

TECHNICAL REFERENCE MANUAL

OBSIDIAN® V25-1



2. About this document

This is the Technical Reference Manual for OBSIDIAN® Systems.

OBSIDIAN® embedded data acquisition system based on a low-power ARM processor with Linux-based open architecture. OBSIDIAN® can act like a standalone data logger, real-time control system, and signal conditioning frontend, all at the same time. Currently, it comes in standard and rugged form which can be equipped with a wide range of different amplifiers so you can use it for virtually any measurement task. Each system also includes a professional license for our award-winning DewesoftX® data acquisition software.

The manual is divided into several chapters. You will find:

- A comprehensive introduction to the configuration of the device and modules using DewesoftX®
- A detailed description of the OBSIDIAN® hardware and the main combination and expansion options
- A description of the connection variants and the pin assignments on the inputs and outputs
- Detailed technical data: Specifications, etc.
- List of Accessories for the device

2.1. Legend

The following symbols and formats will be used throughout the document.



Important

It gives you important information about the subject.
Please read carefully!



Hint

It gives you a hint or provides additional information about a subject.



Example

It gives you an example of a specific subject.

Safety symbols in the manual:



Warning

Calls attention to a procedure, practice, or condition that could cause the body injury or death



Caution

Calls attention to a procedure, practice, or condition that could possibly cause damage to equipment or permanent loss of data.

3. Getting started

This chapter will help you to install the software, connect your OBSIDIAN® system to the PC via GLAN or EtherCAT®, and show you how to configure the device inside DewesoftX® software.

To follow these steps, you need the following items:

- your brand new OBSIDIAN® system (included in the shipment)
- your network cable (included in the shipment)
- your PC with Windows 10

Hint



As OBSIDIAN® is a new platform device and its software functionalities are still improving therefore we recommend using the latest Release, Release Candidate or Development versions of DewesoftX® with the newest compatible FW version. For more information please contact our support team (support@dewesoft.com)

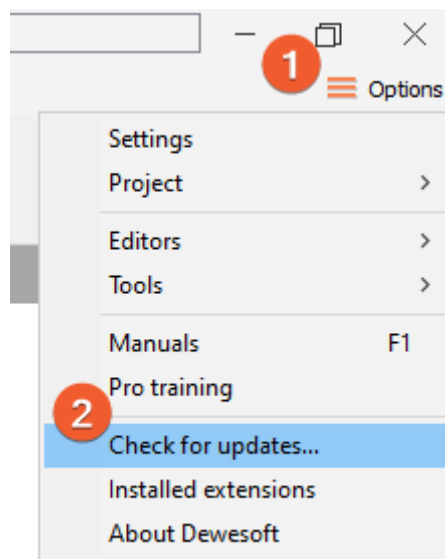


Important

OBSIDIAN devices are not compatible with the 32-bit version of DewesoftX..

3.1. Software installation

For optimal working, we recommend that you install the latest version of DewesoftX®. If you already have DewesoftX® installed, please check if a newer version is already available. You can either check for this on the [Dewesoft website](https://www.dewesoft.com) under the “Support -> Dewesoft Downloads” section or directly in the software under the “Options -> Check for updates”. In both cases, the full changelog is included.



Check for updates

3.2. OBSIDIAN® device connection options

OBSIDIAN® is a multifunctional device that can be utilized either as a standalone data logging device or as an EtherCAT device (behaves the same as an IOLITE device). These two modes are different in terms of hardware connection, software configuration, supported software options, and more. The two possible configuration modes are:

- **Standalone mode/GLAN mode** - when used as a standalone device, the software on the embedded Linux system is controlling the OBSIDIAN device therefore the device can also acquire/store data without DewesoftX software. In such case DewesoftX software is used as the device configurator. To add the device to the software and start configuration, it needs to be connected to the PC over a GLAN connector.

When connected over GLAN, also the other device modules are enabled, for signal conditioning:

- CAN output RT
- XCP output RT
- Analog output RT

When the device is connected via GLAN, you can also use it as a standard data-acquisition system and acquire data via DewesoftX software

- **EtherCAT mode** - when used as an EtherCAT device, the first step is to connect the device over GLAN and disable standalone mode. While still connected over GLAN you will only see the CAN and GPS modules. Then, connect the device to the PC via the 8-pin Lemo EtherCAT connector for proper usage. In this mode, the OBSIDIAN® device behaves the same way as our IOLITE® device. For additional information please refer to the IOLITE® manual.

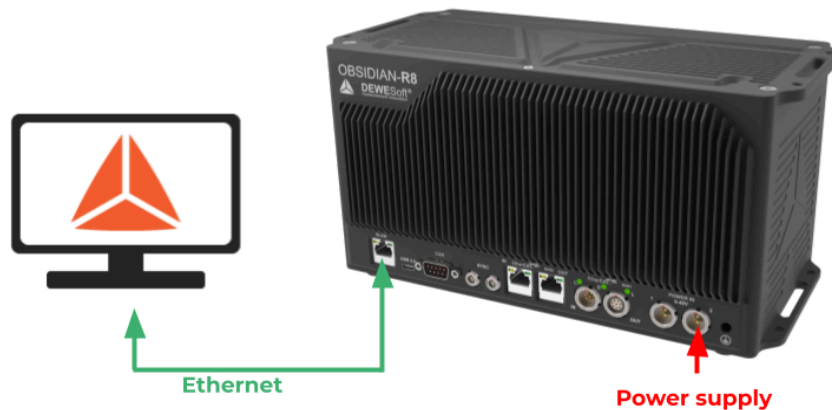
Important



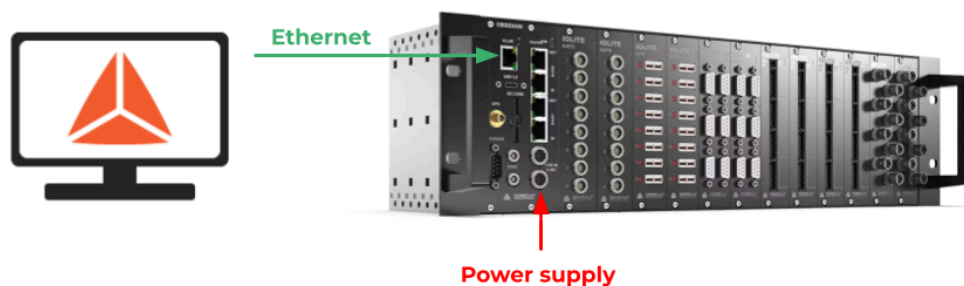
This manual will mostly focus on the **Standalone mode/GLANmode**. Only configuration and features related to the standalone mode will be described. For more information regarding the behavior, functionality and features of IOLITE® device please refer to the IOLITE® manual.

3.3. Connecting OBSIDIAN® device in standalone mode

First connect the power supply cable (LIT2f for OBSIDIAN-R8w and LIB2f for OBSIDIAN-R8 and R12)) to the PWR IN 2-pin LEMO male connector. Then connect the Ethernet Cable with the RJ-45 connector to the appropriate GLAN connector on the back of the OBSIDIAN® device. Finally, connect the other side of the ethernet cable to the LAN port of the PC.



Connection of the OBSIDIAN-R8 to a PC



Connection of the OBSIDIAN-R12 to a PC



Important

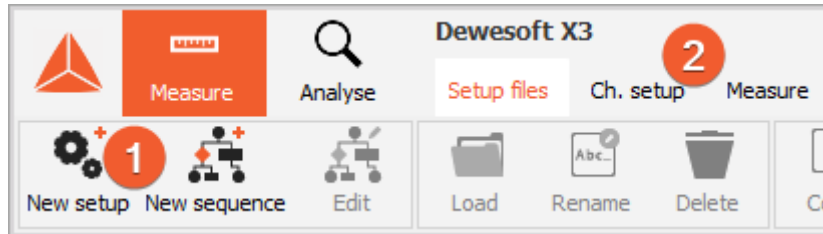
Power supply cable with watertight **LIT2f LEMO** connector fits in OBSIDIAN-R8w, OBSIDIAN-R8 and OBSIDIAN-R12. Power supply cable with standard **LIB2f LEMO** connector fits in OBSIDIAN-R8 and OBSIDIAN-R12. The **LIB2f LEMO** fits very loosely in OBSIDIAN-R8w so it is not recommended for actual usage.

