Overview
The Honeywell ControlEdge HC900 Controller is an advanced loop and logic controller offering a modular design sized to satisfy the control and data acquisition needs of a wide range of process equipment.

I/O Modules
The following I/O modules are available to create a custom control solution.

- 16 Channel Universal IO Module: Galvanically isolated Input/Output to chassis (p.27)
- 8-point universal analog input modules: Galvanic isolation point to chassis inputs may be mixed on a module and may include multiple thermocouple types, RTDs, ohms, voltage or mill voltage types – all easily assigned using the Process Control Designer configuration tool. High point-to-point galvanic isolation simplifies installation and saves the expense of external isolation hardware (p.6).
- 16-point high level analog input module: each point is configurable for V or mA. Galvanically isolated point to chassis. Galvanically isolated point to point (p.10). 250-ohm shunt resistors can be added per channel.
- 4-point galvanically isolated analog output module. Galvanically isolated point to chassis supports from 0 to 20mA each (p.12).
- 8-point analog output, galvanically isolated in 2 groups of 4 points. Galvanically isolated point to chassis. Supports from 0 to 20mA each (p.13).
- 16-point analog output, galvanically isolated in 4 groups of 4 points. Galvanically isolated point to chassis. Supports from 0 to 20mA each (p.14).
- 16-point digital input modules: Contact closure type, DC Voltage, AC Voltage and AC/DC voltage types (p.15). Galvanically isolated in groups of 8 channel to chassis
- 32-point digital input module: DC voltage. Galvanically isolated point to chassis. Galvanically isolated in 2 groups of 16 points (p.1915).
- 8-point AC or 16-point DC digital output modules (sinking type). Galvanically isolated point to chassis. Galvanically isolated in 2 groups of 8 points (p.18).
- 32-point digital output: DC voltage (sourcing type). Galvanically isolated point to chassis. Galvanically isolated in 2 groups of 16 points (p.23).
- 8-point relay output module: four form C type and four form A type relays. Galvanically isolated point to chassis. Galvanically isolated relay to relay (p.20).
- 4 channel Pulse/Frequency/Quadrature I/O module. Galvanically isolated point to chassis (p.24).

Insert and Removal of I/O under Power
For ease of maintenance, the ControlEdge HC900 controller supports removing and inserting I/O modules from the module rack without removing power from the controller. Each module is sensed for validity by the controller and auto-configured on insertion.

Other Modules
In addition to I/O, the following modules are available.

- Scanner 1 module, single port (p.31)
- Scanner 2 Module, dual port (p.32)
- Universal AC Power Supply, 60W (p.4)
- Power Supply 24VDC, 60W (p.4)
- Redundant Switch Module (p.33)
- Power Status Module (p.33)

Failsafe
All ControlEdge 900 Platform I/O modules support a user specified failsafe value (analog) or state (digital) that the module outputs or inputs will assume if communication between the controller and the module is interrupted. Output modules are also disabled if the controller fails to start. Module diagnostics are not initiated if the control strategy does not call for the inputs or outputs on the modules to execute.

Failsafe is restricted to de-energize in safety applications.
Remote Terminal Panels
Optional DIN rail mounted Remote Terminal Panels (RTPs) are available for use with pre-wired cables to reduce installation time and labor expense. Four types of RTPs are available: analog inputs, relay outputs, redundant I/O and other I/O modules. Three cable lengths are also available to match hardware to installation variations. Analog inputs RTPs include transmitter shunt resistors and transmitter power terminals with individual circuit fuses. The Relay Output RTP includes a fuse and power disconnect switch for each output. All the three types of RTP panels also switch power to allow module removal and installation under controller power. See page 34.

Terminal Blocks
20-screw Barrier style and Euro style terminal blocks are available for use with all ControlEdge HC900 I/O Modules. Red terminal blocks are used for high voltage connections for added safety while black terminal blocks are used for low voltage connections. A 36-terminal Euro style block is available with the 16 AI, the 8 and 16 AO as well as the 32 DC DI and 32 DC DO module types. See page 27.

Specifications for modules

<table>
<thead>
<tr>
<th>I/O Module Attributes</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remove &amp; Insert under power</td>
<td>Standard. Modules are automatically sensed and configured on insertion. Field power shall be disconnected before removing field terminal blocks.</td>
</tr>
<tr>
<td>LED Channel State indicators</td>
<td>Via light pipes at front of module, one state LED for each digital I/O point – green indicates ON, logic side</td>
</tr>
<tr>
<td>LED Module Status indicator</td>
<td>Via light pipe, one per module, tri-color to represent module status, Green = OK, Red = Fault (# of flashes indicates fault), Amber = Override (Force)</td>
</tr>
<tr>
<td>I/O Labels</td>
<td>Color-coded, on module door, removable, with write-on area to label I/O</td>
</tr>
<tr>
<td>Processor</td>
<td>Micro-controller per module for parallel processing</td>
</tr>
</tbody>
</table>
| Terminal Boards                        | 20 screw: Barrier or Euro style, tin-plated or gold-plated (for DC connections)  
36 screw: Euro style gold plated (Required with certain higher capacity modules) |
| Keying                                 | Hardware keying matches each module to its terminal block with its field wiring. |

Environmental and Vibration Specifications

<table>
<thead>
<tr>
<th>Mounting</th>
<th>Standard 35mm wide DIN Rail Provides connection of field wiring to controller I/O within an enclosure only.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions</td>
<td>4.38” (111.1 mm) x 3.70” (94.0mm) x 2.60” (66.0mm) (L x W x H)</td>
</tr>
</tbody>
</table>
| Vibration                               | 5Hz to 15.77Hz, 2.03mm (0.08”) amplitude (peak to peak)  
15.77 to 250Hz, 1.0-g Sweeping, at rate of .33 octave/min. |
| Tray material                           | Polyvinyl Chloride (PVC)                                                                                          |
| Flammability                            | UL94-V0                                                                                                           |
| Environmental                           | Operating: 0 deg. C (32F) to 60 deg. C (140F)  
Storage: -40 deg. C (140F) to 70 deg. C (158F)  
Operating: 10% to 90% Non-condensing  
Storage: 5% to 95% Non-condensing |
<p>| Harsh Environment **                    | All the modules including CPU, Scanner, RTP, Backplane, RSM/PSM, and Backplanes have conformal coating that is suitable for operation in G3 level of harsh environment. Power Supply Units (PSU) do not have conformal coating. |
| ROHS**                                  | Entire system is compliant to RoHS 2 directive, except PSU.                                                       |</p>
<table>
<thead>
<tr>
<th>** Except PSU module</th>
<th></th>
</tr>
</thead>
</table>
| UL | Certificate: E201698  
UL Listed- Process Control Equipment, Electrical UL 61010-1 2nd Edition |
| ATEX | Certificate: HON 08.0201  
II 3 G Ex nA IIC T* Gc  
EN 60079-0: 2011; EN 60079-15: 2010 |
| CSA | Certificate: 1367757  
Class I, Division 2, Groups A, B, C D; T*  
CAN/ CSA C22.2 No. 0-M91; CAN/ CSA C22.2 No. 94-M94;  
CAN/ CSA C22.2 No 1010.1-92; CAN/ CSA C22.2 No 1010.1B-97;  
CSA C22.2 No. 213-M1987 |
| FM | Certificate: 3011798  
Class 1, Div. 2 Groups A, B, C, D; T*  
* Module Temperature: Classifications T3 to T6 |
| Cables | High voltage  
Lengths: 1.0, 2.5, 5.0 meters. Cable power is limited to 24 Amps per module at 60C (140 degrees F) and 32 Amps at 54C (129 degrees F).  
Low voltage  
Lengths: 1.0, 2.5, 5.0 meters. |
| I/O module Compliance | This product is in conformity with the protection requirements of the following European Council Directives:  
**2006/ 95/ EC**, the Low Voltage Directive (evaluated to EN61010-1:2010)  
Compliant with EN61010-1, UL61010-1 2nd Edition, CSA C22.2 No. 1010-1 |

<table>
<thead>
<tr>
<th>Module Type</th>
<th>Temperature Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controller (C30, C50, C70, C75)</td>
<td>T4</td>
</tr>
<tr>
<td>Safety Module Controller (C30S, C50S, C70S and C75S)</td>
<td>T4</td>
</tr>
<tr>
<td>Power Supply (P01, P24)</td>
<td>T4</td>
</tr>
<tr>
<td>Power Status (PSM))</td>
<td>T6</td>
</tr>
<tr>
<td>Scanner (1 or 2 Port)</td>
<td>T4</td>
</tr>
<tr>
<td>Safety Scanner (1 or 2 Port)</td>
<td>T4</td>
</tr>
<tr>
<td>Redundant Switch (RSM)</td>
<td>T6</td>
</tr>
<tr>
<td>Analog Input (Universal 8 channel)</td>
<td>T6</td>
</tr>
<tr>
<td>Analog Input (High Level 16 channel)</td>
<td>T6</td>
</tr>
<tr>
<td>Analog Output (4 Channel)</td>
<td>T4</td>
</tr>
<tr>
<td>Analog Output (8 channel)</td>
<td>T4</td>
</tr>
<tr>
<td>Analog Output (16 channel)</td>
<td>T3C</td>
</tr>
<tr>
<td>Digital Input, Contact type (16 Channel)</td>
<td>T5</td>
</tr>
<tr>
<td>Digital Input, 24 Vdc (16 channel)</td>
<td>T4</td>
</tr>
</tbody>
</table>
| Digital Input, 120/240 Vac (16 channel) | T3C @ Ta = 60 deg. C  
T4 @ Ta = 40 deg. C |
Power Supply

P01 Power Supply (900P01-xxxx)

The P01 power supply provides 5VDC and 24VDC to satisfy the power requirements of a rack with a controller and local I/O, a rack with a scanner, and remote I/O. The 60-watt capacity allows for almost any mix of I/O modules in one rack. See Module Specifications starting on page 6. A tool-secured door covers the high voltage connections; test jacks behind the door allow for quick verification of proper operation. An internal non-replaceable fuse limits supply current under certain fault conditions.

P24 Power Supply (900P24-xxxx)

The P24 power supply provides 5VDC and 24VDC to satisfy the power requirements of a rack with a controller and local I/O, a rack with a scanner and remote I/O or a redundant controller rack. The 60-watt capacity requires minimal de-rating of the available ControlEdge HC900 I/O modules. A tool-secured door covers the voltage connections. An internal non-replaceable fuse limits supply current under certain fault conditions.

