



Micro-DCI™ Single Loop Controller Series 53SL5100

- High visibility dot matrix display
- Configurable from the front display
- Built-in transmitter power supply+
- Standard RS485 Datalink Communications
- Four Selectable Control Strategies: PID, Ratio PID, Auto/Manual Station, Analog Backup
- Password security



Series 53SL5100
Single Loop Controller

53SL5100 SINGLE LOOP CONTROLLER

The 53SL5100 controller is capable of functioning as any one of four selectable application-specific instruments. The instrument's function is selected with the faceplate push buttons by entering the appropriate number (1 through 4 respectively) into designated database locations. The four instrument functions are as follows:

Control Strategy 1 (CS-1) - PID Control can be applied to distillation column tray temperature control, batch reactors, filter flow control, and any other industrial application that must be responsive to plant wide process upsets while maintaining consistent product quality. All three modes of the controller (CS-1,CS-2,CS-3) can be used for complex exothermic reactor control. In some cases proportional control only may be used to solve a simple flow rate problem. Controller tuning can easily be adjusted by the plant engineer. Alternately, the operator may press a few buttons on the faceplate that instructs EASY-TUNE™ loop tuner to characterize the process and automatically insert a set of stable and efficient tuning parameters. As shown in Figure 1, the single loop controller has a vertical bargraph indicator for the process variable. To the right of the bargraph is a 50 segment scale and setpoint indicator. The scale ranges are configured as zero and span entries. The setpoint indicator can be manually positioned with the faceplate push buttons or set remotely. Percentage output appears at the bottom of the display as a horizontal bar graph under a 40 segment scale. The output can track automatically under instrument control or be set manually with the faceplate push buttons. The closed (C) and Open (O) valve indicators at the ends of the horizontal scale can be configured to be displayed at either end to indicate actual valve control direction. Digital values of the setpoint (SP) and process variable (PV) appear on the display to the right of the vertical bar graph. A tracking / setpoint alpha indicator, at the lower display right, indicates automatic (A) or manual (M) tracking and local (L) or remote (R) setpoint control.

Control Strategy 2 (CS-2) - Analog Backup Controller is used in operations where a remote instrument or computer is normally controlling the final element directly. In this configuration, the controller acts as a control signal selector and as an automatic backup in the event the remote instrument fails.

As a backup, the controller will assume control of the process in the event of an indicated primary unit failure. The controller continuously adjusts its output to match the feedback signal from the final element so that transfer is bumpless.

Control Strategy 3 (CS-3) - Ratio PID Controller is used where one variable must be automatically maintained in direct proportion to another variable. The PID algorithm is executed to maintain a "controlled line" at a predetermined proportion to the uncontrolled or "wild" process variable. Transmitter signals from the controlled and wild variable are received by the ratio controller which compares the two values and calculates the required correction that is sent to the final element as an output signal. Common applications are in-line blending and metering pump control.

As shown in Figure 2, the ratio PID controller display is identical to the display shown in Figure 1 for the single loop controller with two exceptions: In place of the SP legend, there is an RA legend designating that the value below is the preset ratio setpoint. In the column containing the setpoint indicators an additional tick bar briefly appears when the ratio value is altered. (The tick bar is immediately covered by the setpoint indicator and may not be visible).

