Installation Instructions for LonWorks Modbus Gateway

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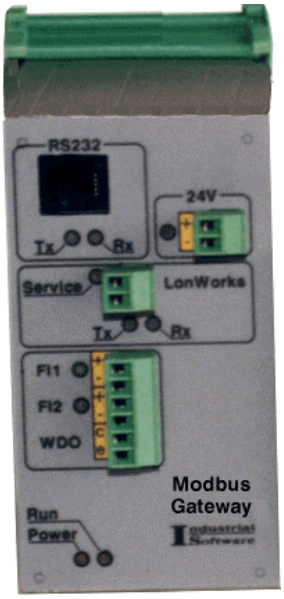
LonWorks Modbus Gateway



GENERAL INFORMATION

The LonWorks Modbus Gateway (LMG) provides integrated control solution, providing a bridge between LonWorks network and Modbus devices. The benefits of gateway include:

- **Programmable Comm parameters for Modbus side (baudrate, parity, address, ASCII/RTU)**
- **Configuration uses config network variables from LonWorks side**
- **Flexible routing tables**
- **Powerfull 16-bit microcontroller for Modbus side**

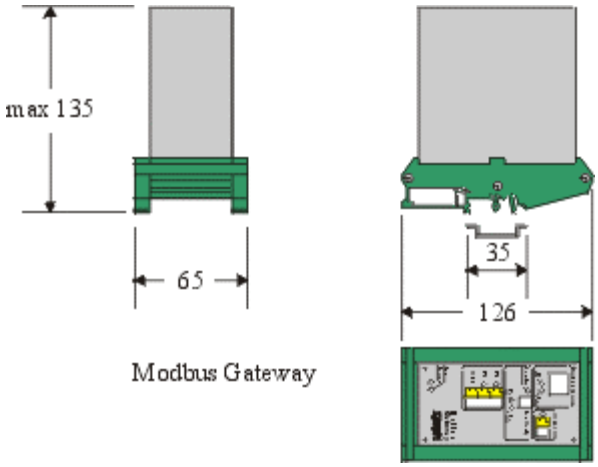
INSTALLATION

Gateways are shipped from factory in UNCONFIGURED state.

All devices have unique serial number (NEURON ID).
After physically installation of device you may use **Find and Wink** or **Neuron ID** installation scenario.

