SMC

OPERATION MANUAL

E/P REGULATOR

MODEL NAME

ITV1000, ITV2000, ITV3000 series

Series

For PROFIBUS

CONTENTS

SMC Corporation

4-14-1, Sotokanda, Chiyoda-ku, Tokyo 101-0021 JAPAN

Tel : +81 3 52078249   Fax: +81 3 52985362   URL http://www.smcworld.com

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". To ensure safety, be sure to observe ISO 4414 and other safety practices.

Definition

Label	Meaning of label
WARNING	Operator error could result in serious injury or loss of life.
CAUTION	Operator error could result in injury or equipment damage.

WARNING

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.

Only personnel with appropriate training should operate machinery and equipment.

Compressed air can be dangerous if an operator is unfamiliar with it. Assembly, handling or repair of pneumatic systems should be performed by trained and experienced operators.

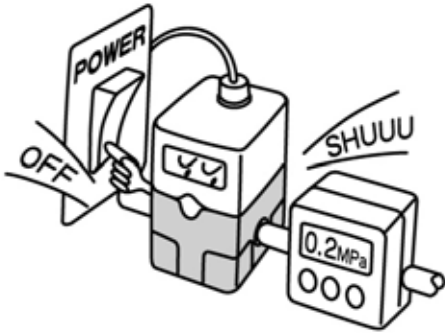**Do not service machinery/equipment or attempt to remove the product until safety is confirmed.**

A. Inspection and maintenance of machinery / equipment should only be performed once measures to prevent falling or runaway of the driver objects have been confirmed.
B. When equipment is to be removed, confirm the safety process as mentioned above. Cut the supply pressure for this equipment and exhaust all residual compressed air in the system.
C. Before machinery / equipment is restarted, take measures to prevent shooting-out of cylinder piston rod, etc.

Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.
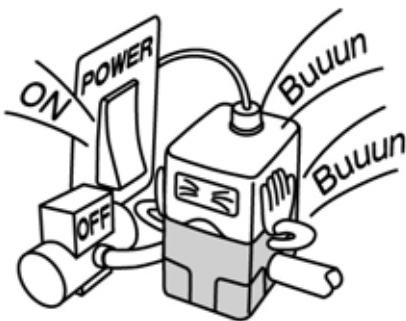
A. Conditions and environments beyond the given specifications, or if product is used outdoors.
B. Installation on equipment in conjunction with atomic energy, railway, air navigation, vehicles, medical equipment, food and beverages, recreation equipment, emergency stop circuits, clutch and brake circuit in press applications, or safety equipment.
C. An application which has the possibility of having negative effects on people, property, or animals requiring special safety analysis.
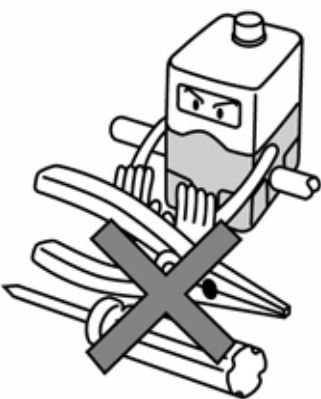
Precautions for Handling

CAUTION

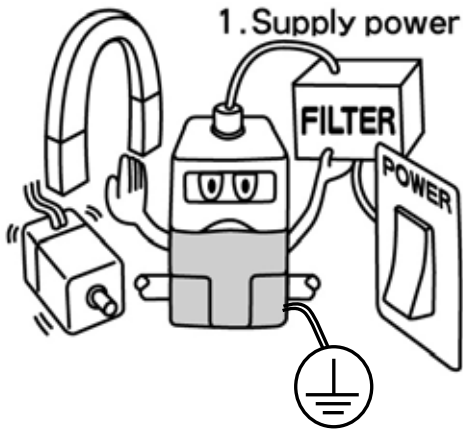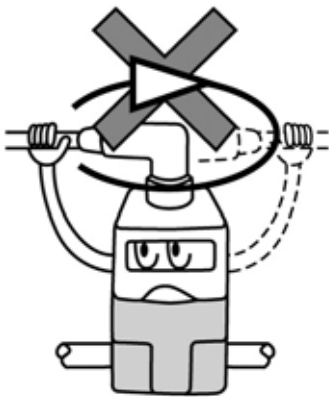|	
	If the power supply for this product is cut due to a power failure during controlling, the output of the secondary side is held temporarily. If the secondary side output is released to the atmosphere, air will keep coming out. Handle with care.
	If the pressure supply is cut while power is supplied, the built in solenoid valve will keep operating and may make a buzzing noise. This may affect the life of the solenoid valve. Be sure to cut the power supply to the product when cutting the pressure supply.
	The product is adjusted to each specification at the time of shipment from the factory. Avoid unnecessary disassembly or removal of parts, as this may cause failure.

