The wireless alternative to expensive cabling...

ELPRO 905U

New Products... New Solutions

The ELPRO 905U range of wireless I/O provides a low cost alternative to expensive signal wire installations, over short or long distances. Transducer and control signals connected at one module (input signals) are transmitted to other modules where the signals are re-created as output signals, or passed via a data bus to a host device such as a PLC, DCS or SCADA system.

Easy to Use

The ELPRO 905U wireless I/O range is easy to use and simple to install. The modules are completely integrated, including micro controller, input/output (I/O) circuits, radio transceiver, RS485/232 serial port and power supply with battery backup facilities.

Each module is housed in an industrial strength extruded aluminum case, with plug-in terminal strips for ease of wiring connection and maintenance

905U Wireless I/O Modules

The 905U modules provide a wireless radio link for discrete (switch contact), pulse/counter and analog signals. The 905U also has a RS485 multidrop serial port, for communications to I/O expansion modules.

105S Serial I/O Modules

The 105S serial I/O modules communicate via RS485 multidrop. RS485 is a method of transmitting between many devices using a common twisted pair wire. The maximum length of the wire is typically 4000 feet (1200 m).

105S modules can be used as a dedicated twisted-pair I/O system, or as I/O expansion for 905U modules. Each 905U can connect to up to 31 serial modules. This combination of wireless and serial I/O provides a powerful I/O network for factory automation and process instrumentation.

Two-way Communications

The 905U internal radio is a transceiver - a transmitter and receiver. Because the 905U can communicate in both directions, each module is capable of both input and output signals. Both monitoring (input) and control (output) functions are provided on 905U and 105S modules

Simple, Reliable and Secure!

The ELPRO 905U system uses a very reliable transmission protocol designed for secure communications. Because 905U modules use two-way transceivers, modules are able to communicate with each other to control the flow of information. By using "listen before transmit" technology, error-checking, handshake acknowledgments and auto re-transmissions, the 905U achieves an extremely high level of reliability even in the presence of external radio nterference

The 905U uses exception-reporting messaging, transmitting when an input signal changes - that is, when a discrete (switch contact) input turns off or on, or when the value of an analog input changes by a user-configurable amount. The 905U provides immediate real-time communications with low radio band usage, which polling or time-scan systems can not achieve

There are also regular self-checking update transmissions to check I/O values and to check the integrity of the communication path. Communication failure alarms can be configured for transmission-failure or fail-to-receive events.

Networking

The I/O network can comprise up to hundreds of modules, using peer-to-peer communications. There is no network master, and any module can communicate with every other module. Any input can be linked to any output using a simple network configuration program, provided with each module. Each input can be configured to several outputs at different remote modules.

I/O modules are configured with a system address and a unit address. Only modules with the same system address will communicate within the same system. Multiple systems can operate within the same radio range without "cross-talk" or malfunction

The wireless alternative to expensive wiring...

Security Encryption

The 905U uses high security data encryption and frequency encoding algorithms to protect against theft of wireless data (industrial espionage) or malicious wireless attack ("hacking").

Only other 905U modules with the correct security keys can understand the wireless messages.

Variety of I/O Configurations

There are four I/O versions available in the 905U and 105S modules. All modules in the ELPRO range use the same flexible and reliable operating protocol. Different I/O versions will operate together in the one system, and different 105S versions can connect to each 905U version

Modules provide different combinations of the following I/O :

- discrete inputs for switch devices such as limit switches, level switches, security sensors, motor starters, pushbuttons
- analog inputs (mA or voltage) for connecting transducers which measure parameters such as level, flow, pressure, temperature, vibration
- discrete outputs (relay contacts or transistor) for controlling devices such as motor drives, indicating lights, alarms
- analog outputs (mA or voltage) for connection to meters or indicators to display measured parameters.
- pulse/counter inputs and outputs for transmitting totalization signals from flowmeters, energy meters etc.

Analog I/O

The 905U-1 module has two inputs which will accept 4-20mA analog signals. The first of these inputs has adjustable setpoints. The –1 module also has two 4-20mA outputs.

The 905U-2 module has six inputs which will accept 0-20/0-10/4-20 mA or 0-5V signals. The first four analog inputs have adjustable setpoints.