<table>
<thead>
<tr>
<th>P01 Power Supply (900P01-xxxx)</th>
<th>P24 Power Supply (900P24-xxxx)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Wiring</strong></td>
<td>Screw type terminals, Wire gauge #12-22 AWG</td>
</tr>
<tr>
<td><strong>Operating Voltage</strong></td>
<td>Universal Power, 90-264VAC, 47-63 Hz</td>
</tr>
<tr>
<td><strong>Input Rating</strong></td>
<td>130VA</td>
</tr>
<tr>
<td><strong>Output Rating</strong></td>
<td>60W</td>
</tr>
<tr>
<td><strong>In Rush Current</strong></td>
<td>7 Amps peak-to-peak for 150 ms at 240 VAC</td>
</tr>
<tr>
<td><strong>Fuse</strong></td>
<td>Internal, non-replaceable</td>
</tr>
<tr>
<td><strong>Test jacks</strong></td>
<td>5 volt, 24 Volt</td>
</tr>
<tr>
<td><strong>Hold up time</strong></td>
<td>20 milliseconds @ 115VAC, 60HZ maximum Load</td>
</tr>
</tbody>
</table>

See next section for how to choose an AC power supply.
### How to choose an AC Power Supply

<table>
<thead>
<tr>
<th>Module</th>
<th>ControlEdge HC900 Hardware Power (Watts)</th>
<th>Field Power (Watts)</th>
<th>Total Power (Watts)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controller C30 and C30S</td>
<td>6.0</td>
<td>0.0</td>
<td>6.0</td>
</tr>
<tr>
<td>Controller C50 and C50S</td>
<td>6.0</td>
<td>0.0</td>
<td>6.0</td>
</tr>
<tr>
<td>Controller C70 and C70S</td>
<td>7.1</td>
<td>0.0</td>
<td>7.1</td>
</tr>
<tr>
<td>Controller C75 and C75S</td>
<td>7.8</td>
<td>0.0</td>
<td>7.8</td>
</tr>
<tr>
<td>Redundancy switch module (RSM)</td>
<td>0.1</td>
<td>0.0</td>
<td>0.1</td>
</tr>
<tr>
<td>Power Status Module (PSM)</td>
<td>0.1</td>
<td>0.0</td>
<td>0.1</td>
</tr>
<tr>
<td>Scanner 1 Port (S50/S50S)</td>
<td>3.9</td>
<td>0.0</td>
<td>3.9</td>
</tr>
<tr>
<td>Scanner 2 Port (S75/S75S)</td>
<td>5.0</td>
<td>0.0</td>
<td>5.0</td>
</tr>
<tr>
<td>Analog Input (Universal)</td>
<td>0.8</td>
<td>0.0</td>
<td>0.8</td>
</tr>
<tr>
<td>Analog Input (High level)</td>
<td>1.6</td>
<td>0.0</td>
<td>1.6</td>
</tr>
<tr>
<td>Analog Output (4 points)*</td>
<td>5.1</td>
<td>0.0</td>
<td>5.1</td>
</tr>
<tr>
<td>Analog Output (8 pts. internal 24V)***</td>
<td>9.4</td>
<td>0.0</td>
<td>9.4</td>
</tr>
<tr>
<td>Analog Output (8 pts. external 24V)***</td>
<td>1.1</td>
<td>8.3</td>
<td>9.4</td>
</tr>
<tr>
<td>Analog Output (16 pts. internal 24V)***</td>
<td>18.3</td>
<td>0.0</td>
<td>18.3</td>
</tr>
<tr>
<td>Analog Output (16 pts. external 24V)***</td>
<td>1.7</td>
<td>16.6</td>
<td>18.3</td>
</tr>
<tr>
<td>Contact Input</td>
<td>1.6</td>
<td>0.0</td>
<td>1.6</td>
</tr>
<tr>
<td>Relay Output</td>
<td>3.0</td>
<td>0.0</td>
<td>3.0</td>
</tr>
<tr>
<td>16 pt DC In (@ 24V)</td>
<td>0.7</td>
<td>2.6</td>
<td>3.3</td>
</tr>
<tr>
<td>16 pt DC In (@ 32V)</td>
<td>0.7</td>
<td>5.1</td>
<td>5.7</td>
</tr>
<tr>
<td>32 pt DC In (@ 24V)</td>
<td>1.1</td>
<td>3.1</td>
<td>4.2</td>
</tr>
<tr>
<td>32 pt DC In (@ 32V)</td>
<td>1.1</td>
<td>5.1</td>
<td>6.2</td>
</tr>
<tr>
<td>16 pt DC Out</td>
<td>1.7</td>
<td>1.2</td>
<td>2.9</td>
</tr>
<tr>
<td>32 pt DC Out</td>
<td>1.2</td>
<td>1.8</td>
<td>3.0</td>
</tr>
<tr>
<td>AC In (@120V)</td>
<td>0.7</td>
<td>1.9</td>
<td>2.6</td>
</tr>
<tr>
<td>AC In (@240V)</td>
<td>0.7</td>
<td>7.7</td>
<td>8.3</td>
</tr>
<tr>
<td>AC/DC In</td>
<td>0.7</td>
<td>7.7</td>
<td>8.3</td>
</tr>
<tr>
<td>AC Out</td>
<td>1.1</td>
<td>12.0</td>
<td>13.1</td>
</tr>
<tr>
<td>PFQ**</td>
<td>6.7</td>
<td>0.1</td>
<td>6.8</td>
</tr>
<tr>
<td>Universal IO (16 Pts)</td>
<td>2.45</td>
<td>4.5</td>
<td>6.95</td>
</tr>
</tbody>
</table>

*Limit 10 Analog Output modules per I/O rack.

** Limit 4 PFQ modules per I/O rack.

***Limit 2 16-pt. modules per rack.

***Limit 5 8-pt. modules per rack with internal power supply.
Analog Input Module (900A01-xxxx)

The Universal Analog Input module supports up to 8 user-configurable inputs on a per point basis for thermocouple, RTD, Resistance, V, mV, mA or slidewire. Point-to-point isolation and back-plane isolation are provided. Modules perform analog to digital conversion in synchronization with CPU control execution, eliminating data interchange latency. All analog input modules are processed in parallel, eliminating scan time increases as modules are added.

A green blinking status LED on the module indicates when the module is being scanned. An amber blinking status LED when input channels are forced and a red status LED when module diagnostics exist. A user-selectable failsafe value is supported on a per channel basis. A warning signal is provided for thermocouple inputs to indicate maintenance is needed prior to a sensor failure. A sensor failure signal is also provided.

### Table 1 - Analog Input Specifications

<table>
<thead>
<tr>
<th>Inputs per module</th>
<th>8 (isolated)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input types</td>
<td>mV, V, T/C, RTD, ohms, mA, slidewire assigned to any channel</td>
</tr>
<tr>
<td>Signal Source</td>
<td>See Table 2 on page 7 for range types. Thermocouple with cold junction compensation RTD, PT100 3 wire, 40 ohms balanced maximum Thermocouples: 100 Ohms/Leg 100 (except Low), 500 &amp; 1000 RTD: 100 Ohms/Leg 100 YIS: 100 Ohms/Leg 100-Low RTD &amp; 10 ohm Cu: 10 Ohms/Leg Slidewire 100 to 6,500 Ohms: 10% of total res./leg</td>
</tr>
</tbody>
</table>
### Table 1 - Analog Input Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Impedance</td>
<td>10 megohms for T/C and mV inputs; &gt;1 megohm for volts and 250 ohms for mA inputs</td>
</tr>
<tr>
<td>Galvanic Input Isolation</td>
<td>400 VDC point to point, 1K VDC to logic RTDs are isolated in pairs (I&lt;sub&gt;RTD&lt;/sub&gt; is common to two inputs)</td>
</tr>
<tr>
<td>Noise Rejection</td>
<td>Series Mode &gt;60dB. Common Mode &gt;130dB at 120VAC.</td>
</tr>
<tr>
<td>Burnout</td>
<td>T/C, mV, V (except for ranges below) configurable to upscale, downscale, defined value, or none. Volt: −500 mV to 500 mV; −1 V to 1 V; −2 V to 2 V; −5 V to 5 V; 0 V to 10 V; −10 V to 10 V; inherent to zero volt RTD: Inherent upscale mA: Inherent downscale</td>
</tr>
<tr>
<td>Over-range limit</td>
<td>+/- 10% for linear ranges (volts). +/-1% for non-linear ranges (T/C, RTD).</td>
</tr>
<tr>
<td>T/C Break Detection</td>
<td>Via current pulse</td>
</tr>
<tr>
<td>Faulty thermocouple detection</td>
<td>If greater than 100 ohms, a warning status is provided as an output for the AI block</td>
</tr>
<tr>
<td>Accuracy</td>
<td>Factory configured accuracy = ± 0.1 % of range (± 0.2 % of range for 0V to 10V and -10V to 10V) Cold junction accuracy = ± 0.7 °C Field calibration accuracy = ± 0.05 % of range Reference conditions: Temperature = 25 °C ± 3 °C (77 °F ± 5 °F) Humidity = 45 % to 55 % RH non-condensing Line voltage = Nominal ± 1 % Source resistance = 0 ohm Series mode and common mode = 0 V Frequency = Nominal ± 1 %</td>
</tr>
<tr>
<td>Temp. Effect on Accuracy</td>
<td>± 0.01% of full scale per degree Celsius maximum</td>
</tr>
<tr>
<td>A/D Converter</td>
<td>One per module</td>
</tr>
<tr>
<td>A/D Resolution</td>
<td>15 Bits</td>
</tr>
<tr>
<td>Reference Junction Sensing</td>
<td>Via 2 RTDs at top/bottom of module</td>
</tr>
<tr>
<td>Update rate</td>
<td>500ms (Analog to Digital Converter per module)</td>
</tr>
<tr>
<td>Long term Stability</td>
<td>0.1% per year</td>
</tr>
<tr>
<td>Calibration</td>
<td>Data is stored in non-volatile memory Redundant Factory Calibration Individual Channel Field Calibration</td>
</tr>
<tr>
<td>Diagnostics</td>
<td>Monitoring of Factory Calibration, Field Calibration, 24 VDC supply, and configuration.</td>
</tr>
<tr>
<td>Channel Configuration Data</td>
<td>Stored in non-volatile memory</td>
</tr>
<tr>
<td>Power supply loading</td>
<td>5V; 40mA max 24V; 25mA max</td>
</tr>
</tbody>
</table>
### Table 2 – Analog Input Reference Accuracy

<table>
<thead>
<tr>
<th>Input Type</th>
<th>Range</th>
<th>Reference Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Thermocouple inputs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B T/C</td>
<td>0 to 105</td>
<td>-18 to 41</td>
</tr>
<tr>
<td></td>
<td>105 to 150</td>
<td>41 to 66</td>
</tr>
<tr>
<td></td>
<td>150 to 500</td>
<td>66 to 260</td>
</tr>
<tr>
<td></td>
<td>500 to 1000</td>
<td>260 to 538</td>
</tr>
<tr>
<td></td>
<td>1000 to 3300</td>
<td>538 to 1815</td>
</tr>
<tr>
<td>E T/C</td>
<td>-454 to -202</td>
<td>-270 to -130</td>
</tr>
<tr>
<td></td>
<td>-202 to 1832</td>
<td>-130 to 1000</td>
</tr>
<tr>
<td></td>
<td>-200 to 1100</td>
<td>-129 to 593</td>
</tr>
<tr>
<td>J T/C</td>
<td>0 to 1600</td>
<td>-18 to 871</td>
</tr>
<tr>
<td>J (low) T/C</td>
<td>20 to 770</td>
<td>-7 to 410</td>
</tr>
<tr>
<td></td>
<td>-292 to 32</td>
<td>-180 to 0</td>
</tr>
<tr>
<td>K T/C</td>
<td>0 to 2400</td>
<td>-18 to 1316</td>
</tr>
<tr>
<td>K (low) T/C</td>
<td>-20 to 1000</td>
<td>-29 to 538</td>
</tr>
<tr>
<td>K T/C (mid)**</td>
<td>0 to 1800</td>
<td>-18 to 982</td>
</tr>
<tr>
<td></td>
<td>32 to 2192</td>
<td>0 to 1200</td>
</tr>
<tr>
<td>Ni-NiMo (NNM68)</td>
<td>32 to 500</td>
<td>0 to 260</td>
</tr>
<tr>
<td></td>
<td>500 to 2500</td>
<td>260 to 1371</td>
</tr>
<tr>
<td></td>
<td>32 to 1260</td>
<td>0 to 682</td>
</tr>
<tr>
<td>NiMo-NiCo (NM90)</td>
<td>32 to 500</td>
<td>0 to 260</td>
</tr>
<tr>
<td></td>
<td>500 to 2500</td>
<td>260 to 1371</td>
</tr>
<tr>
<td></td>
<td>32 to 1260</td>
<td>0 to 682</td>
</tr>
<tr>
<td>N T/C</td>
<td>0 to 2372</td>
<td>-18 to 1300</td>
</tr>
<tr>
<td>N T/C</td>
<td>0 to 1472</td>
<td>-18 to 800</td>
</tr>
<tr>
<td>N T/C</td>
<td>32 to 2192</td>
<td>0 to 1200</td>
</tr>
<tr>
<td>R T/C</td>
<td>0 to 500</td>
<td>-18 to 260</td>
</tr>
<tr>
<td></td>
<td>500 to 3100</td>
<td>260 to 1704</td>
</tr>
<tr>
<td>S T/C</td>
<td>0 to 500</td>
<td>-18 to 260</td>
</tr>
<tr>
<td></td>
<td>500 to 3100</td>
<td>260 to 1704</td>
</tr>
<tr>
<td>T T/C</td>
<td>-300 to 700</td>
<td>-184 to 371</td>
</tr>
<tr>
<td>T (low) T/C</td>
<td>-100 to 700</td>
<td>-73 to 371</td>
</tr>
<tr>
<td>W _ W26</td>
<td>-200 to 500</td>
<td>-129 to 260</td>
</tr>
<tr>
<td></td>
<td>-4 to 600</td>
<td>-20 to 2320</td>
</tr>
<tr>
<td></td>
<td>600 to 3600</td>
<td>316 to 1982</td>
</tr>
<tr>
<td></td>
<td>3600 to 4200</td>
<td>1982 to 2316</td>
</tr>
<tr>
<td>W6 W26 T/C</td>
<td>0 to 600</td>
<td>-18 to 316</td>
</tr>
<tr>
<td></td>
<td>600 to 3600</td>
<td>316 to 1982</td>
</tr>
<tr>
<td></td>
<td>3600 to 4200</td>
<td>1982 to 2316</td>
</tr>
<tr>
<td></td>
<td>0 to 2240</td>
<td>-18 to 1227</td>
</tr>
</tbody>
</table>

