ENERTRONICA SANTERNO

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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All figures, dimensions, weights and data are indicative.
For a detailed dimensioning please call Santerno pre-sales technical office.
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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

Wide Power Range and Four Voltage Classes
2T: 3 x 200 to 240Vac - 280 to 340Vdc, 3 to 260kW
4T: 3 x 380 to 500Vac - 530 to 705Vdc, 4.5 to 2100kW
5T: 3 x 500 to 600Vac - 705 to 845Vdc, 4 to 2500kW
6T: 3 x 575 to 690Vac - 815 to 970Vdc, 5.5 to 3000kW
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, ProfibusDP, CCLink, DeviceNet, Modbus TCP/IP, Ethernet IP, Profinet IRT, EtherCAT, PowerLink

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 Autodiagnostics
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, RCM, UL*

* Depending on the drive model

TOP EFFICIENCY DRIVE
CDM IE2 according to IEC 61800-9-2

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

ADVANCED SOLUTIONS

Overloads for any application
Available for 60s every 10min or for 120s every 20min*

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

N.4 Control Methods

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

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 function: 4 virtual logic outputs are available in addition to the 4 physical outputs (DGOs) 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 installations. Compliant with the Det Norske Veritas "Rules for Classification of Ships, High - Speed & Light Craft" and Det Norske Veritas "Offshore Standards".

Active Front End Solution

Regenerative Solution featuring low harmonic content

IRIS BLUE

SPECIAL-PURPOSE DRIVE FOR WATER AND WASTEWATER INDUSTRY AND HVAC APPLICATIONS
For the Control of Three-phase Asynchronous Motors

Power Range and Voltage Classes
2T: 3 x 200 to 240 Vac , 3 to 132kW
4T: 3 x 380 to 480 Vac, 4.5 to 300kW
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

TOP EFFICIENCY DRIVE
CDM IE2 according to IEC 61800-9-2

+ SPECIAL-PURPOSE FUNCTIONS
+ ENERGY SAVING
- INSTALLATION TIME

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, ProfibusDP, CCLink, DeviceNet, Modbus TCP/IP, Ethernet IP, Profinet IRT, EtherCAT, PowerLink

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

Certifications CE, RoHS, EAC, RCM

SINUS H

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

Power Range and Voltage Classes
2S: 1 x 200 to 240Vac, 0.4 to 3.7 kW
(always three-phase output voltage)
2T: 3 x 200 to 240Vac, 0.4 to 18.5 kW
4T: 3 x 380 to 480Vac, 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 60s, 200% for 4s
Normal Duty: 120% for 60s, 200% for 4s

TOP EFFICIENCY DRIVE
CDM IE2 according to IEC 61800-9-2

+ CONNECTIVITY
+ ENERGY SAVING

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
- Fieldbuses (optional): Profibus DP, CANopen, TCP/IP bus, 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, RCM, UL

SINUS M

GENERAL-PURPOSE DRIVE For Three-phase Asynchronous Motors

Power Range and Voltage Classes
2S/T: 1 x 200 to 230Vac / 3 x 200 to 230Vac,
0.4 to 22 kW (always three-phase output voltage)
4T: 3 x 380 to 480Vac, 0.4 to 22 kW
Supply Voltage Tolerance: +10/-15%

Overload 150% for 60s, 200% for 0.5s

Control Methods V/f, Sensorless Vector Control

Degree of Protection IP20

Display/Keypad integrated with potentiometer

Standard I/Os
- 2 x analog inputs
- 8 x digital inputs
- 1 x analog output
- 2 x digital outputs (1 x transistor, 1 x relay)

Integrated Braking Unit

Integrated EMC Filter
Category C3 in compliance with EN61800-3

Integrated RS485 Serial Port
with Modbus RTU communications protocol

Certifications CE, RoHS, EAC, RCM, UL

TOP EFFICIENCY DRIVE
CDM IE2 according to IEC 61800-9-2

SINUS B

GENERAL-PURPOSE INVERTER For small power Three-phase Asynchronous Motors

Power Range and Voltage Class
2S: single-phase supply 200÷240 Vac +10/-15%, 0.4÷2.2 kW (three-phase Output Voltage)

Overload 150% for 60 s (Heavy Duty)
Control Method V/f
Output Frequency 0÷400 Hz
Protection Degree IP20
Display/Keypad with built-in potentiometer

Standard I/Os
- 1 Analog Input 0-10 Vdc
- 1 Analog Input 0-10 Vdc / 4-20 mA (Sinus B Plus only [*])
- 3 Digital Inputs NPN/PNP (5 for Sinus B Plus [*])
- 1 Analog Output 0-10 Vdc
- 1 Digital Output (open collector transistor
- 1 Digital Output (relay) (2 for Sinus B Plus [*])

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 ≥ 1.5 kW)

