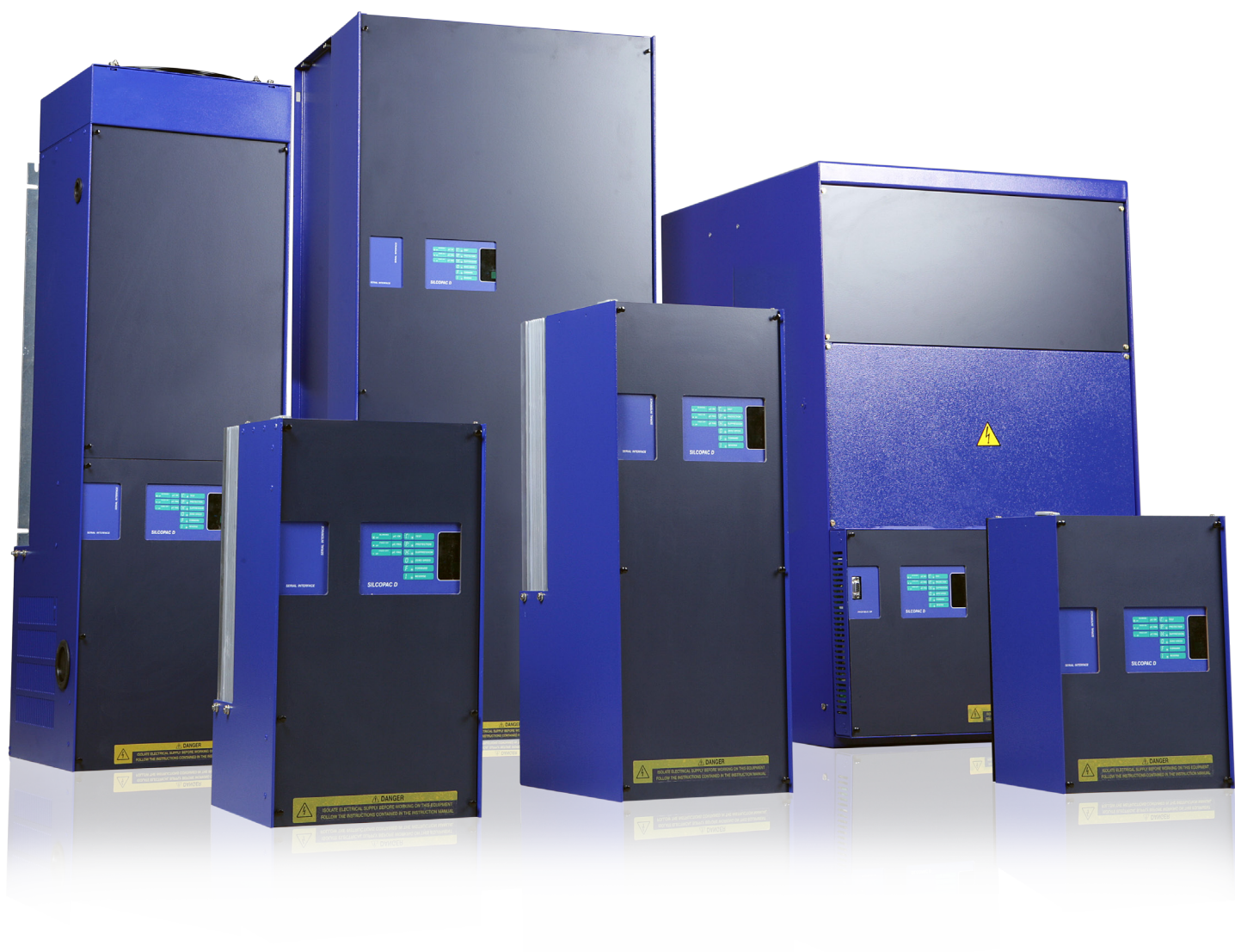


Nidec
All for dreams



Our high performance compact three-phase AC/DC thyristor converters offer two or four quadrant operation, high, dynamic response, ease of customization and fully digital control. These drives are the ideal solution for all types of industrial DC applications, from the most simple to the most complex. They have been designed for use in industrial environments and is the response to application requirements in the steel, paper, cement, naval and industrial sectors.



