353 RetroPAK Controllers

- **Replaces obsolete Moore 352 and Siemens 353 controllers**
- **Easy migration for operators and engineers**
- **Fits the same panel cut-out**
- **Peer-to-peer, Modbus RS-485, and Ethernet Modbus/TCP networks**
- **Removable memory module stores complete configuration & operating status**
- **Library of factory-configured options and Moore 352 & Siemens 353 function blocks**
- **Graphical configuration program**

The Logical Migration

Standard 2-year Warranty

The 353 RetroPAK is a standalone, microprocessor-based industrial controller designed to replace the Moore 352 and Siemens 353 controllers. It can serve as a single-loop or multiloop controller, with math, logic and sequence functions. It's the ideal migration path to current technology designed, manufactured and supported in the USA.

The 353 RetroPAK is based on state-of-the-art surface mount technology. Like the Moore 352 and Siemens 353, the basic hardware platform includes the carrier board, CPU, display assembly, and terminations. The non-volatile RAM not only stores the configured database, but backs up all current tuning, state, and operating parameters.

The base RetroPAK controller provides:

- 3 analog inputs
- 2 current outputs
- 3 discrete inputs (2.5 - 28Vdc)
- 2 relay outputs

Two of the standard analog inputs are universal, so low-level inputs such as thermocouple and RTD can be accommodated without ordering extra options. The third input is 4-20mA.

The Expanded version provides two additional 4-20mA inputs and a third 4-20mA output.

Two serial communication ports are standard. One is dedicated to the ICN peer-to-peer network for communication to other RetroPAK controllers. The other is either Modbus RS-485 or Ethernet Modbus/TCP for connecting to PCs, operator panels and other hosts.

The RetroPAK display is bright, robust, and operator-friendly. Plain-language operating, alarm, and tuning displays provide more information without having to interpret codes, and multiple display screens are viewed using the TAG key. The display elements and bargraphs can be assigned to virtually any variable during configuration.

The Factory Configured Options (FCOs) can be loaded and adjusted from the front keypad of the controller. To make major modifications to the FCOs, or to develop a custom configuration, use Visual Application Designer, a graphical, function block-based program that includes a library of Moore function blocks to reduce engineering retraining. There is virtually no limit to the number of times a function block type can be used.

The Portable Memory Module backs up the configuration and, when left on an operating controller, live process parameters. It can be used to copy configurations to other RetroPAK controllers and help maintenance technicians get a process back up and running without having to reconfigure or re-tune the controller.

INFORMATIVE, HIGH VISIBILITY DISPLAY

The pixel-based vacuum fluorescent display is highly visible and extremely robust. It provides a choice of up to six fonts and seven levels of brightness for ease of operation.

Standard Loop Display
Provides familiarity and reduces operator retraining

Alarm Displays
Any number of alarms can be configured for any signal. The alarm displays make it easy to identify, review and acknowledge process and diagnostic alarms.

Tuning Displays
Password-protected entry of tuning parameters, XY table values, recipe data and other information

Application-Specific Displays
User screens can be configured for sequence and batch operations, discrete device operation, recipe selection, and more. All keys are user programmable.

Maintenance & Troubleshooting
View raw input values for commissioning and startup, detailed diagnostic information before and during normal operation, and an Event Queue of up to 1024 entries.

SAFETY AND SECURITY

The RetroPAK goes over and above the features provided by the Moore 352 and Siemens 353 controllers for protecting the process and ensuring continued safety and operation.

Signal Quality Detection - All inputs and outputs have quality detection and an associated alarm bit.

Power fail/recovery settings - available for every parameter, so that outputs, steps, control modes and setpoint values assume a known good value, either 'previous' or user-configured, after a power outage. Warm- and cold-start options allow different settings depending on a user-specified time period before power is restored.

Failsafe output settings - the option to select failsafe values, either 'previous' or a user-determined value, on all outputs should the controller I/O lose communication with the CPU.

Single-point isolation & short-circuit protection - Inputs, outputs and built-in communications are individually isolated, channel-to-channel and channel-to-ground. Each I/O point includes short-circuit and cut-wire detection with associated diagnostics

Database & tuning parameter backup - The Portable Memory Module option contains a backup copy of the controller's configured database and, when installed on an operating controller, it is updated every 50ms with current process parameters. Continuous checksums ensure against corruption of Memory Module data.

