EcoStruxure™

Foxboro™ SCADA

SCD6000 Input-Output Modules

PSS 41H-8K1

Product Specification

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Schneider Electric™

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Overview

The Foxboro™ SCADA Input/Output Modules provide connection of wide range of field equipment and devices to the SCD5200/SCD6000 Station Computing Devices for monitoring and control of industrial plant.

The range of I/O modules comprises:

- Multi I/O Module
- Analog Digital Input (ADI) Module
- Channel Analog Input Module
- Channel Analog Output Module
- Digital Output Module

Field Interrogation Power Supply (FIPS) options for digital inputs include nominal 24 V to 129 V, selectable via jumper settings.

A 1 kV isolation option is available for the analog inputs on the Analog Digital Input (ADI) Module and 20 Channel Analog Input Module.

Latched and non-latched relay options are available on Digital Outputs.

Key features of the range include:

- Opto-isolated digital inputs
- Relay-isolated digital outputs
- High isolation optional on analog inputs
- Analog outputs individually isolated
- High security “check-before-operate” control outputs
- Sequence of Events resolution of 1 ms
- High resolution analog inputs (12 bit plus sign) and analog outputs (12 bit)
- Digital inputs provide Status, Momentary Change Detect, Accumulator, and Sequence of Events
- Software configurable:
  - Digital outputs as individual variable pulse or latched, trip/close or raise/lower pairs, multiple relay variable pulsed or latched
  - Analog output range and offset, open loop detection
- High transient and surge immunity
- EMC emission and immunity to CE standards for industrial equipment
- Analog current loop resistors integral to terminal boards
- Enclosed insulated terminal assemblies for safety
- Removable terminal assemblies allow card replacement without disconnecting field wiring
- Run/fail status front panel indicator and database health point
- High density for compact connection of large I/O count
- Range of I/O combinations provides connection flexibility at minimum cost

Through flexible I/O configurations and options, the range of I/O Modules is matched to a wide range of applications.

The combination of a ten I/O module capacity file, integrated local network capability, and high I/O density modules can accommodate large to very large I/O counts while providing excellent value for money.

The one I/O card file and five I/O card file options (For more information, see *Remote Terminal Unit (RTU) Station Computing Device (SCD) SCD5200 Architectural*

Overview (PSS 41H-8G1)) aim to meet the needs of small I/O and space limited applications.

The Multi I/O Module provides the highest I/O density of combined digital input, analog input, and digital output (24 DI, 6 AI, and 6 or 8 DO). The ADI Module (32 DI and 4 AI) provides for high density input-only configurations.

Where greater flexibility of configuration, connection, and/or isolation is required, the Analog Input Modules, Analog Output and Digital Output Modules may be combined with the high density Multi I/O and ADI Module types.

As the modular design of the SCD5200/SCD6000 allows any mix of I/O modules, a wide range of number and type of I/O connections may be economically accommodated.

The I/O module range is designed and tested for application in the most demanding industrial environments. Compliance standards include European Community (CE) Electro-Magnetic Compliance (EMC) immunity and emissions, transient and surge immunity, isolation, and electrical safety. CE Mark certification and CE compliant installation guidelines are available.

Software complements the I/O module hardware. Momentary Change Detect, Sequence of Events, and Accumulator functionality is provided for digital inputs. Digital outputs are highly secure, incorporate “check before operate” execution, and may be configured as variable pulse, latch, trip/close pairs, or multiple relay groups (set point).

Analog/Digital Input Modules

The Analog/Digital Input Module provides flexible data collection and input monitoring facilities through 32 individually configured digital inputs and four high-resolution analog inputs.

The Analog/Digital Input Module has 1 kV isolation on the analog inputs.

The module supports digital inputs over the nominal ranges of 24 V to 48 V and 48 V to 129 V. A jumper for each digital input can be individually set to select either of these ranges. The factory default setting is for 48 V to 129 V operation.

⚠⚠WARNING

RISK OF EQUIPMENT DAMAGE

In this module, the jumpers J3 to J34 must be removed when using digital input voltages in the range 60–129 V (dc) or 72–144 V RMS (ac). Failure to do so may result in permanent damage to the module and possible electric hazard.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Features

- Removable plug-connected terminal board
- Plug in current loop resistors
- Software configurable digital inputs
- Optical isolation on digital inputs
- Galvanic isolation on analog inputs
- Common voltage inputs (+VE or –VE) that are selectable in groups of eight digital inputs
- Digital input bounce elimination circuitry
- Individually configurable chatter filters
- RUN/FAIL LED indicator

NOTE:

The Analog/Digital Input Module is available in two variants to support two different sizes of wires in terminal assembly. The size of the wire is based on insulation requirements, that is, thicker wires are required to support higher insulation requirements.