3.3.1. Ethernet configuration on the PC

In order to access the OBSIDIAN® over as a GLAN, you have to set a static address on your Network Card. The static address should be part of the same subnet as the address of the device.

Let's say that the *device IP address* is 192.168.10.1, then you need to set up the following settings on your *PC's network card*:

- define the IP address (e.g. 192.168.10.10)
- define the Subnet mask (e.g. 255.255.255.0)



Setup files

3.4.2. Analog-in channel setup

Inside the Analog-in module in channel setup all the available channels from the connected device will be listed. This is where you can adjust amplifier properties such as range, measurement type, etc. For more detailed information and a signal preview, you can enter the channel setup by clicking on the Setup button in the DS-Grid.

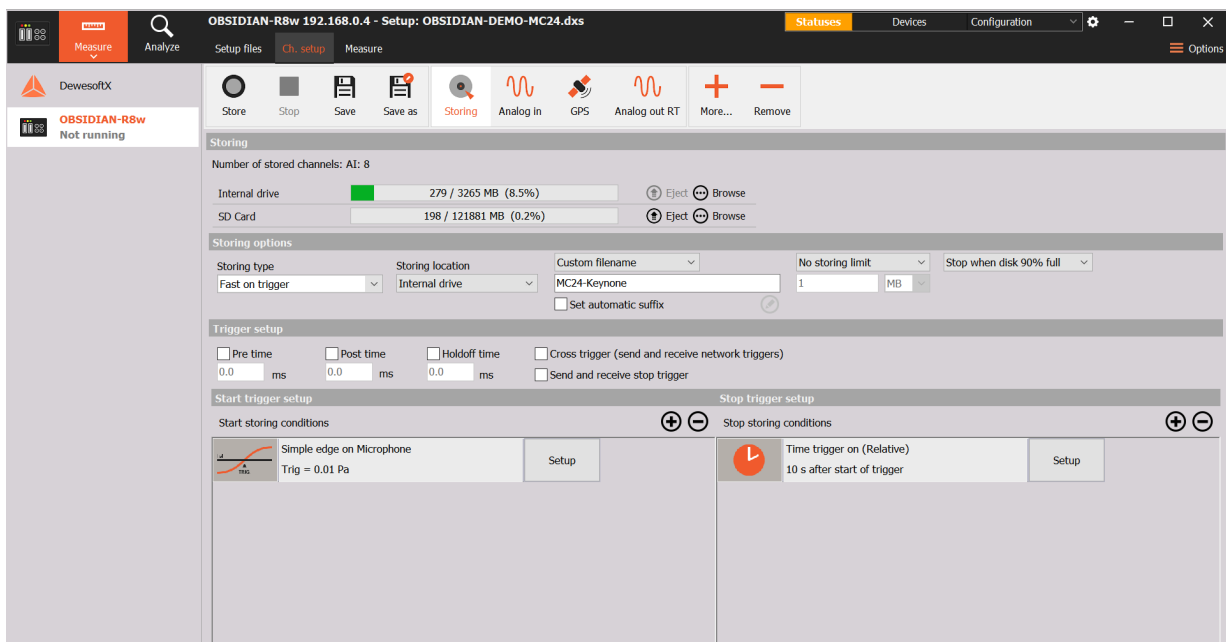


Important

The OBSIDIAN device doesn't support binary sample rates (such as 512, 1024), due to EtherCAT limitation.

3.4.3. Storing module on device

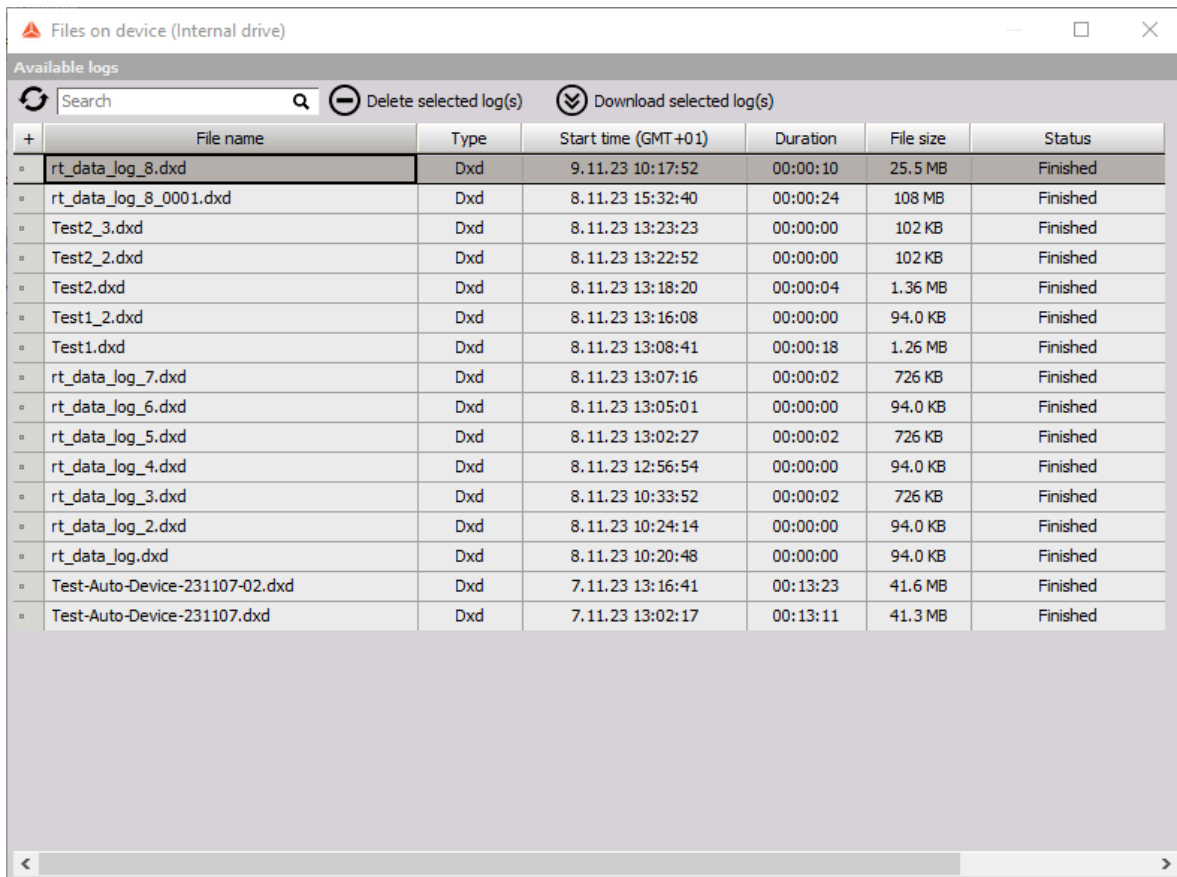
If you want to store data directly on the device or on any external drives connected to the device, first you need to enable it in the **Storing module**, when you are on the **Device preview**. As default the storing will be set to "Always fast mode".



Logger RT module setup

At the top of the storing setup screen a number of stored channels separated into different channel groups are presented.

Further, all the currently available drives (internal and external) are shown. When the three-dotted button (Browse) next to the drive is clicked, an additional window opens with a list of already stored files on the device. From this view, the files on the device can be downloaded or deleted.



