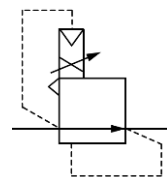




ORIGINAL INSTRUCTIONS

Instruction Manual High Pressure Electro-Pneumatic Regulator ITVH2020 Series



The intended use of the electro-pneumatic regulator is to control the flow and pressure of fluid in response to an electrical input signal.

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 and safety requirements for systems and their components.
ISO 4413: Hydraulic fluid power — General rules and safety requirements for systems and their components
IEC 60204-1: Safety of machinery - Electrical equipment of machines - Part 1: General requirements
ISO 10218-1: Robotics — Safety requirements — Part 1: Industrial robots

- 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.

Danger	Danger indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.
Warning	Warning indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
Caution	Caution indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate 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		ITVH
Min. supply pressure		0.5 MPa or (Set pressure) + 0.2 MPa whichever is greater
Max. supply pressure		3.0 MPa
Set pressure range ^{*1}		0.2 to 2.0 MPa
Supply voltage		24 VDC ± 10%
Current consumption		0.12 A or less
Input signal	Current type ^{*2}	4 to 20 mA, 0 to 20 mA (sink type)
	Voltage type	0 to 5 VDC, 0 to 10 VDC
	Preset input type	Maximum 4 steps
Input impedance	Current type	500 Ω or less
	Voltage type	6 to 6.5 kΩ
	Preset input type	Approx. 4.7 kΩ
Output signal ^{*3}	Analogue output	1 to 5 VDC, 4 to 20 mA (sink type)
	Switch output	NPN or PNP
Linearity		±1% F.S. or less
Hysteresis		1% F.S. or less
Repeatability		±1% F.S. or less
Sensitivity		±1% F.S. or less
Temperature characteristics		±0.12% F.S. / °C or less
LED display	Accuracy	±2% F.S. or less, ±1 digit
	Minimum unit ^{*4}	MPa:0.01, kgf/cm ² : 0.1, bar:0.1, psi:1
Ambient and fluid temperature		0 to 50°C (no condensation)
Enclosure rating		IP65
Weight		630 g approx. (without options)

*1) Pressures of 0.2 MPa or less cannot be controlled.

*2) 2-wire type 4 to 20 mA is not available.
A power supply voltage (24 VDC) is required.

*3) Select either analogue output or switch output. Further, when switch output is used, select either NPN or PNP output. When measuring analogue output of 1 to 5 VDC with a load impedance less than 100 kΩ, the analogue output may not achieve the output accuracy of +/- 6% F.S. or less.

*4) The setting (Zero/Span, Preset input, Switch output) can be adjusted by each minimum display unit. The unit cannot be changed.

*5) The above characteristics are confined to the static state. When air is consumed on the output side, the pressure may fluctuate.

*6) This product is not certified by Japan's High Pressure Gas Safety Act.

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.

- 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.
- Ensure all air is exhausted from the product before maintenance.
- The length of the connector cable should be 10 m maximum.

3 Installation (continued)

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.

3.3 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 1.5 to 2 threads exposed on the end of the pipe/fitting.
- Tighten fittings to the specified tightening torque.

Thread	Tightening Torque (N.m)
M5	1.5 to 2
Rc 1/4	8 to 12
Rc 3/8	15 to 20

- When connecting piping to a product, refer to its instruction manual to avoid mistakes regarding the supply port, etc.
Port 1: Supply port / Port 2: Output port / Port 3: Exhaust port

3.4 Lubrication

Caution

- SMC products have been lubricated for life at manufacture, and do not require lubrication in service.
- If a lubricant is to be used in the system, refer to the catalogue for details.
- Do not use a lubricator on the supply side of this product, as this can cause malfunction. When lubrication of equipment is necessary, connect a lubricator on the output side of this product.

4 Wiring

Caution

- Proceed carefully, as incorrect wiring can cause damage.
- Use a DC power supply with sufficient capacity and a low ripple.
- Turn off the power supply to remove and insert the connector.
- Never rotate the right angle connector as it is not designed to rotate.
- Connect the F.G. terminal at the front of the product to Ground.

Current / Voltage type

No.	Colour	Signal
1	Brown	Power supply
2	White	Input Signal
3	Blue	GND (Common)
4	Black	Monitor output

Note: The wire colour shown are when the optional cable is used.