SY-0399160 accommodates wire sizes of 0.5 sq.mm and SY-0399222 accommodates wire sizes of 1sq.mm.

The thickest wire size supported for a fully populated IO count [45 wires] is 0.75 sq.mm for the SY-0399160 and 1.0 sq.mm for the SY-039922. In all other respects, SY-0399222 is identical to SY-0399160.

Digital Inputs

The digital input subsystem processes 32 contact inputs. The module optically isolates, filters, and protects against surge transients. It interfaces the contact state to the on-board microprocessor.

Digital input circuits employ contact bounce elimination circuitry, which rejects noisy contact transitions until the input signal has been stable for 2 ms.

The digital inputs are grouped into four groups of eight, with a common terminal for each group. Each group accepts common positive or common negative.

Digital inputs status is provided by scanning every millisecond. Sequence of Events with one millisecond resolution time-tagging is available.

In addition, each of the digital inputs supports accumulator and Momentary Change Detection functionality.

Analog Inputs

The analog input subsystem consists of individually isolated amplifiers and analog-to-digital converters for each input. Each input is measured and converted to a 12-bit plus sign value and has automatic zero drift correction and calibration scale checking. The conversion provides a nominal range of values from -4000 to +4000 for inputs from -2V to +2V with overrange capability to ±2.0475 Volts. The plug-in current loop termination resistor value for each input is selected so as to provide a 2 Volt signal for the nominal full-scale current loop range.

12 Channel Digital Output Modules

These versions of output modules are available:

- 12 Pilot Relay Output Module
- 12 Magnetically Latched Relay Output Module

The 12 Channel Digital Output Modules offer several configuration possibilities. Relay outputs can be configured as individual relays, pairs, or multiples in set point combinations. Two-pass operation with built-in hardware checking ensures reliable control over equipment.

Features

- 12 independent relays
- Magnetically latched relays are optional
- RUN/FAIL LED indicator
- Module operating condition available as the RTU database point
- Configurable output types (latch, variable pulse, trip/close pairs, raise/lower pairs, and multiple relays)
- High security control output logic with two pass ‘check before operate’
- Built-in hardware and software monitoring of control operations
- Removable plug-connected termination assembly
- Control output duration is individually configurable

Module Description

The digital output subsystem provides security and control for twelve electrical or magnetically latched relays. The 12 Channel Digital Output Modules consist of an on-board microprocessor and security circuits mounted on a logic board with a plug-in relay and terminal assembly. Configuration data from the main processor (COPE) determines the control of each output relay by the on-board processor.

Digital Output Subsystem

The 12 Channel Digital Output Module contains source and sink drivers for 12 relays. Each relay may be driven as fixed length pulse outputs, variable length pulse outputs, or latched outputs.

Two-Pass Operation

During pass 1, the on-board microprocessor accepts command data from the main processor (COPE). The validity of the command is confirmed and then the hardware is checked on the output driver circuits. If tests succeed, feedback of the command is sent to the main processor.

During pass 2, the main processor (COPE) sends the execute command and the control relays are operated. Pulse output controls are automatically timed and independently checked.

8 Channel Digital Output Module

The 8 Channel Digital Output 10A Module provides high current AC and DC control outputs at voltages up to 129V dc and 110 Vac. High switching capacity relays are used to provide long contact life while controlling inductive loads up to 129 V dc nominal.

Features

- Eight independent single pole normally open digital outputs
- Two power relays in series provide high current DC inductive load break capacity
- Configurable output types (latch, variable pulse, trip/close pairs, raise/lower pairs, and multiple relays setpoint)
- High security control output logic with two pass ‘check before operate’ and one-of-N check on paired outputs
- Built-in hardware and software monitoring of control operations
- Removable plug-connected termination assembly
- Control output duration is individually configurable
- Screw terminals for loop connection of up to 16 gauge cable
- RUN/FAIL LED indicator
- Module operating condition available as database point

Module Description

The digital output subsystem provides security and control for electrical or magnetically latched relays. The Digital Output Modules consist of an on-board microprocessor and security circuits mounted on a logic board. Configuration data from the main processor (COPE) determines the control of each output relay by the on-board processor.

For the 10A relay modules, the relays are mounted on the logic board. The plug-in terminal assembly carries screw terminals for loop termination of heavy gauge wire.

