

Z-PORT
24V AC or DC POWERED
ZIGBEE RECEIVER AND NETWORK CO-ORDINATOR

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.

Industrial Interface

This document may not be reproduced in any way without the prior written permission of the company.

March 2014

CONTENTS

1.	<i>INTRODUCTION</i>	4
1.1	Hardware Features	4
1.2	Isolation Details	4
2.	<i>UNPACKING</i>	4
3.	<i>QUICK START GUIDE</i>	5
3.1	Example 1	5
3.2	Example 2	5
3.3	Example 3	6
4.	<i>CONNECTIONS</i>	7
5.	<i>CONFIGURING THE Z-PORT OUTPUT STAGE</i>	9
6.	<i>CALIBRATING THE Z-PORT</i>	10
6.1	Main menu	10
6.2	Output Span and Output Zero (1. OUT SPAN and 2. OUT ZERO)	11
6.3	Display Scaling Values Adjustment (3.DSV Cc Pp, 4.DS span, 5.DZ zero)	11
6.4	View Display Scaling Values (6.VIEW DSV)	13
6.5	Linking Outputs to other Parameters (7. OUT Cc Pp, 8. LINK Cc Pp)	13
6.6	View Link Table (9.VIEW LINK)	15
6.7	Burnout Control (10.BURNOUT Cc Pp, 11.LEVEL level, 12.TIME time)	15
6.8	View Burnout (13.VIEW BURNOUT)	16
6.9	Serial Protocol (14.MODBUS type)	17
6.10	Slave Address (15.ADDRESS address)	17
6.11	Baud Rate (16.BAUD baud)	17
6.12	Port Settings (17.PORT port setting)	17
6.13	Character Timeout (18.CH TIME)	18
6.14	Display Timer (19.DISPLAY display)	18
6.15	Age Select (20.AGE age)	18
6.16	Led Control (21.LED led)	19
6.17	Restore Defaults (22.DEFAULTS)	19
7.	<i>ISOSLICE BUS</i>	20
8.	<i>SERIAL DATA OPTIONS</i>	21
8.1	RS232	21
8.2	RS485	21
8.3	Ethernet	22
9.	<i>ACCESSING THE Z-PORT DATA</i>	23

9.1	Reading Data Values	23
9.2	Reading Scaling and Other Values	25
9.3	Writing Output Values	30
10.	<i>INSTALLATION</i>	34
11.	<i>TROUBLESHOOTING</i>	35
11.1	Incorrect Reading	35
11.2	Sensor Failure	35
12.	<i>SPECIFICATIONS (@ 25°C)</i>	36

Industrial Interface Ltd, Signal House, Unit 15, Alstone Lane Trading Estate
Alstone Lane, Cheltenham, Gloucestershire, GL51 8HF
Tel: 01242 251794, Fax: 01242 571683
www.industrialinterface.co.uk

1. INTRODUCTION

1.1 Hardware Features

The Z-Port ZigBee wireless receiver and network coordinator module provides a straightforward method of interfacing wireless sensors and transmitters to an RS232, RS485 or Ethernet network. It can also be linked to wired Isoslice input and output units and so accept virtually every type of analogue input signal from millivolts to 40Vdc, mA, thermocouples and RTD's.

Alternatively it can be used as a simple wireless 4-20mA cable replacement system, providing 4-20mA 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 36Vdc or 16 and 32Vac.

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

The system can be expanded through the use of 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 Z-Port can be configured to accept inputs from up to 254 wireless transmitters and present this information, along with signal strength and update time to either RS232/485 or Ethernet communications port.

1.2 Isolation Details

The Z-Port has full 3 port isolation of 1000V between the Output Stage and Power Supply for functional reasons.

2. UNPACKING

The instrument should be carefully inspected for signs of damage which 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. QUICK START GUIDE

There are a number of different ways the Z-Port can be used, here we show QUICK START examples of three different systems.

3.1 Example 1

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

The Z-Head transmitters are configured to be channels 2 to 9.

Refer to the Z-Head installation instructions for details.

Connect up 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 can be changed from the default 0-100% by following the procedure in section 6.3. For each Z-Head channel, parameter 1 will be the thermocouple temperature and parameter 2 will be the ambient cjc 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 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.

