34-Series

Electronic Actuated Pilot Control

Installation / Operation / Maintenance

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1. Introduction

The 34 Series electronic actuated pilots offer accurate and reliable control of the valve. 34 Series pilots are a 4-20 mA standalone actuated controller calibrated via PC through a maintenance port and able to remotely control any Cla-Val valve. The pilot setting can be adjusted with a standard 4-20 mA signal, and 4-20 mA position feedback is available to cross check if requested position is reached.

34 series pilots include:

- **CRD-34 & CRA-34** "Electronic Actuated **Pressure reducing** pilot control".
- **CRL-34** "Electronic Actuated Pressure **sustaining pilot** control".
- **CDHS-34** "Electronic Actuated **rate of flow pilot** control".

The 34 series includes the following features:

- Ideal for Pressure/Flow optimization
- Simplified Remote Valve Set-point Control
- Modbus RTU Communication
- Easy integration with VC-22D Electronic valve controller
- 12 to 24 VDC Input Power
- Isolated input
- Reverse Polarity protection
- IP-68 Submersible
- Calibrated Via PC and VC-22D

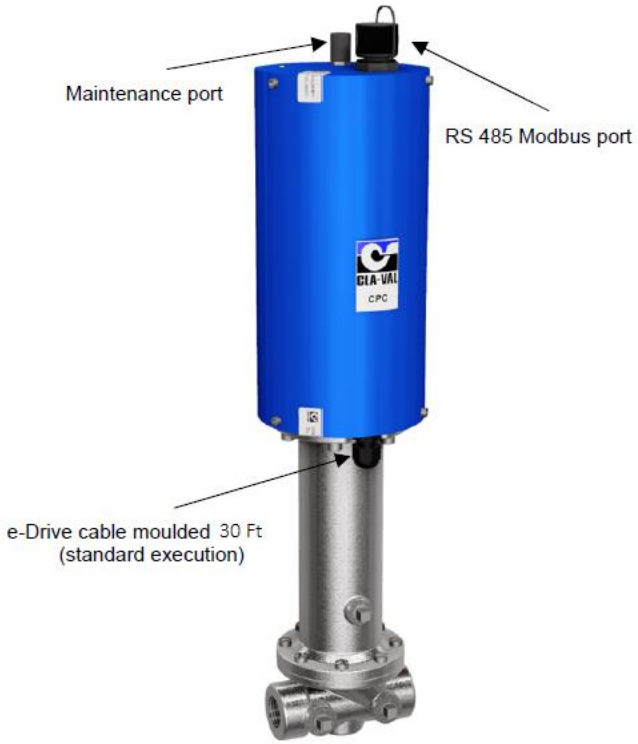


Figure 1: 34-series overview.

Cla-Val Electronic Actuated Pilot Controls are a simple and effective solution to add or improve electronic control in waterworks valve applications. They allow for remote valve set point control, are ideal for use with SCADA systems and can be adjusted to accommodate changing requirements. The 34 Series Pilot Control can be easily retrofitted to an existing valve in the field without removal from the pipeline.

Typical **applications** include the following major control functions.

- Pressure Reducing
- Pressure Management
- Pressure Sustaining
- Rate-of-Flow Control
- Reservoir Filling
- Combination Pressure Reducing/Pressure Sustaining

2. Installation

2.1 Unpacking

Remove Pilot from box. Inspect the packaging and contents for damage. Report damages, if any, to the carrier.
If any part is missing or the control malfunctions, please contact your supplier or the factory for assistance.

2.2 Installation Instructions

Recommended installation for the 34 series is vertical with the valve to ensure proper operation.

- All installation, adjustment and maintenance should be carried out by a competent electrician.
- Do not exceed the maximum ratings given in the specifications and printed on the label.
- The electrical connections should be made as described in the user's manual.
- Before any maintenance operation the main power should be turned off.

Figure 2: Recommended installation of 34 series

2.3 Dimensions

The following dimensions are the same for all 34 series pilots:

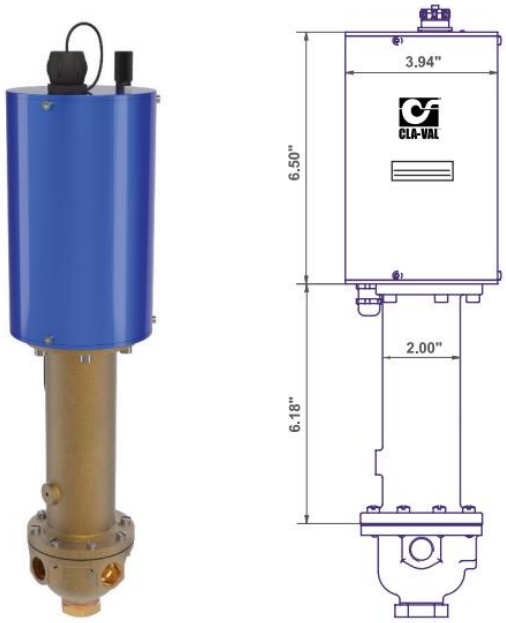


Figure 3: 34 series electronic actuated pilot dimensions.

3. Specifications

3.1 Subassembly Specifications

Specification	CRD-34 & CRA-34	CRL-34	CDHS-34
Adjustment Ranges	2 - 30 psi (3 psi per turn) 15 - 75 psi (9 psi per turn) 40 - 140 psi (27.5 psi per turn)	7 – 75 psi (8.5 psi per turn) 20 – 105 psi (13 psi per turn) 20 – 200 psi (28 psi per turn)	70 – 480 inches H2O Differential
End Connection	3/8” NPT	½” and 3/4” Threaded	3/8” NPT
Temperature Range	Water: to 176 F / 80 C	Water: to 176 F / 80 C	Water: to 176 F / 80 C
Materials	Pilot Control: Low Lead Bronze Trim: Stainless steel Type 303 Rubber: Buna-N synthetic rubber. Available with optional Stainless Steel or Monel materials at additional cost. Consult factory for details. Note: Available with remote sensing control (specify Model # CRA-34)	Pilot Control: Low Lead Bronze Trim: Stainless steel Type 303 Rubber: Buna-N synthetic rubber. Available with optional Stainless Steel or Monel materials at additional cost.	Pilot Control: Bronze ASTM B62 Trim: Stainless steel Type 303 Rubber: Buna-N synthetic rubber. Available with optional Stainless Steel or Monel materials at additional cost. Consult factory for details Note: Available with Remote Sensing for orifice upstream, specify CDHS-34A
Weight	8 Lbs.	8 Lbs.	8 Lbs.
Environmental Protection	IP68, Validated 1 month at 0.2 bar/2.9 psi	IP68, Validated 1 month at 0.2 bar/2.9 psi	IP68, Validated 1 month at 0.2 bar/2.9 psi

3.2 Electronic Specifications

Specification	CRD-34 & CRA-34 / CRL-34 / CDHS-34
Electrical Power:	• 10 VDC to 30 VDC • 16 rpm nominal speed @ 24 VDC • 8 rpm nominal speed @ 12 VDC 500 mA max. (actuating mode) @ 16 bar ~ 232 Psi 800 mA max. (actuating mode) @ 21 bar ~ 304 Psi 350 mA average nominal 30 mA stand-by (un-actuating mode) CLA-VAL recommended power supply is the e-Power-IP turbine for a completely autonomous system
Power Protection:	Max. 32 VDC overvoltage Max. 1 A couple limitation Polarity inversion & short circuit Automatic shut-down at 80°C internal
Operating diagnostic:	Through diagnostic LED as referenced in the user manual (Green / Red / Blinking)
Electrical connection:	1x 30 ft shielded cable (12 wire) Wire section: 0.22 mm2 Cable diameter: 6.9 mm 1x 6-pin Serial connector for Modbus communication 1x3-pin connector for computer connection / maintenance
Control inputs:	• 4-20 mA (2 wires) • 2x dry contact (manual operation) • Modbus RTU 485 Serial 6-pin connector
4-20 mA input protection:	Max. 32 VDC over voltage Insolation (2 wires) Optocoupler isolation CMR 1000 V (CMR: common mode rejection)
Position feedback:	• 4-20 mA (load impedance ≤ 500 Ω) • 2x programmable alarm position 10-32 VDC / 110-240 VAC at max 1 A
4-20 mA output protection:	Max. 32 VDC over voltage (dry contact input and 4-20 mA output at the same voltage, un isolated to each other)

4. Applications

4.1 CRD-34 & CRA-34

The **CRD-34** and **CRA-34** are installed on the Cla-Val 390 Series valves that maintain downstream pressure and require this pressure to be changed from a local/remote location. It can be an effective solution for lowering costs associated with "confined space" requirements by eliminating the need for entry in valve structure for set-point adjustment. It is also ideal for pressure management and can be programmed to minimum nighttime and optimum daytime pressures. Remote set-point command signals can be from any SCADA-type control system using an analog 4-20 mA signal, by contact closure for CC/CCW rotation, or through Modbus RTU.

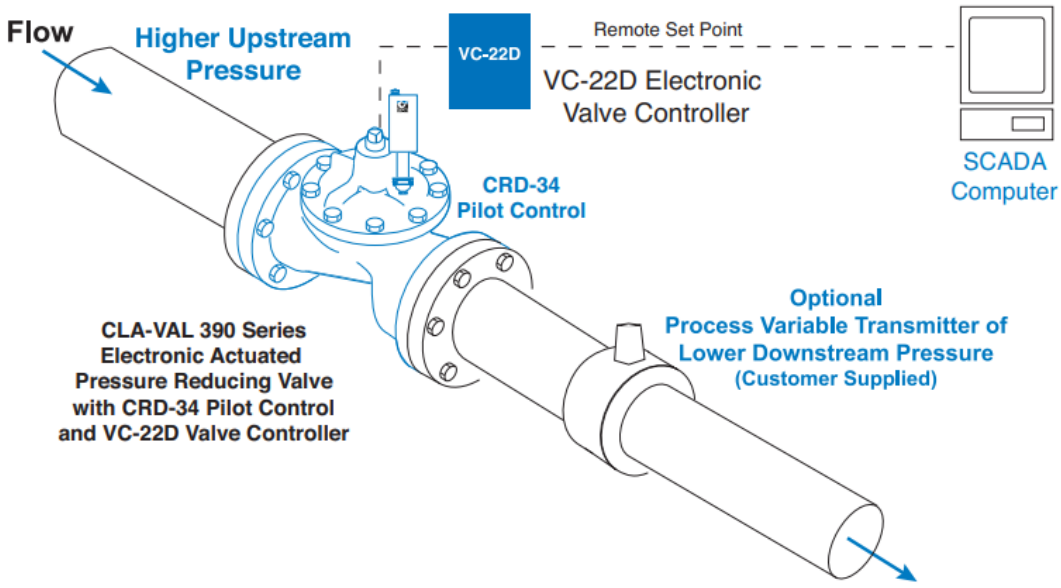


Figure 4: Typical Installation of CRD-34 & CRA-34

4.1.1 CRD-34 VS CRA-34

The **CRD-34** senses valve outlet pressure directly and the **CRA-34** senses downstream pressure with remote hydraulic connection. Existing manually set Cla-Val 90 Series Pressure Reducing control valves can be retrofitted with CRD-34 or CRA-34 to add remote set-point control of delivery pressure.

