

# **Der's Guide**

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# OM-240 24-Channel Ethernet Data Logger with Embedded Web Server



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#### **SPECIFIC WARNINGS**

To guarantee the IP protection during the installation, expect to seal the instrument cables (with silicone or foam) after having tightened the cable-gland. Through the installation expect suitable protections to avoid product overheating (eg. a shelter to avoid direct sunlight); similarly for low temperatures. Do not open in case of bad weather conditions (rain, snow, etc). Expect the recurring substitution of the hygroscopic salts. Do not install in small locations and/or without ventilation, with high humidity, in potentially dangerous areas or where is prescribed the use of explosioproof components. Electrical connections on the product must be executed only from qualified and expert personnel, in compliance with actual rules and regulations.

For external network powering, the plug at the end of the cord has ground contact; the grounding of the powering is provided from the plug inserted in the socket. The product powering source must be divided from dangerous voltage parts with double insulation and must guarantee insulation of at least 3000 Vrms.

Be sure to have, in the plant, suitable protection from an electric short circuit (for example high sensitivity differential circuit-breaker at the root of the AC/DC power supply unit). Before any maintenance on the product, the powering must be disconnected. Avoid any action that can short-circuit the rechargeable battery poles.

To enable the product protections, expect a connection to the ground plant through a proper green-yellow grounding connector; this connector must be connected to the proper ground clamp (or to any bolt if it is a metal cabinet).

Verify periodically rechargeable battery voltage; expect a substitution after roughly 5 years and if the voltage measured on the poles is too low (eg. 10.5V for a battery with nominal voltage 12V) and investigate on the causes. Using the product differently from the one expected from the manufacturer can compromise safety conditions. The use of parts other than original spare parts could lead to irregular functioning or even dangerous situations for a person and things.

TABLE OF CONTENTS

	6		20
QUICK START	<b>6</b>	WEB PAGES FUNCTIONALITY	<b>39</b> 39
			39 40
	6	Web interface Language setup	
Connections Front Panel	6	Configuration of local analog channels	40
	6	Input Configuration	43
Rear Panel	8	Multiplexer Configuration	47
Cabling	8	MODBUS SENSORS	51
Overview	8	What's Modbus?	51
Power Supply	8	Digital Sensors Configuration	52
Connecting PSU	9	Output Configuration and Alarms 1&2	54
Analog Channels Connection	9	Virtual Channel Alarm	55
Examples	10	Tips	56
Digital Inputs Connection	18	DATALOGGER CONFIGURATION	58
Example	19	Overview	58
Digital Output Connection	20	Configuration -> Datalogger	58
RS485 SmartModbus Connection	20	ALARMS	61
Multiplexers Connection	21	Overview	61
		Configuration	61
SETUP	22	SMS Configuration	62
POWERING THE DATALOGGER	22	Email Configuration	63
Default OM-240 Settings	22	SMTP Configuration	64
Direct connection (LOCAL) to the Datalogger	22	FTP Configuration	64
REMOTE CONNECTION TO THE DATALOGGE	R 23	Channel Alarm Types	65
P Computer Settings	23	Low and High Thresholds	65
Overview	23	Derivate	65
Description	23	Examples	65
WEB CONNECTION AND OPENING	25	DIGITAL INPUTS CONFIGURATION	66
Overview	25	Example of Digital Input IN1 Configuration	69
Description	25	Example of Digital Input IN2 Configuration	71
CONNECTION THROUGH DHCP	26	VIRTUAL CHANNELS	73
Overview	26	Overview	73
Description	26	Why are Virtual Channels Implemented?	73
Display and Keyboard Functionality	29	Scripts	74
Keyboard Overview	29	Virtual Channel Configuration	76
Display Overview	30	Common Errors and Warnings	77
Firmware and Web Updates – Vibrating Wire		ADVANCED CONFIGURATION	79
Firmware Update	32	Overview	79
•	32	Connections	79 79
Jata Download			/ 7
Data Download Datalogger Stop and Switch Off	35	Measure log data transfer	81

TABLE OF CONTENTS

123

Date and Time	83	TROUBLESHOOTING	103
Energy Management	84	BASIC TROUBLESHOOTING	103
Info	84	LOCAL/REMOTE COMMUNICATION	104
CHARTS	84	EMAIL SENDING	106
Overview	84	FTP SERVER SENDING DATA	108
Activation	85	MEASURE	109
Setup and use	85		
•			

**SPECIFICATIONS** 

MODBUS TCP (SCADA INTEGRATION)	90
Overview	90
COMMUNICATION	90
Communication Bus	90
Measure Register	90
Timestamp details	91
Flag's Register	91
Sensor Acquired	92
Examples	92
Input X Valid	92
Input X Alarm	92
REGISTER MAP	92
General	92
Analog Sensors Locations	93
Digital Sensors Locations	93
Multiplexers Sensors Locations	94
Digital Inputs Locations	96
Virtual Channels Locations	97
SENSOR BASE ADDRESS	98
Local Sensors (Analog)	98
Digital Sensors (Smart Modbus)	98
Multiplexers sensors	98
Digital Inputs	98
Virtual Channels	98
Event Log Registers	99
STATUS REGISTERS	99
Datalogger Status	100
Next Acquisition	100
Firmware Version	101
Model Info	101
Serial Number	101
Device Name	102
External Digital Input / Output Status	102

APPENDIX	110
APPENDIX A: WIRING SCHEMES	110
2 WIRES SENSORS	110
4 WIRES SENSORS	114
6 WIRES SENSORS	119
MAINTENANCE	122

# QUICK START

## Overview

This chapter is about different product's features, starting from a device overview, and it will show how to connect every available sensor:

1. Front and Rear panel

Connection for:

2.Power Supply3.Analog sensors4.Digital Inputs5.RS485 SmartModbus Sensors6.Multiplexer boards

#### **DEVICE OVERVIEW**

OM-240 is a universal datalogger, capable of reading 0..25mA Current Loop and Transmitter, -10..10V, Vibrating Wire, NTC, PT100, PT200, PT500, PT1000, Ratiometric, Wheatstone Bridge, Thermocouple, Potentiometer and SmartModbus RS485 Digital Sensors. It provides a maximum of 24 channels when using only 2 wires sensors. OM-240 is expandable with SmartMux device.

#### Connections



Figure 1

#### **Front Panel**

		[			
•	<u>13 14 15</u> A B'A B'A B' B B B B B B B B B B	16 17 18 A B'A B'A B'⇒	<u>19 20 21</u> A B'A B'A B' ↓	22 23 24 TA B'A B'A B'±	
	$\begin{array}{c} A & B_1 A & B_1 A & B_1 \\ \hline 1 & 2 & 3 \end{array}$		$A \ B \ A \ A$	A B A B A B + 10 11 12	2:3
		<u>(A B, A B, A B,</u> <u>4 5 6</u> <u>4</u>		<u>(A B, A B, A B, ↓</u> 10 11 12	

#### Figure 2

The majority of connections are located In OM-240's front panel:

• RS232: it can be used to connect a 3G Modem to expand connectivity

• Ethernet: This port is used to connect the device to an existing LAN. Internal Web Server can be browsed to configure and download acquired data. It can be used for Internet connection (Cloud, FTP and EMAIL connections)

• USB Host: it allows the user to download measures, events and alarm logs to a pendrive, or to update the firmware

• V OUT: this connector is designed to output the same voltage applied to V IN. It can be turned off automatically when logger is in sleep mode or be kept always on.

• RS485#2 – V OUT: This is SmartMux port, which allows the connection of 16 SmartMux in daisy chain and offers power supply.

• RS485#1 – V OUT: This is SmartModbus port, which allows digital sensors connections and offers power supply.

• V IN: This port is to power the datalogger. It's designed to work in 10-30V range.

• PWR-CONFIG: This port will allow the selection of Power supply. A jumper between two rightmost connections is needed to let the datalogger be powered up.

• ANALOG INPUTS: This 8 terminal blocks is used to connect analog sensors. Starting from bottom-left to bottom-right we find channels from 1 to 12, and from top-left to top-right we find channels from 13 to 24.Every 6 connections, there is a Ground connector designed to be the termination of shielded cables.

#### **Rear Panel**





OM-240's rear panel has 2 Digital Inputs and 1 Digital Output.

• Digital Inputs IN1 IN2 can be configured to read rain meters and anemometers, or similar pulse sensors (optoisolated, Min input voltage is 5V and Min current input is 2mA, while Max input voltage is 24V and Max current is 10mA, Max frequency 1KHz, accuracy 0.1Hz).

• Digital Output is a relay output (for alarms), volt-free closure (low voltage, 30V 2A).

#### Cabling

#### Overview

This chapter will explain every connection to datalogger, how to optimize connections availability and to use proper connectors to avoid unexpected behavior (malfunctions).

# **Power Supply**

OM-240 can be supplied with 10V to 30V. In order to grant correct functioning of every connected sensor or device, and its internal circuitry, at least 2A PSU is needed. If Analog Sensors, External Modems, RS485 SmartModbus Sensors are powered from OM-240, a more powerful PSU should be used.

Warning: ALL V-OUT connections on the front panel - in the upper terminal block - expose the same V-IN applied. If you apply 24V to V-IN, 24V will be exposed. Since OM-240 can work in a wide range of voltage, use has to choose the right one to power external devices connected.

# **Connecting PSU**

The logger should be configured before powering it up.

New datalogger are shipped already configured (as it follows) to be powered from external power source.

Rightmost pins of PWR CONFIG must be short-circuited to allow the datalogger to use V-IN source.

Connect V-IN to the right Power Supply Unit.

Picture below shows connections.



# **Analog Channels Connection**

OM-240 can handle sensors up to a total of wires of 48

Examples:

2 wires sensors: up to 24 channels

4 wires sensors: up to 12 channels

6 wires sensors: up to 8 channels

User can also mix sensors type and the datalogger will shift positions with this rule:

- 6 Wires sensors first
- 4 Wires sensors middle
- 2 Wires sensors last

With this simple rule, it will maximize connection simplicity

Here are few examples:

## Example 1 (2 wires sensors)

User connects 4 sensors, all of them are 2 wires: First of all we configure the datalogger to read this sensors, as shown in Figure 4.

Status Configuration	This page allows to	and sensors to local ch	anneis configura	tion. Depending on	the type of sensor (Nr.of w	ires) † ne local channels	configuration will be create	a automatically			
Channels Configuration     O Locals	Sensor Typ	e Nr. Senso	rs Add								
O Digitals	6 wires	6	Ade	d 6 wires sensor							
Digital Impuls     Multiplexers	4 wires	10	Add	d 4 wires sensor							
O Virtuals	2 wires	20	Add	d 2 wires sensor							
Data Monitor Advanced	Add Mux24	1		Add Mux24							
	🖉 Enable	Nr. of wires	Modify	Position	Identification	Description	Measure Type	Power Supply	Clone	Delete	Wiring scheme
	R	2	Edit	1	AN_0001		Voltage	External	Clone	Delete	Wining scheme
	R	2	Edit	2	AN_0002		Voltage	External	Clone	Delete	Wiring scheme
	<b>T</b>	2	Edit	3	AN_0003		Voltage	External	Clone	Delete	Wining scheme
	<b>P</b>	2	Edit	4	AN_0004		Voltage	External	Clone	Delete	Wining scheme



Now we can proceed with physical configuration.

SENSOR1 will be connected to channel 1, A and B terminals.

SENSOR2 will be connected to channel 2, A and B terminals.

SENSOR3 will be connected to channel 3, A and B terminals.

SENSOR4 will be connected to channel 4, A and B terminals.

Wiring schemes are available from web server, or in the APPENDIX of this manual.





#### Example 2 (4 wires sensors)

User connects 3 sensors, all of them are 4 wires:

First of all we configure the datalogger to read this sensors, as shown in Figure 6.

innels Configuration	Sensor Typ	e Nr. Senso	rs Add								
gitnis	6 wires	6	Ad	d 6 wires sensa							
ta Inputs typievers	4 wires	9	Ad	d 4 wires sensor	r						
ituals	2 wires	18	Ad	d 2 wires sensor							
Data Monitor     Advanced	Add Mux24	1		Add Mux24							
	🖬 Enable	Nr. of wires	Modify	Position	Identification	Description	Measure Type	Power Supply	Clone	Delete	Wiring scheme
	P.	4	Edit	1-2	AN_0102		Voltage	24V	Clone	Delete	Wining scheme
	R	4	Edit	3-4	AN_0304		Voltage	24V	Clone	Delete	Wiring scheme
	5	4	Edit	5-6	AN_0506		Voltage	24V	Clone	Delete	Wiring scheme



Now we can proceed with physical configuration.

SENSOR1 will be connected to channel 1, A and B terminals, and channel 2, A and B terminals. SENSOR2 will be connected to channel 3, A and B terminals, and channel 4, A and B terminals. SENSOR3 will be connected to channel 5, A and B terminals, and channel 6, A and B terminals. Wiring schemes are available from web server, or in APPENDIX of this manual.



Figure 7

#### Example 3 (6 wires sensors)

User connects 3 sensors, all of them are 6 wires: First of all we configure the datalogger to read this sensors, as shown in Figure 8.

Innels Configuration	Sensor Type	Nr. Sensor	s Add								
Digitals	6 wires	5	Ade	i 6 wires sensar							
Digital Inputs Multiplexers	4 wires	7	Add	4 wires sensor							
Virtuals	2 wires	15	Ade	2 wires sensor							
Monitor	Add Mux24	1		Add Mur24							
	M Enable	Nr. of wires	Modify	Position	Identification	Description	Measure Type	Power Supply	Clone	Delete	Wiring scheme
	P	6	Edit	1-2-3	AN_0103		Voltage 2CH	External	Clone	Delete	Winng scheme
	R.	6	Edit	4-5-6	AN_0406		Voltage 2CH	External	Clone	Delete	Wiring scheme
	R	6	Edit	7-8-9	AN_0709		Voltage 2CH	External	Clone	Delete	Wiring scheme



SENSOR1 will be connected to channel 1, A and B terminals, channel 2, A and B terminals, and channel 3, A and B terminals.

SENSOR2 will be connected to channel 4, A and B terminals, channel 5, A and B terminals, and channel 6, A and B terminals.

SENSOR3 will be connected to channel 7, A and B terminals, channel 8, A and B terminals, and channel 9, A and B terminals.

Wiring schemes are available from web server, or in APPENDIX of this manual.



Figure 9

#### Example 4 (4 wires and 2 wires mix)

User connects 4 sensors, 2 of them are 4 wires, while the other 2 are 2 wires. First of all we configure the datalogger to read this sensors, as shown in Figure 10.

Configuration	Sensor Type	Nr. Sensors	Add								
e de la companya de la	6 wires	6	Add	6 wires sensor							
nputs mens	4 wires	9	Add	4 wires sensor							
-	2 wires	18	Add	2 wires sensor							
ta Monitor vanced	Add Mux24	1	9	Add Mux24							
	Enable I	Nr. of wires	Modify	Position	Identification	Description	Measure Type	Power Supply	Clone	Delete	Wiring scheme
	R 1		Edit	1-2	AN_0102		Voltage	24V	Clone	Delete	Wiring scheme
	P 4		Edit	3-4	AN_0304		Voltage	24V	Clone	Delete	Wiring scheme
	R 3	2	Edit	5	AN_0005		Voltage	External	Clone	Delete	Wining scheme
	P :		Edit	6	AN_0006		Voltage	External	Cione	Delete	Wining scheme



According to rules mentioned at the beginning of this chapter, we will start with 4 wires sensors, followed by 2 wires sensors.

SENSOR1 will be connected to channel 1, A and B terminals, and channel 2, A and B terminals. SENSOR2 will be connected to channel 3, A and B terminals, and channel 4, A and B terminals. SENSOR3 will be connected to channel 5, A and B terminals.

SENSOR4 will be connected to channel 6, A and B terminals.

Wiring schemes are available from web server, or in APPENDIX of this manual.



#### Example 5 (6 wires and 2 wires mix)

User connects 3 sensors, 1 of them is 6 wires, while the other 2 are 2 wires. First of all we configure the datalogger to read this sensors, as shown in Figure 12.

Carlos .	e Nr. Sensor			100						
6 wires 4 wires	6		d 6 wires sensor d 4 wires sensor							
4 wires 2 wires	9		d 2 wires sensor							
Add Mux24	10.00		Add Mux24							
M Enable	Nr. of wires	Modify	Position	Identification	Description	Measure Type	Power Supply	Clone	Delete	Wiring scheme
R	6	Edit	1-2-3	AN_0103		Voltage 2CH	External	Clone	Delete	Wining scheme
R.	2	Ede	4	AN_0004		Voltage	External	Clone	Delete	Wiring scheme
7	2	Edit	5	AN_0005		Voltage	External	Clone	Delete	Wining scheme
Save Lock	1									



According to rules mentioned at the beginning of this chapter, we will start with 6 wires sensors, followed by 2 wires sensors.

SENSOR1 will be connected to channel 1, A and B terminals, channel 2, A and B terminals, and channel 3, A and B terminals.

SENSOR2 will be connected to channel 4, A and B terminals.

SENSOR3 will be connected to channel 5, A and B terminals.

Wiring schemes are available from web server, or in APPENDIX of this manual.



#### Figure 13

#### Example 6 (6 wires and 4 wires mix)

User connects 3 sensors, 1 of them is 6 wires, while the other 2 are 4 wires. First of all we configure the datalogger to read this sensors, as shown in Figure 14.

nels Configuration	Sensor Typ	Nr. Senso	rs Add								
sals salinputs	6 wires	5	Ade	d 6 wires sensor							
tipletes	4 wires	8	Ade	d 4 wires sensor							
uals	2 wires	17	Ade	d 2 wires sensor	211						
Data Monitor     Advanced	Add Mux24	1	2	Add Mux24							
	🖬 Enable	Nr. of wires	Modify	Position	Identification	Description	Measure Type	Power Supply	Clone	Delete	Wiring scheme
	R	6	Edit	1-2-3	AN_0103		Voltage 2CH	External	Clone	Delete	Wiring scheme
	a A	4	Edit	4-5	AN_0405		Voltage	24V	Clone	Delete	Wiring scheme
	5	4	Edit	6-7	AN_0607		Voltage	24V	Clone	Delete	Wiring scheme

Figure 14

According to rules mentioned at the beginning of this chapter, we will start with 6 wires sensors, followed by 4 wires sensors.

SENSOR1 will be connected to channel 1, A and B terminals, channel 2, A and B terminals, and channel 3, A and B terminals.

SENSOR2 will be connected to channel 4, A and B terminals, and channel 5, A and B terminals.

SENSOR3 will be connected to channel 6, A and B terminals, and channel 7, A and B terminals. Wiring schemes are available from web server, or in APPENDIX of this manual.



#### Figure 15

Configuration Channels Configuration • Locals	Sensor Type	Nr. Sensor	s Add								
O Digitals	6 wires	5	Add	6 wires sensor							
Digital Inputs     Multiplexers	4 wires	7	Add	4 wires sensor							
o Virtuals	2 wires	15	Add	2 wires sensor	r						
Data Monitor Advanced	Add Mux24	1		Add Mux24							
	🗷 Enable	Nr. of wires	Modify	Position	Identification	Description	Measure Type	Power Supply	Clone	Delete	Wiring scheme
	N	6	Edit	1-2-3	AN_0103		Voltage 2CH	External	Clone	Delete	Wiring scheme
	<b>v</b>	4	Edit	4-5	AN_0405		Voltage	24V	Clone	Delete	Wiring scheme
	V	4	Edit	6-7	AN_0607		Voltage	24V	Clone	Delete	Wiring scheme
	<b>v</b>	2	Edit	8	AN_0008		Voltage	External	Clone	Delete	Wiring scheme
	<b>v</b>	2	Edit	9	AN_0009		Voltage	External	Clone	Delete	Wiring scheme

Figure 16

According to rules mentioned at the beginning of this chapter, we will start with 6 wires sensors, followed by 4 wires and 2 wires.

SENSOR1 will be connected to channel 1, A and B terminals, channel 2, A and B terminals, and channel 3, A and B terminals.

SENSOR2 will be connected to channel 4, A and B terminals, and channel 5, A and B terminals. SENSOR3 will be connected to channel 6, A and B terminals, and channel 7, A and B terminals. SENSOR4 will be connected to channel 8, A and B terminals.

SENSOR5 will be connected to channel 9, A and B terminals.

Wiring schemes are available from web server, or in APPENDIX of this manual.



#### **Digital Inputs Connection**

OM-240 has 2 digital inputs (on rear panel) that can be configured, independently, as "Trigger" or "Rainmeter/Anemometer".

If they are configured as Trigger, a pulse on the channel will start an acquisition of all configured channels.

If they are configured as Rainmeter/Anemometer, input frequency will be measured and logged in measure log.

Readable signal specifications:

- Min 5V (2mA max)
- Max 24V (10mA max)
- Max Frequency 1KHz
- Accuracy: 0.1Hz

Inputs are optoisolated.

