



Integrated Systems Engineering & Products

PROTOCOL CONVERTER

LR300 to MODBUS TCP

Technical Manual

DOCUMENTED BY

ISEP

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1 Introduction

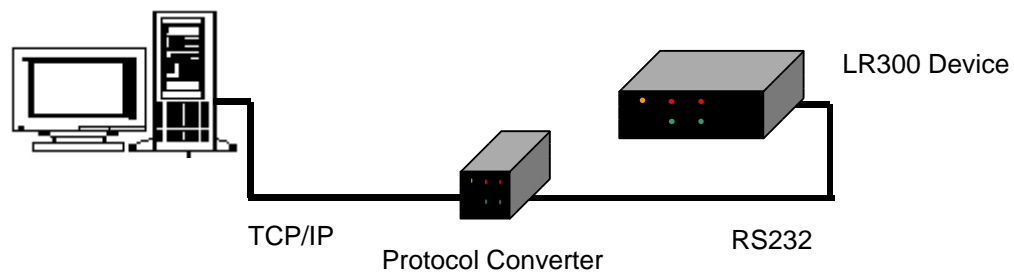
The LR300 to MODBUS TCP Protocol Converter by ISEP facilitates data communications between MODBUS TCP and LR300. It does this by sending MODBUS TCP queries to LR300 and vice-versa. The LR300 datas are transmitted through RS-232 port and MODBUS TCP through ethernet port provided on the converter.

2 System Configuration

Converter is user configurable. The HyperTerminal of a PC connected to port 2 can be used to enter the configuration for IP address (IP address of the Converter itself), Remote IP address (IP Address of the MODBUS TCP Slave, to which the Converter wants to establish a connection), Gateway address, Net-mask address, for the Ethernet port .

In the monitoring system, LR300 or MODBUS TCP could be monitored. The converter can be configured to act as Client or Server based on which device (LR300 or MODBUS TCP) is acting as Master or Slave. If the MODBUS TCP is acting as Master then configure the converter to act as server and if LR300 is acting as Master then configure the converter to act as client. (See the Configuration Setup for details) .

The converter is connected to LR300 via the Port 1 (RS232 port). The converter is connected to MODBUS TCP via the LAN port.. The system configuration is shown below.



3 Configuration Set-Up

The Converter is designed to sit on a 35 mm DIN Rail. There are two serial ports and one ethernet port on the Converter.

PORT 1: Communication port.

PORT 2 : Configuration port .

LAN : Ethernet port.

The Communication port is configured for 9600 baud, 8 databits, 1 stopbit and Parity None, which is the settings required by LR300 device.

To enter the configuration values or to see the existing configuration, for ethernet port connect a PC to the Configuration port (port 2) of the Converter and open the HyperTerminal.

Hyper Terminal should be connected at 19,200 baud, 8 data bits, 1 stop bit and parity None. On power up, the HyperTerminal displays the factory settings of the following parameters:

IP address = 090.000.000.190
(IP address of the Converter)

Remote IP address = 000.000.000.000
LR300 always acts as a slave in a slave – host / multi slave network configuration. The MODBUS TCP is acting as Master, so leave the Remote IP address at its factory setting (0.0.0.0).

Net-mask = 255.255.255.000
Gateway = 0.0.0.0

Converter requests if the user wants to change any configuration or use the existing one.

Do you wish to continue configuration ?

Press “Y” or “y” and wait for few seconds until the Converter enters into configuration mode. DO not enter “Enter Key” after pressing “Y” or “y” on the keyboard.

If the user doesn't wish to change any configuration simply enter “any key” other than “Y” or “y” to exit out of configuration mode.

Once in the configuration mode, Converter requests for the following values :
User can enter the corresponding new values followed by “Enter Key” or simply enter the “Enter Key “ to use the existing values

Enter the IP address.(xxx.xxx.xxx.xxx followed by Enter Key)
(e.g :- “090.000.000.180” followed by “Enter Key”).