The **CRD-34** and **CRA-34** consists of a hydraulic pilot and integral controller that accepts a remote set-point and positions the pilot to maintain a pressure at valve outlet within preset limits. Pressure settings are linear between these settings. Pressure settings are calibrated to the specific spring range of the control. Continuous internal monitoring of actuator position results in smooth transitions between pilot set-points with no backlash or dithering. Should power or control input fail, this pilot remains in automatic hydraulic control assuring system stability under all conditions.

4.2 CRL-34

The **CRL-34** is installed on Cla-Val 350 Series valves to maintain constant upstream pressure within close limits and allows this pressure to be changed from a remote location. This pilot can be an effective solution for lowering costs associated with "confined space" requirements by eliminating the need for entry in valve structure for set-point adjustment.

The Model **CRL-34** Electronic Actuated Pressure Sustaining Pilot Control provides remote set-point adjustment and accurate upstream pressure control. Remote set-point command signals can be sent from Cla-Val's VC-22D e-Controller or any SCADA-type control system using an analog 4-20 mA signal, by contact closure for CC / CCW rotation, or through Modbus RTU.

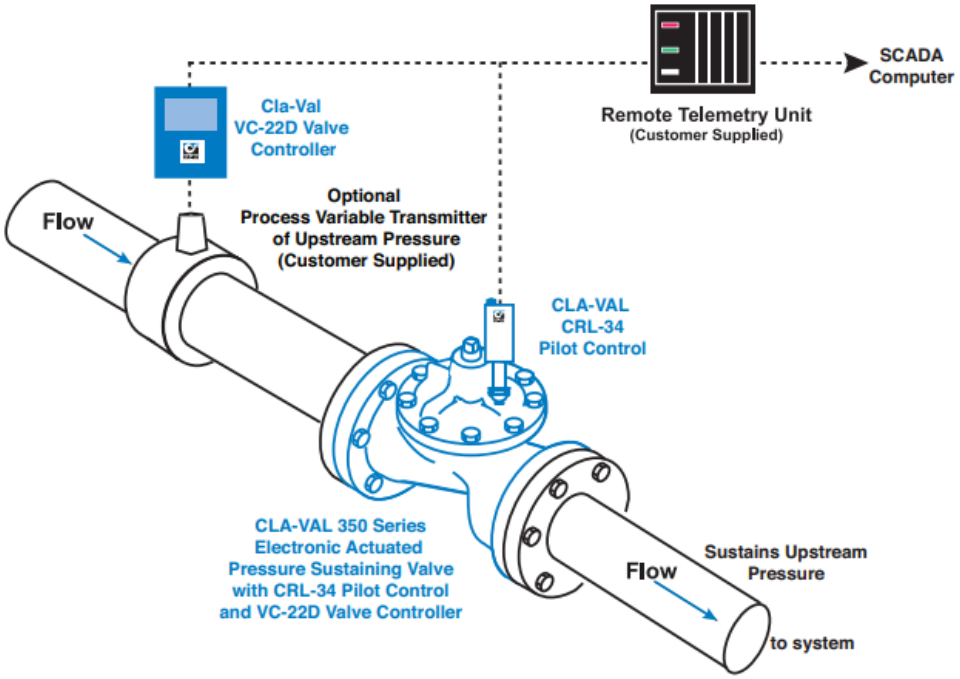


Figure 5: Typical Installation of CRL-34.

Existing manually set Cla-Val 50 Series Pressure Relief / Pressure Sustaining Control valves can be retrofitted with **CRL-34** pilots to add remote set-point control of upstream pressure.

The **CRL-34** consists of a hydraulic pilot and integral controller that accepts a remote set-point and positions the pilot system to sustain a pressure at the valve inlet within preset limits. Pressure settings are linear between these settings. Pressure settings are calibrated to the specific spring range of the pilot control.

4.3 CDHS-34

The Cla-Val Model **CDHS-34** Electronic Actuated Differential Pressure Pilot Control provides remote set-point adjustment and accurate differential pressure control for rate of flow control on Cla-Val 340 Series Control Valves.

Remote set-point command signals can be from any SCADA-type control system using analog 4-20 mA signal, by contact closure for CC/CCW rotation, or through Modbus RTU.

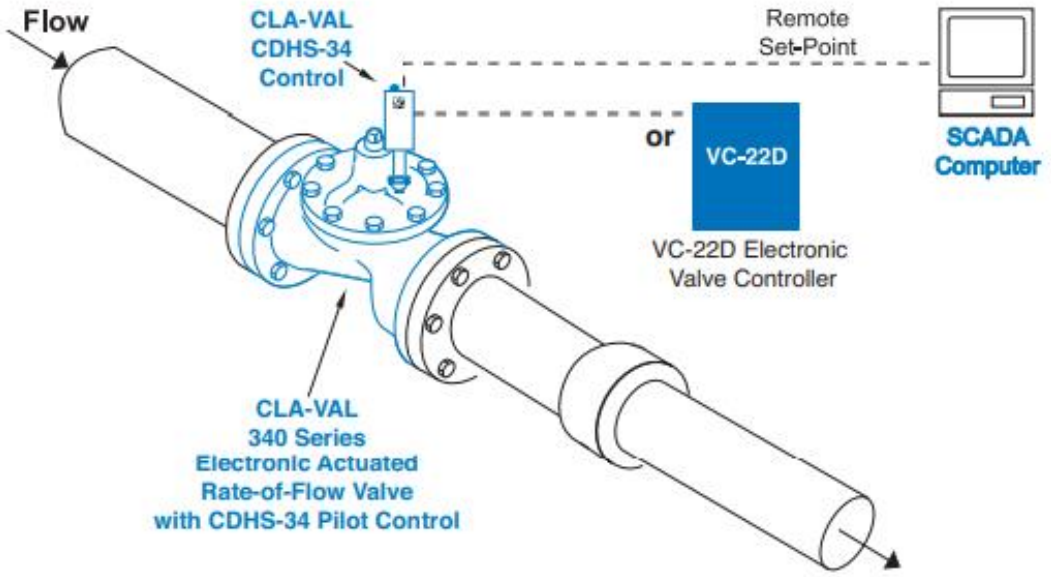


Figure 6: Typical Installation of CDHS-34.

A precision orifice plate installed with valve creates differential pressure used for rate of flow control by the **CDHS-34**.

Existing manually set Cla-Val 40 Series Rate-of-Flow control valves can be retrofitted with **CDHS-34** to add remote set-point control.

The **CDHS-34** consists of a hydraulic pilot and integral controller that accepts a 4-20 mA remote set-point and positions the pilot to maintain a maximum pressure differential at orifice plate and corresponding flow rate within preset limits.

The **CDHS-34** Is installed on Cla-Val 340 Series valves to maintain flow rate and allow the flow rate to be changed from a remote location. Additional pilot controls, hydraulic and/or electronic, are also available to perform multiple functions to fit exact system requirements.

4.4 Complementary Products

The 34 Series motorized pilot can comply with many Cla-Val Products such as:

1. **VC-22D** Valve Controller: Vc-22D controller as a very powerful tool which can control many devices in addition to 34 series with multiple communication protocols.
2. **X143IP** Power Generator: the X143IP can power the 34, power calculations may be required.
3. **X144D** e-Flowmeter: The X144D is an additional complementary product that can also be used along with the 34-series.
4. **X145** Electronic Display: having an electronic display with the 34-series can be very helpful.
5. **XF2F** package: Cla-Val new XP2F package is another source of flow metering which can also be complementary with the 34 series.

Figure 7: Complementary Products With 34 Series.

5. Electrical Wiring

5.1 34 Power/Signal Connections

The 34 series comes with a 12-wire shielded 30 ft cable and its configured wiring as follows:

Cable		
Code	Function	Colour
0 V	Connect with ground principal	black
+24 VDC	Power supply	red
+4-20 mA	Position Feedback	green
Common -	For position feedback & push button	pink
+4-20 mA-	Set point +	yellow
-4-20 mA	Set point -	grey
Alarm 1	Input low contact relay	brown
Alarm 1	Output low contact relay	blue
Alarm 2	Input high contact relay	orange
Alarm 2	Output high contact relay	white
Manual 1	Decrease position by push button	turquoise
Manual 2	Increase position by push button	purple

5.2 Modbus Connections

The connection side of the 34 series is circular plug type, And the connection side of the VC-22D is a screw terminal. The connection of the VC-D22 side must be wired as the following table:

Cable		
Code	Function	Wire N°
+24 VDC	Power supply	1
0 V	Connect with ground principal	2
GND	Ground for Modbus controller	3
485A	485A Terminal Modbus controller	4
485B-	485B Terminal Modbus controller	5
Free	Not used, do not connect	6

5.3 Wiring Instructions

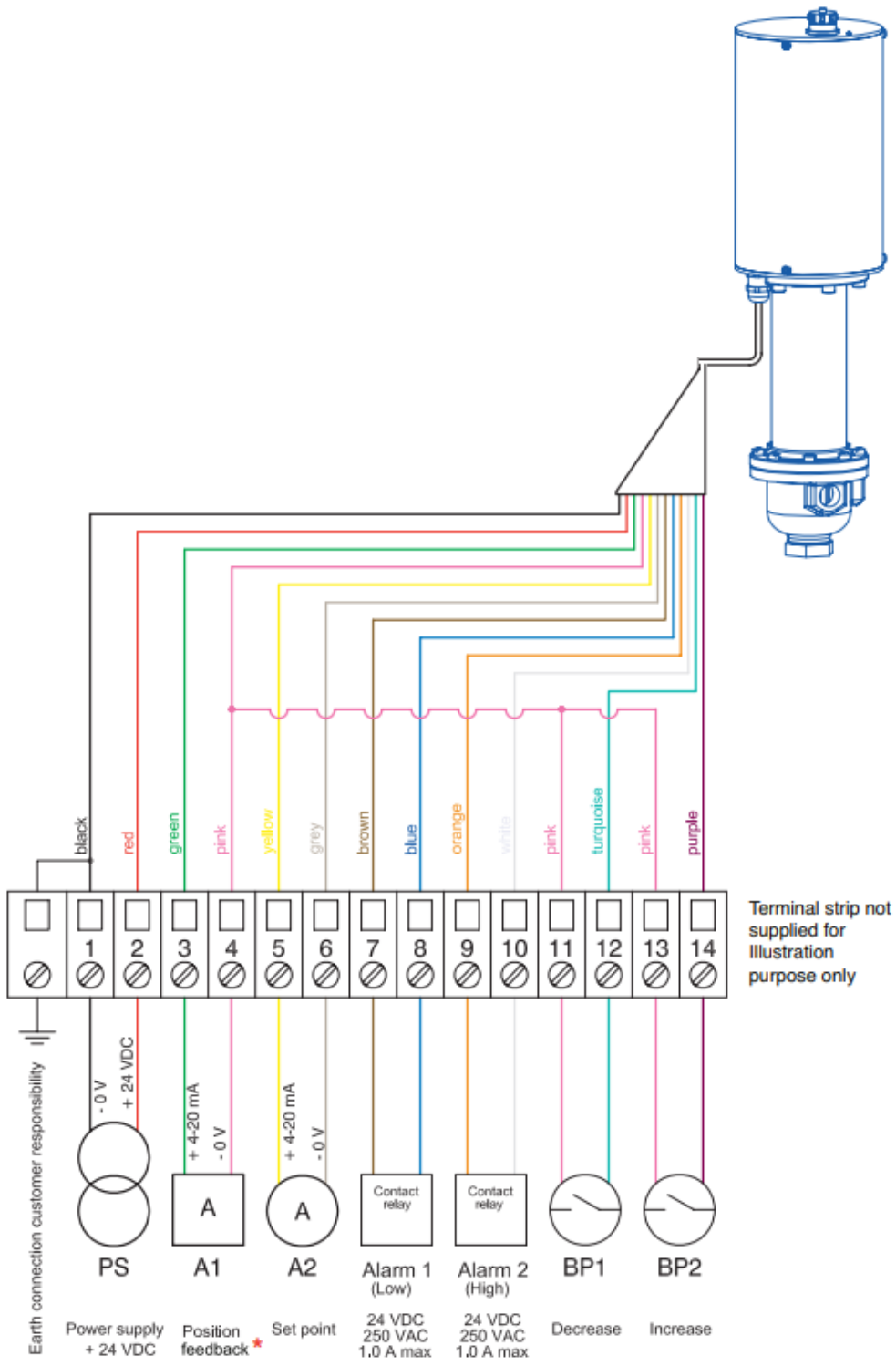
Before running actuator or software program, complete the following hookup steps:

- Avoid potential ground loops.
- Avoid over tightening wiring connector fasteners.
- The enclosure is rated IP-68 submersible for short periods of time. It is not intended for continuous underwater use.
- Consult Cla-Val factory technical support if you have questions.
- The twelve - wire 30 ft cable is attached to 34 Series actuator and should be terminated in suitable junction box or directly into an above grade RTU or similar device.
- Care should be used when attaching to wires to avoid damage.
- Installation of suitable protection from lightning is highly recommended.
- There are no user serviceable parts inside the actuator and tampering or opening it will void the warranty.
- The twelve-wire actuator cable is permanently attached. Internal damage not covered by warranty will occur if cable is removed.

