| IWR-PORT

UTILITY OPERATING MANUAL

24 V AC or DC POWERED
IWT RECEIVER AND NETWORK CO-ORDINATOR
with 128 channels

Whilst every effort has been taken to ensure the accuracy of this document, we accept no responsibility for damage, injury, loss, or expense resulting from errors or omissions, and reserve the right of amendment without notice.

Information for users
This equipment has been tested and found to comply with the limits for a Class B device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help

Caution: To satisfy FCC RF Exposure requirements for mobile and base station transmission devices, a separation distance of 20 cm or more should be maintained between the antenna of this device and persons during operation. To ensure compliance operation at closer than this distance is not recommended. The antenna used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. No other antenna may be used with this equipment other than the antenna supplied with this equipment.

Cynergy3 Components Ltd
7 Cobham Road, Ferndown Industrial Estate, Wimborne
Dorset BH21 7PE, United Kingdom
Tel: +44(0)1202 897969, email: sales@cynergy3.com
www.cynergy3.com

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1. INTRODUCTION

1.1 Safety Information

This manual contains information that must be observed in the interest of your safety and to avoid damage to assets. Please read this manual before installing and commissioning the device and keep the manual in an accessible location for all users.

Contains FCC ID: W70MRF24J40MDME
Caution: To satisfy FCC RF Exposure requirements for mobile and base station transmission devices, a separation distance of 20 cm or more should be maintained between the antenna of this device and persons during operation. To ensure compliance operation at closer than this distance is not recommended. The antenna used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. No other antenna may be used with this equipment other than the PCB antenna supplied with this equipment.
Please see the Certifications section for more information on RF Exposure Compliance

1.2 Hardware Features

The IWR-Port wireless receiver and network coordinator module provide a straightforward method of interfacing wireless sensors and transmitters to an RS-232, RS-485, or Ethernet network. It can also be linked to wired Isoslice input and output units and so accept virtually every type of analog input signal from millivolts to 40 V dc, mA, thermocouples, and RTDs.
Alternatively, it can be used as a simple wireless 4-20mA cable replacement system, providing 4-20 mA outputs from wireless sensors.

A built-in display allows local monitoring of the individual inputs and outputs and displays menu options when the unit is configured.

The unit can be powered by a DC or AC voltage between 16 and 36 V dc or 16 and 32 V ac.

The instrument is packaged in a compact 22.5 mm wide enclosure which can be mounted on a standard TS35 DIN-rail.

The system can be expanded with optional ISO-SLICE slice I/O modules. These modules connect automatically via the DIN rail-mounted bus connector, allowing the easy addition and removal of extra I/O.

The IWR-Port can be configured to accept inputs from up to 128 wireless transmitters and present this information, along with signal strength and update time to either RS232/485 or Ethernet communications port.

1.3 Isolation Details

The IWR-Port has full 2 port isolation of 1000 V between the Output Stage and Power Supply for functional reasons.

2. UNPACKING

The instrument should be carefully inspected for signs of damage that may have occurred in transit. In the unlikely case that damage has been sustained, DO NOT use the instrument, but please retain all packaging for our inspection and contact your supplier immediately.

3. QUICKSTART GUIDE

There are many ways the IWR-Port can be used, here Sensata shows QUICKSTART examples of three different systems.

3.1 Example 1

IWR-Port receives values from 8 IWTT thermocouple wireless transmitters and provides this information to an Ethernet network using a MODBUS TCP protocol.

The IWTT transmitters are configured to be channels 1 to 8.
Refer to the IWTT installation instructions for details.
Connect power and Ethernet cable then switch on (see section 4)
Access the main menu by pushing and holding both buttons until OK is displayed.
Display scaling values will be automatically shown correctly, but if AUTO is off, they can be changed from the default 0-100% by following the procedure in section 6.3. For each IWTT channel, parameter 1 will be the thermocouple temperature.
Select the network protocol by following the procedure in section 6.9.
Set up the Modbus slave address by following the procedure in section 6.10.
Set up the Ethernet port by following the procedure in section 8.3.
Measure the age of reading in minutes by following the procedure in section 6.15.
Exit the main menu by holding both buttons until OK is displayed.
Calculate the registers to read by referring to section 9.1.

3.2 Example 2

A single IWTP provides wireless transmission of a pressure level in a pipe and the IWR-Port outputs this value as a 4-20 mA output

The IWTP transmitter is configured to be channel 2.
Refer to the IWTP installation instructions for details.
Open the IWR-Port case and slide out the PCB (see section 4)
Set up the output switch to mA (see section 5)
For 4-20 mA output the switch should be off (yellow switch away from PCB edge).
Refit the PCB into the housing and fit the complete unit onto the din rail.
Connect output and power then switch on (see section 4)
Access the main menu by pushing and holding both buttons until OK is displayed.

Calibrate the mA output following the procedure in section 6.2
Display scaling values will be automatically shown correctly, but if AUTO is off, they can be changed from the default 0-100% by following the procedure in section 6.3
The IWR-Port output is channel 1 parameter 1.
The parameter that it represents must be changed to channel 2 parameters 1 by following the procedure described in section 6.5.
Measure the age of a reading in minutes by following the procedure in section 6.15.
Exit the main menu by holding both buttons until OK is displayed.

3.3 Example 3

The IWR-Port receives value from 4 IWmAT and outputs these as 4-20 mA outputs using an Isoslice-8 analog output card as well as providing them as MODBUS RTU values over an RS485 network.

The IWmAT transmitters are configured to be channels 1,2,3 and 4.
Refer to the IWmAT installation instructions for details.
The Isoslice-8 unit is configured as channel 5.
Refer to the Isoslice-8 installation instructions for details.
Fit the Isoslice-8 and IWR-Port units to the din rail.
Connect power and RS-485 cable to the IWR-Port then switch on (see section 4)

Access the main menu by pushing and holding both buttons until OK is displayed.
Display scaling values will be automatically shown correctly for the 4 IWmAT devices, but if AUTO is off, they can be changed from the default 0-100% by following the procedure in section 6.3.
The Isoslice-8 outputs must be configured to represent the 4 IWmAT values of channels 1,2,3 and 4 by following the procedure described in section 6.5.
Select the network protocol by following the procedure in section 6.9.
Set up the Modbus slave address by the following procedure in section 6.10.
Set up Serial port options by following procedures in sections 6.11,6.12 and 6.13.
Measure the age of a reading in minutes by following the procedure in section 6.15.

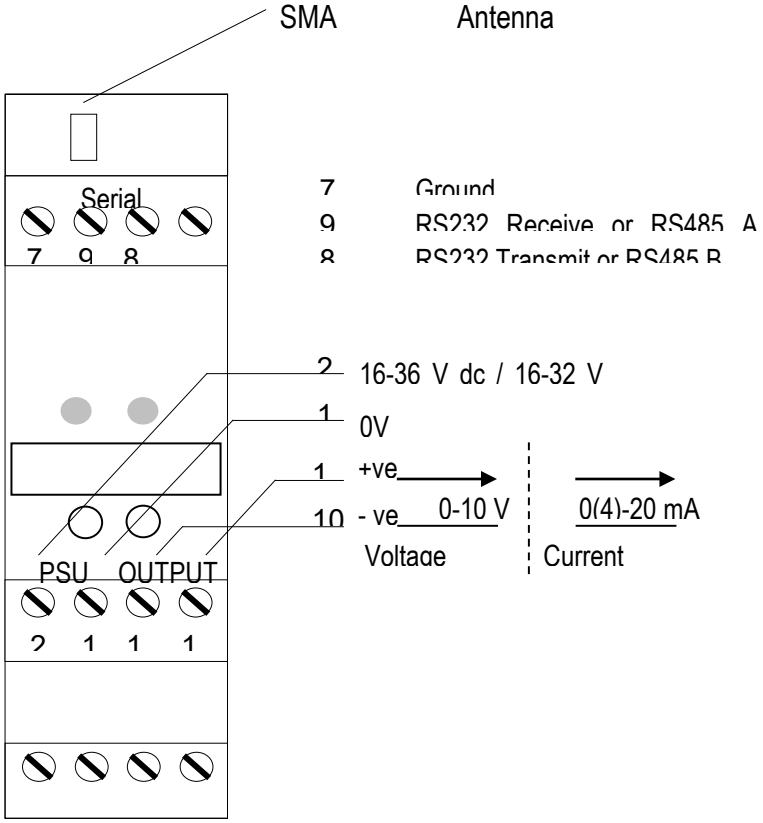
Exit the main menu by holding both buttons until OK is displayed.
Calculate the registers to read by referring to section 9.1.

4. CONNECTIONS

The IWR-Port is housed in a compact DIN rail mounting enclosure, with terminals, arranged in 4 rows. The Communications ports are on the top and the power supply and analog outputs are on the bottom rows.

The diagram below shows how to connect to an IWR-Port with an analog output and a serial port, either RS-232 or RS-485.

