



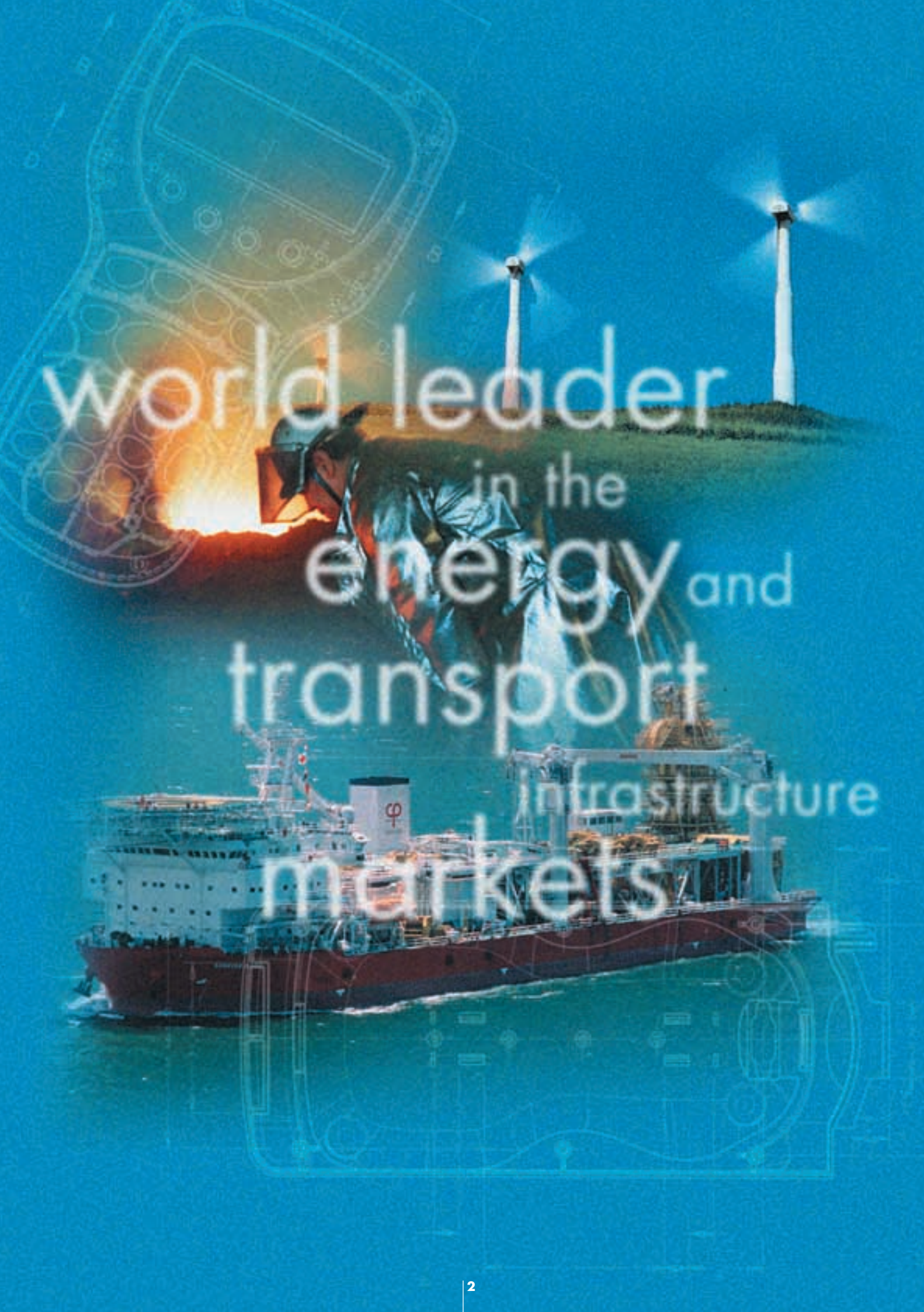
**ALSPA Drives  
Catalogue 2000/2001**

**ALSTOM**

[www.alstom.com](http://www.alstom.com)

**ALSTOM**

**Power Conversion**



**ALSTOM Power Conversion**

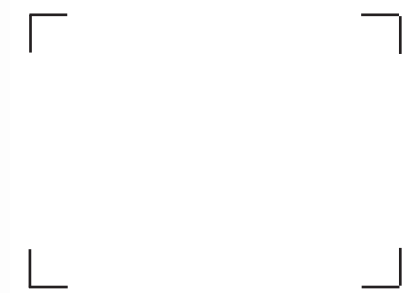
**23, avenue de Neuilly  
75116 Paris  
France  
Tel: +33 (0) 1 40 67 58 00  
Fax : +33 (0) 1 40 67 58 71**

**France**  
9, rue Ampère  
91345 Massy Cedex  
Tel: +33 (0) 1 60 13 24 43  
Fax: +33 (0) 1 60 13 20 02

**Germany**  
Culemeyerstraße 1  
D-12277 Berlin  
Tel: +49 (0) 30 74 96 27 00  
Fax: +49 (0) 30 74 96 27 08

**UK**  
Boughton Road, Rugby  
Warwickshire, CV21 1BU  
Tel: +44 (0)1788 563 625  
Fax: +44 (0)1788 563 780

**USA**  
610 Epsilon Drive  
Pittsburgh, PA 15238  
Tel: +1 412 967 0765  
Fax: +1 412 967 7660



## Our Customer Support Service

We recognise the importance to our clients of providing an excellent level of customer support services. Our philosophy is based on the concept that our relationship with customers is only just beginning when we complete commissioning of a system. It is vital for long term success of our business that we offer "lifetime support."

Our service organisation around the world is geared to working closely with clients to improve their business performance by ensuring optimum operation of plant and systems with increased availability and improved system performance. Support services are tailored to meet the needs of your specific industry. For example, we recognise that the support needs of our Marine customers are different to those of our Metals customers. The structure and operation of our service organisation reflects this and is adapted to suit.

We offer a full portfolio of support services that can be tailored to suit your individual requirements. These include:

- 24 hour telephone helpline
- Emergency breakdown callout
- Remote diagnostics facilities
- Service and maintenance contracts
- Spare parts supply and inventory management
- Repairs
- Obsolescence management
- Training centres
- Maintenance engineering
- Plant and system optimisation services
- Upgrades and enhancements



## ALSTOM – The Company



### The ALSTOM Group

**ALSTOM is a world leader in the energy and transport infrastructure markets.**

ALSTOM is organised in six Sectors, Energy, Transmission & Distribution, Transport, Power Conversion, Marine and Contracting, all of these being supported by the ALSTOM Network.

ALSTOM offers a complete range of systems, components and services covering design and manufacture as well as commissioning and long-term maintenance and has unique expertise in systems integration and management of turnkey projects.

On 31 March 2000, ALSTOM announced the acquisition\* of ABB's share of the 50-50 joint company, ABB ALSTOM POWER. The acquired company becomes ALSTOM Power, a new Sector of ALSTOM.

As of the closing date, ALSTOM will have a new combined turnover of more than 20 billion euros and will employ over 140,000 people in 100 countries.

The company is listed on the Paris, London and New York stock exchanges.

\*The transaction is subject to customary regulatory approvals.

### General Drives

The Power Conversion Sector of ALSTOM provides a full range of drives and automation for all variable speed applications, including pumps, fans, compressors and extrusion machines, with a range of more than 100 megawatts. ALSTOM drives are widely used in the oil, gas and cement industries; for water treatment and waste applications; by distribution power utilities; and in a myriad of other industrial applications.

ALSTOM is also a recognised specialist in the specification, design and installation of complete drive systems and power electronics for applications such as test benches, windmills, linear motors, gas turbines, soft starters, high-speed compressors, frequency convertors, fuel cells and more.



### Technical Features

Start mode	Current limited start-up, vector controlled start-up
Stop mode coast	Controlled deceleration (pumps)
Motor protection	Thermal protection, phase loss, unbalanced phases, Motor disabled
Motor thermistor	PTC
Pump protection	No load running, lmin, fmax
Measurements	V, I, Cos φ, kW, accuracy 2%
Energy consumption	kWh and run time (hours)
Special features	Pre-heating, anti over hauling energy saving, auto-restart on mains dip
Digital inputs	Run, stop, controlled deceleration, rapid stop
Analogue outputs	I (Amp) or P (kW) as 4 – 20mA signal
Serial link	Modbus/Jbus, RS485, PC RS232
Standards	CE, EN 60947-1 EN 60947-4-2 EN 61000-4-2 EN 61000-4-3 EN 61000-4-5 EN 61000-4-6 EN 61000-4-11

### Product Range

DNTA 220-400-500-690V*	Type Unit	19/25	37/45	45/60	60/75	85/100	100/135	140/175
<b>Full load current class 10 3FLC Amb. 40°C</b>	A	25	45	60	75	100	135	175
<b>Full load current class 20 4FLC Amb. 40°C</b>	A	19	37	45	60	85	100	140
<b>Weight</b>	kg	10	10	10	10	10	10	15
<b>Physical dimensions</b>	W mm	175	175	175	175	175	175	295
	H mm	245	245	245	245	245	245	287
	D mm	210	210	210	210	210	210	270

DNTA 220-400-500-690V*	Type Unit	175/200	250/380	300/380	380/450	450/600	600/750	750/1000
<b>Full load current class 10 3FLC Amb. 40°C</b>	A	200	300	380	450	600	750	1000
<b>Full load current class 20 4FLC Amb. 40°C</b>	A	175	250	300	380	450	600	750
<b>Weight</b>	kg	15	25	30	30	50	50	80
<b>Physical dimensions</b>	W mm	295	295	371	371	370	370	565
	H mm	287	376	440	440	652	652	820
	D mm	270	285	308	308	310	310	418

\* Optional

## DNTA



### Vector Algorithm Controlled

The ALSPA DNTA 6-pulse digital starter using vector control is a new step forward in starting induction motors. It efficiently gives motors progressive and optimum starting, as well as controlled process slow down and increased availability.

### Simple Setting

The ALSPA DNTA soft starter is pre-set at the factory for standard use, and it gives additional settings through its keypad. Access is given through menus to all the parameters and states of the starter, motor and mains supply.

Electrical measurements and energy control make optimisation of start-up and stop settings much easier.

### Safe and Meets International Standards

The ALSPA DNTA soft starter continuously monitors the motor by either a thermal model or by thermistors. It is protected against short-circuits and overloads, and is in agreement with classes shown in international standards.

The ALSPA DNTA soft starter has a standard serial link for communicating with control devices such as PLCs and supervision PCs.

### Applications

#### • Pumps

- Start-up in Vector control < 3FLC
- No load run protection
- Controlled deceleration, suppression of water hammer
- Auto-restart on mains dip
- Pre-heating

#### • Fans

- Start-up in current limit
- Auto-adaptable starting current, depending on the fan ratings, inertia, etc...
- Optimum starting for all conditions

#### • Quarry Machine

- Start-up of variable load machines
- Start-up in current limit
- Auto-adaptable starting current, depending on the load. Applications: conveyors, crushers, grinders, etc...

#### • Compressor

- Start-up in current limit
- Auto-adaptable starting current, depending on compressor load
- Applications: reciprocating compressors, screw compressors, centrifugal compressors

#### • Generating plant

- Motor start-up on generating plant
- Decrease of active and reactive power
- Reduced size of the generator required
- Important saving on capital cost

## Contents

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## ALSPA MV500 - Control Simplicity



The ALSPA MV500 range of low power drives brings reductions in both cost and in complexity. No drives knowledge is required to install and use ALSPA MV500 in most applications.

In addition to ease of installation, ALSPA MV500 provides ease of operation with only 10 parameter settings to cover most drive applications. Additional menus can be made available if required.

### The ALSPA MV500 Range Provides:

- simple installation and start up
- 230V and 400V operation with single and three phase input
- fast installation and convenient cable management
- non shaft rotating autotune to assist fast set up
- RS485 serial communications as standard
- intelligent thermal management ensuring minimum motor noise with maximum drive protection
- large power terminals for ease of cabling
- pluggable terminals for fast access
- built-in braking transistor for fast dynamic braking (sizes B to D)

### Technical Features

Motor Connections	
Voltage 3 phase:	from zero to $U_{mains}$
Nominal motor voltage:	200V to 240V (single or three phase for 220V drive input) 380V to 480V (three phase for 380/400V drive input)
Nominal motor frequency:	50:1 range 1000Hz maximum
Continuous load capacity (constant torque) rated current $1_n$	
Overload capacity:	$1.5 \times 1_n$ for 1 minute every 10 minutes
Switching frequency:	standard 3kHz, 6kHz, 12kHz
Acceleration time:	0.1 to 3200 seconds/100Hz
Deceleration time:	0.1 to 3200 seconds/100Hz

Protection Functions	
Overcurrent trip	Overvoltage trip
Undervoltage trip	Current $1^2t$ protection
Overtemperature limit (heatsink)	Earth fault protection on output
Output short circuit protection	Power loss ride through
Serial communications failure ITM	Loss of analogue signal

Control Connections	
Analogue inputs:	voltage signal: 0 to 10V/100k $\Omega$ current signal: 0(4) to 20mA/200k $\Omega$
Analogue outputs:	0 to 10V
Auxiliary voltage:	24V/100mA
Digital inputs:	12V DC PNP and NPN logic 24V DC PNP and NPN logic input impedance 7.5k $\Omega$ sample time 1.5ms
Digital output:	24V maximum 50mA
Relay output:	switching voltage 30VDC/240VAC, 6A/2A resistive
Serial communications	RS232, RS485 Options: Profibus, MODBUS Plus, DeviceNet, others

### Options

Order reference	
MD29	MD29 extension card
E/SMD29	Extension I/O module
ENRVNTCE10	MD29 Module with MCOMMS Protocol and Coiler/Uncoiler software
INDEXVNTCE	MD29 Module with MCOMMS Protocol and Index software
KW20VNTCE	MD29 Module with MCOMMS Protocol and Power measurement software
PIDVNTCE10	Optional PID software
SVNTCE	MD29 Module with MCOMMS Protocol and S curb software

