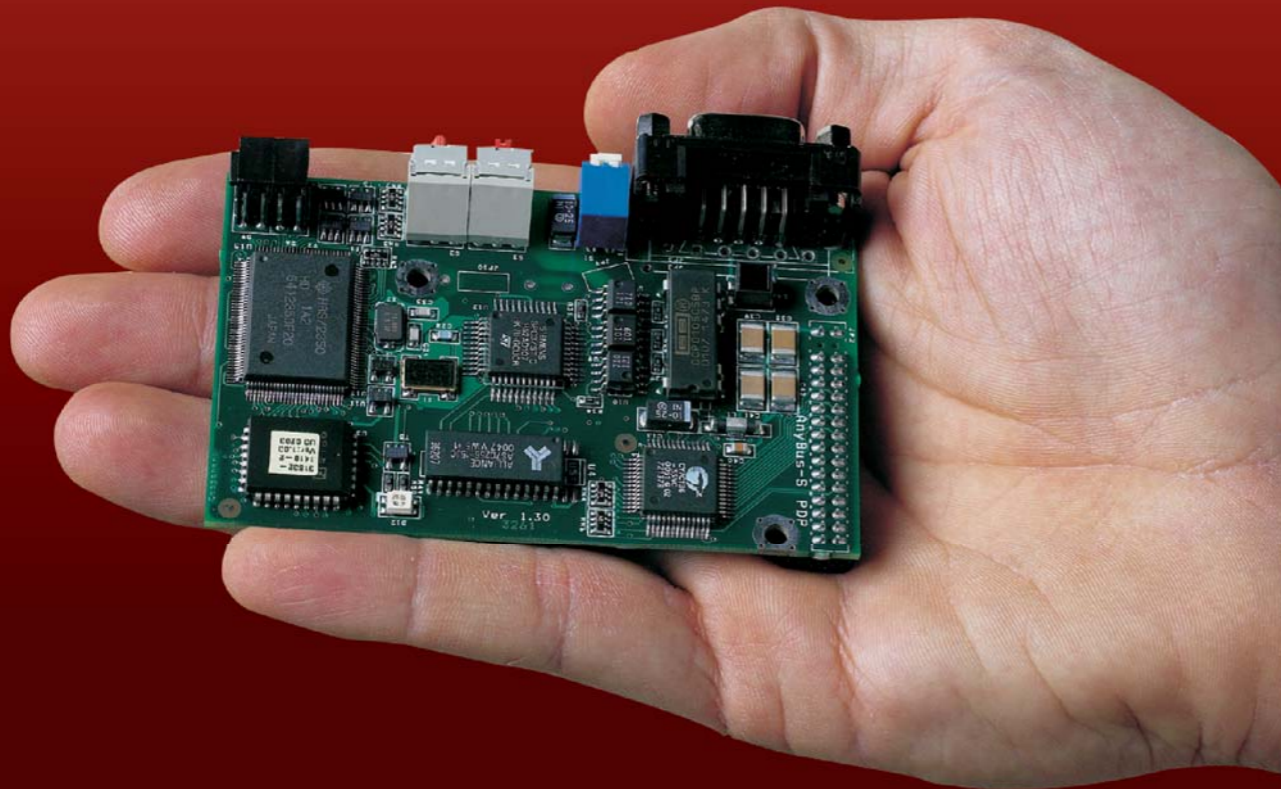


# OPTIONAL BOARDS

A full range of optional boards for Sinus Penta; the right solution for every application



## SINUS PENTA OPTIONAL BOARDS

### Fieldbus and communication boards for SINUS PENTA

- ES822 Insulated board, RS232 and/or RS485 (this board must be installed on the inverter and it is suggested for ModBus networks)
- Profibus DP board (hardware and software kit)
- PROFIdrive board (hardware and software kit)
- DeviceNet board (hardware and software kit)
- CANOpen board (hardware and software kit)
- Interbus board (hardware and software kit)
- Lonworks (hardware and software kit)
- Ethernet+IT board (hardware and software kit)
- ControlNet board (hardware and software kit)
- Metasys N2 ES919
- BacNet RS485 ES919
- BacNet Ethernet ES919

### Speed sensors boards for SINUS PENTA

- ES836 Encoder board
- ES913 LINE DRIVER Encoder board
- ES860 SINcos board
- ES861 Resolver/Encoder board with repeated Encoder + 3 digital Inputs/Outputs
- ES950 EnDAT Encoder board
- ES950 BiSS Encoder board
- ES966 Hiperface Encoder board

