



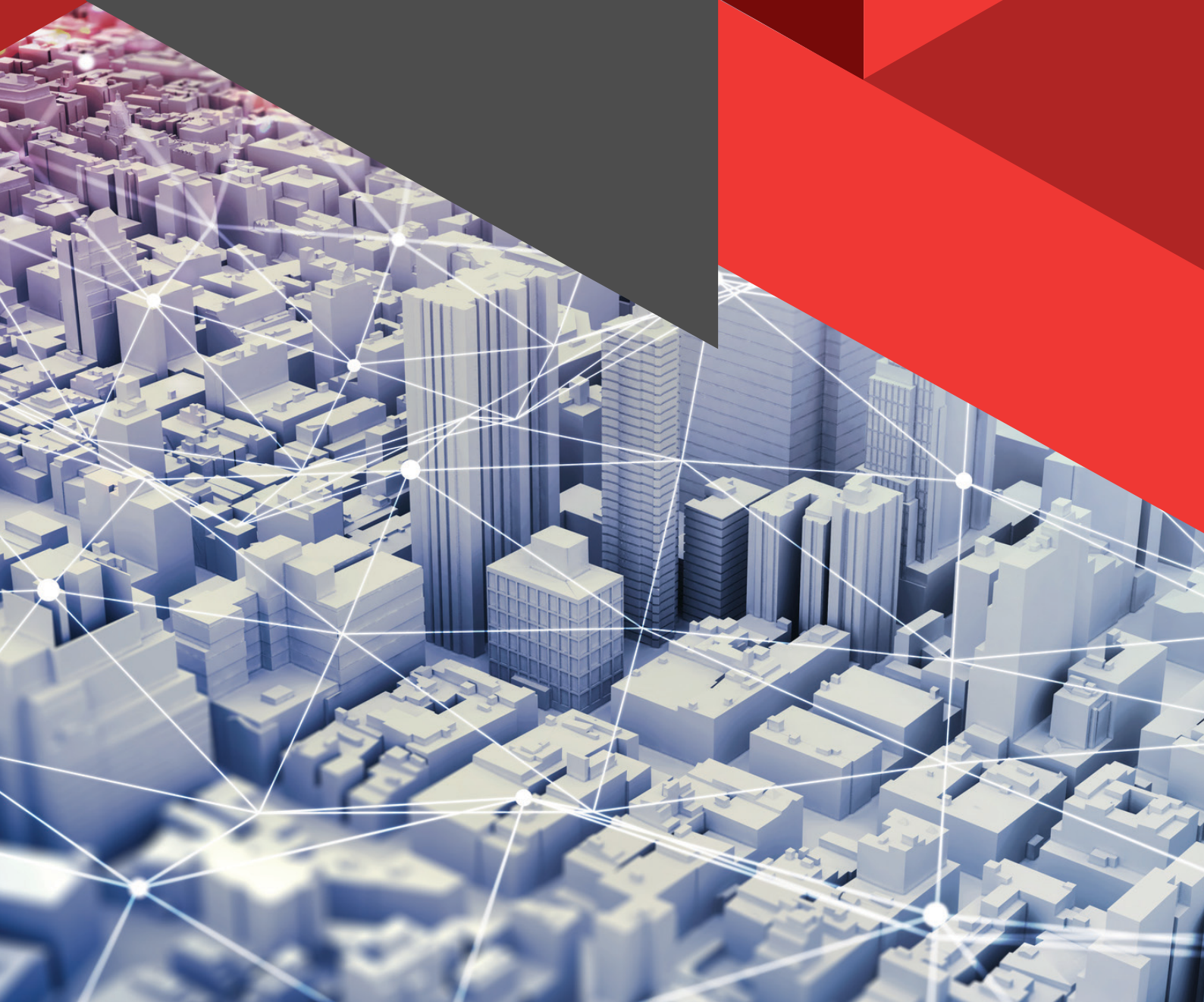
# INDUSTRIAL AUTOMATION

## Product Range

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MADE IN ITALY Technology since 1970





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*Giving Energy More Value*

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# 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 Autodiagnosics

Easy maintenance, reliable system

#### Integrated Safety Function

Safe Torque Off SIL3 and EN ISO 13849-1, PL-d

**Certification** CE, UL\*, EAC, RCM, QPS, ONV

\* 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

## Active Front End Solution

Regenerative Solution featuring low harmonic content

## 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. Product derived from the Sinus Penta. Compliant with the Det Norske Veritas "Rules for Classification of Ships, High - Speed & Light Craft" and Det Norske Veritas "Offshore Standards".



