



# Device Description User Manual

## Logix® 520MD Positioners

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## GENERAL INFORMATION

### Introduction

This document provides detailed information about the function of the Logix 520MD+ Device Description (DD). The DD follows the protocol provided by the HART Communication Foundation. For more information about downloading, installing and using HART DDs, visit

<http://www.hartcomm.org/>

### Qualified Personnel

Qualified personnel are people who, on account of their training, experience, instruction and their knowledge of relevant standards, specifications, accident prevention regulations and operating conditions, have been authorized by those responsible for the safety of the plant to perform the necessary work and who can recognize and avoid possible dangers.

In using this software, the position and operation of the related valves can be affected. Product users and maintenance personnel should thoroughly review the effects of any functions before applying those functions.


### Using This Document


The features listed below are numbered to correspond to their location in the DD menu tree. Some menu items may not be available depending on positioner upgrade status and the presence of auxiliary cards.


### Terms Concerning Safety

The safety terms DANGER, CAUTION and NOTE are used in these instructions to highlight particular dangers and/or to provide additional information on aspects that may not be readily apparent.

To avoid possible injury to personnel or damage to valve parts, DANGER and CAUTION notes must be strictly followed. Modifying this product, substituting non-factory parts or using maintenance procedures other than outlined could drastically affect performance and be hazardous to personnel and equipment, and may void existing warranties.

 **NOTE:** *indicates and provides additional technical information, which may not be very obvious even to qualified personnel.*

 **CAUTION:** *Indicates that minor personal injury and/or property damage can occur if proper precautions are not taken.*

 **DANGER:** *Indicates that death, severe personal injury and/or substantial property damage can occur if proper precautions are not taken.*

## 1 STATUS

Allows access to real time command, position, temperature, and, if equipped, pressure data. Allows access to change the command source.

### 1.1 Cmd Source

Displays the source of the command signal (analog or digital).

### 1.2 Change Command Source

Use to change the command source to/from Analog/Digital.

**⚠ CAUTION:** *Changing Command Source may cause closure member movement. Please, follow all safety procedures.*

### 1.3 Dgtl Cmd

Enter the digital command value, in percent of full stroke. This variable is available only when the valve is being positioned by a digital command (digital source) rather than the 4-20 mA analog signal (analog source).

### 1.4 4-20 Cmd

Input 4-20 mA command expressed in percent of full scale Input.

### 1.5 Cntrl Cmd

The modified command signal, in percent of full stroke, which actually sets the controlled position of the valve. Cntrl Cmd is generated after custom characterization, soft limits, and minimum position cutoff parameters are evaluated. 4-20 mA command and Cntrl Cmd can differ if custom characterization, soft limits, or minimum position cutoff are active.

### 1.6 Position

Actual stem position in percent of full stroke, as measured by the position stem position transducer.

### 1.7 Deviation

The difference between the modified position command (Cntrl Cmd) signal and the stem position signal expressed in percent of full stroke. Deviation = Cntrl Cmd - Position

### 1.8 Posn Cutoff

Is the set point less or greater than the Minimum / Maximum Position Cutoff defined in the Soft Limit / Characterization Menu.

### 1.9 Temp

Circuit board ambient temperature

### 1.10 Pressure Lock

Indicates that the current position is within the Pressure Control Window.

### 1.11 Pressures

Displays pressure values.

#### 1.11.1 Supply Pressure Calibrated

Supply pressure in user units used as basis for pressure sensor calibrations.

#### 1.11.2 Port 1 ( % of Calibrated Supply)

Port 1 pressure value in percent of calibrated supply maximum.

#### 1.11.3 Supply ( % of Calibrated Supply)

Supply pressure value in percent of calibrated supply maximum.

### 1.12 Positioner Settings

View current positioner settings: Diagnostics capabilities, positioner model, and characterization.

#### 1.12.1 Diagnostic Level

Indicates whether positioner is Standard, Advanced, or Pro.

#### 1.12.2 Positioner Model

View whether the positioner has pressure sensors. 520 = No pressure sensors, 521 = Has pressure sensors.

#### 1.12.3 Characterization

Displays the position Characterization (linear, equal %, or custom)

## 2 ALERTS AND ALARMS

Allows access to Current Alarms, Alarm Masks, Error History, Temperature History, and the Hour Meters.