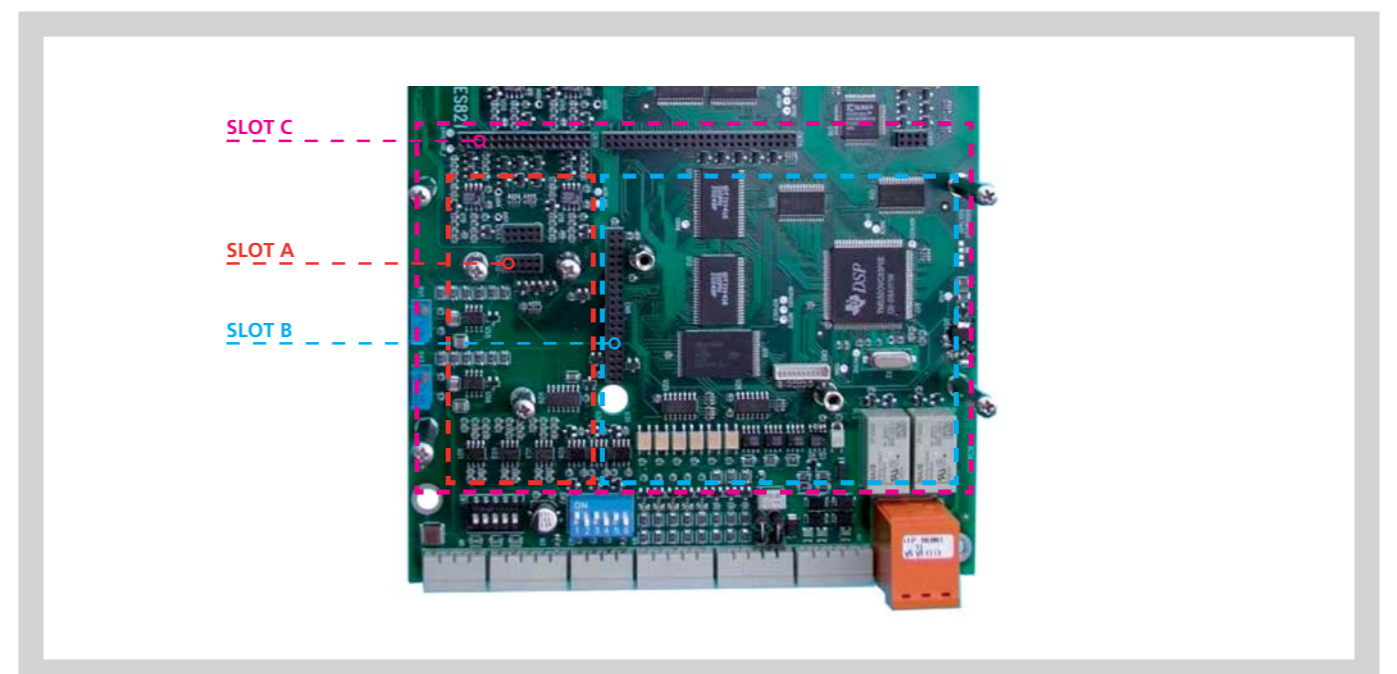
### I/O expansion boards for SINUS PENTA

- ES847/1 Board 8 Digital Inputs + 6 Transistor Outputs, 4 PT100 inputs up to 260°C, 1 Analog Voltage input, 1 Analog current input 0-20mA - for SINUS PENTA plus ADE Energy Counter for Regenerative (RGN) application
- ES870 Board, 8 Digital Inputs + 6 Relay Outputs for SINUS PENTA Regenerative application
- ES988 120V/240V Board, 8 Digital Inputs + 4 Relay Outputs

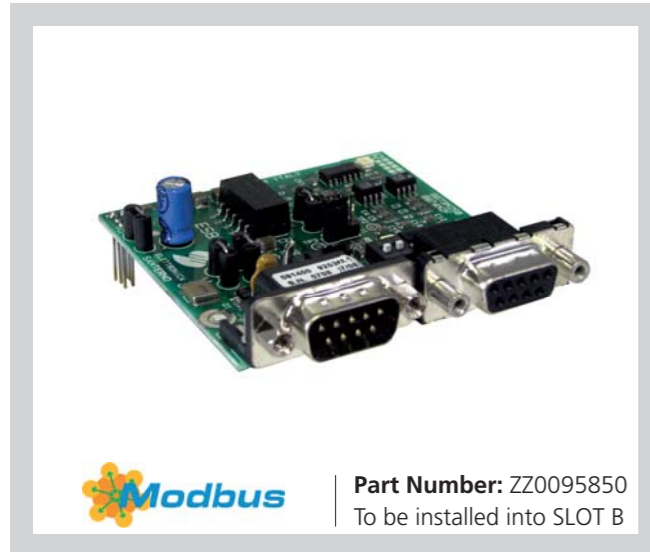
### Datalogger and RTC boards for SINUS PENTA

- ES851 Data Logger Board, REMOTE DRIVE wireless connection, RS232 Full modem - GSM - Local Ethernet - RS485 multidrop for the connection of up to 15 inverters
- ES851 REAL TIME CLOCK
- ES851 Data Logger Board, REMOTE DRIVE wireless connection, RS232 Full modem - GSM - Local Ethernet, RS485 multidrop for the connection of up to 15 inverters

### Optional boards slots on the Sinus Penta CPU board



## FIELD BUS COMMUNICATION BOARDS



### ES822 ISOLATED SERIAL BOARD

The isolated serial board RS232/485 controlling SINUS PENTA inverters allows connecting a computer through RS232 interface or allows a multidrop connection of Modbus devices through RS485 interface. It provides galvanic isolation of interface signals relating to both the control board ground and the terminal board common of the control board.



**Part Number:** ZZ0095850  
To be installed into SLOT B



**Part Number:** ZZ4600055  
To be installed into SLOT B

## FIELD BUS COMMUNICATION BOARDS

### DEVICENET® FIELD BUS BOARD

DeviceNet is a registered trademark of open DeviceNet Vendor Association.

