



MAN-00099-R7

Communication Configuration User Guide



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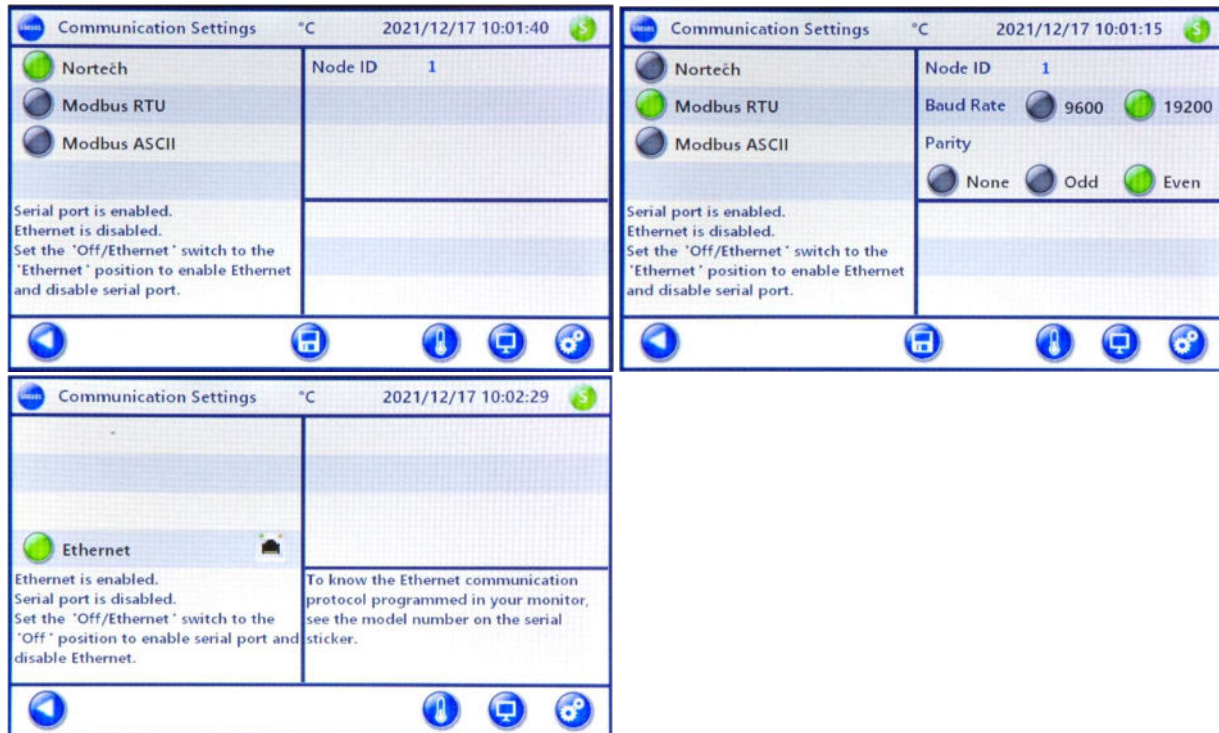
2 Digital Communication Protocol

Nortech devices support multiple digital communication ports. For each protocol, the Ethernet communication switch might need to be in a specific position so that only the specified port can be used. Use the following tables for the required configuration for each protocol on the different Nortech devices.

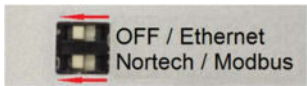
EasyGrid Device Configuration

Protocol	Standard / Optional	Communication Switch Position	Port to use	
Nortech Modbus	Standard		USB	
			RS-422/485	
IEC 61850 IEC 60870-5-104 DNP 3.0 Modbus TCP/IP	Optional		Ethernet	

In the EasyGrid device, the configuration for communication protocol should be set to the selected protocol.



EasyGrid LT Device Configuration

Protocol	Standard / Optional	Communication Switch Position	Port to use	
Nortech	Standard		USB	
			RS-422/485	
Modbus	Standard		USB	
			RS-422/485	
IEC 61850 IEC 60870-5-104 DNP 3.0 Modbus TCP/IP	Optional		Ethernet	

EasyGrid Base Device Configuration

Protocol	Standard / Optional	Communication Switch Position	Port to use	
Fiso	Standard	No dipswitch to set	USB	
Modbus	Standard	No dipswitch to set	RS-422/485	
IEC 61850 IEC 60870-5-104 DNP 3.0 Modbus TCP/IP	Optional	No dipswitch to set	Ethernet	

2.1 Nortech Protocol - EasyGrid & EasyGrid-LT with Nortech Client software

Your configuration for communication protocol should be set to “Nortech”.

