SHM Communications Ltd.

DL4 Logger Technical Information

Introduction

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

The DL4 is robust, reliable and easy to install. All input and power connections use 2-part plug-in terminal blocks.

The DL4 has four digital inputs that can each be configured to monitor Digital (pulse) or Status (on / off) sensors.

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).

Each 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 input. When logging every 30 minutes, each channel logs data for approximately 120 days before wrap-round occurs.

The logger is mains powered, but can be fitted with a UPS that allows it to continue logging for up to 5 days 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 DL4 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 DL4 protocol built in. SHM is an Approved Application Partner for Stark Software International and will provide full details of RT on request.

Protocol

The DL4 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. Packnet).

Multi-Level Security

The DL4 logger has 4 levels of security each controlled by 32-bit numeric passwords. Each channel has independent passwords for reading data and configuration. Internal counts of log-in failures and password changes are provided to track attempts at unauthorized access.

For non-critical installations, the security system can be bypassed by programming null passwords (this is the factory default).

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 DL4 logger has 4 inputs and 4 memory channels, and these are normally configured to correspond (Memory Channel 1 is connected to Input 1 etc.). However it is possible to assign any input to any channel, or to assign one input to two or more channels.

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 inputs. 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 channel can be configured to log pulse counts or status (on / off).

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 channel. 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.

Communications Sharing

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

The Modem Answer Window feature configures the logger to only answer the line outside normal office hours. This allows the line to be shared with an office telephone or fax.

The Dial-In feature configures the logger to dial in once per day to the Host PC, as opposed to the usual configuration, where the Host PC dials the logger. This minimizes the inconvenience to other users of a shared line.

The Modem Serial Switch option allows the logger to share a modem with another device (eg. tariff meter). The device automatically switches the data connection to the logger when interrogated.

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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DL4 Specifications

INPUTS

Configuration	4 digital
Pulse Counting	Volt-free contact closure input, 10k pull-up to +5V
	Pulse width 20 ms (minimum)
	Pulse rate 20 Hz (maximum)
Status	Binary status input, 10k pull-up to +5V
	Glitches of 20 ms (minimum) recorded

CHANNELS

Pulse Counting	Configurable pre-scaler 1 to 255
	32-bit (9 digit) register, pre-settable
Status	Time and date of every state change logged
	Resolution 1 second
Capacity	128 kbytes of RAM memory provides storage for up to 24,000 readings (125 days logging at 30 minutes)

REAL-TIME CLOCK

Accuracy	±1 second per day
External Sync	Volt-free relay contact (Option) provides 1-sec time synchronization pulse every ½ hour

COMMUNICATIONS

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

SECURITY

Level 1	Read data - each channel has its own unique password
Level 2	Configure channel - each channel has its own unique password
Level 3	Time Control - a single password controls access to both regulate the time and read data
Level 4	Logger Commissioning - a single password controls access for overall commissioning at installation

POWER SUPPLY

Voltage	240V AC ±15% or 110V AC ±15% (manufacture options)
Consumption	3VA (maximum)
UPS Battery	120 hours sustained logging in the absence of external power
Memory Battery	35 days retention of logged data and calendar clock

ENCLOSURE

Construction	Two parts. Base and cover. Polycarbonate.
Cable Entry	Three 20mm conduit knock-outs for bottom entry of cables.
W x H x D	175 x 175 x 100 mm
Environmental	IP 51