The DeviceNet® communications board allows interfacing a Sinus PENTA drive with an external control unit through a communications interface using a CAN protocol of the DeviceNet 2.0 type. The baud rate and the MAC ID can be set through the on-board DIP-switches. Max. 512 bytes for input/output data are available; some of them are used for the interfacing with the inverter.

#### Main features:

- Baud Rate: 125, 250, 500 kbits/s
- DIP-switch for baud rate and MAC ID selection
- Optically isolated DeviceNet interface
- Max. 512 bytes for input & output data
- Max. 2048 bytes for input & output data through mailbox

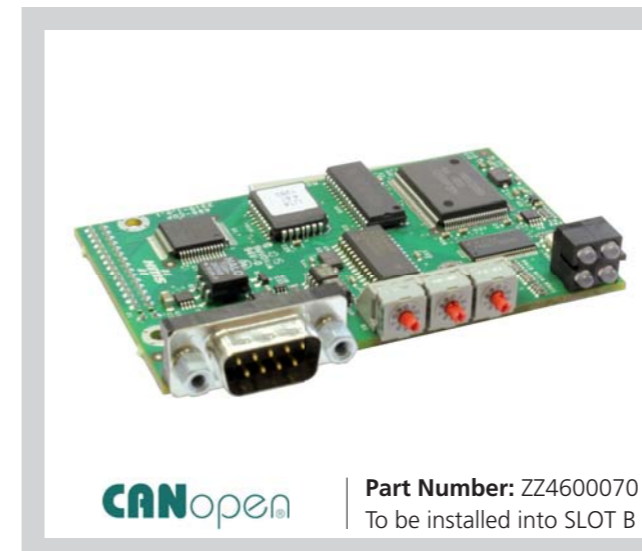


**Part Number:** ZZ4600045  
To be installed into SLOT B

### PROFIBUS-DP® FIELD BUS BOARD

PROFIBUS-DP® is a registered trademark of PROFIBUS International.

The Profibus-DP communications board allows interfacing an inverter of the SINUS PENTA Series and an external control unit, such as a PLC, using a PROFIBUS-DP communications interface. The Sinus PENTA inverter operates as a Slave device and is controlled by a Master device (PLC) through command messages and reference values which are equivalent to the ones sent via terminal board.



**Part Number:** ZZ4600070  
To be installed into SLOT B

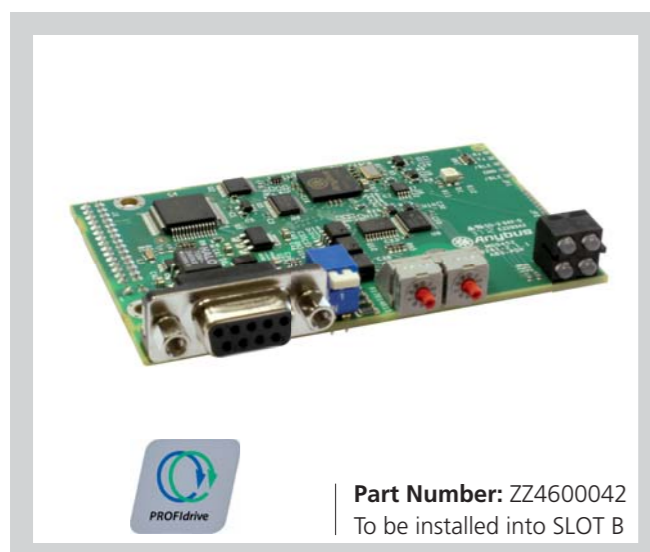
### CANOPEN® FIELD BUS BOARD

CANopen® and CiA® are registered trademarks of CAN in Automation e.V. The CANopen communications board allows interfacing a Sinus PENTA drive with an external control unit using communications interface operating with a CAN protocol of the CANopen type complying with the CIA DS-301 V3.0 specifications.

The baud rate and the Device Address can be set through the on-board rotary switches. Eight baud rate levels can be set, up to 1Mbit/s.

#### Main features:

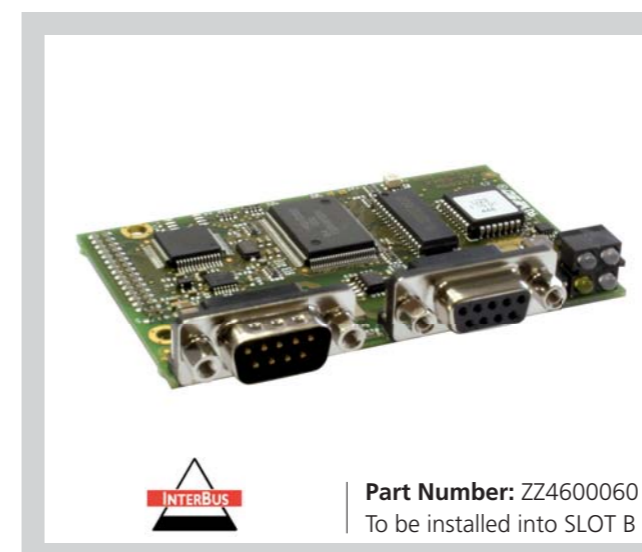
- Unscheduled data exchange support
- Synch & Freeze operating mode
- Possibility of setting Slave Watch-dog timer
- Eight baud rate levels, from 10kbits/s to 1Mbit/s
- Possibility of setting different Device Addresses up to max. 99 nodes
- Optically isolated CAN interface
- CANopen conformity: CIA DS-301 V3.0



**Part Number:** ZZ4600042  
To be installed into SLOT B

### PROFIDRIVE® FIELD BUS BOARD

PROFdrive® is a registered trademark of PROFIBUS International. The PROFdrive® communications board allows interfacing an inverter of the SINUS PENTA Series and an external control unit, such as a PLC, using a PROFdrive® communications interface. The PROFIBUS protocol family is specified in the IEC 61158 standard. The communication with a drive is defined in the PROFdrive Profile – The PROFIBUS Profile for Adjustable Speed Drives. For further information on PROFIBUS, refer to the above mentioned standards.