### Network

Order reference	
MDFIP	FIP Interface
MD24	Profibus DP Interface
MD25	Device Net Interface
MDIBIS	InterBus S Interface

### Field drive

Order reference	
VAMEX4020A	Field drive $I_n=20A$
CORVAMEX15	VAMEX cable with VNTC and WNTC length > 1.5m
MD29TOOLKIT1	MD29 Programming Tool Kit
VNTCOM	Programming software for VNTC-E and WNTC-E

### Software

Order reference	
MD29TOOLKIT1	MD29 Programming Tool Kit
VNTCOM	Programming software for VNTC-E and WNTC-E

### Single Quadrant Drive VNTC

400VAC	Order reference: Supply		Motor Power 400VDC armature	Output A	Weight kg	Cooling
	525VAC	660VAC				
4025E	5025E		7.5	25	10	natural
4045E	5045E		15	45	10	natural
4075E	5075E		30	75	10	natural
4105E	5105E		37.5	105	10	natural
4155E	5155E		56	155	10	fan cooled
4210E	5210E		75	210	10	fan cooled
4420E	5420E	6420E	150	420	30	fan cooled
4550E	5550E	6550E	200	550	30	fan cooled
4700E	5700E	6700E	250	700	30	fan cooled
4825E	5825E	6825E	300	825	30	fan cooled
4900E	5900E	6900E	340	900	80	fan cooled
41200E	51200E	61200E	450	1200	80	fan cooled
41850E	51850E	61850E	750	1850	80	fan cooled

### Four Quadrant Drive WNTC

400VAC	Order reference: Supply		Motor Power kW 400VAC armature	Output A	Weight kg	Cooling
	525VAC	660VAC				
4025E	5025E		7.5	25	12	natural
4045E	5045E		15	45	12	natural
4075E	5075E		30	75	12	natural
4105E	5105E		37.5	105	12	natural
4155E	5155E		56	155	12	fan cooled
4210E	5210E		75	210	12	fan cooled
4420E	5420E	6420E	150	420	36	fan cooled
4550E	5550E	6550E	200	550	36	fan cooled
4700E	5700E	6700E	250	700	36	fan cooled
4825E	5825E	6825E	300	825	36	fan cooled
4900E	5900E	6900E	340	900	130	fan cooled
41200E	51200E	61200E	450	1200	130	fan cooled
41850E	51850E	61850E	750	1850	130	fan cooled

### Line Reactors

Order reference	
SELF4025	Line reactor for VNTC & WNTC 0.2mH 22A
SELF4045	Line reactor for VNTC & WNTC 0.2mH 4A
SELF4075	Line reactor for VNTC & WNTC 0.1mH 65A
SELF4105	Line reactor for VNTC & WNTC 0.1mH 90A
SELF4155	Line reactor for VNTC & WNTC 0.075mH 135A
SELF4210	Line reactor for VNTC & WNTC 0.075mH 180A
SELF4420	Line reactor for VNTC & WNTC 0.025mH 360A
SELF4550	Line reactor for VNTC & WNTC 0.025mH 470A
SELF4700	Line reactor for VNTC & WNTC 0.02mH 600A
SELF4825	Line reactor for VNTC & WNTC 0.02mH 700A
SELF4900	Line reactor for VNTC & WNTC 0.02mH 800A
SELF41200	Line reactor for VNTC & WNTC 0.02mH 1050A
SELF41850	Line reactor for VNTC & WNTC 0.01mH 1600A

### General

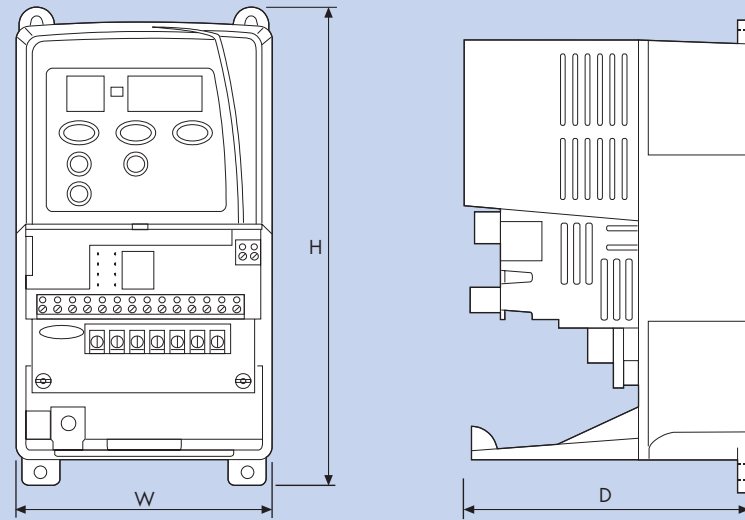
Fundamental power factor:	0.98
Ambient operating temperature:	0 to 40°C @ 6kHz 0 to 50°C @ 3kHz with derating
Approvals:	UL, CSA, CE marking
Applied standards:	IEC, EN
Compliance with regulations:	97/37/EC; Safety of Machinery 89/336/EEC; Electromagnetic Compatibility

### Ordering Details & Ratings

Order Reference	Frame Size	No. of Phases	Supply Voltage ± 10%	kW Rating	Motor hp Rating	Output Current	150% Output Current
MV501S2B1	A	1	200 - 240	0.25		1.5	2.3
MV502S2B1	A	1	200 - 240	0.37	0.5	2.3	3.5
MV503S2B1	A	1	200 - 240	0.55		3.1	4.7
MV504S2B1	A	1	200 - 240	0.75	1.0	4.3	6.5
MV504A2D1	B	1/3	200 - 240	0.75	1.0	4.3	6.5
MV506A2D1	B	1/3	200 - 240	1.1		5.8	8.7
MV507A2D1	B	1/3	200 - 240	1.5	2.0	7.5	11.3
MV510A2D1	B	1/3	200 - 240	2.2	3.0	10.6	15.9
MV517A2C1	B	3	200 - 240	4	5.0	17.0	25.5
MV525A2C1	C	3	200 - 240	5.5	7.5	25.0	37.5
MV528A2C1	C	3	200 - 240	7.5	10.0	28.5	42.8
MV502A4C1	B	3	380 - 480	0.75	1.0	2.1	3.2
MV503A4C1	B	3	380 - 480	1.1		3.0	4.5
MV504A4C1	B	3	380 - 480	1.5	2.0	4.2	6.3
MV506A4C1	B	3	380 - 480	2.2	3.0	5.8	8.7
MV508A4C1	B	3	380 - 480	3.0		7.6	11.4
MV510A4C1	B	3	380 - 480	4	5.0	9.5	14.3
MV513A4C1	C	3	380 - 480	5.5	7.5	13.0	19.5
MV516A4C1	C	3	380 - 480	7.5	10.0	16.5	24.8
MV524A4C1	D	3	380 - 480	11.0	15.0	24.5	36.8
MV530A4C1	D	3	380 - 480	15.0	20.0	30.5	45.8

## Overall Dimensions (millimetres)

Dimensions mm	H	W	D	Weight Kg
Size A	191	102	130	1.25
Size B	280	147	130	2.75
Size C	336	190	155	6
Size D	412	250	185	11



Shown with cover removed

## Optional Extras

### Input Line Reactors

Drive Order Reference	Input Line Reactor	Input Line Reactor to Match Drive Unit Order Reference
MV501S2B1	1 phase, 2mH, 7A	SELFM7A2
MV502S2B1	1 phase, 2mH, 7A	SELFM7A2
MV503S2B1	1 phase, 1mH, 15A	SELFM15A1
MV504S2B1	1 phase, 1mH, 15A	SELFM15A1
MV504A2D1*	1 phase, 1mH, 15A	SELFM15A1
MV506A2D1*	1 phase, 1mH, 15A	SELFM15A1
MV507A2D1*	1 phase, 0.5mH, 26A	SELFM26A05
MV510A2D1*	1 phase, 0.5mH, 26A	SELFM26A05
MV504A2D1*	3 phase, 2mH, 8A	SELFRT8A2
MV506A2D1*	3 phase, 2mH, 8A	SELFRT8A2
MV507A2D1*	3 phase, 2mH, 8A	SELFRT15A1
MV510A2D1*	3 phase, 2mH, 8A	SELFRT15A1
MV517A2C1	3 phase, 0.5mH, 25A	SELFRT25A05
MV525A2C1	On Request	On Request
MV528A2C1	On Request	On Request
MV502A4C1	3 phase, 2mH, 8A	SELFRT8A2
MV503A4C1	3 phase, 2mH, 8A	SELFRT8A2
MV504A4C1	3 phase, 2mH, 8A	SELFRT8A2
MV506A4C1	3 phase, 1mH, 15A	SELFRT15A1
MV508A4C1	3 phase, 1mH, 15A	SELFRT15A1
MV510A4C1	3 phase, 1mH, 15A	SELFRT15A1
MV513A4C1	On Request	On Request
MV516A4C1	On Request	On Request
MV524A4C1	On Request	On Request
MV530A4C1	On Request	On Request

\* These units may be operated from either a One or a Three Phase supply, please ensure that the correct Input Reactor is selected.

## Technical Features

Power supply	Voltage: 3 phase, 3 wire 220V to 660V ±10% Frequency: 45Hz to 62Hz
Recommended motor voltages	Supply volts: 380 415 440 480 525 660 Maximum field volts: 330 360 380 320* 380** 380** Drive armature volts: 440 460 500 530 600 750 * USA specification ** Control voltage max. 480V
Power bridge	VNTC: 6 thyristor Graetz bridge WNTC: 12 thyristor Graetz bridge (2 bridges connected back-to-back)
Insulation	Control electronics insulated in relation to power circuit and earth Tacho-generator feedback: 2kV Armature feedback: R = 1MΩ
Programmable I/O	Programmable logic inputs: Dedicated logic inputs: drive inhibit/on-off/reset 9 digital inputs available on terminal block: run forward/jog forward run reverse (WNTC only)/jog reverse (WNTC only)/5 user programmable inputs for internal signal switching  Dedicated analogue inputs: motor thermistors/speed feedback by tacho-generator  Programmable analogue inputs: speed reference: voltage ±10V or current 4-20mA four ±0-10V analogue inputs  Programmable digital inputs: 5 open collector outputs: drive operation/speed reached/overload/speed, current, voltage thresholds, etc.  Dedicated analogue output: current in load  Programmable analogue outputs: 3 outputs to dedicate: speed, current, temperature, etc. Maximum output voltage: 10V  Relay outputs drive ready zero speed
Environmental conditions	Operating temperature: 0 to 40°C, derating 1.5% per°C up to 50°C Storage temperature: -40°C to +55°C All fan cooled models have temperature sensor Altitude: 1000m maximum derating 1% per 100m up to 4000m Relative humidity: 85% non-condensing
Indicators	Nine LEDs indicate drive status: drive ready, alarm, zero speed, forward, reverse, front bridge operating, speed reached, current limit reached
Connectors	Two 10-pin connectors: encoder reference input/encoder speed feedback Three 9-pin connectors: RS485 serial link/encoder speed feedback 10-point connector for internal/or external fieldbus controller



## DC Drives



ALSPA VNTC (single quadrant) and WNTC (four quadrant) are compact, flexible, micro-processor controlled digital drives.

Used to supply DC motors in the 9kW to 1.25MW range, these drives are completely configurable either locally by mini-keyboard or remotely from a PC. They can communicate with any data processing system via ALSPA F8000, WorldFIP or any fieldbus or industrial network.

The drives are rugged and can operate in simple applications or be incorporated in complex systems. Typical applications include:

- handling
- multi-motor drive systems
- special machines
- hoists
- coiler/uncoiler systems
- wire drawing machines
- machine tool spindle control

The drives are easy to configure via the mini-keyboard which has just six keys and two displays. Nine indicators on the panel show the drive status.

Many parameters, organised in functional menus, can be used to customise the drive and adapt it to special applications. The most popular parameters can be brought together in a single menu.

ALSPA VNTCOM, a 3rd generation programming software tool allows for smart navigation through functional menus.

Users can perform tuning on parameter tables or, more directly, on functional diagrams.

Modified parameters are stored in RAM. A special sequence stores all new parameters in E<sup>2</sup>PROM and retrieves them on power-up, after which the values can still be modified.

ALSPA VNTC and WNTC DC drives offer numerous advantages to the user.

