

INDUSTRIAL AUTOMATION

Product Range

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MADE IN ITALY Technology since 1970

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Giving energy more value

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INDUSTRIAL AUTOMATION Product Range

First Edition 2024 - published on January 1st 2024

All figures, dimensions, weights and data are indicative.

For a detailed dimensioning please call Santerno pre-sales technical office.

This catalogue is subject to changes without prior notice.

No liability shall be accepted for printing errors.

SINUS B

GENERAL-PURPOSE INVERTER

For Small Power Three-phase Asynchronous Motors



Voltage Classes and Power Range

2S: 1 x 200 to 240 Vac, 0.4 to 2.2 kW
(always three-phase output voltage)
Supply Voltage Tolerance: +10/-15%

Control Methods

- V/f

Overload

Heavy Duty: 150% for 60 s

Output Frequency

0 to 400 Hz

Water and Dust Resistant

IP20 Protection Degree

Display/Keypad with built-in potentiometer

Serial connection

RJ45 built-in port with Modbus RTU protocol
(SINUS B PLUS only)

EMC Filter – Built-in

C2 Category according to EN61800-3

Braking Unit – Built-in (models \geq 1.5 kW)

DIN Rail Mountable

Side by Side Installation

Certifications CE, RoHS, UL

	SINUS B Standard I/Os	SINUS B PLUS Advanced I/Os
Analog Input 0-10 Vdc	1	1
Analog Input 0-10 Vdc / 4-20 mA	-	1
Digital Inputs NPN / PNP	3	5
Analog Output 0-10 Vdc	1	1
Digital Output (open collector transistor)	1	-
Digital Output (relay)	1	2



**SIMPLICITY
AND VERSATILITY**



SINUS J

MULTI-PURPOSE, HIGH-PERFORMANCE COMPACT DRIVE For Three-phase Asynchronous Motors



Voltage Classes and Power Range

2S/T:

Single-phase Supply: 220 to 240 Vac
(-5%/+10%), 0.4 to 15 kW

Three-phase Supply: 200 to 240 Vac
(-15%/+10%), 0.4 to 22 kW

4T:

Three-phase Supply: 380 to 480 Vac
(-15%/+10%), 0.4 to 22 kW

Control Methods

- V/f
- Sensorless Vector Control

Overload

Heavy Duty: 150% for 60 s

Normal Duty: 120% for 60 s

Water and Dust Resistant

IP20 Protection Degree

Removable Display

Optional kit with 3 m cable

Advanced Functions

- Estimated lifetime of fans
- "Energy Saving" operation mode
- Motor autotuning when stopped or running

Communications

- RS485 Serial port with Modbus RTU communication protocol
- Optional Fieldbus cards: CANopen, Ethernet/IP, Modbus TCP, Profibus-DP

Integrated Braking Unit

On all models

Integrated EMC Filter

Only on 4T models

DIN Rail Mountable (up to 5.5 kW)

Side by Side Installation (up to 5.5 kW)

Certifications CE, RoHS, UL, UKCA



**SIMPLICITY
AND VERSATILITY**



SINUS H

MULTI-PURPOSE, HIGH-PERFORMANCE COMPACT DRIVE For Three-phase Asynchronous and Synchronous Motors

Voltage Classes and Power Range

2S: 1 x 200 to 240 Vac, 0.4 to 3.7 kW
(always three-phase output voltage)

2T: 3 x 200 to 240 Vac, 0.4 to 18.5 kW

4T: 3 x 380 to 480 Vac, 0.4 to 37 kW

Supply Voltage Tolerance: +10/-15%

Control Methods

- V/f
- Sensorless Vector Control
- Sensorless Vector Control for permanent magnet motors

Overload

Heavy Duty: 150% for 60 s, 200% for 4 s

Normal Duty: 120% for 60 s, 200% for 4 s

Water and Dust Resistant

IP66 version with integrated AC disconnect switch *

IP20 version available

* IP66 version available up to model 0030

Optional Graphic LCD Display

Integrated PLC Function

Simple PLC sequences may be obtained by combining different functional blocks. N.18 programmable logic blocks available

Advanced Functions

- Estimated lifetime of capacitors and fans
- "Energy Saving" operating mode
- 200% Starting torque at 0.5 Hz
- Motor autotuning when stopped or running