The Nortech Client application exchanges configuration and monitoring information with the Nortech devices using the Nortech protocol.

Compatible Nortech devices are the EasyGrid & EasyGrid-LT.

The Nortech network address is configured through the Nortech Client software.

If you intend to connect multiple units to a RS-422/485 bus, a unique network address must be set to each unit prior to final installation. Otherwise, you will have to go to each unit location with a portable computer and configure its network address on-site.

In order for the multiple Nortech devices to work on the same serial bus, each unit must:

- ▲ Be connected to the other units through the RS-485/422 interface.
- ▲ Have a unique Nortech address.

Please refer to the Nortech Client software guide included on the USB Flash drive for detailed information.

2.2 Fiso Protocol - EasyGrid Base with Nortech Client II

The Nortech Client II application exchanges configuration and monitoring information with the EasyGrid Base using the Fiso protocol.

The Fiso network address is configured through the Nortech Client II software.

Please refer to the Nortech Client II software guide for detailed information.

2.3 Modbus

Modbus Protocol is a messaging structure used to establish master-slave/client-server communication between intelligent devices. It is a de facto standard, open and widely used in the industrial manufacturing environment. It has been implemented on different devices to transfer discrete/analog I/O and register data between control devices.

Modbus is used in multiple master-slave applications to monitor and program devices; to communicate between intelligent devices and sensors and instruments; to monitor field devices using PCs and HMIs. Modbus is also an ideal protocol for RTU applications where wireless communication is required. For this reason, it is used in innumerable gas and oil and substation applications. Modbus is not only an industrial protocol, building, infrastructure, transportation and energy applications also make use of its benefits.

The protocol defines a message structure that controllers recognize and use, regardless of the type of networks over which they communicate. It describes the process a controller uses to request access to another device, how it will respond to requests from the other devices, and how errors will be detected and reported. It establishes a common format for the layout and contents of message fields.

The Modbus protocol provides the internal standard that the Nortech Device unit uses for parsing messages. During communication on a Modbus network, the protocol determines how each controller will know its device address, recognize a message addressed to it, determine the kind of action to be taken and extract any data or other information contained in the message. If a reply is required, the controller will construct the reply message and send it using Modbus protocol.

The Nortech device unit can be setup to communicate on standard Modbus networks using either of two transmission modes: ASCII or RTU. Users select the desired mode, along with the serial port communication parameters (baud rate, parity mode, etc.), during configuration of each controller. The mode and serial parameters must be the same for all devices on the network.

When using ASCII mode, each byte in a message is sent as two ASCII characters. The main advantage of this mode is that it allows time intervals of up to one second to occur between characters without causing an error.

When controllers are setup to communicate on a Modbus network using RTU (Remote Terminal Unit) mode, a byte in a message contains two 4-bit hexadecimal characters. The main advantage of this mode is that its greater character density allows better data throughput than ASCII for the same baud rate. Each message must be transmitted in a continuous stream.

2.3.1 Modbus Configuration

Your configuration for communication protocol should be set to “Modbus RTU”, “Modbus ASCII” or “Modbus TCP-IP”.

Communication Mode	ASCII	RTU
Network Address	1 to 247	
Bits / Word	11	12
Data Bits	7	8
Parity	None = 2 Stop Bits Even = 1 Stop Bit Odd = 1 Stop Bit	
Stop Bits		
Baud Rate		
End of Frame Character	Configurable LF default value (equivalent to 0x10 hex “Line Feed”)	N/A

By default “Modbus TCP-IP” is configured with STATIC ip 192.168.0.121.

For more information on how to set a static address. See section “2.3 Ethernet Protocol Configuration”.