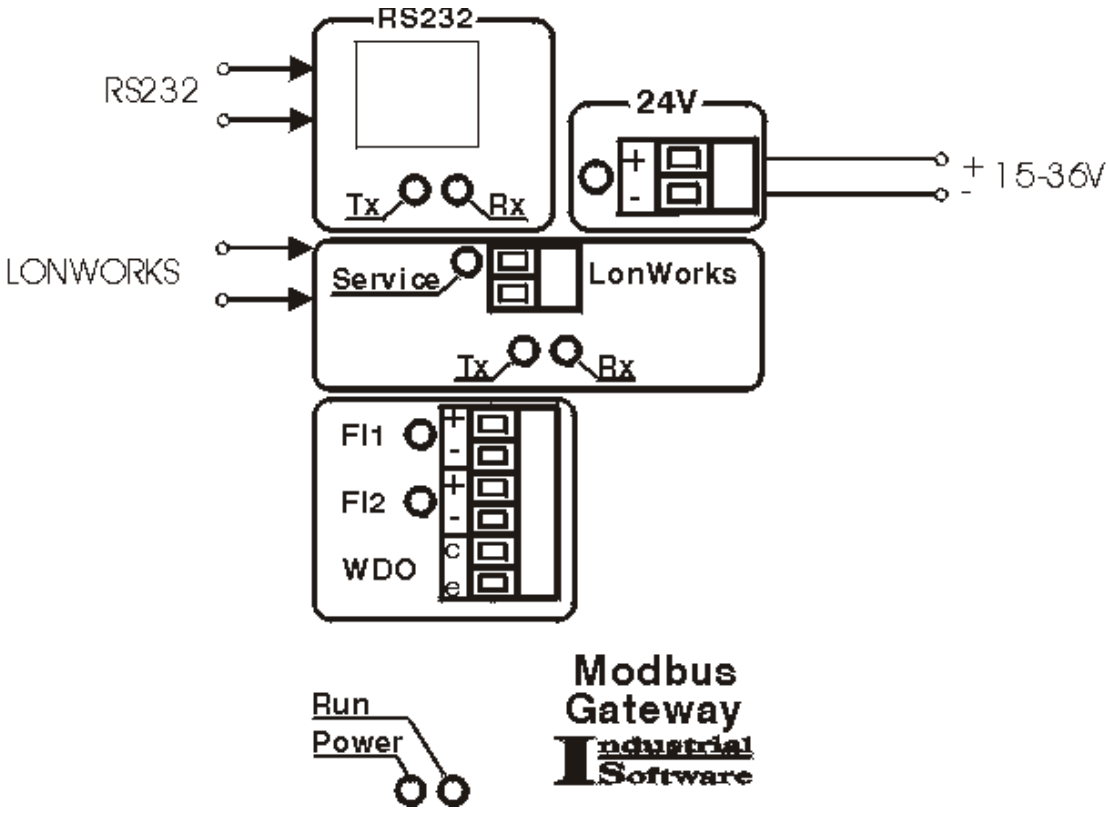
INSTALLATION - MECHANICAL

To mechanically install the Modbus Gateway, proceed as follows:
1. Drill two clearance holes for mounting DIN rail. Mount it.
2. Mount the module on the rail.



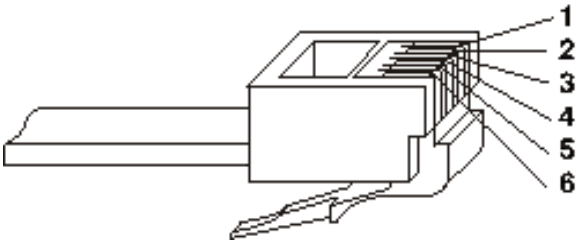
LonWorks Modbus Gateway

INSTALLATION - ELECTRICAL



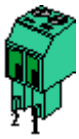
The following tables provide connector pinout information for each control module:

Connector RS 232

Connections	PART OF	Descriptions	
	1	**GND**	1
	2	**CTS**	1
	3	**RTS**	1
	4	**TxD**	1
	5	**RxD**	1
	6	**Vcc***	1

5VDC - Used to power external Galvanicaly insulated RS232/RS485 converter if needed. 100 mA maximum sink.

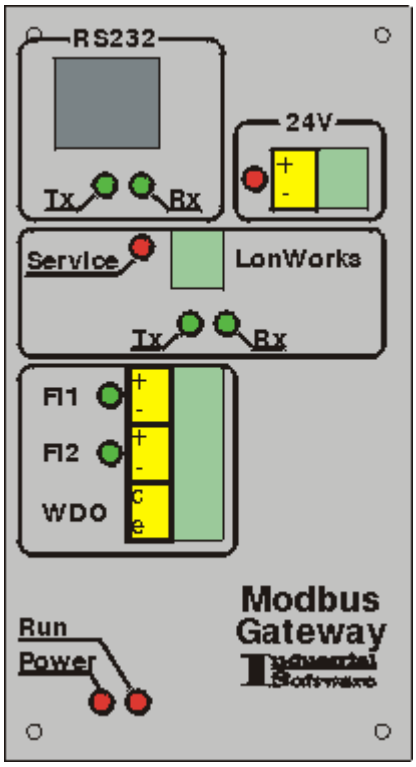
Module Power Connection

Module Power Connection	Micro Pin	Function
	1	- Power Supply
	2	+ Power Supply
Module Network Connection	**Micro Pin**	**Function**
	1	FTT-10 or TP/XF-1250
	2	FTT-10 or TP/XF-1250

SPECIFICATIONS

Electrical	
Module Power Voltage	15 - 36 VDC
Module Current Consumption	80 mA / 24VDC
Interface Capacity	48 read/write registers, 96 read/write coils
Galvanic insulation	LonWorks to Modbus, Power to Modbus, Power to LonWorks
LonWorks Voltage &Current	No need of power

