KGP5000 series Smart valve positioner

# HART Communication Operation Manual

For GUI type



# **Table of Contents**

1.	Introd	uction	
	1.1. Sc	ope of this operation manual	4
	1.2. Sa	fety notices	5
	1.3. Pr	oduct summary	5
	1.4. Ele	ectrical connections	6
	1.5. Pr	eparation for HART communication	9
2.	Menu	tree on the HART communication	10
	2.1. M	enu type	
	2.2. M	enu tree	
3.	Proces	s Variables (Root Menu)	13
	3.1. Ala	arm status	13
	3.2. Tre	ends	14
4.	Device	(Root Menu)	15
	4.1. Ala	arm status	
	4.2. Inf	ormation	
	4.2.1.	Monitor	16
	4.2.2.	Alarm status	16
	4.2.3.	Positioner info	19
	4.2.4.	Config. parameter	
	4.2.5.	Diag. result	
	4.3. Se	tup	25
	4.3.1.	Setup and operation authority by HART communication	
	4.3.2.	Basic setup	
	4.3.3.	Easy tuning	
	4.3.4.	Expert tuning	
	4.3.5.	Error messages	
	4.3.6.	Detailed setup	
	4.3.7.	Function select	
	4.3.8.	Memory management	
	4.4. IVI	Adjuste and a suite is a	
	4.4.1.	Adjustment ' switching	
	4.4.2. 1 1 2	Action switching of pilot relay Palanced pressure adjustment of pilot relay	
	4.4.5. ////	Calibration	
	4.4.4. 1 1 5	Simulation test	
	4.4.5.	Service	
	ч.ч.о. ДД 7	HART relation	63
	4.5 Al:	arms	
	4.5.1	Summary of alarms	66
	4.5.2	Alarm setting / Check and Clear of result	68
	4.5.3.	NAMUR status select	
	4.6. Dia	agnosis	
	4.6.1.	Online diagnosis	
	4.6.2.	Offline diagnosis	
	4.6.3.	Check and Save of online diagnosis results (Diag.test data)	
5.	Diagno	osis Root Menu	
	5.1. Ala	arm status	
	5.2. Or	Iline diagnosis setup	
	5.2.1.	Clear of diagnosis logs	
	5.3. Of	fline diagnosis setup	

	5.3.1.	Summary of offline diagnosis	
	5.3.2.	25% step response test	
	5.3.3.	Pneumatic circuit span	
	5.3.4.	Pneumatic circuit drift	
	5.3.5.	Simple valve signature	92
	5.4. Che	eck and Save of online diagnosis results (Diag.test data)	94
	5.5. Adv	vanced Diagnostics	
	5.5.1.	Valve signature	
	5.6. Ala	rm setup	
	5.6.1.	Alarm setting / Check and Clear of result	
	5.7. NAI	MUR status select	
6.	Trouble	eshooting	
7.	Menu i	tem	
A)	APPENI	DIX / Flow chart of settings procedure	104

# 1. Introduction

## Please read carefully at first!

This operation manual includes getting information, calibration, maintenance procedures, diagnosis and so on for the KGP5000 series smart valve positioner by HART communication. Read this operation manual and an instruction manual carefully before using the positioner.

Please read this along with the instruction manual for the KGP5000 you are using.

%Please check the instruction manual (CD) included at the time of delivery.

%If you do not know the instruction manual for your device, check the positioner version / electronics version / software version of your device and order the latest version.

Notes regarding this operation manual;

- > The user should read and understand this publication.
- > The contents of this publication are subject to change without notice to improve specifications.
- The contents of this publication may not be reproduced or duplicated in whole or in part, without prior consent.
- This publication may not be revised so long as changes in structure and specifications have no effect on the operation of the positioner.
- The contents of this publication are described as correct as possible but if anything is unclear or you have any questions, please contact KOSO sales office.

## 1.1. Scope of this operation manual

This document is compatible with the following versions as below.

#### KGP5003

<b>Electronics Version</b>	:	1.0.0 and more
Software Version	:	0.6.1 and more

#### HART DD

<b>Device Revision</b>	:	2 and more
DD Revision	:	0 and more

# 1.2. Safety notices

This document describes safety notices by using warnings and cautions as below. The user should thoroughly review safety notices described in this operation manual prior to installation, operation, maintenance for the positioner.



# Warning

Death or severe personal injury can occur if the user fails to keep safety precautions.



# Caution

Minor personal injury or property damage, damages or breakdown of the positioner and the system equipped with the positioner can occur if the user fails to keep safety precautions.

It should be noted that this operation manual includes information for only this smart valve positioner. Therefore, it is the responsibility of the user to take into account safety considerations relate to any other installation methods or operation methods except the method provided herein.

## **1.3.** Product summary

KGP5000 series smart valve positioner is a control device mounted on the pneumatic actuator for control valve, which positions a control valve according to a 4 to 20mA signal from a higher-level control system or a control device. Position feedback control system which receives feedback signal mapped to the desired valve travel and compares both input signal and feedback signal enables accurate positioning of a control valve.

In addition, it is possible to use this positioner in order to operate various types of pneumatic actuator such as linear or rotary motion actuators both of single and double acting.

Furthermore, the positioner utilizing digital techniques performs the functions of advanced PID controller, local user interface (LUI) using LCD, diagnosis utilizing sensing techniques with potentiometers and internal pressure sensors. Such features enable an easy installation and calibration, an effective monitoring and an efficient process management relevant to operations and maintenance.

This device can do the work of setting and adjustment by a communication tool of a HART communicator

# **1.4.** Electrical connections



# Warning

- Disconnect the power supply before wiring connections.
- Wiring connections must be done in accordance with national electrical code requirements.
- Avoid wiring connection on wet weather days or in environments are saturated with water. They are liable to electric leakage or damage to the positioner.



# Caution

- Close the unused entries for flameproof enclosures with blanking elements to avoid the intrusion of humidity, dust, etc.
- The entries shall be sealed with sealants to avoid the intrusion of water or rain
- > Earthing and bonding conductor shall be connected by terminal lugs (Tinning copper).
- Earthing or bonding conductor shall be firmly connected by using screws with captive spring lock washer(M4) provided on the positioner in such a way to prevent loosening and twisting.
- When using the flame proof type, a conductor with a cross-sectional area of at least 1mm<sup>2</sup> shall be used for internal earthing.
- When using the flame proof type, a conductor with a cross-sectional area of at least 4mm<sup>2</sup> shall be used for external bonding.
- Check the specifications of cable glands and blanking elements to make sure to use only suitable Ex certificated cable glands and blanking elements. See Table 1.4a shows the suitable Ex certificated cable glands and blanking elements for each proof type.

Figure of the wiring connections and terminals is shown as below.



The positioner uses a 4-20mA loop current and the HART communication is carried out through the digital signal which is superposed on this loop current.

Make wiring connections according to the following procedure.

- 1. Remove the terminal cover.
- 2. Then, draw cables of the facilities inside the terminal box. Use cable glands which are rated for the environment of installation and are in accordance with electrical codes which apply to the application. Since screw thread types of electrical connections may vary with specifications, make wiring connections after confirming specifications.
- 3. Connect cables of loop current, respectively, to IN+ and IN- of the positioner.
- 4. Connect cables of position transmitter, respectively, to OUT+ and OUT- of the positioner.
- 5. As illustrated in figure 1.4a, two ground terminals of a safety ground and earth ground are available. The safety ground and earth ground are electrically identical. Make wiring connections according to local electrical codes which apply to the application.
- 6. Replace the terminal cover.
- 7. Turn the cover locking screw counterclockwise to fix the terminal cover.

Field wiring diagram is shown in figure 1.4b.



Figure 1.4b Field wiring diagram



Figure 1.4c Load resistance to supply voltage relationship via the connection of position transmitter

Supply power to the positioner according to the load resistance. It should be noted that the supply power must not be exceed 40VDC.

	The suitable Ex certin	carea cable Blands and	Blaining ciciliterites for	each proof type
Proof type	Thread form of	Certification	Rated ambient	Service temperature
	entries		temperature range	range
TIIS	G1/2	Ex d IIC Gb	-20℃~+60℃	-20℃~+63℃
CCC(NEPSI)	1/2NPT	Ex d IIC Gb	-40℃~+70℃	-40℃~+73℃
KOSHA	1/2NPT	Ex d IIC	-20℃~+60℃	-20℃~+63℃
IECEx	1/2NPT or M20X1.5	Ex db IIC Gb	-40℃~+70℃	-40℃~+72℃
ATEX	1/2NPT or M20X1.5	II 2 G Ex db IIC Gb	-40℃~+70℃	-40℃~+72℃

 Table 1.4a
 The suitable Ex certificated cable glands and blanking elements for each proof type

#### SETUP AND INFORMATION



# Warning

- Changes in parameters and so on owing to setup procedure may cause unexpected movements of the valve. Perform the setup in the conditions such as offline state which does not directly affect the process.
- Don't remove the terminal cover of the positioner during or after the passage of electric current. In case the terminal cover must be opened reluctantly, perform that after confirming that flammable, explosive gases are not present and the environment is not saturated with water or steam.
- > Don't touch the moving parts during the setup procedure. It causes personal injury.
- Keep away from a magnet material or a magnetic-tripped screwdriver. It unexpectedly moves the control valve so that it may cause a serious damage.
- > Don't use a wireless transceiver near the positioner.

# **1.5.** Preparation for HART communication

A personal computer or communicator and a HART modem are required to acquire the information of this unit via HART communication and perform installation / setting work, maintenance, alarm setting / diagnosis. In addition, the HART modem driver and device description (DD) for KGP5000 communication must be installed on the PC.

%If you want to download and install DD to a communicator, please check with the communicator manufacturer.

% Please check with each manufacturer for the installation of the HART modem driver and management software.

% If the communicator uses the Text type, refer to *OME-KGP5HT-01B\_KGP5000 \_HART Text type Manual\_EN*.

The procedure for connecting to a PC and downloading / installing DD is shown below.

 Download DD for HART communication. The DD for HART communication can be downloaded from the following FieldComm Group website. You can also use the DD from the CD that was included when you purchased this unit.

Download to PC:

- ① Enter KGP5000 in the Search by Product Name section of the URL: URL:https://www.fieldcommgroup.org/registered-products Search.
- ② Select the KGP5000 page and select [2] for DD VERSION.
- ③ Click EDD Download to start the download and save hart.0000cf.cf83.zip to any location.
- ④ Unzip the downloaded hart.0000cf.cf83.zip.
- Installation of DD for HART communication. The following shows the case where the application SDC625 is used as an example. For others, please check the instruction manual of the management software you are using.

Installation procedure on PC:

- (1) Download to PC Save 0000cf of hart.0000cf.cf83 described in (4) to the folder of C:  $\pm$  HCF  $\pm$  DDL  $\pm$  Library on your PC and complete the installation.
- ② When SDC625 is started, HART communication with this unit becomes possible.

The data saved in the 0000cf folder is as follows. Software Ver. The data corresponding to this unit is available. (DD in 0083 folder is a HART6 file)

Folder name: <b>cf83 ※In the case of HART7</b>	Folder name: 0083 <b>%In the case of HART6</b>
For software up to Ver 0.4.9 DD(Two files)	For software up to Ver 0.4.9 DD(Two files)
0103.fm8	0103.fm6
0103.sym	0103.sym
For software Ver0.6.1 or later DD(Two files)	For software Ver0.6.1 or later DD(Two files)
0200.fm8Two files	0200.fm6
0200.sym	0200.sym

## 3) Connection

According to section 1.4, connect the IN+ and IN- of this device to a communication tool. For example HART communicator or a terminal of host controller.

# 2. Menu tree on the HART communication

# 2.1. Menu type

This document describes the GUI (Graphical User Interface) type DD.

- If you are using a Text type communicator, refer to OME-KGP5HT-01B\_KGP5000\_HART Text type Manual\_EN.
- The menu types that correspond to GUI type menus and text type menus depend on the management software.

For details, see the instruction manual of the management software you are using.

Both GUI-type and text-type menus are available on the PC.

% Menu (1)(2)(3) is a menu of management software set by GUI type.

①Process Variables	
(2)Device	
③Diagnosis	

 $\operatorname{Henu} (4)$  is a menu of management software set by text type.

Please refer to OME-KGP5HT-01B\_KGP5000 \_HART Text type Manual\_EN separately.

④Root menu

Figure 2a menu type

# 2.2. Menu tree

# **①**Process Variables Root Menu

		【Chapter / Section】
Process Variables Root Menu →	Alarm status	【3.1.】
	<set point=""></set>	
	<position></position>	
	<loop current=""></loop>	
	<input/>	
	<p-sup.></p-sup.>	
	<p-out1></p-out1>	
	<p-out2></p-out2>	
	<temperature></temperature>	
	Trends	【3.2.】

Figure 2b Process Variables Root Menu

# **2** Device Root Menu

Device Root Menu



Figure 2c Device Root Menu

# **③**Diagnosis Root Menu

			[Chapter / Section]				
Diagnosis Root Menu	/	Alarm status	【5.1.】				
	<	<total stroke=""></total>	~				
	<	<total change="" direction=""></total>	_				
	<	<total time=""></total>					
	•	<low position="" time=""></low>	•				
	•	<low percentage="" position="" time=""></low>					
	<	<maximum temperature=""></maximum>					
	<	<minmum temperature=""></minmum>		_		Chapter / Se	ection
	[	Diagnosis Extended Menu	→ Online diag.setup	⊢	Total Stroke Setting	【5.2.】	
					Total Direction Change Setting		
					Low Position Setting		
					Max/MinTemperature Setting		
					Partial stroke T.		
					Diag. log clear	【5.2.1.】	
				]		_	
			Offline diag.set.	⊢	25% step response	【5.3.2.】	
					Pneumatic span	【5.3.3.】	
					Pneumatic drift	[5.3.4.]	
					S-valve signature	[5.3.5.]	
				-	<u>.</u>	-	
			Offline diag.test	Ĩ <b> →</b>	25% step response	【5.3.2.】	
					Pneumatic span	[5.3.3.]	
					Pneumatic drift	[5.3.4.]	
					S-valve signature	<b>[</b> 5.3.5. <b>]</b>	
					PST (offline)		
						_	
			Advanced Diagnostics	┝	Valve signature	【5.5.1.】	
			Alarm setup	→	Position alarm	【5.6.1.】	
					Deviation alarm	【5.6.1.】	
					Temperture alarm	【5.6.1.】	
					High sup-pres. AL	【5.6.1.】	
					Low sup-pres. AL	【5.6.1.】	
					Pressure failure	【5.6.1.】	
					All alarm clear	【5.6.1.】	
						_	
			NAMUR status sel.	⊢	Position alarm NAMUR status	【5.4.】	
					Deviation alarm NAMUR status	【5.4.】	
					Temp. alarm NAMUR status	【5.4.】	
					High sup-pressure NAMUR status	【5.4.】	
					Low sup-pressure NAMUR status	【5.4.】	
			Diag.test data	-	25% Step response	[5.4.]	
				-	Step res, save	[5.4.]	
					Pneumatic span	[54]	
					Pneu span save	[54]	
					Pneumatic drift	[54]	
					Pneu drift save	[54]	
					S-valve signature	[54]	
					Valve signature	[54]	
						- [5 / ]	
						<b>1</b> ,0.4.	

Figure 2c Diagnosis Root menu

# 3. Process Variables (Root Menu)

Instructions for information obtaining, setting, maintaining, alerting, and diagnosing are provided with reference to SDC625.

## 3.1. Alarm status

The operator can confirm the alarm status as below.

MENU) View > Process Variables Root Menu > Alarm status

- ➢ EEPROM error
- Position sensor error
- P-sup. sensor error
- P-out1. sensor error
- P-out2. sensor error
- Input signal alarm history
- Position alarm

- Deviation alarm
- Temperature alarm
- Low sup-pres. Alarm
- High sup-pres. Alarm
- PST stroke alarm
- PST incomplete alarm
- PST pressure al

🕺 SDCe	625 - [Offline]		😻 SDC625 - [Proc	ess Variables Root N	/lenu]			
Devi	e View Window He	elp	Device View	<u>W</u> indow <u>H</u> elp				
D. 2	V loolbar		D <u>0</u>	🔁 🖶 🕰 🕾 (	۵			
	Status Bar							
Positione	er inl Communication	Log		Alarm status				
Model	Face Plate		Set point	50.0	%	P-sup.	300.00	
T	Device Conditio	n		100.0		· .		
Tag	Event-Status Lo	g	Position	50.0	%	P-out1	150.70	kPa
Long ta	9 Available DDs		Loop current	11.997	mA	P-out2	1.42	kPa
	Root menu		Input	,	- *	Temperature	, 21	deaC
	Offline		in par	100.0		remperature	21	oogo
	Diagnosis Root	Menu	•	Trends				
	Process Variable	es Root Menu						
	Device Root Me	enu						
	Maintenance		<ol> <li>Press t</li> </ol>	he 'Alarm sta	atus'			
<ol> <li>Pr</li> </ol>	ress the ' View	>						
Droco	ss Variables Pe	ot Monu '						
FIUCE	ss variables no							
Alarm	status							
EEP	ROM error	Good 🚽		Deviatio	on alarm	OK	-	
				-				
Posi	ition sensor error	Fail 🚽		Temper	ature alarm	ок	-	
Pro								
F-SI	up. sensor error	Good 👻		LOW SUL	p-pres. airam	ок	-	
P-or	ut1 sensor error			High su	n-pres alram			
		Good		Thigh Su	p pros. all all	UK	-	
P-or	ut2 sensor error	Good		PST str	oke alarm	lor.		
						I N	<b>T</b>	
Inpu	it signal alarm	NG		PST inc	omplete alarm	ОК	_	
histe	ory						Ť	
Posi	ition alarm	OK 🚽		Pst pre:	ssure alarm	OK	-	

③ Shows the current alarm status.

# 3.2. Trends

 $\geq$ 

 $\geq$ 

The operator can confirm operating status of the positioner such as input signal, set point, valve position, Supply pressure, Output pressure, temperature.

