Controllers
Model 353R Controller

Introduction

Features & Benefits
- Scalable hardware design that provides lower entry costs and easy future expansion
- Optional, front faceplate that affords full configuration and change capabilities on the plant floor
- Universal serial bus that accommodates up to 31 I/O modules for true distributed control
- Password protection that provides separate security levels for plant personnel
- RS485 Modbus® network connection that allows multidrop wiring for operation, monitoring, troubleshooting, or configuration from a system workstation
- RS232 Modbus connection that accommodates local configuration, monitoring, or troubleshooting via graphical configuration software
- Ethernet option provides connections to plant network
- Local Instrument Link (LIL) networking option that provides integration with existing systems and peer-to-peer communication
- DIN rail and wall mounting options for application versatility
- Redundant power supply

Description
353R is a robust controller that accommodates continuous and discrete needs in one device, while increasing and enhancing information flow between your process and plant personnel. Its out-of-the-box capabilities make 353R both a powerful replacement for loop controllers and a viable low-cost alternative to other hybrid control systems. With this unprecedented simplicity and flexibility, 353R is useful for a broad range of unit or area applications—from column distillation control to combustion and burner management for packaged boilers.

All data, including tags, alarms, and history, resides in 353R—the control system component closest to the process. This reduces configuration time and eliminates the possibility of manual errors via a single point of entry for all process information. In other words, you configure 353R, and the rest takes care of itself.

353R’s open platform, which supports such protocols as Modbus, Modbus TCP/IP, and LIL, provides comprehensive access to system data and facilitates integration with your other control systems and field devices. 353R’s Ethernet networking capability also simplifies integration and reduces networking costs, while eliminating the need to standardize on a fieldbus protocol.

Specifications

Electrical & Environmental

Power Supply
- Standard: 120/240 Vac (85 to 264 Vac); 47 to 63 Hz
- The 353R PSUA-B4 power supply is separate from the 353R controller and plugs into the left side of the control carrier.

Power Requirements
- 75 Watts, 160 VA (max.)

Transmitter Power
- Voltage: 24 Vdc ±10%
- Current: 150 mA

Bussed Field Power (Field power for I/O modules plugged into control carrier.)
- Voltage: 24 Vdc ±10%
- Current: 550 mA

Ubus Module Power (Operating module power for I/O modules plugged into control and module carriers. Check individual modules specifications for individual current requirements.)
- Voltage: 12 Vdc ±5%
- Current: 2.0 Amps.

Hazardous Area Approvals
- FM/CSA: Class I, Division 2, Groups A, B, C & D

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

Climate Conditions - IEC 654-1
- Class B3 - Standard Mounting

Electrostatic Discharge
- IEC 1000-4-2

RFI Protection
- IEC 1000-4-3

Electrical Transients
- IEC 1000-4-4
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Technical data

**Net Weight** (includes controller, power supply, and control carrier) 6 lbs. (2.72 kg)

**Heat Dissipation**
250 BTU/hr.

**Scan Time**
Varies with configuration: 20 msec (minimum)

**Inputs**

- **Analog Inputs (non-isolated)**
  1-5 Vdc, 4-20 mA with included 250 ohm 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, R, S, B, & N
  RTD: DIN 43760, US (NBS126), JIS C-1604
  Slidewire: 500-5000 ohms
  Resistance: 0-5000 ohms
  Millivolt: Narrow: -19.0 to 19.0 mV
  Wide: -30.0 to 77.0 mV
  I/O Expander Board: Qty 2

**Outputs**

- **Analog Outputs (non-isolated)**
  4-20 mA, 800Ω load (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 µA @ 30 Vdc
  MPU Controller Board: Qty 2

- **Relay Outputs (SPDT)**
  Contact Rating:
  5A @ 120 Vac, 2.5 A @ 230 Vac (Resistive Load)
  Minimum Current: 100 mA @ 10 mVdc;
  150 mA @ 50 mV
  I/O Expander Board: Qty 2

**Optional Boards**

- Local I/O Expander
- Local Instrument Link Network
- RTC/CB Board
- Ethernet Board

**Function Blocks**

Control strategies within the i|pac controller are configured using the following function blocks, which are stored in memory. The total number and type of I/O function blocks available in i|pac 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.

**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**
- **ROUT1-2 - Relay Output**

**Ethernet Data I/O Function Blocks**
- **AIE01-32 - Analog Input Ethernet**
- **AOE01-32 - Analog Output Ethernet**
- **AWE01-32 - Analog Write Ethernet**
- **CIE01-32 - Coil Input Ethernet**
- **CWE01-32 - Coil Write Ethernet**
- **DIE01-32 - Discrete Input Ethernet**
- **DOE01-32 - Digital Output Ethernet**
- **DWE01-32 - Digital Write 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**

