ELTEK
A Delta Group Company

Installation Guide

Battery Monitor2

CAN Bus Node and Symmetry Kit

Power Supply Systems

Battery Monitor2 (T2) and Battery Monitor (T1)

351507.033

SAFETY and ENVIRONMENTAL PRECAUTIONS

The **product warranty** becomes invalid if the following safety precautions are not followed during handling, installation, commissioning and general use/operation of *Eltek* power supply systems.

General Precautions


Device Hazard

CAUTION: Even though the product incorporates protection circuitry and other safeguards, it can be **damaged, perform poorly or have a reduced lifetime** if it is exposed to **incorrect treatment** during transport, installation or service. Always handle the equipment using proper lifting techniques, do not roll, climb or drill hole in the cabinets or enclosures. G1


Electric Shock

WARNING: Opening the equipment may cause personal injury — even if the mains AC supply is disconnected. Hazardous voltages may be present inside, as large capacitors may still be charged. G2

Environmental Precautions


Ventilated Hot Surface

CAUTION: To avoid damage the equipment, **keep objects clear of system ventilation inlets, outlets and system fans**, if any, ensuring the **airflow** through the units is **not obstructed**, and that the fans rotate freely. Use caution with power modules, as they can reach **extreme temperatures** under load and normal operation. E1


Current Surge Protection

WARNING: The installer/user is responsible for ensuring that the power system is not damaged by current surges, over-voltages, etc. caused by external transients, lightning, electrostatic discharge, etc. To avoid damage and obtain the expected system reliability, it is mandatory to always install SPDs in Eltek's power supply systems. Follow the instructions given in "Requirements for Surge Protection", doc. 2024623. E2


Humidity & Dust Protection

WARNING: The electronics in the power supply system are designed for indoor, clean environment. When installed in outdoor enclosures — using heat sinks or closed loop heat management systems — it is important to maintain the equipment closed and tight during operation, to avoid external air entering the enclosure. Also, when using open loop heat management systems, it is important to replace the filters on a regular basis. Indoor installations in dusty or humid areas require appropriate air filtering of the room, or filtering of the air entering the power system. Follow the instructions given in "Generic Guidelines Environmental Protection.", doc. 2038879 E3

Precautions during Installation


Qualified Personnel

CAUTION: Read the user documentation carefully before installing and using the equipment, as installation and operation is to be performed as described in it. Always tighten screws and bolts with the **torque values recommended by the supplier** of the terminals, breakers, etc. Also, refer to **Eltek's Typical Torque Recommendations** in the documentation. For safety reasons, the **commissioning and configuration of the equipment is only to be performed** by *Eltek*'s personnel or by authorized and qualified persons. I1


EMC, NEC/CEC Regard

CAUTION: This product is tested and verified according to international safety, environmental and EMC standards. Any **non-*Eltek* equipment** installed into this product after delivery might influence the performance and **could infringe the original approvals**. The **installer is responsible** for ensuring that the environmental properties of this product/ system do not deteriorate during installation, and that it is performed in accordance with applying regulations.

Installations in USA and Canada must comply with NEC/CEC requirements. I2


Device Hazard

CAUTION: Before you start the electrical installation, you must **always disconnect** all external supply circuit breakers, as well as internal battery and load fuses/ breakers, if any. I3


Electric Shock

WARNING: For safety reasons (high leakage current / high touch current) you must always connect the AC earth wire (PE) to the terminals, before you connect the AC input cable(s).

The batteries, if any, represent a major energy hazard. To avoid short-circuit of battery poles, you must always remove metallic objects — uninsulated tools, rings, watches, etc. — from the vicinity of the batteries. I4


Electric Shock

WARNING: 60V power systems, and higher voltage systems, are only to be installed in Restricted Access Locations (RAL). Access must be limited by use of tool, i.e. lock and key. I5

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Battery Monitor Types

Part #	Type	Description
242100.300 until v3.0	Battery Monitor	Type 1 (T1), with internal temperature sensor
242100.300 from v4.0	Battery Monitor2	Type 2 (T2), with increased accuracy and external temperature probe
226887	Kit	Battery Monitor Symmetry Kit

Table 1. Overview of Eltek Battery Monitors and Symmetry Kit

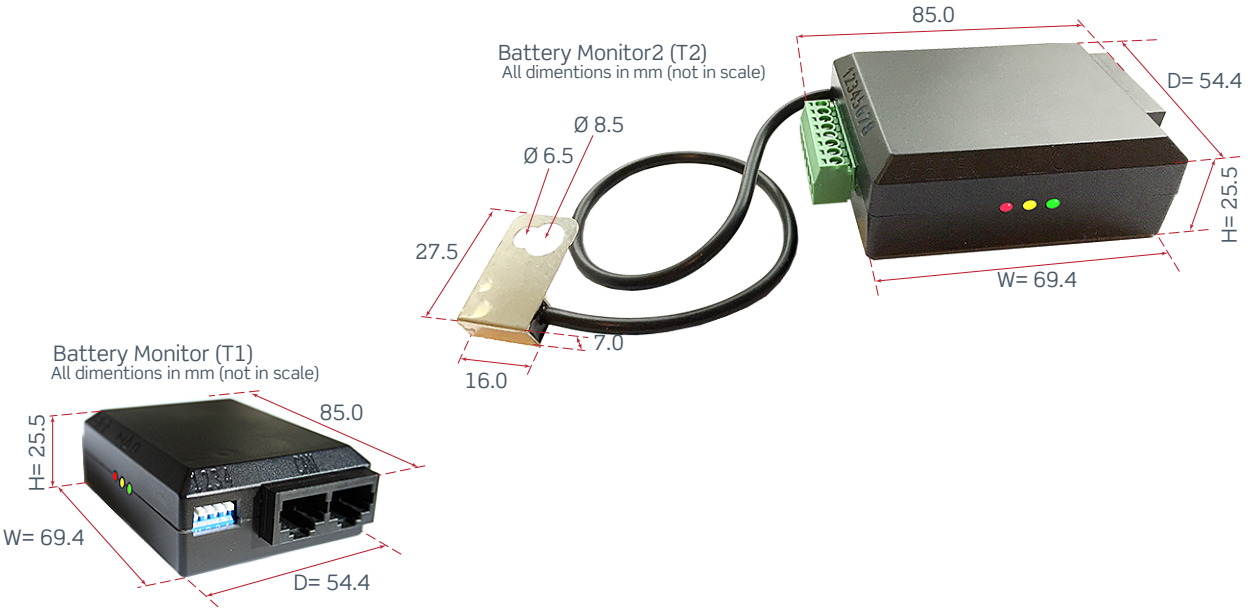

Figure 1. Dimensions Battery Monitor (T1) and Battery Monitor2 (T2)

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1. Introduction

Congratulations on your purchase of the *Battery Monitor, CAN Bus Node*, an intelligent "plug-and-play" module to decentralize and expand the functionality of *Eltek* power supply systems.

About this Guide

This booklet provides you with the required information for installing the *Battery Monitor2 (T2) and Battery Monitor (T1) CAN Bus Nodes* in *Eltek* power supply systems. The booklet also presents the *Battery Monitors'* technical specifications and the content of *Battery Monitor Symmetry Kit*.

For more detailed information about how to activate and configure the *Battery Monitors*, browse and search through *PowerSuite Online Help* or *CWUI Online Help (Controllers' Web-based User Interface).*

System Diagram — CAN Bus Nodes

The *Battery Monitor CAN Bus Node* is used as a building block in *Eltek* power supply systems, see *Figure 2 on page 5*.

The *Battery Monitor* and other *CAN bus nodes* — like the *AC Mains Monitor*, the *FlexiMonitor*, the *Load Monitor*, etc. — are powered directly from the CAN bus, and have dedicated inputs and outputs that expand the system monitoring and controlling capability.

The *Smartpack2 Master controller* serves as the local user interface between you and the system. The *Smartpack2 Basic Industrial controller* monitors and controls the power system's internal wiring and supplies both CAN bus systems with power. The system may also be configured via the controller's web-based user interface (CWUI) on a standard web browser or via the *PowerSuite* PC application.

