Installation Operation & Maintenance Instruction Manual

Connect-TH
Trim and Heel Indication System

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1. General Introduction to the Connect-TH Trim and Heel Display System

The Connect-TH is a purpose developed system intended for the display of Vessel Trim and Heel. In its standard implementation it comprises two main components.

i. A Panel mounted 7" touchscreen display with a standardised screen layout showing both real-time and averaged values for Trim and Heel. The display is from PSM's VPM4355 series of monitoring instruments.
ii. A Bulkhead mounting enclosure which contains two single axis inclinometers to measure trim and heel angles.

The two units communicate via an RS485 data link using Modbus RTU protocol, with the display unit continually requesting data from the inclinometer enclosure and performing the necessary calculations to determine displayed values.

In addition to its integral display the VPM4355 can also output to other systems via a second RS485 serial port. Again, the protocol used is Modbus RTU and the data will be arranged and formatted as detailed later in this Manual.

Additional display points can be added to the system as required. These can either be additional 4355 monitors or larger screens as agreed at contract placement. The VPM4355 also has an Ethernet output and acts as a server to these remote clients.

Finally, the VPM4355 may be supplied as a panel-mount unit or provided in a wall-mount enclosure, with or without an integral AC power supply unit.

For each supply, project specific general assembly drawings and wiring diagrams will be issued appropriate to the actual hardware supplied.

The VPM4355 performs the following functions:

- Data Acquisition – It acts as a master device to Slave inclinometers which it interrogates via an RS485 network using Modbus RTU communication protocol.
- Data Processing – The raw values obtained from the inclinometers are processed using
- data held within the VPM4300's configuration to provide scaled and calculated results.
- Data Display – Using the calculated results the VPM4300 provides a real-time status of Vessel Trim and Heel on its integral screen.
- Data Output – the VPM4300 can present scaled data with content and order in a specific format via a second RS485 port. In this case the VPM4300 acts as a Modbus RTU slave and responds to a request from an external master Device.

2. About This Manual

Incorrect function or damage to associated equipment may occur if the system is not installed and operated in accordance with this manual. The information in this manual may be highlighted by the following headings indicating that special care should be taken when performing these associated actions.

A Note highlights points where particular attention should be paid to the information provided and due consideration made before changing settings.

A Caution indicates actions or procedures if not performed correctly may cause incorrect functionality, loss of information or damage to the equipment.

A Hazard indicates actions or procedures which if not performed correctly may invalidate safety certification or endanger personnel.

3. Applicability of This Manual

This manual is intended to provide general guidance on the installation and operation of the Trim and Heel monitoring system. It should be read in conjunction with the any drawings and supplements which have been issued for specific projects.

For each application the unit must be configured with the parameters appropriate for its intended duty.

The VPM4355 stores configuration data in non-volatile memory and are retained in the event of power failure.

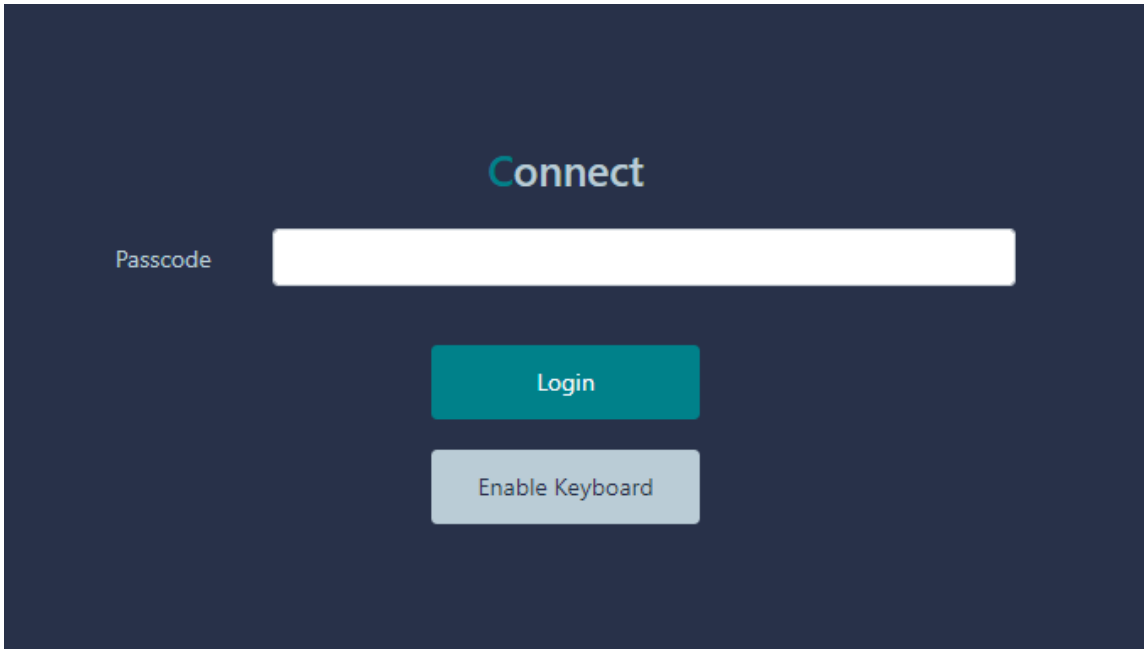
The VPM uses two SD memory cards for the purpose of storing this configuration data. One is the primary card and the second is used as a back-up. For a full explanation of the function of the SD cards refer to Section 11.0 Emergency Restore.

The VPM4355 is factory set to automatically boot up into run mode when power is applied.

The system has two levels of password access as follows:

User	Allows access to normal operation mode - Password **654321**
Service Engineer	Allows editing and updating of configuration data. Password **789654**

Following power up a log in screen will be displayed



The appropriate password should be entered to access the system.

Note the “Enable Keyboard” button will bring up an onscreen keyboard to allow data entry. Alternatively, a standard USB keyboard may be temporarily connected to either of the 2 USB ports located under the removeable cover in the front panel.

This cover should be replaced to preserve the protection rating of the front panel when the USB ports are not in use.

4. Mechanical Installation

4.1. VPM4355 Display

Refer to section 12.0 Drawings for details of the enclosure and panel cut out dimensions.

With respect to Intrinsic Safety the entire system MUST be installed in a designated Safe Area.

The VPM4300 may be panel mounted, wall mounted or may have been specified in a secondary enclosure. Refer to specific project drawings provided for details.

Tools needed for the installation will depend upon the intended location and mounting type but will require either a suitable panel cut out if console mounted, or a means of preparing suitable mounting studs or bolts for bulkhead mounting. Suitable spanners for tightening the selected fixings will be required and all fixing nuts / bolts should be secured using spring or shake-proof washers to prevent loosening in accordance with normal practice.

For units supplied in a secondary wall mount enclosure the supplied mounting brackets provide for different orientations and the unit may be directly mounted without the need for anti-vibration straps. In general, the unit should be located away from extremes of temperature and vibration and in a position where the display is readily viewable.

4.2. Inclinometer Panel

Correct location of the Inclinometer panel is critical to accuracy of measurement. Although the system allows for offsets and corrections to be added in the configuration to accommodate less than ideal installation locations the following are general requirements.

a) The enclosure should ideally be mounted on the Vessel centreline on a vertical bulkhead and mounted on a Port bulkhead, i.e. with the enclosure door opening towards the starboard side. If the enclosure is not on the centreline, then each inclinometer will be measuring a compound angle of both trim and heel and accuracy will be affected.

b) The default condition for the system is that trim by Stern is positive and is based on the expectation that the enclosure will be orientated as described in a) above. If this is not the case this will need to be corrected in the systems configuration as detailed later in this manual. To further explain this, when the enclosure is open, the inclinometer which measures heel angle is mounted on a plate at 90° to the enclosure baseplate. This heel inclinometer should be on the forward side of the enclosure.

c) It is important that the enclosure is mounted to be truly horizontal in both planes, i.e. parallel and perpendicular to the keel based on the Vessel being on an even keel and with no trim. Recognising that this may be difficult in practice where the Vessel is afloat, compensation offsets may be added in the configuration, but a spirit or laser level should be used to check the installation. The top of the mounting enclosure is the reference datum and it is this that should be checked to ensure it is level in both planes.

d) The enclosure must be securely and rigidly mounted to the ships structure and not to a panel which may itself be subject to movement or vibration relative to the hull.

5. Electrical Installation

Refer to Section 12.0 Drawings for details of the connections of both the VPM4355 and the inclinometer panel. Both units require a supply of 24V DC for operation.

5.1. VPM4355 Display

Where the VPM4355 has been supplied in a secondary wall mount enclosure this may incorporate a power supply module meaning an AC supply is required instead.

Where a secondary enclosure is supplied, all internal connections between the plugs on the rear of the VPM4300 Display module and the field terminations are completed during manufacture and so all external connections should be made to the provided terminals. A suitable terminal screwdriver and hand tools for preparation of cable ends will be required.

The base of the secondary enclosure will have a removable gland plate to allow glands to be fitted by the installer suitable for the cabling being used. The gland plate must be removed before drilling to prevent damage to the enclosure internals.

All cabling should be identified with permanent markings in accordance with normal practice.

Hazard: Ensure that where AC power is to be used the power supply to the VPM is isolated at the distribution point before attempting to connect or make any changes to internal wiring of the unit.

Direct connection Plug & Socket or Screw Terminal Connections are provided for:

- RS485 Port 1
- RS485 Port 2
- 24V DC Supply
- AC Power Supply (if applicable)

5.2. Inclinometer Panel

Connection between the VPM4355 display and the inclinometer panel requires a 4-core cable. This cable should be arranged in 2 twisted pairs of conductors.

One pair is used to provide 24V DC power from the VPM4355 to the inclinometer panel, and the second pair for the RS485 data connection.

The cable should have an overall braided screen which must be terminated (grounded) as either enclosure.

Cable should be multistrand type with a minimum size of 0.5mm CSA / 20 AWG.

6. Using The Display

When all external connections are made and confirmed to be in accordance with the referenced wiring diagrams the VPM4300 may be powered up.

Following a power up sequence and internal self-checking of all functions the unit will boot up directly into “Operational Mode” as detailed in section 7.0 of this manual.

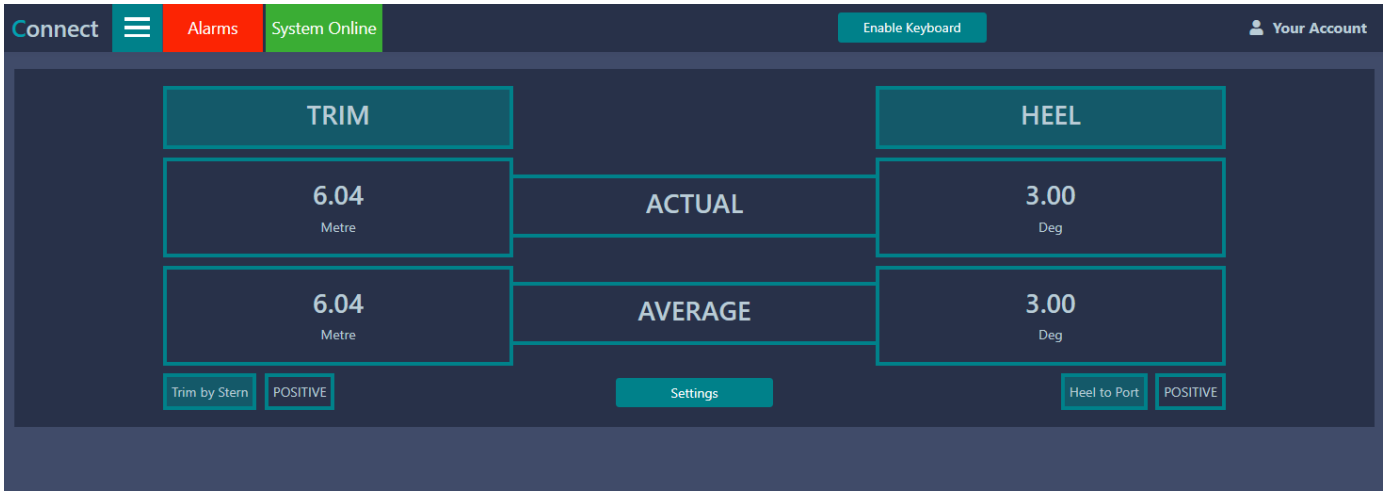
The VPM4300 has an integral 7” colour display which presents the trim and heel status and also provides an indication of any alarm conditions which may arise. The screen presentation is covered in specific detail in the following section “Operational Mode” but in general operation of the unit is fully automatic.