5.3.1 Wiring Example

Terminate wires only applicable to your application. For example, minimal wiring requirements for power and remote set point are as follows:

1. Attach 12 to 24 VDC power to 34 Series Actuator cable. Black wire is for (-) negative; Red wire is for (+) positive. Provide minimum 500 mA supply.
2. Attach 4 to 20 mA analog Remote Command Input (from SCADA system or loop calibrator) to 34 Series Actuator cable. Yellow is positive and Grey is negative.
3. After wiring is complete and actuator is powered, it can be used with 4 - 20 mA remote command input signal scaled to factory default pilot control adjustment range (Operation A, above).


black
red
green
pink
yellow
grey
brown
blue
orange
white
pink
turquoise
pink
purple
1
2
3
4
5
6
7
8
9
10
11
12
13
14
Terminal strip not supplied for Illustration purpose only
Earth connection customer responsibility
- 0 V
+ 24 VDC
+ 4-20 mA
- 0 V
+ 4-20 mA
- 0 V
A
A
Contact relay
Contact relay
PS
A1
A2
Alarm 1 (Low)
Alarm 2 (High)
BP1
BP2
Power supply + 24 VDC
Position feedback *
Set point
24 VDC 250 VAC 1.0 A max
24 VDC 250 VAC 1.0 A max
Decrease
Increase

6. 34 Series Calibration

Before beginning the calibration process, determine if it is necessary! The actuator, if new, has been factory calibrated to the spring range shown on the pilot and may not require further calibration (30-300 spring range is calibrated from 40 to 140 psi).

Hardware set-up steps must be completed before program will communicate. Until wiring and power connections are made to the actuator, the software program can be opened, but new parameters cannot be created or stored or sent to actuator.

Configure the e-drive as follows:

6.1 e-Drive Overview

Connect laptop computer to actuator using special multi-USB cable. Be sure computer is on and actuator is powered. Check that Actuator LED is steady green, and perform the steps below:

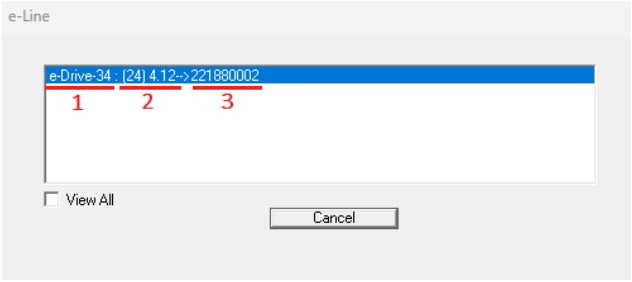


Figure 8: e-Drive Name Specifications.

1. Start the e-Drive / CLA-VAL software.
2. Select the e-Drive in the e-Line list.
3. Select language and click "Read parameters".
4. The right side will display specific configuration information.
5. General information including:
    a. the date of latest calibration.
    b. the average & total working time since the first power up.
    c. the number of starts.
    d. the serial number.
    e. the firmware version.
    f. the maximum and minimum recorded temperature is displayed.
6. Click on continuous reading to see the position of e-Drive, set point (mA) and, if used feedback position (mA and units).
7. To manually change the setting, write the setting and click on "Override Set point".

CAUTION: Improper use of "Override Set point" may cause damage to your system.

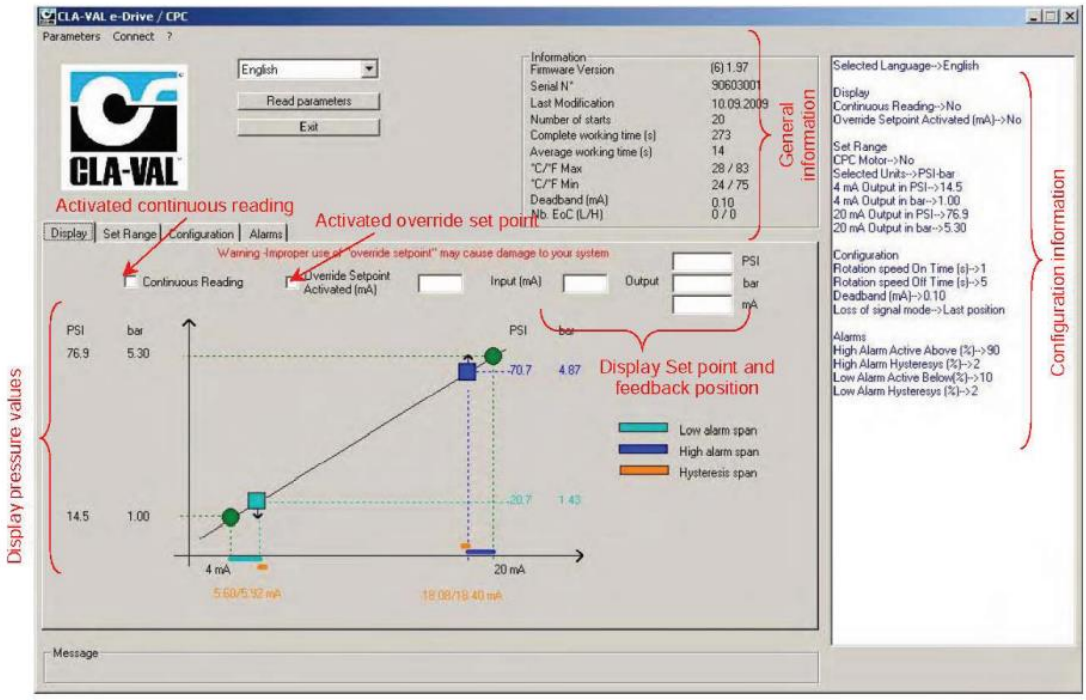


Figure 9: e-Drive Screen Layout.

6.2 Static Calibration

Static Calibration is a fast and convenient method of calibrating the actuator by calculating the 4 and 20 mA values rather than raise or lower the actual system pressure. Dynamic Calibration requires that the system pressure is raised and lowered to the system values desired.

The “Set Range” window will launch either Static or Dynamic calibration. When the "Set Range" is activated, the following message will be displayed. To continue with calibration, click "OK”, if not click "Cancel".

Figure 10: Confirmation Screen.

1. Select "**Static Calibration**" Mode. Uncheck The "CPC Motor".
2. Use increase and decrease buttons to modulate valve to maintain setpoint used most.
3. Calculate the number of turns between the reference set point and desired low and high pressures per section 6.2.1
4. These numbers are the "Value at 4 mA" and the Value at 20 mA". Numbers must be positive and can have up to 2 decimal places.

5. Enter the **low value** in set-point window (1).
6. Enter the **high value** in set-point window (2).
7. Click "**Write Set Range**" tab to complete actuator to complete calibration.

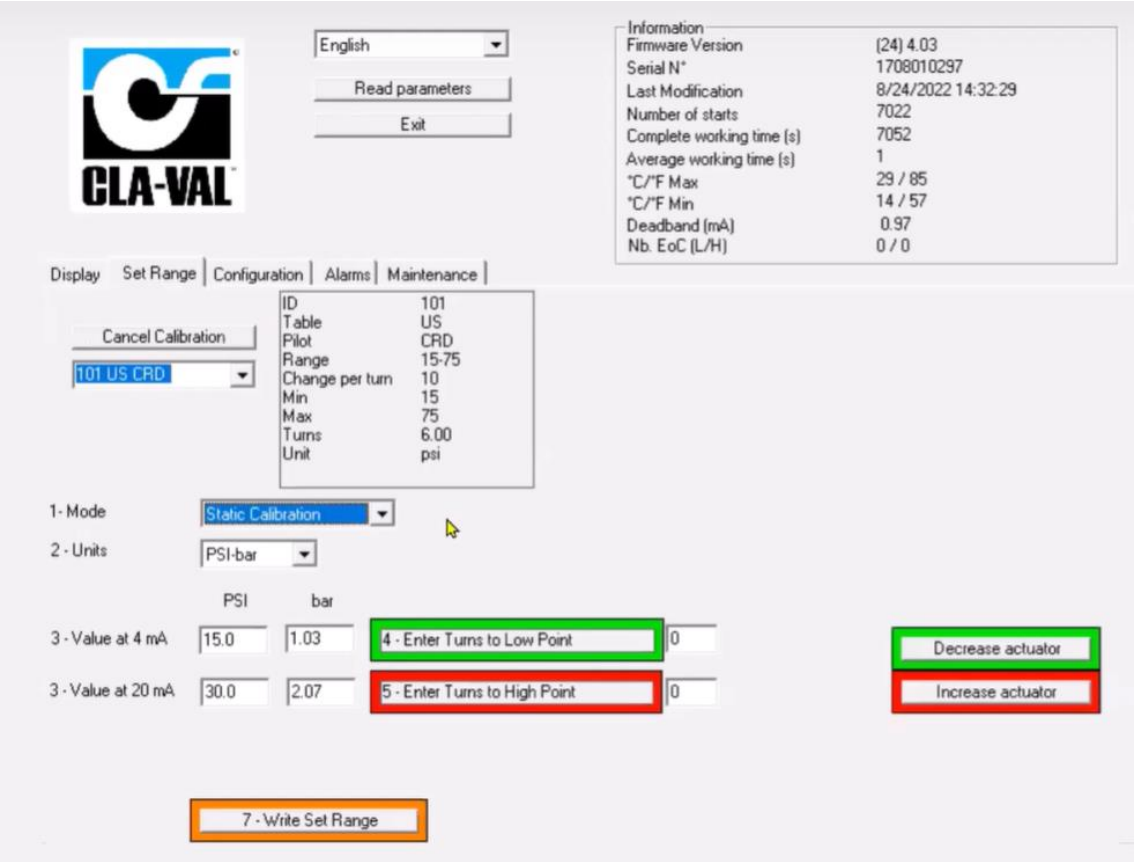


Figure 11: Static Calibration Screen.

6.2.1 Number Of psi Per Turn Calculation Example

Example Program:

- Current pressure = 22 Psi
- The pressure desired at 4 mA is 15 Psi.
- The pressure desired at 20 mA is 30 Psi.
- Spring range for the 34 series is 15-30 Psi.