The screenshot shows a window titled "Files on device (Internal drive)". Inside, there's a section "Available logs" with a search bar and two buttons: "Delete selected log(s)" and "Download selected log(s)". Below this is a table with the following columns: File name, Type, Start time (GMT+01), Duration, File size, and Status. The table lists 18 files, all of type "Dxd" and status "Finished".

File name	Type	Start time (GMT+01)	Duration	File size	Status
rt_data_log_8.dxd	Dxd	9.11.23 10:17:52	00:00:10	25.5 MB	Finished
rt_data_log_8_0001.dxd	Dxd	8.11.23 15:32:40	00:00:24	108 MB	Finished
Test2_3.dxd	Dxd	8.11.23 13:23:23	00:00:00	102 KB	Finished
Test2_2.dxd	Dxd	8.11.23 13:22:52	00:00:00	102 KB	Finished
Test2.dxd	Dxd	8.11.23 13:18:20	00:00:04	1.36 MB	Finished
Test1_2.dxd	Dxd	8.11.23 13:16:08	00:00:00	94.0 KB	Finished
Test1.dxd	Dxd	8.11.23 13:08:41	00:00:18	1.26 MB	Finished
rt_data_log_7.dxd	Dxd	8.11.23 13:07:16	00:00:02	726 KB	Finished
rt_data_log_6.dxd	Dxd	8.11.23 13:05:01	00:00:00	94.0 KB	Finished
rt_data_log_5.dxd	Dxd	8.11.23 13:02:27	00:00:02	726 KB	Finished
rt_data_log_4.dxd	Dxd	8.11.23 12:56:54	00:00:00	94.0 KB	Finished
rt_data_log_3.dxd	Dxd	8.11.23 10:33:52	00:00:02	726 KB	Finished
rt_data_log_2.dxd	Dxd	8.11.23 10:24:14	00:00:00	94.0 KB	Finished
rt_data_log.dxd	Dxd	8.11.23 10:20:48	00:00:00	94.0 KB	Finished
Test-Auto-Device-231107-02.dxd	Dxd	7.11.23 13:16:41	00:13:23	41.6 MB	Finished
Test-Auto-Device-231107.dxd	Dxd	7.11.23 13:02:17	00:13:11	41.3 MB	Finished

Files on device preview

To start preparing the device setup first, you need to select storing type between:

- **Off** - if the storing module is not enabled, the data will not be stored on the device.
- **Always fast** - all the data is stored on the device.
- **Always slow** - only reduced/statistical data is stored on the device (min, max, avg, rms).
- **Fast on trigger** - all the data is stored on the device based on a trigger condition. If multiple triggers occur, this will result in one file with gaps between trigger conditions.
- **Fast on trigger, slow otherwise** - all the data will be stored on a trigger condition. When the trigger is not active only reduced data will be stored.



Important

The reduced rate is always set to 0.2 seconds. This means that when slow storing is enabled all the parameters are saved by this rate.



Hint

Once the storing is actually enabled, the drive where the data should be stored can be selected.

In the Storing settings you can also define:

- **Name** of the data file with the option of adding a suffix
 - You can additionally Link the name to Name used in DewesoftX storing engine in case of parallel storing the data with DewesoftX
- **Stop storing after** - You can define the amount of data either in MB, the format of time or number of trigger events.
- **Make a new file after** - You can define the amount of data either in MB the format of time or number of trigger events.
- **Stop when the disk is 90% full** - storing will automatically stop when the disk will be 90% full.
- **Keep only the last # of files** - when the number of files exceeds the entered custom value, the older file will be deleted.
- **Delete the oldest file when the disk is #% full** - when the disk is at the entered custom %, the oldest file will be deleted.

If the trigger option is enabled following setting will appear

- **Pre-time** - Pre trigger time, defined in milliseconds. This value defines the storage duration before the trigger event occurs. **You can adjust up to 1000 ms of pre-time.**
- **Post time** - Post trigger time, defined in milliseconds. This value defines the storage duration after the trigger event has been finished. **You can adjust up to 1000 ms of post-time.**
- **Holdoff time** - Gives you the possibility to suppress trigger events for a certain time after the last event had happened
- **Start storing condition** - Define a start storing event on a condition.
- **Stop storing condition** - Define stop storing event on a condition.
- **Don't store condition** - Define condition, when the acquisition will not start storing even if start-trigger appears.

There is also a possibility of enabling Cross triggers (start and stop), when multiple devices are connected. This means that one defined start trigger can affect all the connected devices in the same network.

3.4.3.1. SD-Card format

NTFS, FAT32, EXT4 and exFAT formats are supported for the inserted SD-Card. The following table shows the performance of the storing module, when SD-Card is formatted in different ways.



Hint

EXT4 format is a Linux OS format, meaning that the SD-Card will not be automatically detected if connected to a PC with Windows OS. There are also different EXT4 formats (Quick/Lazy and Fast/Full), please make sure that you use Fast/Full format for better performance



Hint

FAT32 has a maximum of 2GB data file size, so the storing engine should be adjusted accordingly

Filesystem format	MAX # of Channels stored with 20kHz
NTFS	24
FAT32	48
EXT4 (Linux)	52
exFAT	52

3.4.3.2. Storing Counter and CAN data on the device

When CNT module is connected, you can only store the following channels directly on the device:

- **Raw_edge**
- **Raw_EdgeSep** (in sensor mode)
- **Event CNT channel** in Basic Count mode.

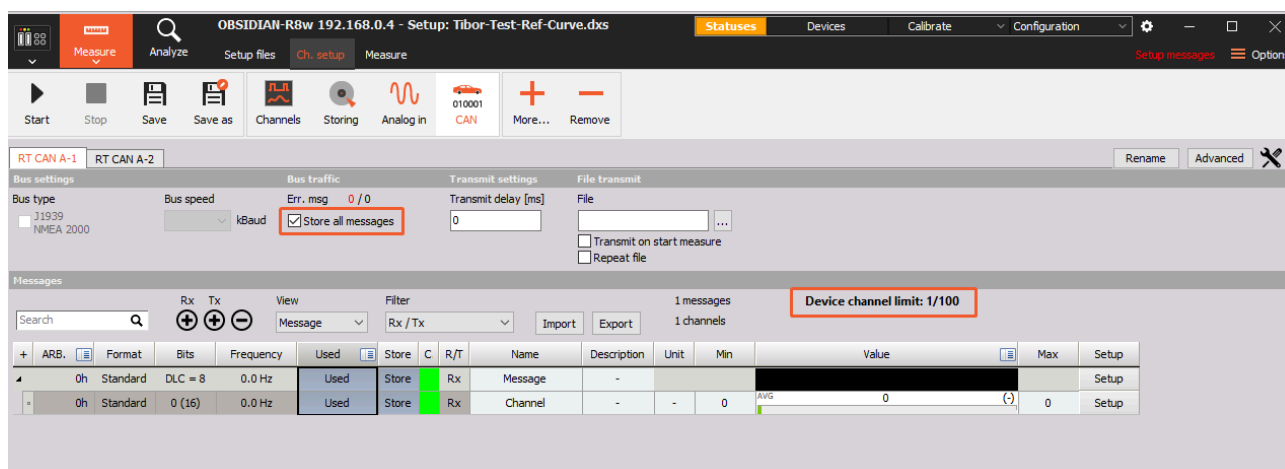
The recalculation of Angle and Speed channels can be done in post-analysis via the Counter Math.



Important

Currently the digital inputs (IN0, IN1, IN2) and calculated channels Angle and Frequency are not stored on the device. The Angle and Frequency can be calculated in the post-analysis.

When storing CAN data, you have an option to store all messages from the CAN ports. You can decode all the messages in Analyze mode, by using the offline CAN decoder. Additionally, you can also decode CAN data online (in real-time). However, the number of decoded channels is limited to up to 100 channels.



