ORIGINAL INSTRUCTIONS

Instruction Manual

Electro-Pneumatic Regulator - IO-Link compatible

*ITV*0*0-IL*****-******** series*

IO-Link

The intended use of the electro-pneumatic regulator is to control the flow and pressure of fluid while connected to IO-Link communication.

1 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: Manipulating industrial robots -Safety. etc.

- Refer to product catalogue, Operation Manual and Handling Precautions for SMC Products for additional information.
- Keep this manual in a safe place for future reference.
- Electromagnetic compatibility:
  This product is class A equipment intended for use in an industrial environment. There may be potential difficulties in ensuring electromagnetic compatibility in other environments due to conducted as well as radiated disturbances.

Caution	Indicates a hazard with a low level of risk, which if not avoided, could result in minor or moderate injury.
Warning	Indicates a hazard with a medium level of risk, which if not avoided, could result in death or serious injury.
Danger	Indicates a hazard with a high level of risk, which if not avoided, will result in death or serious injury.

Warning

- **Always ensure compliance with relevant safety laws and standards.**
- All work must be carried out in a safe manner by a qualified person in compliance with applicable national regulations.
- This product is class A equipment intended for use in an industrial environment. There may be potential difficulties in ensuring electromagnetic compatibility in other environments due to conducted or radiated disturbances.

Caution

- Ensure that the air supply system is filtered to 5 microns.

Refer to the SMC website (URL: https// www.smcworld.com) for more information about safety Instructions.

2 Specifications

2.1 General specifications

Model	ITV*010	ITV*030	ITV*050
Min. supply pressure	(Set pressure) + 0.1 MPa		
Max. supply pressure	0.2 MPa	1.0 MPa	
Set pressure range	0.005 ~ 0.1 MPa	0.005 ~ 0.5 MPa	0.005 ~ 0.9 MPa
Supply voltage	24 VDC±10%		
Current consumption	Max. 120 mA		
Linearity	Max. ±1% F.S.		
Hysteresis	Max. 0.5% F.S.		
Repeatability	Max. ±0.5% F.S.		
Sensitivity	Max. 0.2% F.S.		
Temperature characteristics	Max. ±0.12% F.S./°C		
Operating temperature	0~50°C (without condensation)		
Protection structure	Main unit: IP65, Cable connector: IP67		

2.2 Communication specifications

Protocol	IO-Link
Version	Version 1.1
Communication speed	230.4 kbps (COM3)
IO-Link port	Class A
IO-Link type	Device
Process data length	Input data: 4 BYTE Output data: 2 BYTE (Resolution 12 Bit)
Vendor ID	131 (Dec)
Device ID	537 (Dec)
IODD file *	SMC-ITV-IL-20201112

* Download the latest version of IODD file from the SMC website (URL: https// www.smcworld.com).

Warning

Special products (-X) might have specifications different from those shown in this section. Contact SMC for specific drawings.

3 Installation

3.1 Installation

Warning

Do not install the product unless the safety instructions have been read and understood.

- If the power supply fails, settings are ‘held’ for a short period.
- If the air pressure fails with power ‘on’ the solenoid will ‘flutter’. Turn off the power.
- This product is pre-set at the factory and must not be dismantled by the user. Contact your local SMC office for advice.
- Ensure, when installing this product, that it is kept clear of power lines to avoid noise interference.
- Ensure that load surge protection is fitted when inductive loads are present (i.e. solenoid, relay etc.).
- Ensure precautions are in place if the product is used in a ‘free flow output ’condition. Air will continue to flow continuously.
- Length of connector cable shall be 10 m maximum.

3.2 Environment

Warning

- Do not use in an environment where corrosive gases, chemicals, salt water or steam are present.
- Do not use in an explosive atmosphere.
- Do not expose to direct sunlight. Use a suitable protective cover.
- Do not install in a location subject to vibration or impact. Check the product specifications.
- Do not mount in a location exposed to radiant heat.

3 Installation (continued)

3.3 Piping

Caution

- Before piping make sure to clean up chips, cutting oil, dust etc.
- When installing piping or fittings, ensure sealant material does not enter inside the port. When using seal tape, leave 1 thread exposed on the end of the pipe/fitting.
- Tighten fittings to the specified tightening torque.