- **The number of turns to Low set point is equal**:
  Pressure difference = 22 psi – 15 psi = 7 Psi.
  7 psi * (1 Turn / 10 Psi) = 0.7 Turns.

The number of turns to High set point is equal:
Pressure Difference = 30 Psi – 22 Psi = 8 Psi
8 Psi * (1 Turn/10 Psi) = 0.8 Turns.
See figure 13 for low point-high point adjustment.

After calculating low point and high point based on the spring range of the 34 series actuator and having a static calibration, values should be entered in the software accordingly low point and high point and write set range as shown in figure below.

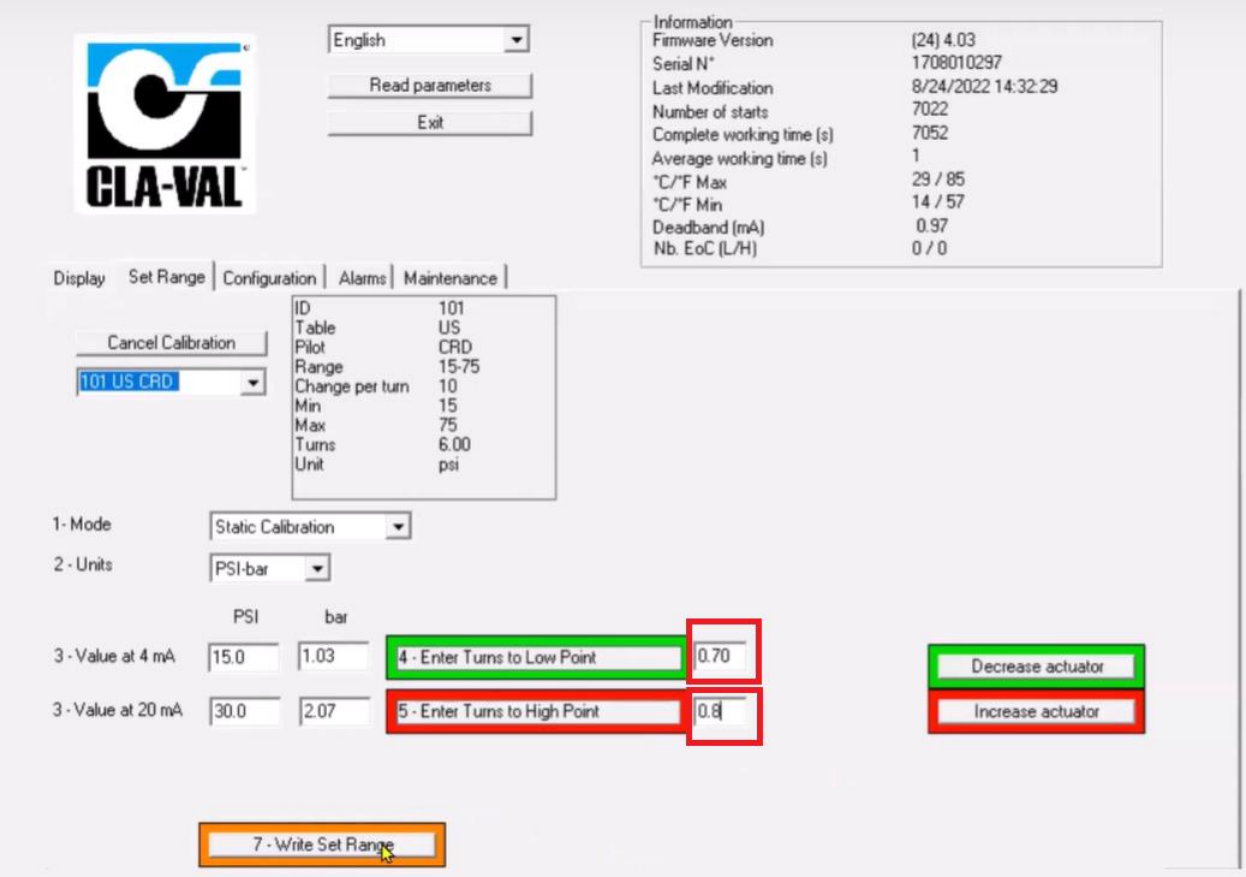


Figure 12: low point high point settings.

6.3 Dynamic Calibration

When using **Dynamic Calibration**, the system pressures must be changed from the actual minimum to maximum set-point values. If this is not possible, use "Static Calibration" mode. To perform a dynamic calibration, follow the steps below:

1. Press the Set Range tab and select the **Dynamic Calibration** mode. Uncheck the "CPC Motor".
2. Select Units.
3. Enter the desired pressure/flow value at 4 mA and at 20 mA.
4. Look at the pressure/flow gauge/display and use the " Decrease.
5. actuator" button until the low pressure/flow setting is attained.
6. Click on "**Low point setting**" button to store the value.
7. Look at the pressure/flow on the gauge/display and use the "Increase actuator" button until the high pressure/flow setting is attained.
8. Click on the "**High point setting**" tab to store value.
9. When all values have been entered, click on "**Write Set Range**".

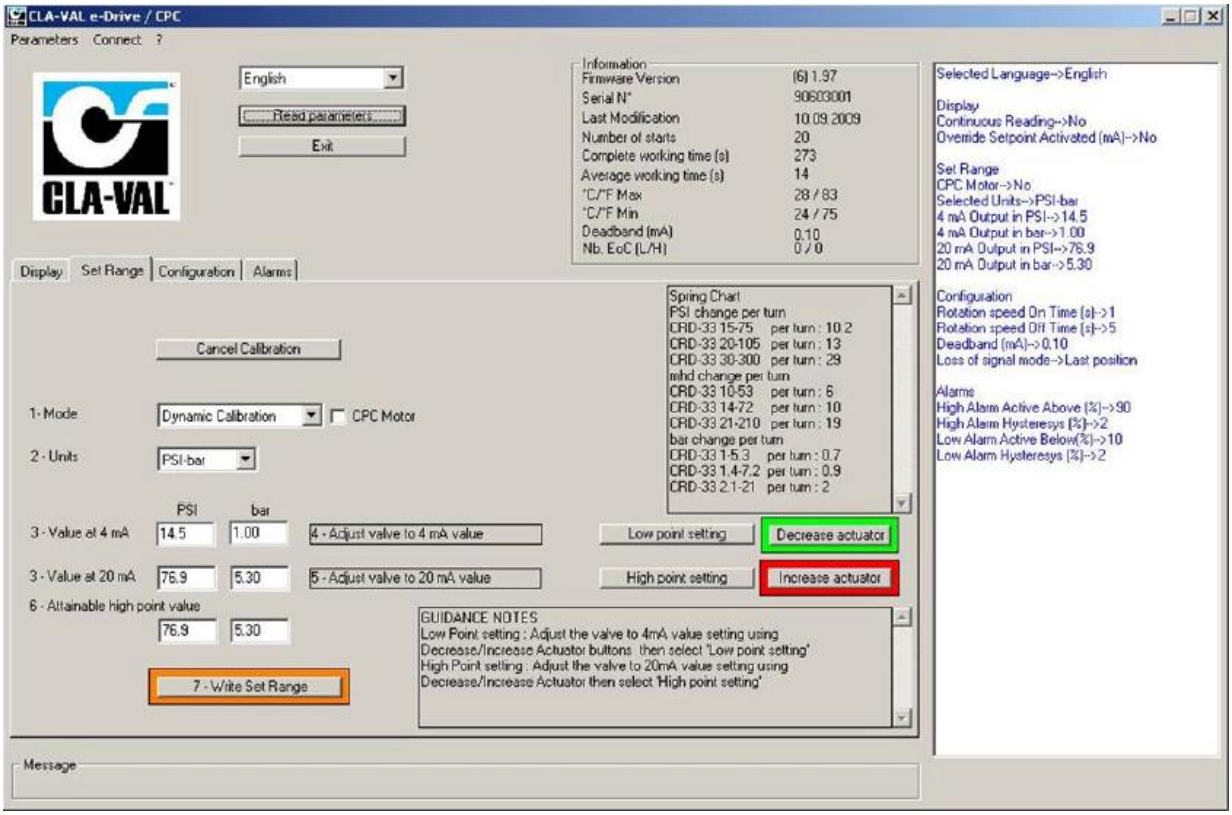


Figure 13: Dynamic Calibration Screen.

6.4 Extended Dynamic Calibration Mode: High Point Value

During this process, system pressures will be changed from the minimum to the chosen maximum set-point values to complete the process. If it is not possible to change system pressures, use "Static Calibration" Mode. To perform an extended dynamic calibration, follow the steps below:

1. Select "**Dynamic Calibration**" mode.
2. Select Units.
3. Enter the desired setting value at 4 mA point and value at 20 mA point.
4. Look at the pressure/flow on the gauge/display and use the "Increase actuator / Decrease actuator" button to decrease the pressure/flow until it reaches the low pressure/flow point. When the low pressure/flow point is reached, then click on the button "**Low point setting**".
5. Look at the pressure/flow on the gauge/display and use the "Increase actuator / Decrease actuator" button, to increase the pressure/flow until it reaches the high pressure/flow point. When the pressure does not increase any more then stop the actuator. Decrease the pressure/flow by a small amount, and as soon as you see the gauge/flow changing stop again.
6. Enter the indicated pressure/flow value in the projected calibration window "Attainable high point value", then click on "**High point setting**".
7. When all values have been entered, click on "**Write Set Range**".

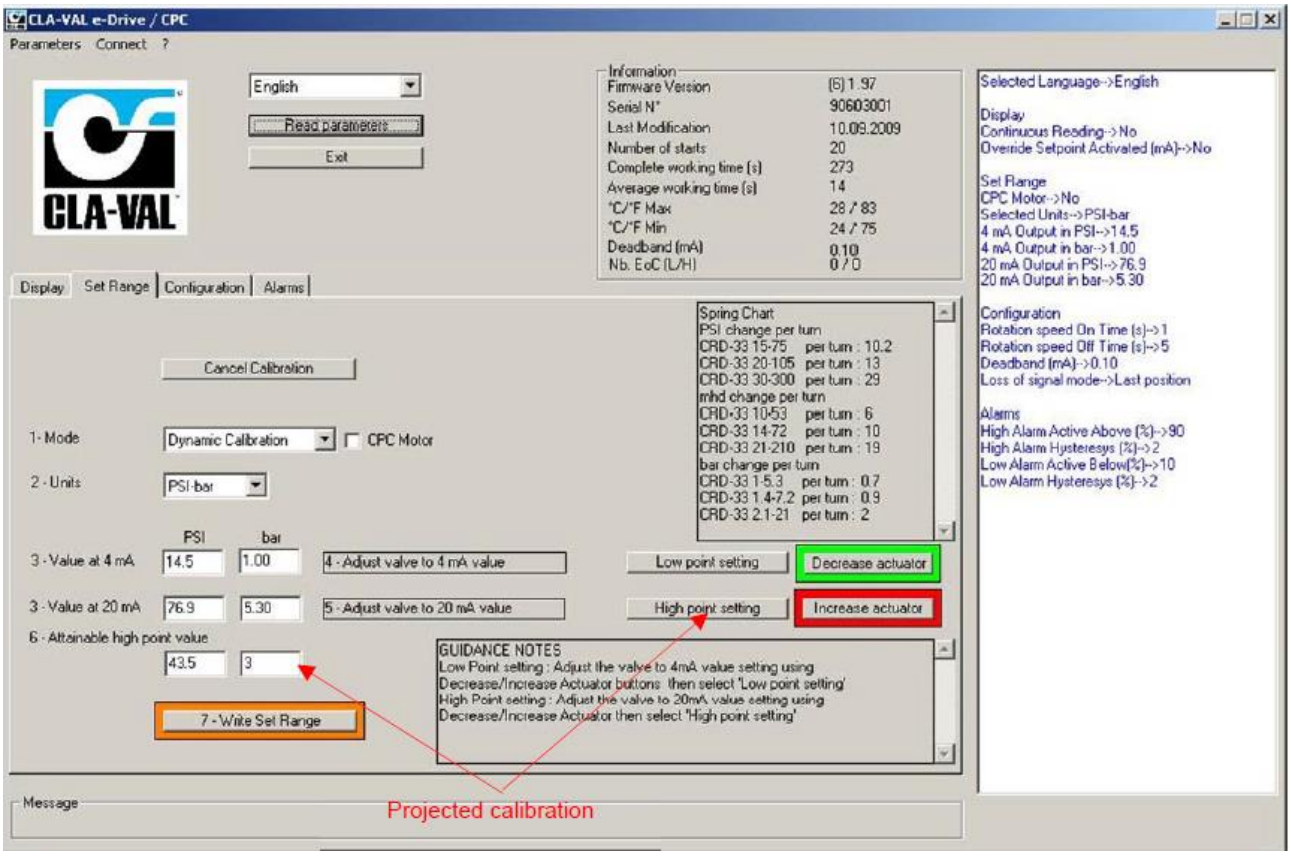


Figure 14: Extended Dynamic Calibration Screen.

