A Sierra Monitor Company

Driver Manual
(Supplement to the FieldServer Instruction Manual)

FS-8704-13 GE-SRTP Ethernet Driver

APPLICABILITY & EFFECTIVITY

Effective for all systems manufactured after January 1, 1999

Instruction Manual Part Number FS-8704-13
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1. GE-SRTP Driver Description

The GE-SRTP driver allows the FieldServer to transfer data to and from devices over Ethernet using GE-SRTP Driver protocol. There are two Ethernet ports standard on the FieldServer. The FieldServer can emulate either a Server or Client.

The GE-SRTP driver is capable of read & writing the data tables of a GE series 90 PLC which is equipped with an Ethernet port.

The driver is capable of exposing its communication statistics so that they can be monitored by a downstream device.

2. Driver Scope of Supply

2.1 Supplied by FieldServer Technologies for this driver

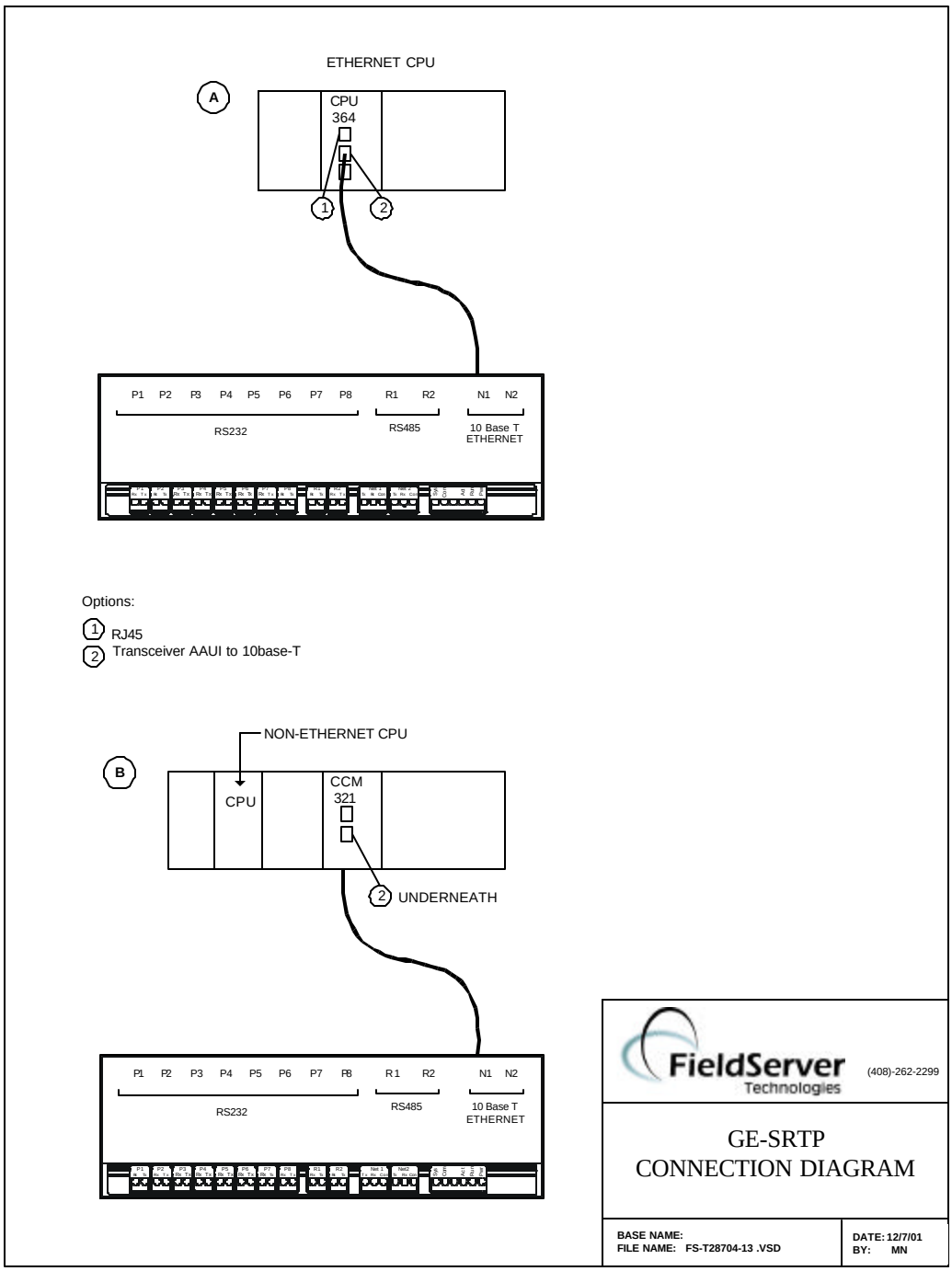
UTP cable (7 foot) for Ethernet connection
UTP cable (7 foot) for RS232 use
RJ45 to DB9F connector adapter
RJ45 to DB25M connection adapter
RS485 connection adapter
Driver Manual.

