



# Operation Manual

## PRODUCT NAME

**Standby E/P Regulator  
(Air Management System/ELECTRO-PNEUMATIC  
REGULATOR)**

## MODEL / Series / Product Number

**ITV2050-IL20- \* - \* -X399**

**ITV2050-IL30- \* - \* -X399**

**ITV3050-IL40- \* - \* -X399**

**ITV3050-IL60- \* - \* -X399**

**SMC Corporation**

# CONTENTS

Contents	P1
Safety instructions	P2
Handling precautions	P4
IO-Link Specifications	P6
Setting using buttons	P21
Key locking function	P22
Operation Mode / Standby Mode setting	P23
Reset function	P24
Error indicating function	P25
Detail setting mode	P26
Gain setting	P27
Sensitivity setting	P28
Zero clear	P29
Pressure display unit	P30
Pressure Ramp Up Duration	P31
Solenoid valve stop time	P32
Initialize	P33
LED display	P34
Maintenance	P35



# E/P Regulator Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of “Caution,” “Warning” or “Danger.” They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC)\*1), and other safety regulations.

\*1) ISO 4414: Pneumatic fluid power -- General rules relating to systems.

ISO 4413: Hydraulic fluid power -- General rules relating to systems.

IEC 60204-1: Safety of machinery -- Electrical equipment of machines. (Part 1: General requirements)

ISO 10218-1: Robots and robotic devices - Safety requirements for industrial robots - Part 1: Robots.



## Caution

**Caution** indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.



## Warning

**Warning** indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.



## Danger

**Danger** indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.



## Warning

### 1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.

Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results.

The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product.

This person should also continuously review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

### 2. Only personnel with appropriate training should operate machinery and equipment.

The product specified here may become unsafe if handled incorrectly.

The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

### 3. Do not service or attempt to remove product and machinery/equipment until safety is confirmed.

1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.

2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.

3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

### 4. Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.

2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalog.

3. An application which could have negative effects on people, property, or animals requiring special safety analysis.

4. Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.



# E/P Regulator Safety Instructions

## Caution

### **1. The product is provided for use in manufacturing industries.**

The product herein described is basically provided for peaceful use in manufacturing industries. If considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary.  
If anything is unclear, contact your nearest sales branch.

## **Limited warranty and Disclaimer/Compliance Requirements**

The product used is subject to the following “Limited warranty and Disclaimer” and “Compliance Requirements”.

Read and accept them before using the product.

### **Limited warranty and Disclaimer**

1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first. □2)

Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.

2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.

This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.

3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.

2) Vacuum pads are excluded from this 1 year warranty.

A vacuum pad is a consumable part, so it is warranted for a year after it is delivered.

Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

### **Compliance Requirements**

**1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction(WMD) or any other weapon is strictly prohibited.**

**2. The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulation of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.**

## Caution

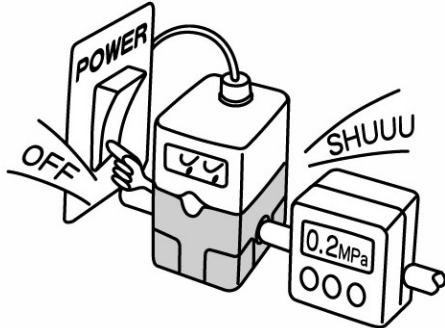
**SMC products are not intended for use as instruments for legal metrology.**

Measurement instruments that SMC manufactures or sells have not been qualified by type approval tests relevant to the metrology (measurement) laws of each country.

Therefore, SMC products cannot be used for business or certification ordained by the metrology (measurement) laws of each country.

## Handling precautions

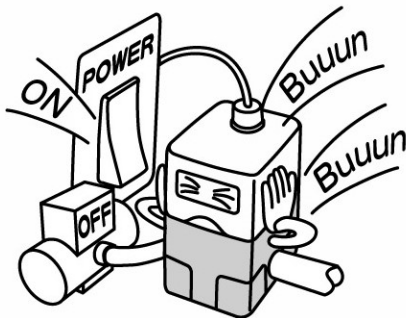
### ⚠ Caution



If the power supply to this product is turned off due to a power failure during operation, the output on the secondary side depends on the specifications.

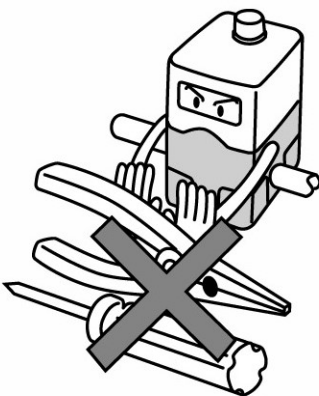
Normal close specification:  
The output pressure is held.

Normal open Specification:  
Supply pressure minus 0.1 MPa or more pressure continues to flow out.



If supply pressure to this product is interrupted or shut off, while the power is still on, the internal solenoid valve will continue to operate and a humming noise will be generated.

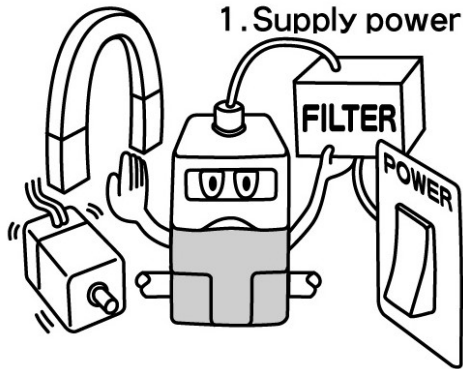
Since it may greatly affect the life of the built-in solenoid valve, when shutting off the supply pressure, turn off the power of this product or set the Solenoid Valve stop time.



This product is adjusted to specification at the time of shipment from the factory.

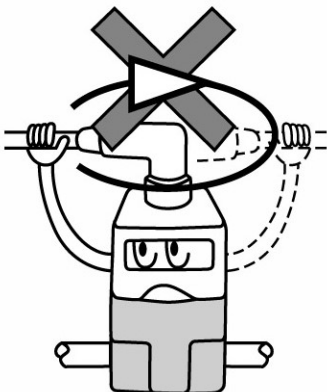
Avoid careless disassembly or removal of parts, as this can lead to malfunction.

**! Caution**



Take the following steps to avoid malfunction due to noise.

1. Install a line filter etc. to the AC power line to reduce / eliminate power supply noise.
2. Avoid malfunction due to noise by installing this product and its wiring away from strong electric fields, such as those of motors and power cables, etc.
3. Be sure to implement protective measures against load surge for inductive loads (solenoid valves, relays etc.).
4. Turn off the power supply before inserting or removing the connector.



Please note that the right angled cable connector does not rotate and is limited to only one entry direction.

