Scadaflex RIO
Packaged Remote I/O Modules
Wireless or Wired

Scadaflex Remote I/O (RIO) Modules extend the I/O capacity of Scadaflex II SCADA controllers. They are offered in three versions that differ in the type of communications interface: license-free mesh radio, traditional spread spectrum radio, or a hardwired RS-485 network. The spread spectrum radio and RS-485 versions may also be used with third party equipment since they support standard Modbus RTU communications. The mesh radio version must be used with either Scadaflex II or Modulus SCADA controllers from Industrial Control Links.

RIO modules are prepackaged in rugged polycarbonate enclosures, ready to be installed. Up to 254 modules can reside on a single network.

RIO modules are designed for ease of installation. Other than setting a network address, there are no hardware field setup requirements. Any operation adjustments are made via register communications from a Master (Host) controller. If a module must be exchanged in the field, all field device wiring terminates to removable terminal plugs.

SOFTWARE CONFIGURABLE ANALOG INPUTS
RIO modules have 4 high-resolution analog inputs, individually software configurable to accept 20mA, 5V, +/-250mV, resistance, and thermistor temperature sensors. There are no jumpers or switches.

OPTICALLY ISOLATED DISCRETE INPUTS
RIO modules have 10 optically isolated discrete inputs that reject surges and ground loops. The inputs are bipolar, accepting AC signals, or DC signals of either polarity.

HIGH SPEED DISCRETE INPUT
RIO modules have a high-speed discrete input that accepts contact closure, open collector, and low-voltage DC input signals. The input can totalize pulses in excess of 10KHz.

RELAY DISCRETE OUTPUTS
RIO modules have 10 relay discrete outputs with integral snubber protection against inductive transients. A built-in safety watchdog can be set to shut the outputs off if the communications link fails.

MESH RADIO COMMUNICATIONS OPTION
RIO modules are available with a built-in mesh radio that is compatible with LPR I/O modules, and Scadaflex II and Modulus controllers. Mesh radios form a wide-area network with every node automatically able to serve as a repeater for any modules that cannot get through directly. Mesh networks are “self healing”; if a node drops out, others take over the repeater functions. RIO modules support the same network protocol used by the battery powered LPR I/O modules and can extend the total network coverage area accordingly. The mesh radios have a range of up to about two miles with the supplied antenna, or much farther with elevated higher gain antennas, covering many square miles.

SPREAD SPECTRUM RADIO COMMUNICATIONS OPTION
RIO modules are available with a traditional license-free spread spectrum radios. The main advantage of this radio over the mesh counterparts is improved point-to-point range when the mesh automatic repeater functionality is not required (the spread spectrum radios have approximately 9dB improved sensitivity).

RS-485 COMMUNICATIONS OPTION
RIO modules are available with an RS-485 hardwired interface for low-cost shorter distance communications. A bused pair of RJ-45 (Ethernet) connectors and Ethernet cables join the RIO modules together with a Scadaflex II controller. Twisted pair wire up to several thousand feet may also be used. The hardwired RIO modules support industry standard Modbus RTU communications supported both by ICL controllers as well as many third party devices.

AUTOMATIC FIRMWARE UPDATES
Mesh radio versions of RIO modules are automatically updated “over-the-air” when new firmware is uploaded into the master Scadaflex II or Modulus controller. No manual intervention or technical expertise is required.

EXTENDED TEMPERATURE OPERATION
RIO modules operate from –40°C to +70°C.