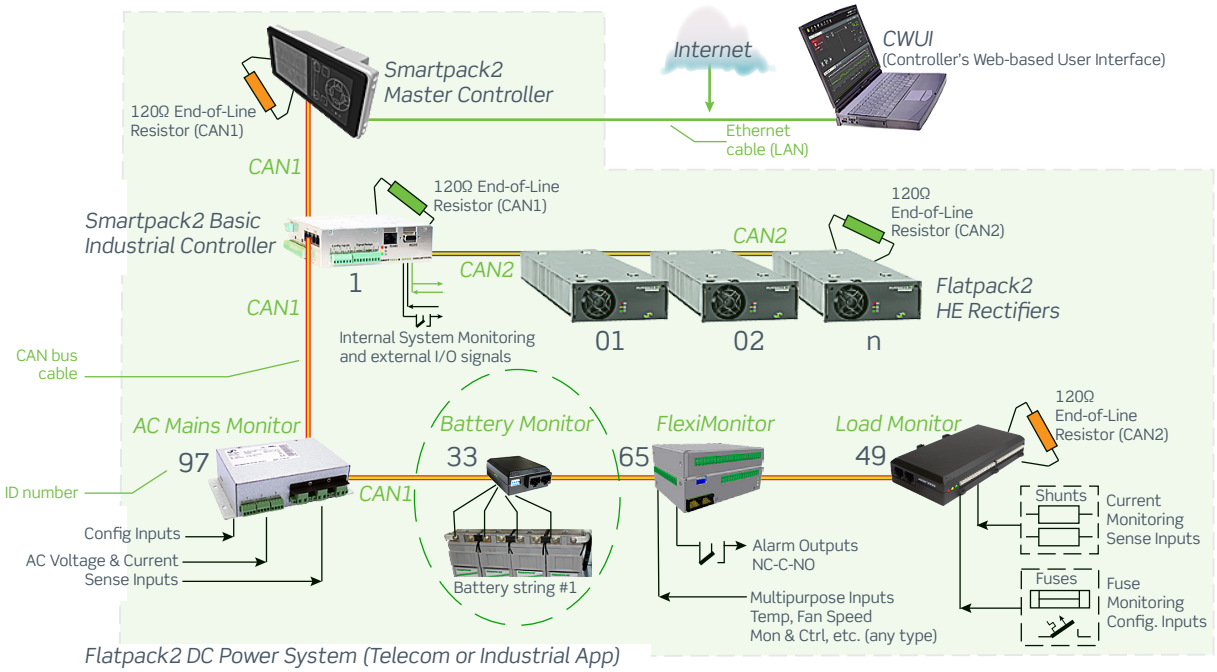

Figure 2. Example of the Battery Monitor and three other CAN bus nodes connected in a Flatpack2 power supply system

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2. Battery Monitors, CAN Bus Nodes

The *Battery Monitor CAN Bus Node* enables you to decentralize and increase the number of battery symmetry measurements in *Eltek* power supply systems. Also, it monitors the battery fuse – with a fuse monitoring input – and the battery current – via a current sense input.

The *Battery Monitor2 (T2)* also monitors the battery compartment temperature using the temperature sensor built-in at the end of the external cable or probe, while the *Battery Monitor (T1)* uses a temperature sensor built-in the unit's casing.

Key Features

A wide range of features are implemented in the *Battery Monitor CAN Bus Node*, as mentioned below:

- Powered via the CAN bus; no external power supply required
- Firmware upgrade via the SD card or Flash memory or CAN bus (see FW Upload Tools on *page 24*
- 4 battery symmetry inputs
  for battery strings' symmetry measurements
- 1 fuse monitoring input, user configurable
  for fuse monitoring and other site equipment monitoring
- 1 battery current sense input
  for bi-directional current monitoring via external current shunts
- 1 battery temperature sense input
  via the temperature sensor built-in at the end of the probe (*Battery Monitor2 (T2)*) or via the temperature sensor built-in the unit's casing *(Battery Monitor (T1)*)
- Storage of calibration data and real time event log
- Configuration via the master controller's front keys and via the controller's web-based user interface (CWUI) on a standard web browser or via the PowerSuite PC application
- Flexible mounting using Velcroue adhesive tape on the bottom of the unit, or using a screw
- Up to 14 the Battery Monitor modules may be connected the CAN bus
- CAN bus addressing via DIP switches
- Suitable for -48V and -60V power systems
  with negative DC distribution

Read also chapter *"4. Technical Specifications" on page 24*, for more details.

Typical Applications

The *Battery Monitor CAN Bus Node* is employed in *Eltek* power systems, to implement flexible expansion and distribution of system functionality.

The *Battery Monitor CAN Bus Node* is suitable for distributed monitoring of battery symmetry, fuse, current and temperature of local and remote located battery banks.

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3. Installation of Battery Monitors

You can install the *Battery Monitor CAN Bus Node* in *Eltek*'s -48V and -60V power supply systems with negative DC distribution.

NOTICE:

— The power system's controller may indicate CAN bus and Battery alarms during installation of the Battery Monitors

— You need standard installation tools and equipment used by an authorized electrician. All tools must be insulated


Electric Shock

Safety Precautions

Follow these precautions during installation, commissioning and general handling of the *Eltek* power supply system.


Qualified Personnel

CAUTION:
For safety reasons, the **commissioning and configuration of the equipment is only to be performed** by Eltek 's personnel or by authorized and qualified persons; otherwise the warranty may be invalidated.

Please, **read the user documentation carefully** before installing and using the equipment, as installation and operation is to be performed as described in it.


Electric Shock

WARNING:
The batteries represent a major energy hazard. To avoid short-circuit of battery poles, you must always remove metallic objects — uninsulated tools, rings, watches, etc. — from the vicinity of the batteries.

Basis Installation Steps

Carry out these steps to install the *Battery Monitor CAN Bus Node* in your power system. Connect first one end of the cables to the monitor's terminals (X:*), and then connect the other ends of the cables to the battery blocks' terminals, the current shunt and the battery fuse, if applicable.

Power is ON!

1. **Switch OFF Battery Fuses**
   Switch OFF or remove all battery fuses or circuit breakers
2. **Assign the Battery Monitor's CAN bus address**, *by* setting the *Battery Monitor*'s DIP switches. Read also chapter *"Configuration" on page 15*
3. **Attach the Temperature Probe to the object** or the place you want to monitor (Skip this step, if you are installing a *Battery Monitor (T1)*
   For example, to monitor the temperature of a battery string, connect the ring tongue terminal — at the end of the 30cm long probe or cable — to one of the terminals of the battery block located in the middle of the string. The tongue is suitable for terminals with a diameter of both 6.5mm and 8.5mm. Read also chapter *"Location of Connectors, Ports, LEDs (T2)" on page 10*

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4. **Attach the Battery Monitor to a battery block** or suitable surface
   Use the adhesive tape ("Velcro") (T) or a suitable screw (S) to attach it max. 30cm away from where the temperature sensor was attached on the previous step.
   (If you are installing a *Battery Monitor (T1)*, you can attach it to the best suitable place, as the temperature sensor is embedded in the monitor's casing).
   Read also chapter *"Fastening the Battery Monitors" on page 9*.
5. **Connect the Battery Symmetry Wires**
   For wire types, refer to the chapter *"Battery Monitor Symmetry Kit" on page 25* in the Appendix.
   For location of terminals, refer to the chapters *"Connection Drawing — Battery Monitor2 (T2)" on page 11*.
   — Connect one end of the symmetry wire to the monitor's input terminal, X:*pin 1
   — Repeat the step above for the other symmetry wires (X:*pin 2, 3 and 4)
   — Connect the cable lugs, on the other end of the symmetry wires, to the correct battery terminals. Refer to chapter *"Connections — Battery Symmetry Wires" on page 12*.
6. **Connect the Battery Fuse Alarm and Current Sense cables**
   Notice that these cables are not included in the kit, refer to the chapter *"Battery Monitor Symmetry Kit" on page 25* in the Appendix.
   If required,
   — Connect one end of the Battery Fuse Alarm cable to the *Battery Monitor*'s terminal X:*pin 5 & 6 (+ & —) and the other end to the battery fuse's alarm contact
   — Connect one end of the Battery Current Sense cable to the *Battery Monitor*'s terminal X:*pin 7 & 8 (+ & —) and the other end to the battery current shunt
7. **Connect the CAN bus cable and terminate the bus**
   A. Connect one end of the CAN bus cable to the system's CAN bus.
      — Remove and keep the RJ45 CAN bus termination plug from the first or last node in the power system's CAN bus
      — Plug the one end of the CAN bus cable to this node's CAN port.
      The cable included in the kit is 2 m long, refer to *"Kit's Content" on page 25* in the Appendix
   B. Connect the other end of the CAN bus cable to the *Battery Monitor*
      — Route the CAN bus cable to the battery compartment, where the *Battery Monitor* is attached
      — Plug the other end of the CAN bus cable to one of the *Battery Monitor*'s CAN ports
   C. Terminate the CAN bus
      — Insert the RJ45 CAN bus termination plug, that you removed in the step 1, into the other B*attery Monitor*'s CAN port
      For more information, read chapter *"CAN Bus Termination" on page 16*.

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8. **Switch ON Battery Fuses**
   — Switch ON all battery fuses or circuit breakers
   — Reset possible alarms that the power system's controller may indicate
9. **Activate and configure the Battery Monitor's operation**
   — Access the power system's controller using a computer's browser or the *PowerSuite* application
   — Enable and configure the *Battery Monitor*'s communication on the CAN bus
   — Enable and configure the *Battery Monitor*'s inputs
   — Enable and configure the main parameters for battery symmetry measurements
   Read more in chapter *"Configuration via Web Browser" on page 18* or in chapter *"Configuration via PowerSuite" on page 22.*

Fastening the Battery Monitors

You fasten the *Battery Monitor CAN Bus Node* to a battery block or to a suitable surface, max. 30 cm from the fastening point you choose to attach the temperature probe — using the touch fastener adhesive tape "Velcro" (T) on the bottom of the *Battery Monitor*. For dimensions, see *Figure 1 on page 3*

Alternatively, you can mount a screw (S) on a suitable surface, and thread the monitor so that the screw head slides along the slit (L) of the *Battery Monitor*.

The *Battery Monitor (T1)* has no external temperature probe, and the temperature sensor is embedded inside the monitor. Refer to the Appendix, to section *"Fastening the Battery Monitor (T1)" on page 25*.