If the IWR-Port does not have the single analog output option, there are no connections to terminals 10 and 12.

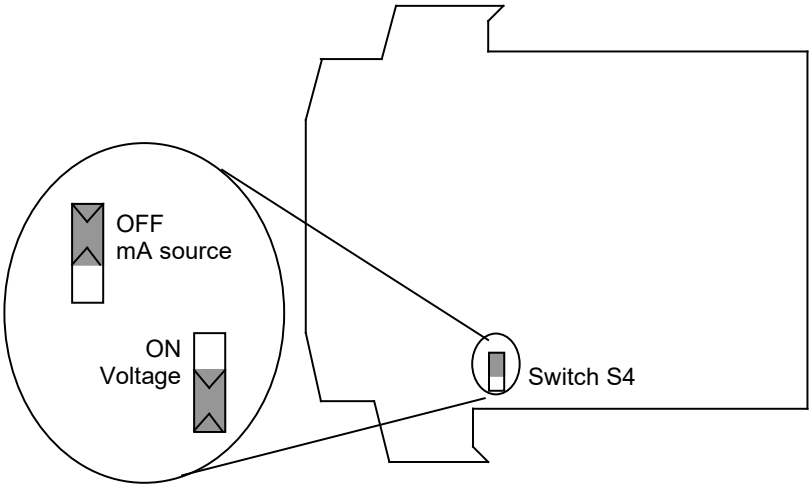


5. CONFIGURING THE IWR-PORT

5.1 Output Stage

If an analog output is fitted the output type is selected with Switch S4.
The analog output of the IWR-Port is channel 1, parameter 1.

Output Type	S4 Position
mA Source	Off
Voltage	On



! WARNING !
DO NOT OPEN UNIT OR ADJUST SWITCHES WITH POWER SUPPLY, INPUT OR OUTPUT CONNECTED

5.2 Radio Network Selection

Use the 4-way dip switch to select the Network to set up. The dip switch must be changed when the power to the IWR-Port is off.

1 2 3 4	Network	Pan Id	RF	1 2 3 4	Network	Pan Id	RF
0 0 0 0	1	6000	21	0 0 0 1	9	6008	14
0 0 1 0	2	6001	22	0 0 1 1	10	6009	15
0 1 0 0	3	6002	23	0 1 0 1	11	600A	16
0 1 1 0	4	6003	24	0 1 1 1	12	600B	17
1 0 0 0	5	6004	25	1 0 0 1	13	600C	18
1 0 1 0	6	6005	11	1 0 1 1	14	600D	19
1 1 0 0	7	6006	12	1 1 0 1	15	600E	20
1 1 1 0	8	6007	13	1 1 1 1	16	600F	21

If the radio stops receiving data, a watchdog timer will reset it after 1 minute.

6. CALIBRATING THE IWR-PORT

When the unit is shipped the IWR-Port will be calibrated for the output type and range noted on the side label if it is fitted. If this label is blank, then the unit will be calibrated for 4-20 mA output.

The display is used to show scaled values of the inputs and outputs in the system, or ON and OFF for digital inputs and outputs. The left button scrolls through the available channels, and the right button scrolls through the available parameters. Whilst the button is held down, the channel number is shown on the left of the screen, and the parameter is shown on the right. The led can be configured to flash every 3 seconds to indicate that the unit is operating or configured to flash each time data is received. The display can be configured to remain on all the time or switch off after 15 minutes.

When the IWR-Port receives data from an IWT that counts pulses, it must scroll the value on the display, because the display only has 4 digits (to show 0 to 65535). This happens automatically when the IWR-Port recognizes the data is from an IWT pulse counter. Values from IWTs with normal scaled data are displayed as described in section 6.3 (where 3869 = 0% and 61650 = 100%).

Output parameters should not be linked to follow pulse count input parameters, because the scaling is different. This is because an output linked to a normal scaled input value follows a value between 3869 and 61650 representing 0 to 100%, whereas a pulse count value can be between 0 and 65535.

6.1 Main menu

To access the main menu push and hold both buttons until OK is displayed.
These are the main menu options; use raise and lower buttons to cycle through:

1. OUT SPAN	*(sec 6.2)*	13. VIEW BURNOUT	*(sec 6.8)*
2. OUT ZERO	*(sec 6.2)*	14. MODBUS type	*(sec 6.9)*
3. DSV Cc Pp	*(sec 6.3)*	15. ADDRESS	*(sec 6.10)*
4. DS span	*(sec 6.3)*	16. BAUD	*(sec 6.11)*
5. DS zero	*(sec 6.3)*	17. PORT setting	*(sec 6.12)*
6. VIEW DSV	*(sec 6.4)*	18. CH TIME	*(sec 6.13)*
7. OUT Cc Pp	*(sec 6.5)*	19. DISPLAY time	*(sec 6.14)*
8. LINK Cc Pp	*(sec 6.5)*	20. AGE	*(sec 6.15)*
9. VIEW LINK	*(sec 6.6)*	21. LED	*(sec 6.16)*
10. BURNOUT Cc Pp	*(sec 6.7)*	22. DEFAULTS	*(sec 6.17)*
11. LEVEL	*(sec 6.7)*	23. ENDIAN type	*(sec 6.18)*
12. TIME	*(sec 6.7)*	24. AUTOSCALE auto	*(sec 6.19)*

Note that menu options 1 and 2 are only available if an analog output is fitted.
To access the sub-menu of one of the main menu options, use raise or lower to cycle to the option required then push and release both buttons. Change the parameter as required.

To return to the main menu, push and release both buttons.

To exit from the main menu and return to run mode, press and hold both buttons for 2 seconds until OK is displayed on the screen.

After two minutes of inactivity from the front buttons when the main menu (or a sub-menu) had been accessed, a timeout will occur, and the unit will automatically return to run mode.

6.2 Output Span and Output Zero (1. OUT SPAN and 2. OUT ZERO)

These menu options allow the IWR-Port to learn the output span and zero values if there is an output fitted to the IWR-Port. Default output values will make the DAC output 4 to 20 mA or 2 to 10 V for the voltage option.

Display	Action
1.OUT SPAN	Press and release both buttons together
OS	Press raise/lower buttons to adjust output value until correct
OS□	The tick will appear when a valid value has been learned
	Press and release both buttons together to go to the main menu
1.OUT SPAN	Push the raise button once to change the menu item
2.OUT ZERO	Press and release both buttons together
OZ	Press raise/lower buttons to adjust output value until correct
OZ□	The tick will appear when a valid value has been learned
	Press and release both buttons together to go to the main menu
2.OUT ZERO	

6.3 Display Scaling Values Adjustment (3.DSV Cc Pp, 4.DS span, 5.DZ zero)

The display can show a scaled numerical value for each parameter of each channel. Scaling values can be adjusted between –999 and 9999. The default scaling values are 0 to 100. For all channels, all 8 parameters can be changed even if the channel is not used, or some of the parameters are not used, or autoscaling is on (see 6.19).

For channels with digital outputs, the display scaling values can be used to configure setpoints if the digital output is linked to following an analog input. The setpoints are compared to the analog input value to switch the digital output on and off. The setpoints are configured as percentage values (0-100%). The span value is the on setpoint and the zero value is the hysteresis. The off setpoint is calculated by adding the span and hysteresis together.
The hysteresis value can be positive or negative. If hysteresis is negative, the digital output switches on (when the analog value it is following is) above the on setpoint and off below the off setpoint. For example, if the span is 50% and zero is -10%, output switches on above 50% and off again below 40%.

If hysteresis is positive, the digital output switches on below the setpoint and off above the off setpoint. For example, if the span is 50% and zero is 20%, output switches on below 50% and off again above 70%.

Example: To change the scaling of channel 3 parameter 2, from 0 - 100 to 4 - 20:

Display	Action
3.DSV C1 P1	C1 P1 is channel 1 parameter 1
	Press and release both buttons together
01 1	Press the lower button to choose a channel (on left: 1 to 128)
03 1	Press the raise button to choose a parameter (on right: 1 to 8)
03 2	Press and release both buttons together
3.DSV C3 P2	C3 P2 is channel 3, parameter 2
	Push the raise button once to change the menu item
4.DS 100	Display Span value is 100
	Press and release both buttons together
100	Press raise/lower buttons to adjust display span value
20	Press and release both buttons together
4.DS 20	Display Span value is now 20
	Push the raise button once to change the menu item
5.DZ 0	Display Zero value is 0
	Press and release both buttons together
0	Press raise/lower buttons to adjust display zero value
4	Press and release both buttons together
5.DZ 4	Display Zero value is now 4

3.DSV Cc Pp is used to select the channel and parameter that need display values changing, where c represents the channel and p indicates the parameter.
To select a different channel or parameter enter the submenu. The display will show the channel on the left and the parameter on the right. The lower button increases the channel (1 to 128) and the raise button increases the parameter (1 to 8).

