





High-power variable speed solutions up to 2800 kW POWERDRIVE MD2

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POWERDRIVE: power to suit your needs

Respecting the environment, optimising investments, reducing operating costs - these are the main industrial challenges for manufacturing processes. Leroy-Somer has designed POWERDRIVE, the first modular frequency inverter, porviding solutions suitable with any high-power application. In order to offer the ultimate in performance, compactness and usability, Leroy-Somer upgrades the range with POWERDRIVE MD2.







Flexible • •

Standard

Architecture

- 6, 12, 18 or 24-pulse converter
- 2 or 4 quadrants
- Color touch screen for parameter setting and supervision

IP 21 protection

Conformal coated PCB's

Air cooling (liquid on request)

Inputs/Outputs

- 10 digital and/or analog
- 2 Safe Torque Off inputs (STO)
- 2 NO relay outputs

Motor control

- Induction motors: fixed or dynamic (energy savings) V/F, vector control...
- Synchronous permanent magnet motors: Sensorless closed loop

100% full load tested

Commissioning by Leroy-Somer if required

Options

- Protection: IP 00 to IP 55
- Speed / position feedback for high dynamic performances or full torque at standstill
- Additional I/O's
- Fieldbus
- Input harmonic filter, output dv/dt or sine filter
- Mechanical and electrical braking control
- Electrical protection devices
- Baseplate for cable connection

Systems

To customer specification, complete turnkey offer optimised for the application

- Cooling via a cold plate
- Electrical and mechanical design adapted to space available
- Dedicated automation

"Sensorless" virtual sensor mode of PM motors

- Permanent Magnet Sensorles solution
- Sensorless advantages
- 100% C_N Starting torque
- Accurate speed control over 1 to 20 speed range

NEW



The Operational pack



Quick set-up using the standard color touch screen HMI or PC tools.

- POWERDRIVE MD2 parameter setting via "Quick setup" menu
- Auto-tuning of motor parameters for optimized performance in open loop
- Settings backup

"MDX-Powerscreen" HMI • • • • • • • • • •



Multilingual: English, French, German, etc

"MDX-SOFT" PC tools •••••••

- Comparison of files or with the factory settings
- Parameter display with list of chart
- Parameter export
- Scope function

Main menus

- Information: drive characteristics and running time, language selection
- Reading mode: drive status (run, accelerating, decelerating, stop) and the main physical values: mains and motor voltages, current, speed, etc
- Setting: quick setup with 5 intuitive submenus including the most currently used data, advanced settings allowing reading and modification of all the parameters, configuration of the drive control mode and parameter saving
- Keypad control: local/remote
- Trip history: last 10 trips saved with time and operating conditions





The POWERDRIVE MD2 offer





Designation

Main characteristics • • • • • • • • • • • •

(POWERDR	IVE MD2S - ·	- 180 T
Modular variable sp with flux vector cont			
Chassis version MD2CS*:6 pulses		,	
-: Air cooling L: Liquid cooling		,l	
-: Single output D: Double output (c	onnection of 2 independer	t motors)	
Rating in kVA		·	
	3-phase power supply 3-phase power supply y-Somer	F]

Operating conditions and compliances

- Storage and transport temperature: -30°C to +60°C
- Operating temperature: -10°C to +40°C up to +50°C with derating
- Altitude: 0 to 4000 m, with operating temperature derating of 0.6°C per 100 m between 1000 and 4000 m
- Relative humidity in accordance with IEC standard 60068-2-56: < 90% non condensing
- Ingress protection: EN 60529
- Vibrations: EN 60068-2-6
- Mechanical shocks: tested in compliance with IEC 60068-2-29 standard
- Electromagnetic immunity complies with EN 61800-3 and EN 61000-6-2 standards
- Safe Torque Off inputs: IEC/EN 62061 : 2005 and EN/ISO 13849-1 : 2006, single channel locking (SIL1-PLb) or double channel locking (SIL3-PLe)
- I/O: IEC 61131-2
- Emissions: EN 61800-3 category C3, or category C2 with optional filter

