

MAS24-DY v2.0



Solgeo s.r.l.

Via Pastrengo, 9

24068 - Seriate (BG) - Italy

Tel: +39 035 4520075

Web: www.solgeo.it

E-mail: info@solgeo.it

User Manual



Document references	
Date	13/07/2020
Tot. Pag.	24

Revision n.	Date	Revision Cause
Rev. 00	13/07/2020	1° Emission

Autors	Company
R. Signori	Solgeo s.r.l.
M. Limonta	Solgeo s.r.l



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1 INTRODUCTION

The Dymas24 is a sophisticated 6-channel 24-bit acquisition system designed to provide a complete seismic and accelerometric monitoring solution. The high resolution and flexibility of use allow the system to operate as an acquisition system for microseismic, broad band and strong motion signals:

- Acquisition unit
- Battery
- Receiver GPS
- Charger (external)

Optional modules can be added to the standard configuration:

- Modem GSM or Wifi
- External battery with its connection cable or external power supply
- External receiver GPS

The case, when closed, has IP65 degree of protection (with connectors connected to the relative cables, or protected with the closing caps provided).

Any type of sensor that has a voltage output whose full scale is equal to or less than $\pm 10V$ can be directly connected to the acquisition unit. Adapters for sensors with IEPE or 4-20mA power supply are available on request.

The acquisition unit is supplied in the standard version with: an internal LiFePO4 12.8V 10.8Ah battery, battery charger and internal GPS receiver.

The acquisition unit can work in two different modes:

- Event
- Continue (Seedlink) with miniseed file generation

1.1 PRODUCT WARRANTY

The product is guaranteed one year from manufacturing defects. The warranty is limited to 6 months for batteries supplied (energy accumulators) subject to wear and tear depending on multiple factors, especially the type of workload and use. Solgeo S.r.l., will be liable for product malfunctions only and exclusively for the components and labor to repair the fault. No charge can be raised for loss or damage of any kind and for any reason due to the instrument failure. Transport costs for repair of the instrument are always at the user's expense. In case of acknowledgment of repair under warranty the transport costs for the return to the customer will be charged to Solgeo S.r.l.

1.2 LICENSE OF USE

For instruments sold with the software and firmware embedded in the instruments (firmware means a software application residing in the components on board the instrument) is sold exclusively in LICENSE OF USE for an unlimited period of time. The user may not copy the software and use it for other products that are not specifically authorized by the software/firmware manufacturer. It is also forbidden the reverse engineering of any component which will be prosecuted in civil and criminal proceedings in any country where the violation will occur. For use licenses for third party operating systems or programs that may be part of the product, the license terms of the respective manufacturer apply.

Licensing certificates for the use of third-parts programs are stored in our archives.

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Solgeo S.r.l. will never be in any way responsible for copyright infringement actions of third-parts software performed by the end user.

1.3 INFORMATION TO USERS

The equipment complies with RoHS Directive 2011/65/EU



According to the WEEE Directive 2012/19/EU, it is specified that this product, at the end of its useful life, must be collected separately from other waste as shown by the symbol on the right. The recycling of this end-of-life equipment is organized and managed by the manufacturer. The user who wants to dispose of this equipment should contact the manufacturer and follow the system that the manufacturer has adopted to allow the separate collection of the equipment at the end of its life. Adequate separate collection for the subsequent start-up of the discarded equipment for recycling, treatment and environmentally compatible disposal helps to avoid possible negative effects on the environment and health and promotes the reuse and/or recycling of the materials of which the equipment is composed. The abusive disposal of the product by the holder involves the application of the administrative sanctions provided for by current legislation.

2 SECURITY

2.1 SYMBOLS, SIGNALS AND TERMS

You may find these symbols in SOLGEO equipment and/or in this manual:



This symbol indicates that the device is sensitive to electrostatic discharge (ESD) special care must be taken to handle, ship and/or install this device and use special precautions for electrostatic discharge sensitive devices.



This symbol draws the user's attention to situations and/or prescriptions that if not applied may lead to damage to the equipment, software or other property.



This symbol draws your attention and imposes specific instructions concerning the safety of persons in relation to the risk of electrocution and damage to instruments and/or persons.

2.2 SPECIFIC SAFETY INSTRUCTIONS

Power supply



The instrument may need to be powered from a direct current source and/or alternating current from very low or low voltage sources. In the countries of the European Union, a source of electricity with a voltage below 50Vac is considered to be very-low voltage, while a source of low voltage from 50 to 240Vac is considered to be low voltage. For devices powered from low voltage sources (50 to 240Vac) it is mandatory to apply the requirements of the country where the instrument is installed. As a minimum precautionary measure, the installation downstream of a power supply system equipped with an earth leakage circuit breaker and protective earth conductor is mandatory.

Replacing fuses



To avoid risk of fire and equipment damage, use only fuses of the same rating as indicated on the labels on the instrument and/or in the instruction manual. Under any circumstances the fuse must be replaced **ONLY AFTER** the instrument is turned **OFF AND/OR DISCONNECTED** from power supply. For any doubt consult the supplier!

