OPDAQ 220725

OpHMI User Manual

OpHMI User Manual

July 2022

How to get copies of OpDAQ technical publications:

352 Suite 201, Alcide C. Horth,
Rimouski, Québec
Canada G5M 0W6
Telephone : 418 727-5753
Email : Info@opdaq.com

For information on all aspects of the OpDAQ Systems shipboard instrumentation systems and associated services, visit our World Wide Web site: **http://www.opdaq.com**

LIMITED WARRANTY

Please record the date of purchase and serial numbers of the purchased OpDAQ Systems Inc. Products:

Name and address of purchaser: _____

Date of Purchase: _____

Model of product: _____

Serial number of the product: _____

ONE YEAR LIMITED WARRANTY

OpDAQ Systems Inc. warrants solely to the original purchaser of the products for a period of (1) one year after the date of delivery, the products to be free from defective material and workmanship under normal use, and that its products will conform to specifications and standards published by OpDAQ Systems Inc. Notwithstanding the foregoing, OpDAQ Systems Inc. retains its right to deviate from published specifications due to latest improvements in function and design of the product. The foregoing warranty is subject to proper storage, transportation and use of the products, and does not include defects due to normal wear and tear or deterioration. Upon delivery, Customer shall immediately inspect the products for conformity and visible defects. Customer shall give OpDAQ Systems Inc. immediate written notice of any conformity or visible defects regarding the Products and contact OpDAQ Systems Inc. in writing concerning return or repair, as the case may be.

OpDAQ Systems Inc.'s sole obligation under this warranty is, upon evaluation by OpDAQ Systems Inc., and at OpDAQ Systems Inc.'s option, to repair or correct any defect or to replace or exchange the product with a copy of the original invoice to OpDAQ Systems Inc. at its own cost. Any repaired, corrected, replaced or exchanged Products shall be subject to the warranty and limitations set forth. If OpDAQ Systems Inc. has received notification from the customer, and no defects of the product could be found, the customer shall bear the costs that OpDAQ Systems Inc. incurred as a result of notice.

DISCLAIMER OF IMPLIED WARRANTIES

This warranty set forth is exclusive and in lieu of all other warranties (whether expressed or implied), rights or conditions and customer acknowledges that except for such limited warranty the products are provided "as is". OpDAQ Systems Inc. specifically disclaims, without limitation, all other warranties of any kind including any implied warranties of merchantability and fitness for a particular purpose or use. Handling of this product is to be as stated in the Installation and Operating Instructions of this manual. In no event shall OpDAQ Systems Inc. be liable for any special, indirect, incidental or consequential damages or loss, whether in contract, tort, or otherwise, even if advised of the possibility of such damages. Some states and provinces do not allow limitation of implied warranties or the exclusion of incidental or consequential damages so the above limitations or exclusions may not apply to you. This warranty gives you specific legal rights and you may have other rights which vary from state to state or province to province.

SUPPORT SERVICES

For technical support, installation services or request for repair please see the contact information below.

OpDAQ Systems Inc.
352 Suite 201, Alcide C. Horth,
Rimouski, Québec
Canada G5M 0W6
Telephone : +1 418 727-5753
Email : Info@opdaq.com
www.opdaq.com

If any defects not capped under the warranty are found, OpDAQ Systems Inc. will repair the defect after providing the customer with an estimate.

ABOUT THIS MANUAL

The **OpHMI** is a Human-Machine Interface dedicated to the monitoring and display of energy efficiency for industrial engines in marine, mining and industrial applications. The **OpMHI** is developed to optimize day-to-day operations. It provides high-precision measurements, real-time display and easy configuration interface of power, fuel consumption and speed using renowned Binsfeld Engineering torquemeters, KRAL flowmeters and standard NMEA-0183 GPS.

Target group	Tasks
Operator-owner	Keep these instructions available at the installation site for future reference. Ensure that employees read and observe these instructions and the associated documents. Observe additional system specific directives and regulations.

The information contained in this manual is based on our experience. It is current and complete to the best of our knowledge and ability at the time of printing. OpDAQ Systems Inc. does not accept responsibility for errors, omissions or incorrect interpretations of the contents or any information herein.

TABLE OF CONTENTS

1. INTRODUCTION

The **OpHMI** is a Human-Machine Interface dedicated to the monitoring and display the energy efficiency data from industrial engines in marine, mining and industrial applications.

The **OpHMI** is developed to facilitate the installation and operation of an efficiency monitoring system using a long-range network of Op-Modules. OpHMI offers real-time display and easy configuration interface for KRAL Volumeters, Binsfeld Engineering TorqueTrak TPM2 Torquemeters and standard NMEA 0183 GPS.

The **OpHMI** can also be used to retransmit all the measured parameters over Modbus from a single point.

2. DRAWINGS AND SPECIFICATIONS

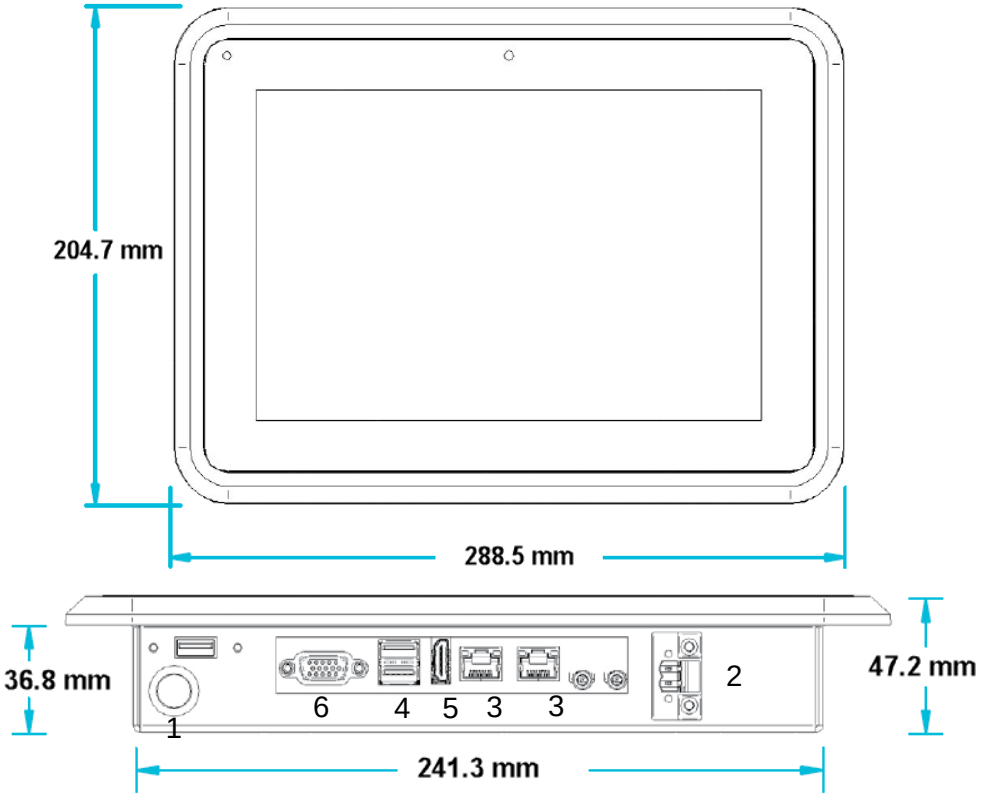


Figure 1 – Dimensions [mm] of the OpHMI panel

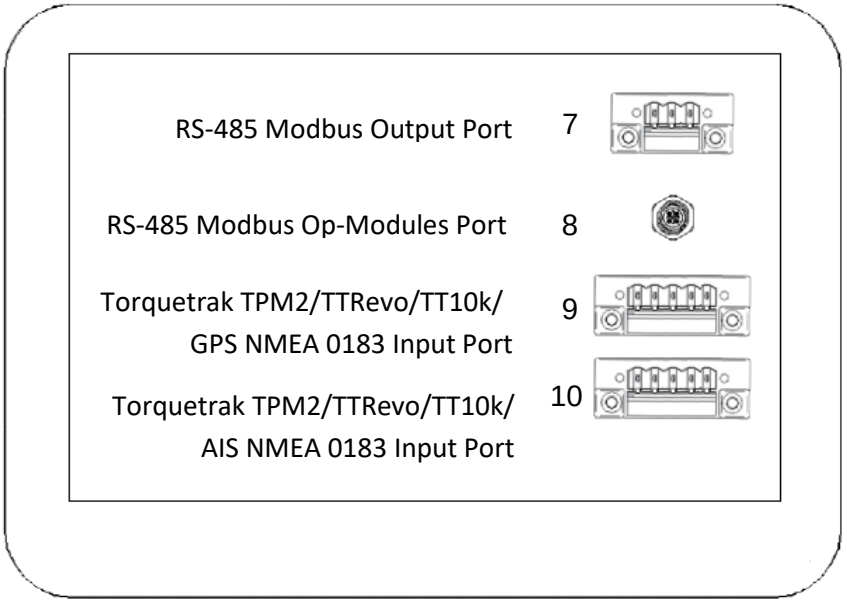


Figure 2 – Electrical connections of the OpHMI panel

Table 1: Terminal number, type and description

	Terminal	Description
1	On/Off Switch	
2	Voltage Input Type: Molex	
3	Ethernet	Remote access Interface
4	USB Ports	USB Memory Stick
5	HDMI Port	Secondary display output
6	VGA Port	Secondary display output
7	RS-485 Modbus Output Port	RS485
8	RS-485 Modbus Op-Modules Port	RS485
9	GPS NMEA 0183 Input Port	RS232/422
10	Torquetrak TPM2/TTRevo/TT10k/ AIS NMEA 0183 Input Port	RS232/422

Table 2 : OpHMI specifications

Specifications	OpHMI
Display	LCD 10.1 inch, 1280x800 Projected capacitive touchscreen Dimmable
Performance parameters	Intel Apollo Lake 2.4 GHz Dual Core 4GB RAM SSD 64GB
Operating system	Windows 10 IoT Enterprise 64 bit
Communication	OpModules (OpVI, OpTS, etc.): Modbus RTU over RS-485 Master interface Optional PLC Output: Modbus RTU over RS-485 Slave interface GPS Input: NMEA0183 RS232/RS422 AIS Input: NMEA0183 RS232/RS422
Connectors	Power: Screw terminals Modbus to Op-Modules: M12 Modbus Output: Screw Terminals AIS/GPS: DB9 Display output: HDMI USB Power: Screw terminals Ethernet: RJ45
Electrical properties	Voltage Input: 9-36VDC Power Consumption: approx. 30 W
Operating conditions	Temperature: 0 °C to 55 °C (32 °F to 131 °F) Humidity: 20-80% Non-Condensing Certifications FCC RoHS / CE IP Proof Front IP65
Mounting	VESA Standard Panel Mount

3. INSTALLATION

This section is intended as a summary of the steps needed for the installation of the OpHMI. The installation instructions for the instruments and sensors forming the complete system are provided with the system assembly manual. Always follow the instructions supplied with each monitoring instrument.

Do not connect power to the OpHMI during installation

The following safety instructions must be observed at all time

- ☐ Read the operating instructions supplied with the components.
- ☐ The OpHMI components are part of a precision measuring system.
- ☐ Ensure cleanliness and take care during installation and removal.
- ☐ Do not take apart the OpHMI touch panel.

3.1 MECHANICAL INSTALLATION OF THE DISPLAY

- ☐ The OpHMI should be installed in a convenient location.
- ☐ Prepare the required cut-out in the console.
- ☐ Insert the OpHMI into the cut-out and screw the touch panel in position.

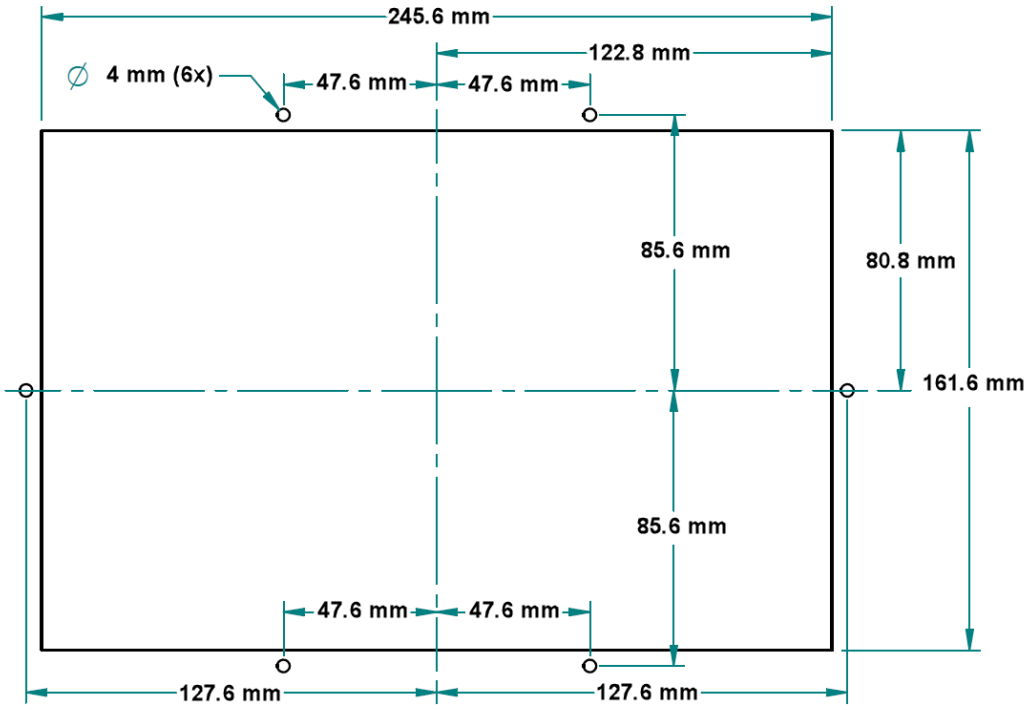


Figure 3 - Dimensions [mm] of the OpHMI cut-out for wheelhouse console

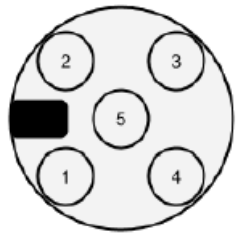
3.2 ELECTRICAL INSTALLATION AND PINOUT

The OpHMI comes with four serial communication ports (two RS232/RS422 and two RS485). Refer to the following table to match the pinout with the instruments.

Table 3: RS-485 Modbus Output Port Connection

OpHMI RS-485 Port	Third Party PLC
Pin 1: 0V	0V
Pin 2: RS-485 A+	RS-485 A+
Pin 3: RS-485 B-	RS-485 B-

Table 4: RS-485 Modbus OpModules (OpVI, OpTS, etc.) Port Connection



M12 Connector Pinout

OpHMI M12 RS-485 Port	OpModules IN M12 Connector
M12 Pin 1: Shield	Pin 1: Shield
M12 Pin 2: 24VDC Output	Pin 2: 24VDC Input
M12 Pin 3: 0VDC	Pin 3: 0VDC
M12 Pin 4: RS-485 A+	Pin 4: RS-485 A+
M12 Pin 5: RS-485 B-	Pin 5: RS-485 B-

Table 5: GPS NME A0183

Main Terminal	RS232 Mode	RS422 Mode
Terminal 1:	GND	GND
Terminal 2:	RX	RX+
Terminal 3:	NC	RX-
Terminal 4:	NC	TX+
Terminal 5:	TX	TX-

Table 6: AIS NMEA 0183

Main Terminal	RS232 Mode	RS422 Mode
Terminal 1:	GND	GND
Terminal 2:	RX	RX+
Terminal 3:	NC	RX-
Terminal 4:	NC	TX+
Terminal 5:	TX	TX-

Please note that some third-party instruments might not use the same wiring standard. The polarity of differential signals might need to be inverted for the device to successfully communicate with the OpHMI.

3.2.1 CONFIGURING THE COM PORTS MODE

The OpHMI's four communication ports usually come preconfigured to the user requirements. In the event the configuration needs to be updated, simply remove the back cover of the OpHMI and set the switches to the desired configuration.

Figure 4: OpHMI COM DIP Switches

Table 7: S1 (COM1) and S2 (COM2) RS232/RS422 mode selection

Mode	SW1	SW2	SW3	SW4	SW5
RS232	ON	ON	OFF	OFF	OFF
RS422	OFF	ON	OFF	OFF	ON*

*On short cable run, SW5 (End-of-Line resistor) might need to be OFF for the communication to work.

Table 8: S3-S4 (COM3) and S5-S6 (COM4) RS-485 configuration

State	Baud Rate Select				Termination Select		
	SW1	SW2	SW3	SW4	SW1	SW2	SW3
ON	9600	19200	38400	115200	Pull-up 680Ω	Pull-down 680Ω	EOL 120 Ω
OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF

4. SYSTEM OVERVIEW

The **OpHMI** can be configured to meet the requirements of a variety of users. For example, the system displayed hereafter is built for a ship configuration of twin engines as shown below.

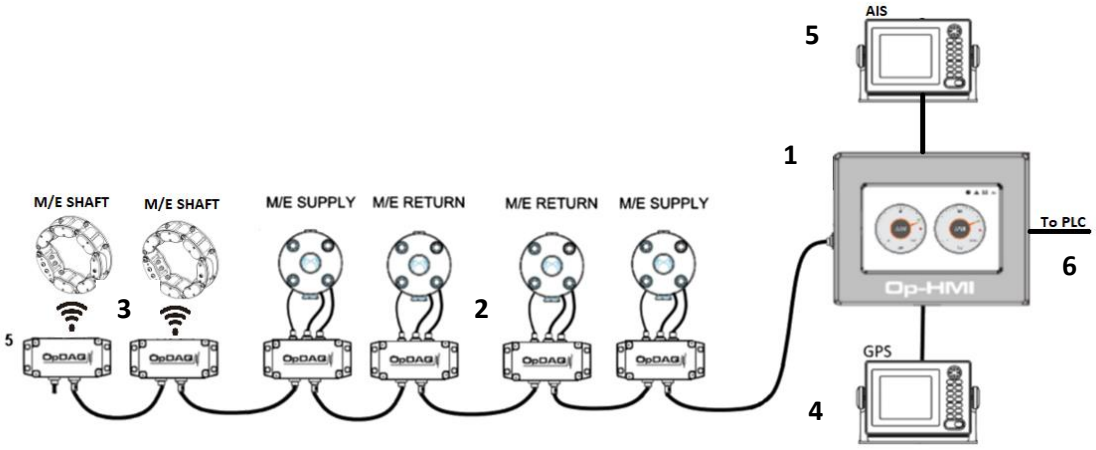


Figure 5 - System components overview for a ship configuration of twin engines.

1: OPHMI Monitoring and display unit

The OpHMI is a monitoring and control unit engineered to optimize day-to-day operations. It allows the configuration and display of information from high precision sensors.

2. KRAL Volumeters with OpDAQ OpVI

The KRAL volumetric flowmeters are positive displacement screw type flowmeters equipped with temperature sensors to ensure temperature-compensated measurements. They provide simple and reliable measurement of flow with typical measurements accuracy of 0.1% and repeatability of 0.01%. The flowmeters are interfaced with the OpDAQ OpModules units which transmit the data to Modbus.

3. OpDAQ OpTS torquemeter

The OpDAQ OpTS torquemeter is a wireless torque and power monitoring system. The batteries are sized to last more than a year. It is designed for applications that require ongoing measurement of torque, rpm and power.

4. GPS

The OpHMI is designed for connection to a GPS NMEA 0183 output. It monitors the GPS speed and provides SOG, COG, Position, Date and Time information.

5. AIS

The OpHMI is designed for connection to an AIS NMEA 0183 output. It can detect the closest vessel and use that information to automatically set the vessel operation mode.

6. Modbus repeater

A Modbus RTU output is available to share the instruments data to a PLC.

5. OpHMI SOFTWARE

OpHMI is a powerful tool specifically designed to collect, store, analyze and display sensor data. It can generate Excel reports. It also includes a configuration tool for the system instruments and sensors.

5.1 RESTARTING THE SYSTEM

To restart and reboot the system, press the Power button on the Main Terminal.

5.2 SOFTWARE OVERVIEW

Figure 6 – Software Overview

Table 9: General Navigation Tool Description

	Navigation tool	Description
1	***Notification Area***	System status and alarm notifications are always displayed at the top. This area indicates if the system is working properly or if errors occurred. The user may click on the notification area to display the errors detail.
2	***Main Menu***	The monitoring system is arranged into five main screens accessible through 5 buttons in the lower part of the screen. This menu never changes.
3	***Contextual Menu***	The contextual menu is found in the top right corner of the screen. The contextual menu enables access to more complex displays. Repeatedly pressing the Main menu button will also cycle between those displays.
4	***Day/Night Mode***	Toggles the display between day and night mode.

5.2.1 NOTIFICATION SYSTEM

The notification area can display various notifications. The notification area is directly linked to the event subscreen, but will only display a single notification. When more than one notification needs to be displayed to the user, only the highest priority notification will be displayed. A GREEN notification indicates that everything is running properly. A RED blanking notification is indicative of an error or a warning about the system. The user should always attest notifications and take the appropriate action before clearing them.

Table 10: Notification List

Type	Priority	Notification	Description
System	*1 (highest)*	*System Running*	System is running properly without any notification.
System	*1 (highest)*	*System Error*	System is running with error(s). The errors must to be fixed for this notification to be cleared.
System	*1 (highest)*	*System Warning*	Error(s) occurred but system was able to clear them and keep running without error. Make sure to attest the errors and take the appropriate action to make sure the system keeps running without errors.
Automatic Input	*2*	*Input Warning*	Automatic input overshoot was detected.

5.3 REAL TIME SCREEN

The "DATA" screen is used for the real-time display of the measured data from the system instrumentation (torquemeter, flowmeter, GPS, etc.). The REAL TIME screen displays all measured data including the following:

- Fuel consumption
- Specific fuel consumption
- Distance traveled
- GPS speed
- Shaft torque, power and RPM

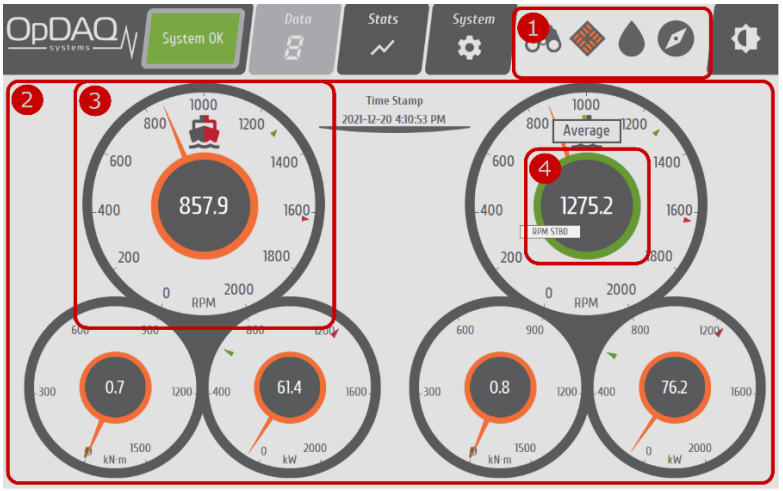


Figure 7 – Real Time Screen Example

Table 11: Real Time Screen Elements Description

	Navigation tool	Description
1	***Real Time Contextual Menu***	The *Real Time* contextual menu is built to include the ship overview according to the installed instrumentation and sensors.
2	***Real Time Instrument Values***	The *Real Time* screens display the actual values read from the sensors. A variety of gauges, bars and images may be used to display the data.
3	***Real Time Gauges & Graphical Element***	On all graphical elements, the following colors are used to display values: **Orange: Current Value** **Green: Voyage Average Value** **Red: Voyage Max Value**
4	***Gauge Statistics***	Click on the center of any gauge to cycle between **Current**, **Maximum** and **Average** value.

5.3.1 RESETTING AVERAGES & TOTALIZERS

Average and totalizer values are computed from current voyage data. To reset averages, you must start a new voyage. Refer to Table 12 for the procedure to save current voyage and start a new one.

5.4 STATS SCREEN

The stats screen can be used to get a deeper understanding of the engines. Two useful displays can be used to analyze the data: the running statistics and the graph. A third option  is available in the contextual menu to open the optional analysis modules.

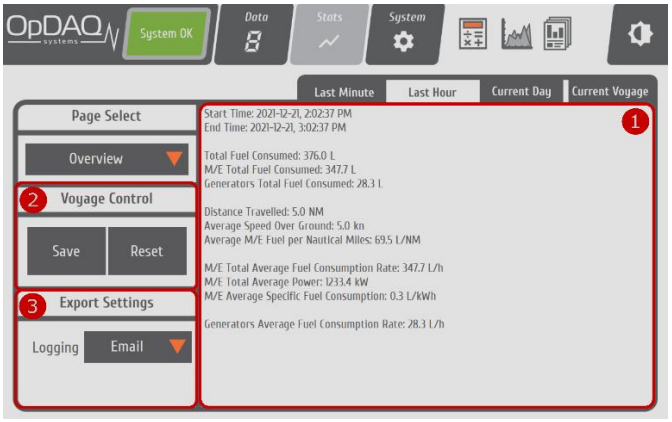


Figure 8 – Stats Screen Example

Figure 9 – Graph Screen Example

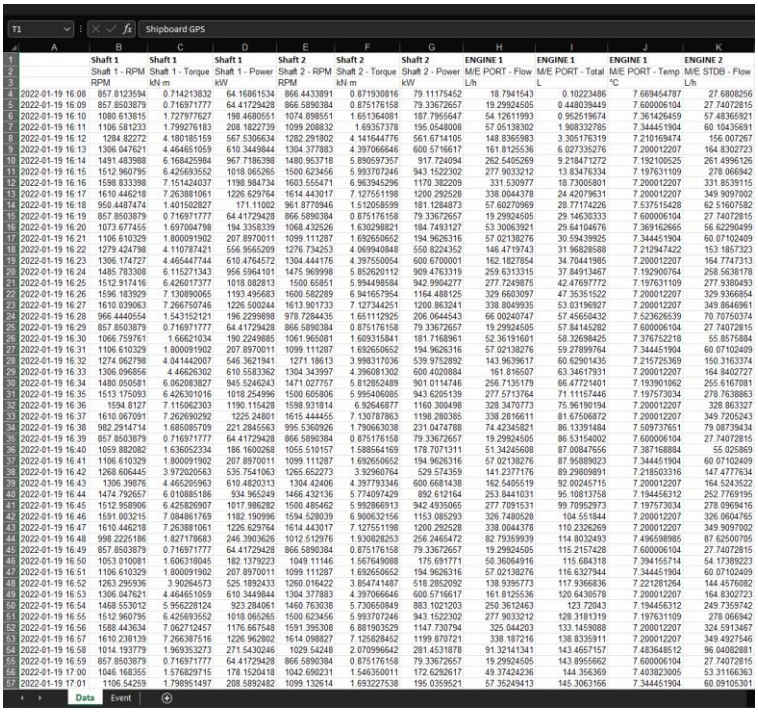
Table 12: Stats Screens Element Description

	Navigation tool	Description
1	***Statistics Display***	This section displays various statistics about the instrument inputs. For more complex systems, the statistics can be grouped on many pages and selected using the drop-down menu on the left. The time frame can also be adjusted to show the statistics for the last minute, last hour, last day or the last voyage.
2	***Voyage Control***	The voyage start/end time can be controlled with the “Save” and “Reset” buttons. Use the “Reset” button to clear the previous data and start a new voyage. Use the “Save” button to save the current voyage statistics. Make sure to save the current voyage before resetting the data since any unsaved data will be lost.
3	***Data Export Settings***	The data export method can be selected with those controls. If “email” is selected, then you will need to configure the email list in the general system configuration (refer to Figure 29). When USB is selected, make sure to also select the USB drive plugged into the OpHMI.
4	***Graph Display***	The graph can be used to visualize up to two parameters on a single graph. The graph is not meant to be a logging tool. It can be very powerful to understand the impact of a parameter on another input during the operations.