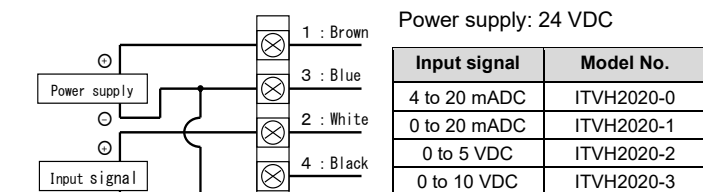
4.1 Ground connection

Connect the F.G. terminal at the front of the main body to Ground (F.G.). If the field ground fluctuates due to noise, it may affect the operation of the product.

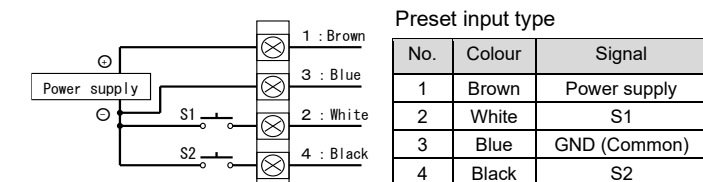


4 Wiring (continued)

4.2 Wiring diagram Current / Voltage type



Preset input type

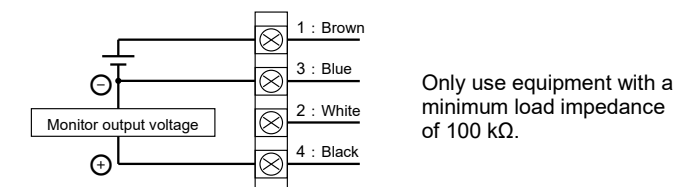


Note: The wire colours shown are when the optional cable is used.

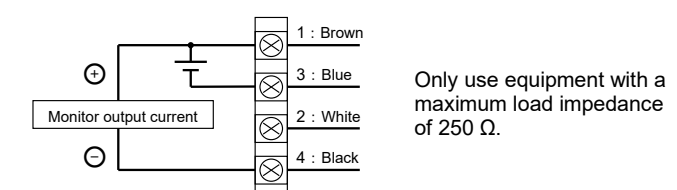
Preset pressure	P_1	P_2	P_3	P_4
S1	OFF	ON	OFF	ON
S2	OFF	OFF	ON	ON

For safety reasons, it is recommended that one of the preset pressures be set to 0 MPa.

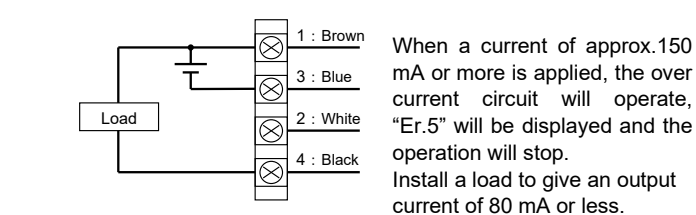
Analogue output - Voltage type (ITVH2020-*1)



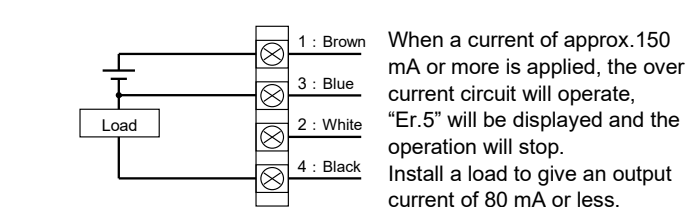
Analogue output - Current (Sink) type (ITVH2020-*4)



Switch output - NPN type (ITVH2020-*2)



Switch output - PNP type (ITVH2020-*3)



5 Settings

5.1 Setting method

Caution

- If an incorrect key is pressed or incorrect information is displayed during setting, power must be turned off and the procedure started again.
- It is recommended that the settings are changed without supply pressure. The product operates immediately maximum and minimum pressures are set and the S-key is pressed.
- It is recommended that the minimum pressure is output when air is supplied to the inlet, even if the input signal has not been entered.
- Output pressure from this product and state of operation are changed by changing of each setting and function.

5.2 Key locking function

Caution

The keys are locked when power is turned ON and cannot be operated.

Unlocking the keys

No.	Key operation	LED display
1		(current) pressure is displayed.
2	Press ∇ key for 2 seconds min.	LOC is displayed
3		LOC flashes on the display
4	Press S-key	
5		UNL is displayed for approx. 1 sec.
6	Key lock is released	(current) pressure is displayed.

Note: Step 4, press Δ key to cancel.