CAUTION	
	Take the following measures against malfunction due to noise. 　Install a line filter in the AC power supply line to remove noise. 　Separate the signal lines from any intense electric field such as motor lines and power transmission lines as far as possible so as not to be affected by noise. 　For inductive loads such as solenoid valves and relays, make sure to take measures against load surge. 　Ensure the power supply is cut before removing the connector, to avoid the impact of chattering. 　For safety and improved noise immunity, keep the ground as short as possible.
	The right angle cable connector does not rotate. Do not rotate it.

Wiring and LED display

<table>
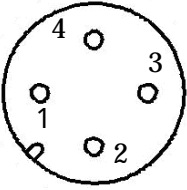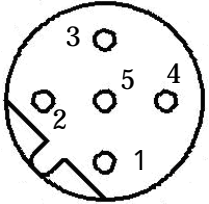<tr><td align="center">CAUTION</td></tr>
</table>

Incorrect wiring may lead to breakage.

Select a DC power supply with adequate capacity with low ripple.

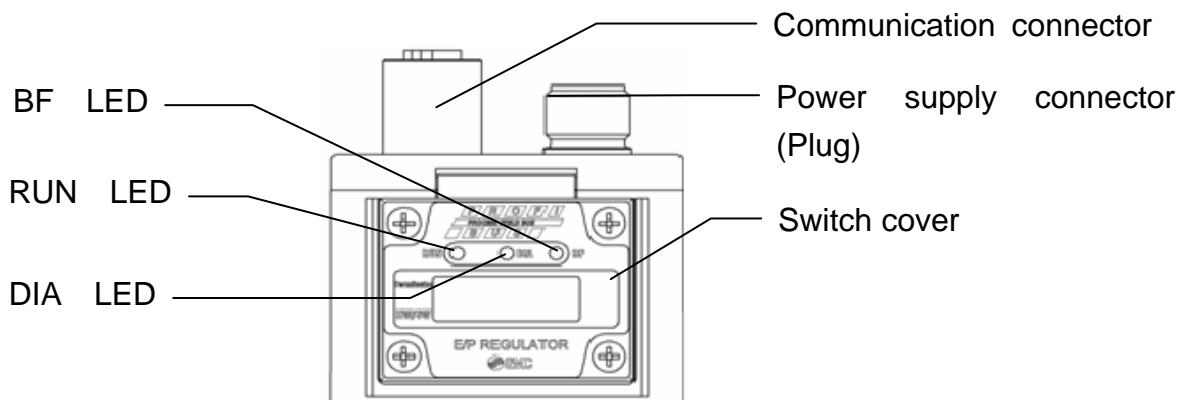Insert/pull out the connector after cutting the power supply.

The right angle cable connector does not rotate. Do not rotate it.
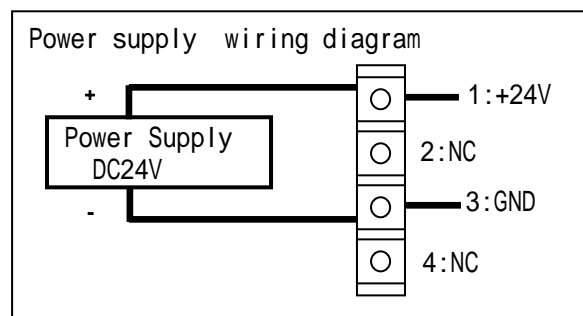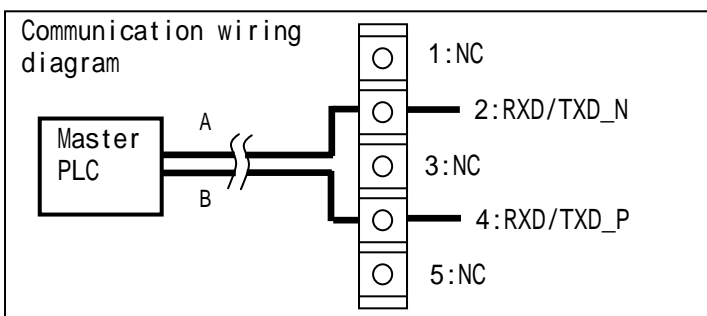
ITV connector pin assignment

Item	Pin assignment		Wire color (Note 1)
Power supply connector (Plug)		+24[V]	Brown
		N.C.	
		GND	Blue
		N.C.	
Communication connector (Socket)(Note 2)		N.C.	
		RXD/TXD_N A	Green
		N.C.	
		RXD/TXD_P B	Red
		N.C.	

Note 1. Wire color when SMC cable is used.

Note 2. SMC's PCA-1557691 (cable with shield) is recommended as the communication cable. The cable shield and the metal part of the connector conduct electricity, and electricity is connected to the ground from the body through the substrate. Care should be taken when a cable made by other company is used.