*W6 W26 is also known as type "C" Thermocouple.

** Type K thermocouple (mid-range) has a working range from 75 to 1800 °F, 25 to 982 °C. Input measurements below 75°F or 25°C may cause the input to default to the programmed failsafe value. Use type K low or full ranges if measurements are required outside the mid-working range.
<table>
<thead>
<tr>
<th>RTD</th>
<th>°F</th>
<th>°C</th>
<th>°F</th>
<th>°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Platinel</td>
<td>-94 to 1382</td>
<td>-70 to 750</td>
<td>3.0</td>
<td>1.7</td>
</tr>
<tr>
<td>Platinel (low)</td>
<td>32 to 2516</td>
<td>0 to 1380</td>
<td>1.5</td>
<td>0.8</td>
</tr>
<tr>
<td>100 Pt. (high) RTD***</td>
<td>-300 to 1500</td>
<td>-184 to 816</td>
<td>1.8</td>
<td>1.0</td>
</tr>
<tr>
<td>100 Pt. (mid) RTD***</td>
<td>-300 to 1200</td>
<td>-184 to 649</td>
<td>1.4</td>
<td>0.8</td>
</tr>
<tr>
<td>100 Pt. (low) RTD***</td>
<td>-300 to 600</td>
<td>-184 to 316</td>
<td>0.9</td>
<td>0.5</td>
</tr>
<tr>
<td>500 Pt. RTD***</td>
<td>-300 to 1200</td>
<td>-184 to 649</td>
<td>0.9</td>
<td>0.5</td>
</tr>
<tr>
<td>1000 Pt RTD*****</td>
<td>-40 to 500</td>
<td>-40 to 260</td>
<td>0.8</td>
<td>0.4</td>
</tr>
<tr>
<td>100 JIS</td>
<td>-328 to 932</td>
<td>-200 to 500</td>
<td>1.3</td>
<td>0.7</td>
</tr>
<tr>
<td>100 JIS (low)</td>
<td>0 to 212</td>
<td>-18 to 100</td>
<td>0.5</td>
<td>0.3</td>
</tr>
<tr>
<td>Cu10</td>
<td>-4 to 482</td>
<td>-20 to 250</td>
<td>2.0</td>
<td>1.0</td>
</tr>
<tr>
<td>YSI405</td>
<td>50 to 100</td>
<td>10 to 37.8</td>
<td>0.05</td>
<td>0.03</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Input Type</th>
<th>Range</th>
<th>Reference Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ohms, 200</td>
<td>0 to 200</td>
<td>+/- 0.4 ohms</td>
</tr>
<tr>
<td>Ohms, 500</td>
<td>0 to 500</td>
<td>+/- 1.0 ohms</td>
</tr>
<tr>
<td>Ohms, 1000</td>
<td>0 to 1000</td>
<td>+/- 2.0 ohms</td>
</tr>
<tr>
<td>Ohms, 2000</td>
<td>0 to 2000</td>
<td>+/- 4.0 ohms</td>
</tr>
<tr>
<td>Ohms, 4000</td>
<td>0 to 4000</td>
<td>+/- 8.0 ohms</td>
</tr>
<tr>
<td>Milliamperes</td>
<td>4 to 20 mAdc</td>
<td>±0.2% F.S. (mA)****</td>
</tr>
<tr>
<td></td>
<td>0 to 20 mAdc</td>
<td>±0.2% F.S. (mA)****</td>
</tr>
<tr>
<td>Millivolts</td>
<td>0 to 10 mVDC</td>
<td>±0.17% F.S. (mV)</td>
</tr>
<tr>
<td></td>
<td>0 to 50 mVDC</td>
<td>±0.1% F.S. (mV)</td>
</tr>
<tr>
<td></td>
<td>0 to 100 mVDC</td>
<td>±0.1% F.S. (mV)</td>
</tr>
<tr>
<td></td>
<td>-10 to 10 mVDC</td>
<td>±0.2% F.S. (mV)</td>
</tr>
<tr>
<td></td>
<td>-50 to 50 mVDC</td>
<td>±0.1% F.S. (mV)</td>
</tr>
<tr>
<td></td>
<td>-100 to 100 mVDC</td>
<td>±0.1% F.S. (mV)</td>
</tr>
<tr>
<td></td>
<td>-500 to 500 mVDC</td>
<td>±0.1% F.S. (mV)</td>
</tr>
<tr>
<td>Volts</td>
<td>1 to 5 VDC</td>
<td>±0.1% F.S. (mV)</td>
</tr>
<tr>
<td></td>
<td>0 to 1 VDC</td>
<td>±0.1% F.S. (mV)</td>
</tr>
<tr>
<td></td>
<td>0 to 2 VDC</td>
<td>±0.1% F.S. (mV)</td>
</tr>
<tr>
<td></td>
<td>0 to 5 VDC</td>
<td>±0.1% F.S. (mV)</td>
</tr>
<tr>
<td></td>
<td>0 to 10 VDC</td>
<td>±0.2% F.S. (mV)</td>
</tr>
<tr>
<td></td>
<td>-1 to 1 VDC</td>
<td>±0.1% F.S. (mV)</td>
</tr>
<tr>
<td></td>
<td>-2 to 2 VDC</td>
<td>±0.1% F.S. (mV)</td>
</tr>
<tr>
<td></td>
<td>-5 to 5 VDC</td>
<td>±0.1% F.S. (mV)</td>
</tr>
<tr>
<td></td>
<td>-10 to 10 VDC</td>
<td>±0.2% F.S. (mV)</td>
</tr>
<tr>
<td>Slidewire</td>
<td>≤ 250 ohms</td>
<td></td>
</tr>
<tr>
<td></td>
<td>250 to 1250 ohms</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1250 to 4000 ohms</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4000 to 6500 ohms</td>
<td></td>
</tr>
<tr>
<td>Carbon</td>
<td>0 to 1250 mVDC</td>
<td>±0.1% F.S. (mV)</td>
</tr>
<tr>
<td>Oxygen</td>
<td>-30 to 510 mVDC</td>
<td>±0.1% F.S. (mV)</td>
</tr>
</tbody>
</table>

*** Conforms to IEC751, DIN 0.00385 Ohm/Ohm/DegC
**** Tolerances for these input types include that of the external Dropping Resistors.
***** DIN 0.00375 Ohm/Ohm/DegC
Calibration standards are based on ITS-90; except Ni-NiMo is based on IPTS-68.
High Level Analog Input Module (900A16-xxxx)

The High-Level Analog Input module supports up to 16 user-configurable inputs on a per point basis for Voltage or current. Point-to-point isolation and back-plane isolation are provided. Modules perform analog to digital conversion in synchronization with CPU control execution, eliminating data interchange latency. All analog input modules are processed in parallel, eliminating scan time increases as modules are added.

A green blinking status LED on the module indicates when the module is being scanned. An amber blinking status LED when input channels are forced and a red status LED when module diagnostics exist. A user-selectable failsafe value is supported on a per channel basis.

The module supports field calibration. Each of the inputs has its own integrated 250-ohm shunt resistor which is activated through DIP switches.

Requires Euro style 36-terminal terminal block.

<table>
<thead>
<tr>
<th>Table 3 – High Level Analog Input Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inputs per module</td>
</tr>
<tr>
<td>Input types</td>
</tr>
<tr>
<td>Signal Source</td>
</tr>
<tr>
<td>Input Impedance</td>
</tr>
<tr>
<td>Galvanic Input Isolation</td>
</tr>
<tr>
<td>Noise Rejection</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Over-range limit</td>
</tr>
</tbody>
</table>
### Table 3 – High Level Analog Input Specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Accuracy</strong></td>
<td>Factory configured accuracy = ± 0.1 % of range.</td>
</tr>
<tr>
<td><strong>Reference conditions</strong></td>
<td></td>
</tr>
<tr>
<td>Temperature</td>
<td>25 °C ± 3 °C (77 °F ± 5 °F)</td>
</tr>
<tr>
<td>Humidity</td>
<td>45 % to 55 % RH non-condensing</td>
</tr>
<tr>
<td>Line voltage</td>
<td>Nominal ± 1 %</td>
</tr>
<tr>
<td>Source resistance</td>
<td>0 ohm</td>
</tr>
<tr>
<td>Series mode and common mode</td>
<td>0 V</td>
</tr>
<tr>
<td>Frequency</td>
<td>Nominal ± 1 %</td>
</tr>
<tr>
<td><strong>Temp. Effect on Accuracy</strong></td>
<td>±0.01% of full scale per degree Celsius maximum</td>
</tr>
<tr>
<td><strong>A/D Converter</strong></td>
<td>One per module</td>
</tr>
<tr>
<td><strong>A/D Resolution</strong></td>
<td>±15 Bits</td>
</tr>
<tr>
<td><strong>Update rate</strong></td>
<td>100ms (Analog to Digital Converter per module)</td>
</tr>
<tr>
<td><strong>Long term Stability</strong></td>
<td>0.1% per year</td>
</tr>
<tr>
<td><strong>Calibration</strong></td>
<td>Data is stored in non-volatile memory</td>
</tr>
<tr>
<td></td>
<td>Redundant Factory Calibration</td>
</tr>
<tr>
<td></td>
<td>Individual Channel Field Calibration</td>
</tr>
<tr>
<td><strong>Diagnostics</strong></td>
<td>Monitoring of Factory Calibration, Field Calibration, 24 VDC supply, and</td>
</tr>
<tr>
<td></td>
<td>configuration.</td>
</tr>
<tr>
<td><strong>Channel Configuration Data</strong></td>
<td>Stored in non-volatile memory</td>
</tr>
<tr>
<td><strong>Power supply loading</strong></td>
<td>5V ; 75mA max</td>
</tr>
<tr>
<td></td>
<td>24V ; 50mA max</td>
</tr>
</tbody>
</table>

