USER MANUAL

Intelligent Hydraulic Positioner

IHP24-A
IHP24-AF
IHP24-B
IHP24-BF
IHP24-F
IHP24-I

Val Controls A/S • Sallingsundvej 5 • DK-6715 Esbjerg N • Tel. +45 7547 0600
vc@valcontrols.com • www.valcontrols.com

Table of contents

Val Controls A/S • Sallingsundvej 5 • DK-6715 Esbjerg N • Tel. +45 7547 0600
vc@valcontrols.com • www.valcontrols.com

1 General

This manual cover software version:

Software ID: DHP-SW-0015 version: 3.17
Software ID: DHP-SW-0016 version: 3.17

1.1 Safety instructions

For a safe installation of a positioner, the following must be observed. The module shall 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.

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 is a 4-20mA signal with HART communication. The control valve signals are powered through the 24VDC power supply and can supply valves up to 192W, 48W each. The position feedback from the actuator/valve can be either a potentiometer or a 4-20mA loop powered transmitter.

The power unit controller measures the pressure in the hydraulic system and controls a hydraulic pump unit in order to keep the pressure within a specified range. When the pressure falls below a user defined value, the positioner will turn on the pump and keep it running until the pressure has reached the maximum defined value. Two pressure switches can be used instead of a pressure transmitter.

It is possible to connect temperature and level transmitter/switches to monitor the hydraulic system and shutdown the pump if a user defined value is reached.

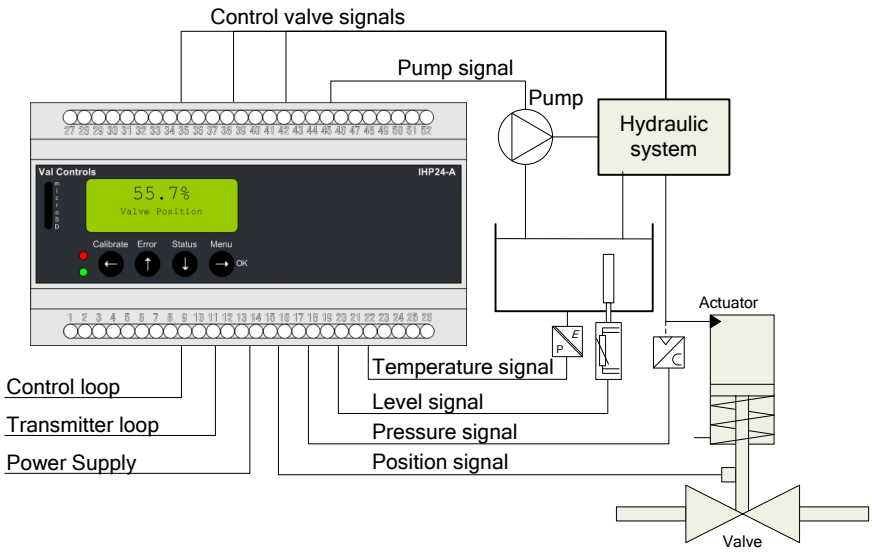


Figure 1: IHP24-A

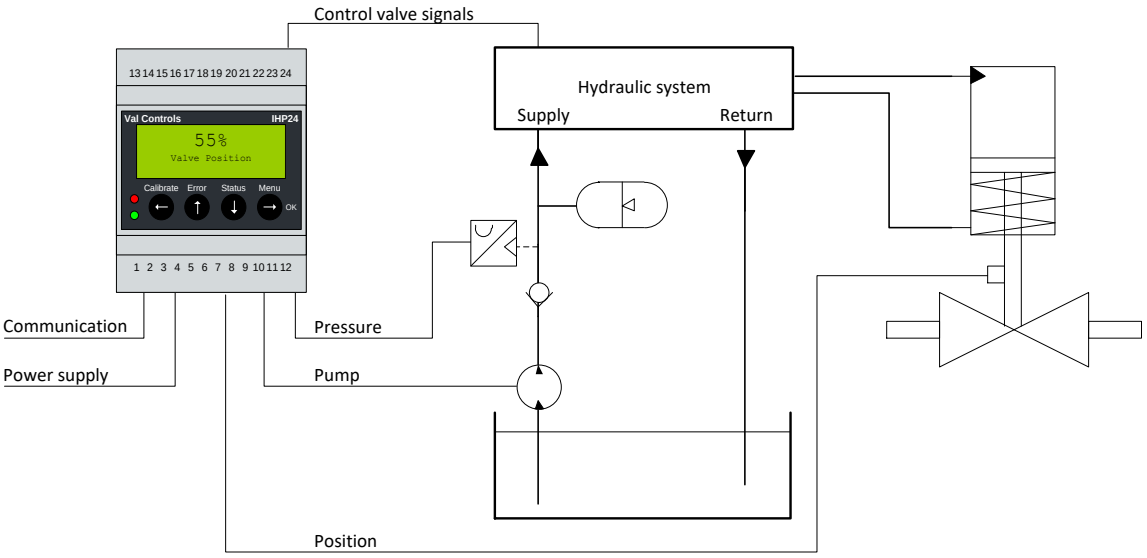


Figure 2: IHP24-B

Val Controls A/S • Sallingsundvej 5 • DK-6715 Esbjerg N • Tel. +45 7547 0600
vc@valcontrols.com • www.valcontrols.com

3 Installation guide

1. Connect all wires and make sure that all is connected correctly according to the hardware manual/installation drawings.

2. Configure the unit using ValConnect or the display and keyboard
    a. Configure the valve function, see 5.4.2 Advanced menu.
    b. Configure position feedback, see 5.4.2 Advanced menu.

3. Auto calibrate the unit by pushing CAL button or using ValConnect, see 5.1.1 Automatic.

4. After a successful calibration the green indicator will light, see 4.4.6 Indicator.

5. If the red is light, there was an error during calibration. Press error on the keyboard and see the error no. on the display or connect ValConnect and see what the error message is and go to the manual to get an explanation on the error no. and how to solve it, see 7 Error no.

4 User interface

The IHP comes with 4 different user interfaces which are described here.

4.1 Display, indicator and keyboard

To control and monitor the device, it is fitted with a graphical display, four buttons and two indicators. When the lid is removed a TTL connector is available, for configuration via ValConnect. A special connector cable is required.