Communication Mode	TCP-IP (Example)
IP Address	192.168.0.121
Subnet Mask	255.255.255.0
Default Gateway	192.168.0.1

2.3.2 Supported Functions

Data Type	Function Code (decimal)	Access	Description
Read Coils	1	Read Only	Read one or more Coil Input(s)
Read Discrete Inputs	2	Read Only	Read one or more Discrete Input(s)
Read Holding Registers	3	Read Only	Read one or more Holding Register(s)
Read Input Registers	4	Read Only	Read one or more Input Register(s)
Write Single Coil	5	Write Only	Write One Coil

2.3.3 Modbus Data Format Description

Name	Size (bits)	Size (Integer)	Description
Bit	1	1	For Single Coils and Discrete Inputs
Int16	16	1	Signed Integer, values are represented in 2's complement notation
UInt16	16	1	Unsigned Integer
Int32	32	2	Signed Long, values are represented in 2's complement notation
UInt32	32	2	Unsigned Long
Float (IEEE 754)	32	2	The Lowest Address is the MSB part of the Float The Highest Address is the LSB part of the Float
String	x	x	<u>EasyGrid, EasyGrid LT and the Sentinel II</u> Null terminated string with each characters coded on a word (UTF16) <u>EasyGrid Base</u> Null terminated string with each characters coded on a byte (UTF8)

2.3.4 Modbus Register map

 IMPORTANT	<i>In FISO monitors, the RS-485 communication settings are by default: 19200 Baud, Even parity, 1 stop bit.</i>
 IMPORTANT	- <i>In our manuals the register addresses are the physical addresses, some Scada use the logical addresses (PDU).</i> - <i>If your Scada use the logical addresses, in some cases you should add 1 to the physical addresses, for example to read the temperature of channel 1 the physical address is 12320 and the logical address is 12321.</i> - <i>Also, the addresses are in decimal, if you need to use the hexadecimal format, you should use 3020 instead of 12320.</i>
 IMPORTANT	- <i>The temperature of each channel is in float 32 format, so you need to read two 16 bits registers to have the temperature of one channel.</i> - <i>The Lower Address is the MSB part of the Float</i> - <i>The Highest Address is the LSB part of the Float</i> - <i>For example, to read the temperature of an 8 channels monitor, you must read 16 registers beginning at 12320.</i>

The following tables contain the Modbus register mapping used in the Nortech devices:

Note: For Channel, Alarm and Relay the maximum count is up to 32 but in fact you will be able to send commands up to the number of Channels, Alarms and Relays available on your device.

Data Type : Read Coils and Read Discrete Inputs						
Address		Data Size	Data Format	Max Count	Name	Value
Start	End					
4096	4127	1	Bit	32	Alarm	0 – Condition not met 1 – Condition met
4128	4128	1	Bit	1	Alarm System	
12288	12319	1	Bit	32	Channel Enable	0 – Disable / 1- Enable

Data Type : Read Coils and Read Discrete Inputs						
Address		Data Size	Data Format	Max Count	Name	Value
Start	End					
24576	24607	1	Bit	32	Relay	0 – Condition not met
24608	24608	1	Bit	1	Relay System	1 – Condition met
32768	32768	1	Bit	1	System Unit	0 - °C / 1 - °F

Data Type : Write Single Coil						
Address		Data Size	Data Format	Max Count	Name	Value
Start	End					
12288	12319	1	Bit	32	Channel Enable	0 – Disable / 1- Enable
12320	12351	1	Bit	32	Erase Temp Minimum Stats	0 – No Action / 1 - Clear
12352	12383	1	Bit	32	Erase Temp Average Stats	
12384	12415	1	Bit	32	Erase Temp Maximum Stats	
12416	12447	1	Bit	32	Erase Temp All Stats	
32768	32768	1	Bit	1	System Unit	0 - °C / 1 - °F
32769	32769	1	Bit	1	System Reset	0 – No Action / 1 - Reset

Data Type : Read Holding Registers and Read Inputs Registers (Int16 and UInt16)							
Address		Data Size	Data Format	Max Count	Name	Value	
Start	End						
12288	12319	1	UInt16	32	Channel State	EasyGrid & EasyGrid-LT: 0 – Ok 1 – Too Low 2 – Too High 3 – No Signal ? 4 – No Signal ? 5 – Not Initialized 6 – Bad Signal ? 7 – Bad Signal ? 8 – No Calib 9 – Off 10 – NA	EasyGrid-Base: 0 – Off 1 – Ok 2 – Ok 3 – No Signal ? 4 – No Signal ?
16384	16384	1	UInt16	1	Com Nortech Address	1 to 32	
16385	16385	1	UInt16	1	Com Nortech Baudrate	115 200 (Scale : x100)	
16386	16386	1	UInt16	1	Com Nortech Data Bits	8	
16387	16387	1	UInt16	1	Com Nortech Parity	0 – None	
16388	16388	1	UInt16	1	Com Nortech Stop Bits	1	
16389	16389	1	UInt16	1	Com Modbus Address	1 to 247	
16390	16390	1	UInt16	1	Com Modbus Baudrate	9 600 / 19 200 (Scale : x100)	
16391	16391	1	UInt16	1	Com Modbus Data Bits	7 – 8	
16392	16392	1	UInt16	1	Com Modbus Parity	0 – None 1 – Odd 2 – Even	
16393	16393	1	UInt16	1	Com Modbus Stop Bits	1 – 2	
16394	16394	1	UInt16	1	Com Modbus Type	0 – RTU 1 – ASCII	
16395	16395	1	UInt16	1	Com Modbus Ascii EOF	0 – 127	
16396	16396	1	UInt16	1	Com Modbus Ascii Char Interval	5 – 100 ms	
16397	16397	1	UInt16	1	Com Protocol	0 – Nortech 1 – Modbus ASCII 2 – Modbus RTU 3 – IEC-61850 4 – IEC-60870-5-104 5 – DNP3	