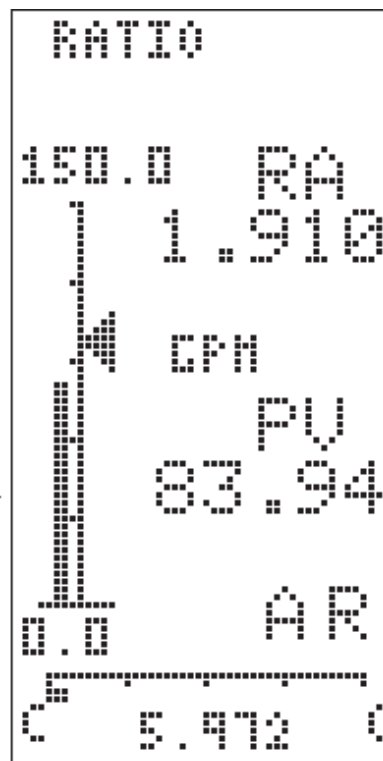


Figure 2. Ratio PID Controller

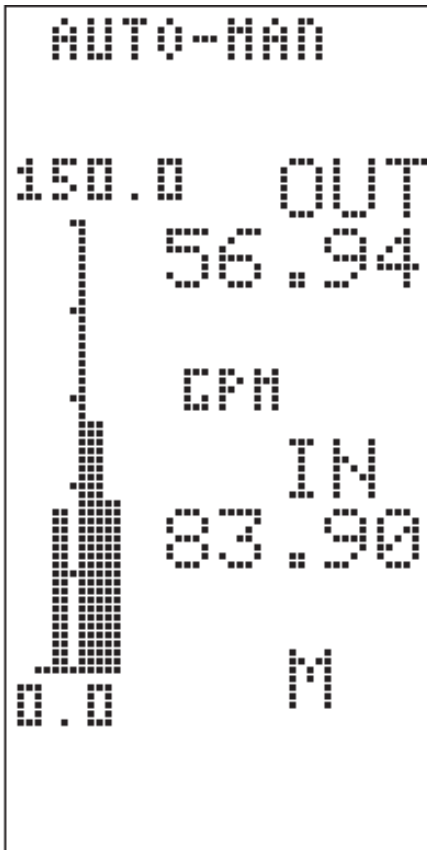


Figure 3. Automatic /Manual Station

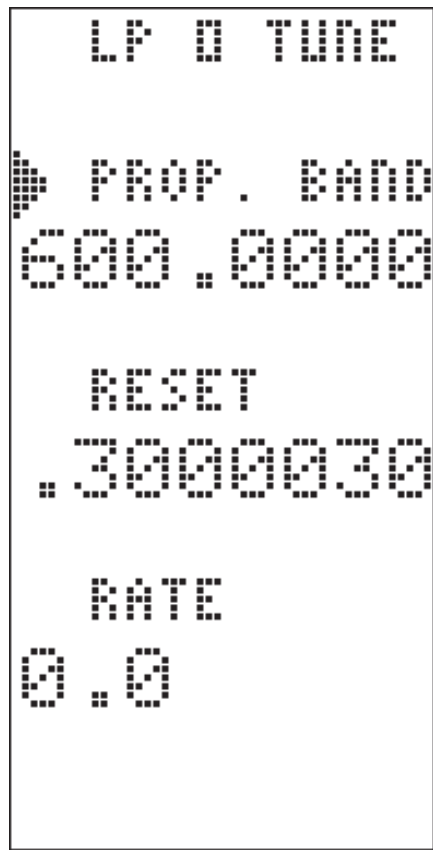


Figure 5. Parameter Display showing Loop Tuning Constants

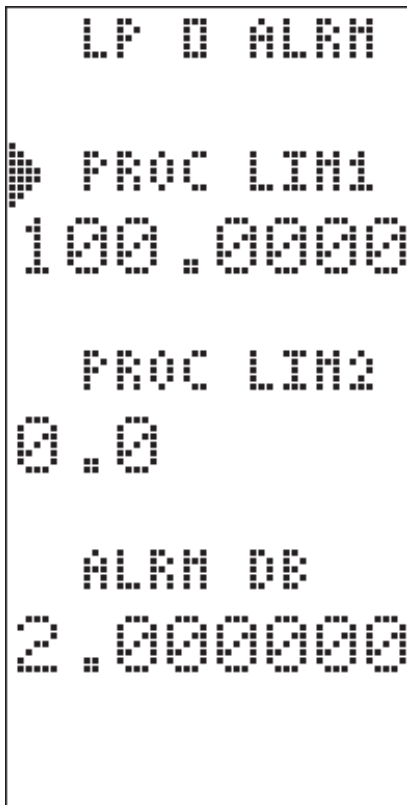


Figure 4. Typical Parameter Display showing Alarm Limits & Deadband

Control Strategy 4 (CS-4) -Automatic/Manual Station is a conventional single station selector. In auto, the input is passed directly through the station to the output. In manual, the station functions as a manual loader allowing the output to be controlled from the front panel push-button. If the process variable exceeds user-configurable limits, the station activates a signal to a contact output (CCO) for external annunciation.