Display items:

- Set point  $\geq$ Position
- $\triangleright$ Input 🔆

- P-out2
- Temperature

- Loop current  $\geq$
- P-sup P-out1

When you set the split range, the value displayed on the input will differ from the actual valve opening.

For example, check the input signal as follows.

MENU) View > Process Variables Root Menu > Trends > Input



(1) Press the 'View>

Process Variables Root Menu'

/ Set point	Position	Foup   P-ou	t1   Temper	ature									
sition		_											
→ II	+ 🛠 🤆		)4 답	•• 🖬 🖨			_		_	_			_
													- Position
80 -		-	-										
60 -			-										
40 -	<u> </u>												
20 -	i												-
8	3.00 8	03.50 80	4.00 8	04.50 80	00 80	5.50 806	00 806	50 807	.00 807	50 808	.00 801	3.50 809	00

③ When you select the 'position', the valve opening relative to the current input signal is displayed.

# 4. Device (Root Menu)

Instructions for information obtaining, setting, maintaining, alerting, and diagnosing are provided with reference to SDC625.

## 4.1. Alarm status

The operator can confirm the alarm status as below.

MENU) View > Device Root Menu > Alarm status

- EEPROM error
- Position sensor error
- P-sup. sensor error
- P-out1. sensor error
- P-out2. sensor error
- Input signal alarm history
- Position alarm

- Deviation alarm
- Temperature alarm
- Low sup-pres. Alarm
- High sup-pres. Alarm
- PST stroke alarm
- > PST incomplete alarm
- PST pressure al

#### 4.2. Information

The operator can confirm the information as below.

MENU) View > Device Root Menu > Information

- Monitor
- Alarm status
- Positioner info

- Config. parameter
- Diag. result



① Press the 'View> Device Root Menu'

② Press the 'Information'

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## 4.2.1. Monitor

The operator can confirm the current status of the positioner.

MENU) View > Device Root Menu > Information > Monitor

lonitor 📊 larm sta	itus   Positioner info.	Config.parameter	Diag. result		
Status					
LCD/HART	HART		HART	4-20mA	-
Mode	4-20mA			1 -	
Input/posietc —					
Loop current	19.624	mA	Position	0.0	- ×
Set point	97.7	*	IP signal	0.0	- ×
Pressure					
P-sup.	1500.00	kPa	P-out1	1500.00	kPa
P-out2	1500.00	kPa			
Temperature					
Temperature	27	degC			

#### Menu items:

Status	Pressure
Input/posi etc	Temperature

#### 4.2.2. Alarm status

The operator can confirm the alarm status as below.

MENU) View > Device Root Menu > Information > Alarm status

Information	
Monite Alarm status   Iositioner info.   Config. parameter   Diag. re	sult
Position alarm	Temperature alarm
Deviation alarm	S-pressure alarm
Other failure	
EEPROM error Good -	P-out1 sensor error Good 🗸
Position sensor error Fail	P-out2 sensor error Good -
P-sup. sensor error Good +	
Pst alarm	
-PST alarms	
Walve does not stroke	
PST does not complete	
Pressure is too large	
Menu items:	
Position alarm	S-pressure alarm
Deviation alarm	
Tomporature alarm	Other failure X
lemperature alarm	PST alarm

%For other failures, you can check the alarm status of the memory, angle sensor, and pressure sensor.

#### 4.2.2.1. Position alarm

The operator can confirm the Position alarm status as below.

MENU) View	> Device Root	Menu > Information	> Alarm status	> Position alarm
------------	---------------	--------------------	----------------	------------------

Position alarm		×
Position 0.0 %		
Position alarm		
Lo alarm Disable 🚽		
Lo alarm threshold = 0.0 %		
Hi alarm Disable 🚽		
Hi alarm threshold = 100.0 %		
		OK Abort
Menu items:		
Position	: Valve position	
Position alarm	: Position alarm	
Lo alarm	: Lo position alarm	
Lo alarm threshold	: Lo position alarm threshold	
High alarm	: High position alarm	
High alarm threshold	: High position alarm threshold	
nign alarm threshold	. Figh position alarm threshold	

#### 4.2.2.2. Deviation alarm

The operator can confirm the Deviation alarm status as below.

MENU) View 2	> Device Root Menu	> Information > Alarn	n status > Deviation alarm
--------------	--------------------	-----------------------	----------------------------

Deviation alarm			×
Deviation alarm	OK 🚽		
Deviation alarm	Disable 🚽		
Threshold	99 %		
Times	99 s		
	1		
			OK Abort
Menu items	5:		
Devia	ation alarm	: Deviation judgment [OK/NG]	
Devia	ation alarm	: Enable / Disable settings	
thres	shold	: Threshold[%]	
Time	es	: Deviation judgment time[S]	

#### 4.2.2.3. Temperature alarm

The operator can confirm the value of the current temperature inside the positioner.

#### MENU) View > Device Root Menu > Information > Alarm status > Temperature alarm

Temperature alarm						×
Temperature	27	degC				
Temperature alarm	OK 👻					
Temperature alarm	Enable 🚽					
Low	-30	Celsius				
High	70	Celsius				
			[	<u> </u>	Abort	
Menu items	:					
Temp	erature	: Current temperature				

remperature	
Temperature alarm	: Temperature judgment [OK/NG]
Temperature alarm	: Enable / disable the temperature judgment setting
Low	: Low temperature threshold
High	: High temperature threshold

#### 4.2.2.4. S-pressure alarm

The operator can confirm the supply pressure alarm status as below

MENU	View >	> Device	Root Menu	> In	formation :	> Alarm	status 2	> 5.	nressure	alarm	alarm
	VIEW /	DEVICE	NOUL WIEITU	~ III	101111411011 -	- Alui III	stutus -	~ J'	pressure	uiuiiii	uiuiiii

-			4
S-pressure alarm			×
P-sup.	1500.00	í kPa	
Low sup-pres. alram	OK 👻		
Low sup-pres. AL	Enable 🚽		
Value		kPa	
High sup-pres.alram	NG 🚽		
High sup-pres. AL	Enable 🚽		
Value		kPa	
		СК	Abort
Menu items:			
_			

: Supply pressure
: Low Supply pressure judgment [OK/NG]
: Enable / disable the Low Supply pressure judgment setting
: Low Pressure threshold
: High Supply pressure judgment [OK/NG]
: Enable / disable the High Supply pressure judgment setting
: High Pressure threshold

## 4.2.3. Positioner info

The operator can confirm the version of the positioner.

MENU) View > Device Root Menu > Information > Positioner info

Monitor       Alarm status       Positioner info.       Cor ig. parameter       Diag. result         Serial No.       00000000       Manufacture Date       00/00/1900         Universal rev       7       Version
Serial No. 00000000 Manufacture Date 00/00/1900 Universal rev 7 Version
Universal rev 7 Version
version
OK Cancel
1) Select the 'Positioner info' and press 'Version '
Menu items:
Serial No.
Liniversal rev(HAPT version)
Oniversal rev(mart version)
Manufacture Date
ersion X
Positioner : 100
Electronics: 100
Software : 104
OK Abort

② The operator can confirm the version information as below

Menu items:

Positioner	: Positioner version
Electronics	: Electronics version
Software	: Software version

# 4.2.4. Config. parameter

The operator can confirm the configuration parameter information as below.

formation							>
Monitor   Alarm statu	us   Positioner in o	. Config. parameter	Dag.result				
Valve action	ATC	v	PT burnout dir.	Low			
Packing friction	l High		Transfer Function	Linear 🚽			
Booster option	Without		Posi. transmit. dir.	Normal 🚽			
Set point dir.	l Normal			Actuator setup			
	Range abi	lity		PID parameter set			
-Cutoff or Limit							
0%/side	Cutoff	_	100%/side	Cutoff _			
0% side value	0.5	<u> </u>	100% side value	99.0	%		
Dead band	)			)			
Dead band flag	Enable	_	Dead band value	1.0	%		
Input damper				)			
Input damper flag	Disable		Input damper factor	0.0			
-Sprit range		<u> </u>		J			
Min	0	%	Max	100	%		
	J*			1			
						ОК	Cancel

① Select the ' Config. parameter '

Menu items:		
Valve action	Transfer Function	Cutoff or Limit
Packing friction	Posi. transmit. Dir	Dead band
Booster option	Range ability	Input damper
Set point dir.	Acutuator setup	Split range
PT burnout dir.	PID parameter set	

#### 4.2.4.1. Range ability

The operator can confirm the Range ability parameter information as below Only it can be set when Transfer function is Equal percent.

MENU) View > Device Root Menu > Information > Config. parameter >Range ability

Range ability				>	×
Range ability	1				
	,				
			OK	Abort	



#### 4.2.4.2. Actuator setup

The operator can confirm the Actuator setup parameter information as below

#### MENU) View > Device Root Menu > Information > Config. parameter > Acutuator setup

Actuator setup					×
Actuator motion Actuator type	Linear Single				
			OK	Abort	

Press OK to return to the information screen

#### 4.2.4.3. PID parameter set

The operator can confirm the PID parameter set information as below

MENU) View > Device Root Menu > Information > Config. parameter > PID parameter set

PID parameter set		X
PID parameter set	XS	
		OK Abort

Press OK to return to the information screen

#### 4.2.5. Diag. result

The operator can confirm that the diagnostic result follows:

MENU) View > Device Root Menu > Information > Diag. result

Information					×
Monitor Alarm statu	ıs   Positioner info.   Config. parameter	[Diag. result]			
Total stroke					
Total Stroke	2 -	Criteria	10 %		
Total dir. change —					
Total Direction Change	2 -	Criteria	10 %		
Low position time					
Low Position Time	14.7 h	Criteria	5.0 %		
Total time					
Total time	14.7 h				
L	25% step response		Pneumatic drift		
	Pneumatic span		S-valve signature		
	PST setup info.				
				ОК	Cancel
Acou itoma					
vienu items					

Total stroke Total dir. change Low position time Total time. 25%step response. Pneumatic span PST setup info. Pneumatic drift S-Valve signature

#### 4.2.5.1. 25%step response

The operator can confirm the 25%step response parameter information as below.

i% step response								
< Now >			<prev></prev>			<init></init>		
O.S. 0-25	0.0	x	O.S. 0-25	0.0	x	O.S. 0-25	0.0 %	
D.S. 25-50	0.0	x	O.S. 25-50	0.0	x	O.S. 25-50	0.0 %	
D.S. 50-75	0.0	x	O.S. 50-75	0.0	x	O.S. 50-75	0.0 %	
D.S. 75-100	0.0	x	O.S. 75-100	0.0	x	O.S. 75-100	0.0 %	
D.S. 100-75	0.0	x	O.S. 100-75	0.0	x	O.S. 100-75	0.0 %	
D.S. 75-50	0.0	×	O.S. 75-50	0.0	x	O.S. 75-50	0.0 %	
D.S. 50-25	0.0	×	O.S. 50-25	0.0	x	O.S. 50-25	0.0 %	
D.S. 25-0	0.0	×	O.S. 25-0	0.0	x	O.S. 25-0	0.0 %	
Dev. 0	0.0	×	Dev. 0	0.0	x	Dev. 0	0.0 %	
Dev. 0-25	0.0	×	Dev. 0-25	0.0	x	Dev. 0-25	0.0 %	
Dev. 25-50	0.0	x	Dev. 25-50	0.0	x	Dev. 25-50	0.0 %	
Dev. 50-75	0.0	x	Dev. 50-75	0.0	×	Dev. 50-75	0.0 %	
Dev. 75-100	0.0	x	Dev. 75-100	0.0	x	Dev. 75-100	0.0 %	
Dev. 100-75	0.0	x	Dev. 100-75	0.0	x	Dev. 100-75	0.0 %	
Dev. 75-50	0.0	x	Dev. 75-50	0.0	x	Dev. 75-50	0.0 %	
Dev. 50-25	0.0	x	Dev. 50-25	0.0	x	Dev. 50-25	0.0 %	
Dev. 25-0	0.0	×	Dev. 25-0	0.0	x	Dev. 25-0	0.0 %	

MENU) View > Device Root Menu > Information > Diag. result > 25%step response

#### 4.2.5.2. Pneumatic span

The operator can confirm the Pneumatic span parameter information as below.

MENU) View > Device Root Menu	<ul> <li>Information &gt; Diag.</li> </ul>	. result > Pneumatic span
-------------------------------	--	---------------------------

Pneumatic span								×
< Now >			<prev></prev>			<init></init>		
Air-IN/IPmin P1	0	kPa	Air-IN/IPmin P1	0	kPa	Air-IN/IPmin P1	0	kPa
Air-IN/IPmin P2	0	kPa	Air-IN/IPmin P2	0	kPa	Air-IN/IPmin P2	0	kPa
Air-IN/IPmax P1	0	kPa	Air-IN/IPmax P1	0	kPa	Air-IN/IPmax P1	0	kPa
Air-IN/IPmax P2	0	kPa	Air-IN/IPmax P2	0	kPa	Air-IN/IPmax P2	0	kPa
Air-OUT/IPmin P1	0	kPa	Air-OUT/IPmin P1	0	kPa	Air-OUT/IPmin P1	0	kPa
Air-OUT/IPmin P2	0	kPa	Air-OUT/IPmin P2	0	kPa	Air-OUT/IPmin P2	0	kPa
Air-OUT/IPmax P1	0	kPa	Air-OUT/IPmax P1	0	kPa	Air-OUT/IPmax P1	0	kPa
Air-OUT/IPmax P2	0	kPa	Air-OUT/IPmax P2	0	kPa	Air-OUT/IPmax P2	0	kPa
	,			,			,	
							OK A	bort

Press OK to return to the information screen

#### 4.2.5.3. PST setup info.

The operator can confirm the PST setup info. parameter information as below.

MENU) View > Device Root Menu > Information > Diag. result > PST setup info.

PST setup info.		Х
PST flag Remaining days	Disable v 0 day(s)	
		OK Abort

Press OK to return to the information screen

#### 4.2.5.4. Pneumatic drift

The operator can confirm the Pneumatic drift parameter information as below.

Pneumatic drift								×
< Now >			<prev></prev>			<init></init>		
Posi-UP/25%	0.0	- ×	Posi-UP/25%	0.0	×	Posi-UP/25%	0.0	*
Posi-UP/50%	0.0	- x	Posi-UP/50%	0.0	- %	Posi-UP/50%	0.0	*
Posi-UP/75%	0.0	- %	Posi-UP/75%	0.0	- %	Posi-UP/75%	0.0	*
Posi-DN/25%	0.0	%	Posi-DN/25%	0.0	%	Posi-DN/25%	0.0	*
Posi-DN/50%	0.0	%	Posi-DN/50%	0.0	%	Posi-DN/50%	0.0	*
Posi-DN/75%	0.0	%	Posi-DN/75%	0.0	%	Posi-DN/75%	0.0	%
Hysteresis/25%	0.0	%	Hysteresis/25%	0.0	%	Hysteresis/25%	0.0	*
Hysteresis/50%	0.0	%	Hysteresis/50%	0.0	%	Hysteresis/50%	0.0	*
Hysteresis/75%	0.0	%	Hysteresis/75%	0.0	%	Hysteresis/75%	0.0	%
							OK F	Abort

MENU) View > Device Root Menu > Information > Diag. result > Pneumatic drift

Press OK to return to the information screen

#### 4.2.5.5. S-Valve signature

The operator can confirm the S-Valve signature parameter information as below.

MENU) View > Device Root Menu > Information > Diag. result > S-Valve signature

S-valve signature								×
< Now >			<prev></prev>			<init></init>		
P-hysteresis 25%	0	kPa	P-hysteresis 25%	0	kPa	P-hysteresis 25%	0	kPa
P-hysteresis 50%	0	kPa	P-hysteresis 50%	0	kPa	P-hysteresis 50%	0	kPa
P-hysteresis 75%	0	kPa	P-hysteresis 75%	0	kPa	P-hysteresis 75%	0	kPa
P-average 25%	0	kPa	P-average 25%	0	kPa	P-average 25%	0	kPa
P-average 50%	0	kPa	P-average 50%	0	kPa	P-average 50%	0	kPa
P-average 75%	0	kPa	P-average 75%	0	kPa	P-average 75%	0	kPa
P-gradient 25-50%	0	kPa	P-gradient 25-50%	0	kPa	P-gradient 25-50%	0	kPa
P-gradient 50-75%	0	kPa	P-gradient 50-75%	0	kPa	P-gradient 50-75%	0	kPa
							OK A	ibort

Press OK to return to the information screen

# 4.3. Setup

## 4.3.1. Setup and operation authority by HART communication

To change the settings via HART communication, the "authority" must be HART. To operate auto-tuning, calibration, simulation and offline-diagnostics via HART communication, the "Control mode" must be "HART".

#### 4.3.1.1. Authority

To change permissions to HART, the LUI (LCD) screen must be the top menu, alarm status menu, or info menu.

The procedure for changing is as follows.

MENU) View > Device Root Menu > Extended menu > Setup > Function select>Authority>Authority



Setup	
Basic setup   Easy tuning   Expert tuning   Detail Setup   Function select	
Authority	
Authority	Control mode
Password setup	Temperature unit
Screen saver	Pressure unit

④ Select 'Function select' and press 'Authority'.

Authority	
Do <u>vou wan</u> t to read or write? Write <u>v</u> Read Write	⑤ Select 'Write' and press 'OK'.
Press OK button to continue method execution or Abort button to abort method execution.          Help       Abort       OK	
Authority	
Authority : HART • LCD	6 Select 'HART' and press 'OK' to set.
	When 'HART' is selected, only 'Information' in the TOP menu can be accessed from the LUI.
Press OK button to continue method execution or Abort button to abort method execution.	
Help Abort OK	

#### 4.3.1.2. Control mode permissions

#### MENU)

Help

View > Device Root Menu > Extended menu > Setup >Function select > Authority > Control mode

Setup		
Basic setup   Easy tunin	g   Expert tuning   Detail Setup   Function select	
Authority		
	Authority	Control mode
L	Password setup	Temperature unit
	Screen saver	Pressure unit

1 Select 'Function select' and press 'Control mode'.

Control mode	
Do you want to read or write? Write _ Read Write	② Select 'Write' and press 'OK'.
Press OK button to continue method execution or Abort button to abort method execution.          Help       Abort       OK	
Control mode	
Control mode : HART • 4-20mA HART	③ Select 'HART' and press 'OK' to set
Press OK button to continue method execution or Abort button to abort method execution.	XWhen conduct operation with a <u>4-20mA input signal, select 4-20mA.</u>

ΟK

Abort

# 4.3.2. Basic setup

Set the basic items required for control with the positioner. <u>Be sure to do this before performing the tasks</u> in the next section.

