



# SHM Communications Ltd.

## RL32 Logger Technical Information



### Introduction

The RL32 logger together with the DL4, UL8 and UL24 form SHM's family of advanced data loggers for energy monitoring.

The RL32 allows up to 24 pulse counting, analog or temperature channels to be collected via RF links, avoiding the need for running cables to the sensors.

The RL32 is robust, reliable and easy to install. All input and power connections use 2-part plug-in terminal blocks.

The RL32 has eight Universal inputs (1 to 8) that can each be configured to monitor Digital (pulse), Status (on / off), Analog (0 to 10 V or 0 to 20 mA) or Temperature (thermistor) sensors, and 24 inputs (9 to 32) that collect data via an RF data link from up to 24 discrete transmitters.

Digital and Status inputs accept volt-free relay contacts, providing direct connection to all the common utility meters (Electricity, Oil, Gas, Water, Compressed Air, Steam). Analog inputs can be connected to any sensor whose output is one of the industry standard levels, 0 to 10 V or 0 to 20 mA. Temperature inputs are connected to a NTC precision thermistor sensor.

Each universal channel in the logger is independent, and can be configured to log data at intervals of between 1 and 60 minutes, or be triggered by an external Universal input. When logging every 30 minutes, each channel logs data for approximately 50 days before wrap-around occurs.

The logger is mains powered, but can be fitted with a UPS that allows it to power the receiver and continue logging for up to 1 day without mains power.

The logger has its own clock / calendar which is used to timestamp all readings.

The logger is interrogated and controlled via its serial port. The main serial port on the enclosure is normally used for local interrogation by a portable PC. A second internal serial port can be used to connect to a modem or similar device, and is used for remote access.

The RL32 can be a stand-alone logger or be connected to other SHM loggers (of any type) via a simple local area network. Connection to the host PC can be via direct connection, telephone modem, RF modem (Paknet) or Ethernet TCP/IP. A variety of solutions are

available to minimize installation and communications costs.

SHM supplies a simple PC utility to configure the many firmware options available on the logger. To collect the logged data another utility is available to store it in standard CSV format for importing into spreadsheet programs like Microsoft Excel. If full-featured energy monitoring is required, then the leading energy information software package **Stark RT** is the preferred choice, and comes with the RL32 protocol built in. SHM is an Approved Application Partner for Stark Software International and will provide full details of RT on request.

### Radio Frequency Links

The RL32 is supplied with a separate radio receiver which can be sited up to 300m away with an integral or optional external aerial.

Pulse transmitters are ordered separately and come in several variants (single or dual pulse, temperature, Intrinsically safe etc.). Each one is sealed to IP68 and has an integral battery with 10 year life.

Transmission range is approximately 70 to 250m in free space or 30 to 200m in buildings. Repeaters can be used to cover longer distances.

### Protocol

The RL32 uses a proprietary packet-based full-duplex protocol, designed to allow multiple loggers to be connected together in a variety of network configurations. It provides fast efficient data transfers and minimizes cost when using a communications medium with a per-packet tariff (eg. Packetnet).

### Time Control

To avoid sudden changes in the time (and consequent discontinuities in the log), a 'phase lock' technique is used to keep the time on track.

During regular reading, the 'correct' time, derived from an accurate clock in the host computer, is sent to the logger. The logger compares this to its own time and finely adjusts the rate of its clock so that any error is corrected. This is a privileged function and requires knowledge of the 'time controller' password.

### Channel Inputs

The RL32 logger has 8 Universal inputs (1 to 8) and 8 Universal memory channels (1 to 8), and these are normally configured to correspond (Memory Channel 1 is connected to Input 1 etc.). However it is possible to assign any Universal input to any Universal channel, or to assign one input to two or more channels. NB. The digital-only inputs (9 to 24) are always assigned to channels 9 to 24 respectively.

One use of this feature is to configure an input to connect it to both a long-term log channel logging at 30 minute intervals, and a short-term log channel logging every minute.

### Logging Interval

A channel's logging interval can be changed at any time without losing the previous stored data.

A channel can also have its logging triggered by an external time reference connected to one of the logger Universal inputs (1 to 8). This can be used to log 30-minute electricity readings in synchronism with the supply tariff meter.