**Part Number:** ZZ4600060  
To be installed into SLOT B

### INTERBUS® FIELD BUS BOARD

The INTERBUS communications board allows interfacing a Sinus PENTA drive with an external control unit using communications interface operating with an INTERBUS protocol. INTERBUS is an open Fieldbus network, standardized in the International standard IEC 61158. INTERBUS is very popular in automobile production. Today, the installed base is > 6 Million INTERBUS nodes. INTERBUS products are certified by the INTERBUS club for interoperability and compatibility with the INTERBUS standards.

INTERBUS has been designed as a fast sensor / actuator network for transmitting cyclic process data in industrial environments. Due to its transmission procedure and its ring topology, INTERBUS offers excellent features like fast, cyclical and time-equidistant transmission, optimal diagnostics and easy installation procedures.

## FIELD BUS COMMUNICATION BOARDS

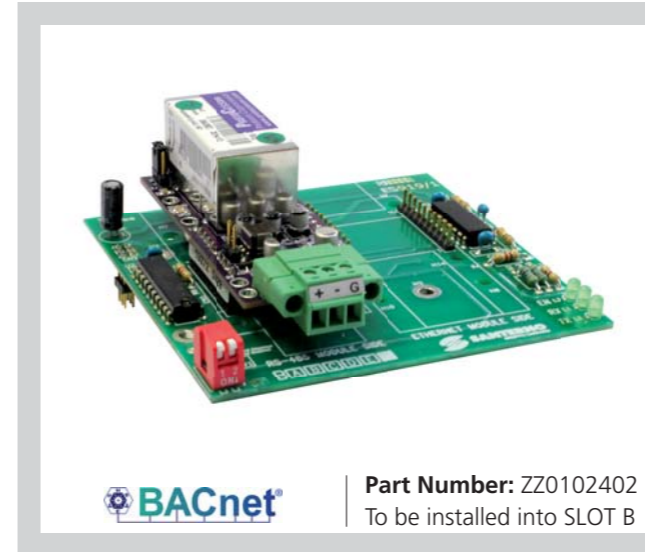


### LONWORKS® FIELD BUS BOARD

The LONWORKS communications board allows interfacing a Sinus PENTA drive with an external control unit using communications interface operating with a LONWORKS protocol. Lonworks networks can be found in all key building automation sub-systems including heating, ventilation, and air conditioning, lighting, boilers, air handlers, security, elevators, fire detection, access control, energy monitoring, irrigation control, and window blinds.



**Part Number:** ZZ4600085  
To be installed into SLOT B

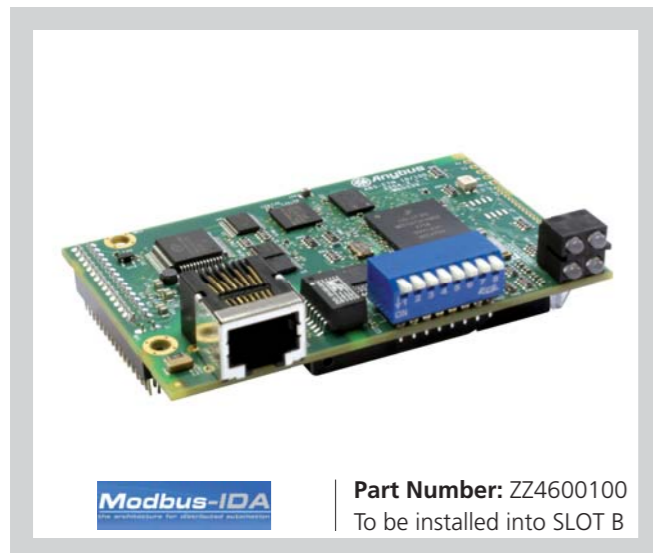


### ES919 BACNET/RS485 BOARD

The BACnet/RS485 Module card uses RS485 serial port to communicate with the system via the BACnet MSTP communications protocol. The card is composed of the ProtoCessor FFP-485 module and of support/interface board ES919.



