

USER MANUAL

Hardware User Manual

IHP24-I



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1 General

This manual covers the following hardware:

IHP24-I Rev.02

1.1 Safety instructions

For a safe installation of a positioner, the following must be observed. The module must only be installed by qualified personnel who are familiar with the national and international laws, directives and standards that apply to this product as well as all instructions in this manual.

The information in this user manual is subject to changes without notice.

1.2 Related Documents

- IECEx – Certificate for IHP24-I
- ATEX - Certificate for IHP24-I
- DHP-DD-002 - Dimensional Drawing
- DHP-UM-020 – IHP24 Software Manual

2 Application

Val Controls intelligent hydraulic positioner controls almost all hydraulic, linear, rotary, single-return (SR) and double-acting (DA) actuators on the market.

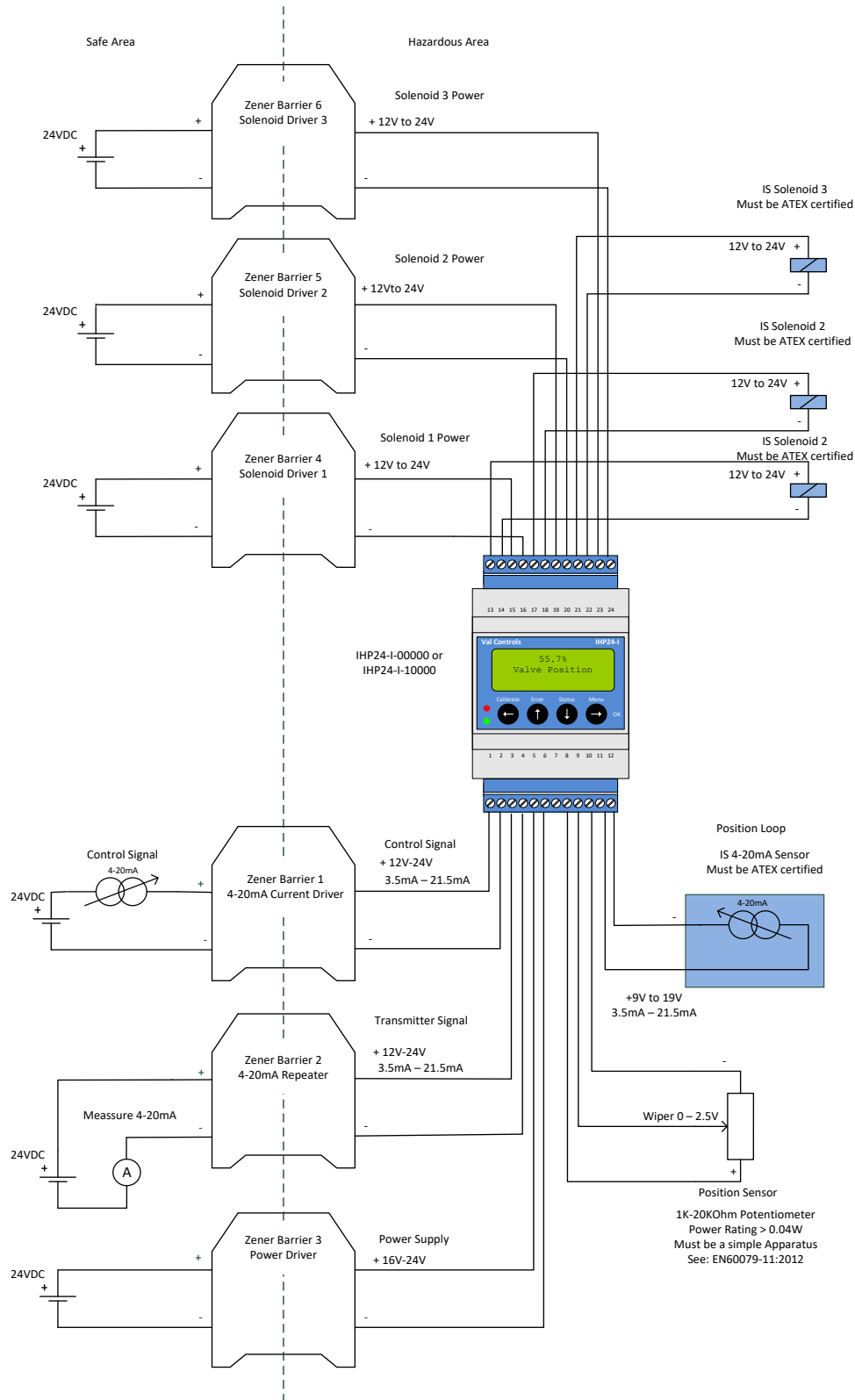
Its compact design, with few moving parts, makes it very reliable. The flexible software calibrates automatically, it contains intern safety surveillance together with several standard flow curves. A special flow curve is defined very simple, and the positioner's set point and deadband can be adjusted from the user menu.