As shown in Figure 3, the automatic manual station has vertical bar graph indicators for the auto input, process variable and output. Digital values of the output and process variable also appear on the display to the right of the bar graph under the OUT and IN legends respectively.

Parameter displays (Figures 4 & 5) allow quick access to three datapoint values that are selected when the display is configured. Three critical user specified datapoints are presented digitally allowing the review and or modification of the values. Enabling the Modify Disable Bit (LSI 3) allows the datalink network is via the rear terminal board (TB-1) of the instrument, pins 19 through 22. The addressable RS-485 serial interface of the instrument allows interconnection to Micro-PWC™ or to numerous third party PC's running operator station software packages.

ENGINEERING SPECIFICATIONS:

Power Requirements:

21-28 Vdc
 120 Vac +/-10% @ 50-60 Hz
 220 / 240 Vac +/- 10% @ 50-60 Hz
 Power Consumption: ac/dc operation; 15 VA
 Internal power supply available power output for transmitters: 24-26 Vdc, 80 mA, short circuit protected
 Output ripple: 200 mV p-p maximum

Environmental Characteristics:

Enclosed temperature controlled locations (class A and B per ISA S71.01 1985)
 Ambient temperature Limits: 4-52°C (40-125°F)
 Relative Humidity Limits: 10 to 90% maximum

Physical Characteristics:

Case: Steel
 Finish: Baked Enamel Lt Gray - RAL9002
 Circuit Boards: Glass Epoxy
 Bezel: Ultem® 1000 UL-94 5V
 Dimensions: DIN Case (72 x 144 mm) (2.844 W x 5.656 H x 12.906 L)
 Front Panel Display: 96 x 48 Pixel
 Push Buttons: 10 (Tactile membrane switches)

Analog Inputs

Analog inputs are referenced to signal common.

Quantity: 2
 Signal Range: 0-5 or 1 -5 Vdc linear or square root
 Input Impedance: 1 megohm minimum for voltage inputs; value of ranging resistor for current signals.

Measurement Accuracy: +/- 0.1% of span

Note: The standard rear terminal board has the appropriate resistors on AN10 and AN11. If the input signal is voltage, the resistors should be removed.

Control Ranges

Proportional Band - 2 to 1000% and OFF
 Integral - 0.02 - 200 minutes/repeat or Manual Reset from 0 - 100%
 Derivative - 0.01 - 8 minutes and OFF

Contact Inputs

Quantity: 1
 Type: Discrete inputs internally powered with 24 volts @ 2 mA dc maximum (contact inputs are referenced to power common.)
 Permissible Contact Resistance: 100 ohm
 Open / Close Contact Duration:
 for open recognition: 50 ms.
 for close recognition: 50 ms.

OUTPUT SIGNALS

(All Analog Output signals are referenced to power common.)

Quantity: 1
 Signal Range: 0-20 mA dc (4-20 mA dc)
 Load Resistance: 0-750 ohms
 Accuracy: +/- 0.2% of span (Current output is updated every 0.1 seconds. The output slew rate is 40 mA / Sec.)

Discrete Outputs

Quantity: 2
 Type: Unpowered discrete solid state output.
 Configuration: Single pole single throw, N.O., or N.C. references to power common.
 Voltage: 30 V dc max.
 Current: 50 mA dc max.
 Temperature effect on accuracy: +/- 0.28% per 28 degrees from reference temp of 25° C.

MICROPROCESSOR SAMPLING & UPDATE

Program scan rate: 100 ms.
 Input Signal Sampling Rate
 Analog: 50 ms for all inputs
 Contact: 50 ms for all inputs
 Display Update: 100 ms.