Data Type : Read Holding Registers and Read Inputs Registers (Int16 and UInt16)						
Address		Data Size	Data Format	Max Count	Name	Value
32768	32768	1	UInt16	1	System State	0 – Ok 40 – At least one channel is in error (Verify Channel State) Other – Contact Fiso Technical Support
32769	32769	1	UInt16	1	System Channel Number	1 - 6
32770	32770	1	UInt16	1	System Alarm Number	0 – 6
32771	32771	1	UInt16	1	System Relay Number	0 – 6
32772	32772	1	UInt16	1	System Platform	0 – Sentinel II 1 – EasyGrid 3 – EasyGrid LT 5 – EasyGrid Base
32773	32773	1	UInt16	1	System Options	Reserved for FISO Technical Support

Data Type : Read Holding Registers and Read Inputs Registers (Int32 and UInt32)						
Address		Data Size	Data Format	Max Count	Name	Value
Start	End					
20480	20481	2	UInt32	1	Log Event Count	0 to 24576
20482	20483	2	UInt32	1	Log Event Size	24576
20484	20485	2	UInt32	1	Log Mega Count	Normal : 0 to 241 664 Enhanced : 0 to 483 328
20486	20487	2	UInt32	1	Log Mega Size	Normal : 241 664 Enhanced : 483 328

Data Type : Read Holding Registers and Read Inputs Registers (Float)						
Address		Data Size	Data Format	Max Count	Name	Value
Start	End					
8192	8255	2	Float	32	Analog Output Value	0.0 to 20.0 mA
12320	12383	2	Float	32	Channel Temp	-40.0°C to 225.0°C
12384	12447	2	Float	32	Channel Temp Min	-40.0°C to 225.0°C
12448	12511	2	Float	32	Channel Temp Avg	-40.0°C to 225.0°C
12512	12575	2	Float	32	Channel Temp Max	-40.0°C to 225.0°C
12576	12639	2	Float	32	Channel Signal	0.0 to 100.0
12640	12703	2	Float	32	Channel Light	0 to 100
12704	12767	2	Float	1	Channel Offset	-270.0°C to 270.0°C
28672	28673	2	Float	1	Memory Card Used	0.00 GB to 8.00 GB
28674	28675	2	Float	1	Memory Card Size	8.00 GB
32774	32775	2	Float	1	System Temp	-40.0°C to 225.0°C
32776	32777	2	Float	1	System Temp Main Board	-40.0°C to 225.0°C
32778	32779	2	Float	1	System Temp Ccd	-40.0°C to 225.0°C

Data Type : Read Holding Registers and Read Inputs Registers (String)						
Address		Data Size	Data Format	Max Count	Name	Value
Start	End					
4096	4703	19	String	32	Alarm Description	"NA"
12768	13375	19	String	32	Channel Description	"NA"
32780	32791	12	String	1	System Model	"EGD-LT-#"
32792	32801	10	String	1	System Serial	"00000000"
32802	32811	10	String	1	System Firmware	"X.X.X.X"
32812	32822	11	String	1	System Manufacturing Date	"YYYY/MM/DD"
32823	32833	11	String	1	System Servicing Date	"YYYY/MM/DD"
32834	32853	20	String	1	System Date Time	"YYYY/MM/DD HH:MM:SS"
36864	36882	19	String	1	Transformer Name	"N/A"
36883	36901	19	String	1	Transformer Type	"N/A"
36902	36920	19	String	1	Transformer Note	"N/A"