5.4.1 DAILY & VOYAGE REPORTING

The system data can be exported by email or by USB daily as well as at the end of a voyage. The exported data will include a .txt file giving the statistics. For daily reports, a minute-by-minute Excel file can also be added. When USB mode is enabled, the USB drive must be connected to the OpHMI for the generated reports to be stored to the drive. If no USB drive was connected when the report was created at midnight, the report will be lost. See below the procedure to enable the data export services:

1. Under “Settings → General Configuration → General → Export Report” (refer to Figure 29), enable the desired reports services.
    a. Optionally, the “Save Raw Data” can be enabled to output the raw data from the instrument in the minute-by-minute report. For example, this will add the Supply and Return data to a differential flowmeter instrument.
2. Under “Stats → Export Settings” (refer to Figure 8), select the logging type.
    a. When USB is selected, also select the USB Drive.
    b. When Email is selected, make sure to update the email distribution list under “Settings → General Configuration → Email → Recipients” (refer to Figure 29).



	A	B	C	D	E	F	G	H	I	J	K
1		Shaft 1	Shaft 1	Shaft 1	Shaft 2	Shaft 2	Shaft 2	ENGINE 1	ENGINE 1	ENGINE 1	ENGINE 2
2		Shaft 1 - RPM	Shaft 1 - Torque	Shaft 1 - Power	Shaft 2 - RPM	Shaft 2 - Torque	Shaft 2 - Power	M/E PORT - Flow	M/E PORT - Total	M/E PORT - Temp	M/E STDB - Flow
3		RPM	kN·m	kW	RPM	kN·m	kW	L/h	L	°C	L/h
4	2022-01-19 16:08	857.8123594	0.714213832	64.16861534	866.4433891	0.871930816	79.11175452	18.7941543	0.10223486	7.669454787	27.6808256
5	2022-01-19 16:09	857.8503879	0.716971777	64.41729428	866.5890384	0.875176158	79.33672657	19.29924505	0.448039449	7.600006104	27.74072815
6	2022-01-19 16:10	1080.613815	1.727977627	198.4680551	1074.898551	1.651364081	187.7955647	54.12611993	0.952519674	7.361426459	57.48365921
7	2022-01-19 16:11	1106.581233	1.799276183	208.1822739	1099.208832	1.69357378	195.0548008	57.05138302	1.908332785	7.344451904	60.10435691
8	2022-01-19 16:12	1284.82272	4.180185159	567.5306634	1282.291802	4.141644776	561.6714105	148.8365983	3.305176319	7.210169474	156.007267
9	2022-01-19 16:13	1306.047621	4.464651059	610.3449844	1304.377883	4.397066646	600.5716617	161.8125536	6.027335276	7.200012207	164.8302723
10	2022-01-19 16:14	1491.483988	6.168425984	967.7186398	1480.953718	5.890597357	917.724094	262.5405269	9.218471272	7.192100525	261.4996126
11	2022-01-19 16:15	1512.960795	6.425693552	1018.065265	1500.623456	5.993707246	943.1522302	277.9033212	13.83476334	7.197631109	278.066942
12	2022-01-19 16:16	1598.833398	7.151424037	1198.984734	1603.555471	6.963945296	1170.382209	331.530977	18.73005801	7.200012207	331.8539115
13	2022-01-19 16:17	1610.446218	7.263881061	1226.629764	1614.443017	7.127551198	1200.292528	338.0444378	24.42079631	7.200012207	349.9097002
14	2022-01-19 16:18	950.4487474	1.401502827	171.11002	961.8770946	1.512058599	181.1284873	57.60270969	28.77174226	7.537515428	62.51607582
15	2022-01-19 16:19	857.8503879	0.716971777	64.41729428	866.5890384	0.875176158	79.33672657	19.29924505	29.14630333	7.600006104	27.74072815
16	2022-01-19 16:20	1073.677455	1.697004798	194.3358339	1068.432526	1.630298821	184.7493127	53.30063921	29.64104676	7.369162665	56.62290499
17	2022-01-19 16:21	1106.610329	1.800091902	207.8970011	1099.111287	1.692650652	194.9626316	57.02138276	30.59439925	7.344451904	60.07102409
18	2022-01-19 16:22	1279.424798	4.110787421	556.9565209	1276.734253	4.069940848	550.8224352	148.4719743	31.96828588	7.212947422	153.1867323
19	2022-01-19 16:23	1306.174727	4.465447744	610.4764572	1304.444176	4.397550054	600.6700001	162.1827854	34.70441985	7.200012207	164.7747313
20	2022-01-19 16:24	1485.783308	6.115271343	956.5964101	1475.969998	5.852620112	909.4763319	259.6313315	37.84913467	7.192900764	258.5638178
21	2022-01-19 16:25	1512.917416	6.426017377	1018.082813	1500.65851	5.994498584	942.9904277	277.7249875	42.47697772	7.197631109	277.9380493
22	2022-01-19 16:26	1596.183929	7.130890065	1193.495683	1600.582289	6.941657954	1164.488125	329.6603097	47.35351522	7.200012207	329.9366854
23	2022-01-19 16:27	1610.039083	7.266750746	1226.5002444	1613.901733	7.127344251	1200.863241	338.8049935	53.03196827	7.200012207	349.8646961
24	2022-01-19 16:28	966.4440554	1.543152121	196.2299898	978.7284435	1.651112925	206.0644543	66.00240747	57.45650432	7.523626539	70.70750374
25	2022-01-19 16:29	857.8503879	0.716971777	64.41729428	866.5890384	0.875176158	79.33672657	19.29924505	57.84145282	7.600006104	27.74072815
26	2022-01-19 16:30	1066.759761	1.66621034	190.2249885	1061.965081	1.609315841	181.7168961	52.36191601	58.32698425	7.376752218	55.8575884
27	2022-01-19 16:31	1106.610329	1.800091902	207.8970011	1099.111287	1.692650652	194.9626316	57.02138276	59.27899764	7.344451904	60.07102409
28	2022-01-19 16:32	1274.862798	4.041442007	548.3621941	1271.18613	3.998317036	539.9752892	143.9639617	60.62901435	7.215725369	150.3163374
29	2022-01-19 16:33	1306.096856	4.46626302	610.5583362	1304.343997	4.396081302	600.4020884	161.816507	63.34617931	7.200012207	164.8402727
30	2022-01-19 16:34	1480.050581	6.062083827	945.5246243	1471.027757	5.812852489	901.0114746	256.7135179	66.47721401	7.193901062	255.6167081
31	2022-01-19 16:35	1513.175093	6.426301016	1018.254996	1500.605806	5.995406085	943.6205139	277.5713764	71.11157446	7.197573034	278.7638863
32	2022-01-19 16:36	1594.8127	7.115062303	1190.115428	1598.931814	6.92646877	1160.300498	328.3470773	75.96190194	7.200012207	328.8633727
33	2022-01-19 16:37	1610.067091	7.262690292	1225.24891	1615.444455	7.130787863	1198.280385	338.2816611	81.67506872	7.200012207	349.7205243
34	2022-01-19 16:38	982.2914714	1.685085709	221.2845563	995.5360926	1.790663038	231.0474788	74.42345821	86.13391484	7.509737651	79.08739434
35	2022-01-19 16:39	857.8503879	0.716971777	64.41729428	866.5890384	0.875176158	79.33672657	19.29924505	86.53154002	7.600006104	27.74072815
36	2022-01-19 16:40	1059.882082	1.636052334	186.1600268	1055.510157	1.588564169	178.7071311	51.34245608	87.00847656	7.387168884	55.025869
37	2022-01-19 16:41	1106.610329	1.800091902	207.8970011	1099.111287	1.692650652	194.9626316	57.02138276	87.96889023	7.344451904	60.07102409
38	2022-01-19 16:42	1268.606445	3.972020563	535.7541063	1265.652273	3.92960764	529.574359	141.2377176	89.29809891	7.218503316	147.4777634
39	2022-01-19 16:43	1306.39876	4.465205963	610.4820313	1304.42406	4.397793346	600.6681438	162.5405519	92.00245715	7.200012207	164.5243522
40	2022-01-19 16:44	1474.792657	6.010885186	934.965249	1466.432136	5.774097429	892.612164	253.8441031	95.10813758	7.194456312	252.7769195
41	2022-01-19 16:45	1512.958906	6.425826907	1017.986282	1500.485462	5.992866913	942.4935065	277.7091531	99.70952973	7.197573034	278.0969416
42	2022-01-19 16:46	1591.003215	7.044861769	1182.190996	1594.528039	6.900632156	1153.085293	326.7480528	104.5518444	7.200012207	326.0604765
43	2022-01-19 16:47	1610.446218	7.263881061	1226.629764	1614.443017	7.127551198	1200.292528	338.0444378	110.2326269	7.200012207	349.9097002
44	2022-01-19 16:48	998.2225186	1.827178683	246.3903626	1012.512976	1.930828253	256.2465472	82.79369939	114.8032493	7.496598985	87.62500705
45	2022-01-19 16:49	857.8503879	0.716971777	64.41729428	866.5890384	0.875176158	79.33672657	19.29924505	115.2157428	7.600006104	27.74072815
46	2022-01-19 16:50	1053.010081	1.606318045	182.1379223	1049.11146	1.567649088	175.691771	50.36064916	115.684318	7.394155714	54.17389223
47	2022-01-19 16:51	1106.610329	1.800091902	207.8970011	1099.111287	1.692650652	194.9626316	57.02138276	116.6327944	7.344451904	60.07102409
48	2022-01-19 16:52	1263.295936	3.90264573	525.1892433	1260.016422	3.854741487	518.2852092	138.9395773	117.9366836	7.221281264	144.4576082
49	2022-01-19 16:53	1306.047621	4.464651059	610.3449844	1304.377883	4.397066646	600.5716617	161.8125536	120.6430578	7.200012207	164.8302723
50	2022-01-19 16:54	1468.553012	5.956228124	923.284061	1460.763038	5.730650849	883.1021203	250.3612463	123.72043	7.194456312	249.7359742
51	2022-01-19 16:55	1512.960795	6.425693552	1018.065265	1500.623456	5.993707246	943.1522302	277.9033212	128.3181319	7.197631109	278.066942
52	2022-01-19 16:56	1588.443634	7.062712457	1176.667548	1591.395308	6.881903529	1147.730794	325.644203	133.1453698	7.200012207	324.5913467
53	2022-01-19 16:57	1610.238139	7.266387516	1226.962802	1614.098827	7.125828452	1199.870721	338.187216	138.8335911	7.200012207	349.4927546
54	2022-01-19 16:58	1014.193779	1.969353273	271.5430246	1029.54248	2.070996642	281.4531878	91.32141341	143.4657157	7.483648512	96.04082881
55	2022-01-19 16:59	857.8503879	0.716971777	64.41729428	866.5890384	0.875176158	79.33672657	19.29924505	143.8955662	7.600006104	27.74072815
56	2022-01-19 17:00	1046.168355	1.576829715	178.1520418	1042.690231	1.546350911	172.6292617	49.37424236	144.366369	7.403823005	53.31166363
57	2022-01-19 17:01	1106.54259	1.798951497	208.5892482	1099.132614	1.693227538	195.0359521	57.35249413	145.3063166	7.344451904	60.0910301

Figure 10 – Raw Minute-by-Minute Report Example

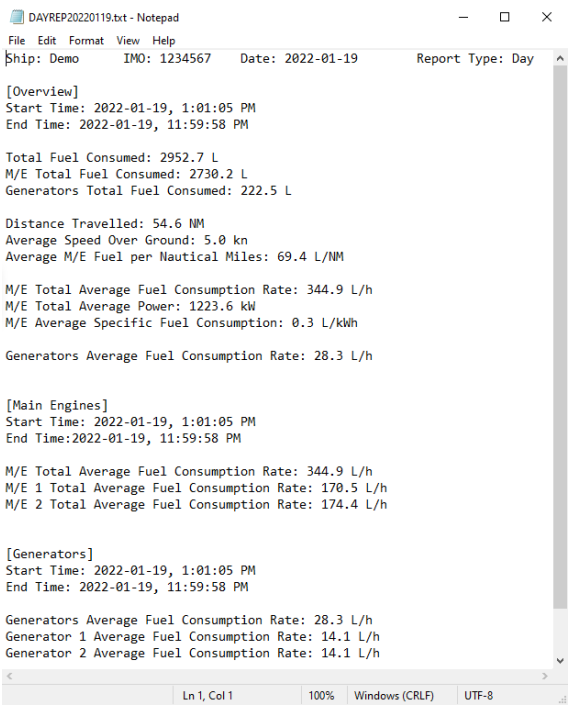


Figure 11 – Daily Report Example

5.4.2 ANALYSIS MODULES

The OpHMI can optionally come with various data analysis tools. These tools can generate reports on demand and display the result on the screen. The reports can also be exported in an Excel format. The OpHMI is usually configured to archive data for the last 365 days.

5.4.2.1 USB EXPORT

Acquired data may be exported on a USB memory stick. Three data types are available. “Standard ACQ” offers the raw data exportation. Excel data exportation for Microsoft Excel. The Excel file is the same as the automated daily reporting but using a higher frequency (second-by-second). “Hi-Speed ACQ” is a customized exportation format designed specifically for TDMS file format.

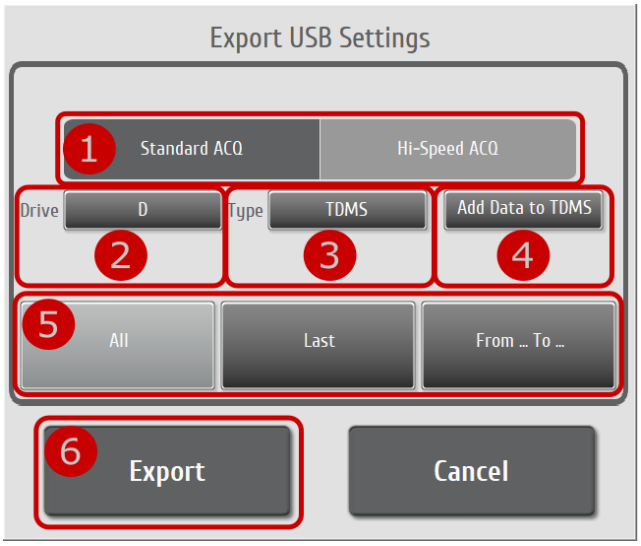


Figure 12 – USB Export Screen

Table 13 : USB Data Exportation Procedure

	Connect the USB memory stick to the remote USB port.
	Open the USB Export utilities located in “Stats →  ”.
1	Select the acquisition type. (Only available on systems supporting Hi-Speed Acquisition)
2	Select USB Drive to export the data.
3	Choose file type (Data or Excel for “Standard ACQ”. TDMS for “Hi-Speed ACQ”).
4	Optionally chose “Standard ACQ” data to append to TDMS files (only available in “Hi-Speed ACQ”).
5	Choose the dates to be exported (EXPORT ALL; EXPORT LAST or EXPORT From… To…). If EXPORT From… To… is selected, choose dates to export.
6	Click “Export” to start the exportation process.
	Remove the USB memory stick from the USB connection.

5.4.2.2 SEA TRIAL

The Sea Trial Module is a helpful and powerful add-on to measure, compare and benchmark vessel performance and efficiency. This module allows the user to record laps and automatically computes the data. This gives precious information on engine performance for each lap. When using this module, a keyboard is recommended to enter the name tag.

5.4.2.2.1 SEA TRIAL MODULE OVERVIEW

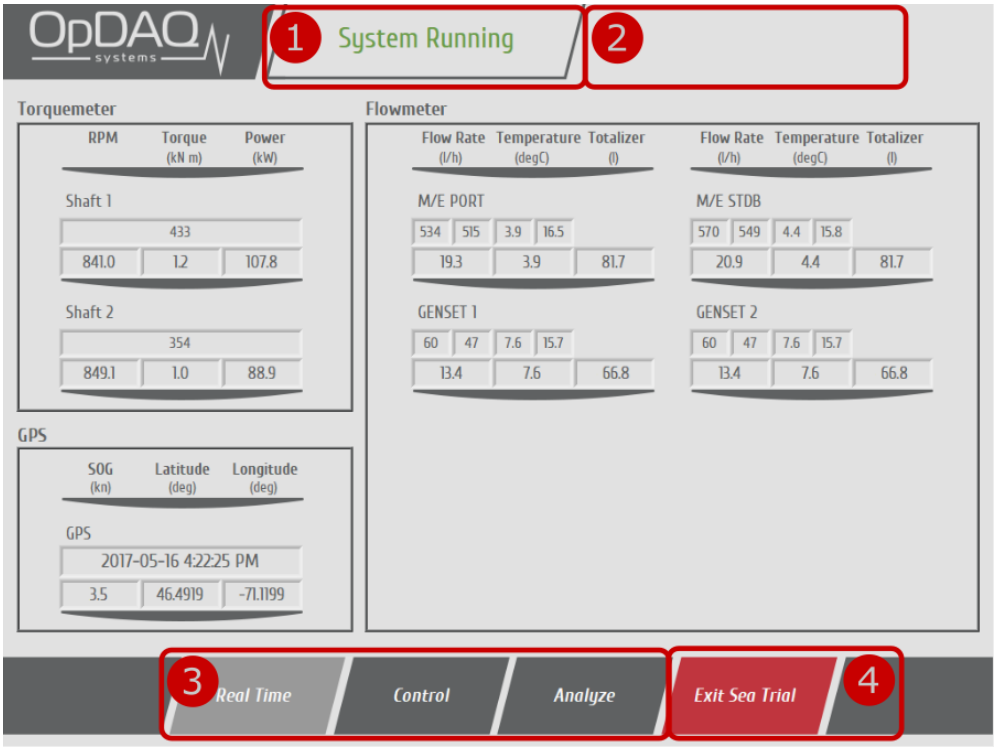


Figure 13 – Sea Trial Main Screen

Table 14: Sea Trial General Navigation Tool Description

	Navigation tool	Description
1	***Notification Area***	System alarm notification is always displayed at the top. This area indicates if the system is working properly during sea trials. The user must leave the Sea Trial module to display errors detail.
2	***Contextual Menu***	The *Analyze* screen holds a contextual menu to display each sensor details. Repeatedly press a main button will also cycle between the different contextual screens.
3	***Main Menu***	The Sea Trial module is arranged into three main screens. This menu does not change.
4	***Exit***	To exit the Sea Trial module and return to the monitoring system screens, press the Exit Sea Trial button.

5.4.2.2.2 RUN A NEW SEA TRIAL

The Sea Trial module is designed to record lap data as easily as recording time with a chronometer.

Figure 14 – Sea Trial Control Screen

Table 15: Record a New Sea Trial Procedure

1	Select the control screen.
2	Enter a new sea trial name. (If no sea trial name is entered, the default name will show date/time).
3	Press “Begin Sea Trial” to create new sea trial data.
4	Enter a lap name. (If no lap name is specified, an increasing number will be used.)
5	Press “Start Lap” when ready to record lap data.
6	Make sure the “Start Lap” request was received (GREEN) by the master. If the request has not been received, high-speed acquisition will be lost but normal acquisition can be recovered as long has the master is recording. Ensure the connection between the repeater and the master is still up when a request was not acknowledged (RED).
7	Press “Stop Lap” to end the recording of lap data. To record a new lap, repeat steps 4 to 6
8	Press “End Sea Trial” to close current sea trial.

5.4.2.2.3 COMPUTE SEA TRIAL DATA

Once Sea Trial data has been recorded, the user may compute past Sea Trial recordings using the compute function. Any previous Sea Trial data may be computed by selecting a date to compute.

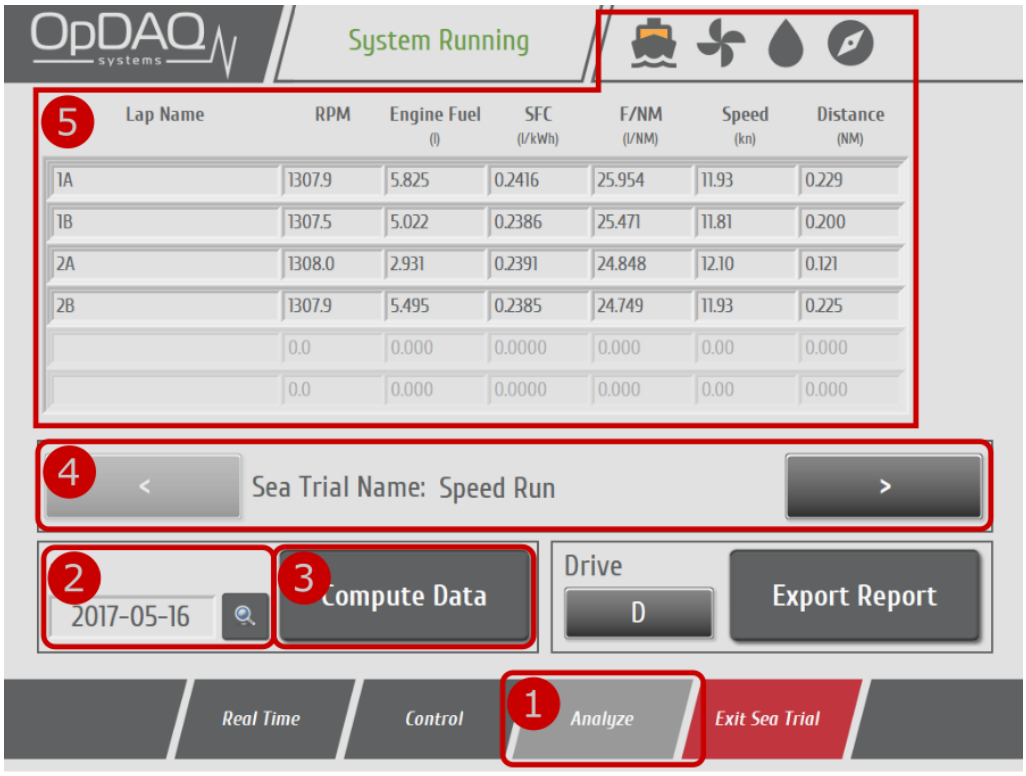


Figure 15 – Sea Trial Analyze Screen – Compute

Table 16: Computing Recorded Sea Trial Data Procedure

1	Select the Analyze screen by clicking the Analyze button.
2	Select a date to fetch data for (default date is the current day).
3	Press “Compute” to start the compute process.
4	Select the Sea Trial name to display.
5	Analyze data. The first screen (Overview) is customizable to the needs of the user.

5.4.2.2.4 EXPORT SEA TRIAL DATA

Sea Trial computed data may be exported to a USB flash drive. The data tables will be exported in a simple html file that can be read on any computer using the default web browser.

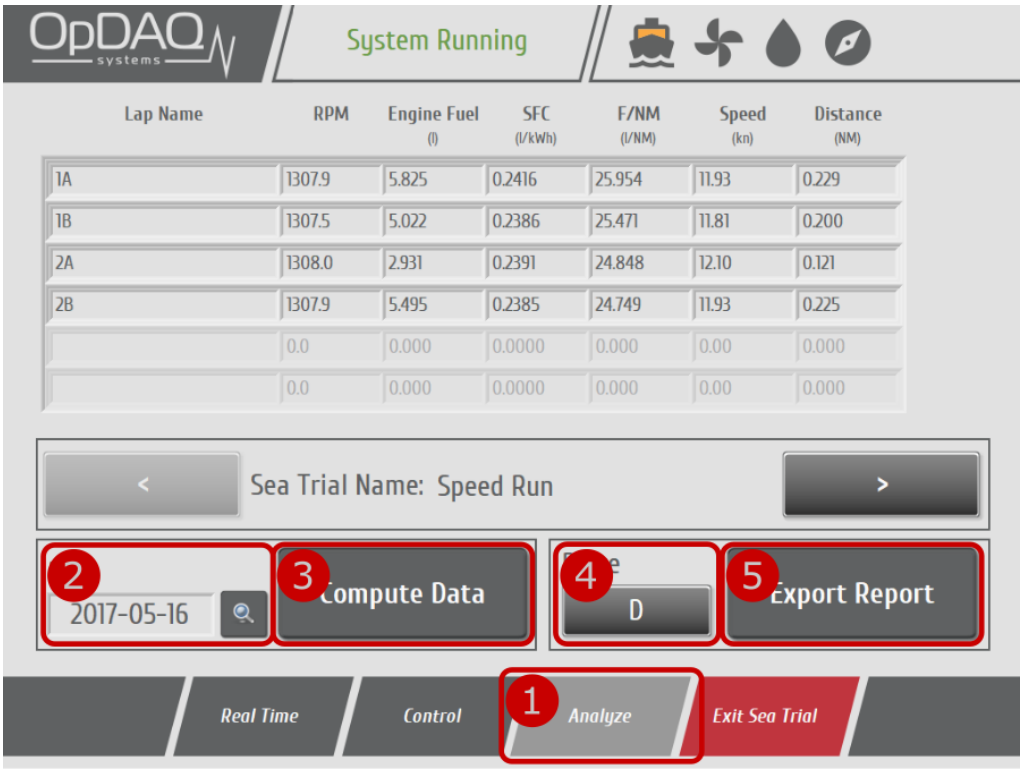


Figure 16 – Sea Trial Analyze Screen – Export

Table 17: Exporting Sea Trial Data Procedure

	Plug the USB flash drive to the terminal.
1	Select the analyze screen by clicking the Analyze button.
2	Select a date to fetch data for (default date is the current day).
3	Press “Compute” to start the compute process.
4	Select the USB drive to export data.
5	Press “Export Report” to copy the report on a USB memory stick.