BF LED

RUN LED

DIA LED

Communication connector

Power supply connector (Plug)

Switch cover

Connection to external equipment

Communication wiring diagram

Master PLC

A

B

1: NC

2: RXD/TXD_N

3: NC

4: RXD/TXD_P

5: NC

Power supply wiring diagram

Power Supply DC24V

1: +24V

2: NC

3: GND

4: NC

5

Select a DC power supply with adequate capacity with low ripple.

Ex. : Class 2 voltage source. UL1310 compliant.

For communication master (PLC), we recommend using a product for Profibus communication with SELV circuit which is compliant to IEC 60950-1, electrical safety standard.

LED indication

Item	Lights up	Goes off
RUN	Lights when the power is turned on (Green)	Light off when the power is cut
DIA	Lights when diagnostic error occurs (Red)	Internal operation is normal
BF	Lights when PROFIBUS communication error occurs (Red)	PROFIBUS communication is normal

Mounting and Installation

Installation

Direct mounting

When the product is mounted directly onto the panel or device, use screws suitable for the thread holes below (See drawing on the right)

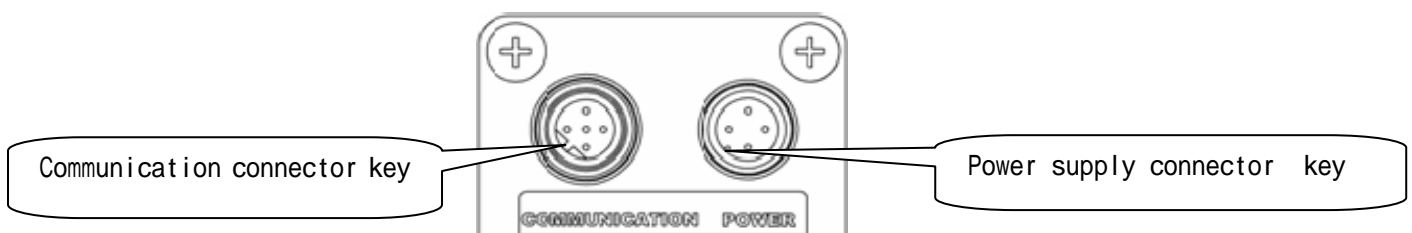| Series	Mounting thread hole	Tightening torque
ITV1000	M4× 0.7 (Depth 6)	2 3N m
ITV2000, ITV3000	M5× 0.8 (Through)	5 6N m

Direct mounting   Bracket mounting

Bracket mounting

When the bracket is mounted to the product for mounting it onto the panel or device,

fix the bracket to the product with the screws provided. (See table above for tightening torque).

The hole of   7 has become empty in the bracket for a fixed screw

Connector mounting

When mounting the connector with cable to the product, match up the position of the connector groove (cable side) and key (product side).

Communication connector key   Power supply connector key

Switch setting

Safety Instructions for Setting

Turn off the power supply while setting the switch.

If there is foreign matter or water droplets around the switch cover, clean it off before opening the cover.

Refer to the drawing below for the setting at the time of shipment from the factory. Confirm the condition of switches before use and reset if necessary.

Setting procedure

Loosen the screw(s) of the switch cover.

Open the cover from the bottom upwards
(See drawing on the right)

Set switch, referring to the setting procedure below

After setting the switch, tighten the switch cover in the reverse order of the above procedure.
(Tightening torque 0.6 to 0.8Nm)

Selection of ADDRESS setting mode

Node address of the product can be set by software mode (SW) and hardware mode (HW).

O HW SW

When software mode is selected, the node address is set by the communication master. Setting range is 1 to 125.

The device supports Set_Slave_Address_Supp function. But the "no further changed allowed" function is not included.

Refer to setting procedure below when hardware mode is selected (condition at the time of shipment : The switch is installed on the left HW)

ADDRESS set switch

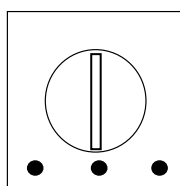Hardware mode can set node address by the switch on the right.

Address setting range is 01 to 99.
Setting at the time of shipment is 01.

×   ×

Setting the terminator

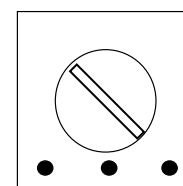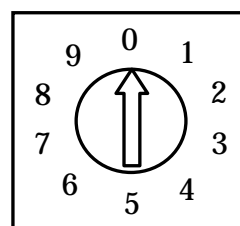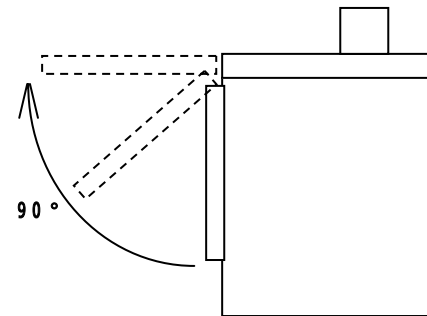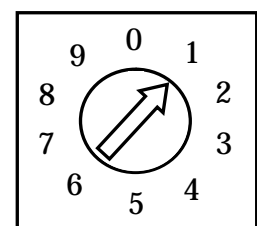Set PROFIBUS communication line terminator.