3.2 Example 2

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

The Z-Press transmitter is configured to be channel 2.

Refer to the Z-Press installation instructions for details.

Open the Z-Port case and slide out the PCB (see section 4)

Set up the output switch to mA (see section 5)

For 4-20mA 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 up 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 can be changed from the default 0-100% by following the procedure in section 6.3

The Z-Port output is channel 1 parameter 1.

The parameter that it represents must be changed to channel 2 parameter 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 Z-Port receives temperature and humidity values from 2 Z-Heads and outputs these as 4-20mA outputs using an Isoslice-8 analogue output card as well as providing them as MODBUS RTU values over an RS485 network

The Z-Head transmitters are configured to be channels 2 and 3.

Refer to the Z-Head installation instructions for details.

The Isoslice-8 unit is configured as channel 4.

Refer to the Isoslice-8 installation instructions for details.

Fit the Isoslice-8 and Z-Port units to the din rail.

Connect up power and RS485 cable to the Z-Port then switch on (see section 4)

Access the main menu by pushing and holding both buttons until OK is displayed.

Display scaling values 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 Z-Head values of channels 2 and 3 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 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.

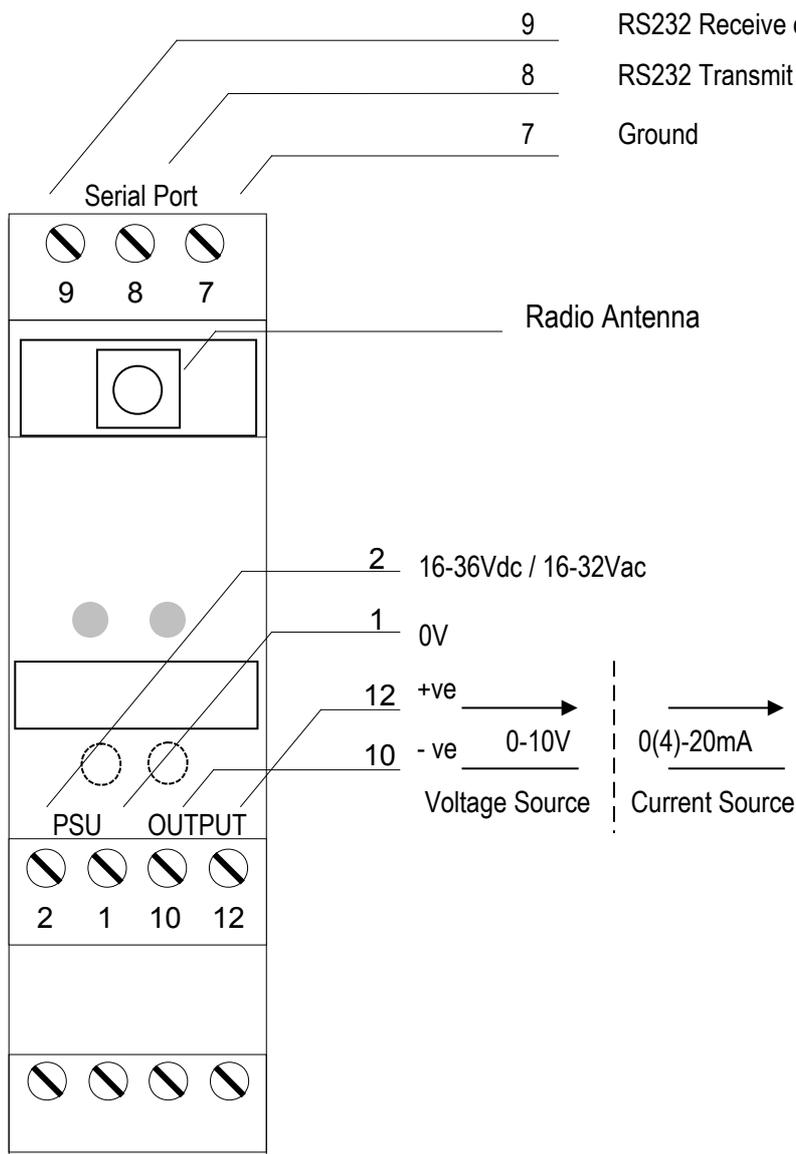
Exit the main menu by holding both buttons until OK is displayed.