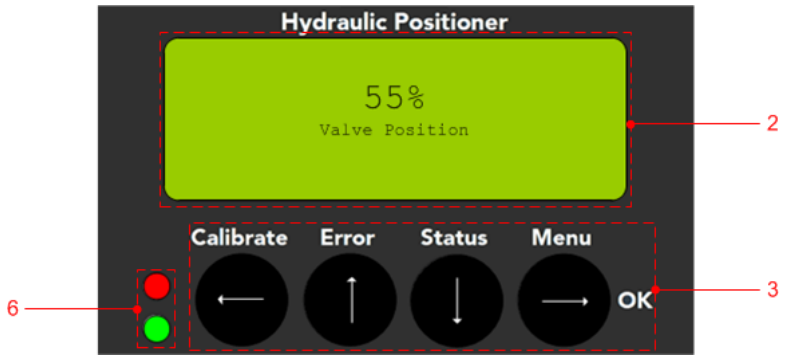


Figure 3: Type B interface

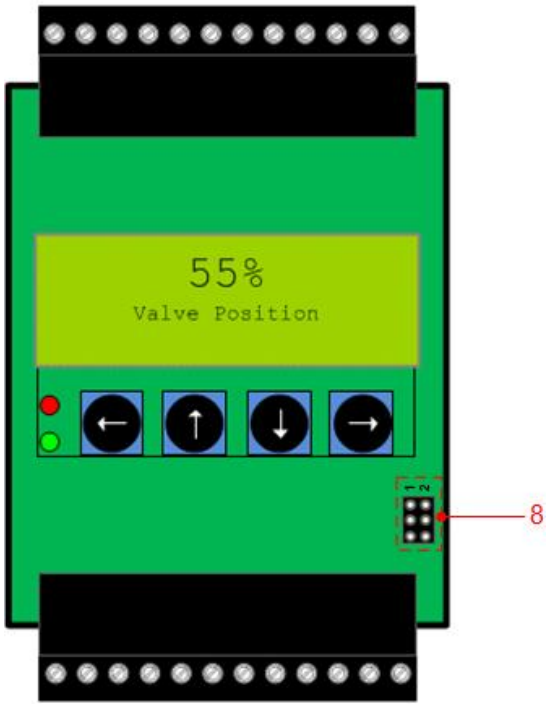


Figure 4: Type B TTL connection. Black marker on cable must face marking 1 and 2

4.2 Display, keyboard, indicator, USB, and status indicators

This front is only available for type A.

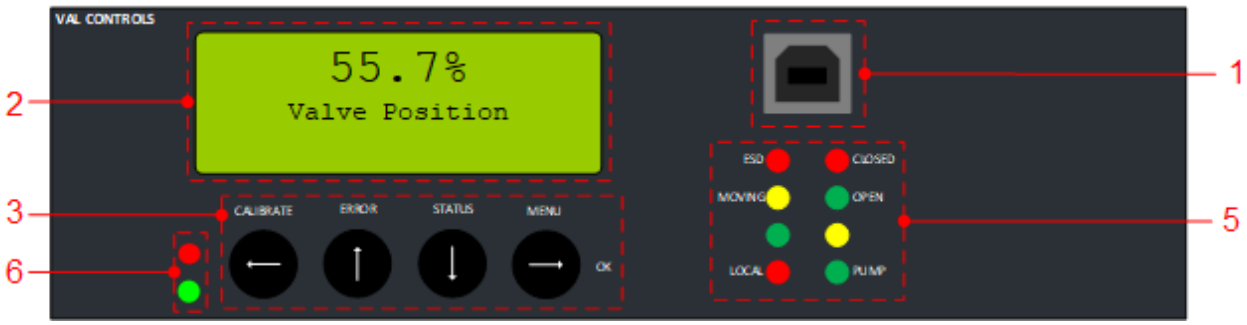


Figure 5: Type A interface

4.3 Display, keyboard, indicator, USB, MT control and status indicators

This front is only available for type BF and AF.

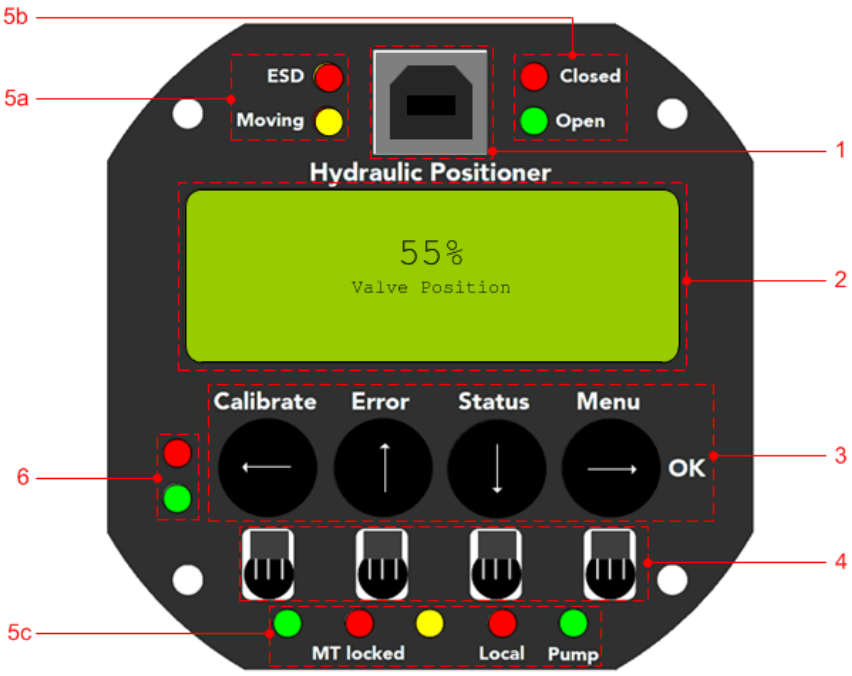


Figure 6: Type BF and AF interface

4.4 Indicator, calibration button and USB

All configuration and control must be done through ValConnect.

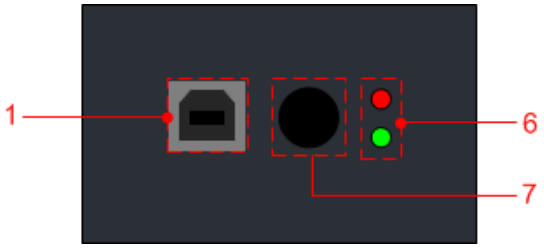


Figure 7: Type A and B interface

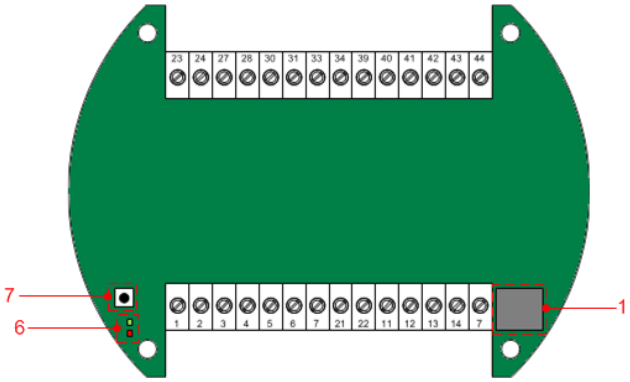


Figure 8: Type F interface

4.5 Components

1) USB connector
2) Display
3) Keyboard
4) MT control sensors
5) Status indicators
6) Indicator
7) Calibration button
8) TTL connector

4.5.1 USB connector

The USB connection can be used to connect the IHP to a PC with ValConnect installed. ValConnect can be used to configure and control the IHP from the PC.

4.5.2 Display

The display is a four lined graphical display with backlight feature and adjustable contrast.

4.5.3 Keyboard

The keyboard is fitted with four buttons, which have the following functions.