2.2 Provided by user

GE-SRTP System.

3. Hardware Connections

Make sure the device IP_address is configured to be on the same IP network as on the FieldServer. Use a crossover cable if the FieldServer is connected directly to the PLC device. Use a straight cable if the FieldServer is connected to a hub.



4. Configuring the FieldServer as a GE-SRTP Driver Client

For a detailed discussion on FieldServer configuration, please refer to the instruction manual for the FieldServer. The information that follows describes how to expand upon the factory defaults provided in the configuration files included with the FieldServer (See ".csv" files on the driver diskette).

This section documents and describes the parameters necessary for configuring the FieldServer to communicate with a GE-SRTP Driver Server.

The configuration file tells the FieldServer about its interfaces, and the routing of data required. In order to enable the FieldServer for GE-SRTP Driver communications, the driver independent FieldServer buffers need to be declared in the "Data Arrays" section, the destination device addresses need to be declared in the "Client Side Nodes" section, and the data required from the servers needs to be mapped in the "Client Side Map Descriptors" section. Details on how to do this can be found below.

Note that in the tables, * indicates an optional parameter, with the bold legal value being the default.

4.1 Data Arrays

Section Title		
Data_Arrays		
Column Title	**Function**	**Legal Values**
Data_Array_Name	Provide name for Data Array	Up to 15 alphanumeric characters
Data_Format	Provide data format. Each data array can only take on one format.	FLOAT, BIT, UInt16, SInt16, Packed_Bit, Byte, Packed_Byte, Swapped_Byte
Data_Array_Length	Number of Data Objects. Must be larger than the data storage area required for the data being placed in this array.	1-10,000

Example

```
//    Data Arrays

Data_Arrays
Data_Array_Name,      Data_Format,      Data_Array_Length
DA_AI_01,             UInt16,           200
DA_AO_01,             UInt16,           200
DA_DI_01,             Byte,             200
DA_DO_01,             Byte,             200
```

4.2 Client Side Connections

Section Title		
Adapter		
Column Title	**Function**	**Legal Values**
Adapter	Specify which port the device is connected to the FieldServer	N1
Protocol	Specify protocol used	GE_SRTP, SRTP

Example

```
//    Client Side Connections

Connections
Adapter, Protocol
N1,      SRTP
```

4.3 Client Side Nodes

Section Title		
Nodes		
Column Title	**Function**	**Legal Values**
Node_Name	Provide name for node	Up to 32 alphanumeric characters
Node_ID	Node ID of physical server node (PLC)	1-255
IP_Address	IP address of physical server node (PLC)	Must be on the same subnet as the server or gateway
Protocol	Specify protocol used	GE_SRTP, SRTP
Adapter	Specify on which port the device is connected to the FieldServer	N1

Example

```
//    Client Side Nodes

Nodes
Node_Name, Protocol, IP_Address,    Adapter
Node_A,    SRTP,     192.168.1.174, N1
```

4.4 Client Side Map Descriptors

4.4.1 FieldServer Specific Map Descriptor Parameters

Column Title	Function	Legal Values
Map_Descriptor_Name	Name of this Map Descriptor	Up to 32 alphanumeric characters
Data_Array_Name	Name of Data Array where data is to be stored in the FieldServer	One of the Data Array names from "Data Array" section above
Data_Array_Location	Starting location in Data Array	0 to maximum specified in "Data Array" section above
Function	Function of Client Map Descriptor	RDBC, WRBC, WRBX