- Simple diagnostics; on-fault detection, control parameters are stored for display and analysis
- Software extension option; second serial interface, dedicated programs, etc
- Common command module for both single and four quadrant drives

- Speed measurement by tachogenerator or pulse generator
- Insensitive to phase order
- Require no network frequency adaption
- Speed control accuracy: 0.1% of full-load variation
- Field loss protection
- Flux controller built-in up to 8A
- Series or parallel 12-pulse mounting
- Electronic overload protection
- Instantaneous overcurrent trip
- Speed feedback loss protection
- Phase loss protection
- Current overload: 150% of rated current for 30 seconds
- Load dl/dt limiting

### Options

Options available for VNTC/WNTC drives are:

- external drive controlled 20A flux module
- 525V, 50/60Hz supply
- 660V, 50/60Hz supply
- WorldFIP and ALSPA F8000 fieldbus connection via MDFIP card
- 12 pulse power supply for complete suppression of 5 & 7 harmonics and improved current smoothing

Other options available for MD29 circuit:

- 2nd serial link for computer connection
- Centre winding system
- Digital speed control
- PID control
- User programming

### Options

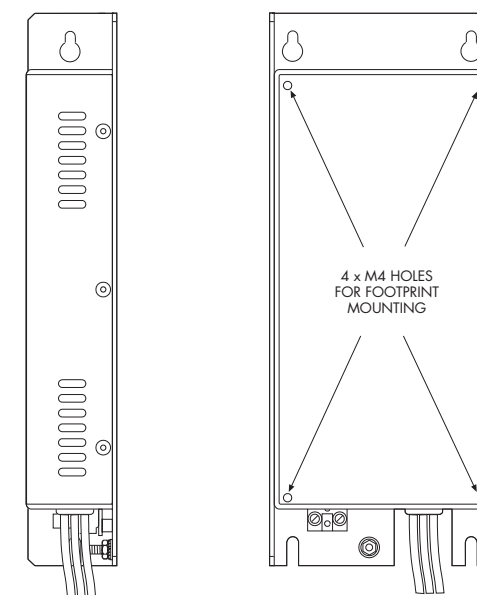
MV5CLONE	Cloning Module
MV5COM	PC Windows™ based set up software
MV5RSCONV	Serial link lead PC Windows™ software MV5COM
MV5RKP	IP65 multi-language remote keypad

### Fieldbus Couplers

MV5PDP	MV500 Profibus-DP Fieldbus Interface
MV5DN	MV500 DeviceNet Fieldbus Interface
MV5FIP	MV5000 WorldFIP Fieldbus Interface
MV5IBS	MV500 Interbus-S Fieldbus Interface

### Dynamic Braking Resistors

RF4033	33 Ohm, Enamel Type Resistor Tube
RF4100	100 Ohm, Enamel Type Resistor Tube



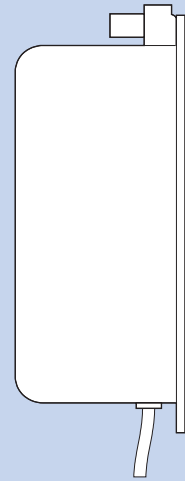
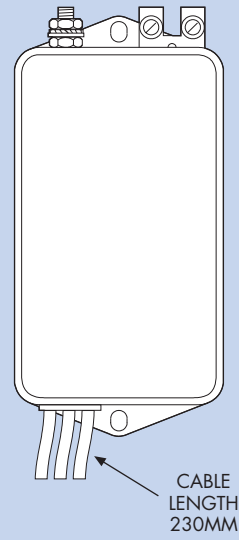
RFI Filter - Footprint

### RFI Filter - Footprint

Drive Order Reference	RFI Footprint Filter Description Class A Max Motor Cable Length 100m Class B Max Motor Cable Length 20m	RFI Filter to Match Drive Unit Order Reference
MV501S2B1	210V, 1 phase, 12A input	FS5581-12-07
MV502S2B1	210V, 1 phase, 12A input	FS5581-12-07
MV503S2B1	210V, 1 phase, 12A input	FS5581-12-07
MV504S2B1	210V, 1 phase, 12A input	FS5581-12-07
MV504A2D1*	240V, 1 phase, 26A input	FS5581-26-07
MV506A2D1*	240V, 1 phase, 26A input	FS5581-26-07
MV507A2D1*	240V, 1 phase, 26A input	FS5581-26-07
MV510A2D1*	240V, 1 phase, 26A input	FS5581-26-07
MV504A2D1*	240V, 3 phase, 20A input	FS5569-16-07
MV506A2D1*	240V, 3 phase, 20A input	FS5569-16-07
MV507A2D1*	240V, 3 phase, 20A input	FS5569-16-07
MV510A2D1*	240V, 3 phase, 20A input	FS5569-16-07
MV517A2C1	240V, 3 phase 26A input	FS5569-26-07
MV525A2C1	240V, 3 phase 30A input	FS5569-30-07
MV528A2C1	240V, 3 phase 30A input	FS5569-30-07
MV502A4C1	480V, 3 phase, 16A input	FS5569-16-07
MV503A4C1	480V, 3 phase, 16A input	FS5569-16-07
MV504A4C1	480V, 3 phase, 16A input	FS5569-16-07
MV506A4C1	480V, 3 phase, 16A input	FS5569-16-07
MV508A4C1	480V, 3 phase, 16A input	FS5569-16-07
MV510A4C1	480V, 3 phase, 16A input	FS5569-16-07
MV513A4C1	480V, 3 phase, 18A input	FS5569-18-07
MV516A4C1	480V, 3 phase, 18A input	FS5569-18-07
MV524A4C1	480V, 3 phase, 33A input	FS5569-33-07
MV530A4C1	480V, 3 phase, 33A input	FS5569-33-07

\* These units may be operated from either a One or a Three Phase supply, please ensure that the correct filter is selected.

## RFI Filter - Chassis (Low Cost) and Bookend



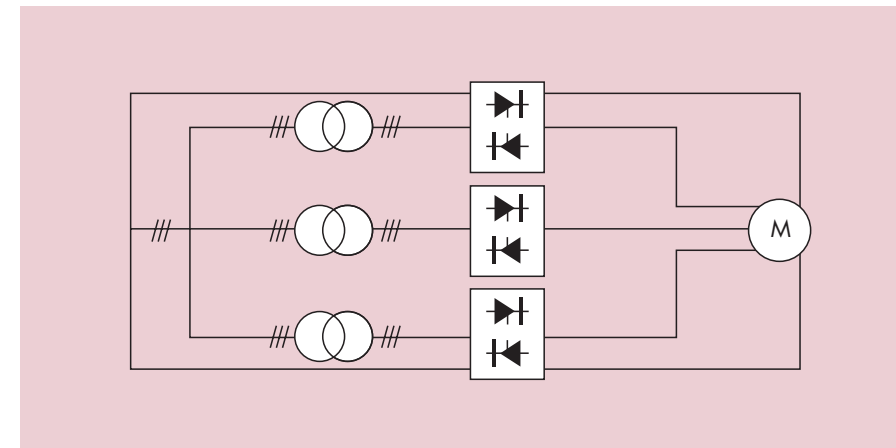
Drive Order Reference	RFI Footprint Filter Description Class A Max Motor Cable Length 15m	RFI Filter to Match Drive Unit Order Reference
MV501S2B1	240V, 1 phase, 12A input	FS5594-12-07
MV502S2B1	240V, 1 phase, 12A input	FS5594-12-07
MV503S2B1	240V, 1 phase, 12A input	FS5594-12-07
MV504S2B1	240V, 1 phase, 12A input	FS5594-12-07
MV504A2D1*	240V, 1 phase, 26A input	FS5594-26-07
MV506A2D1*	240V, 1 phase, 26A input	FS5594-26-07
MV507A2D1*	240V, 1 phase, 26A input	FS5594-26-07
MV510A2D1*	240V, 1 phase, 26A input	FS5594-26-07
MV504A2D1*	240V, 3 phase, 20A input	FS5901-16-07
MV506A2D1*	240V, 3 phase, 20A input	FS5901-16-07
MV507A2D1*	240V, 3 phase, 20A input	FS5901-16-07
MV510A2D1*	240V, 3 phase, 20A input	FS5901-16-07
MV517A2C1	240V, 3 phase, 26A input	FS5901-26-07
MV525A2C1	240V, 3 phase, 30A input	FS5901-30-07
MV528A2C1	240V, 3 phase, 30A input	FS5901-30-07
MV502A4C1	480V, 3 phase, 16A input	FS5901-16-07
MV503A4C1	480V, 3 phase, 16A input	FS5901-16-07
MV504A4C1	480V, 3 phase, 16A input	FS5901-16-07
MV506A4C1	480V, 3 phase, 16A input	FS5901-16-07
MV508A4C1	480V, 3 phase, 16A input	FS5901-16-07
MV510A4C1	480V, 3 phase, 16A input	FS5901-16-07
MV513A4C1	480V, 3 phase, 18A input	FS5901-18-07
MV516A4C1	480V, 3 phase, 18A input	FS5901-18-07
MV524A4C1	480V, 3 phase, 33A input	FS5901-33-07
MV530A4C1	480V, 3 phase, 33A input	FS5901-33-07

\* These units may be operated from either a One or a Three Phase supply, please ensure that the correct Input Reactor is selected.

## Technical Features

<b>Ratings</b>	800kW to 50MW+
<b>Supply Voltage</b>	All supply voltage options available: - Low, medium and high voltages via supply transformer(s)
<b>Motor Voltage</b>	Medium (3-6kV) and low motor voltage options via direct connection
<b>Control Method</b>	Microprocessor based, closed loop control of motor speed and torque using flux vector control
<b>Output Frequency</b>	0Hz to 40% of supply frequency
<b>Typical Speed Range</b>	1000:1 bi-directional
<b>Typical Speed Control Accuracy</b>	±0.02% of full speed with encoder
<b>Torque Capability</b>	4 quadrant operation: - High torque available for starting and throughout speed range - Constant torque with peak torque capability
<b>Converter Configuration</b>	6 pulse supply converter configuration as standard, with alternative 12 or 24 pulse arrangements available to improve supply harmonics and reduce motor torque pulsations

## CYCLODRIVE power diagram



## CYCLODRIVE - Control of Induction or Synchronous Motors for Low Speed/High Torque Applications

CYCLODRIVE is a range of cyclo-converter drive systems ideally suited to applications involving high power, arduous duty cycles, optimum dynamic performance and low speed operation.

The CYCLODRIVE range provides the needs of:

- Good dynamic performance
- Four quadrant capability
- Wide field weakening range
- Freedom of motor design e.g. to fit tight space, low inertia, etc.
- High torque over entire speed range

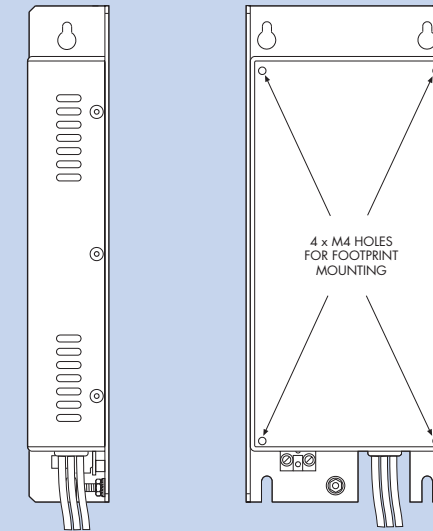
### Features

- 1000:1 speed range
- Full history recording and fault diagnostics
- Simple, well proven convertors
- Significant advantages over DC motor technology
- Suitable for either induction or synchronous motors

### Typical Applications

- High performance rolling mill and roller table drives
- Mine winders and hoists
- Ship propulsion
- Sag and ball mills
- Cement mills
- Large conveyors and crushers
- Test facilities, large centrifuges, etc

### RFI Filter - Low Leakage Footprint



Drive Order Reference	RFI Low Leakage Footprint Filter Description Class A Max Motor Cable Length 100m Class B Max Motor Cable Length 20m	RFI Filter to Match Drive Unit Order Reference
MV501S2B1	240V, 1 phase, 12A input	FS5581-12-07-LL
MV502S2B1	240V, 1 phase, 12A input	FS5581-12-07-LL
MV503S2B1	240V, 1 phase, 12A input	FS5581-12-07-LL
MV504S2B1	240V, 1 phase, 12A input	FS5581-12-07-LL
MV504A2D1*	240V, 1 phase, 26A input	FS5581-26-07-LL
MV506A2D1*	240V, 1 phase, 26A input	FS5581-26-07-LL
MV507A2D1*	240V, 1 phase, 26A input	FS5581-26-07-LL
MV510A2D1*	240V, 1 phase, 26A input	FS5581-26-07-LL
MV504A2D1*	240V, 3 phase, 20A input	FS5569-16-07-LL
MV506A2D1*	240V, 3 phase, 20A input	FS5569-16-07-LL
MV507A2D1*	240V, 3 phase, 20A input	FS5569-16-07-LL
MV510A2D1*	240V, 3 phase, 20A input	FS5569-16-07-LL
MV517A2C1	240V, 3 phase, 26A input	FS5569-26-07-LL
MV502A4C1	480V, 3 phase, 16A input	FS5569-16-07-LL
MV503A4C1	480V, 3 phase, 16A input	FS5569-16-07-LL
MV504A4C1	480V, 3 phase, 16A input	FS5569-16-07-LL
MV506A4C1	480V, 3 phase, 16A input	FS5569-16-07-LL
MV508A4C1	480V, 3 phase, 16A input	FS5569-16-07-LL
MV510A4C1	480V, 3 phase, 16A input	FS5569-16-07-LL

\* These units may be operated from either a One or a Three Phase supply, please ensure that the correct filter is selected.

## ALSPA MV1000 - Intelligent Low Power Drives

Technology controller, summation unit, multiplier, divider and logic modules can be configured using PC drive software.

ALSPA MV1000 is an inverter suitable for any drive configuration in single and multiple motor drive systems.

Four-quadrant operation is possible with DC-braking, with a brake chopper, via a common DC link or with mains regeneration.

Adaptation to the various mains voltages in the range from 380 to 480V, as used in many different countries, underlines the worldwide use of the ALSPA MV1000.

The versatile hardware and software in the ALSPA MV1000 allows special solutions, making drive technology more flexible.

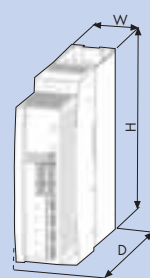
The ALSPA MV1000 series is equipped with many integral freely-configurable facilities.

Thus, as standard, you can select any of five control structures.

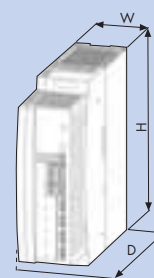
Custom application software is created by our engineers using the LogiCAD project design tool. The field-orientated control – a further development now integrated on a chip – allows you to step into a new dimension for control dynamics and precision with or without encoder feedback. Our long experience in applications has been incorporated through:

- Parameter-adjustable terminal wiring
- Integration of logic functions
- Switch-on and switch-off delay modules
- Fieldbus standards.

