

# Controllers

## Model 353 Process Automation Controller

### Introduction

#### Features & Benefits

- ▶ Affords easy integration with and migration to existing systems
- ▶ Multiple loop capabilities for indication, control, logic, or sequencing accommodate comprehensive process control needs
- ▶ Scalable hardware provides lower entry costs, without limiting future needs
- ▶ Full configuration capability via front faceplate push-buttons allows quick field changes without requiring additional tools
- ▶ Ethernet networking option provides higher speed, peer-to-peer communications.
- ▶ RS485 MODBUS® network connection allows multi-drop wiring for operation, monitoring, troubleshooting, or configuration from a system workstation
- ▶ Local Instrument Link (LIL) networking option provides integration with existing systems.
- ▶ Front panel PC connection accommodates local configuration, monitoring, or troubleshooting using the graphical configuration software
- ▶ Removable Real Time Clock/Configuration Board (RTC/CB) option minimizes maintenance and complexity via a simple board replacement technique that stores a complete copy of the control strategy configuration
- ▶ Factory Configured Options (FCOs) facilitate fast configuration for common applications
- ▶ Password protection provides individual security for various plant personnel
- ▶ LonWorks® digital fieldbus provides flexible I/O expansion and reduced wiring costs for continuous and discrete variables
- ▶ Hardware designed to support emerging fieldbus technologies for both field and network connections ensures smooth plant integration
- ▶ Graphical configuration program provides a choice of function block or ladder logic configuration
- ▶ Short case design allows mounting in 12" deep cabinets
- ▶ Coated circuit boards ensure reliable operation and environmental integrity

#### Description

The Model 353 Process Automation Controller is a stand-alone, microprocessor-based industrial controller designed for a broad range of process applications. It can serve as a simple single-loop controller or as a multi-loop controller with complete control and logic functions for a small unit batch or continuous process. The Model 353's fieldbus and networking options enable it to function as an integral element in a plant system.



Loops are configured for control, sequence, or logic as needed within the Model 353. Each configured loop can have a virtual operator display that is viewed locally using the LOOP button on the faceplate and is mapped to network communication for a plant operator station. Alarm management is handled using the L (Loop) & S (Station) indicator lights along with the priority assignments and flashing options of each alarm.

User defined pushbuttons in each loop can be used for traditional functions, such as Console/Local, External/Internal Switching or individual user requirements, such as Start, Stop or Jog. Multiple variables are displayed on the operator faceplate and viewed using the D button. User defined units assigned to each variable are displayed via the UNITS button. Complete configuration of the Model 353 is available using buttons located behind the flipdown ID door.

A built-in library of pre-configured control strategies (FCOs) enable selection of common basic controller types for quick field set-up. A large selection of reusable function blocks enable simple changes to FCOs or the design of a custom control strategy to meet the needs of specific process control application. The Model 353 Configuration Utility accommodates design, simulation, downloading, uploading, and on-line monitoring capabilities for improved management of controller configurations. In addition, sequencer/logic loops can be configured and monitored on-line in ladder diagram format for those more familiar with this language.

# Controllers

## Model 353 Process Automation Controller

### Technical data

#### Specifications

##### Electrical & Environmental

###### Power Supply

Standard: 120/240 Vac (85 to 264 Vac); 47 to 63 Hz  
Optional: 24 Vdc, +20%, -15%

###### Power Requirements

25 Watts, 40 VA (max.)

###### 2-Wire Transmitter Power

Voltage: 25 Vdc  $\pm$  3V  
Current: 120 mA, short circuit protected

###### Hazardous Area Approvals Pending

FM/CSA: Class I, Division 2, Groups A, B, C & D  
BASEEFA: Ex N IIC  
CE  
(Consult Siemens for current approvals)

###### Ambient Temperature Range

Operating: 32 to 122°F (0 to 50°C)  
Storage: -40 to 185°F (-40 to 85°C)

###### Climate Conditions - IEC654-1

Class B3 - Standard Mounting  
Class D1 - Installed per instructions in Class D1 enclosure

###### Electrostatic Discharge

IEC 801-2

###### RFI Protection

IEC 801-3

###### Electrical Transients

IEC 801-4

###### Net Weight

6 lbs.

