
SHM Communications Ltd.



Installation Guide
SHM Ethernet Gateway EGU1

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Rev.	Date	By	Change
2.0	12/12/3	tj	Changes to suit MCG type enclosure
2.1	10/12/04	Tj	Handshaking from XON/OFF to None
2.2	2/02/05	tj	Text clarifications
2.3	2/3/05	tj	Modifications for EGU mkII, additional Ethernet support info
2.4	29/3/05	tj	subnet info added

Introduction

The Ethernet Gateway allows SHM data loggers to be accessed via an Ethernet network, and so if necessary, be connected to the internet.

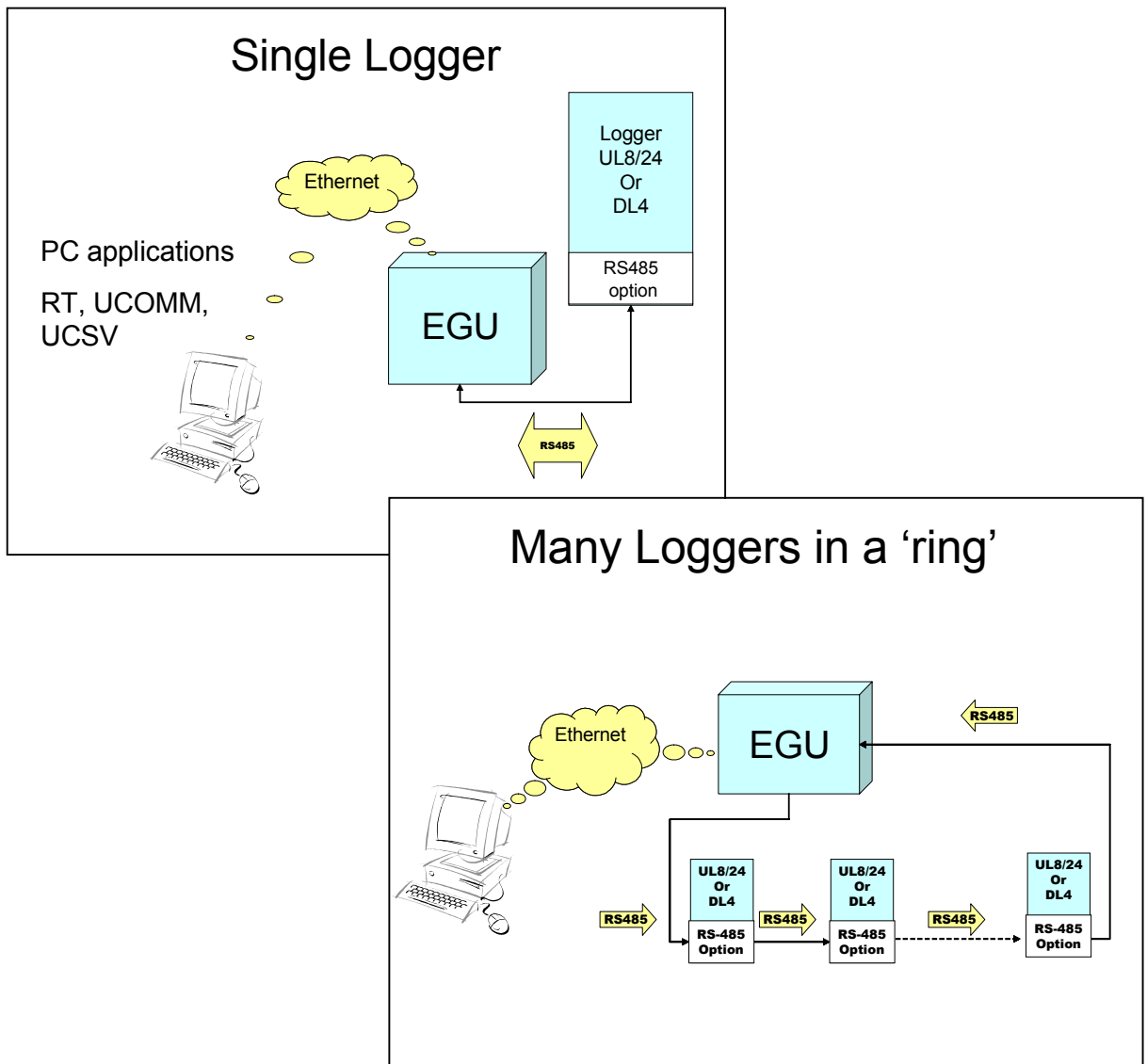
This document details the installation, setting up, and operation of EGU with