Network	
Topology	Bus or free, single or double terminated.
Media	Twisted pair.
Interface	Transformer isolated polarity insensitive.
Environmental	
Temperature	
Operational(ambient)	-10 oC to +85 oC
Storage	-40 oC to +85 oC
Humidity	95% RH,non-condensing
Shock	10 G
Vibration	2 G, at 10 to 500 Hz
Electromagnetic compability	IEC801, level 3
Standards	
IEC	IEC 801, IEC1131-1
Physical	
Size(max. dimensions)	126mm*135mm*65mm
Mounting	DIN Rail
Weight	Enclosed without DIN Rail - apr. 250 g.
Housing /Material	Poliamide PA-F fiber reinforced , aluminum Face - policarbonat
Termination's	Plug-in direction vertical to conductor axis, 3.81 mm step
Recommended wire size	AWG28-16 (24-14) stranded or solid
Communication Indicators	Modbus side Tx, Rx - green LonWorks side Tx, Rx - green
Additional Indicators	Power - red, Service(LonWorks specific) red
Front Panel	See Front Panel View bellow



Front Panel View

Principal of operation of Modbus/LonWorks Gateway

Modbus/LonWorks Gateway makes a route between its Modbus and LonWorks side.

When a value in some Modbus is changed from the value of previous poll, it's propagated over

LonWorks if the corresponding variable(as defined by mapping table) is connected.

When a LonWorks side input variable is written, its value is downloaded to it's corresponding

Register at Modbus side.

Note the restrictions, that Neuron Based nodes (also Gateway) have:

1. **No more than 48 registers can be mapped to single gateway.**
2. **Each Gateway has only 15 address table entries, and each output variable connection uses one entry.**