2.3.5 Modbus Message Description

General

Official reference documents are available at www.modbus.org

- [Modbus Protocol Specification](#)
- [Modbus Over Serial Line FOR LEGACY APPLICATIONS ONLY](#)

Request						
Type	Start	Slave Address	Function Code	Data	Checksum Type	End
RTU		Address	Function	Data	CRC	
ASCII	:	Address	Function	Data	LRC	"\r\n"

Result						
Type	Start	Slave Address	Function Code	Data	Checksum Type	End
RTU		Address	Function	Data	CRC	
ASCII	:	Address	Function	Data	LRC	"\r\n"

Read Coils

Request	Size	Value
Function Code	1 Byte	0x01
Starting Address	2 Bytes	0x0000 to 0xFFFF
Quantity of Coils	2 Bytes	0x0000 to 0x07D0 (1 to 2000)

Response	Size	Value
Function Code	1 Byte	0x01
Byte Count	1 Byte	N*
Coil Status	N* x 1 Byte	
N* = Quantity of Outputs / 8, if the remainder is different of 0 → N = N + 1		

Error	Size	Value
Error Code	1 Byte	Function Code + 0x80 = 0x81
Exception Code	1 Byte	0x01, 0x02, 0x03, 0x04

Read Discrete Inputs

Request	Size	Value
Function Code	1 Byte	0x02
Starting Address	2 Bytes	0x0000 to 0xFFFF
Quantity of Inputs	2 Bytes	0x0000 to 0x07D0 (1 to 2000)

Response	Size	Value
Function Code	1 Byte	0x02
Byte Count	1 Byte	N*
Input Status	N* x 1 Byte	
N* = Quantity of Inputs / 8, if the remainder is different of 0 → N = N + 1		

Error	Size	Value
Error Code	1 Byte	Function Code + 0x80 = 0x82
Exception Code	1 Byte	0x01, 0x02, 0x03 , 0x04

Read Holding Registers Format

Request	Size	Value
Function Code	1 Byte	0x03
Starting Address	2 Bytes	0x0000 to 0xFFFF
Quantity of Registers	2 Bytes	0x0001 to 0x007D (1 to 125)

Response	Size	Value
Function Code	1 Byte	0x03
Byte Count	1 Byte	2 x N*
Register Value	N* x 2 Bytes	
N* = Quantity of Registers		

Error	Size	Value
Error Code	1 Byte	Function Code + 0x80 = 0x83
Exception Code	1 Byte	0x01, 0x02, 0x03 , 0x04

Read Input Registers Format

Request	Size	Value
Function Code	1 Byte	0x04
Starting Address	2 Bytes	0x0000 to 0xFFFF
Quantity of Input Registers	2 Bytes	0x0001 to 0x007D (1 to 125)

Response	Size	Value
Function Code	1 Byte	0x04
Byte Count	1 Byte	2 x N*
Input Registers	N* x 2 Bytes	
N* = Quantity of Input Registers		

Error	Size	Value
Error Code	1 Byte	Function Code + 0x80 = 0x84
Exception Code	1 Byte	0x01, 0x02, 0x03 , 0x04

Write Single Coil

Request	Size	Value
Function Code	1 Byte	0x05
Output Address	2 Bytes	0x0000 to 0xFFFF
Output Value	2 Bytes	0x0000 or 0xFF00 (Off/On)

Response	Size	Value
Function Code	1 Byte	0x05
Output Address	2 Bytes	0x0000 to 0xFFFF
Output Value	2 Bytes	0x0000 or 0xFF00 (Off/On)

Error	Size	Value
Error Code	1 Byte	Function Code + 0x80 = 0x85
Exception Code	1 Byte	0x01, 0x02, 0x03 , 0x04

2.3.6 Modbus Example

Read Coils for Relay 1 to 6	
RTU	TX >> 01 01 6000 0006 A208 RX << 01 01 01 05 918B
ASCII	TX >> : 01 01 6000 0006 98 \r\n RX << : 01 01 01 05 F8 \r\n
Description	relay 1 : 1 -> Condition Met relay 2 : 0 -> Condition Not Met relay 3 : 1 -> Condition Met relay 4 : 0 -> Condition Not Met relay 5 : 0 -> Condition Not Met relay 6 : 0 -> Condition Not Met