Markets and Application

Applications

- Hot Rolling Mills
- Cold Rolling Mills
- Process Lines
- Rolling Mills for Non-Ferrous Materials
- Fume Dedusting Plants
- Stirrers



Applications

- Mixers
- Extruders
- Calanders



Applications

- Packaging Lines
- Conveyor Belts
- Lifting Systems
- Magnetic Plants



Applications

- Furnaces
- Separators
- Mills
- Primary and Secondary Fans
- Exhaust Systems



Steel Mills and Treatment Lines

The high overload capacity and accurate speed/torque control make the SPDM the ideal converter in steel mills. The options and communication characteristics allow the critical processes to be

monitored and kept under constant control. We have been supplying the steel sector for over forty years and has drives installed in more than 700 systems throughout the world.

Rubber and Plastic

A considerable number of applications require a high starting torque. The requirements of the most critical applications can be met thanks to the thyristor overload capacity

(overload rate) and accurate speed/torque control. The options and communication characteristics allow critical processes to be monitored and kept under constant control.

Material Handling

The SPDM guarantees a high degree of control and safety during manoeuvres in lifting systems and allows easy operation. The “crane” macros allow:

- Soft and controlled manoeuvres that reduce the need for maintenance
- Mechanical brake control with verification of the

torque during brake opening, to guarantee sufficient torque (torque-proof function)

- Maximum speed according to the load, thanks to the weight-load function
- Regenerative braking

Cement

The SPDM optimises the production processes, reducing plant maintenance and downtimes, improving quality and increasing production output. Improvement in process control and reduction in the wear of mechanical parts contribute to extending plant life.

Moreover, the overload capacity and accurate speed/torque control allow accurate control of the furnace, which is the core of the production process, optimising fuel consumption and production flow.

Performance and control for a wide variety of applications

The proven control strategy and consolidated thyristor technology make our **DC Drives** the ideal solution for any type of industrial DC application, from the simplest to the most complex. SPDM firmware provides functions that are standard for several important applications, such as:

- Helper for load sharing between two motors mechanically coupled
- ADP for angular speed adjustment in relation to diameter
- Winder for direct or indirect tension control of axial or peripheral rolls
- Load weighing and torque-proofing devices for lifting systems
- Step load compensator for rolling mills, etc.

Control System

Our **DC Drives** converters are user-friendly and offer:

- insensitivity to network frequencies and input phase rotation
- checking of the status of the drive at power on and tachogenerator connections
- converter configuration without the use of special tools
- automatic calibration, thanks to the auto-tuning function
- display of main variables and faults
- recording of main variables

Both the hardware and software of our converters can be configured to respond to the requirements of the system.

Namely, the software is available for standard and special applications:

- **E**: advanced version for standard applications
- **S-L-M-R-F**: for special applications such as

-Ward-Leonard

-Spindle

-Accurate slip

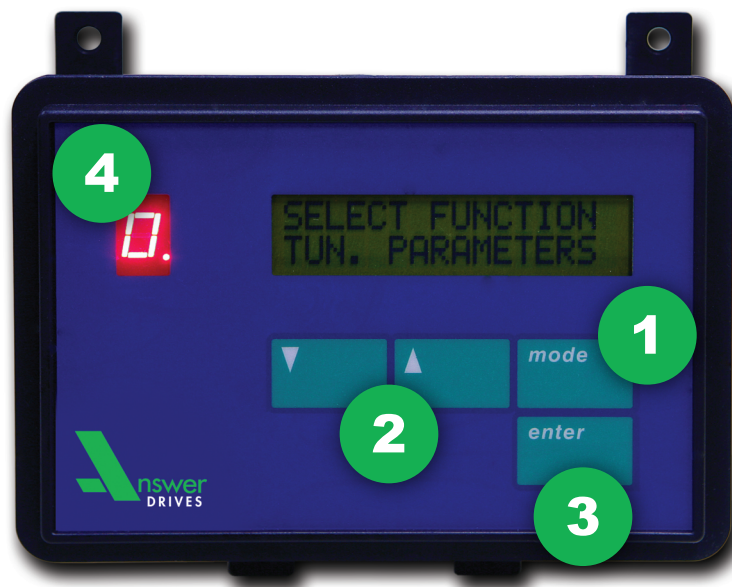
and more.

Among the hardware options available, the man-machine interface, communication between the systems and motor field exciters are worthy of mention.