5.4.2.3 DAILY REPORT

The Daily Report module, once enabled, automatically generate a report at the end of each day. The generated report displays the ship overview including key performance indicators (Specific Fuel Consumption, Fuel per Nautical Mile, etc.) Detailed engines, shafts, GPS and electrical power information are included as well with each report. Daily Reports are a simple tool to get a quick overview of the ship performance over time as well as to monitor the ship daily usage.

5.4.2.3.1 DISPLAY PREVIOUS DAILY REPORT

The Daily Report module will back up every report on the hard drive. Previous daily reports can be loaded by selecting the date of an archived report.

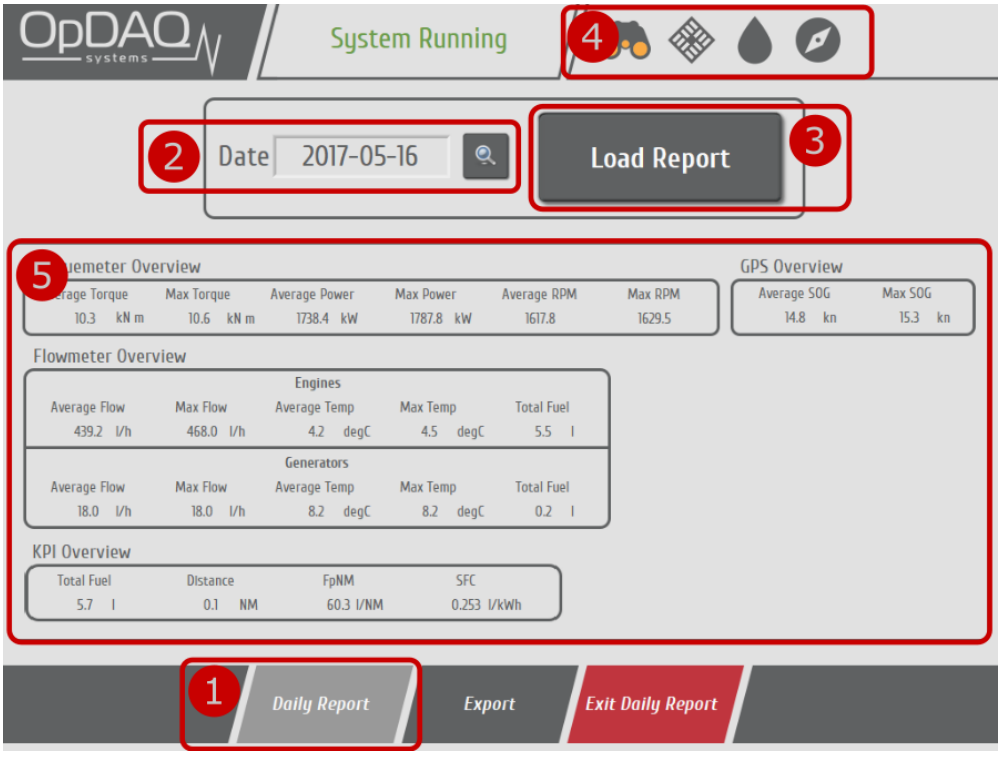


Figure 17 – Daily Report Main Screen

Table 18: Loading Previous Daily Report Procedure

	Open Daily Report module under "Stats → ".
1	Select the Daily Report screen.
2	Select a valid date to fetch a report (default is yesterday).
3	Press "Load Report" to load the selected daily report.
4	Select the information you wish to display. (e.g., select the binoculars to display the ship overview.)
5	Analyze the data. The first screen (Overview) is customizable to fit the user's preferences.

5.4.2.3.2 EXPORT PREVIOUS DAILY REPORT

Daily Report can be exported at any time on a USB drive in Excel format.

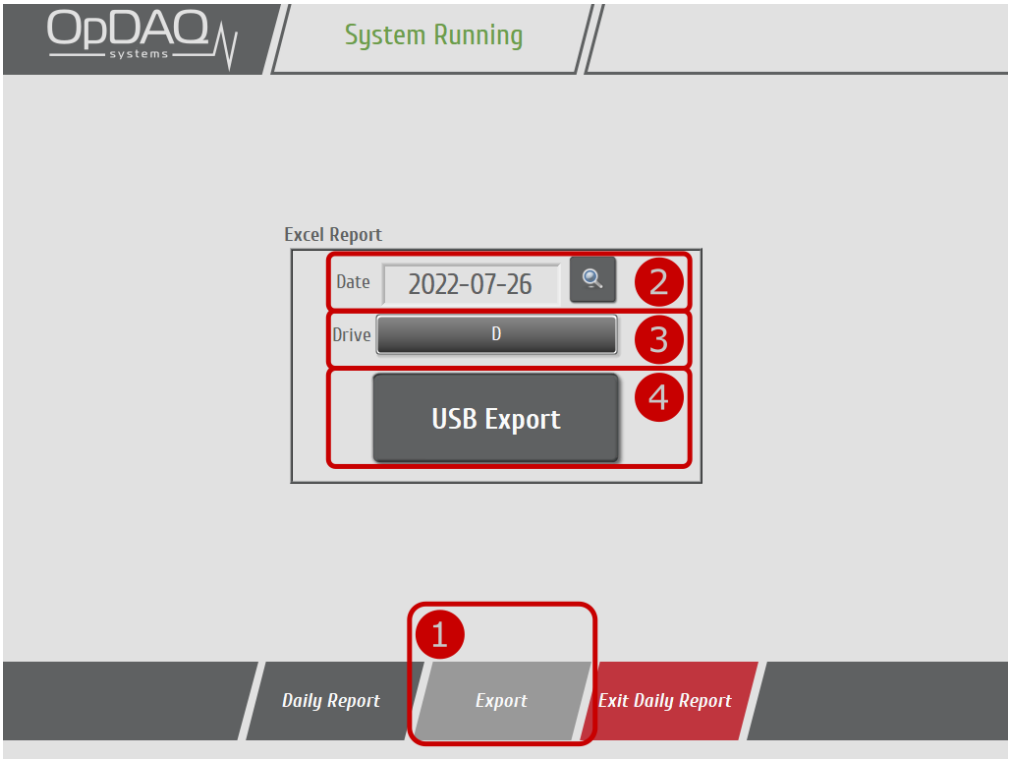


Figure 18 – Daily Report Export Screen

Table 19: Exporting Previous Daily Report Procedure

	Open Daily Report module under "Stats →  ".
1	Select the Export screen.
2	Select a valid date to fetch report for (default date is yesterday).
3	Select USB Drive to export report to.
4	Press "USB Export" to load the selected Daily Report and export it to the USB drive. Exported report data is formatted in an Excel file format.

5.4.2.4 VOYAGE REPORT

The Voyage Report module allows the user to generate a report for any period larger than a single day. This module can be useful to monitor and compare ship voyage performance. The generated voyage report displays the same data as the daily report but over a user-controlled period. Any previously recorded voyage will be lost if a new voyage is saved the same day.

5.4.2.4.1 START & SAVE VOYAGE

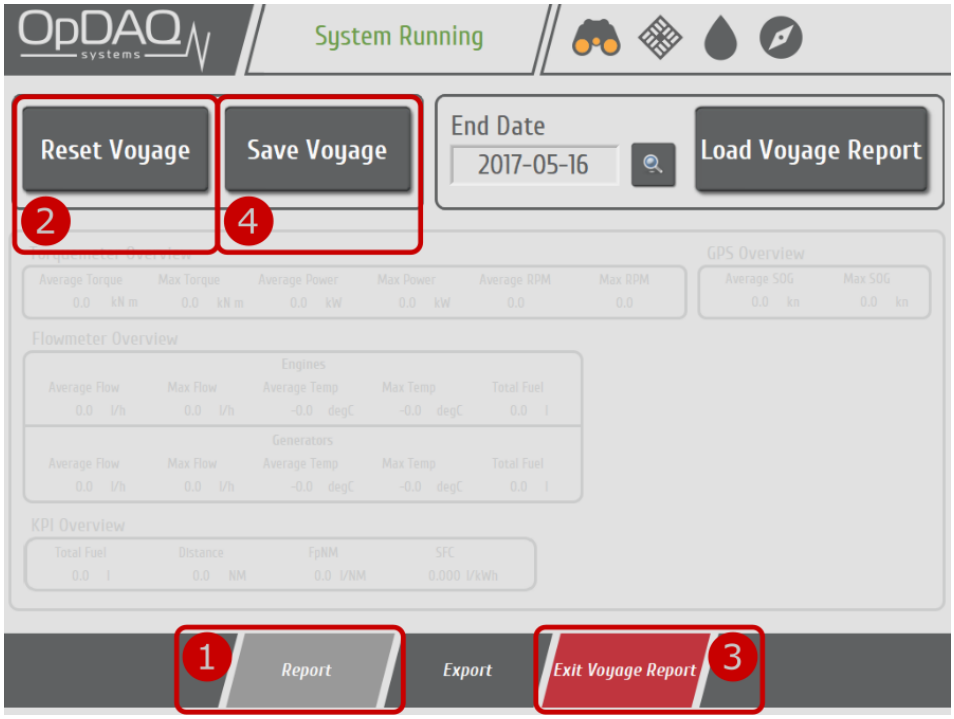


Figure 19 – Create and Save Voyage Report

Table 20: Creating a New Voyage Report Procedure

	Starting a New Voyage Procedure
	Open Voyage Report module under "Stats →  ".
1	Select the Report screen.
2	Reset Voyage to start recording voyage data. *Warning: All previous unsaved voyage statistics will be lost. Make sure to save the current voyage first.*
3	Exit Voyage Report and continue using the system as needed.
	Saving Current Voyage Procedure
	Open Voyage Report module under "Stats →  ".
1	Select the Report screen.
2	Press the "Save Voyage" button to compute the voyage statistics and archive the current voyage report.

5.4.2.4.2 DISPLAY PREVIOUS VOYAGE REPORT

The Voyage Report module will back up every saved report on the hard drive. Previous voyage reports can be loaded by selecting the date of the last recorded day of a voyage report.

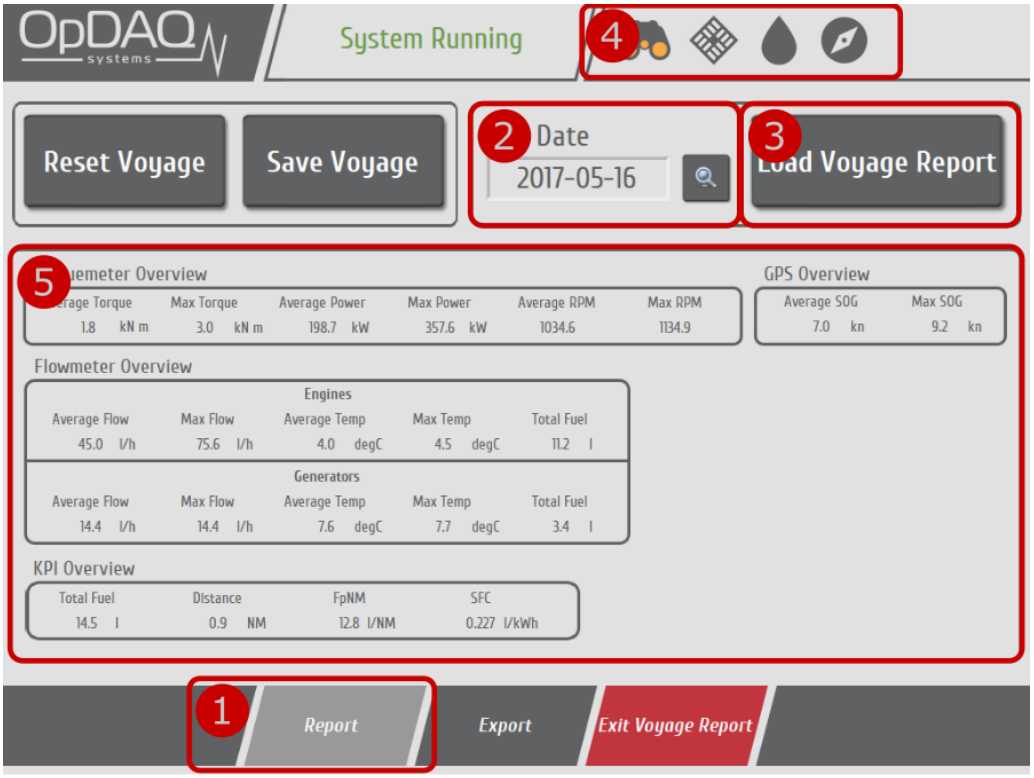


Figure 20 – Voyage Report Main Screen

Table 21: Loading Previous Voyage Report Procedure

	Open Voyage Report module under "Stats →  ".
1	Select the Report screen.
2	Select a valid date for a voyage to fetch report.
3	Press "Load Voyage Report" to load the selected voyage report.
4	Select the information to display (e.g., select the binoculars to display the ship overview).
5	Analyze the data. The first screen (Overview) is customizable to fit the user's preferences.

5.4.2.4.3 EXPORT PREVIOUS VOYAGE REPORT

Voyage Report can be exported at any time on a USB drive in Excel format.

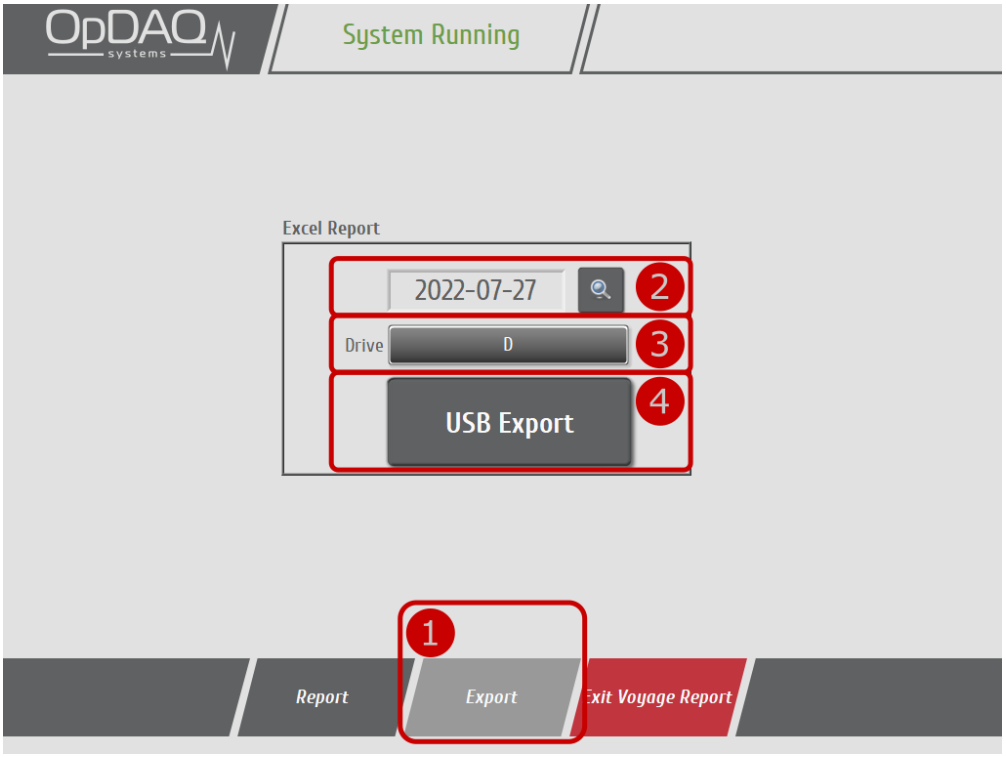


Figure 21 – Voyage Report Export Screen

Table 22: Exporting Voyage Report Procedure

	Open Voyage Report module under "Stats →  ".
1	Select the Export screen.
2	Select a valid voyage date to fetch report.
3	Select the USB drive to export the report to.
4	Press "USB Export" to load the selected voyage report and export it to the USB drive. Exported report data is formatted in an Excel file format.

5.4.2.5 CUSTOM REPORT

The Custom Report module, once enabled, allows the user to manually generate a report using a specific time and date. The generated report time frame can be as small as 5 minutes and as large as multiple years. The generated report displays the ship overview including key performance indicator (specific fuel consumption, fuel per nautical mile, etc.). Detailed engines, shafts and GPS information is also included with the generated report.

5.4.2.5.1 GENERATE A CUSTOM REPORT

Custom reports are generated at the user request and are not saved on the local hard drive. Each time the user requests a report, it is calculated from the raw data. It can take up to several minutes to compute when the report time frame contains multiple days.

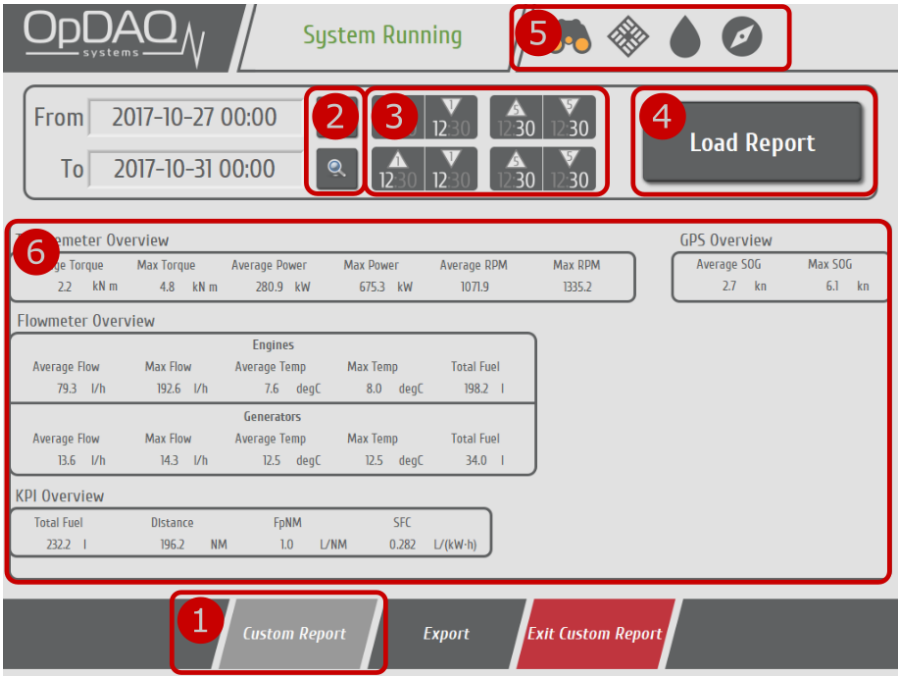


Figure 22 – Custom Report Main Screen

Table 23: Generating a Custom Report Procedure

	Open Custom Report module under "Stats →  ".
1	Select the Custom Report screen.
2	Select the dates to fetch daily reports or raw data.
3	Select the time to generate reports. The smallest time increment/decrement is five minutes.
4	Press "Load Report" to generate the report for the selected data and time.
5	Select the information to display (e.g., select the binoculars to display ship overview).
6	Analyze the data. The first screen (Overview) is customizable to fit the user's preferences.

5.4.2.5.2 EXPORT A CUSTOM REPORT

Custom Reports can be exported at any time on a USB drive in Excel format.

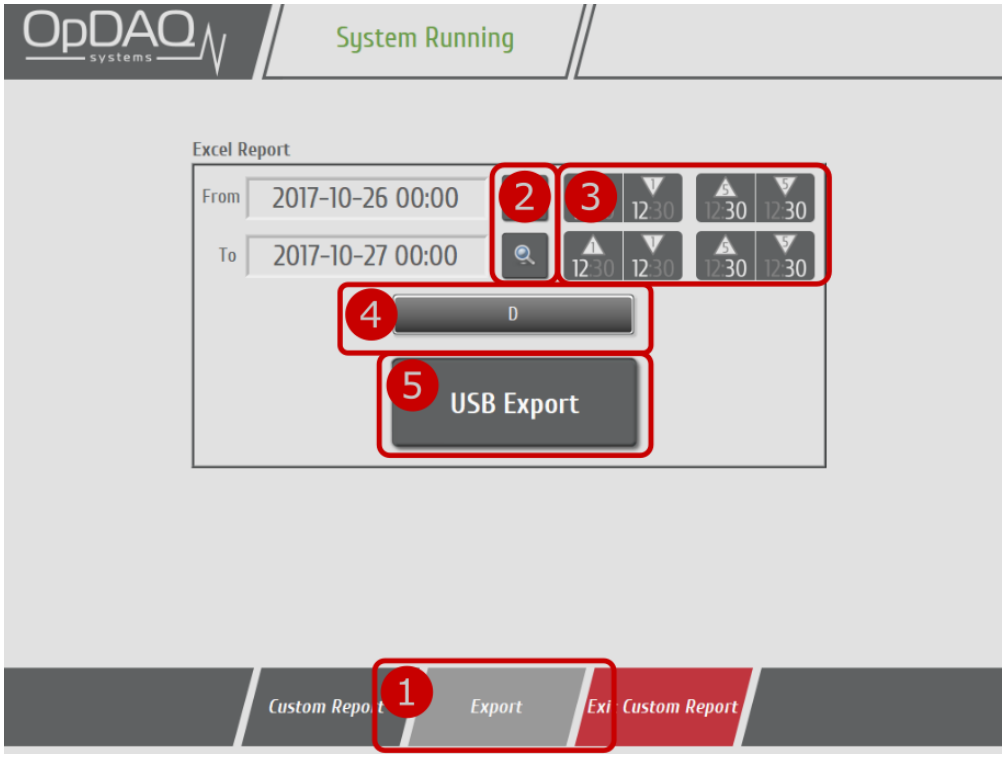


Figure 23 – Custom Report Export Screen

Table 24: Exporting a Custom Report Procedure

	Open Custom Report module under "Stats →  ".
1	Select the Export screen.
2	Select the dates to fetch daily reports or raw data (dates containing data are orange in calendar display).
3	Select the time to generate the report. Smallest time increment/decrement is five minutes.
4	Select the USB drive to export report to.
5	Press "USB Export" to load the selected daily report and export it to the USB drive. Exported report data are formatted in an Excel file format. It may take some time to generate and export the report.

5.5 SYSTEM SCREENS

The system screen gathers many useful interfaces to configure the system and get the status.

5.5.1 HOME SUBSCREEN

The System Status and System View provide a quick overview of the system and instrument status. The operation control, on the other hand, is a powerful tool to automatically detect the vessel current operational mode. The screen can be used to display the current mode detected by the system. This feature **MUST** be used with OpFleet. It is detailed in the OpFleet User Manual.

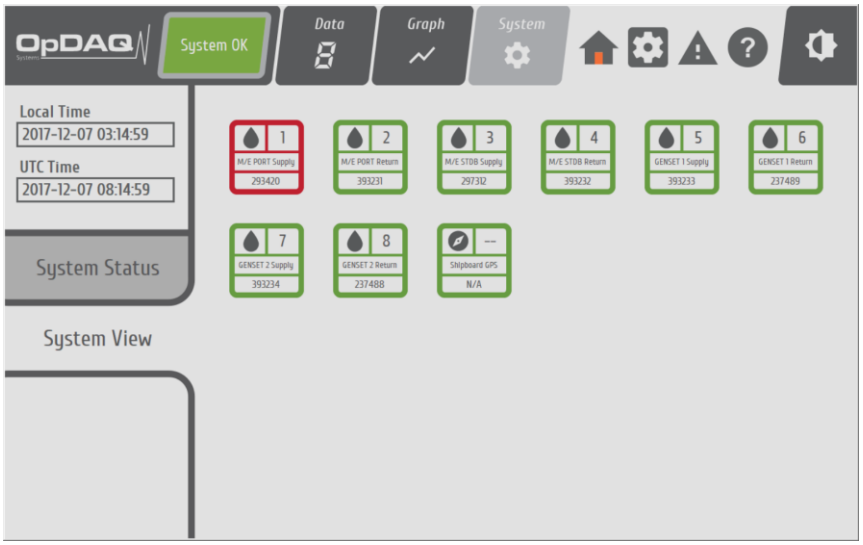


Figure 24 – System View

The icon colors indicate the instrument status:

Color	Status
Green	OK
Yellow	Instrument warning
Red	Instrument error

5.5.2 CONFIG SUBSCREEN

This screen is locked to the normal everyday user. To unlock it and configure the system, refer to section 6. SOFTWARE CONFIGURATION.

5.5.3 EVENT SUBSCREEN

This display will show the information recorded at a specific date/time. These events can be system warnings, user automatic inputs and instrument errors. This screen is helpful for troubleshooting.