### 2.1 Current Alarms

View all current alarms, alerts, modes, and states

#### 2.1.1 Modes

Initializing, Factory Reset State, Digital Command Mode, Squawk Mode, Jog Command Mode, Signature In Progress.

#### 2.1.2 Positioner Status

Position Deviation, Soft Stop Upper Limit, Soft Stop Lower Limit, Position Upper Limit, Position Lower Limit, MPC Active, Local Interface Disabled, Error History Reset.

#### 2.1.3 Mechanical

Actuation Ratio Warning, Pneumatic Inability to Fail Safe, Friction High Warning, Friction Low Warning, Friction High Alarm, Friction Low Alarm, Valve Cycles Warning, Valve Travel Warning.

### 2.1.4 Calibration

Stroke Cal in Progress, Loop Cal in Progress, Pressure Cal in Progress, Analog Output Cal In Progress, Setting Inner Loop Offset.

### 2.1.5 Electronic

Temperature High Warning, Temperature Low Warning, Shunt Voltage Reference Error, Piezo Voltage Error, Watch Dog Time Out, NV Ram Checksum Error, Electronic Unable to Fail Safe.

### 2.1.6 Pressure

Supply Pressure Low Alarm, Supply Pressure High Alarm, Supply Pressure Low Warning, Port 1 Value Out of Range, Port 1 Range too Small, Pneumatic Leak Warning.

### 2.1.7 Inner Loop

Pilot Relay Warning, Pilot Relay Alarm, Spool Cycles Warning, Spool Travel Warning, Hall Sensor Upper Position, Hall Sensor Lower Position.

### 2.1.8 Outer Loop

Feedback Range Too Small, Position Out Of Range 0%, Position Out Of Range 100%, No Motion Time Out, Non-Settle Time Out, Inner Loop Offset Time Out, Jog Calibrate Set 100% Pos.

### 2.1.9 Command Loop

Command Loop Range Too Small, Command Loop 100% Value Out Of Range, Command Loop 0% Value Out Of Range, Analog Output Range Too Small.

### 2.1.10 Configuration

Pressure Sensor Board Present, Analog Output Board Present, Pressure Control Locked, Reversed POT Rotation.

## 2.2 Alarm Masks

Allows access to available alarm and alert masks. Masks let you "turn off" unwanted alarms and alerts. Clear the check mark or set the value to OFF to mask off notifications of positioner modes.

### 2.2.1 Modes Mask

Factory Reset State – Calibrate, Signature In Progress.

### 2.2.2 Positioner Status Mask

Position Deviation, Position Upper Limit, Position Lower Limit.

### 2.2.3 Mechanical Mask

Actuation Ratio Warning, Pneumatic Inability to Fail Safe, Friction High Warning, Friction Low Warning, Friction High Alarm, Friction Low Alarm, Valve Cycles Warning, Valve Travel Warning.

### 2.2.4 Calibration Mask

Stroke Cal in Progress, Loop Cal in Progress, Pressure Cal in Progress, Analog Output Cal In Progress.

### 2.2.5 Electronic Mask

Temperature High Warning, Temperature Low Warning, Shunt Voltage Reference Error, Piezo Voltage Error, Watch Dog Time Out, NV Ram Checksum Error, Electronic Inability to Fail Safe.

### 2.2.6 Pressure Mask

Supply Pressure Low Alarm, Supply Pressure High Warning, Supply Pressure Low Warning, Port 1 Value Out of Range, Pneumatic Leak Warning.

### 2.2.7 Inner Loop Mask

Pilot Relay Warning, Pilot Relay Alarm, Spool Cycles Warning, Spool Travel Warning, Hall Sensor Upper Position, Hall Sensor Lower Position.

## 2.3 Event History

Allows access to last eight errors that occurred.

### 2.3.1 Last event

### 2.3.2 2nd event

### 2.3.3 3rd

### 2.3.4 4th

### 2.3.5 5th

### 2.3.6 6th


### 2.3.7 7th

### 2.3.8 8th

### 2.3.9 Event Count

Number of events since reset or power-up

### 2.3.10 Reset Event Hist.

 **NOTE:** This procedure will erase the stored Event History.

## 2.4 Temperature History

Displays the temperatures attained during operation.