Key menu	Description	Parameters	Default
Actuator motion	Set stem motion type of a actuator	Linear / Rotary	<b>※</b> 1
Actuator type	Set acting type of a actuator Single acting actuator : Single Double acting actuator : Double KOSO high power actuator : 5300	Single / Double / 5300	<b>※1</b>
Valve action	Set direction of a valve when Pout1 is output Air to Open : ATO Air to Close : ATC	ATO / ATC	ATO
Packing friction	Set packing material used for valve body Low friction material such as PTFE, etc. : Low High friction material such as GRAFOIL, etc. : High	Low / High	Low ※2
Booster option	Set the presence of booster Absence of booster : Without Presence of booster : With ※Unavailable setup right now on February, 2022	Without / With	Without
Set point dir.	Set the direction to convert 4-20mA input signals to the percentage Normal : 4mA=0%, 20mA=100% Reverse : 4mA=100%, 20mA=0%	Normal / Reverse	Normal
Posi. Transmit.dir.	Set the direction to convert input signal to the percentage of the transmitter output signal Normal : 0%=4mA, 100%=20mA Reverse : 0%=20mA, 100%=4mA	Normal / Reverse	Normal

Table 4.3.2	Basic setup	parameters
	Dusic Setup	parameters

X1····The parameters setup is carried out according to the specified model code at the factory.

X2···When the factory mounts the positioner on the actuator, the parameters setup is carried out.

For example, Actuator motion setup procedure is shown as below.

#### MENU) View > Device Root Menu > Extended menu> setup > Actuator motion

Setup	
Basic setup Easy tuning Expert tuning Detail Setup Function select	
Actuator motion	Booster option
Actuator type	Set point dir.
Valve action	Posi. transmit. dir.
Packing friction	

- ① Select 'Basic Setup'
- ② Select 'Actuator motion'

Actuator motion		
Do <u>vou wan</u> t to read or write? Write Read Write		③ Select 'Write' and press 'OK'
Press OK button to continue method execution o	r Abort button to abort method execution.	
Help	Abort OK	]

Actuator motion				
Actuator motion : Linear – Linear Rotary			④ Select 'Linear' or 'Rotary', a press 'OK' to set	₃nd
Press OK button to continue m	ethod execution or Abort button to abort Abort	method execution.		

#### 4.3.3. Easy tuning



# Caution

HART communication takes more time than the operation using the LUI of this unit, so make sure that the operation is completed.

Easy tuning is the setup to ensure that the positioner is operated smoothly relative to the actuator on which the positioner is mounted. It is possible to perform easily zero/span adjustments of a control valve, selection of suitable PID parameters and setting of other parameters necessary to control.

Note

Before performing this operation (easy tuning), all parameters of basic setup described in section4.3.2 must be configured. If wrong parameters were configured, it is possible to choose unsuitable PID parameters.

#### 4.3.3.1. Full auto tuning

While performing a sequence of operations, it configures automatically settings such as detection and calibration of zero/span, selection of suitable PID parameters to apply the control, detection and calibration of IP signal current bias.

Note

The configuration time varies with actuator size.

#### 1) Execute full autotune

#### MENU) View > Device Root Menu > Extended menu> setup > Easy tuning > Full autotune

Setup Basic setup Easy tunine   Spert tunine   Detail Setup   Function select	<ol> <li>Select 'Easy tuning' and press 'Full Autotune'.</li> </ol>
Autotune Autotune Completed OK	F
Full Autotune Abort Autotune	▲ ※ To abort autotune, press
Position setup	'Abort Autotune'.
Autotune status No Autotune v Autotune result Completed OK! v	
Span Autotune Abort Autotune	
Tuning result Response tuning	

The progress are shown as below.

Autotune status: Autotune result: In-progress autotune status. Autotune execution result . (Display error, if there is.)

Full Autotune	
You are to start Full Autotune.	(2) Press 'OK' to execute.
Press DK button to continue method execution or Abort button to abort method execution.	
Help Abort OK	

#### 2) Confirm the result of the execution (full autotune)

MENU) View > Device Root Menu > Extended menu> setup > Easy tuning > Full autotune

Setup			
Basic setup Easy to	uning   Expert tuning   Detail Setup	Function select	
-Full autotune			
Autotune status	No Autotune	Autotune result	Completed OK!
Position setup			
	0%		100%
- Auto span			
Autotune status	No Autotune 🚽 Span Autotune	Autotune result	Completed OK!
	Tuning result		Response tuning

1 Press 'Tuning result'

		$\times$
500	ms	
540	ms	
9.3	x	
5.0	x	
	OK Abort	
5	i40 3 0	00       ms         340       ms         3       %         0       %

1 <u>Press 'OK' on confirmation screen.</u>

#### 4.3.3.2. Position setup

It is possible to perform Zero/span settings independently, otherwise full autotune. There are two different ways of Zero/span settings whether to specify Zero/span manually or to determine these automatically.

#### 1) Manual calibration

#### MENU)

View > Device Root Menu > Extended menu> setup > Easy tuning > Position setup > 0% or 100%MENU >

Setup						
Basic setup Easy tuning Expert tuning Detail Setup Function select						
- Full autotune						
Autotune status	No Autotune	Autotune result	Completed OK!			
Position setup						
	0%		100%			
- Auto span						
Autotune status	No Autotune 🚽	Autotune result	Completed OK!			
	Tuning result		Response tuning			

① Select '0%' or '100%'

Position Adjust	×	
Adjust span 0% point.		
1) Adjust by buttons below.		
2) Ok to next		
	Move + Move - Ok(set) Abort	

- ① Press the 'Move-' or 'Move+' to adjust 0% or 100% position of the valve travel.
- ② Press 'OK(set)', to set the position as 0% or 100% point of the valve travel.

## 2) Auto span

MENU) View > Device Root Menu > Extended menu> setup > Easy tuning > Position setup > Auto span

Setun	
Basic seture Easy tunine   Elipert tunine   Detail Setup   Function select	① Select 'Easy tuning' and then 'Span Autotupe'
Full autotune	then Span Autotulie.
Autotune status No Autotune 🚽 Autotune result Comple	**To abort autotune, select
Position setup	'Abort Autotune'.
0%	100%
- Auto span	
Autotune status No Autotune - Autotune result Comple	ted OK!
Span Autotune Abor	t Autotune
Tuning result Resp	onse tuning
Progress are shown as below	
Autotupo status: In prograss autotupo status	
Autotune status: In progress autotane status	). (Diamlay annan if thana ia)
Autotune result: Autotune execution result.	(Display error, if there is)
Autotune result: Autotune execution result.	(Display error, if there is)
Autotune result: Autotune execution result.	(Display error, if there is)
Autotune result: Autotune execution result.	(Display error, if there is)
Autotune result: Autotune execution result. Span Autotune You are to start Span-Autotune.	(Display error, if there is) ② Press 'OK' to execute.
Autotune result: Autotune execution result. Span Autotune You are to start Span-Autotune.	(Display error, if there is) ② Press 'OK' to execute.
Autotune result: Autotune execution result. Span Autotune You are to start Span-Autotune.	 (Display error, if there is) ② Press 'OK' to execute.
Autotune result: Autotune execution result. Span Autotune You are to start Span-Autotune.	 (Display error, if there is) ② Press 'OK' to execute.
Autotune result: Autotune execution result. Span Autotune You are to start Span-Autotune.	 (Display error, if there is) ② Press 'OK' to execute.
Autotune result: Autotune execution result. Span Autotune You are to start Span-Autotune.	 (Display error, if there is) ② Press 'OK' to execute.
Autotune result: Autotune execution result. Span Autotune You are to start Span-Autotune.	 (Display error, if there is) ② Press 'OK' to execute.
Autotune result: Autotune execution result. Span Autotune You are to start Span-Autotune. Press DK button to continue method execution or ébott button to abott method execution	 (Display error, if there is) ② Press 'OK' to execute.
Autotune result: Autotune execution result.  Span Autotune You are to start Span-Autotune.  Press OK button to continue method execution or Abort button to abort method execution.	 (Display error, if there is) ② Press 'OK' to execute.

#### 4.3.3.3. Response tuning

This operation is used to perform an additional fine adjustment relevant to the control response after performing PID tuning.

#### MENU) View > Device Root Menu > Extended menu> setup > Easy tuning > Response tuning

A. In case the higher response sensitivity is desired,

i.e., you wish to reduce response time by making the response quicker,

Select 'Aggressive' from 'Response tuning' menu and the most suitable stage among nine stages ( $+1 \sim +9$ ). The response sensitivity increases in proportion to number of the stage.

- B. In case the lower motion sensitivity is desired,
  - i.e., you wish to decrease the overshoot by making the response slower,

Select 'Stable' from 'Response tuning' menu and the most suitable stage among nine stages (-1  $\sim$ -9). The response sensitivity decreases in proportion to number of the stage.

C. In case of restoring the response to standard settings

Select 'Normal' from 'Response tuning' menu.

# 4.3.4. Expert tuning



# Caution

HART communication takes more time than the operation using the LUI of this unit, so make sure that the operation is completed.

Use this setting in case in which the desired response has not been achieved through easy tuning. More suitable control parameters are configured according to each actuator by tuning individually parameters necessary to control the response.

#### 4.3.4.1. PID parameter set

MENU) View > Device Root Menu > Extended menu> Setup >Expert tuning > PID parameter set



- If you change the rank by two or more, unexpected behavior (too slow response, too fast response) may occur, so perform a thorough test operation in advance and confirm that there are no problems.
- In general, lowering the proportional gain takes longer to start moving and delays reaching the target opening. On the other hand, increasing the proportional gain causes instability and hunting.

It is possible to select preset values prepared previously as PID parameter sets inside the device.

Parameter sets corresponding to maximum seven ranks defined as XS, SS, S, M, L, LL, XL are prepared previously in an ascending order of the proportional gain. Select the parameter set as necessary. If parameters are need to be specified individually through custom setting, select 'custom' menu.

To increase response sensitivity : select PID parameter set with higher proportional gain

To decrease response sensitivity : select PID parameter set with lower proportional gain

Rank	5200LA	6300LA	63D0RC(6300RB)	5300LA
XS	Ф218	Ф150	AT201U	-
SS	Ф270	Ф150	AT251U,AT301U	Ф270S
S	Φ270,Φ350	Φ200	AT351U,AT401U	Ф270S,Ф270L,Ф 350S
м	Φ350,Φ450S	Ф300	AT451U,AT501U	Ф350S,Ф350L,Ф 450S
L	Ф450S	Ф450	AT551U,AT601U	Ф450S,Ф450М,Ф 450L
LL	Ф450L	Ф450,Ф600S	AT651U,AT701U	Ф450M,Ф450L
XL	Ф650	Ф450L,Ф600		-

Table 4.3.4.1. Correspondence table between rank and each actuator size  $(\bigotimes)$ 

 $\times \cdot \cdot \cdot$  Corresponding parameters may change due to differences in actuator stroke and air supply pressure.

## 4.3.4.2. Custom setting for PID parameter



# Caution

- If you change the value of each parameter significantly, unexpected behavior (response is too slow, response is too fast) may occur, so please perform thorough testing in advance to confirm that there are no problems.
- In general, lowering the proportional gain takes longer to start moving and delays reaching the target opening. On the other hand, increasing the proportional gain causes instability and hunting.

It is possible to tune individually PID parameters shown as below.

	Category	Type of pressure action	Description and applicable conditions	Value range
Р			When deviation is $ e  \ge b$ and Po1 output pressure	
D		Air-IN	increases, these parameters will be applied.	
I	Outside	(Increase in output pressure)	P: Proportional gain, D: Derivative gain, I: Integral gain	0.1~
rP	parameter		When deviation is $ e  \ge b$ and Po1 output pressure	99.9
rD		Air-OUT	decreases, these parameters will be applied.	
rl		(Decrease in output pressure)	rP: Proportional gain, rD: Derivative gain, rl: Integral gain	
Inside P			When deviation is $ e  \le b$ and Po1 output pressure	
Inside D			increases, these parameters will be applied.	
Inside I	Inside	Air-IN (Increase in output pressure)	Inside P: Maximum proportional gain, then, P(e)=Inside P+(P-Inside P)*e/b Inside D: Maximum derivative gain, then, D(e)=Inside D+(D-Inside D)*e/b Inside I: Integral gain	0.1~
Inside rP	parameter		When deviation is $ e  \le b$ and Po1 output pressure	99.9
Inside rD			decreases, these parameters will be applied.	
Inside rl		Air-OUT (Decrease in output pressure)	Inside rP: Maximum proportional gain, then, rP(e)=Inside rP+(rP-Inside rP)*e/b Inside rD: Maximum derivative gain, then, rD(e)=Inside rD+(rD-Inside rD)*e/b Inside rI: Integral gain	
b			Set the deviation to switch between outside parameters and inside parameters, and which will be used to optimize the response. IF b is set to zero (0), the outside parameters are valid only.	0~ 10%

Table 4.3.4.2. Customizable PID parameters

 $Outside parameter means the parameters which are used when deviation is <math>|e| \ge b$ .  $Outside parameter means the parameters which are used when deviation is <math>|e| \le b$ . If 'b' parameter is set, Gain P(e) is switched as shown below.



Figure 4.3.4.2. Gain switching (Example of proportional gain)

The procedure is shown as followings.

#### 1) Set PID parameter set to 'Custom'

The Nor View - Device noot menu - Extended menu- Setup - Expert tuning - 11D parameter s	MENU)	) View > Dev	vice Root Menu >	Extended menu>	Setup >Ex	pert tuning	> PID	parameter s	sei
--	-------	--------------	------------------	----------------	-----------	-------------	-------	-------------	-----

Setup				
Basic setup   Easy tu	uning Expert tuning Detail Setup	) Function select		
	PID parameter set			
PID custom setup -				
	Air-Out (not)= Air-In?		Inside threshold	
	PID parameter		Inside PID AI	
	PID parameter Air-Out		Inside PID AO	
-Sensitivity setup				
– Auto bias _size —				
Autotune status	No Autotune	Autotune result	Completed OK!	
	Auto bias _size		Abort Autotune	
- Auto bias				
Autotune status	No Autotune	Autotune result	Completed OK!	
	Start auto bias		Abort Autotune	
	Manual BIAS			

① Select 'PID parameter set'
<u>Do vou wan</u> t to rea	ud or write?	
Read 💌		
Read		
milo		
Press OK button to continue m	ethod execution or Abort button to abort me	thod execution.

Which ?			
Custom			
XS			
SS			
M			
L			
XL			

② Select 'Write' and press 'OK'

③ Select 'Custom' and press 'OK' to set.

## 2) Set PID custom setup parameters

XIf any other submenu except 'Custom' was selected in PID parameter menu, the value of parameters cannot be changed through the following procedure.

MENU) View >	> Device Root Menu >	• Extended menu> se	etup > Expert tuning >	PID custom setup
--------------	----------------------	---------------------	------------------------	------------------

	PID parameter set		
PID custom setup -			
	Air-Out (not)= Air-In?		Inside threshold
	PID parameter		Inside PID AI
	PID parameter Air-Out		Inside FID AO
Sensitivity setup			
Əənsitivity sətup Auto bias _sizə — Autotune status	No Autotune	Autotune result	Completed OK!
Auto bias _size Autotune status Auto bias	No Autotune y Auto bias _size	Autotune result	Completed OK!
Auto bias _size — Autotune status Auto bias — Auto bias — Autotune status	No Autotune Auto bias _size	Autotune result Autotune result	Completed OK!
Auto bias _size — Autotune status Auto bias — Auto bias — Autotune status	No Autotune Auto bias _size No Autotune Start auto bias	Autotune result Autotune result	Completed OK!

Select 'Expert Tuning' and select the item to be changed in 'PID Custom Settings'.

## 2-1) Set 'Air-Out (not)= Air-In?'.

Select whether or not Air-Out (decrease in output pressure) is same with Air-In (increase in output pressure).

MENU) View > Device	e Root Menu > Ext	ended menu> :	setup > Exp	pert tuning > P	ID custom	setup > /	Air-Out
(not)= Air-In?							

Air-Out (not)= Air-In?	
Do you want to read or write? Write Read Write	① Select 'Write' and press 'OK'
Press OK button to continue method execution or Abort button to abort method execution.           Help         Abort         OK	
Air-Out (not) = Air-In?	② Select 'Yes' or 'No', and press 'OK' to set.
Press DK button to continue method execution or Abort button to abort method execution.          Help       Abort       DK	

## 2-2) Set PID parameter of Air-In.

## MENU) View > Device Root Menu > Extended menu> setup > Expert tuning > PID custom setup > PID parameter

PID parameter			
<u>Do vou wan</u> t to re Write <u></u> Read Write	ad or write?		① Select 'Write 'and press 'OK'
Press OK button to continue n	ethod execution or Abort button to abort	t method execution.	
Help	Abort	OK	

PID parameter		
P =  0.9		<ul><li>② Input a P value of Air-In.</li><li>③ Press 'OK'</li></ul>
Press OK button to continue method execu	tion or Abort button to abort method execution.	1
PID parameter		
ι =  5.0		<ul> <li>④ Input a I value of Air-In.</li> <li>⑤ Press 'OK</li> </ul>
Press OK button to continue method exec	ution or Abort button to abort method execution.	
Help	Abort OK	
PID parameter		6 Input a D value of Air-In
D =  2.5		<ul> <li>Press 'OK' to set</li> </ul>
Press OK button to continue method exec	ution or Abort button to abort method execution.	
Help	Abort OK	]

## 2-3) Set PID parameter Air-Out.

Help

	-
PID parameter Air-Out	
<u>Do you wan</u> t to read or write?  Write	① Select 'Write' and press 'OK'
Press OK button to continue method execution or Abort button to abort method	execution.
Help Abort	ОК
PID parameter Air-Out	
rP = Π Ω	② Input an rP value of Air-Out.
η	③Press 'OK'
Help Abort	UK
PID parameter Air-Out	
rt = [3.0]	④ Input a rl value of Air-Out.
	⑤ Press 'OK'
Fless UN button to continue method execution or Abort button to abort method e	xecution.