Button	Menu	Menu navigation	Confirmation
←	Calibrate	Back	
↑	Error	Up	
↓	Status	Down	
→	Menu	Forward	OK

4.5.4 MT control

The MT control can be used to operate the IHP through the window lid on the Ex D enclosure. Position the MT pen above the sensors to emulate a button push. MT control is locked as default and can be unlocked by touching → and then ←. The auto lock time can be set in the menu.

4.5.5 Status indicators

The functions of the seven indicators are as follows:

- ESD: The ESD input on the IHP is open
- Moving: The valve is opening or closing
- Closed: The valve is closed
- Open: The valve is open
- MT locked: MT control is unlocked
- Local: The IHP is in local mode and can be controlled by external open/close buttons
- Pump: The pump output is active

4.5.6 Indicator

The indicator lights will work as follows:

- Red indicator continuous: Glows when an error has occurred in the positioner
- Red indicator flashing: Calibration in progress
- Green indicator: Glows when there are no errors in the positioner
- Green indicator continuous: Initializing

4.5.7 Calibration button

Push the button for 3 seconds to start an auto calibration. Push it again to abort the auto calibration.

4.5.8 TTL connector

5 Menus

The positioner has four menus. All menus can be directly activated by pressing one of the four buttons.

- Calibrate ←, enter the calibrate menu
- Error ↑, enter the error menu
- Status ↓, enter the status menu
- Menu →, enter the main menu

5.1 Calibrate

The positioner can be calibrated using two calibration menus.

Calibrate	Description
1_Automatic	Start the sequence to automatic calibration
2_Manual	Start the sequence to manual calibration

5.1.1 Automatic

The automatic calibration is an automated calibration that will find the necessary information to optimize the performance of the system. The calibration can take from 90 sec. up to 1000 sec.

The automatic calibration is available for the standard and stepping regulator. When the regulator type is set to proportional the auto calibration is automatic endpoint calibration. Tuning of the regulator parameters must be done from ValConnect.

If an emergency shutdown occurs while the calibration is in progress, the calibration procedure will auto abort.

5.1.2 Manual

In manual calibration, it is possible to manually set the travel end points. After manually setting the end points, the positioner will ask to start auto-tune sequence to optimize system performance. Auto-tune is recommended.

5.2 Error

The valve positioner will display an error code whenever an error has occurred. The positioner will, despite the error message, continue to regulate according to the control signal given. For a complete overview of the various error codes, please take reference to section 6.

Error	Description
Error explanation	Detalied explanation of the current highest priority

5.3 Status

If the user wants to get a live status on the control parameters or a general overview of the chosen configuration parameters, this is accessible by pressing the "↓" button while the positioner is in regulation mode. The regulation of the valve will not be influenced.

Status	Description
1 Live status	Show updated values
SP - Flow	% value of the control loop - Flow
PV - Flow	% value of the position loop/sensor - Flow
TM - Flow	% value of the transmitter loop - Flow
SP - Travel	% value of the control loop - Travel
PV - Travel	% value of the position loop/sensor - Travel
SP - mA	mA value of the control loop from control room
PV - mA	mA value of the position loop
TM - mA	mA value of the transmitter loop to control room
Cnt DO1	Puls counter for DO1
Cnt DO2	Puls counter for DO2
Cnt DO3	Puls counter for DO3
Cnt DO4	Puls counter for DO4
DO1	Current status of DO1
DO2	Current status of DO2
DO3	Current status of DO3
DO4	Current status of DO4
DO5	Current status of DO5
DO6	Current status of DO6
DI1	Current status of DI1
DI2	Current status of DI2
DI3	Current status of DI3
DI4	Current status of DI4
DI5	Current status of DI5
DI6	Current status of DI6
DI7	Current status of DI7
DI8	Current status of DI8
AI1 - mA	mA value of the input
AI2 - mA	mA value of the input
AI3 - mA	mA value of the input
AI4 - mA	mA value of the input
AO1 - mA	mA value of the output
AO2 - mA	mA value of the output
Control Mode	The control mode (ESD/Off/Local/Remote)
2 Identification	Values to identify the product
SW-ID	Software ID
SW ver.	Software version
Serial no.	Serial number
Model no.	Model number
Regulator	Regulator type
Tag no.	Tag number

Status	Description
3 Pump control	
Pump	State of the pump
Pressure	Meassured pressure
Switch	Pressure switch state
Level	Meassure level
Switch	Level switch state
Temperature	Temperature
Switch	Temperature switch state

Val Controls A/S • Sallingsundvej 5 • DK-6715 Esbjerg N • Tel. +45 7547 0600
vc@valcontrols.com • www.valcontrols.com

5.4 Menu

The menu consists of three submenus: Basic, Advanced and Pump control. In the basic menu some basic control parameters can be changed. The positioner is still in service while these changes are made. In the advanced menu, more advanced parameters can be changed. These parameters will change how the positioner is working and the positioner will stop regulating while changing settings in this menu.

Menu changes will not take effect until the user exits the menu and confirms the changes.

Menu	Description
1. Basic	Basic control settings
2. Advanced	Advanced control settings
3. Pump control	Pump control settings

5.4.1 Basic menu

Basic menu structure.

Basic	Default	Reset	Description
1 Deadband	1.0	B A	Acceptable deviation from setpoint in percentage
2 Flow curve			Choice of flow curve
1 Linear	√	B A	Linear flow curve
2 Equal pct. 50:1			Equal percentage 50:1 flow curve
3 Custom			Custom flow curve
3 Valve action			Valve action
1 Direct	√	B A	Valve opens with increasing setpoint value
2 Reverse			Valve closes with increasing setpoint value
4 Regulator functions			Special function on how the positioner works
1 End settings			Settings when the setpoint signal is 0% or 100%
1 Hold at open			Function at 100%
1 Status	Off	B A	Timer starts at 100%
2 Time	5	B A	Time before positioner goes to stay-put
2 Hold at close			Function at 0%
1 Status	Off	B A	Timer starts at 0%
2 Time	5	B A	Time before positioner goes to stay-put
5 Transmitter			Transmitter settings
1 Transmitter action			Transmitter action
1 Direct	√	B A	0% flow = 4mA
2 Reverse			0% flow = 20mA
2 Transmitter fail position			Transmitter fail
1 None	√	B A	During a failure will the transmitter show the position
2 3.5 mA			During failure the transmitter will be 3.5mA
3 21.5 mA			During failure the transmitter will be 21.5mA
6 Display			Display settings
1 Display light	Off	B A	Controlling the diplay light
2 Contrast	5	B A	Controlling the diplay contrast
3. Frontpage			Configure the frontpage
1 Valve position		B A	Selcet who to display the position of the valve
1 Percent	√		Show valve position in percent
2 Degree			Show valve position in degree
2 Configuration			Configuration for for the frontpage
1 Action	Direct	B A	Set the direction of the valve position on the frontpage
2 Degree min	0°	B A	Degree at 0%
3 Degree max	90°	B A	Degree at 100%
7 Status indicators			Status indicators
1 Status	On/Off		Enable status indicators
8 MT control			Magnetic touch control
1 Status	On/Off		Enable MT control
2 Auto lock status	On/Off		Enable auto lock for MT control
3 Auto lock time	1 min		Set the auto lock time

Val Controls A/S • Sallingsundvej 5 • DK-6715 Esbjerg N • Tel. +45 7547 0600
vc@valcontrols.com • www.valcontrols.com

Deadband

The deadband can be manual altered from the user menu. The standard adjustment is 1% but this value can be changed from 0.1 to 10 %.
Note: The deadband is on the position of the valve - not the flow!