### 2.4.1 Temp.

Circuit board ambient temperature.

**2.4.2 Max Lifetime**

Maximum temperature reached since startup.

**2.4.3 Min Lifetime**

Minimum temperature reached since startup.

**2.4.4 Max Reset**

Maximum temperature reached since last reset.

**2.4.5 Min Reset**

Minimum temperature reached since last reset.

**2.4.6 Max Power Up**

Maximum temperature reached since last power up.

**2.4.7 Min Power Up**

Minimum temperature reached since last power up.

**2.5 Hour Meters**

Displays hours of operation.

**2.5.1 Lifetime**

Number of hours positioner has been in operation.

**2.5.2 Reset**

Number of hours positioner has been in operation since last reset.

**2.5.3 Power Up**

Number of hours positioner has been powered up.

**3 ADVANCE DIAGNOSTICS**

Allows access to Partial Stroke Test

**CAUTION:** *Starting the Partial Stroke Test will cause closure member movement. Please, follow all safety procedures.*

**3.1 Partial Stroke Test**

Parameters needed to run a partial Stroke Test and see results.

**3.1.1 Start Partial Stroke Test**

Starts the partial stroke test.

**3.1.2 Pst Time Breakaway**

Measured when the valve has moved ½ % from the starting position.

**3.1.3 Pst Pressure Difference**

The pressure at the breakaway point.

**3.1.4 Pst Time to Target**

Actual time it took for the valve to arrive within 2% of the final value.

**3.1.5 Pst Time Limit**

Time used for pass fail criteria for the partial stroke.

**3.1.6 Pst Result**

Pass/Fail indication of the test based on the reference time to target and the actual time to target.

**4 CALIBRATION**

Gives access to Actuator/Stroke/Friction Calibration, Stroke Calibration, Analog Output Calibration, and Analog Input Calibration functions.

**4.1 Actuator/Stroke/Friction**

Combined calibration that calibrates the internal pressure sensors of the positioner, the travel of the valve position (zero and span), and if auto tuning is enabled the gain values for the positioner are also calculated. Finally, a short sequence of movements allows the positioner to update a friction value for the valve assembly. Once set the friction value will continue to update on its own during normal operation.

**4.2 Stroke**

Combined calibration that calibrates the travel of the valve position (zero and span) and, if auto tuning is enabled, the gain values for the positioner are also calculated.

**4.3 Analog Output**

The Analog output calibration is only available for positioners that have been supplied with the analog output module installed in the positioner. The Analog output is updated to match the stroke calibration of the positioner automatically every time a stroke calibration is done. This calibration is required if the 4-20 mA signal from the positioner needs to be spanned to something other than 4-20 mA. This option is also used to reverse the output if needed. Once setup properly, this calibration is usually not required for ongoing maintenance.

**4.4 Analog Input**

The Analog input calibration is updated to match the stroke calibration of the positioner automatically every time a stroke calibration is done. This calibration is required if the 4-20 mA signal to the positioner needs to be spanned to something other than 4-20 mA. Once setup properly this calibration is usually not required for ongoing maintenance.

#### 4.5 Quick Calibration

Set positioner to use the local interface to manually calibrate stroke. (Auto/Jog)

#### 4.6 Stroke Calibration Date

Date of calibration and initials of person who performed calibration. These should be entered at the time of calibration.

#### 4.7 Analog Input Calibration Date

Date of calibration and initials of person who performed calibration. These should be entered at the time of calibration.

#### 4.8 Calibrations Mode

This variable shows the state of the positioner during calibration. Each value of Calibrate corresponds to a specific stage in the calibration process: Calibrate = 0, Normal operation, Calibration OFF, position control enabled; Calibrate=1, Automatically calibrate stroke; Calibrate=2, Automatically calibrate actuator pressure sensors; Calibrate=3, acquire command counts with loop current at 0%; Calibrate=5, Moving valve to closed position, get Stem position at 0%; Calibrate=6, moving valve to open position, get stem position at 100%; Calibrate=7, Calibrating supply sensor; Calibrate=8, Calibrating Actuator Sensor, closing valve; Calibrate=9, Calibrating Actuator sensor, opening valve; Calibrate=11, quick-cal button has been pressed; Calibrate=12, Error occurred during Calibration

### 5 CONFIGURATION

Allows access to Device Configuration, Positioner Tuning, Pressure Control, Soft Limits, Position Cut-off Limits, User Preferences, Device Information, Read Register, and Write Register.