Storing CAN data on the device

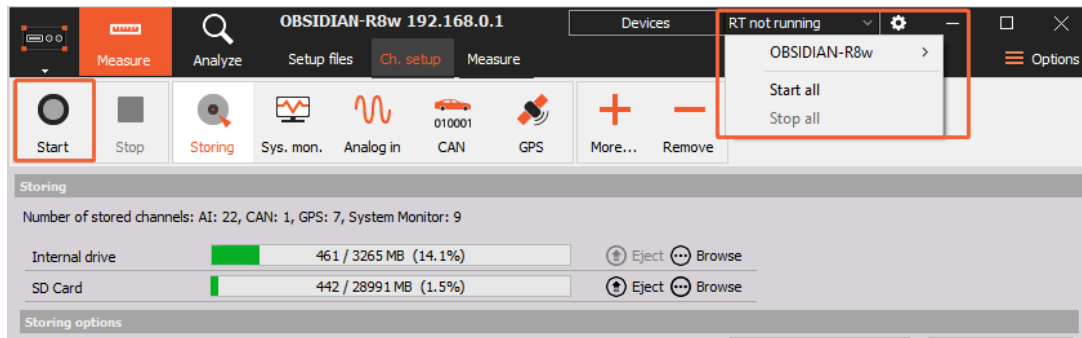


Important

Currently you can only store up to 100 decoded CAN channels on the device.

3.4.4. Measurement mode

For starting the measurement - starting recording on the device or starting the signal conditioning over CAN, AO, XCP protocol you need to start the operation mode on the device. This can be done either by pressing Start button on the Device view or by pressing "Start all" on the down menu of the functional button.



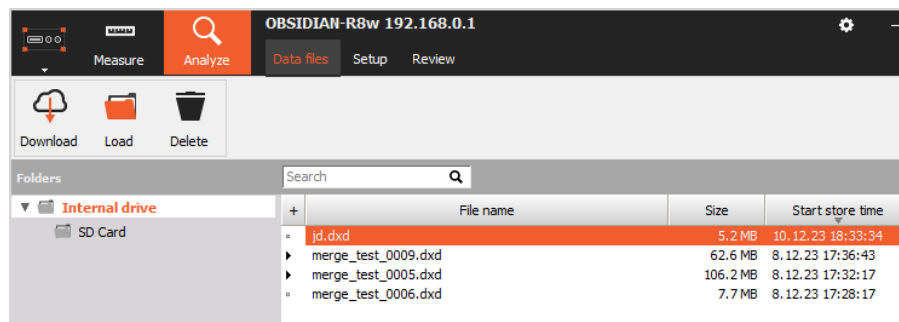
Start button and RT status button

Once the acquisition on the device is started the configuration of the device is locked, meaning that device parameters can not be changed. Also the device status on the top of the DewesoftX window will turn green as a notification that the device is in running mode.

3.4.5. Analyze mode

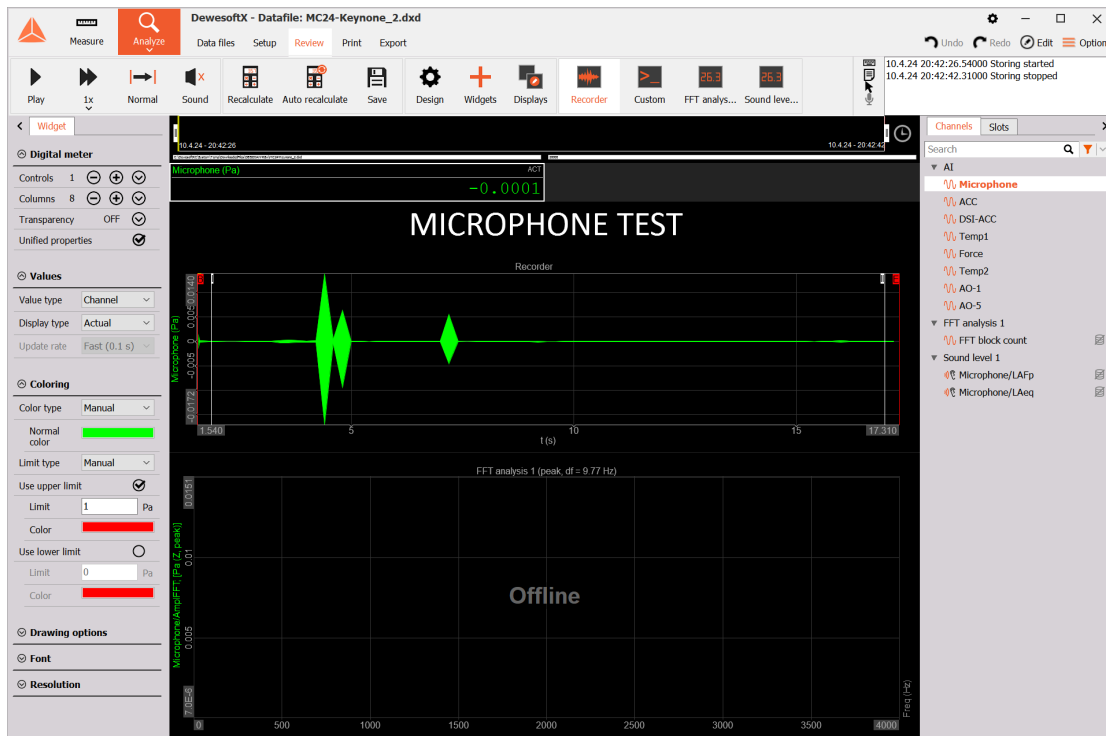
Once you end your storing you can observe the data in the Analyze mode. When the OBSIDIAN device is connected, you will also see the Software view and the Device view as described in the chapter [3.3.3 Channel Setup OBSIDIAN](#).

If you go to the Device view, you will see the data that are stored on the internal drive or any external drive (SD card or external drive connected over USB-C port) currently connected to the device. You can either Load or Download the stored data from the device to the PC.



Analyze mode in Device view

Once you open the *.dxd file you are automatically redirected to the Review window, where you can start to perform the analysis on your recorded data.

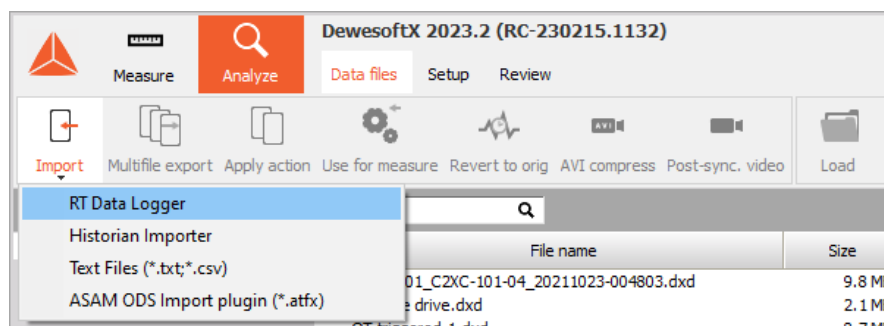


*The *.dxd data contain all Display and offline math defined in *.dxs*

All the display and math settings saved inside the setup file (*.dxs) are automatically stored to the *.dxd file stored on the device. This means that once you open a file, you will already have prepared Displays and offline math. All you need to do is recalculate the data.

3.4.5.1. RT Data Logger Importer (obsolete option)

In previous versions of OBSIDIAN devices it was possible to store the data in the binary file. Binary files are not natively supported inside DewesoftX, therefore such data needs to be imported to the software. This can be done over the RT-importer. The RT-Importer can be reached in Analyze mode, under Import options.