# IO-Link Specifications

## ■ Outline of IO-Link functions

### ○ Communication Function

This product can check the pressure adjustment and diagnostic information using cyclic data communication via the IO-Link system.

### ○ Product status monitoring function

This function monitors the product status via the IO-Link communication.

- Multiple errors (e.g. internal hardware errors) can be detected.
- Multiple alarms can be detected (e.g., low pressure, over-voltage).
- Multiple notifications can be detected (e.g., specified operation cycle of the solenoid valve has been reached).
- Multiple notification states (reaching the set accumulated energizing time) can be detected.

### ○ Output of fault status

The output status (Hold/Clear) when a communication error occurs can be set.

### ○ Data storage function

The data storage function stores the IO-Link device parameter settings to the IO-Link master.

With the IO-Link data storage function, the IO-link device can be replaced easily without re-setting the equipment construction or setting parameters.

When the device parameters are set and downloaded to the device using the IO-Link setting tool, the parameters in the downloaded device will be activated. After that, these parameters are uploaded to the data storage in the master by stem command (back-up communication command).

When the device is replaced with the same type of IO-Link device due to failure, the parameter settings stored in the master are download automatically, device can be operated with the parameter settings of the previous device.

Three levels of back up can be set for each port of the master device ("Disabled," "back-up/restore," and "restore").

"Back-up" implies the activation of upload and "restore" implies download.

## ■Communication specifications

Item	Specifications
Communication	IO-Link V1.1
IO-Link type	Device
IO-Link port type	Class A
Communication speed	230.4kbps (COM3)
Message type(Pre-Operate)	TYPE_0
Message type (Operate)	TYPE_2_V (On-Request Data = 1octet = 1byte)
Service data(ISDU)	Available
Data storage function (DS)	Available
Block parameters	Available
Event	Available
Process data input(PDin: Sent from device)	6bytes
Process data output(PDout: Sent from master)	4bytes
Minimum cycle time(MinCycleTime)	2.5ms

## ■Process data

Process data is the cyclic data which is exchanged periodically between the base module and device.

Process data consists of PD\_IN (process data input); 4 BYTE and PD\_OUT (process data output); 2 BYTE as shown below.

- The process data of this product is Big-Endian type.

When the transmission method of the upper communication is Little-Endian type, the BYTE order will be changed.

Refer to the table below for the Endian type of the major upper communication.

Endian type	Upper communication protocol
Big-Endian type	PROFIBUS and PROFINET
Little-Endian type	EtherNET/IP, EtherCAT and CC-Link IE Field.

## Process data input: 6 BYTE (device (ITV) --> base module)

Byte No. (Order)	Bit No. (Order)							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Output pressure [High byte]							
1	Output pressure [Low byte]							
2	(Reserved): Not required.							
3	(Reserved): Not required.							
4	Diagnostic information [High byte]							
5	Diagnostic information [Low byte]							



## Output pressure

Output pressure of the product is sent.

0								1								BYTE
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Bit
Output pressure(16Bit)															Value	

## Monitoring of output pressure

The output pressure can be monitored by the PLC receiving the output data from the regulator where the output pressure is 16-Bit.

<Relation between the output pressure value (16-Bit) and output pressure>

Output pressure	0x0000	0x02BC
Output pressure	0kPa	700kPa

(Ex.) When the output pressure is 700kPa, the set pressure value is 0x02BC.

## Diagnostic information

This product can detect the device error by diagnostic Bit in the process data.

Byte No.	Bit No.	Item	Applicable event code	Details
4	Bit 15	Error	-	ON with any of Bits 11 to 14 of Byte 4 Set, otherwise 0.
	Bit 14	Memory error	0x1810	Occurs on memory error.
	Bit 13	System error	0x1811	Occurs when a system error .
	Bit 12	Solenoid valve error	0x1812	Occurs when a solenoid valve error .
	Bit 11	Internal communication error	0x1813	Occurs when an internal communication error .
	Bit 10	Alarm generation	-	Bit 8~9 of Byte 4 and Bit 7~4 of Byte 5 It is set when any of them is ON, otherwise it is 0.
	Bit 9	Excessive power supply voltage	0x5110	Occurs when the power supply voltage exceeds the specification.
	Bit 8	Low power supply voltage	0x5111	Occurs when the power supply voltage is below specification.
5	Bit 7	Excessive output pressure	0x8C10	Occurs when the output pressure is exceeded.
	Bit 6	Low output pressure	0x8C30	Occurs when the output pressure is too low.
	Bit 5	Over target pressure	0x1820	Occurs when the target pressure exceeds the specification range.
	Bit 4	Residual pressure error	0x1821	Occurs when performing zero clear while residual pressure remains.
	Bit 3	Accumulated energizing time reached	0x1830	Occurs when the accumulated time reaches the set value.
	Bit 2	Pressure setting error notification	0x1831	Notifies you when the pressure setting is abnormal.
	Bit 1	Standby reached	-	Occurs when reaching standby mode.
	Bit 0	SSC1	-	Occurs when the output pressure is within $\pm 10\%$ F.S. of the target pressure.

**Process data output: 4 BYTE (base module --> device (ITV))**

This product uses process data to switch between Operation Mode and Standby Mode, and to set Control Stop.

Byte No. (Order)	Bit No. (Order)							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Standby command [Bit 0] and Control Stop [Bit 1]							
1	(Reserved): Not required.							
2	(Reserved): Not required.							
3	(Reserved): Not required.							

• Standby command (Bit 0):

Transitions to standby mode when Bit 0 of BYTE0 detects a High (True) level, and transitions to operation mode when a Low (False) level is detected.

• Control Stop (Bit 1):

When Bit 1 of BYTE0 detects a Low (False) level, the pressure target value is set to zero regardless of the state of operation/standby pressure ramp up duration, and pressure control is forcibly stopped.

If the Pressure Ramp Up Duration is not reached or returns from Low (False) to High (True) during operation mode, Start the Pressure Ramp Up Duration from the beginning.

■ IO-Link parameter setting

● IODD file

IODD (I/O Device Description) is a definition file which provides all properties and parameters required for establishing functions and communication of the device.

● Service data

The tables below indicate the parameters which can be read or written by simple access parameter (direct parameters page) and ISDU parameters which are applicable to various parameters and commands.

