The wireless alternative to expensive cabling...

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New Products ..... New Solutions

The ELPRO 105 range of telemetry modules provide remote monitoring and control by radio or twisted-pair wire, over short or long distances. Transducer signals connected at one module (input signals) are transmitted to another module where the signals are re-created as output signals, or passed via RS232/485 to a host device such as a PLC or SCADA system.

Easy to Use

The ELPRO 105 range of telemetry modules have been designed to be easy to use and simple to install. The modules include power supply, microprocessor controller, input/output (I/O) circuits, radio transceiver and/or serial transceiver (RS485/232). The 105 modules are completely integrated and ready for use. They are housed in a strong extruded aluminium case, with plug in terminal strips for ease of wiring connection and maintenance.

105U Radio Telemetry Modules

The ELPRO 105U radio telemetry modules are a low cost alternative to cable installations. The 105U provides a wireless radio link for digital (switch contact), pulse and analogue signals. As well as radio communications, the 105U has a port for RS485 multidrop twisted pair cable, enabling communications to 105S serial telemetry modules.

105S Serial Telemetry Modules

The 105S range of modules provide communications 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 2000 metres. This method of communications is particularly suitable for enclosed factory environments, where distances between modules are not very far, however radio paths may be obstructed. 105S modules may be used as a separate multi-drop I/O system, or as I/O expansion for 105U modules.

In factories or building environments, groups of 105S modules, connected by RS485 multidrop, may also transmit information by radio to another remote multidrop group in another building. For example, several buildings on a large site may be connected by radio links, with signals inside the buildings being conveyed by multidrop twisted-pair.

Simple but Reliable

The ELPRO 105 modules use a very reliable transmission protocol designed for secure communications, even with external interference. Because 105 modules have transceivers, modules are able to communicate with each other to control the flow of information.
Transmissions occur when an input signal changes. That is, when a digital (switch contact) input turns off or on, or when the value of an analogue input changes by a pre-configured amount. The 105 provides real-time communications, which polling systems cannot achieve.

There are also regular update transmissions to check the value of the input signals and to check the integrity of the communication path. The status of the communications path is available as an alarm output.

The input signals are transmitted in a "data frame" which includes the address of the transmitting module, the address of the destination module, and a CRC error check. The error check is used to ensure that there is no corruption of the data frame during transmission.

Each module will wait until the radio channel is "free" before transmitting a message. When the destination module receives the message, it will check the validity of the message and transmit a return acknowledgment - a "handshake". If the original module does not receive this acknowledgment, then it will resend the message another four times. Using this simple but secure communications protocol, the 105 provides reliable operation even in noisy environments.

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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 every 105U module.

Variety of I/O Configurations

The 105 range of products include the 105-1, 105-2, 105-3 and 105-4 modules with various I/O configurations. All modules in the ELPRO 105 range include the same flexible and reliable operating protocol. Different versions will operate together in the one system. Each module provides different combinations of the following I/O :

- digital inputs for switch devices such as limit switches, level switches, security sensors, motor starters, pushbuttons
- analogue inputs (0-10 / 0-20 / 4-20 mA) for connecting transducers which measure parameters such as level, flow, pressure, temperature, vibration
- digital output contacts for controlling devices such as motor drives, lights, alarms
- analogue outputs (0-10 / 0-20 / 4-20mA) for connection to meters or indicators to display measured parameters.
- pulse inputs and outputs for transmitting pulse signals from flowmeters, energy meters etc.

Networking

Each ELPRO 105 module is configured with a system address and a unit address. Only modules with the same system address will communicate within the same system.

More than one system may operate within radio range or on the same multidrop wire without “cross-talk” or malfunction. A system may comprise a simple two unit network, with input signals at one module appearing as outputs at the other. Or a system may comprise up to 95 105U modules communicating by radio, with each module connected to up to 31 105S modules via RS485. Any input may be configured to be transmitted to an output on any other modules.

Interfacing to Other Systems

A 105 network may also connect via RS232 or RS485 to a host device such as a supervisory computer or PLC. The host device will receive the status of input signals, and may set the value of output signals. Interfaces are available for many PLC’s and SCADA software packages. A MAP27 interface is also available for trunked radio systems, allowing I/O to be transferred over very large distances.

