position during PST operation.	0 %/s	0-100 %/s
PST Ramp DN	It sets the speed when the valve moves to a lower position than the current position during PST operation.	0 %/s	0-100 %/s

Figure 39 PST Configuration Parameters

Read PST Config

It uploads the PST configurations stored in positioner.

D OFFLINE MENU

- ➔ In case that the current device is changed into a new one, some of the already installed parameters can be uploaded in the Offline, and then downloaded to the new device to be replaced.

The parameters which can be uploaded on Offline Menu and downloaded to the device are the same with the Offline Menu hierarchy below.

■ Offline Menu Hierarchy

Input Config	Tight Shut Close
	Tight Shut Open
	Transfer Function
	User Char 5P
	User Char 21P
HART Config	PV is
	SV is
	TV is
	QV is
Identify	Model Name
	Feedback Sensor Type
	Tag
	Long tag
	Date
	Descriptor

A dark gray world map with a white grid of latitude and longitude lines, serving as a background for the text.

www.rotork.com

A full listing of our worldwide sales and service network is available on our website.

Rotork YTC Limited
81, Hwanggeum-ro, 89beon-gil,
Gimpo-si, Gyeonggi-do,
South Korea 10048
Tel +82 (31)986 8545
Fax +82 (31)986 2685
Email ytc.sales@rotork.com

Rotork is a corporate
member of the
Institute of Asset
Management



Issue June/07/2023

As part of a process of on-going product development, Rotork reserves the right to amend and change specifications without prior notice. Published data may be subject to change. For the very latest version release, visit our website at www.rotork.com
The name Rotork is a registered trademark. Rotork recognizes all registered trademarks. The Bluetooth® word mark and logos are registered trademarks owned by Bluetooth SIG, Inc. and any use of such marks by Rotork is under license. Published and produced in the UK by Rotork.