**Loop Function Blocks**
- **A/M - Auto/Manual**
- **ACS01-99 - ARC Cosine**
- **ADD01-99 - Addition**
- **AG3 - Orifice Metering of Natural Gas**
- **AG7 - Measurement of Gas by Turbine Meters**
- **AGA8 - Compressibility Factors of Natural Gas**
- **ALAR - 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**
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FTG01-99 - Falling Edge Trigger
GB01-99 - Gain & Bias
HLD01-99 - Hold
ID1 - ID Controller
LL01-99 - Lead/Lag
LMT01-99 - Limit
LN01-99 - Natural Logarithm
LOG01-99 - Logarithm Base 10
MTH01-99 - Math
MUL01-99 - Multiplication
NDD01-99 - NAND Logic
NOR01-99 - NOR Logic
NOT01-99 - NOT Logic
ODA1 - Operator Display for Analog Indication & Alarming
ODC1 - Operator Display for Controllers
ODD1 - Operator Display for Discrete Indication & Control
ODP1 - Operator Display for Pushbutton
ODS1 - Operator Display for Sequencers
ONOFF1 - ON OFF Controller
OR01-99 - OR Logic
ORSL1 - OR Select
OST01-99 - One Shot Timer
PB1SW - PB1 Switch
PB2SW - PB2 Switch
PB3SW - PB3 Switch
PCOM1 - Phase Communication
PD1 - PD Controller
PID1 - PID Controller
PIDAG1 - PIDAG Controller
PRSEQ1 - Program Sequencer
QHD01-99 - Quickset Hold
RATIO1 - 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
RTT01-99 - Real-Time Trip
SCL01-99 - Scaler
SEL01-99 - Signal Selector
SETPT1 - Setpoint
SIN01-99 - Sine
SPLIM1 - 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

Universal Bus I/O Module Function Blocks

UAI - Universal Bus Analog Input
UAO - Universal Bus Analog Output
UDI - Universal Bus Digital Input
UDO - Universal Bus Digital Output
UEI - Universal Bus Extended Digital Input
URI - Universal Bus RTD Input
UTI - Universal Bus Thermocouple Input

Accessories

\(i\)config graphical configuration software - For configuration of the Model 353R controller and \(i/o\) modules. Configurations can be transferred using the built-in RS232 connector, the RS-485 network connection, the LIL network connection, or Ethernet connector.

Local Faceplate - Includes a 6 ft. cable assembly and can be used as hand-held, panel-mounted, or mounted in optional DIN/Wall bracket below.

DIN/Wall Bracket - For use with optional local faceplate.

NOTE:

(1) Each configured loop can contain one operator display block & one controller block.
Mounting Dimensions

Notes:
1. Dimensions are in inches (millimeters).
2. Allow 2.5 (63.5) for cable to remote mounted optional Faceplate. Allow 3.0 (76) when Faceplate is mounted to the Control Carrier.
3. G or T-section DIN Rail can be used.

All dimensions are in inches (millimeters)
All dimensions +/- 0.01 (0.3)
Controllers

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Introduction

Features & Benefits
- Universal serial bus with parallel addressing that accommodates up to 31 input/output modules per controller for application flexibility
- Rack slot keying to prevent plugging a module into an incorrect slot
- Removable termination blocks eliminate the need for costly marshalling terminals
- Front access design provides easy installation and minimizes space requirements

Description

i/o is a collection of PLC-style input/output modules that feature on-line intelligence and auto-configuration. The modular approach reduces your initial costs, because the different input/output types can be grouped together to accommodate your specific needs. It also lets you add new functionality at minimal cost, simplifying future expansion. You just select individual modules that satisfy your requirements and snap them into any of the system’s flexible mounting options. With i/o’s intelligence, modules immediately begin communicating with the controller and automatically configure themselves upon on-line insertion. This reduces the possibility of manual errors, minimizes start-up time, and even eliminates the need for process downtime to do regular system maintenance. It also allows the modules to perform scanning, as well as linearization and scaling, diagnostics, and error checking, and report this information back to the controller.

i/o’s selection of high-density mounting options, with various four-, eight-, and sixteen-point models, save space throughout the plant. Plus, they accommodate installation in a variety of environments and manufacturing areas for real application versatility.

Specifications

Discrete Input
8-channel DI, 24 Vdc sinking isolated (io-8DI24DSI)

Inputs
- Number of channels: 8
- OFF voltage: < 3.2 Vdc
- ON voltage: > 11 Vdc
- Wetting current: 5.0 mA (nom.) @ 24 Vdc
- Minimum pulse width detected: 1 ms
- Maximum switching frequency (no-filtering): 250 Hz
- Maximum voltage
  - Input: 30 Vdc
  - Reverse input: -25 Vdc

Configurable Parameters
- Pulse counting: off/on (up to 65,536 counts)

Mounting
- Control Carrier: YES
- Module Carrier: YES

Power Supplies
- Ubus (12V) current: 60 mA (typ.); 75 mA (max.)
- Bussed Field Power: not required

Mechanical
- Module Key Code: B2
- Module width: 1.65” (42 mm)
- Weight: 0.37 lbs. (170 g)

Field Terminals
- Recommended: iO-SST8-FT
- Compatible: iO-FST8-FT (fused)

8-channel DI, 24 Vdc module powered non-isolated (io-8DI24DMN)

Inputs
- Number of channels: 8
- OFF current: < 0.69 mA
- ON current: > 2.24 mA
- Wetting current: 5 mA (typ.)
- Minimum pulse width detected: 1 ms
- Maximum switching frequency (no-filtering): 250 Hz
- Isolation (any channel to Ubus): 250 Vac

Configurable Parameters
- Pulse counting: off/on (up to 65,536 counts)