Accessing RT Data Logger importer

Once you open the importer the configuration window will appear. If the device is already connected to the PC you can import the data directly from the device. You can also import the data only from the SD Card or External disc in this way you need to select the PC as the device to import from.

RT Data Logger

Importing options

⊙ **RT Data loggers**

Device to import from: IOLITE-LX - 192.168.0.150

Status: Ready

Internal drive (2 logs)

File name	Storing start	Size	Status
rt_data_log2	21.2.23 16:05:22	0 bytes	Finished
rt_data_log	21.2.23 16:04:30	0 bytes	Finished

Log info

Store date and time: **21.2.23 16:05:22 (GMT+01)**

Number of channels: **2**

DAQ Sample rate: **1000 s/sec**

Duration: **00:00:07**

Status: **Finished**

Search:

+	Import	Ch. no	Name	Color	Sampling	Data structure	Data type	Rate	Unit	Scale	Offset	Min	Max
-	Import	1	CAN Port 1 Input	Green	Asynchronous	Vector(72)	Byte	5000.00		1.00	0.00	-10.00	10.0
-	Import	2	CAN Port 2 Input	Cyan	Asynchronous	Vector(72)	Byte	5000.00		1.00	0.00	-10.00	10.0

Cancel Import...

RT Data Logger importer menu

In the settings you will see a list of channels with some additional properties. You can also select which channel you want to import in DewesoftX. The newly created *.dxd file will have the same name as the binary file that you are importing.

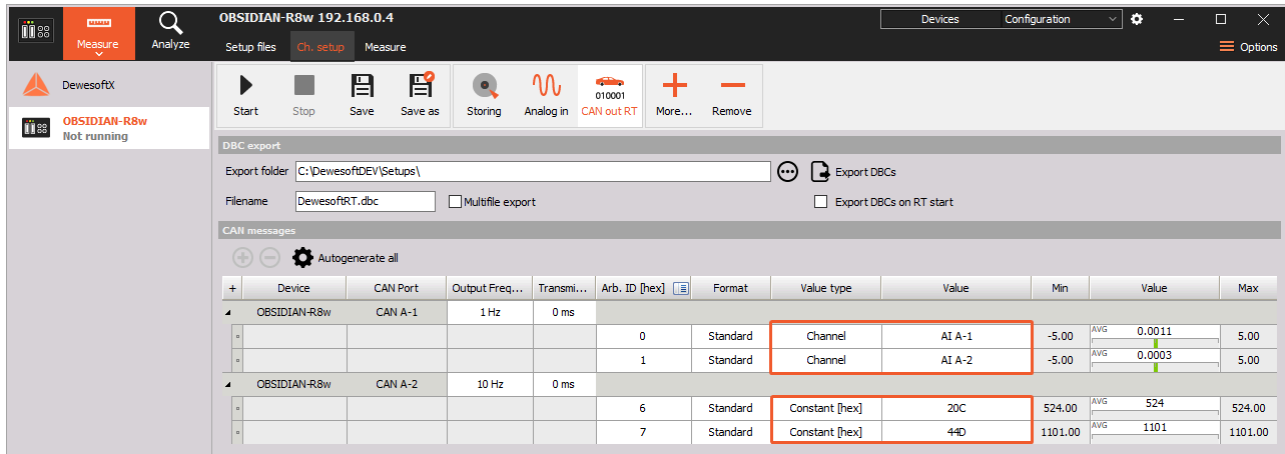
3.4.6. Output RT modules

The OBSIDIAN device offers additional options on how to output the measurement data through different protocols. You can either use EtherCAT, CAN, AO and XCP protocols to output the data when the device is in standalone mode. For setting the output over EtherCAT please refer to the Third Party EtherCAT Masters Technical Reference Manual, that can be found on our website.

3.4.6.1. Output data over CAN channel

The “CAN Output RT” module allows us to output the measured values through the CAN port on the rear of the device. The interface allows us to add or automatically generate the list of channels which should be outputted. It is also possible to define the frequency of the messages being sent out through CAN. For easier definition of CAN channel setup on other devices, a DBC file can be exported with definition of CAN messages.

You can either output the Analog Inputs from an OBSIDIAN device or a Constant value. Both Standard and extended formats are supported.



CAN RT output module settings



Note

Sending a constant value is supported from the DewesoftX 2024.3 version.

3.4.6.2. Output data over the AO channel

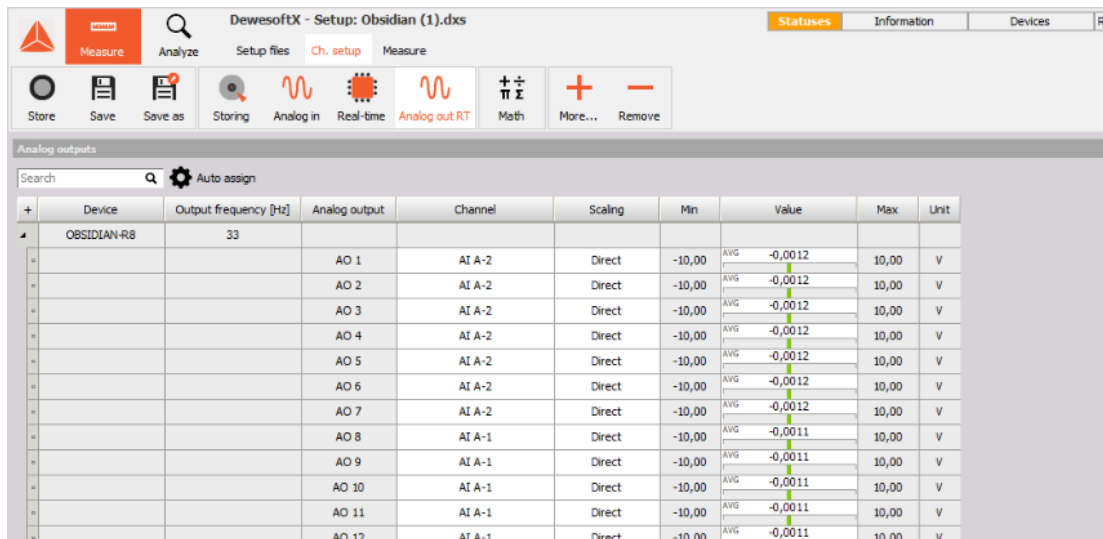
The “Analog output” module is designed for outputting the measured Analog input channels through the analog output module, connected in the OBSIDIAN device. The AO signal is outputted in the range of +/- 10V, depending on the scaling settings.

In the settings you can enable the output functionality and define which input channel should be output on which analog output channel. You can also define the output channel scaling

Direct scaling outputs the same value of the measured signal, represented in voltage value (when input channel is 5 V then the output will also be 5 V).

From range scaling matches the customly defined range of the amplifier (customly defined max range is represented by +10V signal on output, the min defined range is represented by -10V signal on the output. For example, if you you are measuring 5V on the custom range min: 20V and max 20V, the output will be 2.5V)

The output frequency can be either set to 33 Hz or 1000 Hz, depending on the chosen setting of the device. For a faster loop time a special option needs to be enabled. Please check [3.3.2.3. Device properties](#). The output frequency is also dependent on the selected AI channel.

