The wireless alternative to expensive cabling...

WIB ready

Wireless Solutions for Process Applications

New Products ... New Solutions

The ELPRO 105U 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 105U 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 aluminium case, with plug-in terminal strips for ease of wiring connection and maintenance.

105U Wireless I/O Modules

The 105U modules provide a wireless radio link for discrete (switch contact), pulse/counter and analog signals. The 105U 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 1200 m.

105S modules can be used as a dedicated twisted-pair I/O system, or as I/O expansion for 105U modules. Each 105U 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 105U internal radio is a transceiver - a transmitter and receiver. Because the 105U 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 105U and 105S modules.

Simple, Reliable and Secure!

The ELPRO 105U system uses a very reliable transmission protocol designed for secure communications. Because 105U 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 105U achieves an extremely high level of reliability even in the presence of external radio interference.

The 105U 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 105U 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 105U 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 105U 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 105U 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 105U 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 105U-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 105U-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 105U-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 105U 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 105U 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 105U-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 "commsfail" timeout - if no communications is received for this time period, the configured output will reset.

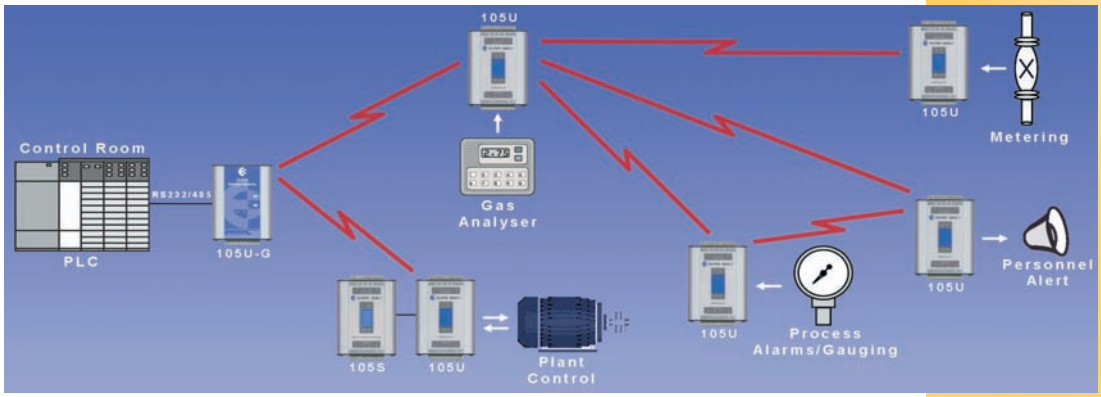
	105U-1	105S-1	105U-2	105S-2	105U-3	105S-3	105U-4	105S-4
Radio Port	☒		☒		☒		☒	
Serial Port	☒	☒	☒	☒	☒	☒	☒	☒
Digital inputs	4		4		0		4 - 16	
Digital outputs	4		1		8		4 - 16	
Analog inputs	2		6		0		0	
Analog outputs	2		0		8		0	
Pulse inputs	1		4		0		4	
Pulse outputs	1		0		4		4	

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!

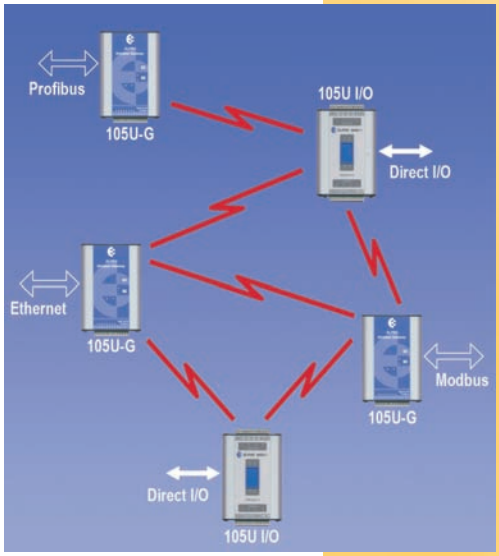
Industrial Automation



WIB Networking

Interfacing to Other Systems

A 105U network can include 105U-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".

