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*Hardware*

 <small>sistemi integrati per la diagnostica e il monitoraggio</small>	<b>User manual</b> <b>eDAS</b> <b>Enhanced Data Acquisition System</b>	Rev.	EN-02_18 AVC
		Date:	(IT 21_03_16 rev. 2 AM)

## Introduction

*This manual is meant to provide the necessary information in order to properly use your latest **eDAS** Multi-channel Data Logger.*

*Therefore it is strongly recommended to carefully read it before using the system.*

*The instructions herein contained refer to **eDAS** with a PCB Vers. 1.*

*The hardware version is identified by the first figure of the serial number printed on the plate sticked onto the side the data logger protective box. The same detail is accessible via software as well.*

*All units are fully inspected and tested in all their functions before they leave our laboratory for sale.*

*Should you need any clarification or assistance, please contact our Technical Service at Boviar:*

☎ (00 39) 081-7583566  
 ✉ info@boviar.com

*We thank you for your choice and wish you a nice work with the equipment you have purchased.*

issued by:  
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# Content

<b>HARDWARE MANUAL .....</b>	<b>4</b>
<b>Description.....</b>	<b>4</b>
<b>Technical Specifications.....</b>	<b>6</b>
<b>Batteries and Power supply additional devices.....</b>	<b>6</b>
<b>Connecting sensors .....</b>	<b>10</b>
<b>eDAS logger fitted with Multiplexers.....</b>	<b>12</b>
<b>eDAS Networking.....</b>	<b>15</b>
<b>Modem.....</b>	<b>16</b>
<b>Diagrams - Cables and pin configuration.....</b>	<b>18</b>

	<b>User manual</b> <b>eDAS</b> <b>Enhanced Data Acquisition System</b>	Rev.	EN-02_18 AVC
		Date:	(IT 21_03_16 rev. 2 AM)

## Hardware Manual

### **Description**

"**eDAS**" is a 16-bit, fully programmable data logger designed to offer a comprehensive solution to structural and environmental monitoring needs wherever signals to be recorded are expected to be slowly changing.

The system core is represented by a 8-channel module that digitizes and formats input signals in order to send them to and / or record them in the internal memory of the system.