Note: The screen is of the resistive variety, this means that it is pressure responsive, rather than being touch sensitive. Only LIGHT PRESSURE is needed, but it will be found that a blunt plastic stylus will give better results compared to using a finger. Care should be taken to ensure the screen is not damaged by the use of a sharp object.

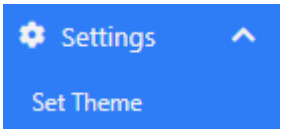
7. Operational Mode

This is the normal running mode for the system. Screen presentation is as follows:

7.1. Night Mode View

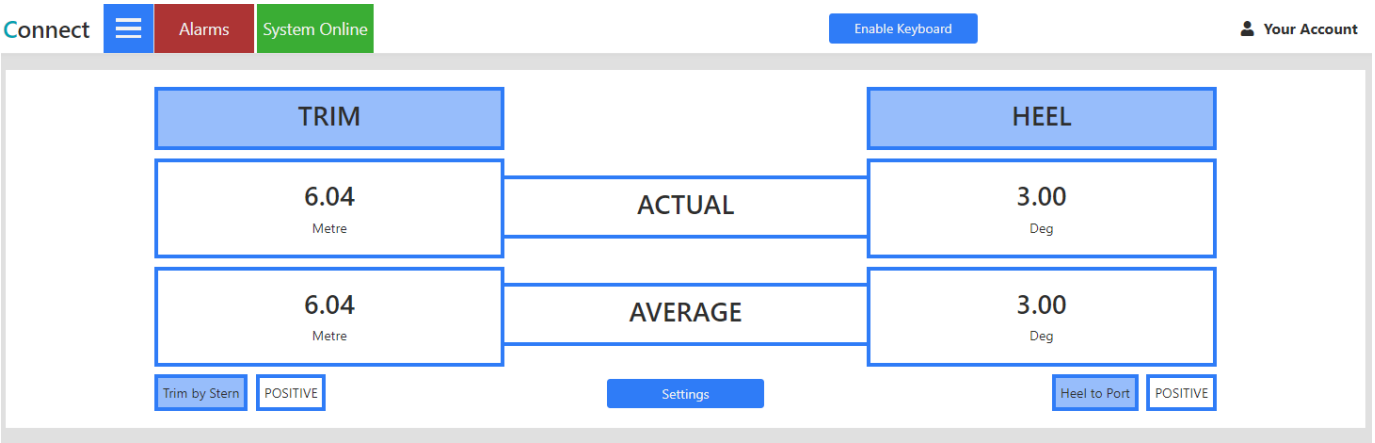


Switching between day or night mode is a menu option

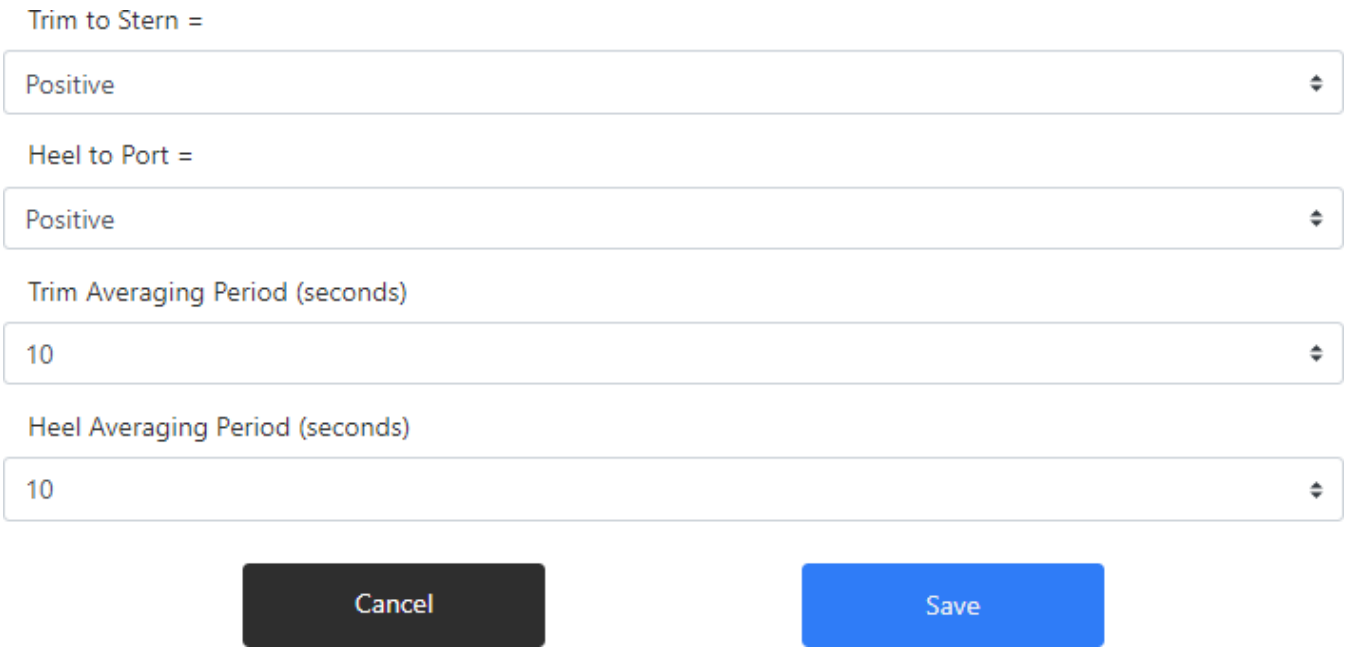


Select Set Theme to open a further page which allows selection of required theme

7.2. Day Mode View



The settings button brings up the following screen



Values for each display option may be selected from a drop-down list.

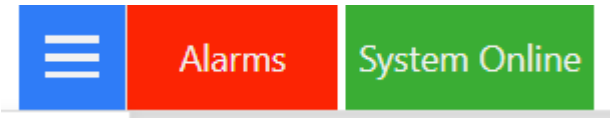
Cancel to discard any changes of Save to store the new values which will immediately be applied, and the display will revert to normal operation.

Trim to Stern – This will select whether trim by Stern is shown as a positive or negative value on the display.

Heel to Port – This will select whether the vessel heeling to port is shown as a positive or negative value on the display.

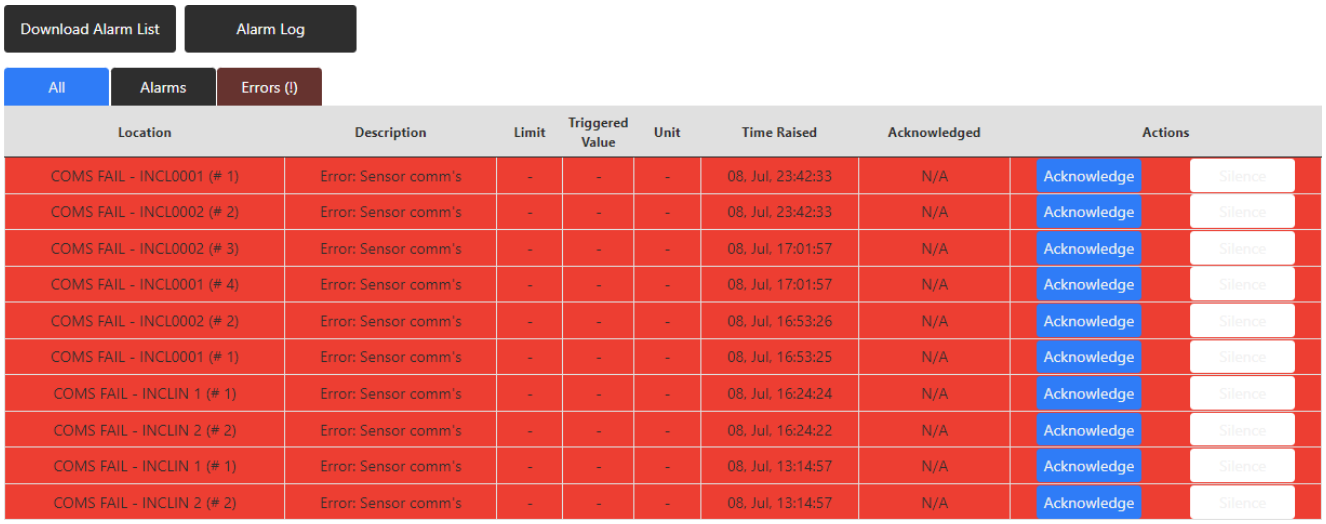
Time averaging – Allows the period in seconds for which the relevant value is averaged before updating, this is a rolling average which will allow filtering of the display for more stability.

7.3. Other Display Screen Options



The Menu button (3 horizontal lines) shows or hides the side menu bar.

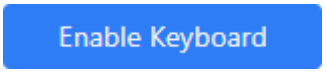
The Alarms button will be steadily illuminated in Red when no alarms are detected. If an alarm occurs the button will flash. In this application alarms are limited to communication errors, indicating that one or more of the Inclinometers is not responding to requests for data. Pressing the alarm button will display a screen similar to the following



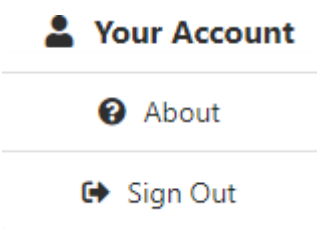
Location	Description	Limit	Triggered Value	Unit	Time Raised	Acknowledged	Actions
COMS FAIL - INCL0001 (# 1)	Error: Sensor comm's	-	-	-	08, Jul, 23:42:33	N/A	Acknowledge Silence
COMS FAIL - INCL0002 (# 2)	Error: Sensor comm's	-	-	-	08, Jul, 23:42:33	N/A	Acknowledge Silence
COMS FAIL - INCL0002 (# 3)	Error: Sensor comm's	-	-	-	08, Jul, 17:01:57	N/A	Acknowledge Silence
COMS FAIL - INCL0001 (# 4)	Error: Sensor comm's	-	-	-	08, Jul, 17:01:57	N/A	Acknowledge Silence
COMS FAIL - INCL0002 (# 2)	Error: Sensor comm's	-	-	-	08, Jul, 16:53:26	N/A	Acknowledge Silence
COMS FAIL - INCL0001 (# 1)	Error: Sensor comm's	-	-	-	08, Jul, 16:53:25	N/A	Acknowledge Silence
COMS FAIL - INCLIN 1 (# 1)	Error: Sensor comm's	-	-	-	08, Jul, 16:24:24	N/A	Acknowledge Silence
COMS FAIL - INCLIN 2 (# 2)	Error: Sensor comm's	-	-	-	08, Jul, 16:24:22	N/A	Acknowledge Silence
COMS FAIL - INCLIN 1 (# 1)	Error: Sensor comm's	-	-	-	08, Jul, 13:14:57	N/A	Acknowledge Silence
COMS FAIL - INCLIN 2 (# 2)	Error: Sensor comm's	-	-	-	08, Jul, 13:14:57	N/A	Acknowledge Silence

Alarms may be acknowledged here and will be removed if the error has been cleared. To exit the alarm display page, click on the menu button and select Trim and Heel.

The System Online button shows that operation is normal, and the system is interrogating the inclinometers and updating the display based on readings received.



This will bring up an on-screen keyboard. In normal operation it is only needed if required on the settings page. It is more relevant to the configuration mode as covered later in this manual.



About allows system information to be displayed.
Sign Out logs current user out and reverts to the log in screen as shown in section 7.0

8. System Configuration

Once the system has been installed as described in sections 4.0 and 5.0 it must be configured for the specific application before it can be used for normal operation as detailed in section 6.0 and 7.0.

The system automatically performs all internal calculations to provide the current and averaged trim and heel values for both its integral display and the Modbus output for other systems based on the data stored in its internal non-volatile memory.

This configuration data includes a dimension (known as factor FA) which is the length in metres between the forward and aft draught marks on the vessel. It is essential that this dimension is entered accurately for the specific vessel since it is directly used in the calculation of the vessel trim value.

Other configuration parameters might be termed as correction factors. These allow the system to be accurately set up for the actual installed location once it has been securely mounted in place.

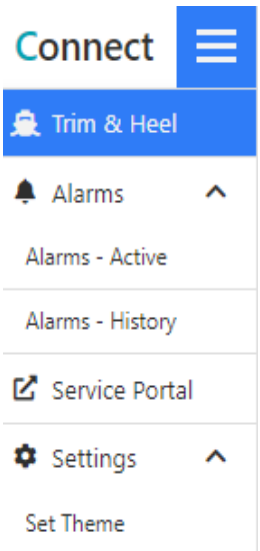
NOTE : Although the system may be fully configured via the integral screen and menu structure it is also possible to directly connect a Laptop o the Display's Ethernet port and set the system up via a web browser on the Laptop. To do this a direct Ethernet link has to be established using a static IP address. Full details of how to do this are given in Section 10 of this manual.