STANDARD CONFIGURATIONS

Factory Configured Options (FCOs) can be enabled and configured from the front panel:

- Single-Loop Controller with Tracking or Fixed Setpoint (FCO 101/102)
- External Set Controller with Tracking or Fixed Setpoing (FCO 103/104)
- Ratio Set Controller with Operator Setpoint Limits (FCO 105)
- Single-Loop Controller with Operator Setpoint Limits (FCO 106)
- Dual Loop Controller (FCO 107)
- Cascade Loop Controller (FCO 121)
- Cascade Loop Controller with Operator Setpoint Limits (FCO 122)

In addition, the most common Function Blocks used in the Moore 352 adn Siemens 353 are stored in the Visual Application Designer software library.

This reduces engineering re-training, and minimizes the time to upgrade to the 353 RetroPAK.

FUNCTION BLOCK LIBRARY

In addition to the Moore 352 and Siemens 353 function block library, the RetroPAK has its own set of native function blocks. Many of these combine functions that required several blocks in the Moore 325 or Siemens 353. For most blocks, there is no practical limit to the number of times they can be re-used in a configuration.

<table>
<tr><td>PID Control Block</td><td>• Multiple combinations of P, I and D
• Gain, Reset and Pre-Act scheduling
• Feed forward
• External feedback
• Adaptive gain and reset
• Deadtime compensation
• Local/remote setpoint with ratio and/or bias
• Auto/manual Manual reset, Procedureless Manual Reset
• Setpoint and output tracking
• Setpoint selection
• Setpoint and output limiting
• Configurable Power Restart Values</td><td>Timer</td><td>Used to perform timing functions such as delayed start and/or stop, pulse duration, interval timing, or periodic self reset timing. A timer can be configured as an up or down timer for a maximum duration of 1193 hours, 2 minutes, 47.295 seconds. Control functions include:
• Direction (up/down)
• Reset time value
• Load a user-definable reset value
• Disable and hold at current value
• Wrap
• Limits</td></tr>
<tr><td>Expression (Math/Logic) Block</td><td>User-specified expressions with logical, arithmetic, and conditional operators including:
• Arithmetic: add, subtract, multiply, divide
• Comparator: less, less or equal, greater, greater or equal, equal, not equal
• Logic: and, or, not and, not or, not
• Exponental, absolute, natural log, log_10, integer, raised to the power
• Square root
• Momentary</td><td>Linearization</td><td>Produces a linearized value based on:
• Linear
• Square and Modified Square
• Square Root and Modified Square Root
• Piecewise
• Inverse Piecewise
• Thermocouple (B, E, J, K, N, R, S, T)
• RTD Types (Platinum 0.00385, 0.0003923, 0.003902, 0.003911, and Nickel 0.00672)</td></tr>
<tr><td rowspan="2">Sequence Block</td><td rowspan="2">Batch, logic and other types of sequential control based on if-then-else logic statements that allow the user to skip steps, specify several steps for various outputs, and go back to previous steps. Each block provides:
• 128 inputs
• 64 outputs
• 512 steps
Sequence blocks can be linked together to increase input/output capacity</td><td>Setpoint Ramp/Hold</td><td>Up to 100 individually guaranteed ramp or hold segments with repeating profiles, tracking function, four segment event states, reset, stop, run, hold and skip commands</td></tr>
<tr><td>Process Alarm</td><td>Produces a discrete signal to advise of an irregular process condition based on: LESS, LESS/EQUAL, GREATER, GREATER/EQUAL, EQUAL, NOT EQUAL, Deviation</td></tr>
<tr><td>Characterization (Piecewise) Block</td><td>Supports 60 pairs of X, Y floating point coordinates for user defined linearizations or recipe data. Blocks can be cascaded for additional pairs.</td><td>Totalizer</td><td>Counts an analog input signal. Features include: Threshold, Up, Down, W rap, Scale Factor, Predetermined Count 1 & 2 and Limit Status.</td></tr>
<tr><td>Supervisory Message Block</td><td>Reads, writes, sets, tunes or configures an attribute internally or over the peer-to-peer network to other controllers</td><td>Input Conditioning Blocks</td><td>Provide input filtering, normalization, linearization, direct/reverse action, and engineering unit scaling for analog and discrete signals</td></tr>
</table>

SPECIFICATIONS

ELECTRICAL & ENVIRONMENTAL

Power Supply
AC: 85-250V rms, 50-400Hz
DC: 24Vdc nominal (20-50Vdc)

Fuse: 2.5 Amps (ac), 4.0 Amps (dc)