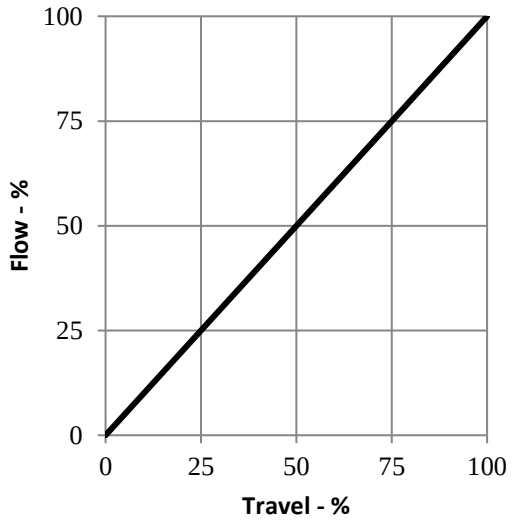
If the deadband is set to e.g. 5% the valve positioner will regulate with a set point accuracy of +/- 5 % and stay there until the position feedback is bigger than 5 %.

Flow curve

The valve characteristic expresses the flow percent through a valve at different opening angles. To obtain an accurate regulation of the flow media it is important to choose a valve characteristic that is identical with the one for the valve used.

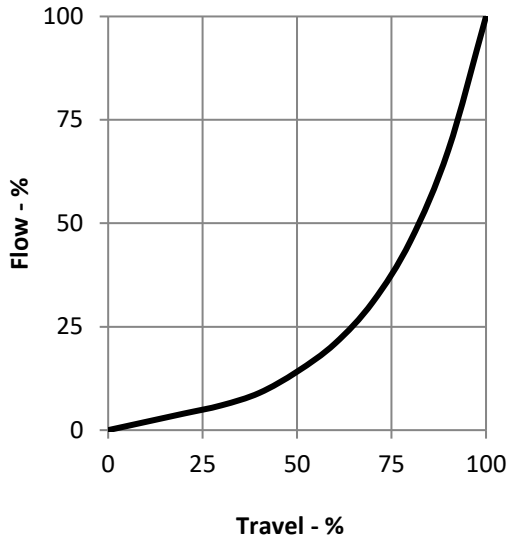
Linear valve characteristic

The flow through the valve is proportional with the travel of the valve. The linear valve-characteristic can be chosen from the user menu.



Equal Percentage 50:1

The flow through the valve rises in the last part of the curve. The equal percentage valve characteristic can be chosen from the user menu.

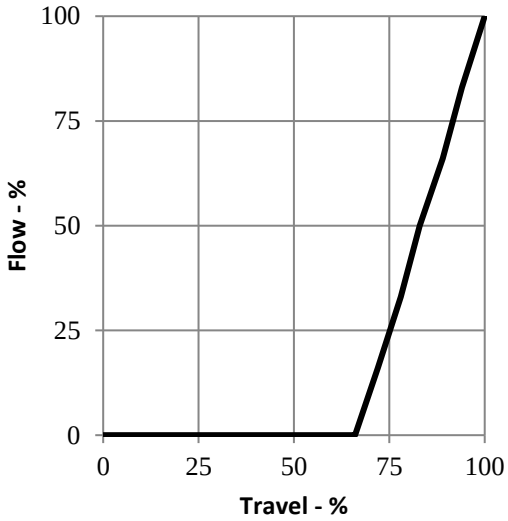


Custom curve

The positioner offers the user to define his own valve characteristic from the keyboard. This option makes it possible to use a wide range of valves and still be able to obtain an accurate regulation. The positioner needs 11 reference points to linearize an arbitrary valve characteristic. Point 0 and point 10 cannot be entered as they must be (0%, 0%) and (100%, 100%).

Point	Travel %	Flow %
0	0	0
1	66	0
2	72	16
3	78	33
4	83	50
5	89	66
6	94	83
7	100	100
8	100	100
9	100	100
10	100	100

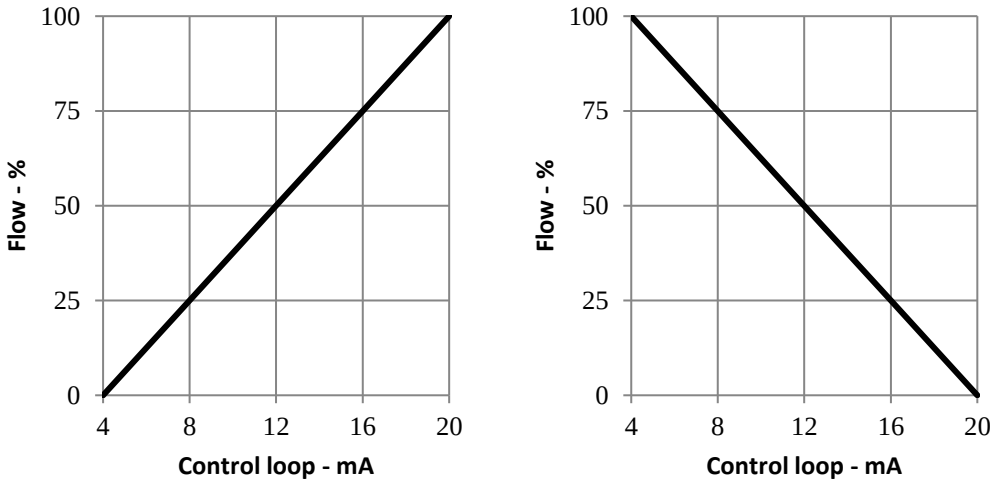
When the points describing the flow curve are keyed in, the valve positioner will linearize the flow curve.



Valve action

Menu to select the Control loop to be Direct or Reverse.