Calculate the registers to read by referring to section 9.1.

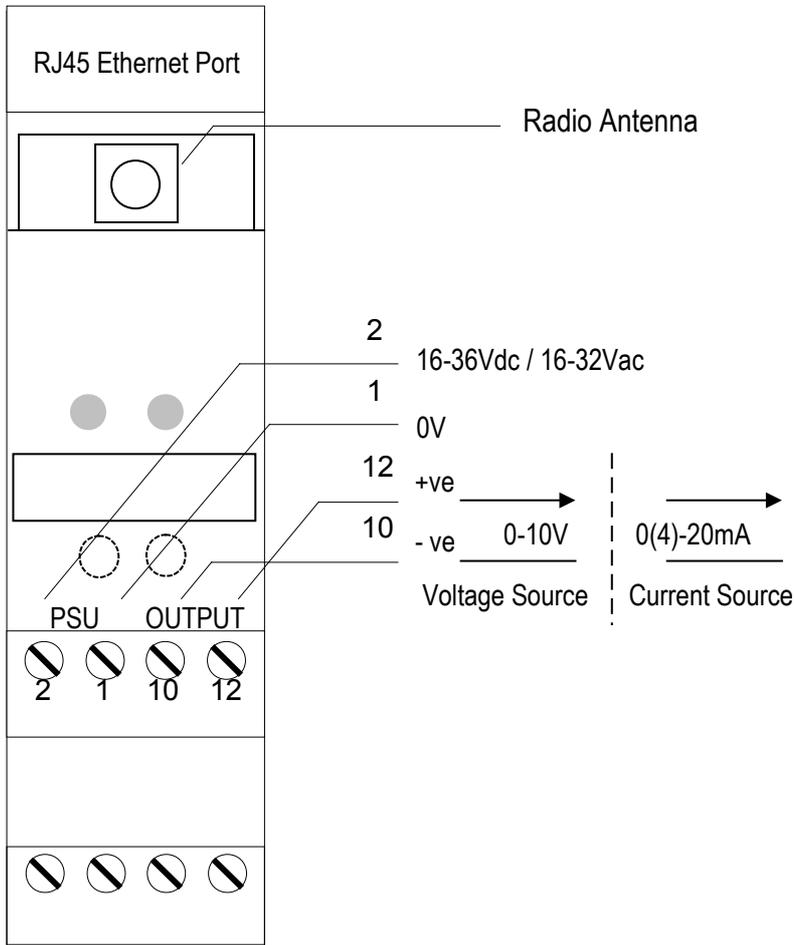
4. CONNECTIONS

The Z-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 analogue outputs are on the bottom rows.

The diagram below shows how to connect to a Z-Port with an analogue output and a serial port, either RS232 or RS485.



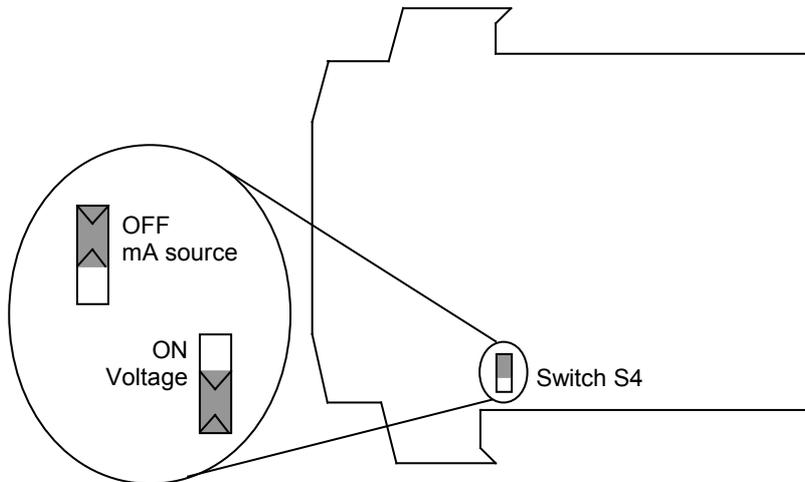
The diagram below shows how to connect to a Z-Port with an analogue output and an Ethernet port.