**Direct parameters page 1**

Address	Access	Parameter name	Default (decimal number)
0x07	R	Vendor ID	0x0083(131)
0x08			
0x09	R	Device ID	0x0271(625)
0x0A			
0x0B			

## ISDU parameters

ISDU		Access *1	Parameter name	Data storage *2	Value
Index (decimal number)	Subindex				
0x0002 (2)	0	W	System Command	N	For more details, refer to "System command." (Page 11)
0x000C (12)	0	R/W	Device Access Locks	N	For more details, refer to "Device access lock parameter." (Page 11)
0x0010 (16)	0	R	Vendor Name	N	SMC Corporation
0x0011 (17)	0	R	Vendor Text	N	www.smcworld.com
0x0012 (18)	0	R	Product Name	N	AMS-ITV
0x0013 (19)	0	R	Product ID	N	AMS-IL
0x0014 (20)	0	R	Product Text	N	AMS-ITV
0x0015 (21)	0	R	Serial Number	N	"xxxxxxxx" *3
0x0016 (22)	0	R	Hardware Revision	N	HW-Vx.y *4
0x0017 (23)	0	R	Software Revision	N	FW-Vx.y *4
0x0018 (24)	0	R/W	Application Specific Tag	Y	***** ***** *5
0x0024 (36)	0	R	Device Status	N	For more details, refer to "Device status parameter." (Page 12)
0x0025 (37)	1..11	R	Detailed Device Status	N	For more details, refer to "Device details status parameter." (Page 12)

\*1: R means Read and W means Write.

\*2: Y is included in data storage, N is not included in data storage.

\*3: 8 octets fixed character string.

\*4: "x" represents a major revision number. "y" represents a minor revision number.

\*5: Character string of 16 to 32 octets.

### System command (Index 0x02)

In the ISDU index 0x02 System Command, the command shown in the table below will be issued.

The button of each system command is displayed on the IO-Link setting tool (excluding "Param Download Store").

Click the button to send the system command to the E-P regulator.

This is system command configuration.

Command (decimal number)	Command name	Details
0x05 (5)	Param Download Store	Back-up of the parameter set data. When the electro-pneumatic regulator receives a command, it starts uploading the parameter settings to the master.
0x80 (128)	Device reset	Corresponds to power ON/OFF. Restart the system.
0x81 (129)	Application reset*1	Reset function Reset the Operation / standby mode and key lock function.
0x82 (130)	Restore factory settings*2	Initialization function. All parameter settings are returned to the factory settings. All settings are cleared.
0xA0 (160)	Zero Clear*3	Execute a zero-clear function.

\*1 to 3: Same definition as button operation.

### Device access lock parameter(Index : 0x0C)

Refer to device access lock conditions below.

Data type : 16Bit Record

Bit	Details
0	Not supported.
1	1: Data storage write access denied 0: No lock, data storage available
2	Not supported.
3	1: Key locked. (It is linked with the key lock of button operation.) 0: Key lock de-activated (It is linked with the key lock of button operation.)
4-15	Not supported.

**Key-lock:**

Performs the key lock using button operation.

When the keys are locked, setting changes or restoration by data storage (rewriting of parameter settings) through communication can still be performed.

**Lock the data storage:**

ITV data storage function" is disabled by locking the "Data storage".

In this case, access is rejected for data storage backup (reading of parameter settings) and restoration (rewriting of parameter settings).

**Device status parameter (Index:0x24)**

Readable device status is as follows.

Data type: 8-Bit UInteger

Value	Definition of status	Details
0	operation	-
1	Maintenance is required	Notification is occurring
2	Out of spec.	Warning
3	Check the functionality.	Not supported.
4	Failure	Abnormal

**Device details status parameter (Index:0x25)**

Event details of the readable device status are as follows.

Subindex	Event	Event class		Event code
		Definition	Value	
1	EEPROM error	Error	0xF4	0x1810
2	Internal system error	Error	0xF4	0x1811
3	Built-in solenoid valve error	Error	0xF4	0x1812
4	Internal communication error	Error	0xF4	0x1813
5	Excessive power supply voltage error	Warning	0xE4	0x5110
6	Low power supply voltage error	Warning	0xE4	0x5111
7	Pressure value over range error	Warning	0xE4	0x8c10
8	Pressure value under range error	Warning	0xE4	0x8c30
9	Target value over range error	Warning	0xE4	0x1820
10	Residual pressure error	Warning	0xE4	0x1821
11	Notification of the accumulated energizing time reached	Notification	0x54	0x1830
12	Pressure setting error notification	Notification	0X54	0x1831

## Product individual parameters

Index (decimal number)	Subindex	Access *1	Parameter name	Data type *2	Initial value	Data storage *3	Details
0x40 (64)	0	R/W	Pressure display unit	U8	{0}	Y	Setting value of pressure display unit
0x41 (65)	0	R/W	Hold/clear	U8	{1}	Y	Pressure control setting when an IO-Link communication error occurs. When {0} is set, output pressure is cleared. When {1} is set, output pressure is held.
0x42 (66)	0	R/W	Gain	U8	{9}	Y	The gain for the electro-pneumatic regulator can be adjusted in the range from 0 to 15.
0x43 (67)	0	R/W	Sensitivity	U8	{2}	Y	The sensitivity of the electro-pneumatic regulator can be adjusted in the range from 0 to 7.
0x48 (72)	0	R	Accumulated energizing time	U32	{0}	Y	Displays accumulated energizing time.
0x49 (73)	0	R/W	Notification setting of the accumulated energizing time	U32	{0}	Y	Set notification of the accumulated energizing time.
0xA0 (160)	0	R	Product number	STR64	{Product number}	N	Displays the product number.
0x4A (74)	0	R/W	Operation Mode (PS1)	U16	{0}	Y	Operation mode command pressure PS1 Set pressure 0 to 1050 (fixed kPa)
0x4B (75)	0	R/W	Standby mode (PS2)	U16	{0}	Y	Standby mode command pressure PS2 Set pressure 0 to 1050 (fixed kPa)
0x4D (77)	0	R/W	Solenoid Valve Stop Time	U8	{0}	Y	Setting Solenoid Valve Stop Time Setting range 0~99(%)
0x52 (82)	0	R/W	Pressure Ramp Up Duration	U16	{0}	Y	Setting the Pressure Ramp Up Duration Setting range 0~1500(0.1 second unit)

\*1: R means Read and W means Write.

\*2: Refer to the table below for the symbol.

Symbol	Data type (IO-Link standard)	Data length Bit [BYTE]	Description
U8	UIntegerT	8 [1]	Unsigned integer (unsigned integer)
U16		16 [2]	
U32		32 [4]	
STR64	StringT	-	Up to 64-BYTE character string (String)

\* 3 “Y” indicates that the parameter setting data is saved to the master, and “N” indicates that the parameter is not saved.

### Pressure setting method

This product switches the switching flag on the process data using the set value (INDEX: 0x4A) of operation mode (PS1) and the set value (INDEX: 0x4B) of standby mode (PS2). , It will adjust the pressure.

Values outside the specification range will be recognized as large values and cause Er1, so please do not use them.