DIN Rail Mountable

Side by Side Installation

Certifications CE, RoHS, EAC, RCM, UL

[*] on demand

ASA 4.0

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

ASA 4.0 BASIC Soft Starters for in-line connections

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

Current and Overload Range
- 24A to 580A (nominal)
- 3 x 200 to 3 x 525Vac or 380 to 690Vac
- Overload up to 600% of the rated current

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

Certifications CE, RoHS, EAC, RCM, UL, Lloyd's Register

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

COMPLETE CONTROL OF THE APPLICATION

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

ASAB

HIGH-PERFORMANCE SOFT STARTERS For Three-phase Asynchronous Motors

Models fitting any wiring requirements
Three-phase soft starter for in-line or inside-delta connections (automatic detection)

Integrated Bypass Contactor
Up to 1000A

Product Range and Overload
- 23A to 1600A (nominal)
- 3 x 200 to 525Vac or 3 x 380 to 690Vac
- Overload up to 450% of the rated current

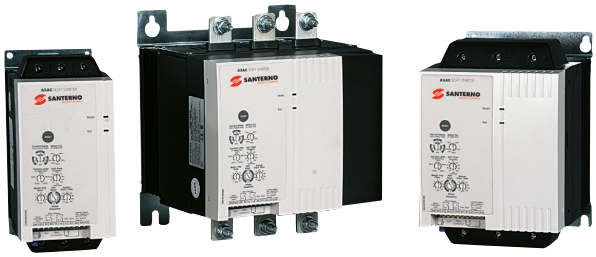
Customisable Protections
- Motor Overload
- Excess Start Time
- Undercurrent
- Instant Overcurrent
- Current Imbalance
- Grid Frequency
- Input Alarm
- Motor Thermistor
- Power Supply Circuit
- Phase Sequence

Starting/Stopping Options
- AAC - Acceleration Adaptive Control
- Constant Current
- Current Ramp
- Soft Stop with Timed Voltage Ramp
- Brake

Certifications CE, RoHS, EAC, UL*
*Depending on the drive model

ASAC 0/1

TWO-PHASE SOFT STARTERS For Three-phase Asynchronous Motors



Two product versions for motor in-line connection:

ASAC 0 for motor soft starting

ASAC 1 for advanced starting control featuring motor protections

Integrated Bypass Contactor
Integrated into all models

Product Range and Overload
- 18A to 200A (nominal)
- 3 x 200 to 440Vac or 3 x 200 to 575Vac (7.5kW to 110kW)
- Overload up to 400% of the rated current

Main Features
- Up to N. 8 adjustments: Nominal Current (FLC), Current Ramp, Current Limit, Trip Class, Duration of Soft Starting, Excess Start Time, Phase Sequence Protection, Auxiliary Relay
- N. 6 Events: Control Power Supply Loss, Soft Starter Ready, Soft Starter Malfunction, Motor Stopped, Motor Running at Max. Speed, Motor Starting/Stopping
- Up to N. 8 Trips: Power Section, Power Supply Frequency, Communications, Excess Start Time, Motor Overload, Motor Thermistor, Phase Imbalance, Phase Sequence
- Up to 3 x Digital Inputs
- Up to 2 x Relay Outputs

Certifications CE, RoHS, EAC, UL

EASY INSTALLATION AND ACCURATE DIAGNOSTICS

ASAMV

MEDIUM-VOLTAGE SOFT STARTER
For Three-phase Asynchronous and Synchronous Motors

MAXIMUM SAFETY AND FLEXIBILITY

CONFIGURATIONS

Version E3: Degree of protection IP54, bypass contactor, line contactor
Version E2: Degree of protection IP54, bypass contactor, line contactor, fuses, circuit breaker

E3 Version Range
Nominal Current: 200A to 600A
Supply Voltage: 2300Vac to 7200Vac
E2 Version Range
Rated Current: 100A to 1000A
Supply Voltage: 2300Vac to 13800Vac (15000V on demand)

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

ADVANCED INTEGRATION

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 (0-10Vdc or 4-20mA)

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, RoHS, EAC

DCREG

AC/DC CONVERTER
For DC Motors, Galvanic Applications and High Inductive Loads such as Electromagnets

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
10A to 4500A (2.4 kW ÷ 3200kW)

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

Armature Voltage
DCREG2: 530Vdc / 600Vdc / 720Vdc / 800Vdc
DCREG4: 460Vdc / 520Vdc / 630Vdc / 720Vdc

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)
- Fieldbuses (optional): Profibus DP, DeviceNet, InterBus, CANopen, ControlNet, Ethernet+IT and Lonworks. Additional fieldbuses available on demand