### Table 4 - High Level Analog Input Reference Accuracy

<table>
<thead>
<tr>
<th>Input Type</th>
<th>Range</th>
<th>Reference Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milliamperes</td>
<td>4 to 20 mAdc</td>
<td>± 0.15% F.S. (mA)**</td>
</tr>
<tr>
<td></td>
<td>0 to 20 mAdc</td>
<td>± 0.15% F.S. (mA)**</td>
</tr>
</tbody>
</table>

**Tolerances for these input types include that of the internal Dropping Resistors.

<table>
<thead>
<tr>
<th>Volts</th>
<th>Range</th>
<th>Reference Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0 to 1VDC</td>
<td>± 0.1% F.S. (mV)</td>
</tr>
<tr>
<td></td>
<td>0 to 2 VDC</td>
<td>± 0.1% F.S. (mV)</td>
</tr>
<tr>
<td></td>
<td>0 to 5 VDC</td>
<td>± 0.1% F.S. (mV)</td>
</tr>
<tr>
<td></td>
<td>0 to 10 VDC</td>
<td>± 0.1% F.S. (mV)</td>
</tr>
<tr>
<td></td>
<td>1 to 5 VDC</td>
<td>± 0.1% F.S. (mV)</td>
</tr>
<tr>
<td></td>
<td>-1 to 1 VDC</td>
<td>± 0.1% F.S. (mV)</td>
</tr>
<tr>
<td></td>
<td>-2 to 2 VDC</td>
<td>± 0.1% F.S. (mV)</td>
</tr>
<tr>
<td></td>
<td>-5 to 5 VDC</td>
<td>± 0.1% F.S. (mV)</td>
</tr>
<tr>
<td></td>
<td>-10 to 10 VDC</td>
<td>± 0.1% F.S. (mV)</td>
</tr>
</tbody>
</table>
**Analog Output Module (900B01-xxxx)**

The Analog Output module provides 4 isolated 0 to 21.8 mA outputs that may be scaled by the user to any span within this range on a per output basis.

A green blinking status LED on the module indicates when the module is being scanned. A red status LED when module or channel diagnostics exist. A user specified failsafe value is supported to allow predictable operation in the event communication between the module and the controller is interrupted.

Outputs are updated synchronous with control execution. A user specified rate of change limit may be applied to each output when needed.

<table>
<thead>
<tr>
<th>Outputs per module</th>
<th>4 (isolated)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
<td>0 to 21.8 mA, range selectable</td>
</tr>
<tr>
<td>Load resistance</td>
<td>750 ohms max</td>
</tr>
<tr>
<td>Galvanic Isolation</td>
<td>500VDC Channel to Channel.</td>
</tr>
<tr>
<td>Galvanic Isolation from logic</td>
<td>600 VDC</td>
</tr>
<tr>
<td>Accuracy</td>
<td>0.1% full scale at reference conditions</td>
</tr>
<tr>
<td>Modules per rack</td>
<td>10 max, up to 12 with product ambient temperature de-rating (see figure below)</td>
</tr>
<tr>
<td>Minimum current sensing</td>
<td>&gt; 3.5 mA per output</td>
</tr>
<tr>
<td>Calibration Data</td>
<td>Data is stored in non-volatile memory. Redundant Factory Calibration, with automatic rejection of Bad version. Individual Channel Field Calibration</td>
</tr>
<tr>
<td>Diagnostics</td>
<td>Monitoring of Factory Calibration, Field Calibration, Configuration, and +24 VDC power supply.</td>
</tr>
<tr>
<td>Output Verification</td>
<td>Feedback to controller that indicates output current flowing.</td>
</tr>
<tr>
<td>D/A Resolution</td>
<td>12 bits</td>
</tr>
<tr>
<td>Power Supply Loading</td>
<td>5V ; 40mA max</td>
</tr>
<tr>
<td></td>
<td>24V ; 200mA max</td>
</tr>
</tbody>
</table>

![Diagram of Analog Output Module Connections](image-url)
**Analog Output Module (900B08-xxxx)**

The Analog Output module provides eight 0 to 21.0 mA outputs that may be scaled by the user to any span within this range on a per output basis. Outputs are isolated in groups of 4 with no isolation between outputs in a group. All points are isolated from controller logic.

A green blinking status LED on the module indicates when the module is being scanned. A red status LED when module or channel diagnostics exist. A user specified failsafe value is supported to allow predictable operation in the event communication between the module and the controller is interrupted.

Outputs are updated synchronous with control execution. A user-specified rate of change limit may be applied to each output when needed. Requires Euro style 36-terminal block.

<table>
<thead>
<tr>
<th>Outputs per module</th>
<th>8, isolated in 2 groups of 4 outputs (1-4, 5-8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
<td>0 to 21.0 mA, range selectable</td>
</tr>
<tr>
<td>Load resistance</td>
<td>750 ohms max</td>
</tr>
<tr>
<td>Galvanic Isolation</td>
<td>500VDC group to group. Groups 1-4, 5-8</td>
</tr>
<tr>
<td>Galvanic Isolation from logic</td>
<td>500 VDC</td>
</tr>
<tr>
<td>Accuracy</td>
<td>0.1% full scale at reference conditions</td>
</tr>
<tr>
<td>Modules per rack</td>
<td>4 max when powered from internal 24V backplane power</td>
</tr>
<tr>
<td>Minimum current sensing</td>
<td>&gt;0.5mA per output</td>
</tr>
<tr>
<td>Calibration Data</td>
<td>Data is stored in non-volatile memory. Redundant Factory Calibration, with automatic rejection of Bad version. Individual Channel Field Calibration</td>
</tr>
<tr>
<td>Diagnostics</td>
<td>Monitoring of Factory Calibration, Field Calibration, Configuration</td>
</tr>
<tr>
<td>Output Verification</td>
<td>Feedback to controller to indicate output current is flowing.</td>
</tr>
<tr>
<td>D/A Resolution</td>
<td>13+ bits (1 part in 13332)</td>
</tr>
<tr>
<td>Power Supply Loading</td>
<td>5V ; 225 mA max</td>
</tr>
<tr>
<td></td>
<td>24V ; 350 mA max</td>
</tr>
<tr>
<td>Terminal Block</td>
<td>36 Position – Euro style, (Model 900TCK-0001)</td>
</tr>
</tbody>
</table>

A DIP switch on the module selects the use of 24V from Rack PS (internal) power or external loop power via a separate 24V DC power source. The as-shipped (default) switch setting is external power.

**External Power Source requirements:**

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Vin: 18 to 36 Vdc</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
<td>350 mA per module</td>
</tr>
</tbody>
</table>
Analog Output Module (900B16-xxxx)

The Analog Output module provides 16, 0 to 21.0 mA outputs that may be scaled by the user to any span within this range on a per output basis. Outputs are isolated in groups of 4 with no isolation between outputs in a group. All points are isolated from controller logic.

A green blinking status LED on the module indicates when the module is being scanned. A red status LED when module or channel diagnostic exist. A user specified failsafe value is supported to allow predictable operation in the event communication between the module and the controller is interrupted.

Outputs are updated synchronous with control execution. A user-specified rate of change limit may be applied to each output when needed. Requires Euro style 36-terminal terminal block.

<table>
<thead>
<tr>
<th>Outputs per module</th>
<th>16, isolated in 4 groups of 4 outputs (1-4, 5-8, 9-12, 13-16)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
<td>0 to 21.0 mA, range selectable</td>
</tr>
<tr>
<td>Load resistance</td>
<td>750 ohms max</td>
</tr>
<tr>
<td>Galvanic Isolation</td>
<td>500VDC group to group. Groups 1-4, 5-8, 9-12, 13-16.</td>
</tr>
<tr>
<td>Galvanic Isolation from logic</td>
<td>500 VDC</td>
</tr>
<tr>
<td>Accuracy</td>
<td>0.1% full scale at reference conditions</td>
</tr>
<tr>
<td>Modules per rack</td>
<td>2 max when powered from internal 24V backplane power.</td>
</tr>
<tr>
<td>Minimum current sensing</td>
<td>&gt; 0.5mA per output</td>
</tr>
<tr>
<td>Calibration Data</td>
<td>Data is stored in non-volatile memory. Redundant Factory Calibration, with automatic rejection of Bad version. Individual Channel Field Calibration</td>
</tr>
<tr>
<td>Diagnostics</td>
<td>Monitoring of Factory Calibration, Field Calibration, and Configuration.</td>
</tr>
<tr>
<td>Output Verification</td>
<td>Feedback to controller to indicate output current is flowing.</td>
</tr>
<tr>
<td>D/A Resolution</td>
<td>13+ bits (1 part in 13332)</td>
</tr>
<tr>
<td>Power Supply Loading</td>
<td>5V ; 350 mA max</td>
</tr>
<tr>
<td></td>
<td>24V ; 700 mA max</td>
</tr>
<tr>
<td>Terminal Block</td>
<td>36 Position – Euro style, (Model 900TCK-0001)</td>
</tr>
</tbody>
</table>

A DIP switch on the module selects the use of 24V from rack PS (internal) power or external loop power via a separate 24V DC power source. The as-shipped (default) switch setting is external power.

External Power Source requirements:

<table>
<thead>
<tr>
<th>Voltage</th>
<th>18 to 36 Vdc</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
<td>700 mA per module</td>
</tr>
</tbody>
</table>
Digital Input Module – Contact Closure Type (900G01- xxxx)
The Contact Closure Digital Input Module is self-powered, providing 15VDC to external switching hardware to close the input loop. A closed external circuit causes current flow to the input to establish an ON state. Logic in the controller allows this state to be inverted when necessary. Four common terminals are provided to simplify field wiring.

There is a green LED state indicator for each channel to indicate when a digital input is ON. A green blinking status LED on the module indicates when the module is being scanned. An amber blinking status LED indicates when channels are forced and a red status LED when module diagnostics exist.

<table>
<thead>
<tr>
<th>Inputs per module</th>
<th>16 (single-ended)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage Supplied by controller</td>
<td>15 VDC nominal</td>
</tr>
<tr>
<td>Maximum contact resistance</td>
<td>1000 ohms</td>
</tr>
<tr>
<td>Galvanic Isolation</td>
<td>Isolation - Between Field wiring (input or output) and Module (Microcontroller or Backplane).</td>
</tr>
<tr>
<td>OFF to ON response time*</td>
<td>4 ms max</td>
</tr>
<tr>
<td>ON to OFF response time*</td>
<td>6 ms max</td>
</tr>
<tr>
<td>Switching current</td>
<td>2.6 mA nominal</td>
</tr>
<tr>
<td>Power supply loading</td>
<td>5V : 130 mA max</td>
</tr>
<tr>
<td></td>
<td>24V : 40 mA max</td>
</tr>
</tbody>
</table>

*excluding controllers scan time and excluding transmission time from module to backplane
Digital Input Module - DC Voltage type  
(900G02-xxxx)

The DC Digital Input module provides two groups of 8 inputs, each with a pair of terminals for connection to common. DC power applied between the common terminal and an input cause the input to turn ON. There is a green LED state indicator for each channel on the module to indicate when a digital input is ON. A green blinking status LED on the module indicates when the module is being scanned. An amber blinking status LED indicates when channels are forced and a red status LED when module diagnostics exist. Logic in the controller allows the state to be inverted when necessary.