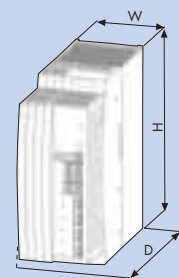
Dimensions mm	H	W	D	Weight kg
Size A	350	78	250	3.5
Size B	350	97	250	5.0
Size C	350	135	250	7.5
Size D	350	250	250	12.5
Size E	591	340	285	36.5



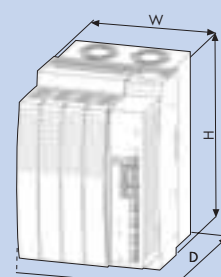
Size A



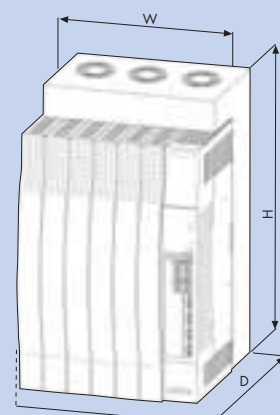
Size B



Size C



Size D

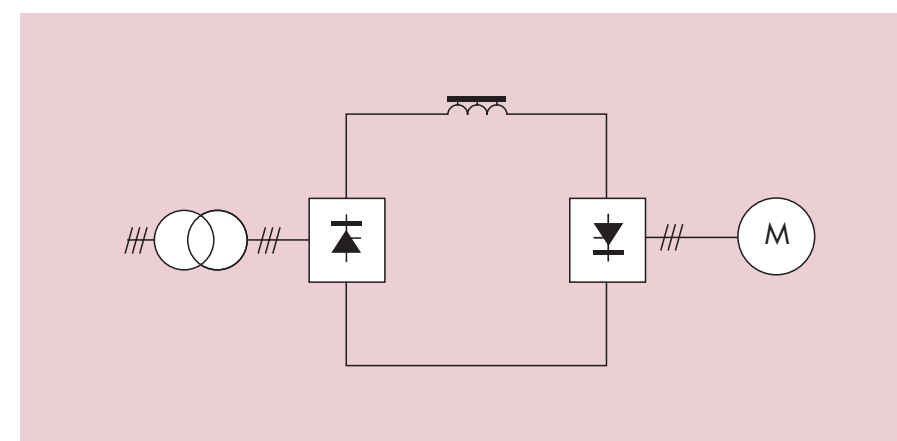


Size E

### Technical Features

<b>Ratings</b>	500kW to 50MW+
<b>Supply Voltage</b>	All supply voltage options available: <ul style="list-style-type: none"> <li>- Low and medium voltage via direct connection</li> <li>- High voltage via supply transformer</li> </ul>
<b>Motor Voltage</b>	All motor voltage options available: <ul style="list-style-type: none"> <li>- Low and medium voltage via direct connection</li> <li>- High voltage via direct connection or output transformer</li> </ul>
<b>Control Method</b>	Microprocessor based, closed loop control of motor current and voltage using load-commutated inverter with DC link forced commutation below 5% speed
<b>Output Frequency</b>	0 to 120Hz
<b>Typical Speed Range</b>	20:1 bi-directional
<b>Typical Speed Control Accuracy</b>	±1% of full speed from no load to full load ±0.5% of full speed with tach option ±0.1% of full speed with encoder option
<b>Torque Capability</b>	4 quadrant operation: <ul style="list-style-type: none"> <li>- High torque available for starting and throughout speed range</li> <li>- Constant torque capability</li> <li>- Optimised for high speed, high torque loads</li> </ul>
<b>Convertor Configuration</b>	6 pulse supply convertor configuration as standard, with alternative 12 or 24 pulse arrangements available to improve supply and machine harmonics

### SYNCHRODRIVE power diagram



# SYNCHRODRIVE and Static Frequency Convertors - Control and Starting for Synchronous Motors

SYNCHRODRIVE is a current-source, load-commutated inverter enabling smooth speed control of synchronous motors.

These drives are ideally suited:

- for control of power where high dynamic performance is required
- for constant torque loads
- for centrifugal loads

The versatile, energy efficient control system used within SYNCHRODRIVE can achieve payback periods as low as 12 months on process duty cycles, compared with fixed speed drives

The SYNCHRODRIVE range provides the needs of:

- New variable speed installations
- Retrofit to existing fixed speed synchronous motors
- High torque capability
- Soft starting of large synchronous motors
- High and low voltage motor designs
- 20:1 speed range

## Features

- Full history recording and fault diagnostics
- Four quadrant capability
- Good dynamic performance and fast response to load changes
- Fuseless design using fast acting electronic protection

## Typical Applications

- Conveyors and crushers
- Extruders and mixers
- Compressors, fans, feed pumps
- Generator soft starters
- Kilns and drums
- Rolling mill applications
- Sag and ball mills
- Ship propulsion
- Test facilities

## Soft Starting Applications

In this case, the SYNCHRODRIVE is used as a static frequency converter (SFC) for starting large synchronous machines.

The design and manufacture of SFCs requires comprehensive expertise in power electronics techniques and the ability to ensure optimum matching between starting SFC and machine in every application.

The Power Conversion sector of ALSTOM has wide experience and expertise in supply of starting systems and technical progress has led to extensive simplification of convertors and the associated control system.

The SYNCHRODRIVE is an indirect frequency convertor comprising:

- A thyristor rectifier bridge - the "network bridge"
- A thyristor inverter bridge - the "machine bridge"
- An intermediate DC current circuit, the reactor of which ensures decoupling between the network and machine bridges

## Advantages

- Operation in four torque/speed quadrants
- Stabilised operation at all intermediate speeds between shutdown and synchronous speed, e.g. turning, washing (gas turbines), mechanical maintenance, etc.
- Only one convertor for successive startup of all turbine generator sets of hydroelectric power plants
- No modification to the turbine/generator assembly

## Typical Applications

- Startup of turbine/pump groups of hydroelectric power plants
- Startup of gas turbines
- Startup of synchronous condensers or short-circuit generators
- Startup of short-circuit generators for circuit breaker tests, laser pulse power supplies, arc chamber power supplies, etc.

## Technical Features

- Control structures available:
  - Frequency control (V V V F)
  - Speed control with or without encoder
  - Torque control with or without encoder
- Economy mode for power and noise reduction when operating at less than full load
- Fully digital control electronics with all safety and monitoring facilities required
- Comprehensive testing and diagnostics functions:
  - Event log, error log with timing information
  - Oscilloscope facility with 4 analog and 8 digital measurement channels in conjunction with PC drive software
- Conventional control through clip-on terminals:
  - 6 digital inputs for control signals at separate potential, five of which can be configured
  - 4 parameter-adjustable digital message outputs at separate potential
  - 2 scaleable analog reference inputs at separate potential as differential inputs -10V to +10V, one of which can also be set for line current 0 (4) to 20mA
  - 2 adjustable scaleable analog outputs at separate potential (-10V to +10V)
  - Incremental encoder input
  - Motor PTC connection for warning or shutdown, at separate potential
- 3-way parameter set changeover
- 4 fixed speeds
- 3 programmable skip speeds with hysteresis
- Regenerative ridethrough on mains failure
- Capture spinning motor without torque surge (synchronous restart)
- Automatic restart after mains failure, adjustable to 10s

Mains supply voltage:	3 phase AC 380V -15% to 480V +10% DC 537V -15% to 678V +10% for operation on mains with star point earthed. Operation on mains with star point not earthed (IT-networks) on request.
Mains frequency:	45 to 65Hz
Mains power factor:	$\lambda_N \approx 0.90$ inductive; $\cos \varphi_1 > 0.95$
Overload capacity:	150% for 60s; 1 minute every 10 minutes
Output voltage:	3AC 0V to input voltage <sup>1)</sup>
Rated current and power:	See Product Data table
Output frequency:	0 to 400Hz
Min. operating frequency:	With/without encoder 0Hz/0.5Hz
Encoder:	f <sub>max</sub> encoder input 500kHz; line count adjustable; 2 channels + complement
Efficiency at rated point:	> 0.97
Speed adjustment range:	For control without encoder motoric 1:100 / generatic 1:20, For speed control with encoder > 1:1000
Speed accuracy:	For speed control without encoder 0.5%, For speed control with encoder and digital reference preset 0.2%
Torque rise times:	For speed control with or without encoder 2 to 8ms
Frequency accuracy on frequency control:	< 0.02%
Protection class:	IP 20, IP 41 for through-mounting, IP 54 cold plate version
Cooling:	Forced air cooling from MV1004 upwards
Ambient temperature:	- During operation 0 to +40°C, up +50°C with derating of 2.5%/°C - Storage -25 to +55°C
Altitude:	< 1000m above msl Up to 4000m with derating of 0.5% per 100m
Relative humidity:	< 85% at 28°C, condensation not permitted
Electromagnetic Compatibility (EMC):	To EMC-product standard for electrical drives EN 61800-3 (IEC 1800-3)
Radiated interference:	Limit EN 55011 class A with mains filter + ferrite ring; Limit EN 55011 class B with mains filter + ferrite ring; up to max. 50m motor cable length (only for class B)
Interference resistance:	EN 61800-3/EN 50082-2
Contamination level:	2 to DIN VDE 0110
Approvals:	UL, CSA
CE mark:	EU Low Voltage Directive 73/23 EWG 1995

<sup>1)</sup> Motor ratings (max. recommended motor power rating) are guideline values only. Depending on the application and the mains voltage, the rated motor voltage may be lower than the maximum inverter output voltage. The rating depends on a control reserve and load-dependent voltage drops.

In applications with less dynamic requirements, the recommended guideline value for the rated motor voltage is 0.95 x rated mains voltage. In highly dynamic applications and with a higher control reserve 0.85 (... 0.9) x rated mains voltage.

## Product Data

### ALSPA MV1000 / 3AC 380V to 480V

Order Reference 029.	Drive Code	Motor Power Rating at Rated Current <sup>1)</sup> kW	Rated Current <sup>2)</sup> at		Max. Current 60 s		Power Rating at Type Voltage			Size
			400V A	480V A	400V A	400V kVA	415V kVA	480V kVA		
203 397	MV1003	0.75	2.5	2.5	3.8	1.7	1.8	2.01	A	
203 398	MV1004	1.5	3.9	3.9	5.9	2.7	2.8	3.2	B	
203 399	MV1007	3.0	7.0	7.0	10.5	4.9	5.0	5.8	B	
203 400	MV1013	5.5	13.0	13.0	19.5	9.0	9.3	10.8	C	
203 401	MV1018	7.5	17.5	15.7	26.3	12.1	12.6	14.5	C	
203 402	MV1024	11.0	23.5	22.3	35.3	16.3	16.9	18.5	C	
203 403	MV1032	15.0	32.0	30.4	48.0	22.2	23.0	25.0	D	
203 404	MV1047	22.0	47.0	44.6	70.5	32.6	33.8	37.0	D	
203 405	MV1059	30.0	59.0	56.0	88.5	40.9	42.4	46.6	D	
203 406	MV1089	45.0	89.0	84.0	133.5	61.7	64.0	69.8	E	

1) Maximum permitted motor rating based on 2, 4 or 6-pole standard motors at 400 V mains voltage

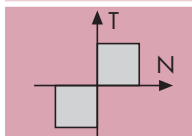
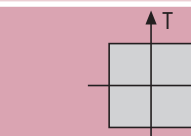
2) Rated data with 150 % overload capacity for 60 s and load cycle of 1:10 or 600 s cycle time respectively at 8 kHz vector frequency

## Optional Items

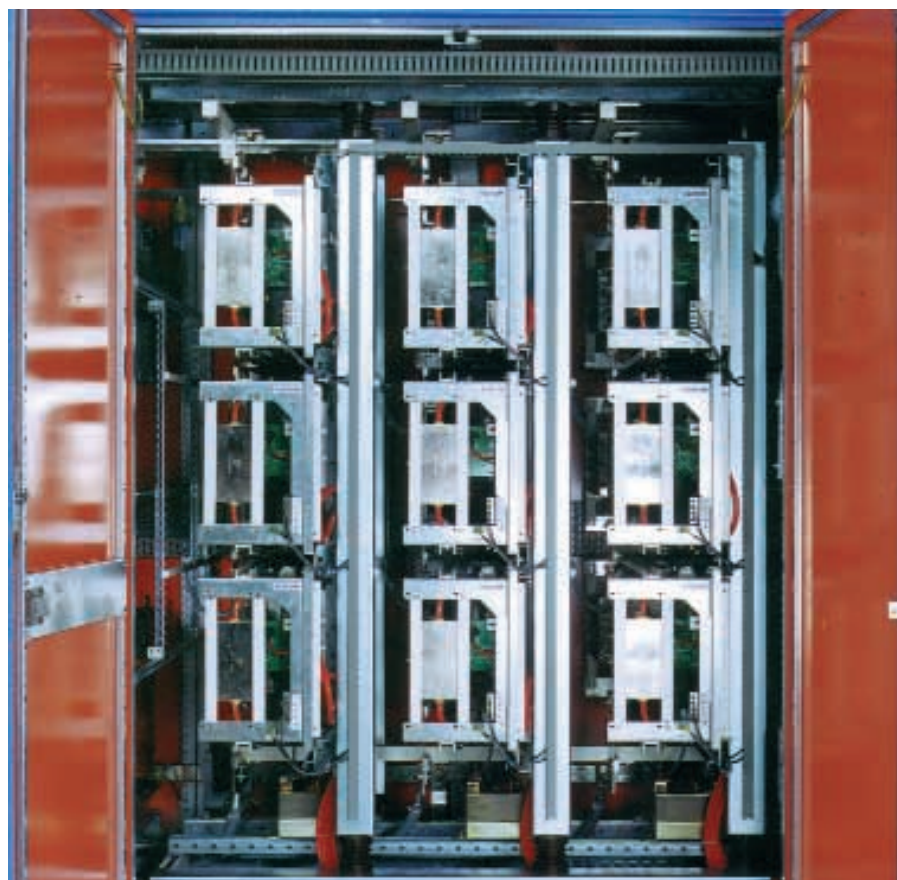
### ALSPA MV1000 Optional Items

Order Reference 029.	Item	Dimensions HxWxD mm	Weight kg
203 365	Keypad for MV1003 to 1089	74x77x38	0.1
206 849	Keypad door mounting kit, including 2m connection cable		0.3
	Mains choke <sup>1)</sup> for		
203 347	MV1003	115 x 95 x 82	1.2
203 348	MV1004	116 x 95 x 90	1.6
203 349	MV1007	138 x 119 x 95	2.6
203 350	MV1013	162 x 150 x 106	5.2
203 351	MV1018	192 x 180 x 120	8.2
203 351	MV1024	192 x 180 x 120	8.2
203 352	MV1032	190 x 190 x 135	9.0
203 353	MV1047	190 x 190 x 135	11.4
203 354	MV1059	235 x 230 x 125	14.2
203 355	MV1089	210 x 230 x 179	20.0
	Mains filter <sup>1)</sup> for		
203 356	MV1003	150 x 78 x 230	3.1
203 357	MV1004	150 x 78 x 230	3.2
203 358	MV1007	180 x 97 x 230	4.6
203 359	MV1013	260 x 135 x 230	11.6
203 360	MV1018	260 x 135 x 230	12.4
203 360	MV1024	260 x 135 x 230	12.4
203 361	MV1032	332 x 234 x 228	16.5
203 362	MV1047	332 x 234 x 228	17.3
203 363	MV1059	332 x 234 x 228	18.0
203 364	MV1089	474 x 323 x 285	32.3
	Ferrite ring for		
206 880	MV1003 to 1024	77 x 74 x 74	1.1
206 881	MV1032 to 1089	77 x 86 x 86	1.3