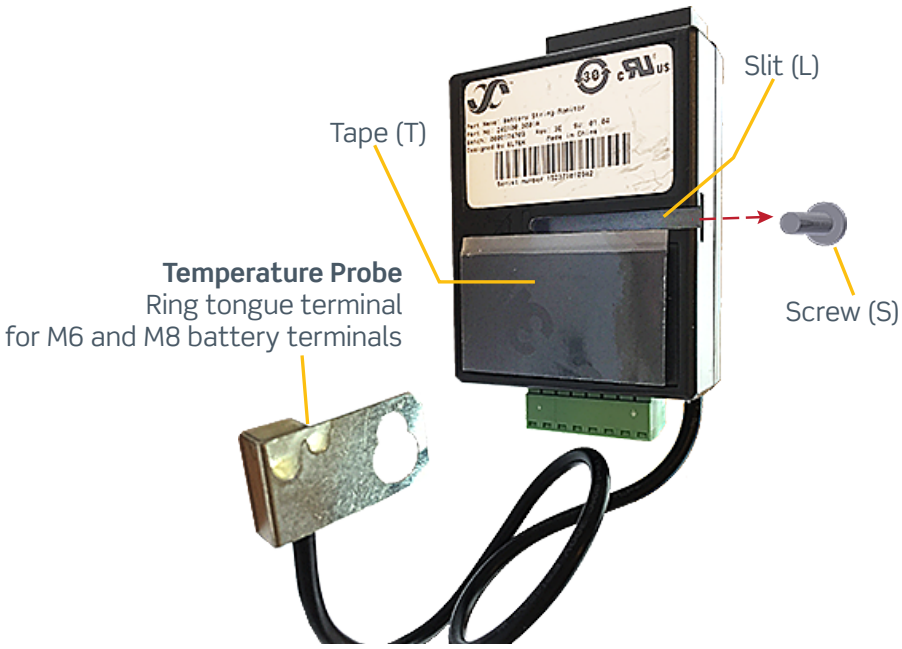

Figure 3. Fastening options for the Battery Monitors (the picture shows the Battery Monitor2)

The temperature sensor at the end of the probe will monitor the battery temperature accurately, as long as the sensor is fastened on a suitable location inside the battery compartment, e.g. on a battery block terminal in the middle of the battery string. The Battery Monitor2 needs no calibration, see *page 24.*

You can install several *Battery Monitor2* modules (max. 14 pcs. per system / CAN bus), if you want to monitor the temperature of different locations of the compartment, e.g. the temperature of the upper battery string, the string in the middle and the lower battery string, etc.

Notice that the power system raises alarms based on the *Battery Monitor* reporting the **highest temperature**, if several are connected.

Location of Connectors, Ports, LEDs (T2)

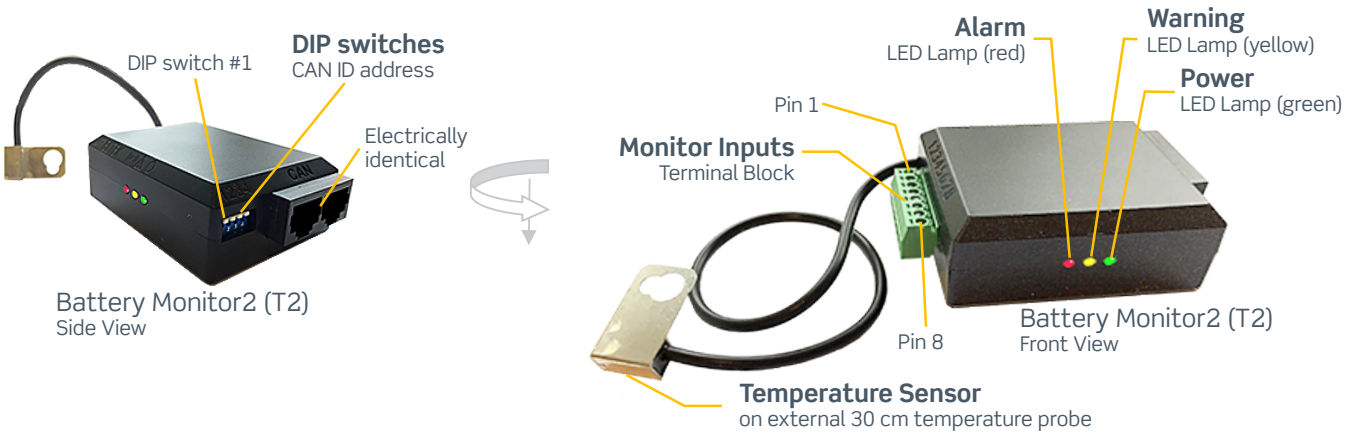

Figure 4. Location of terminals, DIP switches, CAN ports and LED indicators in the Battery Monitor2

CAN port 1 and 2 are electrically identical, and are used to enable connection of the CAN bus incoming and outgoing CAT5 cables, or the RJ45 CAN bus termination plug.

LED Indicator	Illumination Status	Description
Power	OFF ON green	The monitor has NO supply The monitor has supply
Warning	OFF ON amber	No Warning Warning (Non-critical alarm)
Alarm	OFF ON red	No Alarm Alarm (Critical alarm)
Other	Green ON & Red Flashing Green OFF & Red Flashing	Supply voltage too low Firmware boot-loading

Table 2. Description of the Battery Monitor's LED illumination status

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Connection Drawing — Battery Monitor2 (T2)

Use this drawing as a connection reference for all cabling. You find the exact location of connection terminals, plugs and DIP switches, by referring to chapter *"Location of Connectors, Ports, LEDs (T2)" on page 10*.

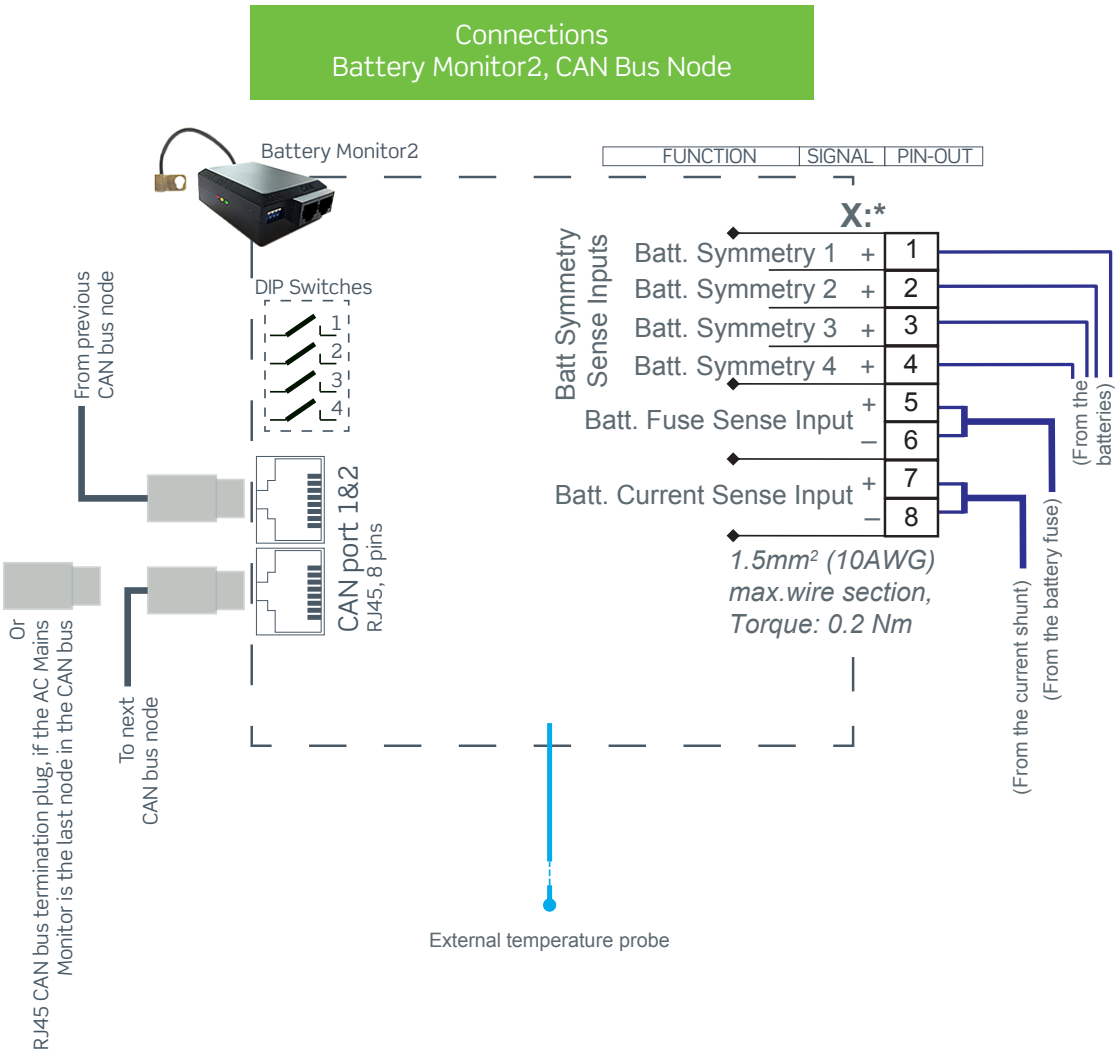

Figure 5. Connection Drawing Battery Monitor2 (T2) CAN Bus node

Notice that the Battery Fuse Alarm cable and the Battery Current Sense cable are not included in the kit, refer to the chapter *"Battery Monitor Symmetry Kit" on page 25* in the Appendix.