Power Consumption (120V rms, 60Hz, Full load):
50 Watts maximum

Data Retention: Typically 10 years with controller unpowered

Ambient Temperature Range
Operating: 0 to +50°C
Storage: -40 to +75°C

Humidity: 5 to 95% RH, noncondensing

Open Input Fault Detection
User configurable for all inputs

Failsafe Output:
Built-in outputs - last value or 0%
Module outputs - user defined between 0 and 100%

PHYSICAL

Height
Bezel - 5.69" (144.5 mm)
Panel cutout - 5.47" (138.9 mm)

Width
Bezel - 2.87" (72.9 mm)
Panel Cutout - 2.69" (68.3mm)

Depth
Behind the panel - 15.75" (400 mm)
Front of panel - 1.13" (28.7 mm)

Weight
6.0 lbs.

COMMUNICATIONS

ICN Peer-to-Peer Network

Protocol	Token-passing
BAUD Rate	31.25K BAUD

Modbus RTU

Protocol	Modbus RTU
Electrical	RS-485
BAUD Rate	150 to 38.4K BAUD

Ethernet

Protocol	Modbus/TCP
Standard	IEEE 802.3
Physical Layer	10/100Base-T
Connector	RJ45

Note: Ethernet network does not support peer-to-peer communiation

INPUTS

Universal Analog Inputs (isolated)

Quantity	Basic: 2
Transmitter Power	24V dc, isolated (each input)
Range / Span	
Current	4-20 mA / 0-20 mA minimum span 1mA
Millivolt	-10 to 120mV minimum span 10mV
Volt	0 to 6 Vdc minimum span 0.1V
Resistance	500 ohms 20 Ω min. with 3,9KΩ resistor
Thermocouple	Type B, E, J, K, N, R, S, T
RTD	3-wire platinum, DIN 43760 (IEC751), range 0-430 ohms (normal) or 0-55 ohms (low)

Current Input (isolated)

Quantity	Basic: 1 Expansion: 2 additional
Range	(0-100%) 4-20mA, 0-20mA
Low Limit	0mA
High Limit	20mA

Discrete Inputs (isolated)

Quantity	Basic: 3
Input Voltage Range	10-32V dc; 12-32V ac
Low Logic Input	1V
Max. input current	30mA

OUTPUTS

Analog Outputs (non-isolated)

Quantity	Basic: 2
Range	0 to 22 mA, non-isolated, with user-adjustable span (1 mA mín.)
Load	22 mA at 1000 ohms maximum

Analog Outputs (isolated)

Quantity	Expansion: 1
Range	(0-100%) 4 to 20 mA
Low Limit	0 mA
High Limit	25 mA

Mechanical Relay Outputs

Quantity	Basic: 2
Type	SPDT, NO
Contact	3A a 250V ac or 30V dc

ORDERING INFORMATION

1. RetroPAK is a licensed package. The following end-user information must be supplied with each order:
   End-user company name and complete address
   Contact name, telephone number, and e-mail address
2. If Custom Configuration services are selected, provide original database documentation or file for SLC or CLC controller
3. ViZapp software is required to configure RetroPAK controllers (not required if Custom Configuration services are selected)

	353RETRO	__	__	__	**1**	**A**	__
	01 - 08	09	10	11	12	13	14-16
353 RetroPAK	353RETRO						
I/O Complement[1]							
Basic I/O		B					
Expansion I/O		E					
Power Supply							
24V dc			0				
85 to 250V ac			1				
Network Communication							
RS-485 Modbus RTU and ICN Peer-to-Peer				1			
Ethernet Modbus/TCP and ICN Peer-to-Peer[2]				2			
Removable configuration module							
Portable memory module					1		
Design Level							
RetroPAK Design Level						A	
Custom Configuration							
Not required							STD
Duplicate existing Siemens/Moore 352 configuration[3]							352
Duplicate existing Siemens/Moore 353 configuration[3]							353
Load duplicate RetroPAK database (multiple RetroPAKs with identical configurations)							DUP

Note 1: *353Retro Basic provides two universal analog inputs, one 4-20mA input, two current outputs, three discrete inputs, and two SPDT relay outputs. Expansion adds two 4-20mA inputs and one current output. For other I/O configurations contact the factory.*