Mounting
- Control Carrier: YES
- Module Carrier: YES

Power Supplies
- Ubus (12V) current: 60 mA (typ.); 75 mA (max.)
- Bussed Field Power: 40 mA, @ 18-36 Vdc

Mechanical
- Module Key Code: B1
- Module width: 1.65” (42 mm)
- Weight: 0.37 lbs. (170 g)

Field Terminals
- Recommended: iO-SST8-FT
- Compatible: iO-FST8-FT (fused)
16-channel DI, 24 Vdc sinking isolated (iO-16DI24DSI)

Inputs
Number of channels: 16
OFF voltage: < 3.2 Vdc
ON voltage: > 11 Vdc
Wetting current: 2.5 mA (nom.) @ 24 Vdc
Minimum pulse width detected: 3 ms
Maximum switching frequency (no-filtering): 100 Hz
Maximum voltage
Input: 30 Vdc
Reverse input: -25 Vdc

Configurable Parameters
Pulse counting: off/on (up to 65,536 counts)

Mounting
Control Carrier: YES
Module Carrier: YES

Power Supplies
Ubus (12V) current: 75 mA (typ.); 110 mA (max.)
Bussed Field Power: not required

Mechanical
Module Key Code: E2
Module width: 1.65" (42 mm)
Weight: 0.37 lbs. (170 g)

Field Terminals
Recommended: iO-SNI16-FT
Compatible: n/a

16-channel DI, 24 Vdc module powered non-isolated (iO-16DI24DMN)

Inputs
Number of channels: 16
OFF current: < 0.3 mA
ON current: > 1.2 mA
Wetting current: 2.5 mA (typ.)
Minimum pulse width detected: 3 ms
Maximum switching frequency (no-filtering): 100 Hz
Isolation (any channel to Ubus): 250 Vac

Configurable Parameters
Pulse counting: off/on (up to 65,536 counts)

Mounting
Control Carrier: YES
Module Carrier: YES

Power Supplies
Ubus (12V) current: 60 mA (typ.); 75 mA (max.)
Bussed Field Power: 115 Vac ±10%

Mechanical
Module Key Code: E1
Module width: 1.65" (42 mm)
Weight: 0.37 lbs. (170 g)

Field Terminals
Recommended: iO-FST8-FT (fused)
Compatible: iO-SST8-FT

8-channel DI, 115 Vac sinking isolated (iO-8DI115ASI)

Inputs
Number of channels: 8
OFF voltage: < 34 Vac
ON voltage: > 84 Vac
Wetting current: 2 mA (nom.) @ 115 Vac
Max. input voltage: 130 Vac
Frequency: 50/60 Hz

Configurable Parameters
Pulse counting: off/on (up to 65,536 counts)

Mounting
Control Carrier: YES
Module Carrier: YES

Power Supplies
Ubus (12V) current: 60 mA (typ.); 75 mA (max.)
Bussed Field Power: 80 mA, @ 24 Vdc ±10%

Mechanical
Module Key Code: E4
Module width: 1.65" (42 mm)
Weight: 0.37 lbs. (170 g)

Field Terminals
Compatible: iO-FST8-FT (fused)
Recommended: iO-SST8-FT

8-channel DI, 115 Vac module powered non-isolated (iO-8DI115AMN)

Inputs
Number of channels: 8
OFF current: < 0.56 mA
ON current: > 1.4 mA

Mounting
Control Carrier: NO
Module Carrier: YES

Configurable Parameters
Pulse counting: off/on (up to 65,536 counts)

Power Supplies
Ubus (12V) current: 60 mA (typ.); 75 mA (max.)
Bussed Field Power: 115 Vac ±10%
Frequency: 50/60 Hz

Mechanical
Module Key Code: E1
Module width: 1.65" (42 mm)
Weight: 0.37 lbs. (170 g)

Field Terminals
Recommended: iO-FST8-FT (fused)
Compatible: iO-SST8-FT
## Controllers
### i/o for 353R Series Controllers

### Technical data

<table>
<thead>
<tr>
<th>8-channel DI, 230 Vac sinking isolated (iO-8DI230ASI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Inputs</strong></td>
</tr>
<tr>
<td>Number of channels: 8</td>
</tr>
<tr>
<td>OFF voltage: &lt; 68 Vac</td>
</tr>
<tr>
<td>ON voltage: &gt; 168 Vac</td>
</tr>
<tr>
<td>Wetting current: 1 mA (nom.) @ 230 Vac</td>
</tr>
<tr>
<td>Max. input voltage: 265 Vac</td>
</tr>
<tr>
<td>Frequency: 50/60 Hz</td>
</tr>
<tr>
<td><strong>Mounting</strong></td>
</tr>
<tr>
<td>Control Carrier: YES</td>
</tr>
<tr>
<td>Module Carrier: YES</td>
</tr>
<tr>
<td><strong>Configurable Parameters</strong></td>
</tr>
<tr>
<td>Pulse counting: off/on (up to 65,536 counts)</td>
</tr>
<tr>
<td><strong>Power Supplies</strong></td>
</tr>
<tr>
<td>Ubus (12V) current: 60 mA (typ.); 75 mA (max.)</td>
</tr>
<tr>
<td>Bussed Field Power: not required</td>
</tr>
<tr>
<td><strong>Mechanical</strong></td>
</tr>
<tr>
<td>Module Key Code: E5</td>
</tr>
<tr>
<td>Module width: 1.65&quot; (42 mm)</td>
</tr>
<tr>
<td>Weight: 0.37 lbs. (170 g)</td>
</tr>
<tr>
<td><strong>Field Terminals</strong></td>
</tr>
<tr>
<td>Compatible: iO-FST8-FT (fused)</td>
</tr>
<tr>
<td>Recommended: iO-SST8-FT</td>
</tr>
</tbody>
</table>