State of the Art

- Easy start-up
- Powerful Diagnostics
- Speed Regulator
- Current Regulator
- Back E.M.F. regulator
- Wide range of Auxiliary Functions
- Advanced Protections



- 1 Choose parameters using mode key
- 2 Navigate settings using up and down buttons
- 3 Press enter to confirm your selection
- 4 The LEC and LCD display facilitate programming and monitoring

General Technical Data

Standards

- IEC 60146.2
- Low Voltage Directive 2006/95/EC
- Directive EMC 89/336/EEC modified by directive 93/68/EEC

Environmental Conditions

- Operating temperature: +40°C. Decrease rated current by 1.2% for each °C between 40°C and 65°C
- Storage temperature: -20°C - +70°C
- Relative humidity: 95% (without condensation)
- Altitude: 0-1000 m a.s.l. Decrease rated current by 1% every 100 metres within the range of 1000 and 4000 m
- Cooling: forced-air with internal fan

Electrical Data

- Power supply voltage: 230-950 VAC $\pm 10\%$
- Frequency: from 45 to 65 Hz
- Output voltage: 400-950 VDC
- Output current: 30-4000 A
- Control circuit power supply. 380 V $\pm 15\%$; 400 V +10% -20% (30 VA)

Control Characteristics

- Analog inputs: -10 V +10 V or 0 V +10 V
- Digital inputs: +24 V (external supply)
- Self-diagnosis at power on and resetting
- Auto-tuning of current, speed and back.e.m.f. loops
- Multi-channel recorder dedicated to the current regulator (thyristor trace) and speed and e.m.f. regulator (drive trace)
- Tacho generator, encoder, armature voltage feedback
- Speed static accuracy: tachometric feedback 0.1%, encoder feedback 0.01%, voltage feedback 2%
- Two programmable acceleration/deceleration ramps
- Two programmable jog speeds
- Drooping
- Anti-reverse-turning on zero speed without overshoot
- Duplication of acceleration/deceleration ramp rates, two jog speeds, current limits and speed and current regulator gains by means of digital input
- Current limits from analog input
- Adjustable current rate limits
- Predictive inversion and compensation for operation with discontinuous current
- Helper function that controls the load sharing between two motors mechanically coupled
- Current limits as speed function
- Bumpless restart
- Multi-poles Filter to prevent torsional oscillations

- PI and feed-forward
- Field saving
- Programmable ramp, enabled from terminal board input
- Programmable start/stop at zero speed and current
- Digital motopotentiometer
- Operating continuity using armature voltage feedback in case of speed transducer failure
- Load weighing, torque-proof (hoisting and lifting)
- Pope: inertia and mechanical losses compensation (paper machines)
- Step load increase compensation (rolling mill)
- Angular position regulator
- ADP angular speed regulator as function of diameter to maintain constant peripheral speed
 - Winder function to directly or indirectly control axial or peripheral rolls tension. Provides compensation of inertia, fixed and variable friction, calculation of coil diameter, stand still tension, etc.
- Microcontroller fault
- Maximum speed
- Stalled motor
- Over-temperature
- Instantaneous overcurrent
- Maximum motor voltage
- Motor field loss
- Serial communication failure
- Tacho generator inversion or failure
- Network failure or voltage out of tolerance
- Motor and converter thermal image

Special Software Versions

| | |
|--|--|
| P= 12 impulse operation (parallel bridges) | <p>Offers the following advantages</p> <ul style="list-style-type: none"> • Reduction of the effects produced by power converters on the power network (harmonics and voltage distortion) • Large output current: doubles the output current due to parallel connection of six-pulse converters to obtain a twelve pulse configuration • Improvement of output current ripple and torque pulse <p>Requires: Dd0/Dy11 double secondary transformer with minimum leakage reactance of 6% and interphase reactor</p> |
| M= Spindle | Manages change in range, C axis and positioning. Allows commutating of acceleration/deceleration time, current limits and speed regulator gain in relation to the range inserted (max. 4) |
| S= Accurate shift | Controls servo-speed between two or more drives (max. 6) with drift free and with high resolution |
| L= Ward-Leonard | <p>Allows updating large Ward-Leonard with modern equipment</p> <p>Controls and adjusts the dynamo and motor(s) excitation for speed and torque control</p> |

SPDMR Series

This is a special converter hardware and software version that has been designed to supply inverters connected in DC Bus. It allows recovery of load regenerated power in the network and considerable energy saving in applications characterised by high braking power. The SPDMR consists of 2 power bridges in anti-parallel connection: it requires an auto-transformer on the recovery bridge and a reactor on DC side.

