

# MODBUS SNET Gateway Setup Guide

## Overview

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MODBUS protocol is an industrial communications and distributive control system developed by Gould-Modicon to integrate programmable logic controllers (PLCs), computers, terminals and other monitoring, sensing, and control devices. By setting a unique address via the address switches, a MODBUS Gateway can become a Slave NODE on the MODBUS Network. This gives you the capability to read input and output status, and to force relays or groups of relays ON or OFF. A MODBUS Gateway node provides a single point connection to the LightMaster Network, eliminating the installation of dedicated cable runs and MODBUS modules on each controller. See Figure 2

## Structure

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MODBUS is a Master/Slave communications protocol. One device (the Master) controls all serial activity by selectively polling one or more of the slave devices. The maximum number of slave devices is 247 per network. Each device (node) is assigned a unique address to distinguish it from all the other nodes.

Only the Master initiates a transaction. Transactions are either a query/response (only a single slave is addressed), or a broadcast/no response (all slaves are addressed). A transaction comprises a single query and single response frame or a single broadcast frame.

Certain characteristics of the MODBUS protocol are fixed: frame format, frame sequences, communications error handling, exception conditions, and the functions performed. Other characteristics are selectable: transmission media, baud rate, character parity, number of stop bits, communications error handling, exception conditions, and functions performed.

## Transmission Modes

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The transmission mode is the structure of the individual units of information within a message, and the numbering system used to transmit the data. Two transmission modes are available. Both provide the same communication capabilities. The mode selected depends on the equipment used as the MODBUS master. Only one transmission mode may be selected per network. Mixing modes on a single network is not allowed. The two available transmission modes are ASCII (American Standard Code For Information Interchange) and RTU (Remote Terminal Unit)

### ASCII

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**Coding System** – ASCII (7 Bit); hexadecimal uses ASCII printable characters (0-9, A-F)

**Start Bits** – 1

**Data Bits** (least significant first) – 7

**Parity** (optional) – 1 (1 Bit set for even or odd, no Bits for no parity )

**Stop Bits** – 1 or 2

**Error Checking** – LRC (Longitudinal Redundancy Check)

### RTU

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**Coding System** – 8 Bit Binary

**Start Bits** – 1

**Data Bits** (least significant first) – 8

**Parity** (optional) – 1 (1 Bit set for even or odd, no Bits for no parity )

**Stop Bits** – 1 or 2

**Error Checking** – CRC (Cyclical Redundancy Check)



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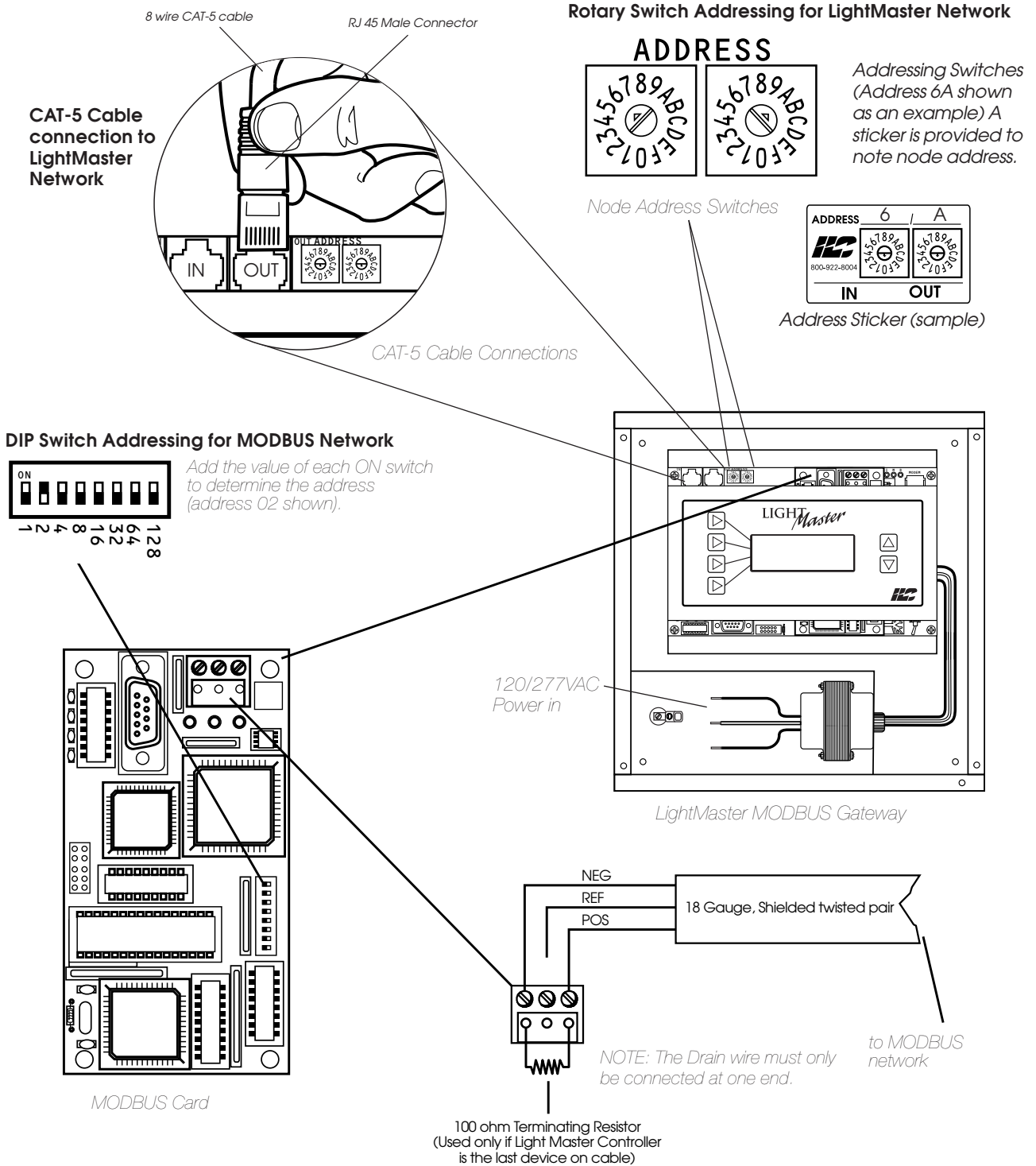