<Relationship between the set pressure (16-Bit) and output pressure>

Set pressure	0x0000	0x02BC
Output pressure	0kPa	700kPa

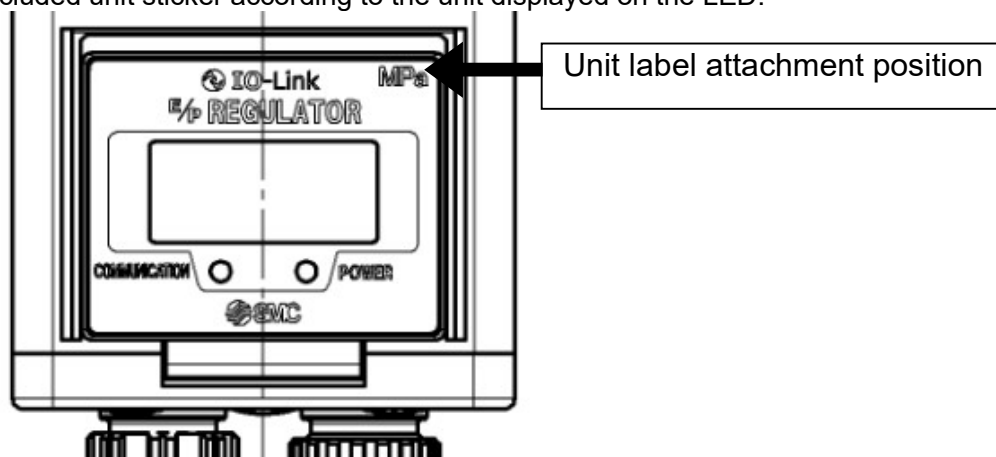
(Example) When the set pressure value is 0x02BC, the output pressure is adjusted to 700kPa.

See page 9 for process data details.

<b>Parameter index</b>	<b>0x40</b>																											
<b>Parameter name</b>	<b>Setting the pressure display unit</b>																											
<b>Function</b>	This is the unit setting for displaying the output pressure on the LED. The product number determines if only SI units are valid, or all units are valid ITV*050-IL*0*-*K-X399: Valid for all units ITV*050-IL*0*-*M-X399: Valid for SI units only																											
<b>Bit</b>	<b>Bit 3</b>																											
<b>Value</b>	ITV*050-IL*N*-*K-X399  <table border="1"> <tr> <td><b>Bit</b></td> <td><b>Value</b></td> <td><b>Unit</b></td> </tr> <tr> <td>※</td> <td>0</td> <td>MPa</td> </tr> <tr> <td></td> <td>1</td> <td>kPa</td> </tr> <tr> <td></td> <td>2</td> <td>bar</td> </tr> <tr> <td></td> <td>3</td> <td>PSI</td> </tr> <tr> <td></td> <td>4</td> <td>kgf/cm<sup>2</sup></td> </tr> </table> ITV*050-IL*N*-*M-X399  <table border="1"> <tr> <td><b>Bit</b></td> <td><b>Value</b></td> <td><b>Unit</b></td> </tr> <tr> <td>※</td> <td>0</td> <td>MPa</td> </tr> <tr> <td></td> <td>1</td> <td>kPa</td> </tr> </table>	<b>Bit</b>	<b>Value</b>	<b>Unit</b>	※	0	MPa		1	kPa		2	bar		3	PSI		4	kgf/cm <sup>2</sup>	<b>Bit</b>	<b>Value</b>	<b>Unit</b>	※	0	MPa		1	kPa
<b>Bit</b>	<b>Value</b>	<b>Unit</b>																										
※	0	MPa																										
	1	kPa																										
	2	bar																										
	3	PSI																										
	4	kgf/cm <sup>2</sup>																										
<b>Bit</b>	<b>Value</b>	<b>Unit</b>																										
※	0	MPa																										
	1	kPa																										

※indicates the initial shipping value.

After changing the unit, affix the included unit sticker according to the unit displayed on the LED.





<b>Parameter index</b>	<b>0x41</b>		
<b>Parameter name</b>	<b>Hold/Clear setting</b>		
<b>Function</b>	Sets the output setting when communication error occurs. 0: Exhaust completely (Clear). 1: Output pressure is maintained (Hold). Default value: Hold		
<b>Bit</b>	<b>Bit 0</b>		
<b>Value</b>	<b>Bit</b>	<b>0</b>	<b>Setting</b>
	*	<b>0</b>	<b>Clear</b>
		<b>1</b>	<b>Hold</b>

\* indicates the initial shipping value.

<b>Parameter index</b>	<b>0x42</b>					
<b>Parameter name</b>	<b>Gain tuning function</b>					
<b>Function</b>	The response time can be changed by tuning the gain. When the gain is increased, the response time tends to be faster, but stability will be lost, which may cause hunting (unstable pressure). Default: Gain 9					
<b>Bit</b>	<b>Bit 3, 2, 1, 0</b>					
<b>Value</b>	<b>Bit</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>Setting</b>
		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>Gain 0</b>
		<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>Gain 1</b>
		<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>Gain 2</b>
		<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>Gain 3</b>
		<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>Gain 4</b>
		<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>Gain 5</b>
		<b>0</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>Gain 6</b>
		<b>0</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>Gain 7</b>
		<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>Gain 8</b>
		*	<b>1</b>	<b>0</b>	<b>0</b>	<b>Gain 9</b>
			<b>1</b>	<b>0</b>	<b>1</b>	<b>Gain A</b>
			<b>1</b>	<b>0</b>	<b>1</b>	<b>Gain B</b>
			<b>1</b>	<b>1</b>	<b>0</b>	<b>Gain C</b>
			<b>1</b>	<b>1</b>	<b>0</b>	<b>Gain D</b>
			<b>1</b>	<b>1</b>	<b>1</b>	<b>Gain E</b>
		<b>1</b>	<b>1</b>	<b>1</b>	<b>Gain F</b>	

\* indicates the initial shipping value.

<b>Parameter index</b>	<b>0x43</b>					
<b>Parameter name</b>	<b>Sensitivity tuning function</b>					
<b>Function</b>	Changing the sensitivity will change the pressure correction operation near the set pressure point. When the sensitivity is increased, hunting may occur. When the sensitivity is decreased, hunting will be reduced, but the pressure correction will be reduced, so there may be a moderate pressure instability. Default value : Sensitivity 0					
<b>Bit</b>	<b>Bit 2, 1, 0</b>					
<b>Value</b>	<b>Bit</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>Setting</b>	
		<b>0</b>	<b>0</b>	<b>0</b>	<b>Sensitivity -</b>	
		<b>0</b>	<b>0</b>	<b>1</b>	<b>Sensitivity -</b>	
		*	<b>0</b>	<b>1</b>	<b>0</b>	<b>Sensitivity 0</b>
		<b>0</b>	<b>1</b>	<b>1</b>	<b>Sensitivity 1</b>	
		<b>1</b>	<b>0</b>	<b>0</b>	<b>Sensitivity 2</b>	
		<b>1</b>	<b>0</b>	<b>1</b>	<b>Sensitivity 3</b>	
		<b>1</b>	<b>1</b>	<b>0</b>	<b>Sensitivity 4</b>	
		<b>1</b>	<b>1</b>	<b>1</b>	<b>Sensitivity 5</b>	

\* indicates the initial shipping value.