Multi Input/Output Module

The Multi I/O Module provides a cost effective solution for applications utilizing a combination of status inputs, analog inputs and control outputs.

The Multi I/O Module combines the technology of the Analog Digital Input Module and the 12 Digital Output Module within one module:

- 24 Digital Inputs
- 6 Analog Inputs
- 8 mini pilot relay or 6 paired pilot relay outputs

Variants of the Multi I/O Module are:

- 129 V 8 Mini Pilot Relay
- 48 V 8 Mini Pilot Relay
- 24 V 8 Mini Pilot Relay
- 129 V 6 Paired Pilot Relay
- 48 V 6 Paired Pilot Relay
- 24 V 6 Paired Pilot Relay

Features

- Removable plug-connected termination assembly
- RUN/FAIL LED indicator
- Module operating conditions available as database points

Digital Inputs:

- 24 software configurable digital inputs
- Individually configurable chatter filters
- Digital input bounce elimination circuitry
- Optical isolation on digital inputs
- Digital input common may be positive or negative

Analog Inputs:

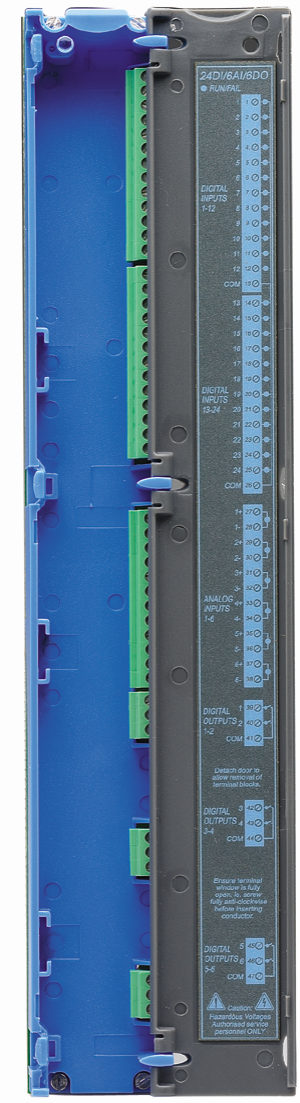
- 6 analog inputs
- Plug-in current loop resistors
- 12 bits plus sign analog-to-digital converter
- ±2 V range
- Continuous automatic input calibration/check

Control Outputs:

- 8 mini pilot relays or 6 paired pilot relays
- Configurable output types (latch, variable pulse, trip/close pairs, raise/lower pairs, and multiple relays)
- Built-in hardware and software monitoring of control operations
- High security control output logic with two pass ‘check before operate’

Control output duration is individually configurable.

Figure 1 - Multi I/O Module



Digital Inputs

This subsystem optically isolates, filters, protects against surge transients, and processes 24 status inputs. Digital input circuits rejects contact noise by use of contact debounce circuitry. Processing by the on-board microprocessor allows identification of chattering contacts.

The digital inputs share a pair of common terminals, which may be connected to positive or negative supply.

Digital inputs status is provided by scanning every millisecond. Sequence of Events with one millisecond resolution time-tagging is available.

In addition, each of the digital inputs supports accumulator and Momentary Change Detection functionality.

Analog Inputs

The analog input circuitry within the Multi I/O Module performs the data sampling and processing for the analog input points. This subsystem provides protection against surge transients, high frequency noise, and mains frequency noise. A multiplexed analog-to-digital converter provides high resolution and high-speed update of analog values.

These values are stored in shared memory for access by the main processor (COPE) via the Electrobus interface. Automatic zero drift correction is provided by the on-board microprocessor. Zero and full-scale voltage references are available as internal database points accessible by the SCADA Master Station.

Digital Outputs

The digital output subsystem of the Multi I/O Module provides secure control for the digital outputs. Eight mini pilot or six paired pilot relay options are available.

Outputs may be driven as fixed or variable length pulse, or may be electrically latched. Independent source and sink drivers control each output relay.

Two-Pass Operation

During pass 1, the on-board microprocessor accepts command data from the main processor (COPE). The validity of the command is confirmed and then the hardware is checked on the output driver circuits. If tests succeed, feedback of the command is sent to the main processor.

During pass 2, the main processor (COPE) sends the execute command and the control relays are operated. Pulse output controls are automatically timed and independently checked.