CAUTION: When in Configuration Mode **ALL** system parameters are available for editing. The operating software used in this system is capable of monitoring many input types and presenting the information in multiple different screen layouts.

For the Trim and Heel indication system all parameters except those specific to the particular installation will be pre-configured and, with the exception of the parameters detailed in this manual, **MUST NOT** be changed. Changes to parameters not covered by this manual will result in incorrect function of the system.

To enter the configuration mode of the system the installer should log in using the Service Engineer Password 789654

The menu button will show / hide the side menu.

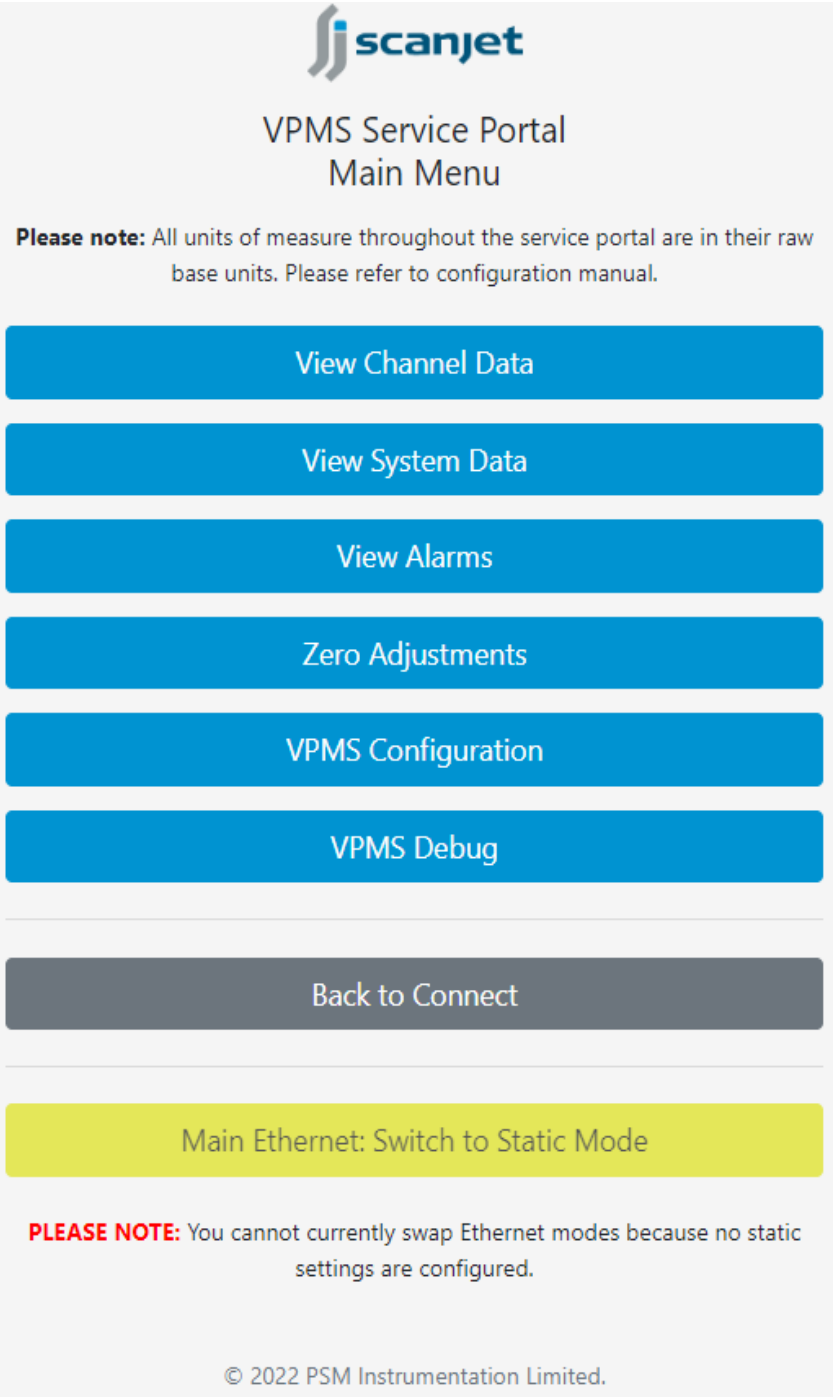


Select the Service Portal.

The service portal page will be displayed as shown on the following page.

This contains various settings which, as stated above, are not relevant to the Trim and Heel System and **MUST NOT** be changed.

Note: At the bottom of each menu page there will be a black button which reverts to the previous page. If parameters are amended, they must be saved using the SAVE button before returning to the previous page otherwise any changes will be discarded.



Shows connected Inclinometer data

Not used for this system

Shows Alarm Log

Not used for this system

Refer to following pages

Not used for this system

Return to normal operation

Not used for this system

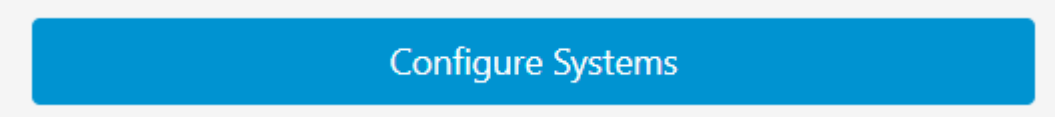
Green items are for information only

For installation the menu option VPMS Configuration should be selected

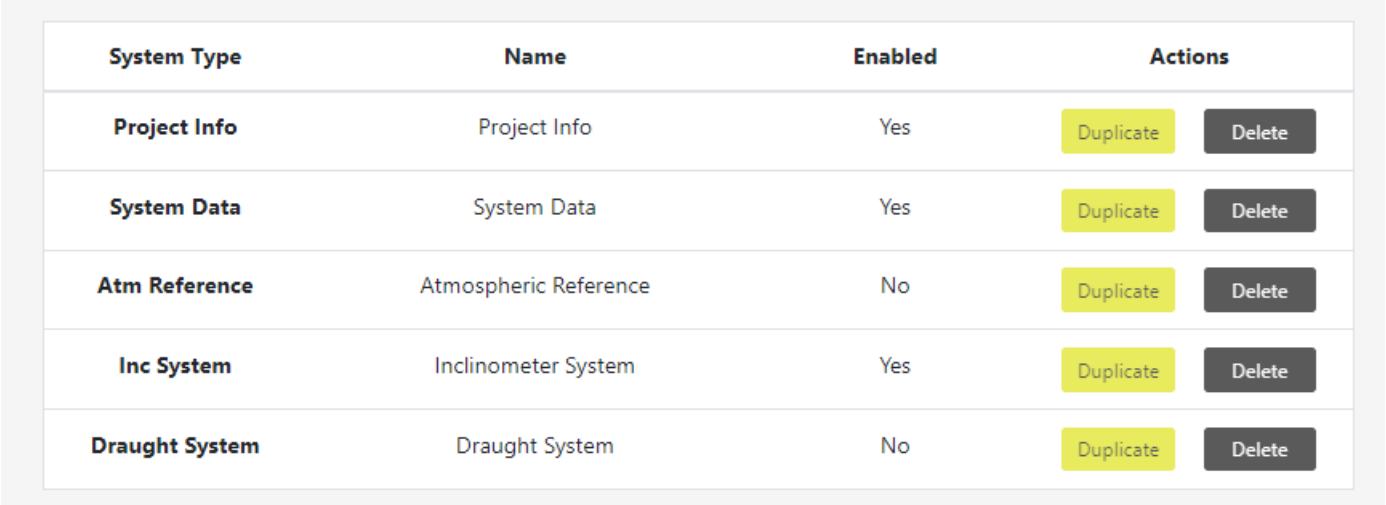
This will lead to a further page which has multiple options. As stated above many of these will not be applicable to the Trim and Heel system and will have been factory set as required.

Following are the only sub-menus which should be accessed for the Trim and Heel system.

8.1. Trim and Heel Configuration



Configure systems will bring up a further screen

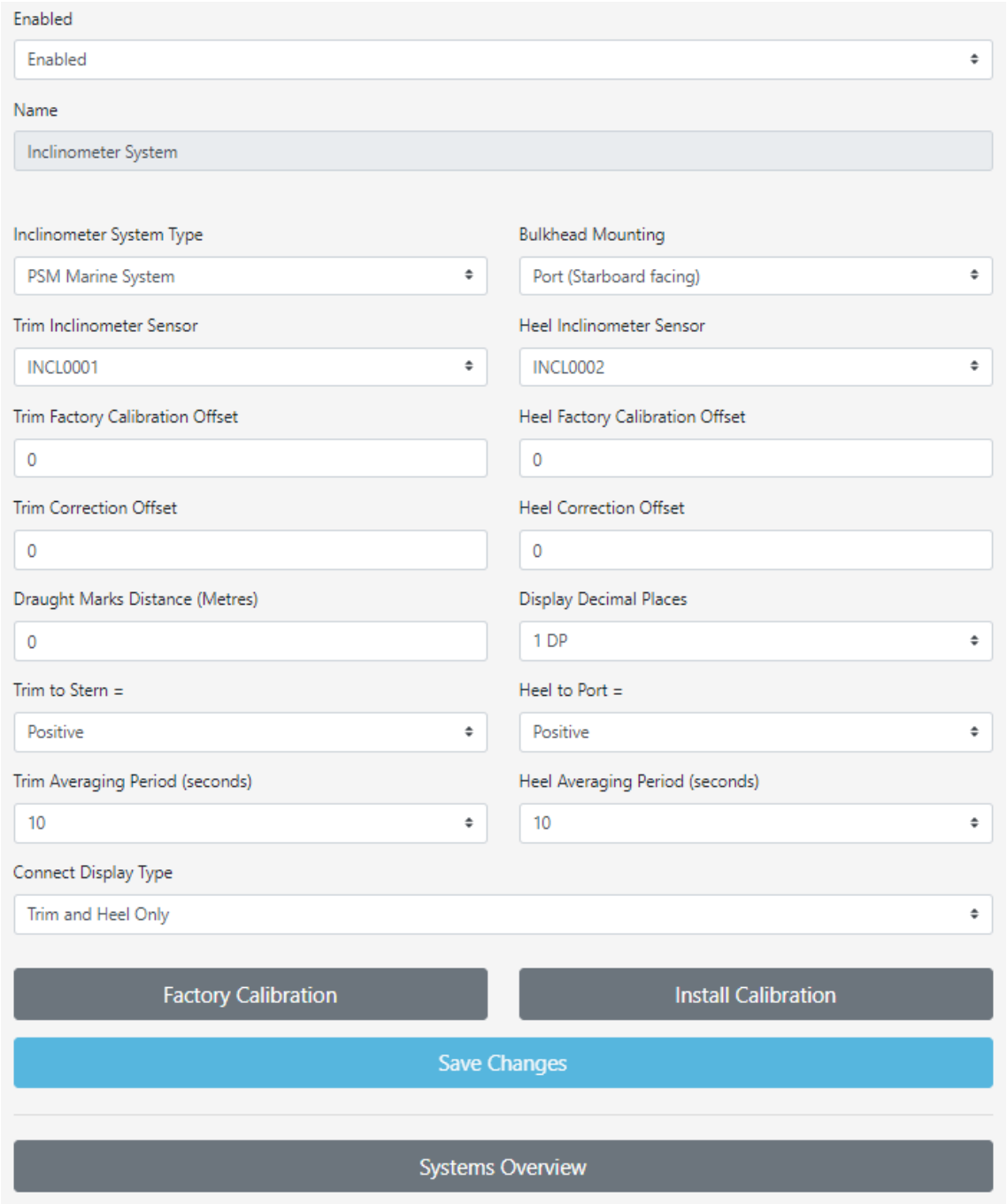


System Type	Name	Enabled	Actions
Project Info	Project Info	Yes	Duplicate Delete
System Data	System Data	Yes	Duplicate Delete
Atm Reference	Atmospheric Reference	No	Duplicate Delete
Inc System	Inclinometer System	Yes	Duplicate Delete
Draught System	Draught System	No	Duplicate Delete

From this screen select **Inc System.**

DO NOT press the DUPLICATE or DELETE Buttons

The Inc System option will lead to the main configuration menu for the Trim and Heel System, as shown on the following page.