The positioner works by comparing the control loop signal with the position feedback, it then uses control valve signals to operate the actuator/valve to the desired position. The control loop and the transmitter loop signal are 4-20mA signals. HART communication is optional on the control loop. The control valve signals are powered through an individual barrier for each output. The position feedback from the actuator/valve can be either a potentiometer or a 4-20mA loop powered transmitter.

Regulating of the position is done by switching on and off DO1, DO2 and DO3. The position on the actuator is measured from a position sensor that can be one of the two types:

- Position sensor - 1Kohm to 20Kohm
- Position Loop – 4-20mA

3 Diagram with Zener Barrier



4 Zenerbarrier

4.1 Barrier

Intrinsic Safe Zener Barriers

The IHP24-I has up to 6 Zener Barriers connected simultaneously. So there is 6 Intrinsically safe circuits and each is galvanic separated inside IHP24-I

Recommended Barriers

Zener Barrier 1 - Control Signal:

- Turck MK35-11Ex01-Li
- Turck IM35-11EX-HI/24VDC
- MTL5546

Zener Barrier 2 - Transmitter Signal:

- Turck MK33-11Ex0-Li
- Turck IM33-11EX-HI/24VDC
- MTL5541A
- MTL5541AS

Zener Barrier 3 – Power Supply:

- Turck MK72-S13-Ex0
- MTL5521
- MTL5522

Zener Barrier 4,5,6 – Solenoid 1 to 3 Power:

- Turck MK72-S13-Ex0 – Note: The used Solenoid needs to match this zener barrier.
- MTL5521 – Note: The used Solenoid needs to match this zener barrier.
- MTL5522 – Note: The used Solenoid needs to match this zener barrier.

Intrinsic Safe position sensor from other manufacturers

- 4-20mA intrinsically safe position sensor.

Intrinsic Safe solenoids from other manufacturers

- External solenoids must be intrinsically safe and match Zener Barrier 4, 5 and 6.

Potentiometer for position measuring

- Potentiometer 1Kohm to 20Kohm, must be a “Simple Apparatus“ in accordance with the definition in EN60079-11:2012
- Linearity for the Potentiometer is important for the overall performance.

5 Specifications

5.1 Environment

Operating temperature: -30 to 80 °C

Storage temperature: -30 to 80 °C

Relative Humidity: < 95% (No condensation)

The hardware is coated for tropical climate conditions on exposed areas.

5.2 Cabinet

WARNING – POTENTIAL ELECTROSTATIC CHARGING HAZARD.
Wipe only with a damp cloth.

5.3 Terminals

Screw torque: 0.4Nm (3.6Lb. in)

Wire diameter: 28-12 AWG 2.5mm²

5.4 Dimension and mounting

Dimensional drawing (DHP-DD-002) can be found on www.valcontrols.com.