The channel and parameter are chosen in menu 3:
4.DS span indicates what the display span value is (span is –999 to 9999)
To change the display span value, enter the sub-menu and adjust it.
5.DZ zero indicates what the display zero value is (zero is –999 to 9999)
To change the display zero value, enter the sub-menu and adjust it.

View Display Scaling Values (6. VIEW DSV)

To view all eight parameter scaling values of a particular channel, enter this sub-menu. The first channel shown will be the one selected in 3.DSV Cc Pp. The scaling values will be shown in a scrolling message in this format: e.g. channel 3:

C3.P1 100,0 P2 20,4 P3 100,0 P4 100,0 P5 100,0 P6 100,0 P7 100,0 P8 100,0

The channel being viewed can be changed using the lower or raise buttons, each press will cause the scrolling message to begin again, for a different channel.

Linking Outputs to other Parameters (7. OUT Cc Pp, 8. LINK Cc Pp)

The IWR-Port 4-20 mA or 0-10 V output can represent the value of any parameter within the system. The outputs of Isoslice units can also represent any parameter within the system. This is done using a link table, which links the outputs to the parameters (usually of input devices) they must represent.

By default, outputs are linked to themselves, so that an output is controlled by a Modbus write to its associated register.

Go to main menu item 7.OUT Cc Pp where c and p show the channel and parameter of the output that needs to be linked to an input value. To select a different output, enter the submenu. The display will show the channel on the left and the parameter on the right. The lower button increases the channel (1 to 128), the raise button increases the parameter (1 to 8). Once the channel and parameter of output have been chosen, exit the sub-menu.
Go to main menu item 8. LINK Cc Pp where c and p show the channel and parameter that the output chosen in 7 is currently linked to. (Note the distinction: it allows the user to see what parameter output is linked to without needing to go into the LINK submenu).

Use this submenu to choose the parameter that the output needs to follow. The display will show the channel on the left and the parameter on the right. The left button increases the channel (1 to 128), the right button increases the parameter (1 to 8). Once the channel and parameter of the input that the output is chosen in 7 are to be linked to having been chosen, exit the sub-menu.

The link function typically allows analog outputs on the isoslice bus to reproduce analog values from remote sensors or allows digital outputs on the isoslice bus to reproduce digital values from remote sensors.

Analog outputs can be linked to digital inputs. If an analog output is linked to a digital input, it will output 100% if the digital input is On and 0% if it is Off.
Digital outputs can be linked to analog inputs, with programmable setpoints to control at what analog input value the digital output is switched on and off. The setpoints are programmed as Display Scaling Values, as described in section 6.3.

The link table only affects output parameters. If an input parameter is linked to follow another, its value will be unaffected by the link table operation.

Example:
Channel 1 is the IWR-Port with 1 analog output, parameter 1.
Channel 2 is an Isoslice-2 with 8 analog inputs, parameters 1 to 8.
Channel 3 is an Isoslice-8 with 4 analog outputs, parameters 1 to 4.

To make the IWR-Port output 1 follow Isoslice-2 input 1 and
make output 1 on the Isoslice-8 follow input 2 of the Isoslice-2

Display	Action
7.OUT C1 P1	C1 P1 is the IWR-Port output that needs to be linked Push the raise button once to change the menu item
8.LINK C1 P1	This shows the IWR-Port output is under Modbus control because it is linked to itself, C1 P1 Push and release both buttons together
02 1	Press the lower button to choose channel 2 (on left: 1 to 128) Press and release both buttons together
8.LINK C2 P1	IWR-Port output is now linked to the Isoslice-2, input 1 Push the lower button to change menu item
7.OUT C1 P1	C1 P1 is the IWR-Port output. We need to select the Isoslice–8 on channel 3 Push and release both buttons together
03 1	Push the left button to select C3, the Isoslice-8, output 1 Press and release both buttons together
7.OUT C3 P1	C3 P1 is output 1 of the Isoslice-8 on channel 3 Push the raise button once to change the menu item
8.LINK C3 P1	This shows the Isoslice-8 output 1 is under Modbus control because it is linked to itself, C3 P1 Push and release both buttons together
03 1	We need to link it to the Isoslice-2, Channel 2 Parameter 2
02 1	Push the lower button to select channel 2 (on left: 1 to 128)
02 2	Push raise button to select parameter 2 (on right: 1 to 8) Push the raise button once to change the menu item
8.LINK C2 P2	Isoslice-8 output 1 is now linked to Isoslice-2 input 2

View Link Table (9. VIEW LINK)

To view the parameters that a channel is linked to use the 9. VIEW LINK menu. The channel and parameters that the outputs are linked to can be seen in a scrolling message in this format
e.g. for channel 3:

C3.P1 2,2 P2 3,2 P3 3,3 P4 3,4 P5 3,5 P6 3,6 P7 3,7 P8 3,8

This shows that channel 3 parameter 1 is linked to channel 2, parameter 2, and all the other channel 3 parameters link to themselves and are therefore under Modbus control.

The channel being viewed can be changed using the lower or raise buttons, each press will cause the scrolling message to begin again, for a different channel.

Burnout Control (10. BURNOUT Cc Pp, 11. LEVEL, 12. TIME time)

10.BURNOUT is used to select the channel and parameter of an output for menu 11.LEVEL level (where the level is HI or LO for that output parameter) and the channel for menu 12.TIME time (where time is the timeout value for that input channel).

Go to main menu item 10. BURNOUT Cc Pp where c and p show the channel and parameter of the output that needs its burnout level to be changed or the input channel

that needs its timeout value to be changed. To select a different channel or parameter, enter the submenu. The display will show the channel on the left and the parameter on the right. The lower button increases the channel (1 to 128), the raise button increases the parameter (1 to 8). Once the channel and parameter have been chosen, exit the sub-menu.

Burnout Level Control

When an output is following an input (because it is linked to it via the LINK and OUT menu) at some stage it may need to indicate the value it is following is not valid. This occurs if the input has an error condition (burnout, data not available, etc) or has timed out because data has not refreshed recently enough (see Burnout Time Control in the next section).

The Burnout Level menu allows individual outputs to indicate this condition by either going to a HI burnout value (23 mA or 11.5 V for analog output, On for a digital output), or a LO burnout value (0 mA or 0 V for analog output, Off for a digital output).
To change the burnout level of an output first select the correct channel and parameter using menu 10. BURNOUT. Then select menu 11. LEVEL and in the submenu choose HI or LO.

The default Burnout Level for all parameters of all channels is HI.

Burnout Time Control

Each channel has an Age parameter associated with it to indicate how old the data is. If the device providing that data becomes unable to send any new data, there comes a time when the data held by the IWR-Port can be considered too old to be valid. It is possible to set a time limit on each channel that will make the IWR-Port change old data values to a timeout error condition (0xFFFE or E 15 on the display) if the time limit is reached.

To change the timeout value for an input channel first select the correct channel using menu 10. BURNOUT. Then select menu 12. TIME and in the submenu choose OFF to disable the timeout, or a value between 1 and 255 inclusive.

The default Burnout Timeout for all channels is OFF.

View Burnout (13. VIEW BURNOUT)

To view the burnout configuration for each channel uses the 13. VIEW BURNOUT menu. The channel burnout time and parameter burnout levels can be seen in a scrolling message.

e.g. for channel 2:
C2 30 P1 HI P2 HI P3 HI P4 HI P5 HI P6 HI P7 HI P8 HI

This shows that if this is an input, its data will become invalid if it is older than 30 seconds (or minutes depending on the AGE parameter selected, see section 6.15).

e.g. for channel 3:

C3 OFF P1 HI P2 HI P3 HI P4 HI P5 HI P6 HI P7 HI P8 HI

This shows that if this is an output, all burnout indications are set to HI. If it is an input, data values are not affected by any timeout.

The channel being viewed can be changed using the lower or raise buttons, each press will cause the scrolling message to begin again, for a different channel.

Serial Protocol (14. MODBUS type)

The main menu will display type as either RTU or TCP.

This option allows the serial protocol to be selected. If a different serial protocol is available, the name of it will be shown in this sub-menu, but it cannot be changed.

MODBUS RTU (default)
MODBUS TCP

Slave Address (15. ADDRESS address)

The main menu will display the address or unit identifier after ADDRESS
The Modbus slave address or unit identifier can be changed. Selectable addresses are 1 to 247.
The default slave address is 11.

Baud Rate (16. BAUD baud)

The main menu will display the current baud rate after BAUD.
The default baud rate is 9600. Selectable baud rate values are:

4800
9600 (default)
19200
38400
57600 (this should be selected if Ethernet port is used)

Port Settings (17. PORT setting)

The main menu will display the port setting after PORT.
The default port settings are 8 data bits, no parity, 1 stop bit.
Selectable port settings are:

8N1 8 data bits, no parity, 1 stop bit (default)
8N2 8 data bits, no parity, 2 stop bits
8O1 8 data bits, odd parity, 1 stop bit
8E1 8 data bits, even parity, 1 stop bit

Character Timeout (18.CH TIME)

This is the time after the last character was received by the IWR-Port before the IWR-Port will respond to the message. For a standard Modbus RTU message, this is normally 3.5-character widths, so the values can be set as low as in the table below.

