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Installation Guide

# I/O Monitor

## CAN Bus Node

*Smartpack* based DC Power Supply Systems

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# Table of Contents

# 1. Introduction

Congratulations on your purchase of the *I/O Monitor, CAN Bus Node*, an intelligent "plug-and-play" module to decentralize and expand the functionality of your *Smartpack* based DC power supply system.

## About this Guide

This booklet provides you with the required information for installing the *I/O Monitor, CAN Bus Node* in your *Smartpack* based DC power supply system. The booklet also presents the *I/O Monitor's* technical specifications.

For more detailed description of the *I/O 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 *I/O Monitor, CAN Bus Node* using the *PowerSuite* PC program, refer to the *PowerSuite* online Help system.

## System Diagram — CAN Bus Nodes

The *I/O 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 *Load 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 controlling 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.

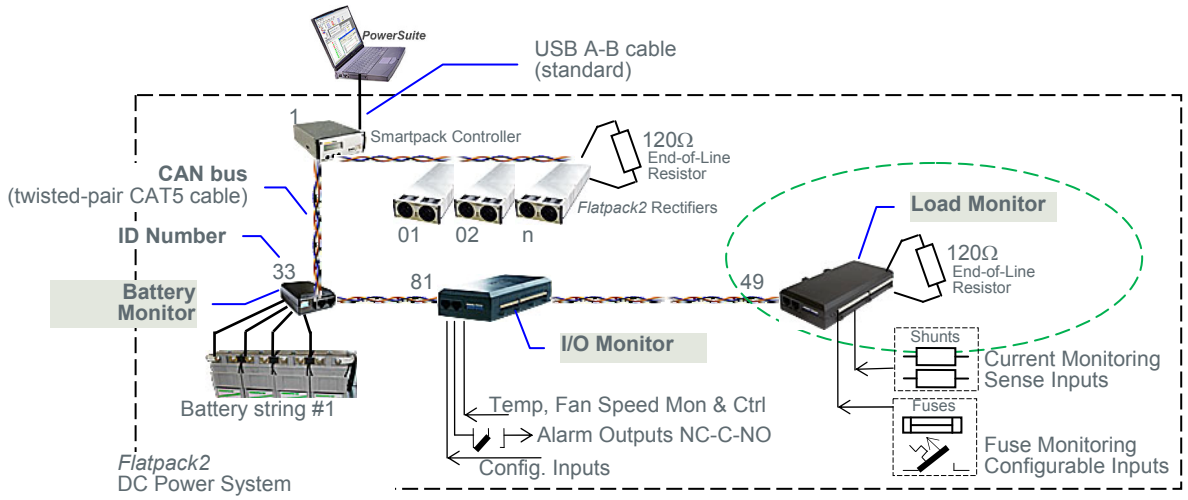



Figure 1 Example of three CAN bus nodes connected in a *Flatpack2* DC Power Supply System

# 2. I/O Monitor, CAN Bus Node

The *I/O Monitor CAN Bus Node* enables you to decentralize and increase the number of input monitoring and output controlling signals in your *Smartpack* based DC power supply system. Also, it monitors and controls the compartment temperature inside fan-cooled outdoor cabinets.

## Key Features

A wide range of features are implemented in the *I/O 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 12)
- ✓ 6 user programmable voltage-free relay outputs for traditional remote control
- ✓ 6 user programmable and configurable inputs
  for fuse monitoring and other site equipment monitoring
- ✓ Outdoor cabinet climate control,
  using dedicated inputs and outputs for temperature and fan control
- ✓ 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 *I/O Monitor* modules may be connected the CAN bus
- ✓ CAN bus addressing via DIP switches

Read also chapter "Technical Specifications", page 12, for more details.

## Typical Applications

The *I/O Monitor CAN Bus Node* is employd in *Smartpack*-based DC power systems, to implement flexible expansion and distribution of system functionality.

The *I/O Monitor CAN Bus Node* is also suitable in outdoor application, for climate control of fan-cooled outdoor cabinets.

# 3. Installation of I/O Monitors

You can install the *I/O Monitor CAN Bus Node* if your DC power system meets the following requirements:


1. The system's *Smartpack* controller has firmware version 2.04 or higher installed
2. You have a PC with *PowerSuite* application version 2.4 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 *Smartpack*-based power supply system.


**CAUTION**: For safety reasons, the **commissioning and configuration of the equipment is only to be performed** by Eltek Valere'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 *I/O Monitor CAN Bus Node* in your DC power system.