### 8-channel DI, 230 Vac module powered non-isolated (iO-8DI230AMN)

| **Inputs**                                           |
| Number of channels: 8                               |
| OFF current: < 0.28 mA                               |
| ON current: > 0.71 mA                                |
| Wetting current: 1 mA (nom.) @ 230 Vac               |
| **Mounting**                                        |
| Control Carrier: NO                                 |
| Module Carrier: YES                                  |
| **Configurable Parameters**                         |
| Pulse counting: off/on (up to 65,536 counts)        |
| **Power Supplies**                                  |
| Ubus (12V) current: 60 mA (typ.); 75 mA (max.)       |
| Bussed Field Power: 207 to 265 Vac                   |
| Frequency: 50/60 Hz                                  |
| **Mechanical**                                      |
| Module Key Code: E2                                  |
| Module width: 1.65" (42 mm)                          |
| Weight: 0.37 lbs. (170 g)                            |
| **Field Terminals**                                 |
| Recommended: iO-FST8-FT                              |
| Compatible: iO-SST8-FT                               |

### Discrete Output

<table>
<thead>
<tr>
<th>8-channel DO, 60 Vdc external powered isolated (iO-8DO60DEI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Outputs</strong></td>
</tr>
<tr>
<td>Number of channels: 8</td>
</tr>
<tr>
<td>Output voltage range: 2-60 Vdc</td>
</tr>
<tr>
<td>ON voltage drop: 0.25 V (max.)</td>
</tr>
<tr>
<td>OFF leakage current: 1.0 mA (max.)</td>
</tr>
<tr>
<td>Switched current per channel</td>
</tr>
<tr>
<td>Continuous: 1 A</td>
</tr>
<tr>
<td>For &lt; 100 ms: 4 A</td>
</tr>
<tr>
<td>For &lt; 20 ms: 6 A</td>
</tr>
<tr>
<td><strong>Configurable Parameters</strong></td>
</tr>
<tr>
<td>Fail Safe Mode: last/set</td>
</tr>
<tr>
<td>Fail Safe Value: off/on</td>
</tr>
<tr>
<td><strong>Mounting</strong></td>
</tr>
<tr>
<td>Control Carrier: YES</td>
</tr>
<tr>
<td>Module Carrier: YES</td>
</tr>
<tr>
<td><strong>Power Supplies</strong></td>
</tr>
<tr>
<td>Ubus (12V) current: 60 mA (typ.); 75 mA (max.)</td>
</tr>
<tr>
<td>Bussed Field Power: not required</td>
</tr>
<tr>
<td><strong>Mechanical</strong></td>
</tr>
<tr>
<td>Module Key Code: B5</td>
</tr>
<tr>
<td>Module width: 1.65&quot; (42 mm)</td>
</tr>
<tr>
<td>Weight: 0.44 lbs. (200 g)</td>
</tr>
<tr>
<td><strong>Field Terminals</strong></td>
</tr>
<tr>
<td>Recommended: iO-FST8-FT</td>
</tr>
<tr>
<td>Compatible: iO-SST8-FT2</td>
</tr>
</tbody>
</table>

### 8-channel DO, 60 Vdc module powered non-isolated (iO-8DO60DMN)

| **Outputs**                                                   |
| Number of channels: 8                                         |
| Output voltage range: 2-60 Vdc                               |
| ON voltage drop: 0.25 V (max.)                               |
| OFF leakage current: 1.0 mA (max.)                           |
| Switched current per channel                                 |
| Continuous: 1 A                                              |
| For < 100 ms: 4 A                                            |
| For < 20 ms: 6 A                                             |
| **Configurable Parameters**                                  |
| Fail Safe Mode: last/set                                     |
| Fail Safe Value: off/on                                      |
| **Mounting**                                                 |
| Control Carrier: NO                                          |
| Module Carrier: YES                                          |
| **Power Supplies**                                           |
| Ubus (12V) current: 60 mA (typ.); 75 mA (max.)               |
| Bussed Field Power: 2 to 60 Vdc                             |
| **Mechanical**                                               |
| Module Key Code: B6                                          |
| Module width: 1.65" (42 mm)                                  |
| Weight: 0.44 lbs. (200 g)                                    |
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Field Terminals
Recommended: iO-FST8-FT (fused)
Compatible: iO-SST8-FT

8-channel DO, 20-265 Vac external powered isolated (iO-8DO250AEI)

Outputs
Number of channels: 8
Output voltage range: 20-265 Vac
Frequency: 50/60 Hz
ON voltage drop: < 1.2 V
OFF leakage current: < 4 mA
Switched current per channel:
  Continuous: 1 A
  For < 100 ms: 5 A
  For < 20 ms: 20 A
Minimum load current, per channel:
  @ 115 Vac, 11 mA; @ 230 Vac, 5 mA