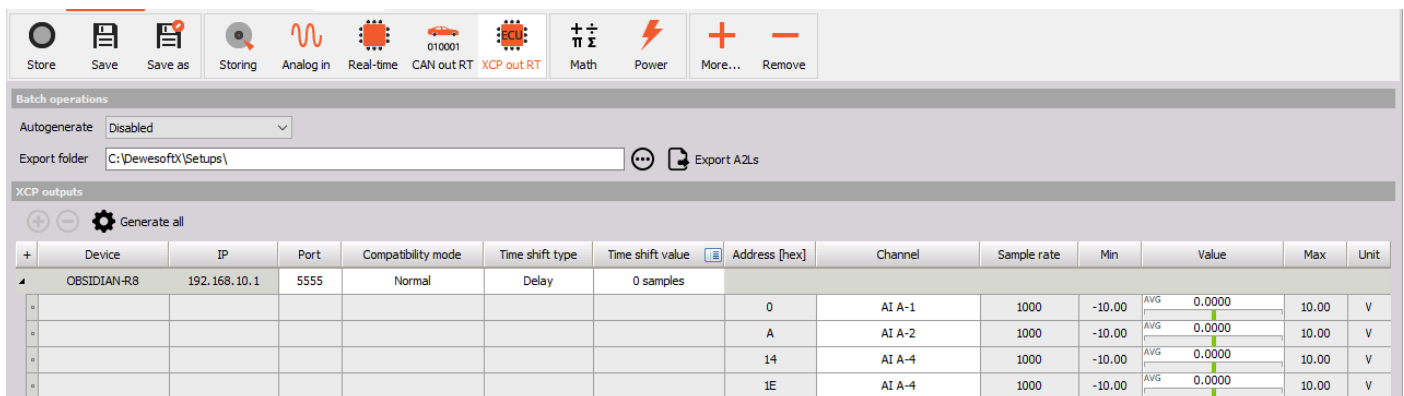


AO RT output module settings

3.4.6.3. Output data over XCP protocol

With the OBSIDIAN device you can output any Analog signals over the XCP protocol. When pressing the “Generate all” button all channels will be populated automatically, according to all the used channels in the Analog input module.

The maximum sample rate is limited to the Dynamic acquisition rate set in DewesoftX software. Only channels with full SR can be outputted, the channels with reduced SR can not be outputted. Once you properly configure the XCP settings and start the RT-mode, the configuration *.a2l file is generated automatically.

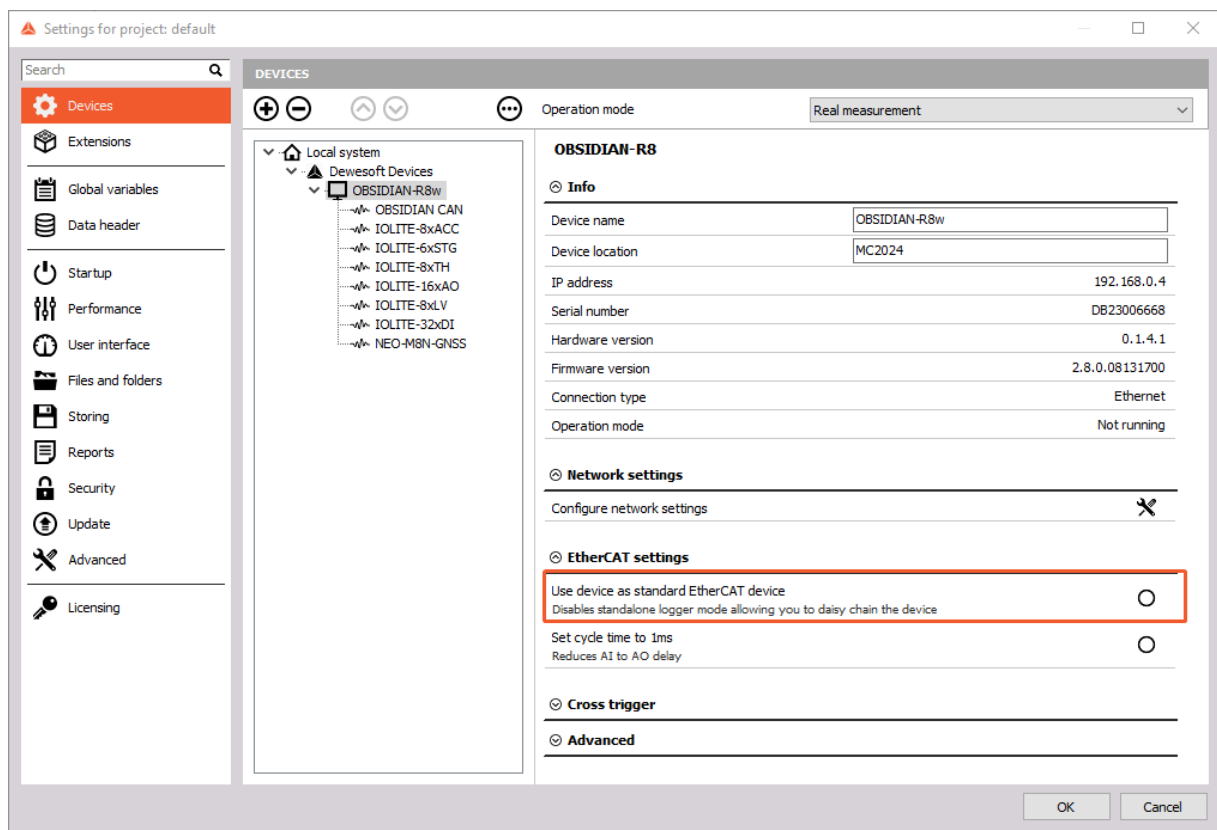


XCP output RT module settings

3.5. Connecting OBSIDIAN® in standard EtherCAT mode

The primary EtherCAT® bus can be switched to external mode, allowing OBSIDIAN® to be used like a regular IOLITE system for full-speed buffered data acquisition to a computer running DewesoftX DAQ software.

To use the OBSIDIAN® device in standard EtherCAT mode (as IOLITE device), you need to first properly set the device. First, you need to connect the device over the GLAN connector and select the **Use device as standard EtherCAT device** option. The device will be rebooted automatically.



Switching between internal and external availability of modules

Once the device is set properly you can connect your OBSIDIAN® device with a 8-pin LEMO connector to the PC. The device will be recognized automatically and will be listed under the Dewesoft Devices in HW settings.

3.5.1. Limitations

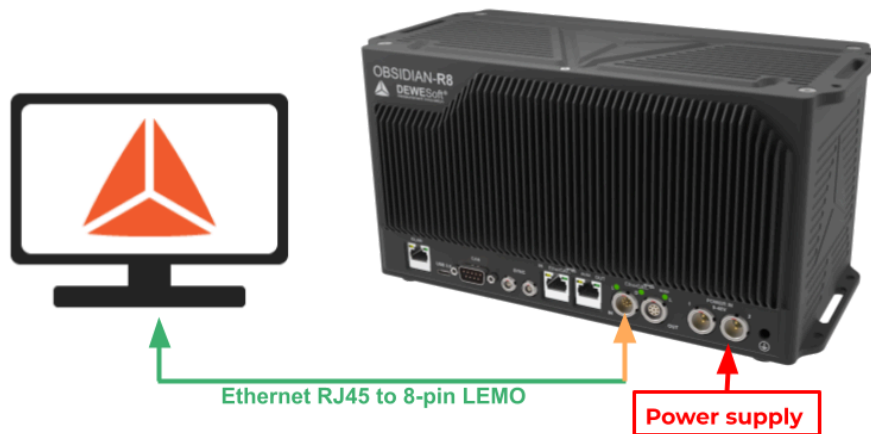
All the functionality that is linked to the ARM processor will not be accessible when the OBSIDIAN device is connected over EtherCAT. Those functionality are

- Integrated CAN port on the device (DB9)
- Integrated Wifi on OBSIDIAN-R8w
- Integrated GPS on OBSIDIAN-R8w, OBSIDIAN-R12

3.5.2. How to connect OBSIDIAN® device over EtherCAT

To connect your OBSIDIAN® device to a PC in external master mode, connect:

- power cable to the Power-in port,
- LIT8m-RJ45 cable from primary EtherCat bus “IN” port to the PC’s Ethernet port.