#### 5.1 Device Config

Allows access to Local Interface, Air Action, 4-20 mA signal configuration, Characterization, Auto Tuning, Valve Stability, Stroke Calibration type, Reset to Factory Default, and whether the positioner has been calibrated since last reset.

##### 5.1.1 Local Interface


Enable or disable the Logix local panel Quick-cal and dip switches.

##### 5.1.2 Air Action

Displays the air action of the valve air to open (ATO) or air to close (ATC).


##### 5.1.3 Change Air Action

Use to change air action from/to Air-to-Open/Air-to-Close.

 **CAUTION:** Changing the air action may cause closure member movement. Please, follow all safety procedures.

##### 5.1.4 Sig at Closed

4-20 mA signal to close the valve.


 **CAUTION:** Changing signal at closed may cause closure member movement. Please, follow all safety procedures.

##### 5.1.5 Characterization

Displays the position Characterization (linear, equal %, or custom

##### 5.1.6 Change Characterization

Select characterization for stem movement. Choices are linear, equal %, and custom.

 **CAUTION:** Changing the characterization may cause closure member movement. Please, follow all safety procedures.

##### 5.1.7 Auto Tune

The positioner will calculate the new tuning parameter values when the stroke calibrated.

##### 5.1.8 Valve Stability


High friction automatically switches to pressure control. Low friction uses calculated tuning values.

##### 5.1.9 Quick Calibration

Auto will automatically calibrate. Use Jog to set positioner to use the local interface to manually calibrate the position of 100% open.

##### 5.1.10 Reset Device Config

This procedure will set all values for the positioner to its factory defaults.


 **CAUTION:** Resetting the device to factory default state will invalidate stroke calibration and cause closure member movement. You must perform Stroke Calibration for the positioner to work properly.

##### 5.1.11 Calibrated

Indicates whether the positioner has been calibrated after a reset or on initial startup.

#### 5.2 Positioner Tuning

Allows editing of positioner response tuning values.

 **CAUTION:** Changing positioner tuning values affect the control. Closure member may move suddenly or erratically.

### 5.2.1 Tuning values

- 5.2.1.1 P - Gain
- 5.2.1.2 I - Gain
- 5.2.1.3 D - Gain
- 5.2.1.4 Velocity
- 5.2.1.5 Open Speed Limit
- 5.2.1.6 Close Speed Limit
- 5.2.1.7 IL Offset

### 5.3 Pressure Control

Allows access to Pressure Control status and settings.

#### 5.3.1 Enabled / Disabled pressure control

Allows user to Enable/Disable pressure control.

**⚠ CAUTION:** *Enabling/Disabling Pressure Control will affect positioning control. Please, follow all safety procedures.*

#### 5.3.2 Pressure Control State

Use Pressure Control function to control stem position in some high friction applications.

#### 5.3.3 Pressure Lock

Indicates that the current position is within the Pressure Control window.

#### 5.3.4 Window

Size of the Pressure Control window.

### 5.4 Soft Limits & Cutoff

Allows access to Soft Limit and Cut -off limits edit display.

#### 5.4.1 Limits

- 5.4.1.1 High Soft Limit  
Enter the Upper Soft Limit in percent of full stroke. The Modified Command Signal will not go above this limit.
- 5.4.1.2 Low Soft Limit  
Enter the Lower Soft Limit in percent of full stroke. The Modified Command Signal will not go below the limit.
- 5.4.1.3 Upr Pos Cutoff  
Point at which the stem will go to the full open position regardless of command value.
- 5.4.1.4 Lwr Pos Cutoff  
Point at which the stem will go to the full closed position regardless of command value.

### 5.5 User Preferences

Allows access to Cycle Limits, Travel Limits, Position Travel Alerts Configuration, Units of Measure, and Burst Mode Control.

#### 5.5.1 Valve Cycle / Travel

Allows access to the valve cycle and travel information and settings.

- 5.5.1.1 Travel Length  
Length of travel. Usually set to 100%.

- 5.5.1.2 Cycle Count  
The Valve Cycle Counter counts the number of cycles of the valve stem since the last reset.