5. CONFIGURING THE Z-PORT OUTPUT STAGE

If an analogue output is fitted the output type is selected with Switch S4.
 The analogue output of the Z-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

6. CALIBRATING THE Z-PORT

When the unit is shipped the Z-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 4-20mA 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 Z-Port receives data from a Z-Head that counts pulses, it has to scroll the value on the display, because the display only has 4 digits (to show 0 to 65535). This happens automatically when the Z-Port recognises the data is from a Z-Head pulse counter. Values from Z-Heads 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)	12. TIME time	(sec 6.7)
2. OUT ZERO	(sec 6.2)	13. VIEW BURNOUT	(sec 6.8)
3. DSV Cc Pp	(sec 6.3)	14. MODBUS type	(sec 6.9)
4. DS span	(sec 6.3)	15. ADDRESS address	(sec 6.10)
5. DS zero	(sec 6.3)	16. BAUD baudrate	(sec 6.11)
6. VIEW DSV	(sec 6.4)	17. PORT port setting	(sec 6.12)
7. OUT Cc Pp	(sec 6.5)	18. CH TIME	(sec 6.13)
8. LINK Cc Pp	(sec 6.5)	19. DISPLAY time	(sec 6.14)
9. VIEW LINK	(sec 6.6)	20. AGE age	(sec 6.15)
10. BURNOUT Cc Pp	(sec 6.7)	21. LED led	(sec 6.16)
11. LEVEL level	(sec 6.7)	22. DEFAULTS	(sec 6.17)

Note that menu options 1 and 2 are only available if an analogue 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 Z-Port to learn the output span and zero values if there is an output fitted to the Z-Port. Default output values will make the DAC output approximately 4 to 20mA or 2 to 10V for the voltage option.

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

For channels with digital outputs, the display scaling values can be used to configure setpoints if the digital output is linked to follow an analogue input. The setpoints are compared to the analogue 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 analogue value it is following is) above the on setpoint and off below the off setpoint. For example if 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 on setpoint and off above the off setpoint. For example if 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
01 1	Press and release both buttons together
03 1	Press lower button to choose channel (on left: 1 to 32)
03 2	Press raise button to choose parameter (on right : 1 to 8)
3.DSV C3 P2	Press and release both buttons together
	C3 P2 is channel 3, parameter 2
4.DS 100	Push the raise button once to change menu item
	Display Span value is 100
100	Press and release both buttons together
20	Press raise/lower buttons to adjust display span value
4.DS 20	Press and release both buttons together
	Display Span value is now 20
5.DZ 0	Push the raise button once to change menu item
	Display Zero value is 0
0	Press and release both buttons together
4	Press raise/lower buttons to adjust display zero value
5.DZ 4	Press and release both buttons together
	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 32) and the raise button increases the parameter (1 to 8).

For the channel and parameter 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.

6.4 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.

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

The Z-Port 4-20mA or 0-10V 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 32), the raise button increases the parameter (1 to 8). Once the channel and parameter of an 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 an 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 32), the right button increases the parameter (1 to 8). Once the channel and parameter of the input that the output chosen in 7 is to be linked to has been chosen, exit the sub menu.

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

Analogue outputs can be linked to digital inputs. If an analogue 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 analogue inputs, with programmable setpoints to control at what analogue 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 Z-Port with 1 analogue output, parameter 1.

Channel 2 is an Isoslice-2 with 8 analogue inputs, parameters 1 to 8.

Channel 3 is an Isoslice-8 with 4 analogue outputs, parameters 1 to 4.