6.5 Configuration

Use the configuration mode to set the rotation speed, deadband and loss of signal values.

1. Rotation speed affects the response time of the valve between set-points. The default condition is 1 second on-time, 5 seconds off-time achieving at rotation speed of 1.2 rpm. Entering a '0' (zero) on time and '0' (zero) off time will achieve a continuous rotation speed of 6 rpm (maximum speed).
2. Dead band - The default value is 0.1 mA. This value can be increased depending on the stability of the set point signal. The actuator is internally isolated however, If the set point is inherently unstable, the actuator can dither. If this happens, improve the signal, or increase the dead band.
3. Choose the loss of set point signal mode:
    a. Go to 4 mA: Actuator will default to the 4mA position (low set point).
    b. Last position: Actuator will maintain the last position.
    c. Go to 20 mA: Actuator will default to the 20mA position (high set point).
4. Click on "Write Configuration" button to complete configuration.

CAUTION: Make sure that the values entered are appropriate to your system to minimize potential for surge.

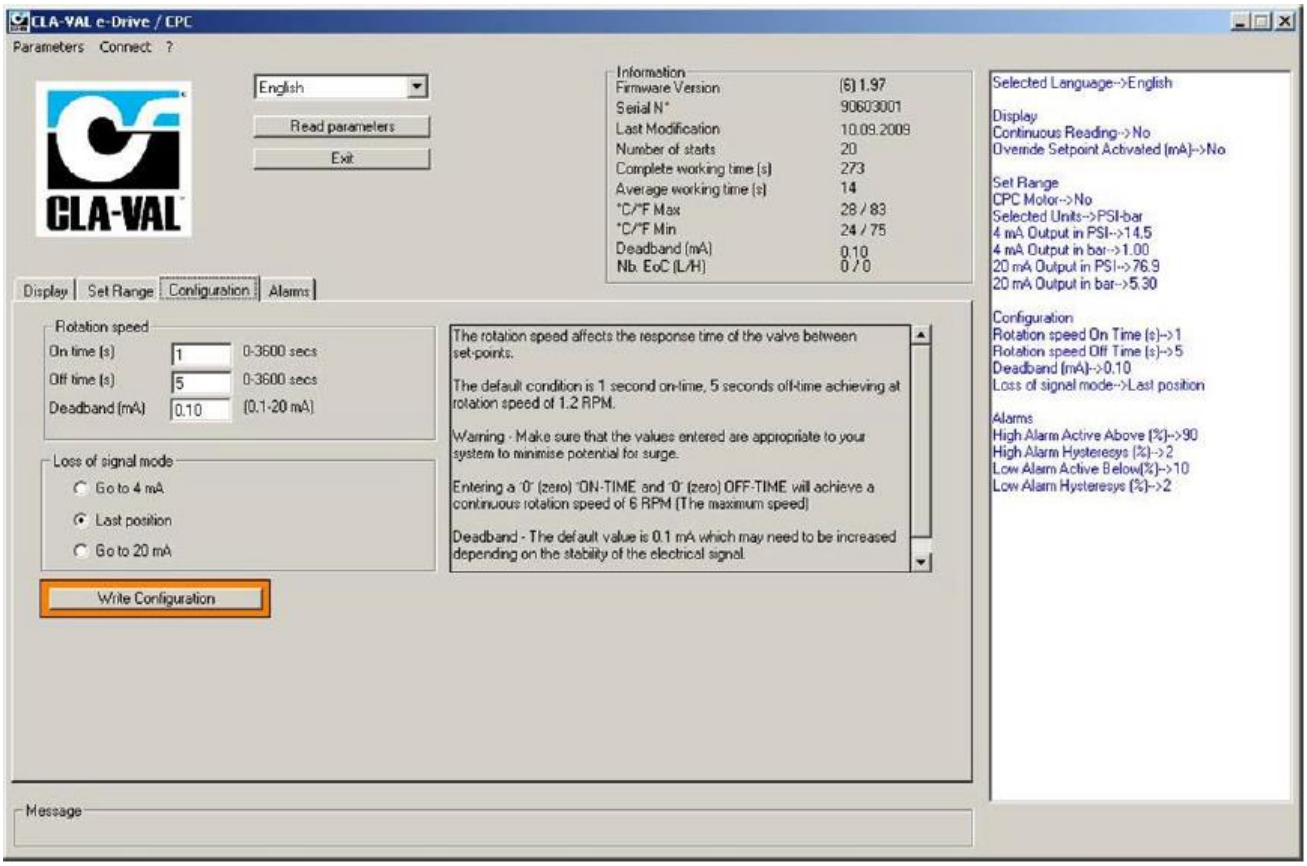


Figure 15: Configuration Screen.

6.6 Alarms

The e-Drive incorporates a LOW and HIGH Alarm with an adjustable hysteresis.
Note: The LOW and HIGH alarm levels are activated within the range:

Example:

- 10% low alarm = 4 + (10% x 16) = 5.6 mA
- 90% High alarm = 4 + (90% x 16) = 18.4 mA

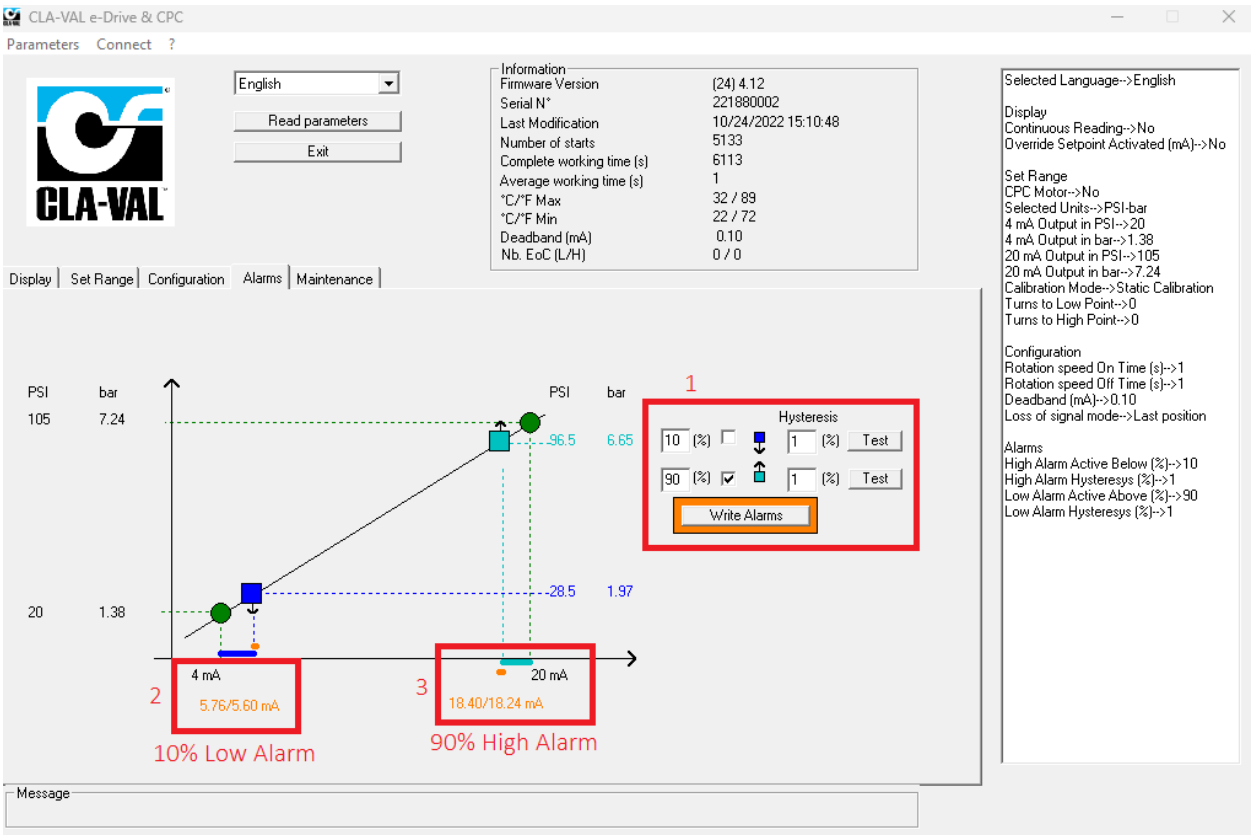


Figure 16: Low Alarm High Alarm Configuration.

6.6.1 Hysteresis

EXAMPLE:

- The calculation is: 4 + (2% x 16) = 0.32 mA.
- Low alarm hysteresis in this example = 5.6 mA + 0.32 mA = 5.92 mA.
- High alarm hysteresis in this example = 18.4 mA - 0.32 mA = 18.08 mA.

1. Enter the requested percentage, for the alarms and hysteresis.
2. Click on "Test" to close or open your contact relay.
3. Click on "Write Alarms" (1) once your alarm settings are correct.