###### Heat Dissipation

80 BTU/Hr.

###### Scan Time

Varies with configuration: 20 msec (minimum)

#### Inputs

##### Analog Inputs (non-isolated)

1-5 Vdc, 4-20 mA with included 250 resistor  
MPU Controller Board: Qty 3  
I/O Expander Board: Qty 1

##### Digital Inputs (isolated)

0-1 Vdc OFF, 15-30 Vdc ON  
MPU Controller Board: Qty 3  
I/O Expander Board: Qty 1

##### Analog Input, Universal (isolated)

Thermocouple: J, K, T, E, S, R, B & N  
RTD: DIN 43760, US (NBS126), JIS C-1604  
Slidewire: 500-5000  
Ohms: 0-5000  
Millivolt: -19.5 to 78 mVdc  
I/O Expander Board: Qty 2

##### Digital/Frequency Input, Universal (isolated)

Frequency Range: 0 to 25,000 Hz  
Minimum Operating Frequency: 0.05 Hz  
ON Voltage: 4-30 Vdc  
OFF Voltage: 0-1 Vdc  
Input Current: <5 mA @ 30 Vdc  
I/O Expander Board: Qty 2

#### Outputs

##### Analog Outputs (non-isolated)

4-20 mA into 800 ohms (max.)  
MPU Controller Board: Qty 2  
I/O Expander Board: Qty 1

##### Digital Outputs (non-isolated)

Open Collector Transistor (emitter @ station common)  
Load Voltage: 30Vdc (maximum)  
Load Current: 100 mA (maximum)  
Off State Leakage Current: <200 mA @ 30 Vdc  
MPU Controller Board: Qty 2

##### Relay Outputs (SPDT)

Contact Rating: 5A @ 120 Vac, 2.5 A Resistive Load @ 230 Vac  
Minimum Current: 100 mA @ 10 mVdc/150 mA @ 50 mVac  
I/O Expander Board: Qty 2

##### Optional Boards

Local I/O Expander  
LonWorks Remote I/O Bus  
Local Instrument Link Network  
Real Time Clock/Removable Configuration Board  
Ethernet Communications

#### Standard Configuration

Nine of the most common control strategies have been stored in a built-in library and can be selected with a single pushbutton entry. These control strategies, which can be customized to accommodate individual needs, are:

- ▶ Single-Loop Controller with Tracking Setpoint
- ▶ Single-Loop Controller with Fixed Setpoint
- ▶ Ratio Set Controller with Operator Setpoint Limits
- ▶ Single-Loop Controller with Operator Setpoint Limits
- ▶ Cascade Loop Controller
- ▶ Cascade Loop Controller with Operator Setpoint Limits
- ▶ Ethernet Set Controller with Tracking Setpoint
- ▶ External Setpoint with Fixed Setpoint
- ▶ Dual Loop controller

# Controllers

## Model 353 Process Automation Controller

### Technical data

#### Function Blocks

Control strategies within the Model 353 are configured using the following function blocks, which are stored in memory. The total number and type of I/O function blocks available in the Model 353 depend on the installed hardware, and when available, can be used as needed within a configured loop. Loop function blocks can be used in the quantities indicated within each loop. Each configured loop can contain one operator display block & one controller block\*.

#### Station Hardware I/O

- AIN1-4 - Analog Input
- AINU1-2 - Analog Input Universal
- AOUT1-3 - Analog Output
- DIN1-4 - Digital Input
- DINU1-2 - Digital Input, Universal
- DOU1-2 - Digital Output
- ROUT1-2 - Relay Output

#### Ethernet Peer-To-Peer I/O

- AIE01-32 - Analog Input Ethernet
- AOE01-32 - Analog Output Ethernet
- CIE01-32 - Coil Input Ethernet
- DIE01-32 - Digital Input Ethernet
- DOE01-32 - Digital Output Ethernet

#### LIL Peer To Peer Global Data I/O

- AIL01-99 - Analog Input\_LIL
- AOL01-99 - Analog Output\_LIL
- DIL01-99 - Discrete Input\_LIL
- DOL01-99 - Discrete Output\_LIL