- Direct : Valve opens with increasing set point value
- Reverse : Valve closes with increasing set point value



Regulator

Menu to set whether the regulator should keep opening or closing when within the deadband of 0% and 100%

End settings

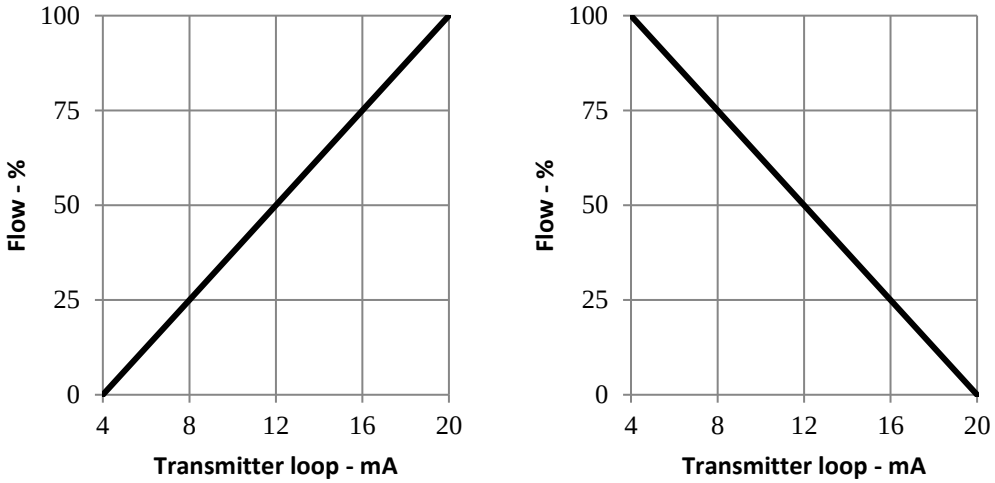
- Hold at Open:
  - Status:
    - Off: Never hold
    - On: Hold after the number of seconds specified in the next menu
  - Time: 0-30 sec. Do not have any effect if Status is Off
- Hold at Open:
  - Status:
    - Off: Never hold

- On: Hold after the number of seconds specified in the next menu
  - Time: 0-30 sec. Do not have any effect if Status is Off

Transmitter loop

Menu to select the Transmitter loop to be Direct or Reverse.

- Direct : 0% flow = 4mA
- Reverse : 0% flow = 20mA



The transmitter loop will go into an error position when there is an error in the error log. It is possible to choose between none and two positions:

- None
- 3.5mA +/- 0.2mA
- 21.5mA +/- 0.2mA

Display

- In this menu it is possible to turn the display light on, off or set it to automatic. When set on automatic the display light will turn on when using the keyboard and turn off after 5 min. not using the keyboard.
- The contrast level of the display can be adjusted.
- The direction of the position shown on the front page can be reversed.

Status indicators

- Enable the extra status indicators on models that have these

MT control

- Status: Enable MT control on models that have that
- Auto lock status: Enable the auto lock function
- Auto lock time: Ste the auto lock time

5.4.2 Advanced menu

Advanced menu	Default	Reset	Description
1 Manual Control			Manual control of positioner.
1 Setpoint			Manual control of set point
2 Actuator			Manual control of control valves
3 Actuator pulse			Manual control of control valves using pulses only
4 Control valves			Manual control of individual control valves
2 Signal Calibration			Calibration of signals to control room
1 Control loop			Calibration of 4-20 mA control signal
2 Transmitter loop			Calibration of 4-20 mA transmitter signal
3 Position loop			Calibration of 4-20 mA position loop
4 AI2			Calibration of 4-20 mA analogue input 1
5 AI3			Calibration of 4-20 mA analogue input 2
6 AI4			Calibration of 4-20 mA analogue input 3
7 AI5			Calibration of 4-20 mA analogue input 4
8 AO1			Calibration of 4-20 mA analogue output 1
9 AO2			Calibration of 4-20 mA analogue output 2
3 Configuration			Configuration of in- and outputs
1 Valve function			Configuration of valve control
1 Open	Not used	A	Menu to select valve position to open actuator
2 Close	Not used	A	Menu to select valve position to close actuator
3 Stay-put	Not used	A	Menu to select valve position to keep current actuator position
4 Fail position	Off	A	Menu to select valve position at fail position
2 Position feedback			Position feedback input
1 Position sensor		A	Potentiometer input
2 Position loop	√		4-20mA input
3 End position			Configuration of endposition signal
1 Output signal 0%	Not used	A	Select output which is active at 0%
2 Output signal 100%	Not used	A	Select output which is active at 100%
3 Deadband	0.5%	A	Deadband for endpoint signal
4 Off/Local		A	Configure off/local signal
1 Off signal	Not used	A	Select off signal input
2 Local signal	Not used	A	Select local signal input
5 Man. valve control			Configure the manaul control when in local mode
1 Open signal	Not used	A	Select input to open valve
2 Close signal	Not used	A	Select input to close valve
6 Emergency shutdown			Configure Emergency shutdown
1 Input signal	Not used	A	Select input to ESD signal
7 Error signal			Configure error signal
1 Output signal	Not used	A	Select output port for error signal
8 Ok signal			Configure ok signal
1 Output signal	Not used	A	Select output port for ok signal
9 Linear correction			Calibrate the linearity of the position feedback
1 Status			Enable the linear correction
2 Calibrate			Perform the linear calibration

Advanced menu	Default	Reset	Description
4 Control Parameters			Control parameters for the regulator
1 Hysteresis	0.5%	A	Hysteresis around the dead band
2 Pos. ADC 1st end	0	A	ADC value of first endpoint
3 Pos. ADC 2nd end	65535	A	ADC value of second endpoint
4 Open on-time	100	A	On-time when pulsing towards open
5 Open off-time	100	A	Off-time when pulsing towards open
6 Close on-time	100	A	On-time when pulsing towards close
7 Close off-time	100	A	Off-time when pulsing towards close
8 Pulse open dist.	2%	A	The distance before the SP where the regulator is pulsing
9 Pulse close dist.	2%	A	The distance before the SP where the regulator is pulsing
5 Reset			Resetting of positioner
1 Basic reset			Resets all marked with B
2 Advanced reset			Resets all marked with A

Manual control

In manual control it is possible to control the positioner manually in 4 different modes:

- Set point: The set point can be set and changed in different steps (1%, 10% and 25%).
- Useful if it is not possible no control loop is connected or the control loop signal cannot be controlled.
- Actuator: The actuator can be opened and closed using the buttons. When no button is pressed is the positioner in stay put mode.
- Useful to check whether open and close are set correctly and to check if the system can hold the position in stay put mode.
- Actuator pulse: Similar to the Actuator function except that the positioner is pulsing.
- Control valves: Valve 1 and Valve 2 output can be controlled individually. Useful to find the right settings for open, close and stay put of the control valves.

Signal calibration

In this menu is it possible to calibrate the analogue in- and out-puts.

Configuration

In configuration the user can change the setup of the positioner.

- Valve function: Configures how the valves operate during
  - Open
  - Close
  - Stay-put
  - Fail position: Only applicable for outputs which are used for open, close and stay-put
- Position feedback: Configures which input that is used for position feedback, either a position sensor or a position loop.
- End position indicator: Lights an indicator when the actuator is at 0% or 100%. This function has an adjustable deadband.
- Off/local selector: These inputs can be used to set the positioner in off or local mode
  - Off: The valve will go to the fail position and the pump is off
  - Local: The system is in manual and can be controlled using open and close buttons, defined under manual valve control.
  - Remote (Default): The system is controlled by control loop or communication protocol.