Certifications
CE, RoHS, EAC, UL*

*Depending on the drive model

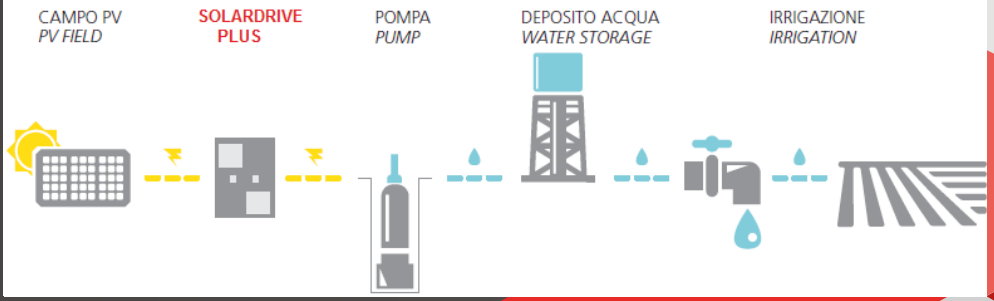
THE GUARANTEE
OF EXPERIENCE:
RELIABILITY AND ACCURACY

SOLARDRIVE PLUS BOX/CABINET

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

30-YEAR EXPERIENCE IN PRODUCING SOLAR PUMPING INVERTERS

MAXIMUM EFFICIENCY AND PERFORMANCE UNDER ANY SOLAR RADIATION CONDITIONS



PUMPING SYSTEMS POWERED BY PV PANELS

The new **SOLARDRIVE PLUS** inverters, designed to control pumps, ensure maximum efficiency and performance under any solar radiation condition

The **SOLARDRIVE PLUS** inverters automatically start up when solar radiation is detected and adjust the water level in the tank or the water pressure in pipes

The **SOLARDRIVE PLUS** inverters may also be power supplied by an electric generator at night

SOLARDRIVE PLUS BOX/CABINET a complete solution housed in a cabinet, including the inverter and all the components required for the connection to the field, the pump and the system protection

Available in Box or Cabinet (IP54)

Power Range and MPPT Range
550 to 900Vdc, 3kW to 315kW *
* Up to 3MW on demand

OPERATING MODES

The inverter starts and stops the pump automatically based on the solar radiation level. The output frequency is automatically adjusted to track the Maximum Power Point in the PV field.

A level switch stops the pump when the tank is full. The pump is stopped also when the well is empty. The inverter may be restarted based on a programmable number of start retries

Certifications
CE, RoHS

Advanced Technical Pre-sales Support
For the complete dimensioning of the system

THREE-PHASE ASYCHRONOUS 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 315kW
Shaft height from 56 to 355

Additional power ratings and sizes available on demand

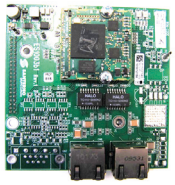
Wide Range of Construction Types
Construction types classified and described in standard IEC 60034 -7

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

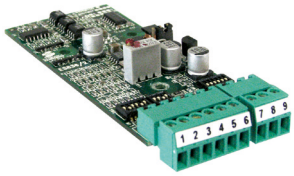
Cooling System
The standard motors are characterized by the IC 411 cooling method (self-ventilation).
IC 416 cooling method available on demand (forced ventilation)

Construction material and Degree of Protection
Aluminium and cast iron motors
IP55 (IP56 or greater on demand), ATEX II 3G / II 3D

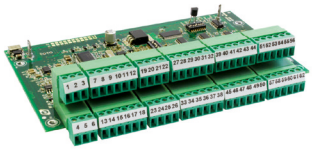
OPTION BOARDS



ETHERNET



LINE DRIVER



I/O EXPANSION

DATALOGGER

Fieldbus and Communications Boards
PROFIdrive, CANopen, ProfibusDP, CCLink, DeviceNet, Modbus/TCP, Ethernet/IP, Profinet/IRT, EtherCAT, Power-Link, RS232/RS485 isolated serial board, etc.

Speed Sensor Boards
- Bidirectional, Incremental Encoder Board
- Line Driver Encoder Board
- SINcos Encoder Board
- Resolver/Encoder Board
- BiSS/EnDAT Encoder Board
- Hiperface Encoder Board
- Board for Metasys N2 and BACnet communications protocols

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

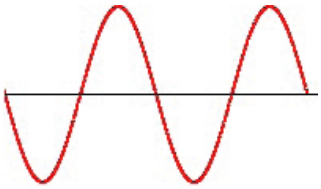
Datalogger and RTC Boards
- Datalogger and WEB Server Board with interface RS232/485, Ethernet, Modem PSTN/GSM/GPRS
- RTC, Real Time Clock Board equipped with a clock detecting date and time even when the inverter is not powered

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

LOW HARMONICS



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

ENERTRONICA
SANTERNO

Enertronica Santerno S.p.A.
7, Via della Concia - 40023 Castel Guelfo (BO) Italy
Ph +39 0542 489711
info@santerno.com | www.santerno.com

Follow us on Linkedin
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