3.4 Lubrication

Caution

- Do not use a lubricator on the input side of this product. If lubrication is required, place the lubricator on the ‘output’ side so that it does not enter the product.
- SMC products have been lubricated for life at manufacture, and do not require lubrication in service.
- If a lubricant is used in the system, use turbine oil Class 1 (no additives), ISO VG32. When lubricant is used in the system, the original lubricant applied during manufacturing will be washed away, therefore lubrication must be continued.

4 Wiring

Caution

Connect the cable to the connector on the main unit as shown in the following diagram. Take precautions, as incorrect wiring will damage the unit. Use a DC power supply capable of supplying the necessary power requirements with minimal ripple.

- Do not insert or remove the connector when the power supply is turned ON. It will cause a communication error with the master.

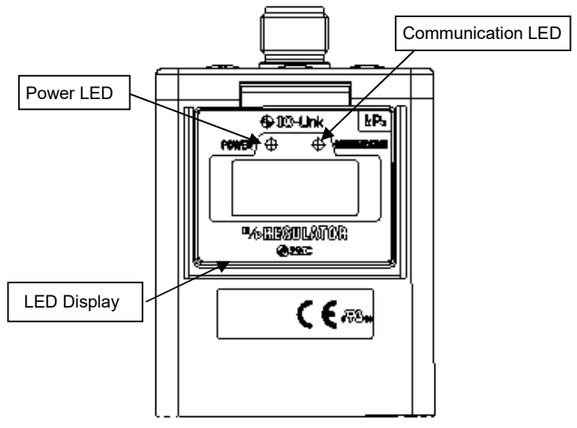
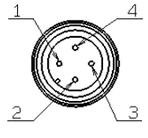


Fig. 1 – Display and Communication



No.	Name	Wire colour	Function
1	Power supply (L+)	Brown	24 VDC
2	N.C.	White	Not connected
3	GND (L-)	Blue	0 V
4	C/Q	Black	IO-Link data

Fig. 2 – Connector pin layout (on product)

5 LED indication

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

LED	ON	Flashing	OFF
Power	Normal operation	Communication system error	Communication EEPROM error / Disconnect the power supply.
Communication	IO-Link communication is not established (SIO mode)	IO-Link communication is established	Disconnect the power supply.

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

Units	ITV*01*	ITV*03*	ITV*05*	ITV209*
MPa	₀020 to .120	₀100 to 600	₀180 to .A80	-
Kgf/cm^2	0₀20 to .120	1₀00 to 6.00	1₀80 to A.80	-
bar	0₀20 to .120	1₀00 to 6.00	1₀80 to A.80	-
PSI	3₀0 to 18.0	14₀0 to 84.0	-26 to 156	-
kPa	-20 to 120	-100 to 600	-180 to A80	16 to -96

Note 1 : The mark "₀" decimal point flashes to indicate a minus.
Note 2): When the digits overflow, the "9" is followed by "A". (example: 999 kPa display is followed by A00 kPa, which represents 1000 kPa).
Note 3): When the display exceeds the lower pressure value, "LLL" is displayed.
Note 4): When the display exceeds the upper pressure value, "HHH" is displayed.

6 Error indication

Error Display	Error Name	Contents of Error
Er.1	Input signal out of range.	Input signal exceeds the rated value range.
Er.2	System error.	Reading or writing error occurred in EEPROM.
Er.3	System error.	Reading or writing error occurred in memory.
Er.4	Solenoid Valve error.	Solenoid valve failure.
Er.5	Residual pressure error.	Zero clear out of range error.

7 Setting

7.1 Pressure and Output setting

- Process data

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

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

7 Setting (continued)

7.2 Process data input: 4 BYTE (device (ITV) to base module)

Bit offset	Item	Note
0	SSC1	Turns ON when the output pressure is within +/-10%F.S. of the set pressure.
1 and 2	Disabled	Not used. The value is not reflected.
3	Diagnostic information (notification)	0: Normal, 1: Notification (defined per Bit) *: Refer to the table for Diagnostic information
4 to 10	Diagnostic information (warning)	0: Normal, 1: Notification (defined per Bit) *: Refer to the table for Diagnostic information
11 to 15	Diagnostic information (abnormal)	0: Normal, 1: Abnormal (defined per Bit) *: Refer to the table for Diagnostic information
16 to 31	Output pressure	No symbol, 16-Bit *: Refer to the table for Output pressure

7.3 Output pressure

The Output pressure of the product can be sent.