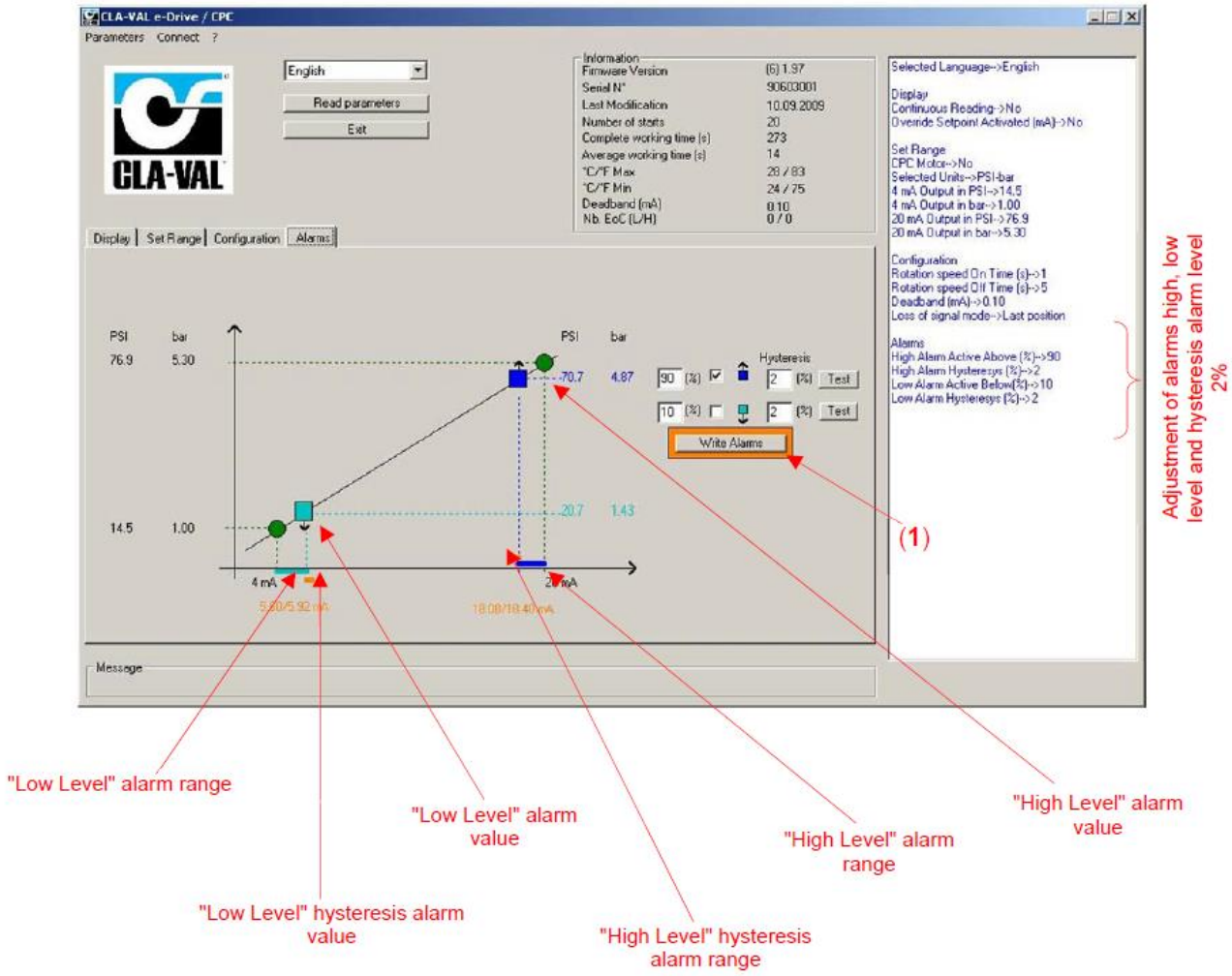


Figure 17: Alarms Screen.

7. 34 Series Calibration Via VC-22D

As mentioned previously in chapter 4.4, Complementary products tend to enhance the operation of the 34 series, and one is the Cla-Val VC-22D controller.

Calibration of the 34 series can be accessed via e-Drive from USB maintenance cable and a PC, or via Cla-Val VC-22D controller when connected to it in series, connection should be as follows:

7.1 34 series to VC-22D Connection

The VC-22D must be powered off prior to any connections to the 34 series. The connection side of the 34 series is a circular plug type, and the connection side of the VC-22D is a cable with flying leads. The leads must be wired to the VC-22D terminals depicted in the following table:

Note: VC-22D will supply 34 series with power once connected properly.

Designation	34 Series Wires N°	VC-22 D Terminal
24V	1	V+
0V	2	V-
GND	3	RS-485 GND
485A	4	RS-485 485A
485B	5	RS-485 485B
Free	6	Unused terminal

VC-22D RS232 and RS485 Modbus terminals are shown below:

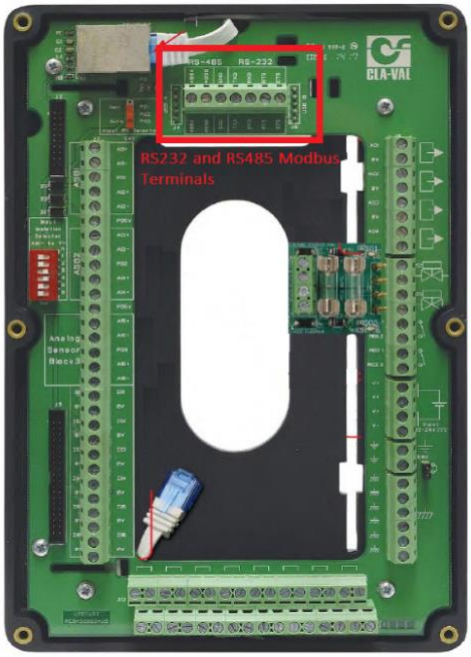


Figure 18: VC-22D RS-485 Terminals.

7.2 Calibration Mode

Powering up the VC-22D will also power the 34 series. If the actuator has been connected properly, the VC-22D will detect the 34 series during the boot sequence and display the e-Drive34 menu in the “configuration” menu. Navigate to this menu via long up from home screen.

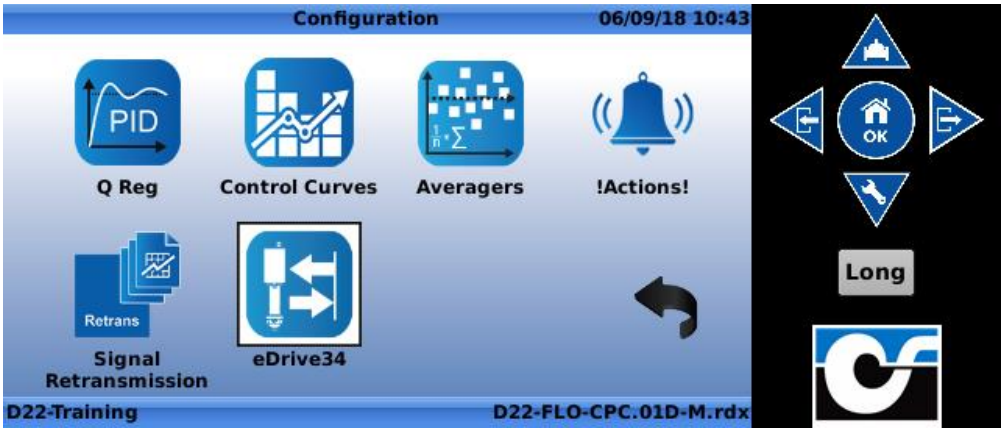


Figure 19: e-Drive34 Configured In VC-22D.

By default, the Modbus slave ID of the e-Drive34 is 1, modification can occur if several Series 34 Actuators are connected.

The VC-22D will establish Modbus connection automatically on the first Modbus slave ID that gives a response.

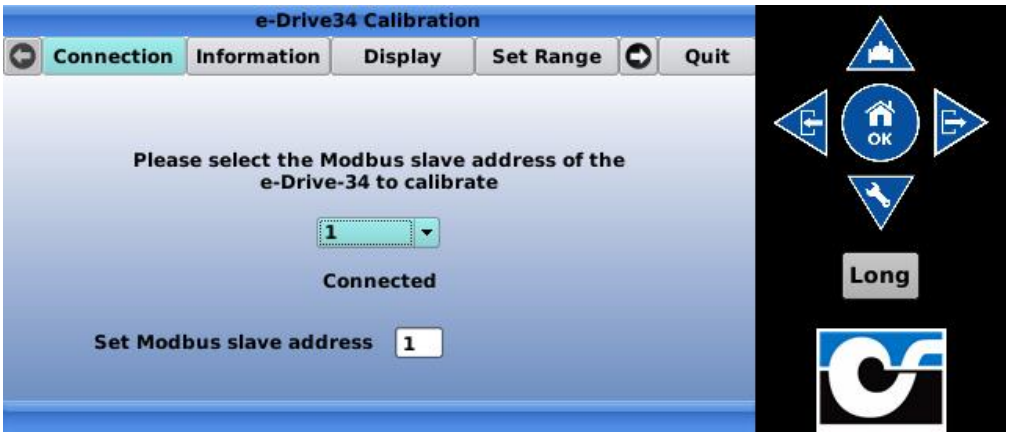


Figure 20: Modbus Slave Address Setup.

You can Setup/Calibrate the actuator using the VC-22D by going into the maintenance tab. A password is required which can be obtained by Cla-Val technical support.

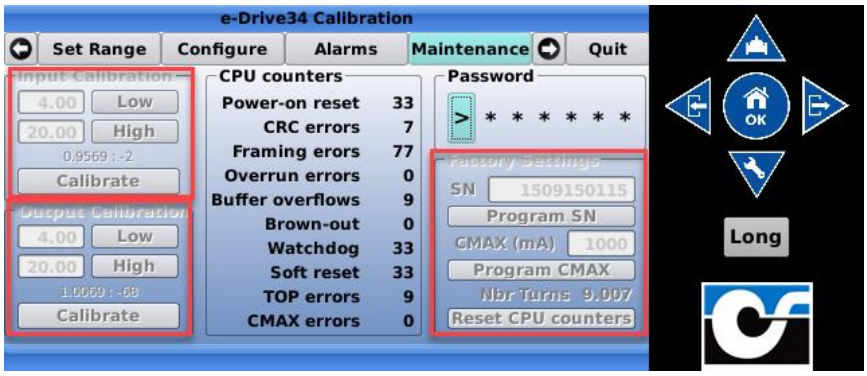


Figure 21: Locked e-Drive34 Calibration Screen.

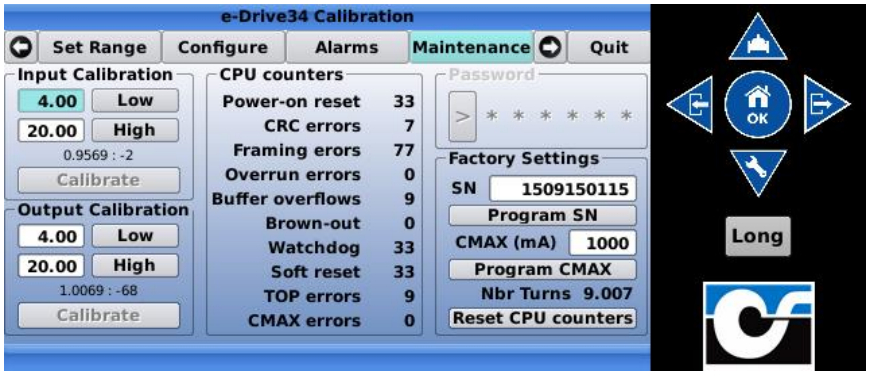


Figure 22: Unlocked e-Drive Calibration Screen

7.3 View Series 34 I/O in VC-22D

To allow the VC-22D to display input/output values of the Series 34 Actuator via Modbus, go into “Modbus” menu and then navigate to the RS485 tab:

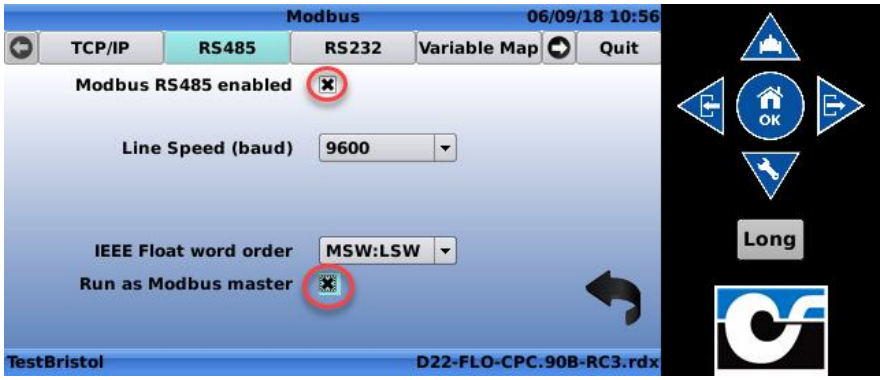


Figure 23: RS-485 Configuration Screen

The Modbus RS485 must be enabled and checkbox “run as Modbus master” checked.