Mounting: 35mm DIN rail according to EN50022

5.5 Electrical specifications for standard configuration

Control loop – AI0 – Terminal 1, 2	
Impedance	< 535 ohm @20mA and 10,7VDC
Linearity	< 0.1%
Temperature coefficient	0.025% / 1°C
Hart (IHP24-I-10000 only)	FSK, 1200Hz / 2200Hz 400-800mVpp
Max Voltage, Current and Power Limits. See Certificate: IHP24-I-ATEX - TÜV 13 ATEX 129516 X IHP24-I-IECE _x - TUN 13.0039 X	U _i ≤ 28V I _i ≤ 100mA P _i ≤ 1.2W C _i ≤ 100nF L _i = 0
Galvanic isolated	
Transmitter loop – AO0 – Terminal 3,4	
Impedance	< 350 ohm @20mA and 7VDC
Linearity	< 0.1%
Temperature coefficient	0.01% / 1°C
Max Voltage, Current and Power Limits. See Certificate: IHP24-I-ATEX - TÜV 13 ATEX 129516 X IHP24-I-IECE _x - TUN 13.0039 X	U _i ≤ 28V I _i ≤ 100mA P _i ≤ 1.2W C _i ≤ 10nF L _i = 0
Galvanic isolated	
Power supply – Terminal 5,6	
Power supply	16VDC – 28VDC
Power dissipation, with position sensor 1-20K Term 8,9,10	< 16mA at 16V (without backlight) < 28mA at 16V (with backlight)
Power dissipation, with position loop Term 11,12	< 38mA at 16V (without backlight) < 50mA at 16V (with backlight)
Max Voltage, Current and Power Limits. See Certificate: IHP24-I-ATEX - TÜV 13 ATEX 129516 X IHP24-I-IECE _x - TUN 13.0039 X	U _i ≤ 28V I _i ≤ 200mA P _i ≤ 1.35W C _i ≤ 68nF (estimated) L _i ≤ 120uH (estimated)
Position sensor – AI10 – Terminal 8,9,10	
Potentiometer size	1 Kohm to 20 Kohm, > 0.04W
Minimum use operating area	40%
Cable length	1.5 meters
Linearity	< 0.1%
Temperature coefficient	0.01% / 1°C
Max Voltage, Current and Power Limits. See Certificate: IHP24-I-ATEX - TÜV 13 ATEX 129516 X IHP24-I-IECE _x - TUN 13.0039 X	U _o ≤ 6V I _o ≤ 6mA P _o ≤ 0.04W C _i ≤ 10uF L _i = 0

Position loop – AI1 – Terminal 11,12	
External position loop max Rload	500 ohm @20mA
Voltage Out	Power Supply – 5V @ 20mA
Operating area	4 – 20mA
Minimum span	12mA
Cable length	1000 meters
Linearity	< 0.1%
Temperature coefficient	0.01% / 1°C
External Sensor Response time	Important: If the valve/actuator system is fast, the response time of the chosen sensor will have a major effect on the total response time and accuracy of entire system.
Max Voltage, Current and Power Limits See Certificate IHP24-I–ATEX - TÜV 13 ATEX 129516 X IHP24-I-IECEX - TUN 13.0039 X	Uo follows the connected barrier to Terminal 5, 6 Io <= 88mA (Calculated by Val Controls) Po <= 0.62W (Calculated by Val Controls) Ci <= 10nF (Estimated by Val Controls). Li = 0
Digital output – DO1 Terminal 13,14	
Max Voltage, Current and Power Limits. See Certificate IHP24-I–ATEX - TÜV 13 ATEX 129516 X IHP24-I-IECEX - TUN 13.0039 X	Uo follows the connected barrier to Terminal 15, 16 Io follows the connected barrier to Terminal 15, 16 Po follows the connected barrier to Terminal 15, 16 Ci = 0 Li = 0
Internal Resistance	1 ohm
Voltage Drop	0.1V at 100mA Current load 0.341V at 341mA Current load
Galvanic isolated	
Digital output Power Supply for DO1 Terminal 15,16	
Max Voltage, Current and Power Limits. See Certificate IHP24-I – ATEX - TÜV 13 ATEX 129516 X IHP24-I – IECEX - TUN 13.0039 X	Ui <= 28V Ii <= 341mA Pi <= 1.65W Ci = 0 Li = 0
Digital output – DO2 Terminal 17,18	
Max Voltage, Current and Power Limits. See Certificate IHP24-I–ATEX - TÜV 13 ATEX 129516 X IHP24-I-IECEX - TUN 13.0039 X	Uo follows the connected barrier to Terminal 19, 20 Io follows the connected barrier to Terminal 19, 20 Po follows the connected barrier to Terminal 19, 20 Ci = 0 Li = 0
Internal Resistance	1 ohm
Voltage Drop	0.1V at 100mA Current load 0.341V at 341mA Current load