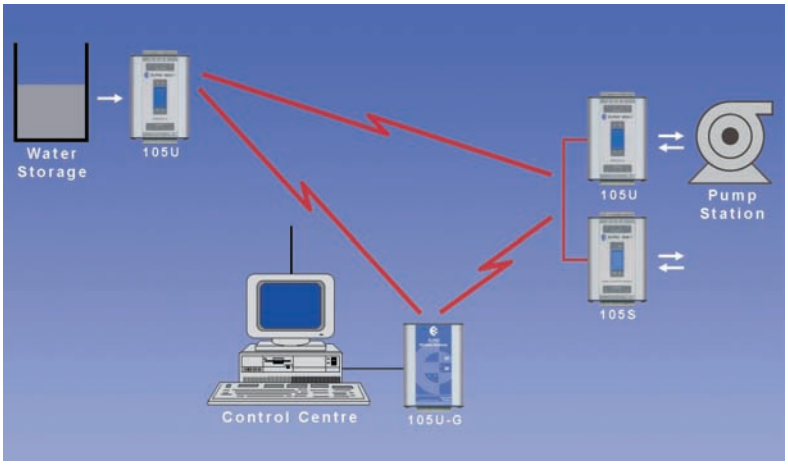


The ELPRO WIB

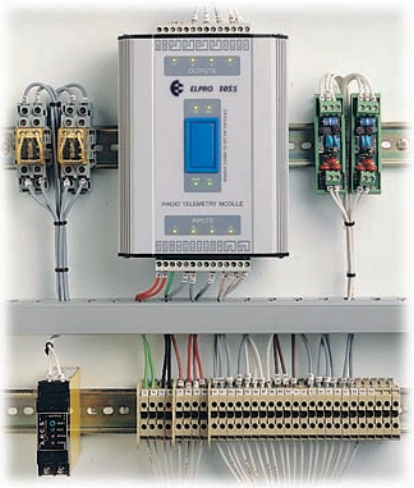
The ELPRO WIB, or Wireless Information Backbone, provides wireless inter-connectivity for different data buses and direct I/O. By using ELPRO's neutral radio protocol, different data buses in various plant areas can be linked, without wiring. Direct I/O signals can be incorporated using the 105U wireless 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.

Water Supply Utilities



ELPRO 105U Wireless I/O



Radio Communications

The ELPRO 105U uses a fixed frequency radio, available in several bands to suit different countries. Models are available for both licence-free and licenced radio channels. Radio channels within licence-free bands can be changed by software configuration. If one radio channel is heavily used, another can be easily selected.

Radio Range

Depending on country regulations, distances of up to 10km can be achieved in licence-free bands, and more than 40km in licenced channels.

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.

The 105U provides a measurement of both background radio noise and radio signal strength to assist with installation and testing.

Repeater Functionality

Each 105U 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 105U 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 105U 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 105U 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 105U includes a switch-mode power supply which will accept a variety of voltage sources. The 105U 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 105U 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.

WHAT IS WIRELESS I/O?

Wireless I/O, or Radio Telemetry, is a method of transmitting information by radio. Signals such as switch status or analog signals can be transmitted to a remote location, and the signals "re-created".

APPLICATIONS

- Process plants
- Factories
- Warehouses
- Agriculture
- Mining
- Irrigation
- Security
- Overhead cranes
- Manufacturing plants
- Marine and ports
- Water and sewerage
- Tank farms
- Building management
- Lighting control
- PLC interconnection
- Mobile vehicles
- Rotating machinery

… anywhere you need a wire to carry a signal.

Specifications

General

Temperature -20 to 60 degC (-40 to 60 degC for 869 MHz units)
Humidity 0 - 99 %RH
EMC Compliant 89/336/EEC, EN55022, EN50082-1,AS3548
Housing - extruded aluminium case
130 x 185 x 60mm with DIN rail mounting
Removable terminals up to 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

105-1 four inputs
105-2 four inputs
105-4 up to 16 inputs (4 fixed + 12 selectable)

Discrete Outputs

105-1 four relay contacts
AC 50V 5A, DC 30V, 2A
105-2 one FET output 30VDC 500mA
105-3 eight FET outputs 30VDC 500mA
105-4 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.

105-1 two 4-20mA, resolution 15 bit, accuracy 0.1%
105-2 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

105-1 two 4-20mA, resolution 15 bit, accuracy 0.1%
105-3 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

105-1 one input (DI1)
105-2 four inputs (DI1-4); first PI (DI1) max 1KHz using configurable 1/10 multiplier
105-4 four inputs (DI1-4); first PI (DI1) max 1KHz using configurable 1/10 multiplier

Pulse Outputs

FET 30VDC 500mA max 100Hz

105-1 one dedicated PO
105-3 four (DO1-4)
105-4 four (DO1-4)

Power Supply

Battery supply 11.5-15.0 VDC
Normal supply 15-24 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

Single channel, synthesised, direct frequency modulation
Frequency / Channel spacing / Transmitter power / Range
405-490 MHz / 12.5 KHz / 10-500mW / 10km
400-500 MHz / 12.5 KHz / 1-5W / 40km
220-235 MHz / 25 KHz / 5W / 40+ km
869 MHz / 250 KHz / 500mW / 5km
Conforms to EN 300 220 for licence-free models, EN 300 113 for licenced models.
Range can be extended by using up to five intermediate 105U units as repeaters.
Antenna connection is BNC or SMA (869 MHz only) and protected by internal gas discharge arrester (400 MHz band only)

Serial Port

RS232/RS485 9600 baud, 8 bits, no parity, 1 stop bit
RS232 9pin DB9 male connector
RS485 terminal connector, max distance 1200m

Data Transmission

Data transmission uses exception reporting plus integrity update transmissions. The period for update transmissions is user-configurable.
Radio protocol includes 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.

ELPRO Technologies

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BRO_105U_ELP_3.2