Communications

- RS485 serial port with Modbus RTU communications protocol
- Integrated P2P function: the I/Os may be shared between master and slave
- Multi-keypad function: the LCD graphic keypad installed on the master drive allows accessing all slave drives connected via RS485
- Fieldbus (optional): Profibus DP, CANopen, Modbus TCP/IP, Ethernet IP, EtherCAT, ProfinET

Integrated Braking Unit

Up to model 0030

Integrated EMC Filter

In 2S and 4T voltage class models

Integrated Safety Function

Safe Torque Off EN 61508 SIL 2 e EN ISO 13849-1 PL 'd'

Certifications CE, RoHS, EAC, UL



**+ CONNECTIVITY
+ ENERGY SAVING**

SINUS S

MODULAR AND COMPACT DRIVE FOR MOST DEMANDING APPLICATIONS For AC Three-phase Induction Motor (with and without speed sensor) and PM Synchronous Motors

Voltage Classes and Power Range

4T: 380 to 480 Vac, 0.37 to 37 kW

Supply Voltage Tolerance: +10/-15%

Control Methods

- V/f open loop (VFC)
- V/f closed loop (VFC closed loop)
- Sensorless Vector Control (SLVC)
- Servo Control closed loop (SC-ASM)
- Sensorless Permanent Magnet Motor Control (SLPSM)

Overload

Heavy Duty: 200% per 3 s, 150% per 60 s

Light Duty: 120% per 60 s



+ PERFORMING
+ POWERFUL
+ COMPACT

Main Features

- Flexible I/O (Standard I/O & Application I/O); inputs are PNP/NPN configurable
- Removal terminal blocks to facilitate the connections of cables
- Internal and external +24 V supply
- Side by side installation (Zero clearance mounting)
- DC BUS terminals available for energy sharing applications
- Dedicated PTC input for motor thermal protection

Integrated PLC Function

Sequencer up to 8 programmable sequences of 16 steps each

Built-in Dynamic Braking Unit

Advanced Functions

- "Favorite" parameters menu on the Display/Keypad
- Energy Saving function (VFEco)
- Integrated Anti-Sway algorithm to reduce the oscillation of gravitational loads during horizontal movements
- Advanced diagnostics menu (history buffer of the last 32 error and warning messages of the inverter)
- High torque also at low frequencies: 200% / 0.5 Hz
- Tuning of the motor: standstill or running
- Tuning of the speed controller

Communication

- Diagnostic and programming module to PC via USB/ WLAN and new REMOTE SINUS software tool
- LCD display/keypad with easy navigation functionality
- Standard I/O control unit with integrated Fieldbus: CANopen, Modbus RTU, Profibus, EtherCAT, Profinet, Ethernet-IP, Modbus TCP

Integrated EMC Filter

- Integrated EMC filter (for TT, TN, IT networks): C1, C2 or C3 Category (EN61800-3), depending on models and motor cable length.
- EMC shield for signal cables on the control unit

Integrated Safety Functions

Safe Torque Off Cat. 4 / PL "e" (EN ISO 13489-1)

SIL 3 / SIL CL 3 (IEC 61800-5-2 / IEC 61508 / IEC 62061)

Certifications CE, RoHS, EAC, UL

SINUS PENTA

HIGH-TECH SOLUTIONS FOR ANY INDUSTRIAL APPLICATION

Drives for the Control of Three-phase Asynchronous Motors and PMSMs

Energy Efficiency and Easy Integration

The SINUS PENTA drives allow reducing energy consumptions ensuring quick ROI

Four Voltage Classes and Wide Power Range

2T: 3 x 200 to 240 Vac - 280 to 340 Vdc, 1.5 to 260 kW
4T: 3 x 380 to 500 Vac - 530 to 705 Vdc, 2.2 to 2100 kW
5T: 3 x 500 to 600 Vac - 705 to 845 Vdc, 3 to 2500 kW
6T: 3 x 575 to 690 Vac - 815 to 970 Vdc, 3 to 3000 kW
Supply Voltage Tolerance: +10/-15%

A Robust, Reliable and Resistant Product

- Standard 3-year warranty
- Steel enclosure
- Tropicalised boards (conformal coating)
- Wide range of operating temperatures with no derating: from -10°C to 55°C *
- Degree of Protection: IP00, IP20 and IP54 *

Braking Unit

Integrated up to size S32 External for greater sizes

Wide Range of Standard I/Os

8 digital inputs, 4 digital outputs, 1 input for PTC, 3 analog inputs, 3 analog outputs, 1 frequency input