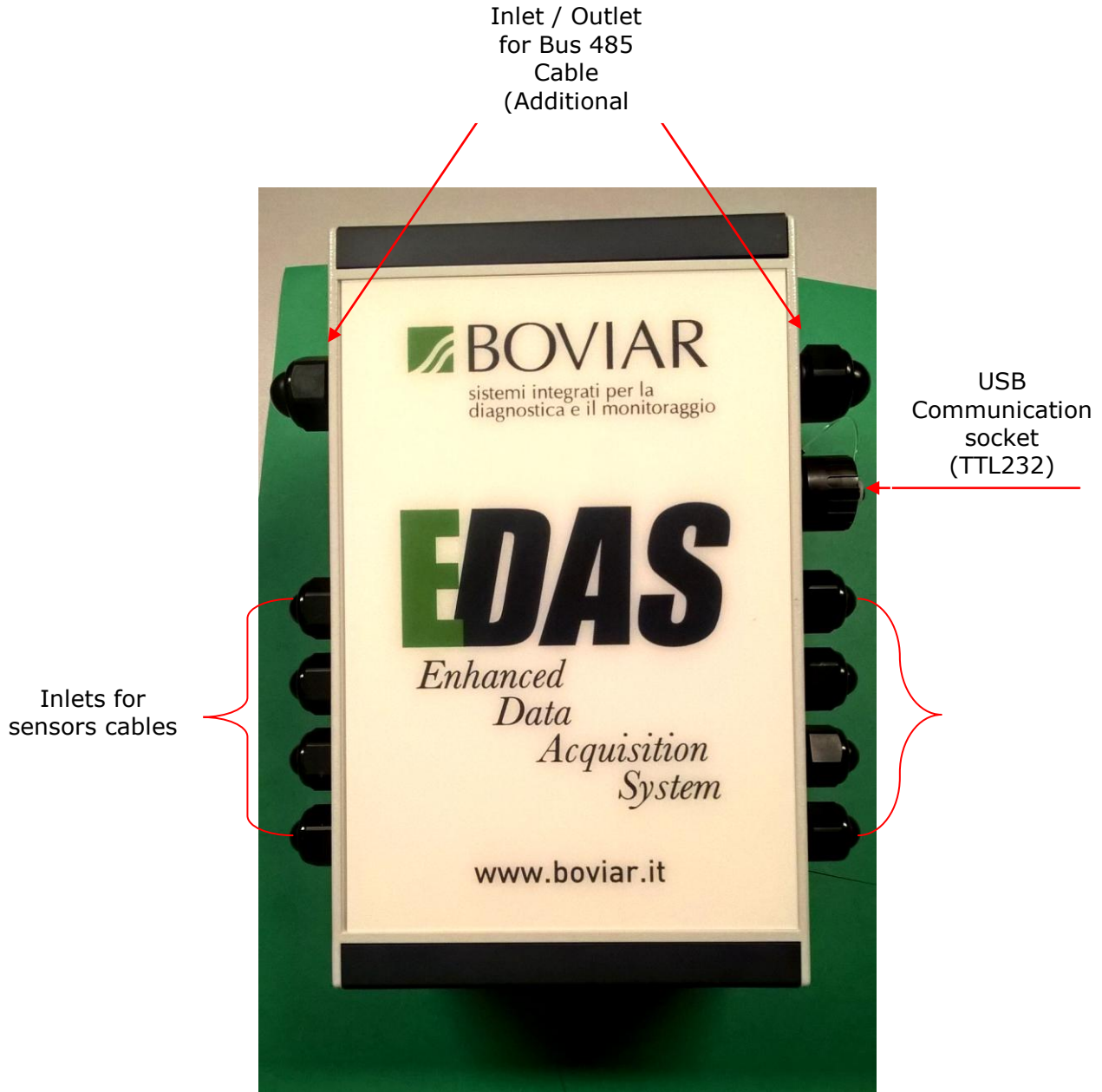
This module is enclosed in a robust, IP65-rated case, fitted with connectors and cable glands, that hosts a user-replaceable main battery and a backup battery as well.

"**eDAS**" logger, that basically comes as a standard 8-channel unit, can be used as a remote acquisition system and, thanks to the internal battery and low consumption features, is suitable for virtually any installation place.

Similarly, it can operate as a distributed multi-channel system made up of as many as 255 units, deployed in proximity with sensors, interconnected via a RS422 / RS485 serial BUS. The BUS will also work as a means to feed all the networked units from an additional 12/24 Vdc power supply consisting in a battery with relevant charger and, if any, a photovoltaic panel (*Powerbox*).

Further, it is possible to increase the number of channels available by implementing a number of multiplexers in order to get standard versions of 16- or 32-channel data loggers.

On request, larger customized systems are assembled in special cases according to the monitoring project needs.



**Fig. 1 - EDAS logger in the newly-designed standard case**

## Technical Specifications

- 8-bit Rabbit 3000 microprocessor operating @ 22,1 Mhz
- Flash Memory 512 Kbyte for approx 1.200.000 readings  
– Static memory with backup battery
- Programs Memory 512 Kbyte – Flash Memory
- Real Time Clock
- Interface Full Duplex RS485 serial (9600 to 115200 bps)
- Interface Half Duplex RS485 serial (9600 to 115200 bps)
- 16-bit Converter with 8 no. Single inputs
- Gain amplifier programmable from 1 to 128
- Resolution: 16 bit  $\pm 1$ LSB with operating range 10mV to 2,5V
- Sensors supply: 2,5V or 12÷15V
- Digital outputs: NC/NO for alarm devices
- Backup Battery for system clock
- Power source: Lithium 3,6V battery or 12÷24V supply bus
- Consumption: 1mA to 50mA
- IP65 rated Aluminium case (standard version)

## Batteries and Power supply additional devices

In order to prevent power waste when not in use, EDAS loggers are normally delivered with separate battery. Users have to fit the battery (or any compatible power supply source) in place before starting any operating procedure.