20 Channel Analog Input Module

The Analog Input Module provides a cost effective method for gathering a large volume of analog information from the field. The 20 Channel Analog Input Module provides accurate 12 bit plus sign resolution over wide temperature ranges. A 1 kV isolation option provides individually isolated channels.

In the non-isolated module, calibration values of zero and full scale voltage reference are available as database points while the isolated module utilizes a self-calibrating analog-to-digital converter.

Features

- 20 analog inputs
- 12 bits plus sign analog-to-digital converter
- ±2 V ranges
- RUN/FAIL LED indicator
- Plug-in current loop resistors
- Removable plug-connected termination assembly

4 Channel Analog Output Module

The 4 Channel Analog Output Module provides four isolated current outputs. Outputs of 4 to 20, 0 to 10 and 0 to 16 mA are independently configurable.

Two-pass operation with built-in hardware checking ensures that reliable control of equipment is maintained. Each analog output can be scaled independently for the selected output current range as part of the RTU database configuration.

Features

- Four channel analog output
- 12-bit resolution
- 4 to 20, 0 to 10, and 0 to 16 mA ranges
- Optical isolation of output circuits
- Internal monitoring of external voltage fail and open circuit alarms
- Removable plug-connected termination assembly

Optical Isolation

The digital-to-analog converters are serially linked to the rest of the module via optical isolators. Power is supplied from an external source, which results in an electrically isolated interface to the external devices.

This design also sustains outputs, even in the event of RTU or module failure, providing external loop power is maintained.

Internal Monitoring

Each channel has two internal alarm points associated with it. If the external voltage source fails, or the current loop is open circuit to the output, the on-board processor is notified via optically isolated digital inputs. These inputs are then passed to the main processor (COPE) module, to be made available for scanning if required by the SCADA Master Station.

An operator can be notified if an analog device has been disconnected from the RTU, or if the external voltage source has failed, enabling problems in the field to be identified remotely.

Functional Specifications

Table 1 - Multi I/O Module

24 Status Input, 6 Analog Input, 8 mini-pilot or 6 paired pilot relay (24 V, 48 V, or 129 V)	
Number of Channels	• 24 Status inputs • 6 Analog field inputs • 2 Internal check analog inputs • 8 Mini-pilot relay controls or 6 paired pilot relay controls
Analog Inputs	• Input Circuit: ◦ 6 differential inputs • Analog-to-Digital Converter Type: ◦ Sigma-Delta • Resolution: ◦ 12 bits plus sign • Input Update Rate (Data Age): ◦ <600 ms • Input Signal Range: ◦ ±2 V dc • Input Signal Scaling: ◦ Dropping resistor for current inputs • Full Scale Range: ◦ ±4000 counts (over range ±4095 counts) • Maximum Error at 25°C and 0 V Common Model: ◦ ±0.1% full scale • Common Mode Error: ◦ 0.01% per Volt to a maximum of ±6 V • Temperature Error: ◦ 0.0016% per °C to over full temperature range • Maximum Error Over Temperature and Common Mode Range: ◦ ±0.25% full scale • Differential Mode Rejection: ◦ 80 dB at 6 V peak, dc to 50/60 Hz balance input • Differential Mode Voltage Without Damage: ◦ ±50 V dc or peak ac • Common Mode Reject: ◦ 60 dB minimum at 50/60 Hz • Maximum Common Mode Voltage: ◦ Operating within spec ±6 V ◦ Without damage ±50 dc or peak ac • Transient Protection: ◦ IEEE C37.90-1 ◦ IEC 60255 Class 3: – Impulse Voltage Withstand: ◊ Common mode 5 kV (input to ground) ◊ Differential mode 5 kV (across input) – High Frequency Disturbance: ◊ Common mode 2.5 kV (input to ground) ◊ Differential mode 1 kV (across input) – Fast Transient (IEC 61000-4-4): ◊ 4 kV 5 kHz capacitively coupled ◦ Reference Voltages: – Zero volts and full scale positive (+1 V)

Table 1 - Multi I/O Module (Continued)

Digital Inputs	• Input Circuits: ◦ 24 per input module • Input Types: ◦ Any input can be used as: Status, Momentary Change Detect, Sequence of Events, Accumulator • Circuit Types: ◦ Common return for all 24 inputs, positive or negative • Input Voltage: ◦ 24 V, 48 V or 129 V dc from field supply • Input Current: ◦ 5 mA per input (nominal) • Transient Protection: ◦ IEEE C37.90.1 ◦ IEC 60255 Class 3: – Impulse Voltage Withstand – Common mode 5 kV (input to frame) – Differential mode 5 kV (input to common) – High Frequency Disturbance – Common mode 2.5 kV (input to frame) – Differential mode 1 kV (input to common) – Fast Transient (IEC 61000-4-4) – 4 kV 5 kHz capacitively coupled – 2 kV 5 kHz direct injection
Control Outputs	• Output Types: ◦ Outputs can be configured as: Pulse, Trip/Close pairs, Raise/Lower pairs, single Variable Pulse, Latched, or Set-point • Security: One or more than one relay energized test check before execution of control

