



## LLM-336

Leased line modems for industrial applications



LLM-336D



LLM-336S



LLM-336R

### Introduction

The MuLogic LLM-336 series are voiceband modems for reliable data communication over 2-wire or 4-wire leased lines or dry copper lines at line data rates up to 33.6 kbps. The LLM-336 modems are designed for industrial applications and can be powered from any 10 to 36 Volts or 18 to 60 Volts power source.

3 versions are available:

- LLM-336D for panel or DIN rail mounting (RS232C and RS485 interface)
- LLM-336S for for desktop or shelf use (RS232C interface)
- LLM-336R rack card for [MCF-16.3](#), [UCF-16.3](#) and [UCF-3.1](#)

All modems support full and half duplex operation modes and can be used on point-to-point and multipoint lines. Special features for SCADA and Modbus RTU communication are implemented.

### Features

- V.34, V32bis, V.32, V.22bis, V.22, V.21; full duplex operation from 300bps to 33,6kbps
- V.29 and V.23; half duplex and multipoint operation with line rates from 1200 to 9600 bps
- Asynchronous data rates up to 115.2 kbps for buffered or error corrected data
- Synchronous data rates up to 33,6 kbps
- Transparent asynchronous operation from 0 to 9600 bit/s (point to point operation)
- Data-controlled carrier for half duplex and multipoint operation. (no need for RS232 RTS signal)
- V.42/MNP2-4 error correction for asynchronous data
- V.42bis/MNP5 data compression for asynchronous data
- Supports Modbus RTU, Modbus ASCII, DNP3, IEC 60870.5 and more.
- Isolated supply voltage input (ac and dc) for industrial applications.
- Supply voltage: 10 to 36Vdc (10 to 28Vac) or 18 to 60Vdc (18 to 30Vac) (72Vdc optional)
- Isolated RX/TX switch for radio communication applications (Optional, LLM-336D only)
- Din-Rail mounting bracket for LLM-336D

- Extended temperature range
- RS422/485 interface (LLM-336D and LLM-336R in [MCF-16.3](#) rack )
- Central modem control for LLM-336R in [MCF-16.3](#) rack. (Using CMC-16 card)

## Application Areas

### Asynchronous applications

For applications with asynchronous data, the LLM-336 supports a buffered DTE (terminal) interface. The modem accepts data rates from 300 bps to 115200 bps 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 data formats and rates and 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 bps Synchronous transmit clocking information can be generated by the modem, externally supplied by the DTE, or slaved to the receive clock.

### Switched carrier and multipoint applications

The LLM-336 supports half duplex operation in V.23, V.27bis 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 DTE to operate at a higher rate than the modem. Carrier control is by means of the RTS signal input or controlled by the TxD (transmit data input). See "AutoCarrier". The LLM-336 can operate in half duplex switched carrier mode on 2-wire and 4-wire lines.

### Scada and Modbus applications

The LLM-336 supports various SCADA communications protocols 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 RS232, RS422 and RS485 devices (that cannot control the RTS signal) to control the modem carrier just by sending data.

### Radio communication

For applications in combination with a simplex (half duplex) radio transceiver, the LLM-336D offers an isolated contact that can be used to control the RX/TX switch (PTT).

### Configuration

The LLM-336 can be configured by means of DIP switches.  
Over 40 pre-defined operation modes can be selected.  
2 user defined operation modes can be stored in non volatile memory.

### Power supply

The LLM-336 modems are equipped with an internal galvanic isolated power supply.  
Three voltage ranges are available:

- 9-36Vdc / 10-26Vac.
- 18-60Vdc / 18-42Vac.
- 18-72Vdc.

For mains power operation (100..240Vac) an external power adapter or power supply is 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-T V.34; 33k6, 28k8, 26k4, 21k6, 19k2, 14k4 and 12kbps async/sync. (QAM)
- ITU-T V.32bis; 14k4, 12k and 7200 bps async/sync (QAM).
- ITU-T V.32; 9600 and 4800 bps async/sync. (QAM)
- ITU-T V.22bis; 2400 and 1200 bps async/sync. (DPSK)
- ITU-T V.22; 1200 bps async/sync. (DPSK)
- ITU-T V.21; 0..300 bps asynchronous. (FSK)

### Switched carrier and multipoint modulation modes

- Half-duplex on 2-wire and 4-wire lines.
- ITU-T V.33; 14400 and 12000 bps async/sync. (QAM)
- ITU-T V.29; 9600, 7200 and 4800 bps async/sync. (QAM)
- ITU-T V.27bis; 4800, 2400 bps async/sync. (DPSK)
- ITU-T V.23; 1200 bps asynchronous. (FSK)

### Error correction and data compression

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

### DTE interface

- Interface types:
  - ITU-T V.24/V.28 (RS-232C) on DB25/ISO2110.

Supported signals: TxD, RxD, RTS, CTS, DSR, DCD, DTR, RxClk, TXclk, ExtClk, TST

- RS-422/RS-485 interface (not available on LLM-336S)

Supported signals: RS-485: TR+ TR- RS-422: Tx+ Tx- Rx+ Rx-

### Supported DTE data rates

- Asynchronous: 300, 600, 1200, 2400, 4800, 7200, 9600, 19k2, 38k4, 57k6, 115k2 bps  
Asynchronous data formats: 10 and 11 bits.
- Synchronous: 1200, 2400, 4800, 7k2, 9k6, 12k, 14k4, 16k8, 19k2, 21k6, 26k4, 28k8, 33k6 bps  
Clock sources: internal, external or slaved to receiver.

### Line connection

- 2-wire or 4-wire at RJ-11 connector
- Fixed impedance 600 $\Omega$
- High impedance 5 k $\Omega$
- RTS controlled TX impedance for multipoint operation
- Transmit level: -8 to -30 dBm at 600 $\Omega$  (factory-pre set value: -11dBm at 600 $\Omega$ )  
(-10 to -32 dBV at ETSI Zref. (factory-pre set value: -12dBV at ETSI Zref)
- Receiver input level range: -8..-43dBm
- Receive 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-336D: Compact plastic housing
- LLM-336R: 3HE, 5TE Rack card
- LLM-336S: Rugged steel housing.

### Dimensions and weight

- LLM-336D: 95x145x30 mm LxWxH, Weight: 210 gr.
- LLM-336R: 100x160 mm. Panel size: 3U (3HE) 5HP (5TE)
- LLM-336S: 250x130x30 mm LxWxH, Weight: 970 gr.

### Power Supply

- Power supply:
  - "VR1" versions: 10-36 Vdc / 10-28Vac (2.2 Watts)
  - "VR2" versions: 18-60Vdc /18-30Vac (2.2 Watts)
  - "VR3" versions: 18-72Vdc (DC only) (2.2 Watts)

### Environment

- Temperature range: 25..+70 $^{\circ}$ C, Humidity: 5..95%

### Compliances

- Public Leased line operation: 2-wire and 4-wire operation: ES 203 021
- CE directives: 2004/108/EC and 2006/95/EC.
- EMC: EN 55022, EN55024: Emission limits and immunity for residential environments.
- EMC: EN 61000-6-2: Immunity for industrial environments.
- Safety: EN 60950.

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