### Main battery

Standard equipment includes a "D" size 3,6V - 13,5Ah Lithium battery

Type	Li-SOCl <sub>2</sub> (Lithium)
Brand	SAFT
Model	LSH 20

The average estimated operating life is 4 to 6 months, but always consider that this estimation depends on:

- how often the loggers is activated
- how many and what kind of sensors are connected
- how often / long the unit is connected to a PC
- what environmental conditions the logger works in

**WARNING!**

The battery of EDAS logger IS **NOT RECHARGEABLE**. We recommend that only original batteries of the type, model and brand stated before are used.

To fit the battery in its compartment proceed as follows:

- Open the logger box by removing the 4 screws located under the two black strips at the top and bottom of the box
- Place the "D" battery in its compartment paying attention to the correct polarity.

A green flashing LED will signal that now the unit is operative.

**Note**

If the unit is not connected to a PC, the green LED will stop flashing after some 10 minutes and the logger will enter a stand-by status.

**WARNING!**

Battery tension is continuously monitored via the Channel 8 of "eDAS". During logging operation, we advise to check this channel from time to time, paying due attention to the tension values recorded. Replace the battery if values lower than **3,45 Volt** are noticed.

**Additional "back-up" battery**

A further battery is installed inside the unit. It is a 3V, 20mm diameter, Lithium button cell "CR2032" to power the system clock.

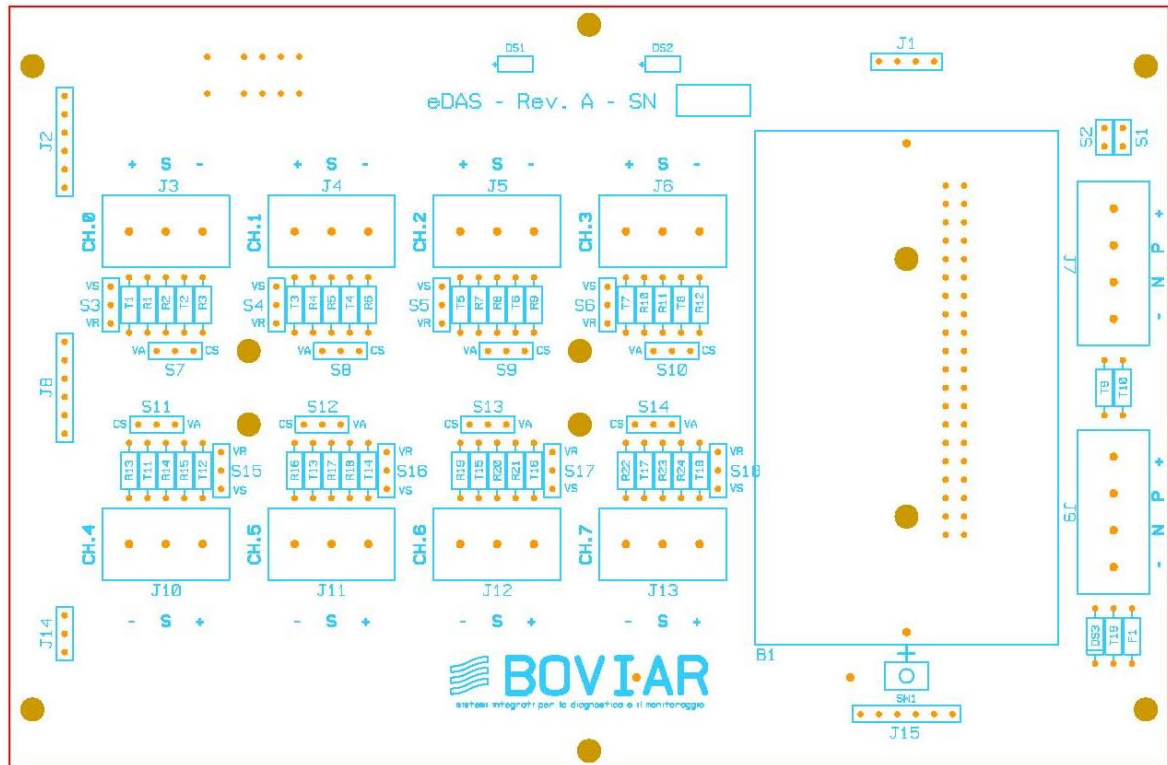
Type	Lithium cell
Brand	PANASONIC
Model	CR2032

The average expected operating life of such a cell is 4..5 years.