MD2S - MD2SL

Po	Nor	Output curr		ent		Weight ¹	
FU	wei	contir	nuous	maximum		Weight	
	Du	uty		for	Rating	Type of cooling	
heavy	normal	heavy	normal	60 s		air	liquid
kW	kW	А	А	А		kg	kg
3-phase	mains s	upply 40	0 V				
75	90	145	175	200	100T	225	200
90	110	175	212	240	120T	225	250
110	132	220	250	308	150T	225	250
132	160	260	315	360	180T	260	300
160	200	315	400	450	220T	260	300
200	250	400	470	530	270T	260	335
250	315	470	580	660	340T	355	360
315	355	570	640	760	400T	355	360
355	450	680	800	940	470T	355	360
450	550	820	990	1140	600T	710	380
550	675	990	1220	1400	750T	710	720
675	750	1220	1430	1725	900T	740	720
750	900	1430	1700	2050	1100T	1350	745
900	1100	1750	2100	2485	1400T	1350	1380
750	900	1430	1700	2050	1100T	1350	745
900	1100	1750	2100	2485	1400T	1350	1380

3-phase mains supply 525 V to 690 $\ensuremath{\text{V}}^2$

200	250	225	280	308	270TH	355	360
250	315	280	340	378	340TH	355	360
315	400	340	415	465	400TH	400	405
400	450	415	500	545	500TH	400	405
450	550	500	580	638	600TH	720	405
550	700	580	730	800	750TH	810	820
700	850	730	900	1000	900TH	810	820
850	1100	900	1120	1230	1200TH	1250	820
1100	1300	1120	1350	1485	1500TH	1250	1265
1500	1800	1350	1720	1930	1800TH	1660	1265
1700	2000	1700	2000	2300	2000TH	2010	1680
2000	2400	2000	2500	2885	2500TH	2440	2020
2400	2800	2500	3000	3450	3000TH	-	2450

1- Weight not including options

2- Power stated for a voltage of 690 V



Dimensions

MD2R - MD2RL

Max. power ³		Output current				Weight ¹	
Wax. F	Jower	conti	nuous	maximum		Wei	gin
Duty			for	Rating	Type of	cooling	
heavy	normal	heavy.	normal	60 s		air	liquid
kW	kW	A A		А		kg	kg
3-phase mains supply 400 V							
45	55	90	110	120	60T	400	405
55	75	110	145	165	75T	400	405
75	90	145	175	200	100T	400	405

75	90	145	175	200	100T	400	405
90	110	175	215	240	120T	450	455
110	132	220	260	308	150T	450	455
132	160	260	305	360	180T	1200	1210
160	200	305	380	450	220T	1200	1210
200	250	380	470	530	270T	1300	1320
250	315	470	580	660	340T	1300	1320
315	355	570	630	760	400T	1400	1415
355	450	680	800	940	470T	1500	1500
450	550	820	990	1140	600T	2100	2100
550	675	990	1220	1400	750T	2200	2200
675	750	1220	1430	1725	900T	2400	2400

3-phase mains supply 525 V to 690 $\ensuremath{\text{V}}^2$

200	250	225	280	308	270TH	1300	1320
250	315	280	340	378	340TH	1300	1320
315	400	340	415	465	400TH	1500	1520
400	450	415	500	545	500TH	1500	1520
450	550	500	580	638	600TH	2100	2150
550	700	580	730	800	750TH	2100	2240
700	850	730	900	1000	900TH ⁴	2200	2240

1- Weight not including options

2- Power stated for a voltage of 690 V

3- Maximum permissible power for cos ϕ = 1 supply end

4- Higher ratings defined according to the installation constraints

Note

The MD2T, MD2E & MD2W versions are designed to customer specification. The characteristics given in the tables are applicable for an ambient temperature of 40° C and a switching frequency of 3 kHz.

Maximum current available for 60 s every 600 s, at maximum drive temperature.

➢ For more information, please contact Leroy-Somer

250kW 6 pulses in a 400 wide cabinet NEW

Examples for standard drive with or without option(s).

Customised configurations are made on customer specification.



Rat	Dimensions (mm)					
т	тн	H ¹	v	v	P	
	in	п	standard	options ²	D	
MD2S (IP 21 ai	r-cooled POWE		version)			
100 à 150	-	2160	400	400	600	
180 à 270	-	2160	400	600	600	
340 à 470	-	2160	600	600 ou 1000 ³	600	
-	270 à 500	2160	600	1000	600	
600 à 900	-	2160	1200	1200 ou 1600 ³	600	
	600 à 900	2160	1200	1600	600	
1100 - 1400	1200 - 1500	2160	1800	2400	600	
-	1800	2160	2400	3000	600	
-	2000	2160	3000	3600	600	
-	2500	2160	3600	4200	600	
MD2SL (IP 21 I	iquid-cooled P	OWERDR	IVE versio	n)		
60 à 150	-	2086	600	600	600	
180 à 600	270 à 600	2086	600	1000	600	
750 à 1100	750 à 1200	2086	1200	1800	600	
1400	1500 - 1800	2086	1800	2400	600	
-	2000	2086	2400	3000	600	
-	2500	2086	3000	3600	600	
-	3000	2086	3600	4200	600	
MD2R (IP 21 air-o	cooled POWERD	RIVE versio	n) ⁴			
60 à 150	-	2160	600	600	600	
180 à 270	-	2160	1200	1200	600	
340 à 470	270 à 500	2160	1800	1800	600	

