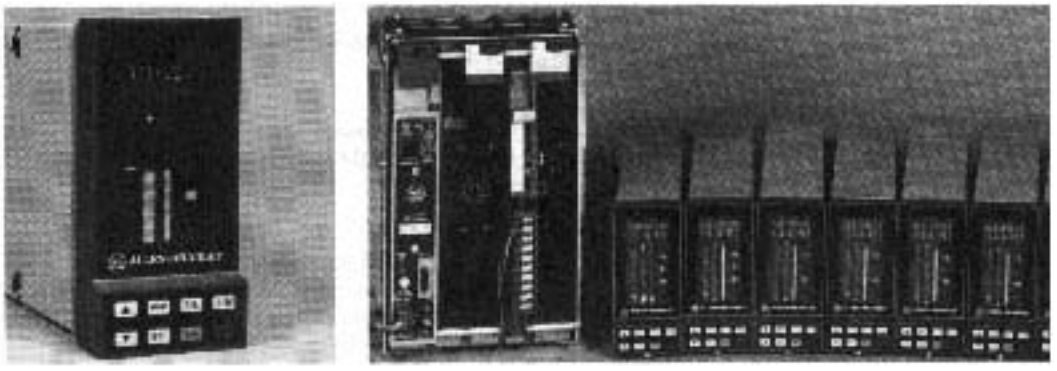
ALLEN-BRADLEY

Allen-Bradley Single-Loop Controller

(Cat. Nos. 1771-LC1B, -LC2B, -LC3B, -LC4B, -LC5B, -LC6B)

Product Data



Get high system integrity and advanced process capability with out 1771-LC single-loop controller.

Closely monitors and controls your process. Single-loop control helps give you more up time. Direct PLC connection gives you precise monitoring and fast reaction time.

Controls a wide range of processes. Handles cascade, ratio and non-linear functions and other complex control situations. Up to 15 1771-LC Single-Loop Controllers can communicate with a PLC through a single interface card covering a wide range of individual control applications.

Benefits

Application flexibility. Controls a wide range of temperature, pressure, flow and level processes.

Auto-tuning. EXACT™ control uses microprocessor technology to continuously scan the process and make controller adjustments based on current process dynamics.

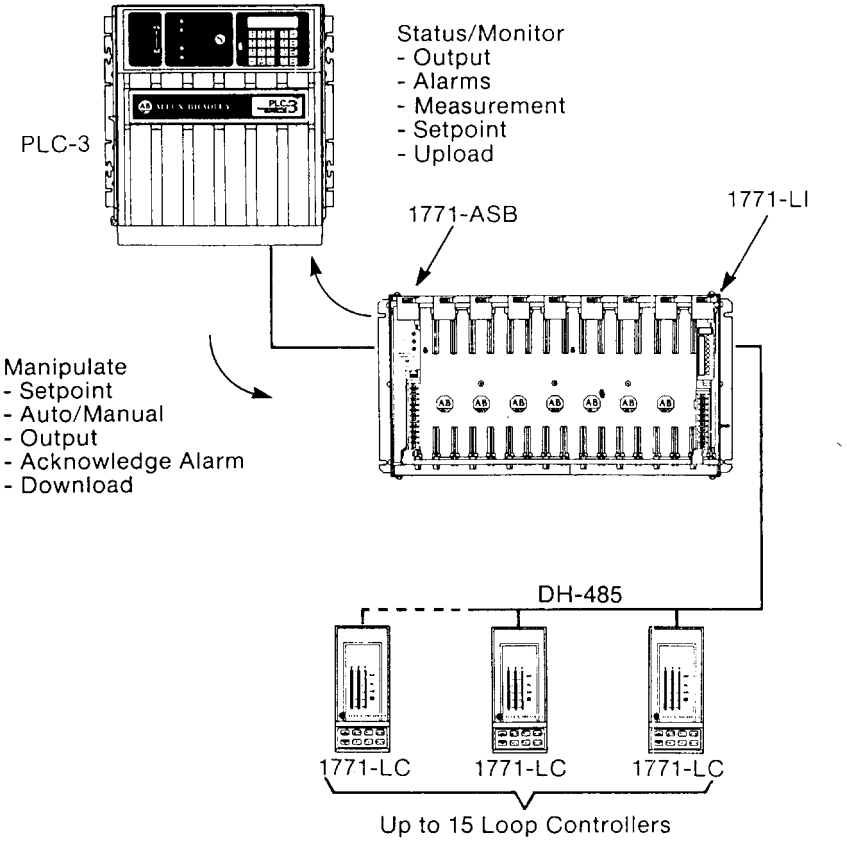
Precise control. Close PLC integration lets you closely monitor and control your process.

No unauthorized use. Multi-level passcode security helps prevent unauthorized use and lets you access the values or status of any set of control and/or alarm parameters.