Sensor wiring and grounding



There are situations where the connection between sensor and digitizer or recorder requires the laying of long cables. It is often preferable for the sensor to be isolated from the local ground potential and for the digitizer to be grounded on the side of the digitizer; however, in this case it is possible to create potential differences, even dangerous ones.

The connection of the sensor is therefore to be made by qualified personnel who **MUST** verify the absence of dangerous potentials between the instrument cable upstream of the sensor and the ground potential at the point where the sensor will be installed and/or apply suitable protections.

Use in explosive atmospheres



All the instruments produced by Solgeo S.r.l. ARE NOT suitable for use in environments with explosive atmosphere. It is explicitly forbidden to use them in environments where explosive gases, flammable, fuels, or any other flammable material or liquid are present.

Use of tools for seismic risk assessment



The information collected with the seismic instrumentation produced by SOLGEO (seismograms, earthquake intensity, duration, distance, epicenter, hypocenter, etc.) **MUST NEVER BE USED FOR SYSTEM RISK EVALUATION** unless collected in a scientific context that validates the data.

3 TECHNICAL SPECIFICATIONS

System	
Number of channels	From 1 to 6 individually selectable
Time reference	Internal RTC synchronized on GPS satellite network
Event Detector	Independent selection for each channel between: Threshold, STA/LTA, Threshold on average STA.
Registration mode EVENT DETECTOR	<ul style="list-style-type: none"> - Recording activated by: Event detector, External trigger, Manual trigger. - Continuous recording of minimum and maximum value with time interval that can be set from 1 to 100 seconds. - Manual/programmed recording by software
Registration mode CONTINUOUS	<ul style="list-style-type: none"> - Continuous data recording to internal SD Card - Continuous recording of the minimum and maximum value at a time interval that can be set from 1 to 100 seconds.
Data storage	<ul style="list-style-type: none"> - Internal 32GB SD card (supplied as standard) - External solid state USB disk drive (SSD) up to 128GB (optional to be requested when ordering), to increase storage capacity
Power supply	
Internal battery	LiFePO4 12,8V 10,8Ah
External charger	AC input: 100÷240V 47÷63Hz DC output: 14.6V - 4A Charging time: about 4 hours Protection fuse: 8A - 5x20mm
Consumption	6W ±5%
Autonomy	>16 hours
Power supply from external source	Possibility of connecting a battery or external power supply (optional) Operating voltage: 10.5 to 15VDC, consumption: about 0.5A @ 12V
Acquisition Module	
Converter	24-bit Sigma/Delta A/D converter for each channel, DSP with antialiasing filter
Full scale entrance	±10Volt, differential inputs (optional ±2.6Volt)
Sampling frequency	Settable from 10Hz to 8.000 ¹ Hz IN EVENT DETECTOR MODE ¹ The * symbol next to the value indicates the undecimated sampling rates. Settable from 10Hz to 1.000Hz IN CONTINUOUS MODE
Bandpass	DC – 3.200 Hz

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Dynamic range	> 130 dB (100 Hz)
Amplification	1-2-4-8-16-32-64-128 software-settable, independent for each channel
Anti Aliasing filter	Digital Filter FIR. Nyquist frequency attenuation (1/2 sample rate) > -130dB, bandwidth (-3dB) 40% of sample rate.
External connections	
Communication	LAN 10/100, USB 2.0; GSM/GPRS/UMTS/3G*, WIFI* *These types of communication require the use of optional accessories
Sincronization	Internal, or external (optional) GPS receiver with RS422 interface
Controls	Activation of external warning devices
External power supply	- Possibility to power any external equipment at 12V - Possibility of connecting an external battery or power supply unit
Sensors	Can be used with dynamic active or passive sensors with direct or alternating voltage output (seismometers, accelerometers, velocimeters, hydrophones, pressure switches, etc.).
Physical characteristics	
Temperature range	In use: -10°C ÷ +50°C Recharging: 0°C ÷ +45°C
Dimensions	(LxPxA) 350x290x150 mm
Weight	5,5Kg
Degree of protection	IP65 (with closed suitcase and special protections on the output connectors)

4 COMMISSIONING

This chapter describes in sequence the operations for the first time the datalogger is turned on. The main preliminary operations required are:

- Connections (chapter 5)
- Hardware Configuration of the acquisition unit (chapter 6)
- Software installation (see DymasSoft manual)

4.1 PRECAUTIONS

Below are some precautions that must be observed when using the acquisition unit.