4.4.2 Driver Specific Map Descriptor Parameters

Column Title	Function	Legal Values
Node_Name	Name of Node to fetch data from	One of the node names specified in "Client Node Descriptor" above
Data_Type	Data type Use one of the Data Types specified in brackets.	Discrete Inputs (%I) Discrete Outputs (%Q) Discrete Temporaries (%T) Discrete Internals (%M) Genius Global Data (%G) Analog Inputs (%AI) Analog Outputs (%AQ) Registers (%R) %SA Dis crete %SB Discrete %SC Discrete %S Discrete (%S)
Length	Length of Map Descriptor Ensure that the length does not exceed the table length in the PLC.	1 - 1000
Address	Starting address of read block / write block The 1st element of each Data type Table is referred to as address one.	1 , 2 , 3 Positive whole numbers
Format	Use to override the default format for obtaining data. Bit tables are by default read by reading whole bytes at a time (If the Length is 10 then 10 bytes of data are read and placed in 10 data array locations) If you wish to read bits instead then use this parameter . (If the Length is 10 then 10 bits are read and each bit is stored in its own location.)	Bit, **Byte** The format for %AI,%AQ and %R cannot be changed.

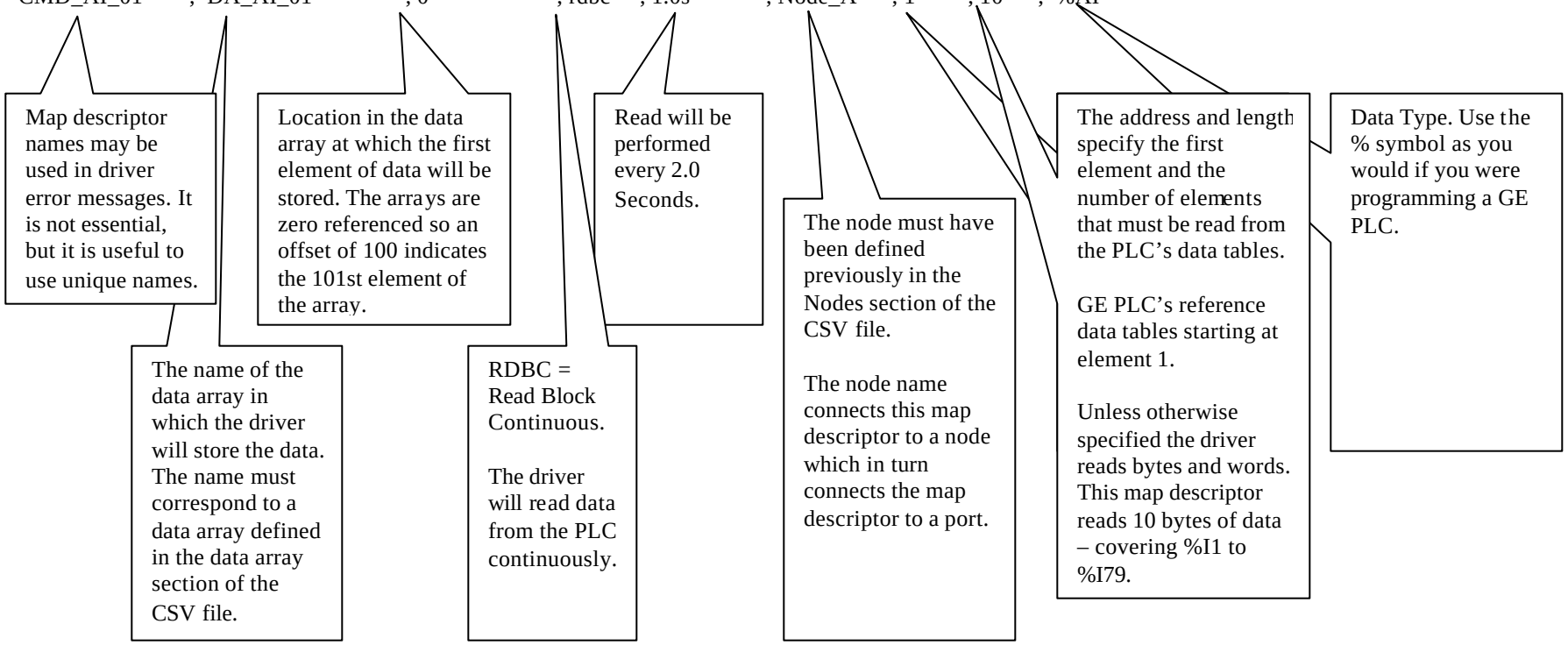
4.4.3 Timing Parameters

Column Title	Function	Legal Values
Scan_Interval	Rate at which data is polled	>0.1s