Read chapter *"Connections — Battery Symmetry Wires" on page 12*.

You find more information on chapter *"Technical Specifications" on page 24*.

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Connections — Battery Symmetry Wires

48V Block Measurements

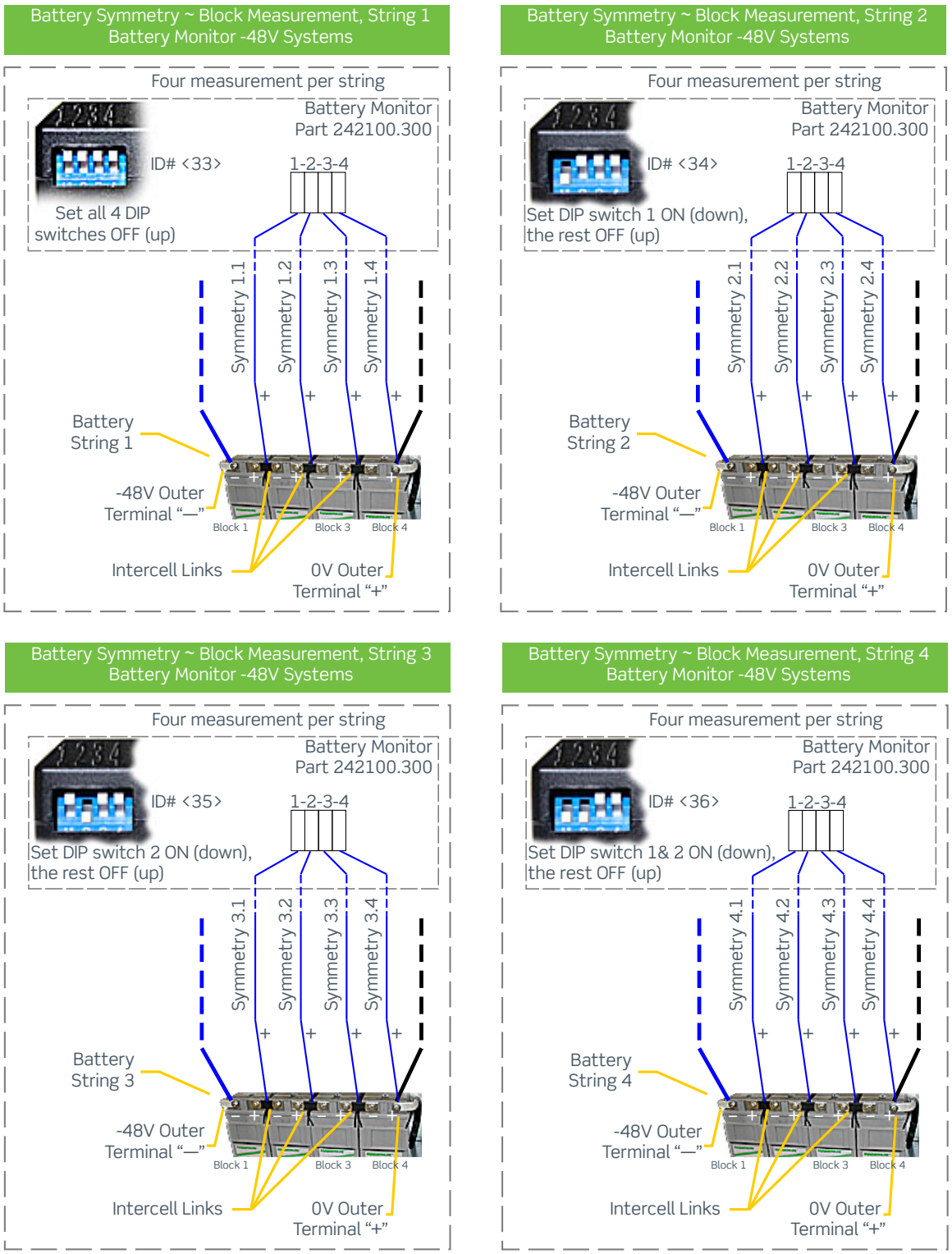
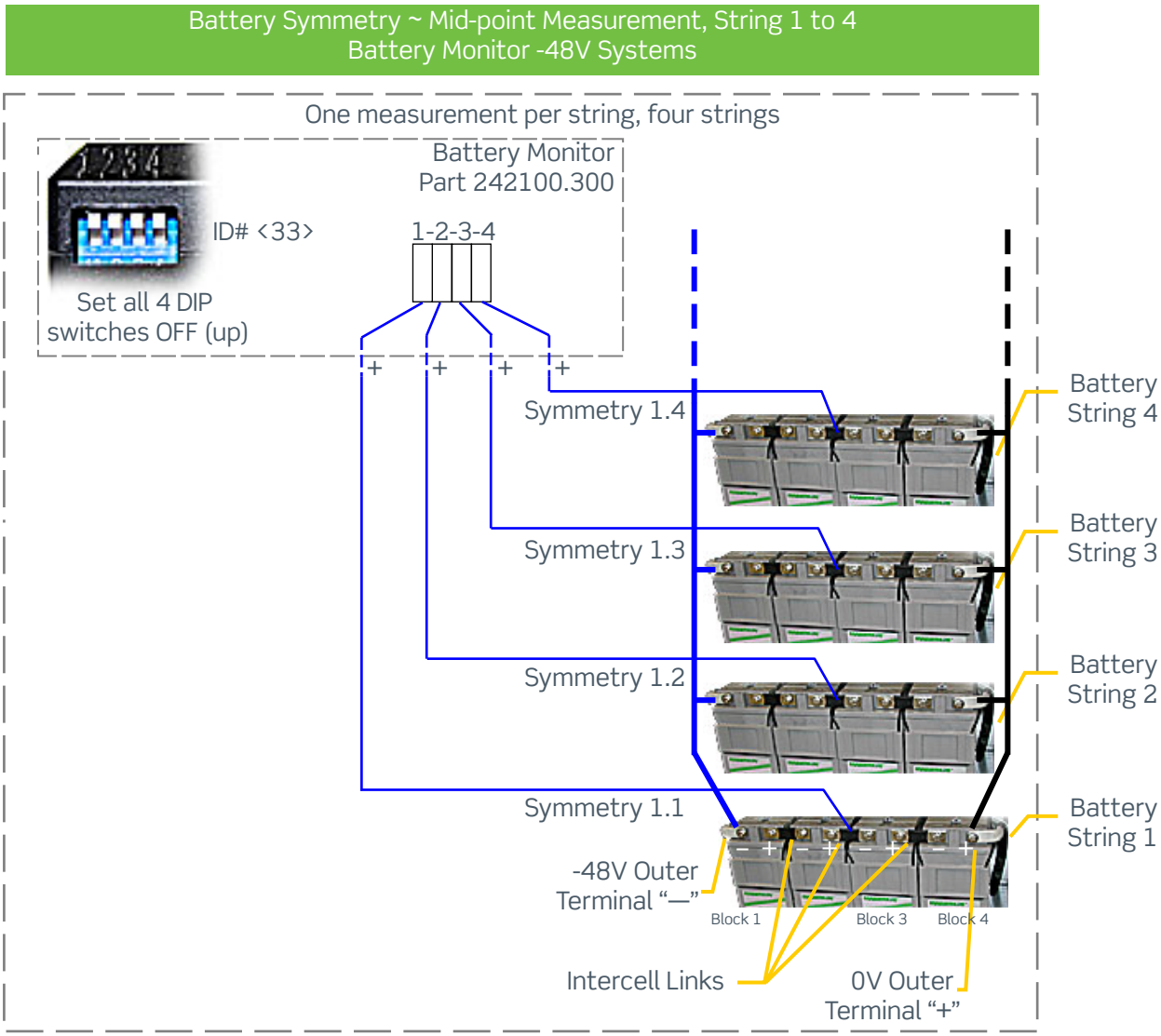


Figure 6. Example of battery symmetry connections. Block measurements 48VDC power systems

Notice: Always connect *Battery Monitor* with ID#<33> to battery string 1 (lowest), with ID#<34> to string 2, and so on. *PowerSuite* will then refer to the correct battery string.

48V Mid-point Measurements



Notice:
Always connect *Battery Monitor* with ID#<33> to battery strings 1 (lowest), 2, 3 and 4. Then *Battery Monitor* with ID#<34> to string 5, 6, 7 and 8. And so on. *PowerSuite* will then refer to the correct battery string.

Figure 7. Example of battery symmetry connections. Mid-point measurements 48VDC power systems

Notice that in +24V power systems using 12V battery blocks, the Mid-Point Measurement Method and the Block Measurement Method are equal, as the strings consist of only two battery blocks. Refer to the topic *"Battery Monitor's Symmetry Connections, 24V"* in CWUI Online Help.