- **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 13-Bit (The upper 3 Bits (29th to 31th) are 0).
<Relationship between output pressure value (16-Bit) and output pressure>

Output pressure	0x0000	0x0FFF
Output pressure	0%	100%

Check the values from the 16th to 28th Bit of the 32-Bit (4-BYTE) process data (When F_1=0%F.S. and F_2=100%F.S.).
(Ex.) When the output pressure is 100%, the set pressure value is 0x0FFF.

Process data output: 2 BYTE (base module to device (ITV))
The product adjusts the pressure to the set value.

7.4 Pressure setting mode

The pressure can be set by sending input data from the base PLC to the regulator where the full span is 12-Bit. Do not use values outside of the specification range (including Bit 13th to 15th). They are recognized as large values which could cause an error (Er1).
<Relationship between the set pressure (16-Bit) and output pressure>

Set pressure	0x0000	0x0FFF
Output pressure	0%	100%

Input data shall be entered from Bit 0 to Bit 12 of the 16-Bit process data (2 BYTE).
(When F_1=0%F.S. and F_2=100%F.S.)
(Ex.) When the output pressure is 100%, the set pressure value is 0x0FFF.

7 Setting (continued)

7.5 Diagnostic information

This product can detect a device error using diagnostic Bits in the process data.

Bit offset	Item	Details
0	SSC1	1: Output pressure value is within +/-10% of the target value. 0: Other than the above case.
1	Disabled	Vacant. Becomes 0.
2	Disabled	Vacant. Becomes 0.
3	Notification of the accumulated energizing time	Becomes 1 when the accumulated energizing time reaches the set value. 0: Other than the above case.
4	Residual pressure error	Becomes 1 when the output pressure value exceeds the specified value at the time of zero-clear.
5	Target value over range	Becomes 1 when the target value exceeds the specified value.
6	Pressure value under range (LLL)	Becomes 1 when the output pressure value is below the specified value.
7	Pressure value over range (HHH)	Becomes 1 when the output pressure value exceeds the specified value.
8	Decline in the power supply voltage	Becomes 1 when the power supply voltage is below the specified value.
9	Excessive power supply voltage	Becomes 1 when the power supply voltage exceeds the specified value.
10	Alarm generation	"0" is displayed when Bit 4 to 9 of the Bit offset are "0." "1" is displayed when any other part of the Bit offset is "1."
11	Internal communication error	"1" is displayed when an error is generated in processing the internal communication.
12	Built-in solenoid valve error	"1" is displayed when an error is generated in the built-in solenoid valve.
13	Internal system error	"1" is displayed when an internal system error is generated.
14	EEPROM error	"1" is displayed when an EEPROM error is generated.
15	Error	"0" is displayed when Bit 11 to 14 of the Bit offset are "0." "1" is displayed when any other part of the Bit offset is "1."

8 Maintenance

⚠ Caution

- Not following proper maintenance procedures could cause the product to malfunction and lead to equipment damage.
- If handled improperly, compressed air can be dangerous.
- Maintenance of pneumatic systems should be performed only by qualified personnel.
- Before performing maintenance, turn off the power supply and be sure to cut off the supply pressure. Confirm that the air is released to atmosphere.
- After installation and maintenance, apply operating pressure and power to the equipment and perform appropriate functional and leakage tests to make sure the equipment is installed correctly.
- If any electrical connections are disturbed during maintenance, ensure they are reconnected correctly and safety checks are carried out as required to ensure continued compliance with applicable national regulations.
- Do not make any modification to the product.
- Do not disassemble the product, unless required by installation or maintenance instructions.

9 How to Order

Refer to the operation manual or catalogue on the SMC website (URL: http// www.smcworld.com for How to order information.

10 Outline dimensions

Refer to the operation manual or catalogue on the SMC website (URL: http// www.smcworld.com for outline dimensions.

11 Limitations of Use

11.1 Limited warranty and Disclaimer/Compliance Requirements
Refer to Handling Precautions for SMC Products.

12 Product disposal

This product should not be disposed of as municipal waste. Check your local regulations and guidelines to dispose of this product correctly, in order to reduce the impact on human health and the environment.

13 Contacts

Refer to www.smcworld.com or www.smc.eu for your local distributor/importer.

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