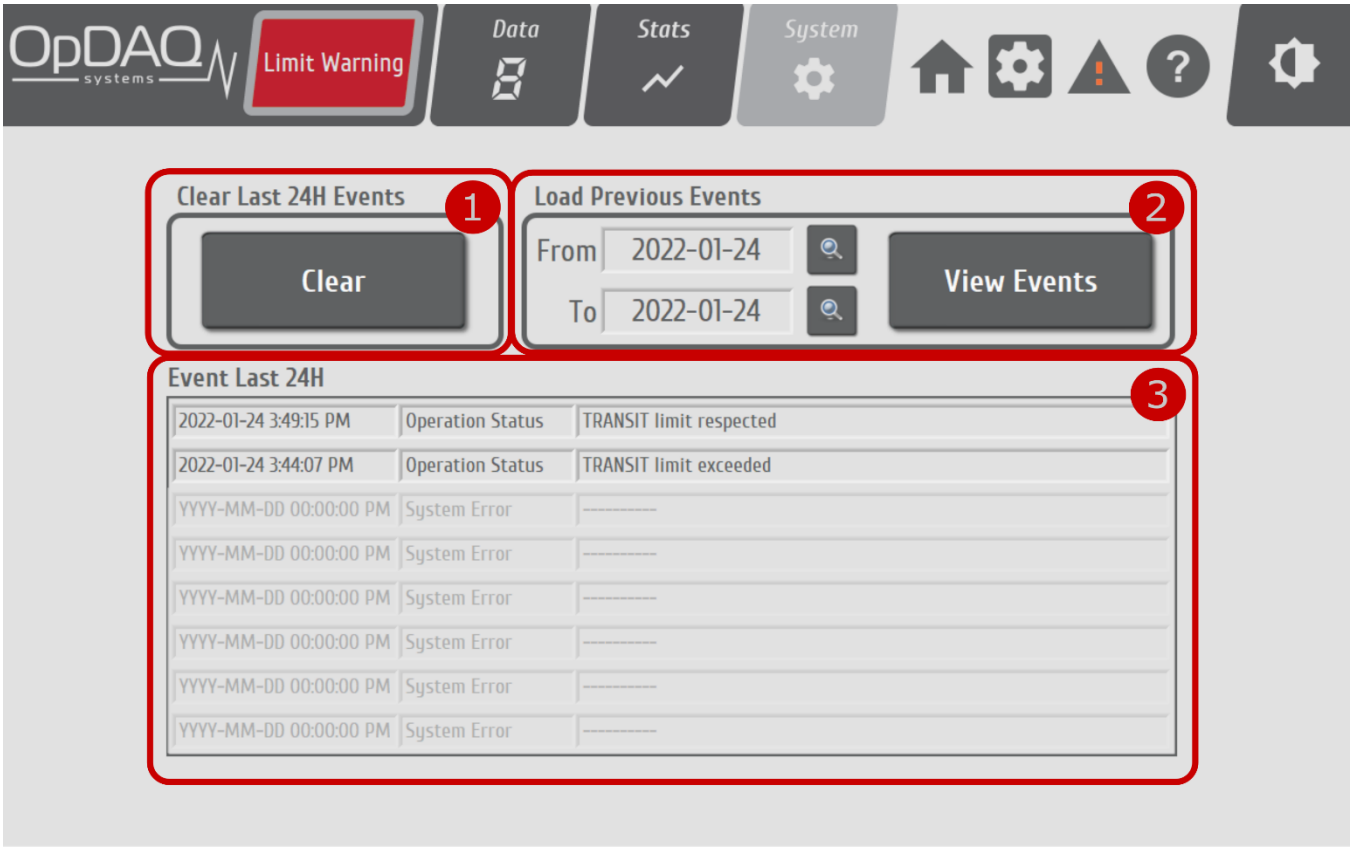


Figure 25 – Event Subscreen

Table 25: System Event Element Description

	Navigation tool	Description
1	***Clear System Events***	This button clears all events from the Last 24h list. All unfixed error events and valid user automatic events will show back on this list as soon as it is cleared.
2	***Load Previous Events***	This area allows the user to view all past errors, warnings and events. To view a single day, enter the same date in both the "From" and "To" selectors.
3	***Event Last 24H***	This box shows a list of all the events that occurred last 24 hours.

5.5.4 CONTACT SUBSCREEN

This subscreen shows the system version and the support contact information.

6. SOFTWARE CONFIGURATION

6.1 SYSTEM FIRST START-UP

At first system start-up, the user will have to set the software initial configuration and enter the provided activation code. Those entries will be saved and will not be needed afterward on future system start-up.

6.1.1 SOFTWARE INITIALIZATION

The initialization screen presented below will appear at first system start-up. All file and folder paths are automatically populated if found. The system can still be re-initialized if needed. To do so, go to system settings and press “Reset”.

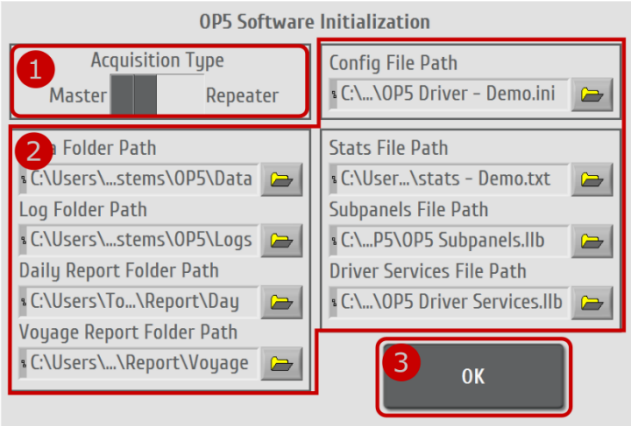


Figure 26 – Initialization screen

Table 26: Software Initialization Procedure

1	***Acquisition type***	Select “Acquisition Type” (Master is the main terminal and Repeater is a UDP terminal).
2	***File path***	Make sure that all paths are found.
3	***OK Button***	Press OK to accept the initial configuration and start system.

Table 27: Software Initialization Parameter Description

Parameter	Description	File Type
Config Path	Master system config file. This file describes the vessel configuration.	.ini
UDP Port	Repeater UDP Port to connect to master system.	---
Data Folder Path	Folder to store acquisition data files.	---
Log Folder Path	Folder to store system log files.	---
Daily Report Folder Path	Folder to store daily report data files.	---
Voyage Report Folder Path	Folder to store voyage report data files.	---
Stats File Path	Template file for stats display.	.txt
Subpanels File Path	Subpanels library for specific Real-Time displays.	.llb
Driver Services File Path	Service library to read instruments status and values.	.llb

6.1.2 SYSTEM ACTIVATION

The first time the system is started, the provided activation code must be entered to unlock the system. If, no activation code was provided, follow the procedure detailed in the following figure.

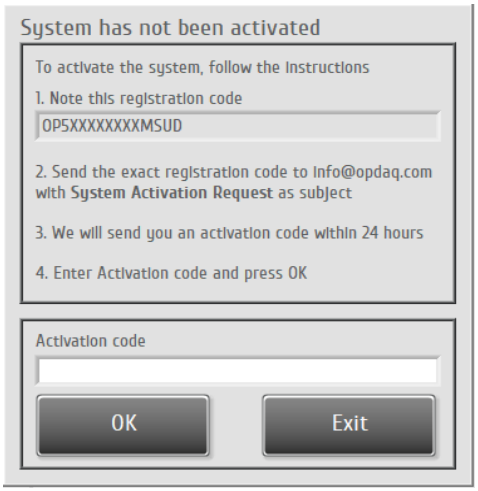


Figure 27 – System activation screen

6.2 SYSTEM SETTINGS

To enter the System Settings mode, press the  button on the system page. When prompted enter the password « 1487 » using the numerical pad and press OK. Once the password is entered, the Configuration Screen will appear. The Configuration Screen is divided in 2 vertical submenus: "*Instrument Setup*" and "*System Setup*". The Instrument Setup menu reflects the user's acquisition instrument package. The System Setup menu is used to access the system general configuration features and to update the system software. The Configuration Screen will go back to a locked state after 15 minutes without modification or by using the "Lock Settings" button.

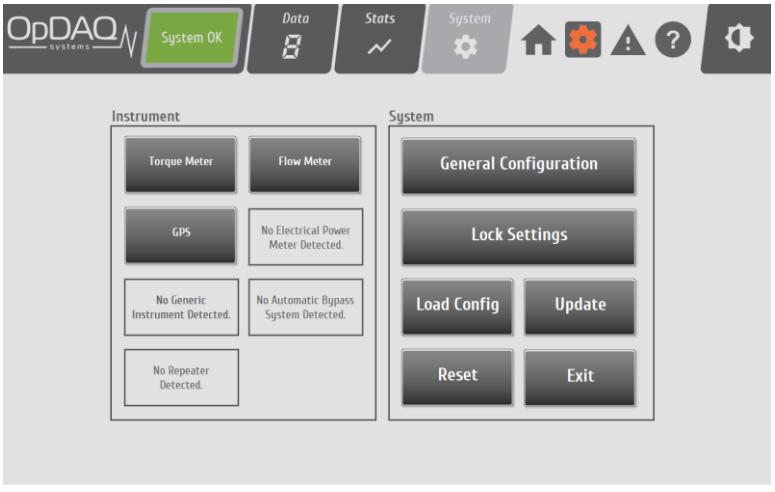


Figure 28 – Configuration Screen

6.2.1 GENERAL CONFIGURATION

This menu provides access to the system general configuration functionalities.

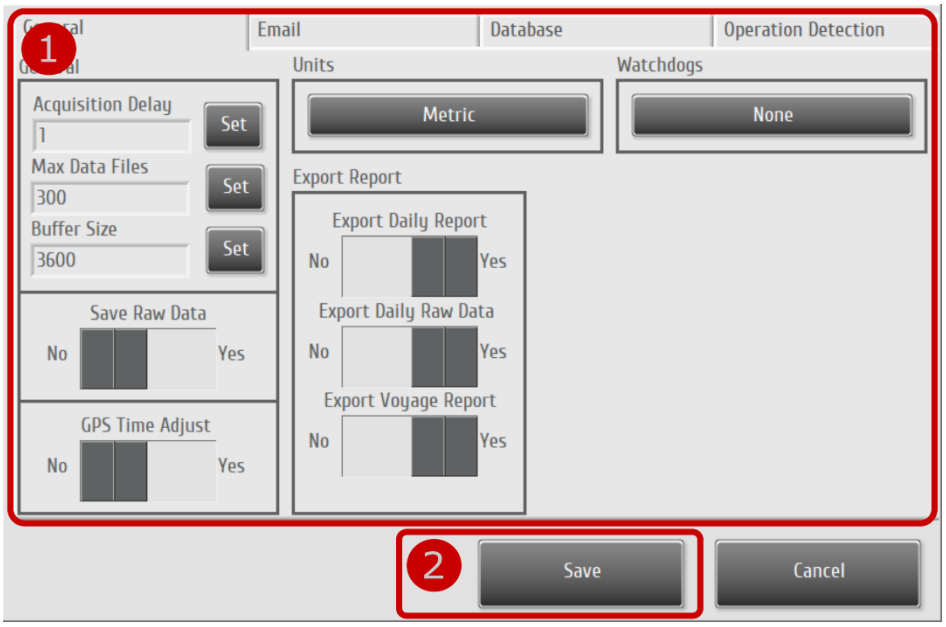


Figure 29 - General configuration screen.

Table 28: General Configuration Procedure

	Press the general configuration button in main system setup screen.
1	Configure the system.
2	Press the save button (the save button will appear once a parameter is changed).

Table 29: General Configuration

Parameter	Description
Acquisition Delay	Delay between each data acquisition (in seconds).
Max Data Files	Maximum data files to save on hard drive (one data file is produced each day).
Buffer Size	Buffer size for graphs and real-time statistics. Note: Default value is set for one hour of data (3600/acquisition delay).
Save Raw Data	Save instrument raw data to data files. Note: This option should only be used for non-permanent system since it will double the data file size.
GPS Time Adjust	Use GPS UTC time to update local system time. Displayed time uses configured Windows time zones.

<table>
<tr><td>Units</td><td>Select the preferred unit type between Metric and English.

<table>
<tr><th>FlowMeter</th><th>English</th><th>Metric (default)</th></tr>
<tr><td>Flow rate</td><td>gal/h</td><td>l/h</td></tr>
<tr><td>Temperature</td><td>deg F</td><td>deg C</td></tr>
<tr><td>Totalizer</td><td>gal</td><td>l</td></tr>
</table>
<table>
<tr><th>TorqueMeter</th><th>English</th><th>Metric (default)</th></tr>
<tr><td>Torque</td><td>ft.lbf</td><td>kN.m</td></tr>
<tr><td>Power</td><td>hp</td><td>kW</td></tr>
</table>
<table>
<tr><th>GPS</th><th>English</th><th>Metric (default)</th></tr>
<tr><td>Speed Over Ground</td><td>kn</td><td>kn</td></tr>
</table>
</td></tr>
<tr><td>Watchdogs</td><td>Select software watchdogs to enable to make sure the system is operating properly.
None: Disable all watchdogs.
Memory: Monitor computer memory usage and reboot if a memory leak is detected.
Major Error: Monitor system major error and reboot if a major error occurred so the system can try to re-initialize the instrument. The system will reboot a maximum of 10 times per 24h.
Memory & Major Error: Monitor memory usage and system major error.</td></tr>
<tr><td>Export Report</td><td>Select the type of reports to export via email or USB.
Daily Report: Daily statistics (total fuel consumed, averages, etc.).
Daily Raw Data: Minute-by-minute raw instruments data in an Excel format.
Voyage Report: Voyage statistics (total fuel consumed, averages, etc.).</td></tr>
</table>

Table 30: Email Configuration

Parameter	Description
Server Info: Address	SMTP server address.
Server Info: Port	SMTP server port.
Login Info: Username	Client username allowed to use the SMTP server.
Login Info: Password	Client username allowed to use the SMTP server.
Email Addresses: Sender	Client email address.
Email Addresses: Recipients	List of Email addresses to send Daily and Voyage reports to.

Table 31: Database Configuration

Parameter	Description
Server Info: Address	PostgreSQL server address. When using OpFleet, the address must be: “https://opfleet.opdaq.com/manage/api/sync/text?apikey=”.
Server Info: API Key	Device specific API key.
Login Info: Username	Not required with OpFleet.
Login Info: Password	Not required with OpFleet.
Server Status	Gives basic information about the current upload progress to the server.

Table 32: Operation Detection Configuration

Parameter	Description
Number of Samples	Number of samples required to detect a new operation mode (about 30 seconds per sample). Default is 3.
Transit Minimum Speed	Minimum speed to enter “Transit” mode (in kn).
Moored Maximum Drift	Maximum drifting distance allowable when moored (in m).
Operation Entry Distance Min	Minimum distance from another vessel to detect the tug is operating (in m).
Operation Entry Distance Max	Maximum distance from another vessel to detect the tug is operating (in m).
Operation Entry Time to Max	Time required for the entry distance to grow from the minimum to the maximum when the tug is near the same vessel (in seconds).
Operation Exit Distance	Distance from another vessel to detect the tug is no longer operating (in m).
Stop Maximum RPM	RPM threshold to detect the tug is loitering.

6.2.2 LOAD CONFIGURATION

The system configuration can be updated from a configuration file provided by an OpDAQ representative. The configuration loader will validate the configuration so that it does not damage the system with an outdated/invalid configuration. Please contact your OpDAQ representative if the configuration is invalid.

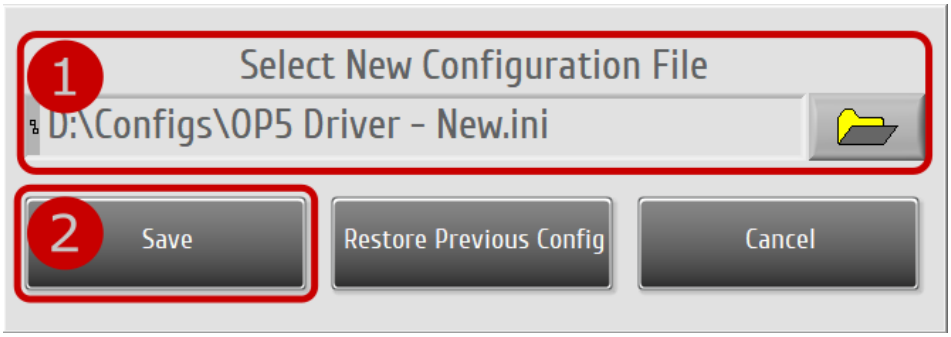


Figure 30 - Load configuration screen.

Table 33: Load Configuration Procedure

	Press the “Load Config” button in the main system setup screen.
1	Select the provided configuration file. Click the folder button to browse the computer. Alternatively, you may select “Restore Previous Config” if you want to go back to the last configuration.
2	Click “Save” to apply the chosen configuration.
3	Reboot the system for the new configuration to take effect.

6.3 INSTRUMENT SETTINGS

6.3.1 FLOWMETER INSTRUMENT CONFIGURATION

To configure the flowmeters, first click on the “Flow Meter” button in the “Instrument set-up” vertical menu, then select the configuration type that corresponds to your system assembly.

6.3.1.1 SETTING THE OPDAQ OPVI/OPGI-V CONFIGURATION

This menu displays the OpGI-V Modbus module configuration for each flow meter. For more details about the specific OPVI/OPGI-V Configuration, refer to the OpDAQ OPVI/OPGI-V Manual.

Figure 31 - Typical OpGI-V volumeter module instrument setup screen.

Table 34: OPVI/OPGI-V Configuration Procedure

	Press the “Flow Meter” → “OpVI” volumeter module button in the instrument setup screen.	
1	Config	Instrument configuration.
	Parameter	Name tag and gauge range configuration.
	Signals	Real-time instrument signals (useful for troubleshooting).
2	Select communication bus. This is the Modbus communication bus on which the module is connected.	
3	Select the Fuel Consumption instrument.	
4	When the instrument is in differential mode, select Supply or Return.	
5	Configure the flowmeter.	
6	Press the save button (the save button will appear once a parameter is changed).	

Table 35: OPVI/OPGI-V Configuration Parameter Description

Config Tab	Description
Temperature At	The Temperature At is the reference temperature used to compensate the thermal dilatation of the fluid. For fuel, the reference temperature normally is 15°C. If the Volume Mode parameter is set to 0, the Temperature At parameter is unused.
Flowrate Max	This parameter is used to trigger the display of Alarm 29. If the actual flow rate is over the Maximum_Flow_Rate parameter, Alarm 29 is triggered.
Flowrate Threshold	This parameter is used to ignore very small flow variations. Any flow rate below this threshold is ignored.
AVG Nb Samples	To attenuate the flow rate variations, the Volumeter module performs averaging. While the averaging reduces the amplitude of the random variations, it also reduces the response time. Typical value is 200 (20-seconds response time)
Volume Mode	Volume At X: Volume corrected at temperature X Volume: Uncorrected volume Mass: Volume corrected at temperature X and converted to mass
Density Table Mode	Manual Density Table – Automatic Manual Density Table – Table 1 Manual Density Table – Table 2 Computed Density Table – Automatic Computed Density Table – Table 1 Computed Density Table – Table 2
Temperature Switch	If the actual temperature is lower than Temperature Switch, Density Table 1 is selected. If the actual temperature is higher than Temperature Switch, Density Table 2 is selected.
Frequency	Frequency from flowmeter calibration table.
K-Factor	K-Factor from flowmeter calibration table.
Temperature 1	Density Table 1
Density 1	Density Table 1
Temperature 2	Density Table 2
Density 2	Density Table 2
Temperature Overshoot	Trigger a warning when temperature is higher than Overshoot value. (0 to disable)
Flowrate Overshoot	Trigger a warning when Flowrate is higher than Overshoot value. (0 to disable)
Total Overshoot	Trigger a warning when Total is higher than Overshoot value. (0 to disable)
Baud Rate	Modbus baud rate. Keep this value to the maximum and lower it when communication error occurs.

Parameter Tab	Description
Instrument Name	Instrument tag to display.
Flow Rate Name	Flow Rate parameter tag to display.
Totalizer Name	Totalizer parameter tag to display.
Temperature Name	Temperature parameter tag to display.
Flow Rate Max	Maximum flow rate value used to build gauges increments and maximum value.
Totalizer Max	Maximum totalizer value used to build gauges increments and maximum value.
Temperature Max	Maximum temperature value used to build gauges increments and maximum value.

Signals Tab	Description
TEMPERATURE	Current temperature read from flowmeter.
AVG_FLOW_RATE	Current average flow rate read from flowmeter.
TOTAL	Current total flow rate read from flowmeter. This total can be reset by users.
PROTECTED_TOTAL	Current total read from flowmeter since beginning of the operation.
FLOW_DIR_CHANGE	Number of flow direction changes.
ALARMS	Current OpVI alarms.
OpVI Serial #	Current OpVI serial number.
Flowmeter Serial #	Flowmeter serial number associated with current OpVI.
Software Version	Current OpVI software version.
Current Error	Displays current volumeter error. Activate “Sticky Error” for error to stick when detected. Use “Clear” to acknowledge the error and wait for next error to occur.

6.3.1.2 SETTING THE KRAL BEM500

This menu displays the Volumeter BEM500 module Configuration for each flow meter. For more details about the BEM500 Volumeter module Configuration, refer to the KRAL BEM500 Manual.

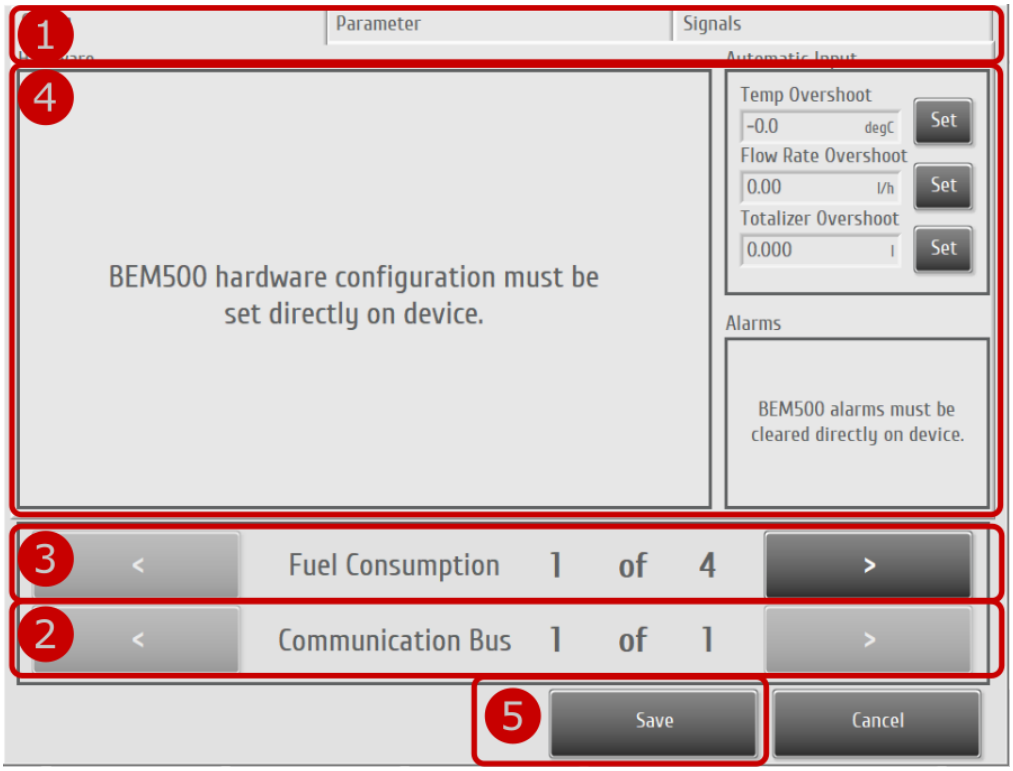


Figure 32 - Typical BEM500 volumeter module instrument setup screen.

Table 36: BEM500 Configuration Procedure

	Press the "Flow Meter" → "BEM500" button in the instrument setup screen.	
1	Config	Instrument configuration.
	Parameter	Name tag and gauge range configuration.
	Signals	Real-time instrument signals (useful for troubleshooting).
2	Select a communication bus. This is the Modbus communication bus on which the module to configure is connected.	
3	Select the Fuel Consumption instrument.	
4	Configure the flowmeter (hardware configuration must be set directly on BEM500).	
5	Press the save button (the save button will appear once a parameter is changed).	

Table 37: BEM500 Configuration Parameter Description

Config Tab	Description
Temperature Overshoot	Trigger a warning when temperature is higher than Overshoot value. (0 to disable)
Flowrate Overshoot	Trigger a warning when Flowrate is higher than Overshoot value. (0 to disable)
Total Overshoot	Trigger a warning when Total is higher than Overshoot value. (0 to disable)

Parameter Tab	Description
Instrument Name	Instrument tag to display.
Flow Rate Name	Flow Rate parameter tag to display.
Totalizer Name	Totalizer parameter tag to display.
Temperature Name	Temperature parameter tag to display.
Flow Rate Max	Maximum flow rate value used to build gauges increments and maximum value.
Totalizer Max	Maximum totalizer value used to build gauges increments and maximum value.
Temperature Max	Maximum temperature value used to build gauges increments and maximum value.

Signals Tab	Description
TEMPERATURE	Current temperature read from flowmeter.
AVG_FLOW_RATE	Current average flow rate read from flowmeter.
TOTAL	Current total flow rate read from flowmeter. This total can be reset by the users.
Serial Number	Current BEM500 serial number.
Hardware Version	Current BEM500 hardware version.
Software Version	Current BEM500 software version.
Current Error	Displays current volumeter error. Activate “Sticky Error” for error to stick when detected. Use “Clear” to acknowledge the error and wait for next error to occur.

6.3.1.3 SETTING THE OPTIMASS 6400

This menu displays the Optimass 6400 mass flowmeter module configuration for each instrument. For more details about the Optimass 6400 mass flowmeter module configuration, refer to the KRONNE Optimass 6400 Manual.

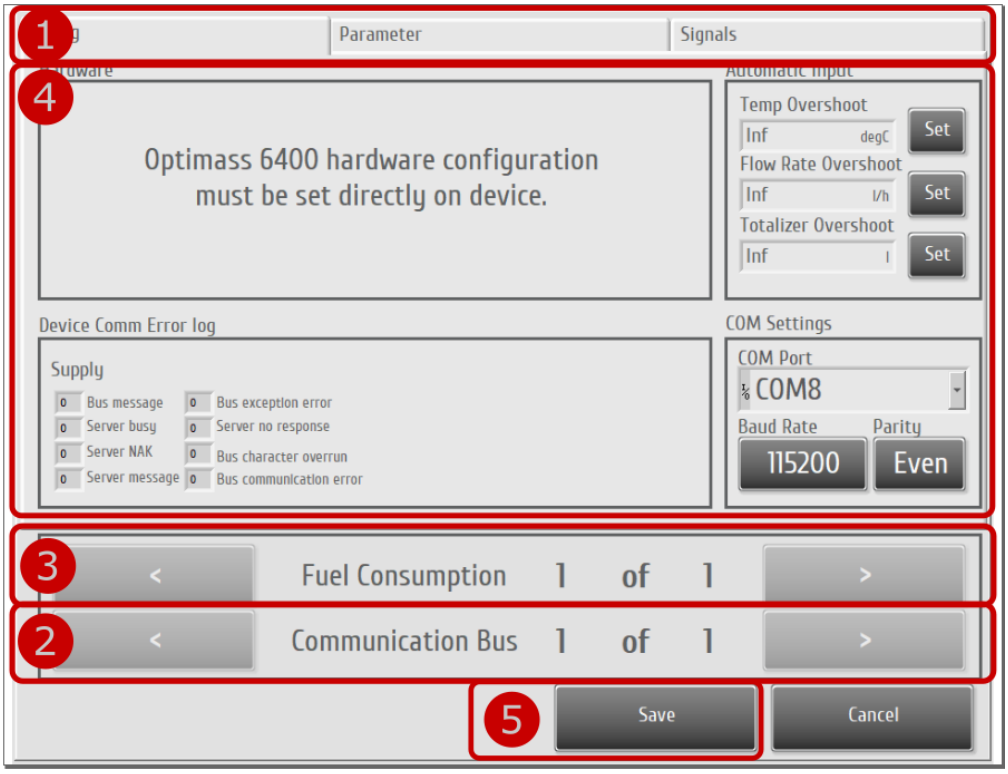


Figure 33 - Optimass 6400 mass flowmeter module instrument setup screen.