# 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 SIL3 and EN ISO 13849-1, PL-d

### CE Certification

# 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



### 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 SIL2 and EN ISO 13849-1, PL-d

Certification CE, UL

### TOP EFFICIENCY DRIVE

CDM IE2 according to IEC 61800-9-2

+ CONNECTIVITY  
+ ENERGY SAVING



# 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

**Certification** CE, UL, EAC, RCM

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



# SINUS N

**GENERAL-PURPOSE DRIVE  
For Three-phase, Low-power  
Asynchronous Motors**



## Power Range and Voltage Classes

**2S:** 1 x 200 to 230Vac, 0.4 to 3 kW  
(always three-phase output voltage)

Supply Voltage Tolerance: +10/-10%

**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, 0-10Vdc and 4-20mA
- 5 x NPN PNP programmable digital inputs
- 1 x multifunction analog output, 0-10Vdc
- 2 x digital outputs (1 x transistor, 1 x relay)

## Integrated EMC Filter

Category C1 in compliance with EN61800-3, 1

**Certification** CE, UL, EAC, RCM

**SIMPLICITY  
AND VERSATILITY**





# ASA 4.0 BASIC / ASA 4.0 ADVANCED

## 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 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

**Certification** CE, UL, RCM, Lloyds Register

#### Protections

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



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

**Certification** CE, UL, EAC, CCC, Lloyds Register

# 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

**Certification** CE, UL, EAC, RCM

**EASY INSTALLATION AND ACCURATE DIAGNOSTICS**

# ASAMV

## MEDIUM-VOLTAGE SOFT STARTER

For three-phase asynchronous and synchronous motors



### CONFIGURATIONS

**Version F3:** Degree of protection IP54, bypass contactor, line contactor

**Version F2:** 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

# 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, Inter-Bus, CANopen, ControlNet, Ethernet+IT and Lonworks. Additional fieldbuses available on demand

### Certification

CE, UL (up to model DCREGX.350), EAC, EMC EN61800-3/IEC1800-3 2nd Env

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



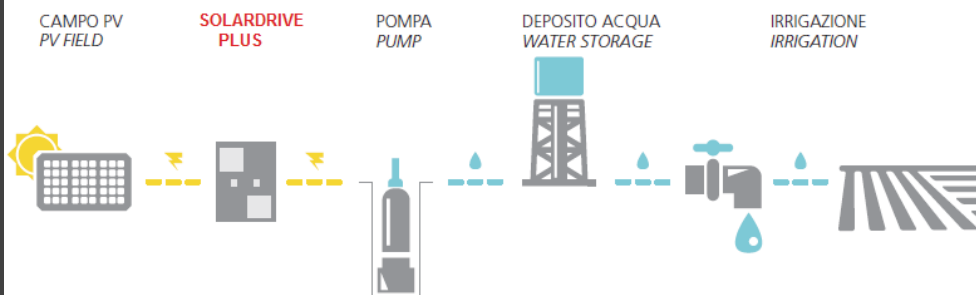
# SOLARDRIVE PLUS BOX/CABINET

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

## Certification

CE and Safe Torque Off according to EN ISO 13849-1 and EN 61508 SIL3, PL-d

## Advanced Technical Pre-sales Support

For the complete dimensioning of the system



# 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 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

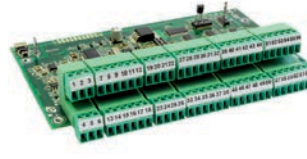
# OPTION BOARDS



**ETHERNET**



**LINE DRIVER**



**I/O EXPANSION**



**DATALOGGER**

## Fieldbus and Communications Boards

PROfdrive, 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



## REMOTE MONITORING SERVICE

**Hydrofast.it** the service from **Santerno** logging the measurements of the inverter-motor unit and the process sensors in real time.

The data logged and the historical data are available and usable from the **www.hydrofast.it** website featuring reserved access.

### This service includes:

- Map
- Summary
- Plant Schematic
- Graphs

## 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

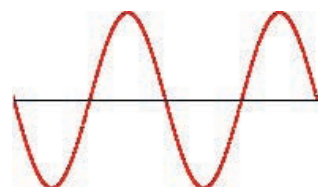
**External Braking Unit** for Sinus Penta drives (size >S32)

**Braking Resistors**

**NEMA 1 Kit**

**Through-panel Assembly Kit**

LOW HARMONICS



Official Partner



**SANTERNO**  
ENERTRONICA GROUP



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