After RS485 has been configured, navigate to the device tab “on the far right” and click on the “+” button:

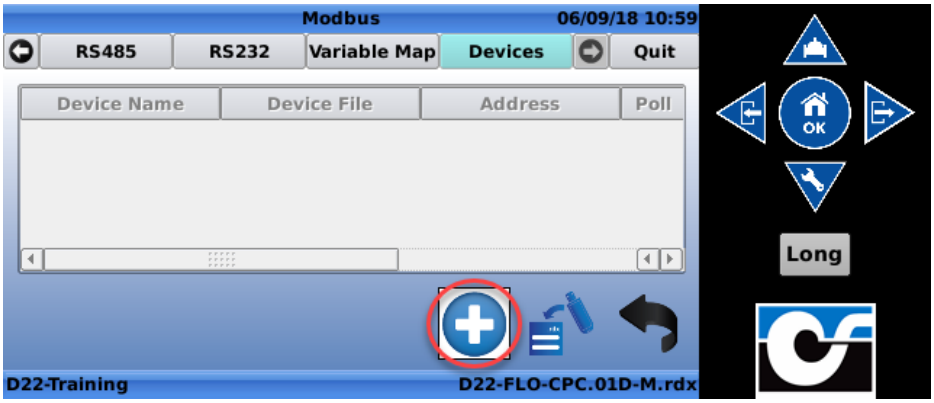


Figure 24: Devices configuration Screen.

Device ID as set to 1 by default, set the name of the device and click on green check mark.

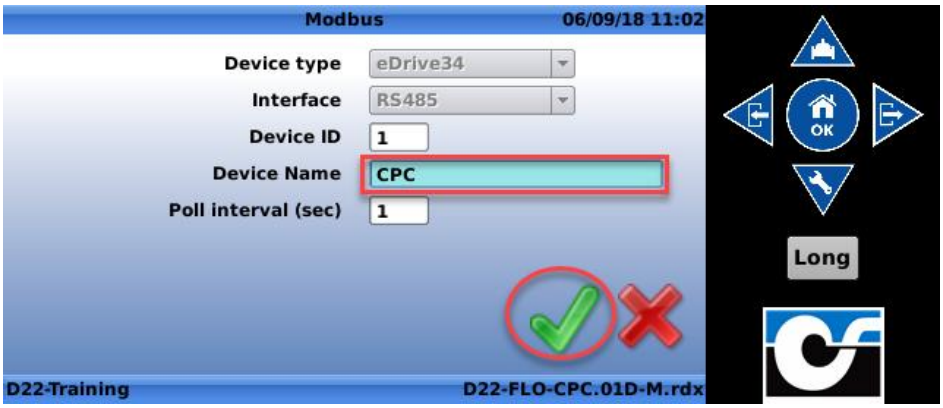


Figure 25: 34 series and VC-22D connection through RS-485

After the process is complete, values of the Series 34 Actuator will be available on the input/output of the VC-22D which can be used in PID, Control Curves, Actions, Input Recopy and signal retransmission.

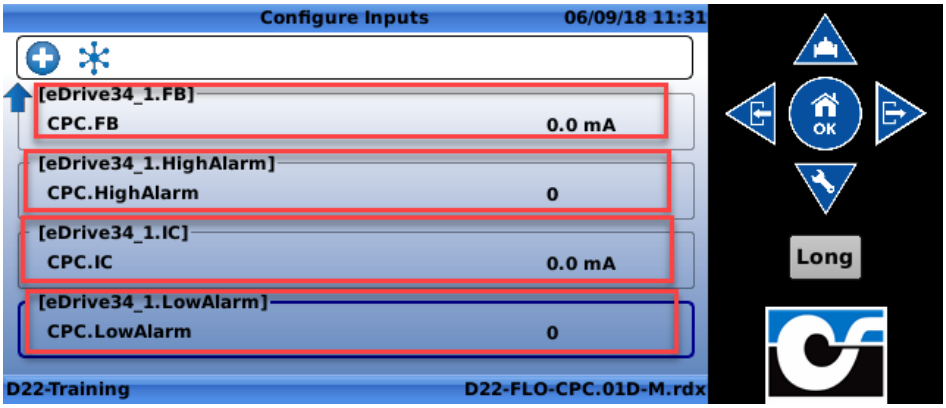


Figure 26: VC-22D Inputs by eDrive34 Modbus.

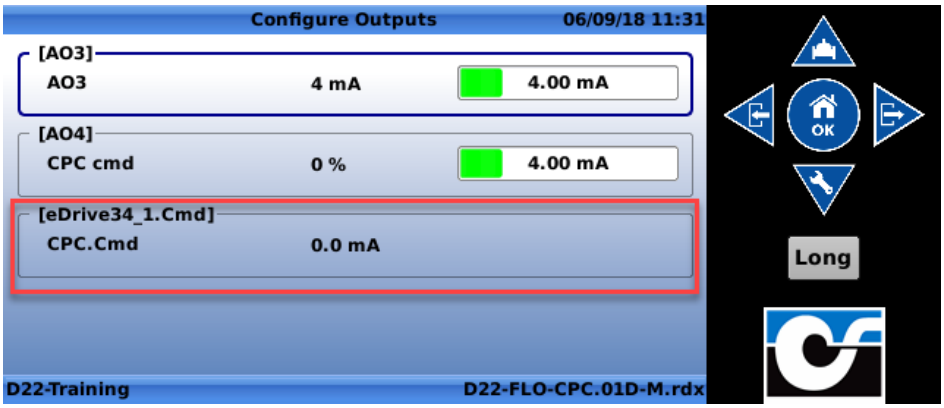


Figure 27:VC-22D Outputs by eDrive34 Modbus.

Note: Established connection between VC-22D and eDrive34 via Modbus RS485 will allow the use of Series 34 Actuator values through VC-22D to establish different operations, however these values cannot be controlled via Modbus connection to the VC-22D.

8. Software Setup

The 34 Series e-Drive software and USB Communication Cable driver will be required to change the 34 Series Actuator from factory default configuration or to update the firmware. To download the e-Drive software and USB Communication Cable driver, do the following:

1. Visit www.cla-val.com.
2. Navigate to Resources.
3. Choose software and driver library from drop down menu.

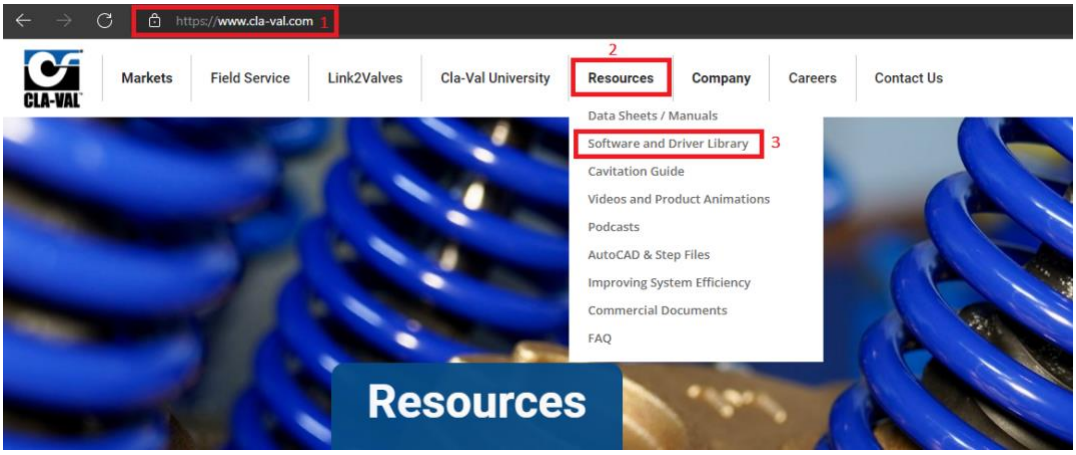


Figure 28: Software and Driver Library.

Setup Software following procedure bellow:

8.1 34 Series e-Drive Software

To set up a communication link with 34 Series Actuator, first download the 34 series Software "e-Drive" for windows:

1. Visit www.cla-val.com.
2. Navigate to Resources Figure [8].
3. Choose software and driver library from drop down menu.
4. Choose 34 series software.
5. Click to download, Software will download automatically.

After Download is complete, install software following installation steps on PC.

Figure 29: 34 Series Software Download.

8.2 USB Communication cable Driver

The 34 series actuator communicates via USB communication cable “Maintenance cable”, which is a USB cable “PC side”, and a “Adaptable side” that connects to the actuator. Windows will search your computer for the cable multi-USB driver. The maintenance cable requires a Driver downloaded and installed, download as follows:

1. Visit www.cla-val.com
2. Navigate to Resources Figure [8].
3. Choose software and driver library from drop down menu.
4. Choose driver associated with PC windows.
5. Click to download, Driver will download automatically.
6. Install USB Driver.

After installing driver for communication/Maintenance cable, the actuator must be powered for link to work. Follow hardware set-up and wiring diagram instructions.

Figure 30: 34 Series Maintenance Cable Driver.

8.3 Firmware Download

The 34 series actuator firmware can be downloaded as follows:

1. Visit www.cla-val.com .
2. Navigate to Resources Figure [8].
3. Choose software and driver library from drop down menu.
4. Click to download, Firmware will download automatically.

Figure 31: 34 Series Firmware Download.

8.4 Firmware Update Procedure

1. Connect the USB wire to the USB connection of your PC.
2. Connect the 34-series to the USB wire.
3. Select "Read Parameters" to read e-Drive settings and record output parameters.
4. Select "Firmware update" in "Parameters", Figure [12].
5. Open the corresponding "hex" file, Figure [13].
6. Select "Read Parameters" to check that the Firmware is updated, Figure [14].

Figure 32: Firmware Update Procedure.

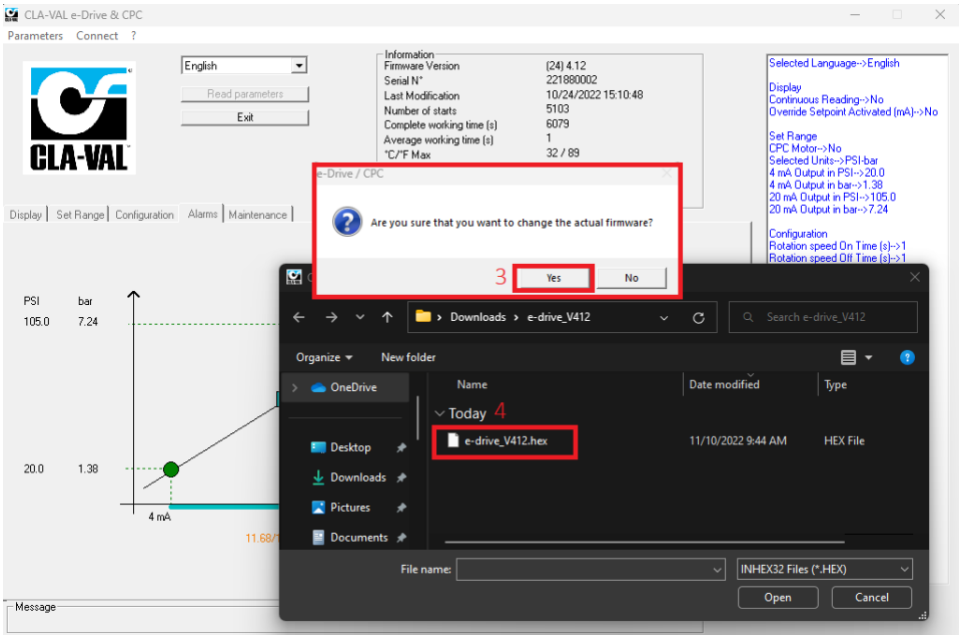


Figure 33: Firmware. Hex File.

