ELTEK
A Delta Group Company

Installation Guide

Load Monitor

CAN Bus Node

Power Supply Systems

351506.033

356800.183, 3v5

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

G1 **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.


Electric Shock

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

Environmental Precautions


Ventilated Hot Surface

E1 **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.


Current Surge Protection

E2 **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 "Guidelines for Lightning and Surge Protection", doc. 2024623**.


Humidity & Dust Protection

E3 **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**

Precautions during Installation


Qualified Personnel

I1 **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** 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.


EMC, NEC/CEC Regard

I2 **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.


Device Hazard

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


Electric Shock

I4 **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.


Electric Shock

I5 **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.**

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Table of Contents

1. Introduction

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

About this Guide

This booklet provides you with the required information for installing the *Load Monitor, CAN Bus Node* in the *Eltek* power supply system. The booklet also presents the *Load Monitor's* technical specifications.

For more detailed description of the *Load Monitor, CAN Bus Node*, read the "*User's Guide Smartpack Monitoring and Control Unit*", Art. 350003.013.

For description of how to activate and configure the *Load Monitor, CAN Bus Node* using the *PowerSuite* PC program, refer to the *PowerSuite* online Help system.

System Diagram — CAN Bus Nodes

The *Load Monitor, CAN Bus Node* is used as a building block in *Smartpack* based power supply systems, see Figure 1. Other CAN bus nodes, like the *Battery Monitor* and the *I/O Monitor*, may also be connected to the bus. The nodes are powered directly from the CAN bus, and have dedicated inputs and outputs that expand the system monitoring and control capability.

The *Smartpack* controller monitors and controls the whole system, and serves as the local user interface between you and the system. The *PowerSuite* application enables you to configure and operate system from a personal computer.

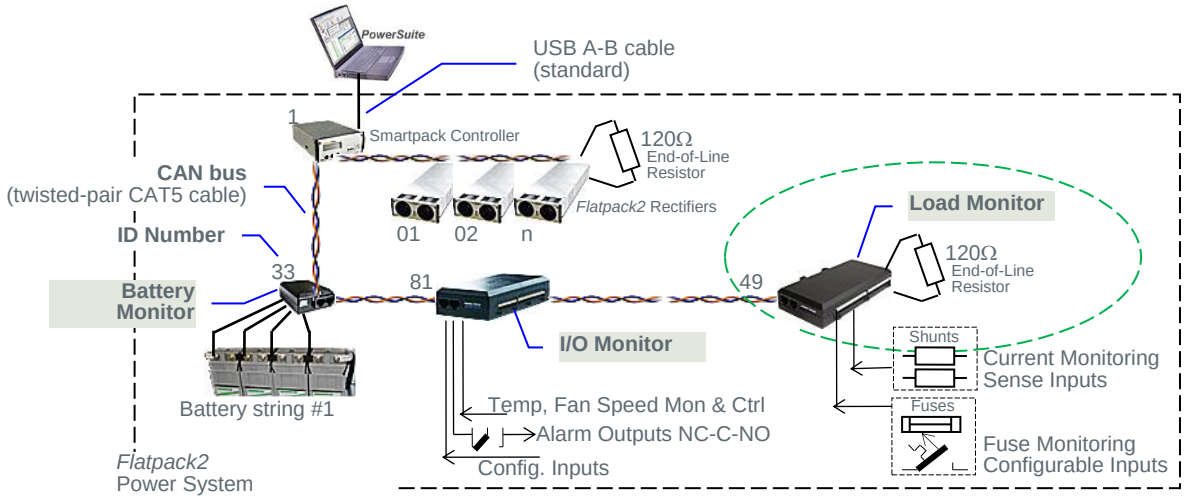


Figure 1 Example of three CAN bus nodes connected in a *Flatpack2* Power Supply System

2. Load Monitor, CAN Bus Node

The *Load Monitor CAN Bus Node* enables you to decentralize and increase the number of input fuse monitoring and current sense signals in the *Eltek* power supply system. The fuse monitoring inputs are suitable for monitoring a wide range of breakers in both positive and negative DC distributions.