#### Lonworks Remote I/O

- AIP01-25 - Analog Input lev\_Percent
- AOP01-25 - Analog Output lev\_Percent
- DID1-6 - Digital Input lev\_Discrete, 16 Chan.
- DOD1-6 - Digital Output lev\_Discrete, 16 Chan.
- DIS1-6 - Digital Input\_State
- DOS1-6 - Digital Output State

#### Loop Function Blocks

- A/M - Auto/Manual
- ACS01-99 - ARC Cosine
- ADD01-99 - Addition
  - AGA3 - Orifice Metering of Natural Gas
  - AGA7 - Measurement of Gas by Turbine Meters
  - AGA8 - Compressibility Factors of Natural Gas
- ALARM - Alarm
- AND01-99 - AND Logic
- ASN01-99 - ARC Sine
- ATD01-05 - Analog Trend Display
- ATN01-09 - Arc Tangent
  - BATOT - Batch Totalizer
  - BATSW - Batch Switch
  - BIAS - Bias
- CHR01-99 - Characterizer
- CMP01-99 - Comparator
- COS01-99 - Cosine

- DAM01-99 - Deviation Amplifier
- DIV01-99 - Division
- DNC01-99 - Divide by N Counter
- DTM01-99 - Dead Time Table
- DYT01-99 - Delay Timer
  - E/I - External/Internal Transfer
  - ESL - Event Sequence Logger
- EXP01-99 - Natural Exponentiation
- EXT01-99 - Exponentiation
- FTG01-99 - Falling Edge Trigger
  - GB01-99 - Gain & Bias
- HLD01-99 - Hold
  - ID\* - ID Controller
- LL01-99 - Lead/Lag
- LMT01-99 - Limit
- LN01-99 - Natural Logarithm
- LOG01-99 - Logarithm Base 10
- MTH01-99 - Math
- MUL01-99 - Multiplication
- NND01-99 - NAND Logic
- NOR01-99 - NOR Logic
- NOT01-99 - NOT Logic
  - ODC\* - Operator Display for Controllers
  - ODS\* - Operator Display for Sequencers
  - ODA - Operator Display for Analog
  - ODD - Operator Display for Discrete
  - ODP - Operator Display for Pushbutton
- ONOFF\* - ON OFF Controller
- OR01-99 - OR Logic
  - ORSL - Override Selector
- OST01-99 - One Shot Timer
- PB1SW - PB1 Switch
- PB2SW - PB2 Switch
- PB3SW - PB3 Switch
- PCOM - Phase Communication
  - PD\* - PD Controller
  - PID\* - PID Controller
  - PIDAG\* - PIDAG Controller
- PRSEQ - Program Sequencer
- QHD01-99 - Quickset Hold
- RATIO - Ratio
- RCT01-99 - Repeat Cycle Timer
- RLM01-99 - Rate Limiter
- ROT01-99 - Retentive On Timer
- RSF01-99 - RS Flip-Flop
- RTG01-99 - Rising Edge Trigger
- SCL01-99 - Scaler
- SEL01-99 - Signal Selector
  - SETPT - Setpoint
- SIN01-99 - Sine
  - SPLIM - Setpoint Limit
- SRF01-99 - SR Flip-Flop
- SRT01-99 - Square Root
- SUB01-99 - Subtraction
- TAN01-99 - Tangent
- TH01-99 - Track & Hold
- TOT01-99 - Totalizer
- TSW01-99 - Transfer Switch
- XOR01-99 - Exclusive OR Logic