**Part Number:** ZZ0102402  
To be installed into SLOT B

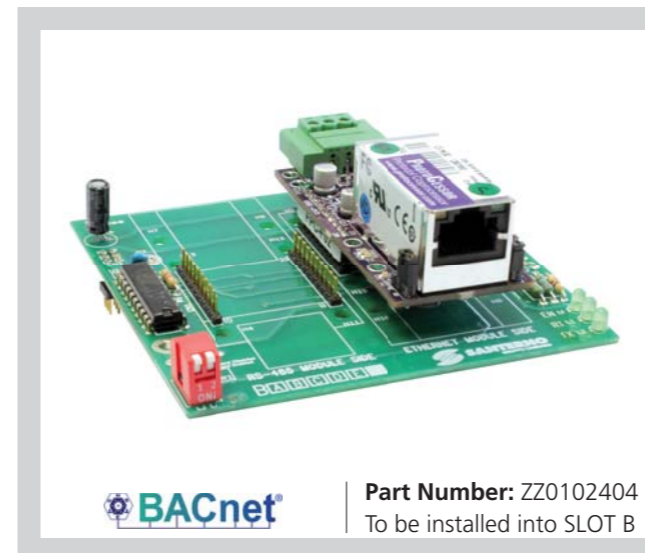


### ETHERNET BOARD

Ethernet communications board allows interfacing a Sinus PENTA inverter to an external control unit with a communications interface operating with a Modbus/TCP Ethernet (IEEE 802) protocol complying with the Modbus-IDA V1.0 specifications. The IP rating for the communications board can be configured both through the on-board DIP-switches and automatically (network assignment through a DHCP protocol). The communications board performs automatic negotiation with the mains if the baud rate is set to 10 or 100 Mbits/s.



**Part Number:** ZZ4600100  
To be installed into SLOT B

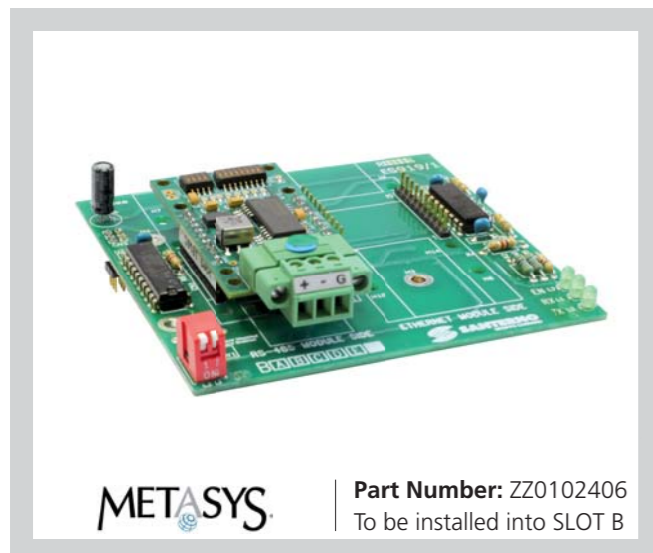


### ES919 BACNET/ETHERNET BOARD

The Module BACnet/Ethernet board uses the Ethernet port to communicate with the system using the BACnet communications protocol. BACnet - A Data Communication Protocol for Building Automation and Control Networks. Developed under the auspices of the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), BACnet is an American national standard, a European standard, a national standard in more than 30 Countries, and an ISO global standard (ISO 16484-5). The protocol is supported and maintained by ASHRAE Standing Standard Project Committee 135 (SSPC 135). Please see <http://www.bacnet.org>. This board is composed of the ProtoCessor FFP-485 communications module.



**Part Number:** ZZ0102404  
To be installed into SLOT B



### ES919 METASYS® N2 BOARD

Metasys is a registered trademark of Johnson Controls Inc. The ES919 BOARD communications board allows interfacing a Sinus PENTA drive with an external control unit using communications interface operating with a Metasys protocol. ES919 board for Metasys® N2 uses RS485 serial port to communicate with the system via the communication protocol "Metasys N2" by Johnson Controls (<http://www.johnsoncontrols.com>). ES919 board includes the ProtoCessor ASP-485 module.



**Part Number:** ZZ0102406  
To be installed into SLOT B



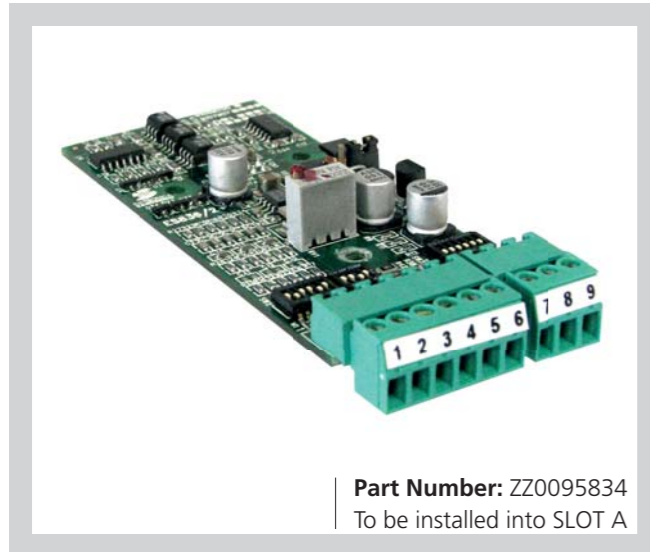
## POWER SUPPLY BOARDS

### ES914 AUXILIARY POWER SUPPLY BOARD

ES914 provides insulated power supply to the inverters of the SINUS PENTA series through RS485 connector. It is supplied on a board-holder support with rear plug connector for DIN rail type OMEGA 35mm. ES914 board also provides insulation of RS485 signals on the inverter connector. 3-zone insulation is provided: the 24Vdc supply input section, the RS485 section on the Master side and RS485 + 9Vdc supply output on the inverter side are electrically isolated. ES914 board transmits data in just one direction at a time (half-duplex transmission). ES914 board is equipped with two indicator LEDs indicating RS485 communication failures. Wiring mismatch (if any) is also detected.