#### Example

In order to configure a trigger, connect it to DIGITAL INPUTS IN1 (or IN2, not showed here):



Open OM-240's web server, at "Channels Configuration -> Digital Inputs" page. Select Trigger in the IN1 Input field:

Menu	Digital Input Configuration
• Status • Configuration • Channels Configuration • Locals • Digitals • Digitals • Multipleers • Multipleers • Data Monitor • Advanced	This page allows to configure Logger local digital input: Digital Input Trigger Disable Rain Gauge Wind Gauge Sensibility: Locococo Edge: C Up C Down Unit Measure: Number of readings (Trigger) L Skipped:

Figure 19

Edge parameter (Up and Down) indicates if the trigger will raise voltage between poles or drop it, or if it's a "rectangular" wave, you can choose to use rising front or falling front. Number of reading indicates how many acquisition cycles will be performed after a trigger event. In order to use Triggers the OM-240 should not go in sleep mode. Check Energy Management section to configure the datalogger to avoid switch off (by selecting Always ON). For more information about how to configure Digital Inputs, refer to Digital Inputs section.

# **Digital Output Connection**

OM-240 is provided with a Digital Output (NC / NO), which can drive low voltage (max 30V, 2A). It's a relay, so it is a volt-free switch.

In order to handle higher voltages or currents, use internal relay to drive a rugged heavy duty relay.

# **RS485 SmartModbus Connection**

OM-240 can read digital sensor over the RS485 SmartModbus port.

The port used for sensors connection is RS485#1.

# WARNING: RS485#2 PORT DOES NOT WORK WITH DIGITAL SENSORS AS IT IS DESIGNED TO WORK ONLY WITH MULTIPLEXERS.

RS485#1 port presents 5 connections:

- Data : can be named as B or "inverting pin" or TxD-/RxD-
- Data + : can be named as A or "non inverting pin" or TxD+/RxD+
- GND: it is the reference pin. It is recommended to use GND (SC, C, or reference pin) while connecting RS485 sensors.

• +V: OM-240 can power RS485 sensors. It provides the same power source applied to OM-240 VIN. Be careful to choose the right supply to power both datalogger and sensor.

• GND: same as +V, is the negative connection of power supply.

RS485 allows daisy chain connections. The example below shows an OM-240 datalogger with four temperature and humidity probes connected in daisy chain.





The **minimum distance** between two nodes (OM-240 to probe, or probe to probe) **is 30 cm**.

WARNING: BE CAREFUL ON CABLE DIMENSIONS, AS THEY ARE AFFECTED FROM TOTAL LENGTH AND PROBE NUMBERS. BE SURE TO CHOOSE A CABLE OF THE RIGHT SIZE FOR YOUR PROJECT.

Example



Figure 21

Not all probes have a signal GND (SC) pin, and in the example above, the probe was not connected to signal ground.

# **Multiplexers Connection**

OM-240 offers Analog Sensors expandability through Multiplexers.

Multiplexers are expansion boards that can read up to 24 sensors each, with connections logic similar to OM-240 (explained in Multiplexer Section), which will be connected to chan-nel 22/23/24 of OM-240

More than one Multiplexer can be connected to OM-240, up to 16 Units, daisy chained to RS485#2 and channels 22/23/24.

# SETUP

# **POWERING THE DATA LOGGER**

The OM-240 is supplied not powered to avoid that during transport the backup battery will discharge.

To begin working with the OM-240 proceed as follows:

• Connect external powering (battery charger or photovoltaic panel);

# ATTENTION: Do not invert battery polarity, otherwise the data logger may be damaged or stop working.

#### **Default OM-240 Settings**

The network card is setup from as follows: IP Address: **192.168.1.100** Subnet Mask: 255.255.255.0 Gateway: 192.168.1.1 DNS1: 0.0.0 DNS2: 0.0.00 To connect with the OM-240 is necessary to setup PC network card in the same class of the data logger, but with different IP (eg. 192.168.1.200).

#### Direct connection (LOCAL) to the Datalogger

To connect and manage the OM-240 through its on-board web pages, after the proper configu-ration of PC network card, connect the PC to the OM-240 through an Ethernet crossover cable (supplied). Once connected through the supplied cable, open any internet browser and put, in the address bar, OM-240 IP address (default 192.168.1.100). After a few seconds you will be asked for the data logger access credentials.

NOTES:

- The OM-240 is compatible with the main internet browsers (FireFox, IE9, Safari, Chrome). FireFox is recommended to manage the OM-240.
- First page upload can take some time.

Following are the default credentials:

<u>User</u>	<u>"Admin"</u>	<u>User</u>	<u>"User"</u>
User:	Admin	User:	User
Psw:	Admin	Psw:	User

# **REMOTE CONNECTION TO THE DATALOGGER**

This manual contains all basic information to properly connect the OM-240 to the network through ethernet connection.

There is also a description of the procedure to set the logger and connect it through DHCP.

#### **IP Computer Settings**

#### **Overview**

Here you will learn how to set the computer IP address to allow the connection with the OM-240.

#### Description

Open control panel and then: Network and Internet - Network Centre and Sharing



Then click on LAN connection and enter Properties  $^{(1)}$ 

General		Networking Sharing			
Connection		Connect using:			
IPv4 Connectivity:	No Internet access	Realtek PCIe G	BE Family Controller		
IPv6 Connectivity: Media State:	No Internet access Enabled	This connection uses	the following items:	<u>C</u> onfigure	
Duration: 00:00:56 Speed: 100.0 Mbps Details Activity		Gos Packet Scheduler      A Microsoft Network Adapter Multiplexor Protocol      A Microsoft LLDP Protocol Driver      A Link-Layer Topology Discovery Mapper I/O Driver      A Link-Layer Topology Discovery Responder      A Internet Protocol Version 6 (TCP/IPv6)      Internet Protocol Version 4 (TCP/IPv4)			
Sent —	- Received	l <u>n</u> stall	Uninstall	Properties	
Bytes: 554,8		Description Transmission Control Protocol/Internet Protocol. The defa wide area network protocol that provides communication across diverse interconnected networks.			

A new window will open "Properites-LAN connection" <sup>(2)</sup> Select "Internet protocol version 4 (TCP/IPv4) (3), and click on Properties (4).



Select "Use this IP: "and write data you see in the picture below.

eneral	
	ed automatically if your network supports i need to ask your network administrator i.
Obtain an IP address aut	comatically
• Use the following IP addr	ess:
IP address:	192.168.1.101
Subnet mask:	255 . 255 . 255 . 0
Default gateway:	· · · · · ·
Obtain DNS server addre	ss automatically
• Use the following DNS set	rver addresses:
Preferred DNS server:	· · · · · · · · ·
Alternate DNS server:	
Validate settings upon e	xit Advanced

## WEB CONNECTION AND OPENING

#### Overview

Here you will learn how to connect the OM-240 to the network and how to access the

#### WEB. **Description**

Connect the OM-240 through Ethernet cable (Look at the 2 different block diagrams)



Open the browser and write in the search bar the OM-240 IP address "192.168.1.100" and then enter user and password:

User: Admin Password: Admin

# **CONNECTION THROUGH DHCP**

#### Overview

Here you will learn how to connect the OM-240 through DHCP. This option will allow the user to use either the OM-240 webserver and the usual Internet connection.

Note. The router must be connected to a DHCP server

# Description

When you are connected to the OM-240 web server (192.168.1.100 IP address to be written in the search bar), select "Advanced" from left menu and then "Connections".

	2 + 4		¥	×		
	Datalogger OM-240 No ala	FW 21.42.66	Ext.Pwr Supply 12.3 V	31/01/17 17:06	Logout Reboot	
Menu	Connections Co	onfigurat	ion		-	
Status     Configuration     Channels Configuration     Data Monitor     Advanced	This page allows to configure Logger network co connected to RS-232 port. It's also possibile to s changing the configuration of the Logger netwo	elect the port (Ethernet o RS-	-232) for email and	FTP sendi ng. NOTE:		
Connections	email and FTP port sending					
<ul> <li>Measure log data transfer</li> <li>Account Management</li> </ul>	Ethernet (Router)	•				
Date and Time     Energy Management	RS-232 (GSM/GPRS Modem)	C				
• Info	Network Card Configuration					
	DHCP Enable					
	MAC Address	0:1E:C0:F1:D1:28				
	IP Address	192.168.1.169				
	Subnet Mask	255.255.255.0				
	Default Gateway	192.168.1.1				
	Preferred DNS Server	8.8.8.8				
	Alternate DNS Server	8.8.4.4				

- 1. Flag "DHCP Enable" and then start OM-240 reboot.
- 2. After Rebooting, IP address has to be setted up look at chapter "Computer IP settings"
- 3. In few steps (summary):
- 4. Open Control Panel and then "Network Centre and Sharing" window
- 5. Enter "LAN Connection" and open Properties
- 6. Select: Internet protocol version 4 (TCP/IPv4) and then click on Properties
- 7. This time unlike before select "Obtain an IP address automatically".

eneral					
You can get IP settings assigned his capability. Otherwise, you n for the appropriate IP settings.					
Obtain an IP address autor	matically	>			
Use the following IP addres	ss:				
IP address:					
Subnet mask:			•		
Default gateway:					
Obtain DNS server address	automatica	ally			
• Use the following DNS serv	er addresse	es:			
Preferred DNS server:					
Alternate DNS server:			÷		
Validate settings upon exit	t			Adv	anced

Click OK and close all windows.

Control from display the new IP address (see picture below).



NOTES

The IP address shown in the picture has been assigned by the router.

Now you should enter the IP address shown in the display – instead of default IP address 192.168.1.100 - in order to enter in the OM-240 web server.



# Display and keyboard functionality

Through the OM-240 keyboard and instructions shown on the display is possible to perform some simple operations without using a computer connected to OM-240.

#### NOTE:

# Some operations (data download on USB key, FW update, network card enabling, etc...) can require the OM-240 to automatically restart; this is normal.



# **Keyboard Overview**

"Up", "Down", "Left" e "Right" keys are used to move within menus and submenus and to select the options. The "Enter" key is used to confirm the option.

The reset keys are used in case the OM-240 stops working. Pushing both keys at the same time, you reboot the datalogger.

# **Display Overview**

Display main page has three icons in the middle and some information in the upper and lower part of the display.

The information shown in the main page are:

- Date and time
- IP address
- External powering voltage or internal batteries percentage.
- Internal temperature

Date and Time 26/07/13 16:00:00 Icons IP: 192.168.1.100 IP address Humidity Bat:13.3V - T:27.7° C - H:30.0% on early models Powering Temperature

Icons in the main page have the following meaning:

**LOG:** It shows last reading stored for each sensor configured on the OM-240. Through "Right" and "Left" keys is possible to browse the different sensors.



To return to main menu press "Enter" key.

**DL:** It shows OM-240 current status.

Next A	acquisition:	
Day 28	8 19:02:18	
Start		
Status	Init Analog	
<	Acquisition	▶
Π		

To return to main menu press  $\triangleleft$ 

ACQUISITION	It is possible to see in real time the current acquired channel. Select- ing "Acquisition" between one measureing cycle and the other, an extemporaneous acquisition will be instantly executed.
START DL	Start the data logger if not already running.
STOP DL	Stop the data logger if running.
TEST FTP	Test FTP parameters with sample file.
TEST MAIL	Test Mail parameters with sample email.
TEST ALL	Test both FTP and Mail.

**SYS:** Here you can find OM-240 connection parameters (network card), calibration values and functions to download data on USB pen drive, update firmware and OM-240 stop (in safety mode before cutting the power).

Status	Status			
Ethernet On	Ethernet On			
FW & WEB Update	FW & WEB Update			
Download data to USB	Download data to USB			
System shutdown	System shutdown			
10mV CALIBRATION	NETWORK CARD			
INA INB	DHCP: OFF			
+FS: -3277085, -3276933	IP: 192.168.1.100			
ZERO:+0000523, +0000878	Snet: 255.255.255.0			
-FS: +3278532, +3279045	Gway: 192.168.1.1			
DATE: 13/12/2012 3/6	MAC: 1e.30.6c.a2.45.bb 2/6			

ATTENTION: Do not use at the same time the web interface and display functionality. When you select SYS menu, the OM-240 enters in configuration mode: in this status the OM-240 WILL NOT PERFORM THE CONFIGURED ACQUISITIONS. Once you ended the operations in SYS menu, you must return in the main page (with the three icons).

# Firmware and Web Updates – Vibrating Wire Firmware Update

To update OM-240 web pages and firmware refer to "FW & WEB UPDATES – Vibr. Wire FW Update" manual.

#### Data download

It is possible to download data (readings, log events and log alarms files) in two ways:

- PC (through web interface)
- USB (through USB pen drive)

To download data through a PC connected to the OM-240, first configure the PC network card (with the OM-240's same class but with different IP). Through the pages "Data Monitor – Measures, Events, Alarms" is possible to download files as CSV format (compatible with the most common spreadsheets eg. Microsoft Excel, Apple Numbers, Open Office Calc etc...) To download data through USB pen-drive (supplied):



• Select through keyboard ("Right" and "Left" keys) the SYS menu and press "Enter" key; If the OM-240 has an acquisition in progress, is necessary to wait its end. In this case will be displayed the following screen:

Wait!	Wait!	Wait!
DL: Run	DL: Run	DL: Run

• When the acquisition ends, it will be displayed the following screen:



• Through "Up" and "Down" keys select the option "Download data on USB" and press "Enter" key;



• The following screen will be displayed and the OM-240 will be automatically restarted;



At restart you will be asked to insert the USB pen-drive and to press "Enter" key to start data download;

MESSAGE
Connect Pen Drive
PRESS ENTER

NOTE: the USB pen-drive in the OM-240 must be FAT32 formatted. Other format will prevent the OM-240 to identify the USB pen-drive and the copy can't be executed.

- Once the USB pen-drive is mounted, data copy will start automatically (according to OM240 acquisitions quantity, the copy could take a few minutes).
- During the copy will be displayed the following screen:



ATTENTION: Do not disconnect the USB pen-drive or cut off the OM-240 pow-ering during the copy, since the copy can be incomplete or corrupted.

• Once the copy is ended, the following message will be displayed; press "Enter" to proceed;



• Disconnect the USB pen-drive and press "Enter". The OM-240 will be restarted and the ac-quisition will proceed as previously set.



# **Datalogger Stop and Switch Off**

When is necessary to cut off the power from the OM-240 (for maintenance or other) is strongly recommended to stop the OM-240 following these steps.

Select, through keyboard, DL -> Stop DL.

Select, through keyboard (Right and Left keys), the SYS menu and press "Enter";



If the OM-240 has an acquisition in progress, is necessary to wait its end. In this case will be displayed the following screen:



• When the acquisition ends, it will be displayed the following screen:



• Using "Up" and "Down" keys select "System shutdown" and press "Enter":


You will see the following screen:



Now is possible to cut off the OM-240 power (eg. Extract the "V IN" clamp.

NOTE:

This switch off procedure allows OM-240 to end all the writing/reading cycles on the SD memory card. If OM-240 power is cut without software shutdown, a scandisk may occur at next boot.

## Display language setup

To modify display language:

• Select "SYS" menu and press "Enter" key:



• Through "Up" or "Down" keys select "English" and press "Enter" key:



• The selected language will be displayed. Using "Left" and "Right" key is possible to slide among the different languages. Select the chosen language and press "Enter" key:



• Display interface language will be changed in the selected one.

### NOTE:

### actually the available languages are ITALIAN ENGLISH AND FRENCH

# WEB INTERFACE

### WEB PAGES FUNCTIONALITY

Follows a brief description of the main OM-240 web pages. **STATUS**: Shows OM-240 status. In this page is shown the current OM-240 mode:

*Run:* OM-240 is set and started. It will start acquisitions according to selected configuration. *Con ig:* OM-240 is in configuration mode. No acquisitions are in progress. In this mode is possible to modify configuration parameters (channel configurations, acquisition time, etc...), delete and download logs.

### "Config" mode is expected only for "Admin" user

*Stop:* OM-240 is stopped. No acquisitions are in progress. In this mode is possible to down-load logs but is not possible to change the configuration.

Moreover is possible to start, stop and set the OM-240 in configuration mode.

**CONFIGURATION-ACQUISITIONS**: in this page is possible to set acquisition frequency.

**CHANNELS CONFIGURATION-LOCALS:** in this page is possible to set local analog channels on the OM-240.

**CHANNELS CONFIGURATION – MULTIPLEXER:** in this page is possible to set multiplexer boards and their channels.

ATTENTION: For sensors wiring it is necessary refers to the schemes on the OM-240 web pages.

**CHANNELS CONFIGURATION - DIGITALS:** In this page is possible to set digital channels to allow the OM-240 to read digital instruments.

**DATA MONITOR - MEASURE**: In this page is possible to display last OM-240 acquisition cycle. It's also possible to download OM-240 executed and saved acquisitions.

## Web interface language setup

To modify the web interface language, connect the OM-240 and access to web interface with the user (Admin or User) that needs to change the language Then:

• Select , from left menu, "Advanced" and in the submenus "Account Management";



- In the page that will be displayed select "Language";
- Insert the password in the field "Old password";
- Press on "Save changes".

Now the web interface will be converted in the selected language. To convert also the left menu is necessary to refresh the web page pressing F5 or the specific symbol on internet browser address bar.

### NOTE:

To avoid that the browser will keep the old language is necessary to completely delete internet browser cache.

## **Configuration of local analog channels**

In this manual is explained how to set up the local analog channels on the OM-240.

**NOTE:** *it is important to make sure that the software configuration of channels coincides with the physical wirings of sensors on channels. This is necessary to power correctly the sensors.* 

To set up the local analog channels of the OM-240:

- enter the OM-240 with user Admin;
- make sure that the OM-240, in page **STATE**, is in **Config** mode before proceeding. If it is not in **Config** mode, **push on CONFIGURE** to set up the OM-240 in configuration mode;

			ion it will be necessary to re-insert the passwords becau automatically refre shes every 60 seconds.
Description	Value	Measure Unit	
Free Memory	98	%	
Temperature	27.7	°C ▼	
Humidity	N.C.	96	
Logger status	Config		

Figure 23

• from the left menu, select the page CHANNELS CONFIGURATION and afterward the entry LOCAL;



Figure 24

The page **LOCAL CHANNELS CONFIGURATION** opens. In this page it is possible to enable and edit the local analog channels of the OM-240.

<b>CE OMEG</b> A	Datalogger	OM-240	No alarm	FW 21.42.66	Ext.Pwr Supply 12.2 V	31/01/17 17:08				
lenu	Local C	hannels	Configura	ation						
Status Configuration	This page allows to add	sensors to local channe	is configuration. Depending on	the type of sensor (Nr.of	wires) the local channe	ls configuration will be create	d automatically.			
Channels Configuration	Sensor Type	Nr. Sensors	Add							
O Dignais	6 wires	8	Add 6 wires sensor							
Digital Inputs     Multiplexes	4 wires	12	Add 4 wires sensor							
o Vituris Data Monitor	2 wires	24	Add 2 wires sensor							
Advanced	Add Mux24	1	Add Mux24							
	Enable N	Ir. of wires N	Modify Position	Identification	Description	Measure Type	Power Supply	Clone	Delete	Wiring scheme
	Save									

Figure 25

Add the proper sensor that you want to read.

- If your sensor requires two wires (for example a current loop 2W) Add 2 wires sensor
- If your sensor requires four wires (for example a volt 2ch with external supply) Add 4 wires sensor
- If your sensor requires six wires (for example a ratiometric sensor) Add 6 wires sensor

For example, if you push on button add 4 wires sensor in the underlying table a 4 wires sensors is added and it is possible to configure it.

CE OMEGA	Datalogge	er OM-24	0 N	o alarm	PW 21.42.66	Ext.Pwr Supply 12.3 V	31/01/17 17:10				
lenu	Local	hanne		figur	ation						
Status						f www.it he local channel	s configuration will be creat	ed automatically.			
Configuration Channels Configuration	over a longer										
O Locali	Sensor Typ	e Nr. Senso	rs Add	-	-						
O Digital busics	6 wires	7	Ada	d 6 wites senso	e						
Multiplicers	4 wires	11	Ada	d 4 wires senso	e						
© Vituels Data Monitor	2 wires	23	Ade	d 2 wires senso	r						
Advanced	Add Mux24	1	200	Add Mux24							
	Enable	Nr. of wires	Modify	Position	Identificatio	n Description	Measure Type	Power Supply	Clone	Delete	Wiring scheme
	E.	2	100	1	AN_0001		Voltage	External	Elone	Delete	Wining scheme
	Save										
	- sere										

Figure 26

After this selection press **EDIT** to setup sensors channel. Then, the first page of configuration of the selected channel opens. In this page it is possible to select:

Figure 27

# Input configuration

The page **INP UT CONFIGURATION** is composed by a table which contains all the input parameters of configuration.