Read Holding Registers for Channel State 1 to 4	
RTU	TX >> 01 03 3000 0004 4B09 RX << 01 03 08 0003 0000 0009 0009 B6D3
ASCII	TX >> : 01 03 3000 0004 C8 \r\n RX << : 01 03 08 0003 0000 0009 0009 EB \r\n
Description	Channel 1 : Error 3 Channel 2 : OK Channel 3 : Off Channel 4 : Off

Read Holding Registers for Channel Temperature 1 to 4	
RTU	TX >> 01 03 3020 0008 4AC6 RX << 01 03 10 00000000 41B8CB48 4479C000 4479C000 2FF0
ASCII	TX >> : 01 03 3020 0008 A4 \r\n RX << : 01 03 10 00000000 41B8CB48 4479C000 4479C000 E6 \r\n
Description	Channel 1 : 0x00000000 = 0.0 °C (IEEE 754) Channel 2 : 0x41B8CB48 = 23.1 °C (IEEE 754) Channel 3 : 0x4479C000 = 999.0 °C (IEEE 754) Channel 4 : 0x4479C000 = 999.0 °C (IEEE 754)

Read Holding Registers for Serial Number	
RTU	TX >> 01 03 8018 000A 6C0A RX << 01 03 14 0031 0031 0046 0050 0030 0033 0039 0039 0000 0000 1895
ASCII	TX >> : 01 03 8018 000A 5A \r\n RX << : 01 03 14 0031 0031 0046 0050 0030 0033 0039 0039 0000 0000 1B \r\n
Description	Serial Number : 11FP0399

2.4 Ethernet

2.4.1 Configuration

By default, the Nortech monitors; EasyGrid, EasyGrid LT and EasyGrid Base are configured with STATIC IP at 192.168.0.121.

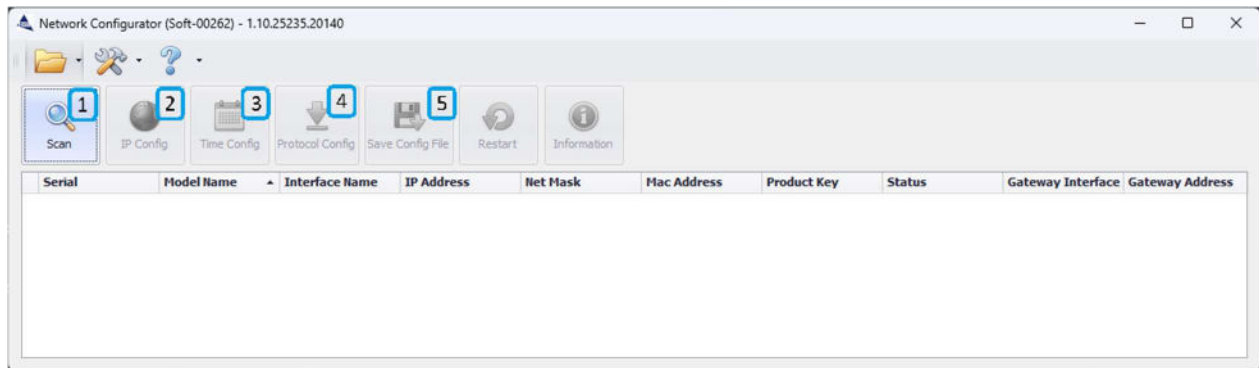
To change your IP address and perform Ethernet configuration of your FISO monitor, you will need a Windows base PC with an Ethernet port (RJ-45) and the “FISO Network Configurator” software.

Please download the latest “FISO Network Configurator” software on the product support section of the FISO web site.

Install FISO “Network Configurator”, then connect your laptop **directly** to the FISO monitor ethernet port (If your FISO monitor has an optical Ethernet port, you need to use a media converter).

Perform all the following 5 steps **in order**:

1. **Scan** to find your monitor.
2. **IP Config**, enter the new IP address of your monitor.
3. **Time config**, enter the SNTP server address.
4. **Protocol config**, enter the parameters of the protocol. Example, for IEC61850, enter the IED name, number of reports, etc
5. **Save config. files** (ICD) with the parameters you have configured.



When Network Configurator will ask you to select the configuration file corresponding to your monitor, please select the model with the same number of channels and the same number of relays.

