

A data acquisition device with embedded triaxial MEMS accelerometer, analog-to-digital conversion and EtherCAT interface based on the Dewesoft IOLITE EtherCAT platform (www.dewesoft.com).

Key features:

- 0.7 $\mu\text{g}/\text{Hz}$ noise density
- ± 15 g measurement range
- EtherCAT bus, daisy-chaining with single cable up to 50 m device-device
- DEWESoftX software support

Typical applications:

- Ground vibration
- Seismic measurements
- Mining



IOLITEi 3xMEMS-ACC-S is an integrated sensing device. Acceleration is measured by a triaxial MEMS accelerometer inside the device that is tightly attached to the mechanical chassis. Analog to digital conversion is done inside the device, eliminating any noise pick up in analog cabling. Microprocessor inside the device transmits the acceleration samples over EtherCAT protocol into DEWESoft software running on a Windows PC, or alternatively to any controller running EtherCAT master on any platform. Scaling is automatic in DEWESoft software, therefore the data in g or m/s^2 is readily available to the user. MEMS sensor internal temperature is also available as a data channel in DEWESoft software under System monitor channels.

Specifications of the MEMS accelerometer

	Min.	Typ.	Max.	Unit
Measurement ranges	± 15		± 15	g
-6 dB bandwidth		460		Hz
Sample rate			1	kS/s
Noise density (see also residual noise spec)		0.7		$\mu\text{g}/\sqrt{\text{Hz}}$
Offser error		+2		mg
Offset temp. drift (-20...60 degC)		± 0.1		mg/degC
Linearity error -1g ... +1g range		0.05		% FS
Crossaxis sensitivity	-1		+1	%

Noise and dynamic range specification

Bandwidth	Residual noise (RMS)	Dynamic range
10 Hz	1 μg	141 dB
100 Hz	2 μg	134 dB
460 Hz	7 μg	124 dB

General specifications of the IOLITEi 3xMEMS-ACC-S device:

Digital interface	EtherCAT
Interface connectors	RJ45
Power consumption	1500 mW
Supply voltage	12-48 V
Operating temperature	-20 ... 65 degC
IP rating	IP20 and IP67 available
Weight	105 g
Housing material	Aluminium
Tariff number (HTS)	8471.90.0000
Tested according to	IEC-61010, IEC-61326

Synchronization: EtherCAT communication between devices ensures 1 us synchronization between the samples taken from different devices in the chain. The distance between devices does not influence the precision of the synchronization.

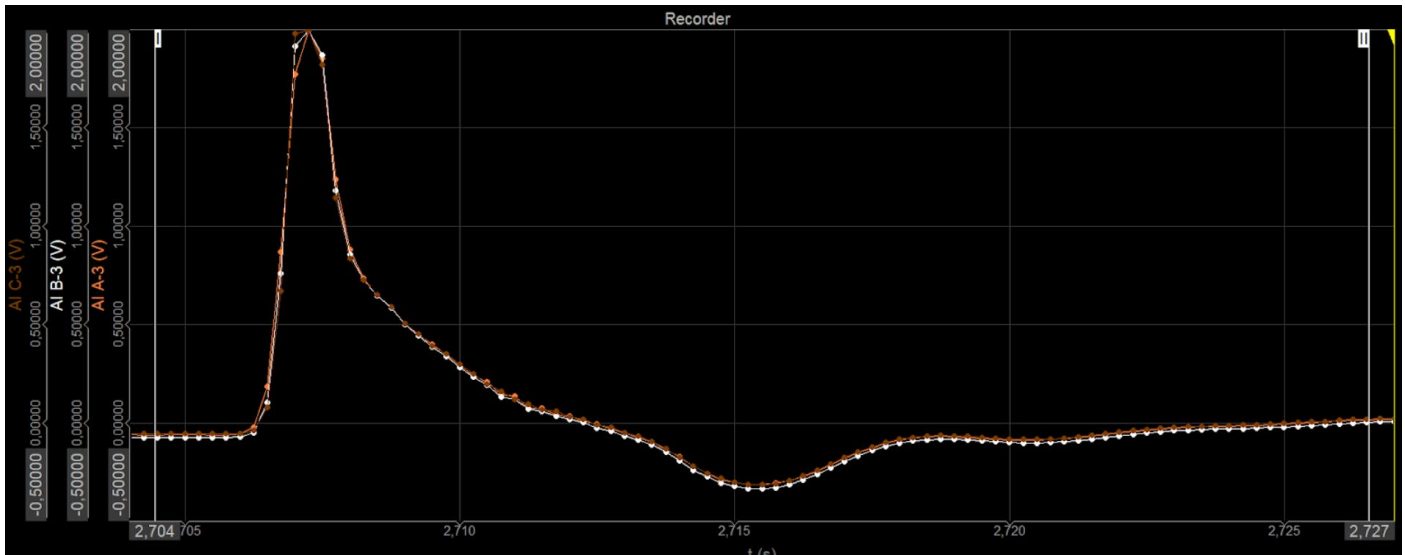


Figure 1 – acceleration data from three 3xMEMS-ACC-S devices that had 50 m of cable between each of them. Devices were screwed together and excited by a drop test. The data is totally synchronized.