<b>Parameter index</b>	<b>0x48 (energizing time)</b>
<b>Parameter name</b>	<b>Energizing time</b>
<b>Function</b>	Displays the accumulated energizing time of the electro pneumatic regulator. Please note that the number indicates hours and is refreshed every hour.
<b>Bit</b>	<b>Bit 31 to 0</b>
<b>Value</b>	If the Bit are <b>1111 1111 1111 1111 1111 1111 1111 1111</b> , this indicates approximately <b>4 billion hours</b> .

\* Default value is 0.

<b>Parameter index</b>	<b>0x49 (Notification setting of accumulated energizing time)</b>
<b>Parameter name</b>	<b>Notification setting of the accumulated energizing time</b>
<b>Function</b>	This function uses process data to notify the user that the accumulated energizing time of the electro-pneumatic regulator reached the time set with this function. The default value is "0," which means no notification is output. If a value is "1" or greater, the notification setting is enabled.
<b>Bit</b>	<b>Bit 31 to 0</b>
<b>Value</b>	<b>Setting the Bit to 1111 1111 1111 1111 1111 1111 1111 1111 sets it to approximately 4 billion hours.</b> <b>Setting the Bit to 0000 0000 0000 0000 0010 0010 0011 1000 sets it to approximately 8,760 hours (equivalent to 1 year: 24 hours x 365 days).</b>

\* The default value is "0," which means that the notification is disabled.

<b>Parameter index</b>	<b>0xA0 (Product number)</b>
<b>Parameter name</b>	<b>Product number</b>
<b>Function</b>	Displays the product number of the electro-pneumatic regulator.
<b>Bit</b>	<b>BYTE 64 (Maximum)</b>
<b>Value</b>	<b>The Bits 49 54 56 32 30 35 30 2D 49 4C 33 30 2D 31 2D 4B 2D 58 33 39 39 (hexadecimal number) indicate "ITV2050-IL30-1-K-X399."</b> (ASCII code)

<b>Parameter index</b>	<b>0x4A</b>
<b>Parameter name</b>	<b>Operation Mode (PS1)</b>
<b>Function</b>	When the process data output switching flag (BIT 0 of BYTE0) detects a Low (False) level, the mode transitions to operation mode and the pressure is regulated to the value set by this
<b>Bit</b>	<b>Bit 15~0(2BYTE)</b>
<b>Value</b>	Adjustable from 0x0000 to 0x02BC. 0x0000=0kPa, 0x02BC=700kPa. It is not linked with the display unit.

※indicates the initial shipping value.

In addition, the program can be set up to 0x41A = 1050kPa.

<b>Parameter</b>	<b>0x4B</b>
<b>Parameter</b>	<b>Standby Mode (PS2)</b>
<b>Function</b>	When the process data output switching flag (BIT 0 of BYTE0) detects the level of High (True), it transitions to standby mode and the pressure is adjusted to the pressure set by this parameter.
<b>Bit</b>	<b>Bit 15~0(2BYTE)</b>
<b>Value</b>	Adjustable from 0x0000 to 0x02BC. 0x0000=0kPa, 0x02BC=700kPa. It is not linked with the display unit.

※indicates the initial shipping value.

In addition, the program can be set up to 0x41A = 1050kPa.

<b>Parameter index</b>	<b>0x4D</b>
<b>Parameter name</b>	<b>Set value of Solenoid Valve Stop Time</b>
<b>Function</b>	This function reduces operation of the solenoid valves when the supply pressure is insufficient.
<b>Bit</b>	<b>Bit 7~0(1BYTE)</b>
<b>Value</b>	It can be set from 0% to 99% (of 100 seconds). If the value is 0, the operating duration reduction is 0% and this function is disabled. In the case of 99, the operating duration is reduced by 99%.

※The initial value is "0" and is disabled.

<b>Parameter index</b>	<b>0x52</b>
<b>Parameter name</b>	<b>Pressure Ramp Up Duration setting</b>
<b>Function</b>	This function gradually changes the command value in the set time when shifting from power ON to operation mode, from standby mode to operation mode or from isolation mode to operation mode. Even if the output pressure is higher than the set pressure during the transition time of the set pressure, the exhaust operation will
<b>Bit</b>	<b>Bit 15~0(2BYTE)</b>
<b>Value</b>	It can be set in units of 0.1 seconds from 0 to F00 (1500). (1=0.1sec)

※The initial value is "0" and is disabled.

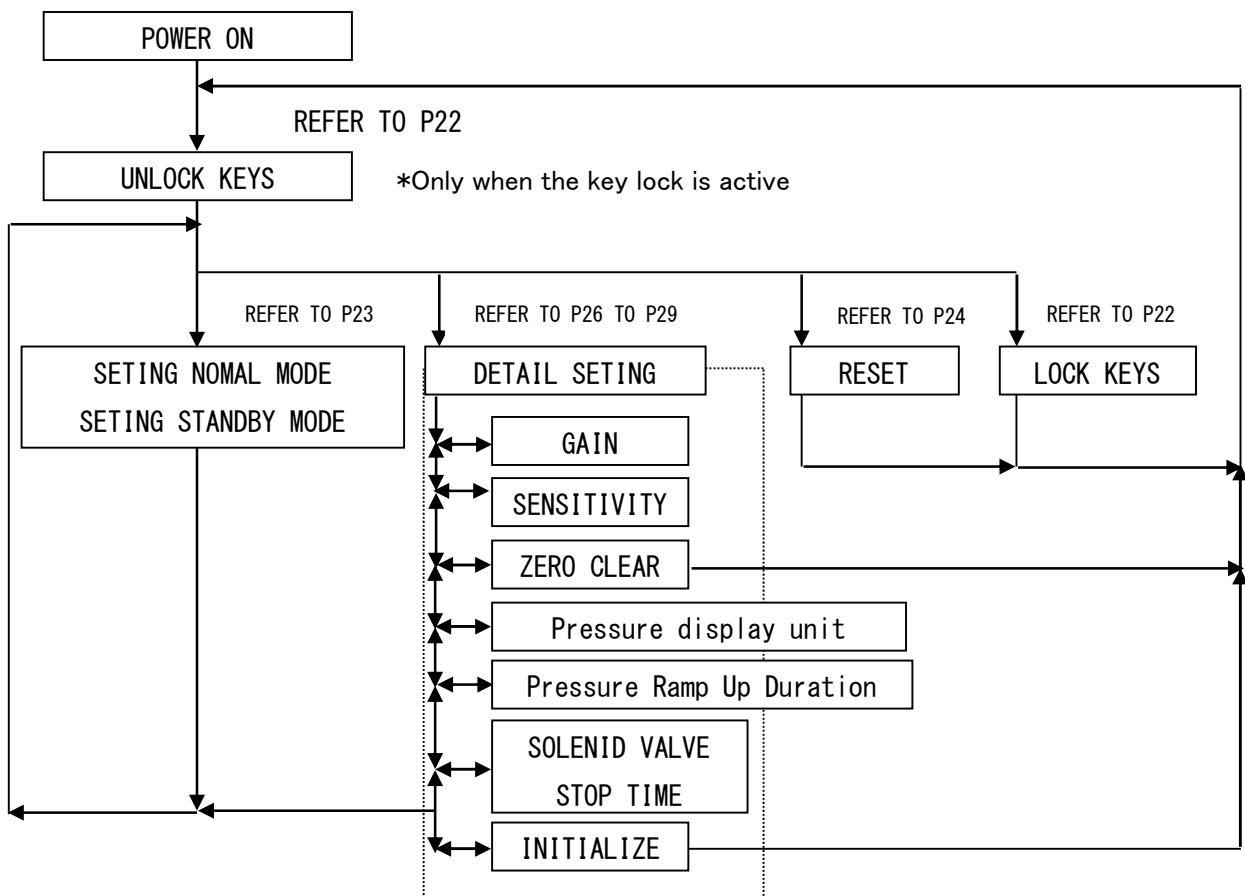
※indicates the initial shipping value.