<table>
<thead>
<tr>
<th>Inputs per module</th>
<th>16 (sinking)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Voltage Range</td>
<td>10 VDC to 32 VDC</td>
</tr>
<tr>
<td>Peak Voltage</td>
<td>32 VDC</td>
</tr>
<tr>
<td>AC Frequency</td>
<td>N/A</td>
</tr>
<tr>
<td>Galvanic Isolation</td>
<td>2 groups of 8 inputs (42.4VDC max.)</td>
</tr>
<tr>
<td>ON Voltage Level</td>
<td>9.5 VDC minimum</td>
</tr>
<tr>
<td>OFF Voltage Level</td>
<td>3.5 VDC maximum</td>
</tr>
<tr>
<td>Input Impedance</td>
<td>2.6 K ohms nominal</td>
</tr>
<tr>
<td>Input Current</td>
<td>2.3 mA @ 12 VDC 6.9 mA @ 24 VDC nominal</td>
</tr>
<tr>
<td>Minimum ON Current</td>
<td>1.0 mA</td>
</tr>
<tr>
<td>Maximum OFF Current</td>
<td>0.7 mA</td>
</tr>
<tr>
<td>OFF to ON response time*</td>
<td>4 ms max</td>
</tr>
<tr>
<td>ON to OFF response time*</td>
<td>4 ms max</td>
</tr>
<tr>
<td>Power Supply Loading</td>
<td>5V; 130mA max 24V; 0mA</td>
</tr>
</tbody>
</table>

*excluding controllers scan time and excluding transmission time from module to backplane
Digital Input Module – AC Voltage type (900G03-xxxx)

The AC Digital Input modules are externally powered and accommodate two circuit voltages for up to 8 inputs each. Two common terminals are provided for each circuit. AC power applied between the common terminal and an input cause the input to turn ON. There is a green LED state indicator for each channel on the module to indicate when a digital input is ON. Logic in the controller allows the state to be inverted when necessary.

A green blinking status LED on the module indicates when the module is being scanned. An amber blinking status LED indicates when channels are forced and a red status LED when module diagnostics exist.

| Active input De-rating table for ACDI |

Inputs per module | 16 (sinking) |
Input Voltage Range | 80 VAC to 264 VAC |
Peak Voltage | 264 VAC |
AC Frequency | 47 Hz to 63 Hz |
Galvanic Isolation | 2 groups of 8 inputs (350VAC max.) |
ON Voltage Level | 75 VAC |
OFF Voltage Level | 20 VAC |
Input Impedance | 48 K ohms nominal |
Input Current | 1 mA nominal @ 120 VAC, 60 Hz |
| | 2 mA nominal @ 230 VAC, 50 Hz |
Minimum ON Current | 0.3 mA |
Maximum OFF Current | 0.2 mA |
OFF to ON response time* | 4 ms + 1.5 line cycles maximum |
ON to OFF response time* | 4 ms + 2 line cycles maximum |
Power Supply Loading | 5V; 130mA max |
| | 24V; 0mA |
Digital Input Module – AC DC Voltage type (900G04-xxsx)

The AC/DC Input Module provides sixteen individually isolated, inputs that are powered externally. Two terminals are provided for each circuit. AC or DC power applied between the input terminals cause the inputs to turn On. There is a green LED state indicator for each channel on the module to indicate when a digital input is ON.

A green blinking status LED on the module indicates when the module is being scanned. An amber blinking status LED indicates when channels are forced and a red status LED when module diagnostics exist. Logic in the controller allows the state to be inverted when necessary.

Requires Euro style 36-terminal terminal block.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>AC Application</th>
<th>DC Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inputs per Module</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>Input Voltage Range</td>
<td>80 VAC to 264 VAC</td>
<td>80 VDC to 125 VDC</td>
</tr>
<tr>
<td>Peak Voltage</td>
<td>264 VAC</td>
<td>150 VDC</td>
</tr>
<tr>
<td>AC Frequency</td>
<td>47 Hz to 63 Hz</td>
<td>NA</td>
</tr>
<tr>
<td>Galvanic Isolation</td>
<td>Input to Input &amp; Input to Chassis (350VAC max)</td>
<td>Input to Input &amp; Input to Chassis (350VAC max)</td>
</tr>
<tr>
<td>On Voltage Level</td>
<td>75 VAC</td>
<td>75 VDC</td>
</tr>
<tr>
<td>Off Voltage Level</td>
<td>20 VAC</td>
<td>30 VDC</td>
</tr>
<tr>
<td>Input Impedance</td>
<td>48 k ohms nominal</td>
<td>48 k ohms nominal</td>
</tr>
<tr>
<td>Input Current</td>
<td>1 ma nom. @120 VAC, 60 Hz 2 ma nom. @240VAC, 50 Hz</td>
<td>2 ma nom. @125 VDC</td>
</tr>
<tr>
<td>Minimum On Current</td>
<td>0.3 mA</td>
<td>0.3 mA</td>
</tr>
<tr>
<td>Maximum Off Current</td>
<td>0.2 mA</td>
<td>0.2 mA</td>
</tr>
<tr>
<td>Off to On response time*</td>
<td>6 ms + 1.5 line cycles max.</td>
<td>6 ms + 2 line cycles max.</td>
</tr>
<tr>
<td>On to Off response time*</td>
<td>6 ms + 2 line cycles max.</td>
<td>6 ms + 2 line cycles max.</td>
</tr>
<tr>
<td>Power Supply Loading</td>
<td>5 V, 130 mA max. 24V 0 mA.</td>
<td>5 V, 130 mA max. 24V 0 mA.</td>
</tr>
</tbody>
</table>

* Nominal times excluding controllers scan time and excluding transmission time from module to backplane. DC application must include controller line filter setting of 50/60 Hz Active input De-rating table for AC/DC DI
32 Point Digital Input Module - DC Voltage type (900G32-xxxx)

The DC Digital Input module provides 32 inputs separated in to 2 groups of 16 channels each. Each group has a pair of screw terminals for the COM connection. DC power applied between the common terminal and an input cause the input to turn ON. There is a green LED state indicator for each channel on the module to indicate when a digital input is ON. A green blinking status LED on the module indicates when the module is being scanned. An amber blinking status LED indicates when channels are forced and a red status LED when module diagnostics exist. Logic in the controller allows the state to be inverted when necessary.

Requires Euro style 36-terminal terminal block

<table>
<thead>
<tr>
<th>Inputs per module</th>
<th>32 (sinking)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Voltage Range</td>
<td>10 VDC to 32 VDC</td>
</tr>
<tr>
<td>Peak Voltage</td>
<td>32 VDC</td>
</tr>
<tr>
<td>AC Frequency</td>
<td>N/A</td>
</tr>
<tr>
<td>Galvanic Isolation</td>
<td>2 groups of 16 inputs (30VDC max.)</td>
</tr>
<tr>
<td>ON Voltage Level</td>
<td>9.5 VDC minimum</td>
</tr>
<tr>
<td>OFF Voltage Level</td>
<td>3.5 VDC maximum</td>
</tr>
<tr>
<td>Input Impedance</td>
<td>6.9 K ohms nominal</td>
</tr>
<tr>
<td>Input Current</td>
<td>1.7 mA @ 12 VDC 3.5 mA @ 24 VDC nominal</td>
</tr>
<tr>
<td>Minimum ON Current</td>
<td>1.0 mA</td>
</tr>
<tr>
<td>Maximum OFF Current</td>
<td>0.7 mA</td>
</tr>
<tr>
<td>OFF to ON response time*</td>
<td>5 ms max</td>
</tr>
<tr>
<td>ON to OFF response time*</td>
<td>5 ms max</td>
</tr>
<tr>
<td>Power Supply Loading</td>
<td>5V; 215mA max 24V; 0mA</td>
</tr>
</tbody>
</table>

*excluding controllers scan time and excluding transmission time from module to backplane
**Relay Output Module (900H01-xxxx)**

The Relay Output Module provides eight individual galvanically isolated, electromechanical relay outputs. Four of the outputs are Form-C, and the other four are Form-A. Outputs are not fused in the Relay module. Install a fuse for each output at the field device that is appropriate for the load and the wire used.

There is a green LED state indicator for each channel on the module to indicate when a digital output is ON.

A green blinking status LED on the module indicates when the module is being scanned. An amber blinking status LED indicates when channels are forced and a red status LED when module diagnostics exist.

| 8 Relays per module | 4 form A, 4 form C |
| Output Device       | Electromechanical relay |
| Voltage             | 120/240 VAC, 30 VDC |
| Current Rating      | 4A @ 240VAC or 30VDC resistive load 0.5 A @ 240VAC or 30VDC incandescent lamp load |
| Galvanic Isolation  | Relay Output Contact to Relay Output Contact Relay Output Contact to Logic |
| Max. Leakage Current| 1 mA @ 350 VDC |
| De-rating           | Max. outputs at max. load – none Max. modules per rack - none |
| OFF to ON response time* | 11 ms max |
| ON to OFF response time* | 8 ms max |
| Power Supply Loading| 5V; 110mA max 24V; 100mA max |
| Expected life (min. operations) | Mechanical at 180 cpm: 5 x 10E7 Electrical: 10E5 |

*excluding controllers scan time and excluding transmission time from module to backplane

**Life expectancy curves (1a1b type)**
Digital Output Module – DC Type (900H02-xxxx)
The DC Digital Output module provides 16 outputs separated in to 2 groups of 8 channels each that are powered externally. Each group has a pair of screw terminals for +V and COM connections. The outputs are low side switching (current sinking) type. Overload protection is built into each output; when tripped the power must be recycled to reset the module.

There is a green LED state indicator for each channel on the module to indicate when a digital output is ON.

A green blinking status LED on the module indicates when the module is being scanned. An amber blinking status LED indicates when channels are forced and a red status LED when module diagnostics exist..

<table>
<thead>
<tr>
<th>Outputs per module</th>
<th>16 (current sinking, low side)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Galvanic Isolation</td>
<td>2 groups of 8 outputs</td>
</tr>
<tr>
<td>Operating Voltage</td>
<td>6.5 to 32 VDC (5.0 to 6.5 V @ &lt;0.5A per channel)</td>
</tr>
<tr>
<td>Output Type</td>
<td>Intelligent power switch (IPS)</td>
</tr>
<tr>
<td>Peak Voltage</td>
<td>34 VDC</td>
</tr>
<tr>
<td>AC Frequency</td>
<td>N/A</td>
</tr>
<tr>
<td>ON Voltage Drop</td>
<td>0.3VDC @ 1 A load</td>
</tr>
<tr>
<td>Overload Protection</td>
<td>Electronic high current and high temperature limiting, resets after cycling field power</td>
</tr>
<tr>
<td>Maximum Load Current</td>
<td>1 A per point, 8A max. per module, resistive load 0.5 A per point incandescent lamp load (5 mH max)</td>
</tr>
<tr>
<td>Maximum Leakage Current</td>
<td>0.15mA @ 32 VDC</td>
</tr>
<tr>
<td>Maximum Inrush Current</td>
<td>4 A for 10 ms</td>
</tr>
<tr>
<td>Minimum Load</td>
<td>0.0 mA</td>
</tr>
<tr>
<td>OFF to ON response time*</td>
<td>6 ms</td>
</tr>
<tr>
<td>ON to OFF response time*</td>
<td>6 ms</td>
</tr>
<tr>
<td>Fuses</td>
<td>Electronic limiting</td>
</tr>
<tr>
<td>Power Supply Loading</td>
<td>5V; 340mA 24V; 0mA</td>
</tr>
</tbody>
</table>

*excluding controllers scan time and excluding transmission time from module to backplane
Digital Output – AC Type (900H03-xxxx)

The AC Digital Output module provides 8 isolated zero switching Triac solid-state outputs. A shorting comb is available for use with barrier type terminal blocks to simplify connections to a common voltage source for all outputs. Each output has a MOV for transient over-voltage protection and a field-replaceable fuse.

There is a green LED state indicator for each channel on the module to indicate when a digital output is ON.

A green blinking status LED on the module indicates when the module is being scanned. An amber blinking status LED indicates when channels are forced and a red status LED when module diagnostics exist.