- SHM Data Loggers in the UL, and DL series
- SHM utilities such as UCOMM and UREAD
- Stark RT Energy Management software

Architecture

The EGU connects to the logger using RS485 communications. The 9-way D port on the outside of the logger is kept free for local interrogation and diagnostics.

The RS485 option for the logger allows one or a 'ring' of loggers to share the single EGU and Ethernet connection.



Installation

Fastenings

EGU is housed in a plastic enclosure with transparent cover.

Environment: IP55 (depends on cable entries)

Weight: 1.4Kg

Outside size: H 215 x W 175 x Depth 105mm

Fastenings: 4 screws. Ctrs. 167 x 122mm, 4.5 dia. holes, max 12 dia. head, thickness of plastic 5

Cable entry: Moulded positions – 2 on top and bottom face, 3 on each side at 23 and 29 dia. Positions at the sides may interfere internally.

Power supply

Power supply: 230 VAC, 50-60 Hz, 50mA

Fuse: The unit has an internal fuse, 20mm 315mA slow blow, but a fused spur should be supplied at 1A

Connection: LNE screw terminals are internal in the EGU

RS485 Connection to Logger

RS-485 connections via 5 screw terminals – labelled I+, I-, E, O+, O- for Input, Output. Screen or drain wire should be connected to E terminal. See logger manual for details of connections and cable specifications.

Ethernet connection

Connection: RJ45 socket located inside the unit (if using cable gland, ensure plug can pass through)

Protocol: 10/100 Base-T auto sense. TCP/IP, UDP

Ports: Ethernet ports used by EGU – your IT staff may need to ensure these are not blocked by firewall.

23 (telnet) used for EGU configuration

4001 used for data (though this default may be changed when more than EGU on a LAN need to be accessed from the internet)

No special software need be installed in the host computer to use with SHM UCOMM (version 4), or Stark RT.

Optionally, a utility (Configurator) may be installed on a PC to help configure the EGU.

Logger Configuration

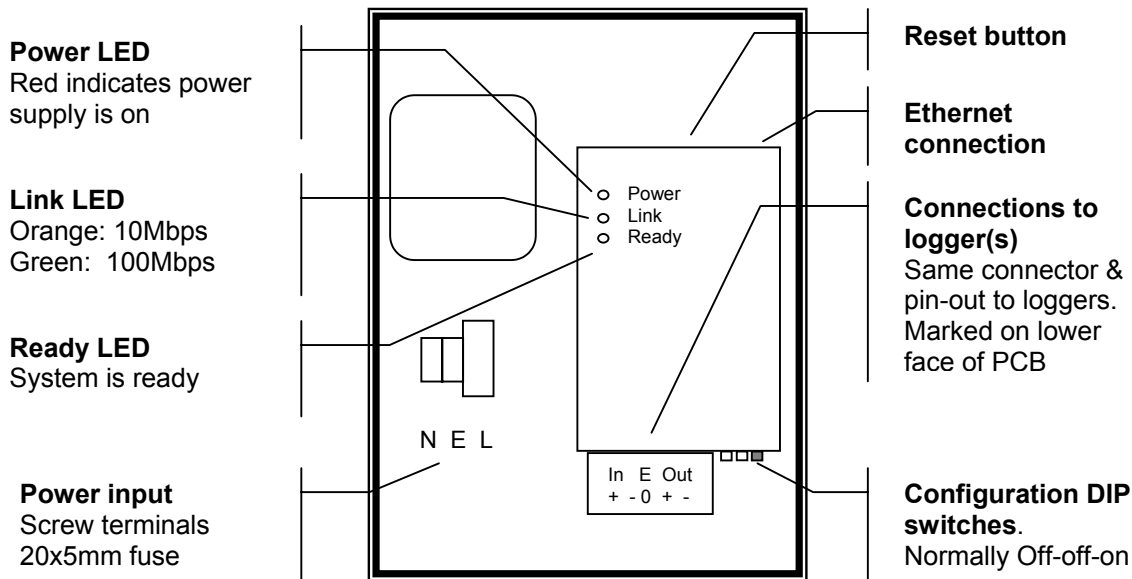
Logger requires RS485 option fitted. May be retrofitted to UL8, UL24, but a factory option for DL4 loggers.