# Controllers

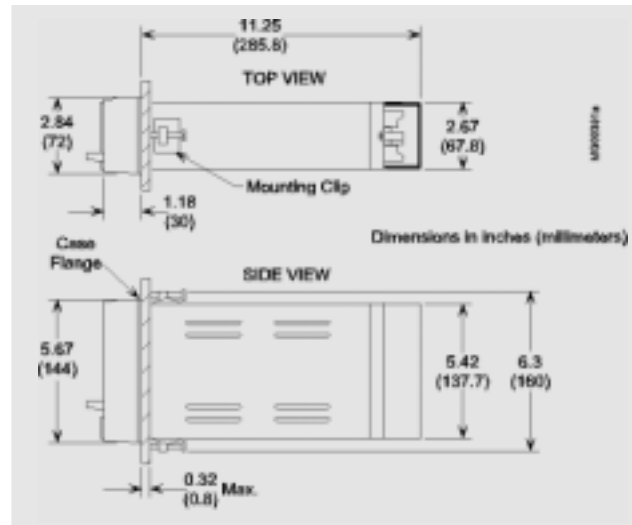
## Model 353 Process Automation Controller

### Accessories

#### Accessories

- ▶ Graphical Configuration Software (P/N i|config™ Vx.xx<sup>1</sup>, Consult Siemens for latest version) Windows® 95/NT™ software for configuration of the Model 353 and creation of the function block diagram. Configurations can be transferred using the built-in front panel connector, the Modbus network, or the LIL network connection or ethernet.
- ▶ Transmitter Power Supply (P/N 15124-1) - Acopian Model B24G210M24 Vdc 2.0 Amp Power Supply.
- ▶ Blank Filler Panel (P/N 15738-168) - Blank unit panel for uniform control room appearance when panel includes space for future controllers.
- ▶ Loop Identification Card - Custom printed loop identification for flipdown access door. Up to 5 lines with 24 characters per line can be specified.
- ▶ Permanent Instrument Tag - Stainless steel instrument tag permanently attached to the Model 353 casing. Two lines with up to 15 characters per line can be specified.

#### Mounting Dimensions



1) x.xx specifies the software's revision number. This will be defined by Siemens as the latest version.

# Controllers

## Model 353 Process Automation Controller

### Ordering data

**Model Number** Order No.

Process Automation Controller

**MPU Controller Board**

- 120/240 Vac (85-264 Vac); 47-63 Hz
- 24 Vdc, +20%, -15%

**Mounting Case**

- Standard Terminals with Ethernet Connection

**Operator's Display Panel**

- Fixed Analog & Digital Displays

**Expansion Board**

- Not Required
- Local I/O Expander (T/C, RTD, Frequency, Relay, ..)

**Option Board A-1 (Remote I/O Communications)**

- Not Required
- LonWorks Protocol

**Option Board A-2**

- Not required

**Option Board B-1 (Network Communications)**

- Ethernet
- Not Required
- Local Instrument Link (LIL)

**Option Board B-2**

- Not Required
- Real Time clock/ Configuration Board

**Modification Options**

- Not Required
- Controller Modified as detailed in order bill of material

**Reserved for Future Use**

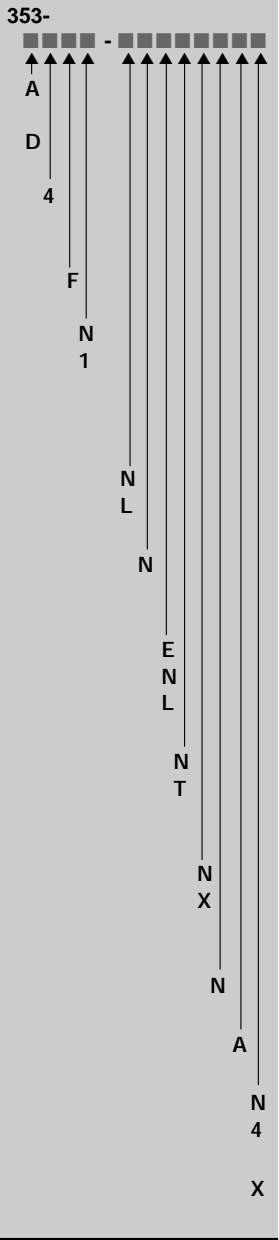
- Reserved for Future Use

**Design Level**

- Design Level A

**Electrical Approval**

- Not required
- FM/CSA Class I, Div. 2, Groups A, B, C, D & CE Compliant
- FM/CSA Class I, Div. 2, Groups A, B, C, D



\*Consult Siemens for current approvals.