OE OMEGA	8	1 (1)		T	$\sim$
	Datalogger (	DM-240 No alarm	FW 21.42.66	Ext.Pwr Supply 12.3 V	31/01/1 17:09
Menu	Local Chan	nels Configu	ration		
Status     Configuration     Channels Configuration     Data Monitor     Advanced	This page allows to configure been				
	Axis A		-		
	Description	Parameters			
	Identification	AN_0001_A			
	Description				
	Measure Type	Voltage			
	Power Supply	External			
	Acquisition	Default	*		
	Measure Unit	mV			
	Warm-Up [sec.]	5			
	Conversion	Nessuna	T Auto Zero		
	Zero Reading (Ez)	0-			
	Sensibility (S)	<u>n</u> ,			
	Poly. Coeff. A	6			
	Poly. Coeff. B	8			
	Poly. Coeff. C	E	2		
	Poly. Coeff. D	6			
	Engineering Units	1			
	Excitation	85			
	Delay	10			
	Range	Autorange			

Figure 28

# Particularly:

INP UT	Non-editable field. It indicates the input that is configuring. The character "_A" or "_B" is added in case of a channel with 2 inputs (ex: 1_A, 1_B)
A CQUISITION:	the acquisition interval "personalized" for the channel
IDE NTIFICATION	Field editable from the user. Name to assign to the sensor. This field is exported as the heading of the column containing the measurements of sensor in file .CSV type "Measurements"
D E SCRIP TION	Field editable from the user. Description ascribable to the sensor for a better identification. This field is present only in file .CSV type "log measurements"
MEASURE TYPE	Type of measurements to read on this input.
P OW E R SUP P LY	Power supply (output voltage or current) that the OM-240 will supply to the connected sensor. In case it is present "external", the OM-240 doesn't supply any power supply Different power supplies are proposed according to the "TYPE OF MEASUR-MENT" selected.
MEASURE UNIT	Electrical unit of measure of the sensor. For some types of sensors it is possible to choose between different units of measure (ex for vibrating wire: digit, Hz, $\mu$ s).
WARM-UP [SEC]	Field editable from the user. "Warm-up" time of the sensor. It indicates how long the sensor is powered by the OM-240 before starting the measurement cycle. For some types of measurements, this field could be disabled.
CONVE RSION	This field allows to select which conversion to realize between LINEAR and POLYNOMIAL. It is also possible to decide to real- ize NO conversion (in this case the reading is expressed in electri- cal unit). This field is necessary to convert the reading of the sen- sor from electrical unit (mA, mV, digit, etc.) to engineering unit (kPa, mm, mbar, etc.)
ZE RO RE ADING	This field is enabled if the linear conversion has been selected. For further information, please refer to manual "Linear and Polynomial Conversion Quick Start"
SE NSIB IUTY	This field is enabled if the linear conversion has been selected. For further information, please refer to manual "Linear and Polynomial Conversion Quick Start"
P OLY NOM IA LCOE FFICIE NTA-B-C-D	This field is enabled if the polynomial conversion has been se- lected. For further information, please refer to manual " <i>Linear and</i> <i>Polynomial Conversion Quick Start</i> "

ENGINEERING UNITField editable from the user. This field is enabled if the linear or polynomial conversion is selected. It represents the acronym of the unit of measure of the reading after the conversion in engineering unit.EXCITATIONThis field is enabled only for the type of measurement "Vibrating Wire" or "Vibrating Wire + Thermistor". It indicates (in msec) the period of each stimulation phaseDELAYThis field is enabled only for the type of measurement "Vibrating Wire" and "Vibrating Wire + Thermistor". It indicates (in msec) the stabilization period, i.e. how long the OM-240 waits before starting the reading phaseRANGEThis field allows to set up the range of functioning of the sensor. If AUTORANGE is configured, the OM-240 decides automatically with which range it is going to do the measurement "Vibrating Wire" or "Vibrating Wire + Thermistor". It indicates the frequency of the research start.START FRE QUE NCYThis field is enabled only for the type of measurement "Vibrating Wire" or "Vibrating Wire + Thermistor". It indicates the frequency of the research end.GAINAmplification factor applied to sensors' signal. Raise this param- eter only if sensor is placed far from datalogger and datalogger provides unexpected or wrong readings.EX CITATION FACTOR(%)Maximum amplitude of sensor excitation signal Lower this pa- rameter only if sensor is placed for this channelSKIPP EDThis parameter sets adapting speed of excitation signal during vi- braing wire reading.NUM B E R OF D E CIM ALSNumber of decimals recorded for this channelSkiPP EDThe Data logger does not read the channel, but CSV file will be populated with "skipped" values. This is to ensure compatibility with software		
Wire" or "Vibrating Wire + Thermistor". It indicates (in msec) the period of each stimulation phaseDE LAYThis field is enabled only for the type of measurement "Vibrating Wire" and "Vibrating Wire + Thermistor". It indicates (in msec) the stabilization period, i.e. how long the OM-240 waits before starting the reading phaseRANGEThis field allows to set up the range of functioning of the sensor. If AUTORANGE is configured, the OM-240 decides automatically with which range it is going to do the measurement. This implies an increase in the reading time of the sensor.START FRE QUE NCYThis field is enabled only for the type of measurement "Vibrating Wire" or "Vibrating Wire + Thermistor". It indicates the frequency of the research start.STOP FRE QUE NCYThis field is enabled only for the type of measurement "Vibrating Wire" or "Vibrating Wire + Thermistor". It indicates the frequency of the research start.STOP FRE QUE NCYMaximum amplitude of sensor signal. Raise this param- eter only if sensor is placed far from datalogger and datalogger provides unexpected or wrong readings.Excitation FACTOR(%)Maximum amplitude of sensor sensor signal. Lower this parameter only if sensor is placed close to datalogger and provides unexpected or wrong readings.NUM B E R OF D E CIM ALSNumber of decimals recorded for this channelKIPP E DThe Data logger does not read the channel, but CSV file will be populated with "skipped" values. This is to ensure compatibility	E NGINE E RING UNIT	polynomial conversion is selected. It represents the acronym of the unit of measure of the reading after the conversion in
Wire" and "Vibrating Wire + Thermistor". It indicates (in msec) the stabilization period, i.e. how long the OM-240 waits before starting the reading phaseRANGEThis field allows to set up the range of functioning of the sensor. If AUTORANGE is configured, the OM-240 decides automatically 	EXCITATION	Wire" or "Vibrating Wire + Thermistor". It indicates (in msec) the
If AUTORANGE is configured, the OM-240 decides automatically with which range it is going to do the measurement. This implies an increase in the reading time of the sensor.START FRE QUE NCYThis field is enabled only for the type of measurement "Vibrating Wire" or "Vibrating Wire + Thermistor". It indicates the frequency of the research start.STOP FRE QUE NCYThis field is enabled only for the type of measurement "Vibrating Wire" or "Vibrating Wire + Thermistor". It indicates the frequency of the research start.STOP FRE QUE NCYThis field is enabled only for the type of measurement "Vibrating Wire" or "Vibrating Wire + Thermistor". It indicates the frequency of the research end.GAINAmplification factor applied to sensors' signal. Raise this param- eter only if sensor is placed far from datalogger and datalogger provides unexpected or wrong readings.Ex CITATION FACTOR(%)Maximum amplitude of sensor excitation signal. Lower this pa- rameter only if sensor is placed close to datalogger and provides unexpected or wrong readings.NUM BER OF DE CIM ALSNumber of decimals recorded for this channelSKIP P E DThe Data logger does not read the channel, but CSV file will be populated with "skipped" values. This is to ensure compatibility	DE LAY	Wire" and "Vibrating Wire + Thermistor". It indicates (in msec) the stabilization period, i.e. how long the OM-240
Wire" or "Vibrating Wire + Thermistor". It indicates the frequency of the research start.STOP FRE QUE NCYThis field is enabled only for the type of measurement "Vibrating Wire" or "Vibrating Wire + Thermistor". It indicates the frequency of the research end.GAINAmplification factor applied to sensors' signal. Raise this param- eter only if sensor is placed far from datalogger and datalogger provides unexpected or wrong readings.Ex CITATION FACTOR(%)Maximum amplitude of sensor excitation signal. Lower this pa- rameter only if sensor is placed close to datalogger and provides unexpected or wrong readings.Ex CITATION SCAUNG SP EE DThis parameter sets adapting speed of excitation signal during vi- braing wire reading.NUM B E R OF D E CIM ALSNumber of decimals recorded for this channelSKIPP E DThe Data logger does not read the channel, but CSV file will be populated with "skipped" values. This is to ensure compatibility	RANGE	If AUTORANGE is configured, the OM-240 decides automatically with which range it is going to do the measurement. This implies
Wire" or "Vibrating Wire + Thermistor". It indicates the frequency of the research end.GAINAmplification factor applied to sensors' signal. Raise this param- eter only if sensor is placed far from datalogger and datalogger provides unexpected or wrong readings.Excitation Factor(%)Maximum amplitude of sensor excitation signal. Lower this parameter only if sensor is placed close to datalogger and provides unexpected or wrong readings.Excitation scaung SP EEDThis parameter sets adapting speed of excitation signal during vi- braing wire reading.Num B E R OF D E CIM ALSNumber of decimals recorded for this channelSkip P E DThe Data logger does not read the channel, but CSV file will be populated with "skipped" values. This is to ensure compatibility	START FRE QUE NCY	Wire" or "Vibrating Wire + Thermistor". It indicates the frequency
eter only if sensor is placed far from datalogger and datalogger provides unexpected or wrong readings.Ex CITATION FACTOR(%)Maximum amplitude of sensor excitation signal. Lower this parameter only if sensor is placed close to datalogger and provides unexpected or wrong readings.Ex CITATION SCAUNG SPEEDThis parameter sets adapting speed of excitation signal during vibraing wire reading.NUM BER OF DE CIM ALSNumber of decimals recorded for this channelSKIPPEDThe Data logger does not read the channel, but CSV file will be populated with "skipped" values. This is to ensure compatibility	STOP FRE QUE NCY	Wire" or "Vibrating Wire + Thermistor". It indicates the frequency
rameter only if sensor is placed close to datalogger and provides unexpected or wrong readings. <b>Ex CITATION SCAUNG SPEED</b> This parameter sets adapting speed of excitation signal during vi- braing wire reading. <b>NUM BER OF DE CIMALS</b> Number of decimals recorded for this channel <b>SKIPPED</b> The Data logger does not read the channel, but CSV file will be populated with "skipped" values. This is to ensure compatibility	GAIN	eter only if sensor is placed far from datalogger and datalogger
braing wire reading.         NUM BER OF DE CIMALS       Number of decimals recorded for this channel         SKIPPED       The Data logger does not read the channel, but CSV file will be populated with "skipped" values. This is to ensure compatibility	Excitation factor(%)	rameter only if sensor is placed close to datalogger and provides
<b>SKIPPED</b> The Data logger does not read the channel, but CSV file will be populated with "skipped" values. This is to ensure compatibility	EXCITATION SCALING SPEED	
populated with "skipped" values. This is to ensure compatibility	NUMBER OF DE CIMALS	Number of decimals recorded for this channel
	<b>S</b> K IP P E D	populated with "skipped" values. This is to ensure compatibility

Some fields will be grayed out depending on chosen sensor.

NOTE: in case of a channel with 2 inputs, the second configuration webpage is completely identical to that described above. Other fields could be "blocked" because they are connected to the configuration executed on input 1.

The second table on the page it is necessary to set up the possible alarm thresholds for the selected input. In particular:

A LA RM TY P E	<b>High:</b> the input is in alarm only if the reading exceeds the value indicated in field <b>HIGH THRE SH-OID</b>
	<b>Low:</b> the input is in alarm only if the reading is lower than the value indicated in field <b>LOW THRE SHOLD</b>
	<b>Derivate:</b> the input is in alarm only if the read- ing differs from the previous reading of a value greater than or equal to the value indicated in field <b>DE RIVATE THRE SHOLD</b>
HIGH THRE SHOLD	Field editable from the user. It indicates the nu- merical value to assign to the high threshold. The value has to be inserted taking into account the unit of measure of the reading.
LOW THRE SHOLD	Field editable from the user. It indicates the nu- merical value to assign to the low threshold. The value has to be inserted taking into account the unit of measure of the reading.
DERIVATE THRE SHOLD	Field editable from the user. It indicates the nu- merical value to assign to the derived threshold. The value has to be inserted taking into account the unit of measure of the reading.
VC ALARM WITH LOGICAL OP E RATIONS	Enabling this tick, the configured alarm is no lon- ger connected to the single input. The channels that adopt this option will be "linked" to each other by logical operations (AND, OR, NOT and XOR). If this field is enabled, therefore it will be necessary to configure a virtual channel with an opportune logical operation.

NOTE: the values inserted in alarm thresholds have to take into account the possible linear or polynomial conversion that has been configured. If the user configured a conversion, the threshold values have to be inserted in engineering unit. If the user didn't configured any conversion, the thresholds values have to be inserted in electrical unit.

- Once the configuration of webpage ended, or of 2 webpages in case of a channel with 2 inputs, push SAVE MODIFICATIONS to confirm the created configuration.
- It is possible to visualize the scheme of connection of the just configured channel pushing on WIRING SCHEME in page LOCAL CHANNELS CONFIGURATION.

CE OMEGA	Datalogge	er OM-24	D N	o alarm	FW 21.42.66 S	Ext.Pwr upply 12.3 V	31/01/17 17:08				
lenu	Local (	Channel	s Cor	figura	ation						
Status Configuration						nes) t he local channels (	configuration will be created a	utometrical):			
Channels Configuration	Sensor Typ	e Nr. Sensor	s Add	1							
O Digitali	6 wires	5	Add	d 6 wires sensor							
Digital Inputs	6 wires 4 wires	5		d 6 wires sensor d 4 wires sensor							
© Digital Inputs © Multiplicates © Virtuals			Ade								
2 Digital Innuts 9 Mattorisony 9 Virtuals <b>ata Monitor</b>	4 wires	7 15	Ada	d 4 wires sensor							
2 Digital Inputs 5 Mattoricson 2 Virtuals ata Monitor	4 wires 2 wires	7 15	Ada	d 4 wires sensor d 2 wires sensor		Description	Measure Type	Power Supply	Clone	Delete	Wiring scheme
a Digital loputa B Multiplicara	4 wires 2 wires Add Mux24	7 15 0	Ade	d 4 wires sensor 12 wires sensor add fwda24		Description	Measure Type Voltage 2CH	Power Supply External	Clone	Delete	Wiring scheme Wiring scheme
2 Digital Inputs 5 Mattoricson 2 Virtuals ata Monitor	4 wires 2 wires Add Mux24	7 15 0 Nr. of wires	Add Add Modify	d 4 wires tensor d 2 wires tensor add instal Position	Identification	Description		1112		-	
2 Digital Inputs 5 Mattoricson 2 Virtuals ata Monitor	4 wires 2 wires Add Mux24 2 Enable 17	7 15 0 Nr. of wires 6	Add Add Modify Edit	d 4 wires tensor 12 wires tensor add iwasos Position 1-2-3	Identification AN_0103	Description	Voltage 2CH	External	Clone	Delete	Wiring scheme

Figure 29

### **Multiplexer Configuration**

Here is shown the standard configuration of an sensor connected to a channel of the multiplexer.

• Open page LOCAL CHANNEL CONFIGURATION and select the item CHANNELS CONFIGURATION / LOCAL from left menu;

Sensor Type	Nr. Sensors	Add
6 wires	6	Add 6 wires sensor
4 wires	9	Add 4 wires sensor
2 wires	18	Add 2 wires sensor
Add Mux24	1	Add Muz24

🗖 Enable	Nr. of wires	Modify	Position	Identification	Description
	6	Edit	1-2-3	AN_0103	
	6	Edit	4-5-6	AN_0406	
	4	Edit	7-8	AN_0708	
	2	Edit	9	AN_0009	
	2	Edit	10	AN_0010	
<b>v</b>	6	Edit	22-23-24		

Save

Figure 31

- Tick the field ADD MUX24 ;
- ENABLE THE NEW CHANNEL CREATED, WITH POSITION 22-23-24, AND CLICK EDIT;
- The page for the configuration of MULTIPLEXERS opens;

Copy Pas	te					
Enable	Modify	RS485 Address	Nr. of 6 wires sensors	Nr. of 4 wires sensors	Nr. of 2 wires sensors	Selection
	Edit	1	0	0	0	E
	Edit	2	0	0	0	
	Edit	3	0	0	0	
	Edit	4	0	0	0	Г
	Edit	5	0	0	0	П
	Edit	6	0	0	0	
	Edit	7	0	0	0	
	Edit	8	0	0	0	
	Edit	9	0	0	0	Π
	Edit	10	0	0	0	Г
	Edit	11	0	0	0	
	Edit	12	0	0	0	Г
	Edit	13	0	0	0	Π
	Edit	14	0	0	0	E
	Edit	15	0	0	0	
	Edit	16	0	0	0	Г

### Figure 32

NOTE: selecting Mux 24ch on channel 22-23-24 it couldn't be possible to use them to connect a sensor

If you continue, multiplex		reset. Continue?	
	OK	Annulla	Figure

- after you saved the configuration, select from left menu the entry CHANNELS CONFIGURA-TION / MULTIPLEXERS;
- the page MULTIPLEXERS opens. Here you could select MUX 24CH.

Multiplexer Type	
Multiplexer configuration page	
Mux 8/16-16/32ch	
To enable Mux 8/16-16/32ch configuration, select "Mux 8/16-16/32ch" into "Multiplexer" field local channel 8.	
Mux 8/16-16/32ch	
Mux 24ch	
To enable Mux 24ch configuration, select "Mux 24ch" into "Multiplexer" field local channel 8.	
Mux 24ch	
	Figure 34

• thus, the page MULTIPLEXER ENABLING opens. Thanks to the tick ENABLE it is possible, pushing on edit, to configure the channels of the selected multiplexer-.

NOTE: it is possible to enable at most 16 multiplexers. We advise to enable only the multiplexers that are used.

Copy Pas	te					
Enable	Modify	RS485 Address	Nr. of 6 wires sensors	Nr. of 4 wires sensors	Nr. of 2 wires sensors	Selection
	Edit	1	0	0	0	E
	Edit	2	0	0	0	
	Eclit	3	0	0	0	
	Edit	4	0	0	0	
	Edit	5	0	0	0	
	Edit	6	0	0	0	
	Edit	7	0	0	0	
	Edit	8	0	0	0	
	Edit	9	0	0	0	Ē
	Edit	10	0	0	0	
	Edit	11	0	0	0	
	Edit	12	0	0	0	
	Edit	13	0	0	0	
	Edit	14	0	0	0	
	Edit	15	0	0	0	
	Edit	16	0	0	0	Г

Save Cancel

Figure 35

• then, the page MULTIPLEXER CONFIGURATION opens. This page allows the sensors insertion thanks to three buttons: ADD 6 WIRES SENSOR, ADD 4 WIRES SENSOR and ADD 2 WIRES SENSOR.

Sensor Type	Nr. Sensors	Add					
5 Wires	8	Add 6 wires sensor					
4 Wires	12	Add 4 wires sensor	1				
2 Wires	24	Add 2 wires sensor	1				

Figure 36

• for example, if you push on button ADD 4 WIRES SENSOR in the underlying table a 4 wires sensors is added and it is possible to configure it.

Sensor Typ	e Nr. Sensors	Add									
6 Wires	7	Add	6 wires sensor								
4 Wires	11	Add	4 wires sensor								
2 Wires	22	Add	2 wires sensor								
Enable	Nr. of wires	Modify	Position	Acquisition	Identification	Description	Measure Type	Power Supply	Clone	Delete	Wiring scheme
	4	Edit	1-2	DEFAULT	MUX01_0102		Voltage	24V	Clone	Delete	Wiring scheme

Figure 37

• pushing on EDIT it is possible to set up all sensor parameters, as you do for a local analog channel. The configuration of an analog channel on multiplexer is not different from that of a local analog channel.

NOTE: once the configuration of all channels of multiplexer ended, it is advised to push on LOCK. In this way, the configuration is "blocked" and the removal of one or more sensors doesn't modify the position of those that are configured yet.

ATTENTION: the addition of a new sensor to a multiplexer that has been already configured could cause a change in sensors position on multiplexer channels. In case of sensors that are physically already connected to the multiplexer, it is necessary to check that their positions are the same. If the positions changed, it is necessary to re-wire the sensors to the multiplexer."

## **MODBUS SENSORS**

### What's Modbus?

Modbus is a serial communication protocol, made by Modicon in 1979 to link their PLC. It has become a de facto standard in communication protocol, and it's now a commonly available means of connecting industrial electronic devices.

Advantages in industrial sectors are:

- developed with industrial applications in mind
- openly published and royality-free
- easy to deploy and mantain
- moves raw bits or words without placing many restriction on vendors

Modbus enables communication among many devices connected to the same network, for example a system that measures temperature and humidity and communicates the results to a computer. Modbus is often used to connect a supervisory computer with a remote terminal unit (RTU) in supervisory control and data acquisition (SCADA) systems. Many of the data types are named from its use in driving relays: a single-bit physical output is called a coil, a single-bit physical input is called a discrete input or a contact.

