

## LLM-336.Eth

Leased line modem for Ethernet transport in industrial applications



LLM-336S.Eth front



LLM-336S.Eth rear

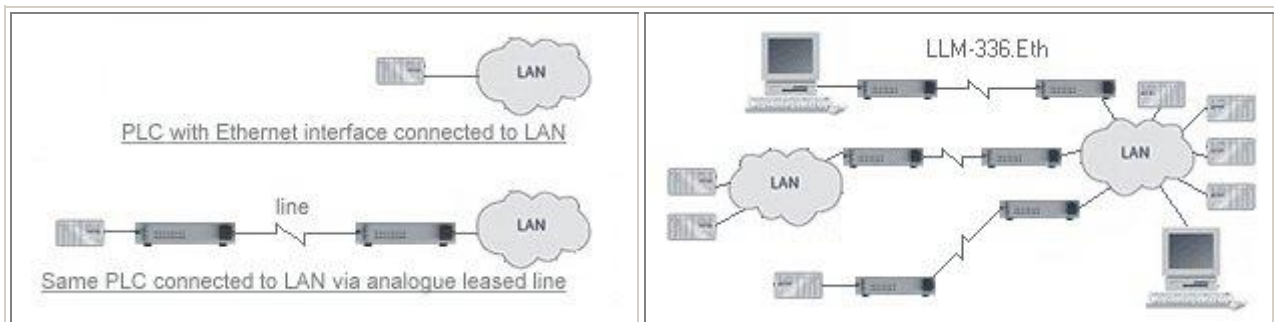
## Introduction

The MuLogic LLM-336.Eth is a voice-band modem combined with an Ethernet bridge for connecting products equipped with an Ethernet port or LANs over voice-grade analogue leased lines or copper wire. The modem offers a transparent link for Ethernet protocols regardless of the higher level protocol.

The LLM-336.Eth was designed for industrial applications: it can be powered from any 7 to 36 Volts DC or AC power source and operates within a temperature range of -25..+70°C. For telephone exchange environments (48Vdc) the modem is available in a 9 to 62 Vdc version.

The modem is available in 3 versions:

- LLM-336D.Eth in compact housing suitable for Din-rail mounting.
- LLM-336S.Eth in rugged steel desktop housing.
- LLM-336R.Eth set of rack cards for use in the 19" UCF-16.3 card frame.



Application examples

## Features

- No configuration, very easy set-up, "plug and play"
- Automatic learning Ethernet bridge
- Protocol independent
- No routing configuration needed
- 10baseT Ethernet interface
- Toggle switch for HUB or device select. No hassle with cross cables.
- V.34 modem for line rates up to 33.6 kbit/s.
- Data compression for throughput enhancement
- Operates over analogue leased lines (2 wire and 4 wire)
- Operates over "dry" copper wire and loaded copper lines
- Isolated supply voltage (ac and dc) for industrial applications
- 9 to 36 Vdc or 9 to 30 Vac supply voltage.
- 9 to 62 Vdc supply voltage optional
- Separate mounting flanges
- Extended temperature range -25..+70°

## Application Areas

Be it for connecting just two Ethernet devices, for connecting a remote Ethernet device to a LAN or even for connecting two LANs, for environments where there is no demand for high bandwidth, the LLM-336.Eth can be used for any device equipped with an Ethernet port: from Personal Computer to PLC.

The LLM-336.Eth is 100% protocol independent. It will bridge TCP/IP, AppleTalk, DecNet, Netbui, or any protocol that can be transported over Ethernet (with some exceptions for protocols that rely on very short latency times). This makes the modem easy to set up.

### LAN to LAN, Device to LAN or Device to Device connection

Because of the automatic MAC address filter, only those Ethernet packets destined for the remote end are sent over the modem link. All other packets are blocked by the bridge circuit. In this way, no bandwidth is consumed by data traffic between devices at the same location of the modem.

### Configuration

The LLM-336.Eth fully configured by means of DIP switches. Basically only the type of line (2 wire or 4 wire) needs to be set. If needed for link reliability, the maximum modem line rate can be reduced, also by means of DIP switches. The modem will work over voice-band leased lines but also over a single pair of copper wire for distances over 20 km.

### Data compression

For data that has a lot of redundant information (such as communication between a PLC and a controller) the LLM-336.Eth features data compression which can give a throughput improvement of over 3 times the normal data rate.