- Manual valve control: Open and close function for connecting two buttons for use to manual operate the valve when the selector is set to local.
- Emergency shutdown: De-energizes all the outputs used to control the solenoid valves and turns off the pump. Error 301 will appear in the error log.
- Error signal: The signal is active when there is an error in the error log
- Ok signal: The signal is active when there is no errors in the error log
- Stepping: Software stepping functionality
    - Status: Turn the stepping function on and off
    - Fail step:
        - Off: Set valve outputs to the fail position
        - Open: Pulse to the open position
        - Close: Pulse to the close position
    - Open off-time ext.: Extra time for pulse off times when opening
    - Close off-time ext.: Extra time for pulse off times when closing
    - Open end pulses: Number of extra pulses to open the valve completely
    - Close end pulses: Number of extra pulses to close the valve completely
- Linear correction: Calibrate the position feedback at 25%, 50% and 75 %. This calibration will be lost at every endpoint calibration and auto calibration.

Control parameters

This menu shall only be used by Val Controls certified personal. For more information please contact Val Controls

Reset

In this menu it is possible to reset the positioner back to default setting.

- Basic reset: Set the parameters in the basic menu to the default values.
- Erase config.: Set all configuration parameters to the default values including the calibration. Analogue inputs and outputs calibration data is reset to factory defaults.

5.4.3 Pump Control menu

Pump Control	Default	Values	Reset	Description
1 Pump				
1 Output	None		A	Configure pump output signal
2 Controller				The status of the pump controller
1 Always off	√		A	The pump is always off
2 Always on				The pump is always on
3 Auto				The pump controller is active
4 Manual				Manual control the pump
3 Motor safety relay	None		A	Select the input signal
4 Max running time				Configure the max running time
1 Status	Off	On/off		Status of the maximum running time function
2 Time	120	0-255 sec	A	Set the time the pump is active before a warning appears
2 Pressure				
1 Loop				Configuration if using a pressure transmitter
1 Pump configuration				Configure the levels which starts and stops the pump
1 Pump start	80 bar	0 - 500 bar	A	Start pump when pressure is below this value
2 Pump stop	120 bar	0 - 500 bar	A	Stop the pump when the pressure is above this value
3 Level				
1 Loop				Configuration if using a level transmitter
1 Pump stop	100 mm	0-9999 mm	A	Stop the pump when the level is below this value
2 Loop configuration				Configure the connected level transmitter
1 Loop 4mA value	0 mm	0-9999 mm	A	Level at 4mA
2 Loop 20mA value	700 mm	0-9999 mm	A	Level at 20mA
4 Temperature				
1 Loop				Configuration if using a temperature transmitter
1 Pump stop high				Pump stop high cofiguration
1 Status	Off	On/off		Turn the pump stop high function on and off
2 Pump stop	80 °C	-200 - 850 °C	A	Stop the pump when the temperature is above this value
2 Pump stop low				Pump stop low cofiguration
1 Status	Off	On/off		Turn the pump stop low function on and off
2 Pump stop	-20 °C	-200 - 850 °C	A	Stop the pump when the temperature is below this value
5 Valve				
1 Pump start				
1 Valve open		√		Start pump when valve opens
2 Valve close		√		Start pump when valve closes
3 Valve stayput		√		Start pump when valve goes to stayput
2 Pump stop				
1 Delay	5 sec	0-240 sec		Keeps the pump running after start command has ended

More settings are available through ValConnect.

Pump

Output: Configure which output is used to control the pump. Note that when an output is selected it will not be available to control a solenoid valve.

Controller: The pump controller can be set to different modes.

- Always off: No power to the pump output
- Always on: Always power to the pump (except if motor safety relay is on or ESD is active)
- Auto: The pump is regulating depending on the hydraulic pressure, level and temperature.
- Manual: The pump can be controlled by a button on the positioner.

A sensor is not used if "None" is selected as the input signal.

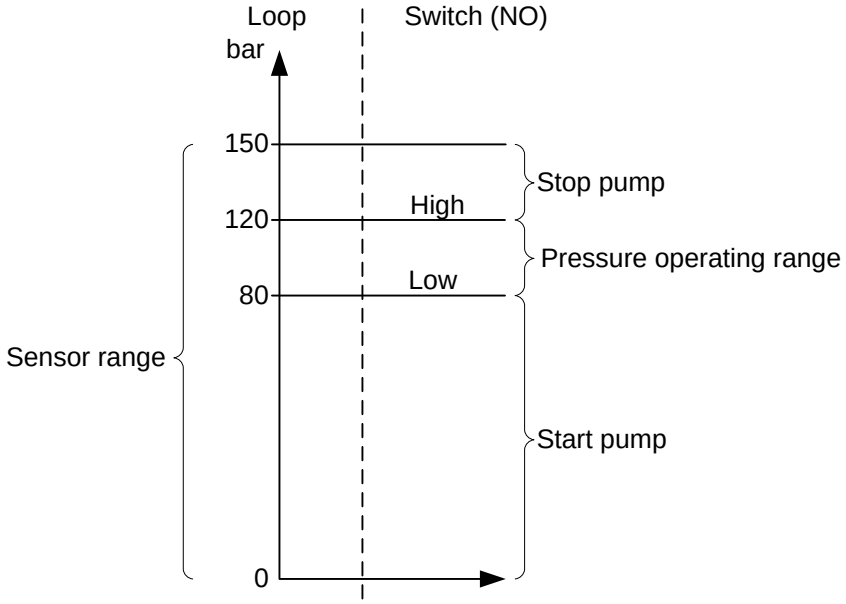
Motor Safety Relay: Set the relay input port. When the port is disconnected the motor will stop running.

Max Running Time: When the motor has been running for the specified period will an entry be made in the error log. To remove this error the motor must stop and the timer is reset.

Pressure

Input signal: Configure which of the analogue or digital inputs that are used as the pressure signal. That can be either an analogue loop input or digital input from two switches. By setting the input signal to "None" the pump controller will not use pressure to determine if the pump should run or not.

Loop: If a loop input is selected as the input signal the user must configure at which pressure the pump must start and stop.
The pressure returned from the sensor at 4mA and 20mA must be entered into the positioner.



Switch: If pressure switches is used, then the user must select whether they are normally open or normally closed switches.

Level

Input signal: Configure which of the analogue or digital inputs that is used as the level signal. That can be either an analogue loop input or digital input from a switch. By setting the input signal to "None" the pump controller will not use level to determine if the pump should run or not.

Loop: If a loop input is selected as the input signal the user must configure at which level the pump must stop.
The levels returned from the sensor at 4mA and 20mA must be configured in the positioner.

There is a delay of 10 sec of the signals to secure stability.

Temperature

Input signal: Configure which of the analogue or digital inputs that is used as the temperature signal. That can be either an analogue loop input or digital input from a switch. By setting the input signal to "None" the pump controller will not use temperature to determine if the pump should run or not.

Loop: If a loop input is selected as the input signal the user must configure at which temperature the pump must stop.
The temperature returned from the sensor at 4mA and 20mA must be configured in the positioner.

There is a delay of 10 sec to secure stability.

6 Regulators

6.1 Electronic stepping

Electronic stepping is used to operate a standard double acting or spring return actuator in a stepping mode replicating the functionality of a stepping actuator.