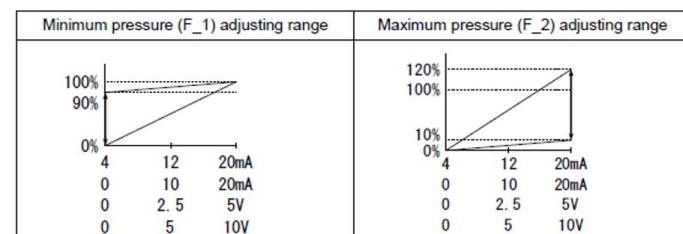
Locking the keys

No.	Key operation	LED display
1		(current) pressure is displayed.
2	Press Δ key for 2 seconds min.	UNL is displayed
3		UNL flashes on the display
4	Press S-key	
5		LOC is displayed for approx. 1 sec.
6	Key lock is released	(current) pressure is displayed.

Note: Step 4, press ∇ key to cancel.

5.3 Setting of Minimum / Maximum pressure and Switch output

No.	Key operation	LED display
1	Unlock the keys (see above)	
2	Press S-key	
3	Set the minimum pressure using the Δ and ∇ keys.	F_1 \rightarrow 000 (displayed alternately) • Adjusting range: See Note 1 to 6.
4	Press S-key	
5	Set the maximum pressure using the Δ and ∇ keys.	F_2 \rightarrow 200 (displayed alternately) • Adjusting range: See Note 1 to 6.
6	Go to No.11 for monitor output: analogue output (voltage and current).	
7	Press S-key	
8	Set P_1 using Δ and ∇ keys.	P_1 \rightarrow 200 (displayed alternately)
9	Press S-key	
10	Set P_2 using Δ and ∇ keys.	P_2 \rightarrow 200 (displayed alternately)
11	Press S-key	Return to (current) pressure display.
12	Lock the keys (see above)	



Note 1) F_1 is adjustable in the range 0 to 90% of the rated value (default value: 0% - 0.00 MPa).

Note 2) F_2 is adjustable in the range 10 to 120% of the rated value (default value: 100% - 2.00 MPa).

Note 3) Do not input the signal to output the pressure of more than 100%.

Note 4) The difference between F_1 and F_2 is adjustable in the range of 10% of the rated value.

Note 5) The adjustment relationship of F_1 > F_2 is not possible.

Note 6) The numbers (2.00 etc.) on the LED display indicate the secondary pressure.

5 Settings (continued)

5.4 Reset function

Reset method

No.	Key operation	LED display
1	Unlock the keys (see above)	
2	Press the Δ and ∇ keys simultaneously for 3 sec. min.	(current) pressure is displayed.
3		RES is displayed for approx. 1 sec.
4	The settings are reset and returned to the condition before power was applied (key locked).	

Reset content

Item	Reset content	Applicable models
F_1	0% F.S.	Current / Voltage input type
F_2	100% F.S.	Current / Voltage input type
P_1, P_2	100% F.S.	Switch output type
P_1 ~ P_4	0% F.S.	Preset input type

5.5 Error Display

If an abnormality is detected by the ITV the LED display will show 'Er' followed by a code number. Isolate the power supply and ascertain the problem and solve. Re-instate the power supply after correcting any fault. Error codes are as shown in the table below.

No.	Content	Display
1	Input signal is outside the specification	Er 1
2	EEPROM read / write error	Er 2
3	Memory read / write error	Er 3
4	Solenoid valve fault	Er 4
5	Switch output over-current	Er 5
6	Outside of the Zero-clear range	Er 6

5.6 Zero-clear function

- Press the 'Set' keys together for 2 seconds or more.
- Press the ' Δ ' and ' ∇ ' keys. Display shows 'F03'.
- Press the 'Set' keys. Display shows 'Ocl'(flashing).
- Press the ' Δ ' and ' ∇ ' keys simultaneously. Display shows 'Ocl'.
- Press the ' Δ ' and ' ∇ ' keys simultaneously for 3 seconds or more.

Display shows 'clr' (1second).

- Zero-clear is complete.

5.7 Initialization

- Press the 'Set' key simultaneously for 2 seconds or more.
- Press the ' Δ ' and ' ∇ ' keys. Display shows 'F99'.
- Press the 'Set' keys. Display shows 'ini'(Flashing).
- Press the ' Δ ' and ' ∇ ' keys simultaneously. Display shows 'ini'.
- Press the ' Δ ' and ' ∇ ' keys simultaneously for 5 seconds or more. Display Turns OFF (1 second).
- Initialization is complete.

6 How to Order

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

7 Outline Dimensions

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

8 Maintenance

8.1 General 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.
- Ensure all air is exhausted from the product before maintenance.

9 Limitations of Use

9.1 Limited warranty and disclaimer/compliance requirements

Refer to Handling Precautions for SMC Products.

10 Product Disposal

This product shall 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.

11 Contacts

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

SMC Corporation

URL : <https://www.smcworld.com> (Global) <https://www.smc.eu> (Europe)
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