To make the Z-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 Z-Port output which needs to be linked
8.LINK C1 P1	Push the raise button once to change menu item This shows the Z-Port output is under Modbus control because it is linked to itself, C1 P1
02 1	Push and release both buttons together Press lower button to choose channel 2 (on left: 1 to 32)
8.LINK C2 P1	Press and release both buttons together Z-Port output is now linked to the Isoslice-2, input 1
7.OUT C1 P1	Push the lower button to change menu item C1 P1 is the Z-Port output.
03 1	We need to select the Isoslice-8 on channel 3 Push and release both buttons together Push left button to select C3, the Isoslice-8, output 1
7.OUT C3 P1	Press and release both buttons together C3 P1 is output 1 of the Isoslice-8 on channel 3
8.LINK C3 P1	Push the raise button once to change menu item This shows the Isoslice-8 output 1 is under Modbus control because it is linked to itself, C3 P1
03 1	Push and release both buttons together We need to link it to the Isoslice-2, Channel 2 Parameter 2
02 1	Push lower button to select channel 2 (on left: 1 to 32)
02 2	Push raise button to select parameter 2 (on right: 1 to 8)
8.LINK C2 P2	Push the raise button once to change menu item Isoslice-8 output 1 is now linked to Isoslice-2 input 2

6.6 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.

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

10.BURNOUT is used to select the channel and parameter of an output for menu 11.LEVEL level (where 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 32), 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 any 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 (23mA or 11.5V for an analogue output, On for a digital output), or a LO burnout value (0mA or 0V for an analogue 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 level and in the sub menu 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 give an indication of 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 Z-Port can be considered too old to be valid. It is possible to set a time limit on each channel that will make the Z-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 time and in the sub menu choose OFF to disable the timeout, or a value between 1 and 255 inclusive.

The default Burnout Timeout for all channels is OFF.

6.8 View Burnout (13.VIEW BURNOUT)

To view the burnout configuration for each channel use 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 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.

6.9 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

6.10 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.

6.11 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)

6.12 Port Settings (17.PORT 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

6.13 Character Timeout (18.CH TIME)

This is the time after the last character was received by the Z-Port before the Z-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 3.64ms.

19200 baud 1.82ms

38400 baud 0.91ms

57600 baud 0.61ms

The default the value is 3.99ms.

If the RS485 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

6.14 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)

6.15 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

6.16 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 perhaps 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

6.17 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.

7. ISOSLICE BUS

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

The Z-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 0xFFFF0, 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 Z-Port the maximum number of isoslice units that can be fitted is 31. This gives up to 249 parameters per Z-Port if 8 input Isoslices are used, if the Z-Port has an output fitted.

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

If scaling data is entered on a Z200T which has an Isoslice bus, it will be local to the display of the Z200T. The same information would need to be entered on the Z-Port as well.

Special versions of the Z-Port allow more than 32 channels at the expense of having less parameters per channel or provide a combination of channels with different numbers of parameters allocated. Modbus addressing depends on the mode since there is a varying amount of LQI and Age values to contend with. Isoslice units with more parameters than are available for the channel selected can be used, but the higher parameter values are unavailable.

Mode 1	8 parameters, 32 channels (default)	32 Age and LQI
Mode 2	4 parameters, 64 channels	64 Age and LQI
Mode 3	2 parameters, 128 channels	128 Age and LQI
Mode 4	1 parameters, 256 channels	256 Age and LQI
Mode 5	8 p, 16 c + 4 p, 32 c	48 Age and LQI
Mode 6	8 p, 16 c + 2 p, 64 c	80 Age and LQI
Mode 7	8 p, 16 c + 1 p, 128 c	144 Age and LQI
Mode 8	8 p, 8 c + 4 p, 16 c + 2 p, 32 c + 1 p, 64 c	120 Age and LQI

8. SERIAL DATA OPTIONS

The Z-Port can be fitted with either an RS232, RS485 or Ethernet port to allow access to the data.

8.1 RS232

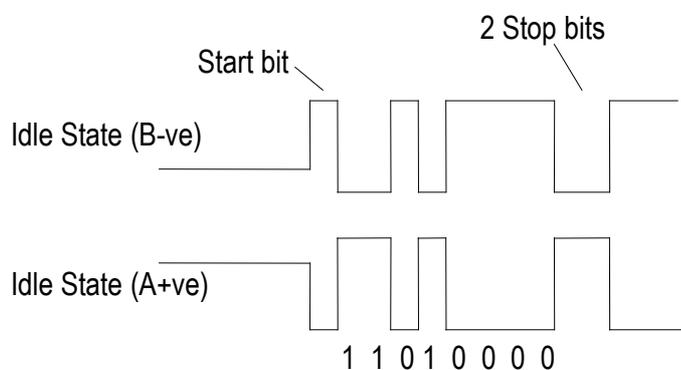
Baud rate, port settings and timeout can be changed using menu options 16,17,18. By default the port settings are 9600 baud, 8 data bits, no parity, 1 stop bit.