Contact Recognition Level

Closed: 1 V dc max or less than 100 ohms
 Open: 4 V dc to 15 Vdc or 10mA max

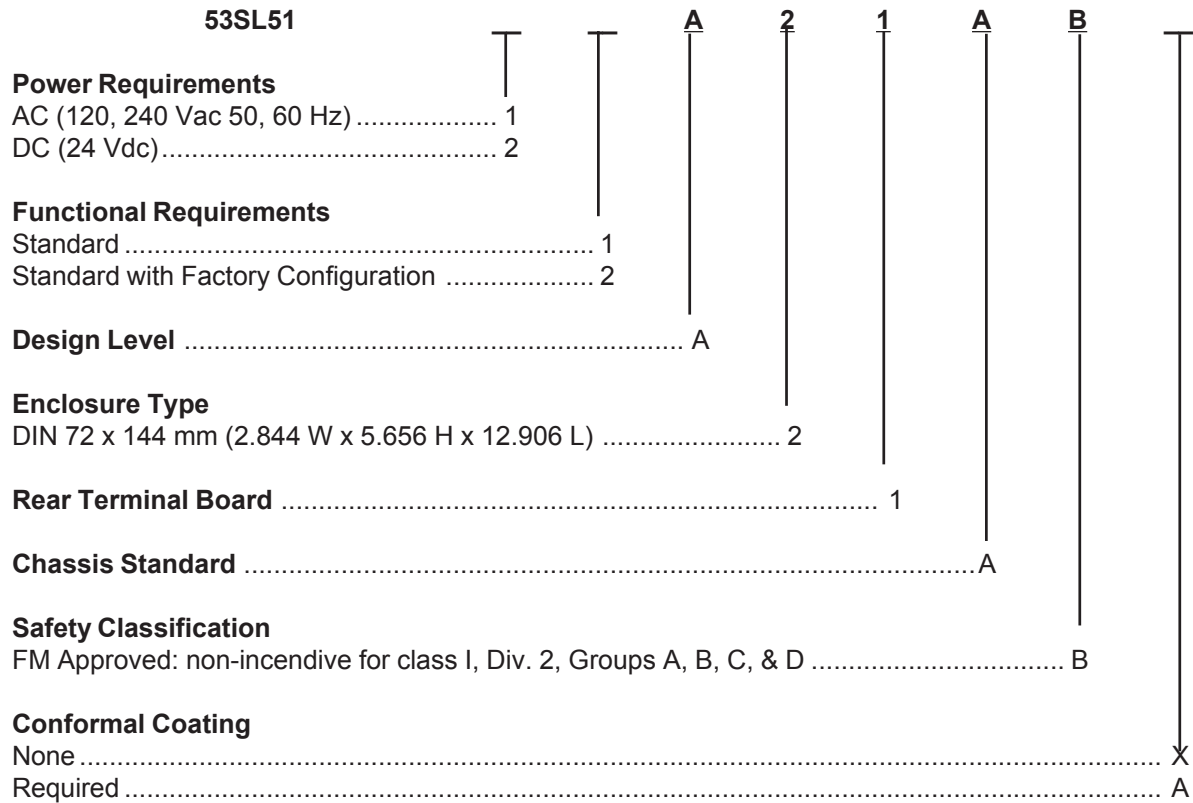
COMMUNICATIONS

Standard Micro-DCI data link

Type: RS422/485, four wire, asynchronous
 Speed: Selectable - all standard baud rates between
 300 and 9600: plus 14,400 and 28,800
 Mode: Binary

Ordering Information

Model Number Designation



Product Summary

- √ High Visibility Dot Matrix Display
- √ Fully rangeable Inputs
- √ Simple Configuration
- √ Password Lockout
- √ DIN Case
- √ 72 W x 144 H x 329 L (millimeters)
2.844 W x 5.656 H. x 12.906 L (inches)
- √ EASY-TUNE™ Tuning Algorithm
- √ 24 Vdc Transmitter Power Supply
- √ RS-485 Data Link Communications
- √ Library of Control Strategies
CS-1, CS-2, CS-3 and CS-4

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