**Power is ON!**

1. **Assign the *I/O Monitor*'s CAN bus address**, by
   setting the *I/O Monitor*'s DIP switches. Read to chapter "CAN Bus Addressing", page 10
2. **Terminate the CAN bus**, by
   e.g. removing the CAN bus termination plug from the controller and plugging it on the last connected *I/O Monitor*. Read chapter "CAN Bus Termination", page 9
3. **Attach the *I/O Monitor* to a suitable surface**;
   Read chapter "Fastening the I/O Monitors", page 7
4. **Connect the required input and output cabling to the terminals**;
   Read chapter "Connection Drawing", page 8
5. **Configure the *I/O Monitor* node**'s operation,
   using the *PowerSuite* application, read chapter "About PowerSuite Configuration", page 11

## Fastening the I/O Monitors

You mount the *I/O Monitor CAN Bus Node* inside the DC power cabinet or subassembly, using the node's DIN rail mounting clips, see "Figure 2", page 7.

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 7.

## Location of Connectors, Ports, LEDs

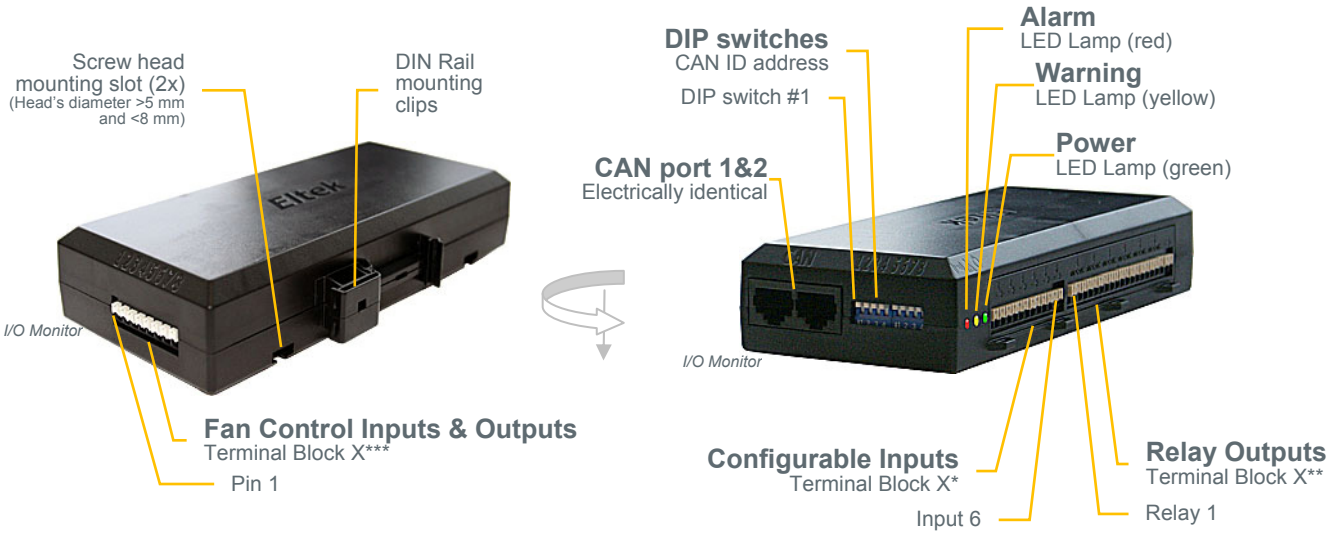



Figure 2 Location of terminals, DIP switches, CAN ports and LED indicators in the I/O Monitor

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

Table 1 Description of the *I/O 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 7.

The figure shows the position of the relay contacts (NC, NO) when the relay coils are de-energized (alarm mode).

Relays 5 and 6 have higher rating, and are suitable for fan control and other current demanding equipment.