The serial communications of the logger is set to:

9600, E, 1, No handshake.



Unlike a modem, dial out from the logger is NOT supported.



EGU – getting started

These installation and commission stages must be carried out .

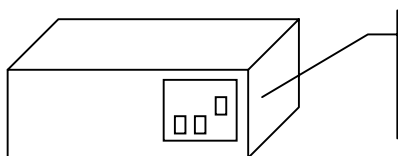
1. Fix EGU, and connect it to mains supply
2. Connect EGU to logger(s) using twisted pair cable – see logger manual for cable specification and connections
3. Configure EGU Ethernet parameters e.g. IP address
4. Connect EGU to your Ethernet network
5. Configure your PC application

Tools needed

- PC with telnet program installed
- Crossover Ethernet cable to connect directly from PC to EGU
- Optionally, Configurator utility, UCOMM utility

Configure EGU

1. Check DIP Switches correctly set



Switches
1 2 3
off off on

2. Connection

We recommend you record the necessary data in the Worksheet at the end of this document.

The Unit is partly configured before shipment from SHM, but at least IP address & gateway, must be set to suit your site.

First one must connect to the EGU - one of the following methods may be used

2.1 Configure using Configurator utility

This Windows utility allows you to change the IP address and Subnet mask even if the EGU is not currently set to be within your Subnet. The Configurator is available from SHM, or from www.moxa.com-> support -> NP-311 utilities.



The Configurator finds all NP-311 devices using a broadcast on your network – be sure you identify the correct one – MAC is unique to each device. There may be terminal servers other than your responsibility, so it is important to protect EGU settings by its password.



For Windows 9x, use a direct connection as detailed below, or you will need an earlier utility – contact SHM

2.2 Configure using telnet

EGU may be configured using the telnet program via the Ethernet connector – telnet is a program supplied with Microsoft Windows. Telnet accesses a series of menus within the EGU itself. First one must connect to the EGU



To run telnet in Windows: Start -> Run... telnet 192.168.127.254 (if this the address of the EGU)



To find the IP settings of your PC, open a Command prompt, and enter ipconfig /all (for Windows 9x, type winipcfg instead)

2.2.1 Connect across the network without Configurator

This is possible only if your computer and EGU are set in the same Subnet. When shipped, the EGU is set to IP address / subnet 192.168.127.254 / 255.255.255.0

Be very careful if your Subnet mask is not 255.255.255.0, or 255.255.0.0 – There are some good tutorials on the internet, for instance at www.techtutorials.info/nettcpip.html

See extra Subnet information at the end of this manual.

Once you have the correct settings, run telnet as above.

2.2.2 Connect using Ethernet crossover cable

Plug a special crossover Ethernet cable directly between your computer and the EGU. If not using the Configurator, must set the IP address of your computer to be compatible with the EGU.

Default IP address of an EGU is 192.168.127.254/255.255.255.0

So we suggest you set your computer IP address to 192.168.127.253/255.255.255.0



Your PC must have a fixed IP address at this time – if set to use DHCP, the PC will fail to start its Ethernet interface.

Once you have the correct settings, run telnet as above.

3. EGU Configuration console

When telnet connects to the EGU, screens generated by the EGU first require entry of terminal type. Type 1 (vt100).

Then type the EGU password (default is shm, and is case sensitive).

Now you are ready to configure. Navigate the menus using

- Arrows to move to item
- Press enter key to select
- Esc key to go back to previous menu
- To make a change permanent, select the Restart option. This reboots the EGU, so the Telnet connection will be lost.