# Setting using buttons

## ⚠ Caution

- (1) If the incorrect key is pressed or incorrect information is displayed during setting, power must be shut off and the procedure started again.
- (2) When you press the S key after completing the value setting for operation mode and standby mode, the operation will start immediately, so be careful when doing so. We recommend operation without supply pressure.
- (3) Even if no signal is input, if pressure is supplied to the primary side, the pressure set in each mode will be output to the secondary side, so be careful. However, please note that for the NO type, when the power is turned off, the pressure equal to the supply pressure minus 0.1 MPa will be output.
- (4) Output pressure from this product and state of operation are changed by changing of each setting and function. Each setting and function should be operated by trained and experienced operator.
- (5) Do not configure settings using the button operation and IO-Link communication at the same time. If settings are made by both methods, unintended settings may be configured.

### Flow of the setting



(Note 1): Please refer to each contents about operation method.

## Key locking function

### Caution

The key lock function is preserved in the EEPROM (non-volatile memory). Its settings are reflected even after power cycling. (The key lock is deactivated by default at shipment). This setting interlocks with the key lock for the IO-Link parameter: Device access lock (Index 12) and can also be set via IO-Link. However, when buttons are operated, the button operations take priority and the settings via IO-Link are processed exclusively.

### Unlocking the keys

No	Key operation	LED Display
(1)		(current) pressure is displayed
(2)	Press ▽ key for 2 seconds or more.	$\overline{L} \square \square$ is displayed
(3)		$\overline{L} \square \square$ flashes on the display
(4)	Press S-key	
(5)		$\square \square \overline{L}$ is displayed for approx. 1 second
(6)	Key lock is released	(current) pressure is displayed

\*(4) Press △ key to cancel.

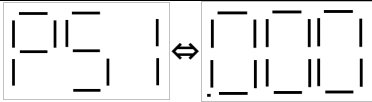
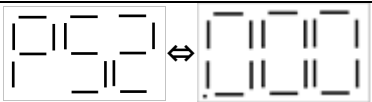
### Locking the keys

No	Key operation	LED Display
(1)		(current) pressure is displayed
(2)	Press △ key for 2 seconds or more.	$\square \square \overline{L}$ is displayed
(3)		$\square \square \overline{L}$ flashes on the display
(4)	Press S-key	
(5)		$\overline{L} \square \square$ is displayed for approx. 1 second
(6)	Keys are locked	(current) pressure is displayed

\*(4) Press ▽ key to cancel.

## Operation Mode / Standby Mode setting

Operation mode set pressure, standby mode set pressure setting method

No	Key operation	LED Display
(1)	Deactivate the key lock if necessary (see page 22).	
(2)	Press S-key	
(3)	Set Operation Mode (PS1) set pressure by using the $\Delta$ and $\nabla$ keys.	 (displayed alternately) *Adjusting range: Refer to note 1 to 3
(4)	Press S-key	
(5)	Set Standby Mode (PS2) set pressure by using the $\Delta$ and $\nabla$ keys.	 (displayed alternately) *Adjusting range: Refer to note 1 to 3
(6)	Press S-key	Display current pressure
(7)	Activate the key lock if necessary (see page 22).	

(Note1): Pressure can be adjusted from 0 to 700[kPa].

(Note2): The adjustable range is 0 to 700[kPa], but the setting range is 0 to 1050[kPa].

(Note3): The setting range of the LED display changes depending on the pressure display unit.



## Reset function

Clear the operation mode and standby mode settings. Same functionality as via IO-Link.

### Operation

No	Key operation	LED Display
(1)	Deactivate the key lock if necessary (see page 22).	
(2)	Press the $\Delta$ and $\nabla$ keys simultaneously for 3 seconds or more.	(current) pressure is displayed
(3)		$r\text{-}E\text{-}S$ is displayed for approx. 1 second
(4)	The settings are reset and returned to the condition before power was supplied. Activate the key lock if necessary (see page 22).	

### Reset content

Item	Reset content
PS1	0kPa
PS2	0kPa

\*(Note): Gain (GL) and sensitivity (SL) are not reset.

## Error indicating function

Error name	LED display	Contents of error	Countermeasure
System error	E1.2	Reading or writing errors occurred in EEPROM.	Please execute "initialize (refer to P33)" when ITV do not operate normally after restarting the power supply. Please contact us, when ITV do not operate normally after initialize.
	E1.3	Reading and writing errors occurred in memory.	Please contact us when ITV do not operate normally after restarting the power supply.
Solenoid valve error	E1.4	Solenoid valve failure.	Replace the solenoid valve. For the replacement procedure contact SMC.
Residual pressure error	E1.5	Out of range error of zero clear	Please operate "zero clear" within the range of 5%F.S.. Please operate "zero clear" after the secondary pressure of ITV is became to atmosphere.