Setting options are:

Enabled: Leave as Enabled

Name: Inclinometer System

Inclinometer System Type: PSM Marine System leave at default setting

Bulkhead Mounting: The default setting for this is Port (Starboard Facing) meaning that the Inclinometer enclosure has been mounted on a Port Bulkhead—i.e. with the enclosure opening facing Starboard. This is the expected installation location for the enclosure as detailed in section 4.0 Mechanical Installation. If the Enclosure has been mounted on a Starboard Bulkhead with the opening facing Port, then this setting must be changed to Starboard (Port Facing).

Trim Inclinometer Sensor: Factory preset to identify which inclinometer is measuring the vessel trim.

Heel inclinometer Sensor: Factory preset to identify which inclinometer is measuring the vessel heel.

Trim Factory Calibration Offset: Factory preset to ensure trim inclinometer output = 0° when mounted horizontal—DO NOT CHANGE

Heel Factory Calibration Offset: Factory preset to ensure heel inclinometer output = 0° when mounted horizontal—DO NOT CHANGE

Trim Correction Offset: This is a correction parameter that is calculated by the system once installed and the “Install Calibration” routine is run—see below for details of the Install Calibration routine.

Heel Correction Offset: This is a correction parameter that is calculated by the system once installed and the “Install Calibration” routine is run—see below for details of the Install Calibration routine.

Draught Marks Distance (Metres): This parameter must be entered. It is the dimension in metres between the Forward and Aft draught marks. Since this parameter is used in the system to determine actual trim based on the angle measured by the inclinometer it is essential that it is accurately known and entered.

Display Decimal Places: This will determine to how many decimal places the Trim (metres) and Heel (degrees) are shown on the normal operation screen. Default setting is 2 Decimal place.

* Trim to Stern =: The default is POSITIVE meaning that when the Vessel is trimmed by Stern this is shown on the display as a positive value. If required, this can be set to NEGATIVE meaning that trim by Stern would be shown as a negative value.

* Heel To Port =: The default is POSITIVE meaning that a heel to port is shown as a positive display value. If required, this can be set to NEGATIVE meaning heel to port is shown as a negative value.

* Trim Averaging Period (seconds): The display shows both actual and averaged Trim values. Select a value in seconds between 0 and 300 to set the averaging period.

* Heel Averaging Period (seconds): The display shows both actual and averaged Heel values. Select a value in seconds between 0 and 300 to set the averaging period.

* Note that these parameters may also be set through the normal operation display.

Connect Display Type: Must be set as Trim and Heel Only.

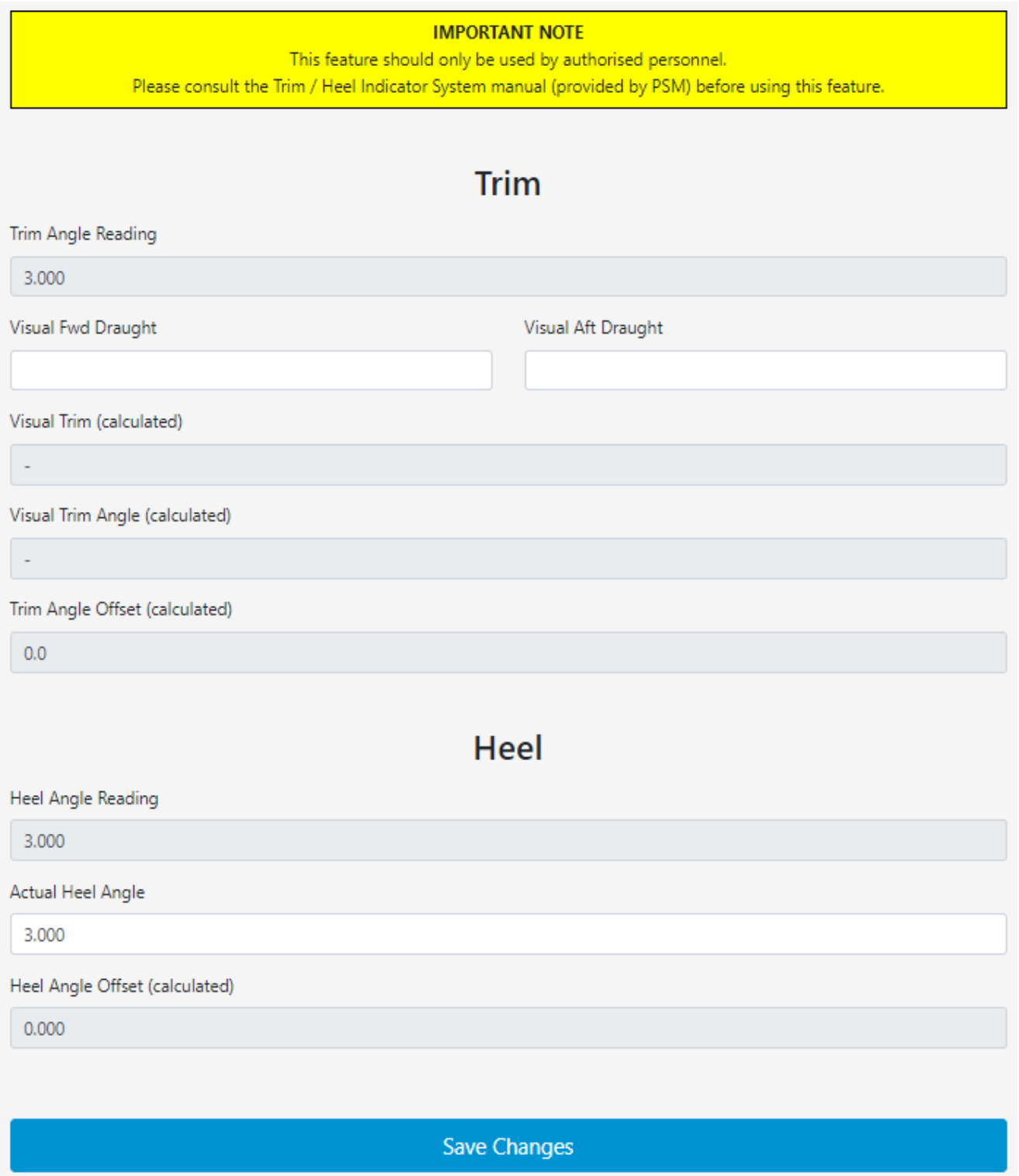
There are further buttons at the bottom of the screen.

Install Calibration: Refer to section 8.2

Save Changes: Once all parameters have been set and corrections applied press Save Changes to store these into the system.

The System Overview Button reverts to the previous screen

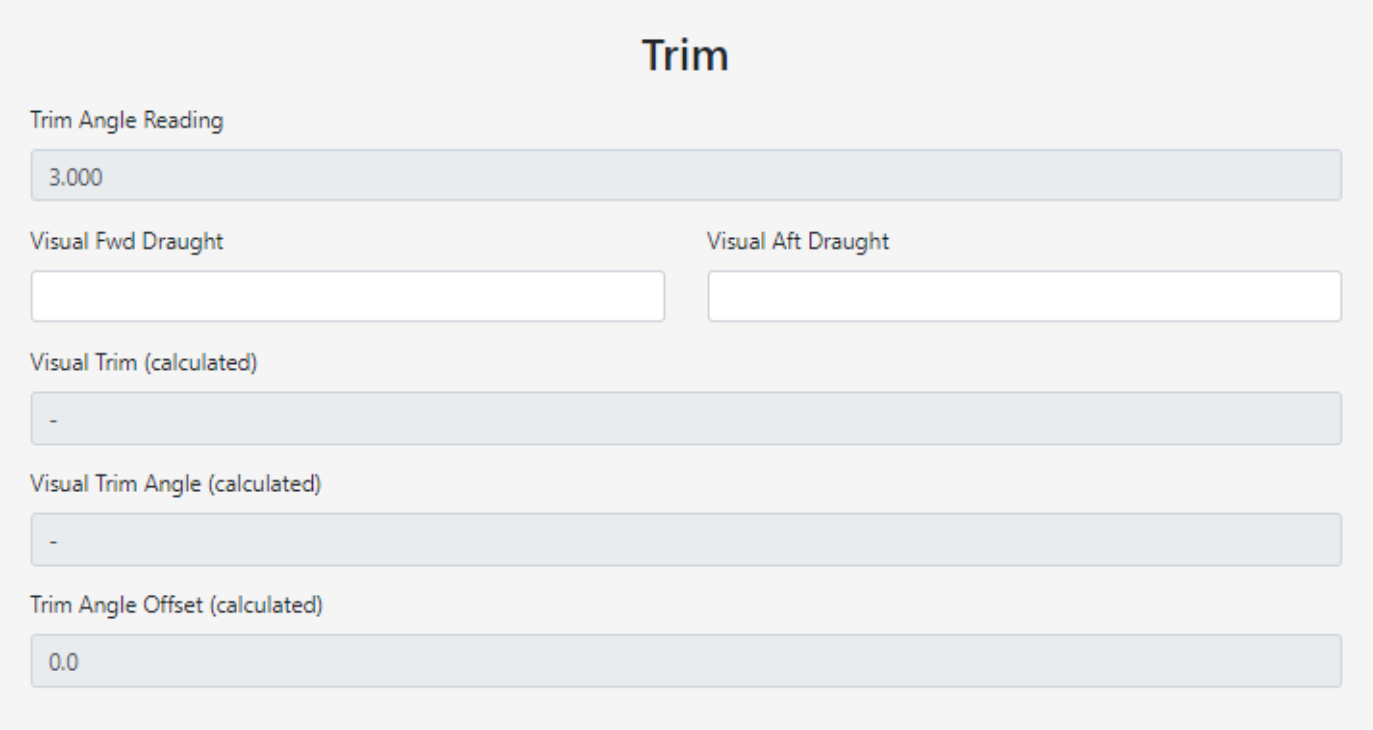
8.2. Install Calibration



This Screen is used to set the system up for the actual installed conditions and to ensure that the system display agrees with observed trim and actual vessel heel.

It is covered in two parts, firstly the trim is corrected based on visual readings and secondly the heel is corrected by external reference to ensure it reads 0° when the vessel has no heel.

8.3. Trim Correction



Trim Angle Reading: This is the live angle currently being read by the inclinometer.

Visual Fwd Draught: In this field the current Forward Draught as visually observed on the vessels draught marks should be entered. **Accuracy is Important.** Data should be in metres to 2 decimal places.

Visual Aft Draught: In this field the current Aft Draught as visually observed on the vessels draught marks should be entered. **Accuracy is Important.** Data should be in metres to 2 decimal places.

Visual Trim (calculated): Once the visual draught values are entered above this field will show the calculated value of the trim, i.e. Aft draught - Forward Draught.

Visual Trim Angle (calculated): Once the visual draught values are entered above the system will calculate ad display the trim angle that is given by the visual trim and the Draught Marks Distance value that was entered in the previous configuration screen.

Trim Angle Offset (calculated): The system will compare the Trim Angle Reading from the inclinometer with the calculated angle from visual trim and determine a correction offset that needs to be applied. This value is shown here and also automatically applied in the Trim Correction Offset field in the previous screen.

Once changes are made use the **SAVE** button to store the new values in the system

8.4. Heel Correction



Heel Angle: This is the live angle currently being read by the inclinometer.

Actual Heel Angle: Enter the actual heel angle remembering to observe the sign depending upon which convention is being used (heel to port is positive or negative).

Heel Angle Offset (calculated): The system will compare the live inclinometer reading with the manually input value and determine and display a correction offset. This offset is also automatically applied in the Heel Correction Offset Field in the previous screen.

CAUTION: Ensure that the manually entered value is accurate before applying this correction since the offset will be applied to all readings in the operational display.

8.5. Other Configuration Parameters

As stated previously (see page 10) the main configuration screen has multiple options which are applicable only to systems other than the Trim and Heel system and should not be accessed or amended.

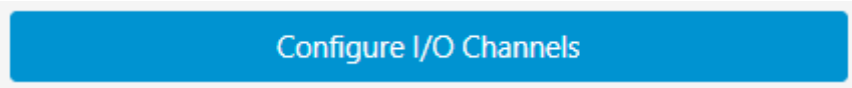
The only relevant options are detailed below.



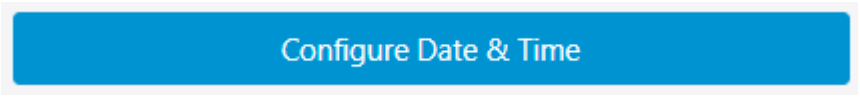
This screen will show the I/O ports that have been factory set for the Trim and Heel system. For both RS485 Ports the settings are : 9600 Baud, No Parity, 8 Data bits, 1 Stop bit.