8.2 RS485

Baud rate, port settings and timeout can be changed using menu options 16,17,18. By default the port settings are 9600 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 Z-Port can be identified by the signals present on them whilst there is activity on the RS485 bus:



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

8.3 Ethernet

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

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

The Ethernet port can be configured using the following software, available to download from the Lantronix website.

Device Installer v4.2 available to download at
<http://www.lantronix.com/device-networking/utilities-tools/device-installer.html>

By default :

- The ip address is obtained automatically, (or it might be set to 192.168.0.81)
- 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.

The ethernet port converts ethernet data packets to serial data and vice versa.

Note that the ip address will be obtained automatically by default. It will almost always be necessary to allocate a static ip address to the Z-Port. This is achieved using the above software.

If connected directly to a PC, the Z-Port requires a crossover cable and the PC will need to be allocated a static ip address.

9. ACCESSING THE Z-PORT DATA

The Z-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 319	40001 to 40320	16 bit unsigned integer data	Yes
320 to 831	40321 to 40832	32 bit IEE-754 float	No
832 to 1087	40833 to 41088	16 bit signed integer span	If unlocked
1088 to 1343	41089 to 41344	16 bit signed integer zero	If unlocked
1344 to 1599	41345 to 41600	16 bit unsigned link value	If unlocked
1600 to 1631	41601 to 41632	Device type code	No
1632 to 1663	41633 to 41664	Burnout Level Bits	If unlocked
1664 to 1695	41665 to 41696	Burnout Timeout	If unlocked
1999	42000	Registers locked/unlocked	Yes

9.1 Reading Data Values

The Z-Port is channel 1. Other units are channels 2 to 32. 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 Z-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:

16 bit Data Values	Offset is : (Channel – 1) x 10 + Parameter – 1	Register Offset + 40001
Channel 1	0 to 9	40001 to 40010
Channel 2	10 to 19	40011 to 40020
up to Channel 32	310 to 319	40311 to 40320

Valid data values are between 0x0000 and 0xFFEF.

Data values are calculated using the following formula,

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

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 0xFFFF0 to 0xFFFFF indicates data is unavailable.

0xFFFF0, 0xFFFF7: The input value is not available

0xFFFF1 : The eeprom checksum indicates the eeprom is corrupt

0xFFFF3 : The input value is currently unavailable

0xFFFF4 : The input span value is too close to the (saved) input zero value

0xFFFF5 : The input zero value is too close to the (saved) input span value

0xFFFFD : Low burnout for an output that is linked to an input with invalid data

0xFFFFE : Channel has timed out and data is no longer valid

0xFFFFF : 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.

Reading 32 bit float scaled input values, IEEE-754 most significant word first:

To calculate the 32 bit float scaled input value register offset:

Floating Point Data Values	Offset is : (Channel – 1) x 16 + (Parameter – 1) x 2 + 320	Register Offset + 40001
Channel 1	320 to 335	40321 to 40336
Channel 2	336 to 351	40337 to 40352
up to Channel 32	816 to 831	40817 to 40832

Floating point values are written out most significant word first. 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 40833

Zero point is –20 (0xFFEC) read from register 41089

16 bit integer is 13398 (0x3456) read from register 40001

The value returned from register 40257 and 40258 is calculated by the Z-Port:

$$\{((13398 - 3869) / 57781) \times (150 - -20)\} + -20 = 8.0357$$

The value read from register 40257 is 0x4100 and 40258 is 0x922B
 Most significant word is first so 0x4100922B converts to 8.0357

A handy tool for converting floating point values can be found here:
<http://babbage.cs.qc.cuny.edu/IEEE-754.old/32bit.html>

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

Span Scaling	Offset is : (Channel - 1) x 8 + Parameter - 1 + 832	Register Offset + 40001
Channel 1	832 to 839	40833 to 40840
Channel 2	840 to 847	40841 to 40848
up to		
Channel 32	1080 to 1087	41081 to 41088

Convert the resulting signed integers as shown above.