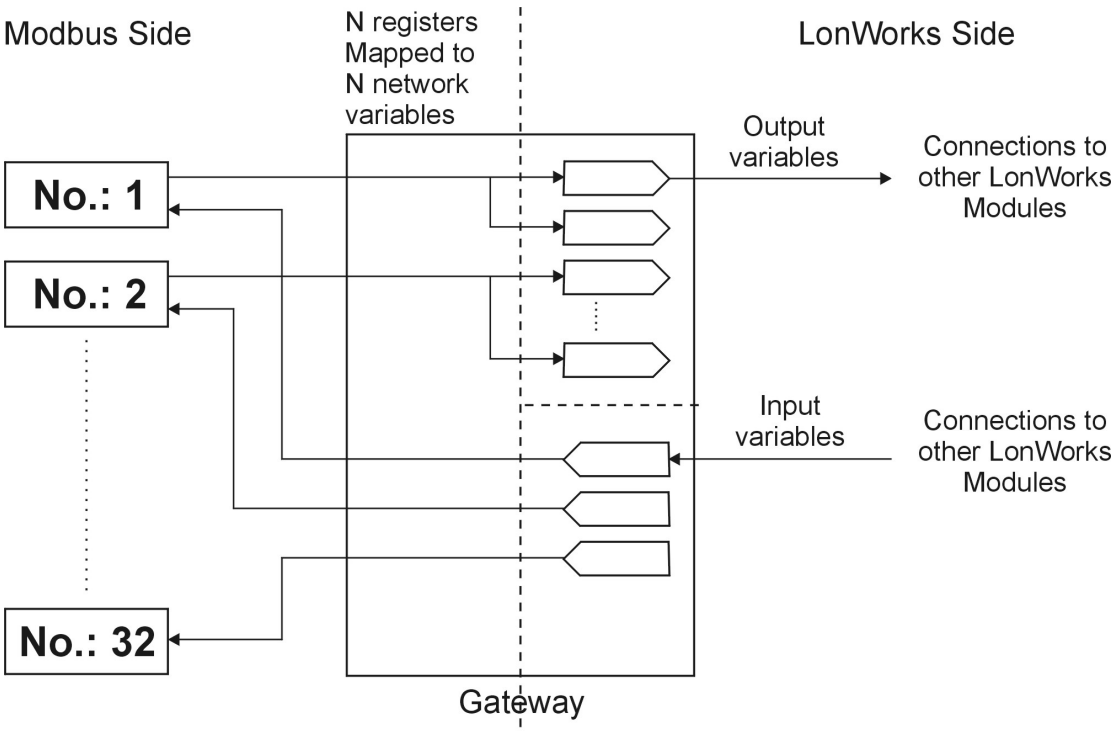


Fig. 1

Gateway Structures, Types and Variables

```
////////////////////////// Definitions of New Types //////////////////////
typedef struct
        {
         unsigned uIdx;
         unsigned uModNum;
        unsigned uFun;
        unsigned uAddrHi;
        unsigned uAddrLo;
        unsigned uNumPHi;
        unsigned uNumPLo;
        unsigned uNumByte;
        unsigned uNumVar;
        }StTpAddr;                    // 9 Bytes
```

```
typedef struct
        {
        unsigned       uAct;
         StTpAddr      sTbl;
        }StTpMapTbl;                        // 10 Bytes
typedef struct
        {
         unsigned      uNum;
         unsigned uBaud;
        unsigned uPar;
        unsigned uPollHi;
        unsigned uPollLo;
        unsigned uTimeHi;
        unsigned uTimeLo;
        }StTpCnfg;                    // 7 Bytes

typedef struct
        {
         unsigned      uData[31];
        }StTpTest;
// Rarallel_io_Interface Structors
typedef struct
        {
         unsigned      uLen;
         unsigned      uCode;
         unsigned      uData[DATA_SIZE-2];
        }parallel_io_interface;
```

```
typedef struct
        {
         unsigned      uLen;  // 8 Bytes
         unsigned      uCode;         // 1-Code
         StTpCnfg      sCnfg;// 7 Bytes
        }ST_PIO_Cnfg;
typedef struct
        {
         unsigned      uLen;  // 11 Bytes
         unsigned      uCode;         // 2,3-Code
         unsigned     uAct;   // 1 Byte
         StTpAddr sTbl;       // 9 Bytes
        }ST_PIO_Tbl;
typedef struct
        {
         unsigned      uLen;  // 11 Bytes
         unsigned      uCode;         // 2,3-Code
         StTpTest      sData;// 31 Bytes
        }ST_PIO_Req;

typedef struct
        {
         unsigned      PioCount;
         unsigned      uByte[6];
        }StTpState;
```

////////////////////////// Network Variables //////////////////////////

/* 00 */ network input StTpMapTbl **nviMapTbl**;

/* 01 */ network input SNVT_count **nviModBusNum**;

/* 02 */ network input SNVT_count **nviBaudRate**;

/* 03 */ network input SNVT_count **nviParity**;

/* 04 */ network input SNVT_count **nviPollTime**;

/* 05 */ network input SNVT_count **nviMwaitS**;

/* 06 */ network input SNVT_count **nviMaxSendTime**;

/* 07 */ network input SNVT_lev_disc **nviModeGtw**;

/* 08 */ fastaccess network output SNVT_state **nvoModBusErr[2]**;

/* 10 */ fastaccess network input SNVT_count **nviLonToMod[NVI_NUM]**;

/* 34 */ fastaccess network output SNVT_count **nvoModToLon[NVO_NUM]**;

/* 58 */ network input StTpTest **nviRegModData**;

/* 59 */ network output StTpTest **nvoRespModData**;

/* 08 */ network input SNVT_state **nviModBusSts**;

far network input StTpState **nviState**;

Network Variables Description

nviMapTbl

This variable is used by configuration tool to download and upload configuration tables.

nviModBusNum

This variable is used to specify MODBUS Gateway's Number in MODBUS network, when it works as Modbus Slave. Not used when Gateway is Modbus Master.

nviBaudrate

Modbus side Baudrate. Valid Values – 1200, 2400 , 4800 , 9600, 19200, 38400. This values represent corresponding baudrates in bits/second.

Default value: 19200

Caution: Write to this network variable initiates writing in EEPROM, so frequently writing may cause an EEPROM damage !

nviParity

Modbus side Parity configuration. Valid values – 0 for No Parity, 1 for even parity, 2 for odd parity.

Caution: Write to this network variable initiates writing in EEPROM, so frequently writing may cause an EEPROM damage !

nviPollTime

Modbus Polling interval in milliseconds – Time between 2 polls of Modbus devices, if “Table mode” is used. (see nviModeGtw). Valid Values – 40 to 20000 ms.