No changes should be made.

Note that the Ethernet port is not used unless multiple displays are included.



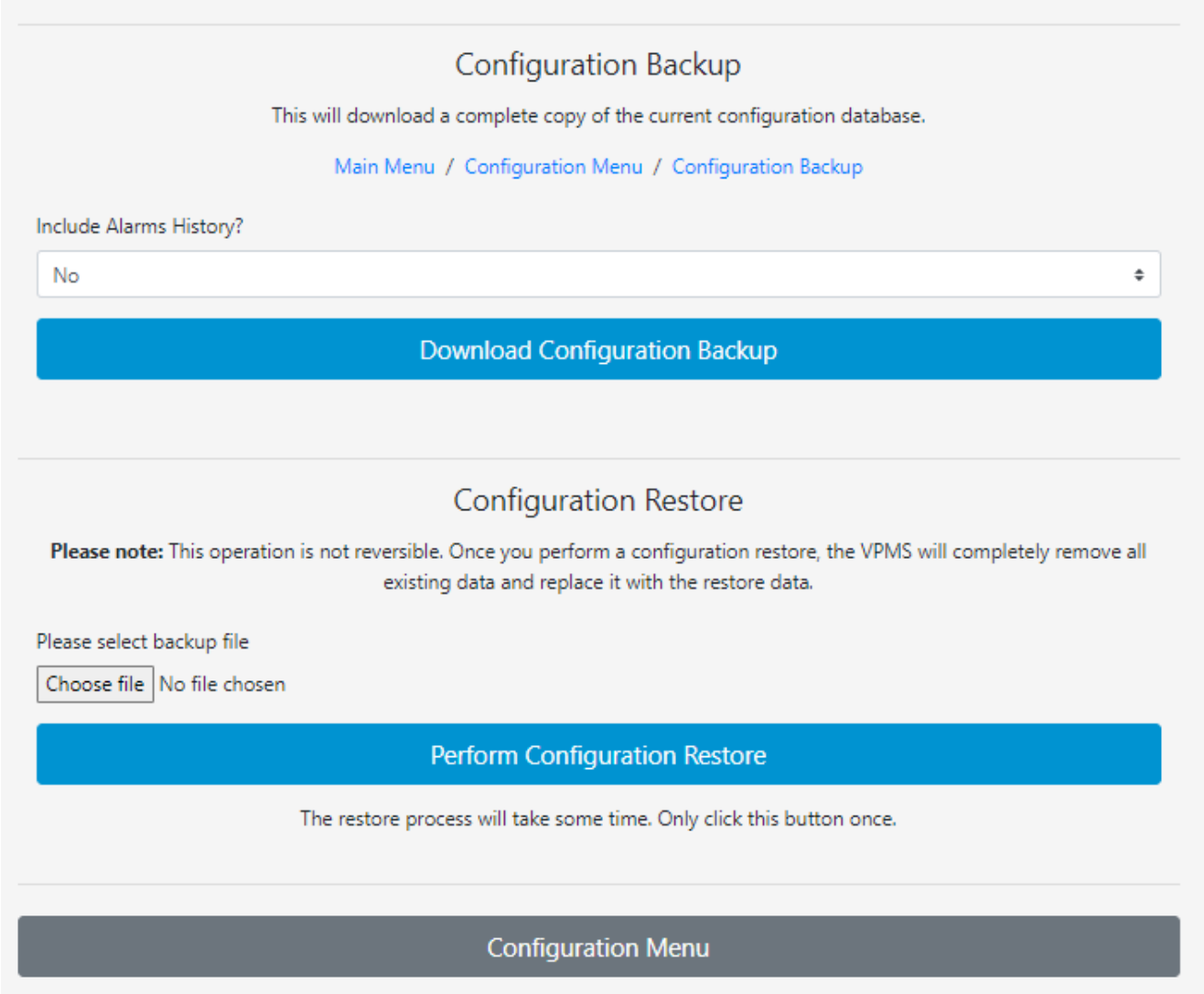
This screen shows the inclinometer inputs which have been factory set for the Trim and Heel system. No changes should be made.



Allows setting of correct date and time for the system.



This leads to a further screen



These are intended for a Service Engineer to perform backup and restore of the specific configuration file for the system and require that an external PC (Laptop) is connected to the system via a straight through Ethernet cable as detailed in Section 10 of this manual.

Once the laptop is connected the system can be accessed in the same way as if logging in via the integral display.

An initial log in screen leads to exactly the same menu structure and displays as detailed in this manual and the user can navigate to this Configuration Backup and Restore page in the same way.

The backup can be set to include or exclude the alarm history by selecting the required option.

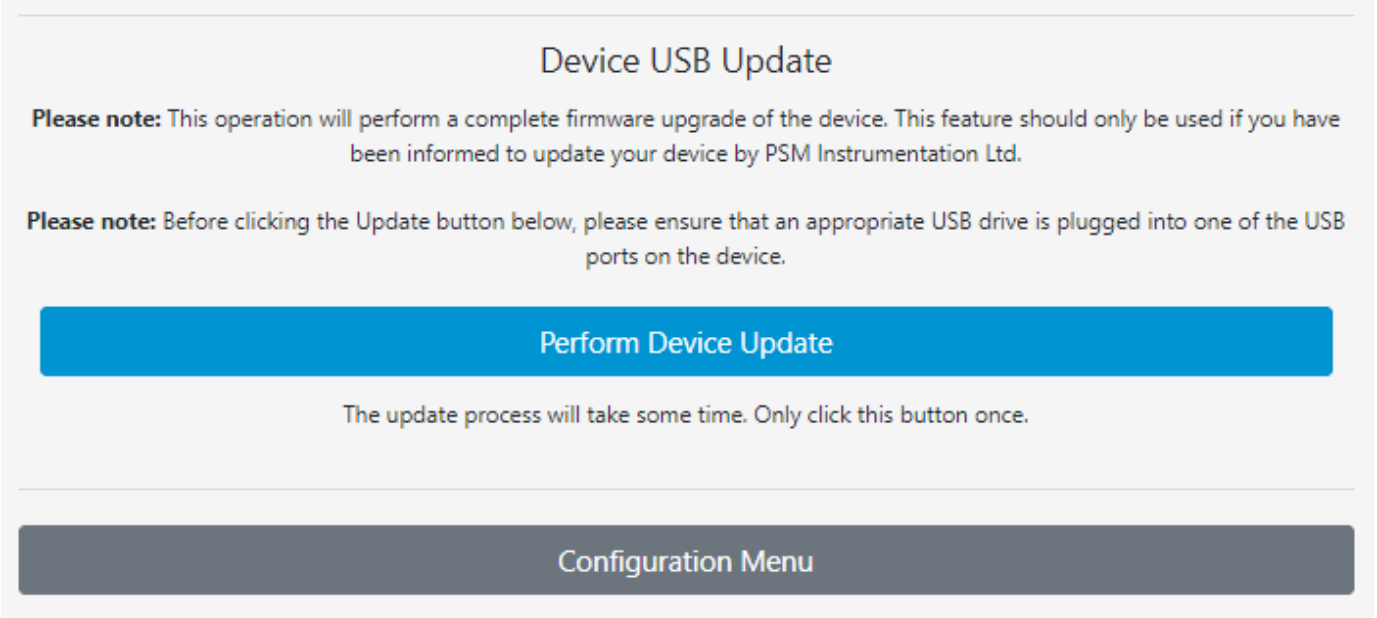
Backup files are downloaded to the normal location the Laptop is set to download files from the internet.

To upload (restore) a configuration file overwriting the current system configuration firstly use the Choose File button to select the required file and then “Perform Configuration Restore”.

For both Backup and Restore functions an onscreen message confirms successful completion.



This leads to a further screen



This screen allows a firmware update to be applied to the system. Note that this is different from the configuration data as described in the previous section. It is undertaken via the Displays integral USB ports and will apply a new version of the operating software to the system.

The firmware update file should be on the root of a USB memory device inserted in one of the two front USB ports.

When the USB drive is in place press the button “Perform Device Update”

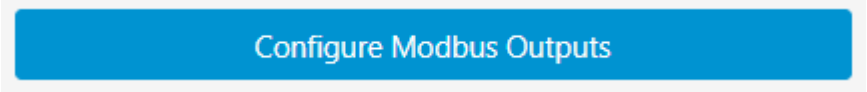
A “Processing” message will appear and once completed a confirmation that firmware has been updated will be displayed.

The USB device may now be removed.

Note: Current version of firmware can be found in the “About” option under the “Your Account” tab on the main display.

9. Modbus Outputs

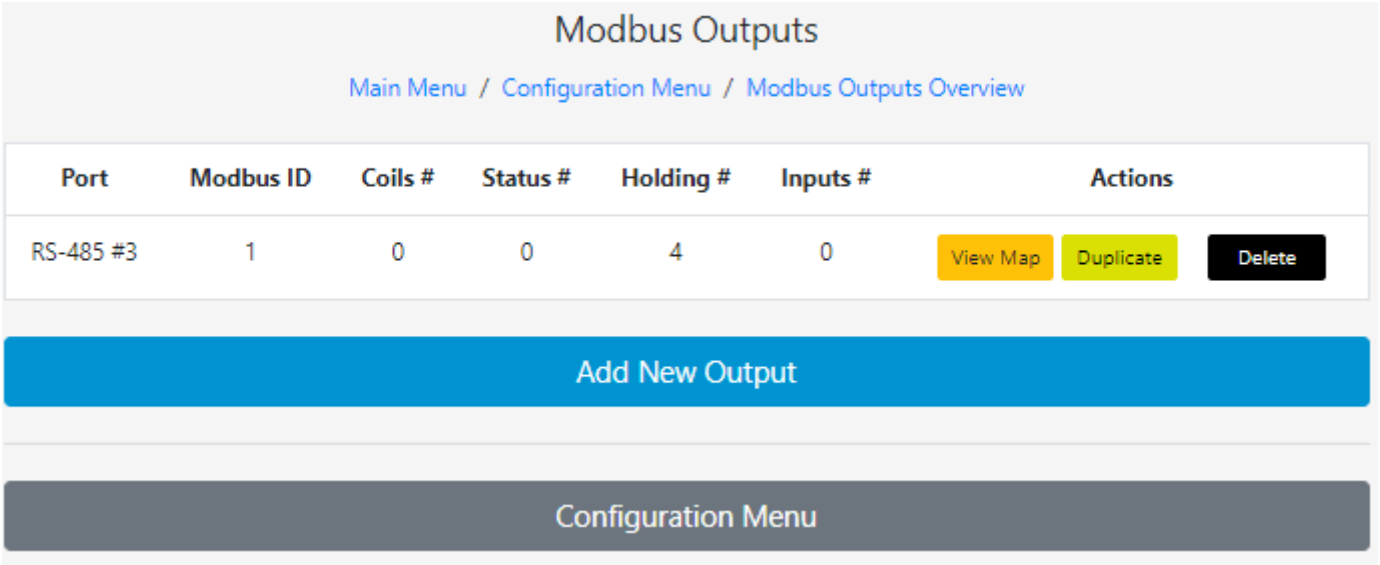
The main configuration menu also has the following button



This leads to a further screen where the settings for communication with other external systems may be configured.

As supplied the system will have been pre-configured to output data for actual and averaged values for both trim and heel. The appropriate settings for these will have been made at the factory and are defined in the following pages. While it should not be necessary, they may be amended by the installer to suit actual requirements

9.1. Modbus Output Options



The initial screen summarises the Modbus data settings.

Port: Identifies the hardware port the output is transmitted from. This has been factory configured with the following settings 9600 Baud, No Parity, 8 Data bits, 1 Stop bit.

Modbus ID: Identifies the Ident of the System. Note that the Trim and Hell system is a Modbus Slave and it is this ident number the remote master should use to interrogate the system. Where there is more than device on the RS485 network the ident numbers of all must be unique.