Reading 16 bit Zero Scaling Point Values:

To calculate the 16 bit zero point registers offset

Zero Scaling	Offset is : (Channel – 1) x 8 + Parameter – 1 + 1088	Register Offset + 40001
Channel 1	1088 to 1095	41089 to 41096
Channel 2	1096 to 1103	41097 to 41104
up to Channel 32	1336 to 1343	41337 to 41344

Convert the resulting signed integers as shown above.

Reading 16 bit Output Link Values:

To calculate the 16 bit output link registers offset

Output Link	Offset is : (Channel – 1) x 8 + Parameter – 1 + 1344	Register Offset + 40001
Channel 1	1344 to 1351	41345 to 41352
Channel 2	1352 to 1359	41353 to 41360
up to Channel 32	1592 to 1599	41593 to 41600

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 Z-Port with 1 analogue output, parameter 1.

Channel 2 is an Isoslice-2 with 8 analogue inputs, parameters 1 to 8.

Channel 3 is an Isoslice-8 with 4 analogue outputs, parameters 1 to 4.

Read register 41345 to find out what the Z-Port output represents when the Z-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.

Read register 41361 to find out what the first analogue 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.

Reading 16 bit Device Types

To calculate the 16 bit Device Type registers offset:

Output Link	Offset is : (Channel – 1) + 1600	Register Offset + 40001
Channel 1	1600	41601
Channel 2	1601	41602
up to Channel 32	1631	41632

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 analogue or digital, and whether the channel is local to the Z-Port on the Z-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

If bit 4 is clear:

Device type	Bit clear	Bit set
Bit 4	Bit 4 is clear	
Bit 7	Local bus	Remote
Bit 6	Analogue	Digital
Bit 5	Input	Output
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

If bit 4 is set, inputs and outputs are analogue:

Device type	Bit clear	Bit set
Bit 4	Bit 4 is set	
Bit 7	Local bus	Remote
	Bit 0 clear	Bit 0 Set
Bit 1 Clear	1 input, 1 output	1 input, 2 outputs
Bit 1 Set	2 inputs, 1 output	2 inputs, 2 outputs

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	1 analogue input and output	0x10
Isoslice-8	4 analogue outputs	0x22
Isoslice-9	4 AC analogue inputs	0x02
Z200T with 1 input		0x00
Z200T with 2 inputs		0x01
Z200T with 1 input, 1 output		0x10
Z200T with 2 inputs, 1 output		0x12
Z200T or Z-Port with no I/O		0xFF (effectively does not exist)
Z200T or Z-Port with 1 output		0x20

When parameters are allocated, the parameter number starts with inputs then outputs, eg 1 input, 1 output: parameter 1 is the input, parameter 2 is the output.

Reading Burnout Level Bits

To calculate the 16 bit burnout level registers offset

Burnout Level	Offset is : (Channel – 1) + 1632	Register Offset + 40001
Channel 1	1632	41633
Channel 2	1633	41634
up to Channel 32	1663	41664

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 find out how channel 2 is configured read register 41634.

Result is 250 which is 0x00FA which is 1111 1010 in binary.

Parameter 1 is bit 0 which is 0 so Parameter 1 is LO

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

Reading Burnout Timeout Values

To calculate the 16 bit burnout timeout registers offset

Burnout Timeout	Offset is : (Channel - 1) + 1664	Register Offset + 40001
Channel 1	1664	41665
Channel 2	1665	41666
up to Channel 32	1695	41696

Each channel has 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 read the timeout for channel 2 read register 41666.

If result is 16, channel 2 will have its values changed to timeout 0xFFFE if the data it has is 16 seconds old or more.

9.3 Writing Output Values

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

- 16 bit data values of analogue 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 42000 to unlock scaling and link table registers

Write 0x0000 to register 42000 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:

16 bit Data Values	Offset is : (Channel – 1) x 10 + Parameter – 1	Register Offset + 40001
Channel 1	0 to 9	40001 to 40010
Channel 2 up to Channel 32	10 to 19 310 to 319	40011 to 40020 40311 to 40320

The Z-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 analogue 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 learnt 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:

Span Scaling	Offset is : (Channel – 1) x 8 + Parameter – 1 + 832	Register Offset + 40001
Channel 1	832 to 839	40833 to 40840
Channel 2	840 to 847	40841 to 40848
up to Channel 32	1080 to 1087	41081 to 41088

Scaling values are written as unsigned integers.