<table>
<thead>
<tr>
<th>Outputs per Module</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Galvanic Isolation</td>
<td>Per output to output, output to logic</td>
</tr>
<tr>
<td>Operating Voltage</td>
<td>85 VAC to 240 VAC</td>
</tr>
<tr>
<td>Output Type</td>
<td>Triac (zero switching voltage)</td>
</tr>
<tr>
<td>Peak Voltage</td>
<td>250 VAC</td>
</tr>
<tr>
<td>AC Frequency</td>
<td>47 Hz to 63 Hz</td>
</tr>
<tr>
<td>ON Voltage Drop</td>
<td>&lt;2.0 VAC (&gt;0.1 A)</td>
</tr>
<tr>
<td></td>
<td>&lt;3.0 VAC (&lt;0.1 A)</td>
</tr>
<tr>
<td>Transient Over voltage Protection</td>
<td>MOV</td>
</tr>
<tr>
<td>Maximum Load Current</td>
<td>2 A per point, 8 A max. per module, resistive load</td>
</tr>
<tr>
<td>Maximum Leakage Current</td>
<td>4 mA (240 VAC, 60 Hz)</td>
</tr>
<tr>
<td></td>
<td>1.2 mA (100 VAC, 60 Hz)</td>
</tr>
<tr>
<td></td>
<td>0.9 mA (100 VAC, 50 Hz)</td>
</tr>
<tr>
<td>Maximum Inrush Current</td>
<td>15 A for 10 ms</td>
</tr>
<tr>
<td>Minimum Load</td>
<td>50 mA</td>
</tr>
<tr>
<td>OFF to ON response time*</td>
<td>3 ms + 0.5 line cycle max</td>
</tr>
<tr>
<td>ON to OFF response time*</td>
<td>3 ms + 0.5 line cycle max</td>
</tr>
<tr>
<td>Fuses</td>
<td>1 per output, 3.15 A Time-lag. Replacement part: Littelfuse 37413150410</td>
</tr>
<tr>
<td>Power Supply Loading</td>
<td>5V; 220mA max</td>
</tr>
<tr>
<td></td>
<td>24V; 0mA</td>
</tr>
</tbody>
</table>

*excluding controllers scan time and excluding transmission time from module to backplane
32 Point Digital Output Module – DC Type (900H32-xxxx)

The DC digital Output module provides 32 outputs separated in to 2 groups of 16 channels each that are powered externally. Each group has a pair of screw terminals for +V and COM connections. The outputs are high side switching (current sourcing) type. Over current protection is provided for all outputs in 4 groups of 8 channels each. In case of short circuit for any output channel, that whole group of 8 is switched off. Power cycling is not required to reset the module.

There is a green LED state indicator for each channel on the module to indicate when a digital output is ON.

A green blinking status LED on the module indicates when the module is being scanned. An amber blinking status LED indicates when channels are forced and a red status LED when module diagnostics exist. Requires Euro style 36-terminal terminal block.

<table>
<thead>
<tr>
<th>Outputs per module</th>
<th>32 (current sourcing, high side). Note: Outputs 17 through 32 may not be used for TPO (Time Proportioning Output), PPO (Position Proportioning Output) or TPSC (Three Position Step Output) output types.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Galvanic Isolation</td>
<td>2 groups of 16 outputs</td>
</tr>
<tr>
<td>Operating Voltage</td>
<td>10.5 to 32 VDC</td>
</tr>
<tr>
<td>Output Type</td>
<td>High side driver</td>
</tr>
<tr>
<td>Peak Voltage</td>
<td>32 VDC</td>
</tr>
<tr>
<td>AC Frequency</td>
<td>N/A</td>
</tr>
<tr>
<td>ON Voltage Drop</td>
<td>0.15 VDC @ 0.5 A load</td>
</tr>
<tr>
<td>Overload Protection</td>
<td>Active Current Limiting is integrated into the output driver as 4 groups of 8 channels each. Power cycling is not required to reset the module after a fault condition.</td>
</tr>
<tr>
<td>Maximum Load Current</td>
<td>0.5 A per point, 6 A max per channel group 12 A max. per module, resistive load 0.25 A per point incandescent lamp load (5 mH max)</td>
</tr>
</tbody>
</table>

| Maximum Leakage Current | 0.15mA @ 32 VDC |
| Maximum Inrush Current  | 2 A for 10 ms |
| Minimum Load            | 0.0 mA |
| OFF to ON response time*| 6 ms |
| ON to OFF response time*| 6 ms |
| Fuses                   | Electronic limiting |
| Power Supply Loading    | 5V; 235mA |
|                         | 24V; 0mA |

*excluding controllers scan time and excluding transmission time from module to backplane
The 4 Channel Pulse/Frequency/Quadrature Module provides four different functionalities in the form of Pulse Input, Frequency measurement, Quadrature encoder input and Pulse Output. Each of these channels can be configured for any one of these four functions; with the exception that quadrature encoder input (A and B pulses) can be applied to only Channels 1 and 2 respectively. When configured for quadrature, the other two channels will still be available for use. The Pulse Output functionality uses the digital output available on the module for outputting pulses.

A green blinking status LED on the module indicates when the module is being scanned. An amber blinking status LED indicates when channels are forced and a red status LED when module diagnostics exist.

<table>
<thead>
<tr>
<th>Input Voltage Range</th>
<th>0 VDC to 24 VDC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inputs per module</td>
<td>4</td>
</tr>
<tr>
<td>Outputs per module</td>
<td>4</td>
</tr>
<tr>
<td>Digital Output type</td>
<td>Open collector, 5 to 24V, 30mA max, used for fast signaling</td>
</tr>
<tr>
<td>Power Supply Loading</td>
<td>5V: 110mA max</td>
</tr>
<tr>
<td></td>
<td>24V: 250mA max (with Encoder)</td>
</tr>
<tr>
<td></td>
<td>24V: 100mA max (without Encoder)</td>
</tr>
</tbody>
</table>

**Pulse Input Specifications**

<table>
<thead>
<tr>
<th>Input Voltage Range</th>
<th>0 VDC to 24 VDC</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON Voltage Level</td>
<td>3.0 VDC minimum</td>
</tr>
<tr>
<td>OFF Voltage Level</td>
<td>1.0 VDC maximum</td>
</tr>
<tr>
<td>Input Impedance</td>
<td>25K ohm</td>
</tr>
<tr>
<td>Frequency</td>
<td>10 KHz maximum</td>
</tr>
<tr>
<td>Minimum Pulse Width</td>
<td>3 µsec</td>
</tr>
<tr>
<td>Pulse Counter</td>
<td>32 bits</td>
</tr>
<tr>
<td>Preset Value</td>
<td>User may configure a preset count value within the range of 32 bit counter</td>
</tr>
<tr>
<td>Preset Action</td>
<td>Settable as ON or OFF in HC Designer</td>
</tr>
<tr>
<td>Digital Output</td>
<td>If preset action ON, output turns ON for 1 second.</td>
</tr>
<tr>
<td></td>
<td>If preset action OFF, output latches ON, and remains ON until counter reset command.</td>
</tr>
<tr>
<td>Counting based on Preset</td>
<td>When the count equals preset value:</td>
</tr>
<tr>
<td></td>
<td>• If preset action ON, counter is reset and immediately resumes count.</td>
</tr>
<tr>
<td></td>
<td>• If preset action OFF, counter is not reset and counts beyond preset value.</td>
</tr>
<tr>
<td>Counter HOLD</td>
<td>When the HOLD input to the pulse input function block is ON in HC Designer, the counter holds its current value.</td>
</tr>
<tr>
<td>Counter RESET</td>
<td>The counter may be reset only via its function block in HC Designer, when an OFF to ON transition occurs on the ^RST input in Monitor mode.</td>
</tr>
<tr>
<td>Counter Flags</td>
<td>The OVERFLOW flag gets set when the module counter overflows. This flag can be reset only with the ^CLFG command sent through HC Designer. Also, the PREI flag is set when the digital output of the module turns ON.</td>
</tr>
</tbody>
</table>
### 4 Channel Pulse/Frequency/Quadrature Module - DC Voltage type (900K01-xxxx) (cont’d)

#### Frequency Input Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Voltage Range</td>
<td>0 VDC to 24 VDC</td>
</tr>
<tr>
<td>ON Voltage Level</td>
<td>3.0 VDC minimum</td>
</tr>
<tr>
<td>OFF Voltage Level</td>
<td>1.0 VDC maximum</td>
</tr>
<tr>
<td>Input Impedance</td>
<td>25K ohm</td>
</tr>
</tbody>
</table>
| Frequency                        | 10 Hz minimum  
                                        100 KHz maximum |
| Minimum Pulse width (frequency ranges) | Settable only through HC Designer:  
                                        500 µsec (10 Hz to 500 Hz)  
                                        50 µsec (10 Hz to 5 KHz)  
                                        2.5 µsec (10 Hz to 100 KHz) |
| Digital Output                   | ON if input frequency out of range, else OFF |

#### Quadrature Input Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channels Used</td>
<td>Only channels 1 and 2 can be used for quadrature pulses A and B respectively. Index pulse is provided in addition.</td>
</tr>
</tbody>
</table>
| Input Voltage Range              | Differential: -6 VDC to +6 VDC  
                                        Single-ended: 0 VDC to 24 VDC |
| ON Voltage Level                 | Differential: 0.2 VDC minimum  
                                        Single-ended: 3.0 VDC minimum |
| OFF Voltage Level                | Differential: -0.2 VDC maximum  
                                        Single-ended: 1 VDC maximum |
| Common Mode Voltage              | +/- 12VDC |
| Input Sensitivity                | +/- 200mV |
| Hysteresis                       | +/- 50mV |
| Module powered encoder           | 5V DC, 0.50A |
| Frequency                        | 200 KHz maximum |
| Minimum Pulse Width              | 2.25 µsec |
| Quadrature Counter               | 32 bits signed |
| Quadrature Modes                 | For variable resolution there are three count modes for the Pulse/Quadrature input:  
                                        X1: rising edges of signal A are counted (increment); falling edges of signal A (decrement)  
                                        X2: rising & falling edges of signal A are counted  
                                        X4: rising & falling edges of signals A & B are counted |
| Quadrature LEDs                  | Two LEDs indicate UP and DOWN direction of counting. |
### 4 Channel Pulse/Frequency/Quadrature Module - DC Voltage type (900K01-xxxx) (cont’d)

**Pulse Output Specifications**

<table>
<thead>
<tr>
<th>Channels Used</th>
<th>Any one of the channels can be used for Pulse Output. However, the use of a particular channel for outputting pulses will render the particular input channel unusable for either of pulse, frequency or quadrature input.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital Output Type</td>
<td>Open Collector, 5 to 24V, 30 mA max</td>
</tr>
<tr>
<td>Frequency Range</td>
<td>25 Hz – 10 KHz</td>
</tr>
<tr>
<td>Duty cycle</td>
<td>Always 50%</td>
</tr>
<tr>
<td>Pulse Output Duration</td>
<td>Selectable CONTINUOUS or NUMBERED PULSES.</td>
</tr>
</tbody>
</table>
Safety Universal Input/Output Module (900U02-xxx)

**CAUTION:** For I/O redundancy, prefabricated cable length from RTP to Redundant UIO modules must be same.

Safety Universal Input/Output (UIO) provides 16 universal channels. Each channel of the module can be soft configured as AI, AO, DI or DO. Features supported by UIO are:

- Channels soft configurable as AI, AO, DI or DO (All channel are sourcing type)
- SOE (Sequence of Events) with resolution of 1 mS
- Simplified wiring for SIL-2 applications due to single module solution.