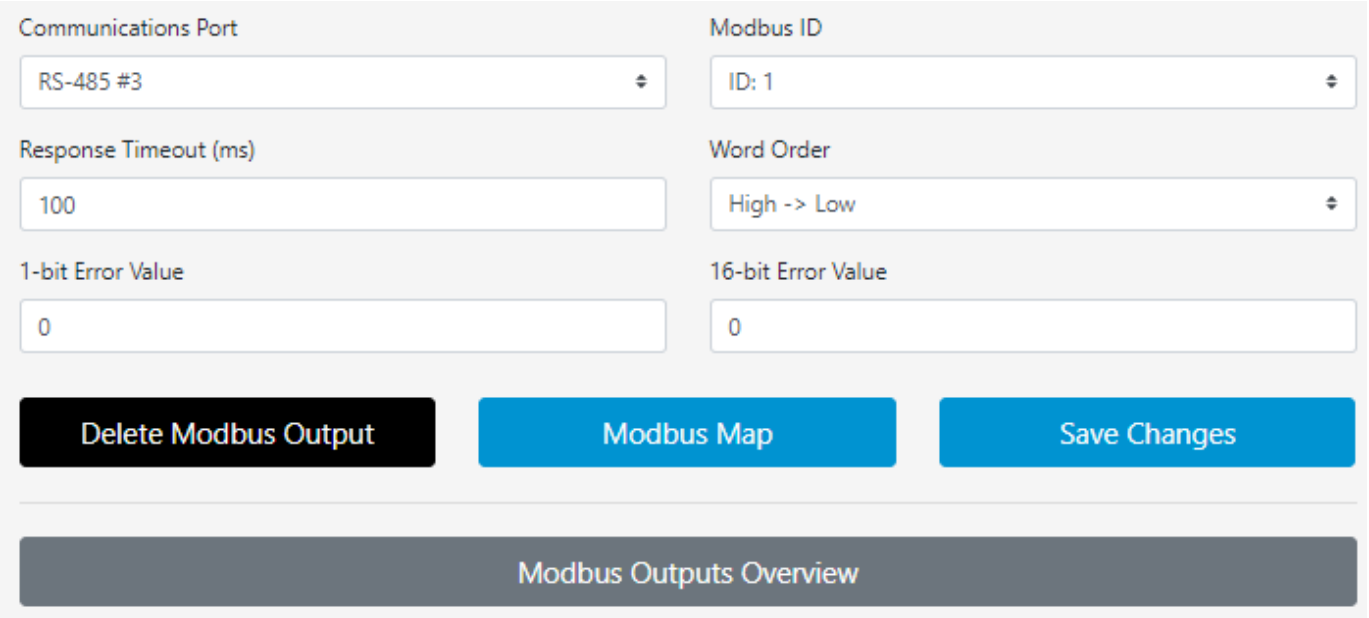
Coils #: In this system there are no Coil single bit data types

Status #: In the Trim and Heel system there are no Status single bit data types.

Holding #: The number of holding registers configured for this system., where Trim and Heel data is stored.

Inputs #: In the Trim and Heel system there are no Input registers.

Hover over the line to highlight / select it. This brings up a further screen



From this screen settings for the output can be set.

Communications Port: Should be left as factory set - this identifies the hardware port that has been assigned to the Modbus output.

Factory settings are 9600Baud, No Parity, 8 Data bits, 1 Stop bit.

Modbus ID: Can be changed as required to avoid bus contention. Valid values are in the range 1 to 247.

Factory default setting is 100

Response timeout (ms): This setting has no effect for the Trim and Heel System and should be left at the default of 100ms

Word Order: This parameter allows setting of the order in which data is presented where it is a large value which requires more than one register (or Word) to transmit it. It can be set as High to Low - most significant word transmitted first, or Low to High, most significant word transmitted last. Where more than one word is required to transmit a value, this will be shown in the Modbus map settings (See section 8.2 below).

For the Trim and Heel System the data can be sent in a single 16-bit Word therefore this setting has no effect and can be left as High - > Low

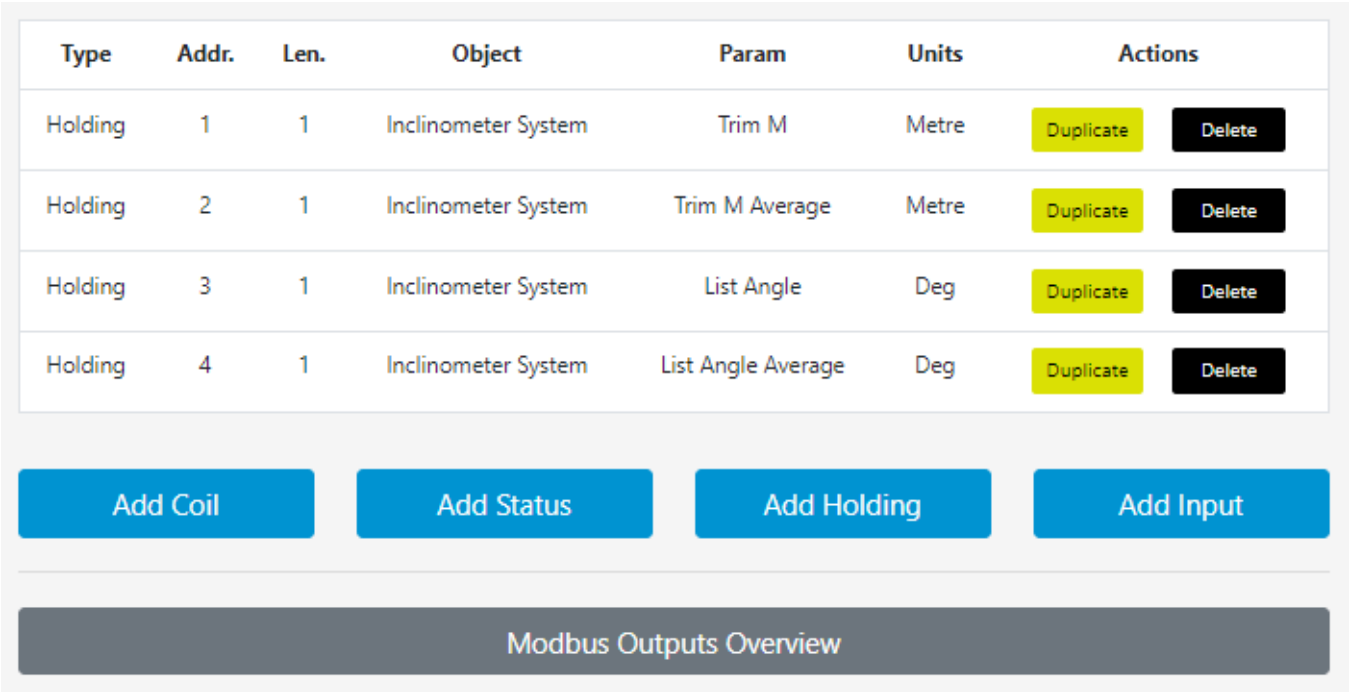
1-bit Error Value: this is the value that will be sent if the system is unable to calculate a valid value—not used for the Trim and Heel System and should be set to 0

16-bit Error Value: This is the value the system will send if it is unable to calculate a valid value for whatever reason. This is factory set at 9999 which the Master will interpret as an invalid (out of range) reading. This may be changed if an alternative value is required to flag an invalid data field.

9.2. Modbus Map



The View Map Button leads to a further screen



This screen shows the data format and location.

Type: Holding (register) a 16-bit word.

Addr: The register address where data is held

Len: The register length 1 = 1 word (2 bytes) Can be extended if large values requiring more than one word are to be sent - Not applicable for the Trim and Heel System.

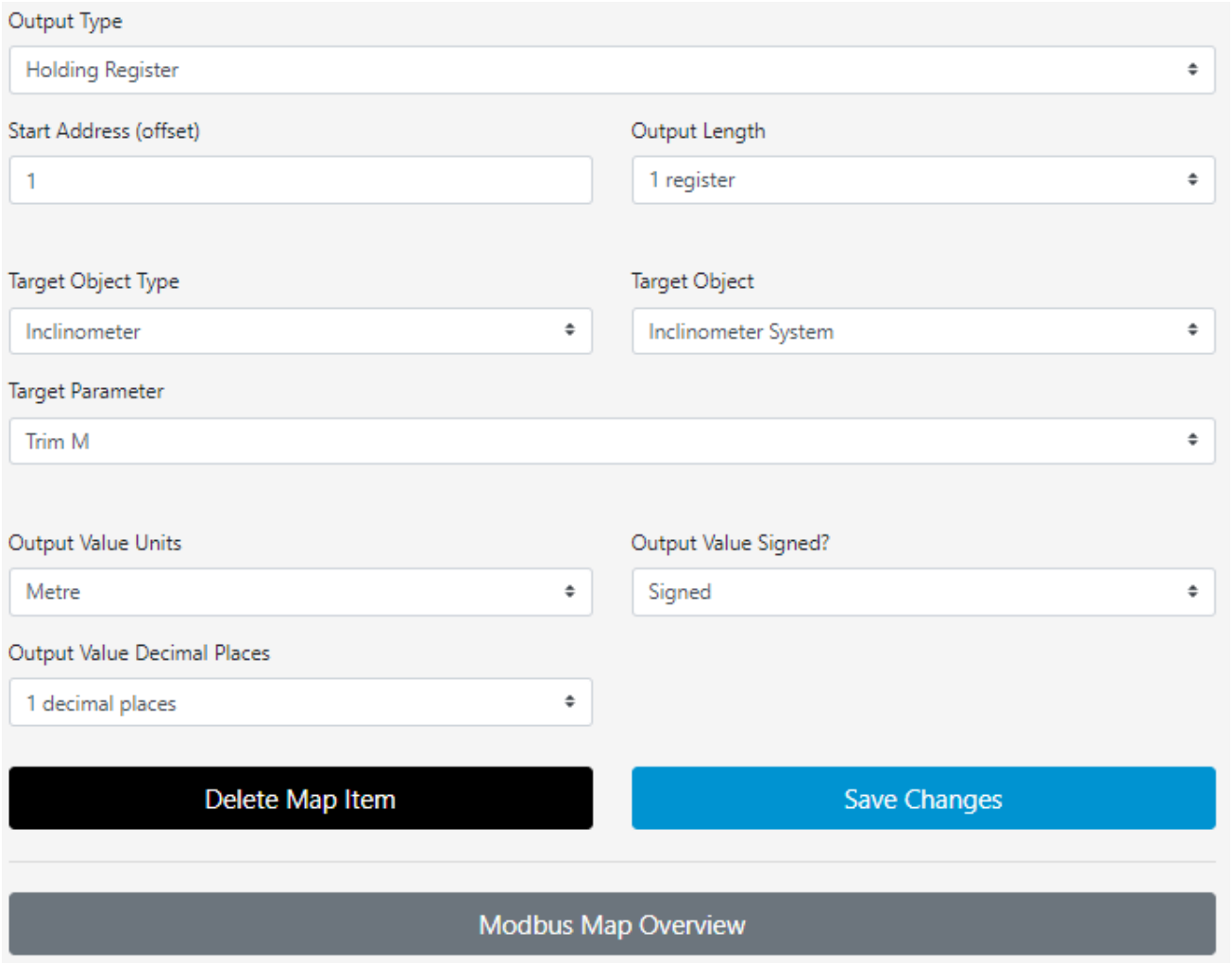
Object: The data source

Param: The parameter this register represents

Units: The Units of Measure that the value is presented in.

See next Section for a further explanation of these settings.

Selecting one of the specific data outputs from the Modbus Map list brings up a detailed configuration page for the output.



Start Address (offset): This is the register address where the data is held.

Output Length: Set as 1 Register for the Trim and Heel system, i.e., a 16 bit parameter

Target Object Type: Defines the type of parameter - leave as Inclinometer

Target Object: Defines the system that the object relates to - leave as Inclinometer system

Target Parameter : Defines the parameter Type - Leave as factory set for each parameter which will be as follows

Actual Trim in Metres = Trim M
Trim Average in Metres = Trim M Average Actual Heel = List Angle
Average Heel = List Angle Average

Output Value Units: Defines the units of measure - Leave as factory set for each parameter which will be as follows

For Trim = Metre
For Heel = Degree

Output Value Signed: Defines if the output is a signed or unsigned value. For the Trim and Heel system data is output as a signed value and should be left at the default factory setting of signed.

Output Value Decimal Places: Values are output as an integer value. This setting defines to how many decimal places the value is sent. The receiving Master will need to correct the received value to account for this setting.

If the setting is to 0 decimal places then the value may be read as is.
If the setting is to 1 decimal place the transmitted value must be divided by 10.
If the setting is to 2 decimal places the transmitted value must be divided by 100.

For the Trim and Heel System the default setting is to 2 Decimal places

10. Connecting to an External Laptop

It is possible to directly connect a laptop (or PC) to the Display to access all menus and displays shown on the integral display.

This feature is intended to allow simple setup of the unit by providing the more convenient access a mouse and full keyboard will provide.

In effect the Display acts as a web server and the laptop becomes the client, in much the same way as a normal website would be accessed.

Connecting between the Display's and Laptop's Ethernet port, a straight through type cable should be used.