Table 2 - Multi I/O Mini-Pilot Relay Termination Assembly

24 V dc, 48 V dc, or 129 V dc with 2 kV ac RMS isolation to chassis for status inputs. Printed circuit assembly 261.8 mm x 35 mm attached to frame by captive screws. Terminals sized for 1.5 mm^2 wire	
Analog Inputs	• 2 Terminals per point • Loop drop resistor mounted on rear side of terminal assembly • Suppression device to ground from each input terminal
Digital Inputs	• 24 status inputs • 1 terminal per point • 2 shared common terminals • Suppression device across each input to the common
Monitors/Indicators	Green/Red RUN/FAIL LED
Number of Relays	Eight
Relay Coil Current	18 mA
Contact Arrangement	8 single pole contacts and 1 common
Contact Rating	• 0.5 A 125 V ac cos f = 0.4 (30,000 operations) • D.C. make capacity • 0.5 A 129 V dc (30,000 operations) • D.C. break capacity • 0.25 A 50 V dc L/R 40 ms (30,000 operations) • 50 mA 129 V dc L/R 40 ms (30,000 operations)

Table 2 - Multi I/O Mini-Pilot Relay Termination Assembly (Continued)

Isolation	• 2 kV RMS for 1 minute output to frame • 1 kV RMS for 1 minute across open contact
Transient Protection	• IEEE C37.90.1 • IEC 60255 Class 2: ◦ Impulse Voltage Withstand: – Common mode 2.5 kV (output to frame) – Across output contact 1 kV ◦ High Frequency Disturbance: – Common mode 1 kV (output to frame) ◦ Fast Transient (IEC 61000-4-4): – 4 kV 5 kHz capacitively coupled – 2 kV 5 kHz direct injection

Table 3 - Multi I/O Paired-Pilot Relay Termination Assembly

24 V dc, 48 V dc, or 129 V dc with 2 kV ac RMS isolation to chassis for status inputs. Printed circuit assembly 261.8 mm x 35 mm attached to frame by screws. Terminals sized for 1.5 mm^2 wire	
Analog Inputs	• 2 Terminals per point • Loop drop resistor and voltage divider terminals mounted on rear side of terminal assembly • Suppression device across each input to the common
Digital Inputs	• 24 status inputs • 1 terminal per point • 2 common terminal • Suppression device across each input to its common
Monitors/Indicators	Green/Red RUN/FAIL LED
Number of Relays	Six in 3 pairs
Relay Coil Current	18 mA
Contact Arrangement	Contacts arranged as pairs of single pole contacts sharing a common
Contact Rating	• 5 A 250 V ac cos f = 0.4 (30,000 operations) • D.C. make capacity • 5 A 129 V dc (30,000 operations) • D.C. break capacity • 0.5 A 50 V dc L/R 40 ms (30,000 operations) • 200 mA 129 V dc L/R 40 ms (30,000 operations)
Isolation	• 2 kV RMS for 1 minute output to frame • 1 kV RMS for 1 minute across open contact
Transient Protection	• IEEE C37.90.1 • IEC 60255 Class 3: ◦ Impulse Voltage Withstand: – Common mode 5 kV (output to frame) – Across output contact 1 kV ◦ High Frequency Disturbance: – Common mode 2.5 kV (output to frame) ◦ Fast Transient (IEC 61000-4-4): – 4 kV 5 kHz capacitively coupled – 2 kV 5 kHz direct injection

Table 4 - 20 Channel Analog Input Module (1 kV Isolated)