Configurable Parameters
  Fail Safe Mode: last/set
  Fail Safe Value: off/on

Mounting
  Control Carrier: YES
  Module Carrier: YES

Power Supplies
  Ubus (12V) current: 110 mA (typ.); 125 mA (max.)
  Bussed Field Power (voltage): 20 to 265 Vac

Mechanical
  Module Key Code: F4
  Module width: 1.65” (42 mm)
  Weight: 0.49 lbs. (220 g)

Field Terminals
Recommended: iO-FST8-FT (fused)
Compatible: iO-SST8-FT

8-channel DO, 20-265 Vac module powered non-isolated (iO-8DO250AMN)

Outputs
Number of channels: 8
Output voltage range: 20-265 Vac
Frequency: 50/60 Hz
ON voltage drop: < 1.2 V
OFF leakage current: < 4 mA
Switched current per channel:
  Continuous: 1 A
  For < 100 ms: 5 A
  For < 20 ms: 20 A
Minimum load current, per channel:
  @ 115 Vac, 11 mA; @ 230 Vac, 5 mA

Configurable Parameters
  Fail Safe Mode: last/set
  Fail Safe Value: off/on

Mounting
  Control Carrier: NO
  Module Carrier: YES

Power Supplies
  Ubus (12V) current: 110 mA (typ.); 125 mA (max.)
  Bussed Field Power (voltage): 20 to 265 Vac

Mechanical
  Module Key Code: A1
  Module width: 1.65” (42 mm)
  Weight: 0.44 lbs. (200 g)

Field Terminals (2-wire Tx)
Recommended: iO-SST8-FT
Compatible: iO-FST8-FT (fused)

Field Terminals (4-wire Tx)
Recommended: iO-S4W8-FT
Compatible: n/a

Analog Input
8-channel AI, 4-20 mA with HART (iO-8AI-2H)

Inputs
Number of channels: 8, single-ended
Nominal signal range (span): 4 to 20 mA
Full signal range: 1 to 23 mA
Line fault detection
  Short circuit current: > 23.5 mA
  Open circuit current: < 0.5 mA
Output voltage (@ 20mA): 13.5 V (min.)
Output current: 32 mA (max.)
Accuracy (over temp range): ± 0.1% of span
Resolution: 16 bits
Repeatability: 0.05% of span
Operating temperature: 32 to 140°F (0 to 60°C)
For non-optimum orientation de-rate to:
  32 to 104°F (0 to 40°C)
Isolation (any channel to Ubus):
  100 Vac (between channels) none

Configurable Parameters
  Refer to Function Block parameters

Mounting
  Control Carrier: YES
  Module Carrier: YES

Power Supplies
  Ubus (12V) current:
    100 mA (typ.); 150 mA (max.)
  Bussed Field Power:
    300 mA max. @ 24 Vdc ±10%
  Quiescent current (for external powered inputs):
    60 mA

Mechanical
  Module Key Code: A1
  Module width: 1.65” (42 mm)
  Weight: 0.44 lbs. (200 g)

Field Terminals (2-wire Tx)
Recommended: iO-SST8-FT
Compatible: iO-FST8-FT (fused)

Field Terminals (4-wire Tx)
Recommended: iO-S4W8-FT
Compatible: n/a
8-channel AI, 4-20 mA (iO-8AI-2)

**Inputs**
- Number of channels: 8, single-ended
- Nominal signal range (span): 4 to 20 mA
- Full signal range: 1 to 23 mA
- Line fault detection:
  - Short circuit current: > 23.5 mA
  - Open circuit current: < 0.5 mA
- Output voltage (@ 20 mA): 13.5 V (min.)
- Output current: 32 mA (max.)
- Accuracy (over temp range): ±0.1% of span
- Resolution: 16 bits
- Repeatability: 0.05% of span
- Operating temperature: 32 to 140°F (0 to 60°C)
- For non-optimum orientation de-rate to: 32 to 104°F (0 to 40°C)
- Isolation (any channel to Ubus): 100 Vac (between channels) none

**Configurable Parameters**
- Refer to Function Block Parameters

**Mounting**
- Control Carrier: YES
- Module Carrier: YES

**Power Supplies**
- Ubus (12V) current: 100 mA (typ.); 150 mA (max.)
- Bussed Field Power: 60 mA max. @ 24 Vdc ±10%

**Mechanical**
- Module Key Code: A
- Weight: 7.1 oz (200 g)

**Field Terminals (4-wire Tx)**
- Recommended: iO-S4W8-FT
- Compatible: n/a

8-channel AI, 1-5 Vdc (iO-8AI-V)

**Inputs**
- Number of channels: 8, single-ended
- Nominal signal range (span): 1 to 5 Vdc
- Full signal range: 0.19 to 5.64 Vdc
- Out of range detection:
  - Lower Threshold: < 0.19Vdc
  - Upper Threshold: > 5.64 Vdc
- Accuracy (over temp range): ±0.1% of span
- Resolution: 16 bits
- Repeatability: 0.05% of span
- Operating temperature: 32 to 140°F (0 to 60°C)
- For non-optimum orientation de-rate to: 32 to 104°F (0 to 40°C)
- Isolation (any channel to Ubus): 100 Vac (between channels) none

**Configurable Parameters**
- Refer to function block parameters

4-channel thermocouple & mV input (iO-4TC)