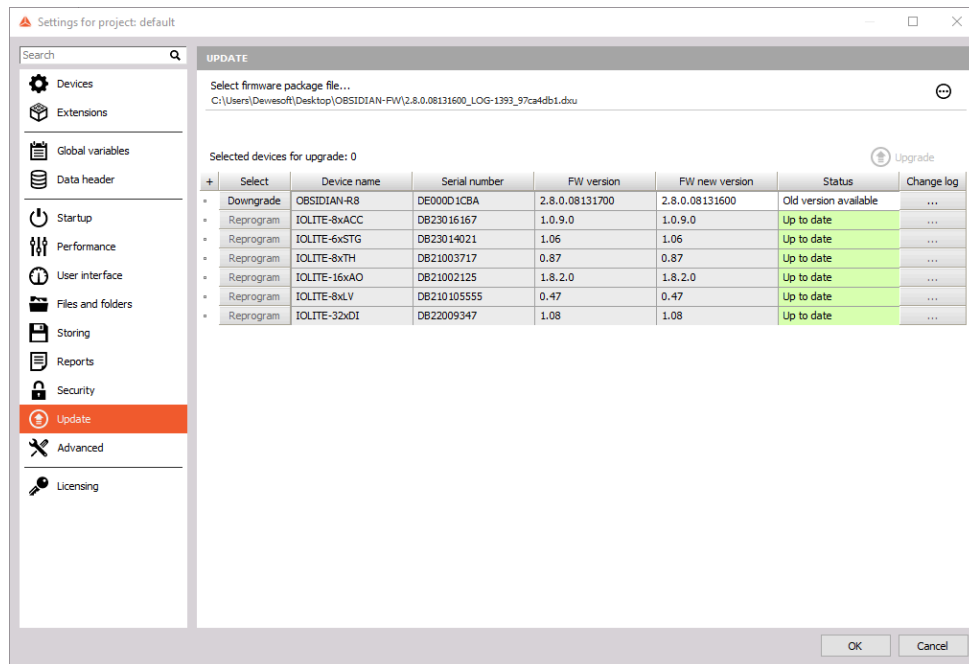


Connection of the OBSIDIAN® to a PC over EtherCAT

3.6. Firmware upgrade

- Download the [Dewesoft upgrade package](#) (.dxu file) from the Dewesoft downloads page under the section Drivers.
- Copy the file into the Firmwares folder of your DewesoftX® installation (e.g. D:\DewesoftX\System\Firmwares).
- Connect the Dewesoft instrument to the PC and run DewesoftX®.

- Go to settings under the Update tab:



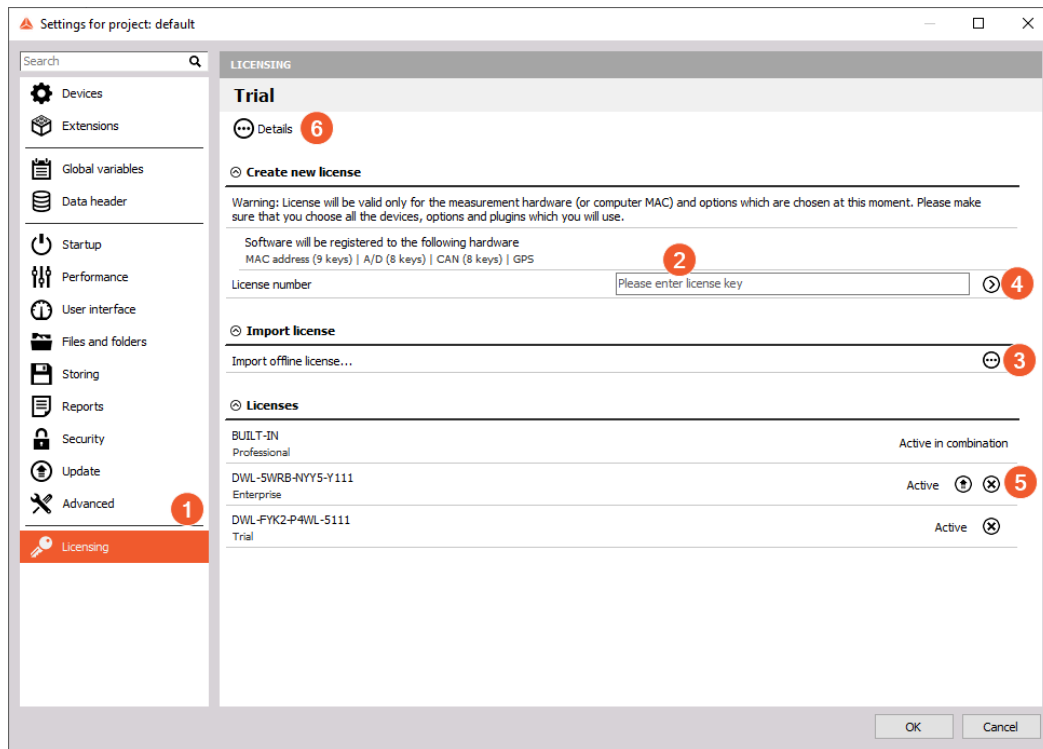
Firmware update settings

- If the firmware package isn't selected, select it by pressing the button and find the folder with the firmware file in it.
- Select the device you want to upgrade and start the firmware upgrade by pressing the "Upgrade" button.

3.7. Licensing

IOLITE or any other Dewesoft device already comes with an embedded DewesoftX® license. You can check the license details with all the available options in the Licensing tab ❶ by pressing the three-dotted buttons ❷. However, if the user decides to upgrade the license with an additional extension, DewesoftX® will require a new license registration. The registration can be made online ❷ or offline by importing an offline license ❸ in case the system doesn't have an internet connection. Offline licenses can be registered on a different PC with an internet connection. If needed, the license can also be written on the actual device ❹.

Active and embedded licenses are seen under the Active Licenses tab ❺. If the license is recognized as none active, it usually means that the wrong license was entered.



Active licenses tab



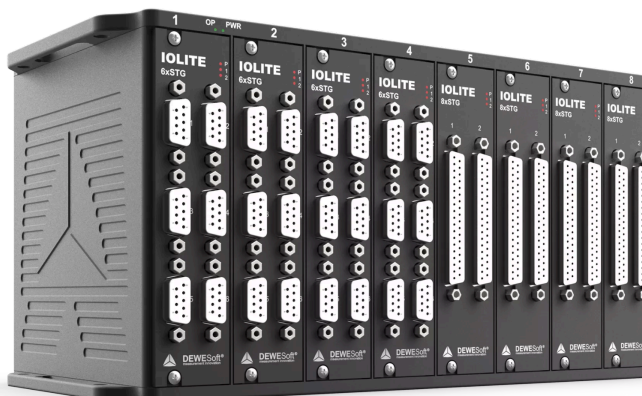
Hint

All licenses regarding OBSIDIAN® will only work when the OBSIDIAN® system is connected to your PC and the device has been activated in the hardware setup.