Key Features

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

- ✓ Powered via the CAN bus; no external power supply required
- ✓ Firmware upgrade via the CAN bus (see required "SW Upload tools" on page 13)
- ✓ 8 user configurable inputs
  for fuse monitoring and other site equipment monitoring
- ✓ 8 current sense inputs
  for bi-directional current monitoring through external current shunts
- ✓ Storage of calibration data and real time event log
- ✓ Windows-based setup, configuration and calibration via PowerSuite
- ✓ Flexible mounting using DIN rail tabs or screw head slots
- ✓ Up to 14 the *Load Monitor* modules may be connected the CAN bus
- ✓ CAN bus addressing via DIP switches

Read also chapter "Technical Specifications", page 13, for more details.

Typical Applications

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

The *Load Monitor CAN Bus Node* is suitable for distributed monitoring of DC distribution breakers and current shunt monitoring.

3. Installation of Load Monitors

You can install the *Load Monitor CAN Bus Node* if your power system meets the following requirements:

1. The system's *Smartpack* controller has firmware version 2.03 or higher installed
2. You have a PC with *PowerSuite* application version 2.3 or higher installed

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

Safety Precautions

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

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.

Basis Installation Steps

Carry out these steps to install the *Load Monitor CAN Bus Node* in your power system.

Power is ON!

1. **Assign the *Load Monitor*'s CAN bus address**, by
   setting the *Load Monitor*'s DIP switches. Read to chapter "CAN Bus Addressing", page 11
2. **Terminate the CAN bus**, by
   e.g. removing the CAN bus termination plug from the controller and plugging it on the last connected *Load Monitor*. Read chapter "CAN Bus Termination", page 10
3. **Attach the *Load Monitor* to a suitable surface**;
   Read chapter "Fastening the Load Monitors", page 8
4. **Connect the required input cabling to the terminals**;
   Read chapter "Connection Drawing", page 9
5. **Configure the *Load Monitor* node**'s operation,
   using the *PowerSuite* application, read chapter "About PowerSuite Configuration", page 12

Fastening the Load Monitors

You mount the *Load Monitor CAN Bus Node* inside the power cabinet or subassembly, using the node's DIN rail mounting clips, see "Figure 2", page 8.

You may also mount 2 screws on a suitable surface and slide the enclosure's mounting slots on the screws' heads. Max. head's height is 3 mm, and head's diameter is to be between 5 and 8 mm, see "Figure 2", page 8.