**Part Number:** ZZ0101790  
To be installed outside the inverter

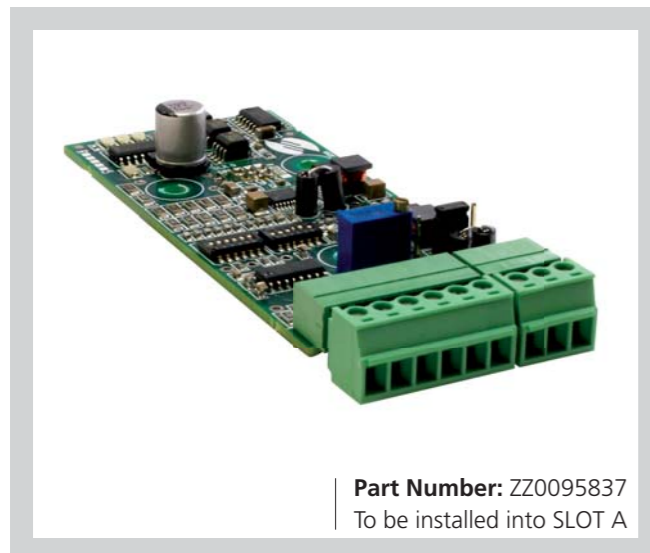
## SPEED SENSORS BOARDS



**Part Number:** ZZ0095834  
To be installed into SLOT A

### ES836 ENCODER BOARD

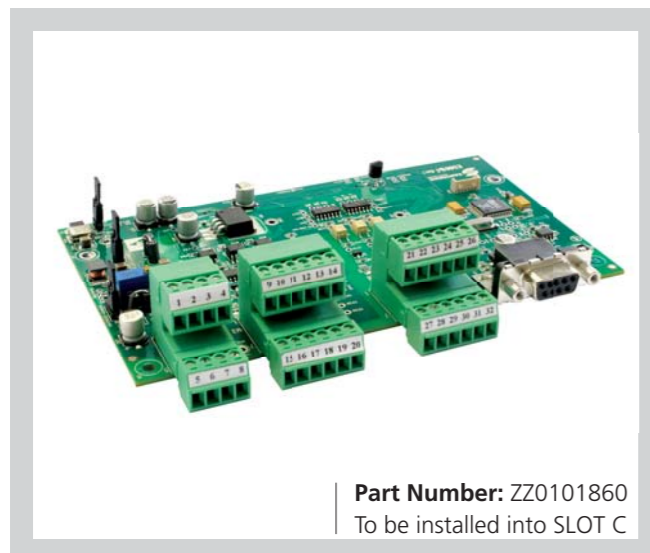
Board for incremental, bidirectional encoder to be used as a speed feedback for inverters of the SINUS series. It allows the acquisition of encoders with power supply ranging from 5 to 15VDC (adjustable output voltage) with complementary outputs (Line Driver, Push-Pull, TTL outputs). It can also be connected to 24VDC encoders with both complementary and single-ended push-pull or PNP/NPN outputs.



**Part Number:** ZZ0095837  
To be installed into SLOT A

### ES913 LINE DRIVER ENCODER BOARD

Board for incremental, bidirectional encoder to be used as a speed feedback for the inverters of the SINUS series. It allows the acquisition of encoders with power supply ranging from 5 to 24VDC (adjustable output voltage) with line driver outputs. The encoder board is to be installed into SLOT A.



**Part Number:** ZZ0101860  
To be installed into SLOT C

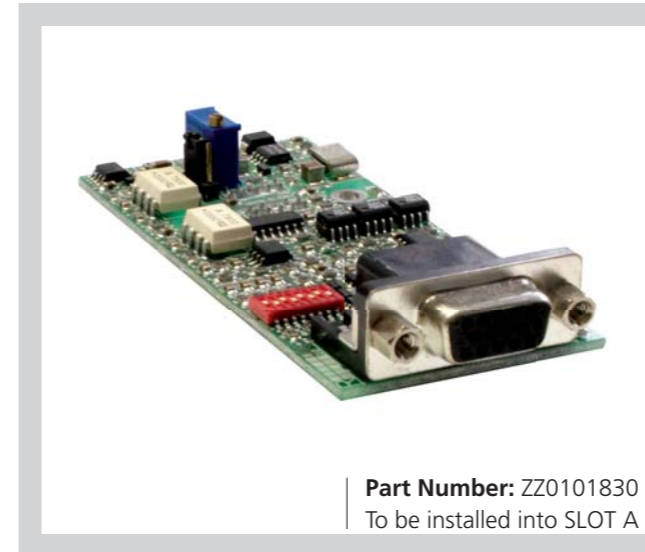
### ES861 RESOLVER AND INCREMENTAL ENCODER BOARD

Board for resolver signals, it converts them into 12-bit digital signals that can be used as speed and/or position feedback for the inverters of the SINUS PENTA series. It also generates the sinusoidal signal for the resolver excitation and features dedicated logics for the acquisition of differential signals sent from incremental encoders and for the control of optoisolated digital inputs and outputs.

#### Main features:

- Resolver to Digital (RtD) conversion allowing selecting motor position readout or speed readout.
- Configurable frequency and gain of the excitation signal and the reading signals from the Resolver.
- Incremental encoder output generated from RtD to line-driver (TIA/EIA-422) at 1024 pps/rev, repeated also to the internal bus of the inverter.