With terminator(At shipment)   W/O   W/O

When the product is connected to the terminal of PROFIBUS communication line, be sure to set it to "with terminator".

Pressure setting and output monitoring

Pressure can be set by sending the input data, in which F.S. consists of 12 bits, to the E/P regulator through master PLC(inputting target value to O area).

<Input data formula>

"Set pressure" / "F.S. pressure range" x 4095

The value obtained by this formula is converted to a hexadecimal number for sending.

EX) To set pressure at 0.3MPa by ITV203*(for 0.5MPa type)

(0.3MPa/0.5MPa) × 4095 ≒ 2457 DEC ≒ 999(HEX)

0.3MPa of pressure is set by sending input data of "999" to the electromagnetic regulator through the master PLC.

Output condition can be monitored by reading the data of I area or diagnostic area. Refer to the description below for detailed allocation of data.

Communication data allocation

Target value (O area)	Set target value Resolution : 12bit (100%F.S.), Occupied byte : 2 Byte Put 0 in upper 4 bits (Note)
Output pressure (I area)	Monitor the output pressure. Resolution : 12bit (100%F.S.), Occupied byte : 2 Byte Resolution may exceed 12bit depending on control conditions.
Diagnosis(DIAG)	Monitor the product error. 7 bytes are occupied for external diagnosis data. Allocate data below to byte 7 as a diagnosis. Internal diagnostic error 0: No error 1: Error Over range error 0: No error 1: Error

Note : Although 100%F.S. for target value is 12bit, communication is available up to 150%F.S. (accuracy is guaranteed up to 100%F.S.). Over range error is output when 150%F.S. is exceeded. Output pressure at this time is controlled by the input data immediately before the error occurred.

8

System configuration / Applications / Specifications

This product is connected to the field bus (PROFIBUS) as a DP slave.

< Example of system configuration >

As shown in the structure example above, this product is to control air pressure for pneumatic equipment. Do not use it for any other application.

Specifications

Model	ITV1010	ITV1030	ITV1050	
	ITV2010	ITV2030	ITV2050	ITV2090
	ITV3010	ITV3030	ITV3050	
Minimum supply pressure	Set pressure + 0.1MPa			Set pressure 13.3kPa
Maximum supply pressure	0.2MPa	1.0MPa	1.0MPa	101kPa
Set pressure range	0.005 0.1MPa	0.005 0.5MPa	0.005 0.9MPa	1.3 80kPa
Power source	Voltage	DC V±			
	Current consumption	A or less			
Linearity	± F.S. or less			
Hysteresis	F.S. or less			
Repeatability	± F.S. or less			
Sensitivity	F.S. or less			
Temperature characteristics	± F.S. or less			
Ambient temperature	0 to 50 (No freezing)			
Standards	CE marking, UL(CSA)			
Protective structure	IP65			IP65 equivalent

Model	ITV10 0	ITV20 0	ITV30 0
Size (mm× mm× mm)	50× 50× 124	50× 50× 146	66× 66× 167
Weight (No option)	350	450	750

Communication specification (Common)

Item	Specifications	Remarks
Communication protocol	PROFIBUS DP	For DP-V0
Baud rate (Note)	9.6k/19.2k/45.45k/93.75k/187.5k /500k/1.5M/3M/6M/12Mbps	Set by master
GSD-File	SMC_1412.GSD	
Occupied area (Input/output data)	1 word / 1 word	Lower 2 bits of 7 bytes of diagnosis area are for diagnosis information.
Communication data resolution	12BIT(4096 resolution)	
Pressure output condition at communication error	Zero clear	Pressure output becomes 0
Address setting	Switch setting / Software setting	Switching by switch
Terminator	Built in to the product	Switching by switch

Note) Baud rate relates to communication distance.

Maintenance and inspection

Turn off the power supply, stop the supplied air, exhaust the residual compressed air and verify the release of air before performing maintenance.

Foreign matter caught in the inlet of piping or exhaust may interfere with normal 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 cloth to remove stains.

Refer to the SMC website (URL http://www.smcworld.com) for more information about troubleshooting.
This document describes the general purpose product. Some parts may differ for particular special products.
This manual is subject to change without prior notice.

ITV2 OM00076 A