**Inputs**
- Number of channels: 4
- Input type:
  - mV: mV input
- I/P signal span (autoranging): x10 gain, ±120 mV; x20 gain, ±60 mV; x50 gain, ±24 mV
- Calibration accuracy:
  - mV input:
    - ± 0.2% of span (-40 to 158°F [-40 to 70°C]);
    - ± 0.1% of span (50 to 104°F [10 to 40°C])
  - T/C input: dependent on thermocouple type
- Cold junction compensation error:
  - ± 33.8°F (1°C) (-40 to 158°F [-40 to 70°C])
- Resolution: 15 bits plus sign bit
- Common mode rejection: >80 dB @ 50/60 Hz
- Series mode rejection: >40 dB @ 50/60 Hz
- Maximum input voltage: ±4.0 V
- Common mode voltage between channels: ±4.5 V (max.)
- Isolation (any channel to Ubus): 250 Vac rms
- Open circuit bleed current: ± 0.5 µA (nom.)

**Configurable Parameters**
- Sensor type: user selectable
- Drive on open circuit fault: disabled/upscale/downscale

**Mounting**
- Control Carrier: YES
- Module Carrier: YES

**Power Supplies**
- Ubus (12V) current: 150 mA (nom.); 200 mA (max.)
- Bussed Field Power: not required

**Mechanical**
- Module Key Code: C1
- Module width: 1.65" (42 mm)
- Weight: 0.44 lbs. (200 g)

**Field Terminals**
- Recommended: iO-STC-FT (CJ compensated)
- Compatible: n/a
### 4-channel RTD & W Input (iO-4RT)

**Inputs**
- Number of channels: 4
- Input type:
  - RTDs: Pt100 to BS1904/DIN43760/IEC 75 (2, 3, or 4 wire); Ni120; Pt100 to JIS C1604: 1989
  - Resistance
- Input resistance range (span): 0 to 500 W
- Calibration accuracy:
  - ±1.0 W (-40 to 158°F [-40 to 70°C])
  - ±0.5 W (50 to 204°F [10 to 40°C])
- RTD excitation current: 200 µA (nom.)
- Resolution: 15 bits plus sign bit
- Common mode rejection: > 80 dB @ 50/60 Hz
- Series mode rejection: > 40 dB @ 50/60 Hz
- Isolation (any channel to Ubus): 250 Vac rms
- Open circuit bleed current: 0.5 µA (nom.)

**Configurable Parameters**
- Sensor type: user selection
- Drive on open circuit fault: disabled/upscale
- Input deadband (hysteresis): user defined value

**Mounting**
- Control Carrier: YES
- Module Carrier: YES

**Response Times**
- Signal change to availability on Ubus: 840 ms (max.)
- O/C sensor detection: - 10 s

**Power Supplies**
- Ubus (12V) current: 150 mA (nom.); 200 mA (max.)
- Bussed Field Power: not required

**Mechanical**
- Module Key Code: C3
- Module width: 1.65" (42 mm)
- Weight: 0.44 lbs. (200 g)

**Field Terminals**
- Recommended: iO-SRT-FT (RTD)
- Compatible: n/a

**Analog Output**

### 8-channel AO, 4-20 mA Output (iO-8AO)

**Outputs**
- Number of channels: 8, single-ended
- Nominal signal range (span): 4 to 20 mA
- Full signal output range: 1 to 23 mA
- Open loop detection threshold: 0.7 ±0.25 mA
- Output compliance: 20 mA at 21.6 Vdc supply (into 700 Ω load)
- Accuracy (over temp range): ±0.25% of span
- Resolution: 12 bits
- Operating temperature: 32 to 140°F (0 to 60°C)

**Configurable Parameters**
- Fail Safe Mode: last/set
- Fail Safe Value: 0-25 mA

**Mounting**
- Control Carrier: YES
- Module Carrier: YES

**Power Supplies**
- Ubus (12V) current: 100 mA (typ.); 150 mA (max.)
- Bussed Field Power: 300 mA (max.) @ 24 Vdc ±10%
- Quiescent current: 60 mA

**Mechanical**
- Module Key Code: A4
- Module width: 1.65" (42 mm)
- Weight: 0.44 lbs. (200 g)

**Field Terminals**
- Recommended: iO-SST8-FT
- Compatible: iO-FST8-FT (fused)

(1) Alternative fusing of the Bussed Field Power supply is recommended if it is not provided in the field terminal.
(2) Additional external fusing to protect field wiring is recommended.
(3) An internal fuse could rupture if the total instantaneous switched current exceeds the following values:
  - 10 A for < 100 ms
  - 18 A for < 20 ms
(4) Limited to 6 A per 8-channel module
(5) Stated figures are for operation with unfused field terminal. When operating with 2 A fused field terminal the maximum switched current is 5 A inrush for < 10 ms pulse width at 0.1% duty cycle and < 108 operations.
(6) Limited to 3 A per 8-channel module.