Location of Connectors, Ports, LEDs

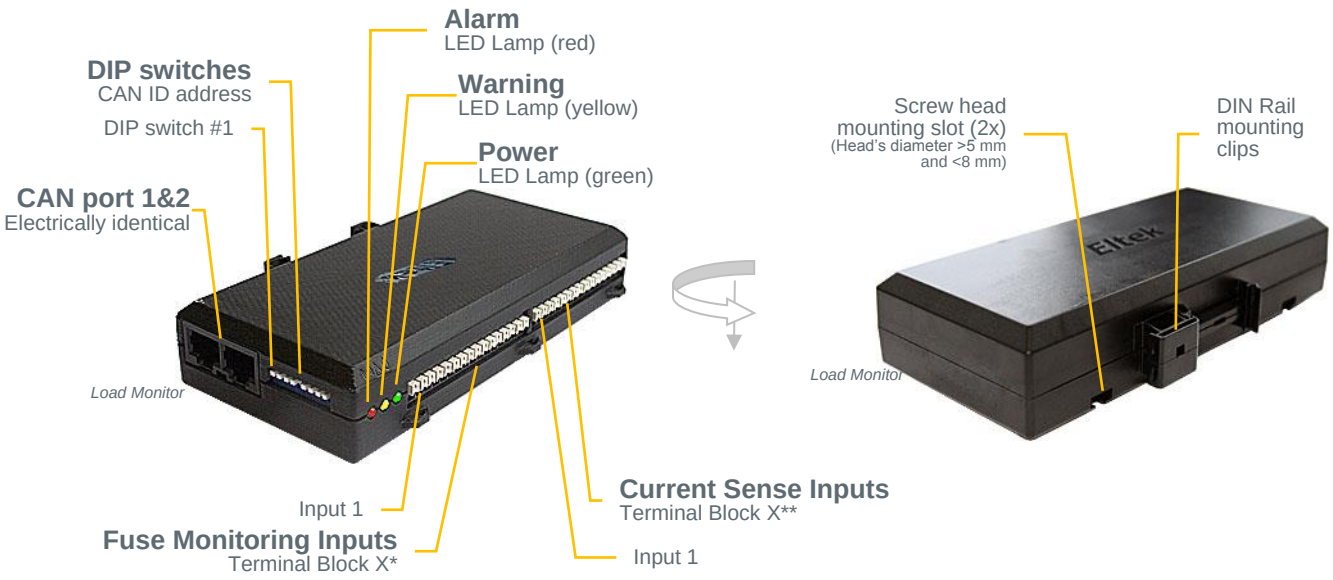


Figure 2 Location of terminals, DIP switches, CAN ports and LED indicators in the Load Monitor

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	The monitor has NO supply
	ON green	The monitor has supply
Warning	OFF	No Warning
	ON yellow	Warning (Non-critical alarm)
Alarm	OFF	No Alarm
	ON red	Alarm (Critical Alarm)
Other	Green ON & Red Flashing	Supply voltage too low
	Green OFF & Red Flashing	Firmware boot-loading

Table 1 Description of the *Load Monitor*'s LED illumination status

Connection Drawing

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”, page 8.

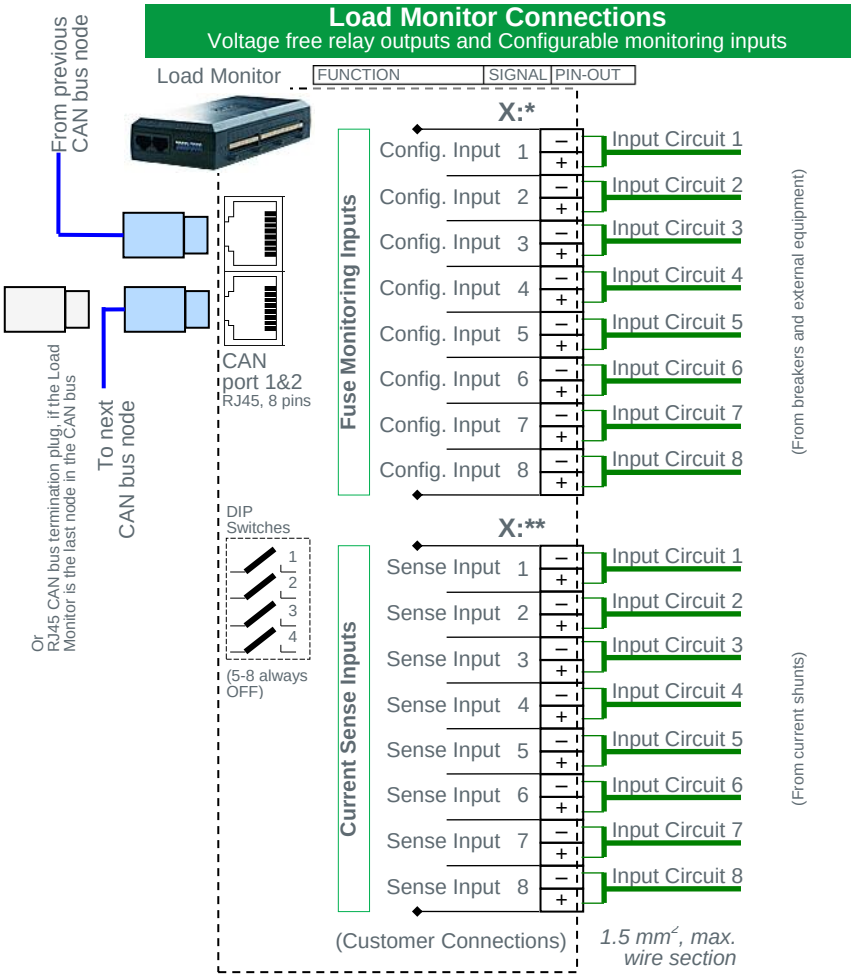


Figure 3 Connection Drawing Load Monitor CAN Bus node

Read also chapter “Technical Specifications”, page 13, for more details.