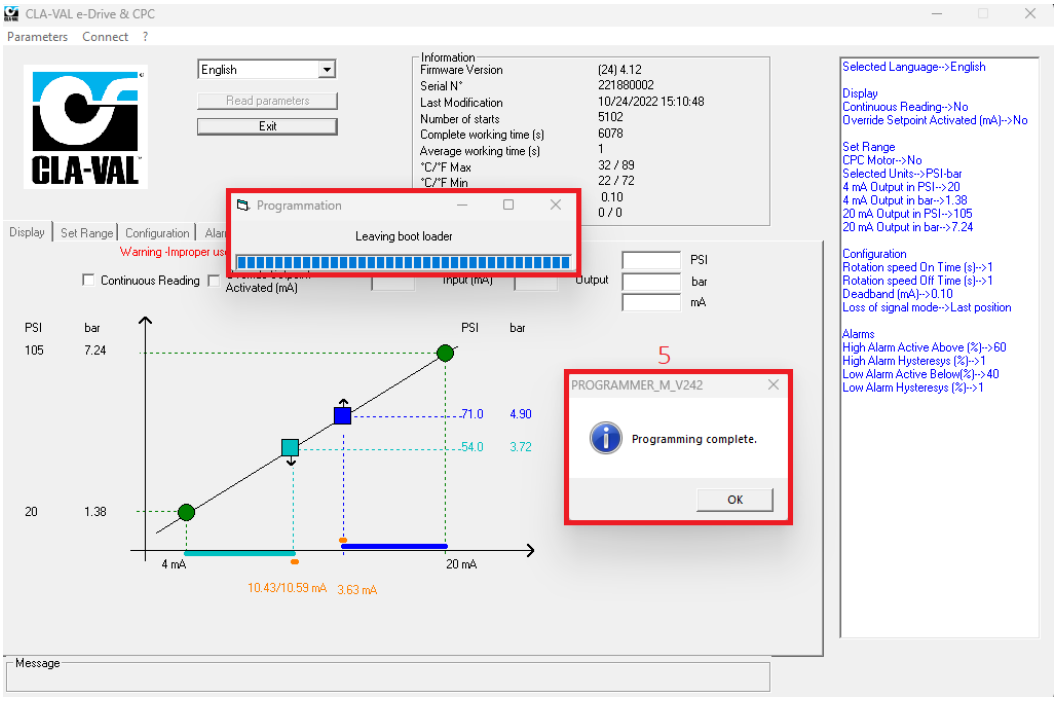


Figure 34: Firmware Update Completed.

8.5 Configuration Mode

To launch e-Drive software when not connected to your PC, the e-Line list (which allows the multi connection of
e-Line products) is empty (see picture below), click "Cancel".

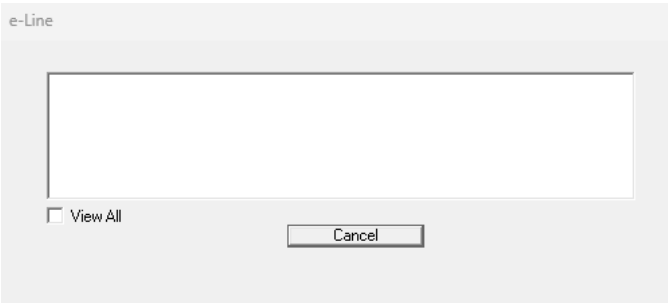


Figure 35: configuration screen.

If you are connected to one or more Series 34 Actuators or another e-Line product, click on "View All" then select the device you would like to communicate with from the list. Then click once on left mouse button.

1. The name of product
2. Firmware version
3. Serial number

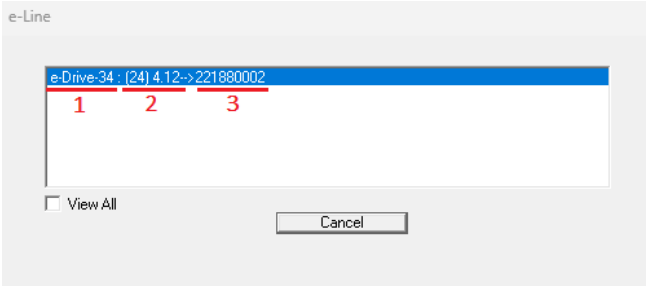


Figure 36: e-Drive Name Specifications.

If your e-Line product isn't updated with the "Multi connection" version, the e-Line list stays empty. Click on "View All", the e-Line product appears with name "Generic e-Line", then click once on left mouse button on this line to communicate with the product.
For the name and serial number of this product to appear, a Firmware update is necessary.

Figure 37: Generic e-Line.

9. Modbus Interface

The 34 series actuator supports Modbus RS-485 protocol only in slave mode.

The Modbus RS-485 protocol requires the unit identification UID (Modbus address, 1-255) and connection parameters: 9600 baud, 8 bits, no parity, 1 bit stop.

9.1 Standard Modbus Interface

As of actuator firmware 4.03, Modbus registers can be read by the VC-22D or other Modbus capable clients in the Series 34 Actuator. All data accessible via Modbus requests are mapped into the “Holding Register” address space (4x). The supported commands are:

- 03 - read multiple holding registers
- 16 - write multiple holding registers

These registers contain 16-bit signed integers (one register) except for registers [10 / 11], [12 / 13], [14 / 15] which are 32-bit signed integers (2 registers) with the most significant number being the first address.

For example, for the number of starts, located in registers [10/11], the most significant number is in [10], and the least significant number is in [11].

The values of the registers can be multiplied by given factor, according to the required precision. See the detail for each register in the register table below.

For example, the 4-20 mA input (register [23]) is expressed in mA*10, and a value of 4 mA will be read 40 in Modbus.

Overriding the input (register [23]) is carried out according to the following sequence:

- Write in [23] the desired value
- Write in [24] the value of 1

The input override is inactive as soon as the value 0 is written in [24].

9.2 Register Table

The register table below lists all Modbus registers available in the Series 34 Actuator.

REGISTER ADDRESS (40000)	CONTENT	MODE
0	Version/Build	Read
1	Product Name	Read
2	Product Type	Read
3	Serial Number	Read
4	Serial Number	Read
5	Last Modification Day	Read
6	Last Modification Month	Read
7	Last Modification Year	Read
8	Last Modification Hours	Read
9	Last Modification Minutes	Read
10	Numbers Of Starts msb	Read
11	Number Of Starts lsb	Read
12	Complete Working Time (s) msb	Read
13	Complete Working Time (s) lsb	Read
14	Average Working Time (s) msb	Read
15	Average Working Time (s) lsb	Read
16	Temperature Max (C*10)	Read
17	Temperature Max (C*10)	Read
18	Temperature Min (F*10)	Read
19	Temperature Max (F*10)	Read
20	Deadband (mA*100)	Read/Write
21	Voltage Level (V*100)	Read
22	Instant Consumption Current Motor (mA*100)	Read
23	Input(mA*10)	Read/Write
24	Override Input (0/1)	Read/Write
25	Output(mA*10)	Read
26	Relay Low Alarm (0/1)	Read/Write
27	Relay High Alarm (0/1)	Read/Write
28	Open cmd (0/1)	Read
29	Close cmd (0/1)	Read

10. Troubleshooting

10.1 Troubleshooting Actuator Set-up

1. The actuator LED will remain red for approximately 30 seconds after power on, and then will switch to green indicating actuator is OK and that internal start-up test is complete.
2. The actuator LED blinks red if there is a problem. After resolving the problem, reset the actuator by turning power off for ten seconds then on again.
3. The actuator blinks red and green if still in the calibration mode. It will be necessary to finish calibration.

10.2 Troubleshooting FAQ

LED Diagnostics
When power is applied to the actuator, the LED will be red for approximately 5-30 seconds, and then will change to solid green.

Green
ok.

No light

Check power supply.

Red

High torque limit has been exceeded - Power down and power up again Excessive Voltage has been applied (Above 32 Volts).

Blinking red/green

Calibration was not completed – recalibrate

Changing set-point without a 4-20 mA command signal with the USB cable connected

Go to 'Display' tab and select Milliamp value and check the box to activate

Changing set-point without a command signal without an e-Drive - USB cable.

Refer to wiring diagram.
To Increase Actuator, connect the Purple Wire with the Pink.
To Decrease Actuator, connect the turquoise Wire with the Pink.

To Increase or Decrease the actuator without 4-20 mA signal.

Refer to wiring diagram in this manual. To increase actuator, connect the purple wire to the pink. To decrease actuator, connect the turquoise wire to the pink.

What are the default settings for the 34 Series actuator?

Factory default setting for 34 Series Actuator range parameter is the full pilot spring range scaled to match the 4 to 20 mA Remote Command Input analog signal. Factory default setting for 34 Series Actuator rotation speed is one rpm with 24 VDC power

How do I get the software to work with the actuator?

To set up a link with 34 Series Actuator, first install cable driver and e-Drive software. After installing driver and software, connect USB cable and power on the Actuator. Follow wiring diagram and hardware hookup instructions. Download Wiring Diagram from website (www.cla-val.com).

My computer does not have a USB port

Older laptop computers with only Serial port may have a problem using USB to Serial adapter with special USB connector cable and communicating with 34 Series actuator. Make sure the USB to Serial adapter cable is less than 18 inches long. Also, USB extension cables should not be used because they will degrade signals and cause problems. If problem persists, consult Cla-Val factory technical support.

Why is actuator LED still blinking red/green after I downloaded the settings?

Once the calibration mode button is activated, all steps must be done before downloading is begun. Actuator LED will show green when downloading is successful and complete.

Can I make a file ahead of time and download it to 34 Series later?

All hardware hookup steps must be completed before program will communicate and change 34 Series parameters. Until wiring and power connections are made to the actuator, this program can be opened, but new parameters cannot be created or stored or sent to the actuator. Changes to parameters must be done "live" and while control valve is operating. Actuator LED will show green when downloading is successful and complete.

10.3 Notes

1. After calibration if you want to change the pilot position, use the "Override setpoint" option.

2. To generate a calibration report, select "Parameters" and then "Report".

- Enter a reference number
- Click on "Report".

The Software will automatically generate a TXT report file (C:\Program Files\CLA-VAL\e-Drive Setup) including all the calibration settings.

Note: With proper maintenance, the actuator will perform indefinitely and provide very accurate and reliable valve control. It is built with the latest technology utilizing the highest quality components.

Note: Before beginning the calibration process, determine if it is necessary! The actuator, if new, has been factory calibrated to the spring range shown on the pilot and may not require further calibration (30-300 spring range is calibrated from 40 to 140 psi).