4.4.4 Map Descriptor Example 1 – Simple Read.

This example provides a map descriptor to read 10 bytes of Discrete Input states, starting at the very first Discrete Input. The data is stored in a data array called DA_DI and the first input is stored at location 100 in the array (101st element). The PLC is polled every 2 seconds

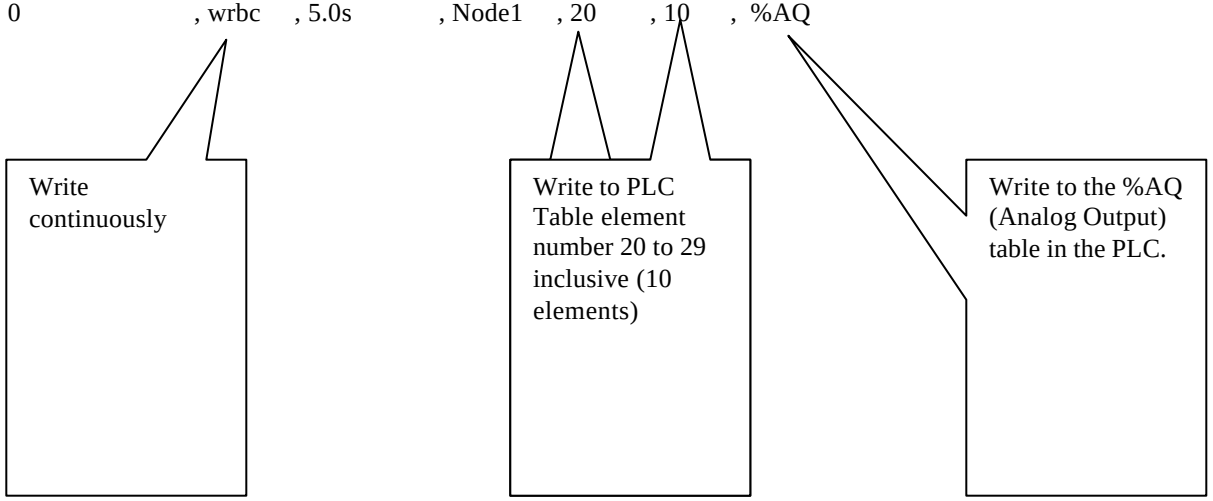
```
Map_Descriptor_Name, Data_Array_Name, Data_Array_Offset, Function, Scan_Interval, node_name, Address, Length, Data_Type
CMD_AI_01       ,  DA_AI_01              , 0                , rdbc    , 1.0s          , Node_A     , 1       , 10     ,  %AI
```



4.4.5 Map Descriptor Example 2 – Simple Write

This example writes data from the Fieldserver data array called DA_AO to the PLC identified as NODE1. The write is repeated every 5 seconds. Ten word values are written to the PLC's %AQ Data Table starting at location 20.

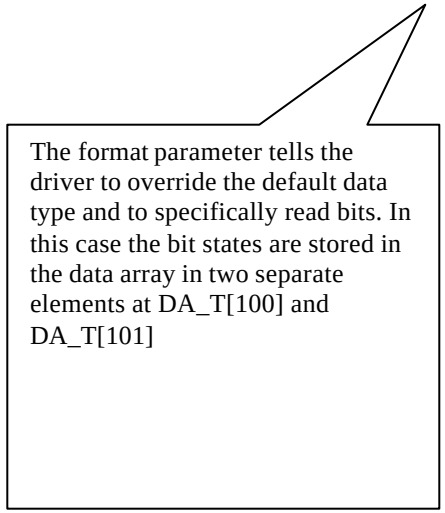
```
Map_Descriptor_Name, Data_Array_Name, Data_Array_Offset, Function, Scan_Interval, node_name, Address, Length, Data_Type
Write_AO            , DA_AO         , 0                , wrbc    , 5.0s         , Node1    , 20      , 10    ,  %AQ
```