System Overview

The 1771-LC Loop Controller is a microprocessor-based single loop, PID controller that can direct a wide range of processes. It communicates with Allen-Bradley's 1771 I/O structure using a DH-485 serial line and the 1771-LI Loop Interface Module. Up to 15 1771-LC Loop Controllers can communicate with a programmable controller through each 1771-LI Loop Interface Module (figure 1).

Figure 1
System Overview



Through the Loop Interface Module the programmable controller can Through the Loop Interface Module the programmable controller can monitor and change modes and values in the Loop Controller. You can also store Loop Controller configurations and transfer them to and from the programmable controller's memory.

The Loop Controller also lets you modify loop parameters without having to add additional hardware. There are six versions of the Loop Controller available:

- 120V ac (Cat. No. 1771-LC1B)
- 240V ac (Cat. No. 1771-LC2B)
- 120V ac with RTD option (Cat. No. 1771-LC3B)
- 240V ac with RTD option (Cat. No. 1771-LC4B)
- 24V dc (Cat. No. 1771-LC5B)
- 24V dc with RTD option (Cal. No. 1771-LC6B)

1771-LC/1771-LI Compatibility

This chart shows what features you can use with the 1771-LC/1771-LI modules you have.

	1771–LC, Series A	1771-LC, Series B
1771-LI, Rev A	Set Control Loop Status	Set Control Loop Status
1771-LI, Rev B	Set Control Loop Status	Set Control Read/Modify Parameters Loop Status Ext. Loop Status Upload Download

Multi-level Passcode Security

The LC Controller's passcode feature lets you set the level of operator access to control and/or alarm parameters when you configure the system. You must use a passcode to access remaining parameters.

Front Panel

The front panel consists of the following:

Keypad with eight keys for configuration and operator interface. Use these keys to examine and change the Loop Controller's operating parameters. The controller prompts you when entering parameter values. You must press a key for a minimum of 0.2 seconds for recognition by the Loop Controller. For analog functions press and hold the key for more rapid value changes.

LCD Display consisting of:

- a two line alphanumeric display (9 characters each line for loop identification)
- a graphics display of three 50-segment bar graphs
- status indicators

The numerical quantities have a resolution of ±0.1% of upper range value. The bar graphs have a resolution of ±2% of span.

Display Accuracy
We show accuracy in percent of span, unless otherwise noted. Refer to table 1.

Table 1
System Accuracy

Parameter	Accuracy
Set point	
Local	± 0.1%
Remote	± 0.1%
Ratio	± 0.1%
Input	
Analog	± 0.1%
Frequency	± 0.1%
RTD	± 0.255C
Output	
Valve	
Retransmitted	± 0.5%
(linear)	± 0.25%
Linearization	
RTD	± 0.15C
Thermocouple	± 0.55C
Control Modes	
Proportional Band	± 1% of indicated value
Integral	± 1% of indicated value
Derivative	± 1% of indicated value
Alarm Settings	
Absolute	± 0.1%
Deviation	± 0.1%
Calculations	± 0.1%

Inputs

The Loop Controller accepts analog, frequency and discrete inputs. You can also select an option for one RTD input.

Refer to table 2 for a list of the available inputs.

Table 2
Analog Input Table

Analog Type Input Signal	Maximum Number	Details
4 to 210 mA dc current input	4	4 to 20 mA into 250 ohm input resistors. Includes 25V dc source for powering one or two 4 to 20 mA field transmitters. (Not suitable for 10 to 50 mA dc transmitters).
Thermocouple input (requires E93 temperature transmitter or equivalent)	1	Linearization of the displayed value is: **Thermocouple** — **Temperature Range** Type J — -20 to +760°C (-4 to +1400°F) Type K — -20 to +1380°C (-4 to +2500°F) Type E — -130 to 540C (-200 to +1000°F)
1 to 9999 Hz Frequency input	2	Input pulse rates, voltage levels and field power compatible with Foxboro E83 Series Vortex Flowmeter and with Foxboro 81 or 82 Series Turbine Flowmeter having a preamplifier input. Input impedance is 500 ohms.
Resistance temperature detector (RTD) input	1	Platinum, per IEC 751 or SAMA 100 (RC 21-4) temperature curves. Linearization of the displayed value is: **IEC 751** — **SAMA 100** **Range**: -200 to +850°C (-330 to +1562°F) — -200 to +600°C (-330 to +1100°F) **Span (absolute measurement)**: 110 to 1000°C (200 to 1800°F) — 110 to 800°C (200 to 1440°F) **Span (temperature difference measurement)**: 200 to 1000°C (360 to 1800°F) — 200 to 800°C (360 to 1440°F)

Analog Input Signals

You can select up to four analog inputs. (Refer to table 2.) Use these inputs for: process measurement, remote setpoint, bias and feed forward signals.

Frequency Input Signals

You can select up to two, 0 to 9999 Hz frequency input signals or one pair of pulse up/pulse down inputs.

Discrete Input Signals

You can select up to two contact or transistor switch inputs with 5V dc open circuit voltage at 1mA maximum current. These inputs let you remotely change controller operating modes: manual/auto, remote/local setpoint or tracking functions.