They will only be changed by the Z-Port if the Scaling values are unlocked, by first writing 0x0000 to register 42000

The scaling value must fall in the range –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

Zero Scaling	Offset is : (Channel – 1) x 8 + Parameter – 1 + 1088	Register Offset + 40001
Channel 1	1088 to 1095	41089 to 41096
Channel 2	1096 to 1103	41097 to 41104
up to Channel 32	1336 to 1343	41337 to 41344

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

Output Link	Offset is : (Channel – 1) x 8 + Parameter – 1 + 1344	Register Offset + 40001
Channel 1	1344 to 1351	41345 to 41352
Channel 2	1352 to 1359	41353 to 41360
Up to Channel 32	1592 to 1599	41593 to 41600

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 Z-Port if the Link values are unlocked, by first writing 0x0000 to register 42000

This is best illustrated with an example.

Channel 1 is the Z-Port with 1 analogue output, parameter 1.

Channel 2 is an Isoslice-2 with 8 analogue inputs, parameters 1 to 8.

Channel 3 is an Isoslice-8 with 4 analogue outputs, parameters 1 to 4.

Read register 41345 to find out what the Z-Port output represents when the Z-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 41345.

Read register 41361 to find out what the first analogue 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 41361.

Writing Burnout Level Bits

To calculate the 16 bit burnout level registers offset

Burnout Level	Offset is : (Channel – 1) + 1632	Register Offset + 40001
Channel 1	1632	41633
Channel 2	1633	41634
up to Channel 32	1663	41664

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 41634 for channel 2.

Writing Burnout Timeout Values

To calculate the 16 bit burnout timeout registers offset

Burnout Timeout	Offset is : (Channel – 1) + 1664	Register Offset + 40001
Channel 1	1664	41665
Channel 2	1665	41666
up to Channel 32	1695	41696

Each channel can be programmed with an 8 bit number representing the timeout time for that channel to automatically change its values to 0xFFFFE 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 41666.

10. INSTALLATION

The Z-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 30V ac or 60V 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 prior to connection to the process input terminals.

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

The use of bootlace ferrules is recommended on 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 Z-Port has some built in self diagnostic functions. Errors encountered will be displayed on screen.

E 1	The input value is not available
ERR1	The radio module did not reset correctly. Switch power off for 10 seconds.
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
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 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 correct terminals.
- Check that the Z-Port is configured for correct sensor.
- Check that applied voltage is not out of range.
- Check that applied current is not out of range.
- Check that applied millivoltage is not out of range.

12. SPECIFICATIONS (@ 25°C)

Operating Temperature	0 to 55 °C
Operating Altitude	Sea Level to 2000m
Humidity	0-90% RH
Power Requirements	DC Supply 16 to 30Vdc
	AC Supply 16 to 32Vac
Current Consumption	120 mA @ 24Vdc (20mA in & out)
Transmitter Power Supply	22V to 29V @ up to 24mA
	Dependant on supply voltage and load
Calibration accuracy	±0.05% full scale
Linearity	±0.05% full scale
Temperature Stability	50ppm / °C
Input Impedance:	
Current Input	15 ohms
Voltage Input	1 Mohm
Millivolt Input	Greater Than 10 Mohm
Thermocouple Burn Out Current:	500nA Nominal
Cold junction compensation accuracy	±0.5°C over operating range
Maximum Voltage Output	11.5 V into a minimum of 7Kohm
Maximum Current Output	23.0 mA into a maximum of 1Kohm

Unit has full 3 port Isolation to 1kV between Power Supply, Input and Output.
The unit can also withstand transients of 2.5kV for 50 µsecs.

Dimensions	114.5 mm x 99mm x 22.5mm (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. 140g
EMC Emissions	BS EN61326
LVD Standards	EN61010-1
Installation Category (IEC 664)	II
Pollution Degree (EN61010-1)	2
Equipment Class (IEC 536)	II