- 5.5.1.3 Cycle Limit  
Changing the Cycle Limit allows you to control the Cycle Limit warning level.

- 5.5.1.4 Change Cycle Limit  
Enter the number of cycles defined by the Valve Cycle Deadband that if exceeded will activate the Valve Cycle Limit alarm.

- 5.5.1.5 Cycle Deadband  
Cycle Deadband defines how large a stem movement is allowed before a cycle is counted.

- 5.5.1.6 Reset Cycle Count  
Valve Cycle Counter can be reset to zero.

- 5.5.1.7 Valve Travel  
Value of the Valve Travel Accumulator. The Valve Travel Accumulator measures the distance the valve stem has traveled since the last reset.

- 5.5.1.8 Travel Limit  
Enter the amount of travel defined by the Valve Travel Deadband that if exceeded will activate the Valve Travel Limit alert. Enter this value in the same engineering units as Stroke.

- 5.5.1.9 Change Travel Limit  
Changing the Travel Limit allows you to control the Travel Limit warning level.

- 5.5.1.10 Travel Deadband  
Valve Travel Deadband defines how large a stem movement is allowed before travel accumulator increases.



#### 5.5.1.11 Reset Travel Count

The Valve Travel Accumulator can be reset to zero.

### 5.5.2 Position Alerts

Allows you to change position alert settings. Controls the Position Upper and Lower Limit Alert.

#### 5.5.2.1 Position Upper Alert

Enter the Upper Position Alert set point in percent of full stroke. If the valve stroke exceeds this value, Upper Position Alert is activated.

#### 5.5.2.2 Position Lower Alert

Enter the Lower Position Alert set point in percent of full stroke. If the valve stroke falls below this value Lower Position Alert is activated.

#### 5.5.2.3 Position Deviation Deadband

Position Deviation Deadband entered in percent determines the minimum steady state difference which generates a Position Deviation Alert. This is entered as an absolute value. For example, if a deadband of +/- 2% is desired a value of 2 should be entered.

#### 5.5.2.4 Position Deviation Time

Position Deviation Time is the amount of time (entered in seconds) that the position deviation can exceed the Position Deviation Deadband before a Position Deviation Alert is generated.

### 5.5.3 Units

Allows you to view and change the pressure, if equipped, and temperature units of measure.

#### 5.5.3.1 Press Units

#### 5.5.3.2 Change Pressure Units

#### 5.5.3.3 Temp Units

### 5.5.4 Burst Mode Settings

Allows access to view and change burst settings.

#### 5.5.4.1 Burst Mode State

There are two possible states: enabled, disabled.

#### 5.5.4.2 Command to Burst

Allows the selection of the HART command to burst to the host.

#### 5.5.4.3 Variables for Command 33

Allows the selection of individual variables to burst with HART command 33.

## 5.6 Device Information

Allows access to System Information, Positioner version information, Actuator information, Valve Trim information, and Valve Body information.

### 5.6.1 Positioner

View HART information, change HART tag name, message, descriptor, and date.

#### 5.6.1.1 Manufacturer

Manufacturer identification code.

#### 5.6.1.2 Device

Device - References the type of Field Device, usually an advertised model number, that is unique to a single manufacturer.

#### 5.6.1.3 Dev ID

Field Device Identification - Uniquely identifies the positioner when combined with the Manufacturer Identification and Device Type, entered at the factory.

#### 5.6.1.4 Elect SN

Serial Number of the electronics control board.

#### 5.6.1.5 Final Assm #

Positioner Final Assembly Number - Number that is used for identification purposed, entered at the factory.

#### 5.6.1.6 Device Tag

Tag - Text that is associated with the positioner installation. This text can be used by the user in any way. A recommended use is as a unique label to a plant that correlates to a Field Device label: a plant drawing, or on a Control System. This variable is also used to address the device when communicating with HART. Enter up to 8 characters.

#### 5.6.1.7 Message

Message - Text that is associated with the positioner. This text can be used by the user in any way. Enter up to 32 characters.

#### 5.6.1.8 Descriptor

Descriptor - Text that is associated with the positioner. This text can be used by the user in any way. Enter up to 16 characters.

#### 5.6.1.9 Date

Date - calendar date that is stored in the positioner. This date can be used by the user in any way.