---

**For non-optimum orientation de-rate to:**
- 32 to 104°F (0 to 40°C)
- Isolation (any channel to Ubus): 100 Vac

**Configurable Parameters**
- Fail Safe Mode: last/set
- Fail Safe Value: 0-25 mA

**Mounting**
- Control Carrier: YES
- Module Carrier: YES

**Power Supplies**
- Ubus (12V) current: 100 mA (typ.); 150 mA (max.)
- Bussed Field Power: 300 mA (max.) @ 24 Vdc ±10%

**Mechanical**
- Module Key Code: A4
- Module width: 1.7" (42 mm)
- Weight: 0.44 lbs. (200 g)

**Field Terminals**
- Recommended: iO-SST8-FT (unfused)
- Compatible: iO-FST8-FT (fused)
Introduction

Features & Benefits

- The 353R PSC power pack can hold up to three power supplies, which can be tied into the base i|pac controller and used to supply additional power to I/O modules, as needed, or act as back-up power supplies for redundancy.
- Ease of assembly and scalability improves application flexibility. 353R PSC can hold from one to three additional power supplies which are easily mounted on the i|power carrier.
- A visual indicator on each power supply simplifies failure identification. In the event one of the power supplies fails, the operator is alerted at the i|station HMI terminal.

Description

353R PSC is an optional power pack accessory to the 353R controller that provides 24 Vdc, 12 Vdc, and 5 Vdc power to the 353R system as it expands. In addition to providing the power needed for additional I/O, 353R PSC also acts as a redundant power supply.

The 353R PSC carrier holds up to three power supplies, which are identical to the power supply on the base 353R unit. All the power supplies are in parallel, so that if one fails, the other power supplies pick up the load. Diagnostics alarm the operator in the event of the loss of a power supply unit while the remaining power supplies share the load. A visual indication on each of the power supplies makes it easy to identify which unit has failed, by the operational LED on the power supply.

Specifications

Dimensions and Flat Panel Mounting Pattern
See Mounting Dimensions

Weight (with 3 Power Supply Modules)
5 lbs. (2.3 kg)

120/240 Vac Power Wiring
18 AWG (0.96 mm)

Accessories

- 353R PSC carrier
- 353R PSC power supplies
Controllers

Power Supply for 353R Series Controller

Dimension drawings

Mounting Dimensions

Flat Panel Mounting Dimensions:
A - 4.1 (105)
B - 1.2 (3.5)
C - 4.6 (115.5)

Detail, Flat Panel Mounting Hole, 3 Places (Cross Section)
0.36 (9.2) 0.17 (4.4)

0.37 (9.45)

Notes:
1. Dimensions are in inches (millimeters)
2. Do not connect or disconnect a cable connector while in a hazardous environment.

Top View

Front View

End View

Power Supply Module
1. Power Supplies become extremely hot if output remains short circuited.
2. Do not plug-in or unplug in a hazardous environment.
# Controllers

## 353R Series Controllers

### Ordering data

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>353R Controller</td>
<td></td>
</tr>
<tr>
<td>• 353R Controller Module (MPU)</td>
<td>353 RCMNNNNBB4</td>
</tr>
<tr>
<td>• 353R Controller Module (MPU + LIL)</td>
<td>353 RCMNLNNB4</td>
</tr>
<tr>
<td>• 353R Controller Module (MPU + Ethernet)</td>
<td>353 RCMEENNBB4</td>
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<tr>
<td>• 353R Controller Module (MPU + RTC/CB)</td>
<td>353 RCMNNRNBB4</td>
</tr>
<tr>
<td>• 353R Controller Module (MPU + LIL + RTC/CB)</td>
<td>353 RCMNLRRNB4</td>
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<tr>
<td>• 353R Controller Module (MPU + Ethernet + RTC/CB)</td>
<td>353 RCMEERNB4</td>
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<tr>
<td>• 353R Controller Module (MPU + EXP)</td>
<td>353 RCMENNB4</td>
</tr>
<tr>
<td>• 353R Controller Module (MPU + EXP + LIL)</td>
<td>353 RCMEERNB4</td>
</tr>
<tr>
<td>• 353R Controller Module (MPU + EXP + Ethernet)</td>
<td>353 RCMEERNBB4</td>
</tr>
<tr>
<td>• 353R Controller Module (MPU + EXP + RTC/CB)</td>
<td>353 RCMENRNBB4</td>
</tr>
<tr>
<td>• 353R Controller Module (MPU + EXP + LIL + RTC/CB)</td>
<td>353 RCMEERRNB4</td>
</tr>
<tr>
<td>• 353R Controller Module (MPU + EXP + Ethernet + RTC/CB)</td>
<td>353 RCMEERNB4</td>
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<td>353R Power Supply</td>
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<tr>
<td>• 353R-Power Supply Universal AC</td>
<td>353 RPUSAB4</td>
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<td>353R Controller Carrier</td>
<td>353 RCCB4</td>
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<td>• 353R Controller Carrier</td>
<td>353 RCCB4</td>
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<td>353R Power Supply Carrier</td>
<td>353 RPSBCB4</td>
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<td>353R Local Faceplate</td>
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<tr>
<td>• 353R Local Faceplate (handheld &amp; panel mount)</td>
<td>353 RFHDB4</td>
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<tr>
<td>• 353R Local Faceplate (wall/DIN rail mount)</td>
<td>353 FWMB4</td>
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## Controllers