9600 baud 3.64 ms.
19200 baud 1.82 ms
38400 baud 0.91 ms
57600 baud 0.61 ms

The default value is 3.99 ms.

If the RS-485 master is slow to release the bus lines after sending a data request, this delay can be increased to compensate so that the data is not sent until the master is ready.
The value on the display is in ms. It can be adjusted from 0 to 13.06 ms

Display Timer (19. DISPLAY display)

Choose if the display remains on all the time or switches off 15 minutes after a button was last pressed.

ON	Select this to make the display stay on all the time
15	Select this to make the display switch off after 15 minutes (default)

6.4 Age Select (20.AGE age)

The age of a parameter can be counted in seconds or minutes, which will depend on the update of the wireless sensors concerned. Use this menu to select between

SEC	select this to count in seconds (default)
MIN	select this to count in minutes

6.5 Led Control (21.LED led)

The led can be used in 2 different ways, depending on the frequency of data received from wireless transmitters.
For applications where wireless transmissions occur continuously, it is recommended to set this to BEAT. For applications where wireless sensors are sending data every 10 minutes or more, choose LINK to see an LED flash each time data is received.

BEAT	select this to see the led flash every 3 seconds (default)
LINK	select this to see the led flash when a wireless transmission is received

Restore Defaults (22. DEFAULTS)

All values that can be changed using the menu system can be restored to default values. Choose to do this by selecting YES

NO	select this to change nothing
YES	select this to restore all menu values to defaults

To select YES, hold down the raise button for about 5 seconds until the display says YES.

If it returns to the main menu when YES was displayed SAVE will be displayed and the red led will come on for a few seconds while default data is restored and saved to EEPROM.

Modbus 32-bit float format (23. ENDIAN type)

The main menu will display type as either BIG or LITTLE.
This option allows the word order of 32-bit floating-point numbers to be selected when Modbus registers 41282 to 43328 are read.

BEND	big endian	(most significant 16 bits first - default)
LEND	little endian	(least significant 16 bits first)

For example, Channel 2, Parameter 1 is 49.70838 %. In hexadecimal format this is 0x4246D562. Registers 43337 and 43338 must be read to get this 32-bit value.

In big endian format: 0x4246 will be in register 43337; 0xD562 in register 43338.
In little endian format: 0xD562 will be in register 43337; 0x4246 in register 43338.

AUTOSCALE (24. AUTOSCALE auto)

This option switches on automatic scaling for IWT devices for the value shown on the display and for Modbus data for the 32-bit float, span point, and zero point.

NO	select this to switch autoscale off
YES	select this to switch autoscale on (default)

When autoscaling is on, the default 0-100% zero and span scaling values are replaced by the actual scaling values of the IWT transmitter.

For example:
An IWT transmitter is 0-500 mbar g on channel 1. It is measuring 250 mbar.
When autoscaling is on the values of 0 and 500 will be used for scaling.

When channel 1, parameter 1 is viewed on the screen, 250 will be shown

Modbus register	Value	Reason
40001 is 16-bit unsigned integer data of channel 1 parameter 1.		
40001	32759	Halfway between 3869 and 61650

41281 is 32-bit floating-point value of channel 1 parameter 1.
41281-41282 250.00 Scaled pressure 0 - 500 mbar g
43329 is the 16-bit signed span point of channel 1 parameter 1.
43329 500 Span Point
44353 is the 16-bit signed zero point of channel 1 parameter 1.
44353 0 Zero point
46401 is the 16-bit device type of channel 1.

46401	0x98	Device type	bit 7: 1 = IWT transmitter bit 6: 0 = Analog value bit 5: 0 = Input value bit 4: 1 = IWT data in P3 to P8 bit 3: 1 = Autoscaling available bit 2: 0 = Display Analog or Digital bit 10: 00 = 1 Input value

When autoscaling is off, default scaling values of 0-100 are used, unless changed.

When channel 1, parameter 1 is viewed on the screen, 50.00 will be shown

Modbus register	Value	Reason
40001	32759	Halfway between 3869 and 61650
41281-41282 50.00		Scaled 0-100%
43329	100	Span point
44353	0	Zero point
46401	0x98	

7. ISOSLICE BUS

The Isoslice units are powered by the Din rail mounted bus connectors.

The IWR-Port will scan the bus when it powers up to find Isoslice units that are attached. Initially, the data values of all data registers are 0xFFF0, which indicates there is no data available.

Each Isoslice is read twice a second. Output data is written to the Isoslice as it is received.

If an Isoslice unit needs to be added to the bus, first switch the power off, add the new Isoslice unit and switch the power on again.

In a standard IWR-Port, the maximum number of isoslice units that can be fitted is 128. This gives up to 1024 parameters per IWR-Port if 8 input Isoslices are used.

If the IWR-Port has an output fitted, the IWR-Port will configure itself to be channel 1, leaving channels 2 to 128 available for external transmitters or isoslice units.

Channels are allocated to wireless devices and Isoslice units within the system, the channels must not be duplicated.

If scaling data is entered on an IWT-128 that has an Isoslice bus, it will be local to the display of the IWT-128. The same information would need to be entered on the IWR-Port as well.

8. SERIAL DATA OPTIONS

The IWR-Port can be fitted with either an RS-232, RS-485, or Ethernet port to allow access to the data.

8.1 RS232

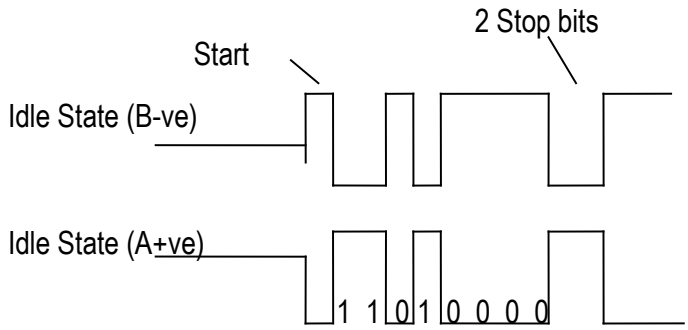
Baud rate, port settings, and timeout can be changed using menu options 16,17,18. By default, the port settings are 38400 baud, 8 data bits, no parity, 1 stop bit.

8.2 RS485

Baud rate, port settings, and timeout can be changed using menu options 16,17,18. By default, the port settings are 38400 baud, 8 data bits, no parity, 1 stop bit.

A 120-ohm termination resistor may be required across A and B

The A and B connections to the IWR-Port can be identified by the signals present on them whilst there is activity on the RS485 bus:



In this example, the first character is 0x0B, and 2 stop bits are used.

8.3 Ethernet

The IWR-Port can be fitted with an ethernet port called an XPort. A standard network cable should be used to connect it to a router on a network.

Baud rate, port settings, and timeout can be changed using menu options 16,17,18. The default settings should remain as 57600 baud, 8 data bits, no parity, 1 stop bit.

Default XPort settings are:

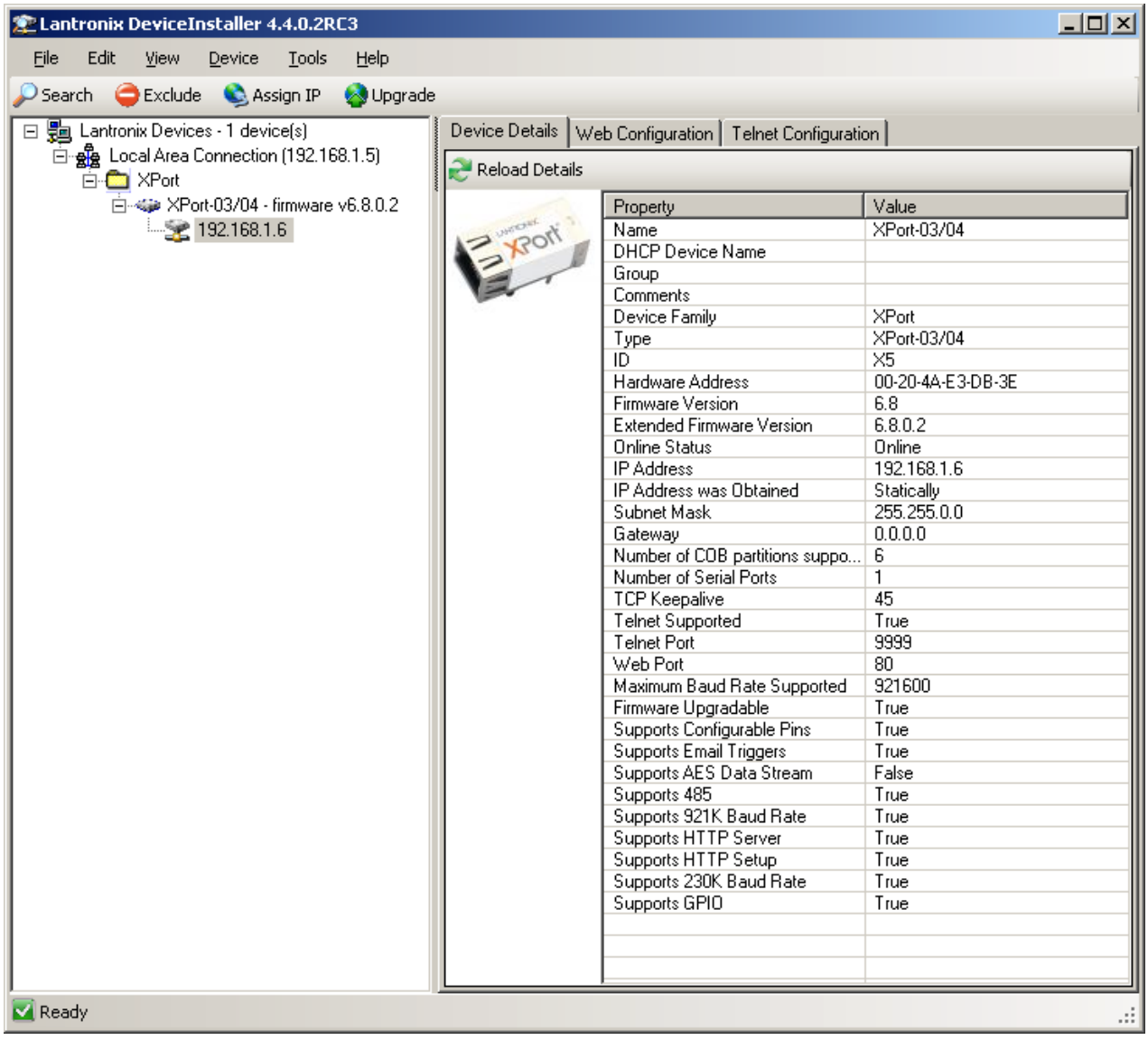
- DHCP is enabled, so an IP address is obtained automatically
- The remote port is 502 (local port on the XPort)
- The baud rate is 57600

- Serial Settings->Pack Control->Enable Packing is selected
- Port settings are 8 data bits, no parity, 1 stop bit, no flow control.

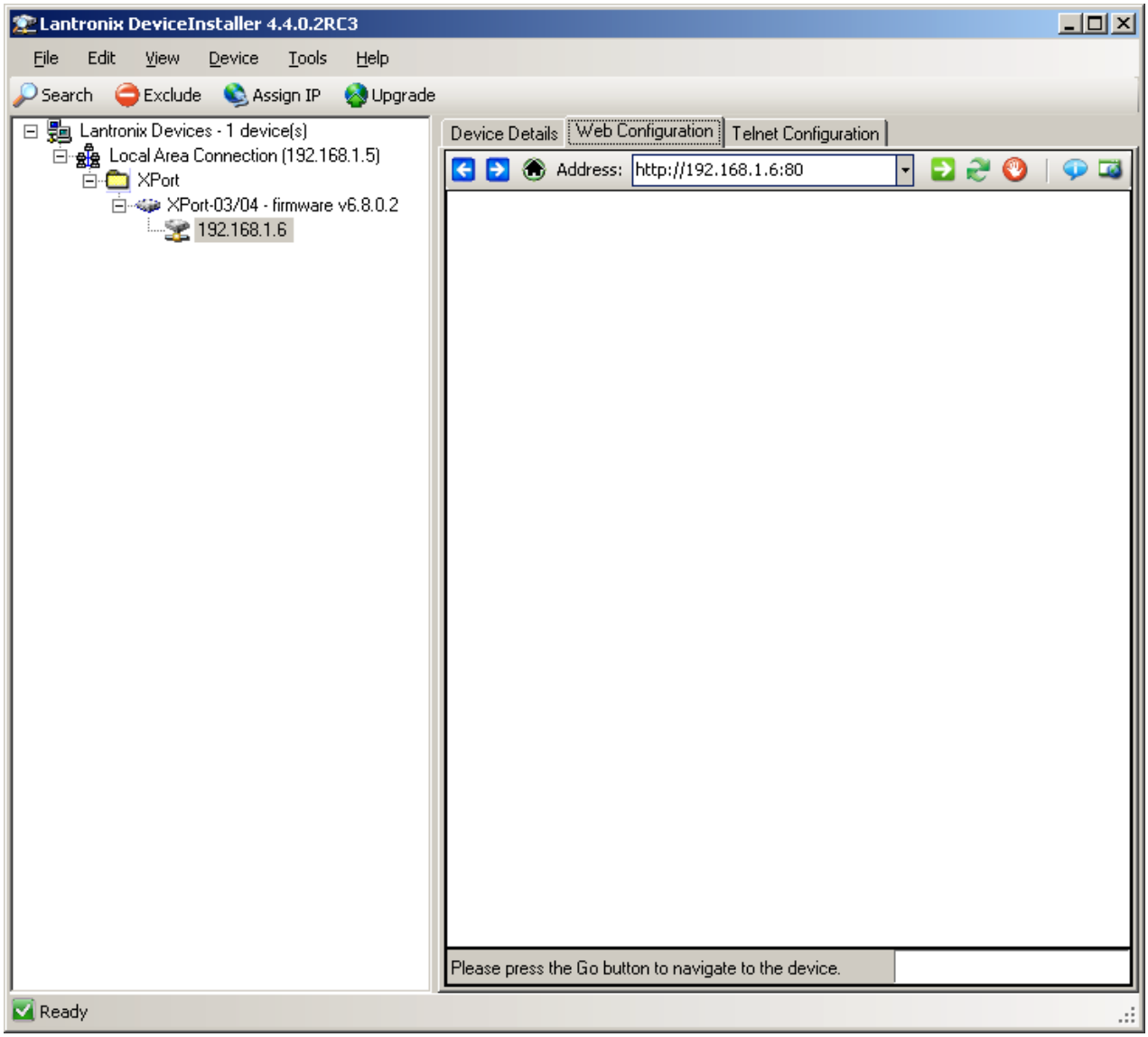
A static IP address can be set using the following software, available to download from the Lantronix website.

Device Installer v4.4 available to download at **https://www.lantronix.com/products/deviceinstaller/**

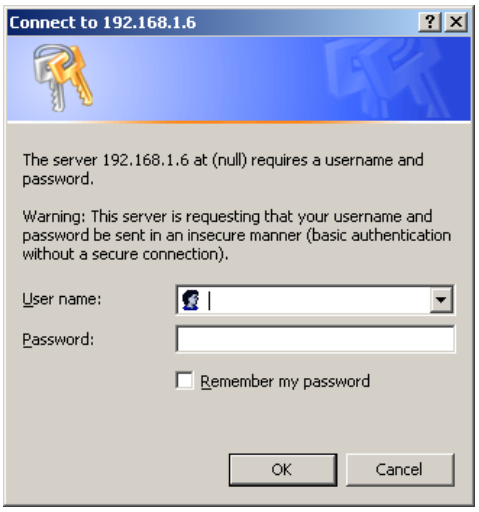
Run Device Installer, wait until the first search is complete (or click Search).
Select the XPort from the list and click on the IP address (192.168.1.6 in the example).
If the XPort has only just been connected to the network, the IP address shown might be in red (169.x.x.x). This means that the IP address has not yet been assigned by the router. Click Search again, until the IP address is shown in black.