**WARNING!**

The CR2032 cell IS **NOT RECHARGEABLE**. We recommend that only original batteries of the type, model and brand stated before are used.

Remove this cell only when it needs to be replaced so to prevent any risk of losing recorded data.



**Fig. 2 – eDAS PCB**

### Optional additional power supply systems

Sometimes - as in the case of a modem or a special-features type of sensors being used - it may be requested to resort to some additional power supply system. Of course, they need to be assessed and defined each time according to the particular needs.

Typically, they will be made of a suitable box inside which a lead-acid rechargeable battery, matched to a 220V charger (or, alternatively, a photovoltaic panel) with necessary circuitry and wiring, are mounted.

In such a case the standard main battery will be automatically switched off. Should the system detect any fault in the additional power system, it will turn on again by itself.



 sistemi integrati per la diagnostica e il monitoraggio	User manual eDAS Enhanced Data Acquisition System	Rev.	EN-02_18 AVC
		Date:	(IT 21_03_16 rev. 2 AM)

## **WARNING!**

When using batteries:

- Recharge them exclusively with the charger supplied with the standard equipment. NEVER USE CHARGERS OF OTHER MAKES.
- Do not heat or throw batteries into fire or put them close to heat sources.
- When you carry / store batteries always pay attention that the positive and negative poles do not get in contact with metal objects.  
DO NOT SHOTCIRCUIT!
- NEVER TRY TO RECHARGE BATTERIES THAT ARE NOT RECHARGEABLE.
- Do not try to open or modify batteries of any kind.

## **WARNING!**

Batteries contain dangerous products that can seriously harm people's health and damage environment! Dispose of batteries only in safe places, handing them in at the designated waste collection centers or according to your country regulations.

## Connecting sensors

Connect sensors to the input channels routing them through the box cable glands.

Screw tightly the glands so that no dust or water can enter to get IP65 tightness conditions. Remember to seal any cable glands not in use.

Before electric connection of sensors, check that the configuration of all the input channels is correct.

Below you'll find the connections for the sensors most frequently used:

### Potentiometric sensors

These include:

- Displacement transducers of PZ, PY, PC, LWG series (no conditioner)
- Inclometers of BIAX series (no conditioner)
- Temperature sensors of NTC series

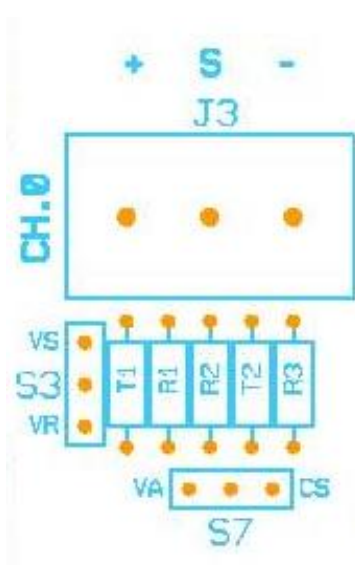
### Sensors with conditioners

- All kind of sensors with voltage or current output

The dedicated channels will be configured according to the type of sensors to be connected

Refer to the Tables shown in next page for directions.