Sample Configuration menus

```

MOXA NPort Express V2.5
-----
[serverConfig] OP_mode Serialport Monitor Ping Restart Exit
Config server settings
ESC: back to menu Enter: select

Server Model          DE-311
Server Name           [NP9614
Serial Number         09614

IP Configuration     [Static IP ]
IP Address            [192.168.0.222 ]
Netmask               [255.255.0.0 ]
Gateway              [192.168.0.1 ]
Ethernet Status      100M/Link
MAC Address           00:90:E8:04:25:8E

Password             [*** ]
  
```

serverConfig [OP_mode] Serialport Monitor Ping Restart Exit
Setup OP mode
ESC: back to menu Enter: select

Port	Application
01	[TCP Server

```

-----
TCP port               : [4001 ]
Destination IP addr   : [
Inactivity time       : [65000]ms
TCP alive check time : [7 ] minutes
Data packing(optional)
Delimiter 1 (Hex)    : [ _ ]
Delimiter 2 (Hex)    : [ _ ]
Force transmit       : [2 ]ms
  
```

```

serverConfig OP_mode [Serialport] Monitor
Config serial port settings
ESC: back to menu Enter: select

Port Number          1

Baud Rate(bps)      [9600 ]
Parity               [Even ]
Data Bit             [ 7 ]
Stop Bit             [ 1 ]
Flow Control         [None ]
UART FIFO            [Enable ]
  
```

4. EGU Parameters

The table shows the parameters as set by SHM, and those parameters the customer may need to modify to your network.

Parameter	Factory Default Grey cells must not be changed	Notes
Server Config Menu		
Server Name or Host name	NPxxxx xxxx is serial No.	No spaces allowed in the name, no underscores, no special characters e.g. FLOOR1 is OK
DHCP	Disable	
IP Address	192.168.127.254	IP address of this EGU
Subnet mask	255.255.255.0	IP mask of this EGU
Gateway		Must enter address of gateway if EGU is to be accessed from outside this Subnet. Obtain this from local IT staff
Password	shm	The password protects the configuration settings – if you lose the password, pressing reset button returns it to blank. All other settings must then be reviewed
OP_Mode menu		
TCP Server	TCP Server	
TCP Server menu – additional settings		
TCP socket Port	4001	Changed if more than one EGU on site, and internet access needed, and port direction used. Discuss this with local IT staff – RT and UCOMM must be set with this
IP address	Blank	Security feature. This is the address of the only PC that is permitted to communicate TO this EGU – normally leave blank
Inactivity	65000ms	
Delimiter1	Blank	
Delimiter 2	Blank	
Force transmit	2ms	
Serial menu		
Baud Rate	9600	
Parity	E	
Data Bit	7	
Stop Bit	1	
Flow Control	None	
UART FIFO	Enable	

Configure PC, UCOMM and Stark RT

Host name resolution

The EGU may be addressed by either its IP address, or Host name.

Host names are more 'friendly' to humans, so you must make an entry in the 'hosts' file of the PC so RT can find the EGU (unless you are going to use IP addresses instead of host names).

- Make a safe copy of the hosts file
- Using notepad (not Word) edit the hosts file, adding a line at the end with IP address, Host name, and comment e.g.
192.168.7.123 FLOOR1 # EGU on floor 1



hosts file location: NT or Win200x \winnt\system32\drivers\etc\hosts, or Win9* in \windows\hosts

To configure SHM Utilities

For UCOMM, select the 'Edit Menu', choose 'Edit PC COM Port & Baud Rate', then enter 0 for Ethernet port.

Then enter the IP address, including any leading zeroes, i.e. not 1.2.3.4, but 001.002.003.004.

Then enter the port to match the EGU port, e.g. 4001.

Configuration of UCSV and UREAD is similar. You are now ready to communicate.

