

Cornerstone Software: ICoT Positioner Model Support Library (ModLib)

Software Features

The principal features of the ICoT Positioner ModLib include:

Full integration into Cornerstone Base Station and Cornerstone Configurator.

Both an "easy" and an "advanced" interface to the positioner configuration parameters. The easy interface allows the user to choose from among indices or categories for parameter values; the advanced interface allows the user a finer degree of control.

Support for tests to indicate when a calibration is necessary, including Input Test, Valve Position Test, and Digital Position Test.

Support for all positioner calibrations, including Deep Calibration, Input Calibration, Shallow Calibration, and New Transducer Calibration.

Zero Calibration

When a Zero Calibration is performed, the positioner automatically measures the internal control signal required to push the valve to the Fully Closed position and then reads the position sensor feedback voltage at that position. Also, a zero pressure reading is automatically made for the pressure transducer. If the command request is for a Deep Calibration, the positioner will automatically measure the control loop current. Whenever a Deep Calibration is started, the user is prompted to set the input control current to the mA value that is to be associated with a Fully Closed valve. During Shallow Calibrations, the positioner ignores the setting of control loop current and will not update its memory in this regard. In other words, the user does not have to manipulate the control loop current during Shallow Calibrations. If the Close Very Tight feature is enabled (see the sections Configure Specific - Easy Dialog Box and Configure Specific - Advanced Dialog Box) during a Deep Zero Calibration, the user should set the Low trim point to a value slightly higher than the minimum control value expected during normal service. A typical example would be to perform the Deep Zero Calibration with the input current at 4.02 mA. This ensures that a very tight close will be achieved when 4 mA is output by the controller during normal operation.

Once the calibration command is sent, the positioner will automatically complete the calibration, which will take from 30 seconds to 2 minutes. Upon completion of the calibration, the valve position should be 0.0%. In most instances, the user will want to now perform a Full Scale calibration. If the positioner could not properly perform the calibration, the error code Err 6 will periodically flash on the positioner's display. This error condition will arise if the positioner could not move the valve. Check the pneumatics and retry the calibration. An Err 6 code will also be displayed during the time between Zero and Full Scale calibrations when the command range is drastically changed. An example of this would be going from 4 to 20 mA operation to 20 to 4 mA

control. If this is the case, the error condition will no longer exist when the Full Scale calibration is successfully completed.

Full Scale Calibration

When a Full Scale Calibration is performed, the positioner automatically measures the internal control signal required to push the valve to the Fully Opened position and then reads the position sensor feedback voltage at that position. Also, a full scale pressure reading is automatically made for the pressure transducer. If the command request is for a Deep Calibration, the positioner will automatically measure the control loop current. Whenever a Deep Calibration is started, the user is prompted to set the input control current to the mA value that is to be associated with a Fully Opened valve. During Shallow Calibrations, the positioner ignores the setting of control loop current and will not update its memory in this regard. In other words, the user does not have to manipulate the control loop current during Shallow Calibrations.

Once the calibration command is sent to the instrument, the positioner will automatically complete the calibration which will take from 30 seconds to 2 minutes. Upon completion of the calibration, the valve position should be 100.0%. If the positioner could not properly perform the calibration, the error code Err 6 will periodically flash on the positioner's display. This error condition will arise if the positioner could not move the valve or the control current span (i.e., Full Scale Current - Zero Current) is less than 2 mA. Check the pneumatics and the control current and retry the calibration.

Valve Position Test Dialog Box

The purpose of this test is to characterize the positioner's overall response to an input. The test steps the input current over the defined range of the valve. Errors are calculated based on the expected valve position at each input versus the actual valve position achieved at each input. This dialog box is only available when the ICoT ModLib is used with the Base Station. It is not available with the Configurator.

Deep Calibration Dialog Box

The Deep Calibration allows the user to efficiently perform Zero and Full Scale positioner calibrations. During a Deep Zero Calibration, the user is required to set the loop current to the value that is desired to push the valve fully Closed. Likewise, during a Deep Full Scale Calibration, the user must set the loop current to the value desired to push the valve one hundred percent Open. See the section Typical Control Loop Current Settings for Deep Calibrations.

The Deep Calibration is useful when the input command range is being changed, say going from 4 to 20 mA operation to 20 to 4 mA. The Shallow Calibration is purposeful when the command range is not being changed, and only the valve and transducer need calibration.

Set Valve Position Dialog Box

This dialog box allows you to set a specific digital set point and view the positioner's output position. While this dialog box is active, the normal current loop input to the positioner is ignored.

Digital Position Test Dialog Box

The purpose of this dialog box is to test the positioner's ability to achieve a specified valve position. The test sends a series of digital valve positions and compares the actual position achieved (as read digitally from the positioner's feed back). This dialog box is only available when the ICoT ModLib is used with the Base Station. It is not available with the Configurator.

Shallow Calibration Dialog Box

The Shallow Calibration allows the user to efficiently perform Zero and Full Scale positioner calibrations. Unlike the Deep Calibration option, the user need not monitor or adjust the control loop current to complete a Shallow Calibration.

Use the Shallow Calibration when the command range has been previously calibrated, and only the valve and transducer require calibration. The Deep Calibration is useful when the input command range is being changed, for example going from 4 to 20 mA operation to 20 to 4 mA.

New Transducer Calibration Dialog Box

Whenever the I to P transducer is replaced, the New Transducer Calibration supplied through this dialog box should be performed. The positioner calibration is completely automatic once the command is sent to the positioner. Internally, the positioner automatically adjusts the electronics to compensate for manufacturing variance in idle current between transducers.

Upon starting the calibration, commands are automatically sent to the positioner to set the Proportional Gain index to 1 and the Set Point to 50%. It is not likely or necessary that the valve will respond by actually moving to 50% at this point. Indeed, depending upon the differences between the old transducer and the new one, the valve may not respond to changes in set point at all, and may simply remain fully closed or fully open. Don't Panic: the worst that can happen in this case is that you will probably have to perform the calibration twice.

The positioner will automatically adjust the transducer's current, and the valve will probably begin to move. Completion of the calibration may take anywhere from several seconds to a few minutes. Upon completion of the calibration, the valve position should be nearly 50.0%. If the calibration has concluded and yet the valve did not move, and it is still fully closed or fully open, the user will be warned that the calibration should be repeated. As a final action, the Proportional Gain index is restored to its original setting.

IMPORTANT: Once a successful New Transducer Calibration is performed, it is important that the user perform both the Zero and Full Scale Calibrations.

Additional Status

The Additional Instrument Status Dialog Box interprets the additional status bytes that were read from the positioner. The positioner performs a variety of self diagnostics. The appropriate status and warning messages are transmitted via the HART link and are also displayed by means of Err codes on its local Liquid Crystal Display. When an

error condition is detected, the error code will periodically flash on the positioner's display.

Complete diagnostic information is always transmitted to the Base Station or Configurator. However, if the positioner detects more than one error condition, only the higher numbered error code will be displayed on the positioner's display. As an example, if Low Input Pressure and a Clogged Nozzle are detected, the positioner will periodically flash Err 3. The positioner may be optionally equipped with non-contact Limit Switches. When the Closed Limit Switch is made, the mnemonic CLSd will periodically flash on the positioner's display. Likewise, when the Opened Limit Switch is made, the mnemonic OPnd will periodically flash on the positioner's display.

Limit switch information is always transmitted to the Base Station or Configurator.

13 May 2005
740-000005-003