## Technical Features

Drive type	ALSPA VDM	ALSPA CDM
Type of drive	Voltage Source Inverter	Current Source Inverter
Power rating	0.5MVA to 9MVA per unit (higher ratings by connecting converters in parallel or in tandem configuration)	5MVA to 13.5MVA (higher ratings by combination with converters equipped with thyristors)
Rated current	IGBT-types : up to 1000A GTO-types : up to 1600A	480A; 770A
Supply voltage	All supply voltages available (2.4 to 6.6kV; 50/60Hz +10 %) higher voltages via output transformer	Standard: 6kV and 10kV Higher voltages via output transformer
Motor voltage	International standard: 2.4kV; 3.3kV; 4.2kV; 6.6kV, Sinewave output voltage available through patented multilevel technology or filter circuits	2.4 to 10kV. 6kV and 10kV as standard Virtually sinewave motor voltage and current waveform due to current source inverter characteristics
Supply converter	Diodes	Thyristors, IGBTs or GTOs
Inverter	IGBTs or GTOs	Thyristors or GTOs
Operating quadrant		
Supply converter configuration	12 pulse supply converter configuration as standard, with alternative arrangements to reduce supply harmonics (e.g. Active Front End)	12 pulse supply converter configuration as standard, (6 pulse for direct connection without transformer up to 10kV possible) with alternative arrangements available for reduction of harmonics and reactive power
Inverter bridge	Voltage source inverter equipped with IGBTs or GTOs	Current source inverter equipped with GTOs. Capacitors at the motor end
Motor	Standard induction motors or synchronous motors without derating	Standard induction motors without derating
Output frequency	0 to 200Hz (up to 300Hz option)	Up to 200Hz (up to 400Hz option)
Typical speed range	1000 : 1 with encoder 50 : 1 encoderless	>1000 : 1 with encoder 50 : 1 encoderless
Speed control accuracy	0.01% of rated speed with encoder 0.50% of rated speed encoderless	0.01% of rated speed with encoder 0.50% of rated speed encoderless
Field weakening range	1 to 5 with synchronous motor 1 to 3 with induction motor	1 to 1.2
Torque capability	High torque available for starting throughout the speed range. Suitable for all applications: quadratic torque, constant torque and constant power  Torque response time: 2 to 8ms	High torque available for starting throughout the speed range. Suitable for all applications: quadratic torque, constant torque and constant power. Optimised for high speed Torque response time: <20ms
Effects on the supply	Low harmonics content (12 pulse as standard). Almost total harmonics eliminated by alternative arrangements, e.g. Active Front End (AFE)  Power factor: >0.97	Low harmonics content (12 pulse as standard). Almost total harmonics eliminated by alternative arrangements, e.g. Active Front End (AFE) Power factor: Depending on motor speed for thyristor supply bridge. With GTO bridge (option): AFE giving unity power factor
dv/dt max	500V/μs	<20V/μs even at 200Hz and motor voltage 10kV
Environment	Protection Class: IP31 up to IP54 EMC: based on IEC 61800-3	Protection Class: IP31 up to IP54 EMC: based on IEC 61800-3
Cooling	Air and de-ionised water cooled versions available (air cooled up to 3MVA)	De-ionised water cooled
Features	<ul style="list-style-type: none"> <li>Standard motor</li> <li>Overload factor</li> <li>Short circuit proof</li> <li>IGBT version fuseless</li> <li>Group feeds via DC bus reducing overall reactive power requirements</li> </ul>	<ul style="list-style-type: none"> <li>Standard motor</li> <li>Overload factor</li> <li>Short circuit proof</li> <li>Fuseless</li> <li>Simple braking capability due to current source inverter characteristics</li> </ul>

## Medium Voltage Drives



The range of medium voltage drives from ALSTOM includes voltage source and current source inverters suitable for all asynchronous, synchronous and induction motor applications.

All industrial needs are catered for within the range of medium voltage (MV) drives:

- New variable speed installations
- Retrofit to existing fixed speed installations
- High torque capability
- Wide speed range
- Choice of optimal standard supply voltage at MV levels
- Optimum choice of standard motor
- High efficiency
- Short circuit proof

A number of powerful features are provided within the medium voltage drive range:

- 2 or 4 quadrant capability
- Excellent dynamic performance
- Sinewave output waveform
- Minimum cable cost
- Modern digital control
- Full history recording and fault diagnostics
- Fieldbus and serial interface options
- Compatibility with ALSTOM's range of monitoring software

The medium voltage range technology brings the following advantages over competing drive systems:

- Near unity power factor
- Reactive power compensation via Active Front End giving unity power factor for virtual zero AC supply effects
- Flexible power system connection for group feeds via DC bus or AC bus, reducing overall reactive power requirements
- Low harmonic distortion of supply at traditional thyristor bridge harmonic frequencies
- Minimum reactive power requirement when operating at full torque at low speed
- Regeneration of energy
- Direct connection up to 10kV without an output transformer

Order Reference	Item	Dimensions HxWxD mm	Weight kg
<b>029.</b>			
203 376	Motor dV/dt Filters MV1003 to 1007	170 x 170 x 120	4.0
203 377	MV1013 to 1024	230 x 230 x 150	7.0
203 378	MV1032 to 1047	260 x 260 x 160	10.0
203 379	MV1059 to 1089	260 x 260 x 160	11.0
207 789	Fieldbus couplers ALSPA F8000 (FIP)	75 x 62 x 52	0.2
207 776	Profibus DP - Slave	75 x 62 x 52	0.2
207 780	Interbus S	75 x 62 x 52	0.2
207 779	Modbus Plus	75 x 62 x 52	0.2
207 775	Bitbus	75 x 62 x 52	0.2
203 370	Supply and regeneration module PS12 for 12A mains current	305 x 135 x 250	7.5
203 372	PS24 for 24A mains current	350 x 135 x 250	7.5
203 388	PS45 for 45A mains current	350 x 250 x 250	12.5
203 384	Mains filters PS12	245 x 135 x 230	4.7
203 385	PS24	365 x 135 x 230	12.2
203 387	PS45	372 x 241 x 285	36.0
203 366	Braking module including braking resistor / BM 12 Peak brake rating 12kW, 0.5% duty cycle/500s Continuous braking power 100W	350 x 52 x 186	2.6
203 368	Brake chopper without braking resistor / BC 32 Peak brake rating 32kW, 1% duty cycle/100min Continuous braking power 19kW	350 x 52 x 186	2.2
122 736	Braking resistors <sup>2)</sup> 1.4kW,100Ohm, 25% ED/120s; 430W 100% ED	120 x 406 x 92	2.0
122 737	2.8kW,100Ohm, 25% ED/120s; 800W 100% ED	120 x 606 x 92	2.7
122 739	2.8kW, 56Ohm,25% ED/120s; 800W 100% ED	120 x 606 x 92	3.6
142 323	18kW, 30Ohm,25% ED/120s; 6kW 100% ED	460 x 595 x 490	25.0
152 822	ALSPA PCS PC Drive Software V1.51		
153 484	9-pin data cable for PC interface, 2m long		
205 103	Device-specific files for PC Drive Software V1-3		
204 538	PC interface RS 232/RS 422	86 x 62 x 52	0.2
PC interface	CANopen components		
Mini PLC	On Request		
I/O	On Request		
203 365	ALSPA MV1000 keypad		
206 849	Keypad door mounting kit with 2m cable		

1) Mains filter or mains chokes are required for operation (see Installation Notes in operating manual).

2) The ratings refer to the braking resistor, not to the possible braking power of the inverter. However, the maximum unit-specific braking power can be determined with the link voltage and the technical data of the brake chopper.

## ALSPA MV3000 - A Revolution in Drive Technology



### Innovation Gives Effortless Ownership

The innovative ALSPA MV3000 is ALSTOM's 5th generation of AC variable speed drives. Designed throughout for effortless ownership, the ALSPA MV3000 sets new standards for variable speed drives for size, ease of use and process availability. With power ratings up to 3,600kW, voltages up to 690V, VVVF, Encoderless Vector and Flux Vector Control modes and a wide range of application functions, ALSPA MV3000 is the one drive you need for all applications:

- Centrifuges
- Coilers, roller tables & mills
- Compressors
- Conveyors
- Crushers & grinders
- Extruders
- Fans & pumps
- Lifts & hoists
- Mixers & stirrers
- Multi drive systems
- Presses
- Test benches

Specific customer research prior to the development of ALSPA MV3000 highlighted three key areas where customers are looking for major improvements on what is available today: the physical design of the equipment, the user interface and process availability.

### The MicroCubicle™

Up to 315kW, the ALSPA MV3000 is in chassis unit format using the MicroCubicle™ concept.

MicroCubicle™ means:

- everything is front accessible
- room inside the unit for application specific enhancements
- bookcase format and side by side mounting for maximum packing density

### Drive Data Manager™

The majority of users prefer to use a keypad on the plant floor rather than a PC.

The Drive Data Manager™ redefines the keypad concept with menu navigation, on-line help, quick start and instrumentation facilities all wrapped up in an ergonomic design with a large, easy to read display.

### NoStop™

By monitoring key aspects of the process, the environment and itself, the MV3000 can do more than just look after itself. It can take intelligent actions in the event of adverse process conditions. This **NoStop™** philosophy means higher plant availability and warning of process problems before they occur.

### A Full Range of Products

From 315kW to 3,600kW, ALSPA MV3000 is available in DELTA format. DELTA format drives can be supplied either as a kit of parts ready for building into a cubicle or as a completely built and tested package ready for site installation.

DELTA format drives are modular in construction. They use the same control system, **NoStop™** philosophy and **Drive Data Manager™** as the ALSPA MV3000 chassis units. These are combined with up to 6 DELTA inverter modules running in parallel. The 100% commonality across the power range, combined with the modular format means training, knowledge and understanding is applicable across the full power range.

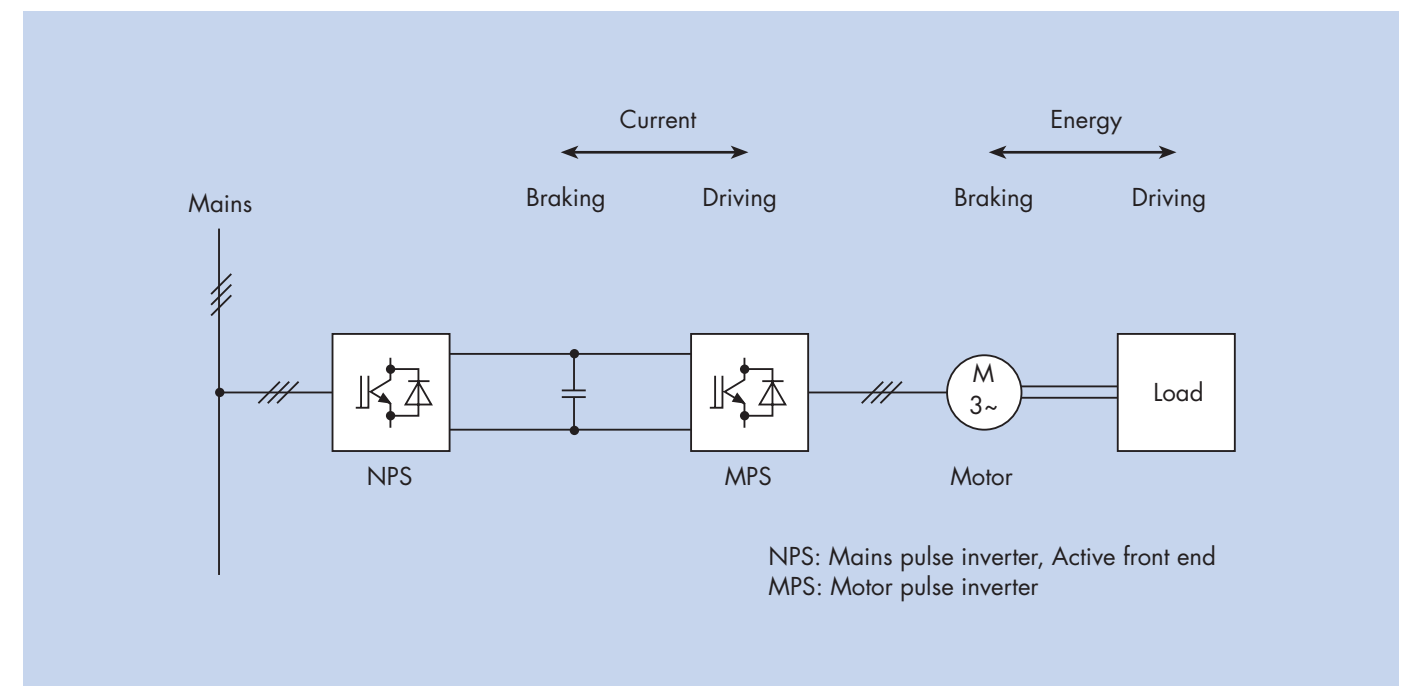
DELTA format MV3000 is available air cooled from 300kW to 1,800kW or liquid cooled from 600kW to 3,600kW.