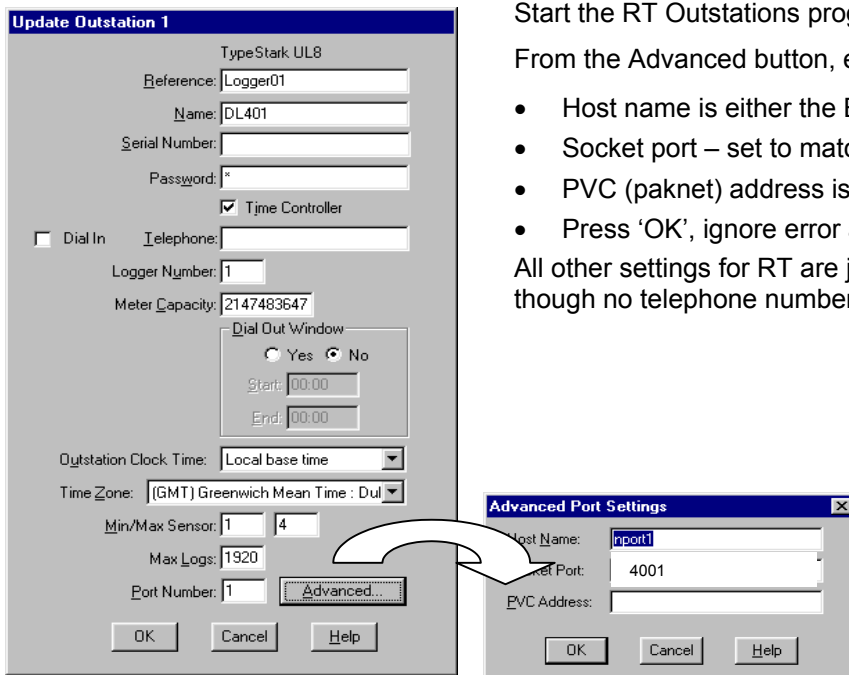
To configure RT

Start the RT Outstations program.

From the Advanced button, enter:

- Host name is either the EGU Server name or its IP address
- Socket port – set to match the EGU port, e.g. 4001
- PVC (paknet) address is not needed – leave it blank.
- Press 'OK', ignore error about PVC address

All other settings for RT are just as for, for instance, a modem, though no telephone number needed.



Logger Power supply

Remember that the EGU is mains powered, so even if the logger has a UPS battery, if there is no power, Ethernet communications will fail. In that case logging will continue, and data may be collected once communications resume.

EGU configuration Worksheet

In the table below, enter necessary communications parameters from your network administrator, and then enter them in this worksheet. If necessary, copy this page for more EGUs.

Building			Notes:
Location			
Identifier			
Logger(s) attached Type & serial No.	Type / LLN	Serial Number	
EGU (Host) name			
EGU Serial number			
Firmware version			
MAC address	: : : : :		
IP Address	. . .		
Subnet mask	255 . . .		
Gateway IP address	. . .		
TCP/IP socket Port for data.			Default: port 4001
Password			If lost, use reset button on EGU, returns password to blank



Keep this data in your records – especially the password!



After setting up the EGU, ensure switches set correctly before leaving the unit

Troubleshooting

☞ Only one application can communicate via the data port of the EGU at a time – even if they are in the same PC. UCOMM must not be running at all if RT is to gather readings, similarly, if UCOMM is communicating, it may disrupt RT gathering data.

If you have problems, first review the settings of the EGU, PC Ethernet, and Stark RT, as in this manual.

Here are some techniques you may find useful in diagnosing.

Monitoring data flow through the EGU

This does not disrupt data gathering (since telnet and data use different ports)

Connect to the EGU using telnet, select the **Monitor** option.

```
serverConfig OP_mode Serialport Monitor Ping
Monitor operating status for each serial port
ESC: back to menu Enter: select
Port Number          1
Tx Char Count        61
Rx Char Count        0
Conn. Status         remote 192.168.0.21_
Line Status          dtr, dsr
                    RTS, cts
                    dcd
Baud Rate(bps)       9600
Parity                Even
Data Bit              7
Stop Bit              1
Flow Control          None
```