Object Type	Access	Size
Coil	Read-Write	1-bit
Discrete Input/Contact	Read-Only	1-bit
Input Register	Read-Only	16-bits
Holding Register	Read-Write	16-bits

## **Digital Sensors Con iguration**

For digital sensors, the OM-240 family offers an in-depth configuration. After choosing Baudrate and Maximum RS485 Address (*Fig.1*), the User can "Save Changes" and start the con-figuration of the sensors.

	Digital Ch This page allows to enable Lo			bling							
	Baudrate: 9600 bps Parity: None	•									
	Stop Bits: 1 Maximum RS485 Address:										
	2 Power Supply mode: Always ON	•									
	Incremental Delay [sec.] 										
	Acquisition Frequency 30 Minutes	ncel Wiring	g scheme								
	Copy Paste										
	Sensor Number	☑ Enable ☑	Edit Edit	Model SmartModBus	Address 1	Identification MDB_001_A	Descri	ption Type	Selection		
	2		Edit	SmartModBus	2	MDB_001_A MDB_002_A					
	<< Previous		Next>>	Sinartivioabus	2	MDD_002_A					
	1/1										Figure 38
Copy Pas	ste										
Sensor Nu	ımber 🗹 Enak	ole Edit	Mo	del	Address	Identifica	ation	Descripti	on Type	🗖 Sele	ction
Sensor Nu	ımber ⊠Enat	ole Edit Edit		o <mark>del</mark> artModBus	Address	Identifica	1	Descripti	on Type	Sele	ection
	1		Sm			1	A	Descripti	on Type	1	ection
1	<u>र</u> ।	Edit	Sma	artModBus	1	MDB_01_/	A	Descripti	on Type		ection

Figure 39

By clicking "Edit" (*Fig.2*) on the sensor row to configure, the system shows typical sensor (IPI, H-LEVEL, TILTMETER) and a SmartModbus element (*Fig.3*). SmartModbus is selected if the User has a generic modbus sensor.

hoose Model	Sens	or	
ensor Number			
Model Type	Select		
IPI			
H-LEVEL			
TILTMETER			
SmartModbus	•	1	

Click "Next" to proceed the configuration. Fig.4 shows MODBUS parameters. These are usually provided by the sensor's manufacturer and reported in either the datasheet or instruction manual.

ensor Numb	er:					
odbus Addı	ress					
e Measure /	Actions					
Action	Enak	oled Modbus Fun	ction Reg Ad	ldress (hex) Com	parision Value	Endianes
Send Comm	and 🗆	Force Multiple I	Reg (0x10) 💌 0		p	🗧 🛛 Big 💌
Wait Condit	ion 🔽	Wait Time (in	seconds) 🔽 0		3	🗧 📕 Big 🔻
quire Meas	sures					
•		Modbus Function	Reg Address (hex	() Data Type	Registers Numbe	r&Order Endiane
Action	Enabled		1	Unsigned Integer	<ul> <li>W2 W1 (32 bit)</li> </ul>	▼ Big ▼
	Enabled	Read Holding (0x3)	1f78	1		
Measure 1		Read Holding (0x3)  Read Holding (0x3)		Unsigned Integer	• W2 W1 (32 bit)	▼ Big ▼
Measure 1	<b>V</b>				• W2 W1 (32 bit)	▼ Big ▼
Measure 1 Measure 2	<b>v</b>				▼ W2 W1 (32 bit)	V Big V
Action Measure 1 Measure 2 ost Measure Action	<b>v</b>	Read Holding (0x3)				Big Y

Figure 41

Modbus Address is sensor's modbus address, usually settable from the sensor.

### **Pre Measure Actions:**

Some sensors require either a *command or a condition to be true* before actually pushing the data in the right register.

**Send Command** enabled orders the OM-240 to push data (Value field) in a sensor's register (Reg Address (hex)). You can "Force Multiple Reg" o "Write Coil".

**Wait Condition** enabled let the OM-240 check if Coil, Input or Holding are less, more, equal or different from a chosen Value. It allows also to wait for a certain time. **Endianess** allows to select if the sensor use a Little Endian or Big Endian data type.

### Acquire Measures:

This section is the actual data reading from the modbus sensor. On most sensors, this is the only section the User should care of.

**Measure n** enabled allows the OM-240 to read the register (Holding, Input or Coil) at the speci-fied "Reg Address (hex)". Data Type is Signed or Unsigned Integer, Float and Fixend Point. **Register Number&Order** let the User choose which register and in which order data is stored in. Usually is reported in sensor's datasheet or instruction manual.

Endianess allows to select if the sensor use a Little Endian or Big Endian data type.

### Post Measure Actions:

As **Pre Measure Actions**, this is not always required, but some sensors need a register to be written in order to return in standby or reset. Settings are quite similar to **Pre Measure Actions' Send Command**, which can be enabled or not, and actions are **Force Multiple Reg**, **Write Coil** (Register Address is specified in Reg Address (hex) field) and Wait Time. **Endianess** allows to select if the sensor use a Little Endian or Big Endian data type.

easure 1		Measure 2	_
Output Configuration Measure	1	Output Configuration Measure 2	
dentification	MDB_01_A	Identification	MDB_01_B
Description		Description	
Conversion	None 🔽 🗖 Auto Zero	Conversion	None 💌 🗖 Auto Zero
Zero Reading	0	Zero Reading (Ez)	0
Sensibility	D	Sensibility (S)	0
Poly. Coeff. A	D	Poly. Coeff. A	0
Poly. Coeff. B	0	Poly. Coeff. B	0
Poly. Coeff. C	0	Poly. Coeff. C	0
Poly. Coeff. D	0	Poly. Coeff. D	0
Engineering Units		Engineering Units	
Number of Decimals	0	Number of Decimals	0
Skipped		Skipped	
ear conversion: Sx-Ez inomial conversion: Ax <sup>3</sup> +Bx <sup>2</sup> +Cx+D-Ez		Linear conversion: Sx-Ez Polinomial conversion: Ax <sup>3</sup> +Bx <sup>2</sup> +Cx+D-Ez	
Allarm Configuration Measure	1	Allarm Configuration Measure 2	
Alarm Type	None	Alarm Type	None
High Threshold	ρ	High Threshold	0
ow Threshold	ρ	Low Threshold	D
Derivate Threshold			

# Output configuration and alarms 1 & 2

### Figure 42

This are channel related settings. The user can specify channel name, a short description, and data conversion.

### **Conversion:**

**Linear:** if sensor output is linear, the systems needs to know Zero Point (Ez) and Sensibility(S) and Number of Decimals (field will be enabled). The output will be equal to Sx - Ez

**Polynomial:** if sensor output is not linear this allows the user to specify sensor output curve, and enable Zero Reading (Ez), Poly.Coeff. A, B, C and D and Number of Decimals. The output will be equal to  $Ax^3 + Bx^2 + Cx + D - Ez$ 

**Engeneering Units:** to complete data with the right engeneering unit like bar, °C, °F, %HR and so on.

Number of Decimals: after linear or poly conversion, here are the number of decimal digits the system will round the value at.

Skipped: the system will ignore this sensor

### Virtual channel alarm

This section enables Logical Operations with Virtual Channels Alarm. Virtual Channels section allows logial operations between alarms, (AND, OR, XOR, NOT).

## Tips

### Multiple Sensor in one single Modbus Device

Our System allows the user to connect one single Modbus device providing information coming from different sensors.

### What if a sensor has more than 2 channels?

The OM-240 allows to create another sensor with the same Modbus address (Fig.9,10,11), so user can select 4 (or more, creating other sensors) registers to read data from. Pre Measure Actions (if required) will be set only in first sensor (relative to the Modbus slave device) and Post Measure Actions will be set only in last sensor (always relative to the Modbus slave device)"

### Virtual Channel Alarm

Virtual Channel Alarm Selection	
VC Alarm with Logical Operations	

Figure 44

Sensor Number	🖉 Enable	Edit	Model	Address	Identification	Description	туре	Selection
1		Edit	SmartModBus	1	MDB_01_A		-	
2	2	Edit	SmartModBus	1	MDB_01_B			
3		Edít	SmartModBus	1	MDB_01_C			(E)
< Previous		Next>:	>			Ó		
45								
ıre 45								
	Sensor Number:							
a	L							
	Nodbus Address							
E	L							
	Pre Measure Actions							
	Pre Measure Actions	_	Modbus Function	Reg Address (h	ex) Comparision Val	ue Endianess		
	Pre Measure Actions Action Send Command	Enabled I	Force Multiple Reg (0x10) ▼	0	0	Big 🔻		
	Pre Measure Actions	Enabled I	Force Multiple Reg (0x10) ▼					
	Pre Measure Actions Action Send Command	Enabled I	Force Multiple Reg (0x10) ▼	0	0	Big 🔻		
	Pre Measure Actions Action Send Command Wait Condition	Enabled 1	Force Multiple Reg (0x10) ▼	0	0 = * 3	Big *	dīaness	
	Action Send Command Wait Condition Acquire Measures Action Enabl Measure 1 2	Enabled I	Force Multiple Reg (0x10) •           Wait Time (in seconds) •           us Function           Reg Address           Holding (0x3) •           1178	0 0 ess (hex) Dat	a Type Registers	Big * Big * Number&Order End 32 bit) * E	Big 🔻	
	Pre Measure Actions Action Send Command Wait Condition Acquire Measures Action Enabl	Enabled I	Force Multiple Reg (0x10) • Wait Time (in seconds) • Wait Time (in seconds) •	0 0 ess (hex) Dat	a Type Registers	Big * Big * Number&Order End 32 bit) * E		
	Action Send Command Wait Condition Acquire Measures Action Enabl Measure 1 2	ed Modb Read t	Force Multiple Reg (0x10) •           Wait Time (in seconds) •           us Function           Reg Address           Holding (0x3) •           1178	0 0 ess (hex) Dat	a Type Registers	Big * Big * Number&Order End 32 bit) * E	Big 🔻	
	Action Send Command Wait Condition Acquire Measures Action Measure 1 Measure 2 Post Measure Action	Enabled I ed Modb Read I Read I	Reg (0x 10) •           Wait Time (in seconds) •           us Function           Reg Address           Holding (0x 3) •           1178           Holding (0x 3) •	0 0 ess (hex) Dat	a Type Registers signed Integer • W2 W1 (	Big • Big • Number&Order En 32 bit) • 52 bit) • E	Big 🔻	

Figure 46

#### Sensor Number:

2

#### Modbus Address

1

#### **Pre Measure Actions**

Action	Enabled	Modbus Function	Reg Address (hex)	Comparision	Value	Endianess
Send Command	0	Force Multiple Reg (0x10) •	0		0	Big 🔻
Wait Condition		Read Holding (0x3)	0	= •	0	Big 🔻

### Acquire Measures

Action	Enabled	<b>Modbus Function</b>	Reg Address (hex)	Data Type	Registers Number	&Order	Endianess
Measure 1	Ø	Read Holding (0x3) •	12b3	Unsigned Integer V	W1 (16 bit)	•	Big 🔻
Measure 2	Ø	Read Holding (0x3) •	13a5	Unsigned Integer •	W1 (16 bit)	•	Big 🔻

#### Post Measure Actions

Action	Enabled	Modbus Function	Reg Address (hex)	Value	Endianess
Send Command		Force Multiple Reg (0x10) V	0	0	Big 🔻

# Figure 47

Sensor Number: 3

-

#### Modbus Address

1

#### Pre Measure Actions

Action	Enabled	Modbus Function	Reg Address (hex)	Comparision	Value	Endianess
Send Command		Force Multiple Reg (0x10) T	0		0	Big 🔻
Wait Condition		Read Holding (0x3)	0	= •	0	Big 🔻

#### Acquire Measures

Action	Enabled	<b>Modbus Function</b>	Reg Address (hex)	Data Type	Registers Numb	er&Order	Endianess
Measure 1	1	Read Holding (0x3) •	12b5	Unsigned Integer •	W1 (16 bit)	Ŧ	Big 🔻
Measure 2	1	Read Holding (0x3) •	13b6	Unsigned Integer •	W1 (16 bit)	Ŧ	Big 🔻

#### Post Measure Actions

Action	Enabled	Modbus Function	Reg Address (hex)	Value	Endianess
Send Command		Force Multiple Reg (0x10) •	11a1	4	Big 🔻

# Figure 48

# DATALOGGER CONFIGURATION

## Overview

This chapter will explain following webserver configuration pages:

- Change Datalogger's name
- Acquisition speed and precision
- IoT Enabling

## Configuration -> Datalogger

Identification Invitation   Measurement Settings Stundard   Fast Measurement Settings Invitation   Relay Time Gain 4   ACC Average Number 4   Simultaneous Relay Number 4   Simultaneous Relay Number 4   ACC Speed 20555   Relay Time Gain 4   ACC Speed 20555   Paley Time Gain 4   ACC Speed 20557   Tum Off Analog During Warm-up F   Humidity sensor No   Humidity alarm enable F   H	nu	Logger Configu	Ira	tion				
on          Serial Number       D1170302         Identification       OMMAlog         Measurement Settings       Standard         Fast Measurement           Relay Warm-up       D00         ADC Average Number       4         Simultaneous Relay Number       6         Relay Dictarge           Polynomial digit           Humidity amenable           Enable VW Tracking           Thermocouple break check           Thermocouple break check           Statery Allarm Threshold           Offset correction (n/m)           Statery Allarm Threshold           Offset correction (n/m)           Statery Correction (clinm)           Stor Canfiguration <td>juration ger</td> <td>This page allows to modify the Logger basic conf</td> <td>iguratio</td> <td>on.</td> <td></td> <td></td> <td></td> <td></td>	juration ger	This page allows to modify the Logger basic conf	iguratio	on.				
Identification Invitation   Measurement Settings Stundard   Fast Measurement Settings Invitation   Relay Time Gain 4   ACC Average Number 4   Simultaneous Relay Number 4   Simultaneous Relay Number 4   ACC Speed 20555   Relay Time Gain 4   ACC Speed 20555   Paley Time Gain 4   ACC Speed 20557   Tum Off Analog During Warm-up F   Humidity sensor No   Humidity alarm enable F   H	quisitions rms	Description		Parameters				
Identification Invitation   Measurement Settings Stundard   Fast Measurement Settings Invitation   Relay Time Gain 4   ACC Average Number 4   Simultaneous Relay Number 4   Simultaneous Relay Number 4   ACC Speed 20555   Relay Time Gain 4   ACC Speed 20555   Paley Time Gain 4   ACC Speed 20557   Tum Off Analog During Warm-up F   Humidity sensor No   Humidity alarm enable F   H	els Configuration			01170502				
Measurement Settings Stundard   Fast Measurement I   Relay Warm-up 00   ADC Average Number 8   Simultaneous Relay Number 8   Relay Discharge I   Humidity sensor I   Humidity alarm enable II   Badie WU Tracking I   Wo Noise subtraction IV   Wo Noise subtraction IV   You Scrictaion IV   Numet correction (mA) 20.20   Radio mode IV   Correction (mA) 20.20   Sate Charge I   Iot Enable Iot Configuration   Iot Charles Iot   Sate Charge Interactore   Sate Charge Interactore   Sate Charge Interactore   Sate Charge Interact	Aonitor				-			
Fast Measurement   Relay Warm-up   ADC Average Number   Belay Time Gain   4   ADC Speed   Relay Time Gain   4   ADC Speed   Relay Reset   F   Tum Off Analog During Warm-up   Analog always on   Polynomial digit   Humidity sensor   Not Connected   Humidity sensor   Not Connected   W Kacitation   Radio mode   Unret Correction (nAm)   0:001900   0:001900   0:001900   0:001900   0:001900   0:001900   0:001900   0:001900   0:001900   0:001900   0:001900   0:001900 <	ced							
Relay Warm-up 00   AOC Average Number 4   Simutaneous Relay Number 6   Relay Time Gain 4   AOC Speed 2059's   Relay Discharge 7   Relay Best 7   Tum Off Analog During Warm-up 7   Analog always on 6   Polynomial digit 1   Humidity alarm enable 7   Humidity alarm enable 7   Wo Noise subtraction 7   Wo Noise subtraction 7   Wo Noise subtraction 7   Wo Noise subtraction 7   Thermocouple break theck Show MAI   FIP file name format 7   Low Battery Allarm Threshold 100   Radio mode 7   Check for Fw update 7   Thermocouple break theck Show MAI   Simutan correction (mAi) 1002800   Offset correction (mAi) 1002800   Offset correction (mAi) 1002800   Offset correction (mAi) 1000000000000000000000000000000000000								
ADC Average Number   Binultaneous Relay Number   Relay Discharge   Relay Discharge   Relay Reset   Wander   Binut Off Analog During Warm-up   Canalog Jaways on   Polynomial digit   Binut Off Analog During Warm-up   Humidity sensor   Wet Connected   Wind Sensor   Wo Noise subtraction   Wind Sensor   Wo Noise subtraction   Wind Ratery Allarm Threshold   Boo   Ratio mode   Current correction (mA)   Dostatory   Offset correction (nA)   Datable   Current correction (nA)   Datable   Di Chable   Dostatory   Current correction (nA)   Datable   Di Chable   Dostatory   Carrent correction (nA)   Di Chable   Di Chable   Di Chable   Di Chable   <								
Simultaneous Relay Number   Belay Discharge   Relay Reset   Turn Off Analog During Warm-up   Analog always on   Polynomial digit   Humidity sensor   Wo Noise subtraction   WW Noise subtraction   Wo Reset   Under Statistic   Beading always on   WW Noise subtraction   Wut Subtraction   WW Noise subtraction   Subtract subtraction   Wut Subtract subtraction   Wut Subtract subtraction   Subtract subtraction   Wut Subtract subtraction   Subtract s					-			
Relay Time Gain   ADC Speed   Idea Poistarge   Relay Rest   Turn Off Analog During Warm-up   Analog always on   Polynomial digit   Lumidity sensor   Humidity sensor   Wo Koise subtraction   WW Excitation   FIP file name format   Intog dd_mm_yry_HH_LMK_SS   Low Battery Allarm Threshold   Doo   Radio mode   Offset correction (mA)   Idoutises   Polf correction (phm)   isascoo <b>NIC Configuration Parameters Polynomial digit</b> ID Configuration Parameters value ID Configuration Parameters value ID Canfiguration Parameters value ID Canfiguration Reservation Save changes Cancel <b>Demotod/lyboid clibration</b> Endition the selecionate: Catheration turbicad Low statery Allare Threshold Bio Domotod/lyboid clibration Catheration Download Save changes Cancel Demotod/lyboid clibration Endition file selecionate: Catheration turbicad Catheration Reservation turbicad Default Settings Record Relay Record Rebox Catheration Default Settings Record Rebox Catheration					_			
ADC Speed INSPS   Relay Discharge I   Relay Reset IF   Turn Off Analog During Warm-up I   Analog always on I   Polynomial digit I   Humidity aarm enable IF   Enable WW Tracking I   WW Noise subtraction IF   We more subtraction IF   Thermocouple break check Show MAM   Iow Battery Allarm Threshold Io0   Radio mode IF   Check for Fw update IF   Offset correction (Panameters Polynomial digit   IoT Configuration Panameters value   IOT Enable IoO000000000000000000000000000000000000					-			
Relay Discharge       Image: Comparison of the comparison of t								
Relay Reset   Turn Off Analog During Warm-up   Analog always on   Polynomial digit   Lumidity sensor   Humidity sensor   Wo Noise subtraction   FTP Mile name format   Integ_dd_mm_uyy_HH_MM_SS   Low Battery Allarm Threshold   10.0   Radio mode   Check for Fw update   Current correction (mA)								
Turn Off Analog During Warm-up   Analog always on   Polynomial digit   Humidity sensor   Work Connected   Humidity alarm enable   Enable Work Tracking   WW Noise subtraction   WW Noise subtraction   WW Excitation   WW Excitation   WW Excitation   WW Excitation   WW Distery Allarm Threshold   Low Battery Allarm Threshold   Download/Uplead Calibration   VOT Configuration   Parameters value   IOT Configuration   Parameters value   IOT Canfiguration   Parameters value   IOT Canfiguration   Devinoad/Uplead Calibration   Edited is elecionation   Sete ta aditionation file:   Stepicity   Stepicity   Stepicity   Default Settings Recover								
Analog always on   Polynomial digit   Humidity sensor   Humidity sensor   Humidity alarm enable   Enable WW Noise subtraction   WW Noise subtraction   WW Noise subtraction   WW Excitation   WW Excitation   FIP file name format   Integ_dd_mm_yy_HH_MM_SS   Low Battery Allarm Threshold   D00   Radio mode   Check for Fw update   VITC Correction Parameters value   IOT Configuration   Parameters value   IOT Configuration   Parameters value   IOT Cik   pocococococococococococococococococococ			up					
Polynomial digit       1         Humidity sensor       Not Connected         Humidity alarm enable       Image: Connected         Enable WV Tracking       Image: Connected         WW Noise subtraction       Image: Connected         WW Excitation       Image: Connected         Thermocouple break check       Show NAN         FTP file name format       Imtog_dd_mm_uyy_HH_MM_SS         Low Battery Allarm Threshold       DO         Radio mode       Image: Connection Parameters         Check for Fw update       Image: Connection (mA)         Offset correction (ohm)       D.000000000000000000000000000000000000			up					
Humidity alarm enable       Image: Connected         Humidity alarm enable       Image: Connected         Enable VW Tracking       Image: Connected         WW Noise subtraction       Image: Connected         Humidity alarm Threshold       Ioo         Radio mode       Image: Connected         Current correction (mA)       Image: Connected         Offset correction (ohm)       Image: Connected         IOT Configuration       Parameters value         IOT Cik       Image: Connected         IOT Cik       Image: Connected         Save Changes       Caneel         Stet a calibration file       Image: Connected         Steps:       Nessun file selezionato.       Calibration Upload         The rollowing functions will reboot Logger       The fullowing functions will reboot Logger								
Humidity alarm enable   Enable VW Tracking   WW Noise subtraction   WW Excitation   Current correction (mA)   0.001300   Offset correction (mA)   0.001300   Out Cike   Docococococococococococococococococococ								
Enable VW Tracking   WW Noise subtraction   WW Excitation   WE Excitation   Radio mode   Check for Fw update   WE Correction Parameters   Polynomial digit   Current correction (mA)   0.001800   Offset correction (mA)   0.001800   OT Chilguration   Parameters value   IOT Cik   000000000000000000000000000000000000		-						
WW Noise subtraction   WW Noise subtraction   WW Excitation   FTP file name format   mLog_dd_mm_yy_HH_MM_SS   Low Battery Allarm Threshold   10.0   Radio mode   Check for Fw update   WC correction Parameters   Polynomial digit   Current correction (mA)   0.001800   Offset correction (ohm)   0.33000     IOT Configuration   Parameters value   IOT Enable   IOT Cik   popposed calibration   Calibration Download   Seet a calibration file   Sfiglis Nessun file selezionato.   Calibration swill reboot Logger		-						
WW Excitation   WW Excitation   FTP file name format   mlog_dd_mm_yy_HH_MM_SS   Low Battery Allarm Threshold   10.0   Radio mode   Check for Fw update     TCC Correction Parameters   Polynomial digit   Current correction (mA)   0.001800   Offset correction (mA)   0.001800   Offset correction (mA)   0.001800   Offset correction (mA)   0.00000000000000000000000000000000000								
Thermocouple break check Show NAN   FTP file name format mlog_dd_mm_yy_HH_MM_SS   Low Battery Allarm Threshold 10.0   Radio mode Image: Check for Fw update   Check for Fw update Image: Check for Fw update   NTC Correction Parameters Polynomial digit   Current correction (mA) 0.001800   Offset correction (ohm) 0.330000     IOT Configuration Parameters value   IOT Cik 000000000000000000000000000000000000								
FTP file name format       mtog_dd_mm_yy_HH_MM_SS         Low Battery Allarm Threshold       D0         Radio mode       Radio mode         Check for Fw update       F         NTC Correction Parameters       Polynomial digit         Current correction (mA)       0.001800         Offset correction (ohm)       0.330000         IOT Configuration       Parameters value         IOT Enable       IOT Cik         Download/Upload Calibration       Calibration Download         Save Changes       Cancel         Definition Download       Calibration Upload         The following functions will reboot Logger       Default Settings Recover         Reboot       Reboot								
Low Battery Allarm Threshold       10.0         Radio mode       Image: Check for Fw update         Check for Fw update       Image: Check for Fw update         NTC Correction Parameters       Polynomial digit         Current correction (mA)       0.001800         Offset correction (ohm)       0.330000         IOT Configuration       Parameters value         IOT Cnfiguration       Parameters value         IOT Cik       000000000000000000000000000000000000								
Radio mode         Check for Fw update         Image: Current correction (mA)         0.001500         Offset correction (mA)         0.330000         Image: Correction (ohm)         0.330000         Image: Correction (ohm)         0.330000         Image: Correction (ohm)         0.330000         Image: Correction (ohm)         0.001500         Save Changes         Cancel         Image: Correction Download         Select a calibration         Calibration Download         Steptia         Nessun file selezionato.         Calibration Upload         Image: The following functions will reboot Logger         Default Settings Recover       Reboot					_			
Check for Fw update       Image: Check for Fw update         NTC Correction Parameters       Polynomial digit         Current correction (mA)       0:001800         Offset correction (ohm)       D:330000         IOT Configuration       Parameters value         IOT Enable       Image: Changes         IOT Cik       prococcoccoccoccoccoccoccoccoccoccoccocco		-		10.0				
NTC Correction Parameters       Polynomial digit         Current correction (mA)       0.001800         Offset correction (ohm)       0.330000         IOT Configuration       Parameters value         IOT Enable								
Current correction (mA)       0.001800         Offset correction (ohm)       0.330000         IOT Configuration       Parameters value         IOT Enable       Image: Concelemption         IOT Cik       pononononononononononononononononononon		·						
Offset correction (ohm)       D.330000         JOT Configuration       Parameters value         IOT Enable       Image: Control of Configuration         IOT Cik       p000000000000000000000000000000000000					- 1			
IOT Configuration       Parameters value         IOT Enable       IOT Cik         IOT Cik       000000000000000000000000000000000000								
IOT Enable       IOT Cik         IOT Cik       Dococcoccoccoccoccoccoccoccoccoccoccocco		Offset correction (ohm)	0.3	30000				
IOT Cik       pocococococococococococococococococococ		IOT Configuration Parame	ters	value				
Save Changes       Cancel         Download/Upload Calibration       Calibration Download         Select a calibration file:       Sfoglia         Sfoglia       Nessun file selezionato.         Calibration Upload       The following functions will reboot Logger         Default Settings Recover       Reboot		IOT Enable						
Download/Upbad Calibration Calibration Download Select a calibration file: Sfoglia Nessun file selezionato. Calibration Upload The following functions will reboot Logger Default Settings Recover Reboot		IOT Cik 00000000	00000	000000000000000000000000000000000000000				
Calibration Download Select a calibration file: Sfoglia Nessun file selezionato. Calibration Upload The following functions will reboot Logger Default Settings Recover Reboot		Save Changes Cancel						
Default Settings Recover Reboot		Calibration Download Select a calibration file:		alibration Upload				
							Figure 49	)

