



## LLM-336S Modem for industrial leased line applications

### Introduction

The MuLogic LLM-336S is a voice band modem for reliable data communication over 2-wire and 4-wire leased lines or copper cable. The modem operates at data rates up to 33.6 kbit/s. The LLM-336S was designed for industrial applications and is intended for shelf or panel mounting.

The modem supports full and half duplex operating modes and can be operated on point-to-point and multipoint lines. Special features for SCADA communication are implemented.

The LLM-336S consists of an LLM-336R card and an I/O card in a rugged steel housing.

### Features

- V.34, V32bis, V.32, V.22bis, V.22, V.21; full duplex operation from 300 bit/s to 33,6 kbit/s.
- V.29, V.27 and V.23; half duplex and multipoint operation from 1200 to 9600 bit/s.
- Asynchronous serial port data rates up to 115.2 kbit/s.
- Synchronous serial port data rates up to 33,6 kbit/s.
- Transparent asynchronous operation from 0 to 9600 bit/s.
- RS232 (V.24/V.28) data interface for asynchronous and synchronous operation.
- Supports Modbus RTU, Modbus ASCII, DNP3, IEC 60870.5 and more.
- AutoCarrier for data-controlled carrier in half duplex and multipoint operating modes.
- V.42/MNP2-4 error correction for asynchronous data.
- V.42bis/MNP5 data compression for asynchronous data.
- Isolated supply voltage (ac and dc) for industrial applications.
- 9 to 36Vdc/10 to 28Vac or 18 to 72Vdc supply voltage.
- Extended temperature range -25..+70°C.
- Suitable for panel mounting (when equipped with optional mounting flanges)

## Application Areas

### Asynchronous applications

For applications with asynchronous data, the LLM-336 supports a buffered serial data interface. The modem accepts data rates from 300 bit/s to 115200 bit/s and supports error correction and data compression according to the V42/V.42bis and MNP5 protocols. Both 10 and 11 bits character formats are supported.

For data rates up to 9600 bit/s, the modem can also offer a fully transparent data path. This allows for operating all rates between 0 and 9600 bit/s without changing the modem configuration. This feature is available in V.34 operating mode only.

### Synchronous applications

For applications with synchronous data, the LLM-336 supports data rates from 1200 to 33600 bit/s. Synchronous transmit clocking information can be generated by the modem, externally supplied by the DTE, or slaved to the receive clock.

### Half duplex and multipoint applications

The LLM-336 supports half duplex (switched carrier) operation in ITU V.23, V.27 and V.29 modes. The modem can be used in multipoint environments on conditioned and unconditioned lines. For multipoint operation on unconditioned copper cable, the transmitter impedance is controlled and the receiver can be switched to high impedance.

Half duplex operation is supported for asynchronous and synchronous data. For asynchronous data the LLM-336 offers a buffered interface which enables the serial port to operate at a higher rate than the modem's line rate.

### SCADA applications

The LLM-336 supports SCADA communications such as Modbus RTU, Modbus ASCII, DNP3 and IEC 60870.5.

### AutoCarrier

The modem has a quite unique feature that makes it possible to have half duplex and multipoint operation under control of the data signals only.

This allows for RS422 and RS485 devices (that cannot control the RTS signal) to control the modem carrier just by sending data. RS422 and RS485 devices can be connected by means of an external RS232-RS485 converter.

### Configuration

On-board DIP switches allow for a selection of 40 pre-defined operating modes. By means of a simple AT command interface, 2 user defined operating profiles can be stored in non volatile memory and selected by DIP switch.

### Power supply

The LLM-336 is equipped with an internal galvanic isolated power supply that can be powered from any 9 to 36 Vdc and 10 to 28 Vac or 18 to 72Vdc source.

For 110 or 230 Vac operation a regular ac power adapter or 24Vac control panel transformer can be used.

### Extended temperature range

The modem can be used in many environments. It is suitable for operating at ambient temperatures ranging from -25 to +70 C.

## Technical Specifications

### Full duplex modulation modes

- ITU-TSS V.34; 33k6, 28k8, 26k4, 21k6, 19k2, 14k4 and 12kbit/s async/sync.
- ITU-TSS V.32bis; 14k4, 12k and 7200 bit/s async/sync.
- ITU-TSS V.32; 9600 and 4800 bit/s async/sync.
- ITU-TSS V.22bis; 2400 and 1200 bit/s async/sync.
- ITU-TSS V.22; 1200 bit/s async/sync.
- ITU-TSS V.21; 0..300 bit/s asynchronous.

### Half duplex and multipoint modulation modes

- ITU-TSS V.29; 9600, 7200 and 4800 bit/s async/sync.
- ITU-TSS V.27bis; 4800, 2400 bit/s async/sync.
- ITU-TSS V.23; 1200 bit/s asynchronous.

### Error correction and data compression

- ITU-TSS V.42 LAPM error correction
- MNP2-4 error correction
- ITU-TSS V.42bis data compression
- MNP5 data compression

### Serial data interface

- Interface types:
  - RS232C (ITU-TSS V.24/V.28), serial asynchronous or synchronous.  
(RS422 and RS485 devices can be connected by means of an external RS232-RS485 converter)
- RS232 signals: TxD, RxD, RTS, CTS, DSR, DCD, DTR, RxCIk, TXclk, ExtClk, TST

### Supported serial port data rates

- Asynchronous: 300, 600, 1200, 2400, 4800, 7200, 9600, 19k2, 38k4, 57k6, 115k2 bit/s
  - 10-bit formats: 7 data bits - Even parity bit, 7 data bits - Odd parity bit, or 8 data bits.
  - 11-bit formats: 8 data bits - Even parity bit or 8 data bits - Odd parity bit.
- Asynchronous transparent: 0 .. 9600 bps, Data format transparent. (V.34 mode only)
- Synchronous: 1200, 2400, 4800, 7k2, 9k6, 12k, 14k4, 16k8, 19k2, 21k6, 26k4, 28k8, 33k6 bit/s, Clock sources: internal, external or slaved to receiver.

### Line connection

- 2-wire or 4-wire
- Fixed impedance: 600 $\Omega$
- High impedance: 5000 $\Omega$
- Controlled TX impedance (600/5000 $\Omega$ ) for multipoint operation
- Transmit level: programmable from -3 to -65 dBm (factory-set value: -13dBm)
- Receive carrier detect thresholds:
  - 43 dBm on / -48 dBm off.
  - 33 dBm on / -38 dBm off.
  - 26 dBm on / -31dBm off.
  - 16 dBm on / -21dBm off.

## Versions

- LLM-336S/24V: 9 to 36Vdc and 10 to 28Vac.
- LLM-336S/48V: 18 to 72Vdc.

## Dimensions and weight

- 250x130x30 mm LxWxH.
- Weight: 970 gr.

## Power Supply and environment

- Power supply:
  - LLM-336S/24V: 9..36 Vdc, 10..28Vac, 2 W max.
  - LLM-336S/48V: 18..62Vdc, 2.2 W max.
- Rush-in current:
  - LLM-336S/24V: 250 mA max.
  - LLM-336S/48V: 130mA max.

## Environment

- Temperature range:  
-25..+70°C, Humidity: 5..95%

## Connectors

- Serial Data: RS232C, ISO2110, DB25 female connector
- Power: Screw terminal connector
- Line: RJ45

## Compliances

- CE mark: 89/336/CEE, 72/23/CEE, EN55022, EN50082-2, EN60950
- Leased line operation CTR15, CTR17
- Climate: EN50125-3
- Vibration: EN50125-3