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).

Smartpack based 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.

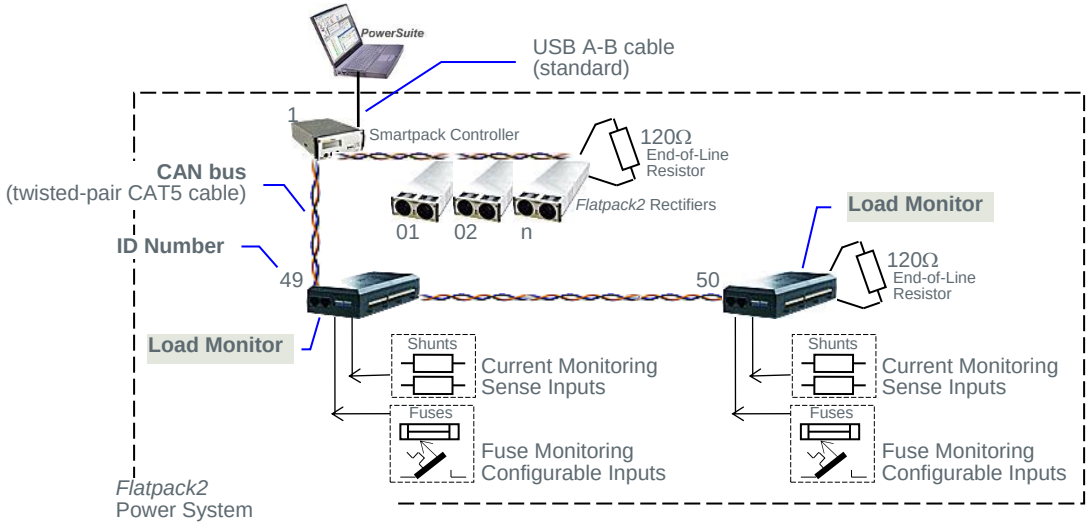


Figure 4 Example of CAN bus addressing and termination in a *Flatpack2* system with two "*Load Monitors*" connected the CAN bus

When connecting *Load Monitor* nodes (max. 14 nodes) to the CAN bus, you have to remove the CAN bus termination plug from the *Smartpack* controller's rear CAN port, and plug it on one of the CAN ports on the last connected *Load Monitor* node. See chapter "Removing the *Smartpack* Controller", page 10.

Removing the *Smartpack* Controller

To access the CAN bus termination plug from the *Smartpack* controller's rear CAN port, release (1) both handle springs — see Figure 5, page 10 — and use both handles to cautiously pull out the module. Be careful, as cables are connected to its rear.

Figure 5 Removing the *Smartpack* controller

Configuration

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

1. **Setting the DIP switches** with the correct CAN bus address,
   to assign a unique ID number to the *Load Monitor*, read chapter "CAN Bus Addressing", on page 11
2. **Configuring the *Load Monitor* node**'s operation,
   using the *PowerSuite* application, read chapter "About PowerSuite Configuration", page 12

CAN Bus Addressing

The *Smartpack* controller dynamically software-assigns ID numbers to rectifiers. The controller registers the rectifiers' ID numbers — or CAN bus address (01, 02…) — together with their Serial Numbers.

The ID numbers (1, 2…30) — on *Smartpack* controllers and *SmartNodes* — and *Load Monitor*'s ID numbers (49, 50…62) are assigned by DIP switches on the nodes' side.

A maximum of 14 *Load Monitors* and or 28 controllers and *SmartNodes* may be connected to the CAN bus. Note that if only one *Load Monitor* is connected, you have to assign it with ID# 49.