# Detail setting mode

No	Key operation and LED display
(1)	Deactivate the key lock if necessary (see page 22).
(2)	Press S-key for 2 seconds or more.
(3)	<p>(displayed alternately)</p> <p>Press S-key To "GAIN" (refer to P27)</p> <p>(displayed alternately)</p> <p>Press S-key To "SENSITIVITY" (refer to P28)</p> <p>(displayed alternately)</p> <p>Press S-key To "ZERO CLEAR" (refer to P29)</p> <p>(displayed alternately)</p> <p>Press S-key To "Pressure display unit" (refer to P30)</p> <p>(displayed alternately)</p> <p>Press S-key To "Pressure Ramp Up Duration" (refer to P31)</p> <p>(displayed alternately)</p> <p>Press S-key To "Solenoid Valve Stop Time" (refer to P32)</p> <p>(displayed alternately)</p> <p>Press S-key To "INITIALIZE" (refer to P33)</p>
(4)	In state of 3, press S-key for 2seconds or more.
(5)	Return to (current) pressure display.
(6)	Activate the key lock if necessary (see page 22).

## Gain setting

Interlocked with the IO-Link parameter.

Operation does not require the adjustment of gain.

This product can change the response with this gain setting.

When the gain is changed to larger, the response become quickly, but there is a possibility that stability is lost.

No	Key operation	LED Display
(1)	Deactivate the key lock if necessary (see page 22).	
(2)	Press S-key for 2 seconds or more, then go to detail setting mode.	
(3)	To "F01" by using the $\Delta$ and $\nabla$ keys.	<i>F01</i> $\leftrightarrow$ <i>GL.9</i> (displayed alternately)
(4)	Press S-key.	
(5)	Set the GAIN by using the $\Delta$ and $\nabla$ keys.	<i>GL.9</i> (blink and change the rightest digit)
(6)	Press S-key.	<i>F01</i> $\leftrightarrow$ <i>GL.9</i> (displayed alternately)
(7)	Press S-key for 2 seconds or more, then go out from detail setting mode. (Select the menu with $\Delta$ or $\nabla$ keys, then jump to another item.)	
(8)	Activate the key lock if necessary (see page 22).	

### Relation between setting of gain and response time

Response	Slow $\leftarrow$ $\rightarrow$ Quick												
Setting of GAIN	<i>GL.0</i>	<i>GL.1</i>	<i>GL.2</i>	to	<i>GL.7</i>	<i>GL.8</i>	<i>GL.9</i>	<i>GL.A</i>	<i>GL.B</i>	<i>GL.C</i>	<i>GL.D</i>	<i>GL.E</i>	<i>GL.F</i>

\* Default: *GL.9*

## Sensitivity setting

Interlocked with the IO-Link parameter.

Operation does not require the adjustment of sensitivity.

When the sensitivity is changed, the correction operation of pressure changes.

When the sensitivity is changed to sharp, the hunting of pressure might be occurred. And, when the sensitivity is changed to dull, there is a possibility that staggering of gradual pressure occur, because the pressure correction become lower.

No	Key operation	LED Display
(1)	Deactivate the key lock if necessary (see page 22).	
(2)	Press S-key for 2 seconds or more, then go to detail setting mode.	
(3)	To "F02" by using the $\Delta$ and $\nabla$ keys.	<i>F02</i> $\leftrightarrow$ <i>SL.0</i> (displayed alternately)
(4)	Press S-key.	
(5)	Set the SENSITIVITY by using the $\Delta$ and $\nabla$ keys.	<i>SL.0</i> (blink and change the rightest digit)
(6)	Press S-key.	<i>F02</i> $\leftrightarrow$ <i>SL.0</i> (displayed alternately)
(7)	Press S-key for 2 seconds or more, then go out from detail setting mode. (Select the menu with $\Delta$ or $\nabla$ keys, then jump to another item.)	
(8)	Activate the key lock if necessary (see page 22).	

### Relation between setting and sensitivity

Sensitivity	Sharp $\leftarrow$ $\rightarrow$ Dull							
Setting of sensitivity	<i>SL.-</i>	<i>SL.~</i>	<i>SL.0</i>	<i>SL.1</i>	<i>SL.2</i>	<i>SL.3</i>	<i>SL.4</i>	<i>SL.5</i>

\*Default: *SL.0*

## Zero clear

This function is the same as the function via IO-Link.

The display can be set to zero again by executing "zero clear".

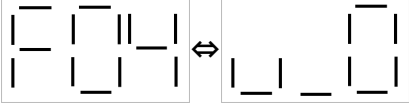
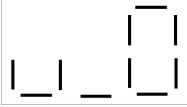
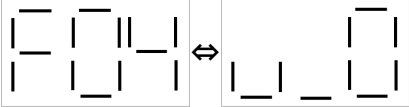
When "zero clear" is executed with residual pressure in the secondary piping, the pressure is assumed to be zero. Please execute the operation of "zero clear" with the supply pressure is intercepted, and the piping of the second side removed.

No	Key operation	LED Display
(1)	Deactivate the key lock if necessary (see page 22).	
(2)	Press S-key for 2 seconds or more, then go to detail setting mode.	
(3)	To "F03" by using the $\Delta$ and $\nabla$ keys.	$F03 \leftrightarrow 0cL$ (displayed alternately)
(4)	Press S-key.	$0cL$ flashes on the display
(5)	Press $\Delta$ and $\nabla$ keys for 3 seconds or more. (press S-key to (3))	$0cL$ is displayed
(6)	"Zero clear" is executed, after 3 seconds. (Release keys till less than 3 seconds to (4))	$0cL$ is displayed for approx. 1 second.
(7)	Returns to the state immediately after turning on of the power supply. Activate the key lock if necessary (see page 22).	

(note): The adjustable range is within  $\pm 5\%$ F.S from the state of the factory shipment. When more than this range,  $Err$  is displayed and zero-clear is not executed.

## Pressure display unit

Same functionality as via IO-Link. It is possible to change the pressure display unit. ITV\*0\*0-IL\*0-\*-M-X399 is from SI units, ITV\*0\*0-IL\*0-\*-K-X399 is from SI units, bar, psi, kgf/cm<sup>2</sup> You can choose.

No	Key operation	LED Display
(1)	Deactivate the key lock if necessary (see page 22).	
(2)	Press S-key for 2 seconds or more, then go to detail setting mode.	
(3)	To "F04" by using the $\Delta$ and $\nabla$ keys.	 (displayed alternately)
(4)	Press S-key.	
(5)	Set Pressure display unit by using the $\Delta$ and $\nabla$ keys.	 (blink and change the rightest digit) *Pressure display unit : refer to note2
(6)	Press S-key.	 (displayed alternately)
(7)	Press S-key for 2 seconds or more, then go out from detail setting mode. (Select the menu with $\Delta$ or $\nabla$ keys, then jump to another item.)	
(8)	Activate the key lock if necessary (see page 22).	

(Note1): Due to the new measurement law, please use only SI units in Japan.

(Note2): The relationship between the LED display by key operation and the pressure display unit setting is as follows.