- The supplied battery charger is not suitable for outdoor use.
- The supplied battery charger is only for charging the internal battery, not to use as a power supplier. Use only to charge the internal battery with the power off. In case you want to power the system through an external source use an external battery with its connection cable or an external power supply (optional accessories).
- It is recommended that you always connect the acquisition unit to ground using the appropriate terminal on the "connector plate" on the right side of the case (see **Figure 4**).
- In the presence of rapid increases in temperature due to the passage from environments to different temperatures, before feeding the acquisition unit make sure that no condensation has occurred.
- Although the power source is equipped with a sturdy container, do not subject it to high mechanical stress (e.g. falls and/or vibrations) during both transport and use. If there are problems with operation at the first commissioning after transport, switch off immediately the unit and contact Solgeo S.r.l. technical assistance.

4.2 FUSES

In order to safeguard its integrity, the system is equipped with protection fuses.



Figure 1 – Detail of the charger on the side integrating the protective fuse holder

If the charger does not charge the internal battery, make sure that its protection fuse is not interrupted. Check the fuse and replace it if necessary. This is a 5x20mm 8A cartridge fuse. In addition to the fuse insert in the power supply, two spare fuses are supplied.

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Under any circumstances, the fuse must be replaced **ONLY AFTER THE POWER SUPPLY** has been disconnected from both the power supply and the acquisition unit. If in doubt, consult the supplier!

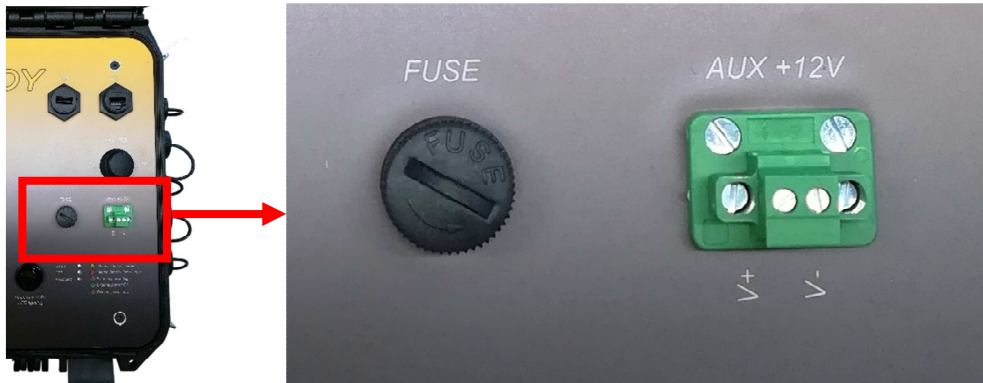


Figure 2 – Detail of the internal panel of the case that integrates the protective fuse-holder

The service fuse (**FUSE**) located near the auxiliary power supply connector (**AUX +12V**) protects the acquisition unit and the derived communication devices.

In case, after having placed the **POWER ON/OFF** switch in the ON position, the device should not turn on, check that the related protection fuse (**FUSE**) is not interrupted. Proceed to check the fuse and replace it if necessary. This is a 5x20mm 2.5A cartridge fuse.



Under any circumstances, the fuse must be replaced **ONLY AFTER THE POWER ON/OFF** switch is turned OFF (by setting the POWER ON/OFF switch to the OFF position) **AND THE POWER SUPPLIER IS DISCONNECTED** from the POWER connector on the side of the case. For any doubt please consult the supplier!

4.3 SIGNALS



Figure 3 – Detail of the internal panel of the case that integrates the LEDs for the signals and the relative button

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First of all proceed with the check of the internal battery charge status, by means of the LEDs, by pressing, even with the acquisition unit turned off, the PUSH BUTTON FOR LED LIGHTING, one of the following LEDs will light up:

- Green **INTERNAL BATTERY LED: FULL CHARGE** indicates that the internal battery is fully charged (voltage >12.57V).
- Yellow **LED INTERNAL BATTERY: CHARGE** indicates that the internal battery is partially charged (voltage 12,1÷12,57V).
- Red **INTERNAL BATTERY LED: LOW CHARGE** indicates that the internal battery is low charged (voltage <12.1) and the receiver will shut down shortly, unless an external power source is connected.

If the red or yellow LEDs light up, please recharge the battery before installing the acquisition unit, alternatively provide for the use of an external power supply (optional).

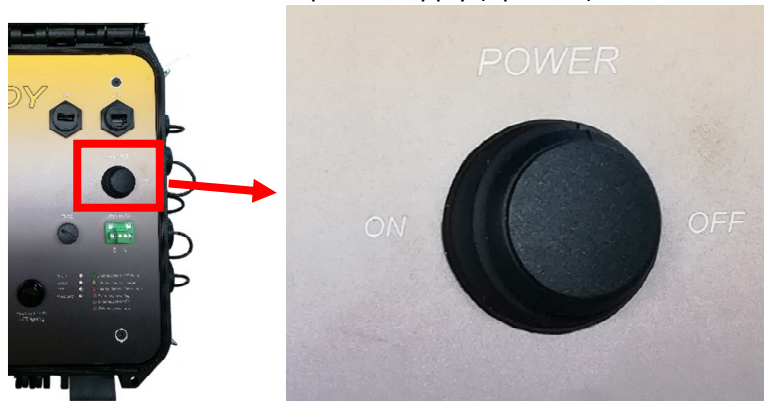


Figure 4 – Detail of the power button located on the internal panel of the case

After having installed the acquisition unit, proceed with the power on by setting the **POWER ON/OFF** switch to ON.