1 to 8 Channel Configuration							
Sensor Type	Jumper Inputs		Supply Jumpers		Terminal board (Fig. 2)		
	S7 - S8 - S9 - S10 - S11 - S12 - S13 - S14		S3 - S4 - S5 - S6 - S15 - S16 - S17 - S18		J3-J4-J5-J6-J10-J11-J12-J13		
	VA	CS	VR (2.5 V)	VS (14 V)	1	2	3
Potenziometric	Open	Open	Closed		+ V	+ S	GND
Voltage output 0 .. 2,5V	Open	Open		Closed	+ V	+ S	GND
Voltage output 0 .. 5V	Closed			Closed	+ V	+ S	GND
Current Output 2-wire 4..20 mA		Closed		Closed	+ V	<b>G N D</b>	
Current Output 3-wire 4..20 mA		Closed		Closed	+ V	+ S	GND



### A TYPICAL CHANNEL

**J3** = Sensor terminal

**S3** = Supply configuration  
Close S3 sideward VR or VS (see table)

**S7** = Input Configuration (see table)  
 - **Open** = Input range: max 2,500 Volt  
 - **Closed towards VA** = Input range: 2,5 to 5,0 Volt  
*Note: In this mode the Input voltage is halved*  
 - **Closed towards CS** = Input range 4 .. 20 mA on 100Ω resistor

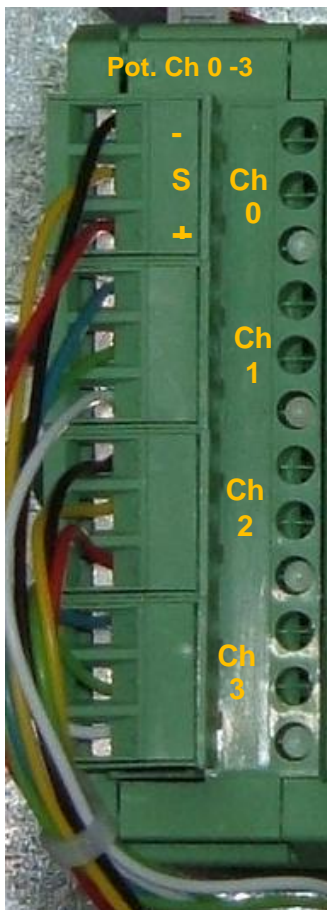
**Fig. 3 – Input Channels Configuration**

## eDAS logger fitted with Multiplexers

The implementation of one or more “multiplexers” offers the chance to increase **eDAS** basic standard number of sensors that can be connected (generally 8 or 16) and expand the logger possibilities at a low cost.

The following example shows how a 16-channel **eDAS** is expanded to 32 channels (in groups of 4) keeping it in the same standard box.

Adding a multiplexer to any **eDAS** logger entails that at least one of the basic channels available has to be dedicated to the new device, by configuring it according to the technical and electrical features of the new sensors to be implemented into the system (see fig. 3).