The 905U-3 module provides eight analog outputs with a range of 0-20mA or 0-5V. These outputs will reflect the same value as the analog input linked by the configuration program.

Analog Setpoints

High and low setpoints can be configured for the analog inputs to control a remote discrete output. The discrete output will set ("on") when the analog input value drops below the low setpoint and will reset ("off") when the analog value exceeds the high setpoint. The high and low setpoints can be the same value such that the discrete output sets and resets at the same setpoint value.

Pulse I/O

The 905U modules can be configured to count a pulse input and transmit the accumulated count to a remote module. At the destination module the pulse signal is recreated - the accumulated value is used to ensure that all input pulses are output accurately. The 905U can also transmit the pulse input rate as a separate analog value and the rate signal is output as an analog value at the destination module.

Pulse I/O will operate up to 100Hz. One pulse input (DI1) on the 905U-2 module will operate to 1000Hz, with a configurable 1/10 divider.

Fail-Safe Outputs

Discrete and analog outputs can be configured to individually reset if communications has failed to the module. The user can configure a "comms-fail" timeout - if no communications is received for this time period, the configured output will reset

	905 U-1	105 S-1	905 U-2	105 S-2	905 U-3	105 S-3	905 U-4	105S-4
Radio Port	'		'		'		'	
Serial Port	1	1	1	1	1	1	1	1
Digital inputs	4		4		0		4 - 16	
Digital outputs	4				8		4 - 16	
Analog inputs	2		6		0		0	
Analog outputs	2		0		8		0	
Pulse inputs			4		0		4	
Pulse outputs			0		4		4	

Pulse and digital I/O are same.
The **105-4** has 4 fixed inputs and 4 fixed outputs and 12 which may be either input or output.

...Low cost, easy to use and secure!

Industrial Automation
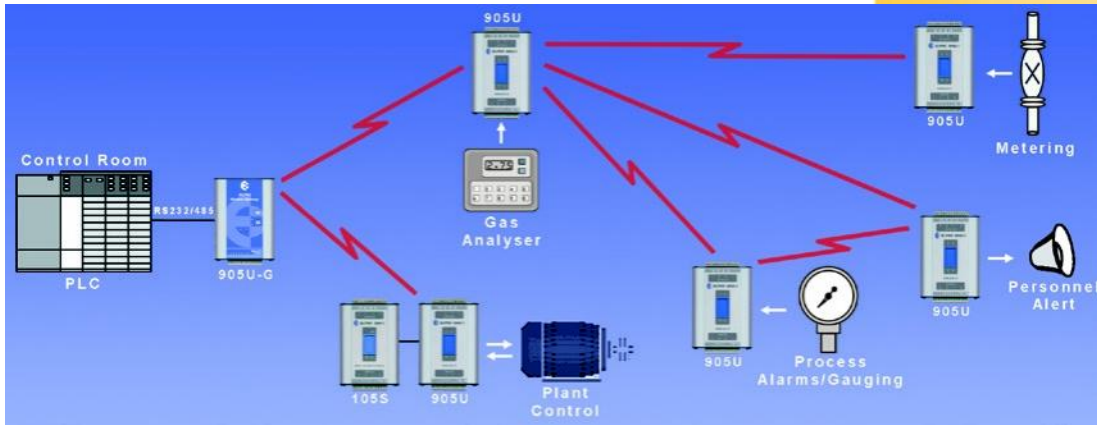

Interfacing to Other Systems

A 905U network can include 905U-G Wireless Gateways - these modules interface to a wide variety of data buses such as Ethernet, Profibus, Modbus and Devicenet. A network comprising wireless I/O and wireless gateways is called a "WIB".
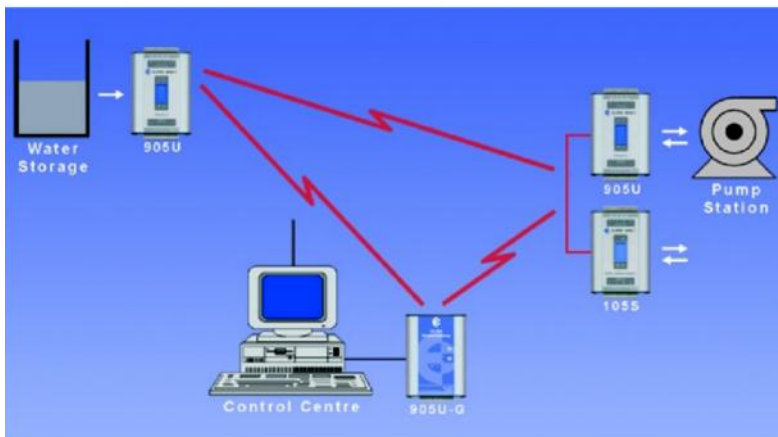
The ELPRO WIB