105U modules can also output signals transmitted from 505U modules, or act as an interface between 505U networks and PLC, computer or trunked radio systems. For further information, refer to the 505U product brochure.

Pulse I/O

The 105 modules may 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 105 can also transmit the pulse input rate as a separate analogue value and the rate signal is provided as an analogue output at the destination module.

	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	
Analogue inputs	2		6		0		0	
Analogue 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.

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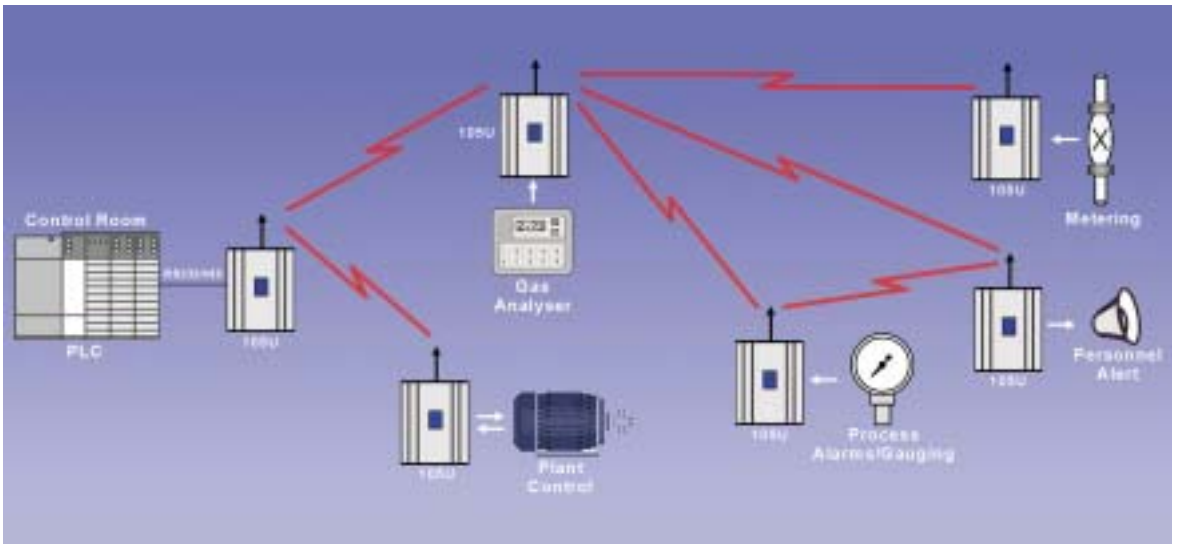
Industrial Automation



Analogue I/O

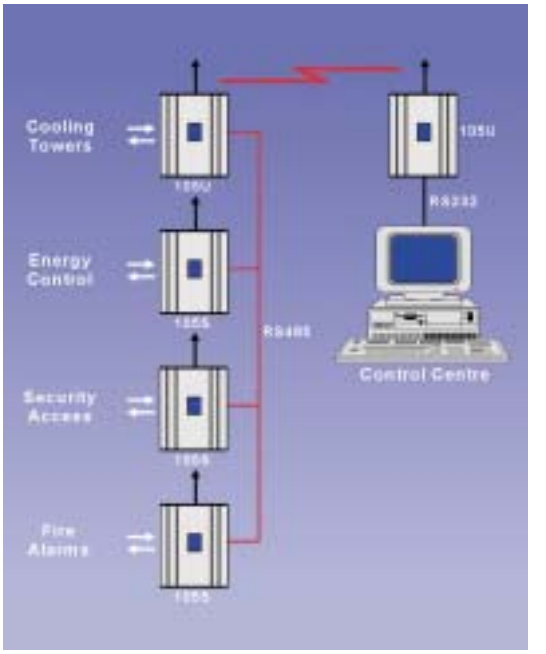
The 105-1 modules have two inputs which will accept 4-20mA analogue signals. One of these inputs has adjustable setpoints for controlling a digital output.