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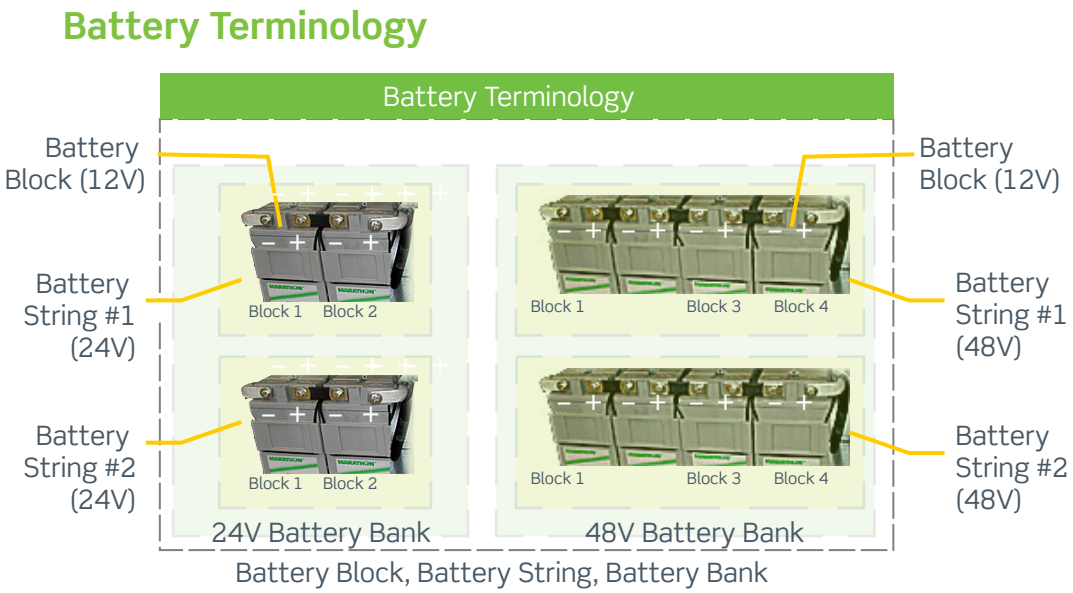

Figure 8. Battery block, battery string and battery bank definitions

Notice that a 60V battery bank could be implemented with one or several 60V battery strings; each string consists of five 12V battery blocks, each block consists of six 2V battery cells. The 60V battery strings consist then of 30 such battery cells.

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Configuration

When connecting *Battery Monitor* nodes to the CAN bus of the *Eltek* power system, you have to configure each of the *Battery Monitors* by:

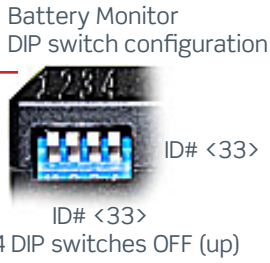
1. Setting the DIP switches with the correct CAN bus address, to assign a unique ID number to the *Battery Monitor*, read chapter *"CAN Bus Addressing" on page 15*.
2. Configuring the Battery Monitor node's operation, using the system controller's keypad or using the controller's web-based user interface (CWUI) on a standard web browser or via the *PowerSuite* application, read chapter *"Configuration via PowerSuite" on page 22*.

CAN Bus Addressing

The power system's controller dynamically software-assigns ID numbers to the rectifiers and power modules. The controller registers the power modules' ID numbers — or CAN bus address (01, 02...) — together with their Serial Numbers.

The Battery Monitor's ID numbers (33, 34...46) are assigned by DIP switches on the nodes' side.

A maximum of 14 Battery Monitors may be connected to the CAN bus. Notice that if only one Battery Monitor is connected, you have to assign it with ID# 33.



Battery Monitor	ID #	DIP Switch Position 1 — 2 — 3 — 4
1st Monitor	33	OFF— OFF— OFF— OFF
2nd Monitor	34	**ON** — OFF— OFF— OFF
3rd Monitor	35	OFF— **ON**— OFF— OFF
4th Monitor	36	**ON** — **ON**— OFF— OFF
5th Monitor	37	OFF— OFF— **ON** — OFF
6th Monitor	38	**ON** — OFF— **ON**— OFF
7th Monitor	39	OFF— **ON**— **ON** — OFF
8th Monitor	40	**ON** — **ON**— **ON**— OFF
9th Monitor	41	OFF— OFF— OFF— **ON**
10th Monitor	42	**ON** — OFF— OFF— **ON**
11th Monitor	43	OFF— **ON** — OFF— **ON**
12th Monitor	44	**ON** — **ON** — OFF— **ON**
13th Monitor	45	OFF— OFF— **ON** — **ON**
14th Monitor	46	**ON** — OFF— **ON** — **ON**

Note: The monitor's ID # corresponds to the DIP switch's binary value plus 33.

Table 3. Battery Monitor DIP switch addressing

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CAN Bus Termination

To ensure a correct bus communication and avoid data reflection, you must always **terminate the CAN bus with two 120Ω resistors**, one at each end of the line (60Ω bus impedance).

Eltek power systems are shipped from factory with the CAN bus already terminated with 120Ω resistors. The **CAN bus termination** is implemented with a special RJ45 plug with built-in 120Ω end-of-line resistor.

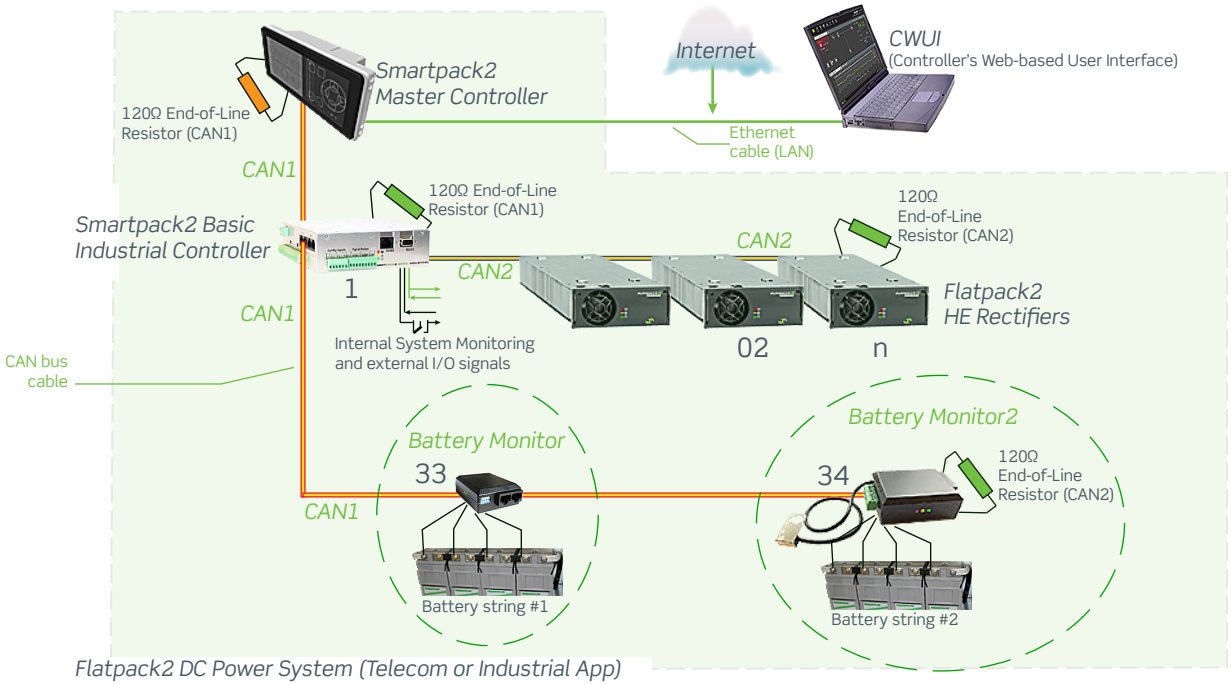

Figure 9. Example of CAN bus addressing and termination in a Flatpack2 system with two "Battery Monitors" connected the CAN bus

When connecting more CAN nodes to the bus, you have to remove the CAN bus termination plug from one of the CAN bus ends, and plug it in one of the CAN ports on the last connected CAN node.

Smartpack2-based power systems implemented with the *Smartpack2 Basic Industrial controller* have more than one CAN bus, as this industrial controller has two separated buses: CAN1 and CAN2.

All the CAN buses in the system are to be terminated with two 120Ω resistors.

Usually, the systems are engineered using CAN1 bus for communication among controllers and CAN nodes, and CAN2 bus to communicate with power conversion modules.

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Configuration via Web Browser

To activate and configure the *Battery Monitor*'s specific settings, you can use either the system controller's keypad or a computer's standard web browser, to run the controller's web-based user interface (CWUI). Or you can use the *PowerSuite* PC application, see chapter *"Configuration via PowerSuite" on page 22*.