The **POWER** LED must turn on immediately and then the other LEDs will also display the operating status.

N.B.: in order to optimize the consumption of the acquisition unit and to guarantee a higher autonomy of the internal battery the LEDs are normally off. In order to check the status of the acquisition unit press the **PUSH BUTTON FOR LED LIGHTING**, which allows the LEDs to turn on.

Before activating the connection with the PC, wait until the acquisition unit is operating.

This version of the acquisition unit displays the operating status through the 4 leds, described below.

- Green **POWER** LED indicates power status:
 - OFF: indicates that the control unit is not powered.
 - ON: indicates that the control unit is powered.
- Green **STATUS** LED indicates operating status:
 - BLINKING: it is flashing after power on or reset until the acquisition unit is fully operating or it indicates that the system has been put in stand-by mode through the appropriate command sent by the operator (note that closing the connection with the control unit automatically reactivates the operation).
 - ON: Indicates that the acquisition unit is operating.

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- OFF: Indicates an anomaly.
- Green **GPS** LED: green LED that indicates the synchronization status of the internal time reference with the GPS satellite network:
 - OFF: Indicates that the GPS receiver is not connected or there is an anomaly on the GPS unit.
 - BLINKING: indicates that the receiver is connected but has not yet hooked up a sufficient number of satellites, so the time reference is not correct
 - ON: Indicates that the receiver provides the correct time reference, so the dating is also synchronized.
- Green **RECORDING** LED: It indicates that the signal is being recorded. If, in event mode it remains constantly on, it will be necessary to change the trigger parameters. In continuous recording mode it is always on.

The acquisition unit is also equipped with 3 additional LEDs that allow you to check the status of the external power supply. The operation of these LEDs is as follows:

- Red **EXTERNAL POWER LED: HIGH** indicates that the external power source provides a voltage >15.5V so it is too high. The acquisition unit automatically switches to using the internal battery until the external voltage drops below 15V, when this condition occurs the acquisition unit will return to use the external power supply.
- Green **EXTERNAL POWER LED: OK** indicates that the external power source provides a voltage suitable for the operation of the acquisition unit. The system operates using external power.
- Red **EXTERNAL POWER LED: LOW** indicates that the external power source supplies is <10V, therefore too low. The acquisition unit will automatically switch to internal battery until the external voltage returns above 10.5V, when this condition occurs the acquisition unit will switch back to external power.

N.B.: since the system automatically switches from the external to the internal power supply, and the other way around, it is advisable not to install the acquisition unit if the internal battery is completely discharged, as it may shut down if one of the above conditions occurs.

5 CONNECTORS AND CONNECTIONS

The connectors are placed on the right side of the case on a stainless steel plate, equipped with two side fins inclined at 45 degrees that mechanically protect against shocks.

Each connector is supplied with the relative protection cap which is indispensable to guarantee (with the lid closed) the IP65 degree of protection.

The IP65 degree of protection also requires that all connectors that may be connected are compatible.

The following connections are available:

- **INPUT 1-3:** for connecting the sensors to channels 1, 2 and 3 of the acquisition unit.
- **INPUT 4-6:** for connecting the sensors to channels 4, 5 and 6 of the acquisition unit.
- **DIGITAL I/O:** for the connection of some signals used to control the operation of the acquisition unit.
- **GPS/UPLOADER:** for connecting the external GPS receiver
- **POWER:** for connecting the battery charger, external battery or external power supply unit
- **GND:** terminal for the grounding of the acquisition unit