Integrated EMC Filter

Category C3 or C2 in compliance with EN61800-3 *

Communications

- Modbus RTU RS485 serial port
- Fieldbus boards (optional): PROFIdrive, CANopen, Profibus DP, DeviceNet, Modbus TCP, Ethernet IP, Profinet IRT, EtherCAT

Parallel Configuration of SINUS PENTA Drives

Available for sizes S41...S52. Benefits:

- Lower costs
- Improved stock management: the product may be modified for the connection in parallel by way of a special kit available on demand
- Easier repairs/replacement
- Space-saving

Option Encoder Boards

One CPU Board for all Models

Integrated Motor Protection and Autodiagnosics

Easy maintenance, reliable system

Integrated Safety Function

Safe Torque Off EN 61508 SIL 3 e EN ISO 13849-1 PL 'd'

Certifications CE, RoHS, EAC, UL

*Depending on the drive model



RELIABLE AND RESISTANT THE SINUS PENTA DRIVE MEETS ALL REQUIREMENTS OF HIGH-PERFORMANCE APPLICATIONS

Advanced Solutions

Overloads for any application.

Available for 60 s every 10 min or for 120 s every 20 min (depending on the drive model)

- Light: up to 120% (up to 144% for 3 s)
- Standard: up to 140% (up to 168% for 3 s)
- Heavy: up to 175% (up to 210% for 3 s)
- Strong: up to 200% (up to 240% for 3 s)

N.5 Control Methods

- IFD: High-performance V/f control
- VTC: Sensorless vector control
- FOC: Field-oriented control with encoder
- SYN: Control for PMSMs
- SYNRM: Sensorless control for reluctance motors

Anti-Sway Function

Bridge Crane Function

For lifting applications requiring to consider the opening and closing dynamics of a mechanical brake for optimum control of the connected motor

Torque Follower/Sharing Mode

Helpful mode to obtain Master/Slave systems where:

- A Master motor is controlled by a drive in speed reference mode
- One or multiple Slave motors are controlled by a drive in torque reference and Torque Follower mode, taking the torque reference from the Master

Virtual Digital Outputs (MPLs)

PLC functions: 4 virtual logic outputs are available in addition to the 4 physical outputs (DGOs) already available on the control board

Smart Voltage Control (IFD only)

With voltage increase due to sudden load variations, the drive controls the motor to avoid regeneration



PENTA MARINE Product Line

For marine and offshore applications. Compliant with the Det Norske Veritas "Rules for Classification of Ships, High Speed & Light Craft" and Det Norske Veritas "Offshore Standards"



ACTIVE FRONT END Product Line

Regenerative Solution featuring low harmonic content

SINUS PENTA XT

"TURNKEY" SOLUTION FOR FLOOR INSTALLATION

The same drive controls both three-phase asynchronous and synchronous permanent magnet motors (with and without speed feedback)

SINUS PENTA XT

- Extends the range of the SINUS PENTA line while maintaining high configurability to the requirements necessary to satisfy applications on machines and systems
- Is the result of an innovative design that allows you to make the most of all the potential of the drives of the SINUS PENTA line
- Is available for IP21 and IP54 floor mounting solutions, ready to use with minimal dimensions for easy, optimized, simple and cost-effective integration

Voltage Classes and Power Range

4T: 3 x 380 to 500 Vac, 110 to 710 kW

6T: 3 x 575 to 690 Vac, 200 to 1240 kW

Supply voltage tolerance: +10/-15%

Main features

- Compact design adaptable to customer needs
- Intuitive and multi-language control panel
- Easy access connection terminal block and internal cable tray available to the customer
- Cooling by means of separate ventilation channels:
 - Front-channel: dissipation of the control section of the drive
 - Back-channel: dissipation of the power section of the drive
- Zero clearance (side-by-side mounting)
- Three front door control modes:
 - O = BASIC
 - S = START/STOP
 - F = FULL
- Three input protective devices:
 - SF = Switch + Fuses 65 kA
 - CB = Circuit Breaker 10 kA
 - BF = Breaker + Fuses 65 kA

External Interfaces

- Communication protocols boards (Fieldbus)
- Angle sensor boards (encoder, resolver, etc...)
- I/O expansion boards

Ready-to-use AC Drive configurable and expandable with the following options

- Harmonic filter on the line input
- High efficiency filter (dV/dt) on the motor output
- PT100 motor reading
- Control and protection of space heaters (both cabinet and motor)
- Control and protection of motor ventilation
- Cabinet temperature monitoring
- Power meter measurements (power, current, voltage, power factor, etc ...)
- RFI output filters