Table 38: Optimass 6400 Configuration Procedure

Press the "Flow Meter" → "Optimass 6400" button in the instrument setup screen.

1 Config — Instrument configuration.
Parameter — Name tag and gauge range configuration.
Signals — Real-time instrument signals (useful for troubleshooting).

2 Select a communication bus. This is the Modbus communication bus on which the module to configure is connected.

3 Select the Fuel Consumption instrument.

4 Configure the flowmeter (hardware configuration must be set directly on Optimass 6400) If the device was able to communicate for at least the span of a single packet the "Device Comm Error log" will display communication diagnostic information that was logged internally by the instrument.

5 Press the save button (the save button will appear once a parameter is changed).

Table 39: Optimass-6400 Configuration Parameter Description

Config Tab	Description
Temperature Overshoot	Trigger a warning when temperature is higher than Overshoot value. (0 to disable)
Flowrate Overshoot	Trigger a warning when Flowrate is higher than Overshoot value. (0 to disable)
Total Overshoot	Trigger a warning when Total is higher than Overshoot value. (0 to disable)
COM Port	Select which serial communication port is used to communicate with the device.
Baud Rate	Modbus baud rate. Match this value to the one set on the device.
Parity	Modbus parity mode used on the device. (Default is even)
Parameter Tab	**Description**
Instrument Name	Instrument tag to display.
Flow Rate Name	Flow Rate parameter tag to display.
Totalizer Name	Totalizer parameter tag to display.
Temperature Name	Temperature parameter tag to display.
Flow Rate Max	Maximum flow rate value used to build gauges increments and maximum value.
Totalizer Max	Maximum totalizer value used to build gauges increments and maximum value.
Temperature Max	Maximum temperature value used to build gauges increments and maximum value.
Signals Tab	**Description**
TEMPERATURE	Current temperature read from flowmeter.
AVG_FLOW_RATE	Current average flow rate read from flowmeter.
TOTAL	Current total flow rate read from flowmeter.
VELOCITY	Current fluid velocity read from flowmeter.
INTERFACE REVISION	Current Optimass 6400 interface revision.
ELECTRONIC REVISION	Current Optimass electronic revision.
Current Error	Displays current volumeter error. Activate “Sticky Error” for error to stick when detected. Use “Clear” to acknowledge the error and wait for next error to occur.
AVG MASS FLOW	Current average mass flow rate read from flowmeter.
MASS TOTAL	Current total mass flow rate read from flowmeter.

6.3.2 TORQUEMETER INSTRUMENT CONFIGURATION

6.3.2.1 SETTING THE OPDAQ OPTS

This menu displays the Torquemeter Configuration for each torquemeter. For more details about the specific OpDAQ OpTS Configuration, refer to the Torquemeter Manual.

Figure 34 - Typical OpTS instrument setup screen

Table 40: OpTS Configuration Procedure

	Press the “Torque Meter” → “OpTS” button in instrument setup screen.	
1	Config	Instrument configuration.
	Parameter	Name tag and gauge range configuration.
	Signals	Real-time instrument signals (useful for troubleshooting).
2	Select a Modbus communication line.	
3	Select an OpTS Base Station/Collar combo.	
4	Not used yet. For future improvement only.	
5	Enter the torquemeter calibration values.	
6	Press the save button (the save button will appear once a parameter is changed).	

Table 41: OpTS Configuration Parameter Description

Config Tab	Description
RPM Sleep Threshold	Any RPM value under that threshold will force the OpTS collar into sleep mode to extend battery life.
Filtering Nb Samples	Number of samples for filtering. Each sample is the average of the data received over 0.53 seconds.
Low Battery Level	Battery voltage value to trigger a low battery alarm. (typically around 2.95V)
Inside Diameter	Shaft Inside Diameter (in mm) (0 = Solid Shaft)
Outside Diameter	Shaft Outside Diameter (in mm)
Poisson Coefficient	Poisson Coefficient value (0.3 for steel)
Elastic Modulus	Elastic Modulus Value (in N/mm^2) (206800 for steel)
Gauge Factor	The gauge factor is the specific gauge calibration factor.
ADC Strain Gain	Not used yet. For future improvement only.
ADC Strain Offset	Calibration offset of the strain gage. The calibration must usually be done once the strain gage is installed on the shaft. The shaft must be at rest during calibration.
ADC RPM Gain	Not used yet. For future improvement only.
ADC RPM Offset	Calibration offset of the RPM gage. The calibration can be fine-tuned after the strain gage is installed, but the factory calibration will in most cases be close enough. The shaft must be at rest during calibration.
RPM Overshoot	Trigger a warning when RPM is higher than Overshoot value. (0 to disable)
Torque Overshoot	Trigger a warning when Torque is higher than Overshoot value. (0 to disable)
Power Overshoot	Trigger a warning when Power is higher than Overshoot value. (0 to disable)
COM Port	Modbus communication port to use. This communication port can be shared with other Modbus instruments.
Baud Rate	Serial baud rate. The sampling rate will always be set to the maximum supported value by the baud rate.

Parameter Tab	Description
Instrument Name	Instrument tag to display.
RPM Name	RPM tag to display.
Torque Name	Torque tag to display.
Power Name	Power tag to display.

RPM Max	Maximum RPM value used to build gauges increments and maximum value.
Torque Max	Maximum torque value used to build gauges increments and maximum value.
Power Max	Maximum power value used to build gauges increment and maximum value.

Signals Tab	**Description**
RPM	Current computed RPM value.
Torque	Current computed torque value.
Power	Current computed power value.
MAC Address	MAC address of the transmitter link to connect to. Write “” to force a disconnect.
OpTS: Alarms	OpTS collar alarms. Refer to the OpTS documentation for a list of the error codes. This will print warnings as well as errors. If no error is reported in the “Current Error” field, then the code refers to a warning.
ADC Ration (V/V)	Current raw strain gauge value from the OpTS Collar.
Battery Level (mV)	Current battery level of the OpTS collar.
Rx Power (dBm)	Current signal power between the OpTS Base Station and the OpTS Collar.
Base Station: Alarms	OpTS Base Station alarms. Refer to the OpTS documentation for a list of the error codes. This will print warnings as well as errors. If no error is reported in the “Current Error” field, then the code refers to a warning.
Serial Number	Serial number of the OpTS.
Software Version	Software version of the OpTS Base Station.
Hardware Version	Hardware version of the OpTS Base Station.
Boot Count	Number of reboots (power failure) of the OpTS Base Station.
Current Error	Displays the current torquemeter error. Activate “Sticky Error” for error to stick when detected. Use “Clear” to acknowledge the error and wait for next error to occur.

6.3.2.2 SETTING THE BINSFELD TORQUETRAK TPM2

This menu displays the Torquemeter Configuration for each torquemeter. For more details about the specific Binsfeld TorqueTrak TPM2 Configuration, refer to the Torquemeter Manual.

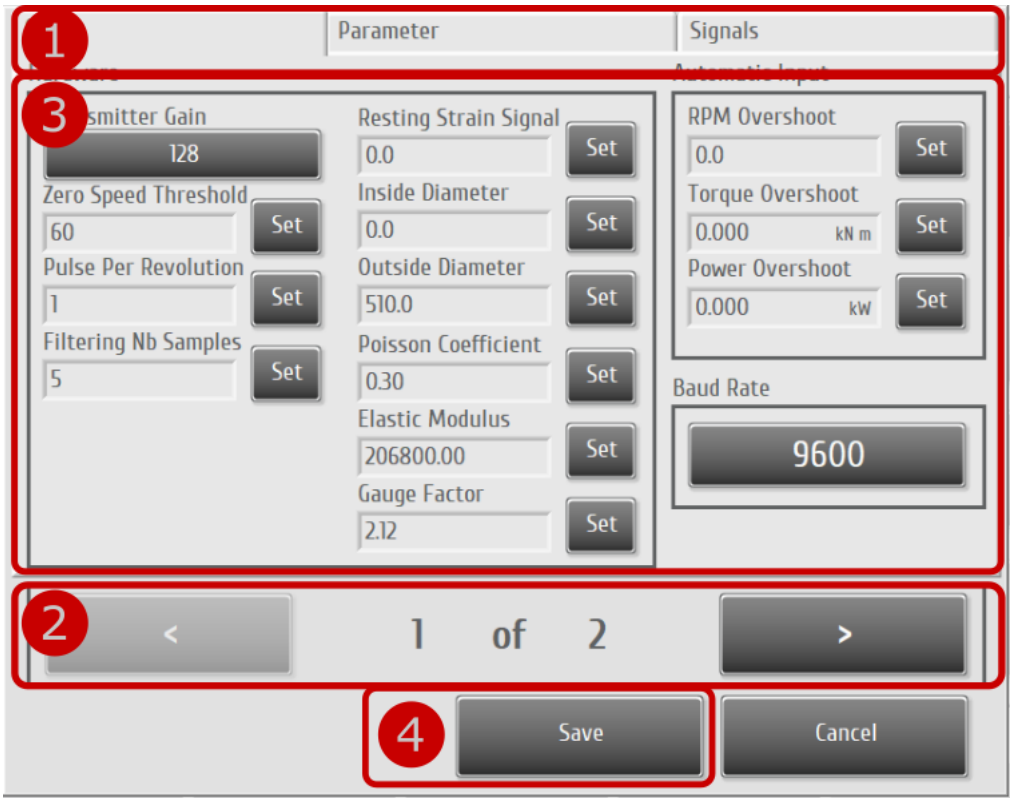


Figure 35 - Typical TPM2 instrument setup screen

Table 42: TPM2 Configuration Procedure

	Press the "Torque Meter" → "TPM2" button in instrument setup screen.	
1	Config	Instrument configuration.
	Parameter	Name tag and gauge range configuration.
	Signals	Real-time instrument signals (useful for troubleshooting).
2	Select a torquemeter	
3	Enter the torquemeter calibration values.	
4	Press the save button (the save button will appear once a parameter is changed).	

Table 43: TPM2 Configuration Parameter Description

Config Tab	Description
Transmitter Gain	The SYSTEM GAIN button is a drop-down menu used to configure the torquemeter system gain. See TorqueTrak TPM2 manual for gain setting instructions.
Zero Speed Threshold	Zero speed RPM threshold value (0 to 250).
Pulse per Revolution	Pulse per revolution. Typically 1 pulse per revolution is received from TPM2. (0 disable speed input)
Filtering Nb Samples	Number of samples for filtering. Each sample is the average of the data received over 0.53 seconds.
Hi-Speed Buffer Size	Number of samples to record when Hi-Speed Acquisition is enabled.
Torque Deadband	The driver will discard torque value below this threshold. (0 disable dead band.)
Power Deadband	The driver will discard power value below this threshold. (0 disable dead band.)
Resting Strain Signal	The torque signal generated by the TorqueTrak TPM2 ranges from -16384 to +16384. The Resting Strain Signal is used to eliminate the offset that is present after the strain gauge installation.
Inside Diameter	Shaft Inside Diameter (in mm) (0 = Solid Shaft)
Outside Diameter	Shaft Outside Diameter (in mm)
Poisson Coefficient	Poisson Coefficient value (0.3 for steel)
Elastic Modulus	Elastic Modulus Value (in N/mm^2) (206800 for steel)
Gauge Factor	The gauge factor is the specific gauge calibration factor.
RPM Overshoot	Trigger a warning when RPM is higher than Overshoot value. (0 to disable)
Torque Overshoot	Trigger a warning when Torque is higher than Overshoot value. (0 to disable)
Power Overshoot	Trigger a warning when Power is higher than Overshoot value. (0 to disable)
Baud Rate	Serial baud rate. The sampling rate will always be set to the maximum supported value by the baud rate.

Parameter Tab	Description
Instrument Name	Instrument tag to display.
Strain Signal Name	Strain signal tag to display.
RPM Name	RPM tag to display.
Torque Name	Torque tag to display.

Power Name	Power tag to display.
Strain Signal Max	Maximum strain signal value used to build gauges increments and maximum value.
RPM Max	Maximum RPM value used to build gauges increments and maximum value.
Torque Max	Maximum torque value used to build gauges increments and maximum value.
Power Max	Maximum power value used to build gauges increment and maximum value.

Signals Tab	**Description**
Strain Signal	Current computed strain signal value.
RPM	Current computed RPM value.
Torque	Current computed torque value.
Power	Current computed power value.
Strain Gauge	Current raw strain gauge value from TPM2.
Shaft Speed	Current raw speed value from TPM2.
Status Byte 0	Current status byte 0 value from TPM2. See TorqueTrak TPM2 manual for detailed status byte 0 meaning.
Status Byte 1	Current status byte 1 value from TPM2. See TorqueTrak TPM2 manual for detailed status byte 1 meaning.
Status Byte 2	Current status byte 2 value from TPM2. See TorqueTrak TPM2 manual for detailed status byte 2 meaning.
Shunt 1	Enable TPM2 shunt 1. The shunts will be disabled outside the TPM2 configuration interface.
Shunt 2	Enable TPM2 shunt 2. The shunts will be disabled outside the TPM2 configuration interface.
Reset Transmit	Send a request to the selected TPM2 to reset his transmitter. It can help the TPM2 to find a better inductive link if the communication is weak.
Reset System	Send a request to the selected TPM2 to reset the whole torquemeter.
Auto Set Zero Strain	Automatically compute Resting Strain Signal.
Current Error	Displays the current torquemeter error. Activate “Sticky Error” for error to stick when detected. Use “Clear” to acknowledge the error and wait for next error to occur.

6.3.2.3 SETTING THE BINSFELD TORQUETRAK REVOLUTION & TT10K

This menu displays the Torquemeter Configuration for each torquemeter. For more details about the specific Binsfeld TorqueTrak 10K or TorqueTrak Revolution Configuration, refer to the Torquemeter Manual.

Figure 36 - Typical TT10K instrument setup screen

Table 44: TT10K/TTRevo Configuration Procedure

	Press the "Torque Meter" → "TT10K/TTRevo" button in the instrument setup screen.	
1	Config	Instrument configuration.
	Parameter	Name tag and gauge range configuration.
	Signals	Real-time instrument signals (useful for troubleshooting).
2	Select a communication port. (1 OpACQ per COM Port)	
3	Select a torquemeter. (Up to 2 torquemeters per OpACQ)	
4	Enter the torquemeter calibration values.	
5	Press the save button (the save button will appear once a parameter is changed).	

Table 45: TT10K/TTRevo Configuration Parameter Description

Config Tab		Description
TT10K	**Transmitter Gain**	The SYSTEM GAIN button is a drop-down menu used to configure the torquemeter system gain. See the torquemeter manual for gain setting instructions.
	Filtering Nb Samples	Number of samples for filtering. Each sample is the average of the data received over 0.53 seconds.
	Resting Strain Signal	The torque signal generated by the torquemeter ranges from -16384 to +16384. The Resting Strain Signal is used to eliminate the offset that is present after the strain gauge installation.
TTRevo	**Torque Min Signal**	Minimum torque signal (in mA).
	Torque Max Signal	Maximum torque signal (in mA).
	Torque Calibration	OpACQ torque calibration.
	Power Min Signal	Minimum power signal (in mA).
	Power Max Signal	Maximum power signal (in mA).
	Power Calibration	OpACQ power calibration.
	RPM Factor	Power scaling (RPM Factor) value.
Inner Diameter		Shaft Inside Diameter (in mm) (0 = Solid Shaft).
Outside Diameter		Shaft Outside Diameter (in mm).
Poisson Coefficient		Poisson Coefficient value (0.3 for steel).
Elastic Modulus		Elastic Modulus Value (in N/mm^2) (206800 for steel).
Gauge Factor		The gauge factor is the specific gauge calibration factor.
RPM Overshoot		Trigger a warning when RPM is higher than Overshoot value. (0 to disable)
Torque Overshoot		Trigger a warning when Torque is higher than Overshoot value. (0 to disable)
Power Overshoot		Trigger a warning when Power is higher than Overshoot value. (0 to disable)
Torque Deadband		The driver will discard torque value below this threshold. (0 disable dead band.)
Power Deadband		The driver will discard power value below this threshold. (0 disable dead band.)

Parameter Tab	Description
Instrument Name	Instrument tag to display.
Strain Signal Name	Strain signal tag to display.
RPM Name	RPM tag to display.
Torque Name	Torque tag to display.
Power Name	Power tag to display.
Strain Signal Max	Maximum strain signal value used to build gauges increments and maximum value.
RPM Max	Maximum RPM value used to build gauges increments and maximum value.
Torque Max	Maximum torque value used to build gauges increments and maximum value.
Power Max	Maximum power value used to build gauges increments and maximum value.

Signals Tab		Description
RPM		Current computed RPM value.
Torque		Current computed torque value.
Power		Current computed power value.
TT10K	**Strain Signal**	Current raw strain signal value from TT10K (12000 = error).
TTRevo	**Torque Signal**	Current raw torque signal from TTRevo (in mA).
	Power Signal	Current raw power signal from TTRevo (in mA).
Current Error		Displays the current torquemeter error. Activate “Sticky Error” for error to stick when detected. Use “Clear” to acknowledge the error and wait for next error to occur.

6.3.2.4 SETTING THE VAF T-SENSE

This menu displays the T-Sense Configuration for each torquemeter. For more details about the specific T-Sense Configuration, refer to the VAF T-Sense Manual.

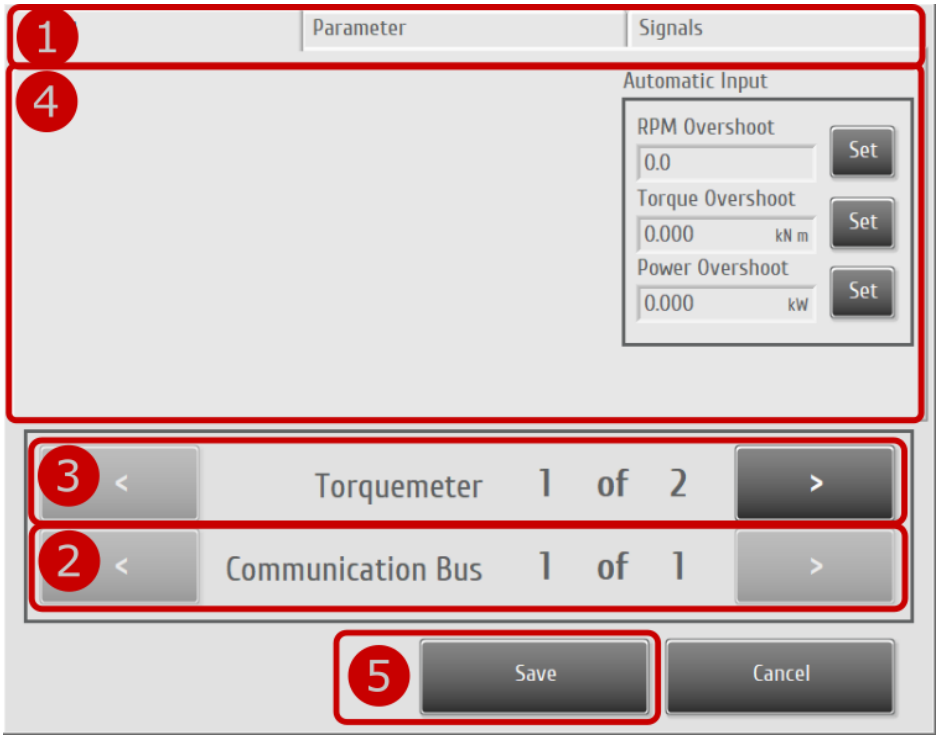


Figure 37 - Typical T-Sense instrument setup screen

Table 46: T-Sense Configuration Procedure

	Press the "Torque Meter" → "T-Sense" button in Instrument setup screen.	
1	Config	Instrument configuration.
	Parameter	Name tag and gauge range configuration.
	Signals	Real-time instrument signals (useful for troubleshooting).
2	Select communication bus. This is the Modbus communication bus on which the torquemeter to configure is connected.	
3	Select a torquemeter.	
4	Edit the torquemeter configuration.	
5	Press the save button (the save button will appear once a parameter is changed).	

Table 47: T-Sense Configuration Parameter Description

Config Tab	Description
RPM Overshoot	Trigger a warning when RPM is higher than Overshoot value. (0 to disable)
Torque Overshoot	Trigger a warning when Torque is higher than Overshoot value. (0 to disable)
Power Overshoot	Trigger a warning when Power is higher than Overshoot value. (0 to disable)

Parameter Tab	Description
Instrument Name	Instrument tag to display.
RPM Name	RPM tag to display.
Torque Name	Torque tag to display.
Power Name	Power tag to display.
Strain Signal Max	Maximum strain signal value used to build gauges increments and maximum value.
RPM Max	Maximum RPM value used to build gauges increments and maximum value.
Torque Max	Maximum torque value used to build gauges increments and maximum value.
Power Max	Maximum power value used to build gauges increments and maximum value.

Signals Tab	Description
RPM	Current computed RPM value.
Torque	Current computed torque value.
Power	Current computed power value.
Current Error	Displays the current torquemeter error. Activate “Sticky Error” for error to stick when detected. Use “Clear” to acknowledge the error and wait for next error to occur.

6.3.2.5 SETTING THE OPDAQ OPGI-RPM

This menu displays the OpGI-RPM Configuration for each RPM sensors. For more details about the specific OpGI-RPM Configuration, refer to the OpDAQ OpGI-RPM Manual.

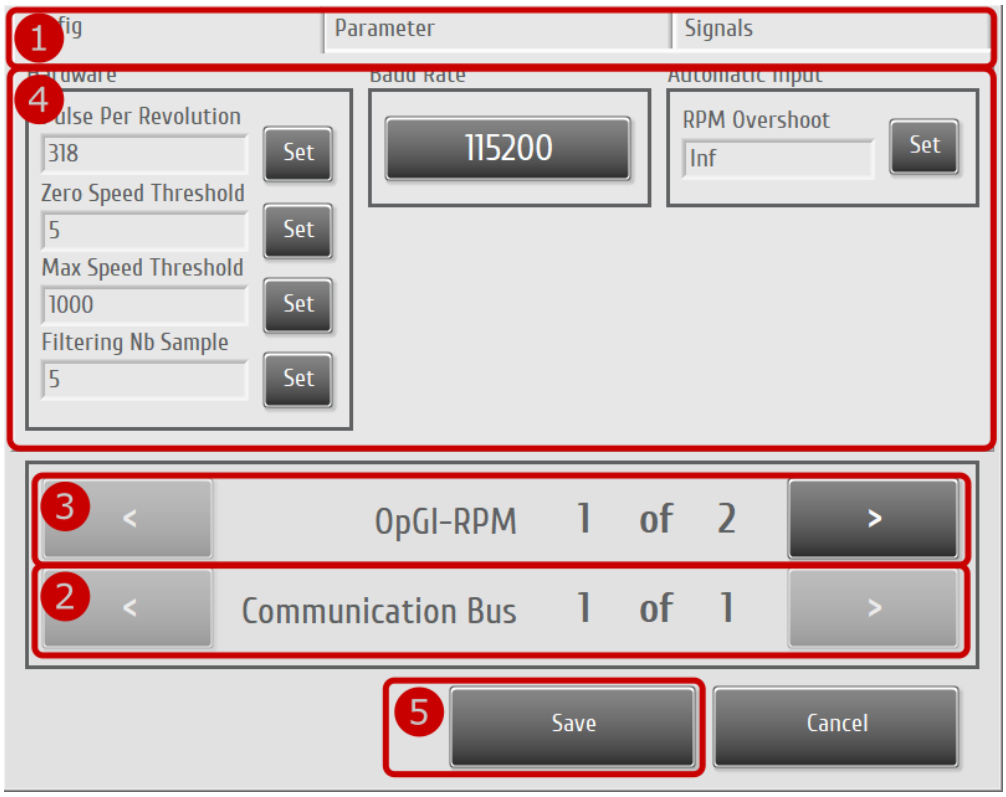


Figure 38 – Typical OpGI-RPM instrument setup screen

Table 48: OpGI-RPM Configuration Procedure

	Press the "Torque Meter" → "OpGI-RPM" button in the instrument setup screen.	
1	Config	Instrument configuration.
	Parameter	Name tag and gauge range configuration.
	Signals	Real-time instrument signals (useful for troubleshooting).
2	Select a communication bus. This is the Modbus communication bus on which the RPM module to configure is connected.	
3	Select an OpGI-RPM.	
4	Edit the RPM module configuration.	
5	Press the save button (the save button will appear once a parameter is changed).	

Table 49: OpGI-RPM Configuration Parameter Description

Config Tab	Description
Pulse per Revolution	Pulse per revolution. Typically 1 pulse per revolution is received when a single magnet is used.
Zero Speed Threshold	This parameter is used to ignore very small RPM variations. Any RPM below this threshold is ignored.
Max Speed Threshold	This parameter is used to control when Alarm 29 is displayed. If the actual RPM is over the Max Speed Threshold parameter, Alarm 29 is triggered.
Filtering Nb Sample	Number of samples for filtering. Each sample is typically 1 second of data.
Baud Rate	Modbus baud rate. Keep this value to the maximum and lower it when communication error occurs.
RPM Overshoot	Trigger a warning when RPM is higher than Overshoot value. (0 to disable)

Parameter Tab	Description
Instrument Name	Instrument tag to display.
RPM Max	Maximum RPM value used to build gauges increments and maximum value.

Signals Tab	Description
RPM	Current computed RPM value.
TOTAL	Current number of shaft rotation read from RPM module.
BOOT_COUNT	Number of times the OpGI-RPM got rebooted.
ALARMS	Current OpGI-RPM alarms.
OpGI-RPM Serial #	Current OpGI-RPM module serial number.
RPM ID	RPM sensor serial number associated with current OpGI-RPM. Most of the time, this value is not available.
Software Version	Current OpGI-RPM software version.
Hardware Version	Current OpGI-RPM hardware version.
Current Error	Displays the current RPM module error. Activate “Sticky Error” for error to stick when detected. Use “Clear” to acknowledge the error and wait for next error to occur.