## Technical Features

### AEM Type Series, Technical Data for ALSPA MD2000, Build-In and Cubicle Mounted Units

Type voltage	400V, 500V or 690V
Build-in units power range	18.5kW to 280kW
Cubicle-mounted power range	315kW to 4500kW
AEM units are generally equipped with option E70 on the mains and motor side, i.e. with no Y class capacitors. This applies to use in networks with an earthed star point and networks with an insulated star point. (IT-Network)	
Mains supply voltage	"400V", 3AC, 380V, -15% to 460V, +10% "500V", 3AC, 480V, -15% to 525V, +10% "690V", 3AC, 575V, -15% to 690V, +10%
Power factor	$\cos \varphi = \pm 1$ , basic setting
Mains base frequency	$\cos \varphi = \pm 1$ to $\pm 0.87$ ind. to cap. adjustable (expanded adjustment range possible)

### AEM configuration for both energy directions, 4Q-Applications





# ALSPA MD2000 - Active Energy Management AEM with ALSPA MD2000 Frequency Inverter



## AEM Active Energy Management

What does **AEM** mean?

ALSPA MD2000 AEM units guarantee mains-friendly characteristics irrespective of the operating condition, as the motor pulse inverter MPS is also used as the main pulse inverter NPS with active front technology.

## Driving and Braking with Voltage Inverters

Inverters with load-independent DC vary the direction of the current on the link when the direction of the energy changes. The voltage remains unchanged. While motor pulse inverters are suitable for both directions of energy, conventional diode network rectifiers only allow one energy direction. For this reason, resistance dynamic braking units are used for braking in discontinuous operation. In the past, thyristor mains inverters were used for continuous braking. The mains current distortion factor, depending on the inductive value of the AC line reactor, is typically around 35%.

## Main Characteristics of AEM with ALSPA MD2000

### Controlling the Mains Current Phase Position. Phase shift operation even at low levels

This means that only the effective power required is taken from the mains supply irrespective of the motor's  $\cos \varphi$  (unity power factor). In addition, the reactive power present in the mains network can be compensated considering the current limits of the unit.

### Controlling Mains Energy in Both Directions with Unity Power Factor

Energy is taken from the mains network or fed back into it, depending on whether the drive is driving (in motor operation) or braking (in regenerative operation). Conversion heat during braking is avoided intentionally. Inverter tripping, as possible with conventional thyristor mains inverters, is not possible in this system.

### Extremely High Dynamic Line Current Control

is adapted to the very high dynamics of motor current control, which gives an unique dynamic system response.

### Sinusoidal Line Side Current Control

The inverter-typical non-sinusoidal mains currents which occur in diode rectifiers or thyristor inverters are avoided by the pulse width modulated (PWM) switching IGBT semiconductor switches. Depending on the type of the AC line reactor, the line current distortion factor is reduced to  $K_1 = 3\%$  to  $6\%$ .

## Typical Applications

- **Wind Driven Generators** with AEM in the stator or rotor have been supplied by ALSTOM with power ratings of up to 1.5 MW. A larger power range e.g. offshore wind power stations, is possible comparing the standard type range.
- **Test Bed Drives, Test Benches** for motors, gearboxes, rear axles and complete drive systems are today also equipped with ALSPA MD2000 AEM so that they can load the item being tested under genuine load and speed conditions. Uneconomic eddy current braking systems are no longer necessary. Any load and road conditions can be applied to the ALSPA MD2000 AEM drive through the interface and converted into speed and torque.

## Typical Application Motor Test Bed Drive:

### ALSPA MD2000 with AEM

$S_{rated} = 275kVA$   
 $S_{max.} = 340kVA$   
 $U_{rated} = 400V$   
 $f_{rated} = 87Hz$   
 $f_{max.} = 150Hz$

### Motor Generator Data

$P_{rated} = 210kW$   
 $P_{max.} = 250kW$   
 $n_{rated} = 5160rpm$   
 $n_{max.} = 9000rpm$

### Drive Characteristics

Torque rise time  
 $T_{on} = 4ms (\Delta m = 100\%)$   
 Full output power at  
 $U_{mains} = U_{rated} -15\% \text{ to } +10\%$

## Technical Features

<b>Motor Control Type</b>	Flux vector without encoder Flux vector with encoder VVVF control
<b>Languages</b>	German; English; French
<b>Current Controller</b>	Digital PI
<b>Control Software</b> Type Configuration Tools	Flexible, linkable logic blocks, parameter selectable. LCD Drive Data Manager™, PC running ALSPA PCS+ or ALSPA Drive Coach.
<b>Speed Controller</b>	Digital PID
<b>Configurable Parameters</b>	30 parameters for standard applications. Only need to edit 3. Up to 490 for specialised applications and process tuning 2 level menu structure. User configurable menu for commonly used parameters.
<b>Indicators</b>	Run, Ready, Fault, Warning.

## Main Characteristics

Speed, torque or position control	4 skip bands to avoid resonances
Skip frequencies	16 pre-sets speeds
Reference sequencing	Fan or constant torque load characteristics
Fluxing characteristics	Normal and auto-synchronising
Start modes	Ramp, coast, DC injection
Stop modes	Programmable analogue input and PID control values
PID control	Programmable defaults for loss of control or speed reference.
Back-up control source	Number of attempts configurable up to 20
Auto restart	Maintains synchronisation with motor during supply dip
Supply loss	10 selectable channels of up to 100 samples
History record	10 Trips / Warnings records first fault / 10 previous first trips.
Trip / warning history	Separate forward & reverse, 10Hz to 800Hz
Maximum frequency	Separate forward & reverse, 0 to max Hz
Minimum frequency	Separate forward & reverse, 0.3s to 1000s
Acceleration rate	Separate forward & reverse, 0.3s to 1000s
Deceleration rate	Motor rated voltage / frequency
Control options	Current limit
	Voltage boost
	Slip compensation
	Start up frequency
Switching frequency:	1.25 / 2.5 / 5.0 / 7.5kHz
Output frequency range:	0 to 200Hz standard
Monitoring	Hours run, days run, kWhrs, MWhrs (160 monitorable parameters)

Motor Shaft Power:	Variable Torque Mode	Constant Torque Mode
Nominal power at 400V:		
Air cooled MicroCubicle™	30kW to 315kW	22kW to 250kW
Air cooled DELTA	up to 1800kW	up to 1500kW
Liquid cooled DELTA	up to 3600kW	up to 3000kW
Peak overload ratio	110%	150%
Peak overload repeatability	60s every 10 mins	60s every 10 mins

<b>AC Network:</b>	
Supply voltage	3 phase, 3 wire, earthed or unearthed neutral. 380V to 440V, 460V to 525V, 575V to 690V ±10%
Supply frequency	45Hz to 65Hz
Built-in capacitor precharge	Yes
<b>Operating Conditions</b>	
Enclosure protection	MicroCubicle™ (BDMs): IP20, optional IP21. Built in clean and dirty air configurations
Storage temperature limits	-25°C to +70°C
Temperature	0 - 40°C - derate output by 2% per°C above 40°C up to 50°C max
Altitude	0 - 2000m - derate output by 1% per additional 100m (above 1000m)
Humidity	5 - 95% non condensing
Cooling	MicroCubicle™: Forced air cooled with built in fans. Air cooled DELTA: Forced air cooled by DELTA fan modules Liquid cooled DELTA: water/glycol cooled
<b>EC Directives</b>	
EMC	Complies with the EN61800-3 - EMC product standard for power drive systems, when used and installed as described in the user manual.
LVD	CE marked. Complies with EN50178 - electronic equipment for use in power installations.
<b>Control Sources</b>	
	Local control via Drive Data Manager™ Local or remote control via a PC Remote control via analogue or digital signals Remote control via serial link or fieldbus
<b>Internal Protection</b>	
Trips or warnings	Voltage, current profile, temperature, short circuit, earth fault, motor control and interface failures
<b>I/O Types</b>	
Analogue inputs	2 x 12 bit resolution, ± 10VDC or ± 20mA.
Analogue outputs	2 x 12 bit resolution, ± 10VDC or ± 20mA.
Digital inputs	6 configurable, 1 fixed, 12 - 50 VDC.
Digital outputs	3 relays 240VAC, 3A with changeover contacts
High speed	1x RS422 bidirectional
Drive to drive link	For drive to drive, and drive to DC feeder
Serial communications	RS485, RS232 with ESP, MODBUS ASCII & RTU. Fieldbus Module for EN50170/WorldFIP/ F8000/ PROFIBUS
User interface	
Front panel	Drive status
Drive Data Manager™	Option - access to all parameters and to status and diagnostic information.
PC individual connection	Yes
PC network	Yes, RS485, 16 drives
Printer	Yes
Encoder Input	1 x ABZ (RS422 format), with complements, fitted as standard with a dedicated fast input. Maximum frequency of pulses: 1MHz

### Standard Package Specification

The standard package includes:

- Inverter
- Isolator
- AC line fusing
- Input line reactor
- Control supply transformer
- Ventilation fans

All mounted and cabled in an IP54/NEMA 12 enclosure

For 22kW to 315kW the Microcubicle™ is used, above 315kW, ALSPA MV3000 comes in DELTA format. This modular construction uses the same control card and software as the Microcubicle™, combined with DELTA power modules. Up to 6 DELTA modules can be added in parallel to give ratings up to 1.8MW for air cooled designs and up to 3.6MW for liquid cooled designs.

### Options

The package can be customised to a particular application requirement by the addition of any of the following optional items:

- Door mounted enhanced keypad
- Remote control terminals
- Door mounted ammeter
- Door mounted frequency meter
- Line output modules
- Emergency Stop circuit without Line Contactor
- Emergency Stop circuit with Line Contactor
- Thermistor relay
- RTD monitor and trip
- Earth fault relay
- RS485 serial/fieldbus communications
- General purpose relays
- Dynamic braking resistors
- 12 pulse module
- Phase shift transformer for 12 pulse module
- Cubicle plinth
- EMC filter unit
- Top cable entry
- Pushbuttons
- Lamps
- Selector switch
- Hours run meter
- Anti-condensation heater
- Phase loss relay

Unit Number	VT Rating kW @ 400V (1.1 Overload)	CT Rating kW @ 400V (1.5 Overload)	Output Current	Cubicle (HxWxD)mm	Cubicle Weight (kg)*
MV3058A4A1	30	22	58	2000x400x600	135
MV3071A4A1	37	30	71	2000x400x600	140
MV3086A4A1	45	37	86	2000x400x600	155
MV3105A4A1	55	45	105	2000x400x600	160
MV3140A4A1	75	55	140	2000x400x600	165
MV3168A4A1	90	75	168	2000x600x600	255
MV3204A4A1	110	90	204	2000x600x600	260
MV3244A4A1	132	110	244	2000x600x600	265
MV3292A4A1	160	132	292	2000x600x600	275
MV3364A4A1	200	160	364	2000x600x600	280
MV3282A4B2	225	165	385	2300x800x800	475
MV3377A4B2	280	221	475	2300x1000x800	610
MV3564A4B2	433	317	738	2300x1200x800	780
MV3754A4B2	537	424	916	2300x2000x800	1155
MV3846A4B2	649	476	1107	2300x2000x800	1280
MV31131A4B2	805	636	1374	2300x2200x800	1940
MV31508A4B2	1030	815	1758	2300x4600x800	2660
MV32262A4B2	1546	1222	2637	2300x5000x800	2960

\* Approximate weight for guidance only.

## Cubicle Mounted Drives

ALSTOM's range of MV3000 drives are available up to 3.6MW fitted in a wall or floor mounted enclosure complete with all associated electrical equipment. By offering standardised units, cost effective solutions with short delivery times can be provided.

### Technical Features

Supply voltage	380 to 690V AC $\pm 10\%$
Supply frequency	45Hz to 63Hz
Drive ratings	22kW to 3.6MW (30HP to 4800HP)
Ambient temperature	Up to 40°C (derate for higher ambient temperatures)
Humidity	5% to 95% relative humidity, non-condensing
Altitude	0 to 2,000m, derate output current by 1% per 100m above 1,000m
Cable entry	Bottom, removable gland plate fitted (optional top entry)
Access	Front door(s) with padlockable handles (optional front/rear access)
Lifting provision	Eye bolts or lifting bars (dependent on cubicle size)
Earthing	Steel earth stud or copper earth bar
Shrouding	All live equipment above 50V AC and 75V DC is shrouded to prevent accidental contact
Degree of protection	IP54/NEMA 12 with dirty air path, IP21/NEMA 1 protection also available
CE Mark	The packaged product is compliant with the Low Voltage Directive 73/23/EEC and the essential protection requirements of the EMC Directive 89/336/EEC. For the USA, ETL/UL labels apply.