Number of Channels	• 20 Analog field inputs • 2 Internal check analog inputs
Analog Inputs	• Input Circuit: ◦ 20 separately isolated analog inputs • Analog-to-digital Converter Type: ◦ Sigma Delta • Resolution: ◦ 12 bits plus sign • Input Update Rate (Data Age): ◦ <600 ms includes calibration cycle • Input Signal Range: ◦ ±2 V dc • Input Signal Scaling: ◦ Current loop resistor • Full Scale Range: ◦ ±4000 counts (over range ±4095 counts) • Maximum Error at 25°C: ◦ ±0.1% full scale • Common Mode Error: ◦ 0.0001% per Volt to a maximum of 1000 V ac (120 dB) • Temperature Error: ◦ 0.002% per °C • Maximum Error Over Temperature and Common Mode Range: ◦ ±0.25% full scale • Differential Mode Rejection: ◦ 60 dB minimum at 60 Hz • Differential Mode Voltage Without Damage: ◦ ±24 V dc or peak ac • Common Mode Rejection: ◦ 120 dB at 1000 V ac, dc to 60 Hz balanced input • Maximum Common Mode Voltage: ◦ Operating within spec 1000 V ac RMS • Transient Protection: ◦ IEEE C37.90.1 ◦ IEC 60255 Class 3: – Impulse Voltage Withstand: ◊ Common mode 2 kV (input to ground) ◊ Differential mode 0.5 kV (across input) – High Frequency Disturbance: ◊ Common mode 1 kV (input to ground) – Fast Transient (IEC 61000-4-4): ◊ 4 kV 5 kHz capacitively coupled – Reference Voltages: ◊ Auto calibration on individual channels does not require external check voltages

Table 5 - 20 Channel Analog Terminal Assembly

Printed Circuit Board	261.8 mm x 35 mm attached to frame by screws. Terminals sized for 1.5 mm^2 wire
Terminals	• 2 Terminals per point • 1 chassis terminal per four input channels • Loop drop resistor mounted on rear side of terminal board
Monitors/Indicators	Green/Red RUN/FAIL LED

Table 6 - 4 Analog/32 Digital Input Module (1 kV Isolated)

Number of Channels	• 4 Analog field inputs • 32 Status inputs
Analog Inputs	• Input Circuit: ◦ 4 differential inputs per input module • Analog-to-Digital Converter Type: ◦ Sigma Delta • Analog-to-Digital Conversion Time: ◦ 20ms • Resolution: ◦ 12 bits plus sign • Input Update Rate (Data Age): ◦ 20 ms • Input Signal Range: ◦ ±2 V dc • Input Signal Scaling: ◦ Dropping resistor for current inputs or voltage • Full Scale Range: ◦ ±4000 counts (over range ±4095 counts) • Maximum Error at 25°C and 0 V Common Mode: ◦ ±0.1% full scale • Common Mode Error: ◦ 0.0001% per Volt to a maximum of 1000 V ac (120 dB) • Temperature Error: ◦ 0.002% per °C over temperature range • Maximum Error Over Temperature and Common Mode Range: ◦ ±0.25% full scale • Differential Mode Rejection: ◦ 60 dB minimum at 50/60 Hz • Differential Mode Voltage Without Damage: ◦ ±24 V dc or peak ac • Common Mode Rejection: ◦ 120 dB at 1000 Vac, dc to 60 Hz balanced input • Maximum Common Mode Voltage: ◦ Operating within spec 1000 V ac • Reference Voltages: ◦ Auto Calibration on individual channels does not require external check voltages • Transient Protection: ◦ IEEE C37.90.1 ◦ IEC 60255 Class 2: ◦ Impulse Voltage Withstand: – Common mode 2 kV (input to ground) – Differential mode 1 kV (across input) ◦ High Frequency Disturbance: – Common mode 1 kV (input to ground) – Differential mode 0.5 kV (across input) ◦ Fast Transient (IEC 61000-4-4): – 4 kV 5 kHz capacitively coupled
Digital Inputs	• Input Circuits: ◦ 32 per input module in 4 groups of 8 inputs • Input Types: ◦ Any input can be used as: Status, Momentary Change Detect, Sequence of Events, Accumulator (1 or 2 inputs per accumulator) • Circuit Types:

Table 6 - 4 Analog/32 Digital Input Module (1 kV Isolated) (Continued)

	◦ Common return per group of 8 inputs ◦ Common positive or common negative • Input Voltage: ◦ 24 V to 129 V, selected individually per input by jumper setting; factory default range is 48-129 V; field configurable to 24-48 V • Input Current: ◦ 5 mA per input (nominal) • Isolation Type: ◦ Opto-coupler • Insulation: ◦ 2 kV RMS for 1 minute input to frame (ground) • Transient Protection: ◦ IEEE C37.90.1 ◦ IEC 60255 Class 3: ◦ Impulse Voltage Withstand: Common mode 5 kV (input to frame) ◦ Differential mode 5 kV (input to common) ◦ High Frequency Disturbance: Common mode 2.5 kV (input to ground) ◦ Differential mode 1 kV (input to common) ◦ Fast Transient (IEC 61000-4-4): 4 kV 5 kHz capacitively coupled ◦ 2 kV 5 kHz direct injection