4.4.6 Map Descriptor Example 3 – Handling Bits.

This example shows how to read 1 couple of bits from a data table rather than reading a whole byte. The bits can cross byte boundaries. Here we read 2 bits from table %T starting at bit 8. This is most useful when writing to the PLC in cases where you want to turn one particular bit on or off.

```
Map_Descriptor_Name, Data_Array_Name, Data_Array_Offset, Function, Scan_Interval, node_name, Address, Length, Data_Type, Format
Read_DI             , DA_T            , 100              , rdbc    , 2.0s         , PLC-1    , 8      , 2     , %T       , Bit
```



5. Configuring the FieldServer as a GE-SRTP Driver Server

For a detailed discussion on FieldServer configuration, please refer to the instruction manual for the FieldServer. The information that follows describes how to expand upon the factory defaults provided in the configuration files included with the FieldServer (See ".csv" files on the driver diskette).

This section documents and describes the parameters necessary for configuring the FieldServer to communicate with a GE-SRTP Driver Client

The configuration file tells the FieldServer about its interfaces, and the routing of data required. In order to enable the FieldServer for GE-SRTP Driver communications, the driver independent FieldServer buffers need to be declared in the "Data Arrays" section, the FieldServer virtual node(s) needs to be declared in the "Server Side Nodes" section, and the data to be provided to the clients needs to be mapped in the "Server Side Map Descriptors" section. Details on how to do this can be found below.

Note that in the tables, * indicates an optional parameter, with the bold legal value being the default.

5.1 Data Arrays

Section Title		
Data_Arrays		
Column Title	**Function**	**Legal Values**
Data_Array_Name	Provide name for Data Array	Up to 15 alphanumeric characters
Data_Format	Provide data format. Each data array can only take on one format.	FLOAT, BIT, UInt16, SInt16, Packed_Bit, Byte, Packed_Byte, Swapped_Byte
Data_Array_Length	Number of Data Objects. Must be larger than the data storage area required for the data being placed in this array.	1-10,000

Example

```
//    Data Arrays

Data_Arrays
Data_Array_Name,      Data_Format,      Data_Array_Length
DA_AI_01,             UInt16,           200
DA_AO_01,             UInt16,           200
DA_DI_01,             Byte,             200
DA_DO_01,             Byte,             200
```

5.2 Server Side Connections

Section Title		
Adapter		
Column Title	**Function**	**Legal Values**
Adapter	Specify which port the device is connected to the FieldServer	N1
Protocol	Specify protocol used	GE_SRTP, SRTP

Example

```
  //    Server Side Connections

Connections
Adapter, Protocol
N1,      SRTP
```

5.3 Server Side Nodes

Section Title
Nodes

Column Title	Function	Legal Values
Node_Name	Provide name for node	Up to 32 alphanumeric characters
Node_ID	Node ID of physical server node	1-255
Protocol	Specify protocol used	SRTP

Example

```
//    Server Side Nodes

Nodes
Node_Name, Node_ID, Protocol,
GE_Srv_11, 11,      SRTP    ,
```

5.4 Server Side Map Descriptors

5.4.1 FieldServer Specific Map Descriptor Parameters

Column Title	Function	Legal Values
Map_Descriptor_Name	Name of this Map Descriptor	Up to 32 alphanumeric characters
Data_Array_Name	Name of Data Array where data is to be stored in the FieldServer	One of the Data Array names from "Data Array" section above
Data_Array_Location	Starting location in Data Array	0 to maximum specified in "Data Array" section above
Function	Function of Server Map Descriptor	Passive