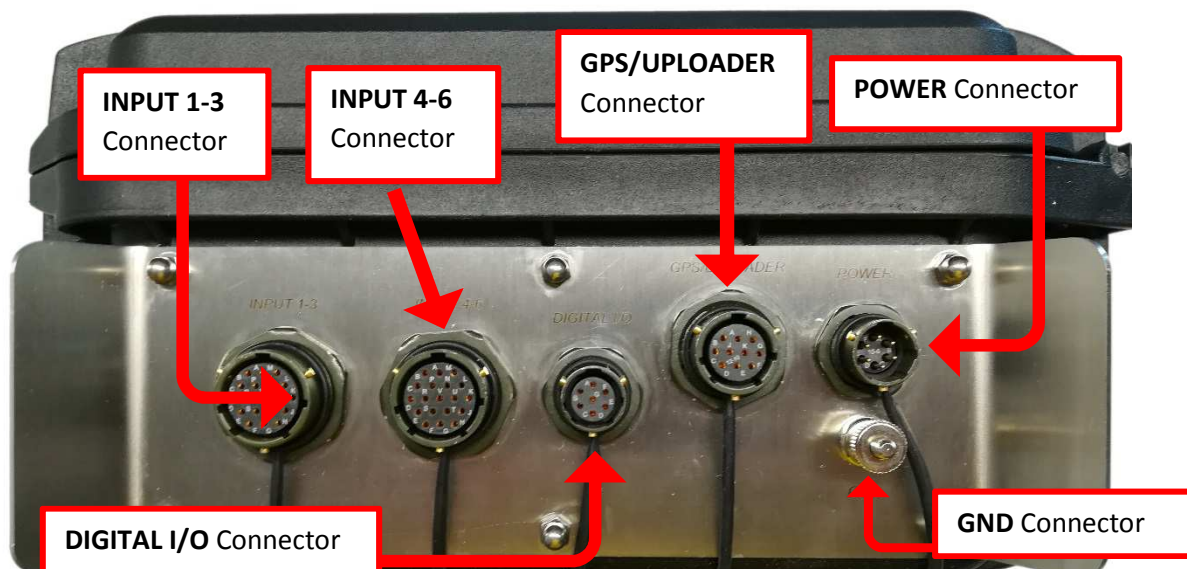


Figure 5 - Detail of the side of the case that integrates the connector panel

Three other connectors are located on the top closing panel:

- **USB:** for connecting external USB flash drives
- **LAN:** for connection to a PC, local network, modem or wireless modules
- **AUX +12V:** to power any external equipment (voltage not stabilized)

The first two are connected to the corresponding outputs on the internal PC board with LINUX operating system.

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Figure 6 – Detail of the internal panel of the case integrating the connectors

Below is the usage information with references for the identification of connections (pinout).

5.1 CONNECTORS

5.1.1 INPUT CONNECTORS

The analog inputs connections are made by n°2 MIL type 19-pin female panel connectors located on the right side of the case, respectively for channel 1-3 and 4-6 inputs. Below is the pinout of these connectors.

PIN	LABEL	DESCRIPTION
L	CH1+ o CH4+	POSITIVE input line to CHANNEL 1 or 4 . With triaxial sensor this input is usually associated to the E/W or X axis component.
M	CH1- o CH4-	NEGATIVE input line to CHANNEL 1 or 4 . With triaxial sensor this input is usually associated to the E/W or X axis component.
A	CH2+ o CH5+	POSITIVE input line to CHANNEL 2 or 5 . With triaxial sensor this input is usually associated to the N/S or Y axis component.
B	CH2- o CH5-	NEGATIVE input line to CHANNEL 2 or 5 . With triaxial sensor this input is usually associated to the N/S or Y axis component.
C	CH3+ o CH6+	POSITIVE input line to CHANNEL 3 or 6 . With triaxial sensor this input is usually associated to the component V or Z AXIS
D	CH3- o CH6-	NEGATIVE input line to CHANNEL 3 or 6 . With triaxial sensor this input is usually associated to the component V or Z AXIS

J	PS1+	Positive power supply for external sensors.
K	PS1-	Negative power supply and GND reference of external sensors.
T	+VE	Positive power supply stabilized external devices. Stabilized voltage output (standard +15Volt 30mA) for external sensor power supply → Optional
G	VE0	GND reference of external devices stabilized power supply. Stabilized voltage output for external sensor supply → Optional
H	-VE	Negative of stabilized power supply external devices. Stabilized voltage output (standard -15Volt 30mA) for external sensor power supply → Optional
E	OTS	10V stabilized output of ITS input. Maximum output current is 80mA. Used to limit the test command to 10V.
P	ITS	10V stabilized input. Apply a voltage between 11V and 15V if you want to use the OTS terminal.
S	Ts1+ o Ts2+	Sensor TEST line control. Positive terminal photo coupler sensor test line. The test line control of each connector has its own opto isolated output.
V	Ts1- o Ts2-	TEST AUX Sensor line control. Negative terminal photo coupler auxiliary line sensor test.
F	/	Not Used.
R	/	Not Used.
U	SHIELD	Central earthing point "CEP" of the acquisition unit. Used to connect the external shield of the cable to the "CEP" of the sensor.
N	SHIELD	Signal inputs screen. To be used to connect the shielding of any individually shielded pairs of analog inputs.

Table 1 – INPUT connector connections

Different levels are possible to drive the test line, in the following table some possible configurations are shown.

REQUIRED CONNECTIONS	PIN TO CONNECT TO THE SENSOR	TEST LINE PILOTING DESCRIPTION
P with J E with S	V=In Test+ K=In Test-	Test with positive pulse of 10 Volt, high impedance resting line. PS1+ and PS1- sensor power supply Configuration for VELOGET
Non	S=In Test+ V=In Test-	Test with Open Collector output with S and V pin conduction activation. High impedance resting line.

Table 2 – Sensor test line connections

5.1.2 DIGITAL I/O CONNECTOR

7-pin female panel mount MIL connector used to connect some signals used to control the operation of the acquisition unit.