Table 7 - 12 Channel Digital Output Modules

Pilot or Magnetically Latched Relay	
Number of Channels	Twelve
Output Types	Outputs can be configured as: Level, Pulse, Trip/Close (in pairs), Raise/Lower (in pairs), Latching
Security	One or more than one relay energized test

Table 8 - Pilot Relay Output Module

Number of Relays	Twelve
Relay Coil Current	27 mA
Contact Arrangement	Two-pole N/O relays with contacts connected in series to boost dc rating (output is single pole)
Contact Rating	• 5 A 250 V ac cos f = 0.4 (30,000 operations) • D.C. make capacity • 5 A 129 V dc (30,000 operations) • D.C. break capacity • 1 A 50 V dc L/R 40 ms (30,000 operations) • 200 mA 129 V dc L/R 40 ms (30,000 operations)

Table 8 - Pilot Relay Output Module (Continued)

Isolation	• 2 kV RMS for 1 minute output to frame • 1 kV RMS for 1 minute across open contact • 2 kV RMS for 1 minute between outputs
Transient Protection	• IEEE C37.90.1 • IEC 60255 Class 3: ◦ Impulse Voltage Withstand: – Common mode 5 kV (output to frame) – Across output contact 2.5 kV ◦ High Frequency Disturbance: – Common mode 2.5 kV (output to frame) – Between outputs 2.5 kV ◦ Fast Transient (IEC 61000-4-4): – 4 kV 5 kHz capacitively coupled – 2 kV 5 kHz direct injection

Table 9 - Magnetically Latched Relay Output Module

Number of Relays	Twelve
Relay Type	Latching
Relay Coil Current	27 mA while latching
Contact Arrangement	Two-pole N/O relays with contacts connected in series to boost dc rating (output is single pole)
Contact Rating	• 5 A 250 V ac cos f = 0.4 (30,000 operations) • D.C. make capacity • 5 A 129 V dc (30,000 operations) • D.C. break capacity • 1 A 50 V dc L/R 40 ms (30,000 operations) • 200 mA 129 V dc L/R 40 ms (30,000 operations)
Isolation	• 2 kV RMS for 1 minute output to frame • 1 kV RMS for 1 minute across open contact • 2 kV RMS for 1 minute between outputs
Transient Protection	• IEEE C37.90.1 • IEC 60255 Class 3: ◦ Impulse Voltage Withstand: – Common mode 5 kV (output to frame) – Across open contact 2.5 kV ◦ High Frequency Disturbance: – Common mode 2.5 kV (output to frame) – Between outputs 2.5 kV ◦ Fast Transient (IEC 61000-4-4): – 4 kV 5 kHz capacitively coupled – 2 kV 5 kHz direct injection

Table 10 - Control Output Termination Assembly

Printed circuit board 261.8 mm x 35 mm attached to frame by screws	
Terminals	Two terminals per relay. Terminals sized for 1.5 mm^2 wire
Monitors/Indicators	Green/Red RUN/FAIL LED

Table 11 - 8 Channel Digital Output 10A Module

Heavy Duty non-latched Relay	
Number of Channels	Eight
Output Types	Outputs can be configured as: Level, Pulse, Trip/Close (in pairs), Raise/Lower (in pairs), Latching
Security	One or more than one relay energized test
Number of Relays	Sixteen single pole N/O relays with contacts connected in series to boost dc rating
Relay Coil Current	75 mA for two coils associated with each output
Contact Arrangement	Output is single pole normally open
Contact Rating	• 10 A 130 V ac cos f = 0.4 (30,000 operations) • 10 A 150 V dc resistive (30,000 operations) • 5 A 150 V dc L/R 40 ms (30,000 operations)
Isolation	• 2 kV rms for 1 minute output to frame • 1 kV rms for 1 minute across open contact • 2 kV rms for 1 minute between outputs
Transient Protection	• IEEE C37.90.1 • IEC 60255 Class 3: ◦ Impulse Voltage Withstand: – Common mode 5 kV (output to frame) – Between outputs 5 KV ◦ High Frequency Disturbance: – Common mode 2.5 kV (output to frame) – Between outputs 2.5 kV ◦ Fast Transient (IEC 61000-4-4): – 4 kV 5 kHz capacitively coupled – 2 kV 5 kHz direct injection
Control Output Termination Assembly	Printed circuit board 261.8 mm x 35 mm attached to frame by screws
Terminals	Two terminals per relay. Plastic encased wire loop screw terminals sized for 2.5 mm^2(16 AWG) wire
Monitors/Indicators	Green/Red RUN/FAIL LED