6.3.3 GPS INSTRUMENT CONFIGURATION

6.3.3.1 SETTING THE NMEA 0183 GPS

The NMEA GPS uses GPRMC sentences at 4800 baud rate. This is the most frequent NMEA signal. Some GPS don't have NMEA Out enabled by default. Also, there is no standard wire color for the NMEA Out on a GPS. Refer to the manufacturer manual for proper pin-out.

The GPS driver looks for GPRMC sentence to fetch coordinates, time and speed. If GPRMC sentences are not available in the GPS NMEA 0183 output, GPZDA, GPGLL and GPVTG sentences will be used.

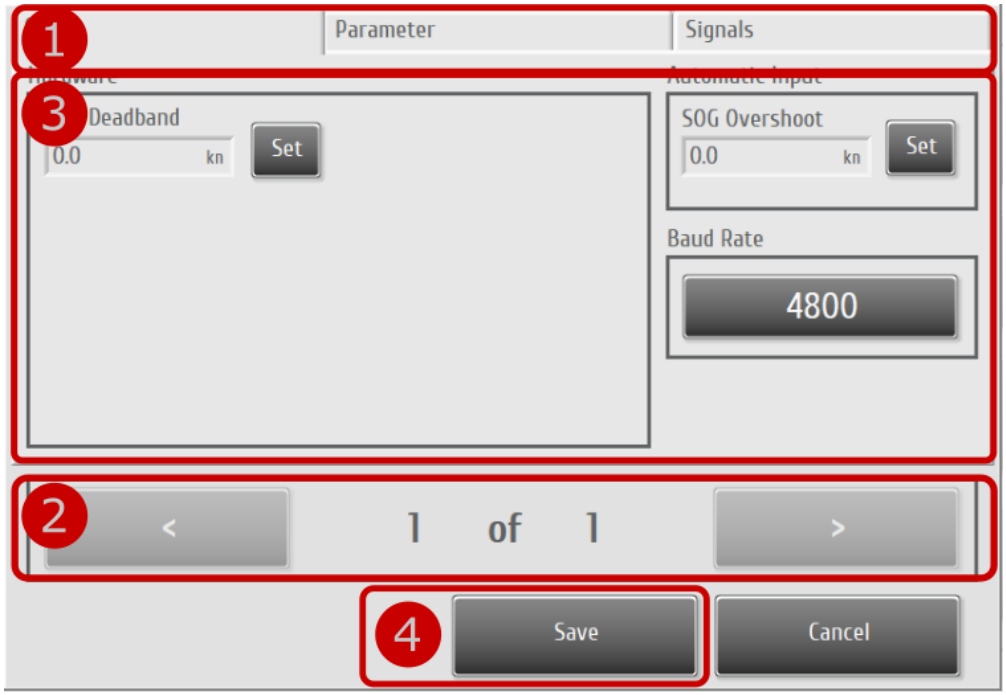


Figure 39 – Typical GPS set up screen

Table 50: GPS Configuration Procedure

	General procedure	
	Press the "GPS" → "GPS NMEA0183" button in the instrument setup screen.	
1	Config	Instrument configuration.
	Parameter	Name tag and gauge range configuration.
	Signals	Real-time instrument signals (useful for troubleshooting).
2	Select the GPS to configure (Typically, a single GPS is connected).	
3	Edit the GPS configuration.	
4	Press the save button to save the data and return to the Setup screen.	

Table 51: GPS Configuration Parameter Description

Config Tab	Description
SOG Deadband	Set threshold under which speed is converted to “0”.
SOG Overshoot	Trigger a warning when Speed Over Ground is higher than Overshoot value. (0 to disable)
Baud Rate	GPS serial baud rate. (Most NMEA 0183 GPS use 4800 baud)

Parameter Tab	Description
Instrument Name	Instrument tag to display.
Speed Over Ground Name	Speed over ground tag to display.
Speed Over Ground Max	Maximum speed over ground value used to build gauges increments and maximum value.

Signals Tab	Description
Satellite Fix Valid?	Light is ON when the satellite fix is valid.
Number of Satellites	Number of discovered satellites.
GPS Sentence	Raw sentences received from GPS.
Current Error	Displays the current GPS error. Activate “Sticky Error” for error to stick when detected. Use “Clear” to acknowledge the error and wait for next error to occur.

6.3.3.2 SETTING THE NMEA 2000 GPS

This GPS driver uses the NMEA2000 plug-and-play communication standard. Communication speed is fixed at 250 kbits/sec following this standard. This driver will look for the PGN (Parameter Group Number) 126992, 129025, 129026 and 129029. Make sure those PGNs are broadcast by the GPS.

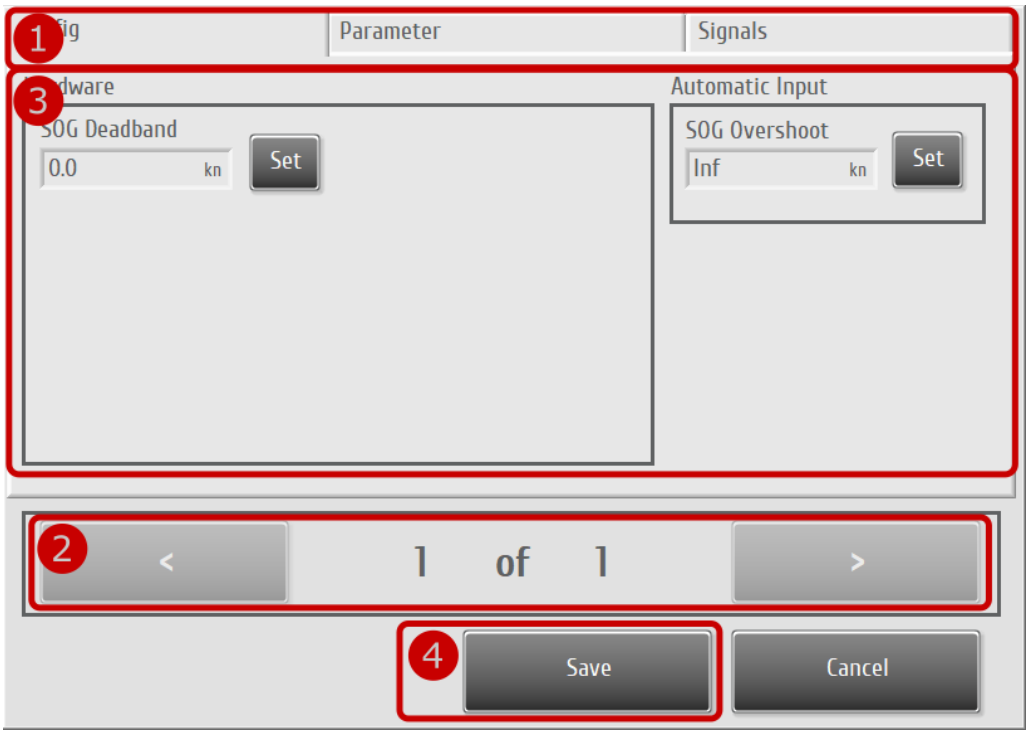


Figure 40 – Typical GPS NMEA2000 set up screen

Table 52: GPS NMEA2000 Configuration Procedure

	General procedure	
	Press the "GPS" → "GPS NMEA 2000" button in the instrument setup screen.	
1	Config	Instrument configuration.
	Parameter	Name tag and gauge range configuration.
	Signals	Real-time instrument signals (useful for troubleshooting).
2	Select the GPS to configure (typically, a single GPS is connected).	
3	Edit the GPS configuration.	
4	Press the save button to save the data and return to the Setup screen.	

Table 53: GPS NMEA 2000 Configuration Parameter Description

Config Tab	Description
SOG Deadband	Set threshold under which speed is converted to “0”.
SOG Overshoot	Trigger a warning when Speed Over Ground is higher than Overshoot value. (0 to disable)

Parameter Tab	Description
Instrument Name	Instrument tag to display.
Speed Over Ground Name	Speed over ground tag to display.
Speed Over Ground Max	Maximum speed over ground value used to build gauges increments and maximum value.

Signals Tab	Description
Satellite Fix Valid?	Light is ON when the satellite fix is valid.
Number of Satellites	Number of discovered satellites.
Latitude	Current received latitude from the GPS.
Longitude	Current received longitude from the GPS.
SOG	Current received speed over ground from the GPS.
Current Error	Displays the current GPS error. Activate “Sticky Error” for error to stick when detected. Use “Clear” to acknowledge the error and wait for next error to occur.

6.3.4 ELECTRICAL POWER METER INSTRUMENT CONFIGURATION

6.3.4.1 SETTING THE WOODWARD EASYGEN-3000

This menu displays the EasyGen-3000 Configuration for each electrical power meter. For more details about the specific EasyGen-3000 Configuration, refer to the Woodward EasyGen-3000 Manual.

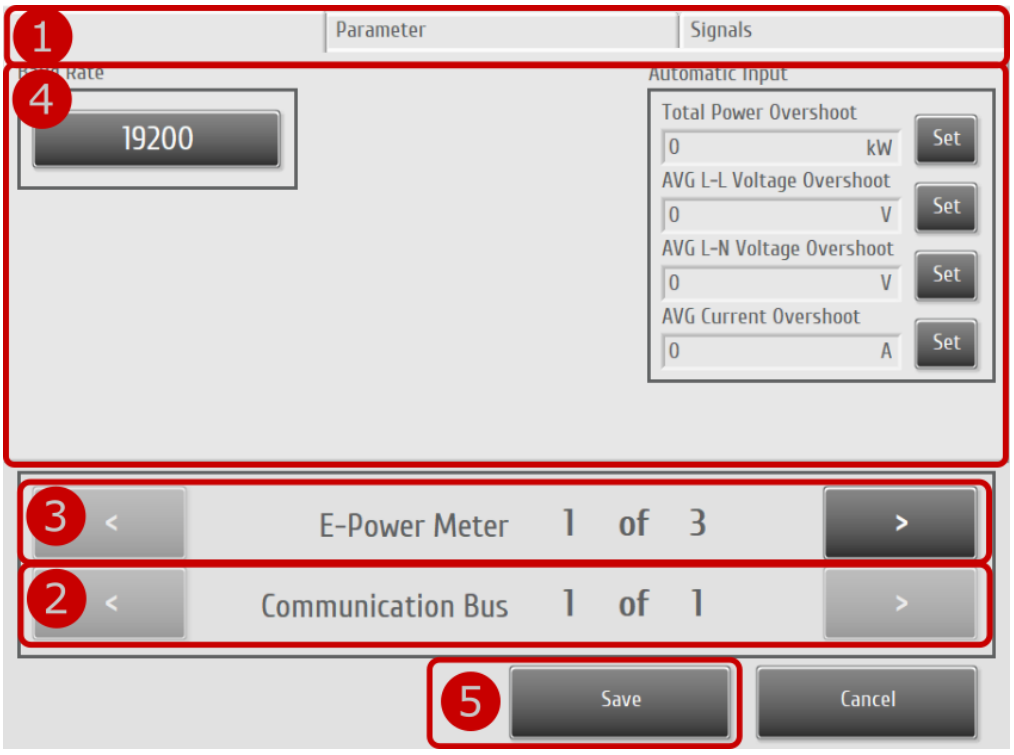


Figure 41 – Typical EasyGen-3000 set up screen

Table 54: EasyGen-3000 Configuration Procedure

	General procedure	
	Press the "EKW" → "EasyGen-3000" button in the instrument setup screen.	
1	Config	Instrument configuration.
	Parameter	Name tag and gauge range configuration.
	Signals	Real-time instrument signals (useful for troubleshooting).
2	Select communication bus. This is the Modbus communication bus on which the EasyGen-3000 to configure is connected.	
3	Select the electrical power meter to configure.	
4	Edit EasyGen-3000 configuration.	
5	Press the save button to save the data and return to the Setup screen.	

Table 55: EasyGen-3000 Configuration Parameter Description

Config Tab	Description
Baud Rate	Modbus serial baud rate. Keep this value to the maximum and lower it when communication error occurs.
Total Power Overshoot	Trigger a warning when Total Power is higher than Overshoot value. (0 to disable)
AVG L-L Voltage Overshoot	Trigger a warning when AVG L-L Voltage is higher than Overshoot value. (0 to disable)
AVG L-N Voltage Overshoot	Trigger a warning when AVG L-N Voltage is higher than Overshoot value. (0 to disable)
AVG Current Overshoot	Trigger a warning when AVG Current is higher than Overshoot value. (0 to disable)

Parameter Tab	Description
Instrument Name	Instrument tag to display.
Total Power Name	Total Power tag to display.
AVG L-L Voltage Name	AVG L-L Voltage tag to display.
AVG L-N Voltage Name	AVG L-N Voltage tag to display.
AVG Current Name	AVG Current tag to display.
Total Power Max	Maximum Total Power value used to build gauges increments and maximum value.
AVG L-L Voltage Max	Maximum AVG L-L Voltage value used to build gauges increments and maximum value.
AVG L-N Voltage Max	Maximum AVG L-N Voltage value used to build gauges increments and maximum value.
AVG Current Max	Maximum AVG Current value used to build gauges increments and maximum value.

Signals Tab	Description
Total Power	Current computed Total Power value.
AVG L-L Voltage	Current computed AVG L-L Voltage value. The average is computed from L1-L2 Voltage, L2-L3 Voltage and L3-L1 Voltage.
AVG L-N Voltage	Current computed AVG L-N Voltage value. The average is computed from L1-N Voltage, L2-N Voltage and L3-N Voltage.
AVG Current	Current computed AVG Current value. The average is computed from Current 1, Current 2 and Current 3.
Power Factor	Current Power Factor. This value combined with Total Power can be used to evaluate Reactive Power.
L1-L2 Voltage	L1-L2 Voltage value.

L2-L3 Voltage	L2-L3 Voltage value.
L3-L1 Voltage	L3-L1 Voltage value.
L1-N Voltage	L1-N Voltage value.
L2-N Voltage	L1-N Voltage value.
L3-N Voltage	L1-N Voltage value.
Current 1	Current 1 value.
Current 2	Current 2 value.
Current 3	Current 3 value.
Current Error	Displays the current EasyGen-3000 error. Activate “Sticky Error” for error to stick when detected. Use “Clear” to acknowledge the error and wait for next error to occur.

6.3.4.2 SETTING THE ACCUENERGY ACUREV-1310

This menu displays the AcuRev-1310 Configuration for each electrical power meter. For more details about the specific power meter configuration, refer to the AccuEnergy AcuRev-1310 Manual.

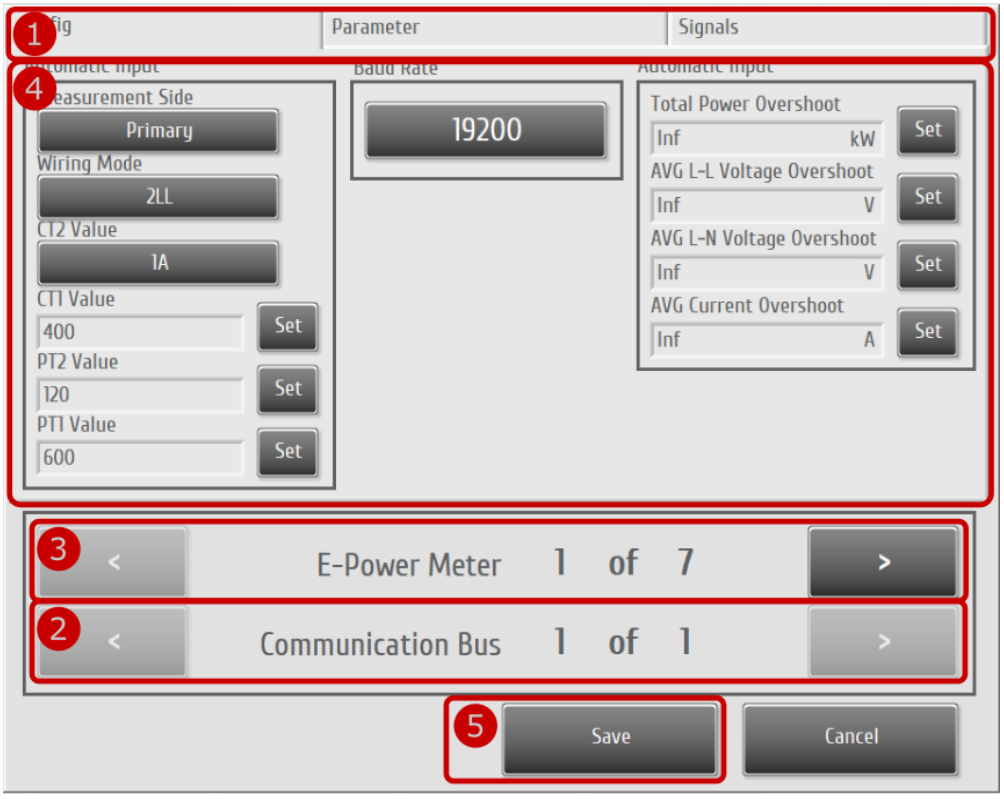


Figure 42 – Typical AcuRev-1310 configuration screen

Table 56: AcuRev-1310 Configuration Procedure

	General procedure	
	Press the "EKW" → "AcuRev-1310" button in the instrument setup screen.	
1	Config	Instrument configuration.
	Parameter	Name tag and gauge range configuration.
	Signals	Real-time instrument signals (useful for troubleshooting).
2	Select communication bus. This is the Modbus communication bus on which the AcuRev-1310 to configure is connected.	
3	Select the electrical power meter to configure.	
4	Edit the AcuRev-1310 configuration.	
5	Press the save button to save the data and return to the Setup screen.	

Table 57: AcuRev-1310 Configuration Parameter Description

Config Tab	Description
Measurement Side	Measurement side on the transformer: • Primary • Secondary
Wiring Mode	Wiring Mode of the equipment: • 3LN • 2LL • 1LN • 1LL
CT1 Value	Current transformer primary side value.
CT2 Value	Current transformer secondary side value.
PT1 Value	Potential transformer primary side value (use 120 when no PT is used).
PT2 Value	Potential transformer secondary side value (use 120 when no PT is used).
Baud Rate	Modbus serial baud rate. Keep this value to the maximum and lower it when communication error occurs.
Total Power Overshoot	Trigger a warning when Total Power is higher than Overshoot value. (0 to disable)
AVG L-L Voltage Overshoot	Trigger a warning when AVG L-L Voltage is higher than Overshoot value. (0 to disable)
AVG L-N Voltage Overshoot	Trigger a warning when AVG L-N Voltage is higher than Overshoot value. (0 to disable)
AVG Current Overshoot	Trigger a warning when AVG Current is higher than Overshoot value. (0 to disable)

Parameter Tab	Description
Instrument Name	Instrument tag to display.
Total Power Name	Total Power tag to display.
AVG L-L Voltage Name	AVG L-L Voltage tag to display.
AVG L-N Voltage Name	AVG L-N Voltage tag to display.
AVG Current Name	AVG Current tag to display.
Total Power Max	Maximum Total Power value used to build gauges increments and maximum value.
AVG L-L Voltage Max	Maximum AVG L-L Voltage value used to build gauges increments and maximum value.
AVG L-N Voltage Max	Maximum AVG L-N Voltage value used to build gauges increments and maximum value.
AVG Current Max	Maximum AVG Current value used to build gauges increments and maximum value.

Signals Tab	Description
Total Power	Current computed Total Power value.
AVG L-L Voltage	Current computed AVG L-L Voltage value. The average is computed from L1-L2 Voltage, L2-L3 Voltage and L3-L1 Voltage.
AVG L-N Voltage	Current computed AVG L-N Voltage value. The average is computed from L1-N Voltage, L2-N Voltage and L3-N Voltage.
AVG Current	Current computed AVG Current value. The average is computed from Current 1, Current 2 and Current 3.
Power Factor	Current Power Factor. This value combined with Total Power can be used to evaluate Reactive Power.
L1-L2 Voltage	L1-L2 Voltage value.
L2-L3 Voltage	L2-L3 Voltage value.
L3-L1 Voltage	L3-L1 Voltage value.
L1-N Voltage	L1-N Voltage value.
L2-N Voltage	L1-N Voltage value.
L3-N Voltage	L1-N Voltage value.
Current 1	Current 1 value.
Current 2	Current 2 value.
Current 3	Current 3 value.
Current Error	Displays the current AcuRev-1310 error. Activate “Sticky Error” for error to stick when detected. Use “Clear” to acknowledge the error and wait for next error to occur.
Model	Selected AcuRev model.
HW Version	Selected AcuRev hardware version.
SW Version	Selected AcuRev software version.
Serial Number	Selected AcuRev serial number.

6.3.5 GENERIC INSTRUMENT CONFIGURATION

6.3.5.1 SETTING THE OPDAQ OPACQ

The OpACQ can read up to eight (8) 0-20 mA analog inputs and 2 digital inputs. The following menu displays the OpACQ Configuration for each analog input. For more details about the OpACQ, please contact an OpDAQ Systems representative.

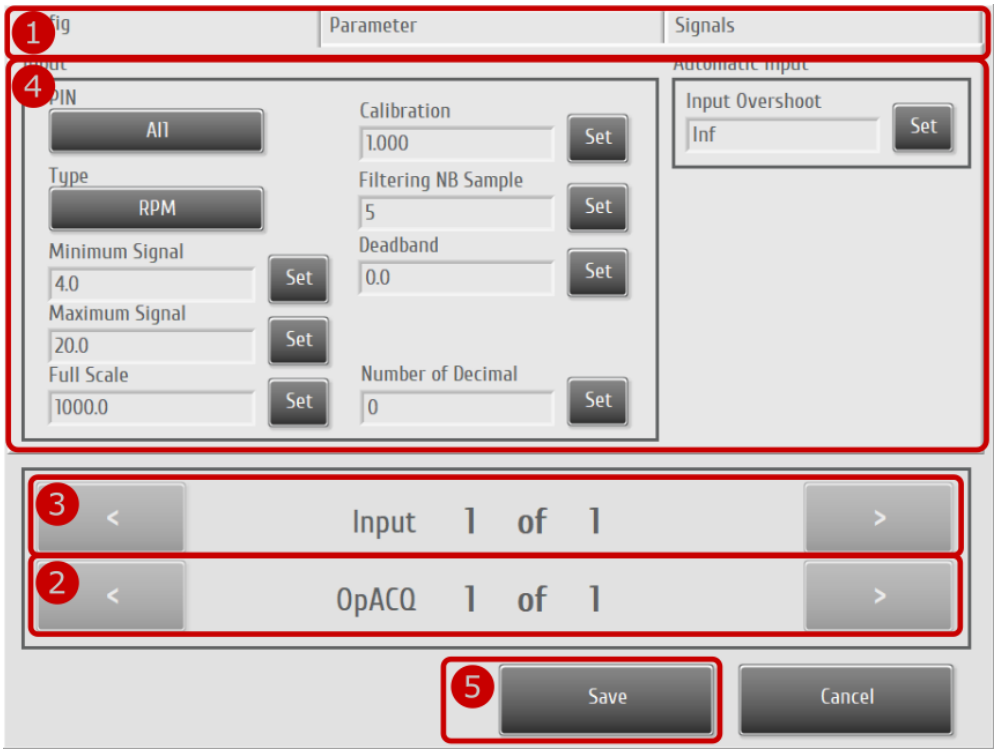


Figure 43 – Typical OpACQ set up screen

Table 58: OpACQ Configuration Procedure

	General procedure	
	Press the "Generic" → "OpACQ" button in instrument setup screen.	
1	Config	Instrument configuration.
	Parameter	Name tag and gauge range configuration.
	Signals	Real-time instrument signals. (Useful for troubleshooting).
2	Select the OpACQ to configure.	
3	Select the input to configure.	
4	Edit the Input configuration.	
5	Press the save button to save the data and return to the Setup screen.	

Table 59: OpACQ Configuration Parameter Description

Config Tab	Description
PIN	OpACQ PIN connected to the signal (AI: 0-20 mA Analog Input, DI: Pulse Digital Input).
Type	Data type to associate with the input. Use “Generic” when no data type describes the input.
Minimum Signal (AI)	Minimum signal value (in mA).
Maximum Signal (AI)	Maximum signal value (in mA).
Full Scale (AI)	Input full-scale value.
Calibration (AI)	OpACQ input calibration. Provided with the unit.
Filtering NB Sample	Number of samples for filtering. Each sample is the data received at the defined system acquisition frequency (usually 1 Hz).
Deadband	The driver will discard input value below this threshold. (0 disable dead band)
Factor (DI)	Factor to apply to digital input pulse frequency.
Number of Decimal	Number of decimals to display.
Input Overshoot	Trigger a warning when Input is higher than Overshoot value. (0 to disable)

Parameter Tab	Description
Instrument Name	Instrument tag to display.
Input Name	Input tag to display.
Input Max	Maximum input value used to build gauges increments and maximum value.

Signals Tab	Description
Computed Input Value	Computed input value using user configuration.
Raw Input Value	Raw input value (in mA for Analog Input or Hz for Digital Input).
Current Error	Displays the current OpACQ error. Activate “Sticky Error” for error to stick when detected. Use “Clear” to acknowledge the error and wait for next error to occur.

6.3.5.2 SETTING THE ADVANTECH ADAM-401X

This menu displays the ADAM-401X Configuration for each generic input. For more details about the specific ADAM-401X configuration, refer to the Advantech ADAM-4017+ manual.