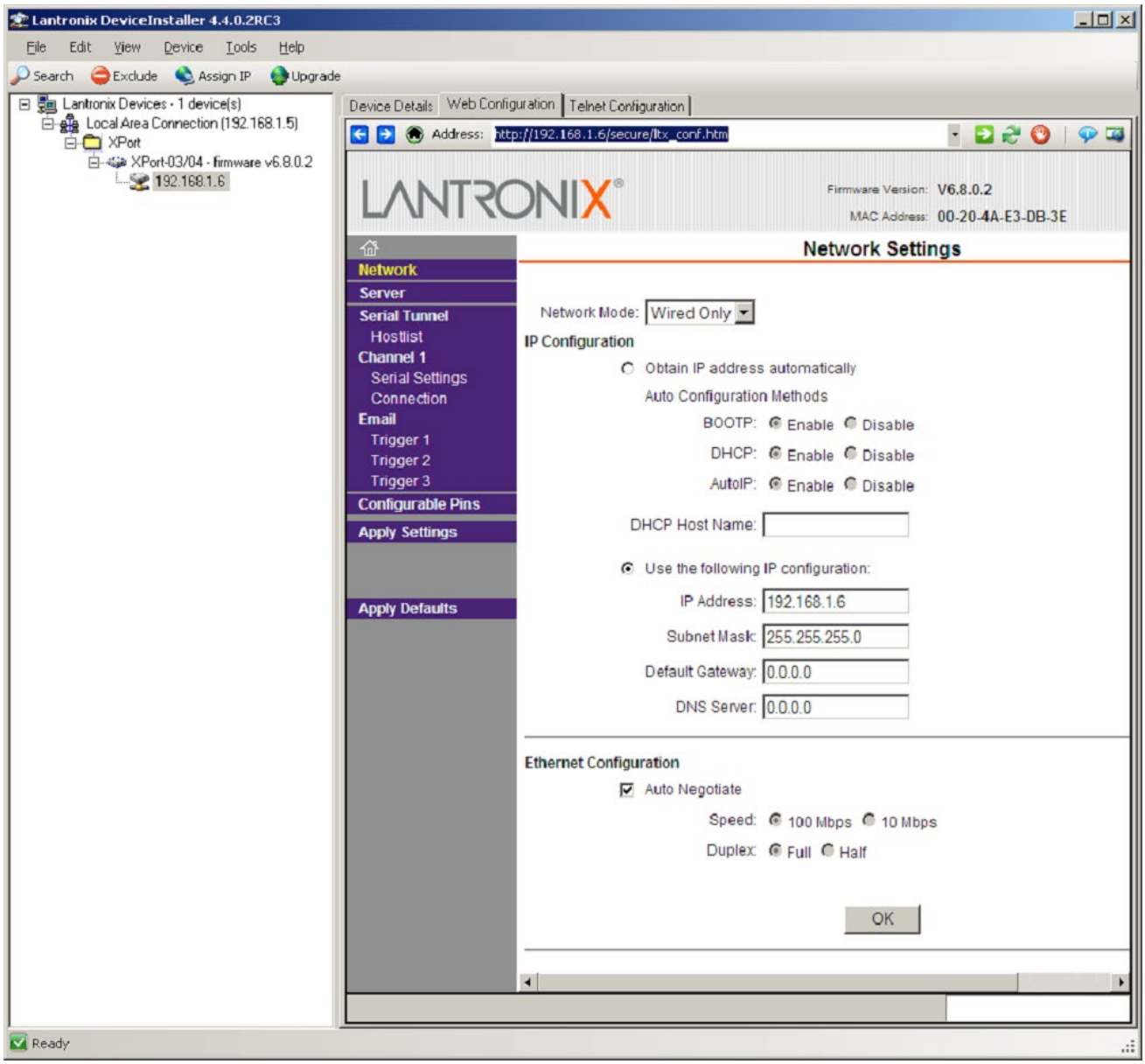


Click on the Web Configuration tab, then click on the green arrow.



A connection screen will appear. Leave the Username and Password blank and click OK. Navigate to the Network section. In the main window where it says, IP Configuration select "Use the following IP configuration:"





Type in the required IP address (192.168.1.6 in this example)
Type in the Subnet Mask (usually 255.255.255.0)
The default gateway can be 0.0.0.0
DNS server can be 0.0.0.0

Click OK at the bottom of the page.
Click Apply Settings on the left.
Wait for it to reboot.

It will now be possible to connect to the static IP address on port 502 with a SCADA system or Modbus test program.

9. ACCESSING THE IWR-PORT DATA

The IWR-Port acts as a Modbus slave.
Data can be read using Modbus command code 0x03 (or 0x04 if required).
Data can be written using Modbus codes 0x06 (single) and 0x10 (multiple) to registers of outputs (see 6.5) and scaling values, link table, and burnout control registers if unlocked (see 9.3).
All commands access the same "table" of registers. A maximum of 40 registers can be read in one request. A maximum of 8 registers can be written in one request.

Offset	Register	Description	Writeable
0 to 1279	40001 to 41280	16-bit unsigned integer data	Outputs only
1280 to 3327	41281 to 43328	32-bit IEE-754 float	No
3328 to 4351	43329 to 44352	16-bit signed integer span	If unlocked
4352 to 5375	44353 to 45376	16-bit signed integer zero	If unlocked
5376 to 6399	45377 to 46400	16-bit unsigned link value	If unlocked
6400 to 6527	46401 to 46528	Device type code	No
6528 to 6655	46529 to 46656	Burnout Level Bits	If unlocked
6656 to 6738	46657 to 46784	Burnout Timeout	If unlocked
7999	48000	Registers locked/unlocked	Yes
8000 to 9279	48001 to 49280	16-bit unsigned integer data	No

9.1 Reading Data Values

The IWR-Port is channel 1 if it has an output fitted. The data can be read as a 16-bit integer or as a scaled 32-bit float. Command 0x03 by convention should be used, but the IWR-Port supports reads to the table of data using command 0x04.

Reading 16-bit unsigned integer values:

Each channel has 10 registers associated with it.
The first 8 registers per channel are data values, followed by LQI then Age.

To calculate the 16-bit unsigned integer register offset please refer to the IWR-Port Modbus register table (128 channel, 8 parameters). Read 40001 to 41280 or 48001 to 49280 for transposed – see table for more details.

Valid data values are between 0x0000 and 0xFFEF.

Data values are calculated using the following formula,

$$\% \text{ Value} = \frac{\{(\text{Input Value} - 3869) \times (\text{Span point} - \text{Zero point})\}}{57781} + \text{Zero point}$$

The resulting value is in the range -6.70% to 106.7% (assuming 0 – 100% scaling).
If the reading is from a pulse count device, scaling is not necessary.
It can be deduced that 3869 (0x0F1D) is 0.0% and 61650 (0xF0D2) is 100.0%.
A value in the range 0xFFF0 to 0xFFFF indicates data is unavailable.
0xFFF0: The input value is not available
0xFFF1: The EEPROM checksum indicates the EEPROM is corrupt
0xFFF3: The input value is currently unavailable.
0xFFF4: The input span value is too close to the (saved) input zero value
0xFFF5: The input zero value is too close to the (saved) input span value

0xFFF7: The input value is not available
0xFFF8: The output has been written to but has not changed yet.
0xFFFD: Low burnout for an output that is linked to an input with invalid data
0xFFFE: Channel has timed out and data is no longer valid
0xFFFF: Thermocouple or RTD burnout of an input, or High burnout for an output that is linked to an input with invalid data

The Age value is a value in seconds or minutes (see 6.13) since the reading was taken, up to a maximum of 255.
The LQI value is the signal strength between 0 and 255. For a wireless device, a value below 30 is considered marginal. For a local Isoslice unit, 255 indicates the Isoslice is responding normally, or 0 if the Isoslice is not responding.

If the device type is 0x98, then extra information is available about the IWT transmitter in the 16-bit registers of parameters 2 to 8:

P1 Scaled data 3869 to 61650
P2 Raw 16-bit data
P3 Span scaling value
P4 Zero scaling value
P5 Serial number most significant 16 bits
P6 Serial number least significant 16 bits
P7 High byte is Update Rate
The low byte is IWT Device Type
P8 Number of transmissions * 1024

For other IWT transmitters, P5 to P8 are available if bit 4 in the device type is set

P7 Update rate	Time (sec)	P7 Update rate	Time (sec)
0	10	4	120
1	20	5	600
2	30	6	1
3	60	7	5

P7 IWT Device Type Codes

0	0 to 100 %	27	0 to 150 psi g	56	0 to 10 V
1	0 to 50 mbar g	28	0 to 300 psi g	57	1 to 5 V
		29	0 to 750 psi g	58	0 to 1000 mV
2	0 to 100 mbar g	30	0 to 1500 psi g	59	0 to 5 V
3	0 to 250 mbar g	31	0 to 3600 psi g	60	0 to 24 V
4	0 to 500 mbar g	32	0 to 5800 psi g	61	0 to 200 mV ac
5	0 to 750 mbar g	33	0 to 1 psi g	62	0 to 50 mV ac
6	0 to 1000 mbar g	34	0 to 2 psi g	63	0 to 330 mV ac
7	0 to 500 mbar abs	35	0 to 5 psi g	64	0 to 500 mV ac
8	0 to 750 mbar abs	36	0 to 8 psi g	65	4 to 20 mA sink
9	0 to 1000 mbar	37	0 to 10 psi g	66	0 to 20 mA sink
abs		38	0 to 15 psi g	67	0 to 10 mA sink
10	0 to 1 Bar g	39	0 to 5 psi Abs	68	0 to 27V
11	-1 to +24 Bar g	40	0 to 10 psi Abs	69	undefined 1 scaled input
12	0 to 6 Bar g	41	0 to 15 psi Abs	70	1 digital input
13	-1 to +9 Bar g	42	-40 to 80 °C	71	2 digital inputs
14	0 to 10 Bar g	43	-40 to 120 °C	72	4 digital inputs
15	0 to 16 Bar g	44	0 to 100 %RH	73	1 32-bit pulse inputs
16	0 to 25 Bar g	45	0 to 500°C TyK	74	2 32-bit pulse inputs
17	0 to 40 Bar g	46	0 to 1200°C TyK	75	-40 to 120 °C, 0 to 100 %RH
18	0 to 100 Bar g	47	0 to 500°C TyJ	76-89	undefined 2 scaled inputs
19	0 to 250 Bar g	48	0 to 1200°C TyJ	90	Horizontal Tilt Sensor
20	0 to 400 Bar g	49	-50 to 200°C PT100	91	Vertical Tilt Sensor
21	0 to 15 psi g	50	-200 to 800°C PT100	92	Horizontal, Vertical Tilt
22	0 to 30 psi g	51	-100 to 400°C PT100	Sensor	
23	-14.5 to +150 psi g	52	0 to 160 Bar g	93	4 scaled -40 to 120 °C
24	0 to 75 psi g	53	4 to 20 mA	94-109	undefined 4 scaled inputs
25	0 to 100 psi g	54	0 to 20 mA	110-127	undefined 1 scaled input
26	-14.5 to +350 psi g	55	0 to 10mA		

Reading 32-bit float scaled input values, IEEE-754 most significant word first:
Note menu 23. (ENDIAN) can be used to make the number small endian.