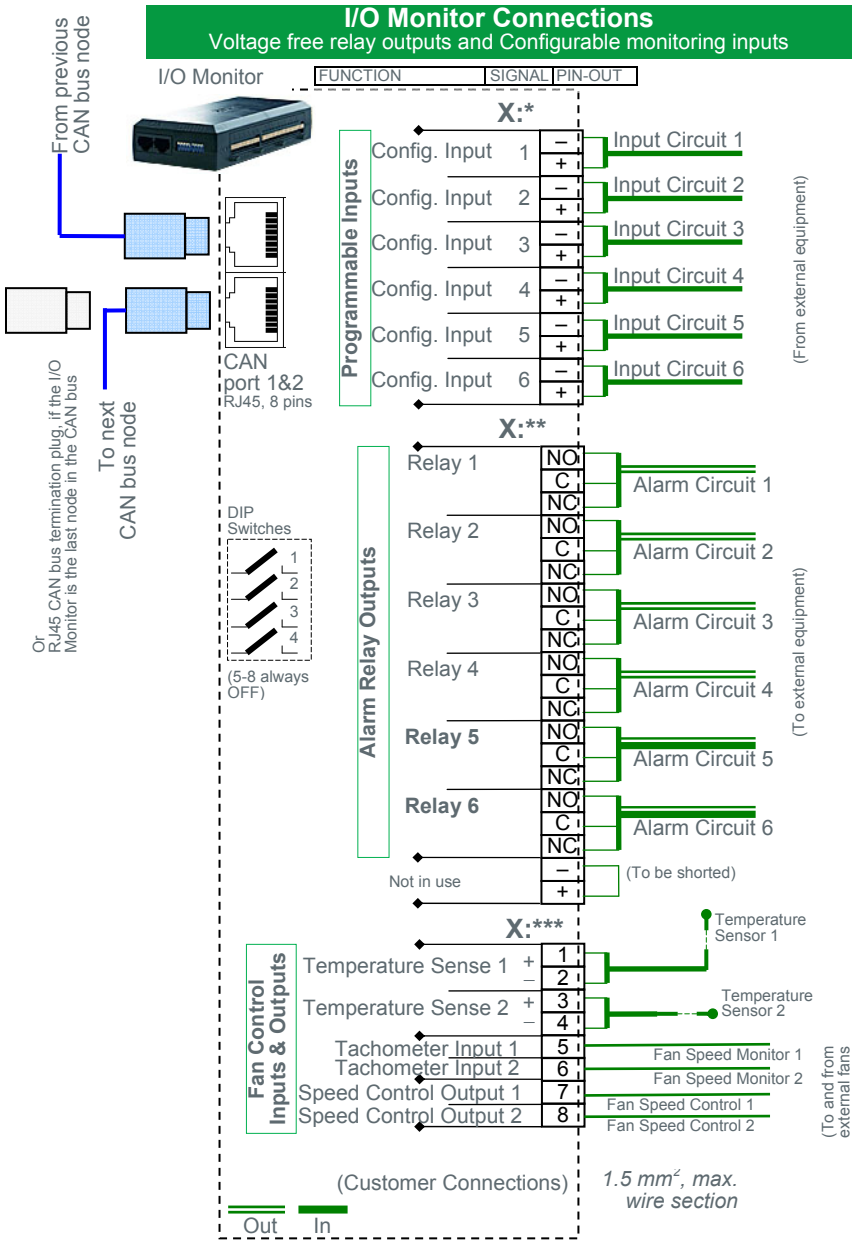



Figure 3 Connection Drawing I/O Monitor CAN Bus node

Read also chapter “Technical Specifications”, page 12, 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.

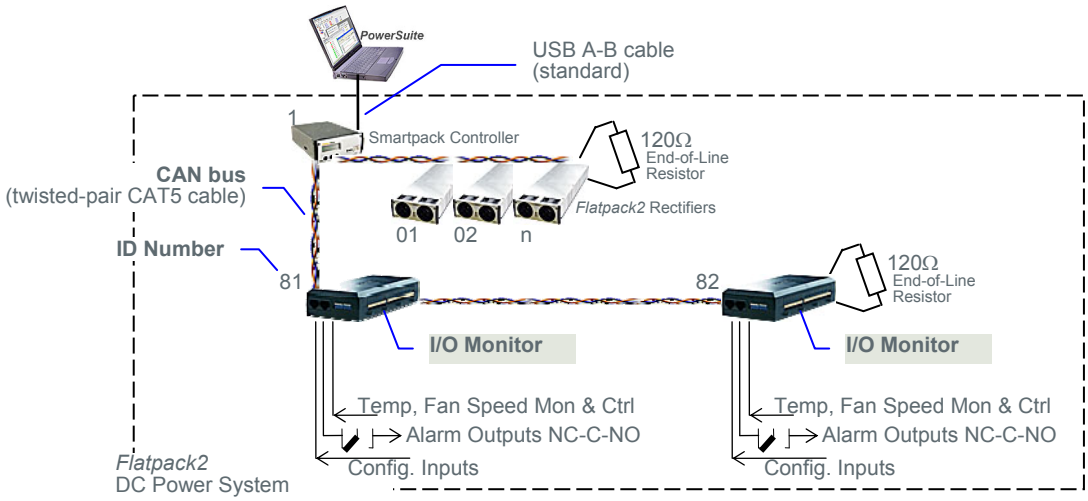



Figure 4 Example of CAN bus addressing and termination in a *Flatpack2* system with two "*I/O Monitors*" connected the CAN bus

When connecting *I/O 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 *I/O Monitor* node. See chapter "Removing the *Smartpack* Controller", page 9.