- Set the Regulator type to “Electronic stepping” through ValConnect
- Perform an auto calibration
- Set the extra “Off-times” to increase the duration of the stroke
    - Open off-time extra
    - Close off-time extra
- Fail step: Set desired action in case of loss of control loop or position signal
- Open end pulses: Number of pulses after the position has reached full open
- Close end pulses: Number of pulses after the position has reached full close

6.2 Mechanical stepping

The configuration of a mechanical stepping is to be done through ValConnect. The recommended settings when setting up a IHP24 with a stepping actuator is:

- Regulator type: Mechanical stepping
- Dead band: 2 %
- Open on-time: 5 sec
- Close on-time: 5 sec
- Open off-time: 5 sec
- Close off-time: 5 sec

The following parameters can be used to tune the functionality of the regulator

- Fail step: Set desired action in case of loss of control loop or position signal
- Open end pulses: Number of pulses after the position has reached full open
- Close end pulses: Number of pulses after the position has reached full close

6.3 Proportional

<u>Configuration</u>
In configuration the user can change the setup of the positioner.

- Valve function: Configures how the valves operate during open, close and stay-put. The proportional output can be configured in three ways.
    - AO1 : 4 mA is full close, 12mA is stay-put and 20mA is full open.
    - AO2 : 4 mA is full close, 12mA is stay-put and 20mA is full open.
    - AO1 and AO2 AO1= 20mA, AO2= 4mA is full close.

      AO1= 4mA, AO2 = 20mA is full open.
      AO1= 4mA, AO2= 4mA is stay-put.

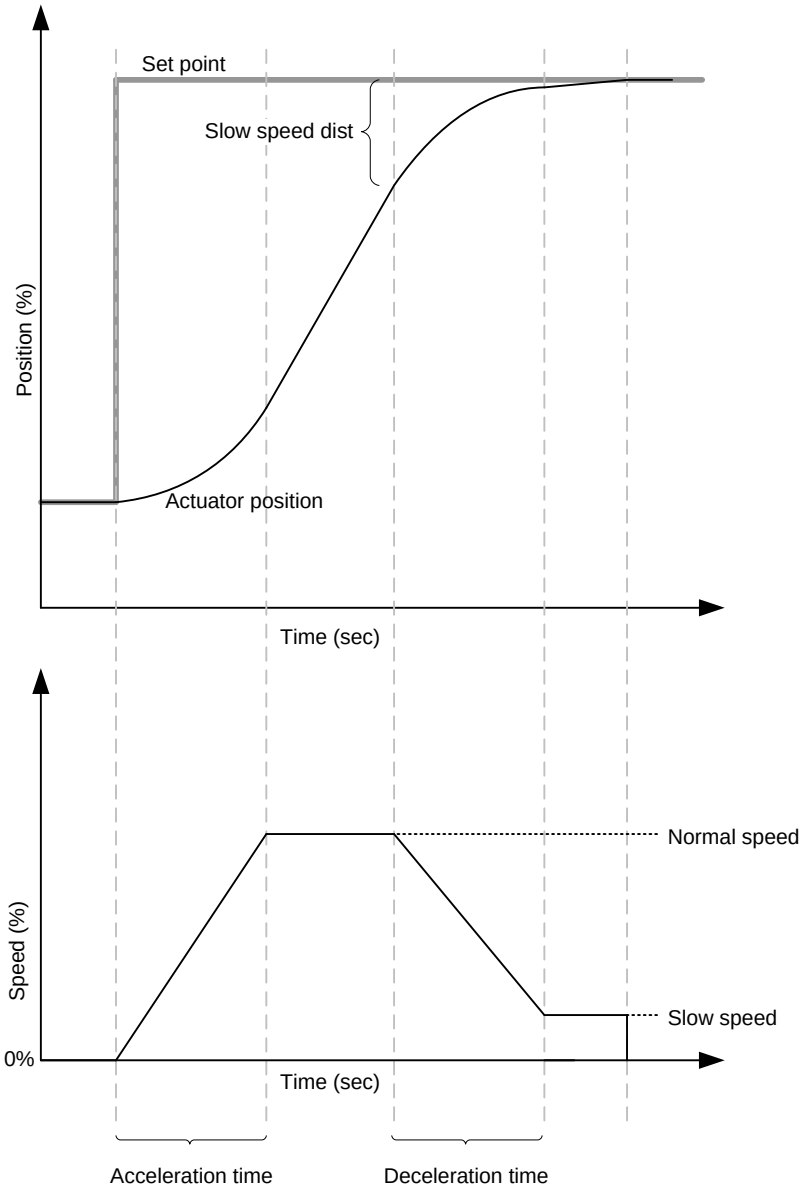
- Stay-put position: Tune the 12mA output when only one AO is used. Used for proportional valves that has a spool which is out of the centre.
- Propor. fail pos: Set the fail position of the analogue output.
    - 4mA
    - 12mA (Default)
    - 20mA

Control parameters

- Hysteresis: The hysteresis at the setpoint
- Pos. ADC 1st end: Fine adjust the 1st end point
- Pos. ADC 2nd end: Fine adjust the 2nd end point

The following parameters can only be accessed through ValConnect.

- Slow speed open: Set the minimum speed when opening
- Slow speed close: Set the minimum speed when opening
- Speed open: Set the normal speed when opening
- Speed close: Set the normal speed when closing
- Acceleration open: Set the acceleration time when opening
- Acceleration close: Set the acceleration time when closing
- Deceleration open: Set the deceleration time when opening
- Deceleration close: Set the deceleration time when closing
- Slow open dist: Set the distance before the set point that deceleration will start when opening
- Slow close dist: Set the distance before the set point that deceleration will start when closing


Set point
Slow speed dist
Position (%)
Actuator position
Time (sec)
Normal speed
Speed (%)
Slow speed
0%
Time (sec)
Acceleration time
Deceleration time

7 Error no.

7.1 Mounting and settings

No. 101	**Solenoids are not configured**
Description	The Valve Function has not been configured in the menu
Trouble shooting	Configure the Valve Function in the advanced menu (3.1)
Consequence	The positioner outputs goes to their fail position.

No. 102	**Potentiometer is not connected**
Description	The potentiometer has been selected as the position feedback signal, but there is not connected a potentiometer to the positioner.
Trouble shooting	Connect a potentiometer to the positioner Or Change the position feedback signal to position loop in the advanced menu (3.2)
Consequence	The positioner outputs goes to their fail position.

No. 103	**Position loop is not connected**
Description	The position loop has been selected as the position feedback signal, but there is not connected a signal to the positioner.
Trouble shooting	Connect a loop signal to the positioner Or Change the position feedback signal to potentiometer in the advanced menu (3.2)
Consequence	The positioner outputs goes to their fail position.

No. 104	**Control loop is not connected**
Description	A control loop has not been connected to the positioner
Trouble shooting	Connect a control loop to the positioner
Consequence	The positioner outputs goes to their fail position.