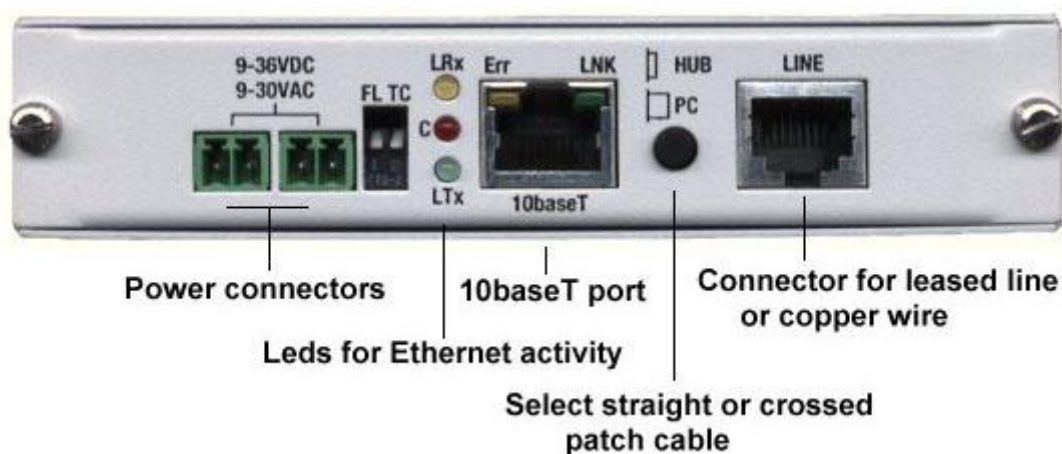
### Power supply

The LLM-336.Eth is equipped with an internal galvanic isolated power supply that can be powered from any 9 to 36 Vdc or 7 to 30 Vac source. For 110 or 230 Vac operation a regular 12 Vac power adapter can be used.  
Wide range power supply versions for 48 Vdc operation are available on request.

### Extended temperature range

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

## LLM-336S.Eth and LLM-336R.Eth rear view



## Technical Specifications

### MODEM

#### Modulation mode and data rates

- Modulation type: ITU/TSS V.34
- Max. modem data rate: 33.6 kbit/s.

#### Line connection

- Conditioned or unconditioned voice-grade analogue leased lines
- Dry copper wire cables (max. cable length depends on gauge, e.g. 20 km on AWG24/0,5mm)
- 2 wire and 4 wire operation
- Line impedance: 600 Ohms
- RJ-45 connector

### ETHERNET INTERFACE

- Type: Remote Bridge
- 10baseT Ethernet: IEEE 802.3 compatible
- Frame size: max. 1518 bytes
- Frame buffer capacity: 256 frames
- Address filter: automatic learning and ageing
- Ageing time: 300 seconds
- Connection type: 10baseT UTP
- 10baseT polarity: Automatic polarity reversal

### DATA THROUGHPUT

- Throughput @ 33,6 kbit/s modem rate without compression: 3,9 kbyte/s
- Throughput @ 33,6 kbit/s modem rate with compression: 3,4..11 kbyte/s\*
- Latency (throughput delay): 90..110 ms (measured as IP "ping" time)  
(\* throughput depends on data content)

# HARDWARE

## LED indicators on front panel

- TxD: Data transmitted to remote modem
- RxD: Data received from remote modem
- DTR: Local 10baseT link connected
- DSR: Modem ready for operation
- RTS: Bridge circuit ready for communication
- CTS: Modem ready for data transfer
- DCD: Modem connected to remote modem

## LED indicators on rear panel

- LTx: Data transmitted from modem to 10baseT port
- LRx: Data received from 10baseT port (LAN or Ethernet device)
- Coll: Collision detected
- Err: Buffer overflow
- Lnk: 10baseT link connected

## Controls

- Push button switch for selecting 10baseT HUB or PC connection
- DIP switches for selecting max. modem rate, type of line and modem mode

## Dimensions and weight

- LLM-336D.Eth: 95x145x30 mm LxWxH, Weight: 240 gr.
- LLM-336S.Eth: 250x130x30 mm LxWxH, Weight: 1450 gr.
- LLM-336R.Eth: 3 units high (3HE) 5TE wide Eurocard, Total depth with interface board: 240mm

## Power Supply and environmental characteristics

- **Power supply:**
  - standard: 9..30 Vac or +9..36 Vdc (2,8 Watts)
  - wide range (option): 9..50 Vac or 9..62 Vdc. (2,9 Watts)
  - mains power adapter (option): 100..240Vac (4 Watts)
- **Temperature range:**
  - extended temp. range: -25..+70°C, Humidity: 5..95%

## Compliances

- CE mark: 89/336/CEE, 72/23/CEE, EN55022, EN50082-2, EN60950
- Leased line operation CTR15, CTR17
- Ethernet: IEEE 802.3
- Climate: EN50125-3
- Vibration: EN50125-3

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