Internal temperature sensor: there is an internal temperature sensor mounted inside the device that measures the temperature of the MEMS accelerometer. The readings from the temperature sensor are displayed in Dewesoft software as a System Monitor channel. The values are updated once per second.

Option: IOLITEiw 3xMEMS-ACC-S (outdoor version)

IOLITEi 3xMEMS-ACC-S can be supplied in a waterproof aluminium enclosure with cable glands. The enclosure is designed to be mounted outdoor. Cables are to be inserted through the cable glands at the installation location and crimped to the male RJ45 connectors. Female RJ45 connector of the 3xMEMS-ACC-S are located inside the waterproof enclosure. The top lid is to be fixed to the enclosure using an O-ring seal and four bolts after the connectors are mated.

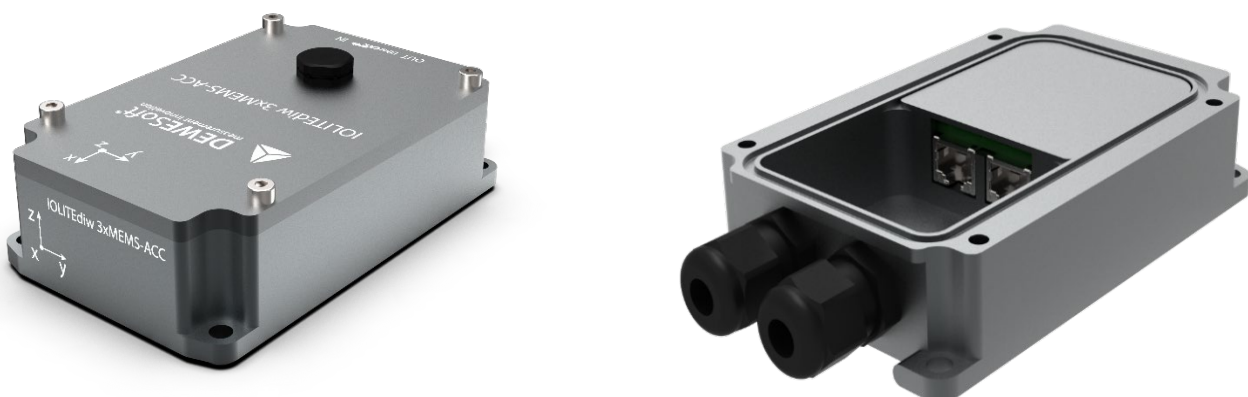


Figure 1 - IOLITEiw 3xMEMS-ACC-S option - outdoor enclosure

The outdoor enclosure automatically vents air to equalize pressure inside the enclosure to the outside air pressure while it does not allow water to pass into the enclosure. This prolongs the life span of the seal and increases durability of the enclosure.