60 à 150	-	2160	600	600	600
180 à 270	-	2160	1200	1200	600
340 à 470	270 à 500	2160	1800	1800	600
600	-	2160	2400	2400	600
750 - 900	600 à 900	2160	3600	3600	600

1- MD2S IP 54: height = 2260 mm; MD2SL IP 54: as per customer request 2- Standard options: RFI filter, electrical protection devices (emergency stop,

2- Standard options. RF1 milet, electrical protection devices (energency stop, contactor, circuit-breaker, thermal relay, isolator, fused isolator), line reactor, braking transistor

3- Dimension depending on configuration (see details in installation manual)

4- MD2RL version: as per customer request



Energy savings

In pumping, ventilation, compression, industrial refrigeration and air conditioning applications, reducing energy bills while protecting the environment has became a major concern. POWERDRIVE is the Solution.

Protecting the environment • • • • • • • • •

Providing air conditioning for an area 24 hours/day, 365 days/year, while making up to 40% energy savings

- Consumption of pumps and cooling towers optimised by on-demand flow control via the POWERDRIVE program
- IP54 solution for harsh environment
- ➤ EMC compliance for urban environment. Total harmonic distortion THDI ≤ 5%
- Resolution of space constraint issues by POWERDRIVE's modular system
- Supervision by Ethernet Modbus
- Easy, user-friendly commissioning thanks to the customised HMI touch screen
- Low noise motor solution
- Single manufacturer warranty for motor and drive, guaranteeing system performance and safety





Modernising at minimal cost ••••••••

Reducing the energy consumption of fans in a dust collector

- Without modifying the existing installation, integration of two POWERDRIVE 120T 6 pulses that are ready to connect and easy to setup
- Communication with supervision via the fieldbus
- Flexible management by selection of preset speeds and flow regulation
- Energy savings allowing a return on investment in less than a year
- Associated saving: the filtering tubes last three times longer









Improving the grinding process in the food industry, while saving energy

- Leroy-Somer provides the answer with the Dyneo[®] solution (sensorless permanent magnet motor) controlled by POWERDRIVE
- Productivity increased by more than 20% thanks to the low rotor inertia and a reduction in downtime when changing products
- Installation in confined spaces made easier by reduced dimensions and weight (LSRPM motor with high specific output power)
- Saving of 12 to 20% (280,000 kWh/year) on energy bills thanks to high efficiency
- A "green" solution which has resulted in annual savings of 28 T of CO₂ and has allowed a new generation of grinders to be designed



Flexible power

Leroy-Somer has had long experience in a range of environments such as those found in seaside applications, foundries, milling industry, sewage treatment plants or dairies requiring special protection devices. With its modular design, POWERDRIVE offers optimised solutions perfectly adapted to the constraints of the application and the operating conditions.

Responding to environmental constraints •

New innovation, a completely autonomous drive system optimized for a straddle carrier whilst generating energy savings during operation

- Resolution of corrosion problems linked to the seaside environment and changing weather conditions thanks to a stainless steel cabinet
- Integration into the space available, without modifying the gantry structure, made possible by the adaptability and compact size of the liquid-cooled POWERDRIVE solution
- Fuel consumption savings generated by the Dyneo[®] solution, HPM[®] motors with high efficiency technology combined with POWERDRIVE, and adjustment of the generator speed on request
- Compact, low-cost solution:
 - size reduction thanks to the common DC bus architecture
 - cost saving by optimising the structure due to more compact solution (electronics and motors)
 - simultaneous control of six hoisting gear and wheel drives
 - integration of motors in wheels thanks to their compact size and their high power ratio



Generator HPM[®] synchronous permanent magnet generator



Hoisting





www.leroy-somer.com



Improving availability rates •

Continuing to work despite an incident during sugar production

- POWERDRIVE solution provides active redundancy with its common DC bus structure and dual regenerative rectifier (Active Front End)
- In the event of a trip or incident on a centrifuge, quick restarting at partial load
- Energy savings
- Reduction in the size of the drive rectifier modules and upstream components by distributing energy between centrifuges according to the cycle