Table 12 - 4 Channel Analog Output Module

Channels	Four
Outputs	Each output is configurable:

Range	Counts	Output Steps
4 to 20 mA	0 to 4000	4000
4 to 20 mA	800 to 4000	3200
0 to 10 mA	0 to 4000	2560
0 to 16 mA	0 to 4000	4000
4 to 20 mA	0 to 2000	2000
4 to 20 mA	400 to 2000	1600
0 to 10 mA	0 to 2000	1280
0 to 16 mA	0 to 2000	2000

Accuracy (4 to 20 MA)	• ±0.1% full scale at 25°C • ±0.25% full scale over temperature range
Accuracy (0 to 16 MA)	±1% full scale over temperature range
External Loop Power	24 V (maximum 36 V, minimum 19 V)

Table 12 - 4 Channel Analog Output Module (Continued)

Loop Load Resistance	0 ohms minimum, 600 ohms maximum
Transient Protection	• IEEE C37.90.1 • IEC 60255 Class 3: ◦ Impulse Voltage Withstand: – Common mode 5 kV (output to frame) – Across open contact 2.5 kV ◦ High Frequency Disturbance: – Common mode 2.5 kV (output to frame) – Between outputs 2.5 kV ◦ Fast Transient (IEC 61000-4-4): – 4 kV 5 kHz capacitively coupled
Channel Isolation	• 50 V dc channel to chassis • 50 V dc channel to channel

Table 13 - 4 Channel Analog Output Termination Assembly

261.8 mm x 35 mm attached to frame by screws	
Terminals	Four terminal blocks
Terminal 1	+ Loop power
Terminal 2	Loop power common
Terminal 3	+I (current out)
Terminal 4	–I (current return)
Monitors/Indicators	Green/Red RUN/FAIL LED

Physical Specifications

Input/Output Modules share the same physical and environmental specifications.

Physical Size	Each plug-in module requires frame space of 35 mm. Modules are assemblies of one or more printed circuit boards. These modules plug into a backplane (Electrobus) via a DIN 41612 connector and are double Eurocard size (233.4 mm x 149 mm). DIN 41612 connectors are also fitted to the front edge of the PCB to provide connection to the terminal board assembly.

Environmental Specifications

Operating Temperature	Standard • 0°C to +60°C (32°F to 140°F)
Humidity	10 to 95% (non-condensing)

Product Safety

This product complies with the U.S. Standard for Safety UL 61010-1 - Safety requirements for electrical equipment for measurement, control, and laboratory use - PART 1: GENERAL REQUIREMENTS - Edition 2 - Revision Date 2008/10/28 and CSA C22.2 NO. 61010-1 - Safety requirements for Electrical equipment for measurement, control, and laboratory use.

Ordering Information

Part Number	Description
Multiple I/O Modules	
SY-0399095	Multi Input Output Module 129 V 8 Mini Pilot Relay
SY-0399094	Multi Input Output Module 48 V 8 Mini Pilot Relay
SY-0399088	Multi Input Output Module 24 V 8 Mini Pilot Relay
SY-0399097	Multi Input Output Module 129 V 6 Paired Pilot Relay
SY-0399096	Multi Input Output Module 48 V 6 Paired Pilot Relay
SY-0399089	Multi Input Output Module 24 V 6 Paired Pilot Relay
Analog Input Module	
SY-0399085	20 Channel Analog Input Module (Isolated)
Analog/Digital Input Module	
SY-0399160	4 Analog/32 Digital Input Module (24 V to 129 V)
SY-0399222	4 Isolated Analog Inputs and 32 Digital Inputs (Deep Wiring Channel) Module
Digital Output Modules	
SY-0399086	12 Pilot Relay Digital Output Module
SY-0399087	12 Magnetically Latched Relay Digital Output Module
SY-0399136	8 Digital Output 10 Amp Module
Analog Output Module	
SY-0399084	4 Channel Analog Output Module

WARNING: This product can expose you to chemicals including lead and lead compounds, which are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information, go to www.p65warnings.ca.gov/.

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As standards, specifications, and design change from time to time, please ask for confirmation of the information given in this publication.

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