Floating-point values are by default written out the most significant word first (see 6.18). The floating-point value is the product of the input value scaled with the scaling values, so it is the same as the value shown on the display.

So, for example if for channel 1, parameter 1:
Span point is 150 (0x0096) read from register 43329
Zero point is –20 (0xFFEC) read from register 44353
16-bit integer is 13398 (0x3456) read from register 40001

The value returned from register 41281 and 41282 is calculated by the IWR-Port:
{((13398 – 3869) / 57781) x (150 - -20)} + -20 = 8.0357
The value read from register 41281 is 0x4100 and 41282 is 0x922B
Most significant word is first so 0x4100922B converts to 8.0357

9.2 Reading Scaling and Other Values

The values used to scale the data values (shown on the display and the 32-bit float registers) can be read. They are signed integers.

0x0000 is 0
0x7FFF is 32767
0xFFFF is -1
0x8000 is -32768

To work out a value in the range 0x8000 to 0xFFFF (for example 0xFFEC)
Subtract 0xFFEC from 0x10000 = 0x14
Convert to decimal and change the sign = -20

Reading 16-bit Span Point Scaling Values:

To calculate the 16-bit span point register offset please refer to the IWR-Port Modbus register table (128 channel, 8 parameters).

Convert the resulting signed integers as shown above.

Reading 16-bit Zero Scaling Point Values:

To calculate the 16-bit zero-point registers offset please refer to the IWR-Port Modbus register table (128 channel, 8 parameters).

Convert the resulting signed integers as shown above.

Reading 16-bit Output Link Values:

To calculate the 16-bit output link registers offset please refer to the IWR-Port Modbus register table (128 channel, 8 parameters).

For outputs on the system, the associated register will have a link value that the output represents. This is best illustrated with an example:

Channel 1 is the IWR-Port with 1 analog output, parameter 1.
Channel 2 is an Isoslice-2 with 8 analog inputs, parameters 1 to 8.
Channel 3 is an Isoslice-8 with 4 analog outputs, parameters 1 to 4.

Read register 45377 to find out what the IWR-Port output represents when the IWR-Port is running. If its link value is 0x0000 it is referencing itself, so its output is under Modbus control. If the link value is 0x0008 it represents the value of parameter 1 of the Isoslice-2 on channel 2, it will follow whatever input 1 on that Isoslice-2 is.

Read register 45393 to find out what the first analog output (parameter 1) of the Isoslice-8 on channel 3 represents. If its link value is 0x0010 it is referencing itself, so its output is under Modbus control. If the link value is 0x0009 it represents the value of parameter 2 of the Isoslice-2 on channel 2, it will follow whatever input 2 on that Isoslice-2 is.

The parameter being followed is the bottom 3 bits of the link value (bits 2,1,0). The channel being followed is always bits 9,8,7,6,5,4,3.

So, if the value read is 572 in decimal, in hex that converts to 0x023C.
0x023C = 0000 0010 0011 1100
Bottom 3 bits are 100 = 4 which is parameter 5 (because 0 to 7 represents parameters 1 to 8

Bits 9:3 are 100 0111 = 0x47 = 71 which is channel 72 (because 0 to 127 represents channels 1 to 128)

So, an output that is linked to decimal value 572 would be following channel 72, parameter 5.

Reading 16-bit Device Types

To calculate the 16-bit Device Type registers offset please refer to the IWR-Port Modbus register table (128 channel, 8 parameters).

The device type is a value between 0x00 and 0xFF, used to indicate which channels are valid, how many inputs and outputs they have, whether the inputs or outputs are analog or digital, and whether the channel is local to the IWR-Port on the IWR-Port bus, or remote, with values updated wirelessly

If the device type is 0xFF, the device has no inputs or outputs or does not exist.

Device type	Bit clear	Bit set
Bit 7	Local bus	Remote
Bit 6	Analogue	Digital
Bit 5	Input	Output
Bit 4	Standard device	IWT device
Bit 3	Autoscale not available	Autoscale available
Bit 2	Normal	Pulse Counter
	Bit 0 clear	Bit 0 Set
Bit 1 Clear	1 parameter	2 parameters
Bit 1 Set	4 parameters	8 parameters

IWR-Port	with 1 output	0x20	
Isoslice-1	2 universal analogue inputs		0x01
Isoslice-2	8 HL analogue inputs		0x03
Isoslice-3	4 RTD analogue inputs		0x02
Isoslice-4	4 TC analogue inputs		0x02
Isoslice-5	8 digital inputs		0x43
Isoslice-6	4 digital outputs		0x62
Isoslice-7	2 frequency inputs or 1 pulse		0x01
Isoslice-8	4 analogue outputs		0x22
Isoslice-9	4 AC analogue inputs		0x02
IWPT, IWTT etc	1 analogue input, scaling available		0x98
IWDigT	1 digital input	0xD0	
*new	1 analogue input, scaling not available	0x90	
*new	2 analogue inputs, scaling available		0x99
*new	2 analogue inputs, scaling not available	0x91	
*new	2 digital inputs		0xD1
*new	4 digital inputs		0xD2
*new	4 analog inputs, scaling available	0x9A	
*new	4 analog inputs, scaling not available		0x92
*new	1 32-bit pulse input	0x95	
*new	2 32-bit pulse inputs	0x96	

9.3 Writing Output Values

Some registers can be written using function code 06. These are

- 16-bit data values of analog or digital outputs
- 16-bit span point scaling values if they are unlocked (see below)
- 16-bit zero-point scaling values if they are unlocked (see below)

- 16-bit output link values if they are unlocked (see below)
- 16-bit burnout level values if they are unlocked (see below)
- 16-bit burnout timeout values if they are unlocked (see below)

Multiple writes are also possible, using function code 0x10. A maximum of 8 registers can be written in one command string.

Writing to register 48000 to unlock scaling and link table registers

Write 0x0000 to register 48000 to gain write access to the span and zero scaling values, link table. Write 0x0001 to lock them again, as they are at power-up.

Writing 16-bit Data Values:

To calculate the 16-bit unsigned integer register offset please refer to the IWR-Port Modbus register table (128 channel, 8 parameters).

The IWR-Port output and Isoslice units that have outputs can have values written to them via Modbus, provided they have been set up to allow this (see section 6.5).

An isoslice unit with a digital output can have a digital value written to it.
A digital output value is 0x0000 = off, 0x0001 = on.

For analog outputs, 16-bit data values are written as unsigned integers representing a number between –6.7% and 106.7%. 100% and 0% correspond to the output span and zero points learned at calibration.

Output value = (%Value x 577.81) + 3869

e.g.	0%	3869d	0x0F1D
	100%	61650d	0xF0D2
	50%	32759d	0x7FF7

Writing 16-bit Span Point Scaling Values:

To calculate the 16-bit span point register offset please refer to the IWR-Port Modbus register table (128 channel, 8 parameters).

Scaling values are written as unsigned integers.

They will only be changed by the IWR-Port if the Scaling values are unlocked, by first writing 0x0000 to register 48000

The scaling value must fall in the range of –999 to 9999

For positive numbers convert to hexadecimal
e.g. 1000 converts to 0x03E8

For negative numbers change the sign and convert to hexadecimal then subtract from 0x10000
e.g. –50 becomes 50 which converts to 0x0032
0x10000 – 0x0032 = 0xFFCE

Writing 16-bit Zero Point Scaling Values:

To calculate the 16 bit zero-point Modbus registers offset please refer to the IWR-Port Modbus register table (128 channel, 8 parameters).

Conversion is carried out as described in the section above.

Writing 16-bit Output Link Values

To calculate the 16-bit output link registers offset please refer to the IWR-Port Modbus register table (128 channel, 8 parameters).

The link values are written as unsigned integers. For outputs on the system, the associated registers will have a link value that the output represents.

These values can be changed by writing to the associated Modbus register.

They will only be changed by the IWR-Port if the Link values are unlocked, by first writing 0x0000 to register 48000
This is best illustrated with an example.