Certifications: CE, RoHS, EAC



Smart heat management
4 configurable modes of air entrance / exit



IRIS BLUE

SPECIAL-PURPOSE DRIVE FOR WATER AND WASTEWATER INDUSTRY AND HVAC APPLICATIONS

For the Control of Three-phase Asynchronous Motors

Voltage Classes and Power Range

2T: 3 x 200 to 240 Vac, 3 to 132 kW

4T: 3 x 380 to 480 Vac, 4.5 to 300 kW

Supply Voltage Tolerance: +10/-15%

Control Methods

- IFD: High-performance V/f control
- VTC: Sensorless vector control

Maximum Efficiency and Complete System Control

Using drives specific to quadratic loads, such as pumps, fans and compressors, dramatically reduces energy consumptions (reducing speed by 20% means reducing consumptions by 50%)

The IRIS BLUE drive features special functions to

- Reduce maintenance
- Obtain maximum energy efficiency
- Obtain full system control
- Control multi-pump systems: the flow rate is adjusted based on the actual demand, thus balancing the working time of the different pumps in the system

Dedicated Functions for Special-Purpose Applications

- Dry Run Control
- Pipe Fill Control
- Fire Mode
- Pump Cleaning Function
- Speed Search Function
- Multi-motor Control
- Pressure Loss Control

Integrated EMC Filter

Category C3 in compliance with EN61800-3

Communications

- Integrated RS485 serial port
- Fieldbus boards (optional): PROFIdrive, CANopen, Profibus DP, DeviceNet, Modbus TCP, Ethernet IP, Profinet IRT, EtherCAT

Integrated Safety Function

Safe Torque Off EN 61508 SIL 3 e EN ISO 13849-1 PL 'd'

Certifications CE, RoHS



+ SPECIAL-PURPOSE FUNCTIONS
+ ENERGY SAVING
- INSTALLATION TIME



ASA 4.0

FOR OPTIMUM MOTOR CONTROL Soft Starters for Three-phase Asynchronous Motors



**COMPLETE
CONTROL
OF THE APPLICATION**

ASA 4.0 BASIC Soft Starters for in-line connections

ASA 4.0 ADVANCED Soft Starters for advanced motor control. In-line or inside-delta connections

Current and Overload Range

24 A to 580 A (nominal) (ASA 4.0 BASIC)

24 A to 1250 A (nominal) (ASA 4.0 ADVANCED)

Overload up to 600% of the rated current

Voltage Range

3 x 200 to 525 Vac or 3 x 380 to 600 Vac (ASA 4.0 BASIC)

3 x 200 to 525 Vac or 3 x 380 to 690 Vac (ASA 4.0 ADVANCED)

Integrated USB port to

- Update the drive software
- Copy programming
- Store logs to a USB stick

Communications modules installable internally to the device

- Modbus RTU
- Profibus
- DeviceNet
- Modbus TCP
- ProfiNet
- Ethernet IP

Pumping Smart Card Option Board

Allows connecting the plant sensors directly to the soft starter

Protections

- Over-/Undercurrent
- Current Imbalance
- Motor Thermistor
- Phase Sequence
- Phase Loss
- Power Loss

Certifications CE, RoHS, UL



FUNCTIONS	ASA 4.0 BASIC	ASA 4.0 ADVANCED
Motor Configurations	1	2
Constant current and current ramp at start up	✓	✓
Start/stop adaptive control	✓	✓
Kickstart		✓
Coast to stop and TVR	✓	✓
DC Brake		✓
Soft brake		✓
Jog (forward and reverse)		✓
Inside-delta connection control (6-wire)		✓
Soft trip		✓
SCR Fail PowerThrough Operation		✓
Automatic Start/Stop programming (RTC)		✓
Number of controlled phases	2	3

ASAMV

MEDIUM-VOLTAGE SOFT STARTER

For Three-phase Asynchronous and Synchronous Motors

Configurations

Degree of protection IP54, bypass contactor, line contactor, fuses, circuit breaker

Rated Current: 100 A to 1000 A

Supply Voltage: 2300 Vac to 13800 Vac
(15000 V on demand)

SCR Overload

- Up to 125% - Continuous
- Up to 500% - 60 seconds
- Up to 600% - 30 seconds



**MAXIMUM
SAFETY
AND FLEXIBILITY**



Advanced Integrations

Integrated Communications ports

- RS232 for point-to-point communications with a PC
- RS485 for multi-drop communications with Modbus RTU protocol