Note, if your monitor model number contain “NS” please refer to the following table to know which model to select:

Monitor part number with NS	Model to select
E-GRID-04-NS-1258RJ	E-GRID-04-A-Y00
E-GRID-04-NS-1258RJ2	E-GRID-04-A-Y00
E-GRID-04-NS-1258RK2	E-GRID-04-A-Y08
E-GRID-08-NS-1258I	E-GRID-08-A-Y08
E-GRID-08-NS-1258RI	E-GRID-08-A-Y08
E-GRID-08-NS-1258RI2	E-GRID-08-A-Y08
E-GRID-08-NS-1258RL2	E-GRID-08-A-Y00
E-GRID-08-NS-1265A	E-GRID-08-A-Y08
E-GRID-10-NS-1258E	E-GRID-10-A-Y08
E-GRID-10-NS-1258RE	E-GRID-10-A-Y08
E-GRID-10-NS-1292B	E-GRID-10-A-Y08
E-GRID-12-NS-1258A	E-GRID-12-A-Y00
E-GRID-12-NS-1258D	E-GRID-12-A-Y08
E-GRID-12-NS-1258RA	E-GRID-12-A-Y00
E-GRID-12-NS-1258RD	E-GRID-12-A-Y08
E-GRID-16-NS-1258C	E-GRID-16-A-Y00
E-GRID-16-NS-1258F	E-GRID-16-A-Y08
E-GRID-16-NS-1258RC	E-GRID-16-A-Y00
E-GRID-16-NS-1258RF	E-GRID-16-A-Y08
E-GRID-16-NS-1265D	E-GRID-16-A-Y16
E-GRID-16-NS-1265E	E-GRID-16-A-Y08
E-GRID-18-NS-1258B	E-GRID-18-A-Y00
E-GRID-18-NS-1258H	E-GRID-18-A-Y16
E-GRID-18-NS-1258RB	E-GRID-18-A-Y00
E-GRID-18-NS-1258RH	E-GRID-18-A-Y16

2.4.2 IEC 61850

Note: For Channel, Alarm and Relay the maximum count is up to 32 but in fact you will be able to send commands up to the number of Channels, Alarms and Relays available on your device.

<x>: is the channel, alarm or relay number

#: is the instance number of the IEC 61850

IEC61850					
MMS Tag	Data Format	Max Count	Name	Value	Refresh Rate (sec)
RS_GGIO#\$ST\$Ind1\$stVal	Bit	1	Relay System	0 – Condition not met	1
R<x>_GGIO#\$ST\$Ind1\$stVal	Bit	32	Relay State	1 – Condition met	1
Sys_GGIO#\$MX\$AnIn\$mag\$f	Float	1	System Temperature	-40.0°C to 225.0°C	10
Ch<x>_STMP#\$MX\$Tmp\$mag\$f	Float	32	Channel Temperature	-40.0°C to 225.0°C	1
Ch<x>_GGIO#\$MX\$AnIn3\$mag\$f	Float	32	Channel Temperature Minimum	-40.0°C to 225.0°C	5
Ch<x>_GGIO#\$MX\$AnIn1\$mag\$f	Float	32	Channel Temperature Maximum	-40.0°C to 225.0°C	5
Ch<x>_GGIO#\$MX\$AnIn2\$mag\$f	Float	32	Channel Temperature Average	-40.0°C to 225.0°C	5
Ch<x>_GGIO#\$MX\$AnIn4\$mag\$f	Float	32	Channel Offset	-270.0°C to 270.0°C	5
Ch<x>_GGIO#\$ST\$IntIn\$stVal	UInt16	32	Channel State	EasyGrid & EasyGrid-LT: 0 – Ok 1 – Too Low 2 – Too High 3 – No Signal ? 4 – No Signal ? 5 – Not Initialized 6 – Bad Signal ? 7 – Bad Signal ? 8 – No Calib 9 – Off 10 – NA EasyGrid-Base: 0 – Off 1 – Ok 2 – Ok 3 – No Signal ? 4 – No Signal ?	2
Ch<x>_GGIO#\$MX\$AnIn5\$mag\$f	Float	32	Channel Signal	0.0 to 100.0	5
Ch<x>_GGIO#\$MX\$AnIn6\$mag\$f	Float	32	Channel Light	0 to 100	5

Note : The recommended parameters to implement are in green.

2.4.3 IEC 60870-5-104

Note: For Channel, Alarm and Relay the maximum count is up to 32 but in fact you will be able to send commands up to the number of Channels, Alarms and Relays available on your device.