4. System Overview

OBSIDIAN®

Data logger and embedded data acquisition system



Voltage



Strain / Stress



Quarter Bridge



Half Bridge



Full Bridge



Thermocouple



High Voltage



RTD



Current



Resistance



Ethernet



EtherCAT



OPC-UA



IEPE



CAN out



XCP out



CAN bus



Data logger



IP67



-10 °C to +60 °C



Charge



LVDT



DSI compatible



TEDS
compatible



GPS, GLONASS,
BEIDOU,
GALILEO



Wi-fi



PTP
synchronization



IRIG and GPS
timecode



Fanless



Shock rating
75g

4.1. Main features

- **EMBEDDED CPU:** The built-in dual-core 1.5 GHz ARM processor, running Linux OS and DewesoftRT software, makes OBSIDIAN ideal for embedded applications like data logging, cloud data collection, and real-time control.
- **ONBOARD DATA STORAGE:** 4 GB of internal storage expandable with up to 1 TB SD card or a USB Type-C external HDD or SSD is useful for storing large amounts of data.
- **LOW POWER CONSUMPTION:** Extremely powerful but designed to operate with very low power consumption which makes it a perfect choice for applications where power consumption is of critical importance.
- **HIGH-END SIGNAL CONDITIONING:** OBSIDIAN® offers the same high-end signal conditioning modules as IOLITE DAQ and control system. Amplifiers are available for Voltage, Current, Resistance, Strain gauge, Bridge, Digital Counters, RTDs, and Thermocouples.
- **REDUNDANT POWER SUPPLY:** Redundant power supply is seamlessly switching between available power sources and provides non-stop availability even for the most demanding test applications.
- **WIDE OPERATING TEMPERATURE RANGE:** While OBSIDIAN® DAQ systems are labeled to run from -10°C to 60°C, certain configurations can operate in the range from 40°C to +85°C temperature..
- **EXTERNAL MASTER MODE:** Instead of being used internally by DewesoftRT, the primary EtherCAT® bus can be switched to external mode, allowing OBSIDIAN® to be used like a regular IOLITE system for full speed buffered data acquisition to a computer running DewesoftX DAQ software.
- **SECONDARY ETHERCAT BUS:** A secondary EtherCAT bus can be used in parallel to serve real-time data to any 3rd party control system like Labview, Beckoff, Clemessy Syclone, MTS FlexTest, Acontis, and similar EtherCAT masters.
- **GREAT CONNECTIVITY:** Standard data interfaces are available to transfer the data to real-time controllers, cloud servers, and Industry 4.0 clients, using a wide variety of standard data interfaces, such as EtherCAT®, OPC UA, XCP, and CAN.
- **DAQ SOFTWARE INCLUDED WITH FREE LIFETIME UPGRADES:** The easy-to-use but rich-in functionality, award-winning DewesoftX data acquisition software is included. All upgrades to the software are free forever with no hidden licensing costs.
- **DEWESOFT QUALITY AND 7-YEAR WARRANTY:** Enjoy our industry-leading 7-year warranty. Our data acquisition systems are made in Europe, utilizing only the highest build quality standards. We offer free and customer-focused technical support. Your investment into the Dewesoft solutions is protected for years ahead.

4.2. System specifications

System	OBSIDIAN-R8	OBSIDIAN-R8w	OBSIDIAN-R12
Number of slots	8	8	12
Synchronization	2x SYNC on L00B4f (IRIG-B) GPS PPS IEEE 1588v2 synchronization (PTP) (RJ45)	2x SYNC on L00B4f (IP67) (IRIG-B) GPS PPS IEEE 1588v2 synchronization (PTP) (RJ45)	2x SYNC on L00B4f (IRIG-B) GPS PPS IEEE 1588v2 synchronization (PTP) (RJ45)
Sync Accuracy	< 200 ns within same EtherCAT chain < 10 µs using sync for multiple EtherCAT chains below 1 sample to Sirius®	< 200 ns within same EtherCAT chain < 10 µs using sync for multiple EtherCAT chains below 1 sample to Sirius®	< 200 ns within same EtherCAT chain < 10 µs using sync for multiple EtherCAT chains below 1 sample to Sirius®
Ethernet Interface			
Interface type	1x Gigabit Ethernet (RJ45)	1x Gigabit Ethernet RJ45, 1xWLAN	1x Gigabit Ethernet RJ45
Dual EtherCAT® interface			
Number of buses	Two (both with buffered DAQ or real time)	Two (both with buffered DAQ or real time)	Two (both with buffered DAQ or real time)
Data Rate	Dual 100 Mbit bus speed	Dual 100 Mbit bus speed	Dual 100 Mbit bus speed
Max. Throughput per Chain	From 6 MB/s to 10 MB/s	From 6 MB/s to 10 MB/s	From 6 MB/s to 10 MB/s
Bus 1 connectors	2x Lemo 1B	2x Lemo 1T	OBSIDIANr: 2x Ethernet RJ45 OBSIDIANr-L: 2x Lemo 1T
Bus 2 connectors	2x Ethernet RJ45	2x Ethernet RJ45	2x Ethernet RJ45
Minimum delay (analog input to EtherCAT® bus)	70 µs	70 µs	70 µs
Minimum EtherCAT® cycle time	100 µs	100 µs	100 µs
Other Interfaces			
Device protocols	OPC-UA XCP over Ethernet openDAQ (see 2)	OPC-UA XCP over Ethernet openDAQ (see 2)	OPC-UA XCP over Ethernet openDAQ (see 2)
CAN bus			
Number of ports	2	2	2
Interface type	CAN 2.0B, up to 1 MBit/sec	CAN 2.0B, up to 1 MBit/sec	CAN 2.0B, up to 1 MBit/sec
Special applications	CCP, OBDII, J1939, CAN output (also on RT)	CCP, OBDII, J1939, CAN output (also on RT)	CCP, OBDII, J1939, CAN output (also on RT)
Galvanic isolation	Isolated (only on isolated motherboard)	Functional isolation	Functional isolation
Bus pin fault protection	±36 V	From -27 V to 40 V	From -27 V to 40 V
ESD protection	8 kV	±4 kV	±4 kV

Sensor supply	5 V (max. 1.2 W)	5 V (max. 1.2 W) / 12 V (max. 1 W)	5 V (max. 1.2 W) / 12 V (max. 1 W)
Options			
GPS	External GNSS via USB-C interface	Integrated - 10Hz update rate GPS L1, SBAS L1, QZSS L1, GLONASS L1OF, BeiDou B1I, Galileo E1 External GNSS via USB-C interface	Integrated - 10Hz update rate (optional) GPS L1, SBAS L1, QZSS L1, GLONASS L1OF, BeiDou B1I, Galileo E1 External GNSS via USB-C interface
Internals			
CPU type	ARM	ARM	ARM
Operating system	Linux	Linux	Linux
Software	Dewesoft RT	Dewesoft RT	Dewesoft RT
Internal storage	4 GB eMMC	4 GB eMMC	4 GB eMMC (max. 32 GB eMMC)
Expandable storage	SD card up to 2 TB, USB-C 3.0 Type external storage	SD card up to 2 TB, USB-C 3.0 Type external storage	SD card up to 2 TB, USB-C 3.0 Type external storage
Power			
Power supply	Dual redundant 9 - 48 V DC	Dual redundant 9 - 48 V DC	Dual redundant 9 - 48 V DC
Power consumption	5.8 W @ 24 V (without modules)	Typ. 7.2 W (Max. 11 W)	OBSIDIAN-R12: Typ 7 W, Max. 11 W IOLITE-RACK (Incl. OBSIDIAN-R12): Typ 15.5 W, Max. 19 W
EtherCAT Bus 1 maximum output	10 A	10 A	10 A
Environmental			
Operating Temperature	-10 to 50 °C (-40 to 85 °C optional) (see 1)	-40 to 60 °C (-40 to 85 °C optional) (see 1)	-10 to 50 °C (-40 to 85 °C optional) (see 1)
Storage Temperature	-40 to 85 °C	-40 to 85 °C	-40 to 85 °C
Humidity	5 to 95 % RH non-condensing at 50 °C	5 to 95 % RH non-condensing at 50 °C	5 to 95 % RH non-condensing at 50 °C
IP rating	IP40	IP67	IP30
Physical			
Dimensions	282 x 145 x 144 mm	322 x 162 x 155 mm	483 x 148 x 133 mm
Weight	2.4 kg	3.6 kg	IOLITE-RACK: 2.85 kg OBSIDIAN-R12 GATE: 500g OBSIDIAN-R12 GATE-L: 520g
1) Extended operating temperature range depends of module configuration			
2) OBSIDIAN devices are openDAQ compliant. The full support will be available with a FW upgrade.			