### 353R Series Controllers

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<td>I/O Modules</td>
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<td>• 8-channel DI, 24 Vdc sinking isolated [8109-DI-DC]</td>
<td>8 DI 24 DS</td>
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<tr>
<td>• 8-channel DI, 24 Vdc module powered non-isolated [8110-DI-DC]</td>
<td>8 DI 24 DMN</td>
</tr>
<tr>
<td>• 16-channel DI, 24 Vdc sinking isolated [8121-DI-DC]</td>
<td>16 DI 24 DS</td>
</tr>
<tr>
<td>• 16-channel DI, 24 Vdc module powered non-isolated [8122-DI-DC]</td>
<td>16 DI 24 DMN</td>
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<tr>
<td>• 8-channel DI, 115Vac sinking isolated [8111-DI-AC]</td>
<td>8 DI 115 AS</td>
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<tr>
<td>• 8-channel DI, 115Vac module powered non-isolated [8112-DI-AC]</td>
<td>8 DI 115 AMN</td>
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<tr>
<td>• 8-channel DI, 230Vac sinking isolated [8113-DI-AC]</td>
<td>8 DI 230 AS</td>
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<tr>
<td>• 8-channel DI, 230Vac module powered non-isolated [8114-DI-AC]</td>
<td>8 DI 230 AMN</td>
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<tr>
<td>• 8-channel DO, 2-60Vdc external power isolated [8117-DO-DC]</td>
<td>8 DI 250 DE</td>
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<tr>
<td>• 8-channel DO, 2-60Vdc module powered non-isolated [8116-DO-AC]</td>
<td>8 DI 250 AMN</td>
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<tr>
<td>• 8-channel DI, 4-20mA, 2-wire xmtr HART [8101-HI-TX]</td>
<td>8 A1 2 H</td>
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<tr>
<td>• 8-channel DI, 4-20mA, 2-wire xmtr [8103-AI-TX]</td>
<td>8 A1 V</td>
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<td>• 8-channel AI, 1-5Vdc [8119-VI-05]</td>
<td>8 AO</td>
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<tr>
<td>• 8-channel AO, 4-20mA [8104-AO-IP]</td>
<td>8 AO H</td>
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<tr>
<td>• 8-channel AO, 4-20mA, HART [8102-HO-IP]</td>
<td>4 TC</td>
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<td>• 4-channel T/C,mV input [8105-TI-TC]</td>
<td>4 RT</td>
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<tr>
<td>• 4-channel RTD input [8106-TI-RT]</td>
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<td>• Thermocouple [8605-FT-TC]</td>
<td>STC FT</td>
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<td>• RTD [8606-FT-RT]</td>
<td>SRT FT</td>
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<tr>
<td>• Standard, unfused (Div 2) 8-channel [8602-FT-ST]</td>
<td>SST 8 FT</td>
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<tr>
<td>• Standard, fused (Div 2) 8-channel [8604-FT-FU]</td>
<td>FST 8 FT</td>
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<tr>
<td>• Standard, nonincendive (Div 2) 8-channel [8601-FT-NI]</td>
<td>SN1 8 FT</td>
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<tr>
<td>• Fused, non-incendive (Div 2) 8-channel [8603-FT-FU]</td>
<td>FNI 8 FT</td>
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<tr>
<td>• Standard, non-arcing (Div 2) 8-channel [8610-FT-NA]</td>
<td>SNA 8 FT</td>
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<tr>
<td>• Fused, non-arcing (Div 2) 8-channel [8611-FT-FU]</td>
<td>FNA 8 FT</td>
</tr>
<tr>
<td>• Standard, non-incindive (Div 2) 16-channel [8617-FT-NI]</td>
<td>SN1 16 FT</td>
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<tr>
<td>• Standard, 4-wire (Div 2) 8-channel [8615-FT-4W]</td>
<td>S4W8 FT</td>
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<tr>
<td>Module Carriers</td>
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<tr>
<td>• 8-module I/O carrier (8707-CA-08)</td>
<td>8 MC</td>
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<tr>
<td>• 4-module I/O carrier (8710-CA-04)</td>
<td>4 MC</td>
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<tr>
<td>Interconnects</td>
<td></td>
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<tr>
<td>• Carrier extender, right hand (8020-CE-RH)</td>
<td>RCE</td>
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<tr>
<td>• Carrier extender, left hand (8021-CE-LH)</td>
<td>LCE</td>
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<tr>
<td>Interconnect Cables</td>
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<tr>
<td>• Carrier extension cable, 0.85 m (33.46 in) [8002-CC-85]</td>
<td>CEC 085</td>
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<tr>
<td>• Carrier extension cable, 1.20m (47.24 in) [8003-CC-12]</td>
<td>CEC 120</td>
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<tr>
<td>Accessories</td>
<td></td>
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<tr>
<td>• Module blanking kit (pack of 1) [8420-BK-MO]</td>
<td>MBK</td>
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<tr>
<td>• Tag strip kit (pack of 10) [8430-TS-MO]</td>
<td>TSK</td>
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<tr>
<td>• Replacement fuses kit, 2A, (pack of 10) [8401-FU-2A]</td>
<td>RFC</td>
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<tr>
<td>• Acopian 24 Vdc 2 amp Power Supply</td>
<td>15124 1</td>
</tr>
<tr>
<td>• Acopian 12 Vdc 3 amp Power Supply</td>
<td>15124 3</td>
</tr>
<tr>
<td>• Acopian DIN Mounting Clips</td>
<td>15124 4</td>
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<tr>
<td>• Entrelec RS232/RS485 Converter Module</td>
<td>16139 226</td>
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