



# Remote Monitoring by Radio



**ELPRO 505U-K**

# ELPRO 505U-K Wireless I/O

The 505U-K wireless I/O module is an economical solution for the remote monitoring of process signals. The 505U-K connects to discrete, pulse or analogue signals from process transducers, and transmits these signal values by radio. The 505U-K is suitable for alarm or metering applications, as well as general plant monitoring.

The 505U-K has an internal 869MHz radio transmitter which operates on a license-free radio band in Europe. The 505U-K has an operating range of up to 5km. It is suitable for monitoring in utility industries such as electricity, water and gas; and is also a cost effective solution for short range applications in factories and plants.

## Mode of Operation

The 505U-K is compatible with the 105U/869 range of wireless I/O products\* - 105U units may be used to output the process signals, or act as a wireless interface connected to a PLC, DCS or PC. The 505U-K transmits the value of its input signals whenever the signal changes, or after a pre-configured update time. Each transmission message includes error-checking to confirm the validity of the message. The 505U-K can be configured to repeat the transmission several times to ensure that the transmission is received correctly. The input signal is output at a 905U unit either as an identical signal or across a serial data link (RS232 or RS485).

905U units may also be used as repeaters to extend the radio range of the 505U-K - up to five intermediate 905U modules may be used as repeaters in any radio path.

More than 10 000 505U-K units may operate together in a single system.

## Extremely Low Power Consumption

The power consumption of the 505U-K is very low as it conserves power by reverting to "sleep" mode between measurements of the input signals and transmissions.

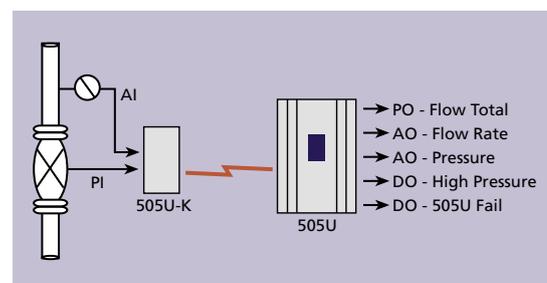


The 505U-K can be powered from a 6 - 30 VDC supply. It can also be powered from one or more ELPRO BU-5 battery packs without any other power source. Each battery pack can power the 505U-K for over a year, depending on input signal configuration. The 505U-K unit provides an internal alarm on low supply voltage - this alarm can be transmitted by radio.

## Weatherproof IP66 Enclosure

The 505U-K is enclosed in a heavy duty painted aluminum enclosure, weather-proofed to IP66. Signal and power connections to the unit are made via a weatherproof connector.

**Because of its battery power supply and weatherproof case, the final installed cost of the 505U-K radio telemetry module is very low, making it a cost effective solution for even simple plant monitoring applications.**



(\*refer to 105U product literature)

# Wireless process monitoring applications

## Inputs

The 505U-K unit can connect to two discrete or pulse signals and one analogue signal, and will transmit the value of an input whenever the signal changes. The input value is also transmitted if the signal has not changed within a pre-configured update time (configurable 10 sec to 7 days).

Pulse signals use the same input connection as discrete inputs.

## Alarm and Status Signals

The 505U-K can connect to two discrete inputs such as alarm or status signals which are voltage free contacts or TTL signals. Whenever the discrete signal changes (off to on, or on to off) the 505U-K will interrupt its sleep mode and transmit the signal value. The 505U-K will also transmit the input values after a pre-configured update time. There are different update times for when the discrete signal is "on" or "off". For example, an alarm input can update once per day when it is inactive, but update every minute when it is active. This feature allows a large number of 505U-K units to share the same radio channel.

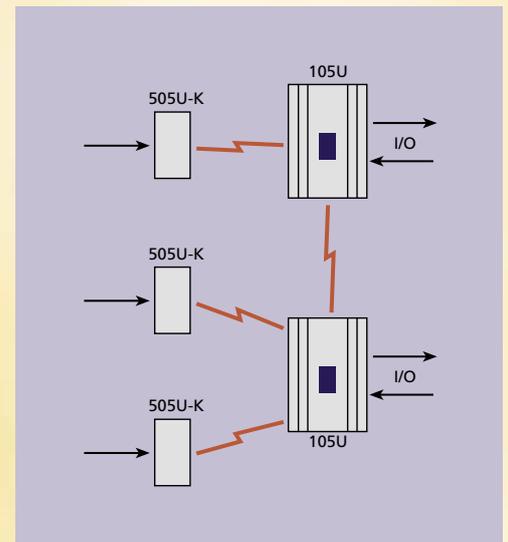
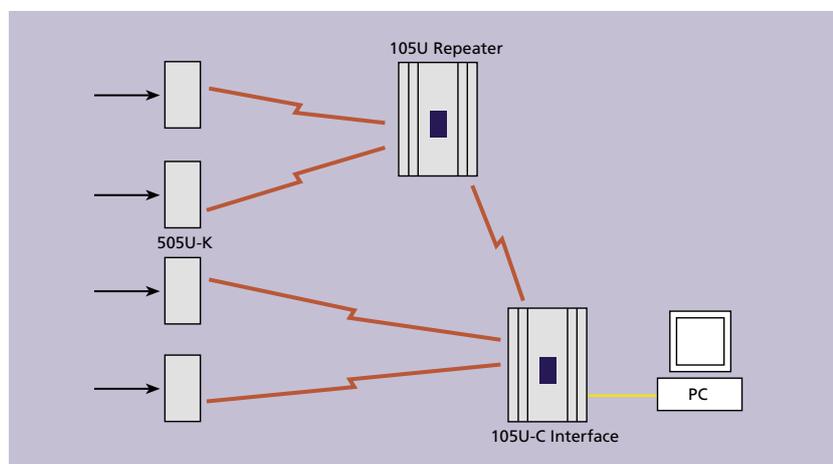
As well as the two external discrete inputs, there are two internal discrete "inputs" - low battery voltage and analogue setpoint status.