This page is dedicated to low levels tweaks to improve stability and correct readings.

Serial Number: This is the device serial number. It is composed by 8 decimal digits.

**Identification:** A short string (16 characters maximum) to identify the datalogger. Identification is used for USB data export. Admitted characters are: Letters (a-z, A-Z) Numbers (0-9) Only this special characters: .\_()[]-{} Non-admitted characters will be substituted with \_ (underscore) character.

**Measurement Settings (Standard, High Precision, Fast):** These are 3 different measure configurations. User can also modify settings, these are recommended settings.

Fast Measurement: The datalogger does not execute analog autocalibration.

Relay Warmup: Delay time between relay activation and acquisition process

ADC Average Number: Number of average computed by Analog to Digital Converter

Simultaneous Relay Number: number of simultaneously activated relays

Relay time Gain: Relay excitation time (tens of milliseconds)

ADC Speed: ADC Sample rate, in SPS (Sample per Seconds)

**Relay Discharge:** before acquisition process, all relays are set to short circuit to discharge capacitors.

Relay Reset: Optimization of relays movements

**Turn Off Analog During Warm-up:** during sensor's warm-up, analog board is temporarily turned off

**Analog always on:** Analog circuits are turned on at first acquisition cycle (in RUN) and then won't be turned off (except when CONFIG or STOP mode are set). This allows faster acquisition rates. In Test Measure mode, analog board is turned on temporarily then turned off again. If datalogger will go in sleep mode, analog circuit should be re-initialized at next acquisition cycle.

**Polynomial digit:** This field establishes number of decimal digits for channel with Linear or Polynomial conversions. This number is used if the channel is left at "DEFAULT". A single channel can override this setting in its own setting page.

**Enable VW Tracking:** This option will speed up Vibrating Wire Excitation by lowering the time needed for frequencies scan.

**VW Noise subtraction:** It performs a noise analysis of the channel, to have a better SNR after excitation.

**VW Excitation:** This field enables the excitation of Vibrating Wire. If it's disabled, no excitation will be applied while reading vibrating wire, thus making the reading impossible. It can be used to test with functions generators.

**Thermocouple break check:** before TC readings, OM-240 inspects TC circuitry to check total resistance. If value is out of thresholds, TC will be flagged as broken, and NAN, +FS or -FS will be recorded. If Thermocouple break check is disabled, this control won't be executed. It is useful to disable this control when using calibrators or mV sources connected as thermo-couple, since their behavior is not the same as Thermocouple's wire.

**FTP file name format: it** allows choice between different file name's formats.

**Low Battery Alarm Threshold:** An alarm will be triggered if V IN voltage drops below this threshold.

### **IOT Configuration**

**IOT Enable:** This checkbox, enables the communication with Exosite cloud. Read dedicated chapter for more info.

WARNING: BEWARE OF ENABLING THIS FIELD. BEFORE ENABLING THIS FIELD, BE SURE TO DELETE ALL MEASURE LOG PRESENT IN MEMORY. IF MEMORY IS NOT CLEAR, AT THE FIRST ACQUISITION, THE DATALOGGER WILL PROCESS EXISTING DATA AND TRY TO EXPORT TO EXOSITE CLOUD. USUALLY THIS OPERATION REQUIRES FEW HOURS AND THE DATALOGGER WILL BE STRUCK PROCESSING THIS DATA FOR NECESSARY TIME.

**IOT Cik**: This field is dedicated to the CIK field, gathered from Exosite cloud after the creation of a device. Read dedicated chapter for more info.

**Download/Upload Calibration:** it allows logger calibration saving or restoring.

Default Settings Recover: It will restore default settings

Reboot: it reboots the datalogger

# ALARMS

## Overview

• OM-240 can handle alarms of both channel (reading out of a determined range) and device (malfunction, wrong configuration etc.)

• Alarms can be recorded on Alarm logs and can be sent via SMS, EMAIL, FTP or activate through OM-240's Digital Output (refer to Chapter1 for more info).

• A first configuration must be done in the Alarm Configuration page (on the web server, click on "Configuration" and "Alarms"). The following screen will be prompted. Simple steps to configure alarms:

- Select Output
- Select "Delay"
- Select "End"

## Configuration

	Enable	Action	Event	Nr.	End	
figuration		Send SMS	1	•	2	•
r		Send email	1	•	2	•
		Upload on FTP	1	•	2	•
		Enable Digital Output	1	•	2	•
		Frequency Increase	1	•	2	•
	Datalogger Enable	Action	Event	Nr.	End	
		Action	Event	Nr.	End	
	Enable	Send SMS	1	•	2	•
	Enable	Send SMS Send email		•	2	•
	Enable	Send SMS	1	•	2	

### Figure 50

In the "SENSOR" section, it is possible to select how OM-240 will handle Sensor's alarm: Enabling any of this checkbox will modify datalogger's action:

• Send SMS will send an SMS (if RS232 modem is connected) with the Alarm

• Send email will send an email (if RS232 modem OR Ethernet connection with internet is connected) with the Alarm, to specified recipient (see next section)

• Upload on FTP will upload the Alarm Log's row (if RS232 modem OR Ethernet connection with internet is connected) with the alarm triggered

• Enable Digital Output will trigger the backpanel's terminal block to control an external Alarm system

• Frequency increase will increase acquisition frequency to gather more information about the event that has triggered the alarm. Acquisition Frequency is set at 1 minute when the channel is in ALARM. If the datalogger is configured to read different sensors, and more than one sensor is in alarm, reading frequency will probably be lower.

There are pretty much the same options in the "OM-240" Section, except for Frequency increase.

**Event Nr**. Dropdown menu will let you choose the number of events in alarm at which the datalogger triggers the alarm. 1 means at the first occurrence, 2 will skip first value in alarm, and if it still in alarm during next acquisition the alarm will be triggered, otherwise there will be no alarm event.

End Dropdown menu will let you choose the number of events after which the datalogger will cease to trigger. NEVER is the option to disable this feature, and let the datalogger trigger EVERY set alarm.

After configuration, click Save to proceed.

If you selected SMS, email or FTP, the relative configuration option will be activated.

### **SMS Configuration**

		Datalogger Alarm	Add Measure in alarm
-393330000000	] 🗖		
+39333000000	] 🗖	Г	
+39333000000	] 🗖	Г	
+39333000000	] 🗖	Г	
+39333000000		Γ	
gger Alarm SMS			

Figure 51

This page will let you select SMS recipient for triggered alarms.

Number: the recipient(s) of the SMS

Sensor Alarm: if you have selected SMS in sensors alarms this will let you use the current recipient for the sensor alarm

OM-240 alarm: if you have selected SMS in OM-240 alarm this will let you use the current recipient for the datalogger's alarm

Add Measure in alarm: it will attach measure value to the SMS.

Text: it allows a small text writing (up to 30 characters) contained in the SMS

Tries: it makes you choose the number of tries if SMS send fail.

Click save to proceed.

## **Email Configuration**

ddress	Sensor Alarm	Datalogger Alarm
fo@info.com		
ger Notifications (max.30 characters): gger Report:		

Figure 52

This page will let you select the email recipient for triggered alarms.

Address: the email address of the recipient

Sensor Alarm: if you have selected email in sensors alarms this will let you use the current recipient for the sensor alarm

Datalogger alarm: if you have selected email in datalogger alarm this will let you use the current recipient for the datalogger's alarm

Object: email's object

Text: a small text (30 charaxters) to be sent with email

SMTP Configuration: it will open a new page to configure SMTP parameters

Save Changes to proceed

## **SMTP Configuration**

Menu	SMTP S	erver Configuration	
Status     Configuration	This page allows to con	igure SMTP server access credentials needed to send alarms notification's	; email.
<ul> <li>Datalogger</li> <li>Acquisitions</li> </ul>	Parameter		
Q Alarms	SMTP Server	192.168.0.1	
Channels Configuration     Data Monitor	Port	25	
Advanced	Username	info@info.com	
	Password		
	Retry	1	
	Save Changes Cancel Back Send test email Supported protocols:	SMTP	
			Figure 53

This page allows the setup of SMTP parameter.

SMTP Server: the smtp server to send mail

Port: port used to communicate with SMTP Server

Username and Password: Credentials to be used to send email

Retry: number of retry(ies) in case of transmission errors.

Send test email: it will send an email to check if parameters are correct

WARNING: Only standard SMTP (not encrypted) is supported.

## **FTP Configuration**

Sending N	leasures
This page allows to configure ti alarm). Select the type of protoc the alarm. In case of FTP sendin "Energy Management" page in t minutes. In "Server" field is high	ve parameters for the measure log on an FTP server or MAIL scheduled sending (or in case of col to enable measure log sending; if not enabled, if the alarms are configured, will be sent only gfalture. Datalogger will send max. 2 delayed a cqualitation cycles. Secting Timert in the the "Communication Device Power Supply" (VOT)" field the TP sending could take Jerve y recommended to insert the domain (i.e. www.domain.com) and NOT the IP address. In this the DNS in the "Network Card Configuration" table in the "Connections" page.
Sending Measures	
Sending Enable:	None
Sending Frequenc	y: Daily (8:00 AM)
FTP Configuration FTP parameters	
Server:	192.168.0.1
Folder (/folder):	/FTPfolder
Username:	admin
Password:	••••
Port:	21
Tries:	1
Supported protocols: FTP	
Cancel	

This page allows FTP connection configuration. Sending Measure Table is related to Measure log transfer and this is explained in the related section. FTP Configuration table allows to setup all parameters for FTP server connection. If the server is not on the same LAN, a 3G modem or Internet connection is required. Server: it is the server address Folder: it allows to specify subfolder to be used. The directory MUST exist Username and Password: credentials used to connect to the server Port: port used to connect to the server Tries: number of attempts in case of failure. Save changes to continue **WARNING: Only standard FTP (not encrypted) is supported.** 

## **Channel Alarm Types**

Thresholds in OM-240 alarm settings are here described. WARNING: all alarms evaluations are computed AFTER linear or polynomial conversion, if any.

## Low and High Thresholds

Thresholds are basically limits to sensor's ranges. If a threshold is overcome (lower value so low threshold, or higher value so high threshold), the alarm is triggered.

## Derivate

Derivate alarm will analyze, at n sample, value of n-1 sample and compare to n sample. If value(n)-value(n-1)>threshold, an alarm is triggered.

## **Examples**

Derivate alarm, linear conversion

(Ln\*S+Lz)-(Ln-1\*S+Lz) > threshold

Ln is last sample, while Ln-1 is second-last sample. S is sensibility parameter and Lz is offset (Zero reading) in linear conversion's channel settings.

## **DIGITAL INPUTS CONFIGURATION**

The OM-240 has two digital inputs (IN1 & IN1) on its back side.



Figure 55

The digital inputs could be configured to acquire a **TRIGGER** or an **RAIN GAUGE** or an **ANEMOMETER.** The trigger could be used with a seismic station and it is used to start one or more acquisitions extemporaneous.

NOTE: in case of a rain gauge or anemometer, no elaboration of reading is considered (ex: average speed, maximum, instantaneous, daily storage, etc.)

To set up a digital input it is necessary:

- to select the entry CHANNEL CONFIGURATION, then DIGITAL INPUTS;
- the page DIGITAL INPUTS CONFIGURATION opens. In this page it is possible to set up 1 or both digital inputs independently;

CE OMEGA	3	٠			<b></b>	F
	Datalogger	OM-240	No alarm	FW 21.42.66	Ext.Pwr Supply 12.2 V	31/01/17 17:10
Menu • Status • Configuration • Locals • Digitals • Digital Inputs • Multiplexers • Virtuals • Data Monitor • Advanced	Digital Input This page allows to configure of Digital Input INI Input: Disable Acquisition Frequency Default Default Constibility:	Logger local digital		tion		

Figure 56

• in this page you could find the following fields:

INX INPUT (X is 1 or 2)	<ul> <li>Using the drop-down menu, it is possible to select the type of digital input between 4 possibilities:</li> <li>DISABLE D</li> <li>TRIGGE R</li> <li>RAIN GAUGE</li> <li>WIND GAUGE</li> <li>The input has to be configured according to the sensor that is connected.</li> </ul>
A CQUISITION FRE QUE NCY	Sampling rate of selected channel (wind gauge, rain gauge)
SE NSIB IUTY	This field enables only for RAIN GAUGE and ANEMOMETER. If it is well configured, it allows to transform the counts in engineering units (ex: from "counts" to "mm")
EDGE	This field enables only for TRIGGER. It is possible to select between two entries: <b>UP</b> or <b>DOWN</b> . The state change could be high-low (DOWN) or low-high (UP). Therefore, if on the input generally there is no voltage and you want to do an acquisition with the OM-240, in case a voltage arrives on the input (ex: 5Vdc) it is necessary to select <b>UP</b> . This because you pass from a low (0Vdc) to a high (5Vdc) state.
UNIT M E A SURE	This field enables only for RAIN GAUGE and WIND GAUGE. It indicates the unit of measure of the read value.
NUM B E R OF RE A D INGS (TRIGGE R)	Editable field. Numerical value. This field enables only for TRIGGER. It indicates how many extempora-neous and consecutive acquisitions the OM-240 has to do with a trigger. Acquisitions are done independent-ly from the configured acquisition interval. These data are stored and so they could be exported in CSV file.
	1

NOTE: If you enable the digital inputs, the OM-240 is in permanent acquisition. This means that, even if the OM-240 is in Timed, he will never go in "low consumption" mode. This situation has to be taken into account in case it is necessary to optimize the consump-tions (for example with batteries or solar panel)

## Example of digital input in 1 configuration

Here is shown the standard configuration of a digital input configured as TRIGGER.

• open page DIGITAL INPUT CONFIGURATION and select the entry CHANNELS CONFIGURATION / DIGITAL INPUTS from left menu;



• in field INPUT IN1 select TRIGGER;

IN1 Input:		
Trigger	•	
Acquisition Frequency		
Default 💌		
Sensibility:		
10.000000		

• in field EDGE select UP;

NOTE: in this example it has been selected UP because we supposed there is any voltage on digital input IN1 and that in case of a trigger, a voltage of 5Vdc is applied.

• In field **NUMBER OF READINGS (TRIGGER)** insert the number of acquisitions you want that the OM-240 does after a trigger signal (ex.5)

• Push SAVE CHANGES to confirm the configuration.