Figure 1 – Hardware Set-Up



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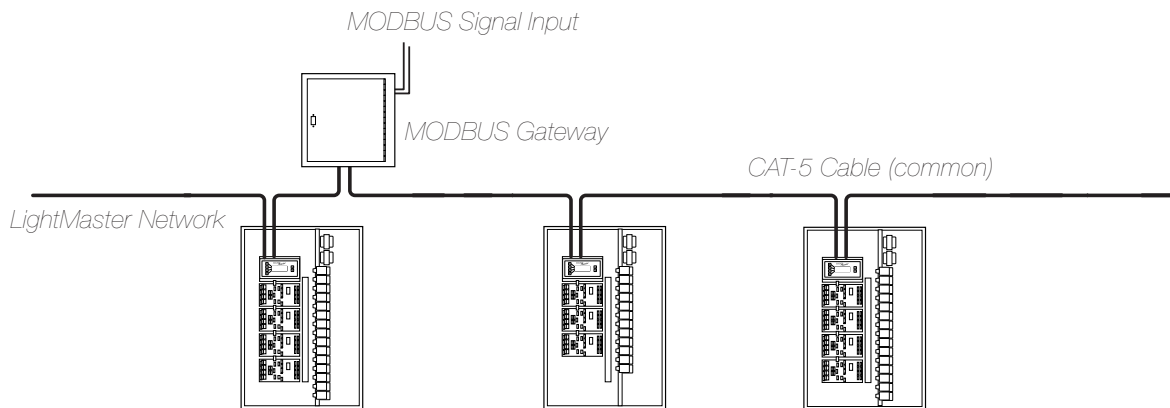


Figure 2 – MODBUS Gateway Connection to LightMaster network

## Transmission Mode Characteristics

ASCII printable characters are easy to view when trouble shooting and this mode is suited to PLC masters and computer masters programmed in a high level language, such as VISCOM BASIC.

In RTU mode, data is sent in 8-bit binary characters. In ASCII mode, data is divided into two 4 bit parts and then represented by the hexadecimal equivalent. ASCII mode uses twice as many characters as RTU mode but decoding is easier.

In RTU mode data must be transmitted in a continuous stream. In ASCII mode breaks of up to one second can occur between characters to allow for a relatively slow master.

## Hardware Setup

The LightMaster MODBUS Gateway must be connected to the LightMaster CAT-5 network of lighting panels and the Extended Network Manager. The Gateway must be addressed with a unique address for both the LightMaster and MODBUS network. The LightMaster network cable is standard CAT-5 cable. The MODBUS network cable is a two wire shielded twisted pair. Consult the Automation system provider for the exact specifications. Terminate the cable as shown in Figure 1.

## Required Parameter Entries

After setting the MODBUS card address DIP switches, you must power up the LightMaster controller and define certain operational parameters for MODBUS communication. (See Configure Gateway on next page.)

## Framing

Both ASCII and RTU transmission modes feature mechanisms to indicate the beginning and end of a frame, the node address, a function code (the type of information sought/command signal), a data field indicating the particular point or register accessed. See Table M-1 for data field I/O point designators for a LightMaster node.