The ELPRO WIB, or Wireless Instrumentation Backbone, provides wireless inter-connectivity for different data buses and direct I/O. By using ELPRO's neutral radio protocol, different data buses in various plant areas can be linked, without wiring. Direct I/O signals can be incorporated using the 905U wireless I/O modules

The ELPRO WIB removes the largest cost component of collecting plant information - wiring; and solves the largest constraint to sharing plant information - data bus compatibility.

WIB Networking
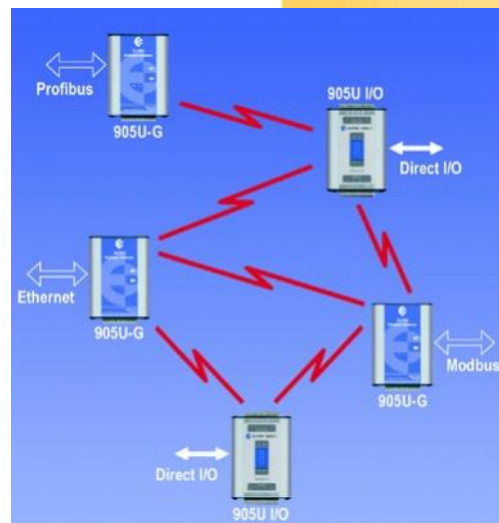
Water Supply Utilities

ELPRO 905U Wireless I/O

Radio Communications

The ELPRO 905U uses frequency hopping spread spectrum and operates in the license-free 900MHz radio band. These products can be used without a radio license

Radio Range

Typical line-of-sight radio distances are:

20 miles in USA/Canada (4W ERP)

20 km in Australia/NZ (1W ERP)

The actual operating distance depends on many factors such as obstructions in the radio path, height of antennas and the type of antennas used. Line-of-sight is not necessary for short distances, as the radio signal will penetrate obstacles or reflect from surfaces. Typical distance in plant and factory environments is 3000 feet (1 km).

The 905U provides a measurement of both background radio noise and radio signal strength to assist with installation and testing.

Repeater Functionality

Each 905U module also provides a repeater function. If a reliable radio path cannot be established between two modules, the radio message can be passed via another 905U module working as a repeater. The repeater module acts as an intermediate module between the two ends of the radio link. Messages can be repeated up to five times by intermediate repeater units, allowing very long radio paths to be achieved. Repeaters are not dedicated units - they are normal modules with their own I/O

Configuration

The 905U modules are easy to configure, using a Windows-based configuration program, supplied with each module. The configuration file can be downloaded or uploaded by connecting to the module RS232 serial port.

Configuration files can be password protected for secure archival.

Diagnostics & Testing

The 905U provides diagnostic and test functions via the configuration software. I/O and communication functions can be tested and verified

The diagnostics features include radio signal measurement, allowing radio paths to be easily tested without any additional test equipment.

Power Supply

The ELPRO 905U includes a switch-mode power supply which will accept a variety of voltage sources. The 905U will operate from a DC supply of 11 to 30 volts or an AC supply of 15 to 24 volts. Connection to 110/240V power is made via a small transformer adaptor. The internal power supply includes a battery charger for battery backup, allowing the 905U to be powered from non-secure power circuits. The power supply also includes a solar regulator for direct connection of solar panels.

The power supply is intelligent and will automatically alarm on loss of normal supply, loss of solar charging or low battery voltage. These alarm signals can be transmitted to remote modules as discrete status signals; the battery voltage value can be transmitted as an analog value for remote trending.