The OM-240, with this configuration, in case it receives a positive voltage on DIGITAL INPUT IN1, does 5 consecutive acquisitions of all configured channels. A practical example of the use of trigger function is that of associate OM-240 to a Seismic Station. The majority of Seismic Stations has the possibility, in case of a seismic event, to ac-tivated a digital output (an output voltage). If this signal is connected directly to the digital input IN1 of the OM-240, when a seismic event happens the Seismic Station furnishes a digital output on the digital input of the OM-240. The OM-240 starts to acquire all connected sensors to verify the monitoring area after the event.

# Example of digital input in2 configuration

Here is shown the standard configuration of a digital input configured as RAIN GAUGE.

• open page DIGITAL INPUT CONFIGURATION and select the entry CHANNELS CONFIGURATION / DIGITAL INPUTS from left menu;

Status     Configuration	Digital Input	
Channels Configuration		
O Locals	INI Input: Trigger	
Digitals	Ingger	
O Digital Inputs	Acquisition Frequency	
<ul> <li>Multiplexers</li> </ul>	Defaum 📼	
O Virtuals	and a second	
Data Monitor	Sensibility:	
Advanced	10.000.000	
	Edge:	
	© Up C Down	
	Unit Measure:	
	and the second second	
	Number of readings (Trigger)	
	Skipped:	
	and the second se	
	IN2 Input: Disable	
	I Disable	
	Acquisition Frequency	
	Dafoult	
	Sensibility:	
	10.000000	
	Edge: © Up © Down	
	- op - Down	
	Unit Measure:	
	Number of readings (Trigger)	
	ALL F	Figur
	Skipped:	- '0''''

• in field INPUT IN2 select RAIN GAUGE;

IN2 Input:	
Rain Gauge	
Acquisition Frequency	
Default	
Sensibility:	
10.000000	
Edge: ©Up C Down	
Unit Measure:	
Number of readings (Trigger)	
Skipped: 🗖	Figure 61

60

- in field **SENSIBILITY** insert the sensibility of sensor (for example 0.2 mm/count);
- in field UNIT OF MEASURE insert the unit of measure of the done conversion (example "mm")

Unit Measure:	
	Figure 62

With this configuration, the OM-240 acquires the number of impulses for a period of a hour. Once this interval ends, the OM-240 memorizes the number of counts done during this period of time. If for example in one hour 5 counts are detached, the OM-240 applies the following conversion:

## 5 COUNT \* 0.2 MM/COUNT = 1 MM

Once tche value is memorized, the counter sets to zero.

Alarm configuration is the same as all other channel types, with High, Low and Derivative Thresholds. VC alarm with Logical Operations is present, as a Virtual Channel alarm can be used in Virtual Channels Logical Alarms.
#### **VIRTUAL CHANNELS**

#### Overview

This chapter is focused on Virtual Channels (VC from now on), to understand why VC are implemented on OM datalogger and how to configure them.

1. Why are Virtual Channels implemented in OM Family? – This paragraph shows benefits of Virtual Channels

2. Scripts – Scripts are a fundamental section of Virtual Channels' architecture.

3. Virtual Channels configuration – "HOW TO" use and configure Virtual Channels' with analog and digital sensors, digital input and multiplexers.

4. Common Errors – Here are shown common errors made during virtual channels creation, and how to avoid them.

#### Why are Virtual Channels Implemented?

We usually use sensors to get a measure. Anyway, we could need a way to modify that number because we need either a derived measure (airflow/airspeed) or an expression calculated on more than 1 sensor (dewpoint or  $\Delta_t$  between two zones for instance). We can calculate this with spreadsheet or just let our datalogger do the work.

OM Family has this feature with Virtual Channels.

Virtual Cannels allows operations to be made on a single channel or between channels.

OM group them into Scripts, with a maximum of 5 scripts containing 16 virtual channels each. Each Virtual Channel can handle up to 9 elements (including Virtual Channel beloning to the same script).

New Sc	- Participant			
Name Acquisition		1		
		Default •		
		Crea	ate	
Script	Acq	uisition	Edit	Delete
	DEF	AULT	Edit	Delete
	DEF	AULT	Edit	Delete
	DEF	AULT	Edit	Delete
	DEF	AULT	Edit	Delete
		AULT	Edit	Delete

Figure 63

#### **Scripts**

OM-240 automatically provides the script name during its creation. Acquisition timing can be chosen between 1 second and 7 days, with "DEFAULT" option not overriding OM-240 global acquisition timing.

After selecting "Create" button the new script will be listed below:

Name Acquisition		2		
		Default		
		Creat	e	
Script	Ac	quisition	Edit	Delete
Script_1	DEFAULT		Edit	Delete
	DE	FAULT	Edit	Delete
	DE	FAULT	Edit	Delete
D		FAULT	Edit	Delete
	DE	FAULT	Edit	Delete

Figure 64

Edit button allows the configuration of Virtual Channels contained by the selected Script. As we see in following Figure, OM-240 provides a large toolbox to program Virtual Channels.

New So	n p u			
Name		1		
Acquisition		Default •		
		Crea	ate	
Script	Acq	uisition	Edit	Delete
	DEF	AULT	Edit	Delete
	DEF	AULT	Edit	Delete
	DEF	AULT	Edit	Delete
	DEF	AULT	Edit	Delete
	DEE	AULT	Edit	Delete

Figure 65

		nnel:				
CV1	_	[i=]		· · · ·		1
an	sin	and	ŧ	1	2	3
dig	COS	0ľ	-	4	5	6
mux	tan	XOF	*	7	8	9
CV	pi	not	1		Q	CE
(	)	🗆 Logi	cal		[	с
Add Cance	21					



an: selects an analog channel (prompts a dialog box to input channel number) dig: selects a digital channel (prompts a dialog box to input channel number) mux: selects multiplexer position (prompts two dialog boxes, the 1<sup>st</sup> for channel number, the 2<sup>nd</sup> for mux address)

cv: selects a virtual channel (only those included in the same script, prompts a dialog box for CV number)

Apart from this we have mathematics operations, like +, -, \*, /, sin, cos, tan, pi-value.

Logical operations allow operations between alarms states. Every channel (analog, digital, virtual and mux) provides a checkbox in alarm configuration, VC Alarm with Logical Operations. This enables alarms to be handled by virtual channels.

VC Alarm with Logical Operations		
----------------------------------	--	--

Figure 67

The following Virtual Channel will trigger an alarm only if one of the two channels is in alarm.

Virtual Channel	Delete	Edit	Configure
an(1.A)XORan(2.A)	Cancel	Edit	Config

an(1.A)	an(2.A)	an(1.A) XOR an(2.A)
F	F	F
F	V	V
V	F	V
V	V	F
an(1.A)	an(2.A)	an(1.A) AND an(2.A)
F	F	F
F	V	F
V	F	F
V	V	F
an(1.A)	an(2.A)	an(1.A) OR an(2.A)
F	F	F
F	V	V
V	F	V
V	V	V
an(1.A)	NOT an(1.A)	
F	V	
V	F	

#### Virtual Channel Configuration

By clicking "config" in the Virtual Channel row (Figure 23) the user can edit Identification (channel name) and alarm properties.

Description	Parameters	
Virtual Channel	1	
Identification		
Alarm Type	None	۲
High Threshold	0	
Low Threshold	0	
Derivative Threshold	0	
VC alarm with Logical Operations	Ū	
Skipped	D	

### **Virtual Channel Configuration**

Alarm configuration is the same for all channel types, with High, Low and Derivative Thresholds. VC alarm with Logical Operation is present, as a Virtual Channel alarm can be used in Virtual Channels Logical Alarms.

#### **Common Errors and Warnings**

In order to write Virtual Channel's formula correctly, you should avoid typing the whole formula in the dialog box prompted by the system.

Vlenu	Script Editor
Status     Configuration	This page allows to edit previously created script and create virtual channels. For each virtual channel can be added max. 9 elements: this check is executed pressing "Add" button.
<ul> <li>Channels Configuration</li> <li>O Locals</li> </ul>	Virtual Channel:
• Digitals	CV2
<ul> <li>Digital Inputs</li> <li>Multiplexers</li> </ul>	an sin and + 1 2 3
O Virtuals	
Data Monitor     Advanced	
Auvanceu	mux tan xon * 7 8 9
	Add
	Cancel
	Virtual Channel Delete Edit Configure
	CV1=an(1.A)+an(3.A) Cancel Edit Config
	Back Save



tatus onfiguration	This page allows to edit previously created script and create virtual channels. For each virtual channel can be added max. 9 elements: this check is executed pressing "Add" button.							
hannels Configuration <ul> <li>Locals</li> </ul>	Virtual Channel:							
Digitals     Digital Inputs	CV2							
O Multiplexers	an sin and + 1 2 3							
○ Virtuals Data Monitor	dig cos or - 4 5 6	[object Object] can not be converted in number!						
Advanced	mux tan xor * 7 8 9	Impedisci a questa pagina di aprire ditenti intestre di dialogo						
	cv pi not / . O CE	ок						
	( ) Logical C							
	Add							
	Cancel							
	Cancer							
	Virtual Channel Delete Edit Con	figure						
	CV1=an(1.A)+an(3.A) Cancel Edit Con	ifig						
	Back Save							

Figure 71

As you can see this causes an error.

**Formula has to be written using keys printed on the screen.** The prompt should be used ONLY to write channel number.

The same procedure applies for dig, mux and cv buttons.

Menu • Status • Configuration • Channels Configuration • Locals	Script Editor This page allows to edit previously created script and create virtual channels. For each virtual channel can be added max. 9 elements: this check is executed pressing "Add" button.						
	Virtual Channel:						
<ul> <li>Digitals</li> <li>Digital Inputs</li> </ul>	CV2						
Multiplexers	an sin and + 1 2 3						
Virtuals Ita Monitor	dig cos or - 4 5 6	Position:					
lvanced	mux tan xor * 7 8 9	Impedisci a questa pagina di aprire ulteriori finestre di dialogo					
	cv pi not / . O CE						
	() I Logical C	OK Annulla					
	Add						
	Cancel						
	Cancer						
	Virtual Channel Delete Edit Configure						
	CV1=an(1.A)+an(3.A) Cancel Edit Config						
	Back Save						

Figure 72

## **Script Editor**

This page allows to edit previously created script and create virtual channels. For each virtual channel can be added max. 9 elements: this check is executed pressing "Add" button.

Virtual Channel:								
CV2	an(1.A)							
an	sin	and	+	1	2	3		
dig	cos	or	-	4	5	6		
mux	tan	xor	*	7	8	9		
cv	pi	not	1		0	CE		
(	)	🗆 Logi	ical		с			
Add								
Can	cel							



**WARNING:** Channel B (1.B, 2.B, and so on) can't be used on Virtual Channels. If you need to use the channel B of a multiaxis sensor, like Voltage 2CH, Vibrating Wire + Thermistor, and all others, you should use 2 separate channels during configuration.

#### **ADVANCED CONFIGURATION**

#### Overview

Advanced parameters are explained in this section.

- •Connection configuration, for Ethernet and 3G modem parameters
- •Measure log transfer, for FTP server configuration
- •Account management, to change account passwords
- •Date and Time, to change timezone or set daytime saving
- •Energy management, to improve power consumption especially if battery powered
- •Information about firmware versions, mac address, bootloader

This section will show how to configure Advanced parameters in the OM-240's web server.

#### Connections

Connection	s Coi	nfigura	ation
is page allows to configure Datalog odem connected to RS-232 port. It's anging the configuration of the Da ply the changes.	also possibile	e to select the port (E	thernet o RS-232
email and FTP port se	nding		
Ethernet (Router)		o	
RS-232 (2G/3G modem	)	0	
Network Card Configu	iration		
MAC Address		00:1E:C0:F1:D1	.79
IP Address		192.168.1.100	.20
Subnet Mask		255.255.255.0	
Default Gateway		192.168.1.1	
DNS			
Preferred DNS Server	0.0.0.0		

Figure 74

This page allows to set network parameters.

In the first block you select which connection will be used by OM-240 to send Email and FTP files.

Network Card Configuration

DHCP Enable: to choose whether or not to use DHCP or specify network parameters

IP Address, Subnet Mask and Default Gateway, DNS Servers addresses depend on network infrastructure.

PN				
PN	2G/3G Modem Param	eters		
ial-up string (ie.*99**1#) 99**1# sername User assword infim Password infim Passw	Baudrate	115200 bps	~	
sername User It2M Password Configuration (Remote Comm. via 2G/3G modem) sername assword onfirm Password NS referred DNS Server D0.0.0	APN			
assword	Dial-up string (ie.*99***	1#) *99***1#		
onfirm Password   Ilow roaming   se modem configuration   IZM Password Configuration (Remote Comm. via 2G/3G modem)  sername  User  assword  onfirm Password  NS  referred DNS Server  D.0.0	Username	User		
Ilow roaming □ se modem configuration □	Password	••••		
Interview of the second sec	Confirm Password	••••		
12M Password Configuration (Remote Comm. via 2G/3G modem)         sername       User         assword       •••••         onfirm Password       •••••         NS       •••••         referred DNS Server       0.0.0	Allow roaming			
sername USer USEr Server D.0.0.0	Use modem configurati	on 🗆		
sername USer USEr Server D.0.0.0				
assword Firm Password Firm Pas	M2M Password Config	guration (Remote Cor	nm. via 2G/3G mo	dem)
onfirm Password  NS  referred DNS Server  D.0.0  D	Username			User
NS referred DNS Server 0.0.0.0	Password			••••
referred DNS Server 0.0.0.0	Confirm Password			••••
referred DNS Server 0.0.0.0			_	
	DNS			
Iternate DNS Server 0.0.0.0	Preferred DNS Server	0.0.0.0	]	
	Alternate DNS Server	0.0.0.0	]	

This settings are related to 3G modem. Parameters are usually provided by telephone operator. **WARNING: Remember to set DNS also on RS232 2G/3G modem.** 

#### Measure log data transfer

## **Sending Measures**

This page allows to configure the parameters for the measure log on an FTP server or MAIL scheduled sending (or in case of alarm). Select the type of protocol to enable measure log sending; if not enabled, if the alarms are configured, will be sent only the alarm. In case of FTP sending failure, Datalogger will send max. 2 delayed acquisition cycles. Selecting "Timed" in the "Energy Management" page in the "Communication Device Power Supply (V OUT)" field the FTP sending could take a few minutes. In "Server" field is highly recommended to insert the domain (i.e 'www.domain.com') and NOT the IP address. In this case, you will need to configure the DNS in the "Network Card Configuration" table in the "Connections" page.

Sending Measures		
Sending Enable:	FTP	-
Sending Frequency:	Daily (8:00 AM)	-

#### **FTP Configuration**

FTP parameters	
Server:	192.168.0.1
Folder (/folder):	/FTPfolder
Username:	admin
Password:	••••
Port:	21
Tries:	1

Supported protocols: FTP

Save Changes

Figure 76

This page contains data transfer settings.

Sending Measure block allows to choose the way to send data:

None: no data transfer

Email: data will be transferred via email

FTP: data will be transferred via FTP

FTP Configuration block contains the configuration to create an FTP connection with a user's server.

#### Account Management

Account Management
This page allows to change Datalogger access credentials and language. Language can be changed filling the "Old Pa ssword field and leaving "New Password" and "Confirm New Password" fields blank.
Account:
Admin
Old Password:
New Password:
Confirm New Password:
English
Save Changes

Figure 77

Here it is possible to change the passwords for User and Admin accounts, and to change web language.

#### Date and Time

Date and Time Setting
This page allows to set Datalogger date and time.
Date (dd/mm/yy):
30 / 06 / 17
Hours (hh:mm):
16 : 42
Timezone
(GMT +1:00 hour) Brussels, Copenhagen, Madrid, Paris ▼ ✓ Daylight saving time
Save Changes Cancel
Synchronize with PC

Figure 78

In this screen it's possible to change date, hour and Timezone.

## **Energy Management**

This page allows Datalogger and communication devices energy management. The communication device are powered from Datalogger on "V OUT". Selecting "Timed" in "Datalogger (Switch On)" field, Datalogger will work in energy saving mode. Selecting "Timed" in "Communication Device Power Supply (V OUT)" field the communication device will be powered only when necessary (acquisition sending, alarm notification); in case is "Always ON" is selected at 00:00 the power will be cut of for a few seconds to allow the reset of the device. NOTE: After changing "Datalogger (switch on)" and/or "Comunication Device Power Supply (V OUT)" a reboot is required to apply the changes

Datalogger (Switch On):
Always on
Communication Device Power Supply (V OUT):
Always On
Display Timeout [min]:
1
Logout (for Always ON and Timed) and LAN Switch Off (only for Timed) [min]:
30
Save Changes Cancel

Figure 79

This page is about Energy Management.

OM-240 can work in 2 modes:

Always On: the datalogger does not turn off itself to save energy, Ethernet connection is available.

Timed: The datalogger turns off itself, waking up few minutes before acquisition starting. VOUT port can be kept always on, or timed.

#### Info

This page contains information about firmware, web, bootloader and model. Note this parameters in case of assistance enquiry.

#### **CHARTS**

#### **Overview**

OM240 is provided with a simple tool to generate Charts. It's available on request and need to be activated with a Purchased Key. Contact your dealer for more information. It's possible to export data and save charts as pdf, png or vector files.

#### Activation

In order to activate charts, you have to buy a key from dealer. Load Data Monitor -> Charts page and insert the key in the right field and click Submit button.

ence Required.			
Description	Command		
Status	Exported		
Chart configuration	Configure chart		
Saved charts selection	DEMO  Plot Chart Delete chart		
		1	
ease insert license key:	73 87 33 58 36 97 Submit	1	

#### Setup and Use

From the Web Server pages go in "Data Monitor" and then click "Charts". This screen will be loaded.

Datalogger	Charts
his page allows to print charts data.	
Description	Command
Status	Exported
Chart configuration	Configure chart
Saved charts selection	Plot Chart     Delete chart
	,

#### Figure 28

No chart is available at this time, and we need to create one.

Click on "Configure chart" to proceed.

The next screen will ask for Start and Stop date, and you will need a Logarithmic scale (Log scale check) to allow different unit channels to fit the same chart and be readable.

81

Description	Parameters		
Start date	2017/06/29 16:55	Stone age	
Stop date	2017/06/30 16:55	Now	
Log scale	Г		
puit		Next	

Figure 82

Click Next to proceed.

Sensor select screen allows channels selection, so you choose which channel(s) you want to include in the chart. One or more sensors should be selected to go further on.

Axis selection create up to 3 vertical axis related to that channel. If different scales are presents, this solves readability troubles.

Configuration Chart to Plot - Mozilla Firefox			
() 192.168.1.169/code/inputchartform.html			🦗 🔫 🔒 🗸
Sensor select This page allows to select sensors to plot. Analog			
Plottable sensors	Sensors to plot	Axis selection	Color Marker
AN_0002_A AN_0003_A	AN_0001_A	axis 1 💌	F
	_		ß
Back	Next		

Figure 83

Color window let the user select the color of that channels. A full palette is available.

Configuration Chart to Plot - Mozilla Firefox 192.168.1.169/code/inputchartform.html			
Sensor select This page allows to select sensors to plot. Analog Mux 1 Plottable sensors	Sensors to plot	Axis selection Color	Marker
AN_0002_A AN_0003_A	AN_0001_A	axis 1 💌	E
	0	R 50‡	
		B 199≎ # 3289c7	
Back	Next		

Figure 84

Marker checkbox, will put markes points on the charts as shown here (AN\_0001 has Marker checked, other channels instead do not).





Click Next to go on last configuration screen. Here it is possible to choose Chart's Title, Subtitle, Description and Name.

92.168.1.169/code/inputcharttitle	num	# +
Title/subtitle This page allows to configure	a chart title or subtitle.	
Description	Values	
Chart title	Test chart	
Chart subtitle	chart subtitle	
Chart description	Chart used for demo purpose	
Chart Name (required)	DEMO	
Back	Plot data	
buck	The data	

#### Figure 86

Click "Plot data" to load the chart.

🙆 DEHO - Mozilla Fi	rcfox				
192.168.1.169/	nde/pintungwinduw.html?23				1 - OF
			Test chart		<b></b>
			chart subtitle		12
	Zoom				
	Abom				
		$\wedge$			- AN_0001_A (A1)
-14.8					
			× · · · · · · · · · · · · · · · · · · ·		
=14.9					
(14.9 S					
-15					$\sim$
			$\sim$		
-15.1					
-12.3	15:53:00 15:53:30 15	54:00 15:54:30 15:55:00	15:55:30 15:56:00	15:55:30 15:57:00 15	57-30
			Time		
	4				
autoupdate:	update				



From this screen it's possible to print or download the chart:



Figure 88

You can now select the new chart from "Saved charts selection" and Plot every time you need. It can be autoupdated after every new acquisition event by checking autoupdate flag, or manually updated with "update" button, in bottom left area of the window.

Description	Command	
Status	Exported	
Chart configuration	Configure chart	
Saved charts selection	DEMO  Plot Chart Delete chart	

Figure 89

## **MODBUS TCP (SCADA INTEGRATION)**

#### Overview

Modbus ADU (application data unit) is sent in form of TCP packets. All Modbus TCP ADU are sent via TCP to registered port 502.