For example, using the controller's web-based user interface (CWUI) on a standard web browser, you can connect to the power system's controller to a computer via an Ethernet connection, and configure the Battery Monitor as follows:

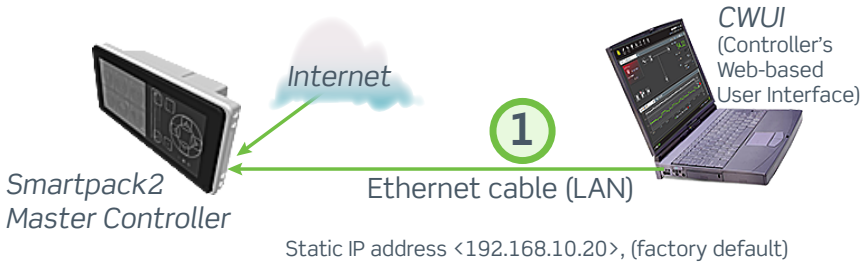

Figure 10. Connect a SP2M controller to a computer via Ethernet

- Access the controller (1) on the web browser via LAN or Internet.
  Find a more detailed description in the topic *"Networking the Controller - Access Methods"*, in CWUI Online Help
- Continue as described below to verify that the controller and the Battery Monitor are communicating...

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Carry out the following to verify that the controller is communicating with the Battery Monitor, and that it is displayed as a Battery Monitor on the control system's Inventory.

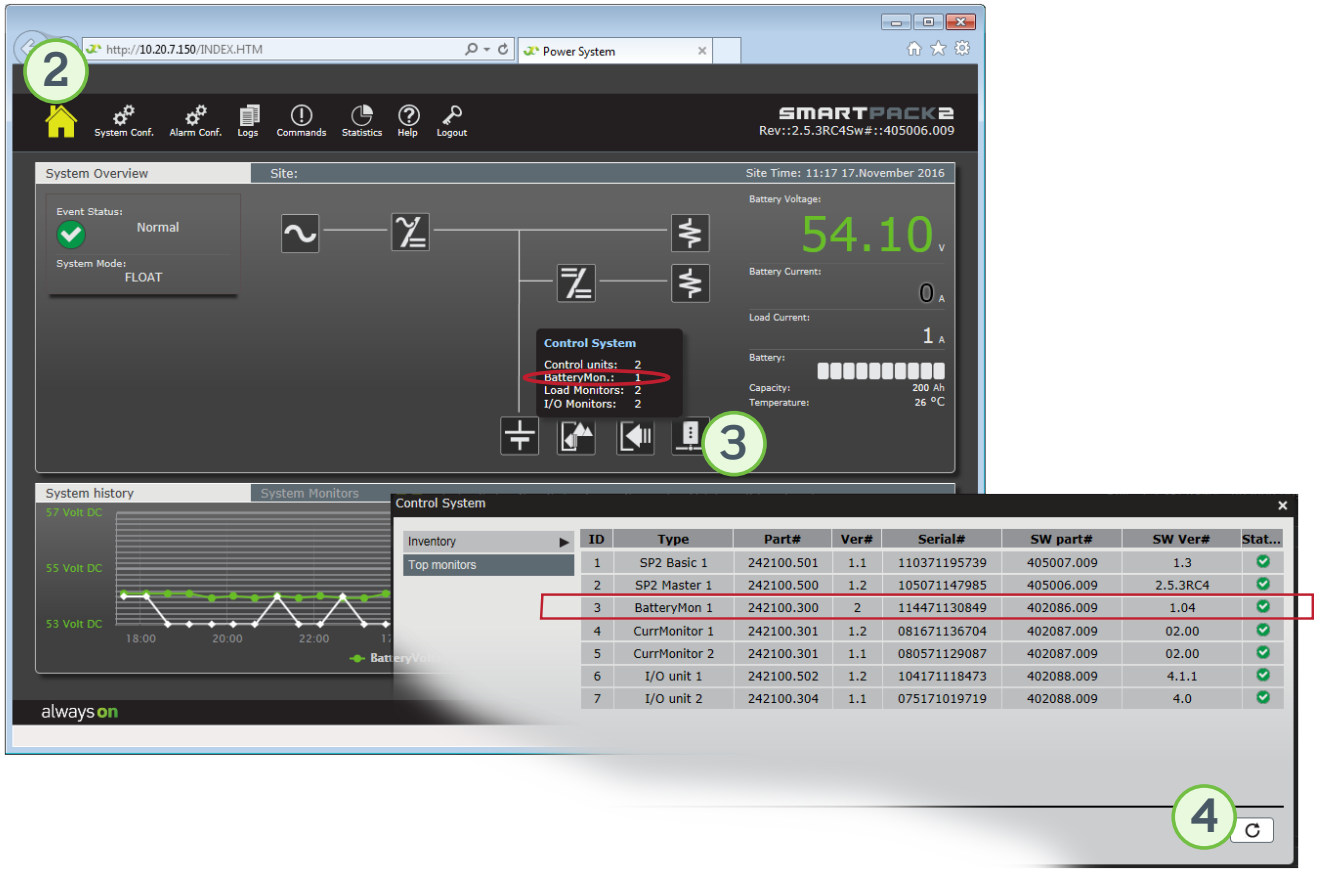

Figure 11. The Battery Monitor displayed on the control system's Inventory

- Click on the **Home page icon** (2), if necessary, and point at the **Control System icon** (3) to open a list of all the control units communicating with the system controller
- **Click on the Control System icon** (3) to open the Control System's Inventory, where you can see the Battery Monitor's part and serial numbers, its hardware and software versions and its status (green or red check icon)
- If necessary, click on the Refresh icon (4) to update the Inventory list

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All the *Battery Monitor*'s inputs are by default disabled, and they have to be enabled and configured for a specific monitoring task, before they can be used. The configuration is performed on the software alarm monitor (sAM) assigned to each input, e.g. the sAM "BattMonSym1.4" is assigned to input "Batt Symmetry 4" (pin 4 on the block terminal).

For more information, browse and search through *PowerSuite Online Help* or *CWUI Online Help* (Controllers' Web-based User Interface).

Figure 12. Configuration of the Battery Monitor's inputs via Web browser

The *Battery Monitor* is equipped with 4 Battery Symmetry inputs (pin 1-4, see *Figure 5 on page 11*) monitored by their sAM **(D)**. It is also equipped with 3 inputs each of the type Battery Fuse Sense, Current Sense and Temperature Sense (pin 5-6, 7-8 and fixed temperature probe). These 3 inputs are monitored by their respective sAM **(T)**.

Configure each of the required software alarm monitors (sAM) for the specific monitoring tasks of their inputs, as follows.

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1. **Access the inputs** or sAM assigned to the *Battery Monitor* (steps 1-4)
2. **Select the input or sAM to configure** by clicking on one of the Edit icons (step 5)
   For more information about Delta voltages for the symmetry inputs, refer to following topic in *CWUI Online Help*: *Recommended Delta Voltages*.
   When the required inputs are configured, click on “Save” icon (step 6) to store the configuration.
3. **Select and configure** the sAM used to monitor the **Battery Monitor’s communication** on the CAN bus (steps 7-8).
   Click on the Edit icon (step 8) to configure the *Battery Monitor*’s communication alarm.
4. **Enable and configure** the main parameters for **symmetry** measurements by selecting from the toolbar and menu pane:
   System Conf. >> Battery >> Symmetry
   Read more in topic *“Battery Symmetry Monitoring” Pane*, in *CWUI Online Help*

NOTICE:
— The *Battery Monitor2* is calibrated at the factory, and additional calibration is neither required nor possible. See section *“4. Technical Specifications” on page 24*

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Configuration via PowerSuite

You have to connect a computer to the power system's controller and start the *PowerSuite* application, version 2.3 or higher, to activate and configure the *Battery Monitor*'s specific settings.

Read the *PowerSuite* application's Help for information on how to configure the *Battery Monitor*s.