## 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 9 — 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 *I/O Monitor* nodes to the CAN bus of the *Smartpack* based DC power system, you have to configure each of the *I/O Monitors* by:

1. **Setting the DIP switches** with the correct CAN bus address,
   to assign a unique ID number to the *I/O Monitor*, read chapter "CAN Bus Addressing", on page 10
2. **Configuring the *I/O Monitor* node**'s operation,
   using the *PowerSuite* application, read chapter "About PowerSuite Configuration", page 11

## 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 *I/O Monitor*'s ID numbers (81, 82…94) are assigned by DIP switches on the nodes' side.

A maximum of 14 *I/O Monitors* and or 28 controllers and *SmartNodes* may be connected to the CAN bus. Note that if only one *I/O Monitor* is connected, you have to assign it with ID# 81.

*I/O Monitor*
DIP switch configuration

**ID <81>**
(All switches OFF)

| I/O Monitor | ID # | DIP Switch Position 1 —2 —3 —4 |
|---|---|---|
| 1st Monitor | 81 | OFF—OFF—OFF—OFF |
| 2nd Monitor | 82 | **ON** —OFF—OFF—OFF |
| 3rd Monitor | 83 | OFF— **ON**—OFF—OFF |
| 4th Monitor | 84 | **ON** — **ON**—OFF—OFF |
| 5th Monitor | 85 | OFF—OFF—**ON** —OFF |
| 6th Monitor | 86 | **ON** —OFF— **ON**—OFF |
| 7th Monitor | 87 | OFF—**ON**— **ON** —OFF |
| 8th Monitor | 88 | **ON** — **ON**— **ON**—OFF |
| 9th Monitor | 89 | OFF—OFF—OFF—**ON** |
| 10th Monitor | 90 | **ON** —OFF—OFF—**ON** |
| 11th Monitor | 91 | OFF—**ON** —OFF—**ON** |
| 12th Monitor | 92 | **ON** —**ON** —OFF—**ON** |
| 13th Monitor | 93 | OFF—OFF—**ON** —**ON** |
| 14th Monitor | 94 | **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 81

Table 3 *I/O* Monitor 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

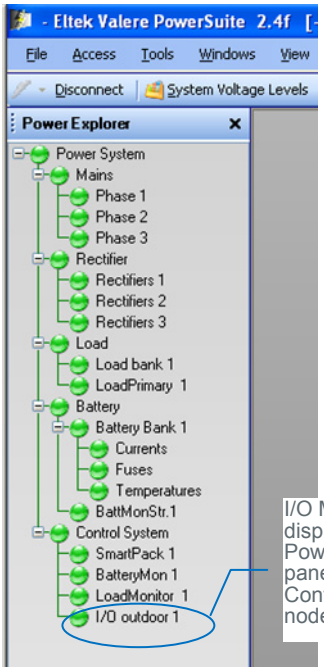
# About PowerSuite Configuration

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 *I/O Monitor* nodes.

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

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

For configuring the *I/O Monitor* specific settings — such as its inputs' and outputs' software alarm monitors, activation of alarms, speed and tachometer controls, etc — open the *I/O Monitor*'s icon under the *Control System node.*



# 4. Technical Specifications

| I/O Monitor (Outdoor) | |
|---|---|
| Inputs | 6x Configurable (“digital”)<br>2x Tacho<br>2x Temperature probe |
| Outputs | 6x Relay – Dry/Form C<br>4x signal 1A /60V [no. 1,2,3,4]<br>2x power 5A /60V [no. 5,6]<br>2x Analogue linear (Max. 0-10V) |
| Functionality | Relay Alarming<br>o Normally activated or deactivated<br>Configurable inputs<br>o NO, NC or Diode Matrix<br>Climate control<br>o Fan speed regulation and monitoring<br>Data logging (non-volatile memory)<br>o 10000 time stamped logs<br>o 4 user selectable data points<br>o Default: 2x Temp. 2x Fan Speed |
| SW Part number | 402088.009 |
| Max. CAN Power consumption | 160mA |

| 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)<br>o GREEN: Power<br>o YELLOW: Warning<br>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<br>UL 60950-1<br>CSA C22.2 |
| EMC | IEC 61000-6-1<br>IEC 61000-6-2<br>IEC 61000-6-3 /A1<br>IEC 61000-6-4<br>ETSI EN 300 386 v1.3.3<br>FCC Part 15B Subpart 109 |
| Environment | 2002/95/EC (RoHS) & 2002/96/EC (WEEE)<br>ETS 300 019-2-1 Class 1.2<br>ETS 300 019-2-2 Class 2.3<br>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 |
|---|---|
| 242100.304 | I/O Monitor (Outdoor) |

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