General Technical Data

| 2 Quadrant | | Output Current | Input Voltage | | | | | | Dimensions | | | |
|------------|-------|----------------|---------------|-------|-------|-------|-------|-------|------------|----------|-----|--------|
| | | | Available = • | | | | | | L | H | P | Weight |
| Model | Frame | A | 400 - 500 V | 600 V | 690 V | 750 V | 850 V | 950 V | mm | mm | mm | Kg |
| SPDM030U | I | 30 | • | • | | | | | 230 | 320 | 168 | 4 |
| SPDM060U | I | 60 | • | • | | | | | 230 | 320 | 220 | 7 |
| SPDM080U | I | 80 | • | • | | | | | 230 | 320 | 220 | 7 |
| SPDM110U | I | 110 | • | • | | | | | 230 | 320 | 220 | 10 |
| SPDM160U | II | 160 (1) | • | • | | | | | 230 | 420 | 240 | 13 |
| SPDM200U | II | 200 (1) | • | • | | | | | 230 | 420 | 240 | 13 |
| SPDM260U | II | 260 (1) | • | • | | | | | 230 | 420 | 240 | 13 |
| SPDM350U | II | 350 (1) | • | • | | | | | 230 | 420 | 240 | 14 |
| SPDM450U | III | 450 (1) | • | • | | | | | 230 | 570 | 262 | 18 |
| SPDM500U | III | 500 (1) | | | • | | | | 230 | 570 | 262 | 21 |
| SPDM600U | III | 600 (1) | • | • | | | | | 230 | 570 | 262 | 21 |
| SPDM850U | IIIL | 850 (1) | • | • | • | | | | 230 | 875 | 350 | 46 |
| SPDM1M0U | IIIL | 1000 (1) | • | • | | | | | 288 | 875 | 390 | 47 |
| SPDM1M1U | IIIL | 1100 (1) | • | • | | | | | 288 | 875 | 390 | 47 |
| SPDM1K5U | IV | 1500 (2) | | | • | • | • | • | 484 | 1100+212 | 420 | 100 |
| SPDM1K6U | IV | 1650 (2) | • | | | | | | 484 | 1100+212 | 420 | 100 |
| SPDM1K7U | IV | 1700 (2) | • | | • | • | • | • | 484 | 1100+212 | 420 | 100 |
| SPDM2K1U | IV | 2100 (2) | • | | | | | | 484 | 1100+212 | 420 | 100 |
| SPDM2K2U | V | 2200 (2) | • | | • | • | • | • | 560 | 875+300 | 563 | 150 |
| SPDM2K5U | V | 2500 (2) | • | | • | • | • | • | 560 | 875+355 | 563 | 150 |
| SPDM3K1U | V | 3100 (2) | • | | • | • | • | • | 560 | 875+355 | 563 | 180 |
| SPDM3K6U | V | 3600 (2) | • | | • | • | • | • | 560 | 875+355 | 563 | 230 |
| SPDM4K0U | V | 4000 (2) | • | | • | • | | | 560 | 875+355 | 563 | 230 |

| 4 Quadrant | | Output Current | Input Voltage | | | | | | Dimensions | | | |
|------------|-------|----------------|---------------|-------|-------|-------|-------|-------|------------|-----|-----|--------|
| | | | Available = • | | | | | | L | H | P | Weight |
| Model | Frame | A | 400 - 500 V | 600 V | 690 V | 750 V | 850 V | 950 V | mm | mm | mm | Kg |
| SPDM030R | I | 30 | • | • | | | | | 230 | 320 | 168 | 5 |
| SPDM060R | I | 60 | • | • | | | | | 230 | 320 | 220 | 8 |
| SPDM080R | I | 80 | • | • | | | | | 230 | 320 | 220 | 8 |
| SPDM110R | I | 110 | • | • | | | | | 230 | 320 | 220 | 11 |
| SPDM160R | II | 160 (1) | • | • | | | | | 230 | 420 | 240 | 15 |
| SPDM200R | II | 200 (1) | • | • | | | | | 230 | 420 | 240 | 15 |
| SPDM260R | II | 260 (1) | • | • | | | | | 230 | 420 | 240 | 15 |
| SPDM350R | II | 350 (1) | • | • | | | | | 230 | 420 | 240 | 17 |
| SPDM450R | III | 450 (1) | • | • | | | | | 230 | 570 | 262 | 20 |
| SPDM500R | III | 500 (1) | | | • | | | | 230 | 570 | 262 | 26 |
| SPDM600R | III | 600 (1) | • | • | | | | | 230 | 570 | 262 | 26 |
| SPDM750R | IIIL | 850 (1) | | | • | | | | 230 | 875 | 350 | 57 |

