

# HARDWARE MANUAL

Ixx24-F



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## 1 General

This manual covers hardware revision:

IHP24-F  
IDP24-F with software DID-SW-001  
IVC24-F  
IDC24-F  
ILB24-F  
ILC24-F  
IPC24-F

### 1.1 Safety instructions

For a safe installation of a Val Controls device, the following must be observed. The module must 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 manual is subject to changes without notice.

### 1.2 Environment

Operating temperature: -40 to 85°C

Storage temperature: -55 to 100°C

Relative Humidity: < 95% (No condensation)

The printed circuit boards are coated for tropical climate and harsh environments to resist airborne contamination according to G3, ISA-71.04-2013.

Ingress protection: IP66/IP67

### 1.3 Mounting and dimension

Screw torque: 0.4Nm (3.6Lb. in)

Wire diameter: AWG14-22 (0.5mm<sup>2</sup> til 2.5mm<sup>2</sup>)

Mounting: Directly onto actuator, different mounting kits are available.

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

After installation the lid shall to be closed properly to maintain the IP rating.

The O-ring is as standard treated with Molykote 55 O-ring grease. To maintain the IP rating the O-ring shall be treated every 2<sup>nd</sup> year with Molykote 55 O-ring grease or similar.

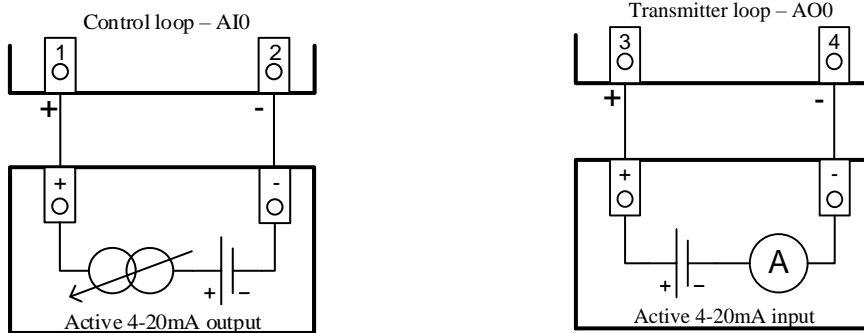
Dimensional drawing can be found on [www.valcontrols.com](http://www.valcontrols.com)

## 2 Communication

Several communication types are available as options.

### 2.1 Control loop – AI0 and Transmitter loop – AO0 (HART)

Passive 4-20mA input and passive 4-20mA output. On some models HART is available on either AO0 or AI0.



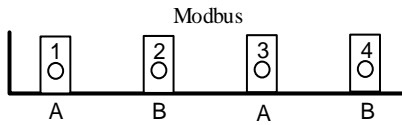
#### 2.1.1 Terminals

AI0	1 (+) 2 (-)
AO0	3 (+) 4 (-)

#### 2.1.2 Electrical specifications

Control loop – AI0	
Impedance	< 470 Ohm at 20mA and 9.4VDC
Linearity	< 0.1%
Temperature coefficient	0.025% / 1°C (Warm-up: 10 min)
HART (optional)	FSK, 1200Hz / 2200Hz 400-800mVpp
Galvanic isolated	
Transmitter loop – AO0	
Impedance	< 470 Ohm at 20mA and 9.4VDC
Linearity	< 0.1%
Temperature coefficient	0.015% / 1°C (Warm-up: 10 min)
HART (optional)	FSK, 1200Hz / 2200Hz 400-800mVpp
Galvanic isolated	

## 2.2 Modbus



### 2.2.1 Terminals

Modbus	1 (A) 2 (B) 3 (A) 4 (B)
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Terminals 1 and 3 are connected inside the device. Terminals 2 and 4 are connected inside the device.

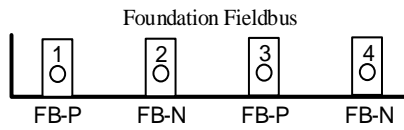
### 2.2.2 Electrical specifications

Modbus	
Interface	RS485
Termination resistor	No internal resistor. External resistor can be applied across terminal 3 and 4. Termination resistors must have the value of 120 Ohm.
Galvanic isolated	

A maximum of 247 nodes can be connected on the same daisy chain bus.

Typical shielding of the RS485 bus cable is done on the master side of the cable.

## 2.3 Foundation Fieldbus



### 2.3.1 Terminals

Foundation Fieldbus	
Foundation Fieldbus	1 (FB-P) 2 (FB-N) 3 (FB-P) 4 (FB-N)

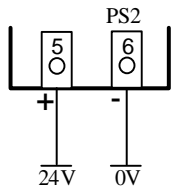
### 2.3.2 Electrical specifications

FF-Fieldbus	
Interface	FF-Fieldbus - H1 Device Class – Basic Device
Termination	No internal termination

### 3 Main board

#### 3.1 Power supply – PS2

24VDC power input to the device.



Depending on device configuration, this power supply input may not be used.