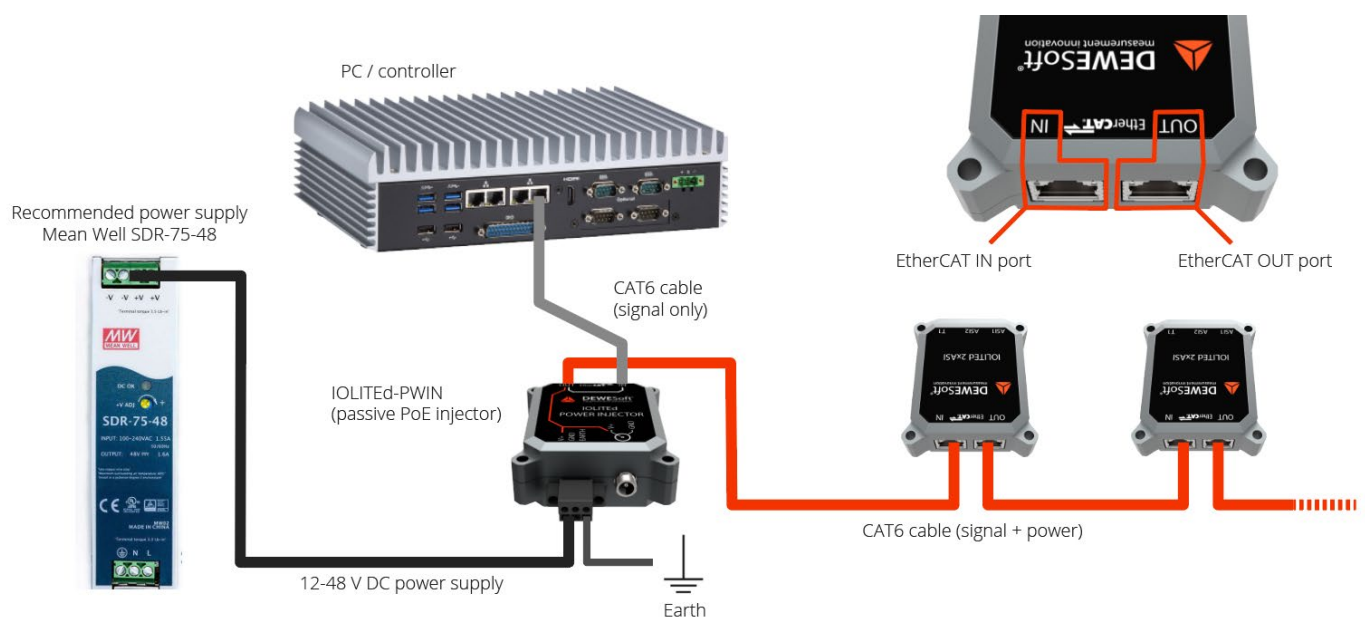
Software support

1. DewesoftX – the IOLITEi 3xMEMS-ACC-S is automatically recognized by the DewesoftX software. Device settings such as measurement range and sample rate are easily configured with the user interface. DewesoftX offers limitless possibilities of synchronized data acquisition, display, recording, mathematics, post-analysis and data export.
2. Any standard EtherCAT master – the IOLITEi 3xMEMS-ACC-S is a standard EtherCAT slave and can therefore be connected to any EtherCAT master controller (Beckhoff TwinCAT, NI Labview, Simulink RT, Acontis etc.).

Hardware Installation

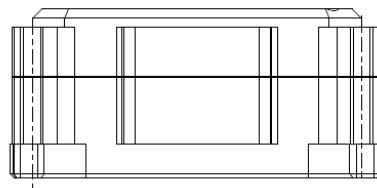
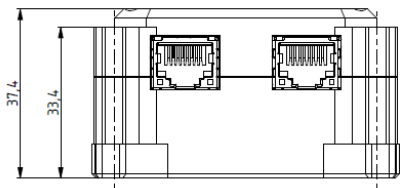
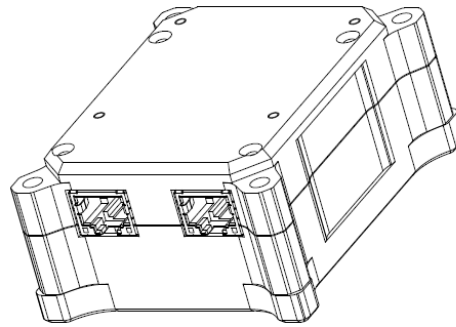
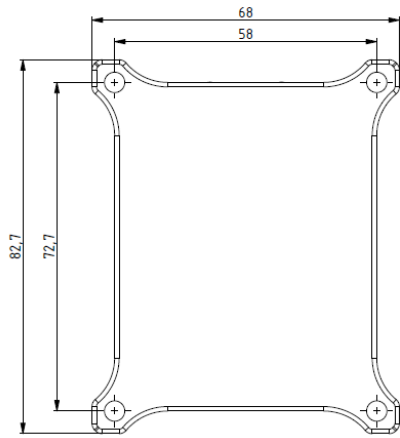
Devices are daisy chained with a standard network cable. It is recommended that the cable is shielded (SFTP, CAT5e) and has a minimum 24 AWG wire thickness. The cable must have 4 wire pairs. The maximum distance node-to-node is 50 m.

Power supply: Passive PoE power injector is necessary for merging the EtherCAT signal and power into a single cable.



Power supply voltage	Cable length device-to-device	Cable size	Max. number of devices from a single power supply
24 V	1 m	AWG 24	8
24 V	50 m	AWG 24	4
48 V	1 m	AWG 24	12
48 V	50 m	AWG 24	10

Technical drawing - IOLITEi-3xMEMS-ACC-S



Technical drawing - IOLITEiw-3xMEMS-ACC-S