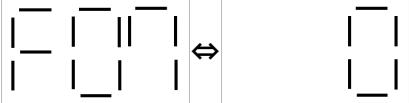
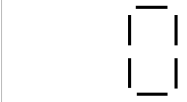
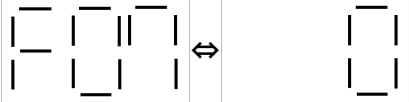
	LED	Pressure display unit
※	U_0	MPa
	U_1	kPa
	U_2	Bar
	U_3	PSI
	U_4	kgf/cm <sup>2</sup>

※is the factory default value.

Only U\_0 and U\_1 can be selected for ITV\*0\*0-IL\*0-\*-M-X399.

## Pressure Ramp Up Duration

Interlocked with the IO-Link parameter.  
Set the time to reach the operation mode set pressure when shifting to operation mode.

No	Key operation	LED Display
(1)	Deactivate the key lock if necessary (see page 22).	
(2)	Press S-key for 2 seconds or more, then go to detail setting mode.	
(3)	To "F07" by using the $\Delta$ and $\nabla$ keys.	 (displayed alternately)
(4)	Press S-key.	
(5)	Set Pressure Ramp Up Duration by using the $\Delta$ and $\nabla$ keys.	 (number changes) ※Setting range : refer to Note 1
(6)	Press S-key.	 (displayed alternately)
(7)	Press S-key for 2 seconds or more, then go out from detail setting mode. (Select the menu with $\Delta$ or $\nabla$ keys, then jump to another item.)	
(8)	Activate the key lock if necessary (see page 22).	

(Note1) : The setting range of Pressure Ramp Up Duration is 0 to 1500 (in units of 0.1 seconds).  
The relationship between the LED display by key operation and Pressure Ramp Up Duration is as follows.

※	LED	Pressure Ramp Up Duration [sec]
	0	0
	1	0.1
	∫	∫
	F00	150

※is the factory default value.

Only the third digit of the LED display is displayed in hexadecimal.

Therefore, "F00" represents "1500" in decimal, and the setting value is in units of 0.1 seconds.

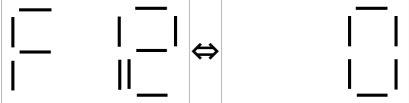
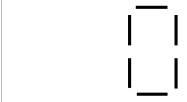
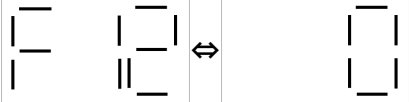
Pressure Ramp Up Duration will be "150 seconds".

If Pressure Ramp Up Duration is 0 (factory default), the function is disabled.



## Solenoid Valve Stop Time

Interlocked with the IO-Link parameter.  
Set the function to prevent overdrive of the solenoid valve when the supply pressure is insufficient.

No	Key operation	LED Display
(1)	Deactivate the key lock if necessary (see page 22).	
(2)	Press S-key for 2 seconds or more, then go to detail setting mode.	
(3)	To "F12" by using the $\Delta$ and $\nabla$ keys.	 (displayed alternately)
(4)	Press S-key.	
(5)	Set Solenoid Valve Stop Time by using the $\Delta$ and $\nabla$ keys.	 (number changes) ※Setting range : refer to Note 1
(6)	Press S-key.	 (displayed alternately)
(7)	Press S-key for 2 seconds or more, then go out from detail setting mode. (Select the menu with $\Delta$ or $\nabla$ keys, then jump to another item.)	
(8)	Activate the key lock if necessary (see page 22).	

(Note1) : The setting range of Solenoid Valve Stop Time is 0 to 99 (in percent units).  
The relationship between the LED display by key operation and Solenoid Valve Stop Time is as follows.

※	LED 表示	Solenoid Valve Stop Time [% of 100 seconds]
	0	0
	1	1
	5	5
	99	99

※is the factory default value.

If the Solenoid Valve Stop Time is set, it will  
Stops the operation of the solenoid valve.

The longer the set Solenoid Valve Stop Time, the longer the stop time of solenoid valve operation.

If the Solenoid Valve Stop Time is 0 (factory default), the function is disabled.

## Initialize

This function is the same as the function via IO-Link.

This is a function to return settings, including internal control constants, to initial values. Only run it if it displays an error and doesn't work at all. If you want to return the pressure setting etc. to the initial value, please execute the reset operation.

No	Key operation	LED Display
(1)	Deactivate the key lock if necessary (see page 22).	
(2)	Press S-key for 2 seconds or more, then go to detail setting mode.	
(3)	To "F99" by using the $\Delta$ and $\nabla$ keys.	$\overline{F99} \leftrightarrow \overline{117}$ (displayed alternately)
(4)	Press S-key.	$\overline{117}$ flashes on the display)
(5)	Press $\Delta$ and S keys for 5 seconds or more. (press S-key to (3))	$\overline{117}$ is displayed
(6)	"Initialize" is executed, after 5 seconds. (Release keys till less than 5 seconds to (4))	Turning off for 1 second
(7)	Returns to the state immediately after turning on of the power supply. Activate the key lock if necessary (see page 22).	

## LED display

The meaning of LED indications are as shown in the table below.

LED label	color	lighting conditions	flashing condition	Lights-out condition
power supply (PWR)	green	Not reaching Pressure Ramp Up Duration or Control Stop	- (not applicable)	Power off
	orange	in operation mode	in standby mode	
communication (COM)	green	IO-Link communication not established	IO-Link communication establishment	Power off

The range of the LED pressure display is different according to the pressure range and the unit of the display.

unit	700kPa range
MPa	.000 to .A00
Kgf/cm <sup>2</sup>	0.00 to A.00
bar	0.00 to A.00
PSI	0 to 150
kPa	0 to A00

(note1): The mark "." is blinking the decimal point, and it is shown a minus.

(note2): The adjustable pressure range of the product is 700kPa, but the LED pressure display range can display up to 1000kPa.

(note3): When the digit overflows, the following of "9" are substituted by "A".

(example: The following of 999(kPa) are displayed as A00(kPa), and it shows 1000 kPa.)

(note4): When the display exceeds the lower bound value, "" is displayed.

(note5): When the display exceeds the upper bound value, "" is displayed.

## Maintenance

- Before performing maintenance, turn off the power supply, stop the air supply, exhaust the residual compressed air in the piping, and verify the release of air.
- Foreign matter caught in the inlet or exhaust piping may interfere with operation. Periodic cleaning is necessary.
- Do not use solvents such as benzene, thinner, etc., to clean the product including the switch cover. Use a soft dry cloth to remove stains.

Refer to the SMC website  
(URL <http://www.smcworld.com>) for more information  
about troubleshooting.  
This operation manual refers to all standard types  
and is partially applicable to special models.

Revision history

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NOTE: Specifications are subject to change without prior notice and any obligation on the part of the manufacturer.  
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