Caution: Write to this network variable initiates writing in EEPROM, so frequently writing may cause an EEPROM damage !

nviMwaitS

Modbus Side Timeout in milliseconds – If Modbus Gateway tries to read from or write to some device, and don’t receives query in this interval, it generates an error for this device and sets to 1 appropriate bit in nvoModBusErr[2]; Be Careful when configuring this timeout – at slower baudrates it have to be higher. **It also have to be lower then nviPollTime.**

nviMaxSendTime

Time in miliseconds, between two propagates of network variables, if their values are not changed.

Valid values – 0 – never propagate if there is no change ; 500 – 30000 .

nviModeGtw

Mode of functioning of Gateway. Valid Values:

ST_OFF (0) – **“Query” mode**

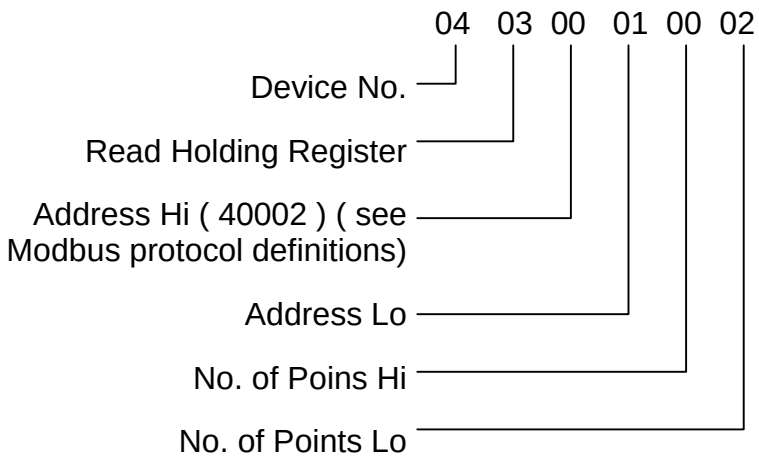
In this mode Gateway polls Modbus device only if nviRegModData writen with appropriate Modbus Message and returns result in nvoRespModData.

Gateway doesn’t use any internal tables in this mode !

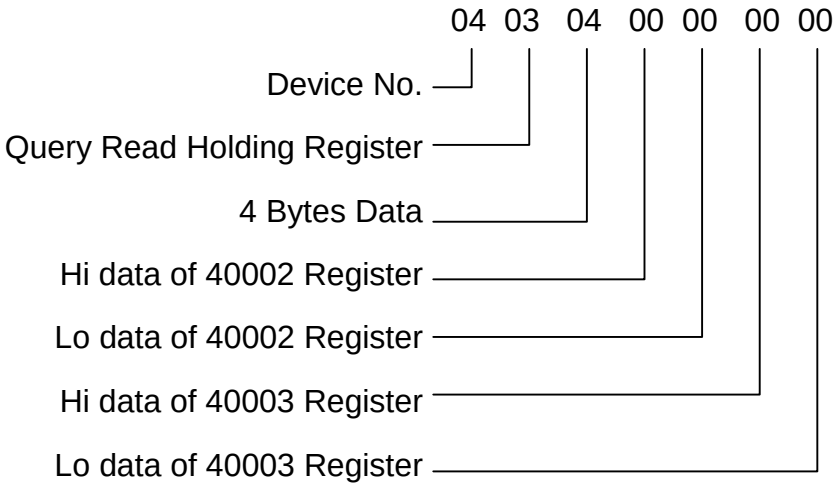
Gateway forms CRC by itself !

Example: (all values in the example are hexadecimal)

write to nviRegModData :



Gateway returns in nvoRespModData :



ST_ON (4) **– “Table” mode**

In this mode Gateway uses tables , downloaded by configuration tool to poll devices sequentially and send information to nvoModToLon[NVO_NUM].

If some value is written to nviLonToMod[NVI_NUM] , this value is downloaded to Modbus device, as this is described with configuration tool.

nvoModBusErr[2]

Each bit in these variables represents the state of one Modbus device .

0 – O.K

1 – Modbus device doesn’t answers in nviMwaitS time after poll.

LSB(bit 0) of nvoModBusErr[0] is for device 1

MSB(bit 1) of nvoModBusErr[0] is for device 16

LSB(bit 0) of nvoModBusErr[1] is for device 17

MSB(bit 1) of nvoModBusErr[1] is for device 32

nviModBusSts

Message level Errors at Modbus side