PIN	LABEL	DESCRIPTION
A	Int+	POSITIVE input for digital signaling (1/0); positive terminal photo coupler line signaling.
B	Int-	NEGATIVE input for digital signaling (1/0); negative terminal photo coupler line signaling. In case of use with external dry contact, connect Int+ with PWO+ and Int- with -V through the contact. Closing the contact will activate the signaling.
C	Alarm+	Output line that is activated when the ALARM condition occurs. Suitable for driving an external signaling device. Maximum applicable voltage 50V pilotable load 1A; the output is NPN open collector type (referred to -V).
D	PWO+	POSITIVE output voltage (from 10 to 15V) for external equipment power supply. This output is controlled by the internal on/off management circuit. The maximum applicable load cannot exceed

		2A.
E	+V	POSITIVE output voltage (10 to 15V) for external modem power supply. This output is dedicated to the power supply of an external communication device and is controlled by an internal circuit that provides automatic on/off management. The maximum applicable load cannot exceed 2A.
F	Trg+	Input for closing contact to activate a recording. Connect via a dry contact (or button) to -V to start recording.
G	-V	Negative reference (GND). To be used in combination with the signals described above.

Table 3 – Digital I/O connector connections

5.1.3 GPS/UPLOADER CONNECTOR

This connector, a 10-pin female MIL panel mount connector, is used to connect an external GPS receiver (optional), for the synchronization of the time reference of the acquisition unit. Please note that the system is already equipped with an internal GPS receiver, so the connection of an external receiver is only necessary if the device is installed in a condition that does not allow the synchronization of the internal GPS. The synchronization of the GPS receiver allows the exact dating of the recordings so, if the internal receiver fails to synchronize and you do not have an external GPS, you will have to periodically realign the internal clock manually.

PIN	LABEL	DESCRIPTION
A	RX-	RX line negative RS422 interface. Negative RS422 receiving data from GPS receiver.
B	TX-	TX line negative RS422 interface. Positive RS422 data reception from GPS receiver.
C	TX+	TX line positive RS422 interface. Negative RS422 receiving data from GPS receiver.
D	PPS-	PPS negative line. Negative pulse reception line for second GPS.
E	PWS+	Positive Power Supply Line. Positive GPS receiver power supply.
F	PWS-	Negative Line Power Supply. Negative GPS receiver power supply.
G	PPS+	Positive input PPS GPS receiver. Input pulse per second from GPS receiver.
H	SHIELD	Line connected to the ground point of the acquisition.
J	RX+	RX line positive RS422 interface. RS422 positive receiving data from GPS receiver.
K	PRG	Not Used.

Table 4 – GPS/Uploader connector connections

5.1.4 POWER CONNECTOR

MIL 6-pin male panel mount MIL connector used to externally power supply the acquisition unit or charge the internal battery.

PIN	LABEL	DESCRIPTION
A	PWe-	External power supply NEGATIVE pole input. Direct power supply to the acquisition unit (10,5 ÷ 15V).
B	Ckp-	Connection to the NEGATIVE pole of the internal battery. Used to recharge the internal battery.
C	Ckp+	Connection to the POSITIVE pole of the internal battery. Used to recharge the internal battery.
D	PWe+	External power supply POSITIVE pole input. Direct power supply to the acquisition unit (10,5 ÷ 15V).
E	/	Not used.
F	SHIELD	Line connected to the ground point of the acquisition unit.

Table 5 – Power supply connections



ATTENTION!!! The **BATT+** and **BATT-** terminals are derived directly from the internal batteries, so there is voltage even when the power is off. Protect the POWER connector with the appropriate

protection cap when not in use.

5.1.5 CONNECTORS ON THE INSIDE PLATE OF THE CASE

The following table shows the function and connections of the connectors placed on the inner plate of the case shown in **Figure 6**.

PIN	LABEL	DESCRIPTION
/	USB	for connecting external USB flash drives to be used for storing recorded data. (N.B.: Enabling the recording on external USB flash drives, as an alternative to the Internal SD card, is to be requested at the time of the order confirmation).
/	LAN	for the connection, through LAN cable, to a local network or to a possible external network interface.
V+	AUX +12V	POSITIVE power supply output for external modem power supply. This output is dedicated to the power supply of an external communication device and is controlled by an internal circuit that provides automatic on/off management. The maximum applicable load cannot exceed 2A. (Voltage not stabilized, the value can vary between 10,5 ÷ 15V)
V-		NEGATIVE power supply output to power supply any external equipment working with 12Vdc power supply. (Voltage not stabilized, the value can vary between 10,5 ÷ 15V)

Table 6 – Connections of the connectors placed on the inner plate of the case



The AUX +12V auxiliary power supply voltage is not stabilized, so its value may vary depending on the power supply conditions of the acquisition unit between 10 and 15Vdc.

5.2 CONNECTIONS

5.2.1 SENSOR SELECTION AND CONNECTION

Different types of sensors can be connected to the Dymas24 acquisition unit.