Menu hints

Menu

Problems between PC connection to the EGU

- ❑ Should your PC normally have internet access – does it still have internet access?
- ❑ To check Ethernet settings on PC, run: **ipconfig /all** in NT, XP, or Win2x or **winipcfg** Win9x
- ❑ If connecting directly from PC to EGU rather than via a hub, DO NOT use a ‘normal’ patch cable, you *must* use a crossover cable, available from SHM, or your IT department.
- ❑ Test TCP/IP software on this PC: **ping 127.0.0.1** – (this is a special address for this test). If no response, then TCP/IP is not working in this PC – this test ignores external hardware.
- ❑ ‘Ping’ to the EGU. From command prompt, enter **ping www.xxx.yyy.zzz**, where that is the address of the EGU – if no response, check IP address of the EGU, Subnet settings, of the PC and EGU. If you are remote from the EGU, use the Configurator utility can ‘see’ EGU even if IP settings are wrong.
- ❑ Check Gateway address from your local IT support – needed if EGU to be accessed from internet
- ❑ ‘Ping’ using Host name e.g. **ping SHM7654** – if no response, suggests DNS not working, or hosts file not correct.
- ❑ Ensure PWR (power), Link, and Ready LEDs are all lit on EGU.
- ❑ If you can not contact the EGU using Telnet, then check EGU SW 1 needs to be OFF

Problems between EGU and the Logger(s)

- ❑ The RS485 interface in the UL logger is inactive when the mains power is off, data cable is bridged directly to the next logger in the loop – if a single logger is not communicating, suspect power there.
- ❑ The RS485 data passes round a loop, so any failure (e.g. cable fault) disables the whole loop. Measuring the DC voltages at the terminals of the loggers can locate a fault – either cable, or the interface card.
- ❑ If you suspect an interface card, switch off the mains to logger – see if the others in the loop can now be read from (ensure the logger has a UPS battery, else logging will be lost while mains off).

IP address - additional information

Reserved addresses and ports

You must not use an address ending in:

- x.x.x.0 – router, or x.x.x.255 – broadcast

If you have a good reason to not use port 4001, you must use a number greater than 1024 – but reference www.iana.org first.

Subnets

Subnets allow one to subdivide a range of IP addresses. The simplest is to give ranges of 254 addresses. Below is an example to use Subnets – note you do need to understand some binary maths.

The IP address and the Subnet mask comprise 4 eight bit numbers.

Each eight bit number allows 255 addresses, 1+2+4+8+16+32+64+128, though 0 and 255 are reserved.

A worked example: Maybe you wish to create five subnets, with the largest subnet allowing 28 host addresses.
Start by looking at the number of subnets needed.
To create five subnets, you would need to use three bits. Two bits would only allow you four subnets (00, 01, 10, and 11).
Since you need the three subnet bits, this leaves you with five (from eight) bits for the host portion of the address. How many hosts will this support? 2 to the power 5 = 32 (30 usable). Good, this is more than the 28 we were hoping for.
So, you have determined that it is possible to create this network using just 8 bits. An example of how you might assign the sub-networks is:
netA: 204.15.5.0/255.255.255.224 host address range 1 to 30
netB: 204.15.5.32/255.255.255.224 host address range 33 to 62
netC: 204.15.5.64/255.255.255.224 host address range 65 to 94
netD: 204.15.5.96/255.255.255.224 host address range 97 to 126
netE: 204.15.5.128/255.255.255.224 host address range 129 to 158

The subnet mask 255.255.255.224 has 27 1's (binary 11111111 11111111 11111111 11100000).
The 5 0's at the end correspond to the 5 bits that are used to form the Host portion of the address in each subnet (224 = binary 11100000).

An EGU in netA, 204.15.5.20 / 255.255.255.224 is visible by a PC set to 204.15.5.26 / 255.255.255.224, but NOT by a PC 204.15.5.66 / 255.255.255.224

Changing the subnet mask of the PC to 255.255.255.192 would make the EGU 'visible'.

Support Information

For Configuration of loggers, see SHM Communications handbooks. (www.shmcomms.com)

The configuration presented is that needed for use with Stark RT energy management software. (www.stark.co.uk)

EGU contains a Terminal Server, DE-311 Nport Express manufactured by Moxa (www.moxa.com)