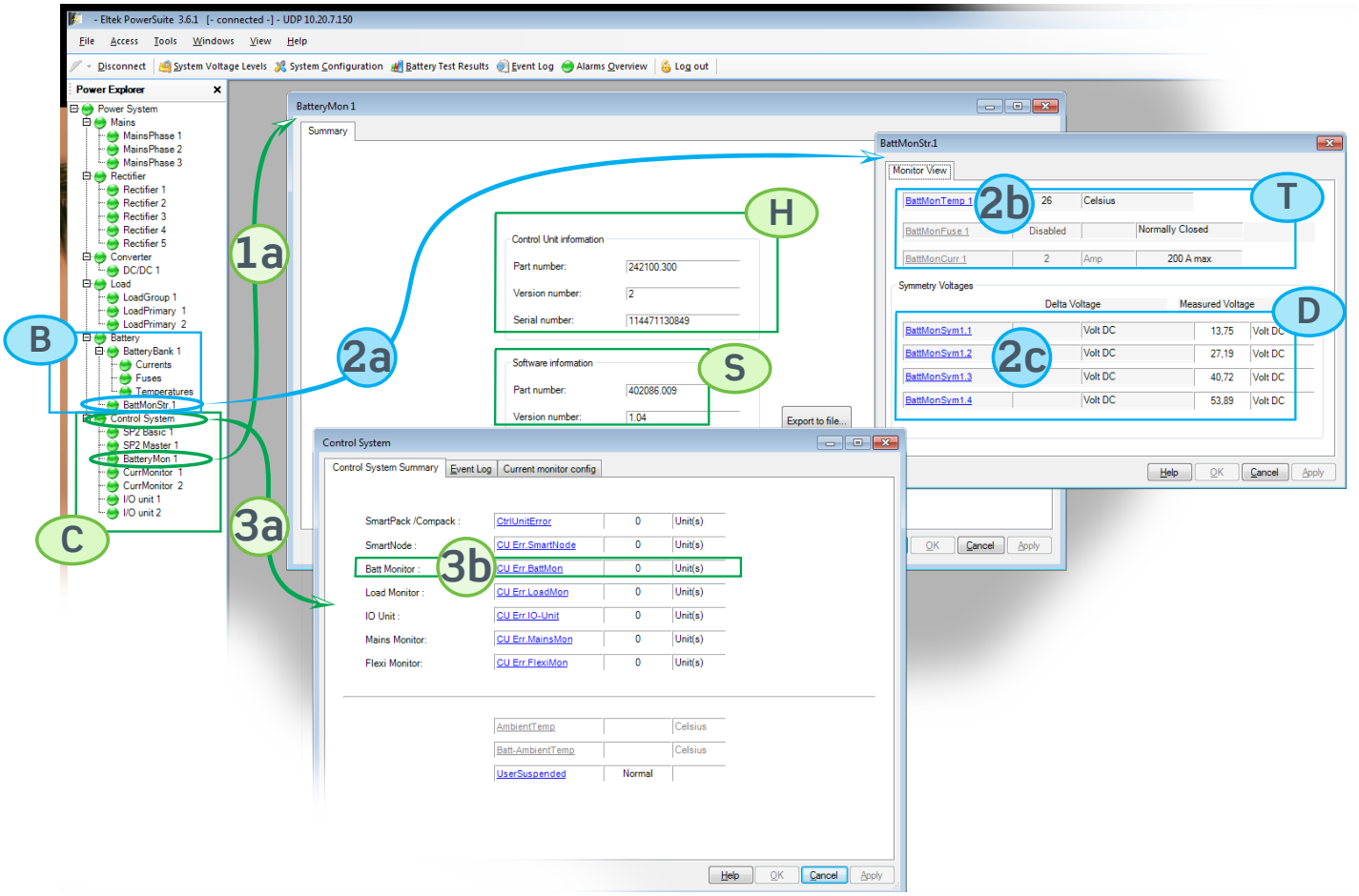

Figure 13. Configuration of the Battery Monitor's inputs via PowerSuite PC application

In general, the connected *Battery Monitor*s are displayed in the *PowerSuite*'s Power Explorer pane, under the Control System node (**C**) and under the Battery node (**B**).

Battery Monitor Summary

Select the "BatteryMon 1" command (**step 1a**) under the Control System node (**C**), to open the dialogue box where you can see the Battery Monitor's part and serial numbers (**H**), its hardware and software versions (**S**), etc.

Inputs Configuration

For accessing the Battery Monitor's specific settings — such as its software alarm monitors (sAM) for fuse monitoring, current sense and temperature inputs **(T)**, and symmetry measurement inputs (**D**) — select the "BattMonStr.1" command (**step 2a**) under the Battery node (**B**).

For configuring the inputs or sAM, select the respective link (**step 2b** and **2c**) to open the actual dialogue box to edit the configuration parameters.

Read more in *PowerSuite Online Help* topics "*Battery Monitor dialogue box*" and "*Recommended Delta Voltages*".

Also, enable and configure the main parameters for symmetry measurements. Read how to configure battery symmetry in *PowerSuite Online Help* topic "*Battery Symmetry Configuration tab*".

NOTICE:
— The *Battery Monitor2* is calibrated at the factory, and additional calibration is neither required nor possible. See section *"4. Technical Specifications" on page 24*

Battery Monitor Communication

Select the "Control System" command (**step 3a**) to open the dialog box with a summary of all the connected control units.

Select the "CU Err.BattMon" link (**step 3b**) to configure the *Battery Monitor*'s communication alarm.

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4. Technical Specifications

Battery Monitors, T2 and T1	
Inputs	o 4x Symmetry Voltage (T2: 0 - 75V), (T1: 0 - 60V) o 1x Fuse failure detect, NO/NC or Diode Matrix o 1x Current sense
Accuracy based on resolution (calibrated)	o Voltage: 76mV o Current (200A): +/- 1A
Functionality	o Symmetry measurement: 2, 6, 12, 24, 30 or 36V o Fuse failure: NO, NC or Diode Matrix o Current sense: T2: 60mV shunt T1: 50mV or 60mV shunt o T2 Temperature measurement, only factory calibration is possible: Sensor in external 30cm probe Display -100ºC when measurement is not possible, e.g. damaged cable Accuracy: +/-2ºC, in range -55ºC to 100ºC (-67ºF to 212ºF) Accuracy: +/-1ºC, in range -10ºC to 85ºC (14ºF to 185ºF) o T1 Temperature measurement, no calibration required Sensor embedded in the unit Accuracy: +/-2ºC, in range -40ºC to 150ºC (-40ºF to 302ºF)
FW Part number	402086.009
Max. CAN Power consumption	90mA
Dimensions (WxDxH)	85 x 55 x 26 mm (3.35 x 2.17 x 1.02") (see *page 3*)

CAN Nodes	
Max. nodes	14 units of same type can be added a single CAN bus
Mounting	Slot, groove or slit for mounting screw head and Velcro adhesive tape (see *page 9*)
Visual Indication	3xLED lamps (see *page 10*) o GREEN: Power o YELLOW: Warning o RED: Alarm
FW Upload tools (see *Online Help*)	o From the controller's storage device, via the front panel, (*Smartpack2 Master*'s SD card or *Smartpack S* Flash memory) OR o From a PC, using FWLoader app. (Ver ≥3.25) and "IXXAT USB-to-CAN Converter" (p/n: 208565) (see Online Help *example with the FlexiMonitor*; similar for all CAN nodes)
Casing material	Plastic - V0 rated / Steel (CAN Power)
Operating temp	-40 to 70°C (-40 to 158°F) Storage temp -40 to 85°C (-40 to 185°F)

Applicable Standards				
Electrical safety	IEC 60950-1	UL 60950-1	CSA C22.2	
EMC	IEC 61000-6-1 ETSI EN 300 386 v1.3.3	IEC 61000-6-2	IEC 61000-6-3 /A1 FCC Part 15B Subpart 109	IEC 61000-6-4
Environment	2002/95/EC (RoHS) & 2002/96/EC (WEEE) ETS 300 019-2-1 Class 1.2	ETS 300 019-2-2 Class 2.3	ETS 300 019-2-3 Class 3.2	
Specifications are subject to change without notice				242100.CAN.DS3, v8(part)

Ordering Information

Part no.	Description
242100.300, v4.0 or higher	Battery Monitor2 (Type 2), T2
242100.300, v3.0 or lower	Battery Monitor (Type 1), T1

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5. Appendix

Battery Monitor Symmetry Kit

The *Battery Monitor Symmetry Kit*, Part 226887, provides you with all the parts you need to perform battery symmetry measurements with the *Battery Monitor*. Cables for Battery Fuse Alarm circuit and Battery Current Sense circuit are not included in the kit.

Kit's Content

Unpack the *Battery Monitor Symmetry Kit*, and check that it includes the following 4 components:

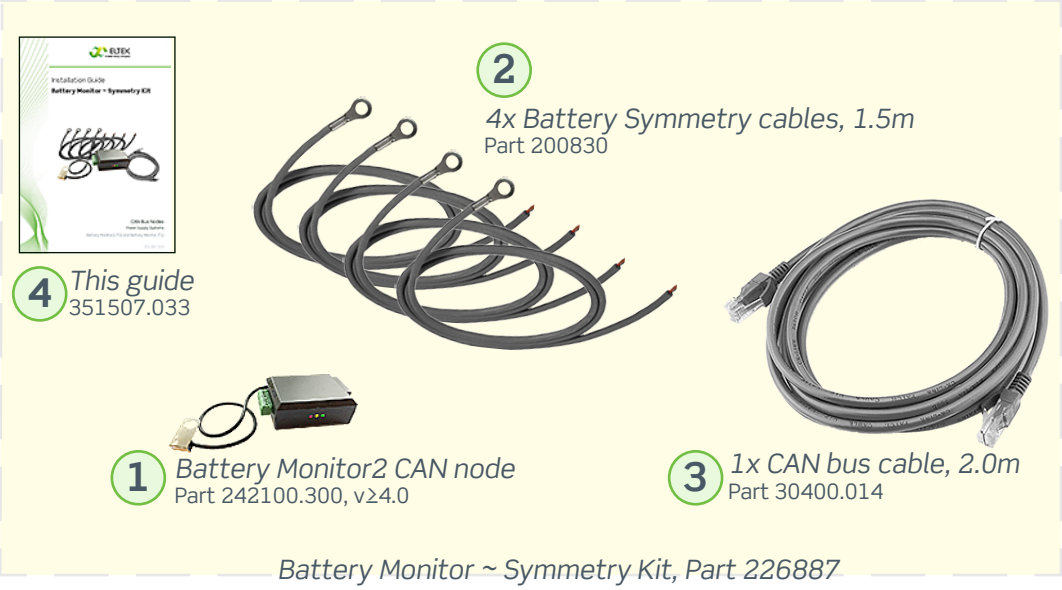

Figure 14. The content of the Battery Monitor Symmetry Kit

Battery Monitor (T1)

The *Battery Monitor (T1)* — Part 242100.300 v1.0 to v3.0 — is equipped with an internal temperature sensor.