**Note:** The SIL-2 UIO has inbuilt advanced diagnostics such as, SIL certified microcontroller and critical voltage monitoring. Due to its higher reliability, for SIL-2 UIO there is no need to do 2oo1 or 2oo3 for wiring of IOs for SIL-2 application. For more details refer safety manual (51-52-25-153) and PFD calculation sheet.

- Line Monitoring for all configurations.
- Short circuit protection for DO
- Per channel Safety Shutdown eliminates need for external master relay.
- HART Supported

A green blinking status LED on the module indicates when the module is being scanned. A red status LED when module or channel diagnostics exist.

For channels configured as Digital input a closed external circuit causes current flow from UIO to establish an ON state. Logic in the controller allows this state to be inverted when necessary.

Analog outputs can only be configured on channels 9 to 16. The Analog Output provides 4 to 20 mA outputs that may be scaled by the user to any span within this range on a per output basis.

Digital Outputs provide over current protection .. In case of short circuit for any output channel, that channel is switched off. Power cycling is not required to reset the module.

For channels which are configured as output (AO/DO) a user specified failsafe value is supported to allow predictable operation in the event of a communication loss between controller and IO module.

Requires 20 pin-terminal terminal block.

**Note:** Field calibration is not required for UIO channels.
Universal IO channel can be soft configured as AI, AO, DI or DO. Details of each IO type are listed in tables below.

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channels</td>
<td>16</td>
</tr>
<tr>
<td>24V Field Supply Voltage</td>
<td>24V DC(Typical)2.3</td>
</tr>
<tr>
<td></td>
<td>22V DC(Min)</td>
</tr>
<tr>
<td></td>
<td>27V DC(Max)</td>
</tr>
<tr>
<td>Load</td>
<td>Max 4.2 Amps per module</td>
</tr>
<tr>
<td></td>
<td>500 mA per channel</td>
</tr>
<tr>
<td>Isolation</td>
<td>1.5 kVDC Module to Rack (Logic Side)</td>
</tr>
<tr>
<td></td>
<td>1.5 kVDC Module to Module</td>
</tr>
<tr>
<td>Update Rate</td>
<td>10ms</td>
</tr>
<tr>
<td>ESCP (Electronic Short Circuit Protection per channel)</td>
<td>620 mA re-settable</td>
</tr>
<tr>
<td>Fuse (per channel)</td>
<td>Internal, non-replacable (1 Amp)</td>
</tr>
<tr>
<td>Field Supply Fuse</td>
<td>Internal, electronic fuse (10 Amps)</td>
</tr>
</tbody>
</table>

**Detail Specifications – Analog Input**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input type</td>
<td>Current (2, 3, or 4 wire devices)</td>
</tr>
<tr>
<td>Input Channels</td>
<td>16 Maximum per module</td>
</tr>
<tr>
<td>(line monitored)</td>
<td></td>
</tr>
<tr>
<td>A/D Converter Resolution</td>
<td>16 Bit</td>
</tr>
<tr>
<td>Input Range</td>
<td>4-20 mA</td>
</tr>
<tr>
<td>Crosstalk, dc to 60 Hz (channel-to-channel)</td>
<td>58dB</td>
</tr>
<tr>
<td>Input Impedance</td>
<td>250 Ω nominal</td>
</tr>
<tr>
<td>Maximum Input Voltage (any input referenced to common, no damage)</td>
<td>0 - 30V</td>
</tr>
<tr>
<td>Hardware accuracy</td>
<td>0.1% of full-scale (23.5 ± 2°C)</td>
</tr>
<tr>
<td></td>
<td>0.2% of full-scale (23.5 ± 2°C) (For Redundant)</td>
</tr>
<tr>
<td></td>
<td>0.17% of full-scale (0 to +60°C)</td>
</tr>
<tr>
<td></td>
<td>0.34% of full-scale (0 to +60°C) (For Redundant)</td>
</tr>
<tr>
<td>Transmitter Field Power Conditioning</td>
<td>Current limited to 24 mA</td>
</tr>
<tr>
<td>Input Filter</td>
<td>First-order low-pass 1 kHz</td>
</tr>
</tbody>
</table>

**Detail Specifications – Analog Output**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output Type</td>
<td>4-20 mA current loop</td>
</tr>
<tr>
<td>Output Channels</td>
<td>8 Maximum per module</td>
</tr>
<tr>
<td>(with line monitoring)</td>
<td></td>
</tr>
<tr>
<td>Assignable as channels 9 to 16</td>
<td></td>
</tr>
<tr>
<td>Accuracy</td>
<td>&lt;0.5% of Full Scale (25°C) including linearity, entire operating temperature.</td>
</tr>
<tr>
<td></td>
<td>&lt;1% of Full Scale (25°C) including linearity, entire operating temperature (for Redundant).</td>
</tr>
<tr>
<td>Output Ripple</td>
<td>&lt;= 125 mV peak-to-peak at power line frequency, across 250 Ohm load</td>
</tr>
<tr>
<td>Output Readback Accuracy</td>
<td>0.17% of full scale</td>
</tr>
<tr>
<td>Output Current Linearity</td>
<td>± 0.1% of Full Scale nominal</td>
</tr>
<tr>
<td>Resolution</td>
<td>12 Bit</td>
</tr>
<tr>
<td>Directly Settable Output Current Range</td>
<td>2.4 mA to 21 mA</td>
</tr>
<tr>
<td>Maximum Resistive Load</td>
<td>7504 Ohms</td>
</tr>
<tr>
<td>Minimum Resistive Load</td>
<td>250 Ohms</td>
</tr>
<tr>
<td>Maximum Output Compliant Voltage (24 V supply = 22 VDC through 28 VDC)</td>
<td>14 VDC</td>
</tr>
<tr>
<td>Maximum Open Circuit Voltage</td>
<td>24 VDC</td>
</tr>
<tr>
<td>Maximum Load capacitance</td>
<td>&lt; 1 uF</td>
</tr>
</tbody>
</table>
## Detail Specifications – Digital Input with Open Wire Detection (OWD)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open Voltage</td>
<td>24V</td>
</tr>
<tr>
<td>Short Circuit Current</td>
<td>7 mA</td>
</tr>
<tr>
<td>Open Contact</td>
<td>15 kΩ &gt; 0.1 W A</td>
</tr>
<tr>
<td>Closed Contact</td>
<td>5 kΩ &gt; 0.25 W B</td>
</tr>
<tr>
<td>Short circuit detection</td>
<td>I &gt; 6 mA +/- 5 %</td>
</tr>
<tr>
<td>Closed contact detection</td>
<td>2.8 mA &lt; I &lt; 6 mA +/- 5 %</td>
</tr>
<tr>
<td>Open contact detection</td>
<td>0.9 mA &lt;= I &lt;= 2.8 mA +/- 5 %</td>
</tr>
<tr>
<td>Lead Breakage Detection</td>
<td>I &lt; 0.9 mA +/- 5 %</td>
</tr>
<tr>
<td>Input filter</td>
<td>First-order low-pass 1 kHz</td>
</tr>
</tbody>
</table>

Note A: At 24 VDC, equates to 8.57 KΩ > R > 4 KΩ (where R = total loop resistance)

Note B: At 24 VDC, equates to 26.7 KΩ > R > 10 KΩ

## Detail Specifications – Digital Input without Open Wire Detection (OWD)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open Voltage</td>
<td>24 VDC</td>
</tr>
<tr>
<td>Closed contact detection</td>
<td>I &gt; 2.81 mA C</td>
</tr>
<tr>
<td>Open contact detection</td>
<td>I &lt; 1.8 mA D</td>
</tr>
<tr>
<td>Input filter</td>
<td>First-order low-pass 1 kHz</td>
</tr>
</tbody>
</table>

Note C: At 24 VDC, equates to R < 8.57 KΩ (where R = total loop resistance)

Note D: At 24 VDC, equates to 26.7 KΩ > R > 10 KΩ

## Detail Specifications – Digital Output

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output Channels</td>
<td>16 Maximum per module (with line monitoring) 2</td>
</tr>
<tr>
<td>Output Type</td>
<td>Solid state source, short circuit protected</td>
</tr>
<tr>
<td>Load Current</td>
<td>0mA Minimum to 0.5 A Maximum per channel</td>
</tr>
<tr>
<td>On-State Voltage</td>
<td>24 V (typ), load current @ 0.5 A</td>
</tr>
<tr>
<td>Off-State Voltage</td>
<td>0 VDC (max) Open Load</td>
</tr>
<tr>
<td>Off-State Leak Current</td>
<td>&lt; 0.1 mA</td>
</tr>
<tr>
<td>Minimum ON State Current Required</td>
<td>1mA (Non-Redundant)</td>
</tr>
<tr>
<td>Maximum Load Inductance</td>
<td>&lt; 10 H</td>
</tr>
<tr>
<td>Maximum Load Capacitance</td>
<td>&lt; 1 uF</td>
</tr>
<tr>
<td>Lamp Load</td>
<td>&lt; 3 Watt (Verify Inrush Current requirement of Lamp Load)</td>
</tr>
<tr>
<td>Inrush Current</td>
<td>1 A for 10 uS</td>
</tr>
<tr>
<td>DO read back current Accuracy</td>
<td>DO Current : 0-10 mA +/- 1 mA</td>
</tr>
<tr>
<td></td>
<td>11-100 mA +/- 5 mA</td>
</tr>
<tr>
<td></td>
<td>101-500 mA +/- 20 mA</td>
</tr>
<tr>
<td>Short Circuit Protection</td>
<td>Internal Electronic (750 mA)</td>
</tr>
</tbody>
</table>

**Note:**

1. 900U02 modules may not be installed such that the 900U02 is between two 900B16 modules. 900B16 may only be installed in one adjacent slot.
2. Field power to be supplied by a local power supply providing tertiary protection from zone B severity levels. Generally characterized by short wiring, isolation, surge suppressors etc.
3. For Marine applications ABS Type approved power supplies are required for field supply voltage.
4. Field supply voltage should be maintained higher than 22.5 V for AO higher AO loads (> 750 Ohms)
Terminal Blocks (900TEK-xxxx, 900TBK-xxxx, 900TER-xxxx, 900TBR-xxxx)

ControlEdge HC900 I/O modules use terminal blocks with various features available.

Terminals are available in Barrier style and Euro style. The Barrier style terminal block provides a floating washer to accommodate two different size conductors. The Euro style offers a more compact terminal design providing more room within the terminal block cavity for conductors.

All terminal blocks support customer wiring entering the block from the top or bottom when mounted in the controller. A locking swing out door provides easy access for wiring and covers potential high voltage connections during operation.

For low voltage terminals accepting thermocouple inputs, cold junction compensation is provided by the AI modules.

Terminal blocks are secured to the rack assembly with screws. These screws provide vibration immune terminal connections during operation and also serve as jacking screws when removing modules to minimize the extraction force required.

The rear of the Terminal block provides keying to prevent accidental terminal block insertion into incorrect module slots. Labels are provided to identify module type by name and color, offer wiring instructions and provide an area for customer identification of field circuits. Shorting combs are available for use with Barrier terminal blocks to connect common signal pairs together or to jumper together common signals on AC and Relay output modules.

Shield terminal strips are also available to terminate the shields of shielded cables at the controller.

Sample terminal blocks
(L) 20-terminal high voltage Barrier
(R) 36-terminal Euro
The 31-1 module resides in a remote I/O rack along with the I/O modules. The Scanner 1 and the controller are connected to each other's I/O port (see the photo on the right side of this page). The scanner collects data from the Input modules populated in its remote rack and communicates the information to the controller. Output data is sent from the controller to the Scanner 1 module which in turn sends the data to appropriate output module. Data exchanges are synchronous with the controller scan time to maintain deterministic operation. Diagnostic status of I/O modules is also monitored and reported to the controller when detected. The Rack address of a Scanner 1 is set via DIP switches on the Scanner 1's circuit board. Connection to the controller uses IEEE 802.4 Ethernet 100base-TxPhysical Layer. An external Ethernet switch is required when multiple I/O scanners are used with a single controller. Scanner 1 modules do support removal and insertion under power.