### 5.6.2 Positioner Revs

View the positioner internal version and revision information.

5.6.2.1 EC Major Rev  
Embedded code major version number.

5.6.2.2 EC Minor Rev  
Embedded code minor version number.

5.6.2.3 EC Build Date and Time  
Display the date embedded code was built.

5.6.2.4 Universal Rev  
Universal Revision - Revision of the Universal Device Description, that the Field Device conforms to, entered at the factory.

5.6.2.5 Hardware Rev  
Hardware Revision - Revision that corresponds to the electronics hardware of positioner, entered at the factory.

### 5.6.3 Actuator

Allows access to Actuator Manufacturer, Actuator Size and selection, etc.

**NOTE:** Actuator size is used for friction calculations.

- 5.6.3.1 Select Actuator Info
- 5.6.3.2 Manufacturer
- 5.6.3.3 Model
- 5.6.3.4 Positioner Action
- 5.6.3.5 Type
- 5.6.3.6 Spring

### 5.6.4 Valve Trim

Allows access to valve trim information and settings.

- 5.6.4.1 Stroke Length
- 5.6.4.2 Stem Dia.
- 5.6.4.3 Character
- 5.6.4.4 Trim Mat
- 5.6.4.5 Type
- 5.6.4.6 Size
- 5.6.4.7 Leak Class

### 5.6.5 Valve Body

Allows access to valve body information.

- 5.6.5.1 Fail Posn
- 5.6.5.2 Motion
- 5.6.5.3 Manuf.
- 5.6.5.4 Model
- 5.6.5.5 Body Mat
- 5.6.5.6 Body Size
- 5.6.5.7 Pressure Class
- 5.6.5.8 End Conn
- 5.6.5.9 Pack Type
- 5.6.5.10 Flow Dir.

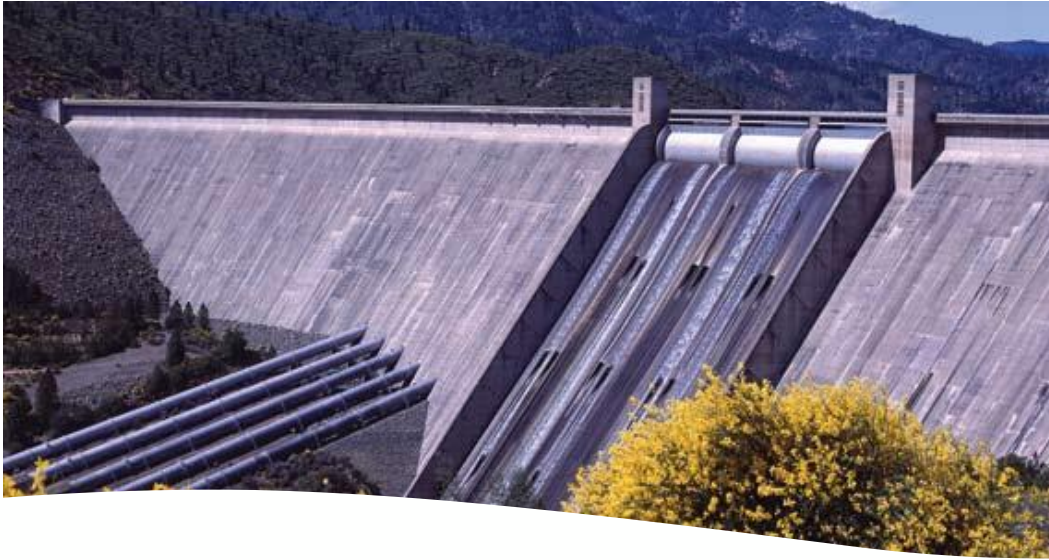
### 5.7 Read Register

Allows you to read a single register value from positioner. (Contact your Flowserve service technician for a variable map to correctly select values to read.)

### 5.8 Write Register

Allows you to change internal variable values directly. (Contact your Flowserve service technician for a variable map to correctly select values to read.)

**CAUTION:** Changing variables using the write register may affect how the positioner controls the valve. Follow safety procedures.



Bulletin FCD-LGENSF0017-00 8/13

To find your local Flowserve representative please use the Sales Support Locator System found at [www.flowserve.com](http://www.flowserve.com)

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