Fastening the Battery Monitor (T1)

The built-in temperature sensor inside will monitor the battery temperature accurately, as long as the *Battery Monitor* is mounted on a suitable location inside the battery compartment.

Fasten the *Battery Monitor* in the middle of the battery compartment. For exact measurements, attach the monitor on the front of a battery block. If not possible, you can fix it on the side of the outer battery block, or on top, or on the cabinet's inner side wall.

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Location of Connectors, Ports, LEDs (T1)

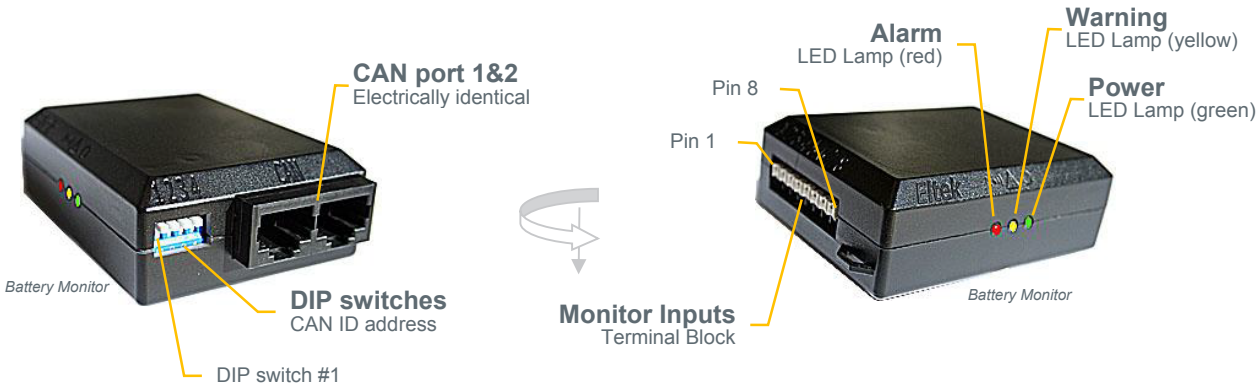

Figure 15. Location of terminals, DIP switches, CAN ports and LED indicators in the Battery Monitor

Connection Drawing (T1)

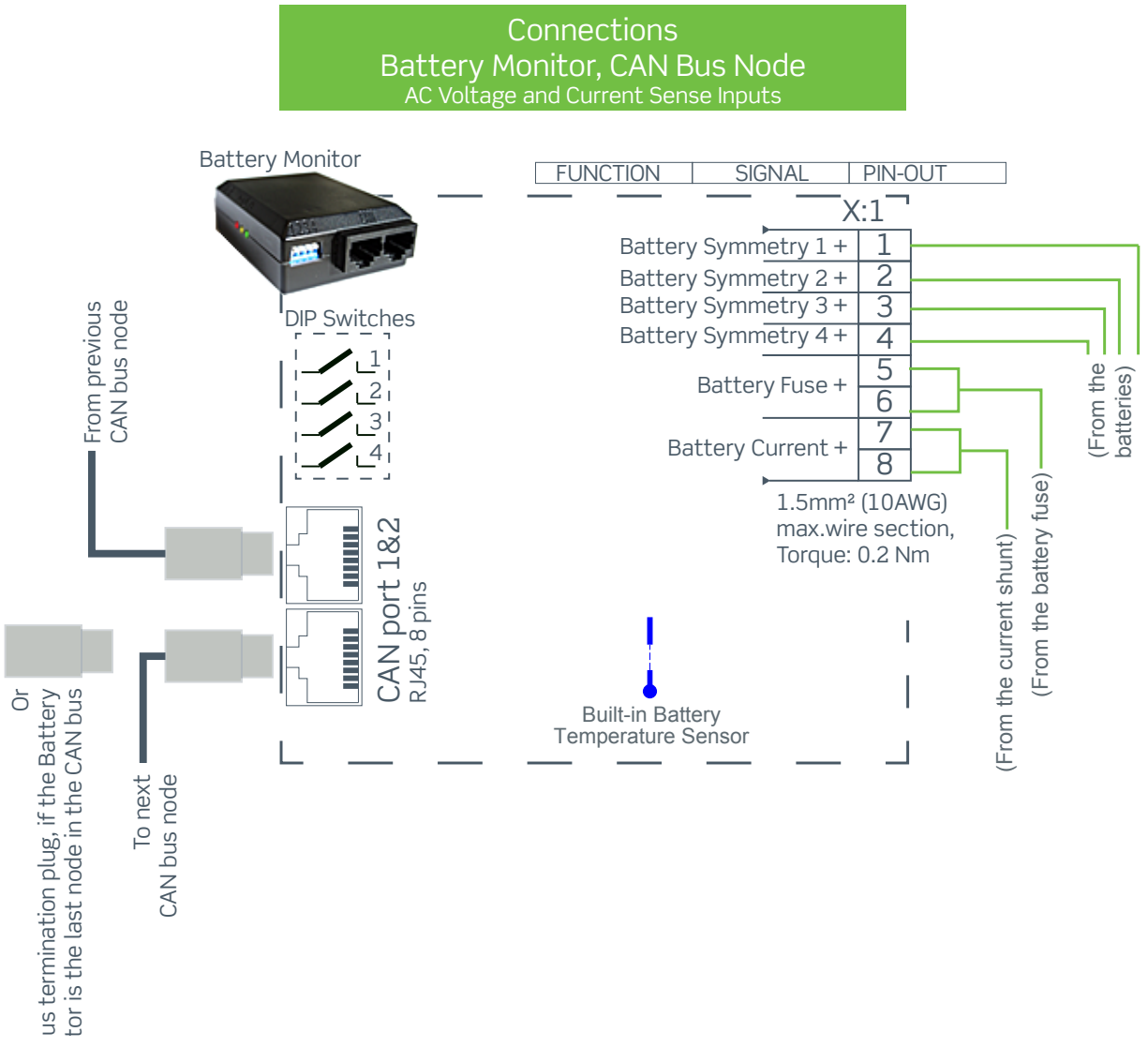

Figure 16. Connection Drawing Battery Monitor (T1) CAN Bus node

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Typical Torque Values ~ Eltek Power Systems

Always tighten screws and bolts with the **torque values recommended by the supplier of the terminals, breakers, etc**. The table below indicates typical torque values for some breakers, nuts, terminals, etc. used in *Eltek* power systems.

Typical Torque Values
Recommended Ratings ~ Eltek Power Systems

Application Type	Torque (Nm)	Tool Type	Wire Section (mm2)	
Circuit Breakers				
Schneider iC65	2.0	Screwdriver: blade/crosshead PH	1.0–25.0 1.0–16.0	Solid Stranded
Schneider iC60 <=25A (Merlin Gerin)	2.0	PZ2 screwdriver	1.0–25.0 1.0–16.0	Solid Flexible or ferrule
Schneider iC60 >25A (Merlin Gerin)	3.5	PZ2 screwdriver	1.0–35.0 1.0–25.0	Solid Flexible or ferrule
SIEMENS 18 mm, 5SY4, 5SY5, 5SY6	2.5–3.0	Screwdriver: blade/crosshead PH	0.75–35.0 0.75–25.0	Solid Finely stranded with end sleeve
SIEMENS 27 mm, 5SP4	3.0–3.5	Screwdriver: blade/crosshead PH	0.75–50.0 0.75–35.0	Solid Finely stranded with ferrule
CBI, QY Series	2.5	PZ2 screwdriver, combi head	0.75–35.0	Solid
Nuts, Screws, Rail Terminals				
M8	10.0	Open-ended spanner ISO & DIN 13 mm	Lug connection	
M10	16.0	Open-ended spanner ISO 16 mm; DIN 17 mm	Lug connection	
M12	25.0	Open-ended spanner ISO 18 mm; DIN 19 mm	Lug connection	
AKG 16 / AK 16	3.0	SL6 blade screwdriver	Lug connection	
AKG 35 /AK 35	3.7	SL8 blade screwdriver	Lug connection	
Terminal Blocks				
1.5 mm²	0.2–0.4	Blade screwdriver	1.3	Solid or stranded
Weidmüller WDU 2.5 mm²	0.8 max.	0.6x35 mm blade	0.5–2.5 1.5–2.5	Solid Flexible with or without ferrule
Weidmüller WDU 4.0 mm²	1.0 max.	0.6x35 mm blade	1.5–4.0 1.5–4.0	Solid Flexible with or without ferrule
Weidmüller WDU 10 mm²	1.8 max.	1.0x55 mm blade	1.5–10.0 1.5–10.0	Solid Flexible with or without ferrule
Weidmüller WDU 16 mm²	4.0 max.	1.0x55 mm blade	1.5–16.0 1.5–16.0	Solid Flexible with or without ferrule
Weidmüller WDU 35 mm²	5.0 max.	1.2x65 mm blade	2.5–16.0 2.5–16.0	Solid Flexible with or without ferrule
Weidmüller WDU 70 mm²	12.0 max.	SL6 (DIN6911) blade	10.0–16.0 10.0–70.0	Solid Flexible with or without ferrule

Note: General tolerance: ±10%

v1.1

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