### I/O Scanner Module (900S50x-xxxx)

The I/O Scanner 1 module resides in a remote I/O rack along with the I/O modules. The Scanner 1 and the controller are connected to each other's I/O port (see the photo on the right side of this page). The scanner collects data from the Input modules populated in its remote rack and communicates the information to the controller. Output data is sent from the controller to the Scanner 1 module which in turn sends the data to appropriate output module. Data exchanges are synchronous with the controller scan time to maintain deterministic operation. Diagnostic status of I/O modules is also monitored and reported to the controller when detected. The Rack address of a Scanner 1 is set via DIP switches on the Scanner 1's circuit board. Connection to the controller uses IEEE 802.4 Ethernet 100base-TxPhysical Layer. An external Ethernet switch is required when multiple I/O scanners are used with a single controller. Scanner 1 modules do support removal and insertion under power.

### I/O Scanner

<table>
<thead>
<tr>
<th>Type</th>
<th>I/O Scanner</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status indicators</td>
<td>Scanner: Module status Red/Green LED indicates mode or error</td>
</tr>
<tr>
<td></td>
<td>Expansion I/O port: Green and Yellow LEDs indicate receive/transmit</td>
</tr>
<tr>
<td>Power supply loading</td>
<td>5V; 770 mA max</td>
</tr>
</tbody>
</table>

---

**Terminal styles**

- (top) Barrier
- (middle) Euro
- (bottom) 36-terminal Euro

---

**Number of terminals**

<table>
<thead>
<tr>
<th>Number of terminals</th>
<th>20</th>
<th>36*</th>
</tr>
</thead>
</table>

**Type**

<table>
<thead>
<tr>
<th>Type</th>
<th>I/O Scanner</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal blocks removable</td>
<td>Terminal blocks removable</td>
</tr>
<tr>
<td>(Field power disconnected)</td>
<td>(Field power disconnected)</td>
</tr>
</tbody>
</table>

**Gauge Wires**

<table>
<thead>
<tr>
<th>Type</th>
<th>I/O Scanner</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barrier and Euro: #14 to 26</td>
<td>Euro: #12 to 26 AWG, solid or stranded</td>
</tr>
<tr>
<td>AWG, solid or stranded</td>
<td></td>
</tr>
</tbody>
</table>

**Terminal color**

<table>
<thead>
<tr>
<th>Type</th>
<th>I/O Scanner</th>
</tr>
</thead>
<tbody>
<tr>
<td>High voltage: Red</td>
<td>Black</td>
</tr>
<tr>
<td>Low Voltage: Black</td>
<td></td>
</tr>
</tbody>
</table>

**Contacts**

<table>
<thead>
<tr>
<th>Type</th>
<th>I/O Scanner</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Voltage: Tin Coated</td>
<td>Gold plated</td>
</tr>
<tr>
<td>Low Voltage: Gold Plated</td>
<td></td>
</tr>
</tbody>
</table>

**Contact Style**

<table>
<thead>
<tr>
<th>Type</th>
<th>I/O Scanner</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post and socket</td>
<td>Post and socket</td>
</tr>
<tr>
<td>Tool accessible</td>
<td>Tool accessible</td>
</tr>
</tbody>
</table>

**Cold Junction compensation for thermocouples**

<table>
<thead>
<tr>
<th>Type</th>
<th>I/O Scanner</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes (provided by AI module)</td>
<td>N/A—thermocouples not used</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Required with the following I/O modules: 16 HL AI, 8 AO, 16 AO, 32 DI, 32 DO and 16 AC/DC DI.
I/O Scanner 2 Module (900S75x-xxxx)

The I/O Scanner 2 module resides in a remote I/O rack along with its I/O in a Redundant Controller System. The Scanner 2 has two I/O connections I/O A is connected to CPU-A and I/O B is connected to CPU-B in the Redundant Controller rack. The scanner 2 collects data from the Input modules populated in its remote rack and communicates the information to the Lead controller. Output data is sent from the Lead controller to the Scanner 2 module which in turn sends the data to appropriate output module. Data exchanges are synchronous with the controller scan time to maintain deterministic operation. Diagnostic status of I/O modules is also monitored and reported to the controller when detected.

The Rack address of a Scanner 2 module is set via switches on the module. Connection to both of the redundant controllers is made using both ports, each conforming uses IEEE 802.4 Ethernet 100base-TxPhysical Layer. An external Ethernet switch is required when multiple I/O scanners are used with a single controller. Scanner modules do support removal and insertion under power.

<table>
<thead>
<tr>
<th>Type</th>
<th>I/O Scanner</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status indicators</td>
<td>Scanner: Red/Green LED indicates mode or error</td>
</tr>
<tr>
<td></td>
<td>I/O A Port: Green and Yellow LEDs indicate receive/transmit</td>
</tr>
<tr>
<td></td>
<td>I/O A Port: Green and Yellow LEDs indicate receive/transmit</td>
</tr>
<tr>
<td>Power supply loading</td>
<td>5V; 770mA max</td>
</tr>
</tbody>
</table>

Process Scanner (left) Safety Scanner (right)
Redundant Switch Module (RSM) (900RSM-xxxx)

The Redundant Switch Module resides in a ControlEdge HC900 Redundant controller rack and interfaces with both CPUs of a redundant system and indicates which CPU is functioning as the Lead controller and which is the Reserve. A key switch on the module sets the mode of both the Lead and Reserve controllers, guaranteeing synchronization of CPUs. A momentary contact position of the key switch allows the user to switch the Lead control function from CPU-A to CPU-B or vice versa.

The RSM module supports insertion and removal under power.

<table>
<thead>
<tr>
<th>Type</th>
<th>Redundant CPU Status and Mode control Module</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead/Reserve indication</td>
<td>Green arrow LEDs</td>
</tr>
<tr>
<td>Mode Switch</td>
<td>Removable key (2 keys supplied), three stationary positions, one momentary</td>
</tr>
<tr>
<td>Power Supply Loading</td>
<td>5V; 22mA max</td>
</tr>
</tbody>
</table>

Power Status Module (PSM) (900PSM-xxxx)

The Power Status Module resides in a local or remote I/O rack containing redundant power supplies. The PSM and second power supply are contained in a rack extension assembly adjacent to the power supply slot position. The PSM module is positioned in a dedicated slot between the two power supplies.

Redundant power and the PSM may be used with a Controller rack with local I/O, a Scanner 1 rack with remote I/O controller racks of non-redundant systems and a Scanner 2 rack with remote I/O racks of redundant systems.

Directional indicators on the module indicate when both voltage sources of the power supply are operating properly.

<table>
<thead>
<tr>
<th>Type</th>
<th>Redundant Power Supply Status indicating Module</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status indication</td>
<td>Green directional indicators using LEDs</td>
</tr>
<tr>
<td>Power Supply Loading</td>
<td>5V; 22mA max</td>
</tr>
</tbody>
</table>
Remote Terminal Panels

DIN rail mounted Remote Terminal Panels (RTPs) are available for use with pre-wired cables to reduce installation time and labor expense. Three types of RTPs are available: for analog inputs, for relay outputs, and for other I/O modules. Three cable lengths are also available to match hardware to installation variations. Analog input RTPs include transmitter shunt resistors and transmitter power terminals with individual circuit fuses. The Relay Output RTP includes a fuse and power disconnect switch for each output. All RTP panels switch field power to allow module removal and installation under controller power. All RTPs are qualified as non-interfering for SIL-2 application.

<table>
<thead>
<tr>
<th>Mounting</th>
<th>Provides connection of field wiring to controller I/O within an enclosure only.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard 35mm wide DIN Rail</td>
<td>4.38” (111.1 mm) x 3.70” (94.0mm) x 2.60” (66.0mm) (L x W x H)</td>
</tr>
<tr>
<td>Cables</td>
<td></td>
</tr>
<tr>
<td>High voltage</td>
<td>Lengths: 1.0, 2.5, 5.0 meters. Cable power is limited to 24 Amps per module at 60C (140 degrees F) and 32 Amps at 54C (129 degrees F).</td>
</tr>
<tr>
<td>Low voltage</td>
<td>Lengths: 1.0, 2.5, 5.0 meters.</td>
</tr>
</tbody>
</table>
Remote Terminal Panel for Analog Input Modules (900RTA-xxxx)

The Analog Input RTP integrates some of the typical externally connected components such as switch selectable shunt resistors for current loops and common power supply terminals with individual fuses for powering two-wire transmitters. A power switch is provided to disconnect power from all transmitters for I/O module maintenance.

The RTP also minimizes the need for multiple wires under a single screw connection by expanding the connectivity of the shared terminals of the I/O module.

The analog input RTP cannot be used for thermocouple inputs.

Note:
You must set switches 1-8 for transmitters.
Remote Terminal Panel for Analog Input Modules (900RTA-xxxx) (cont’d)

<table>
<thead>
<tr>
<th>Analog input Module</th>
<th>Excludes Thermocouple Input types.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Accuracy De-rating (Module + RTP)</td>
</tr>
<tr>
<td></td>
<td>100 ohm Plat. RTD = +/- 0.14% of range</td>
</tr>
<tr>
<td></td>
<td>JIS RTD = +/- 0.22% of range</td>
</tr>
<tr>
<td></td>
<td>10 ohm Cu. RTD = +/- 0.67% of range</td>
</tr>
<tr>
<td></td>
<td>200 ohm = +/- 0.17% of range</td>
</tr>
<tr>
<td></td>
<td>0 – 10 mV = +/- 0.14% of range</td>
</tr>
</tbody>
</table>

Transmitter power

<table>
<thead>
<tr>
<th>Common supply terminals – selectable per circuit.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuse per circuit - 80mA, time lag type</td>
</tr>
</tbody>
</table>

Shunt Resistor

<table>
<thead>
<tr>
<th>Selectable per circuit</th>
</tr>
</thead>
<tbody>
<tr>
<td>250 Ohms, 0.05% - 15ppm</td>
</tr>
</tbody>
</table>

Remote Terminal Panel for Relay Output Modules (900RTR-xxx)

The RTP for Relay Output modules provides individual fuses for each output. A load disconnect switch is also provided for each output to support maintenance of the relay module under instrument power.

 Relay Output RTP | Used with Relay Output Module |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Relay common disconnect per circuit</td>
</tr>
<tr>
<td></td>
<td>Fuse per circuit – 6.3A, time lag type</td>
</tr>
<tr>
<td></td>
<td>24A maximum per RTP</td>
</tr>
</tbody>
</table>
Remote Terminal Panel for Other ControlEdge HC900 Modules (900RTS-xxxx)

Remote Terminal Panel(s) may be used with the following ControlEdge HC900 I/O Modules:

- 16 channel safety UIO module
- 16 Point Digital Input Module, Contact Type
- 16 Point Digital Input Module, AC & DC Types
- 8 Point Digital Output Module, AC type
- 16 Point Digital Output Module, DC type
- 4/8/16 Point Analog Output Module
- 16 Point Digital Input Module, AC/DC types not available

Jumpers on the Remote Terminal Panel may be positioned to accommodate the above input and output modules. A switch on the module is used to disconnect field power from I/O modules to facilitate maintenance of the module under instrument power.
Sales and Service
For application assistance, current specifications, pricing, or name of the nearest Authorized Distributor, contact one of the offices below.

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Specifications are subject to change without notice.

For more information
To learn more about ControlEdge HC900 Controller,
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Or contact your Honeywell Account Manager

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