Installation at the heart of the machine • • • • • • • •



Leroy-Somer offers chassis-mounted solutions for optimum integration into OEM's equipment (air or cooling compressor for example)

- Choice of cooling method for the power modules (air, liquid or cold plate) which can make the machine even more compact
- Low-cost Dyneo[®] solution thanks to sensorless control of permanent magnet motors
- Energy costs optimised by flow rate and pressure regulation
- Ease of maintenance thanks to the modular concept which makes replacement of standard components very quick: reduction in handling equipment, no need for personnel having any particular skills in electronics



Power wherever you need it, on land ...

Controlling an ESP (Electrical Submersible Pump) located 4000 m underground to convey oil, or managing civil or military onboard auxiliary equipment, primarily involves designing products to meet high level of specifications. Leroy-Somer has more than forty years' experience in oil and gas or marine applications. Based on robust proven industrial modules, POWERDRIVE offers customised solutions, delivered as a turnkey solution, ready to connect and simple to install.

Working all over the world •••••••••••••





... and sea



400T 6 pulses liquid cooled naval type Pump control Integration in any type of ship ••••••••••

With its compact standard modules and flexibility, POWERDRIVE makes it possible to design solutions that fit perfectly in the most confined spaces, while meeting the stringent requirements of marine applications.

- Shock and vibration resistance
- EMC compatibility
- Air or liquid cooling
- IP 55 protection
- AC or DC mains power supply
- Cabinet or rack design
- Technical documentation supplied
- Certification by notified bodies: ABS, BV, DNV, GL, LRS etc

When combined with specific drive mechanisms, POWERDRIVE solutions offer global responses for motorisation applications: propulsion, compression, ventilation, pumping, materials handling, etc.

60T 6 pulses liquid cooled naval type Ventilation control

> 900T Active Front End Automatic control of bow thruster unit

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Renewable energies

By developing variable speed solutions using the new Dyneo[®] technologies, high-efficiency motors and geared motors, Leroy-Somer has made a significant contribution to reducing energy consumption. In addition, POWERDRIVE solutions open up new horizons in renewable energy: wind, water and geothermal energy.

Power generation • • • • • •

- Tidal turbines, hydroelectricity, wind turbines, cogeneration, etc
 - Long-term solution lasting more than 15 years and ease of maintenance thanks to its modular design
 - Complies with current and planned legislation
 - Reactive power control
 - Mains loss mode
 - Instantaneous restarting guaranteed
 - Installation protected against overspeed by braking module
 - Integrated remote monitoring

Hydroelectricity

- Connection and disconnection without mechanical or electric shock by elimination of the synchronous coupler
- Annual production maximised by adjusting the speed
- Maintenance minimised by elimination of the Kaplan turbine gearbox where applicable

Geothermal energy

POWERDRIVE solutions derived directly from experience of deep pumping applications in the oil industry, ideal for geothermal energy

Compact back to back architecture with front and rear access...





Optimised operation

Warranty

- Control of complete application processes thanks to experience acquired in the various fields of applications
- Complete drive system tests on our test rigs
 - No-load, on load, with customer drive mechanism as applicable
 - Simulation of the main functions, control system validation
 - Customer acceptance testing, etc
- Assistance with on-site commissioning on all five continents
- Continuity of the modular solution

Savings during operation ••••••••••

- Customised functions ensure a high level of availability
 - Control of mains interference: power line disturbance, voltage dips, etc
 - Flying restart on a mains fault without tripping, etc
- POWERDRIVE's modular design results in substantial savings on operating costs: parts, labour, downtime
- Longer service life of components
 - Protection of the line, contactors, drive, and motor
 - Preventive self-test at reduced voltage for power components and control boards
- > Ethernet communication can be used to manage the remote application using M2M (Machine to Machine) links

Maintenance reduced to the absolute minimum • • • • •

- Diagnostic assistance with long-term monitoring using data analysis
 - Identification of the faulty module
 - Recording of average & instantaneous values
 - Memorisation of states
 - Historical analysis
- Simplified equipment
 - Limited number of part numbers in stock
 - Troubleshooting by changing the power module in less than an hour: each element is easy to access independently. No specific skills in electronics is needed

Leroy-Somer service •••••••

- Global network of advisors and support with 140 approved Partners in France and 470 worldwide
- Locally-held stocks
- Preventive, predictive or conditional maintenance contracts







International network

www.leroy-somer.com

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