5.4.2 Driver Specific Map Descriptor Parameters

Column Title	Function	Legal Values
Data_Type	Data type Use one of the Data Types specified in brackets.	Discrete Inputs (%I) Discrete Outputs (%Q) Discrete Temporaries (%T) Discrete Internals (%M) Genius Global Data (%G) Analog Inputs (%AI) Analog Outputs (%AQ) Registers (%R) %SA Discrete %SB Discrete %SC Discrete %S Discrete (%S)
Length	Length of Map Descriptor Ensure that the length does not exceed the table length in the PLC.	1 - 1000
Address	Starting address of read block / write block The 1st element of each Data type Table is referred to as address one.	1 , 2 , 3 Positive whole numbers
Format	Has no meaning on the server as the driver responds based on the nature of the request The map descriptors should be considered to be the definitions of data tables in a PLC. Thus one map descriptor can be used to respond to bit or byte requests.	N/A

5.4.3 Timing Parameters

Column Title	Function	Legal Values
Scada_Hold_Timeout	Specifies time server side waits before responding to client that node is offline on FieldServer client side.	>1.0s

5.4.4 Map Descriptor Example.

In this example the FieldServer can respond to polls the request %R data provided that the request is in the range of address indicated below.

```
Map_Descriptor_Name, Data_Array_Name, Data_Array_Offset, Function, Node_Name, Address, Length, Data_Type
Server-R-Data       , TABLE_R       , 0                , passive, PLC1     , 1       , 1000  ,%R
```

If the client is reading then response data will be obtained from this table. If the client array writing then incoming data will be stored in this array.

Address 1 corresponds to offset zero (1st location) in the array.

If client reads %R15 then driver responds with data from element 14 of the array.

This is a server. It responds to polls but does no active work itself.

This map descriptor can be used to respond to poll that read and write to addresses 1 to 1000.

If a poll attempts to read data at address 1001 then if no other map descriptor covers that address space then a no data response will be sent.

This map descriptor will be used to process client read/writes of Register (%R) data.

6. Driver Notes

6.1 Driver Stats

The statistics recorded by the GE-SNPX Serial Driver are slightly different from the way that Fieldserver driver normally record statistics. This difference arises from the fact that this driver is not a simple poll response driver. Bare in mind that a single poll can generate a large number of response fragments.

Fragment Ack/nack messages are NOT counted as message but the bytes sent/rcvd are counted. Connection messages are counted as messages and the bytes sent/rcvd are counted.

This driver can expose these and additional statistics by writing data to a data array.

A special map descriptor is required. The driver recognizes the map descriptor by its name which must be "***SRTP-stats***" .

The following example shows how this special map descriptor can be configured.

```
Nodes
Node_name, Protocol
null_node, SRTP

Data_Arrays
Data_Array_Name, Data_Format, Data_Array_Length
SRTP_STATS      , UINT32       ,  600

Map_blocks
Map_block_Name, Data_Array_Name, Node_name, Length
srtp-stats            , SRTP _STATS     , null_node   , 600
```

When the driver sees this map descriptor it uses the data array SRTP _STATS (in this example) to store driver specific statistics. Only one of these map descriptors may be specified (per tier) per FieldServer.

The driver stores the following stats for each port.. The offset into the data array can be found by multiplying the port number by 50

Stat #	Stat Code
1	GE_STAT_BAD_SEND
2	GE_STAT_POLL_MSGS_SENT
3	GE_STAT_POLL_BYTES_SENT
4	GE_STAT_SESS_CONNECT
5	GE_STAT_DEV_CONNECT
6	GE_STAT_BAD_PDU
7	GE_STAT_BAD_PROTOCOL
8	GE_STAT_TIMEOUT
9	GE_STAT_MBOX_NAK_MAJOR

10 GE_STAT_MBOX_NAK_MINOR
11 GE_STAT_MBOX_NAK_CNT
12 GE_STAT_MBOX_PROG_NUM
13 GE_STAT_MBOX_SWEEP
14 GE_STAT_MBOX_PLC_STAT
15 GE_STAT_MBOX_PRIV_LVL
16 GE_STAT_DEV_CONNECT_RESP
17 GE_STAT_SESS_CONNECT_RESP
18 GE_STAT_SESS_RESPONSE
19 GE_STAT_DEV_RESPONSE
20 GE_STAT_SLAVE_BAD_PDU
21 GE_STAT_SLAVE_SENDS_BAD_MBOX
22 GE_STAT_SLAVE_SENDS_OTHER_NAK
23 GE_STAT_SLAVE_BAD_SERVICE_RQST
24 GE_STAT_ERROR_PDU_RESP_COUNT
25 GE_STAT_ERROR_PDU_RESP_CODE
26 GE_STAT_RESPONSE_MSGS_RECD
27 GE_STAT_RESPONSE_BYTES_RECD
28 GE_STAT_POLL_MSGS_RECD
29 GE_STAT_POLL_BYTES_RECD
30 GE_STAT_RESPONSE_MSGS_SENT
31 GE_STAT_RESPONSE_BYTES_SENT