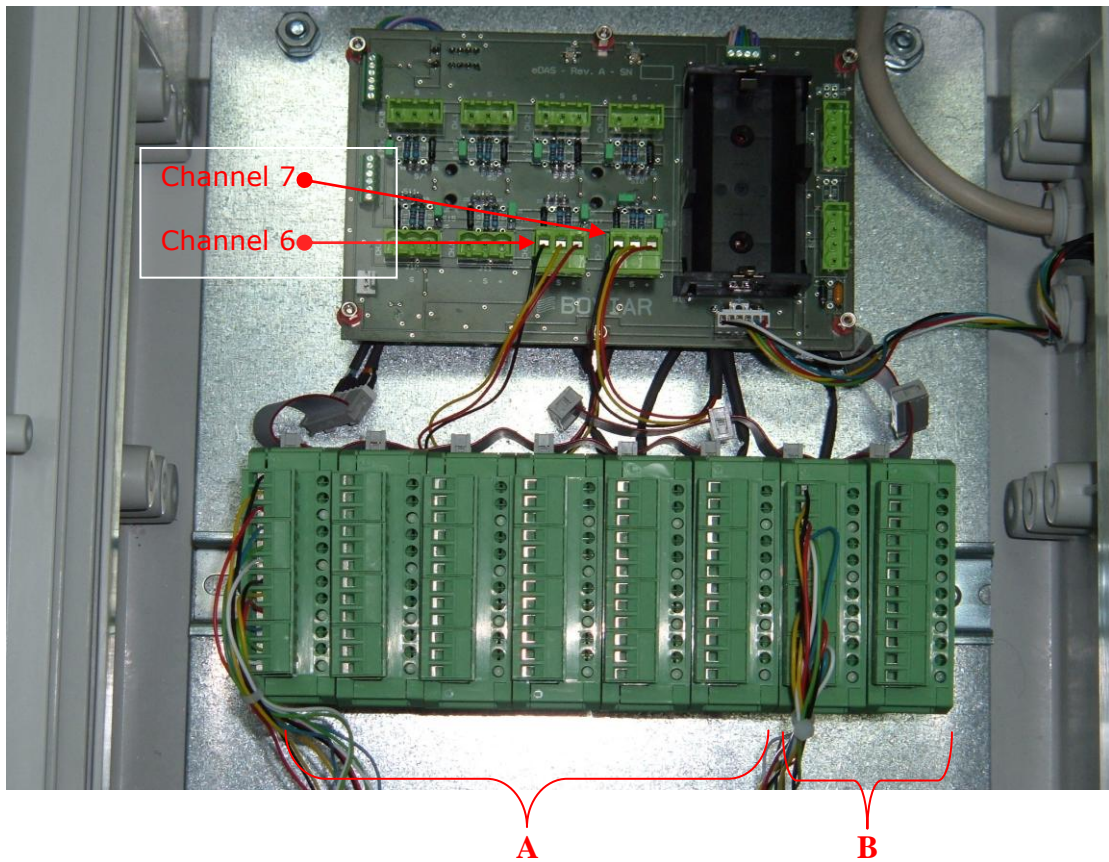


This means that a multiplexer (or a group of multiplexers) may be connected exclusively to transducers of the same type (e.g. vibrating wire gauges or current output transducers). Consequently, for each different type of sensor that you wish to add to your logger you will need to get a further dedicated multiplexer (or a group of multiplexers) that will relate to as many input channels of **eDAS** logger (which will be suitably configured).

Connect the sensors wires to the multiplexer terminal board as shown in the picture on the left.

*When a channel is measuring its LED will turn on.*

**Fig. 4 – eDAS Multiplexer Terminal Board**



**Fig. 5 – eDAS implemented with 4 + 2 multiplexers**

**A**

**24-ch Multiplexer bundle** (6 x 4ch)  
connected to eDAS **Channel 6**  
configured for potentiometers

**B**

**8-ch Multiplexer bundle** (2 x 4ch)  
connected to eDAS **Channel 7**  
configured for 4..20 mA sensors

For the correct matching of multiplexer to **eDAS** channels you need to use the "SGA" software, supplied with the standard equipment.

 <small>sistemi integrati per la diagnostica e il monitoraggio</small>	<b>User manual</b> <b>eDAS</b> <b>Enhanced Data Acquisition System</b>	Rev.	EN-02_18 AVC
		Date:	(IT 21_03_16 rev. 2 AM)

## Standard equipment and Accessories

The standard equipment of **eDAS** includes:

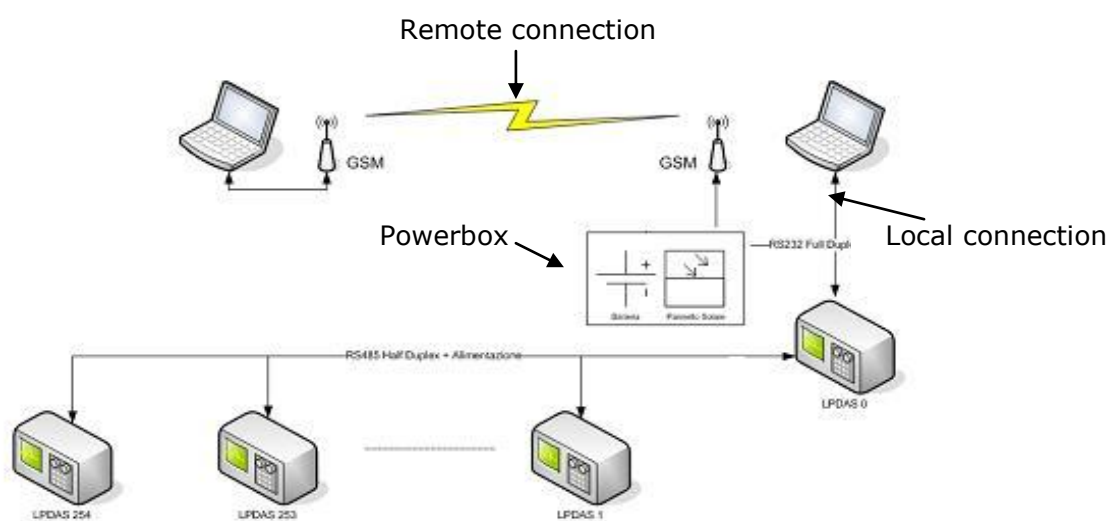
- "D" size 3,6V - 13,5Ah Lithium Battery
- USB Connecting Cable EDAS to PC (TTL232)
- "SGA" Software for running system and data downloading

### Optionals for special needs

(to be assessed after consulting our engineers)

- Electronic conditioners to connect non-standard sensors (load cells, strain gauges, etc.)
- PowerBox (Power supply from 220V mains or photovoltaic panels)
- Additional and / or Special boxes for heavy-duty installations
- Pole and fixing kit for supporting eDAS and accessories
- Customized solutions

## eDAS Networking



**Fig. 6 – eDAS networking**

Figure 6 above illustrates a typical distribution of a number of eDAS (**NODES**) networked on a 485 BUS connection. If needed, this BUS can serve as well to carry the power supply from the additional Powerbox.

The maximum number of **eDAS** units in a network is 255 and the distance from the first to the furthest node, provided that a suitable supply source is available, can reach as far as 1 km.

In Fig. 6 you can also notice that it is possible to communicate with the network either **remotely** via a GSM modem or **locally** via a PC/Notebook

 <small>sistemi integrati per la diagnostica e il monitoraggio</small>	<b>User manual</b> <b>eDAS</b> <b>Enhanced Data Acquisition System</b>	Rev.	EN-02_18 AVC
		Date:	(IT 21_03_16 rev. 2 AM)

## Modem

In order to connect remotely to **eDAS** you will need a GSM/GPRS modem and a SIM card.

You will have to purchase and activate your SIM card (it is NOT included in the standard equipment) ensuring to choose a **M2M SIM** card for **GSM/GPRS** traffic.

Different options for SIM cards are available in the market and they vary according to the various telephone operators in your country.

### **WARNING!**

Before opting for one particular telephone company, we recommend that you previously check that the GSM / GPRS signal in the area where eDAS with modem has to be installed is sufficiently covered by the operator of your choice.

Due to compatibility and efficiency matters, we suggest to include also the modems in your order of a data logging system to BOVIAR s.r.l. This way you can be sure that they are always correctly configured, tested and ready to be connected to your new logger.

Boviar cannot guarantee that **eDAS** equipment works properly when modem models of client's choice are being used.



## Modem connection

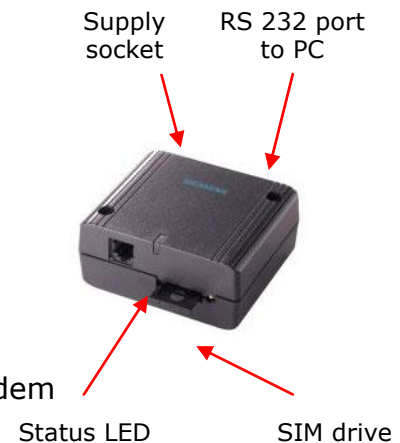
### PC pole

Modem units are generally supplied with a charger and a RS232 cable as standard equipment. If your PC has no serial port you will need to get a USB-RS232 adaptor.

In this latter case the adaptor needs to be installed firstly (refer to the product instructions).