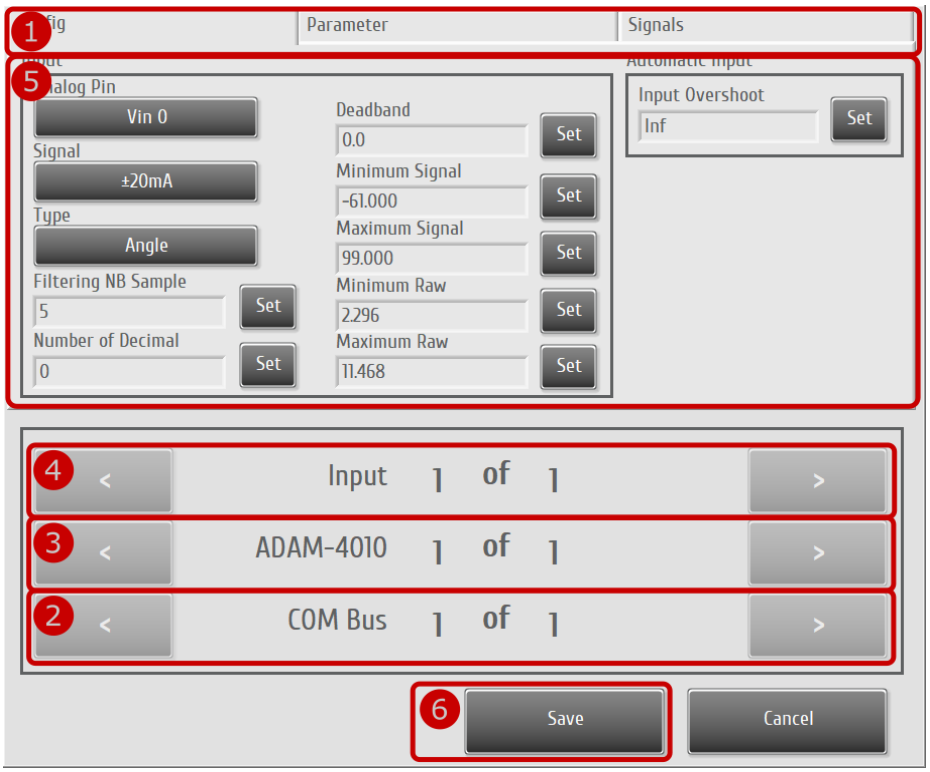


Figure 44 – Typical ADAM-401X set up screen

Table 60: ADAM-401X Configuration Procedure

	General procedure	
	Press the "Generic" → "ADAM-401X" button in the instrumentation setup screen.	
1	Config	Instrument configuration.
	Parameter	Name tag and gauge range configuration.
	Signals	Real-time instrument signals (useful for troubleshooting).
2	Select a communication bus. This is the Modbus communication bus on which the ADAM device to configure is connected.	
3	Select the device to configure.	
4	Select the input on the device to configure (usually from 1 and 8 available).	
5	Edit the ADAM-401X configuration.	
6	Press the save button to save the data and return to the Setup screen.	

Table 61: ADAM-401X Configuration Parameter Description

Config Tab	Description
Analog Pin	Select the physical analog PIN to associate with the input.
Signal	Select the signal type. Make sure the appropriate jumpers are set when you change the input signal from voltage to current and vice versa.
Type	Data type to associate with the input. Use “Generic” when no data type describes the input.
Filtering NB Sample	Number of samples for filtering. Each sample is the data received at the defined system acquisition frequency (usually 1 Hz).
Number of Decimal	Number of decimals to display.
Deadband	The driver will discard input value below this threshold. (0 disable dead band)
Minimum Signal	Minimum expected signal value associated with the Minimum Raw value.
Maximum Signal	Maximum expected signal value associated with the Maximum Raw value.
Minimum Raw	Minimum signal value (in mA or V).
Maximum Raw	Maximum signal value (in mA or V).
Input Overshoot	Trigger a warning when Input is higher than Overshoot value. (0 to disable)

Parameter Tab	Description
Instrument Name	Instrument tag to display.
Input Name	Input tag to display.
Input Max	Maximum input value used to build gauges increments and maximum value.

Signals Tab	Description
Computed Input Value	Computed input value using user configuration.
Raw Input Value	Raw input value (in mA or V).
Raw Module Name	ADAM module model name.
Raw Module Version	ADAM module version.
Current Error	Displays the current ADAM-401X error. Activate “Sticky Error” for error to stick when detected. Use “Clear” to acknowledge the error and wait for next error to occur.

6.3.5.3 SETTING THE CAN READER

This menu displays the CAN Reader Configuration for each CANBus module. This driver needs a preloaded library to read the inputs on a CAN network. To add/remove signals, please contact an OpDAQ representative.

Figure 45 – Typical CAN Reader set up screen

Table 62: CAN Reader Configuration Procedure

	General procedure	
	Press the "Generic" → "CAN Reader" button in instrument setup screen.	
1	Config	Instrument configuration.
	Parameter	Name tag and gauge range configuration.
	Signals	Real-time instrument signals (useful for troubleshooting).
2	Select CANBus module.	
3	Select the input to configure.	
4	Edit the input configuration.	
5	Press the save button to save the data and return to the Setup screen.	

Table 63: CAN Reader Configuration Parameter Description

Config Tab	Description
Type	Data type to associate with the input. Use “Generic” when no data type describes the input.
Number of Decimal	Number of decimals to display.
Input Overshoot	Trigger a warning when Input is higher than Overshoot value. (0 to disable)

Parameter Tab	Description
Instrument Name	Instrument tag to display.
Input Name	Input tag to display.
Input Max	Maximum input value used to build gauges increments and maximum value.

Signals Tab	Description
Input Value	Input value read on the CAN network.
Input Unit	Associated input unit.
Module Version	CAN module version.
Signal Name	CAN signal name.
Current Error	Displays the current CAN Reader error. Activate “Sticky Error” for error to stick when detected. Use “Clear” to acknowledge the error and wait for next error to occur.

6.3.5.4 SETTING THE NI USB-6002

This menu displays the NI USB-6002 Configurations for each input channel.

Figure 46 – Typical NI USB-6002 set up screen

Table 64: NI USB-6002 Configuration Procedure

	General procedure	
	Press the "Generic" → "NI USB-6002" button in the instrument setup screen.	
1	Config	Channel configuration.
	Parameter	Name tag, gauge range and displayed unit configuration.
	Signals	Real-time instrument signals (useful for troubleshooting).
2	Select NI USB-6002 Channel. This is the input channel that is currently displayed and can be configured.	
3	Edit NI USB-6002 Channel configuration.	
4	Press the save button to save the data and return to the Setup screen.	

Table 58: NI USB-6002 Channel Configuration Parameter Description

Config Tab	Description
Physical Channel	NI USB-6002 physical channel. The format is DEVICE/CHANNEL (e.g. Dev1/ai0).
Input Mode	Channel input mode and reference.
Type	Type of data used for display.
Log High-Speed Data	Log this channel in High-Speed while in Sea Trial mode.
Number of Decimal	Number of decimals to be displayed in the Generic Real time Subpanel.
Timeout	Channel read timeout.
Sample Rate	High-Speed sampling rate (Hz). IMPORTANT: On a same device (e.g. Dev1), all inputs share the same acquisition rate. Currently, the highest acquisition rate found on a device is set to all inputs.
Min Voltage	Minimum raw input voltage. Used for scaling.
Max Voltage	Maximum raw input voltage. Used for scaling.
Minimum Signal	Minimum input signal. Used for scaling.
Maximum Signal	Maximum input signal. Used for scaling.
Deadband	Set threshold under which the signal is converted to “0”.
Filtering NB Sample	Number of samples for filtering.
Input Overshoot	The upper limit before a warning is displayed.

Parameter Tab	Description
Channel Name	Instrument tag to display.
Input Unit	Input unit to display.
Input Max	Maximum input value.

Signals Tab	Description
Input Value	Computed input value.
Input Value (V)	Raw input value (V).
Current Error	Displays the current NI USB-6002 Channel error. Activate “Sticky Error” for error to stick when detected. Use “Clear” to acknowledge the error and wait for next error to occur.

6.3.6 DATA REPEATER CONFIGURATION

6.3.6.1 SETTING THE MURPHY WHEELHOUSE REPEATER

This menu displays the Murphy Configuration for the wheelhouse repeater.

Figure 47 – Typical Murphy configuration screen

Table 65: Murphy Configuration Procedure

	General procedure	
	Press the "Repeater" → "Murphy" button in Instrument setup screen.	
1	Config Signals	Instrument configuration. Real-time error status (useful for troubleshooting).
2	Select the communication bus. This is the Modbus communication bus on which the Murphy to configure is connected.	
3	Select the repeater to configure.	
4	Edit the Murphy configuration.	
5	Press the save button to save the data and return to the Setup screen.	

Table 66: Murphy Configuration Parameter Description

Config Tab	Description
Use System Unit	Specify if the output data should use the same unit as displayed on the system. Selecting "No" will force metric units.
Address	Modbus slave address of the repeater.
Baud Rate	Modbus baud rate of the repeater.
Timeout	Delay (in msec) before a timeout error occurs when no reply is received from the repeater (default is 5000).

Signals Tab	Description
Current Error	Displays the current Murphy error. Activate "Sticky Error" for error to stick when detected. Use "Clear" to acknowledge the error and wait for next error to occur.

6.3.6.2 SETTING THE UDP OUTPUT

This menu displays the UDP Output Configuration.

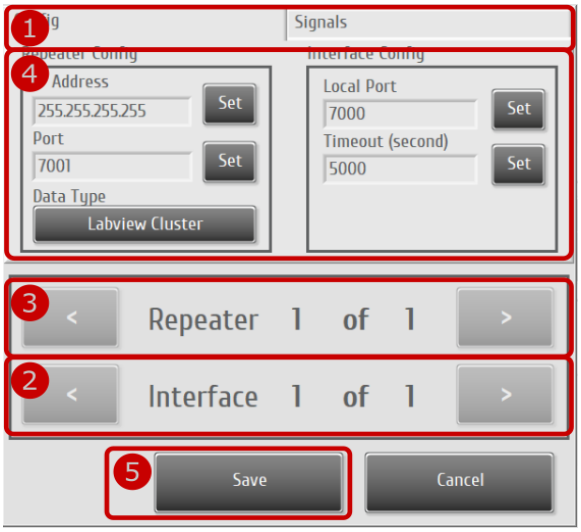


Figure 48– Typical UDP Output configuration screen

Table 67: UDP Output Configuration Procedure

	General procedure	
	Press the "Repeater" → "UDP" button in main system setup screen.	
1	Config	Instrument configuration.
	Signals	Real-time error status (useful for troubleshooting).
2	Select the interface (the local port to use).	
3	Select the repeater to configure.	
4	Edit the UDP configuration.	
5	Press the save button to save the data and return to the Setup screen.	

Table 68: UDP Output Configuration Parameter Description

Config Tab	Description
IP Address	Current repeater IP Address. Select 255.255.255.255 for broadcast.
Port	Current repeater UDP Port.
Data Type	• Labview Cluster: When the system is connected to another OpDAQ display • XML: When the system is connected to a custom repeater.
Local Port	UDP local port of the current interface.
Timeout	Timeout (in msec) of the current interface. Default is 5000.

Signals Tab	Description
Current Error	Displays the current UDP error. Activate "Sticky Error" for error to stick when detected. Use "Clear" to acknowledge the error and wait for next error to occur.

6.3.6.3 SETTING THE MODBUS RTU OUTPUT

This menu displays the Modbus RTU Output Configuration. To get the Modbus registers list, please contact an OpDAQ representative.

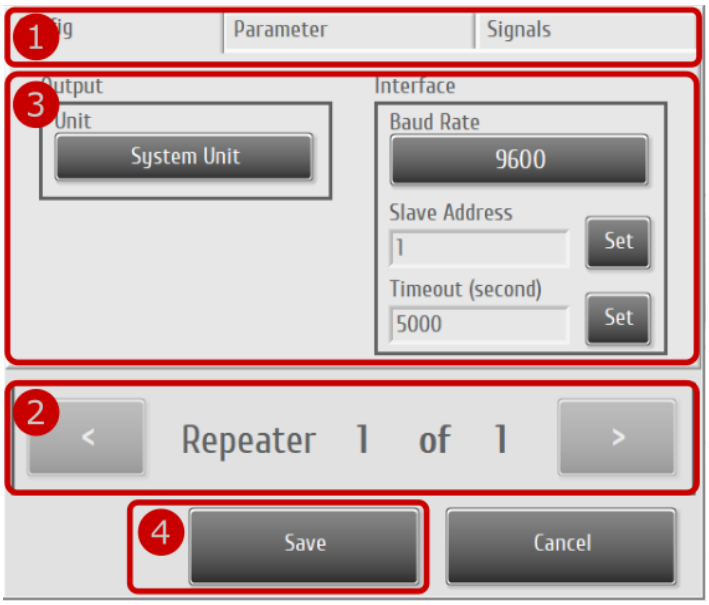


Figure 49 – Typical Modbus RTU Output configuration screen

Table 69: Modbus RTU Output Configuration Procedure

	General procedure	
	Press the “Repeater” à “Modbus RTU” Repeater button in the instrument setup screen.	
1	Config	Instrument configuration.
	Parameter	Name tag configuration.
	Signals	Real-time error status (useful for troubleshooting).
2	Select the repeater to configure.	
3	Edit the Modbus RTU Repeater configuration.	
4	Press the save button to save the data and return to the Setup screen.	

Table 70: Modbus RTU Output Configuration Parameter Description

Config Tab	Description
Unit	Unit of measurement used. System Unit uses the current setting on the system. Metric or English will force the units to that standard.
Baud Rate	Modbus baud rate.
Slave Address	Modbus slave address to use.
Timeout	Timeout (in msec) for the current repeater.

Parameter Tab	Description
Instrument Name	Repeater tag to display.

Signals Tab	Description
Current Error	Displays the current UDP error. Activate “Sticky Error” for error to stick when detected. Use “Clear” to acknowledge the error and wait for next error to occur.

6.3.7 CONTROL INSTRUMENT CONFIGURATION

6.3.7.1 SETTING THE AUTOMATIC BYPASS

This menu displays the Automatic Flow Meter Bypass System Configuration.

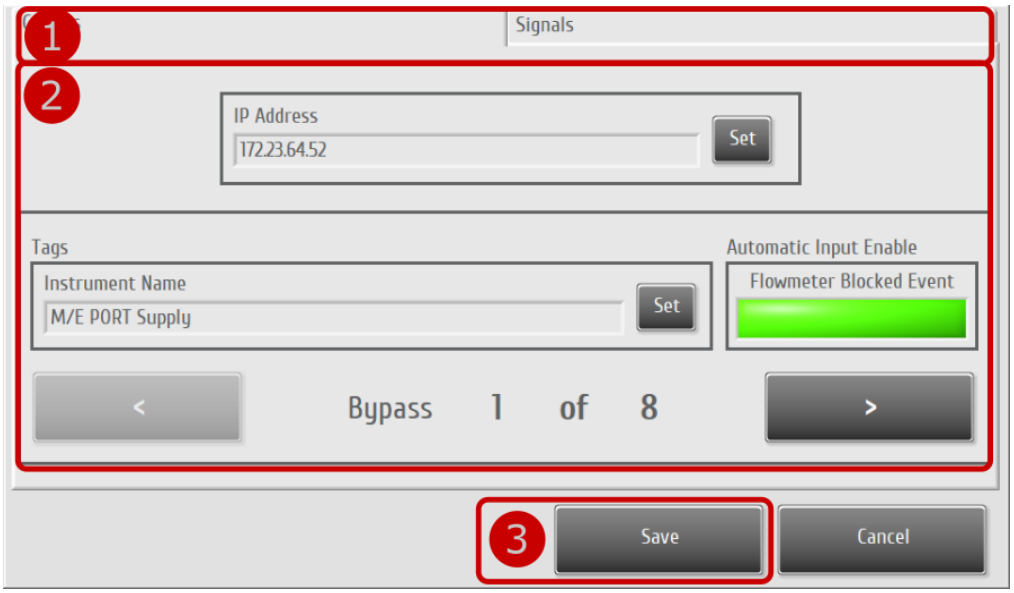


Figure 50 – Typical Automatic Bypass set up screen

Table 71: Automatic Bypass Configuration Procedure

	General procedure	
	Press the "Bypass" button in instrument setup screen.	
1	Config	Instrument configuration.
	Signals	Real-time instrument signals. (Useful for troubleshooting).
2	Edit Automatic Bypass configuration.	
3	Press the save button to save the data and return to the Setup screen.	

Table 72: Automatic Bypass Configuration Parameter Description

Config Tab	Description
IP Address	Modbus IP Address of the Bypass System. Default is 172.23.64.52.
Instrument Name	Instrument tag to display.
Flowmeter Blocked Event	Enable Op-Advance system event to generate a notification when a flow meter is blocked.

Signals Tab	Description
Bypass Activated	Large LED indicates the bypass system is activated when the LED is ON. Small LEDs indicate the flow meter is blocked when ON.

7. TROUBLESHOOTING

7.1 SYSTEM STATUS

The System Status Screen (Figure 24) indicates the status of all measurement instruments and repeaters. When no faults are present, all instrument names are followed by “OK”. In the case of a fault, a short description of the error appears, and a notification will show in the notification area. To get detailed system errors, click on the blinking notification or click on the icon  to access system status.

7.1.1 PREVIOUS SYSTEM ERROR AND NOTIFICATION

All system errors, events and notifications are saved in a log file. Previous log may be displayed by selecting the dates to display and pressing the “View Events” button. The event can be filtered by events type to facilitate browsing. See Figure 25 for more details.

7.2 SYSTEM ERROR CODES

Table 73: System Error Code Description

Error Code	Description	Possible Causes
5000-6999	**Software Module Error**	**See error description below.**
5100	Report Generic Error	See error description in Op-Advance software.
5110	Daily Report Generic Error	See error description in Op-Advance software.
5112	Daily Report: Unable to save daily report	▪ Make sure a R/W folder was specified in the initial configuration. ▪ Make sure specified folder path exists.
5113	Daily Report: Unable to send daily report email	▪ Make sure system is connected to the Internet. ▪ Make sure specified email addresses are valid.
5114	Daily Report: Unable to export daily report	▪ No USB connection
5115	Daily Report: Unable to load daily report	▪ Corrupted daily report file. ▪ No daily report on the selected date.
5120	Voyage Report Generic Error	See error description in Op-Advance software.
5121	Voyage Report: Unable to reset voyage	See error description in Op-Advance software.
5122	Voyage Report: Unable to save voyage report	▪ Make sure a R/W folder was specified in the initial configuration. ▪ Make sure specified folder path exists.

5123	Voyage Report: Unable to send voyage report email	▪ Make sure system is connected to the Internet. ▪ Make sure specified email addresses are valid.
5124	Voyage Report: Unable to export voyage report	▪ No USB connection
5125	Voyage Report: Unable to load voyage report.	▪ Corrupted voyage report file. ▪ No voyage report on selected dates.
5130	Custom Report Generic Error	See error description in Op-Advance software.
5134	Custom Report: Unable to export custom report	▪ No USB connection
5135	Custom Report: Unable to load the custom report.	▪ Corrupted daily reports or raw data files. ▪ No daily report or raw data on selected dates.
5300	Sea Trial Generic Error	See error description in Op-Advance software.
5304	Sea Trial: Unable to export sea trial report	▪ No USB connection
6910	TDMS Module Generic Error	See error description in Op-Advance software.
6911	TDMS: Missing driver data	▪ Make sure the device reporting the High-speed data is working properly.
6913	TDMS: Missing configuration information(s).	▪ Contact an OpDAQ representative.
6914	TDMS: No channel to log.	▪ Contact an OpDAQ representative.
6915	TDMS: Time between files cannot be less than 1 second.	▪ Contact an OpDAQ representative.
6916	TDMS: TDMS file already exists.	▪ Contact an OpDAQ representative.
6917	TDMS: No driver to log	▪ Contact an OpDAQ representative.
6918	TDMS: Driver added while High-Speed ACQ was started. Should not happen.	▪ Contact an OpDAQ representative.
6919	TDMS: High-Speed data lost. (Recommended to restart lap)	▪ Restart the current Sea Trial Lap to make sure no data is lost.
500000-599999	**Software Driver Error**	
500100-500199	**OpDAQ OpVI Driver Error**	
500100	OpVI Driver Generic Error	See error description in Op-Advance software.
500110	OpVI Hardware Generic Error	See error description in Op-Advance software.
500111	OpVI Hardware: OpVI are not using same volume mode for differential calculation	▪ Configure return and supply of volumeter module OpGI-V with the same volume mode

500112	OpVI Hardware Supply & Return: Communication timed out	▪ Modbus cable is not connected. ▪ Check pinout and cable continuity. ▪ No power on OpVIs (check power LED).
500113	OpVI Hardware Supply: Communication timed out	▪ Refer to Error 500112
500114	OpVI Hardware Return: Communication timed out	▪ Refer to Error 500112
500115	OpVI Hardware Supply & Return: Unable to set baud rate	▪ Autobaud failed on OpVIs (lower baud rate and restart Op-Advance).
500116	OpVI Hardware Supply: Unable to set baud rate	▪ Refer to Error 500115
500117	OpVI Hardware Return: Unable to set baud rate	▪ Refer to Error 500115
500118	OPVI Hardware Supply & Return: Framing Error	▪ Check if the end-of-line resistor is connected. ▪ Check pinout and cable continuity. ▪ Make sure all modules are daisy chained (no “T” or star connection on the data bus)
500119	OPVI Hardware Supply: Framing Error	▪ Refer to Error 500118
500120	OPVI Hardware Return: Framing Error	▪ Refer to Error 500118
500121	OPVI Hardware Supply & Return: I/O Error	▪ Refer to Error 500118
500122	OPVI Hardware Supply: I/O Error	▪ Refer to Error 500118
500123	OPVI Hardware Return: I/O Error	▪ Refer to Error 500118
500124	OPVI Hardware: Resource is locked. (Please Reboot)	▪ Application was not terminated properly. Rebooting should clear this error.
500125	OPVI Hardware: Resource is locked. (Please Reboot)	▪ Refer to Error 500124
500126	OPVI Hardware: Resource is locked.	▪ Refer to Error 500124
500127	OPVI Hardware Supply & Return: Overrun Error	▪ Refer to Error 500118
500128	OPVI Hardware Supply: Overrun Error	▪ Refer to Error 500118
500129	OPVI Hardware Return: Overrun Error	▪ Refer to Error 500118
500130	OPVI Hardware Supply & Return: Parity Error	▪ Refer to Error 500118
500131	OPVI Hardware Supply: Parity Error	▪ Refer to Error 500118
500132	OPVI Hardware Return: Parity Error	▪ Refer to Error 500118
500140-500160	OpVI Supply Alarm Specific Code	▪ Alarm present on supply volumeter module OpGI-V (See alarm codes in module manual). Error condition needs to be fixed for the error to be cleared.

500170-500190	OpVI Return Alarm Specific Code	▪ Alarm present on return volumeter module OpGI-V (See alarm codes in module manual). Error condition needs to be fixed for the error to be cleared.
500200-500299	**KRAL BEM500 Driver Error**	
500200	BEM500 Driver Generic Error	See error description in Op-Advance software.
500210	BEM500 Hardware Generic Error	See error description in Op-Advance software.
500212	BEM500 Hardware: Unexpected unit type.	▪ Unable to write configuration at initialization.
500213	BEM500 Hardware: Communication timed out	▪ Modbus cable is not connected. ▪ Check pinout and cable continuity. ▪ No power on BEM500 (check LCD)
500214	BEM500 Hardware: Parity Error	▪ Make sure the BEM500 is configured to use 8N1. ▪ Check if the end-of-line resistor is connected. ▪ Check pinout and cable continuity. ▪ Make sure all modules are daisy chained (no “T” or star connection on the data bus)
500215	BEM500 Hardware: Overrun Error	▪ Refer to Error 500214
500216	BEM500 Hardware: Framing Error	▪ Refer to Error 500214
500217	BEM500 Hardware: I/O Error	▪ Refer to Error 500214
500218	BEM500 Hardware: Resource is locked	▪ Refer to Error 500124
500219	BEM500 Hardware: Resource is locked (Please Reboot)	▪ Refer to Error 500124
500250-500270	BEM500 Alarm Specific Code	▪ Alarm present on volumeter module BEM500 (see alarm code in BEM500 manual) Once an alarm occurs, it must be cleared directly on BEM500 module.
500300-500399	**Binsfeld TPM2 Driver Error**	
500300	TPM2 Generic Error	See error description in Op-Advance software.
500310	TPM2 Service Generic Error	See error description in Op-Advance software.
500311	TPM2 Service: Checksum is invalid	▪ Interference on data line ▪ Loose connection
500312	TPM2 Service: Unable to align data	▪ Interference on data line ▪ Loose connection
500313	TPM2 Service: Session was lost	▪ USB Cable disconnected
500314	TPM2 Service: Communication timed out	▪ Cable not connected ▪ Check pinout and cable continuity. ▪ No power on TPM2 (check power LED)
500320	TPM2 Hardware Generic Error	See error description in Op-Advance software.