Signal Connections

You make input connections to the Loop Controller through a 32-position terminal block located on the rear panel of the Loop Controller. The terminal block has compression terminals for wire sizes up to 14 AWG.

Input Specifications

- direct interface capability with two sensor types:
  - Analog (1-5V dc/4-20mA)
  - Frequency (0-9999Hz)
- thermocouple interface through a 4-20mA transducer
- individual filtering, gain and bias parameters for each input
- linear, square root and squared format selections for each input
- resolution of one part in 3000
- internal 25V dc field power for (2) 4-20mA transmitters

Outputs

The Loop Controller generates both analog and discrete output signals.

Analog Outputs

The Loop Controller has two nonisolated analog outputs:

- Output: 4 to 20mA (500 ohms maximum) for control
- Auxiliary Output: 1 to 5V dc (2k ohms minimum) primarily for interface to chart recorders. You can assign this signal to track the: control output, process measurement, setpoint or any input signal.

Discrete Outputs
The Loop Controller also has two nonisolated open collector transistor switch outputs. Contact ratings are 50V dc maximum, 250mA maximum.

Transmitter Power Supply

Nominal 25V dc power supply with a 250 ohms limiting resistor provides field power for two (4 to 20mA) transmitters.

Supply Voltage

You make power connections to the Loop Controller through a 3-position terminal strip in the rear panel. The Loop Controller operates from ac or dc voltage:

- 120V or 240V ac (+10, -15%), 47 to 63Hz at 30VA maximum
- For a +10% to -15% change in ac voltage, the change in span is ±0.1% maximum.

Alarms

The Loop Controller has four alarms. Each may activate on any signal in the controller. You can configure each alarm for a specific Type, Action or Form:

- Type: high/low, high/high or low/low
- Action: latching, nonlatching or permissive
- Form: absolute, deviation or rate of change

These alarm actions allow different methods of alarm display and acknowledgement.

The controller indicates alarm status by a combination of alphanumeric display, bar graphs and the contact outputs.

You can adjust the alarm dead band between 0 and 100% of span.

You can assign alarm indications to either one of the two discrete outputs.

Humidity Effect

Maximum error, in percent of span, from 5% to 95% relative humidity, measured at a wet-bulb temperature of 30°C (855°F) is ±0.1% for all conversions, calculations and settings.

Ambient Temperature Effect

Maximum error, in percentage of span, for a 30°C (55°F) change in temperature within normal operating limits is shown in table 3.

Table 3
Ambient Temperature Effect

Parameter	Maximum Error In Percent of Span
Set Point	
Local	± 0.1%
Remote	± 0.5%
Input	
Analog	± 0.5%
Frequency	± 0.2%
RTD	± 0.5°C
Output	
Valve	± 0.5%
Retransmitted	± 0.5%

EXACT Control

EXACT auto-tuning uses microprocessor technology to make controller adjustments based on the current process dynamics. EXACT continuously scans the process. When a process upset occurs EXACT can adjust tuning parameters if necessary. You can adjust response by specifying the desired damping and overshoot change. You can turn EXACT tuning on and off from the keypad.

Memory

The Loop Controller stores all configuration and operating parameters in nonvolatile memory. Nonvolatile memory reduces the chance of losing data. If power is lost, control parameters automatically save the contents of memory without battery backup.

Setpoint Scaling

- Available setpoint range of -999 to +9999
- Four alpha characters available for engineering unit identifier.

Specifications

Single Loop Controller	
Operating Temperature	5 to 50°C(40 to 120°F)
Relative Humidity Rating	5 to 95%
Control Adjustment Limits	Proportional Band: 1 to 8000% Integral: 0.01 to 200 minutes/repeat Derivative: 0 to 100 minutes
Frequency Response	Down 3 dB at 3Hz with a ±5% amplitude signal
Weight	4.5kg (10 lb)
Loop Update Time	▪ 100ms normal operation ▪ 200ms using EXACT mode
Output Limiting	-2 to 102%
Accuracy	Inputs: resolution of one part in 3000 Supply Voltage: for a +10% to -15% change in AC voltage, the change in span is ±0.1% maximum Humidity Effect: Maximum error, in percent of span, from 5% to 95% relative humidity, measured at a wet-bulb temperature of 30°C (855F) is ±0.1% for all conversions, calculations and settings Ambient Temperature Effect: Maximum error, in percentage of span, for a 30°C (55°F) change in temperature within normal operating limits is shown in table 3.

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A ROCKWELL INTERNATIONAL COMPANY

As a subsidiary of Rockwell International, one of the world's largest technology companies — Allen-Bradley meets today's challenges of industrial automation with over 85 years of practical plant-floor experience. More than 11,000 employees throughout the world design, manufacture and apply a wide range of control and automation products and supporting services to help our customers continuously improve quality, productivity and time to market. These products and services not only control individual machines but integrate the manufacturing process, while providing access to vital plant floor data that can be used to support decision-making throughout the enterprise.

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