#### **GSM MODEM**

1. Connect modem to your PC via cable
2. Insert aerial plug (standard accessory) into modem socket
3. Insert your SIM card in its drive after disabling its PIN code(\*)
4. Connect the 220V mains adapter to the modem



(\*) You can do this by inserting your SIM card in a portable phone and then proceed to PIN code disabling. Now the card is ready to go into your modem.

The status LED will turn on to confirm it is now active:

1. Fast flashing (1/1s) = Searching for phone signal / No signal
2. Slow flashing (1/3s) = working OK
3. Steady light = phone connection on

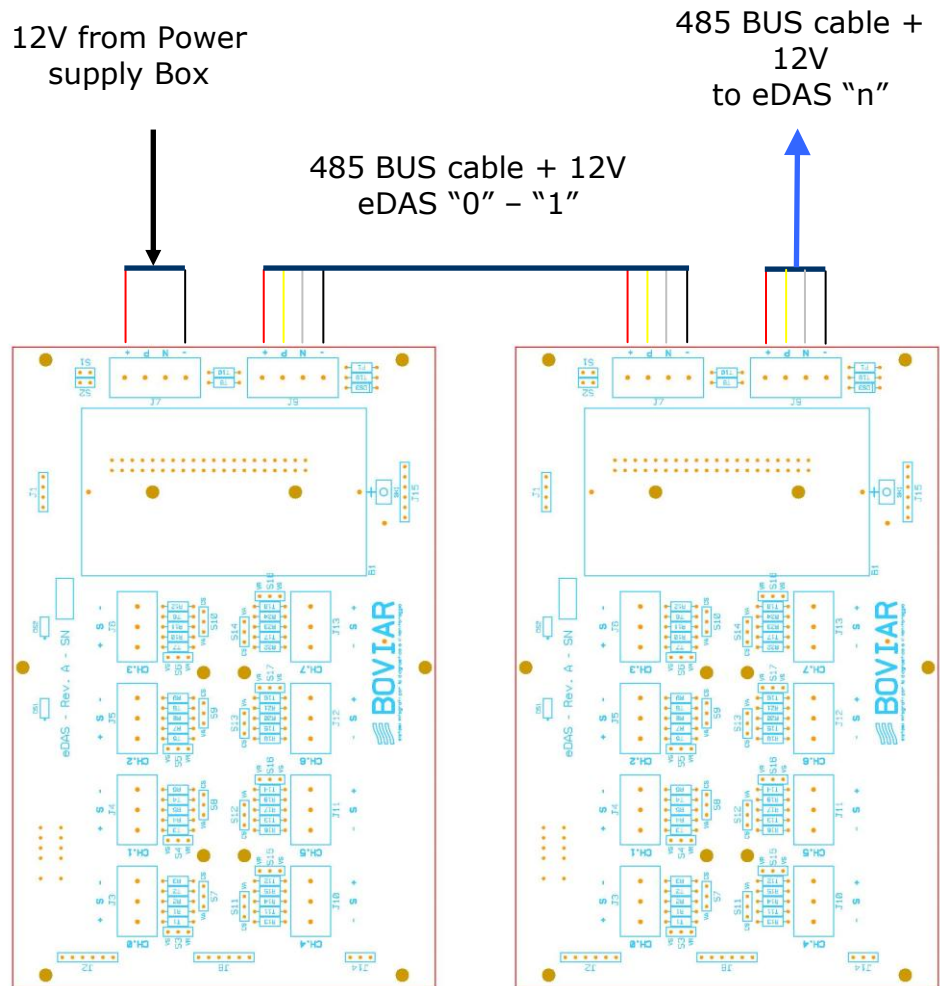
### eDAS pole

In this case, the modem unit is generally pre-mounted and pre-cabled inside the Powerbox (or **eDAS** box) and it is already connected to power supply.

Follow instruction as above or the ensuing operations.

## Diagrams - Cables and pin configuration

### eDAS Networking CONNECTIONS DIAGRAM



**Fig. 7 - eDAS Node 0 - 1**