Flexible I/Os

- 8 x relay programmable outputs
- 2 x programmable analog outputs (0-10 Vdc or 4-20 mA)

User Interface

LCD Display, Start-Stop-Reset-Local/Remote, state indicator LED, trip log, counters (number of starts, hours run, kWh), measurements (current, voltage, power factor, kWh), programming of viewable measurements, password protection

Certifications CE



DCREG

AC/DC CONVERTER

*For DC Motors, Galvanic Applications
and High Inductive Loads such as Electromagnets*



**THE GUARANTEE
OF EXPERIENCE:
RELIABILITY
AND ACCURACY**



Product Versions

DCREG2: Operation as a Motor in quadrant 1, with speed control or torque control Operation as a Brake in quadrant 2, with speed control or torque control

DCREG4: Complete operation and reversibility in the four quadrants: operation as a motor or brake in both directions of rotation, with speed or torque control

Product Range

10 A to 4500 A (2.4 kW to 3200 kW)

Power Supply

- Power Section: 3x 440 Vac / 500 Vac / 600 Vac / 690 Vac
- Field Section: 1 x 200 to 500 Vac
- Control Section: 1 x 380 to 500 Vac or 24 Vdc

Armature Voltage

DCREG2: 530 Vdc / 600 Vdc / 720 Vdc / 800 Vdc

DCREG4: 460 Vdc / 520 Vdc / 630 Vdc / 720 Vdc

Overload up to 150% for 60s every 10 minutes

Easy Start-up

- Current and speed autotuning
- Field current autotuning
- Insensitivity to power phase sequence

Advanced Technical Solutions

- Field Regulator, Energy Saving function and Field Current Boost function
- Predictive Control
- Tacho generator feedback, encoder feedback, armature feedback
- Automatic switching of speed feedback from tacho/encoder to armature feedback in case of fault
- Control fitting applications with electromagnets and electro-mechanical brakes

Integrated I/Os

- 4 x Analog Inputs
- 4 x Configurable Analog Outputs
- 8 x Digital Inputs
- 5 x Configurable Relay Outputs
- Dual input for encoder

Communications

- RS232 / RS485 serial port (optional)
- Fieldbus (optional): Profibus DP, DeviceNet, InterBus, CANopen, ControlNet, Ethernet+IT and Lonworks. Additional Fieldbus available on demand

Certifications CE, RoHS, EAC, UL*

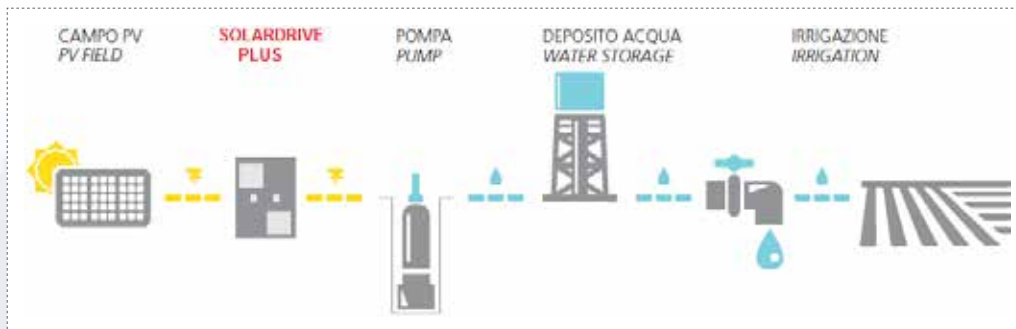
* Depending on the drive model

SOLARDRIVE PLUS/BOX/CABINET

THE COMPLETE SOLUTION FOR SOLAR PUMPING SYSTEMS
For Three-phase Asynchronous Motors



**MAXIMUM EFFICIENCY
 AND PERFORMANCE
 UNDER ANY SOLAR
 RADIATION CONDITIONS**



30 YEARS OF EXPERIENCE IN THE PRODUCTION OF INVERTERS FOR SOLAR PUMPING

The inverters of the SOLARDRIVE PLUS line

- Guarantee maximum performance and efficiency in all conditions of irradiation thanks to the proprietary MPPT algorithm (Maximum Power Point Tracking).
- Start automatically during daylight hours.
- May be supplied by a generator set or grid during nocturnal hours.
- Regulate the water level in the tank or the water pressure in the pipes
- Are applicable to all types of pumps

They are available in different types:

- **SOLARDRIVE PLUS** for installation inside electrical panels at the customer's discretion.
- **SOLARDRIVE PLUS IP54** for wall installation with IP54 protection degree.
- **SOLARDRIVE PLUS/BOX/CABINET (turnkey solutions):** equipped with components for connection to the field and for connection to the pump and system protection.