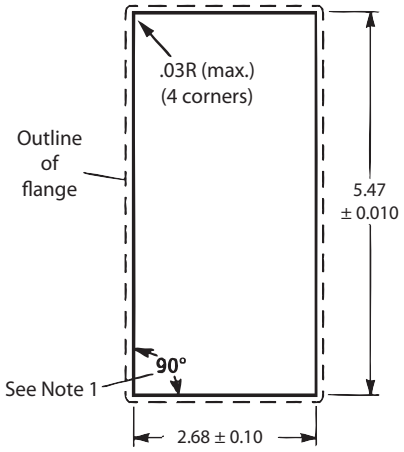
Note 2: *RetroPAK controllers do not communicate directly with 352 or 353 controllers. Ethernet Modbus/TCP does not support peer-to-peer.*

Note 3: *Customer must provide current database files and documentation. Controller configured as per documentation supplied.*

Termination resistor for peer-to-peer network (one required per network)	2030FZ00001A

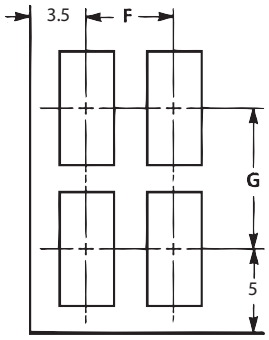
CONFIGURATION DEVELOPMENT SOFTWARE	VIZAPP	XMB	DEV	__	__
Visual Application Designer	VIZAPP				
Communications Interface					
Modbus OPC		XMB			
Functionality					
Development			DEV		
Software protection key					
Parallel port				PAR	
USB				USB	
Extended Support Services					
None					000
One Year Technical Support & Version Updates					ESS

MOUNTING DIMENSIONS



PANEL CUTOUT

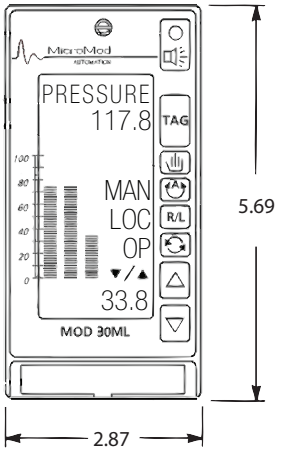
DISTANCE BETWEEN CENTERS



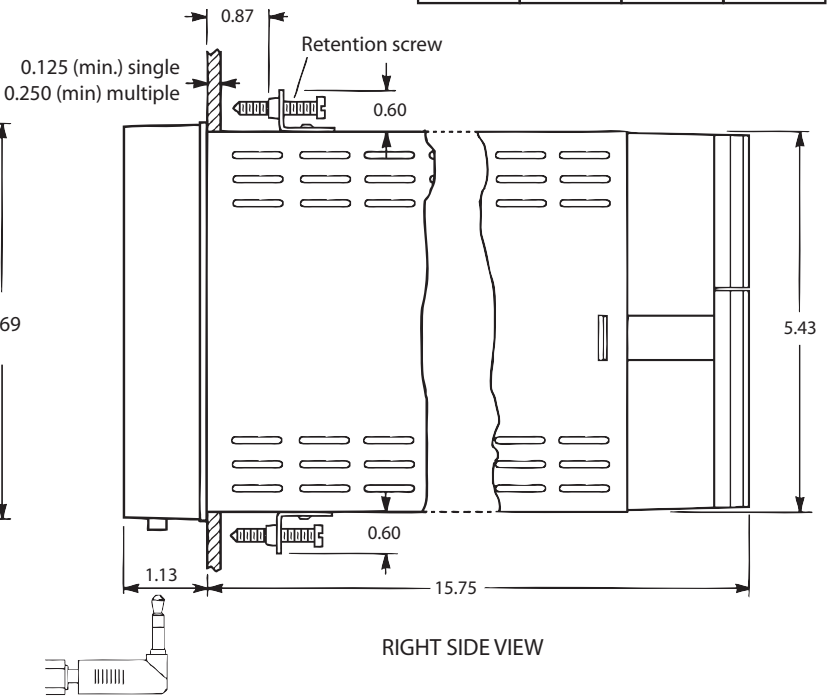
Center-to-Center distance when mounting multiple controllers

	F	G
Recommended	4	8
Minimum	3.5	7

inches	mm	inches	mm
0.6	15.2	5.43	137.9
0.87	22.1	5.47	168.9
1.13	28.7	5.69	144.5
2.69	67.31	7	177.8
2.87	72.9	8	203.2
3.5	88.9	15.75	400
4	101.6		



FRONT VIEW



RIGHT SIDE VIEW

Note 1: *When mounting housing in panel cutout or rack and panel mounted bezel, turn retaining screws until point of screw touches rear of panel or bezel. Overtightening of retaining screws will distort housing. Housing must be square after retaining screws are tightened.*

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