Channel 1 is the IWR-Port with 1 analog output, parameter 1.
Channel 2 is an Isoslice-2 with 8 analog inputs, parameters 1 to 8.
Channel 3 is an Isoslice-8 with 4 analog outputs, parameters 1 to 4.

Read register 45377 to find out what the IWR-Port output represents when the IWR-Port is running. If its link value is 0x0000 it is referencing itself, so its output is under Modbus control.
To change it to represent the value of parameter 1 of the Isoslice-2 on channel 2 change this link value to 0x0008 by writing this value to register 45377.

Read register 45393 to find out what the first analog output (parameter 1) of the Isoslice-8 on channel 3 represents. If its link value is 0x0010 it is referencing itself, so its output is under Modbus control.
To change it to represent the value of parameter 2 of the Isoslice-2 on channel 2. Change this link value to 0x0009 by writing this value to register 45393.

The parameter being followed is the bottom 3 bits of the link value (bits 2,1,0). The channel being followed is always bits 9,8,7,6,5,4,3.

If an output needs to follow channel 63, parameter 2:

Link value = ((Channel –1) * 8) + (Parameter – 1)
= ((63 – 1) * 8) + (2 – 1) = (62*8) + 1 = 497

So, an output that should be following channel 63, parameter 2 should have decimal value 497 written to its link register.

The bottom 3 bits for parameter 2 is 001 (which is the binary for 2 - 1 because 0 to 7 represents parameters 1 to 8).

The next 7 bits for channel 63 are 011 1110 (which is the binary for 63 - 1, because 0 to 127 represents channels 1 to 128).

So, the final number is 011 1110 001 = 01 1111 0001 = 0x1F1 = 497

Writing Burnout Level Bits

To calculate the 16-bit burnout level registers offset please refer to the IWR-Port Modbus register table (128 channel, 8 parameters).

Each channel has an 8-bit number with each bit representing the HI or LO selection for each parameter. Bit 7 is parameter 8, Bit 0 is parameter 1.

For example: to program the burnout bits for channel 2 like this:

Parameter 1 is LO, Parameter 2 is HI, Parameter 3 is LO, Parameter 4,5,6,7, and 8 are HI.

This is 1111 1010 in binary.
Which is 0x00FA
Write the value 0x00FA to register 46530 for channel 2.

They will only be changed by the IWR-Port if the Link values are unlocked, by first writing 0x0000 to register 48000

Writing Burnout Timeout Values

To calculate the 16-bit burnout timeout registers offset please refer to the IWR-Port Modbus register table (128 channel, 8 parameters).

Each channel can be programmed with an 8-bit number representing the timeout time for that channel to automatically change its values to 0xFFFE if the age reaches this value.

For example, to program the timeout for channel 2 to be 16 seconds:
16 seconds is 0x0010 in hexadecimal
Therefore, write 0x0010 to register 46658.

They will only be changed by the IWR-Port if the Link values are unlocked, by first writing 0x0000 to register 48000

10. INSTALLATION

The IWR-Port's input and output circuits are classed as Separated Extra Low Voltage (SELV). This means that they must not be externally connected to voltages exceeding 30 V ac or 60 V dc, nor do they generate voltages above these limits internally. Where a higher voltage input is required a specially designed DIVIDER unit can be used to condition the input signal before connection to the process input terminals.

The IWR-Port unit clips directly onto the 'Top Hat' (TS35) symmetrical DIN rail. Ideally, the mounting orientation should be vertical. Good airflow around the unit will maximize the reliability of the instrument.

The use of bootlace ferrules is recommended for wiring terminations.

Do not exceed terminal torque rating of 0.4 Nm – use an appropriate screwdriver. The unit can be removed from the DIN rail by sliding a small screwdriver into the slot at the rear of the enclosure on the lower face and gently levering the metal clip, whilst lifting the unit from the rail.

11. TROUBLESHOOTING

The IWR-Port has some built-in self-diagnostic functions. Errors encountered will be displayed on the screen.

E 1 The input value is not available
ERR1 The radio module did not reset correctly. Switch power off for 10 sec.
ERR2 Eeprom Error: Stored data has been corrupted. Push and release both buttons then recalibrate the output options and values.
ERR3 Link Table Error: Stored data has been corrupted. Push and release both buttons then reprogram the link table values
ERR4 Burnout Table Error: Stored data has been corrupted. Push and release both buttons then reprogram the burnout levels and timeouts
ERR5 Span Table Error: Stored data has been corrupted. Push and release both buttons then reprogram the span values
ERR6 Zero Table Error: Stored data has been corrupted. Push and release both buttons then reprogram the zero values
E 4 The input value is currently unavailable
E 5 The input span value is too close to the (saved) input zero value
E 6 The input zero value is too close to the (saved) input span value
E 8 There is no data available.
E 9 This output has been written to but has not changed yet.
E 14 Low burnout indication on an output
E 15 Timeout Error: An input device value has timed out.
E 16 Burnout Error: Check wiring connections of RTD or TC on an input.
High burnout indication on an output

11.1 Incorrect Reading

- Check that Unit is configured for the correct Sensor
- Check that Input Scaling is as required.
- Check that Linearisation has been set correctly.

11.2 Sensor Failure

- Check that sensor wiring is correct.
- Check Thermocouple polarity.
- Check that all RTD leads are connected to the correct terminals.
- Check that the IWR-Port is configured for the correct sensor.
- Check that the applied voltage is not out of range.
- Check that the applied current is not out of range.
- Check that applied millivoltage is not out of range.

12. CERTIFICATIONS

United States FCC

This equipment has been tested and found to comply with the limits for a Class B device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
Reorient or relocate the receiving antenna
Increase the separation between the equipment and receiver
Connect the equipment into an outlet on a circuit different from that which the receiver is connected
Consult the dealer or an experienced radio/TV technician for help

Warning: Changes or modifications not expressly approved by Cynergy3 could void the user's authority to operate the equipment.

RF Exposure

Contains FCC ID: W70MRF24J40MDME

In this equipment, the antenna supplied is a PCB antenna and an alternative antenna must not be used.

Caution: To satisfy FCC RF Exposure requirements for mobile and base station transmission devices, a separation distance of 20cm or more should be maintained

between the antenna of this device and persons during operation. To ensure compliance operation at closer than this distance is not recommended. The antenna used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. No other antenna may be used with this equipment other than the PCB antenna supplied with this equipment.

Canada (IC) - English

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of the type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

Canada (IC) - French

Le présent appareil est conforme aux CNR d'industrie Canada applicables aux appareils radio exempts de licence. L'explitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioelectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenna d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il fait choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

Europe

The MRF24J40MD/ME wireless module used in this equipment has been tested and is in conformity with the essential requirements and other relevant requirements of the RED Directive 2014/53/EU. That module is in conformity with the following standards and/or other normative documents:

Certification	Standards	Article
Safety	EN60950-1-2006 / A11:2009 / A1:2010 / A12:2011 / A2:2013	(3.1(a))
Health	EN 300 328 V2.1.1 / EN 62479:2010	(3.1(a))
EMC	EN 301 489-1 V2.1.1 EN 301 489-1 V2.2.0 EN 301 489-17 V3.1.1 EN 301 489-17 V3.2.0	(3.1(b))
Radio	EN 300 328 V2.1.1	(3.2)

13. SPECIFICATIONS (@ 25°C)

Operating Temperature		0 to 55 °C
Operating Altitude		Sea Level to 2000m
Humidity		0-90% RH (Relative Humidity)
Power Requirements	DC Supply	16 to 30 V dc
	AC Supply	16 to 32 V ac
Current Consumption		120 mA @ 24 V dc (20mA in & out)
Transmitter Power Supply		22 V to 29 V @ up to 24 mA Dependant on supply voltage and load
Maximum Voltage Output		11.5 V into a minimum of 7Kohm
Maximum Current Output		23.0 mA into a maximum of 1Kohm

The unit has full 2 port Isolation to 1kV between Power Supply and Output.
The unit can also withstand transients of 2.5 kV for 50 µsecs.

Dimensions	114.5 mm x 99 mm x 22.5 mm (H x D x W)
Mounting	DIN Rail TS35
Connections	Screw Clamp with pressure plate
Conductor Size	0.5 to 4.0 mm
Insulation Stripping	12 mm
Maximum Terminal Torque	0.4 Nm
Weight	Approx. 140 g
EMC Emissions	BS EN61326
LVD Standards	EN61010-1
Installation Category (IEC 664)	II
Pollution Degree (EN61010-1)	2
Equipment Class (IEC 536)	II

CONTACT US
EUROPE
+44 (0)1202 897969
c3w_sales@sensata.com
Cynergy3 Components Ltd.
7 Cobham Road,
Ferndown Industrial Estate,
Wimborne, Dorset,
BH21 7PE, United Kingdom
USA
+1 310 561 8092 / +1 866 258 5057
c3w_sales@sensata.com