## Pulse Signals

The 505U-K will accept two pulse signals suitable for metering applications. The 505U-K calculates both totalised pulse count and pulse rate. The totalised count is a 32 bit count (2 x 16 bit registers) and is transmitted whenever the count has changed by a pre-configured amount and also after its update time. By transmitting the totalised pulse count, the 505U-K ensures that individual pulses are not lost. Should a radio transmission not be successful, the pulse count is still held in the 505U-K, and totalised value will be updated on the next transmission.

The 505U-K can be configured for use with a quadrature or incremental shaft-encoder, where the two pulse inputs operate on a single up-down counter.

The pulse rate is treated as an internal analogue input, and transmitted when the rate changes and after its configured update time. The 505U-K can accept a pulse signal up to 10 KHz.



## Analogue Signals

The 505U-K model has one analogue input (selectable 4-20 mA or 0-10V). The analogue signal may be externally or loop powered; the 505U-K generates a 24VDC loop supply. During sleep mode, the loop supply is switched off. After a user-configured sample period, the analogue loop supply is activated, and the analogue measurement is taken. A warm-up time may be configured to allow the analogue loop to stabilize before the measurement is taken. If the sample period is set to zero, then the 505U-K does not revert to sleep mode, and it will continually measure the analogue signal (note that this is not suitable when used with the BU-5 battery pack). The analogue measurement has 12 bit resolution. After the analogue measurement is taken, the 505U-K will transmit its value if it has changed since the last measurement. A sensitivity value is configured to determine the minimum change to cause a transmission. The analogue value is also transmitted on the update time. Configurable setpoint values may be used to generate an internal alarm status which can also be transmitted. The setpoint status is treated as another discrete input. Both the analogue value and the setpoint status may be transmitted.

## Specifications

### General

Environmental -40 to 60°C, 0 - 99% RH  
 EMC compliant EN 300 683  
 Housing IP66 painted aluminum enclosure  
 170 x 64 x 36 mm, 0.5 kg  
 Weatherproof connector for external connections.  
 SMA connector for antenna or coaxial cable connection.  
 LED indicators - Radio TX, Operation OK

**Power Supply** 6 - 30 VDC  
 Power consumption - quiescent (sleep mode) <140µA  
 operating mode (@12VDC) <10mA + analogue loop\*2,  
 during radio transmission (35 msec) 300mA @ 12VDC  
 Analogue loop supply internally generated, 24VDC 50mA  
 Internal monitoring of supply low voltage status - can be  
 transmitted to remote modules as a "discrete input".  
 Internal monitoring of supply voltage - can be transmitted to  
 remote module as an "analogue input".

Inputs	External/Internal	Type
Discrete	external	Status
Pulse total	external	Count
Pulse rate	internal	Analogue
Analogue	external	Analogue
Setpoint	internal	Status
Supply voltage	internal	Analogue
Supply low voltage	internal	Status

### Discrete/Pulse Input

two inputs, voltage free contacts / NPN, or TTL voltage  
 input 0-1.5 VDC on / 3.5-13VDC off  
**Pulse inputs**  
 max rate volt free contacts 300 Hz TTL 10 KHz  
 50 KHz possible on PI2 using a configurable divider  
**Up/Down Pulse count**  
 suitable for quadrature or incremental shaft encoders  
**Pulse Rate**  
 calculated as an internal analogue input – range 0 – 1000Hz  
 configurable scaling

### Analogue Input

selectable 0-24mA (4-20mA, 0-10mA) or 0-10V (0-5V, 0-10V)  
 input range can be user calibrated  
 "floating" differential input common mode voltage 27V,  
 resolution 12 bit accuracy < 0.1 % of full range

**Setpoint Status**  
 status sets (on) when analog value <  
 low SP and resets (off) when analog  
 value > high SP  
 status transmitted as per discrete input

### Serial Port

RS232 DB9 female DCE, used for  
 configuration and diagnostics.

### Radio Transmitter

869.4 – 869.65MHz, fixed channel  
 Transmitter power 500mW  
 Conforms to EN 300 220  
 Line of sight range 5km  
 Range may be extended by up  
 to five 905U repeaters.  
 Each transmission may be configured  
 to be sent 1 to 5 times.

### Configuration and Diagnostics

Windows configuration package

### Mode of Operation

Digital/pulse inputs measured on change  
 and every 0.5 sec. Analogue input measured  
 on user-configured sample period.  
 Input messages transmitted to configured  
 outputs when inputs change value, or after  
 configured update time. User configurable  
 paralysis time to inhibit transmissions.  
 Units powers down between measurements  
 to conserve power.

### BU-5 Battery Pack

6 x AA alkaline batteries 9V,  
 up to 1.4 year service life depending  
 on input configuration  
 Enclosure, specifications as per  
 505U-K enclosure.  
 Temperature - dependant on  
 battery type used.



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KD-03-39/02