## SPEED SENSORS BOARDS



**Part Number:** ZZ0101830  
To be installed into SLOT A

### ES860 SIN/COS ENCODER BOARD

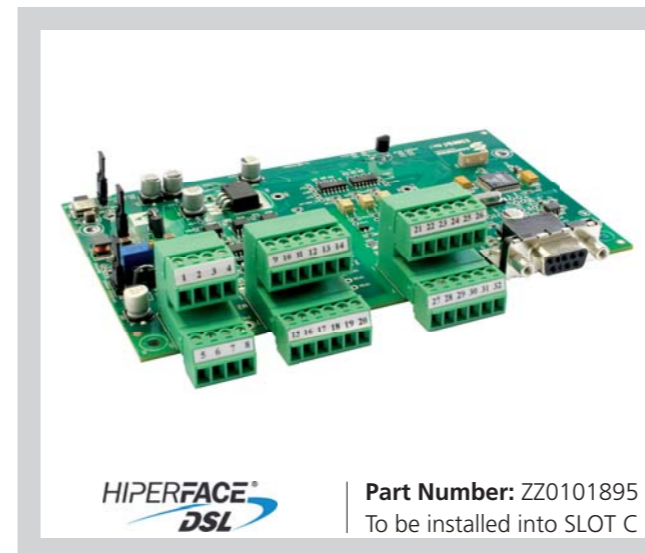
Board for encoders provided with 1Volt peak-to-peak analog outputs. To be used to provide speed feedback and/or position feedback for the inverters of the SINUS PENTA series.

Two acquisition modes as follows:

- **Three-channel mode:** increments low speed resolution and is suitable for slow rotation speed actuators requiring very accurate measurement of speed and position.
- **Five-channel mode:** detects the absolute mechanical position as soon as the inverter is first started up.

#### Main features:

- Two channels acquired via zero crossing and bidirectional digital counter with quadrature direction
- Zero index control for accurate alignment
- Two channels acquired in analog mode for absolute angle detection (12-bit resolution)

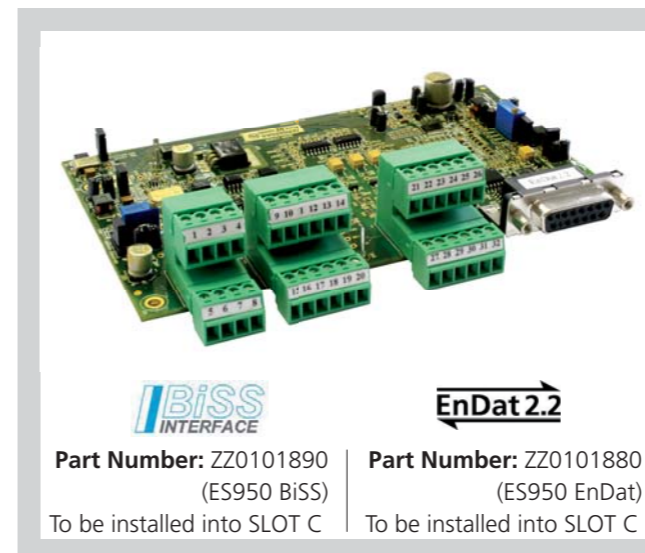


**Part Number:** ZZ0101895  
To be installed into SLOT C

### ES966 Hiperface ENCODER BOARD

HIPERFACE® is a registered trademark by SICK STEGMANN. The Hiperface Encoder Board allows users to connect single-turn or multi-turn encoders that have the HIPERFACE® interface to provide speed feedback and/or position feedback for the inverters of the Sinus PENTA series.

HIPERFACE® interface have been designed as Motor Feedback systems for drive technology. This results in compact design.



**Part Number:** ZZ0101890  
(ES950 BiSS)  
To be installed into SLOT C



**Part Number:** ZZ0101880  
(ES950 EnDat)  
To be installed into SLOT C

### ES950 BiSS/EnDat ENCODER BOARD

The encoder board allows connecting absolute encoders with digital serial interface using mutually exclusive BiSS and EnDat 2.2 protocols and allows using them to provide speed feedback and/or position feedback for the inverters of the Sinus PENTA series.

The absolute measurement allows detecting the exact position of the motor as soon as the inverter is started, thus avoiding demanding alignment checks.

The ES950 board also features control logics for additional functions, such as the acquisition of differential incremental signals from external encoders and the control of optoisolated digital inputs/outputs.

## DATALOGGER AND RTC BOARDS



**Part Number:** ZZ0101820  
To be installed into SLOT B

### ES851 DATA LOGGER BOARD

ES851 DataLogger is an option board allowing acquiring the operating variables of a plant and interfacing to a supervisor computer, even a remote computer, through different connecting modes for data logging and monitoring of the devices connected to the plant.