### Channel Size

The available memory can be distributed among the channels to tailor the channel size to the application.

### Channel Type

Each Universal channel (1 to 8) can be configured to log pulse counts, status (on / off), analog values or temperature. A built-in linearizer converts the resistance of a 10k thermistor to degrees Celsius.

### Data Authentication

All messages containing logged data have a 16-bit validator appended. This validator provides a checksum for all the data in the message and guards against data corruption or tampering. The validator calculation uses a configurable 32-bit authentication key.

### Immediate Data

All channels can be read as immediate (rather than stored) values, updated every second.

### Channel Alarms

The logger can be programmed with simple high and low alarm thresholds for each Universal channel (1 to 8). The alarm status of each channel is logged alongside its data. The logger can be programmed to make selected channel alarms notify the user, either by activating a relay, or by dialling in to a central point.

For RF channels, an alarm is generated if no signal is received from the transmitter, or if its battery is low.

### Communications Sharing

There are a number of features for sharing communications with other users, thus minimizing cost.

Contact the sales office or web-site "technical support" for details.

### Hardware Options

The following hardware options are available to order :-

1. Integral telephone modem.
2. RS485 Interface. Used to connect loggers together in a LAN.
3. Modem Serial Switch. Allows the logger to share an external modem.



For further information on this product or advice on loggers, meters, sensors or Energy Monitoring Systems, contact SHM.



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## ◆ RL32 Specifications ◆

### INPUTS

<b>Configuration</b>	1 to 8 universal, 9 to 32 via RF link
<b>Pulse Counting</b>	Volt-free contact closure input, 10k pull-up to +5V Pulse width 20 ms (minimum) Pulse rate 20 Hz (maximum)
<b>Status</b>	Binary status input, 10k pull-up to +5V Glitches of 20 ms (minimum) recorded
<b>Current</b>	Range 0 to 20 mA Input impedance 250 ohms 10-bit ADC, $\pm 2\%$
<b>Voltage</b>	Range 0 to 10 V Input impedance 200 kohms 10-bit ADC, $\pm 2\%$
<b>Temperature</b>	Thermistor sensor, 10k nominal at 25 °C Range -80 to +150 °C Input impedance 10k pull-up to +5V Resolution 0.1 °C $\pm 0.5$ °C at +25 °C

### CHANNELS

<b>Pulse Counting</b>	Configurable pre-scaler 1 to 255 32-bit (9 digit) register, pre-settable
<b>Status</b>	Time and date of every state change logged Resolution 1 second
<b>Capacity</b>	512 kbytes of RAM memory provides storage for up to 96,000 readings (80 days logging at 30 minutes)

### RF RECEIVER

<b>Frequency band</b>	434 MHz (licence exempt)
<b>Modulation</b>	Wide-band FM
<b>Sensitivity</b>	-100 dBm
<b>Range</b>	70 to 250 m (Free space) 30 to 200 m (Industrial building)

### REAL-TIME CLOCK

<b>Accuracy</b>	$\pm 1$ second per day
<b>External Sync</b>	Volt-free relay contact provides 1-sec time synchronization pulse every ½ hour

### COMMUNICATIONS

<b>Character Set</b>	7-bit printable ASCII plus CR
<b>Character Format</b>	Asynchronous 7 data bits, 1 stop bit
<b>Parity</b>	Configurable to Even, Odd, Mark (1) or Space (0)
<b>Flow Control</b>	XON / XOFF in both directions
<b>Local Access</b>	RS232 9-way D-type
<b>Remote Access</b>	Separate internal RS232 port for connection of external BT modem or Paknet radio modem

### POWER SUPPLY

<b>Voltage</b>	240V or 110V AC $\pm 15\%$ selectable
<b>Consumption</b>	3VA (maximum)
<b>UPS Battery</b>	17 hours sustained logging in the absence of external power
<b>Memory Battery</b>	60 days retention of logged data and calendar clock

### ENCLOSURE

<b>Construction</b>	Three parts. Base-plate, sub-chassis and cover. Mild steel, powder coated. Separate RF receiver.
<b>Cable Entry</b>	Eight 20mm conduit knock-outs for bottom and rear entry of cables.
<b>W x H x D</b>	265 x 262 x 95 mm
<b>Environmental</b>	IP 41