Modbus over TCP allows OM-240 integration in LabVIEW and SCADA systems. By reading holding registers, it's possible to gather all sensors data (analog, smartmodbus, multiplexers, digital inputs), events and alarm, datalogger status and information.

- It's possible to read sensor's alarm status.
- By integrating OM-240 in a SCADA, industrial plant remote monitoring and logging are possible without the need on-site visits.

• Maintenance costs are reduced through centralized control and monitoring to minimize downtime.

- Centralized alarms to improve operational effectiveness.
- Data could be available in mobility (depending on used SCADA).

#### COMMUNICATION

#### **Communication Bus**

Communication bus for this module is **Ethernet** interface.

Port used for **TCP** communication is **502** (**Modbus TCP Standard Port**) Modbus function to use for registry reading is **ReadHoldingRegister**.

#### **Measure Register**

For each sensor (analogs, digitals, multiplexers and virtual channels), 16 registers will be exported. Input A's last acquired measure (Offset 0-1), input b (Offset 2-3), sensor's temperature (Offset 4-5), Acquisition's timestamp (Offset 6-7-8-9-10-11-12-13-14) and different flags to show acquisition status and alarm status (Offset 15).

Measures will be communicated in float IEEE754 standard.

Endialess can be user configured by writing 0-1-2-3 values into configuration register at 0x5000 address.

Following table will represent 4 endianless configurations: IEEE754 = AA:BB:CC:DD AA = MSB DD = LSB Configuration=0 (default)

AA	BB	CC	DD
MSB Modbus address 0	LSB Modbus address 0	MSB Modbus address 1	LSB Modbus address 1

#### Configuration=1

BB	AA	DD	CC
MSB Modbus address 0	LSB Modbus address 0	MSB Modbus address 1	LSB Modbus address 1

#### Configuration=2

CC	DD	BB	AA
MSB Modbus address	LSB Modbus address 0	MSB Modbus address	LSB Modbus address 1
0		1	

#### Configuration=3

DD	CC	AA	BB
MSB Modbus address 0	LSB Modbus address 0	MSB Modbus address 1	LSB Modbus address 1

#### **Timestamp details**

Timestamp is composed by 9 registers, with offset 6 (MSB) to 15 (LSB). Timestamp is an ASCII string 18 bytes long, in the following format: "dd/mm/yy hh:mm:ss"

#### Flag's Register

Flag's register is mapped as it follows:

BIT	Content
0	Sensor acquired
1	A valid Input
2	B valid Input
3	Valid Temp input
4	A alarm Input
5	B alarm Input
6	Temp alarm Input

#### **Sensor Acquired**

This register is set to 1 when sensor is acquired and a new data is available. SCADA (or Modbus Master) reads the updated register and reset it to 0 by using Coils Functions. In this way the system is ready to note the presence of a new acquisition.

This BIT is also accessible through read/write coils functions.

Coils are mapped on flag "Sensor Acquired" having referral to base address of each sensor.

To obtain Coil address of a sensor, Use the following formula:

Coil Address = Base Address /10

Base Address computation will be shown in next pages.

#### **Example 1**

Channel: CH4 Base Address: 30 Coil Address: 3

#### Example 2

Channel: DIG2 Base Address: 90

Coil Address: 9

By using Coil functions, Modbus Master will be able to read the entire Coil Vector (858 sensors) in a single Modbus transaction, to understand acquired sensors and to read only updated measures, without the need to read the 10 registers block every time.

#### Input X Valid

It indicates if matching Inputs are valid or not. If sensor is configured as Volt 1CH, registers status will be:

- Input A Valid: 1
- Input B Valid: 0
- Input temp Valid: 0

For a digital single channel sensor, registers status will be:

- Input A Valid: 1
- Input temp Valid: 1
- Input B Valid: 0

#### **Input X Alarm**

It indicates if matching inputs are in alarm.

#### **REGISTER MAP**

#### General

All this registers are read-only. Only "Sensor Acquired" BIT is read-write, using Write single/multiple coils.

#### **Analog Sensors Locations**

Register Address (dec)	Description	Sensor
0-1	MSB-LSB Input A LOCAL CH1	CH1
2-3	MSB-LSB Input B LOCAL CH1	CH1
4-5	MSB-LSB Temperature LOCAL CH1	CH1
6-14	Timestamp acquisition LOCAL CH1	CH1
15	Flags LOCAL CH1	CH1
16-17	MSB-LSB Input A LOCAL CH2	CH2
18-19	MSB-LSB Input B LOCAL CH2	CH2
20-21	MSB-LSB Temperature LOCAL CH2	CH2
22-30	Timestamp acquisition LOCAL CH2	CH2
31	Flags LOCAL CH2	CH2
112-113	MSB-LSB Input A LOCAL CH8	CH8
114-115	MSB-LSB Input B LOCAL CH8	CH8
116-117	MSB-LSB Temperature LOCAL CH8	CH8
118-126	Timestamp acquisition LOCAL CH8	CH8
127	Flags LOCAL CH8	CH8

## Digital Sensors Locations

BASE_DIG+0 -	MSB-LSB Input A DIGITAL 1	DIG1
BASE_DIG+1	MSB-LSD linput A DIOTTAL 1	DIGI
BASE_DIG+2 -	MCD I CD Input D DICITAL 1	DICI
BASE_DIG+3	MSB-LSB Input B DIGITAL 1	DIG1

BASE_DIG+2 - BASE_DIG+3	MSB-LSB Input B DIGITAL 1	DIG1
BASE_DIG+4 - BASE_DIG+5	MSB-LSB Temperature DIGITAL 1	DIG1
BASE_DIG+6 - BASE_DIG+14	Timestamp acquisition DIGITAL 1	DIG1
BASE_DIG+15	Flags DIGITAL 1	DIG1
BASE_DIG+4048 - BASE_DIG+4049	MSB-LSB Input A DIGITAL 254	DIG254
BASE_DIG+4050 - BASE_DIG+4051	MSB-LSB Input B DIGITAL 254	DIG254
BASE_DIG+4052 - BASE_DIG+4053	MSB-LSB Temperature DIGITAL 254	DIG254
BASE_DIG+4054 - BASE_DIG+4062	Timestamp acquisition DIGITAL 254	DIG254
BASE_DIG+4063	Flags DIGITAL 254	DIG254

## **Multiplexers Sensors Locations**

BASE_MUX+0 - BASE_MUX+1	MSB-LSB Input A MUX 1- CH1	MUX1 - CH1
BASE_MUX+2 - BASE_MUX+3	MSB-LSB Input B MUX 1- CH1	MUX1 - CH1
BASE_MUX+4 - BASE_MUX+5	MSB-LSB Temperature MUX 1- CH1	MUX1 - CH1
BASE_MUX+6 - BASE_MUX+14	Timestamp acquisition MUX 1- CH1	MUX1 - CH1
BASE_MUX+15	Flags MUX 1- CH1	MUX1 - CH1

BASE_MUX+496 - BASE_MUX+497	MSB-LSB Input A MUX 1- CH32	MUX1 - CH32
BASE_MUX+498 - BASE_MUX+499	MSB-LSB Input B MUX 1- CH32	MUX1 - CH32
BASE_MUX+500 - BASE_MUX+501	MSB-LSB Temperature MUX 1- CH32	MUX1 - CH32
BASE_MUX+502 - BASE_MUX+510	Timestamp acquisition MUX 1- CH32	MUX1 - CH32
BASE_MUX+511	Flags MUX 1- CH32	MUX1 - CH32
BASE_MUX+512 - BASE_MUX+513	MSB-LSB Input A MUX 2- CH1	MUX2 - CH1
BASE_MUX+514 - BASE_MUX+515	MSB-LSB Input B MUX 2- CH1	MUX2 - CH1
BASE_MUX+516 - BASE_MUX+517	MSB-LSB Temperature MUX 2- CH1	MUX2 - CH1
BASE_MUX+518 - BASE_MUX+526	Timestamp acquisition MUX 2- CH1	MUX2 - CH1
BASE_MUX+527	Flags MUX 2- CH1	MUX2 - CH1
	MUX3	MUX3
	MUX4	MUX4

	MUX15 CH1	MUX15 - CH1
BASE_MUX+8176 - BASE_MUX+8177	MSB-LSB Input A MUX_16 - CH_32	MUX16 - CH32
BASE_MUX+8178 - BASE_MUX+8179	MSB-LSB Input B MUX_16 - CH_32	MUX16 - CH32
BASE_MUX+8180 - BASE_MUX+8181	MSB-LSB Temperature MUX_16 - CH_32	MUX16 - CH32
BASE_MUX+8182 - BASE_MUX+8190	Timestamp acquisition MUX_16 - CH_32	MUX16 - CH32
BASE_MUX+8191	Flags MUX_16 - CH_32	MUX16 - CH32

## **Digital Inputs Locations**

BASE_DIN+0 - BASE_DIN+1	MSB-LSB Input A DigIn1	DigIn1
BASE_DIN+2 - BASE_DIN+3	MSB-LSB Input B DigIn1	DigIn1
BASE_DIN+4 - BASE_DIN+5	MSB-LSB Temperature DigIn1	DigIn1
BASE_DIN+6 - BASE_DIN+14	Timestamp acquisition DigIn1	DigIn1
BASE_DIN+15	Flags DigIn1	DigIn1
BASE_DIN+16 - BASE_DIN+17	MSB-LSB Input A DigIn2	DigIn2
BASE_DIN+18 - BASE_DIN+19	MSB-LSB Input B DigIn2	DigIn2
BASE_DIN+20 - BASE_DIN+21	MSB-LSB Temperature DigIn2	DigIn2

#### **Virtual Channels Locations**

BASE_DIN+22 - BASE_DIN+30	Timestamp acquisition DigIn2	DigIn2
BASE_DIN+31	Flags DigIn2	DigIn2
BASE_VIRT+0 - BASE_VIRT+1	MSB-LSB Input A Script1 Ch1	Script1 - Ch1
BASE_VIRT+2 - BASE_VIRT+3	MSB-LSB Input B Script1 Ch1	Script1 - Ch1
BASE_VIRT+4 - BASE_VIRT+5	MSB-LSB Temperature Script1 Ch1	Script1 - Ch1
BASE_VIRT+6 - BASE_VIRT+14	Timestamp acquisition Script1 Ch1	Script1 - Ch1
BASE_VIRT+15	Flags Script1 Ch1	Script1 - Ch1
BASE_VIRT+16 - BASE_VIRT+17	MSB-LSB Input A Script1 Ch2	Script1 - Ch2
BASE_VIRT+18 - BASE_VIRT+19	MSB-LSB Input B Script1 Ch2	Script1 - Ch2
BASE_VIRT+20 - BASE_VIRT+21	MSB-LSB Temperature Script1 Ch2	Script1 - Ch2
BASE_VIRT+22 - BASE_VIRT+30	Timestamp acquisition Script1 Ch2	Script1 - Ch2
BASE_VIRT+31	Flags Script1 Ch2	Script1 - Ch2
BASE_VIRT+1264 - BASE_VIRT+1265	MSB-LSB Input A Script5 Ch16	Script5 - Ch16
BASE_VIRT+1266 - BASE_VIRT+1267	MSB-LSB Input B Script5 Ch16	Script5 - Ch16
BASE_VIRT+1268 - BASE_VIRT+1269	MSB-LSB Temperature Script5 Ch16	Script5 - Ch16

BASE_VIRT+1270 - BASE_VIRT+1278	Timestamp acquisition Script5 Ch16	Script5 - Ch16
BASE_VIRT+1279	Flags Script5 Ch16	Script5 - Ch16

#### **SENSORS BASE ADDRESS**

Following formulas will show how to get every connected sensor's base address.

#### Local Sensors (Analog)

BASE\_ANALOG = 0 Channel\_ADDRESS = (Channel-1)\*16 + BASE\_ANALOG 8CH Channel = [1;8] 24CH Channel = [1;24]

#### **Digital Sensors (Smart Modbus)**

 8CH
 24CH

 B A S E 128
 384

 DIG
 384

Channel\_ADDRESS = (Channel-1)\*16 + BASE\_DIG Channel = [1;254]

#### **Multiplexer Sensors**

 8 CH
 24 CH

 BASE\_MUX
 4224
 4480

Channel\_ADDRESS = ((Address-1)\*32\*16)+((Channel-1)\*16)+BASE\_MUX Address = [1;16], Channel = [1;24]

#### **Digital Inputs**

	8 CH	24 CH
BASE_DIN	12416	12672

Channel\_ADDRESS = ((Channel-1)\*16) + BASE\_DIN Channel = [1;2]

#### **Virtual Channels**

	8 CH	24 CH
BASE_VIRT	12448	12704

Channel\_ADDRESS = ((Script-1)\*16\*16)+((Channel-1)\*16)+BASE\_VIRT Script = [1;5], Channel = [1;16]

#### **Event Log Registers**

This register set handles Event Log status. For every log, timestamp, and code is exposed. This register set starts at Modbus address 0x3800 (14336 DEC).

Register	Description	
14336 - 14344	Timestamp Event n	Event n
14346	Event Code n	Event n
14347-14410	Event String n	Event n
14411 – 14419	Timestamp Event n-1	Event n-1
14421	Event Code n -1	Event n-1
14422-14485	Event String n -1	Event n-1
15816 - 15824	Timestamp Event n -19	Event n-19
15826	Event Code n -19	Event n-19
15827-15890	Event String n -19	Event n-19

#### **STATUS REGISTERS**

This register exposes information about the datalogger. Base Address for this register is 0x4000 (16384 DEC)

It can be read in every way, as there is no bond on alignments or number of registers to read.

Register (dec)	Description
16384	Datalogger status
16385	Next acquisition MSB
16386	Next acquisition
16387	Next acquisition LSB
16388	Firmware version MSB
16389	Firmware version LSB
16390	Model info 1
16391	Model info 2
16392	Model info 3
16393	Model info 4
16394	Model info 5
16395	Model info 6
16396	Model info 7
16397	Model info 8
16398	Model info 9
16399	Model info 10
16400	Model info 11
16401	Model info 12
16402	Serial number 1
16402	Serial number 2
16403	Serial number 3
16404	Serial number 4
16405	Device name 1
16406	Device name 2
16407	Device name 3
16408	Device name 4
16405	Device name 5
16406	Device name 6
16407	Device name 7
16408	Device name 8
16409	External digital input status (LSB) + External digital output status (MSB)

#### **Datalogger Status**

This register contains datalogger status.

<b>Register Value</b>	Description
1	Ready
2	Run
3	Stop
4	Configuration
5	Alarm
6	Diagnostic
7	Error
8	Backup

#### **Next Acquisition**

This register, composed by 48 bits, exposes next acquisition's timestamp, when the datalogger acquires the next sensor.

Bit	Description
0-5	Seconds (0-59)
6-11	Minutes (0-59)
12-16	Hours (0-23)
17-21	Day (1-31)
22-25	Month (1-12)
26-32	Year (0-99)
33-47	Reserved

#### **Firmware Version**

These two registers, composed in the format A.B.CD, expose firmware version loaded on the datalogger

Register	Bits	Description
Firmware version MSB	15-8	А
Firmware version MSB	7-0	В
Firmware version LSB	15-8	С
Firmware version LSB	7-0	D

Letters A, B and C, contain binary value of versions (values from 0 to 99).

Letter D contains, if present, ASCII value of alphanumeric character that could be present at the end of the version string to identify special firmwares. If D is not present, its value will be 0.

#### Model Info

This register, when chained, forms a 24 character string to identify configured datalogger model.

Chaining should be executed starting from Model info 1 to Model info 12 registers.

Exam	ole:

Model info 1 MSB	Model info 1 LSB	Model info 2 MSB	Model info 2 LSB	Model info 3 MSB	Model info 3 LSB
М	А	Х	L	0	G

#### **Serial Number**

This register, when chained, forms an 8 characters long string to identify datalogger's serial number. Chaining should be executed starting from Serial Number 1 to Serial Number 4 registers.

#### Example:

Serial num. 1	Serial num. 1	Serial num. 2	Serial num. 2	Serial num. 3	Serial num. 3	Serial num. 4	Serial num. 4
MSB	LSB	MSB	LSB	MSB	LSB	MSB	LSB
1	5	2	1	4	7	9	6

#### **Device Name**

This register, when chained, forms a 16 characters string which represents datalogger's name. Chaining must be executed starting from Device name 1 register to Device name 8 register.

Example of Device n	ame register's ch	aining (Device n	ame: Bridge_1)

Device nat	me Device name 1	Device name 2	Device name 2	Device name 3	Device name 3	Device name	Device name
1 MSB	LSB	MSB	LSB	MSB	LSB	4 MSB	4 LSB
В	r	i	d	g	e	_	1

#### External digital input/outputs status

This register contains digital input/output current status.

#### MSB

It contains external digital output status

#### LSB

It contains external digital input status

<b>B15</b>	<b>B14</b>	B13	B12	B11	<b>B10</b>	<b>B9</b>	<b>B8</b>	<b>B7</b>	<b>B6</b>	<b>B5</b>	<b>B4</b>	<b>B</b> 3	<b>B2</b>	<b>B1</b>	<b>B</b> 0
#	#	O6	O5	O4	O3	O2	O1	#	#	I6	I5	I4	I3	I2	I1

## TROUBLESHOOTING

In case of OM-240 malfunctioning or irregular behavior, read the following pages and carry out the indicated attempts before contacting our Assistance Department.

#### **BASIC TROUBLESHOOTING**

This paragraph provides basic OM-240 troubleshooting tips.

#### ARE YOU UP-TO-DATE?

- 1. Verify that you installed the last version of firmware
- 2. Verify that you have an adequate power supply (from photovoltaic module or external power supply) on the V IN clamp of the OM-240; check if the voltage is within the range accepted by the OM-240 and stable.

#### IF THE OM-240 DOESN'T TURN

**ON.** Follow this step, testing after each:

- 1. remove power supply on V IN clamp for 10 seconds and try to reconnect.
- 2. verify the presence of jumper cables on the "PWR CONFIG" clamp
- 3. control that the power supply system works, is correctly sized and respects the character-istic declared on datasheet
- 4. make sure you hadn't set the OM-240 in Timed mode using the webpage "Energy management"

NOTE: if on the display appears TELNET MODE, contact directly OMEGA Assistancetechnical support for assistance.

#### IF THE OM-240 DISPLAY STOPS RESPONDING

Follow this step, testing after each:

1. remove power supply on V IN clamp for 10 seconds and try to reconnect.

#### IT IS IMPOSSIBLE TO UPLOAD THE CONFIGURATION

Follow this step, testing after each:

- 1. on webpage STATUS verify that the OM-240 is in "Config"
- 2. make sure that the configuration you are trying to upload has been created with the same major release of the firmware on the OM-240.

NOTE: if what is written above is correct, the configuration file could be damaged. In this case, the OM-240 warns with an error message and the file is no more usable. We suggest to repeat the configuration.

#### IF THE OM-240 STOPS DURING AN ACQUISITION

Follow this step, testing after each:

- 1. verify the events log and refer to manual "Codes Alarms-Events" to understand the eventual logs
- 2. verify that the OM-240 is correctly supplied. If the power supply is below the minimum threshold or over the maximum threshold of power supply, the OM-240 blocks every activity in progress;
- 3. verify the alarm log to identify the problem and refer to manual "Codes Alarms-Events" to understand the eventual logs
- 4. Verify if in alarm logs there is an "overcurrent" error. In case of overcurrent, the OM-240 stops the acquisition.
- 5. verify the available memory. In case of full memory, the OM-240 stops the acquisition.

#### IT IS IMPOSSIBLE TO HAVE ACCESS TO SYS MENU

Follow this step, testing after each::

1. verify that the OM-240 is not acquiring. In this case, wait until the end of the acquisition or go in "DL" menu and select "Stop DL"

#### IT IS NOT POSSIBLE TO DOWNLOAD DATA ON USB FLASH-DRIVE

Follow this step, testing after each:

- 1. verify that the USB flash-drive is formatted in FAT32;
- 2. verify with the PC that the USB flash-drive is read without any errors.
- 3. try with a different USB flash-drive

#### LOCAL/REMOTE COMMUNICATION

This paragraph provides OM-240 local communication (from PC through a LAN cable) and remote communication (from PC through internet) troubleshooting tips.

#### ARE YOU UP TO DATE?

- 1. Verify that you installed the last version of firmware
- 2. Verify that you have the correct power supply (from photovoltaic module or external pow-er supply) on the V IN clamp of the OM-240

#### IF YOU ARE NOT ABLE TO ESTABLISH THE CONNECTION WITH THE OM-240.

Follow this step, testing after each:

- 1. remove the power supply on V IN clamp for 10 seconds and try to reconnect.
- 2. reboot the PC and try to connect
- 3. make sure you configured appropriately the network card of the PC, that is it is part of the same subnet mask of the OM-240.
- 4. make sure you are using the correct LAN cable according to the type of network you chose.
- 5. make sure the OM-240 is not configured in "Timed". In this case the network card remains switched off. It is necessary to turn it on manually from SYS menu.
- 6. make sure the OM-240 is not used by another user. The OM-240 accepts only one connec-tion at a time.
- 7. make sure that the last user that logged on the OM-240 had logged out. Otherwise, it is necessary to wait until the automatic log out. This happens after the time configured in page "Energy management" has passed. You could also reboot the OM-240, in order to not wait for the log out.
- 8. in case of use of remote communication devices (ex: HSPA router connected to the OM-240), remove them and do a test of direct connection between PC and the OM-240. This is neces-sary in order to exclude problems with communication interfaces.