## Supported Commands

- 01 Read coil status
- 02 Read input status
- 05 Force single coil
- 15 Force multiple coils

## Additional Information

Contact Modicon Inc. if you would like more detailed information on MODBUS protocol.

For more information refer to Modicon Modbus Protocol Reference Guide (PI-MBUS-300)



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## Configure Gateway

From the Master Panel (Node 01) keypad, press EDIT, then press EDIT NODES. Select the LightMaster Network node number set on the MODBUS Gateway node address switches. Select GATEWAY under TYPE. Press EDIT twice. From the screen that appears, configure Mode (RTU, ASCII), Baud Rate and Parity.

### Gateway Input and Output Point Addresses.

The address is a four-digit hex number. The upper two digits are the Node number, and the lower two digits are the input or relay (coils) numbers. Example: Node 2D/ Relay 23 is MODBUS address 2D17H. See Table 1 and 2 for Input and Output point designators.

### Gateway Group Point Addresses

Node FF controls groups. See Table 3 for Group point designators.

Keypad Screen Example:

```
NETWORK MASTER *
TUE 09/01/04
EDIT          09:46:54 PM
              (C)2004 ILC
```

Press ► EDIT

```
EDIT SYSTEM
EDIT NODES
SYNCHRONIZE SETTINGS
EXIT
```

Press ► EDIT NODES, select node

```
NODE ◀ 02
TYPE 08 I/O
EDIT
EXIT
```

Press ▲ or ▼ to select type

```
NODE 02
TYPE ◀ GATEWAY
EDIT
EXIT
```

Press ► EDIT TWICE

```
MODE          ASCII
BAUD          38400
PARITY        ODD
EXIT
```



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LightMaster Input	ON Point	OFF Point	Closed	Open
1	01	31	1 = Input Closed	0= Input Open
2	02	32	1 = Input Closed	0= Input Open
3	03	33	1 = Input Closed	0= Input Open
4	04	34	1 = Input Closed	0= Input Open
5	05	35	1 = Input Closed	0= Input Open
6	06	36	1 = Input Closed	0= Input Open
7	07	37	1 = Input Closed	0= Input Open
8	08	38	1 = Input Closed	0= Input Open
9	09	39	1 = Input Closed	0= Input Open
10	0A	3A	1 = Input Closed	0= Input Open
11	0B	3B	1 = Input Closed	0= Input Open
12	0C	3C	1 = Input Closed	0= Input Open
13	0D	3D	1 = Input Closed	0= Input Open
14	0E	3E	1 = Input Closed	0= Input Open
15	0F	3F	1 = Input Closed	0= Input Open
16	10	40	1 = Input Closed	0= Input Open
17	11	41	1 = Input Closed	0= Input Open
18	12	42	1 = Input Closed	0= Input Open
19	13	43	1 = Input Closed	0= Input Open
20	14	44	1 = Input Closed	0= Input Open
21	15	45	1 = Input Closed	0= Input Open
22	16	46	1 = Input Closed	0= Input Open
23	17	47	1 = Input Closed	0= Input Open
24	18	48	1 = Input Closed	0= Input Open
25	19	49	1 = Input Closed	0= Input Open
26	1A	4A	1 = Input Closed	0= Input Open
27	1B	4B	1 = Input Closed	0= Input Open
28	1C	4C	1 = Input Closed	0= Input Open
29	1D	4D	1 = Input Closed	0= Input Open
30	1E	4E	1 = Input Closed	0= Input Open
31	1F	4F	1 = Input Closed	0= Input Open
32	20	50	1 = Input Closed	0= Input Open
33	21	51	1 = Input Closed	0= Input Open
34	22	52	1 = Input Closed	0= Input Open
35	23	53	1 = Input Closed	0= Input Open
36	24	54	1 = Input Closed	0= Input Open
37	25	55	1 = Input Closed	0= Input Open
38	26	56	1 = Input Closed	0= Input Open
39	27	57	1 = Input Closed	0= Input Open
40	28	58	1 = Input Closed	0= Input Open
41	29	59	1 = Input Closed	0= Input Open
42	2A	5A	1 = Input Closed	0= Input Open
43	2B	5B	1 = Input Closed	0= Input Open
44	2C	5C	1 = Input Closed	0= Input Open
45	2D	5D	1 = Input Closed	0= Input Open
46	2E	5E	1 = Input Closed	0= Input Open
47	2F	5F	1 = Input Closed	0= Input Open
48	30	60	1 = Input Closed	0= Input Open