Enter the Remote IP address.(xxx.xxx.xxx.xxx followed by Enter Key)
Leave the Remote IP address at its factory setting 000.000.000.000.

Enter the Gateway address.(xxx.xxx.xxx.xxx followed by Enter Key)
Please leave it at factory setting if there is no gateway

Enter the Netmask address.(xxx.xxx.xxx.xxx followed by Enter Key)
(e.g :- “255.255.255.000” followed by “Enter Key”).

Once the user finishes the configuration, the Converter will prompt again if the user wishes to continue the configuration to correct any of the values.

Do you wish to continue the configuration ?

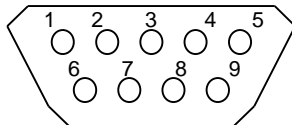
Enter "any key" other than "Y" or "y" to exit out of configuration mode.

Converter then displays the last entered values

All MODBUS TCP requests are sent via TCP on registered port 502

Once the Converter exits out of configuration mode it enters into communication mode. It transmits data received from the Ethernet port to the serial port and vice versa. During the communication mode, for any reason if the user wishes to change any configuration of the ports, power off the Converter and power up again. The Converter will start the communication process described above automatically.

The pin description for the 9 pin D connector is shown below.



3 Pin Male Connector	
Pin #	Description
2	Tx
3	Rx
5	Ground
rest	No connection

(Once the converter is configured the same connector can be used for the Communication Port).

Communication Port(Port 1) = 3 Pin Male Connector

Configuration Port(Port 2) = 3 Pin Male Connector

4 Overview of Communication Process

This section provides an overview of the communication processes that takes place within the MODBUS TCP device , the LR300 device and the protocol converter.

The protocol converter begins a series of events upon receiving a valid query from the Master device(MODBUS TCP). Currently, the valid function code is 3 (Read Registers).

The converter will ignore any function codes other than those stated above.

On power up, the converter monitors the Master device continuously for queries. Upon receipt of a valid query, the converter will convert the Modbus TCP query to a valid LR300 request and send the request to the LR300 device (slave). After which, it waits for a response from the slave. The Converter supports only the function code 0x03 (Read General Status) of LR300 protocol . This command allows the host to read the current status of the LR300 device for all channels at once .

The maximum amount of time, that is allowed between the time the last byte of the command is sent from the converter to the time the slave responds, is 400 milliseconds. That is around 500 milliseconds, that is the maximum amount of time that a master can wait for the response from the converter after a query have been sent. If no response is received from the slave, the converter will abort the communication process of the current query and monitors the master for a new query. The whole communication process of the current query could be finished before the master send next query.

For the LR300, the converter will do the error check first. After a packet is received the CRC of the LR300 response is calculated and checked for correctness. If the CRC fails the converter will ignore this packet. If the packet is a valid response , then the converter decodes it and converts it into a valid Modbus TCP response and sends it to the master.

If no response is received from the converter after the master sent the query, check the converter first. If the Tx LED of the port still flash after a query is received, that means the converter work well and the devices should be checked. Otherwise, power off the converter and power up again. The converter will start the communication process described above automatically.

5 Data Array Maps

General Status

Description	Modbus Address	Type
Channel 1 Reading Overflow	40001	AA
Channel 2 Reading Overflow	40002	AA
Channel 3 Reading Overflow	40003	AA
Channel 4 Reading Overflow	40004	AA
Channel 1 Setpoint 1 Alarm status	40005:0	DI
Channel 1 Setpoint 2 Alarm status	40005:1	DI
Channel 2 Setpoint 1 Alarm status	40005:2	DI
Channel 2 Setpoint 2 Alarm status	40005:3	DI
Channel 3 Setpoint 1 Alarm status	40005:4	DI
Channel 3 Setpoint 2 Alarm status	40005:5	DI
Channel 4 Setpoint 1 Alarm status	40005:6	DI
Channel 4 Setpoint 2 Alarm status	40005:7	DI