The 105-2 modules have six inputs which will accept 0-20mA analogue signals. Because of the inputs' high resolution, they may be used for 4-20mA signals or 0-10mA signals. Each analogue input has adjustable setpoints for controlling digital outputs. The 105-3 modules provide eight analogue outputs with a range of 0-20mA. These outputs will reflect the same value as the analogue input signal.

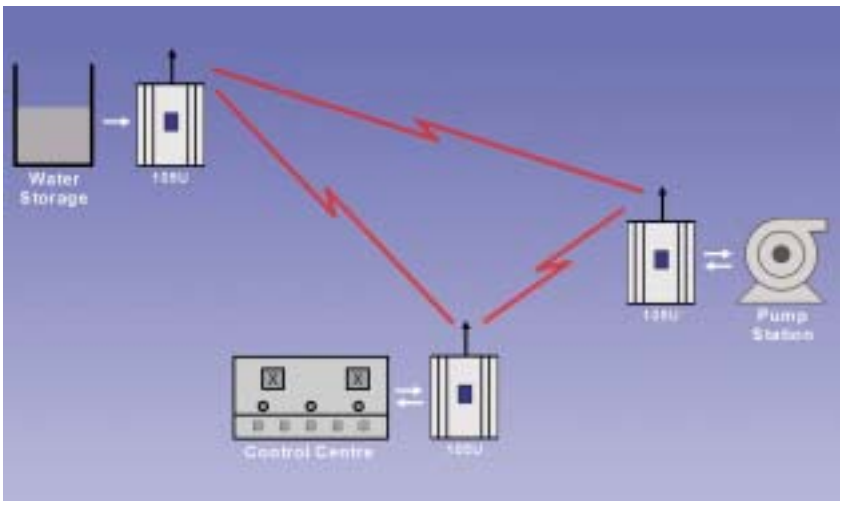
Analogue Setpoints

High and low setpoints may be configured for the analogue inputs to control a remote digital output contact. The digital output will set ("on") when the analogue input value drops below the low setpoint and will reset ("off") when the analogue value exceeds the high setpoint.

Building Management



Water Supply Utilities



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ELPRO 105 Telemetry

Radio Communications

The ELPRO 105U transceiver can operate in several UHF radio bands. These bands provides a low noise environment, with a good radio range using low cost compact aerials. The 105U transmission power may be factory set between 10mW and 500mW. Many countries provide a licence-free channel in the UHF band for low power devices such as the 105U. Radio channels are selected by connecting a PC terminal to the RS232 port on the 105U. If a radio channel is already heavily used, then another can be easily selected.

Radio Range

The operating radio range of the 105U depends on obstructions in the radio path, the height above ground of the aerials, and the type of aerial used. Typical line-of-site ranges are:

- 500mW 10km or 6 miles
- 100mW 5km
- 10mW 2km

The 105U provides a measurement of both radio channel noise and radio signal strength to assist with installation and testing. Each 105U also provides a repeater function. A module may be configured to retransmit a message on to a remote module which does not have a reliable radio path. The repeater acts as an intermediate module between the two ends of the radio link. Messages may be repeated up to five time by intermediate repeater units, allowing very long radio paths to be achieved. Repeaters can also have their own I/O.

Power Supply

The ELPRO 105 modules include 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. Mains supply can be connected via a small transformer "plugpack". The power supply includes a battery charger for backup batteries, and a solar regulator for direct connection of solar panels. The 105 power supply is intelligent and will automatically alarm on loss of mains supply, loss of solar charging or low battery voltage. These alarm signals may also be transmitted to remote modules as digital output signals.

Configuration

The 105 modules are easy to configure, using on-board selection switches, or by connecting a PC to the module serial port and downloading a configuration file. Configuration software is provided with the modules. Configuration files may be uploaded from the modules for modification or archival.

Diagnostics, Testing

The 105 modules provide diagnostic and test functions by connecting a PC terminal to the module. I/O and communication functions may be tested. The 105U module includes a radio strength measurement, which provides an indication of background noise and received radio strength. This feature allows radio paths to be tested without any additional test equipment.