MENU) View > Device Root Menu > Extended menu> setup > Expert tuning > PID custom setup > PID parameter Air-Out

ΟK

Abort

PID	parameter Air-Out	
,	rD =	6 Input a rD value of Air-Out.
	11.2	⑦ Press 'OK' to set.
	Press UK button to continue method execution or Abort button to abort method execution.	
	Help Abort OK	

## 2-4) Set inside threshold value.

## MENU) View > Device Root Menu > Extended menu> setup > Expert tuning > PID custom setup > Inside threshold

Inside threshold	
Do vou want to read or write? Write Read Write	① Select 'Write' and press 'OK'
Press OK button to continue method execution or Abort button to abort method execution.	
Help Abort OK	
Inside threshold Inside threshold Inside threshold	<ul> <li>② Input an inside threshold value.</li> <li>③ Press 'OK' to set.</li> </ul>
Press OK button to continue method execution or Abort button to abort method execution.	
Help Abort OK	

## 2-5) Set inside PID Air-In.

## MENU)

View > Device Root Menu > Extended menu> setup > Expert tuning > PID custom setup > Inside PID AI

Inside PID AI	
Do vou want to read or write? Write Read Write	① Select 'Write' and press 'OK'
Press OK button to continue method execution or Abort button to abort method execution.	
Help Abort OK	
Inside PID AI	
Inside P =	② Input a inside P value of Air-In.
3.1	
	3 Press OK
Press OK button to continue method execution or Abort button to abort method execution.	
Help Abort OK	
Inside PID AI	
Inside I =	④ Input a inside I value of Air-In.
3.0	
	(5) Press 'OK'
Press OK button to continue method execution or Abort button to abort method execution.	
Help Abort OK	

Inside PID AI			]
Inside D =  5.0	·		6 Input a inside D value of Air-In
1			O Press 'OK' to set.
Press OK button to continue meth	od execution or Abort button to abort metho	d execution.	
Help	Abort	ОК	

## 2-6) Set inside PID Air-Out parameters

## MENU) View > Device Root Menu > Extended menu> setup > Expert tuning > PID custom setup > Inside PID AO

Inside PID AO			
<u>Do vou wan</u> t to read or Write _ Read Write	write?		(1) Select 'Write' and press 'OK'
J			
Press OK button to continue method	execution or Abort button to abort me	ethod execution.	
Help	Abort	OK	

Inside PID AO	
Inside rP = 3.5	② Input an inside rP value of Air-out.
	③ Select press'OK'
Press OK button to continue method evenution or Abort button to abort method evenution	
Press OK button to continue method execution of Abort button to abort method execution.	
Help Abort OK	

Inside PID AO	
Inside II =	④ Input a inside rI value of Air-out.
12.0	⑤ Press 'OK'
Help Abort OK	
	_
Inside PID AO	
Inside rD =	<ol> <li>Input a inside rD value of Air-out.</li> </ol>
12.0	⑦ Press 'OK' to set.
Press OK button to continue method execution or Abort button to abort method execution.	

## 4.3.4.3. Setup for IP signal current bias

IP signal current bias is the parameter necessary to determine the control output signal (IP signal) corresponding to an input signal.

ΟK

There are two different ways whether to determine IP signal current bias automatically or to specify it manually.

#### 1) Auto setup

Help

View > Device Root Menu > Extended menu> setup > Expert tuning > Sensitivity setup

A. Set IP signal current bias and PID parameters together.
 Sensitivity setup > Auto bias & size select

Abort

B. Set IP signal current bias only. Sensitivity setup > Auto bias

#### 2) Manual setup

View > Device Root Menu > Extended menu> setup > Expert tuning > Sensitivity setup > Manual Bias Specify individually IP signal current bias of each position in 25% and 75% of the valve travel.

## 4.3.5. Error messages

If the problems cause during the operations such as full auto tune (Section 4.3.3.1), position setup 2) auto setup (Section 4.3.3.2), IP signal bias 1) automatic setting (Section 4.3.4.3), the following error messages will be displayed. and the performance will be stopped.

Code		Error description and solution		
<b>_</b> .	Meaning	It does not reach the 0% travel position or steady state.		
Error at	Possible causes	Lack in off-balanced pressure		
ciosing	Solution	Confirm off-balanced pressure		
<b>-</b> .	Meaning	It does not reach 100% travel position or the steady state.		
Error at	Possible causes	Decrease or pulsation in supply pressure		
opening	Solution	Confirm the supply pressure		
	Meaning	It does not reach IP signal bias value (point) or the steady state		
Error at	Possible causes	Limit cycle causes by large packing friction Limit cycle causes by the fall of the tension spring		
stopping	Solution	<ul> <li>Set dead band or confirm the tension spring</li> <li>After changing the suitable PID parameters, perform the auto setup of position setup and IP signal bias.</li> </ul>		
<b>_</b>	Meaning	It does not reach the span position (point).		
Error at span	Possible causes	Decrease or pulsation in supply pressure		
measurement	Solution	Confirm the supply pressure		

Table 4.3.5 List of error messages

XIn addition to the possible causes of each error code, if five minutes is passed while performing the specified operation, the error codes will be displayed.

# 4.3.6. Detailed setup



# Caution

➢ HART communication takes longer than the operation using the LUI of this unit, so be sure to complete the operation.

Set values which need to be changed to achieve the desired response.

MENU) View > Device Root Menu > Extended menu> setup > Detailed setup

Key menu	Description	Parameters	Default			
	<ul> <li>Set the control range which tracks the input signal</li> <li>0% : If the input signal is lower than this value, IP signal will be cutoff to the low side. The range of values available is 0.1~50.0%.</li> <li>100% : If the input signal is higher than this value, IP signal will be cutoff to the high side. The range of values available is 50.0~99.9%.</li> </ul>					
Cutoff	<ul> <li>%1 The parameters setup is carried out according to the specified model code at the factory. Linear actuator : 0.5% at the 0% side</li> <li>Disable at the 100% side</li> </ul>					
	Rotary actuator : 0.5% at the 0% side 99.5% at the 100% side					
	* Choose either one Cutoff or Limit as shown below					
	Handling precautions					
	Be sure to use the cutoff setting if you want to control the mechanical hit position as 0% or 100%.					
Limit	<ul> <li>Set high and low limit percentage of input signal which the positioner may recognize</li> <li>0% : This value is a low limit above which the input signal is in effect. The range of values available is 0.1~50.0%.</li> <li>100% : This value is a high limit below which the input signal is in effect. The range of values available is 50.0~99.9%.</li> <li>※ Choose either one Cutoff as shown above or Limit</li> </ul>	Value/Disable	Disable			
Dead band	Set the deviation value below which the integral	Value/Disable	Disable			
	action is disabled.	(0.1~2.0%)	Disable			
Transfer function	Set the type of the flow characteristic curve Linear : Linear characteristics Equal percent Low : Low equal percentage characteristics (Rangeability 30:1) Equal percent Mid : Middle equal percentage characteristics (Rangeability 50:1) Equal percent Hig :	As shown on the left	Linear			

Table 4.3.6 Item list of the detailed setup

Key menu	Description	Parameters	Default
	High equal percentage characteristics (Rangeability 100:1) Quick opening : Quick opening characteristics (Rangeability 20:1)		
	(Rangeability 30:1) Custom curve: Customized characteristics		
	※ In case of using equal percent characteristic besides the rangeability mentioned above, input the value directly to "Range ability".		
Custom curve set	Set the flow characteristic curve by specifying arbitrary 20 points. Since the 0% valve travel corresponds to the 0% input and the 100% valve travel corresponds to the 100% input, set points of the intervals between them. Define the relationship in such a way that the valve travel monotonically increases as the input increases.	Value/Unused	Unused
Range ability	<ul> <li>Specify a rangeability in relevant to the equal percentage characteristic curve.</li> <li>This setup is available on condition that the equal percentage characteristics from' flow characteristic curve' menu was selected previously.</li> <li>If the rangeability is set to 1, it becomes the value of each equal percent characteristics.</li> </ul>	Value	1
Input damper	Set the damping coefficient to the input signal. As the value becomes lager, the response becomes slower because the primary delay time constant becomes larger.	Value/Unused (0.1~99.9%)	Unused
Split range	Set the input current value corresponding to 0% and 100% position. Example 1) If 0% is set to 4mA, 4mA becomes 0% input signal. If 100% is set to 12mA, 12mA becomes 100% input signal. Example 2) If 0% is set to 8mA, 4mA becomes 0% input signal . If 100% is set to 16mA, 16mA becomes 100% input signal.	0%/100%	0%=4mA 100%=20mA
PT burnout dir.	Set the burnout direction of output transmitter, when the alarm is activated. Low setting : When the current is lower than 3.6mA, the lower current (burnout signal) will flow	Low/High	Low

Key menu	Description	Parameters	Default	
	<ul> <li>High setting :</li> <li>When the current bigger than 21mA, the bigger current (burnout signal) will flow</li> <li>※ If the input signal is zero, the current of Lo setting will flow regardless of above setting.</li> </ul>			
AT span limit	<ul> <li>Set the full mechanical limit of valve travel over the 100% travel position, when the positioner detects the 100% travel position.</li> <li>※This value is valid only in condition when 'Linear' from 'actuator motion' menu is selected on the basic setup.</li> </ul>	Value (100~150%)	105%	
	Handling precautions When setting the overstroke value to 100%, be sure to enable the setting on th Cutoff 100% side. By setting the value according to the actuator, you can save the time of adjusting th span from the next time onward.			
Integ. stop press	<ul> <li>When the supply air pressure falls below the set threshold value, the correction operation by integration is stopped.</li> <li>※However, regardless of the setting, the integral correction operation stops at 10kPa or less.</li> </ul>	Value/Unused (0~999kPa)	Unused	

## 4.3.7. Function select

You can individually set permissions, control modes, password settings, screen savers, temperature units, and pressure units.

MFNU)	View > De	evice Root	Menu >	Fxtended	menu>	setun >	> Function s	elect
10161107	VICW - DO		WICHU >	LATCHACA	menur	Julup -	i unction 5	CICCL

Key menu	Description	Parameters	Default
Authority > Authority	Set access permission to HART communication. Select 'HART' in case in which settings should be configured via HART communication. To change authority to 'HART', LUI(LCD) screen should be top menu, alarm status menu or information menu and below. <u>Once HART is selected, only 'Information' from</u> <u>'TOP' menu will be able to be accessed through LUI(LCD).</u>	LCD / HART	LCD
Authority > Control mode	Set operations permission. Select 'HART' to do operations via HART communication.	4-20mA / HART	4-20mA
Password setup	Set password. Once the password is set, only 'Information' from 'TOP' menu will be able to be accessed unless you	Three-digit integer	Unused

Table 4.3.7 List of selectable functions

	type the password. If forgetting the password, please inquire to the business office of this manual end.		
Screen saver	Set the time for screen saver during which the LCD screen display will be turned off. It is possible to extend the life span of the LCD with a limited life by using screen saver.	Value/ Unused	Unused
Temperature unit	Set temperature unit displayed on the LCD.	Celsius / Fahrenheit	Celsius
Pressure unit	Set pressure unit displayed on the LCD.	kPa/bar/psi	*

X · · · The parameters setup is carried out according to the specified model code at the factory.

## 4.3.8. Memory management

#### 4.3.8.1. Memory save

Save setting data to the memory.

MENU) View > Device Root Menu > Extended menu> Maintenance > Memory save & res > Save

To save date, select 'OK' on confirmation screen.

## 4.3.8.2. Restore memory data

Restore setting data from the memory. MENU) View > Device Root Menu > Extended menu> Maintenance > Memory save & res. > Restore

To restore date, select 'OK' on confirmation screen.

## 4.3.8.3. Restore factory default

Reset the setting data to factory settings.

MENU) View > Device Root Menu > Extended menu> Maintenance > Memory save & res. > Factory default

To restore date, select 'OK' on confirmation screen.

## 4.4. Maintenance



# Warning

- If the exhaust port becomes clogged with contaminants, high pressure will be applied to the front cover. Then, removing it on the positioner causes of hazards. Before removing it, confirm that the exhaust port of the housing is surely opened.
- > Always wear protective suit, gloves, and eyeglasses before performing any maintenance operation.



# Caution

- Don't remove the fall prevention screws from pilot relay, A/M unit.
- ➢ HART communication takes longer than the operation using the LUI of this unit, so be sure to complete the operation.

## 4.4.1. Adjustment · switching

## 4.4.1.1. Torque motor adjustment

Adjust the gap of nozzle flapper parts, namely, nozzle and nozzle pad. The procedure is shown as below.

MENU) View > Device Root Menu > Information > Monitor > Input/posi etc

Inf	ormation						
M	Aonitor │Alarm status │ -Status	Positioner info. Confi	ig.parameter   Diag.r	esult			① Display
	LCD/HART Mode	HART -		HART	HART	~	② Input
Γ	-Input/posietc			<b>D</b> 111		~~~	
	Loop current	11.998	mA	Position	49.9	%	
	Set point	49.9	%	IP signal	43.7	*	

① Display 'Input/posi etc' screen.

 Input the signal corresponding to the 50% travel position.

nformation							
Monitor Alarm status Positioner info. Config. parameter Diag. result							
LCD/HART	HART	Ţ	HART	HART	Ţ		
Mode	HART	Y					
Input/posi etc							
Loop current	11.998	mA	Position	49.9	*		
Set point	49.9	%	IP signal	50.0	*		

(3) While turning the nozzle of the torque motor clockwise or counterclockwise, adjust the value of 'IP signal' to 50±2%. Then, the procedure is now complete.



Figure 4.4.1.1 Nozzle adjustment of torque motor

## 4.4.2. Action switching of pilot relay

The operator can switch the pilot relay between single action mode and double action mode by turning the screw attached to the pilot relay.



Figure 4.4.2. Action switching of pilot relay

Switching to single action mode;

Turn the switch screw clockwise until it reaches its end position.

Switching to double action mode;

Turn the switch screw counterclockwise until it hits the fall prevention screw.

Since a balance pressure becomes supply pressure at this time, subsequently, the operate need s to perform [Adjustment of balance pressure] operation described in next section.

## 4.4.3. Balanced pressure adjustment of pilot relay

When the pilot relay is used in double action mode, the operator needs to adjust the balanced pressure of the output pressure 1 and 2 by rotating switch screw. When turning the switch screw counterclockwise, the balanced pressure increases. On the other hand when turning the switch screw clockwise, the balanced pressure decreases. Adjust the balanced pressure to 70-80% of the supply pressure.

Once set the following menu shown below, then, you can adjust it while confirming the values of the output pressure 1 and 2.

It should be noted that the larger the actuator, the more it takes time to adjust the pressure.

## MENU) View > Device Root Menu > Extended menu> Maintenance > Calibration > Pilot relay adju.

Pilot relay adju.				×
balance air lower limit	0.00	kPa		
balance air upper limit	0.00	kPa		
P-out 1	0.00	kPa		
P-out2	1500.00	kPa		
				OK Abort
Balanced ai	r lower limit	: Low limit of balanced pressure.	P-out1:	The current value of Pout1
		(70% of the supply pressure)	P-out2	The current value of Pout?
Balanced ai	r upper limi	High limit of balanced pressure	. 5412	
Data lieed al		(90%  of the supply pressure)		
		(00/00) the supply plessure		

## 4.4.4. Calibration

Since the operation described in this section is preset at the factory, generally, it is not necessary to repeat this. However, since there is a case in which a deviation is produced from long-term operation and so on, if necessary, perform this operation.

#### 4.4.4.1. Input signal calibration

Calibrate the value of input signal which the positioner is received.

The procedure to calibration each value of 4mA and 20mA is shown as below.

## MENU) View > Device Root Menu > Extended menu> Maintenance > Calibration > Input signal cal.

Input signal cal.	
You are performing input signal calibration.	${ m (1)}$ Confirm the message and press 'OK'
Press OK button to continue method execution or Abort button to abort method execution.	1
Input signal cal.	
Set input signal 4.0mA.	② Set input signal 4.0mA and press 'OK'
Press OK button to continue method execution or Abort button to abort method execution.	
Input signal cal.	
Set input signal 20.0mA,	③ Set input signal 20.0mA and press 'OK'
Press OK button to continue method execution or Abort button to abort method execution.	
Help Abort OK	

## 4.4.4.2. Cross point calibration

Calibrate the position which the feedback lever is horizontal. It is necessary to perform it in order to precisely control the travel position. When a feedback lever isn't installed horizontally in the 50% position, this calibration will be required.

The procedure is shown below.

```
MENU) View > Device Root Menu > Extended menu> Maintenance > Calibration > Cross point cal.
```

e and press 'OK'

Position adjust	×
You can adjust output signal by 'up'/'down'.	
	Up Down Ok(set) Abort
	Up Down Ck(set) Abort

- ② Press the 'Down' or 'Up' to adjust position.
- ③ Press 'Ok(set)', to set the position as the crospoint.

#### 4.4.4.3. Position transmitter calibration

Calibrate the position transmitter signal which the positioner send.

The procedure to calibrate individually the position transmitter signal of each position in 0% and 100% is shown below.

MENU) View > Device Root Menu > Extended menu> Maintenance > Calibration > Position transmit cal.

Position transmit	
You are perfomrimg Position Transmitter Calibration	1 Confirm the message and press 'OK'
Press UK button to continue method execution or Abort button to abort method execution.	
Help Abort OK	

Position Transmitter Calibration	>	<
Select 0%-side or 100%-side to adjust.		
	100%-side Ok(Return) Abort	

2 Select '0%-side' or '100%-side'.

Position Transmitter Calibration	Х
Select 0%-side or 100%-side to adjust.	
	100%-side; 0%-side Ok(Return) Abort

③ Adjust position transmitter signal by 'Up' or 'Down'.