Each module generates a 24V regulated supply (150mA) for analog loop power. The 24V is available for the full range of input supply voltage.

Specifications

General

Temperature   -40 to 140 degF (-40 to 60 degC)
Humidity   0 - 99 %RH
EMC   FCC Part 15, AS3548
Housing - extruded aluminum case, 5.1" x 7.3" x 2.4"
(130 x 185 x 60mm) with DIN rail mounting
Removable terminals up to 12 gauge (2.5sqmm) wiring
LED indication for power supply, OK status, digital I/O

Inputs and Outputs

Discrete Inputs

suitable for voltage free contacts or NPN transistor, contact
wetting current 5mA, "debounce" delay configurable
0.1 – 8 sec
905-1   four inputs
905-2   four inputs
905-4   up to 16 inputs (4 fixed + 12 selectable)

Discrete Outputs

905-1   four relay contacts, Form A
            AC 50V 5A, DC 30V, 2A
905-2   one FET output 30VDC 500mA
905-3   eight FET outputs 30VDC 500mA
905-4   up to 16 FET output (4 fixed + 12 selectable)

Analog Inputs

"floating" differential inputs, common mode voltage 27V,
loop power 24V provided, filtering configurable 0.1 - 8 sec.
905-1   two 4-20mA, resolution 15 bit, accuracy 0.1%
905-2   six 0-20mA (0-5V factory option),
            resolution 12 bit, accuracy 0.1%

Analog Outputs

current sink to common, max loop voltage 27V, max loop
resistance 1000 ohms
905-1   two 4-20mA, resolution 15 bit, accuracy 0.1%
905-3   eight 0-20mA (0-5V factory option),
            resolution 12 bit, accuracy 0.1%

Pulse Inputs

Pulse inputs use discrete input channels
Max pulse rate 100Hz, pulse width min 5msec
905-1   one input (DI1)
905-2   four inputs (DI1-4); first PI (DI1) max 1KHz
            using configurable 1/10 multiplier
905-4   four inputs (DI1-4); first PI (DI1) max 1KHz
            using configurable 1/10 multiplier

Pulse Outputs

FET 30VDC 500mA max 100Hz
905-1   one dedicated PO
905-3   four (DO1-4)
905-4   four (DO1-4)

Power Supply

Battery supply 11.5-15.0 VDC
Normal supply 12-24 VAC or 15-30 VDC, overvoltage and
reverse power protected
110-250 VAC supply available via transformer adapter
Battery charging circuit included for 1.2-12 AHr sealed battery
Solar regulator for direct connection of solar panel (up to
30W) and solar battery (100AHr)
Internal monitoring of normal supply fail, solar charge status,
and battery voltage. These values may be transmitted to
remote modules for monitoring.
An internal DC/DC converter provides 24VDC 150mA for
analog loop supply.

Radio Transceiver

Frequency hopping spread spectrum
        USA/Canada   902-928 MHz
        Australia   915-928 MHz
        New Zealand   921-928 MHz
Approved to FCC Part 15.247, RS210
Transmit power 1W
Line-of-sight range, dependant on local conditions
        USA/Canada, 4W ERP, 20 miles
        Australia/NZ, 1W ERP, 20 km
Typical range in industrial plants/factories 3000 feet (1 km)
Range may be extended by using up to five intermediate
905U modules as repeater units
Antenna connector is SMA coaxia

Serial Port

RS232/RS485 9600 baud, 8 bits, no parity, 1 stop bit
RS232   9pin DB9 male connector
RS485   terminal connector, max distance 4000' (1.2 km)

Data Transmission

Data transmission uses exception reporting plus integrity
update transmissions. The period for update transmissions
is user-configurable.
Radio protocol includes 64 bit security encryption, system
and unit addressing, peer-to-peer I/O mapping, 16 bit CRC
error checking, acknowledgement of error-free transmissions
and automatic retries.
Communications failure status may be configured as a
discrete output. Resetting of outputs on communications
failure is configurable.
Transmission rates   Radio 19200 baud   Serial 9600 baud
Typical radio message transmission time 36 msec

Area Approval

USA/Canada Class 1 Div 2 Groups A, B, C, D Temp T6

Specifications subject to change without notice