Scadaflex RIO Packaged Remote I/O Modules
10DI, 1PI, 10DO, 4AI
29-1010 RS-485 Interface
29-1011 1/4W 900MHz Mesh Radio
29-1012 1/4W 900MHz Spread Spectrum Radio
AC Power option
29-9001 110/220 Vac Power
## Scadaflex RIO Remote I/O Modules—Specifications

### FIELD I/O

<table>
<thead>
<tr>
<th>Digital Inputs:</th>
<th>10</th>
<th>Optically Isolated (AC/DC, not polarity sensitive)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Range:</td>
<td>0 to 30Vdc (ON= &gt;9V, OFF &lt; 6V), <strong>60Vdc absolute maximum</strong></td>
<td></td>
</tr>
<tr>
<td>Input Current:</td>
<td>0.5mA (Internal current source)</td>
<td></td>
</tr>
</tbody>
</table>

**High-speed Pulse Input:** 1 Non-isolated DC or contact closure, DC to 20KHz maximum—16-bit rate and 32-bit totalizer registers

**Input Range:** Contact closure or open collector driver to ground, or 0 to 30Vdc (ON=<1.5V, OFF > 2.5V), **60Vdc absolute maximum**

**Input Current:** 0.5mA (internal current source)

**Digital Outputs:** 10 Relay contacts, Form A (normally open)

**Contact Output Rating:** 240/277 Vac, 30Vdc, 3A maximum per output (resistive load). **Do not exceed 8A total of all outputs**

**Analog Inputs:** 4

**Input Ranges:**
- 20mA
- +/- 250mV
- 65,000 ohms
- Maximum signal level: 35Vdc on any range

### COMMUNICATIONS

**Serial Interface Option:** 1 [29-1010] RS-485

<table>
<thead>
<tr>
<th>Baud Rates (all ports)</th>
<th>115K, 38.4K, 19.2K, 9600, 4800, 2400, 1200 baud</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protocols</td>
<td>Modbus RTU (slave)</td>
</tr>
</tbody>
</table>

**Radio Interface Options:** 1 [29-1011] 900MHz 1/4W (24dBm) Meshing radio, -101 dBm sensitivity @ 200kbps

- Proprietary ultra low-power protocol (optimized power-down/sleep), or

- [29-1012] 900MHz 1/4W (24dBm) Frequency Hopping Spread Spectrum radio, -110 dBm sensitivity @ 10kbps, Modbus RTU (slave)

### GENERAL

**Input Power:** 10Vdc to 30Vdc

| Relays OFF, idle      | 20mA @ 10Vdc, 17mA @ 12Vdc, 10mA @ 24Vdc |
| Relays OFF, transmitting | 28mA @ 10Vdc, 26mA @ 12Vdc, 15mA @ 24Vdc |
| Add per ON relay     | 13mA @ 120Vdc, 11mA @ 12Vdc, 6mA @ 24Vdc  |

**Field Wiring Termination:** Screw terminal blocks, 3.5mm, 22 to 14GA wires

**Antenna Connector:** [29-02x0]: RPSMA female (male pin center conductor)

**Temperature:** -40°C to 70°C (operating), -40°C to 85°C (storage)

**Humidity:** <95% RH (non-condensing)

**Enclosure:** 8"(H) x 4"(W) x 3"(D), Polycarbonate, wall mounting hardware provided

**Electrical Entrance/Exit:** Pre-drilled for 3/4" conduit fitting

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Specifications subject to change without notice. Consult factory to ensure that you are working with current information.
Scadaflex RIO Packaged Remote I/O Modules—WIRING

Refer to the installation manual for additional installation details and precautions.

The RS-485 serial version of RIO module is pictured on the left. Field wiring is identical for all RIO modules, wired or wireless.

### Serial Port Connectors (bused together)

<table>
<thead>
<tr>
<th>Pin#</th>
<th>RS-485 Function</th>
<th>Wire Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RS-485+</td>
<td>Orange/White</td>
</tr>
<tr>
<td>2</td>
<td>RS-485-</td>
<td>Orange</td>
</tr>
<tr>
<td>3</td>
<td>Gnd</td>
<td>Green/White</td>
</tr>
<tr>
<td>4</td>
<td>Blue</td>
<td>Blue</td>
</tr>
<tr>
<td>5</td>
<td>Blue/White</td>
<td>Brown/White</td>
</tr>
<tr>
<td>6</td>
<td>Brown/White</td>
<td>Brown</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
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