④ Press 'OK' to set.

#### 4.4.4.4. Pressure sensor calibration

Calibrate three pressure sensors in the positioner. It is necessary to connect the positioner to a pressure measuring device of gauge pressure type which is used for pressure reference. It is required to calibrate both of the first order pressure (lower side) and the second order pressure (upper side) for each sensors.

The procedure to calibrate the supply pressure sensor is showed as below.

MENU) View > Device Root Menu > Extended menu> Maintenance > Calibration > Pressure sensor

Pressure sensor	
You are perfomrimg pressure sensor calibration	① Confirm the message and press 'OK'
Press OK button to continue method execution or Abort button to abort method execution.	
Abort OK	
Pressure sensor	
Pressure sensor cal. Sup. press. Out1 press. Out2 press.	② Select 'Sup. press.' and press 'OK'
Press OK button to continue method execution or Abort button to abort method execution.	
Help Abort OK	
Pressure sensor	
Set pressure for lower side	③ Set pressure for lower side and press 'OK'
Press OK button to continue method execution or Abort button to abort method execution.	
Help         Abort         OK	

D	]
Pressure sensor	
Enter pressure value for lower side( kPa ) :	④Enter pressure value for lower side
D.000000	
	5 Press OK
Press OK button to continue method execution or Abort button to abort method execution.	
Help Abort OK	
	_
Pressure sensor	]
	© Cat areas for wares side and
Set pressure for upper side	Set pressure for upper side and
	Press OK
Press OK button to continue method execution or Abort button to abort method execution.	
Help Abort OK	
	_
Pressure sensor	
Enter pressure value for upper side ( kPa ) :	② Enter pressure value for upper side
14100-00000	8 Press 'OK' to set.
Press OK button to continue method execution or Abort button to abort method execution.	
Help Abort OK	

## 4.4.5. Simulation test



# Caution

- Simulation test is the function which enables the positioner to be operated regardless of the signal from a higher-level control system connected with the positioner. Prior to operating this function, make sure that the simulation will not affect the process.
- ➢ HART communication takes longer than the operation using the LUI of this unit, so be sure to complete the operation.

It is possible to simulate input signal, IP signal current and position transmitter output. And it is also possible to check the response by simulating ramp and step input signal internally.

#### 4.4.5.1. Input signal simulation

It is possible to move the control valve by providing the input signal which is similar to the desired signal.

There are two modes in the simulation; manual mode or preset mode. The manual mode makes the positioner to detect continuously all the values among the process that the current value goes to the displayed (input) value. But the preset mode makes the positioner to detect only the displayed (input) value. The simulation of the ramp response and so on is suitable to use the manual mode and the simulation of the step response and so on is suitable to use the preset mode.

#### 1) Manual mode

N4 1 1			
Maintenance			
Calibration Simul	ation test   Hemory save _res   Service   HART Relatio	n   Factory setup	
Manual input —			
Position	<b>%</b>	Set Moving Value	(1) Select 'Set Moving Value'
Preset input			
Position	<b>%</b>	Set Value	
Ramp resp. test -			
Mode	Stroke range 🚽		
	Ramp resp. test	Abort Operation	
Step resp. test			
Mode	Stroke range 🚽		
	Step resp. test	Abort Operation	
	Position transit.		

MENU) View > Device Root Menu > Extended menu> Maintenance > Simulation test > Manual input

et Moving Value			
Set Moving Value		<ul> <li>2 Input a Moving (Value range:</li> <li>3 Press 'OK' to e</li> </ul>	g value. -10.0% - +10.0%) xecute.
Help	Abort		

## 2) Preset mode

MENU) View > Device Root Menu > Extended menu> Maintenance > Simulation test > Preset input

Maintenance						
Calibration Simulation	n test Memory save _re	es   Service   HART Relati	ion   Factory setup			
- Manual input						
Position	0.0	%		Set Moving Value		
Preset input						
Position	0.0	*		Set Value	① Se	elect 'Set Value'.
Ramp resp. test						
Mode	Stroke range 🚽	[				
	Ramp resp. test			Abort Operation		
Step resp. test						
Mode		ſ				
mode	Stroke range					
	Step resp. test		_	Abort Operation		
-	Position transit.					
Set Value						
				<li>② Input a</li>	value.	
Set Value to Move				(Value ra	ange:	0.0% - 100.0%)
50.0				3 Pross 'C	-	vocuto
				J Fless C		xecule.
Press OK button to co	ntinue method execution o	r Abort button to abort metho	d execution.			
Help		Abort	ОК			

## 4.4.5.2. Ramp response simulation

It is possible to move the control valve by providing the ramp signal internally.

Parameter	Description	Unit
Start Position	Set the start position of the valve travel	[%]
Stop Position	Set the end position of the valve travel	[%]
Ramp time	Set the one-way travel time of the ramp response	[s]
Wait time	Set the delay time required for the start of the ramp response	[s]
Papart	Set the motion type whether or not to repeat the ramp response	One time only
πεμευι		/Repeat

MENU) View > Device Root Menu > Extended menu> Maintenance > Simulation test > Ramp resp. test

#### 1) Start ramp resp. test.;

Maintenance				-
Calibration Simulat	ion test Memory save	res   Service   HART Relation   Factory setup		
- Manual input				(1) Confirm the mode is ' HART'.
Position	0.0	*	Set Moving Value	② Select 'Ramp resp. test'.
Preset input				(3) To accome from this screen
Position	0.0	%	Set Value	press (OK' or 'Abort'
Ramp resp. test				
Mode	Stroke range	r		
	Ramp resp. test		Abort Operation	
Step resp. test				
Mode	Stroke range	r		
	Step resp. test		Abort Operation	
	Position transit.			
ramp_operation				×
Start Position	0	x		
Stop Position	100	ĸ		
Ramp Time	30	s		
Wait Time	10 *	s		
Repeat	One time only			
				OK Abort

- ① To modify the parameter, select each item.
- ② Confirm all parameters are correct.
- ③ Press 'OK'
- ④ Press 'OK' on confirmation screen to execute.

## 2) Abort ramp resp. test.;

Ramp resp. test			
You are to perform ramp operation.			① Select 'Abort Operation'.
Press OK button to continue method exec	ution or Abort button to abort method	execution.	
Help	Abort	ОК	

② Select 'OK' on confirmation screen to abort the ramp resp test..

#### 4.4.5.3. Step response simulation

It is possible to move the control valve by providing the step signal internally.

Parameter	Description	Unit
Step	Set the interval of the step response	[%]
Start	Set the start position of the valve travel	[%]
End	Set the end position of the valve travel	[%]
Time	Set the delay time required for the start of the step response	[s]
Papagt	Set the motion type whether or not to repeat the step response	One time only
περεαι		/Repeat

MENU) View > Device Root Menu > Extended menu> Maintenance > Simulation test > Step resp. test

## 1) Start step resp. test.

Maintenance		
Calibration Simu	ilation test Memory save _res   Service   HART Relati	ion   Factory setup
Manual input —		
Position	0.0 %	Set Moving Value
Preset input		
Position	0.0 %	Set Value
-Ramp resp. test		
Mode	Stroke range 🚽	
	Ramp resp. test	Abort Operation
Step resp. test -		
Mode	Stroke range 🚽	
	Step resp. test	Abort Operation
	Position transit.	

1 Confirm the mode is ' HART'.

② Select 'Step resp. test'.

Step resp. test					×
Step	25.0	×			
Start	0	×			
End	100	ж			
Time	10	s			
Repeat	One time only	]			
		-			
				<u>OK</u>	Abort
~					

- $(\ensuremath{\mathfrak{I}})$  To escape from this screen, select 'OK' or 'Abort'
- ④ To modify the parameter, select each item.
- (5) Confirm all parameters are correct.
- 6 Press 'OK'
- ⑦ Press 'OK' on confirmation screen to execution.

## 2) Abort step resp. test.

Maintenance			
Calibration Simul	lation test   Memory save _res   Service   HART Relati	on   Factory setup	(1) Select 'Abort Operation'.
Manual input Position	0.0 %	Set Moving Value	② Press 'OK' on confirmation screen to abort the step resp test.
Position	0.0 %	Set Value	
Mode	Stroke range		
-Step resp. test -	Ramp resp. test	Abort Operation	
Mode	Stroke range Step resp. test	Abort Operation	
	Position transit.		

# 4.4.6. Service

## 4.4.6.1. Identification of internal parameters

While entering the following menu as below, the operator can identify A/D converted values, value of potentiometer angle, set value of cross point, time stamp of software, current values of PID parameters.

MENU) View > Device Root Menu > Extended menu> Maintenance > Service

## 4.4.6.2. Switching of factory setup



# Caution

Since the suitable parameters are configured at the factory, in general, do not perform switching of factory setup and the reconfiguration on its menu. The reconfiguration of the values causes the case that the desired response may not be achieved.

MENU) View > Device Root Menu > Extended menu> Maintenance > Service Factory menu

## 4.4.7. HART relation

Functions related with HART communication.

## 4.4.7.1. Find device

By using this command, you can read device information from the armed device.

% If no armed devices are found, communication may be disconnected.

MENU) View > Device Root Menu > Extended menu> Maintenance > HART relation > Find device

Maintenance						×
	1.					
Calibration   Simulatio	on test   Memory save _res	Service [HART Relation] Factory setup				
- FIND DEVICE	Find Device	Universal rev	7			
Manufacturer	KOSO 🚽	Fld dev rev	1			
Model	KGP5000 _	Software rev	1			
Dev id		Hardware rev	1			
HART/Device Inform	nation					
Manufacturer	KOSO 🚽	Model	KGP5000 -			
Dev id	0		Read Device Information			
Tag	22222		Write Tag			
Descriptor			Write Descriptor			
Date	01/06/2015		Write Date			
Long tag			Write Long Tag			
Message			Write Message			
Final asmbly num	0		Write Final asmbly num			
	Squawk		Reset			
				OK	Cancel	
_						
Command	ls:					
Find De	vice					
Device inf	ormation:					
Manufa	ictur	Universal re	evision (HART)			
Model		Field device	e revision			

Dev id

Field device revision Software revision Hardware revision

#### 4.4.7.2. Squawk

By using this command, the "Squawk ON !!" or "Squawk ONCE ON " is indicated(blinked) on a LCD screen of the device. To indicate the sign, screen on the LCD should be top menu or 'HART relation > Squawk' menu.

MENU)	View >	Device Root Menu	> Extended menu>	Maintenance >	HART relation >	>Sauawk>	Sauawk
				in an ice i an ice i		09000000	0900000

Squawk	
<u>Sauawks = 5. beain sauawkina?</u> Squawk Change Number of Squawks <mark>Squawk</mark> Exit	① If you want to change number of squawking, Select 'Change Number of Squawks' and 'ENTER'. Then input the number.
	② To do squawking, select 'Squawk'.
Press DK button to continue method execution or Abort button to abort method execution.	③ To exit from this screen, select 'Exit'.
Help Abort OK	-

## 4.4.7.3. HART device information

By using the following commands, the device information on HART communication can be read and written.

#### MENU)

Find Device       Universal rev       7         Manufacturer       KGSO       Fid dev rev       1         Model       KGP5000       Software rev       1         Dev id       0       Hardware rev       1         HART/Device Information       Model       KGP5000       V         HART/Device Information       Model       KGP5000       V         Tag       0       Read Device Information       V         Tag       Virite Tag       Write Tag       V         Descriptor       Virite Date       V/// Unif       V/// Unif         Date       01//06/2015       Write Date       V// Unif         Long tag       Virite Message       V/// Write Message       V/// Write Message         Final asmbly num       0       Write Final asmbly num       V/// Write Message	Calibration   Simulat	ion test   Memory save _res   Serv pe	HART Relation F. ctory setup		
Find Device Universal rev 7   Manufacturer KOSO Fild dev rev 1   Model KGP5000 Software rev 1   Dev id 0 Hardware rev 1   HART/Device Information Model KGP5000   Pev id 0 Read Device Information   Tag ??????? Write Tag   Descriptor ???????   Date 01/06/2015   Long tag ???????   Final asmbly num 0	Find Device				
Manufacturer KOSO   Model KGP5000   Dev id 0   HARM/Device Information   HART/Device Information   HART/Device Information   Model   KGSO   Out   HART/Device Information   Model   KGSO   Out   HART/Device Information   Model   KGSO   Model   KGSO   Out   Read Device Information   Tag   Write Tag   Descriptor   Date   01/06/2015   Long tag   Message   Write Long Tag   Write Kessage   Final asmbly num   0   Caputation   Caputation		Find Device	Universal rev	7	
Model       KGP5000       Software rev       1         Dev id       0       Hardware rev       1         HART/Device Information       Model       KGP5000       Image: Comparison of the comp	Manufacturer	KOSO	Fld dev rev	1	
Dev id     0     Hardware rev     1       HART/Device Information     Model     KGP5000       Manufacturer     KOSO     Model       Dev id     0     Read Device Information       Tag     Immediate     Write Tag       Descriptor     Immediate     Write Descriptor       Date     01/06/2015     Write Date       Long tag     Immediate     Write Message       Final asmbly num     0     Write Final asmbly num	Model	KGP5000 -	Software rev	1	
HART/Device Information         Manufacturer       KOSO       Model       KGP5000         Dev id       0       Read Device Information         Tag       Image: Comparison of the second of t	Dev id	0	Hardware rev	1	
Manufacturer       KOSO       Model       KGP5000         Dev id       0       Read Device Information         Tag       0       Write Tag         Descriptor       0       Write Descriptor         Date       01/06/2015       Write Date         Long tag       0       Write Message         Final asmbly num       0       Write Final asmbly num	-HART/Device Info	rmation			
Dev id     0       Tag     0       Tag     0       Descriptor     Write Tag       Descriptor     Write Descriptor       Date     01/06/2015       Long tag     Write Long Tag       Message     Write Message       Final asmbly num     0	Manufacturer	KOSO	Model	KGP5000 -	
Tag     Write Tag       Descriptor     Write Descriptor       Date     01/06/2015     Write Date       Long tag     Write Long Tag       Message     Write Message       Final asmbly num     0	Dev id	0		Read Device Information	
Descriptor     Write Descriptor       Date     01/06/2015       Long tag     Write Long Tag       Message     Write Message       Final asmbly num     0       Oquank     Tesest	Tag	,		Write Tag	
Date     01/06/2015       Long tag     Write Date       Message     Write Message       Final asmbly num     0       Gquunik     Pessit	Descriptor			Write Descriptor	
Long tag Umite Long Tag Write Long Tag Write Message Final asmbly num O Gquunt Peau	Date	01/06/2015		Write Date	
Message Write Message Final asmbly num O Oquunix Pesut	Long tag			Write Long Tag	
Final asmbly num 0 Write Final asmbly num	Message			Write Message	
Squanit Pasai	Final asmbly num	0		Write Final asmbly num	
		- Oquanik		Resol	

View > Device Root Menu > Extended menu> Maintenance > HART Relation > HART/Device Information

Device information:	
Manufacture <sup>*</sup>	Long tag
Dev id <sup>*</sup>	Message
Тад	Final asmbly num
Descriptor	Model <sup>*</sup>
Date	
*Read only information	
Commands:	
Read Device information	
Write Tag	Write Descriptor
Write Date	Write Long Tag

#### 4.4.7.4. Reset

Write Message



Write Final assembly num

This is a function for restarting the device To reset the device, use the following command.

#### MENU)

View > Device Root Menu > Extended menu> Maintenance > HART Relation > HART/Device Information

Aaintenance				
Collinguian   Simulati	in test Memory and the Court	HART Relation	1	
Calibration   Simulati	ion test   Memory save _res   Servine	e [marki relation] Factory setup	1	
- Find Device				
	Find Device	Universal rev	7	
Manufacturer	KOSO 👻	Fld dev rev	1	
Model	KGP5000 -	Software rev	1	
Dev id	0	Hardware rev	1	
HART/Device Infor	mation		,	
Manufacturer	KOSO	Model	KGP5000	
Dev id	0		Read Device Information	
Tag	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		Write Tag	
Descriptor			Write Descriptor	
Date	01/06/2015		Write Date	
Long tag			Write Long Tag	
Message			Write Message	
Final asmbly num	0		Write Final asmbly num	
	Squawk		Reset	
				OK Cancel

Confirm the message and press 'OK' to execute.

## 4.5. Alarms

When detecting a breakdown of internal memory and sensors, this positioner announces an alarm by self-diagnostic function as well as shutdown an IP signal current off compulsorily and moves toward fail safe direction.

Additionally, it's possible to set the alarm condition optionally about the valve position, the deviation, the temperature and the pressures. Moreover, it'll be possible to assign the status category defined in NAMUR107 and to make LCD indicate a symbol mark to the respective alarms.

<u>Note</u>

The cause of alarm is taken as well as an alarm has to be released to return when an IP signal current signal blocked off compulsorily by an alarms.

Status symbols defined in NAMUR107 are shown in Table 4.5.

#### Table 4.5.NAMUR status

Symbol mark	Category	Description / Action to take
	Maintenance required	The problem caused by degradation and wear-out of the device out has occurred. Action) Adjust device or replace parts
$\mathbf{V}$	Check function	The problem caused by setting and adjustment of the device out has occurred. Action) Check setting and adjust device
<u>^</u>	Out of specification	The problem caused by environment in which the device is used has occurred. Action) Remove environmental condition
$\bigotimes$	Failure	The problem caused by internal defects of the device has occurred. Action) Replacement of device or parts

## 4.5.1. Summary of alarms

<u>Alarms unable to change setting;</u>

Alarms caused by a breakdown inside the positioner are shown in Table 4.5.1a.

Table.4.5.1a. Ala	arms caused by	a breakdown	(unable to cha	ange setting)
-------------------	----------------	-------------	----------------	---------------

Contents	Cause	Action to take
Memory failure	Failure of EEPROM	Replace the device or inquire to our
Potentiometer failure	Failure of angle sensor	office

After detecting these failures, the symbol marks of failure based on NAMUR107 are indicated on LCD. (Refer to right symbol mark)



Alarm of input signal level is shown in Table4.5.1b.