IEC60870-5-104						
Address		Data Format	Max Count	Name	Value	Refresh Rate (sec)
Start	End					
1	1	Bit	1	Relay System	0 – Condition not met	1
100	131	Bit	32	Relay State	1 – Condition met	1
1	1	Float	1	System Temperature	-40.0°C to 225.0°C	10
100	131	Float	32	Channel Temperature	-40.0°C to 225.0°C	1
132	163	Float	32	Channel Temperature Minimum	-40.0°C to 225.0°C	5
164	195	Float	32	Channel Temperature Maximum	-40.0°C to 225.0°C	5
196	227	Float	32	Channel Temperature Average	-40.0°C to 225.0°C	5
228	259	Float	32	Channel Offset	-270.0°C to 270.0°C	5
300	331	UInt16	32	Channel State	EasyGrid & EasyGrid-LT: 0 – Ok 1 – Too Low 2 – Too High 3 – No Signal ? 4 – No Signal ? 5 – Not Initialized 6 – Bad Signal ? 7 – Bad Signal ? 8 – No Calib 9 – Off 10 – NA EasyGrid-Base: 0 – Off 1 – Ok 2 – Ok 3 – No Signal ? 4 – No Signal ?	2
332	363	Float	32	Channel Signal	0.0 to 100.0	5
364	395	Float	32	Channel Light	0 to 100	5

Note : The recommended parameters to implement are in green.

2.4.4 DNP 3.0

Note: For Channel, Alarm and Relay the maximum count is up to 32 but in fact you will be able to send commands up to the number of Channels, Alarms and Relays available on your device.

DNP3							
Address		Data Format	Max Count	Name	Value		Resfresh Rate (sec)
Start	End						
1	1	Bit	1	Relay System	0 – Condition not met		1
100	131	Bit	32	Relay State	1 – Condition met		1
1	1	Float	1	System Temperature	-40.0°C to 225.0°C		10
100	131	Float	32	Channel Temperature	-40.0°C to 225.0°C		1
132	163	Float	32	Channel Temperature Minimum	-40.0°C to 225.0°C		5
164	195	Float	32	Channel Temperature Maximum	-40.0°C to 225.0°C		5
196	227	Float	32	Channel Temperature Average	-40.0°C to 225.0°C		5
228	259	Float	32	Channel Offset	-270.0°C to 270.0°C		5
300	331	UInt16	32	Channel State	EasyGrid & EasyGrid-LT: 0 – Ok 1 – Too Low 2 – Too High 3 – No Signal ? 4 – No Signal ? 5 – Not Initialized 6 – Bad Signal ? 7 – Bad Signal ? 8 – No Calib 9 – Off 10 – NA	EasyGrid-Base: 0 – Off 1 – Ok 2 – Ok 3 – No Signal ? 4 – No Signal ?	2
332	363	Float	32	Channel Signal	0.0 to 100.0		5
364	395	Float	32	Channel Light	0 to 100		5

Note : The recommended parameters to implement are in green.

2.4.5 Modbus TCP/IP

Note: For Channel, Alarm and Relay the maximum count is up to 32 but in fact you will be able to send commands up to the number of Channels, Alarms and Relays available on your device.

Modbus TCP/IP						
Address		Data Format	Max Count	Name	Value	Refresh Rate (sec)
Start	End					
24608	24608	Bit	1	Relay System	0 – Condition not met	1
24576	24607	Bit	32	Relay State	1 – Condition met	1
32774	32775	Float	1	System Temperature	-40.0°C to 225.0°C	10
12320	12383	Float	32	Channel Temperature	-40.0°C to 225.0°C	1
12384	12447	Float	32	Channel Temperature Minimum	-40.0°C to 225.0°C	5
12512	12575	Float	32	Channel Temperature Maximum	-40.0°C to 225.0°C	5
12448	12511	Float	32	Channel Temperature Average	-40.0°C to 225.0°C	5
12704	12767	Float	32	Channel Offset	-270.0°C to 270.0°C	5
12288	12319	UInt16	32	Channel State	EasyGrid & EasyGrid-LT: 0 – Ok 1 – Too Low 2 – Too High 3 – No Signal ? 4 – No Signal ? 5 – Not Initialized 6 – Bad Signal ? 7 – Bad Signal ? 8 – No Calib 9 – Off 10 – NA EasyGrid-Base: 0 – Off 1 – Ok 2 – Ok 3 – No Signal ? 4 – No Signal ?	2
12576	12639	Float	32	Channel Signal	0.0 to 100.0	5
12640	12703	Float	32	Channel Light	0 to 100	5

Note : The recommended parameters to implement are in green.

See Section 2.2.1 “Modbus Configuration” for complete Modbus configuration information.