##### 3.1.1 Terminals

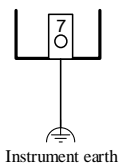
PS2	5 (+) 6 (-)

##### 3.1.2 Electrical specifications

Power supply – PS2	
Power supply	20.4 – 27.6VDC
Power dissipation, no position sensor/loop or valves are connected.	< 2W
Power dissipation, with maximum load on all inputs and outputs	< 5W

### 3.2 Earth

Device instrument earth terminal shall be connected to instrument earth bar at marshalling cabinet to avoid electromagnetic interference.

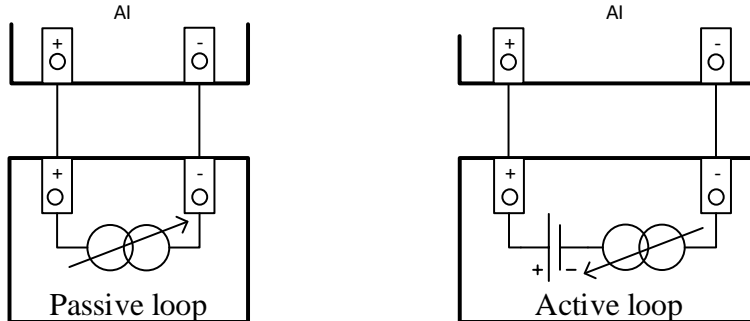


##### 3.2.1 Terminal

IE	7 Instrument earth

### 3.3 4-20mA input – AI1, AI2

The analogue inputs can be used to connect passive 4-20mA sensors to the device or in the alternative configuration active 4-20mA sensors.



#### 3.3.1 Terminals

	Passive sensor	Active sensor
AI1	11 (+) 12 (-)	12 (+) 6 (-)
AI2	13 (+) 14 (-)	14 (+) 6 (-)

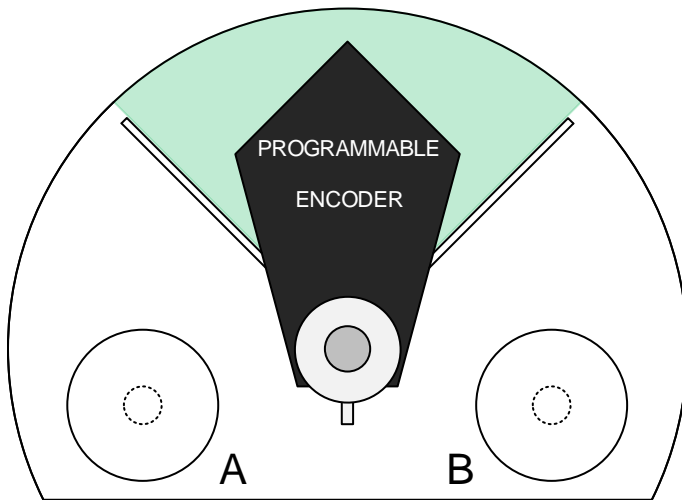
#### 3.3.2 Electrical specifications

AI – Analogue inputs	
External loop max Rload	820 Ohm at 20mA and 16.4VDC
Operating area	4 – 20mA
Minimum span	12mA
Cable length	1000 meters
Linearity	< 0.1%
Temperature coefficient	0.01% / 1°C (Warm-up: 10 min)
Rin	< 100 Ohm



### 3.3.3 Position transmitter

The Ixx24-F uses an internal position transmitter and the transmitter is always connected to AI1.

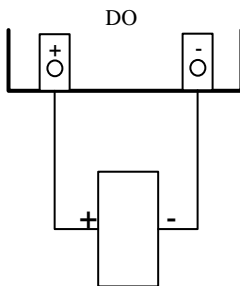


After mounting the Ixx24-F on the actuator make sure the arrow on the position transmitter is within the green area. See markings on drawing.

Loosen the set screw on the shaft and adjust the arrow so that it moves within the marked area.

### 3.4 Digital output – DO1, DO2, DO3

24 VDC digital outputs.



#### 3.4.1 Terminals

DO1	27 (+) 28 (-)
DO2	30 (+) 31 (-)
DO3	33: (+) 34: (-)

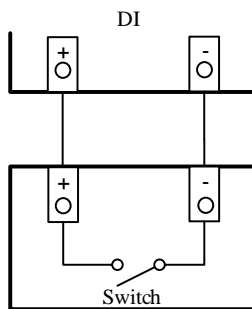
All DOs (-) are common with PS2 (-)

#### 3.4.2 Electrical specifications

DO – Digital outputs	
Max load per digital output	up to 48W at 24VDC
Max load total	up to 144W at 24VDC

### 3.5 Digital input – DI1, DI2, DI3

Use digital inputs to connect dry signals.