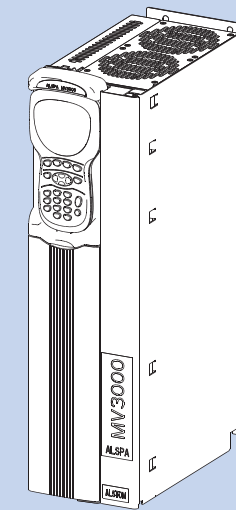


**Microcubicle™**

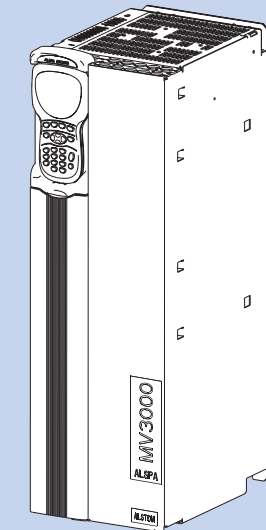


**Delta Modules**

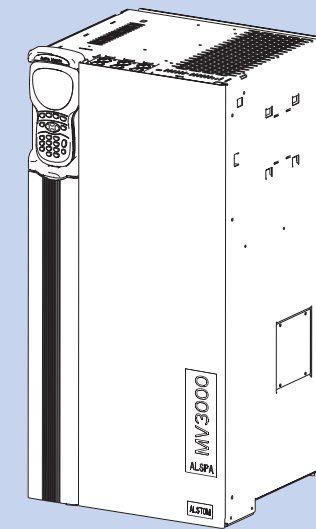
Dimensions mm	H	W	D	Weight Kg
Size A	620	170	350	27.0
Size B	809	255	370	45.0
Size C	893	430	420	100.5
Size D	1170	485	450	170.0



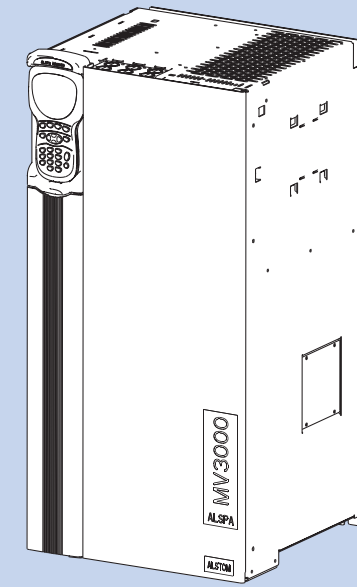
Size A



Size B



Size C



Size D

**6 Pulse, AC Input Voltage 380V - 440V 50Hz**

Order Reference	Variable Torque kW @400V (1.1 Overload)	Constant Torque kW @400V (1.5 Overload)	Output Current Amps	AC Line Reactor for Variable Torque Application	AC Line Reactor for Constant Torque Application
MV3058A4A1	30	22	58	MV3ACL030A4	MV3ACL022A4
MV3071A4A1	37	30	71	MV3ACL037A4	MV3ACL030A4
MV3086A4A1	45	37	86	MV3ACL045A4	MV3ACL037A4
MV3105A4A1	55	45	105	MV3ACL055A4	MV3ACL045A4
MV3140A4A1	75	55	140	MV3ACL075A4	MV3ACL055A4
MV3168A4A1	90	75	168	MV3ACL090A4	MV3ACL075A4
MV3204A4A1	110	90	204	MV3ACL110A4	MV3ACL090A4
MV3244A4A1	132	110	244	MV3ACL132A4	MV3ACL110A4
MV3292A4A1	160	132	292	MV3ACL160A4	MV3ACL132A4
MV3364A4A1	200	160	364	MV3ACL200A4	MV3ACL160A4
MV3449A4A1	250	200	449	MV3ACL250A4	MV3ACL200A4
MV3503A4A1	280	250	503	MV3ACL280A4	MV3ACL250A4
MV3566A4A1	315	250	565	MV3ACL315A4	MV3ACL250A4

**6 Pulse, AC Input Voltage 460V - 525V 60Hz**

Order Reference	Variable Torque HP @400V (1.1 Overload)	Constant Torque HP @400V (1.5 Overload)	Output Current Amps	AC Line Reactor for Variable Torque Application	AC Line Reactor for Constant Torque Application
MV3052A5A1	40	30	52	MV3ACL030A4	MV3ACL022A4
MV3065A5A1	50	40	65	MV3ACL037A4	MV3ACL030A4
MV3077A5A1	60	50	77	MV3ACL045A4	MV3ACL037A4
MV3096A5A1	75	60	96	MV3ACL055A4	MV3ACL045A4
MV3124A5A1	100	75	124	MV3ACL075A4	MV3ACL055A4
MV3156A5A1	125	100	156	MV3ACL090A4	MV3ACL075A4
MV3180A5A1	150	125	180	MV3ACL110A4	MV3ACL090A4
MV3240A5A1	200	150	240	MV3ACL132A4	MV3ACL110A4
MV3302A5A1	250	200	302	MV3ACL160A4	MV3ACL132A4
MV3361A5A1	300	250	361	MV3ACL200A4	MV3ACL160A4
MV3414A5A1	350	300	414	MV3ACL250A4	MV3ACL200A4
MV3477A5A1	400	350	477	MV3ACL280A4	MV3ACL250A4

**6 Pulse, AC Input Voltage 575V - 690V 50Hz**

Order Reference	Variable Torque HP @400V (1.1 Overload)	Constant Torque HP @400V (1.5 Overload)	Output Current Amps	AC Line Reactor for Variable Torque Application	AC Line Reactor for Constant Torque Application
MV3062A6A1	60	50	61	MV3ACL055A7	MV3ACL045A7
MV3077A6A1	75	60	82	MV3ACL075A7	MV3ACL055A7
MV3099A6A1	100	75	98	MV3ACL090A7	MV3ACL075A7
MV3125A6A1	125	100	119	MV3ACL110A7	MV3ACL090A7
MV3144A6A1	150	125	142	MV3ACL132A7	MV3ACL110A7
MV3192A6A1	200	150	170	MV3ACL160A7	MV3ACL132A7
MV3242A6A1	250	200	211	MV3ACL200A7	MV3ACL160A7
MV3289A6A1	300	250	260	MV3ACL250A7	MV3ACL200A7
MV3336A6A1	350	300	292	MV3ACL280A7	MV3ACL250A7
MV3382A6A1	400	350	328	MV3ACL315A7	MV3ACL280A7

Assumed Efficiency 0.94 Ambient 40 Altitude 1000m  
 Assumed Cos phi 0.9 Frequency 1.25kHz Voltage = nominal

**Standard Cooling Fan**

Drive Units	380	380	400	400	415	415	480	480	525	525
<b>1.1 X O/L</b>	RMS Current	Nominal kW	RMS Current	Nominal kW	RMS Current	Nominal kW	RMS Current	Nominal kW	RMS Current	Nominal kW
MV3282	358	199	357	210	357	217	355	249	353	272
MV3377	424	236	423	248	423	257	419	295	417	321
MV3564	688	383	686	402	685	417	681	479	678	521
MV3754	815	454	813	476	811	493	805	566	801	616
MV3846	1032	574	1030	603	1028	625	1021	718	1017	782
MV31131	1222	680	1219	715	1217	740	1208	850	1202	925
MV31508	1564	871	1560	915	1558	947	1546	1088	1538	1183
MV31885	1955	1089	1951	1143	1947	1184	1933	1359	1923	1479
MV32262	2346	1306	2341	1372	2337	1421	2319	1631	2308	1775
<b>1.5 x O/L</b>	RMS Current	Nominal kW	RMS Current	Nominal kW	RMS Current	Nominal kW	RMS Current	Nominal kW	RMS Current	Nominal kW
MV3282	282	157	282	165	282	171	282	198	282	217
MV3377	346	192	345	202	344	209	342	240	340	262
MV3564	541	301	541	317	541	329	541	381	541	417
MV3754	664	370	662	388	661	402	656	461	653	502
MV3846	812	452	812	476	812	494	812	571	812	625
MV31131	996	554	993	582	992	603	984	692	979	753
MV31508	1274	710	1271	745	1269	772	1260	886	1253	964
MV31885	1593	887	1589	931	1586	965	1575	1108	1567	1205
MV32262	1911	1064	1907	1118	1904	1158	1890	1329	1880	1446

**Advanced Cooling Fan**

Drive Units	380	380	400	400	415	415	480	480	525	525
<b>1.1 X O/L</b>	RMS Current	Nominal kW	RMS Current	Nominal kW	RMS Current	Nominal kW	RMS Current	Nominal kW	RMS Current	Nominal kW
MV3282	385	214	385	225	385	234	385	270	385	296
MV3377	500	278	499	292	498	303	495	348	493	379
MV3564	738	411	738	433	738	449	738	519	738	568
MV3754	960	535	958	562	957	582	950	668	946	728
MV3846	1107	617	1107	649	1107	673	1107	779	1107	852
MV31131	1440	802	1437	842	1435	873	1425	1003	1419	1092
MV31508	1843	1026	1840	1078	1837	1117	1825	1283	1816	1397
MV31885	2304	1283	2299	1348	2296	1396	2281	1604	2270	1747
MV32262	2765	1540	2759	1617	2755	1675	2737	1925	2724	2096
<b>1.5 x O/L</b>	RMS Current	Nominal kW	RMS Current	Nominal kW	RMS Current	Nominal kW	RMS Current	Nominal kW	RMS Current	Nominal kW
MV3282	282	157	282	165	282	171	282	198	282	217
MV3377	377	210	377	221	377	229	377	265	377	290
MV3564	541	301	541	317	541	329	541	381	541	417
MV3754	724	403	724	424	724	440	724	509	724	557
MV3846	812	452	812	476	812	494	812	571	812	625
MV31131	1086	605	1086	636	1086	660	1086	764	1086	835
MV31508	1390	774	1390	815	1390	845	1390	977	1390	1069
MV31885	1737	967	1737	1018	1737	1056	1737	1222	1737	1336
MV32262	2085	1161	2085	1222	2085	1268	2085	1466	2085	1604

**Standard Cooling Fan**

Drive Units	600	600	690	690
<b>1.1 X O/L</b>	RMS Current	Nominal kW	RMS Current	Nominal kW
MV3300	308	271	298	301
MV3600	592	520	572	578
MV3900	888	781	858	867
MV31200	1136	999	1098	1110
MV31500	1421	1249	1372	1387
MV31800	1705	1499	1646	1665
<b>1.5 x O/L</b>	RMS Current	Nominal kW	RMS Current	Nominal kW
MV3300	251	221	242	245
MV3600	482	424	465	471
MV3900	723	636	698	706
MV31200	925	814	894	904
MV31500	1157	1017	1117	1129
MV31800	1388	1220	1341	1355

**Advanced Cooling Fan**

Drive Units	600	600	690	690
<b>1.1 X O/L</b>	RMS Current	Nominal kW	RMS Current	Nominal kW
MV3300	367	322	355	359
MV3600	704	619	683	690
MV3900	1056	929	1024	1035
MV31200	1352	1188	1310	1325
MV31500	1690	1486	1638	1656
MV31800	2028	1783	1966	1987
<b>1.5 x O/L</b>	RMS Current	Nominal kW	RMS Current	Nominal kW
MV3300	296	261	287	290
MV3600	569	500	552	558
MV3900	853	750	827	836
MV31200	1092	960	1059	1071
MV31500	1365	1200	1324	1338
MV31800	1639	1441	1588	1606

## MV3000 DELTA - Air Cooled Drives Modules - 160kW to 1.8MW



From 315kW to 1.8MW ALSPA MV3000 is available in DELTA format. DELTA format drives can be supplied either as a kit of parts ready for building into a cubicle or as a completely built tested package ready for site installation.

The advantages of the DELTA format over conventional designs are many:

- Modules are easy to store and assemble
- Elimination of chassis steelwork reduces weight and cost
- Use of standard modules reduces factory lead time
- Rapid replacement with minimum spares holding
- Parallel capability with dirty air configuration
- Rectifiers and chokes available in the same DELTA package
- Fully tested 'Drive Kits' for system builders

DELTA based drives are available in either 6-pulse or 12-pulse configurations for supply voltage ratings between 380V to 525V and 600/690V

### DC Link Chokes for 6 Pulse Enhanced

#### AC Input Voltage 380V - 440V 50Hz

Order Reference	Variable Torque kW @400V (1.1 Overload)	Constant Torque kW @400V (1.5 Overload)	Output Current Amps	DC Link Choke for Variable Torque Application	DC Link Choke for Constant Torque Application
MV3058A4A1	30	22	58	MV3DCL030A4	MV3DCL022A4
MV3071A4A1	37	30	71	MV3DCL037A4	MV3DCL030A4
MV3086A4A1	45	37	86	MV3DCL045A4	MV3DCL037A4
MV3105A4A1	55	45	105	MV3DCL055A4	MV3DCL045A4
MV3140A4A1	75	55	140	MV3DCL075A4	MV3DCL055A4
MV3168A4A1	90	75	168	MV3DCL090A4	MV3DCL075A4
MV3204A4A1	110	90	204	MV3DCL110A4	MV3DCL090A4
MV3244A4A1	132	110	244	MV3DCL132A4	MV3DCL110A4
MV3292A4A1	160	132	292	MV3DCL160A4	MV3DCL132A4
MV3364A4A1	200	160	364	MV3DCL200A4	MV3DCL160A4
MV3449A4A1	250	200	449	MV3DCL250A4	MV3DCL200A4
MV3503A4A1	280	250	503	MV3DCL280A4	MV3DCL250A4
MV3566A4A1	315	250	565	MV3DCL315A4	MV3DCL250A4

#### AC Input Voltage 460V - 525V 60Hz

Order Reference	Variable Torque HP @400V (1.1 Overload)	Constant Torque HP @400V (1.5 Overload)	Output Current Amps	DC Link Choke for Variable Torque Application	DC Link Choke for Constant Torque Application
MV3052A5A1	40	30	52	MV3DCL045A7	MV3DCL022A4
MV3065A5A1	50	40	65	MV3DCL055A7	MV3DCL045A7
MV3077A5A1	60	50	77	MV3DCL055A7	MV3DCL055A7
MV3096A5A1	75	60	96	MV3DCL090A7	MV3DCL055A7
MV3124A5A1	100	75	124	MV3DCL090A7	MV3DCL090A7
MV3156A5A1	125	100	156	MV3DCL132A7	MV3DCL090A7
MV3180A5A1	150	125	180	MV3DCL132A7	MV3DCL132A7
MV3240A5A1	200	150	240	MV3DCL200A7	MV3DCL132A7
MV3302A5A1	250	200	302	MV3DCL250A7	MV3DCL200A7
MV3361A5A1	300	250	361	On Request	On Request
MV3414A5A1	350	300	414	On Request	On Request
MV3477A5A1	400	350	477	On Request	On Request

#### AC Input Voltage 575V - 690V 50Hz

Order Reference	Variable Torque HP @400V (1.1 Overload)	Constant Torque HP @400V (1.5 Overload)	Output Current Amps	DC Link Choke for Variable Torque Application	DC Link Choke for Constant Torque Application
MV3062A6A1	60	50	61	MV3DCL055A7	MV3DCL045A7
MV3077A6A1	75	60	82	MV3DCL075A7	MV3DCL055A7
MV3099A6A1	100	75	98	MV3DCL090A7	MV3DCL075A7
MV3125A6A1	125	100	119	MV3DCL110A7	MV3DCL090A7
MV3144A6A1	150	125	142	MV3DCL132A7	MV3DCL110A7
MV3192A6A1	200	150	170	MV3DCL160A7	MV3DCL132A7
MV3242A6A1	250	200	211	MV3DCL200A7	MV3DCL160A7
MV3289A6A1	300	250	260	MV3DCL250A7	MV3DCL200A7
MV3336A6A1	350	300	292	MV3DCL280A7	MV3DCL250A7
MV3382A6A1	400	350	328	MV3DCL315A7	MV3DCL280A7