WHAT IS RADIO TELEMETRY?

Radio Telemetry is a method of transmitting information by radio. Signals such as switch status or analogue signals may be transmitted to a remote location, and the signals "re-created".

APPLICATIONS

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

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Specifications

General

Environmental -20 to 60 degC 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 terminal blocks for ease of module replacement
Terminals suitable for 2.5sqmm conductors
LED indication for power supply, WDT, digital I/O, serial comms.

Inputs and Outputs

- **Digital Inputs**
  opto-isolated (5000V) inputs suitable for voltage free contacts or NPN transistor, contact wetting current 5mA
  105-1 four inputs 105-2 four inputs
  105-4 up to 16 inputs (4 inputs + 12 selectable I/O)
  The 12 selectable inputs are surge protected but not isolated.

- **Digital Outputs**
  105-1 four relay output contacts, normally open, AC3 2A 250V, 5A 120V / AC1 5A 250V / DC 30V 2A
  105-2 one FET output 30VDC 500mA
  105-3 eight FET output 30VDC 500mA
  105-4 up to 16 FET output (4 outputs + 12 selectable I/O)

- **Analogue Inputs**
  "floating" differential inputs, common mode voltage 27V, 24VDC for powering external loops provided, digital filtering 1 sec.
  105-1 two 4-20mA resolution 15 bit, accuracy 10 bit
  105-2 six 0-20mA resolution 12 bit, accuracy 10 bit

- **Analogue Outputs**
  current sink to common, max loop voltage 27V, max loop resistance 1000 ohms
  105-1 two 4-20 mA resolution 15 bit, accuracy 10 bit
  105-3 eight 0-20 mA resolution 12 bit, accuracy 10 bit

- **Pulse Inputs**
  Specifications as per digital inputs
  Max pulse rate 100Hz, pulse width min 5ms
  105-1 one input (DI1)
  105-2 105-4 four input(DI1-4) - first pulse input (DI1) max 1000Hz, pulse width min 0.5ms

- **Pulse Outputs**
  FET 30VDC 500mA max 100Hz
  105-1 one
  105-3 four (DO1-4)
  105-4 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
Mains supply 110-250 VAC available via plug-pack transformer
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 mains fail status, solar charge status, and battery voltage. These values may be transmitted to remote modules for monitoring.
An internal inverter provides 24VDC 150mA for analogue loop supply.

Radio Transceiver

Single channel, synthesised, direct frequency modulation
Synthesiser switching range 4MHz
Frequency / Channel spacing / Transmitter power
405 - 490 MHz / 12.5 KHz / 10 - 500mW, 1 – 5W
220 – 230 MHz / 25KHz / 1W
868 – 870 MHz / 25KHz / 10 – 500mW
Receiver sensitivity 0.4(V (-115dBm) 12dB SINAD
Signal detect / RSSI -120 to -100dBm
Conforms to Europe ETS 300 220 10 – 500mW EIRP
Australia AS4268.2 100mW EIRP
New Zealand RFS29 500mW EIRP
Other countries - check local government regulations
Expected line-of-sight range @ 10mW EIRP - 2km
@ 100mW EIRP - 5km, @ 500mW EIRP - 10 km
Range may be extended by using up to five intermediate 105U modules as repeater units
Aerial connector is BNC or SMA coaxial, and is protected by a gas discharge surge arrester

Serial Port

RS232/RS485 serial port 9600 baud, 8 bits, no parity, 1 stop bit
RS232 9pin DB9 female connector
RS485 max cable distance 2000 m terminal connections

Data Transmission

Data transmission on "change-of-state" of inputs as well as integrity update transmissions.
The period for update transmissions is configurable. Data transmitted as bit stream data frame using a synchronous protocol with 16 bit CRC error checking. Automatic acknowledgment of error-free transmissions with up to 5 retries before communications fail is set.
Communications failure status may be configured as a digital output. Resetting of outputs on communications failure is configurable.
Transmission rates Radio 4800 bd Serial 9600 bd
Typical radio message transmission time 80ms

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