#### 3.5.1 Terminals

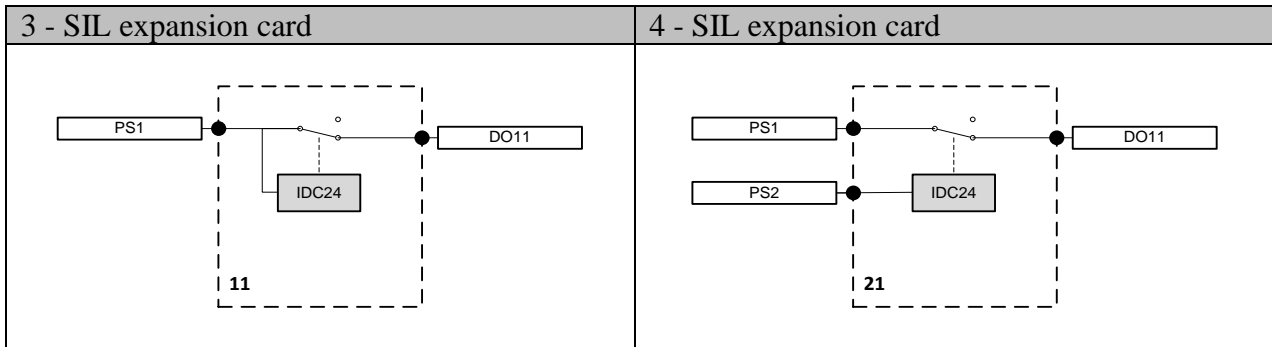
DI1	39 (+) 40 (-)
DI2	41 (+) 42 (-)
DI3	43 (+) 44 (-)

#### 3.5.2 Electrical specifications

DI – Switch	
Type	Switch
Cable length	20 meters
Maximum cable resistance	100 Ohm

### 3.6 SIL – PS1, DO11

The units are approved for installation in SIL 1-4 circuits, if installed as described in this manual.



#### 3.6.1 Terminals

Power supply	Digital output
5. PS2 (+)	23. DO11 (+)
6. PS2 (-)	24. DO11 (-)
21. PS1 (+)	
22. PS1 (-)	

Note: The PS1 and PS2 must be galvanic isolated.

#### 3.6.2 Electrical specifications

Power supply	20.4 – 27.6VDC
Power dissipation, no position sensor/loop or output lamps are connected.	< 2W
Power dissipation, with maximum load on all inputs and outputs	< 5W, the load not included
Max load per DO11	up to 48W @24VDC
If PS2 is not used, total load that can be drawn from all DO/DI/AI ports (except DO11)	2W

### 3.7 Internal watch and SD card

#### 3.7.1 Electrical specification

Internal Watch	
Time deviation	$\Delta f/f_0 = \pm 20\text{ppm}$
Aging	$\Delta f/f_0 = \pm 3\text{ppm} / \text{Year}$
Temperature coefficient	$\beta = -0.034 \pm 0.006\text{ppm}/^\circ\text{C}^2$
Battery life (Estimated)	10 year

Please contact Val Controls for a replacement battery.

The SD card is used to store signatures. Do not move the SD card between devices. Contact Val Controls for a replacement SD card.

Disposal of this product and/or battery shall be in accordance with local environmental laws and regulations.

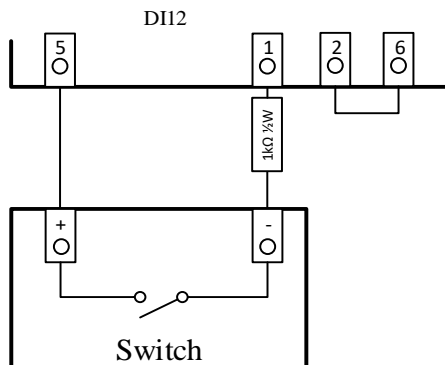


## 4 Alternative digital inputs

DI9 to DI17 are analogue inputs but configured in a way that makes it possible to use them as digital inputs.

### 4.1 Digital input – DI12

DI12 substitutes AI0



The external resistor and connection between terminal 2 and 6 must be mounted to get the correct functionality.

#### 4.1.1 Terminals

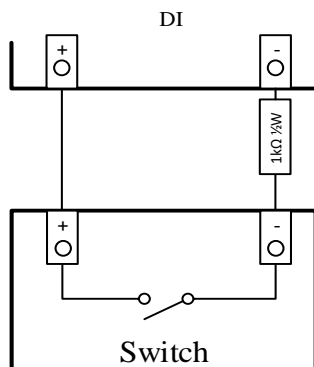
DI12	1 (+) 5 (-)
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#### 4.1.2 Electrical specification

DI12	
Type	Switch
Cable length	1000 meters

## 4.2 Digital input – DI13, DI14

DI13 substitutes AI1 and DI14 substitutes AI2.



The external resistor must be mounted to get the correct functionality.

### 4.2.1 Terminals

DI13	11 (+) 12 (-)
DI14	13 (+) 14 (-)

### 4.2.2 Electrical specification

DI13, DI14, DI15, DI16, DI17	
Type	Switch
Cable length	1000 meters