| 4 Quadrant | | Output Current | Input Voltage | | | | | | Dimensions | | | |
|------------|-------|----------------|---------------|-------|-------|-------|-------|-------|------------|----------|-----|--------|
| | | | Available = • | | | | | | L | H | P | Weight |
| Model | Frame | A | 400 - 500 V | 600 V | 690 V | 750 V | 850 V | 950 V | mm | mm | mm | Kg |
| SPDM850R | IIIL | 1000 (1) | • | • | | | | | 230 | 875 | 350 | 57 |
| SPDM1M0R | IIIL | 1100 (1) | • | • | | | | | 288 | 875 | 390 | 58 |
| SPDM1M1R | IIIL | 1500 (2) | • | • | | | | | 288 | 875 | 390 | 58 |
| SPDM1K5R | IV | 1650 (2) | | | • | • | • | • | 484 | 1100+212 | 420 | 125 |
| SPDM1K6R | IV | 1700 (2) | • | | | | | | 484 | 1100+212 | 420 | 125 |
| SPDM1K7R | IV | 2100 (2) | | | • | • | • | • | 484 | 1100+212 | 420 | 125 |
| SPDM2K1R | IV | 2200 (2) | • | | | | | | 484 | 1100+212 | 563 | 125 |
| SPDM2K2R | V | 2500 (2) | | | • | • | • | • | 560 | 875+355 | 563 | 200 |
| SPDM2K5R | V | 3100 (2) | • | | • | • | • | • | 560 | 875+355 | 563 | 200 |
| SPDM3K1R | V | 3600 (2) | • | | • | • | • | • | 560 | 875+355 | 563 | 270 |
| SPDM3K6U | V | 4000 (2) | • | | • | • | • | • | 560 | 875+355 | 563 | 320 |
| SPDM4K0U | V | 4000 (2) | • | | • | • | | | 560 | 875+355 | 563 | 320 |

(1)= With 1x230V, 50/60Hz fan- (2)= With 3x380V-50Hz/440V-60Hz fan- Higher power on request with the use of RTT modules.

Hardware

Standard Version

Options

| | | |
|--|-------------------------------|--|
| 16 bit, 16 MHz microcontroller | SPDIO | Digital input (4) and output (4) |
| Four-layer control circuit board based on SMD technology | | expansion board (internal installation) |
| 6 analog inputs, 4 of which are programmable | Man-machine interface | |
| 4 analog outputs, 3 of which are programmable | SPDI1 | LCD 16x2, 4 button LCD display, removable for remote control (max. 2 m) |
| 9 optoisolated digital inputs | SPDI2 | LCD 16x2, 4 button LCD display and Centronics printer interface |
| 2 optoisolated programmable digital outputs | | removable for remote control (max. 2 m) |
| 1 stabilised 10 V, 5 mA output | Communication between systems | |
| 2 output relays (zero speed, converter ready) | SPPB2 | Profibus DP 12 Mbit/s interface KIT (internal installation) |
| Optoisolated interface for 2-channel encoder with marker | Field supplies | |
| High impedance DC voltage differential transducer | SPA1 | SPA1 Current regulated thyristor/diode single-phase bridge converter |
| Possibility of parallel connection with RTT series power modules | | 380-415VAC, 10 A DC (internal installation) |
| Man-machine interface: 7 segment LED on control board | SPAEO | Single-phase diode rectifier, 380-415VAC, 10 A DC (internal installation) |
| Communication between systems: RS232 interface towards PC, 38.4 kbit/s | SPA1 | Current regulated thyristor/diode single-phase bridge converter, |
| | SPAEB | 380-415VAC, 12 A DC (external installation) |
| | SPAM | Current regulated thyristor/diode single-phase bridge converter 380-415VAC, 16-35 A DC (external installation) |
| | SPATE | Three phase two quadrant converter 30-600A |
| | SPDME | Three phase 2 or 4 quadrant converter with digital control 30-600 A |



DISTRIBUTORE

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