Description	
Description	Purpose to use
nput signal of 4-20mA drops A, an alarm is occurred.	To detect a drop of the input signal level.
one (※Unable to change thres ory; Out of specification (※Una	hold) able to change)
	nput signal of 4-20mA drops A, an alarm is occurred. one (※Unable to change thresh ory; Out of specification (※Una

Table 4.5.1b. Alarms caused by a breakdown (unable to change setting)

## Alarms able to change setting (User selectable);

The description, the purpose to use, the setting about user selectable alarms are shown in Table.4.5.1c. It's possible to set a threshold of alarm according to the user's conditions for use, and also to assign a symbol mark based on NAMUR107 and to indicate on LCD.

Contents	Description	Purpose to use
	When the valve position exceeded an upper and lower threshold, an alarm is occurred.	To detect drifts of zero and span caused by wear-out and defect of control valves
Position alarm	Set-value; 0% side threshold[%], 100% side threshold [%] Status category; Check function(default)	
	When the deviation of input signal and valve position exceeded a threshold, an alarm is occurred.	To detect sticking of control valve or actuator and air leakage of piping
Deviation alarm	Set-value; Deviation threshold[%], Judgment tin Status category; Check function(default)	ne of deviation occur[s]
	When the temperature exceeded an upper and lower threshold, an alarm is occurred.	To detect use by the temperature outside the specification which leads to early degradation of parts
Temperature alarm	Set-value; Low temp. threshold [Celsius, Fahren [Celsius, Fahrenheit ] Status category; Out of specification(default)	heit], High temp. threshold
High supply pressure alarm	When the supply pressure exceeded an upper threshold, an alarm is occurred.	To detect use by high supply pressure which leads to break of actuator diaphragm
	Set-value; High pressure threshold[kPa,bar,psi] Status category; Out of specification(default)	$\triangle$
Low supply pressure alarm	When the supply pressure exceeded a lower threshold, an alarm is occurred and integral terms accumulation is stopped	To detect use by low supply pressure that leads to lack of actuator output. And, to suppress uncontrollability caused by saturation of the integral term, by

Table.4.5.1.c. Alarms (able to change setting)

Contents	Description	Purpose to use
	and their correction is held.	stopping integral terms accumulation.
	Set-value; Low pressure threshold[kPa,bar,psi] Default status category; Out of specification	<u>^</u>
Failure of pressure sensors alarm	When the A/D value of pressure sensors exceeded a threshold, an alarm is occurred.	To detect abnormality of pressure sensors.
	Set-value; Disable / Enable ( <sup>*</sup> Unable to change threshold) Status category; Failure ( <sup>*</sup> Unable to change) <sup>*</sup> To disable under failure condition, once, remove the input signal. (Cycle the power.)	

## 4.5.2. Alarm setting / Check and Clear of result

It's possible to operate setting, check of a result and clear of each alarm by following menu.

## 1) Setting

MENU) View > Device Root Menu > Extended menu> Diag. & Alarms > Alarm setup

## 2) Check of results

MENU) View > Device Root Menu > Information > Alarm status

## 3) Clear of results

MENU) View > Device Root Menu > Extended menu> Diag. & Alarms > Alarm setup > All alarm clear



①Press 'Error/Alarm Clear' to execute.

## 4.5.3. NAMUR status select

The NAMUR status category related to each alarm can be selected voluntarily.

For example, the procedure for setting the position alarm is as follows.

#### MENU) View > Device Root Menu > Extended menu> Diag. & Alarms > NAMUR status sel.

Diag. & Alarms	
Online diag. setup   Offline diag. set.   Offline diag. test   Alarm setup	NAMUR status sel. Diag. test data
Position alarm NAMUR status	High sup-pressure NAMUR status
Deviation alarm NAMUR status	Low sup-pressure NAMUR status
Temperature alarm NAMUR status	

#### ① Select the 'Position alarm NAMUR status'

Position alarm NAMUR status	
Do you want to read or write? Write Read Write	② Select 'Write' and press 'OK'
Press OK button to continue method execution or Abort button to abort method execution.	
Help Abort OK	

Position alarm NAMUR status	
Position alarm NAMUR status : Check function Maintenance req. Out of spec. Check function	<ul> <li>③ Select NAMUR status category and press 'OK' to set.</li> <li>NAMUR status category: Maintenance require Out of specification Check function</li> </ul>
Press DK button to continue method execution or Abort button to abort method execution.	
Help Abort OK	

# 4.6. Diagnosis



# Caution

HART communication takes longer than the operation using the LUI of this unit, so be sure to complete the operation.

This positioner is equipped with the on-line diagnosis which acquires and estimates data during plant operation and the offline diagnosis performed in maintenance. Through appropriate diagnosis settings based on an operating condition of the installation environment and a process, it's possible to do efficient prevention and forecast preservation.

## 4.6.1. Online diagnosis

## 4.6.1.1. Summary of online diagnosis

Summary and set value of online diagnosis is indicated in Table 4.6.1.

Items	Summary of online diagnosis
Total stroke	When a valve travel change beyond a threshold has happened, its displacement is accumulated, and it's indicated. It's possible to use it for a prediction of long-term deterioration such as wear of packing and damage of spring.
	Indicated value; The 200% valve position change is counted as 1. Ex) The five times full stroke of 100% equals to the 5 counts. It's indicated until at most about 4,200,000,000 counts, and when this is exceeded, it's reset by a zero. Set value; Criteria [%]: A threshold of the position change to accumulate is set.
Total direction change	When a valve travel direction change beyond a threshold has happened, its number of times is accumulated, and it's indicated. It's possible to use it for a prediction of long-term deterioration such as wear of packing and damage of spring. Set value; Criteria [%]: A change width to judge direction change is set.
Low position time	Time when the valve travel was in the range of threshold is accumulated, and it's indicated. It's possible to use it for a prediction of damage of the valve body caused by control by the low position.
	Criteria [%]: A position to judge low position is set.
Maximum temperature	Time when the temperature was over threshold is accumulated, and it's indicated. It's possible to use it for a prediction of degradation and damage of a part caused by high temperature environment.
time	Criteria [Celsius / Fahrenheit] <sup>.</sup> A temperature to judge high temperature is set
Minimum temperature time	Time when the temperature was under threshold is accumulated, and it's indicated. It's possible to use it for a prediction of degradation and damage of a part caused by low temperature environment. Set value;
Partial stroke	Criteria [Celsius / Fahrenheit] : A temperature to judge low temperature is set. Test to move such emergency shutdown valves partially and periodically, and to confirm
	rest to more such emergency shataown varyes partiany and periodically, and to commit

Table 4.6.1. Online diagnosis



## 4.6.1.2. Online diagnosis setup

For example, the procedures for setting the total stroke parameter and erasing its log are as follows.

#### 1) Setting the total stroke parameter.

## MENU)

View > Device Root Menu > Extended menu> Diag. & Alarms > Online diag. setup> Total Stroke Setting

Diag. & Alarms	
Online diag.setup offline diag.set. Offline diag.test Alarm setup NAMUR sta	atus sel. Diag. test data
Total Stroke Setting	Max/Min Temperature Setting
Total Direction Change Setting	Partial stroke T.
Low Position Setting	Diag. log clear

1 Select the 'Total Stroke Setting'

Total Stroke Setting			
Do you want to read or write? Write Read Write Erace log		② Select 'Write' and press 'OK'	
Press OK button to continue method execution o	r Abort button to abort methe	od execution.	

Total Stroke Settin	ng				×
Criteria	10 %				
			OK	Abort	

- ③ Select 'Criteria
- ④ Input a criteria value. (Value range: 1% 50%)
- ⑤ Press 'OK' to set.
### 2) Check of results.

## MENU) View > Device Root Menu > Information > Diag. resutl > Total Stroke

Information					
Monitor   Alarm s	tatus   Positioner info.   Config. paramet	Diag. result			
_ Total stroke —					
Total Stroke	2 -	Criteria	10	*	
- Total dir. change	ē				
Total Direction Change	2 -	Criteria	10	%	
Low position tim	ne				
Low Position Tin	ne 14.7 h	Criteria	5.0	*	
Total time					
Total time	14.7 h				
Total Stroke	: Present total stroke value	е			

Criteria : Set value

#### 3) Erasing the total stroke log

MENU) View > Device Root Menu > Extended menu> Diag & Alarms > Online diag. setup

Diag. & Alarms	
Online diag.setup   Offline diag.set.   Offline diag.test   Alarm setup   NAMUR status sel.	Diag. test data
Total Stroke Setting	Max/Min Temperature Setting
Total Direction Change Setting	Partial stroke T.
Low Position Setting	Diag. log clear

## 1 Select the 'Total Stroke Setting'

Total Stroke Setting	
Do vou want to read or write? Erace log – Read Write Erace log	② Select 'Erase log' and press 'OK'
Press OK button to continue method execution or Abort button to abort method execution	x.
Help	0K
3 Select 'OK' on confirmation to execute.	

### 4.6.1.3. Clear of diagnosis logs

The procedures for clearing diagnosis logs is as follows.

MENU) View > Device Root Menu > Extended menu> Diag & Alarms > Online diag. setup > Diag. log clear

Press 'OK' on confirmation screen to execute.

## 4.6.2. Offline diagnosis

## 4.6.2.1. Summary of offline diagnosis

Summary and set value of offline diagnosis is indicated in Table 4.6.2.



Items	Summary of offline diagnosis		
Pneumatic circuit drift	IP signal current to control 25%, 50% and 75% position are measured, and it's checked whether the drift is in tolerance or not. The degradation over time in a pneumatic circuit can be checked by comparing initial values, previous values and present values.		
Simple valve signature	Output pressure at 25%, 50% and 75% position are measured, and a hysteresis and pressure gradient of control valve are calculated, and it's checked whether the values are in tolerance or not. It'll be a simple version of general valve signature. The degradation of packing and spring in control valve can be checked by comparing initial values, previous values and present values. Reference) The approximate hysteresis of the actuator can be calculated in% by the following formula. Single acting type actuator : Hysteresis Single acting type actuator : Hysteresis Supply air pressure Set value; Ramp time [s]: Set a time to fully stroke by ramp input. Initial value: 60s Hysteresis limit [kPa,bar,psi]: Set limit of pressure hysteresis. Initial: 50kPa Gradient limit H [kPa,bar,psi]: Set upper limit of pressure gradient(pressure difference) Initial value: 80kPa		

## 4.6.2.2. 25% step response test

For setting and executing the 25% step response test are as follows.

#### 1) Setting the 25% step response test.

#### MENU)

View > Device Root Menu > Extended menu> Diag & Alarms > Offline diag. set. > 25% step response



#### ① Select '25% step response'

_
② Select 'Write' and press 'OK'
×
OK Abort

- ③ Input a step time value.
- ④ Press 'OK' to set.

#### 2) Executing the 25% step response test.

MENU) View > Device Root Menu > Extended menu> Diag & Alarms > Offline diag. test > 25% step response

① Press 'OK' on confirmation screen to execute.

#### 4.6.2.3. Pneumatic circuit span

The procedures for setting the Pneumatic circuit span test and executing are as follows.

#### 1) Setting

MENU) View > Device Root Menu > Extended menu> Diag & Alarms > Offline diag. set > Pneumatic span

SDC625 - [Diagnosis Extended Menu]	
Device View Window Help	
D. 20 📾 🖑 🔊 🖶 🔊 🖉	
Online diag. set p Offline diag. set. Diffline diag. test Advance	d Diagnostics   Alarm setup   NAMUR status sel.   Diag. test data
25% step response	Pneumatic drift
Pneumatic span	S-valve signature

① Select 'Pneumatic span'

Pneumatic span	]
Do you want to read or write? Write Read Write	② Select 'Write' and press 'OK'
Press DK button to continue method execution or Abort button to abort method execution.           Help         Abort         DK	
	-
Pneumatic span	×
Step time 20 s	
Criteria 95.0 %	
	OK Abort
③ Select 'Step time'	
④ Input a step time value.	

Pneumatic span								×
Step time	20	s						
Oriteria	95	x						
						OK	Abort	

- (5) Select 'Criteria'
- 6 Input a criteria value.
- ⑦ Press 'OK'

#### 2) Execution

MENU) View > Device Root Menu > Extended menu> Diag. & Alarms > Offline diag. test > Pneumatic span

① <u>Press 'OK' on confirmation screen.to execute.</u>

#### 4.6.2.4. Pneumatic circuit drift

The procedures for setting the Pneumatic circuit drift test and executing are as follows.

#### 1) Setting

MENU) View > Device Root Menu > Extended menu> Diag. & Alarms > Offline diag. set. > Pneumatic drift

🗱 SDC625 - [Diagnosis Extended Menu]	
■ <u>D</u> evice <u>V</u> iew <u>W</u> indow <u>H</u> elp	
D 🔊 🕼 🕾 🖻 🖨 🔊	
Online diag. setu <mark>p</mark> Offline diag. set. Offline 25% step response Pneumatic span	diag. test   Advanced Diagnostics   Alarm setup   NAMUR status sel.   Diag. test data   Pneumatic drift S-valve signature

1 Select 'Pneumatic drift'

Pneumatic drift	
Do you want to read or write? Write Read Write	② Select 'Write' and press 'OK'
Press OK button to continue method execution or Abort button to abort method execution.	
Help Abort OK	
Pneumatic drift	×
* Ramp time 80 s	
Tolerance 15.0 %	
	OK Abort

- ③ Select 'Ramp time'
- ④ Input a ramp time value.

Ramp time 30 s Tolerance 15 %	×	neumatic drift
Tolerance [15] %		Ramp time 30 s
		Tolerance 15 %
OK Abort		OK Abort

- (5) Select 'Tolerance'
- 6 Input a tolerance value.
- ⑦ Press 'OK' to set.

#### 2) Execution

MENU) View > Device Root Menu > Extended menu> Diag. & Alarms > Offline diag. test > Pneumatic drift

① Press 'OK' on confirmation screen.to execute.

#### 4.6.2.5. Simple valve signature

## 1) Setting

MENU) View > Device Root Menu > Extended menu> Diag. & Alarms > Offline diag. set. > S-valve signature

💓 SDC625 - [Diagnosis Extended Menu]	
Device View Window Help	
D 🔊 🕼 🖑 🖻 🖬 🔊	
Online diag. setup Offline diag. set. Dffline di 25% step response Pneumatic span	ag. test   Advanced Diagnostics   Alarm setup   NAMUR status sel.   Diag. test data   Pneumatic drift S-valve signature

1 Select 'S-valve signature'

Do you want to read or write?         Write         Read         Write         Press DK button to continue method execution or Abort button to abort method execution.         Help       Abort         DK	S-valve signature				]	
Press DK button to continue method execution or Abort button to abort method execution.         Help       Abort       DK         S-valve signature       X         Ramp time       60       \$         Hysteresis limit       50.0       kPa         Oradient limit       Hea       KPa	<u>Do you w</u> Write Read Write	vant to read or	write?		② Select 'Write' and press 'OK'	
Help     Abort     OK       S-valve signature     K       Ramp time     60       Hysteresis limit     50.0       KPa	Press OK buttor	n to continue method	execution or Abort button to abort met	hod execution.		
S-valve signature X Ramp time 60 s Hysteresis limit 50.0 kPa	Help	]	Abort	ОК		
Ramp time     60      s       Hysteresis limit     50.0     kPa       Gradient limit H     1000     kPa	S-valve signature	1000				×
Hysteresis limit 50.0 kPa	Ramp time	60	s			
Gradient limit H Jaco kPa	Hysteresis limit	50.0	kPa			
Gradier and the SON Real	Gradient limit H	80.0	kPa			
Gradient limit L 20.0 kPa	Gradient limit L	20.0	kPa			
OK Abort					OK Abort	

- ③ Select 'Ramp time'
- ④ Input a ramp time value to set.

S-valve signature	X
Ramp time 60 s	
Hysteresis limit <mark>50 </mark> kPa	
Gradient limit H 70.0 kPa	
Gradient limit L 10.0 kPa	
	OK Abort
5 Select 'Hysteresis limit'	
	Hysteresis IIIIII(KPd) .
⑥ Input a hysteresis limit value.	sets the pressure hysteresis tolerance. For details,
S-valve signature	X
Ramp time 60 s	
Hysteresis limit 500 kPa	
Gradient limit H 80 kPa	
Gradient limit L 10.0 kPa	
1	
	OK Abort
⑦ Select 'Gradient limit H'	Gradient limit H(kPa):
(8) Input a gradient limit high value	Sets the upper limit of the pressure gradient
	tolerance. See Table 4.6.2. for more information.
S-valve signature	Х
Ramptime 60 s	
Hysteresis limit 50.0 kPa	
Gradient limit H 80.0 kPa	
Gradient limit L 20 kPa	
	OF About
(9) Select (Gradient limit !'	Gradient limit I (kPa)
	Sets the upper limit of the pressure gradient
${f I\!\!D}$ Input a gradient limit low value.	tolerance. See Table 4.6.2 for more information
(1) Press (OK)	

### 2) Execution

MENU) View > Device Root Menu > Extended menu> Diag. & Alarms > Offline diag. test > S-valve signature

① Press 'OK' on confirmation screen to execute.

### 4.6.3. Check and Save of online diagnosis results (Diag.test data)

In this section, confirmation and save of diagnosis results are explained. It'll be the same operation with each diagnosis. Therefore, for instance, the 25% step response is explained here.

#### 1) Check of result

It's possible to indicate a result data in following menu.

MENU) View > Device Root Menu > Extended menu> Diag. & Alarms > Diag.test data > 25% step response

A list of result is indicated.