The pinout for **INPUT 1-3** and **INPUT 4-6** connectors shown in the chapter **5.1.1**.

The power supply of the sensors is supplied only when the power supply is switched on. This avoids over-discharging the battery in case of prolonged absence of mains voltage.

On request it is possible to provide an additional stabilized voltage output for sensors that require a dual stabilized power supply of ± 15 Volt 30mA, please refer to the specifications of the configuration of the acquisition unit.

The sensor must be installed in a stable and perfectly horizontal position by acting on the three adjustment pins. In particular, the velocimeter has a small tilt angle, so alignment must be performed accurately.

If vibrations of less than 2 mm/sec in speed or 2 mg in acceleration are expected, it will not be necessary to fix the sensor, it will be enough to weigh it down to increase its stability.

The sensor must be fixed firmly to the ground if the amount of vibration to be detected exceeds 5 mm/sec in speed or 10 mg in acceleration.

In any case the connection cable must be stabilized to prevent it from inducing abnormal vibrations.

The digitized signal is always stored in 24bit binary format. During visualization or processing this format is converted into Volts (based on the set full scale value) and then, in order to be represented in the selected engineering quantity, it is divided by the relative translation constant set.



ATTENTION THE CONNECTION OF AN UNSUITABLE SENSOR CAN CAUSE THE FAILURE OF THE CONTROL UNIT AND/OR OF THE SENSOR ITSELF!!!

5.2.2 P.C. INTERFACE CONNECTION AND SELECTION

The acquisition unit, depending on the version, has different communication interfaces. The version in question has a LAN and USB interface.

The LAN port is located on the top panel inside the case (*see Figure 6*), use a standard LAN cable to connect a router, or a cross LAN cable to connect the PC. Note that all modern PC integrate a LAN commutation interface witch also allow to use even a standard LAN cable.

Before you connect your PC to the acquisition unit, install the DymasSoft management software (see the relative manual).

Equipping the control unit with a GSM/GPRS/UMTS/3G modem it will be possible to connect the control unit to your company network or to your PC through the internet, having the same functionality of a local connection.

A Wireless Access Point module is also available, as an optional accessory, which allows to interact up to 100 meters away from the acquisition unit.

The USB port is located on the top panel, allows to connect a USB flash disk drive, up to 128GB capacity, to increase the storage capacity compared to the internal SD memory (32GB). Enabling storage on external USB memory, useful for long time recordings without the possibility to connect to the acquisition unit for data download, must be requested when ordering the acquisition unit.

5.2.3 SYNCHRONIZATION AND CONTROL CONNECTIONS

The **DIGITAL I/O** connector makes the outputs available for the additional functions of the acquisition unit. The pinout and the description of the signals related to these connectors are reported in the chapter **5.1.2**.

The 10-pin female MIL connector "**GPS/UPLOADER**" allows you to connect the external GPS receiver to synchronize the internal time reference. Please note that the device is equipped with an internal GPS receiver inside the case, therefore, the use of the external receiver (which is an optional accessory) is only necessary in cases where the internal one fails to synchronize.

The receiver in use communicates via RS422 serial interface, so it can also be placed very far away (till 500m) from the acquisition unit (the cable for the connection of the external receiver is supplied, optionally, together with the external GPS receiver).

The pinout and the description of the signals for these connectors can be found in chapter **5.1.3**.

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The time reference of the acquisition unit can also be entered manually from the PC without any synchronization.

The connection of the GPS receiver involves the synchronization of the time reference of the ECU to the UTC time of the Greenwich meridian.

The setted time is maintained for several days in case of power failure.

5.2.4 SHIELD CONNECTION

This acquisition unit is equipped with a screw ground socket, located on the connector panel, with which it is possible to connect the acquisition unit to the C.E.P. grounding point of the system.

The way in which the connection of the shield of the acquisition and the system is made is very important and some basic rules must be respected:

- The connection of the acquisition unit's SHIELD is indispensable if you want to guarantee the quality of the digitized signal.
- Identify and use only one point of the system (C.E.P.) to connect the ground point of all the equipment to the ground system.
- Avoid the connection to grounding systems in common with systems that may be a source of disturbance. If the risk of overvoltage is limited and all equipment is nearby, the resistance of the grounding system is not critical and it is preferable to avoid connection to existing systems.
- Always connect the shield of a line at one end only. An exception is the case when connecting a sensor located on an electrically isolated surface.

Note that in order to mitigate the collection of mains grid disturbances the **control unit has the negative power supply internally connected to the ground terminal.**

5.3 POWER MANAGEMENT

The **POWER ON/OFF** switch controls the power supply to the acquisition unit, a protection fuse is provided.

The acquisition unit integrates a system that automatically switch from the internal battery to an external power source (battery or power supply). If a suitable external power source is connected, the system will be powered by it, otherwise it will automatically switch to using the internal battery.

Below are the instructions with which you can optimize energy management.