Table 1 – LightMaster Data Field Input Point Designators, Gateway Level



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LightMaster Output	Point	Closed	Open
1	01	1=Output Closed	0=Output Open
2	02	1=Output Closed	0=Output Open
3	03	1=Output Closed	0=Output Open
4	04	1=Output Closed	0=Output Open
5	05	1=Output Closed	0=Output Open
6	06	1=Output Closed	0=Output Open
7	07	1=Output Closed	0=Output Open
8	08	1=Output Closed	0=Output Open
9	09	1=Output Closed	0=Output Open
10	0A	1=Output Closed	0=Output Open
11	0B	1=Output Closed	0=Output Open
12	0C	1=Output Closed	0=Output Open
13	0D	1=Output Closed	0=Output Open
14	0E	1=Output Closed	0=Output Open
15	0F	1=Output Closed	0=Output Open
16	10	1=Output Closed	0=Output Open
17	11	1=Output Closed	0=Output Open
18	12	1=Output Closed	0=Output Open
19	13	1=Output Closed	0=Output Open
20	14	1=Output Closed	0=Output Open
21	15	1=Output Closed	0=Output Open
22	16	1=Output Closed	0=Output Open
23	17	1=Output Closed	0=Output Open
24	18	1=Output Closed	0=Output Open
25	19	1=Output Closed	0=Output Open
26	1A	1=Output Closed	0=Output Open
27	1B	1=Output Closed	0=Output Open
28	1C	1=Output Closed	0=Output Open
29	1D	1=Output Closed	0=Output Open
30	1E	1=Output Closed	0=Output Open
31	1F	1=Output Closed	0=Output Open
32	20	1=Output Closed	0=Output Open
33	21	1=Output Closed	0=Output Open
34	22	1=Output Closed	0=Output Open
35	23	1=Output Closed	0=Output Open
36	24	1=Output Closed	0=Output Open
37	25	1=Output Closed	0=Output Open
38	26	1=Output Closed	0=Output Open
30	27	1=Output Closed	0=Output Open
40	28	1=Output Closed	0=Output Open
41	29	1=Output Closed	0=Output Open
42	2A	1=Output Closed	0=Output Open
43	2B	1=Output Closed	0=Output Open
44	2C	1=Output Closed	0=Output Open
45	2D	1=Output Closed	0=Output Open
46	2E	1=Output Closed	0=Output Open
47	2F	1=Output Closed	0=Output Open
48	30	1=Output Closed	0=Output Open

Table 2 – LightMaster Data Field Output Point Designators: Gateway Level



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LightMaster Group	Point	Closed	Open
1	01	1=Group Closed	0=Group Open
2	02	1=Group Closed	0=Group Open
3	03	1=Group Closed	0=Group Open
4	04	1=Group Closed	0=Group Open
5	05	1=Group Closed	0=Group Open
6	06	1=Group Closed	0=Group Open
7	07	1=Group Closed	0=Group Open
8	08	1=Group Closed	0=Group Open
9	09	1=Group Closed	0=Group Open
10	0A	1=Group Closed	0=Group Open
11	0B	1=Group Closed	0=Group Open
12	0C	1=Group Closed	0=Group Open
13	0D	1=Group Closed	0=Group Open
14	0E	1=Group Closed	0=Group Open
15	0F	1=Group Closed	0=Group Open
16	10	1=Group Closed	0=Group Open
17	11	1=Group Closed	0=Group Open
18	12	1=Group Closed	0=Group Open
19	13	1=Group Closed	0=Group Open
20	14	1=Group Closed	0=Group Open
21	15	1=Group Closed	0=Group Open
22	16	1=Group Closed	0=Group Open
23	17	1=Group Closed	0=Group Open
24	18	1=Group Closed	0=Group Open
25	19	1=Group Closed	0=Group Open
26	1A	1=Group Closed	0=Group Open
27	1B	1=Group Closed	0=Group Open
28	1C	1=Group Closed	0=Group Open
29	1D	1=Group Closed	0=Group Open
30	1E	1=Group Closed	0=Group Open
31	1F	1=Group Closed	0=Group Open
32	20	1=Group Closed	0=Group Open
33	21	1=Group Closed	0=Group Open
34	22	1=Group Closed	0=Group Open
35	23	1=Group Closed	0=Group Open
36	24	1=Group Closed	0=Group Open
37	25	1=Group Closed	0=Group Open
38	26	1=Group Closed	0=Group Open
39	27	1=Group Closed	0=Group Open
40	28	1=Group Closed	0=Group Open
41	29	1=Group Closed	0=Group Open
42	2A	1=Group Closed	0=Group Open
43	2B	1=Group Closed	0=Group Open
44	2C	1=Group Closed	0=Group Open
45	2D	1=Group Closed	0=Group Open
46	2E	1=Group Closed	0=Group Open
47	2F	1=Group Closed	0=Group Open
48	30	1=Group Closed	0=Group Open

Table 3 – Light Master Data Field Output Group Point Designators: Gateway Level



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