25% step response									×
< Now >			<prev></prev>			<init></init>			^
O.S. 0-25	0.0	x	O.S. 0-25	0.0	*	O.S. 0-25	0.0	×	
O.S. 25-50	0.0		O.S. 25-50	0.0	×	O.S. 25-50	0.0	×	
O.S. 50-75	0.0	x	O.S. 50-75	0.0	×	O.S. 50-75	0.0	×	
O.S. 75-100	0.0		O.S. 75-100	0.0	<b>%</b>	O.S. 75-100	0.0	×	
O.S. 100-75	0.0	×	O.S. 100-75	0.0	*	O.S. 100-75	0.0	×	
O.S. 75-50	0.0	×	O.S. 75-50	0.0	×	O.S. 75-50	0.0	×	
O.S. 50-25	0.0		O.S. 50-25	0.0	×	O.S. 50-25	0.0	×	
O.S. 25-0	0.0	x	O.S. 25-0	0.0	×	O.S. 25-0	0.0	x	
Dev. 0	0.0	*	Dev. 0	0.0	*	Dev. 0	0.0	×	
Dev. 0-25	0.0	×	Dev. 0-25	0.0	*	Dev. 0-25	0.0	×	
Dev. 25-50	0.0	×	Dev. 25-50	0.0	*	Dev. 25-50	0.0	×	
Dev. 50-75	0.0	%	Dev. 50-75	0.0	*	Dev. 50-75	0.0	×	
Dev. 75-100	0.0	*	Dev. 75-100	0.0	*	Dev. 75-100	0.0	×	
Dev. 100-75	0.0	x	Dev. 100-75	0.0	*	Dev. 100-75	0.0	×	
Dev. 75-50	0.0		Dev. 75-50	0.0	*	Dev. 75-50	0.0	×	
Dev. 50-25	0.0	*	Dev. 50-25	0.0	*	Dev. 50-25	0.0	×	
Dev. 25-0	0.0	*	Dev. 25-0	0.0	×	Dev. 25-0	0.0	×	
						C	OK	Abort	

It's possible to indicate a result data from following menu.

MENU) View > Device Root Menu >> Information > Diag. result > 25% step response

### 2) Save of result

You can save a result data as a previous data or an initial data from following menu.

### MENU) View > Device Root Menu > Extended menu> Diag. & Alarms > Diag.test data > Step res. save

Step res. save		
Save as : Prev. Prev. Init.		<ol> <li>Select 'Prev.' or 'Init'</li> <li>Press 'OK' to save.</li> </ol>
Press OK button to continue metho	d execution or Abort button to abort method execution.	
Help	Abort OK	

# 5. Diagnosis Root Menu

The operation procedure of the alarm / diagnosis function is explained on the screen of SDC625.

For an overview of online diagnosis, refer to 4.6.1.1 of this instruction manual.

## 5.1. Alarm status

The operator can confirm the alarm status as below.

- ➢ EEPROM error
- Position sensor error
- P-sup. sensor error
- P-out1. sensor error
- P-out2. sensor error
- Input signal alarm history
- Position alarm

- Deviation alarm
- > Temperature alarm
- Low sup-pres. Alarm
- High sup-pres. Alarm
- PST stroke alarm
- PST incomplete alarm
- PST pressure al

MENU) View > Diagnosis Root Menu > Alarm status

## 5.2. Online diagnosis setup

For example, the procedures for setting the total stroke parameter and erasing its log are as follows.

## 1) Setting the total stroke parameter.

🗱 SDC625 - [Offline]	👹 SDC625 - [Diagnosis Root Menu]
Device View Vindow Help	■ <u>D</u> evice <u>V</u> iew <u>W</u> indow <u>H</u> elp
Image: Construction of the process variables Root Menu         Positioner in         Communication Log         Model         Face Plate         Tag         Event-Status Log         Long tag         Available DDs         Root menu         Offline         Diagnosis Root Menu         Device Root Menu         Device Root Menu         Model	Image       Image       Image       Image         Total Stroke       0       -         Total Direction       33       -         Total Direction       33       -         Total Direction       33       -         Total Direction       167.4       h         Low Position Time       166.2       h         Low Position Time       99       %         Percentage       99       %         Maximum       28       Celsius         Temperature       16       Celsius         Diagnosis Extended Menu       Diagnosis Extended Menu
① Press the 'View > Diagnosis Root Menu'	② Press the 'Diagnosis Extended Menu'

## MENU) View > Diagnosis Root Menu > Diagnosis Extended Menu > Online diag. setup

	🗱 SDC625 - [Diagnosis Extended Menu]	_
	Device View Window Help	
	D. 20 an al 20 - 20 20 an	
Π	Online diag. setup Offline diag. set. Offline diag. test Advanced Diagnostics	Alarm setup   NAMUR status sel.   Diag. test data
	Total Stroke Setting	Max/Min Temperature Setting
	Total Direction Change Setting	Partial stroke T.
	Low Position Setting	Diag. log clear

 $(\ensuremath{\mathfrak{I}})$  Select the 'Total Stroke Setting'

Total Stroke Setting	
Do vou want to read or write? Write Read Write Erace log	④ Select 'Write' and press 'OK'
Press OK button to continue method execution or Abort button to abort method execution.	
Help Abort OK	
Total Stroke Setting	×
Criteria 10 %	OK Abort
<ul> <li>Select 'Criteria'</li> <li>Input a criteria value. (Value range: 1% - 50%)</li> </ul>	

O Press 'OK' to set.

#### 2) Check of results.

MENU)	View >	Device	Root Menu	> In	formation>	Diag.	result>	Total	Stroke
- /									

Ir	formation								×
ſ	Monitor   Alarm status	Positioner info. Cor	nfig.parame	Diag. result					
	- Total stroke		_						
	Total Stroke	2	-	Criteria	10	%			
	Total dir obanga								
	Total Direction Change	2	-	Criteria	10	*			
	Low position time								
	Low Position Time	14.7	h	Criteria	5.0	%			
	Total time								
	Total time	1112	- h						
	Total time	14.7							
		25% step response			Pneumatic o	drift			
		Pneumatic span			S-valve sign	ature			
		PST setup info.							
							ОК	Cancel	

Total Stroke : Present total stroke value Criteria : Set value

#### 3) Erasing the total stroke log

## MENU) View > Diagnosis Root Menu > Diagnosis Extended Menu >Online Diag. setup >Total Stroke Setting

Diag. & Alarms				
Online diag. setup Dffline diag. set. Offline diag. te Total Stroke Setting Total Direction Change Setting Low Position Setting	st   Alarm setup   NAMUR statu	us sel.   Diag. test data   Max/Min Temperatur Partial stroke Diag. log clea	e Setting T m	① Select the 'Total Stroke Setting'
Total Stroke Setting				
Do you want to read or write? Erace log Read Write Erace log Press OK button to continue method execution of	Abort button to abort method e	xecution.	<ul> <li>2 Se</li> <li>3 Pr</li> <li>execution</li> </ul>	elect 'Erase log' and press 'OK' r <u>ess 'OK' on confirmation screen.to</u> <u>te.</u>
Help	Abort	ОК		

### 5.2.1. Clear of diagnosis logs

The procedures for clearing diagnosis logs is as follows.

MENU) View > Device Root Menu > Extended Menu > Diag. & Alarms > Online Diag. setup > Diag. log clear

Select 'OK' on confirmation screen.

#### 5.3. Offline diagnosis setup

#### 5.3.1. Summary of offline diagnosis

For an overview of offline diagnostics, see 4.6.2.1. in this instruction manual.

#### 5.3.2. 25% step response test

The procedures for setting the 25% step response test and executing are as follows.

### 1) Setting the 25% step response test.

MENU) View > Diagnosis Root Menu > Diagnosis Extended Menu > Offline diag. set > 25% step response

🗱 SDC625 - [Diagnosis Extended Menu]	
Device View Window Help	
D 2 4 2 4 2 4	
Online diag. setu <mark>p</mark> Offline diag. set. <mark>O</mark> ffline diag	g. test   Advanced Diagnostics   Alarm setup   NAMUR status sel.   Diag. test data
25% step response	Pneumatic drift
Pneumatic span	S-valve signature

#### ① Select '25% step response'

25% step response	
Do vou want to read or write? Write Read Write	② Select 'Write' and press 'OK'
Press OK button to continue method execution or Abort button to abort method execution.	
Help Abort OK	

25% step response						×
Step time	60	s				
				OK	Abort	

- ③ Input a step time value.
- ④ Press 'OK' to set.

2) Executing the 25% step response test.

MENU) View > Diagnosis Root Menu > Diagnosis Extended Menu > Offline diag. test >25 step response

Press 'OK' on confirmation screen to execute..

## 5.3.3. Pneumatic circuit span

#### 1) Setting

MENU) View > Diagnosis Root Menu > Diagnosis Extended Menu > Offline diag. set > Pneumatic span

SDC625 - [Diagnosis Extended Menu]	
Device View Window Help	
D. 20 📾 🖑 🖻 🖶 20 🙆	
Online diag. set up Offline diag. set. Offline diag. test Advanced 25% step response Pneumatic span	Diagnostics Alarm setup NAMUR status sel. Diag. test data Pneumatic drift S-valve signature

① Select ' Pneumatic span'

Pneumatic span	
Do <u>vou wan</u> t to read or write? Write <b>v</b> Read Write	(1) Select 'Write' and press 'OK'
Press OK button to continue method execution or Abort button to abort method execution.          Help       Abort       OK	

Pneumatic span									×
Step time	20	s							
Criteria	95.0	- ×							
					_	OK	A	bort	

- ② Select 'Step time'
- ③ Input a step time value.

Pneumatic span							×
Step time	20	s					
Oriteria	95	×					
					ОК	Abort	

- ④ Select 'Criteria'
- ⑤ Input a criteria value.
- 6 Select 'OK to set.

#### 2) Execution

MENU) View > Diagnosis Root Menu > Diagnosis Extended Menu > Offline diag. test > Pneumatic span

Select 'OK' on confirmation screen to execute.

## 5.3.4. Pneumatic circuit drift

### 1) Setting

MENU) View > Diagnosis Root Menu > Diagnosis Extended Menu > Offline diag. set > Pneumatic drift

😹 SDC625 - [Diagnosis Extended Menu]	
Device View Window Help	
다 🧿 🛛 📾 🖑 🎾 🖶 호 🔊	
Online diag. setu <mark>p</mark> Offline diag. set. Offline diag 25% step response Pneumatic span	a, test   Advanced Diagnostics   Alarm setup   NAMUR status sel.   Diag. test data   Pneumatic drift S-valve signature

① Select ' Pneumatic drift'

Pneumatic drift	]
Do vou want to read or write? Write Read Write	② Select 'Write' and press 'OK'
Press DK button to continue method execution or Abort button to abort method execution.           Help         Abort         DK	
Pneumatic drift	X
Ramptime 30 s	
Tolerance 15.0 %	
	OK Abort

- ③ Select 'Ramp time'
- ④ Input a ramp time value

Pneumatic drift							×
Ramp time	30	s					
Tolerance	15	×					
							<i>.</i>
					OK	 Abort	J

- (5) Select 'Tolerance'
- (6) Input a tolerance value.
- $\bigcirc$  Press 'OK' to set.

## 2) Execution;

MENU) View > Diagnosis Root Menu > Diagnosis Extended Menu > Offline diag. test > Pneumatic drift

Select 'OK' on confirmation screen to execute.

## 5.3.5. Simple valve signature

## 1) Setting

## MENU) View > Diagnosis Root Menu > Diagnosis Extended Menu > Offline diag. set > S-valve signature

📓 SDC625 - [Diagnosis Extended Menu]	
Device View Window Help	
D. 🧕 📾 🕾 🖻 🖬 🛣 🔊	
Online diag. setup Offline diag. set. Offline	diag. test   Advanced Diagnostics   Alarm setup   NAMUR status sel.   Diag. test data
25% step response	Pneumatic drift
Pneumatic span	S-valve signature

1 Select 'S-valve signature'

S-valve signature	
Do vou want to read or write? Write _ Read Write	② Select 'Write' and 'OK'
Press DK button to continue method execution or Abort button to abort method execution.	
Help Abort OK	

S-valve signature									×
Ramp time	60	s							
Hysteresis limit	50.0	kPa							
Gradient limit H	80.0	kPa							
Gradient limit L	20.0	k Pa							
						OK	l	Abort	]
③ Select	: 'Ramp tim	e'							

④ Input a ramp time value.

S-valve signature	X
Ramp time 60 s	
Hysteresis limit 50  kPa	
Gradient limit H 70.0 kPa	
Gradient limit L 10.0 kPa	
⑤ Select 'Hysteresis limit'	Hysteresis limit(kPa):
6 Input a hysteresis limit value	Sets the pressure hysteresis tolerance. For details,
	see Table 4.6.2. Offline diagnosis.
	L
S-valve signature	×
Pamo time e	~
Hysteresis limit Enn	
Gradient limit H 80 kPa	
Gradient limit L 10.0 kPa	
	OK Abort
(7) Select 'Gradient limit H'	Gradient limit H(kPa) :
	Sets the unner limit of the pressure gradient
(8) Input a gradient limit high value.	tolerance. See Table 4.6.2 for more information.
	L
S-valve signature	X
Ramp time 60 s	
Hysteresis limit 50.0 kPa	
Gradient limit H 80.0 kPa	
Gradient limit L 20 kPa	
	OK Abort
	1000 V
9 Select 'Gradient limit L'	Gradient limit I (kPa) :
10 Input a gradient limit low value	Sets the upper limit of the pressure gradient

① Press 'OK' to set.

Sets the upper limit of the pressure gradient tolerance. See Table 4.6.2 for more information.

## 2) Execution;

MENU) View > Diagnosis Root Menu > Diagnosis Extended Menu > Offline diag. test > S-valve signature

Press 'OK' on confirmation screen to execute.

### 5.4. Check and Save of online diagnosis results (Diag.test data)

In this section, confirmation and save of diagnosis results are explained. It'll be the same operation with each diagnosis. Therefore, for instance, the 25% step response is explained here.

#### 1) Check of result

It's possible to indicate a result data in following menu.

MENU) View > Diagnosis Root Menu > Diagnosis Extended Menu > Diag test data> 25% step response

#### A list of result is indicated.

25% step response									×
< Now >			<prev></prev>			<init></init>			^
O.S. 0-25	0.0	x	O.S. 0-25	0.0	x	O.S. 0-25	0.0	x	- 1
O.S. 25-50	0.0	×	O.S. 25-50	0.0	x .	O.S. 25-50	0.0	x	
O.S. 50-75	0.0	x	O.S. 50-75	0.0	x	O.S. 50-75	0.0	x	
O.S. 75~100	0.0	x	O.S. 75-100	0.0	x	OS. 75-100	0.0	x	
O.S. 100-75	0.0	x	O.S. 100-75	0.0	x	O.S. 100-75	0.0	x	
O.S. 75-50	0.0	x	O.S. 75-50	0.0	x	O.S. 75-50	0.0	x	
O.S. 50-25	0.0	x	O.S. 50-25	0.0	x	O.S. 50-25	0.0	x	
O.S. 25-0	0.0	x	O.S. 25-0	0.0	x	O.S. 25-0	0.0	x	
Dev. 0	0.0	x	Dev. 0	0.0	x	Dev. 0	0.0	x	
Dev. 0-25	0.0	x	Dev. 0-25	0.0	x	Dev. 0-25	0.0	x	
Dev. 25-50	0.0	x	Dev. 25-50	0.0	x	Dev. 25-50	0.0	x	
Dev. 50-75	0.0	x	Dev. 50-75	0.0	x	Dev. 50-75	0.0	x	
Dev. 75-100	0.0	x	Dev. 75-100	0.0	x	Dev. 75-100	0.0	x	
Dev. 100-75	0.0		Dev. 100-75	0.0	x	Dev. 100-75	0.0	x	
Dev. 75-50	0.0		Dev. 75-50	0.0	x	Dev. 75-50	0.0	x	
Dev. 50-25	0.0	x	Dev. 50-25	0.0	x	Dev. 50-25	0.0	x	
Dev. 25-0	0.0	x	Dev. 25-0	0.0	x	Dev. 25-0	0.0	x	
				I			ОК	Abort	

It's possible to indicate a result data from following menu.

#### MENU)

View > device Root Menu > Diagnosis Extended Menu > Information > Diag. result> 25% step response

#### 2) Save of result

You can save a result data as a previous data or an initial data from following menu.

MENU) View > Diagnosis Root Menu > Diagnosis Extended Menu > Diag. test data > Step res save

Step res. save	
Save as: Prev. ▼ Prev. Init.	<ol> <li>Select 'Prev.' or 'Init'</li> <li>Press 'OK'to save.</li> </ol>
Press DK button to continue method execution or Abort button to abort method execution.           Help         Abort         DK	

## 5.5. Advanced Diagnostics

#### 5.5.1. Valve signature

The Valve signature shows the relationship between the operating pressure and the valve position when the valve is moved. And it shows the characteristics of a valve and an actuator.

From the data, various events occurring in the valve, such as irregular frictional force, can be found.

MENU) View > Diagnosis Root Menu > Diagnosis Extended Menu > Advanced Diagnostics

Configuration and Execution	Position	0.0 %	P-out1 P-out2	1500.00 kPa 1500.00 kPa	
Signature					
ାା †ବ୍ ସ୍ ସ୍ା ଶ	7 🖻 🖬 🖨				
100 -				- Valve Signatu	ле
80 -					
e - 40 -					
20 -					
0 -					

Select 'Configuration and Execution'

Valve Signature	X
Start Position 0 %	
Stop Position 100 %	
Ramp Time 30 s	
	OK Abort
② Select 'Start Position'	<ul> <li>Input a Ramp Time value.</li> </ul>
${\ensuremath{ ]}}$ Input a Start Position value.	⑧ Select 'Wait Time'
④ Select 'Stop Position'	<ol> <li>Input a Wait Time value.</li> </ol>
⑤ Input a Stop Position value.	IPress 'OK
6 Select 'Ramp Time'	
Configuration and Execution	
<u>Ramp ope</u> ration is about to start. Do you want to continue? Yes 💽	(1) Select 'Yes' and press'OK'
	<sup>②</sup> Press 'OK' on confirmation screen to execute.
Press DK button to continue method execution or Abort button to abort method execution.	
Help Abort OK	

#### 5.6. Alarm setup

For an overview of alarms, refer to 6.4.1of this instruction manual.