The display is accessed by opening a web browser to a specific IP address.

Normally devices are set to obtain an IP address automatically when connected to a network. This is known as Dynamic Host Configuration Protocol (DHCP), in this instance though we need to use a Static IP address to facilitate direct connection.

The Display will have been factory set for direct static connection with the following configuration:

Static IP Address: 10.0.1.2
Static Subnet: 255.255.255.0
Static Gateway: 10.0.1.250

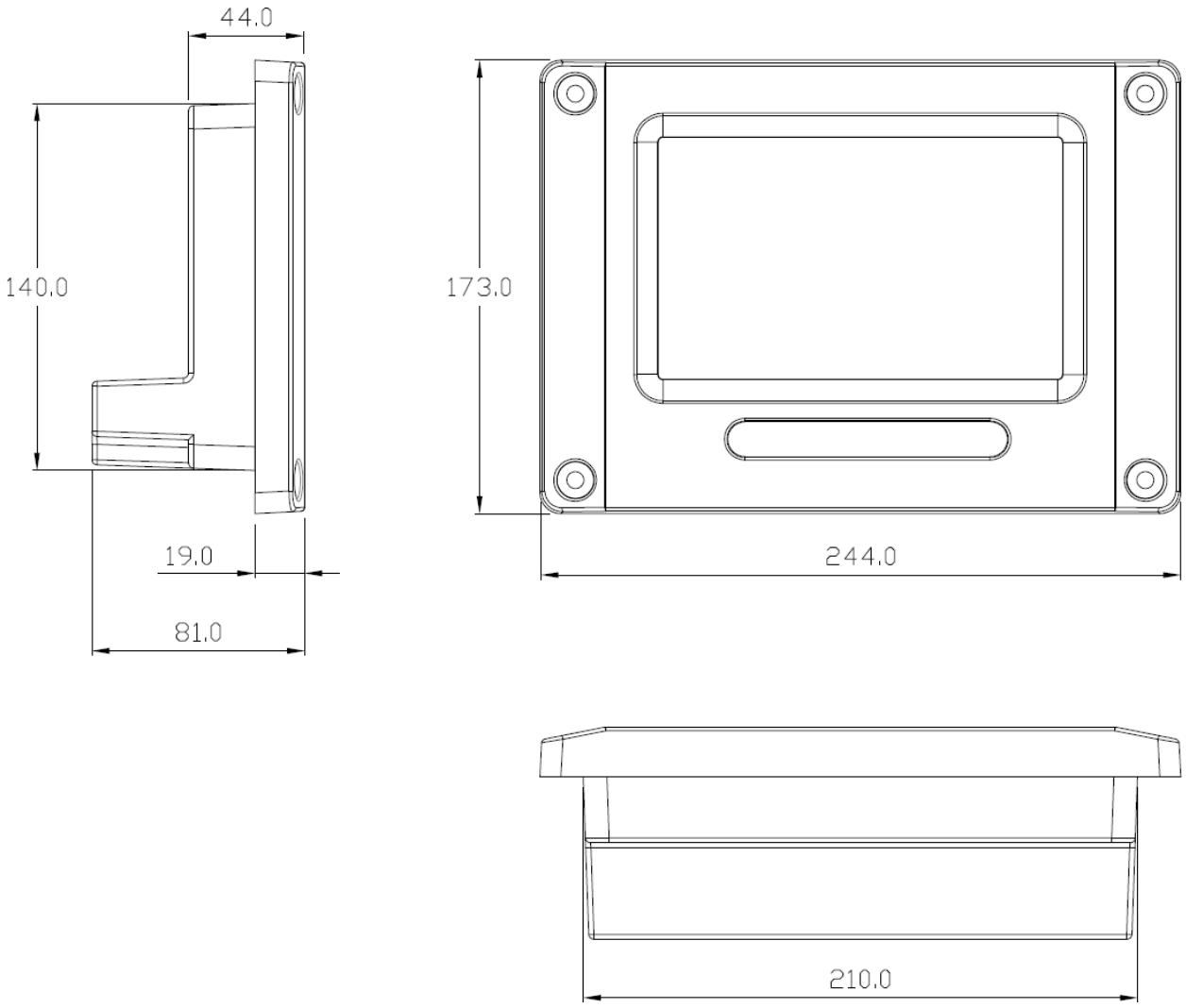
The Laptop being connected to the display must have its ethernet connection set up to connect directly to this static address. Rather than the DHCP setting which is normally applied.

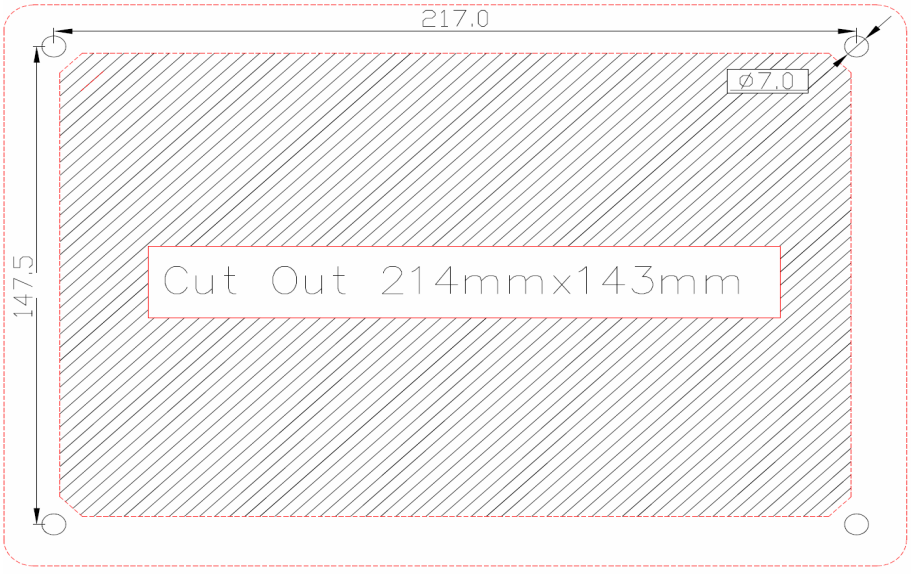
How this is done will vary depending upon the device and operating system in use. A separate supplementary manual is available which details this procedure.

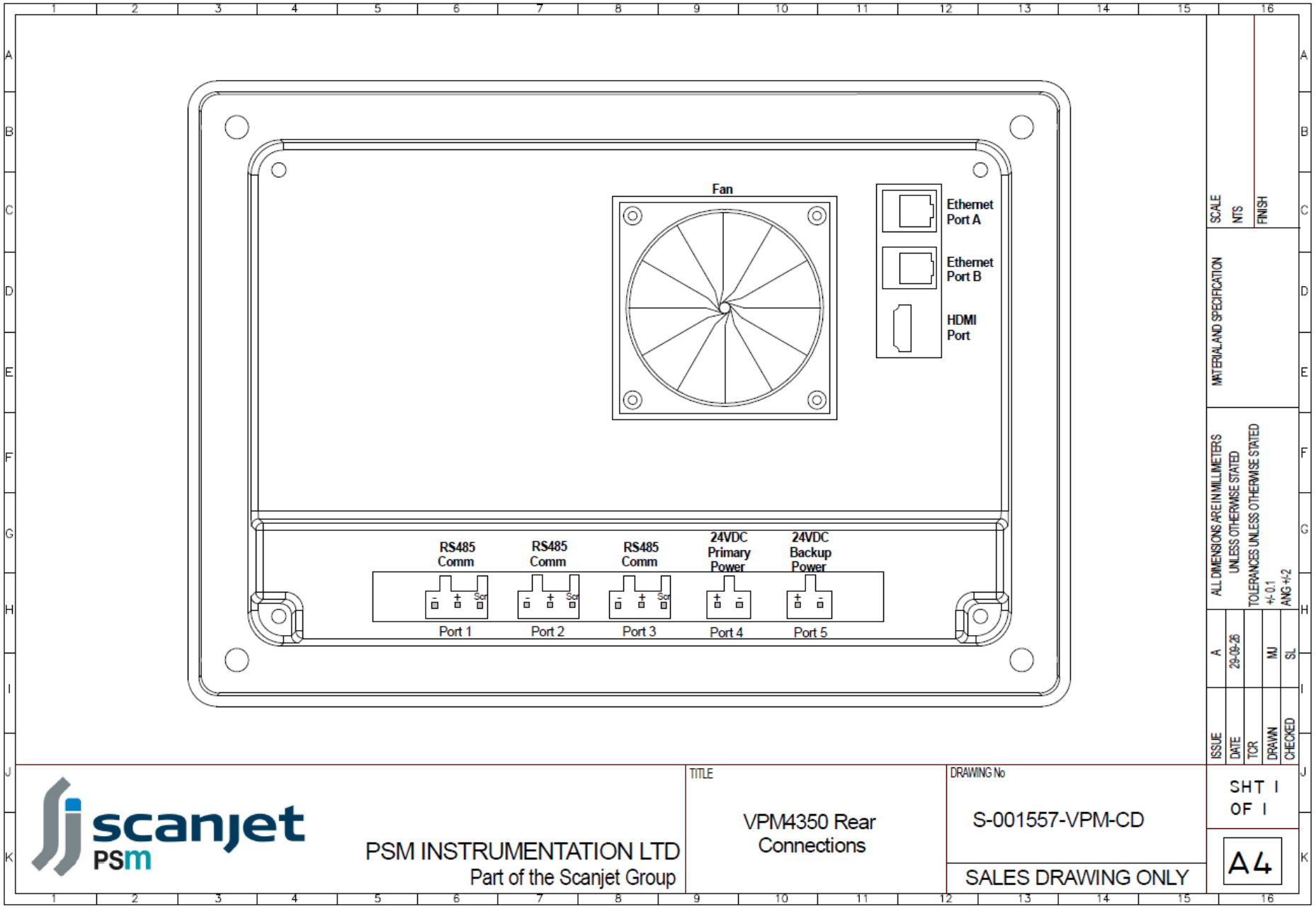
Refer to PSM Manual **MAN096 VPM+ / VPMS Ethernet Settings for Direct Connection**

Note: Once the direct connection is finished ensure that the laptop ethernet connection is reset to DCHP by selecting "Obtain an IP address automatically"