6.2 Driver Error messages

The following messages are produced by the driver and written to the error log which can be viewed using the RUInet utility program or logged using the RUIdebug utility program.

Messages marked with a *, are only printed once and then suppressed to prevent the error log being filled with repetitive messages.

SRTP:#1 FYI. The MapDesc called <%s> is too short.
You have define a map descriptor to expose driver statistics but the length parameter must be at least 500 long. Ensure the Data array is this long too. Edit the CSV, correct he problem and reset the Fieldserver.

SRTP:#2 FYI. You could have used a mapDesc called <%s> to expose diagnostic info.
You may safely ignore this message. Read section 6.3 for information on how to expose the drivers communication statistics using a data array.

SRTP:#3 Error. MapDesc=<%s> has bad data type.
You must edit the CSV file, correct the problem and then reset the FieldServer to correct this problem. Read the manual to get a list of valid data types.

SRTP:#4 Err. Address < 1 for MapDesc=<%s>.
GE references its data elements starting at one. You have a map descriptor with an address less than 1. The driver will assume you meant an address of one until you edit the CSV file and reset the FieldServer.

*SRTP:#5 FYI. Capability is non-zero
This message requires no user action. It is intended for Fieldserver support engineers.

*SRTP:#6 FYI. Connect remaining bytes non-zero
This message requires no user action. It is intended for Fieldserver support engineers.

*SRTP:#7 Err. Destination request not supported.
*SRTP:#8 Err. Destination response not supported.
The driver has received a message that it cannot respond to. The message received is not normally associated with reading / writing table memory and can be ignored by this driver. There is no corrective action that you can take. If you wish, take a log file using RUIdebug and contact Fieldserver support.

SRTP:#9 Err. Driver des not support unconfirmed messages.
The driver has been polled using a method which does not require confirmation. The driver does not support this method. A panic is produced by this message. There is no corrective action that you can take. If you wish, take a log file using RUIdebug and contact Fieldserver support.

SRTP:#10 Err. Session Mbox bad type. Act/Exp=%x/c0
SRTP:#11 Err. Session Mbox bad SR code. Act/Exp=%x/4f
SRTP:#12 Err. Session SR bad param. Act/Exp=%x/01
If this error occurs repeatedly or frequently then take a log using RUIdebug and contact support. If infrequent then it indicate an occasional corrupt message. There is no corrective action you can take to eliminate this error.

SRTP:#13 Err. Cant Process ServiceRQst=%x(h)
The driver cannot process this service request. It can only read/write table memory. There is no corrective action you can take when this message is printed. If you wish, take a log file using RUIdebug and contact Fieldserver support. The message is followed by a buffer dump. Recording the buffer may be useful to Fieldserver support engineers.

SRTP:#14 Err. Cant Process Mbox=%x(h)
The driver cannot process this type of Mailbox message or a valild mailbox message was received in an invalid context. If this message occurs frequently, take a log file using RUIdebug and contact Fieldserver support. The message is followed by a buffer dump. Recording the buffer may be useful to Fieldserver support engineers.

SRTP:#15 Err. Cant Process PDU=%x(h)
The driver can only process 'connect' and 'data request' PDU's. . There is no corrective action you can take when this message is printed. If you wish, take a log file using RUIdebug and contact Fieldserver support. The message is followed by a buffer dump. Recording the buffer may be useful to Fieldserver support engineers.

6.3 Scaling

The driver only supports scaling fro the following data types
Analog Inputs (%AI)
Analog Outputs (%AQ)
Registers (%R)

The scaling is only applied when the driver acts as a client.

When using scaling on an active map descriptor which writes data to a PLC ensure that the scaling produces a number in the range 0-65536 (an unsigned short integer).