#### 5.6.1. Alarm setting / Check and Clear of result

It's possible to operate setting, check of a result and clear of result of each alarm from following menu.

#### 1) Setting

MENU) View > Diagnosis Root Menu > Diagnosis Extended Menu > Alarm setup

#### 2) Check of results

MENU) View > Device Root Menu > Information > Alarm status

#### 3) Clear of results

#### MENU) View > Diagnosis Root Menu > Diagnosis Extended Menu > Alarm setup

-		
Device View Window Help		
D. 20 an al 20 an 20 20 an		
Online diag. setup   Offline diag. set.   Offline diag. test   Adva	anced Diagnostics Alarm setup NAMUR status set. Diag. test data	
Deviation alarm	Low sup-pres. AL	
Temperature alarm	Pressure failure	
All alarm clear		
-Alarm code-	Error code	① Press 'Error/Alarm Clear'
Position alarm	EEPROM error	
🚳 Deviation alarm	🐵 Position sensor error	
🚳 Temperature alarm	Supply pressure sensor error	
💮 Input signal alarm	Out-1 pressure sensor error	
PST alarm	Out-2 pressure sensor error	
	Supply pressure high alarm	
	Supply pressure low alarm	
Alarm back	Error back	
Position alarm	EEPROM error	
Deviation alarm	🐵 Position sensor error	
🚳 Temperature alarm	Supply pressure sensor error	
🚳 Input signal alarm	Out-1 pressure sensor error	
PST alarm	Out-2 pressure sensor error	
	Supply pressure high alarm	
	Supply pressure low alarm	
PST alarms	Error/Alarm Clear	
Valve does not stroke		
PST does not complete		
Pressure is too large		

## 5.7. NAMUR status select

The NAMUR status category related to each alarm can be selected voluntarily.

For example, the procedure for setting the position alarm is as follows.

MENU) View > Diagnosis Root Menu > Diagnosis Extended Menu > NAMUR status sel.

🗱 SDC625 - [Diagnosis Extended Menu]	
Device View Window Help	
D· 20 · · · · · · · · · · · · · · · · · ·	
Online diag. setup   Offline diag. set.   Offline diag. test   Advanced Diagnostics	Alarm setur NAMUR status sel. Diag. test data
Position alarm NAMUR status	High sup-pressure NAMUR status
Deviation alarm NAMUR status	Low sup-pressure NAMUR status
Temperature alarm NAMUR status	

1 Select the 'Position alarm NAMUR status'

Position alarm NAMUR status       (2) Select 'Write' and press 'OK'         Press OK button to continue method execution or Abot button to abot method execution.       (2) Select 'Write' and press 'OK'         Press OK button to continue method execution or Abot button to abot method execution.       (3) Select NAMUR status         Position alarm NAMUR status       (3) Select NAMUR status category a press 'OK' to set         NAMUR status category:       Check function         Out of spec.       Check function         Press OK button to continue method execution to abot method execution.       (3) Select NAMUR status category: a press 'OK' to set         NAMUR status category:       Maintenance require         Out of specification       Out of specification         Press OK button to continue method execution or Abot button to abot method execution.       (4) DK		
Press OK button to continue method execution or Abort button to abort method execution.   Help     Position alarm NAMUR status     Position alarm NAMUR status :   Check function   Maintenance req.   Out of spec.   Check function     Press OK button to continue method execution to abort method execution.     Position alarm NAMUR status     ************************************	Position alarm NAMUR status	
Press DK button to continue method execution or Abort button to abort method execution.         Help       Abort       DK         Position alarm NAMUR status         Position alarm NAMUR status :       ③ Select NAMUR status category a press 'OK' to set         Maintenance req.       Out of spec.         Out of spec.       Check function         Press DK button to continue method execution or Abort button to abort method execution.       Maintenance require         Out of specification       Check function	Do you want to read or write? Write _ Read Write	② Select 'Write' and press 'OK'
Position alarm NAMUR status       ③ Select NAMUR status category a press 'OK' to set         Check function       Image: Check function         Maintenance req.       Out of spec.         Check function       Image: Check function         Press OK button to continue method execution or Abort button to abort method execution.       Maintenance require         Help       Abort       OK	Press OK button to continue method execution or Abort button to abort method execution.	
Position alarm NAMUR status :       ③ Select NAMUR status category a press 'OK' to set         Check function       •         Maintenance req. Out of spec. Check function       •         Press 0K button to continue method execution or Abort button to abort method execution.       •         Help       Abort       OK	Position alarm NAMUR status	
Out of spec.       NAMUR status category:         Check function       Maintenance require         Out of specification       Out of specification         Check button to continue method execution or Abort button to abort method execution.       Check function	Position alarm NAMUR status : Check function	③ Select NAMUR status category and press 'OK' to set
Press 0K button to continue method execution or Abort button to abort method execution.         Help       Abort	Out of spec. Check function	NAMUR status category:
Out of specification         Check function         Press DK button to continue method execution or Abort button to abort method execution.         Help       Abort		Maintenance require
Press DK button to continue method execution or Abort button to abort method execution.           Help         Abort         DK		Out of specification
Press OK button to continue method execution or Abort button to abort method execution.           Help         Abort         OK		Check function
Help Abort OK	Press DK button to continue method execution or Abort button to abort method execution.	
	Help Abort OK	

# 6. Troubleshooting

When problems occurred at the operation starting or during operation, please refer to the following table and take an action appropriately.

Phenomenon	Assumed cause	Action			
		✓ Check input current			
	Loss of electrical power, disconnection or miswiring	✓ Check wiring			
		✓ Check supply pressure			
	Drop of supply pressure of loss	✓ Check air regulator			
	Leak from air piping	✓ Check piping			
Deere wet were	Actuator abnormality	<ul> <li>Sat handle to auto mode</li> </ul>			
Does not move	/ Handle is in manual mode				
	Actuator abnormality	✓ Replace packing			
Move too slow	/ Packing sticking or wear out				
	Lack of actuator output	✓ Replace actuator			
	Forced shut down by positioner alarm	✓ Check alarm status			
Does not move fully	Mistake of setting	<ul> <li>Check setting parameters</li> </ul>			
		✓ Check PID parameter			
		✓ Check mode of A/M-unit			
		✓ Cleaning of restriction			
	Adjustment difference	<ul> <li>Cleaning of nozzle flapper</li> </ul>			
		<ul> <li>Adjustment of torque motor</li> </ul>			
	Breakdown of positioner	Inquire to our office			
	Abnormality of positioner	✓ Cleaning of restriction			
Hunting		✓ Cleaning of nozzle flapper			
Overshoot	Mismatch of PID parameter	✓ Check PID parameter			
		✓ Check there are no backlashes			
	Abnormal attachment	✓ Check whether a feedback lever			
		becomes horizontal at 50% position			
Rad accuracy		✓ Readjust cross point			
Bau accuracy	Abnormal control	✓ Check PID parameter			
		✓ Check dead band setting			
	Actuator abnormality	✓ Replace packing			
	/ Packing sticking or wear out				
	Loss of electrical power, disconnection or miswiring	✓ Check input current			
		✓ Check wiring			
LCD does not work	Temperature is too low	✓ Check indication in the LCD specification			
		temperature range.			
	Breakdown of positioner	Inquire to our office			
Position transmitter	Loss of electrical power disconnection or miswiring	✓ Check input voltage			
signal does not		✓ Check wiring			
output or drifts	Adjustment difference	✓ Implement position transmitter			
		current calibration			
Leak from valve seat	Lack of actuator output	✓ Increase actuator output			
of CVs		(Raise actuator size)			
0,000	Corrosion, erosion or defect in valve seat	✓ Overhauling of valve			

Table 6 Trouble shooting

## 7. Menu item

1st hierarchy	2nd hierarchy	3rd hierarchy	4th hierarchy	5th hierarchy	6th hierarchy	reference (chapter)
Process Variables	Alarm status					
Root Menu	<set point=""></set>					
	<position></position>					
	<loop current=""></loop>					]
	<input/>					3.1.
	<p-sup.></p-sup.>					
	<p-out1></p-out1>					]
	<p-out2></p-out2>					]
	<temperature></temperature>					
	Trends	****				3.2.
	-					
1st hierarchy	2nd hierarchy	3rd hierarchy	4th hierarchy	5th hierarchy	6th hierarchy	reference (chapter)
Device	Alarm status					
Root Menu	<set point=""></set>					
	<position></position>					
	<loop current=""></loop>					41
	<input/>					
	<p-sup.></p-sup.>					
	<p-out1></p-out1>					
	<p-out2></p-out2>					
	Information	Monitor	<status></status>			
			<input etc="" posi=""/>			4.2.1
			<pressure></pressure>			~
			<temperature></temperature>			
		Alarm status	Position alarm			_
			Deviation alarm			J
			Temperature alarm			4.2.2
			S-pressure alarm			
			<other failure=""></other>			
			<pst alarm=""></pst>			
		Positioner info.	<serial no.=""></serial>			J
			<universal rev=""></universal>			4.2.3.
			<manufacture date=""></manufacture>			-
			Version			
		Config. parameter	<valve action=""></valve>			-
			<packing friction=""></packing>			~
			<booster option=""></booster>			
			<set dir.="" point=""></set>			-
			Range ability			-
			<pt burnout="" dir.=""></pt>			
			<transfer function=""></transfer>			
			<posi.transmit.dir></posi.transmit.dir>			4.2.4.
			Actuator setup			-
			PID parameter set			-
			<cutoff limit="" or=""></cutoff>			-
			<dead band=""></dead>			-
			<input damper=""/>			-
			<sprit range=""></sprit>			-
			<integ.stop press.=""></integ.stop>			
		Dian and l	aTalal alasha a			
		Diag. result	< IOTAL STOKE >		1	-
			< rotal dir. Change >			4.2.5.
			<low position="" time=""></low>		1	-
			< IOTAL TIME >			4054
			25% step response		1	4.2.5.1.
			Preumatic span			4.2.5.2.
			Preumatic dritt			4.2.5.4.
			o-valve signature			4.2.5.5.
		1	ro i setup into			4.2.3.3.
	E	1	1	1	1	g I



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Extended Menu	Alarm status				
	<set point=""></set>				
	< Desition>				
	<loop current=""></loop>				
	<input/>				
	<p-sun></p-sun>				
	-sup.s				
	<p-out1></p-out1>				
	<p-out2></p-out2>				
	Setup	Basic setup	Actuator motion	Linear	
				Datas	
				Rolary	
			Actuator type	Single	
				Double	
				5300	
				4.70	
			Valve action	AIU	
				ATC	4.3.2.
			Packing friction	Low	
			Ŭ	Hiab	
				i ngn	
			Booster option		
			Set point dir.	Normal	
				Reverse	
			Position transmit dir	Normal	
				Povoreo	
				11000130	
		Easy tuning	Full Autotune	<autotune status=""></autotune>	
				Full autotune	
				<autotupo roculto<="" td=""><td>4.3.3.1.</td></autotupo>	4.3.3.1.
				Abort Autotune	
			Position setup	0%	
				100%	4.3.3.2
				A	
				Auto span	
			Tuning result		
			Response tuning	Response tuning value	1333
					-1.0.0.0.
		Expert tuning	PID parameter set	Custom /XS ~ XL	4.3.4.1.
			DIDtor	A	
			PID custom setup	Air-Out(not)= Air-In?	
				PID narameter	
				PID parameter Air-Out	4.3.4.2.
				Inside threshold	
				Inside PID AI	
				Inside PID AO	
			Sensitivity setup	Auto bias & size	
					4343
				Auto bias	
				Manual bias	
		Dataila d Oatai	0.4.4.4	Disable	
		Detailed Setup	Guton of Limit	LISADIE	
				Cutoff	
				Limit	
			Dead band	Disable/Enable	
			ITATISTET TUTICION	LIIIEAI	
				Equal percent Low	
				Equal percent Mid	
				Equal percent Hig	
				Quick opening	
				Custom Curve	4.3.6.
			Custom curve	Disable/Enable	
			Range ability		
			lonut domocr	Diaghlo/E-ship	
				LISADIE/ ETIADIE	
			Split range		
			PT burnout dir.	Low	
				High	
			AT snan limit	-	
			integ.stop press.		
		Function select	Authority	Authority	4.3.1.1.
			-	Control mode	1212
	1	ann 1	1		T.V. I.Z

Extended Menu	Setup	Function select	Password setup	Disable/Enable		
			Screen savor	Disable/Enable		
				Coloiuo		
			remperature unit		407	
				Fahrenheit	4.3.7.	
			Pressure unit	kPa		
				psi		
				bar		
	Maintenance	Calibration	Input signal cal.		4.4.4.1	
			Cross point cal		1112	
			Desition becauit		4.4.4.2	
					4.4.4.3.	
			Pressure sensor	Sup.press.		
				Out1 press.	4444	
					4.4.4.4.	
				Out2 press.		
			Dilat valavi adivi		4.4.2	
			Pliot relay adju.		4.4.3.	
		Simulation test	Manual input	<position></position>		
				Set Moving Value	4.4.5.1.	
			Preset input	<position></position>	-	
				Set Value		
			Ramp resp. test	<mode></mode>		
				Ramp resp. test	4.4.5.2.	
				Abort Operation		
			Step resp. test	<mode></mode>		
				Step resp. test	4.4.5.3.	
				Abort Operation		
		Momony cours & ros	Sava		1201	
		wentory save & res	Save		4.3.0.1.	
			Restore		4.3.8.2.	
			Factory Default		4.3.8.3.	
		Service	<angle></angle>			
			<cross point=""></cross>			
			<a d="" values=""></a>		4.4.6.1.	
			<time stamp=""></time>			
					4460	
			Factory menu		4.4.0.2.	
		HART Relation	Find Device		4.4.7.1.	
			HART/Device Information***			
			Squawk		4.4.7.2.	
		*** HART only menu	Reset***		4.4.7.4.	
		Factory setup**	IP signal range			
		** Display only if 'Factory	IP signal factor			
		menu' is ON	Virtual DIP SW			
			Cutoff IP signal			
	Diog & Alormo	Oplino diag optin	Total Strake Setting		4610	
	Diay. & Aldinis	Of life diag.setup	Total Stoke Setting		4.0. I.Z.	
			Iotal Dir. Change Setting			
			Low Position Setting		4.6.1.1.	
			Max/Min Temp. Setting			
			Partial stroke T.			
			Diag. log clear		4.6.1.3.	
		Offline diag.set.	25% step response		4.6.2.2.	
		-	Pneumatic span		4.6.2.3	
			Pneumatic drift		4624	
			S-valve signaturo		1625	
			U-Y AIY E SIYI IALUI E		4.0.2.3.	
		Ottline diag.test	<mode></mode>			
			25% step response		4.6.2.2.	
			Pneumatic span		4.6.2.3.	
			Pneumatic drift		4.6.2.4.	
			S-valve signature		4.6.2.5.	
			PST (offline)		4.6.11	
1	1	L	1	1	l	

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Extended Menu	Diag. & Alarms	Alarm setup	Position alarm		
			Deviation alarm		
			Temperature alarm		
			High sup-pres. AL		4.5.2.
			Low sup-pres. AL		
			Pressure failure		
			Error/Alarm clear		
		NAMUR status sel.	Position alarm NAMUR status		
			Deviation alarm NAMUR status		
			Temperature alarm NAMUR sta	us	45.0
			High sup-pressure NAMUR sta	us	4.5.3.
			Low sup-pressure NAMUR stat	JS	
		Diag.test data	25% step response		
			Step res. sav e		
			Pneumatic span		
			Pneu. span save		
			Pneumatic drift		4.6.3
			Pneu. drift save		
			S-valve signature		
			S-valve sig. save		
			<pst. alarm="" result=""></pst.>		

1st hierarchy	2nd hierarchy	3rd hierarchy	4th hierarchy	5th hierarchy	6th hierarchy	reference (chapter)
Diagnosis A	Varm status					5.1.
Root Menu <	Total Stroke>					
<	<total change="" direction=""></total>					
<	Total time>					
<	<low position="" time=""></low>					
	<low percentage="" position="" time=""></low>					
<	<maximum tamperature=""></maximum>					
<	<minmum tamperature=""></minmum>					
Di	Diagnosis Extended Menu	Online diag.setup	Total Stroke Setting			5.2.
			Total Dir. Change Setting			-
			Low Position Setting			
			Max/Min Temp. Setting			4.6.1.1.
			Partial stroke T.			
			Diag. log clear			5.2.1.
		Offline diag.set.	25% step response			5.3.2.
			Pneumatic span			5.3.3.
			Pneumatic drift			5.3.4.
			S-valve signature			5.3.5.
		Offline diag.test	25% step response			5.3.2.
			Pneumatic span			5.3.3.
			Pneumatic drift			5.3.4.
			S-valve signature			5.3.5.
			PST (offline)			4.6.1.1.
		Advanced Diagnostics	Valve signature	Configuration and Exection		
				View Graph		
				Clear Graph Data		5.5.1. 
				<position></position>		
				<p-out1></p-out1>		
				<p-out2></p-out2>		
		Alarm setup	Position alarm			-
			Deviation alarm			
			Temperature alarm			
			High sup-pres. AL			5.6.1.
			Low sup-pres. AL			
			Pressure failure			
			Error/Alarm clear			
R						*****

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Diagnosis Extended	NAMUR status sel.	Position alarm NAMUR status			
		Deviation alarm NAMUR status			
		Temperature alarm NAMUR status			
		High sup-pressure NAMUR status			5.7.
		Low sup-pressure NAMUR status			
	Diag.test data	25% Step response			
		Step res. sav e			
		Pneumatic span			
		Pneu. span save			
		Pneumatic drift			5.4
		Pneu. drift save			
		S-valve signature			
		S-valve sig. save			
	-	<pst. alarm="" result=""></pst.>			

# A) APPENDIX / Flow chart of settings procedure

In case of the purchase of a control valve with the positioner, settings described in this section are completed at the factory. Accordingly, it is not necessary to repeat the settings. However, if the positioner is specified on the order or it is separated from the control valve for maintenance, if necessary, perform the setting according to the following procedure.



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