5.3.1 USE WITH INTERNAL BATTERY ONLY

The LiFePO4 battery integrates a control circuit for energy management, so the battery automatically interrupts the supply when the supplied voltage drops below a minimum threshold level.

Proceed with the check of the state of charge of the internal battery, even with the power off, as described above. It is recommended to use the system with the internal battery only if it is fully charged (green

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INTERNAL BATTERY LED: FULL CHARGE). If it is not, you should also use an external power source or, alternatively, charge the internal battery before using the device.



During charging the LiFePO4 batteries have no absorption limitation, so it is essential to use only the supplied charger, otherwise the internal battery may be damaged.

5.3.2 USE WITH EXTERNAL BATTERY

The use of an external battery must be done exclusively with 12V batteries. If a battery with a higher or lower voltage is connected, the internal power management circuit will automatically switch to the use of the internal battery.



If you connect an external power source that delivers more than 28V to the system, damage to the acquisition unit may occur. Always check that the external battery characteristics are compatible with the system.

To connect the external battery to the system it's necessary to use the appropriate cable, connecting the contacts to the relative battery poles (red to the positive pole "+", black to the negative pole "-") and inserting the flying connector to the relative **POWER** panel connector placed on the side of the case (the pinout of this connector is indicated in chapter **5.1.4**).

The following describes the behavior of the system depending on the voltage supplied by the external battery connected to it.

- If the applied voltage is between 10.5 and 15V, the system is powered by the external battery, the evidence is given by the green **LED EXTERNAL POWER: OK**
- If the applied voltage is higher than 15.5V, the acquisition unit automatically switches to the internal battery, the evidence is given by the red **LED EXTERNAL POWER: HIGH**, until the voltage drops below the value of 15V, when this condition occurs the acquisition unit will return to use the external power supply.
- If the applied voltage is less than 10V, the acquisition unit automatically switches to the use of the internal battery, the evidence is given by the red **LED EXTERNAL POWER: LOW**, until the voltage rises above the value of 10.5V, when this condition occurs the acquisition unit will return to use the external power supply.

When the indicated thresholds are exceeded, if the internal battery is completely discharged, the acquisition unit will switch off.

5.3.3 USE WITH MAIN POWER AND CHARGING

The use of an external power supply (optional), connected to the mains power supply, allows you to use the acquisition unit for long periods of time. It is recommended, also for use in this condition, to install the system with a fully charged internal battery, in order to avoid, in case of interruption of the main power to the power supply, the switch off of the acquisition unit. The external power supply does not recharge the internal battery.

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The external power supply, as well as the external battery, is connected to the acquisition unit through the POWER connector (whose pinout is indicated in chapter **5.1.4.**).

Especially in case the system is powered by an external power supply connected to the main power, it is recommended to connect the acquisition unit to ground by the appropriate terminal.



Connecting an external power source that delivers high value voltage (greater than 28V) may cause a damage of the acquisition unit, always verify that the power supply features are compatible with the system.

Recharge

Below is a list of instructions for proper and safe recharging of the internal battery.

The charge:

- can only be carried out in a sheltered environment, the charger supplied cannot be used outdoors exposed to the weathering (rain).
- can be carried out in an environment where the temperature is in the range 0°C ÷ +45°C.
- don't allowed the contemporary use of the acquisition unit, it can be carried out only when the acquisition unit is switched off.
- can be carried out only and exclusively with the battery charger supplied. Requires a time of about 4 hours to recharge the battery completely discharged.



Using a charger different than the one supplied may damage the battery.

During charging the LED on the charger is red illuminated. When fully charged the LED lights up green.

6 HARDWARE CONFIGURATION OF THE ACQUISITION UNIT

The hardware configuration of the acquisition unit is made at the factory and does not require subsequent modifications. The operating mode is programmed by software, the only exception is the selection of the full scale of the analog input signal which, for this version of the acquisition, is selected at the factory at $\pm 10V$ (optionally it can be set to $\pm 2.6V$).

6.1 CONFIGURATION AND FULL SCALE ACQUISITION SELECTION

The modification of the full scale acquisition is not foreseen for this type of acquisition unit and is reported only for completeness of information.

The full scale configuration requires two distinct operations:

- Properly configure the jumpers for the input attenuation stage, noting the activated selection. On the acquisition module there are 6 groups of jumpers, one per channel, to select the full scale of $\pm 2.6V$ or $\pm 10V$ position as indicated in the screenprint (bottom right on the board).
- Modify the relative software parameters as reported in the DymasSoft operator manual.

At the factory the exact full scale value is determined for each channel, corresponding to the 2 possible selections $\pm 10V$ or $\pm 2.6V$. The value indicated in the calibration sheet must be entered in the relative full scale field for each channel ("advanced parameters" section).

Since the firmware is not able to recognize the exact setting of the jumpers, it is important to verify the correspondence between jumpers configuration and the relative value inserted in the parameters of each channel.

For this type of acquisition, make sure that the software parameters correspond to the selection of the full scale $\pm 10V$.

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