Load Monitor
DIP switch configuration

ID <49>
(All switches OFF)

Load Monitor	ID #	DIP Switch Position 1 —2 —3 —4
1st Monitor	49	OFF—OFF—OFF—OFF
2nd Monitor	50	**ON**—OFF—OFF—OFF
3rd Monitor	51	OFF—**ON**—OFF—OFF
4th Monitor	52	**ON**—**ON**—OFF—OFF
5th Monitor	53	OFF—OFF—**ON**—OFF
6th Monitor	54	**ON**—OFF—**ON**—OFF
7th Monitor	55	OFF—**ON**—**ON**—OFF
8th Monitor	56	**ON**—**ON**—**ON**—OFF
9th Monitor	57	OFF—OFF—OFF—**ON**
10th Monitor	58	**ON**—OFF—OFF—**ON**
11th Monitor	59	OFF—**ON**—OFF—**ON**
12th Monitor	60	**ON**—**ON**—OFF—**ON**
13th Monitor	61	OFF—OFF—**ON**—**ON**
14th Monitor	62	**ON**—OFF—**ON**—**ON**

Note:

- DIP switch positions 5 through 8 are always to be OFF
- The monitor's ID # corresponds to the DIP switch's binary value plus 49

Table 3 *Load M*onitor DIP switch addressing

Smartpack controller
DIP switch configuration

ID <1>
(All switches OFF)

Smartpack Controller	ID #	DIP Switch Position 1 —2 —3 —4
Master	1	OFF—OFF—OFF—OFF
Slave 1	2	**ON**—OFF—OFF—OFF
Slave 2	3	OFF—**ON**—OFF—OFF
Slave 3	4	**ON**—**ON**—OFF—OFF

Note that the controller's ID # corresponds to the DIP switch's binary value plus one.

Table 2 Smartpack DIP switch addressing

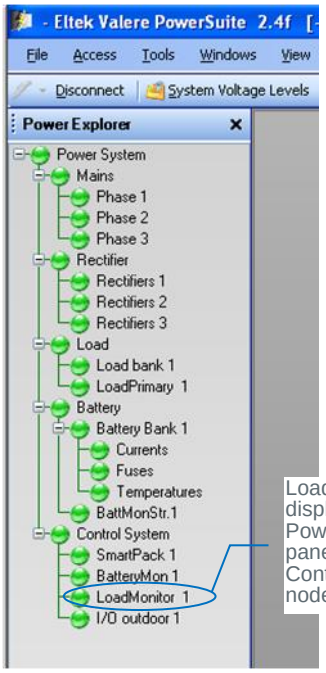
About PowerSuite Configuration

You have to connect a PC to the system's *Smartpack* controller and start the *PowerSuite* application, version 2.3 or higher, to activate and configure the *Load Monitor* nodes.

Read the *PowerSuite* application's Online Help for information on how to configure the CAN Bus nodes.

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

For configuring the *Load Monitor* specific settings — such as its software alarm monitors for fuse monitoring and current sense inputs, the activation of alarms, etc — open the *Load Monitor*'s icon under the *Control System node.*



4. Technical Specifications

Load Monitor	
Inputs	8x Configurable (Fuse failure) 8x Current sense
Accuracy based on resolution (calibrated)	Current (200A): +/- 1A
Functionality	Fuse failure o NO, NC or Diode Matrix Current sense o 50mV or 60mV shunt
SW Part number	402087.009
Max. CAN Power consumption	120mA

CAN Nodes			
Max. nodes	14 units of same type can be added a single CAN bus		
Mounting	Slotted groove for post mounting or DIN rail		
Visual Indication	3xLED (1xLED CAN Power) o GREEN: Power o YELLOW: Warning o RED: Alarm (Flashing LED: insufficient power)		
SW Upload tools	FWLoader v3.25 or newer and IXXAT USB-to-CAN Converter (p/n: 208565)		
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 IEC 61000-6-2 IEC 61000-6-3 /A1 IEC 61000-6-4 ETSI EN 300 386 v1.3.3 FCC Part 15B Subpart 109
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 – v2(part)

Ordering Information

Part no.	Description
242100.301	Load Monitor

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