No. 105	Control loop is not calibrated
Description	The control loop is not calibrated
Trouble shooting	Calibrate the control loop from the advanced menu (2.1)

No. 106	Transmitter loop is not calibrated
Description	The transmitter loop is not calibrated
Trouble shooting	Calibrate the transmitter loop from the advanced menu (2.2)

No. 108	Position loop is not calibrated
Description	The position loop is not calibrated
Trouble shooting	Calibrate the position loop from the advanced menu (2.3)

No. 109	Analogue input loop 2 is not calibrated
Description	The analogue input loop 2 is not calibrated
Trouble shooting	Calibrate the analogue input loop 2 from the advanced menu (2.4)

No. 110	Analogue input loop 3 is not calibrated
Description	The analogue input loop 3 is not calibrated
Trouble shooting	Calibrate the analogue input loop 3 from the advanced menu (2.5)

No. 111	Analogue input loop 4 is not calibrated
Description	The analogue input loop 4 is not calibrated
Trouble shooting	Calibrate the analogue input loop 4 from the advanced menu (2.6)

No. 112	Analogue input loop 5 is not calibrated
Description	The analogue input loop 5 is not calibrated
Trouble shooting	Calibrate the analogue input loop5 from the advanced menu (2.7)

No. 113	Analogue output loop 1 is not calibrated
Description	The analogue output loop 1 is not calibrated

Trouble shooting	Calibrate the analogue output loop 1 from the advanced menu (2.8)

No. 114	**Analogue output loop 2 is not calibrated**
Description	The analogue output loop 2 is not calibrated Only applicable when using the proportional regulator
Trouble shooting	Calibrate the analogue output loop 2 from the advanced menu (2.9)

No. 120	**Proportional output is not configured**
Description	The proportional output signal has not been configured Only applicable when using the proportional regulator
Trouble shooting	Configure the proportional output signal in the advanced menu (3.1.4)

No. 130	**SP has not been set**
Description	The SP has not been set through Modbus or Foundation Fieldbus Only applicable for Modbus or Foundation Fieldbus version
Trouble shooting	• Send a SP to the unit. • Contact Val Controls
Consequence	The positioner outputs goes to their fail position.

7.2 Calibration

No. 201	Not Calibrated!
Description	The positioner is not calibrated
Trouble shooting	Calibrate the positioner

No. 202	Calibrated w. error. Using old values!
Description	The last calibration failed and the positioner is using the parameters from the previous calibration.
Trouble shooting	Investigate the Error log to find the reason to why the calibration failed.

No. 203	Too few ADC points
Description	The measured travel is not large enough
Trouble shooting	Increase the travel Check that the requirements for operating area (3.4 Electrical specifications) for the position sensor or position loop are used.

No. 204	No movement or too large actuator
Description	The positioner has not detected any movement
Trouble shooting	Movement is confirmed visually: • The actuator is very slow moving. Use manual calibration without auto tuning • Check that the position feedback is connected correct No movement: • Check that the solenoids are configured correct • Check the hydraulic system

No. 205	Travel time too long. Actuator is too big
Description	The travel time is larger than 120 sec
Trouble shooting	Use manual calibration without auto tuning

No. 206	Sensor signal is too noisy
Description	The sensor signal is too noisy, even if the deadband has been set to 10%
Trouble shooting	• Improve signal quality • Increase the travel

No. 207	Calibration timeout
Description	A timeout occurred during the calibration
Trouble shooting	The system behaves in an unexpected way. • Slow down the system Restart the calibration

No. 208	Hold test failed
Description	The positioner is not able to hold the actuator at a 50%
Trouble shooting	• Check solenoid settings • Check for leakages in the hydraulic system • If the system is fast (travel time <3). Slow system down

7.3 External connections

No. 301	ESD signal
Description	The ESD signal is low
Trouble shooting	• Restore ESD signal • Disable ESD functionality in the advanced menu

7.4 Pump unit

No. 601	Pump control. Low level
Description	The measured level is below the specified value.
Trouble shooting	Check the oil level in the tank. If oil level is okay, then check the following items in the menu. • Adjust pump stop level (3.3.2.1) • Adjust loop configuration (3.3.2.2) • Calibrate analogue input (2.2.3-6)

No. 602	Pump control. High temperature
Description	The measured temperature is above the specified values.
Trouble shooting	• Check the temperature of the oil • Increase high temperature limit

No. 603	Pump control. Low pressure
Description	The pressure error input has been disconnected
Trouble shooting	A pressure error has been signalled to the positioner. • Activate the override function (Digital input) to force the pump to run

No. 604	Pump control. Low Low pressure
Description	Low Low pressure has been detected
Trouble shooting	A pressure error has been signalled to the positioner. • Increase the pressure • Decrease the Low Low pressure limit

No. 605	Pump control. High high pressure
Description	High High pressure has been detected
Trouble shooting	A pressure error has been signalled to the positioner. • Decrease the pressure • Increase the High High pressure limit

No. 607	Pump control. Low temperature
Description	The measured temperature is below or below the specified values.
Trouble shooting	• Check the temperature of the oil • Decrease low temperature limit

No. 610	Pump control. Motor safety relay
Description	The motor protection relay
Trouble shooting	Check the motor safety relay and the connection to the IHP.

No. 611	Pump control. Max running time
Description	The motor has been running for too long.
Trouble shooting	Investigate why the motor is still running. Or increase the max running time in the menu • Max running time(3.4)

No. 612	Pump control. Reset required
Description	The pump was shut down due to an error and a reset is required.
Trouble shooting	• Push the Reset button.

7.5 Communication

No. 8xx	Communication error
Description	A communication error has occurred
Trouble shooting	See separate communication user manual.

7.6 Internal errors

No. 9xx	Internal Error contact support
Description	An internal error has occurred
Trouble shooting	Contact Val Controls A/S and give the following information: • Product type • Software version • Error number • How did the error occur

8 Software revision list

Version 3.13.00

- New functions
  - Stepping actuators can be controlled
  - Update to identification menu, show model no and serial no.

Version 3.13.01

- New function
  - Fast detection of lost control loop
- Minor improvements

Version 3.13.02

- Minor improvements

Version 3.13.03

- New function
  - Delayed detection of reconnected control loop

Version 3.14.00

- Foundation fieldbus improved

Version 3.14.01

- Minor improvements

Version 3.15.00

- Digital inputs can be inverted
- Pump controller: DI is not set separately from AI.
- Pump controller: “One pressure” switch configuration is now possible

Version 3.15.01

- Minor improvements

Version 3.16.00

- Invert open/close led on front. Only available via ValConnect

Version 3.17.00

- MT locked LED on front functionality inverted. LED is ON when MT Control is unlocked.
- Advanced reset renamed to Erase config.
- Minor improvements

Version 3.17.01

- Minor improvements

Version 3.17.02

- Minor improvements

Version 3.17.03

- Minor improvements

Version 3.17.04

- Minor improvements

Version 3.17.05

- Proportional controller: Enable automatic calibration as automatic endpoint calibration from the display.

Val Controls A/S • Sallingsundvej 5 • DK-6715 Esbjerg N • Tel. +45 7547 0600
vc@valcontrols.com • www.valcontrols.com