500321	TPM2 Hardware: Stator error	▪ TPM2 stator unaligned or too far from rotor ▪ TPM2 communication error with rotor (reboot TPM2) ▪ Stator power is too high or too low ▪ Temperature is too high
500322	TPM2 Hardware: Rotor error	▪ Strain gauge value is too high ▪ Rotor power is too low ▪ Rotor is too far from the stator
500400-500499	**Binsfeld TT10K-TTRevo Driver Error**	
500400	TT10K/TTRevo Generic Error	See error description in Op-Advance software.
500410	TT10K Service Generic Error	See error description in Op-Advance software.
500411	TT10K Service: Invalid SOF/EOF	▪ Interference on data line ▪ Loose connection
500412	TT10K Service: Unable to align data	▪ Interference on data line ▪ Loose connection
500413	TT10K Service: Session was lost	▪ USB Cable disconnected.
500414	TT10K Service: Communication timed out	▪ Cable not connected ▪ Check pinout and cable continuity. ▪ No power on TT10K (Check power LED)
500420	TT10K/TTRevo OpACQ Hardware Generic Error	See error description in Op-Advance software.
500421	TT10K/TTRevo OpACQ Hardware: Invalid SOF/EOF	▪ Interference on data line ▪ Loose connection
500422	TT10K/TTRevo OpACQ Hardware: Communication timed out.	▪ Cable is not connected ▪ Check pinout and cable continuity. ▪ No power on OpACQ (check power LED)
500500-500599	**VAF T-Sense Driver Error**	
500500	T-Sense Driver Generic Error	See error description in Op-Advance software.
500510	T-Sense Hardware Generic Error	See error description in Op-Advance software.
500513	T-Sense Hardware: Communication timed out	▪ Modbus cable is not connected. ▪ Check pinout and cable continuity. ▪ No power on T-Sense
500514	T-Sense Hardware: Parity Error	▪ Make sure the T-Sense is configured to use 8N1. ▪ Check if the end-of-line resistor is connected. ▪ Check pinout and cable continuity. ▪ Make sure all modules are daisy chained (no “T” or star connection on the data bus)
500515	T-Sense Hardware: Overrun Error	▪ Refer to Error 500514
500516	T-Sense Hardware: Framing Error	▪ Refer to Error 500514
500517	T-Sense Hardware: I/O Error	▪ Refer to Error 500514
500518	T-Sense Hardware: Resource is locked	▪ Refer to Error 500124

500519	T-Sense Hardware: Resource is locked (Please Reboot)	▪ Refer to Error 500124
500600-500699	**KHRONE Optimass 6400 Driver Error**	
500600	Optimass 6400 Driver Generic Error	See error description in Op-Advance software.
500610	Optimass 6400 Hardware Generic Error	See error description in Op-Advance software.
500612 – 500632	Optimass 6400 Communication Error	▪ Modbus cable is not connected. ▪ Check pinout and cable continuity. ▪ No power on T-Sense ▪ Make sure the T-Sense is configured to use 8N1. ▪ Check if the end-of-line resistor is connected. ▪ Check pinout and cable continuity. ▪ Make sure all modules are daisy chained (no “T” or star connection on the data bus)
500640 – 500654	Optimass 6400 Supply Diagnostic Error	▪ Alarm present on supply volumeter module Optimass 6400 (see alarm code in Optimass 6400 manual)
500660 – 500674	Optimass 6400 Return Diagnostic Error	▪ Alarm present on return volumeter module Optimass 6400 (see alarm code in Optimass 6400 manual)
500680 – 500685	Optimass 6400 Write Error	▪ Write error on volumeter module (refer to the Optimass 6400 manual)
500700-500799	**OpDAQ OpGI-RPM Driver Error**	
500700	OPGI-RPM Driver Generic Error	See error description in Op-Advance software.
500703	OPGI-RPM: Communication timed out	▪ Modbus cable is not connected. ▪ Check pinout and cable continuity. ▪ No power on OpGI-RPM (check power LED).
500704	OPGI-RPM: Parity Error	▪ Check if the end-of-line resistor is connected. ▪ Check pinout and cable continuity. ▪ Make sure all modules are daisy chained (no “T” or star connection on the data bus)
500705	OPGI-RPM: Overrun Error	▪ Refer to Error 500704
500706	OPGI-RPM: Framing Error	▪ Refer to Error 500704
500707	OPGI-RPM: I/O Error	▪ Refer to Error 500704
500708	OPGI-RPM: Resource is locked	▪ Refer to Error 500124
500709	OPGI-RPM: Resource is locked (Please Reboot)	▪ Refer to Error 500124
500710	OPGI-RPM Hardware:	See error description in Op-Advance software.

500711-500742	OpGI-RPM Alarm Specific Code	▪ Alarm present on RPM module (See alarm codes in module manual). Error condition needs to be fixed for the error to be cleared.
500744	OPGI-RPM: Unable to set baud rate	▪ Autobaud failed on OpVIs (lower baud rate and restart Op-Advance)
500900-500999	**GPS NMEA0183 Generic Error**	
500900	GPS Driver Generic Error	See error description in Op-Advance software.
500910	GPS Service Generic Error	See error description in Op-Advance software.
500911	GPS Service: Session was lost	▪ USB Cable disconnected
500912	GPS Service: Communication timed out	▪ Cable not connected. ▪ Check pinout and cable continuity. ▪ No power on GPS. ▪ Wrong serial communication on GPS (RS232 or RS422, 4800 bps, 8 data bits, no parity, 1 stop bit)
500920	GPS Hardware Generic Error	See error description in Op-Advance software.
500921	GPS Hardware: No GPRMC sentence found	▪ Strings GPRMC or GPGLL+GPVTG+GPZDA not present in data stream. (Make sure the GPS broadcasts GPRMC and/or GPGLL+GPVTG+GPZDA)
501000-501099	**GPS NMEA2000 Driver Error**	
501010	GPS NMEA2000 Generic Error	See error description in Op-Advance software.
501011	GPS NMEA2000: Error reading CAN Port	▪ Make sure the CANBus converter is connected.
501012	GPS NMEA2000: Session was lost	▪ Re-plug the CANBus converter.
501013	GPS NMEA2000: Error processing data	▪ Contact an OpDAQ representative.
501014	GPS NMEA2000: Service (thread) stopped	▪ Contact an OpDAQ representative.
501015	GPS NMEA2000: No data received from GPS	▪ Cable not connected. ▪ Check pinout and cable continuity. ▪ No power on GPS.
501016	GPS NMEA2000: Error while loading CAN DB	▪ Contact an OpDAQ representative.
501100-501199	**Woodward EasyGen-3000 Driver Error**	
501100	EasyGen-3000 Driver Generic Error	See error description in Op-Advance software.
501110	EasyGen-3000 Hardware Generic Error	See error description in Op-Advance software.
501113	EasyGen-3000 Hardware: Communication timed out	▪ Modbus cable not connected. ▪ Check pinout and cable continuity. ▪ No power on EasyGen-3000. (Verify LCD is ON)

501114	Easygen-3000 Hardware: Parity Error	▪ Make sure the EasyGen-3000 is configured to use 8N1. ▪ Check if the end-of-line resistor is connected. ▪ Check pinout and cable continuity. ▪ Make sure all modules are daisy chained (no “T” or star connection on the data bus)
501115	Easygen-3000 Hardware: Overrun Error	▪ Refer to Error 501114
501116	Easygen-3000 Hardware: Framing Error	▪ Refer to Error 501114
501117	Easygen-3000 Hardware: I/O Error	▪ Refer to Error 501114
501118	Easygen-3000 Hardware: Ressource is locked	▪ Refer to Error 500124
501119	Easygen-3000 Hardware: Ressource is locked (Please Reboot)	▪ Refer to Error 500124
501200-501299	**AccuEnergy AcuRev-1310 Driver Error**	
501200	AcuRev-1310 Driver Generic Error	See error description in Op-Advance software.
501210	AcuRev-1310 Hardware Generic Error	See error description in Op-Advance software.
501213	AcuRev-1310 Hardware: Communication timed out	▪ Modbus cable not connected. ▪ Check pinout and cable continuity. ▪ No power on AcuRev-1310. (Verify LCD is ON)
501214	AcuRev-1310 Hardware: Parity Error	▪ Make sure the AcuRev-1310 is configured to use 8N1. ▪ Check if the end-of-line resistor is connected. ▪ Check pinout and cable continuity. ▪ Make sure all modules are daisy chained (no “T” or star connection on the data bus)
501215	AcuRev-1310 Hardware: Overrun Error	▪ Refer to Error 501214
501216	AcuRev-1310 Hardware: Framing Error	▪ Refer to Error 501214
501217	AcuRev-1310 Hardware: I/O Error	▪ Refer to Error 501214
501218	AcuRev-1310 Hardware: Ressource is locked	▪ Refer to Error 500124
501219	AcuRev-1310 Hardware: Ressource is locked (Please Reboot)	▪ Refer to Error 500124
501300-501399	**Advantech ADAM-401X Driver Error**	
501310	ADAM-4010 Driver Generic Error	See error description in Op-Advance software.

501311	ADAM-4010 Driver: Error opening port	▪ If a USB-to-serial device is used: Unplug it, plug it back and reboot the terminal. ▪ Make sure the COM port is not currently in use.
501312	ADAM-4010 Driver: More than 8 devices on a port	▪ Contact an OpDAQ representative.
501313	ADAM-4010 Driver: Error writing configurations	▪ Contact an OpDAQ representative.
501315	ADAM-4010 Driver: Error formatting string	▪ Contact an OpDAQ representative.
501316	ADAM-4010 Driver: Error in config for filter or data	▪ Contact an OpDAQ representative.
501317	ADAM-4010 Driver: Error computing filter or data	▪ Contact an OpDAQ representative.
501318	ADAM-4010 Driver: Communication timed out	▪ Make sure the device is configured to use 8N1. ▪ Modbus cable is not connected. ▪ Check pinout and cable continuity. ▪ No power on AcuRev-1310. (Verify LCD is ON)
501319	ADAM-4010 Driver: Vin pin initialized twice	▪ Make Sure the same PIN is not used twice in the configuration
501400-501499	**Generic CAN Driver Error**	
501500-501599	**CAN Reader Driver Error**	
501510	CAN Reader Generic Error	See error description in Op-Advance software.
501511	CAN Reader: Error reading CAN Port	▪ Make sure the CANBus converter is connected.
501512	CAN Reader: Session was lost	▪ Replug the CANBus converter.
501513	CAN Reader: Error processing data	▪ Contact an OpDAQ representative.
501514	CAN Reader: Service (thread) stopped	▪ Contact an OpDAQ representative.
501515	CAN Reader: No data received	▪ Cable not connected. ▪ Check pinout and cable continuity. ▪ No power on GPS.
501516	CAN Reader: Error loading CAN database	▪ Contact an OpDAQ representative.
501600-501699	**NI USB-6002 Driver Error**	
501610	NI USB-6002: Driver Generic Error	See error description in Op-Advance software.

501611	NI USB-6002: Error opening port	▪ If a USB-to-serial device is used: Unplug it, plug it back and reboot the terminal. ▪ Make sure the COM port is not currently in use.
501612	NI USB-6002: Error Starting acquisition	▪ Contact an OpDAQ representative.
501613	NI USB-6002: Error Reading Data	▪ Make sure the CANBus converter is connected.
501614	NI USB-6002: File already exist (logging)	▪ Contact an OpDAQ representative.
501615	NI USB-6002: Missing parameter(s) to start logging	▪ Contact an OpDAQ representative.
501616	NI USB-6002: Sample rate exceeds the maximum sample rate for the number of channels specified.	▪ Lower the sample rate or remove a channel.
501617	NI USB-6002: Time between files cannot be lower than 1 second	▪ Contact an OpDAQ representative.
501618	NI USB-6002: Read buffer overflow	▪ Reboot the system.
501700-501799	**OpDAQ OpACQ Driver Error**	
501720	OpACQ Hardware Generic Error	See error description in Op-Advance software.
501721	OpACQ Hardware: Invalid SOF/EOF	▪ Change the baud rate in the configuration. ▪ Check pinout and cable continuity.
501722	OpACQ Hardware: Communication timed out	▪ Change the baud rate in the configuration. ▪ Modbus cable is not connected. ▪ Check pinout and cable continuity. ▪ No power on OpACQ. (Verify LCD is ON)
501723	OpACQ Hardware: Session was lost	▪ USB cable is disconnected.
501800-501899	**Modbus RTU Driver Error**	
501810	Modbus RTU Driver Generic Error	See error description in Op-Advance software.
501811	Modbus RTU Driver: Too many flowmeters	▪ Configuration defines more flowmeters than supported by the repeater.
501812	Modbus RTU Driver: Too many torquemeters	▪ Configuration defines more torquemeters than supported by the repeater.
501813	Modbus RTU Driver: Too many EKW	▪ Configuration defines more electrical power meters than supported by the repeater.
501814	Modbus RTU Driver: Too many GPS	▪ Configuration defines more GPS than supported by the repeater.
501815	Modbus RTU Driver: Too many Generic devices	▪ Configuration defines more generic instruments than supported by the repeater.

501816	Modbus RTU Driver: Error at initialization	▪ If a USB-to-serial device is used: Unplug it, plug it back and reboot the terminal. ▪ Make sure the COM port is not currently in use.
501517	Modbus RTU Driver: Connection lost to COM Port	▪ USB Cable disconnected.
501818	Modbus RTU Driver: Error while trying to reconnect on COM Port	▪ USB Cable disconnected.
501900-501999	**Murphy Driver Error**	
501910	Murphy Driver Generic Error	See error description in Op-Advance software.
501911	Murphy Driver: Too many flowmeters	▪ Refer to error 501811
501912	Murphy Driver: Too many torquemeters	▪ Refer to error 501812
501913	Murphy Driver: Communication timed out	▪ Modbus cable not connected. ▪ Check pinout and cable continuity. ▪ No power on Murphy. (Verify LCD screen)
501914	Murphy Driver: Parity Error	▪ Make sure the device is configured to use 8N1. ▪ Check if the end-of-line resistor is connected. ▪ Check pinout and cable continuity. ▪ Make sure all modules are daisy chained (no “T” or star connection on the data bus)
501915	Murphy Driver: Overrun Error	▪ Refer to Error 501914
501916	Murphy Driver: Framing Error	▪ Refer to Error 501914
501917	Murphy Driver: I/O Error	▪ Refer to Error 501914
501918	Murphy Driver: Resource is locked	▪ Refer to Error 500124
501919	Murphy Driver: Resource is locked (Please Reboot)	▪ Refer to Error 500124
502000-502099	**UDP Driver Error**	
502020	Repeater UDP Driver Generic Error	See error description in Op-Advance software.
502021	Repeater UDP Driver: Communication timed out	▪ Main terminal is not powered. ▪ Check pinout and ethernet cable continuity.
502100-502199	**Allen-Bradley Powermonitor-3000 Driver Error**	
502100	Powermonitor-3000 Driver Generic Error	▪ See error description in Op-Advance software.
502110	Powermonitor-3000 Hardware Generic Error	▪ See error description in Op-Advance software.
502113	Powermonitor-3000 Hardware: Communication timed out	▪ Modbus cable is not connected. ▪ Check pinout and cable continuity. ▪ No power on T-Sense

502114	Powermonitor-3000 Hardware: Parity Error	▪ Make sure the T-Sense is configured to use 8N1. ▪ Check if the end-of-line resistor is connected. ▪ Check pinout and cable continuity. ▪ Make sure all modules are daisy chained (no “T” or star connection on the data bus)
502115	Powermonitor-3000 Hardware: Overrun Error	▪ Refer to Error 502114
502116	Powermonitor-3000 Hardware: Framing Error	▪ Refer to Error 502114
502117	Powermonitor-3000 Hardware: I/O Error	▪ Refer to Error 502114
502118	Powermonitor-3000 Hardware: Resource is locked	▪ Refer to Error 500124
502119	Powermonitor-3000 Hardware: Resource is locked (Please Reboot)	▪ Refer to Error 500124
502150	Powermonitor-3000 Alarms: Unkown alarm is ON.	▪ Refer to the Powermonitor-3000 manual.
502200-502299	**AIS NMEA-0183 Driver Error**	
502200	AIS-NMEA0183 Driver Generic Error	▪ See error description in Op-Advance software.
502201 – 502204	AIS-NMEA0183 Decode Error	▪ Check the AIS is configured to output NMEA0183 sentences.
502210	AIS-NMEA0183 Service Generic Error	▪ See error description in Op-Advance software.
502211	AIS-NMEA0183 Service: Session was lost	▪ USB Cable disconnected
502212	AIS-NMEA0183 Service: Communication timed out	▪ Cable not connected. ▪ Check pinout and cable continuity. ▪ No power on AIS. ▪ Wrong serial communication on AIS (RS232 or RS422, 38400 bps, 8 data bits, no parity, 1 stop bit)
502220	AIS-NMEA0183 Hardware Generic Error	▪ See error description in Op-Advance software.
502300-502399	**GE EntelliGuard Driver Error**	
502300	EntelliGuard Driver Generic Error	▪ See error description in Op-Advance software.
502310	EntelliGuard Hardware Generic Error	▪ See error description in Op-Advance software.

502313	EntelliGuard Hardware: Communication timed out	▪ Modbus cable is not connected. ▪ Check pinout and cable continuity. ▪ No power on EntelliGuard
502314	EntelliGuard Hardware: Parity Error	▪ Make sure the EntelliGuard is configured to use 8N1. ▪ Check if the end-of-line resistor is connected. ▪ Check pinout and cable continuity. ▪ Make sure all modules are daisy chained (no “T” or star connection on the data bus)
502315	EntelliGuard Hardware: Overrun Error	▪ Refer to Error 502314
502316	EntelliGuard Hardware: Framing Error	▪ Refer to Error 502314
502317	EntelliGuard Hardware: I/O Error	▪ Refer to Error 502314
502318	EntelliGuard Hardware: Resource is locked	▪ Refer to Error 500124
502319	EntelliGuard Hardware: Resource is locked (Please Reboot)	▪ Refer to Error 500124
502400-502499	**ABB ACH-550 Driver Error**	
502400	ACH-550 Driver Generic Error	▪ See error description in Op-Advance software.
502410	ACH-550 Hardware Generic Error	▪ See error description in Op-Advance software.
502413	ACH-550 Hardware: Communication timed out	▪ Modbus cable is not connected. ▪ Check pinout and cable continuity. ▪ No power on ACH-550
502414	ACH-550 Hardware: Parity Error	▪ Make sure the ACH-550 is configured to use 8N1. ▪ Check if the end-of-line resistor is connected. ▪ Check pinout and cable continuity. ▪ Make sure all modules are daisy chained (no “T” or star connection on the data bus)
502415	ACH-550 Hardware: Overrun Error	▪ Refer to Error 502414
502416	ACH-550 Hardware: Framing Error	▪ Refer to Error 502414
502417	ACH-550 Hardware: I/O Error	▪ Refer to Error 502414
502418	ACH-550 Hardware: Resource is locked	▪ Refer to Error 500124
502419	ACH-550 Hardware: Resource is locked (Please Reboot)	▪ Refer to Error 500124
502600-502699	**I-7051D Driver Error**	
502600	I-7051D Driver Generic Error	▪ See error description in Op-Advance software.
502610	I-7051D Hardware Generic Error	▪ See error description in Op-Advance software.

502611	I-7051D Hardware: Communication timed out	▪ Serial cable is not connected. ▪ Check pinout and cable continuity. ▪ No power on I-7051D. ▪ Make sure the T-Sense is configured to use 8N1.
502611	I-7051D Hardware: Command is invalid	▪ Contact an OpDAQ representative.
502700-502799	**Generic NMEA-0183 Driver Error**	
502700	NMEA0183 Driver Generic Error	▪ See error description in Op-Advance software.
502710	NMEA0183 Service Generic Error	▪ See error description in Op-Advance software.
502711	NMEA0183 Service: Session was lost	▪ USB Cable disconnected
502712	NMEA0183 Service: Communication timed out	▪ Cable not connected. ▪ Check pinout and cable continuity. ▪ No power on NMEA0183 instrument. ▪ Wrong serial communication on NMEA0183 instrument (RS232 or RS422, 8 data bits, no parity, 1 stop bit)
502720	NMEA0183 Hardware Generic Error	▪ See error description in Op-Advance software.
502721	NMEA0183 Hardware: No NMEA0183 string configured.	▪ Review the system configuration. ▪ Contact an OpDAQ representative.
502722 - 502728	NMEA0183 Hardware: No “X” string found.	▪ Check the NMEA0183 instrument to make sure the output is enabled. ▪ Check the NMEA0183 instrument to add the specific “X” string to the output.
502800-502899	**Generic Modbus Driver Error**	
502800	Modbus Driver Generic Error	▪ See error description in Op-Advance software.
502810	Modbus Hardware Generic Error	▪ See error description in Op-Advance software.
502812	Modbus Hardware: Communication timed out	▪ Modbus cable is not connected. ▪ Check pinout and cable continuity. ▪ No power on the Modbus device.
502900-502999	**LC-2 O2 Driver Error**	
502900	LC-2 Driver Generic Error	▪ See error description in Op-Advance software.
502910	LC-2 Service Generic Error	▪ See error description in Op-Advance software.
502911	LC-2 Service: Session was lost	▪ USB Cable disconnected

502912	LC-2 Service: Communication timed out	▪ Cable not connected. ▪ Check pinout and cable continuity. ▪ No power on LC-2. ▪ Wrong serial communication on LC-2 (RS232, 19200 baud, 8 data bits, no parity, 1 stop bit)
502920	LC-2 Hardware Generic Error	▪ See error description in Op-Advance software.
502930	LC-2 Hardware: Unknown Error	▪ Alarm present on LC-2 (See alarm codes in the LC-2 manual). Error condition needs to be fixed for the error to be cleared.
502931	LC-2 Hardware: Heater circuit shorted	▪ LC-2 O2 probe needs to be replaced.
502932	LC-2 Hardware: Heater circuit open	▪ Check the O2 probe is properly connected. ▪ LC-2 O2 probe needs to be replaced.
502933	LC-2 Hardware: Pump cell circuit shorted	▪ LC-2 O2 probe needs to be replaced.
502934	LC-2 Hardware: Pump cell circuit open	▪ Check the O2 probe is properly connected. ▪ LC-2 O2 probe needs to be replaced.
502935	LC-2 Hardware: Reference cell circuit shorted	▪ LC-2 O2 probe needs to be replaced.
502936	LC-2 Hardware: Reference cell circuit open	▪ Check the O2 probe is properly connected. ▪ LC-2 O2 probe needs to be replaced.
502937	LC-2 Hardware: Sensor system error	▪ Alarm present on LC-2 (See alarm codes in the LC-2 manual). Error condition needs to be fixed for the error to be cleared.
502938	LC-2 Hardware: Sensor timing error	▪ Alarm present on LC-2 (See alarm codes in the LC-2 manual). Error condition needs to be fixed for the error to be cleared.
502939	LC-2 Hardware: Supply voltage too low	▪ Power supply cable run is too long. ▪ Make sure the LC-2 is supplied with 12V at the LC-2 end. ▪ Make sure the power supply can provide 3A.
502940	LC-2 Hardware: Need free air calibration	▪ Wait 15 minutes before starting the engines so the LC-2 can calibrate itself. ▪ LC-2 O2 probe needs to be replaced.
503000-503099	**FTI Flow Driver Error**	
503000	FTI Driver Generic Error	▪ See error description in Op-Advance software.
503010	FTI Hardware Generic Error	▪ See error description in Op-Advance software.
503013	FTI Hardware: Communication timed out	▪ Modbus cable is not connected. ▪ Check pinout and cable continuity. ▪ No power on FTI device.

503014	FTI Hardware: Parity Error	▪ Make sure the FTI is configured to use 8N1. ▪ Check if the end-of-line resistor is connected. ▪ Check pinout and cable continuity. ▪ Make sure all modules are daisy chained (no “T” or star connection on the data bus)
503015	FTI Hardware: Overrun Error	▪ Refer to Error 503014
503016	FTI Hardware: Framing Error	▪ Refer to Error 503014
503017	FTI Hardware: I/O Error	▪ Refer to Error 503014
503018	FTI Hardware: Resource is locked	▪ Refer to Error 500124
503019	FTI Hardware: Resource is locked (Please Reboot)	▪ Refer to Error 500124
503050	FTI Alarms: Unkown alarm is ON.	▪ Alarm present on FTI Flow Meter (See alarm codes in the FTI manual). Error condition needs to be fixed for the error to be cleared.
503051	FTI Alarms: bit 0: Invalid Configuration	▪ Review the FTI configuration on the device (Refer to the FTI manual). Error condition needs to be fixed for the error to be cleared.
503052	FTI Alarms: bit 1: Invalid Register Map Revision	▪ Invalid FTI firmware version. The flowmeter needs to be updated (Refer to the FTI manual). ▪ Contact an OpDAQ representative.
503700-503799	**OpDAQ OpTS Driver Error**	
503700	OPGI-BS Driver Generic Error	▪ See error description in Op-Advance software.
503703	OPGI-BS: Communication timed out	▪ Modbus cable is not connected. ▪ Check pinout and cable continuity. ▪ No power on OpGI-BS (check power LED).
503704	OPGI-BS: Parity Error	▪ Check if the end-of-line resistor is connected. ▪ Check pinout and cable continuity. ▪ Make sure all modules are daisy chained (no “T” or star connection on the data bus)
503705	OPGI-BS: Overrun Error	▪ Refer to Error 503704
503706	OPGI-BS: Framing Error	▪ Refer to Error 503704
503707	OPGI-BS: I/O Error	▪ Refer to Error 503704
503708	OPGI-BS: Resource is locked	▪ Refer to Error 500124
503709	OPGI-BS: Resource is locked (Please Reboot)	▪ Refer to Error 500124
503710	OPGI-BS Hardware	▪ See error description in Op-Advance software.
503711 - 503722	OpTS Alarm Specific Code	▪ Alarm present on OpTS (See alarm codes in the OpTS manual). Error condition needs to be fixed for the error to be cleared.

503723 - 503743	OpTS + Base Station Alarm Specific Code	▪ Alarm present on OpTS and Base Station (See alarm codes in the OpTS manual). Error condition needs to be fixed for the error to be cleared.
503744 - 503750	Base Station Alarm Specific Code	▪ Alarm present on Base Station (See alarm codes in the OpTS manual). Error condition needs to be fixed for the error to be cleared.

7.3 SYSTEM CRITICAL SOFTWARE ERROR

System critical errors will be displayed in a pop-up screen as soon as the system encounters a major error. This should never occur during the system setup and normal usage. This type of error means a software package is missing or low-level configuration is erroneous. This type of error might also occur when the system is not shut down properly (during a blackout) and files get corrupted. The system will try to reboot itself to re-initialize the hardware and clear the error. If this error remains, you should contact an OpDAQ Systems representative as it is very likely that the system will not run as expected.

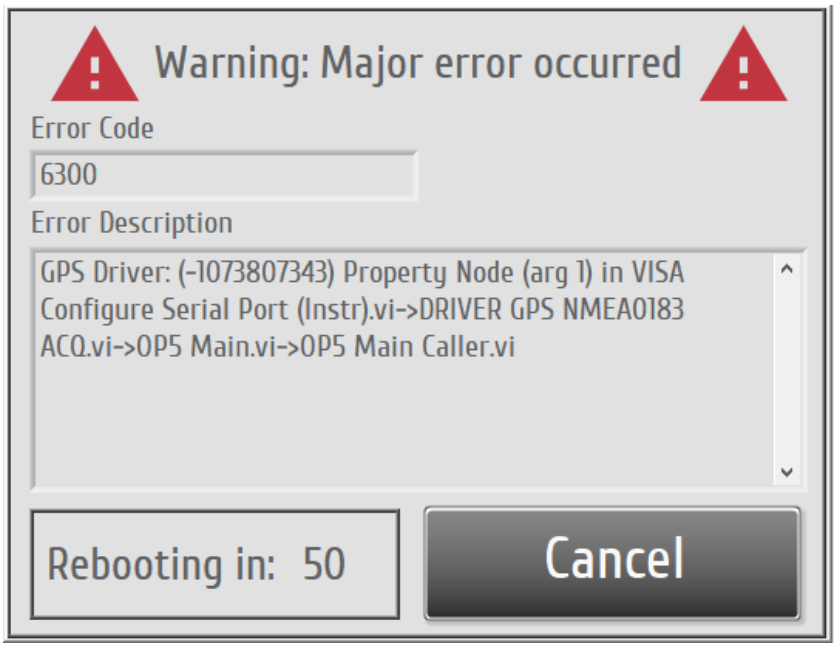


Figure 51 – Major system error screen