Certifications CE, RoHS

Advanced pre-sale technical support for full system sizing

A range for all needs:

Range	Photovoltaic field		Motor	
	V_{MPP}	V_{oc}	Voltage	Power
Voltage class:	V_{dc}	V_{dc}	V_{ac}	kW
2T	270 ÷ 360	440	230	3 ÷ 200
4T	450 ÷ 780	830	400	3 ÷ 400 *
6T	550 ÷ 900	1200	400 ÷ 690	3 ÷ 630 **

* upon request up to 2,1 MW - ** upon request up to 3 MW

THREE-PHASE ASYNCHRONOUS MOTORS



IE2 · IE3 · IE4

High-efficiency Motors

In compliance with the new European standards defining the minimum required efficiency levels: IE2 High Efficiency, IE3 Premium Efficiency and IE4 Super Premium Efficiency

Power Range

2-4-6-pole

0.75 to 315 kW

Shaft height from 56 to 355

Additional power ratings and sizes available on demand

Wide Range of Construction Types

Construction types classified and described in standard IEC 60034 -7

Easy Maintenance and Maximum Motor Safety

- Thermal Protections: PTC and PTO sensors
- Encoder
- Phase separators
- Cable-glands on the terminal board casing
- Compensation spring to reduce vibrations
- Isolated bearings
- Condensation drain holes: closed with special plugs to maintain the correct degree of protection. Those plugs may be removed to drain condensation that may appear inside the motor
- Adjustable feet: detachable and movable

Cooling System

The standard motors are characterized by the IC 411 cooling method (self-ventilation)

IC 416 cooling method available on demand (forced ventilation)

Construction material and Degree of Protection

Aluminium and cast iron motors

IP55 (IP56 or greater on demand), ATEX II 3G / II 3D

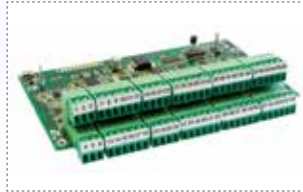
OPTION BOARDS FOR SINUS PENTA



ETHERNET



LINE DRIVER



I/O EXPANSION



BRIDGE MINI EMBEDDED ES1007

Fieldbus and Communications Boards

- PROFIdrive
- CANopen
- Profibus DP
- Modbus TCP
- Ethernet IP
- Profinet IRT
- EtherCAT
- DeviceNet
- RS232/RS485 isolated serial board

Power Supply Boards

- Auxiliary Power Supply Board +24 V

Speed Sensor Boards

- Bidirectional, Incremental Encoder Board
- LINE DRIVER Encoder Board
- SINcos Encoder Board

- Resolver/Encoder Board
- BiSS/EnDat Encoder Board
- HIPERFACE Encoder Board

I/O Expansion Board

- Analog/digital I/O Expansion Board
- Relay I/O Expansion Board
- 120/240 Vac I/O Board

Datalogger and RTC Boards

- Data Logger Bridge Mini board with built-in RTC, Remote Drive connection – connection through GPRS, 4G LTE, optic fiber, ADSL, HDSL, satellite – local Ethernet - RS485

ACCESSORIES FOR MOTOR DRIVES

EMC Filters for IT and TN networks

Filters for Harmonic Current Damping

- Input AC Inductors
- DC inductors
- 12-pulse or 18-pulse Power Supply Module
- Resonant Filters
- AFE Unit

dv/dt Filters

- Output AC inductors
- Sine Filters

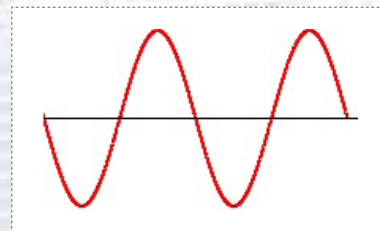
External Braking Unit for SINUS PENTA drives (size >S32)

Braking Resistors

NEMA 1 Kit

Through-panel Assembly Kit

LOW HARMONICS





HEADQUARTERS
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INDUSTRIAL AUTOMATION Product Range
First Edition 2024 - published in January 1st 2024
This catalogue is subject to changes without prior notice.