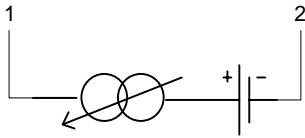
Galvanic isolated	
Digital output Power Supply for DO2 Terminal 19,20	
Max Voltage, Current and Power Limits. See Certificate IHP24-I-ATEX - TÜV 13 ATEX 129516 X IHP24-I-IECE _x - TUN 13.0039 X	U _i ≤ 28V I _i ≤ 341mA P _i ≤ 1.65W C _i = 0 L _i = 0
Digital output – DO3 Terminal 21,22	
Max Voltage, Current and Power Limits. See Certificate IHP24-I-ATEX - TÜV 13 ATEX 129516 X IHP24-I-IECE _x - TUN 13.0039 X	U _o follows the connected barrier to Terminal 23, 24 I _o follows the connected barrier to Terminal 23, 24 P _o follows the connected barrier to Terminal 23, 24 C _i = 0 L _i = 0
Internal Resistance	1 ohm
Voltage Drop	0.1V at 100mA Current load 0.341V at 341mA Current load
Galvanic isolated	
Digital output Power Supply for DO3 Terminal 23,24	
Max Voltage, Current and Power Limits. See Certificate IHP24-I-ATEX - TÜV 13 ATEX 129516 X IHP24-I-IECE _x - TUN 13.0039 X	U _i ≤ 28V I _i ≤ 341mA P _i ≤ 1.65W C _i = 0 L _i = 0

Important:

All external components must have specifications that fit the desired performance and requirements of the valve/actuator system.

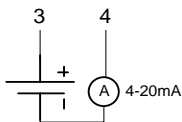
5.5.1 Control loop – AI0

The positioner needs a 4-20mA signal. The signal needs to be powered from the controlroom.



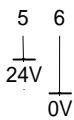
5.5.2 Transmitter loop – AO0

The positioner can send a 4-20mA transmitter loop signal to the control room. This signal is a repeated signal of the position feedback. The signal needs to be powered from the controlroom.



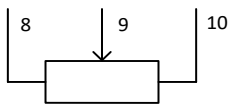
5.5.3 Power supply

The positioner needs 24VDC to operate.



5.5.4 Position sensor – AI10

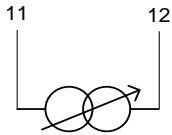
The position feedback can be delivered from a 3-wire potentiometer. The Sensor input can as an alternative also be used as a loop input.



Potentiometer

5.5.5 Position loop – AI1

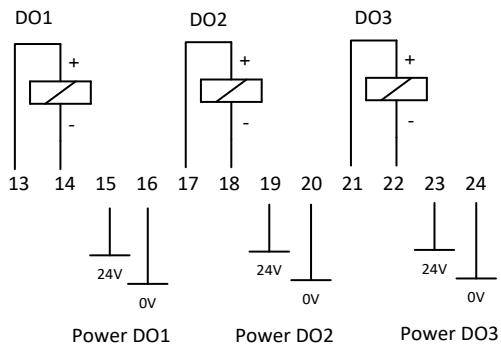
The position feedback can also come from a 4-20mA loop powered transmitter. The power is delivered from terminal 11 and 12.



Passive 4-20mA position loop

5.5.6 Digital outputs – DO1, DO2 and DO3

The positioner IHP24-I has 3 digital outputs to control 24VDC devices. Devices can be a intrinsically Safe Solenoids or a intrinsically safe indicator lamp.



5.5.7 Terminals

See the chart below to see how to connect to the terminals on the positioner.

Control loop – AI0	Digital output – DO1, DO2, DO3
1. AI0 Control loop (+) 4-20mA	13. DO1 (+)
2. AI0 Control loop (-) 4-20mA	14. DO1 (-)
Transmitter loop – AO0	15. DO1 Power Supply (+)
3. AO0 Transmitter loop (+) 4-20mA	16. DO1 Power Supply (-)
4. AO0 Transmitter loop (-) 4-200mA	
Power supply	17. DO2 (+)
5. Power supply (+) 24V	18. DO2 (-)
6. Power supply (-) 0V	19. DO2 Power Supply (+)
7. Not Used	20. DO2 Power Supply (-)
Position sensor – AI10	
8. AI10 Position sensor – High	21. DO3 (+)
9. AI10 Position sensor – Wiper	22. DO3 (-)
10. AI10 Position sensor – Low	23. DO3 Power Supply (+)
Position loop – AI1	24. DO3 Power Supply (-)
11. AI1 (+) 4-20mA	
12. AI1 (-) 4-20mA	