**Main features:**

- 8-Mb Data;
- RS485 and RS232 interface with Modbus-RTU protocol;
- Ethernet interface with TCP/IP protocol;
- Interface for the connection via GSM modem and analog modem with SMS functionality

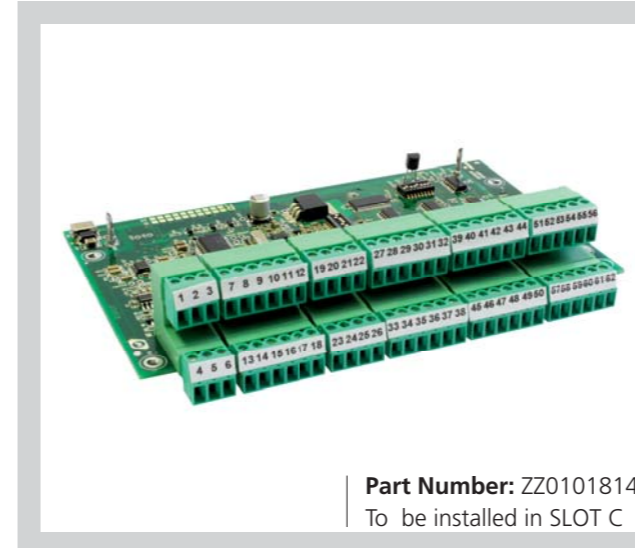


**Part Number:** ZZ0101825  
To be installed into SLOT B

### ES851-RTC REAL TIME CLOCK BOARD

The Real Time Clock ES851 RTC option board is provided with a clock indicating date and operating even when the inverter is not powered.

The inverter firmware may use date and time info to manage different timed events.



**Part Number:** ZZ0101814  
To be installed in SLOT C

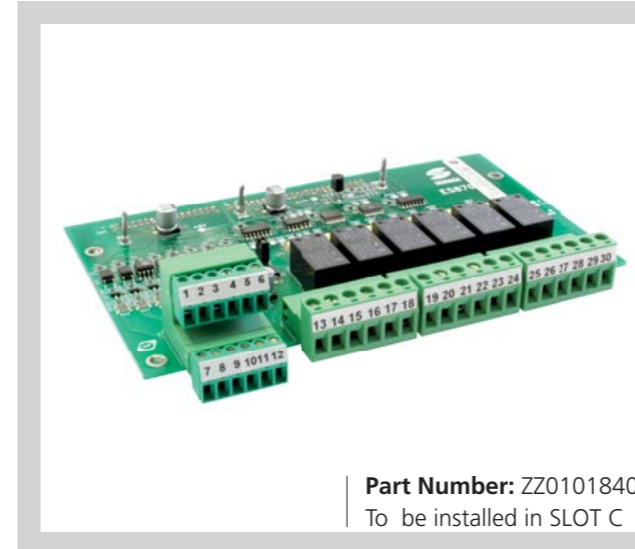
## I/O EXPANSION BOARD

### ES847 I/O EXPANSION BOARD

ES847 Board allows implementing an additional I/O set for any product of the PENTA series

**Additional functionality includes:**

- N.1 "fast" sampling analog inputs, 12-bit,  $\pm 10V$  f.s.;
- N.2 "fast" sampling analog inputs, 12-bit, for AC current measure via CTs or for 0-20mA sensor measures; resolution: 11 bits;
- N.1 "fast" sampling analog input for  $\pm 160mA$  f.s. sensor measures; resolution: 12 bits (Energy Counter option);
- N.4 "slow" sampling inputs, 12-bit, configurable as 0-10V f.s., 0-20 mA f.s., 0-100 mV f.s., temperature acquisition via two-wire thermistor PT100;
- N.2 "slow" sampling analog inputs, 12-bit, 0-10V f.s.;
- N.3 voltage inputs for ADE (Energy Counter option);
- N.3 current inputs for ADE (Energy Counter option);
- N.8 PNP, 24V multifunction digital inputs;
- N.6 multifunction digital outputs.



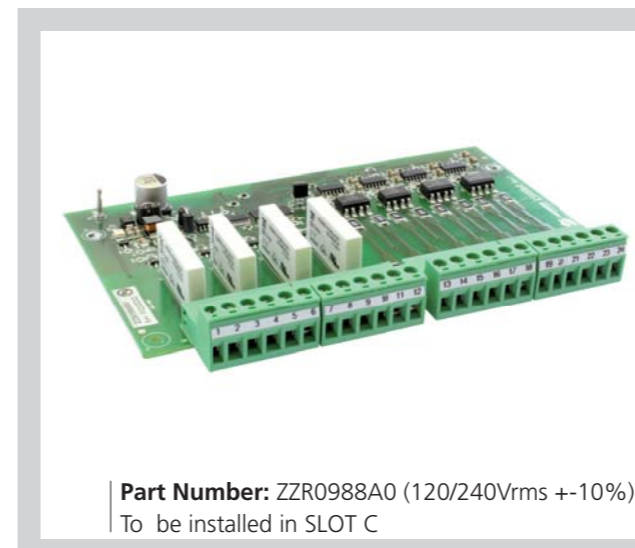
**Part Number:** ZZ0101840  
To be installed in SLOT C

### ES870 RELAY I/O EXPANSION BOARD

ES870 board is an expansion board for the digital I/Os of all the products of the SINUS PENTA series.

**ES870 board includes:**

- N.8 24V multifunction digital inputs, type PNP. Three inputs are "fast propagation" inputs that can be used also for PUSH-PULL 24V encoder acquisition;
- N.6 multifunction relay outputs



**Part Number:** ZZR0988A0 (120/240Vrms  $\pm 10\%$ )  
To be installed in SLOT C

### ES988 120V/240V I/O EXPANSION BOARD

ES988 board is an expansion board for the digital I/Os of all the products of the SINUS PENTA series.

**ES988 board includes:**

- N.8 multifunction digital inputs 120/240V
- N.4 multifunction relay outputs 120/240V