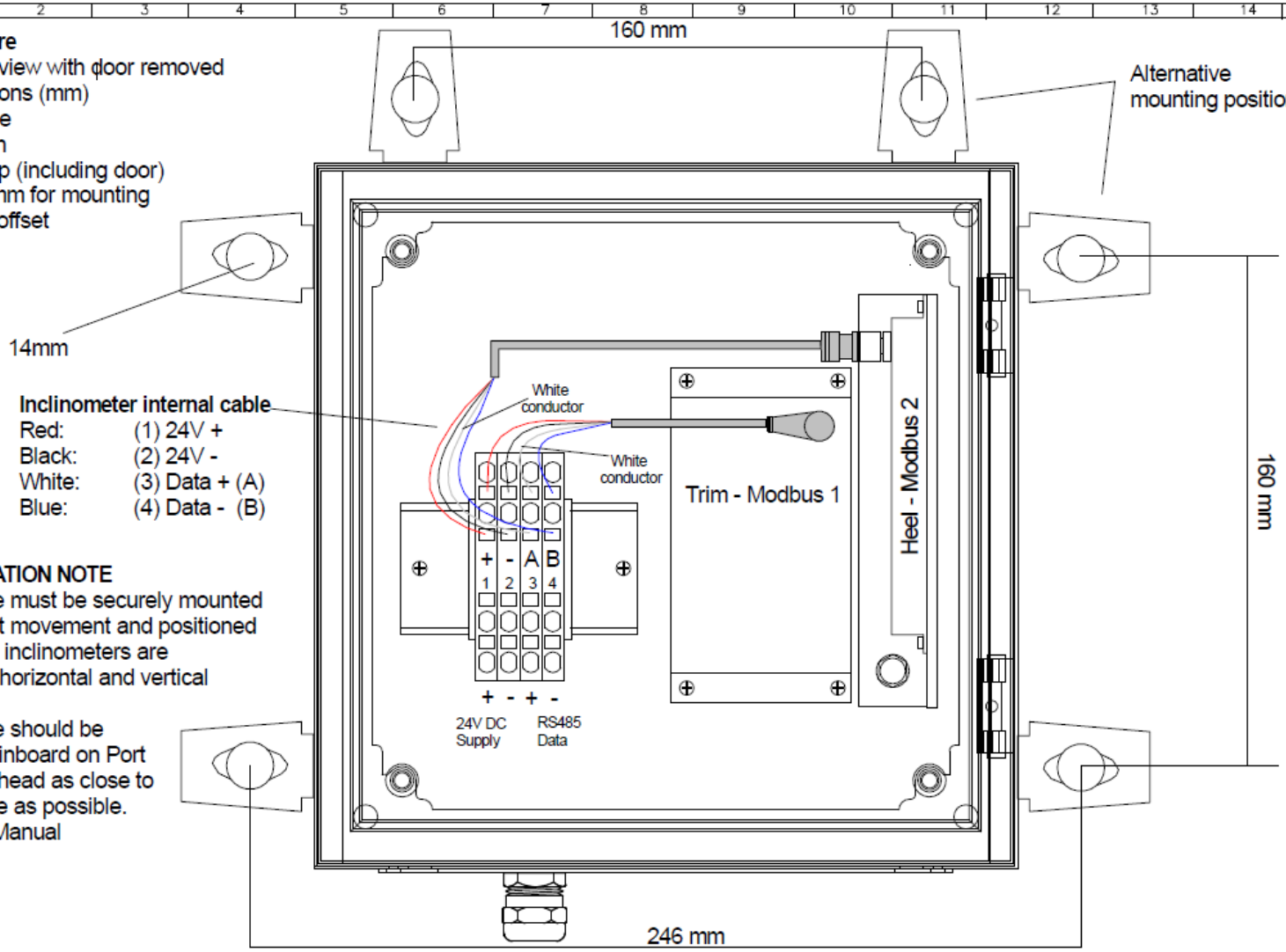
11. Drawings


44.0
140.0
19.0
81.0
173.0
244.0
210.0


217.0
ø7.0
147.5
Cut Out 214mmx143mm


Fan
Ethernet Port A
Ethernet Port B
HDMI Port
RS485 Comm
RS485 Comm
RS485 Comm
24VDC Primary Power
24VDC Backup Power
Port 1
Port 2
Port 3
Port 4
Port 5
SCALE NTS
FINISH
MATERIAL AND SPECIFICATION
ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED
TOLERANCES UNLESS OTHERWISE STATED +/- 0.1 ANG +/-2
ISSUE A
DATE 29-09-26
DRAWN MJ
CHECKED SL
TCR
PSM INSTRUMENTATION LTD
Part of the Scanjet Group
TITLE
VPM4350 Rear Connections
DRAWING No
S-001557-VPM-CD
SALES DRAWING ONLY
SHT 1 OF 1
A4

Enclosure
Internal view with door removed
Dimensions (mm)
200 Wide
200 High
160 deep (including door)
Add 15mm for mounting bracket offset



Inclinometer internal cable

Red:	(1) 24V +
Black:	(2) 24V -
White:	(3) Data + (A)
Blue:	(4) Data - (B)

INSTALLATION NOTE
Enclosure must be securely mounted to prevent movement and positioned to ensure inclinometers are precisely horizontal and vertical

Enclosure should be mounted inboard on Port Side bulkhead as close to centre line as possible. Refer to Manual

SCALE NTS
FINISH
MATERIAL AND SPECIFICATION
ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED
TOLERANCES UNLESS OTHERWISE STATED +/- 0.1 ANG +/-2

ISSUE	DATE	TCR	DRAWN	CHECKED
A	05-07-22		MJ	SL

scanjet PSM
PSM INSTRUMENTATION LTD
Part of the Scanjet Group

TITLE
Dual Inclinometer Enclosure

DRAWING No
S-001519-VPM-GO

SALES DRAWING ONLY

SHT 1 OF 1

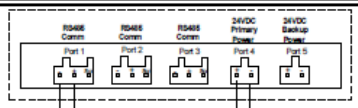
A4

Connect Trim & Heel Display (VPM4350)

Drawing No: S1422 / S1525



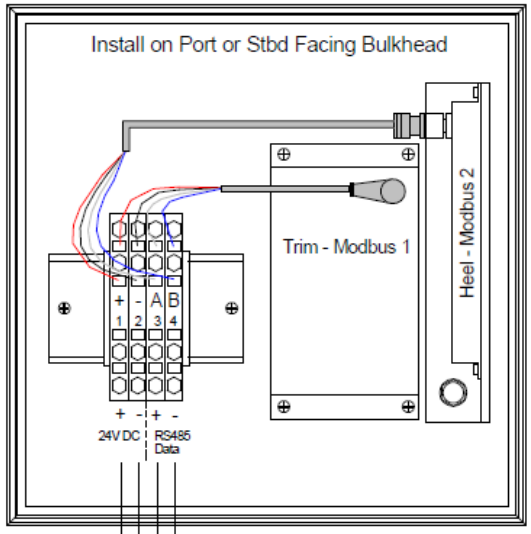
VPM4350
Rear Connections



24Vdc Isolated Supply

Connect Trim & Heel Cabinet

Drawing No: S1519



4 Core (2 twisted pair) Minimum 20 AWG / 0.5mm CSA
Overall braided screen to be terminated to inclinometer panel earth.

Dimension Between Forward & Aft Draught Marks TBC

scanjet PSM an Alfa Laval branc — PSM INSTRUMENTATION LTD	TITLE: VPM Connect Trim & Heel Inclinometer Display System	DRAWING No: S-001540-VPM-GA SALES DRAWING ONLY	SHT 1 OF 1 A4

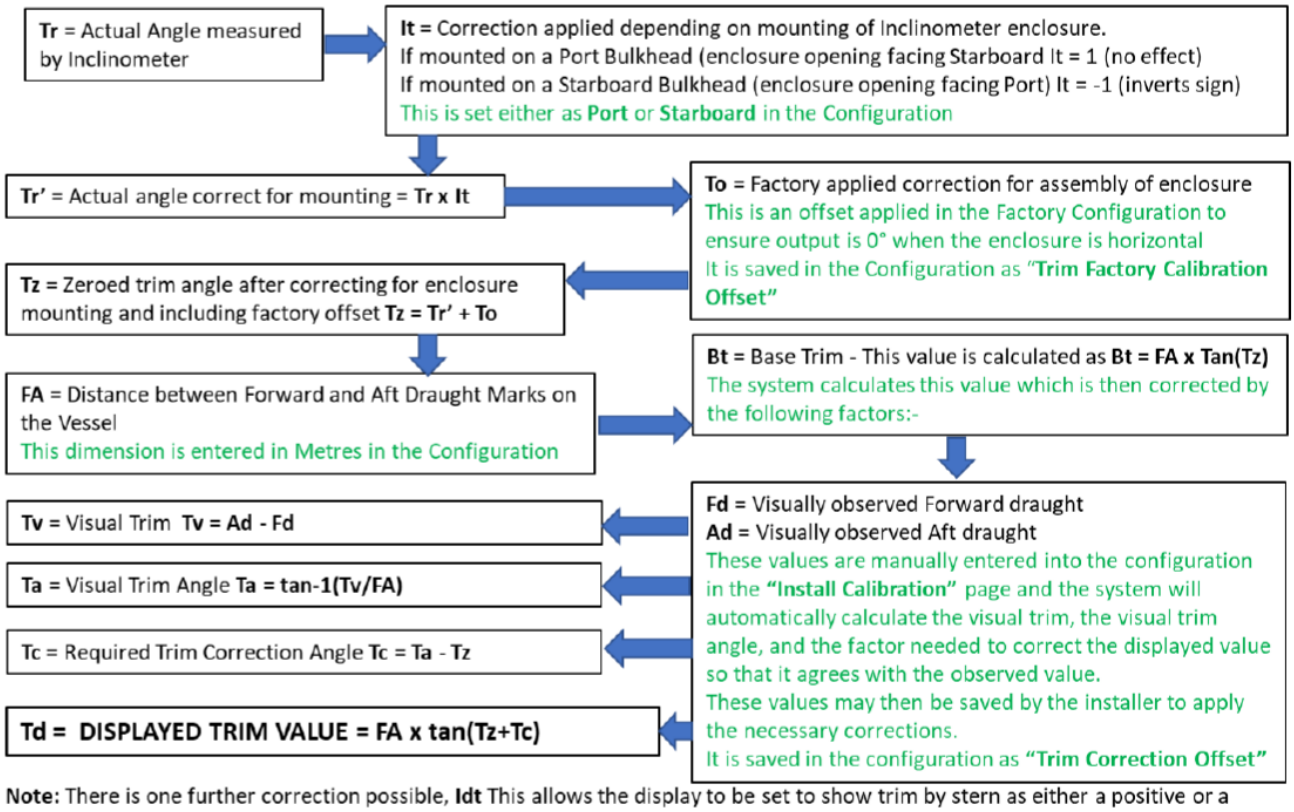
ISSUE	DATE	TOR	DRAWN	CHECKED
C	29-09-25		SL	MVJ

SCALE: NTS
FINISH:
MATERIAL AND SPECIFICATION:
ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED
TOLERANCES UNLESS OTHERWISE STATED +/- 0.1 ANG +/-2

12. System Calculations

Trim Calculations flowchart

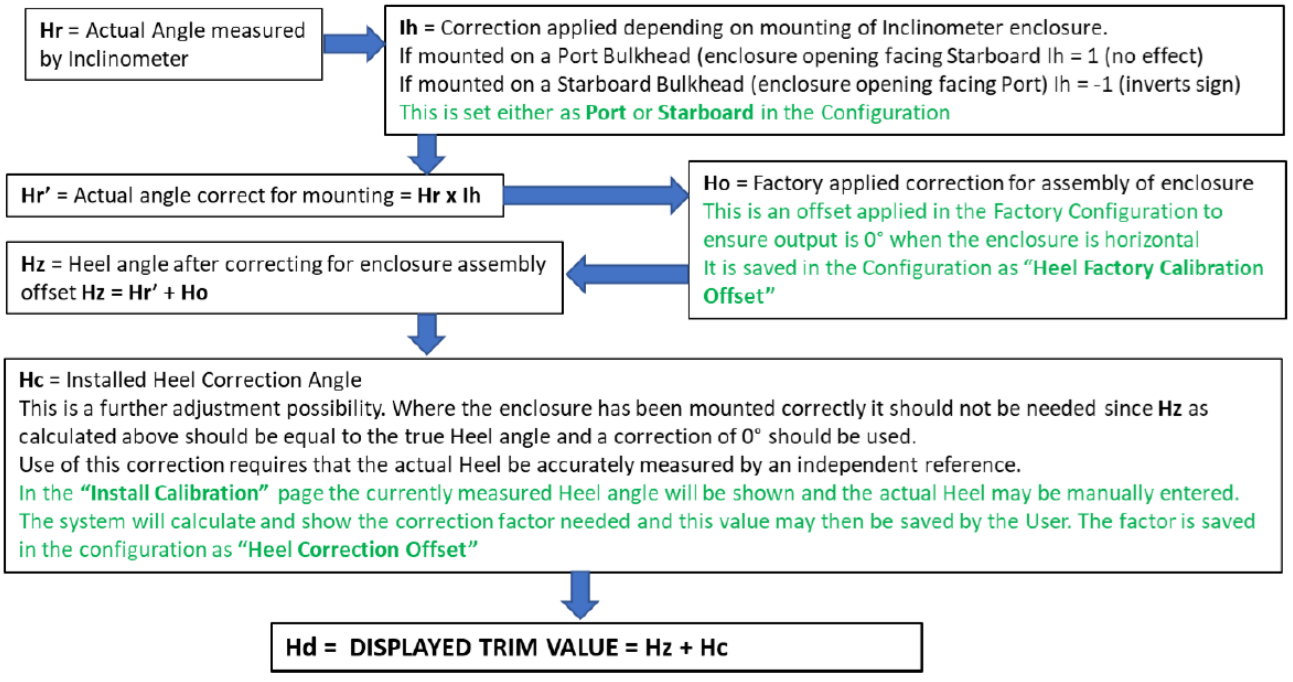
Note: The default installation for the inclinometer enclosure is that it is mounted on a Port bulkhead, i.e. with opening facing Starboard. This will give a positive output angle when the vessel is trimmed by stern.



Note: There is one further correction possible, **Idt** This allows the display to be set to show trim by stern as either a positive or a negative value. This can be set in the Configuration menu as **Trim to Stern =** or via the settings button on the normal display page.

Heel Calculations flowchart

Note: The default installation for the inclinometer enclosure is that it is mounted on a Port bulkhead, i.e. with opening facing Starboard. This will give a positive output angle when the vessel is heeled to Port.



Note: There is one further correction possible, **Idh** This allows the display to be set to show Heel to Port as either a positive or a negative value. This can be set in the Configuration menu as **Heel to Port =** or via the settings button on the normal display page.