## **IF USER CANNOT HAVE ACCESS TO THE OM-240 WITH AN USER** Follow this step, testing after each:

- 1. make sure that the access credentials are correct
- 2. if you logged out with a n user and you are trying to enter again with a different user, delete the browser cache, close and re-open the browser (some browsers are configured in order to memorize passwords)
- 3. make sure that the last user that logged on the OM-240 had logged out. Otherwise, it is necessary to wait until the automatic log out. This happens after the time configured in page "Energy management" has passed. You could also reboot the OM-240, in order to not wait for the log out.
- 4. in case of use of remote communication devices (ex: HSPA router connected to OM-240), remove them and do a test of direct connection between PC and OM-240. This is necessary in order to exclude problems with communication interfaces.

#### THE CONNECTION TROUGH THE OM-240 AND COMPUTER GOES

**DOWN.** Follow this step, testing after each:

- 1. be sure that your PC is not set on Energy Saving mode
- 2. Try to change the LAN cable
- 3. Try using another LAN port of your PC or using another PC
- 4. verify that the OM-240 is not in Timed mode. In this case, once ended the timeout time configured in webpage "Energy management", the network card turns off if there isn't any data exchange.

#### **E-MAIL SENDING**

#### ARE YOU UP TO DATE?

- 1. Verify that you installed the last version of firmware
- 2. Verify that you have the correct power supply (from photovoltaic module or external pow-er supply) on the V IN clamp of the OM-240

This paragraph provides OM-240 e-mail sending troubleshooting tips.

# THE E-MAIL TRANSMISSION INVOLVES DIFFERENT DEVICES. IN THIS DOCUMENT, WE TRY TO DETERMINE WHICH DEVICE COULD CAUSE THE PROBLEM AND THEN WE TRY TO SOLVE IT.

The "system" is composed as follows:

- 1. OM-240
- 2. Internet Service Provider (ISP): allows the communication between OM-240 and the e-mail server
- 3. E-mail Server (ESP): allows to send and to receive e-mails

## NOTE: it may be that the ISP (Telecom, Vodafone, AT&T, Verizon, etc.) doesn't coincide with the ESP (Gmail, AOL, etc.) Resolution

#### FIRST OF ALL, INSURE WITH YOUR IPSP THAT:

- 1. The SIM card or your network is enabled to the internet
- 2. The e-mail transmission is allowed on the used APN or on the used network

#### SECONDLY, INSURE WITH YOUR ESP THAT:

- 1. there are no momentary breakdowns on ESP server
- 2. the username and password of your e-mail account are valid and accepted
- 3. that the e-mail account you want to use is active

#### THESE POINTS DO NOT DEPEND ON OMEGA ENGINEERING AND NEED TO BE RESOLVED THROUGH YOUR ISP OR ESP.

If you don't have any problem with the ISP and the ESP, you could proceed looking for causes on the OM-240.

#### IF THE OM-240 DOESN'T SEND ANY E-MAIL ALTHOUGH IT IS

**CONFIGURED.** Follow this step, testing after each:

- 1. verify the events log and refer to manual "Codes Alarms-Events" to understand eventual logs
- 2. verify that the SIM is properly inserted in its slot into the communication device (HSPA router or 2G modem) or that your network devices are properly configured to permit the e-mail sending (firewall, port, etc)
- 3. verify that you inserted your SMTP server account correctly ("SMTP Server Configuration" page)
- 4. verify that the SMTP account is a simple authentication. The OM-240 doesn't support SSL.
- 5. If you use a communication device base on mobile network, verify that there is a mobile coverage (according to the adopted technology e.g: 2G, 3G or 4G) on the site where the OM-240 is installed.
- 6. If you use a 2G (GSM/GPRS) modem, verify that there is a good 2G signal where the OM-240 is installed. In some place there is only a 3G or 4G coverage. 2G modem is not compatible with 3G, 4G and CDMA networks.

#### FTP SERVER SENDING DATA

#### ARE YOU UP-TO-DATE?

- 1. Verify that you installed the last version of firmware
- 2. Verify that you have the correct power supply (from photovoltaic module or external pow-er supply) on the V IN clamp of the OM-240

#### THIS PARAGRAPH PROVIDES FTP SERVER SENDING DATA TROUBLESHOOTING TIPS.

The FTP transmission involves different devices. In this document, we try to determine which device could cause the problem and then we try to solve it.

The "System" is composed as follows:

- 1. OM-240
- 2. Internet Service Provider (ISP): allows the communication between the OM-240 and FTP server
- 3. server FTP: physical space in which it is possible to memorize files

# NOTE: the FTP server could be completely transferred to societies that offer an hosting FTP service. It could also be internal. In this second case, you have to ask for information to your IT manager.

#### FIRST OF ALL, INSURE WITH YOUR ISP THAT:

- 1. The SIM card or your network is enabled to the internet traffic through APN
- 2. The data transmission on FTP server is allowed on the used APN or on the used network

# INSURE WITH YOUR SYSTEM ADMINISTRATOR OR WITH THE SOCIETY THAT SUPPLIES THE HOSTING FTP SERVICE THAT:

- 1. there are no momentary breakdowns on FTP server
- 2. the username and password of FTP account are valid and accepted
- 3. the FTP account and the same FTP server that will be used are active

#### THESE POINTS DO NOT DEPEND ON OMEGA ENGINEERING AND NEED TO BE RESOLVED THROUGH YOUR ISP OR ESP

If you don't have any problem with the ISP and the FTP server, you could proceed looking for causes on the OM-240.

IF THE OM-240 DOESN'T SEND ANY DATA ON FTP SERVER ALSO IF CONFIGURED.
Follow this step, testing after each:

- 1. verify the events log and refer to manual "Codes Alarms-Events" to understand the possible logs
- 2. if you use a HSPA router or 2G modem verify that the SIM card is properly inserted in its slot.
- 3. verify that you have inserted your FTP server account correctly ("Measure log data transfer" page)
- 4. verify that the FTP server is a basic authentication FTP (for example not MD5, KERBEROS etc.) and that doesn't utilize any secure layer (for example SSH/SSL, FTPS/SFTP etc.). The OM-240 does not support secure layer and encrypted authentication (encrypted username and password).
- 5. if you use a mobile device, verify that there is a good coverage on the site were the OM-240 is installed.
- 6. if you use 2G (GSM/GPRS) modem, verify that there is a good 2G (GSM/GPRS) signal on the site were the OM-240 is installed. In some place there is only a 3G or 4G coverage.2G modem is not compatible with 3G, 4G and CDMA networks .

# MEASURE

### ARE YOU UP-TO-DATE?

- 1. Verify that you installed the last version of firmware
- 2. Verify that you have the correct power supply (from photovoltaic module or external pow-er supply) on the V IN clamp of the OM-240

This paragraph provides measure instruments troubleshooting tips.

### ONE OR MORE VIBRATING WIRE INSTRUMENTS ARE NOT READ.

Follow this step, testing after each:

- 1. verify the events log and refer to the manual "Codes Alarms-Events" to understand the eventual logs;
- 2. verify the instrument with a portable OM-240;
- 3. verify the connection of instruments on the OM-240 inputs;
- 4. change the parameters "Excitation time" (accepted values from 5 to 100) and "Delay Time" (accepted values from 20 to 100) focusing on this last one;
- 5. try to contract the parameters "Start Frequency" and "End Frequency" according to the value read with the portable OM-240,
- 6. consult the reference manual of the instrument

### ONE OR MORE ANALOG INSTRUMENTS ARE NOT READ.

Follow this step, testing after each:

- 1. verify the events log and refer to the manual "Codes Alarms-Events" to understand the eventual logs;
- 2. verify the instrument with a portable OM-240;
- 3. verify the connection of instruments on the OM-240 screw clamps;
- 4. verify that the configured parameters are coherent and correct according to the type of connected instrument (power supply, warm-up time etc)
- 5. consult the reference manual of the instrument

# APPENDIX

# **APPENDIX A: WIRING SCHEMES**

This appendix will show how to connect different sensor types to OM-240 datalogger. Connection schemes are sorted by number of wires (2,4,6 wires).

# **2 WIRES SENSORS**

Current Loop 2 Wires





# 4..20mA Transmitter (External Supply)



### Servo Uni Axial (External Supply)



### Thermistor



Figure 119

# Thermocouple



### Vibrating Wire



# Voltage (External Supply)



### 4 Wires

### 4..20 Transmitter



# 4..20 Transmitter 2 channel (External Supply)



#### Sensor: 4-20mA Current Loop (2 wires) - DOUBLE -Wires on Multiplexer: 4 Sensor: 4-20mA Current Loop (2 wares) - DOUBLE - External Review Barghly. Wires on Multiplexer: 4 TERMINAL BOARD TERMINAL BOARD CH1-24 CH1~24 T ALEAVE METHWARTED Senso CH.B CHA CHA CH.B - LOOP CHA LOOP CHA -LÓOP CHB - LÓOP CHÂ The scheme, shows the connection on channels 1 and 2 of the fust terminal board. The connection's repeatable for all channels of the multiplexer board. The scheme shows the connection on channels 1 and 2 of the first terminal board. The connection is repeatable for all channels of the multiplexer board. 27

# Current Loop 2 Channels (Internal and External Supply)



### Potenziometer 4 Wires



# Potenziometer (2 Channel)



# PT100/PT200/PT500/PT1000



# Ratiometric (External Supply)



### Servo BiAxial (External Supply)



# Vibrating Wire with Thermistor (NTC)



# Voltage









### Wires

2..40mA Transmitter 2 channels



### Ratiometric



### Servo Biaxial



Figure 136

### Servo UniAxial (5 Wires)



### Voltage 2 channel



# MAINTENANCE

In the event that you need after-sale calibration, service or repair of your OM-240, please con-tact Omega's Customer Service Department for an Authorized Return (AR) No.

Omega Customer Service email: cservice@omega.com Phone: 1-800-622-2378

# **SPECIFICATIONS**



- On-Board Web Server
- 24 Differential Analog Input Channels
- Measures: Thermocouples, PT100 RTD, NTC Thermistor, mV, mA, mV/V
- View Data in real Time or Store to 2 GB Internal Memory
- Available GPRS Modem
- Expandable up to 384 channels with multiplexers
- Ethernet, RS485, RS232 and USB Connections
- SMS and e-mail Alerts

The OM-240 is a versatile, high accuracy "smart" data acquisition system with 24 analog inputs. It can be used in a wide range of applications including HVAC, oil and gas, water quality, energy and building monitoring. With the OM-240 no other configuration/analysis software package is needed as it is provided with a Web server on board; just use a standard Web browser and it is ready to use. Logged data is ready to be shown in graphic "real time" mode (License required) or exported in a CSV file.

# CPU AND MEMORY

- *Processor:* ARM Cortex-M3 MCU with 1 MB Flash, 120 MHz CPU, ART Accelerator, Ethernet
- RAM Memory: 1 Mbyte RAM
- Mass Storage: 2 GB SD card for data (about 5 Mega data points) and Web pages
- *Clock accuracy:* High precision RTC (real time clock with battery back-up) temperature compensated
- *On-Board Sensors:* Temperature (accuracy ±1%), measured inside the datalogger

# ANALOG INPUTS

Number of Inputs: 24 differential analog inputs, individually configured. Channel expansion provided by multiplexers. There are 8 terminal blocks (each terminal block can handle up to 3 sensors). The OM-240 is designed to work with 2 to 6-wire sensors. You can connect 2-wire sensors on each channel and read 24 sensors, or 4-wire sensor and read 12 channels. The system will order sensors depending on how many wires they use, placing 6 wires sensors first, 4 wires in the middle, and 2 wires last.

Once software configuration is done, clicking on "Wiring scheme" button on the web interface near the sensors will show how to physically connect the chosen sensor to the block. It shows "relative" position, so if you start connecting sensors from the first you will not have to leave "unused" positions (except for the ground connection of every block, if not used).

Multiplexers are needed if the total "wires" from sensors exceeds the 48 provided by the OM-240.

### ANALOG MEASUREMENTS

#### **Measurement Rate**

	Maximum Speed	Standard Speed
Analog Initialization (±10V range)	1.70 sec	7.10 sec
Instrument Warm-Up	Depends on sensor configuration	
Measurement (±10V range)	80 ms	1.57 sec

Times indicated are not valid for vibrating wire measures Init analog phase is made only once before measurement cycle

ADC: 24-bit (22 true bit) differential analog-to-digital converters, 5SPS to 1000SPS, 0-24 average function, auto-calibration and auto-range

### **ANALOG INPUT TYPES**

*Current Loop* (2 *Wires*): 0 to 25 mA range; power supply: 24/10 Vdc, external *Transmitter* (3-4 *Wires*): 0 to 25 mA range; power supply: 24/10 Vdc, external *Voltage* (4 *Wires*): ±10 mV, ±100 mV, ±1V, ±10V ranges; power supply: 24/20/10/5Vdc, external *Servo Inclinometer:* ±5V range; power supply: ± 12 Vdc (dual), external *Wheatstone Bridge* (6 *Wires, With Sensing*): ±10mV/V range; power supply: 10/5 Vdc, external (max 10 Vdc) *Minimum bridge resistance:* 200 Ω; power supply: 10/5 Vdc, external (max 10 Vdc)

*Potentiometer:* ±2.5V range; power supply: 10/5 Vdc

	THERMOCOUPLE (LOGGER @ 25°C AMBIE	NT TEMPERATURE)
тс түре	RANGE	ERROR
ТС-К	From -200 °C to 1370°C	±1,24 °C
ТС-В	From 600 °C to 1820 °C	±1,22 °C
TC-J	From -200 °C to 1200 °C	±1,04 °C
TC-T	From -200 °C to 400 °C	±1,99 °C
TC-E	From -200 °C to 1000 °C	±0,93 °C
TC-R	From -20 °C to 1760 °C	±1,64 °C
TC-N	From -260°C to 1300°C	±1,24 °C
TC-S	From -20 °C to 1760 °C	±1,64 °C

Thermocouple Input Types and Ranges

RTD Input: 100Ω Platinum (Pt100/200/500/1000) RTD: range -195 to 847°C (-319 to 1556°F); Power supply: 1.2 mA Thermistor (3000 Ω@25°C NTC): Range: -50 to 0°C (-58 to 32°F) maximum error  $\pm$  2°C ( $\pm$  3,6°F) Range: 0°C to 150°C (32 to 302°F) maximum error  $\pm$  1°C ( $\pm$  1,8°F) Power supply: 0.05 mA /0.1 mA/1.2 mA

Reading Resolution: 1  $\mu$ A at FS for 20 mA range; 1  $\mu$ V at FS for ±10 mV range; 10  $\mu$ V at FS for ±100 mV range; 100  $\mu$ V at FS for ±1 V range; 1 mV at FS for ±10 V range; 0.1 °C for Pt100 RTD; 0.1 °C for NTC thermistor; 0.1 Hz for 6000 Hz range; 0.001 mV/V at FS for ±10 mV/V (Wheatstone bridge) Measurement Accuracy: 0.01% mV/mA FS (0.17% FS for Pt100/Pt200/Pt500/Pt1000) - with Standard Measurement Temperature Drift: < 10 ppm/°C, range -30 to 70°C Input Noise Voltage: 5.42  $\mu$ V pp Input Limits : ±12V DC Common Mode Rejection: >105 dB Normal Mode Rejection: >90 dB Input Impedance: 20 MΩ typical

Switched Output Power Supply: The voltage 'V OUT' is switched on and off under program control. V OUT is the unregulated input power supply 'V IN' (2 A)

# **DIGITAL I/O**

Digital Output: One relay output (for alarm, etc.): volt-free closure (low voltage 30V, 2A) Digital Inputs: Two opto-isolated digital inputs individually selectable for switch closure.

Max Input Voltage: 24V (max current: 10mA) Min Input Voltage: 5V (max current: 2mA) Measurement Rate (MR): max frequency 1 kHz Accuracy: 0.1 Hz

### **PROTECTION:**

- Electro-Mechanical Relays for Measuring Each Channel: Electrical Endurance: min 2 x  $10^5$  operations Mechanical Endurance:  $100 \times 10^6$  operations.
- Circuit Protection (Gas Discharge Tubes): DC Breakdown Voltage (@100V/s): 75V Tolerance of DCBV: ± 20%
  Impulse Breakdown Voltage (@100v/µs ): 250V
  Impulse Breakdown Voltage (@1kv/µs ): 525V
- Overvoltage and Reverse Polarity Protection Short Circuit Protection on Every Output

### **INTERFACES**

Display & Keyboard: Small backlight graphic LCD 128 x 64 dpi with membrane keyboard for the minimal local management without the PC. Keyboard for starting a data acquisition scan, sequential display of the last stored readings for each channel (sensor ID, converted unit reading, unit of measure), device status, data download and firmware/Web pages update by USB pen drive, safe mode (back-up/format/restore internal SD card).

LAN Ethernet Isolated: 10/100 Mbps, RJ45

RS232: 9-pin, DE9: DCE port for optional GSM/GPRS modem connection Baud Rates: selectable from 9600 bps to 115.2 kbps Default Format: 8 data bits; 1 stop bits; no parity

USB: USB 2.0 pen drive only (FAT 32), 5 V 200 mA

#### RS485#1 OPTO-ISOLATED:

Connection: 5 screw clamp port for max. No.254 Modbus RS485 digital bus sensors Communication Interface: RS485

Communication Protocol: MODBUS RTU

Voltage 'V OUT': Switched on and off under program control. V OUT is the unregulated input power supply 'V IN' (1 A).

Power supply management: Always on or energy safe

### RS485#2 OPTO-ISOLATED:

Connection: 5 screw clamp port for max. 16 multiplexer boards connection. Communication interface: RS485 Communication protocol: MODBUS RTU Voltage 'V OUT': Switched on and off under program control. V OUT is the unregulated input power supply 'V IN' (1 A). Every channel of each multiplexer board is completely independent.

### **SOFTWARE & FIRMWARE:**

- Web server on board (independent OS platform)
- Live update (firmware and web pages)

• Acquisition Time Interval: selectable from 1 second up to 1 week (depends on the number of channels acquired)

• FTP client to send data/alarms on an FTP server (SFTP not supported)

- MAIL to send data/alarms to max 5 email address (SMTPS / SSL not supported)
- SMS to send alarms to max 5 telephone numbers
- Data download (readings, logs) in .csv file (compatible with Microsoft Excel)
- Virtual channels management
- Languages: Italian, English and French

### SYSTEM POWER REQUIREMENTS

Voltage (External Power Supply): 10 to 30 Vdc (reverse polarity protected), max 5A External Rechargeable Batteries: 12 Vdc nominal Typical Current Drain (@12 Vdc, External Power Supply): Sleep Mode(MAX): 315 μA ON: 62 mA - ON with ethernet connected: 87 mA - ON with display ON: 115 mA ON with display ON and ethernet connected: 142 mA

Analog Initialization: 115 mA Measurement: 123 mA (with 12 mA @ 24 V sensor consumption)

### **ENVIROMENTAL CONDITIONS**

Operating Temperature: -30 to 60°C (display -20 to 60°C) Storage Temperature: -40 to 85°C (display -30 to 80°C) Relative Humidity: 80 %RH Overvoltage Category: II Pollution Degree: 2 Sound Levels: < 74 dBA Maximum Height of Use: 3000 m (9800 ft)

### **PHYSICAL CHARACTERISTICS**

Weight: 980 g (2.16 lb) Dimensions: 231 L x 138 W x 117 mm H (9.09 x 5.43 x 4.61") Material: Plastic and metal Wiring: Removable screw terminal connectors



To Order Model No.	Description
OM-240	24-channel Ethernet data logger with embedded web server
OM-240-MODEM	GSM/3G modem for OM-240
OM-240-PS	Spare 12 Vdc power supply for OM-240

Comes complete with 12 Vdc power supply, Ethernet cable, USB thumb drive. Ordering Example: OM-240 24-channel Ethernet data logger with embedded web server.

# WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by the company will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

# **RETURN REQUESTS/INQUIRIES**

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR <u>WARRANTY</u> RETURNS, please have the following information available BEFORE contacting OMEGA:

- 1. Purchase Order number under which the product was PURCHASED,
- 2. Model and serial number of the product under warranty, and
- 3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

- 1. Purchase Order number to cover the COST of the repair,
- 2. Model and serial number of the product, and
- 3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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