### 12 Pulse AC Input Voltage 380 - 440V - Variable Torque (1.1 Overload)

Variable Torque 1.1 Overload Rating @400V 50Hz		MicroCubicle™	12 Pulse Unit	Interbridge Reactor	12 Pulse* Transformer* (IP00)
A	kW	Order Reference	Order Reference	Order Reference	Order Reference
86	45	MV3086A4A1	MV3R140A6A1	MV3IBTA045A4	MV3TPT045A415/415
105	55	MV3105A4A1	MV3R140A6A1	MV3IBTA055A4	MV3TPT055A415/415
140	75	MV3140A4A1	MV3R140A6A1	MV3IBTA075A4	MV3TPT075A415/415
168	90	MV3168A4A1	MV3R364A6A1	MV3IBTA090A4	MV3TPT090A415/415
204	110	MV3204A4A1	MV3R364A6A1	MV3IBTA110A4	MV3TPT110A415/415
244	132	MV3244A4A1	MV3R364A6A1	MV3IBTA132A4	MV3TPT132A415/415
292	160	MV3292A4A1	MV3R364A6A1	MV3IBTA160A4	MV3TPT160A415/415
364	200	MV3364A4A1	MV3R364A6A1	MV3IBTA200A4	MV3TPT200A415/415
449	250	MV3449A4A1	MV3R566A6A1	MV3IBTA250A4	MV3TPT250A415/415
503	280	MV3503A4A1	MV3R566A6A1	MV3IBTA280A4	MV3TPT280A415/415
565	315	MV3566A4A1	MV3R566A6A1	MV3IBTA315A4	MV3TPT315A415/415

\* For alternative 12 Pulse Transformer Voltages, please refer to options section.  
For ratings above 315kW please refer to ALSTOM.

### 12 Pulse AC Input Voltage 380 - 440V - Constant Torque (1.5 Overload)

Constant Torque 1.5 Overload Rating @400V 50Hz		MicroCubicle™	12 Pulse Unit	Interbridge Reactor	12 Pulse Transformer* (IP00)
A	kW	Order Reference	Order Reference	Order Reference	Order Reference
71	37	MV3086A4A1	MV3R140A6A1	MV3IBTA037A4	MV3TPT037A415/415
86	45	MV3105A4A1	MV3R140A6A1	MV3IBTA045A4	MV3TPT045A415/415
105	55	MV3140A4A1	MV3R140A6A1	MV3IBTA055A4	MV3TPT055A415/415
140	75	MV3168A4A1	MV3R364A6A1	MV3IBTA075A4	MV3TPT075A415/415
168	90	MV3204A4A1	MV3R364A6A1	MV3IBTA090A4	MV3TPT090A415/415
204	110	MV3244A4A1	MV3R364A6A1	MV3IBTA110A4	MV3TPT110A415/415
244	132	MV3292A4A1	MV3R364A6A1	MV3IBTA132A4	MV3TPT132A415/415
292	160	MV3364A4A1	MV3R364A6A1	MV3IBTA160A4	MV3TPT160A415/415
364	200	MV3449A4A1	MV3R566A6A1	MV3IBTA200A4	MV3TPT200A415/415
449	250	MV3503A4A1	MV3R566A6A1	MV3IBTA250A4	MV3TPT250A415/415
449	250	MV3566A4A1	MV3R566A6A1	MV3IBTA250A4	MV3TPT250A415/415

\* For alternative 12 Pulse Transformer Voltages, please refer to options section.  
For ratings above 315kW please refer to ALSTOM.

### 12 pulse AC Input Voltage 460 - 525V - Variable Torque (1.1 Overload)

Variable Torque 1.1 Overload Rating @400V 50Hz		MicroCubicle™	12 Pulse Unit	Interbridge Reactor	12 Pulse* Transformer (IP00)
A	HP	Order Reference	Order Reference	Order Reference	Order Reference
77	60	MV3077A5A1	MV3R140A6A1	MV3IBTA060A5	MV3TPT060A480/480
96	75	MV3096A5A1	MV3R140A6A1	MV3IBTA075A5	MV3TPT075A480/480
124	100	MV3124A5A1	MV3R140A6A1	MV3IBTA100A5	MV3TPT100A480/480
156	125	MV3156A5A1	MV3R364A6A1	MV3IBTA125A5	MV3TPT125A480/480
180	150	MV3180A5A1	MV3R364A6A1	MV3IBTA150A5	MV3TPT150A480/480
240	200	MV3240A5A1	MV3R364A6A1	MV3IBTA200A5	MV3TPT200A480/480
302	250	MV3302A5A1	MV3R364A6A1	MV3IBTA250A5	MV3TPT250A480/480
361	300	MV3361A5A1	MV3R566A6A1	MV3IBTA300A5	MV3TPT300A480/480
414	350	MV3414A5A1	MV3R566A6A1	MV3IBTA350A5	MV3TPT350A480/480
477	400	MV3477A5A1	MV3R566A6A1	MV3IBTA400A5	MV3TPT400A480/480

\* For alternative 12 Pulse Transformer Voltages, please refer to options section.  
For ratings above 315kW please refer to ALSTOM.

### Profibus Fieldbus Coupler

The PROFIBUS Fieldbus Coupler may be retrofitted on all ALSPA MV3000 inverter drives and allows connection to a PROFIBUS-DP network.

The PROFIBUS board is parameterised and controlled using the same parameter interface as for the host drive unit. The board may be configured over the drives serial link, but not over the PROFIBUS link itself.

Specification	
<b>Fieldbus</b>	Capable of the following communication rates: 9.6k, 19.2k, 93.75k 187.5k, 500k, 1.5M bit/s
<b>Protocol</b>	PROFIBUS-DP Fieldbus protocol to DIN 19245
<b>Data Refresh Rate</b>	10 ms
<b>Data Volume</b> Cyclic Channel Receive	1 control word (16 bit), and 5 reference demands (16 bit) or 2 control words (16 bit), and 4 reference demands (16 bit)
Cyclic Channel Transmit	1 status word (16 bit), and 5 monitor values (16 bit)
<b>Power Supply</b>	Internal 5V supply. Current consumption: 315mA
<b>Environment</b> Storage	Altitude 3000m (max) Temperature range -25°C to +70°C Relative humidity 5% to 95% non-condensing
Transport	Altitude 3000m (max) Relative humidity ≤95% non-condensing
Operating	Vibration, drop IEC 60721-3-2 Class 2M1 Altitude 3000m (max) Temperature range -25°C to +50°C Relative humidity 5% to 95% non-condensing Vibration IEC 60721-3-3 Class 3M1 & EN50178
<b>Dimensions</b>	160mm x 100mm. Fits internally to the drive unit.
<b>Weight</b>	165g
<b>Safety</b> EMC:	prEN50178 Electronic equipment for use in power installations EN61800-3 / IEC61800-3

### Ordering Reference

MVS3007-4001	ALSPA MV3000 PROFIBUS Fieldbus Coupler
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## EMC Filters & Ferrites - 12 Pulse

A range of EMC Filters for use with ALSPA MV3000 inverters. The filters will assist the user's installation to meet EMC emission requirements.

EMC Filter Order Reference		EMC Ferrite Order Reference
<b>AC Input Voltage 380-440V</b>		
MV3086A4A1	MV3FLT083A4A1	MV3FLT140B6A1
MV3105A4A1	MV3FLT083A4A1	MV3FLT140B6A1
MV3140A4A1	MV3FLT083A4A1	MV3FLT140B6A1
MV3168A4A1	MV3FLT180A5A1	MV3FLT140B6A1
MV3204A4A1	MV3FLT180A5A1	MV3FLT566B6A1
MV3244A4A1	MV3FLT180A5A1	MV3FLT566B6A1
MV3292A4A1	MV3FLT180A5A1	MV3FLT566B6A1
MV3364A4A1	MV3FLT250A5X1	MV3FLT566B6A1
MV3449A4A1	On Request	On Request
MV3503A4A1	On Request	On Request
MV3566A4A1	On Request	On Request

## AC Input Voltage 460-525V

MV3077A5A1	MV3FLT180A5A1	MV3FLT140B6A1
MV3096A5A1	MV3FLT180A5A1	MV3FLT140B6A1
MV3124A5A1	MV3FLT180A5A1	MV3FLT140B6A1
MV3156A5A1	MV3FLT180A5A1	MV3FLT566B6A1
MV3180A5A1	MV3FLT180A5A1	MV3FLT566B6A1
MV3240A5A1	MV3FLT180A5A1	MV3FLT566B6A1
MV3302A5A1	MV3FLT180A5A1	MV3FLT566B6A1
MV3336A5A1	On Request	On Request
MV3414A5A1	On Request	On Request
MV3477A5A1	On Request	On Request

## AC Input Voltage 575-690V

MV3062A6A1	MV3FLT150A6X1	MV3FLT140B6A1
MV3077A6A1	MV3FLT150A6X1	MV3FLT140B6A1
MV3099A6A1	MV3FLT150A6X1	MV3FLT140B6A1
MV3125A6A1	MV3FLT150A6X1	MV3FLT140B6A1
MV3144A6A1	MV3FLT150A6X1	MV3FLT566B6A1
MV3192A6A1	MV3FLT150A6X1	MV3FLT566B6A1
MV3242A6A1	MV3FLT150A6X1	MV3FLT566B6A1
MV3289A6A1	On Request	On Request
MV3336A6A1	On Request	On Request
MV3382A6A1	On Request	On Request

## Fieldbus Couplers

### WorldFIP Fieldbus Coupler

The interface will support the transfer of drive parameters to and from a FIP network. These parameters may be selected by the configuration. The interface is configured and controlled via dedicated drive parameters, which

are accessed in the normal way. The interface is connected directly to the MV3000 control board via a parallel interface and hence meets the fast update time requirements of process line drives. By receiving near simultaneous references and control signals to multi-drive sections, the problems caused by reference propagation delays are avoided.

The interface is only sold as a customer fit option.

The interface does not support bus arbiter functionality and does not currently support messaging or F8000 compatibility.

## Order References

MVS3002-4001	1MHz FIP Interface Card
MVS3002-4002	2.5MHz FIP Interface Card
MVS3002-4010	FIP Cable with moulded on connector, length 3m
8892-4300	FIP Link AC Earth Connection Assembly (2 Req'd)

## 12 Pulse AC Input Voltage 460 - 525V - Constant Torque (1.5 Overload)

Constant Torque 1.5 Overload Rating @480V 60Hz		MicroCubicle™	12 Pulse Unit	Interbridge Reactor	12 Pulse Transformer*
A	HP	Order Reference	Order Reference	Order Reference	Order Reference
65	50	MV3077A5A1	MV3R140A6A1	MV3IBTA050A5	MV3TPT050A480/480
77	60	MV3096A5A1	MV3R140A6A1	MV3IBTA060A5	MV3TPT060A480/480
96	75	MV3124A5A1	MV3R140A6A1	MV3IBTA075A5	MV3TPT075A480/480
124	100	MV3156A5A1	MV3R364A6A1	MV3IBTA100A5	MV3TPT100A480/480
156	125	MV3180A5A1	MV3R364A6A1	MV3IBTA125A5	MV3TPT125A480/480
180	150	MV3240A5A1	MV3R364A6A1	MV3IBTA150A5	MV3TPT150A480/480
240	200	MV3302A5A1	MV3R364A6A1	MV3IBTA200A5	MV3TPT200A480/480
302	250	MV3361A5A1	MV3R566A6A1	MV3IBTA250A5	MV3TPT250A480/480
631	300	MV3414A5A1	MV3R566A6A1	MV3IBTA300A5	MV3TPT300A480/480
414	350	MV3477A5A1	MV3R566A6A1	MV3IBTA350A5	MV3TPT350A480/480

\* For alternative 12 Pulse Transformer Voltages, please refer to options section. For ratings above 315kW please refer to ALSTOM.

## 12 Pulse AC Input Voltage 575 - 690V - Variable Torque (1.1 Overload)

Variable Torque 1.1 Overload Rating @690V 60Hz		MicroCubicle™	12 Pulse Unit	Interbridge Reactor	12 Pulse Transformer* (IP00)
A	HP	Order Reference	Order Reference	Order Reference	Order Reference
61	60	MV3062A6A1	MV3R140A6A1	MV3IBTA055A7	MV3TPT055A690/690
82	75	MV3077A6A1	MV3R140A6A1	MV3IBTA075A7	MV3TPT075A690/690
98	100	MV3099A6A1	MV3R140A6A1	MV3IBTA090A7	MV3TPT090A690/690
119	125	MV3125A6A1	MV3R364A6A1	MV3IBTA110A7	MV3TPT110A690/690
142	150	MV3144A6A1	MV3R364A6A1	MV3IBTA132A7	MV3TPT132A690/690
170	200	MV3192A6A1	MV3R364A6A1	MV3IBTA160A7	MV3TPT160A690/690
211	250	MV3242A6A1	MV3R364A6A1	MV3IBTA200A7	MV3TPT200A690/690
260	300	MV3289A6A1	MV3R566A6A1	MV3IBTA250A7	MV3TPT250A690/690
292	350	MV3336A6A1	MV3R566A6A1	MV3IBTA280A7	MV3TPT280A690/690
328	400	MV3382A6A1	MV3R566A6A1	MV3IBTA315A7	MV3TPT315A690/690

\* For alternative 12 Pulse Transformer Voltages, please refer to options section. For ratings above 315kW please refer to ALSTOM.

## 12 Pulse AC Input Voltage 575 - 690V - Constant Torque (1.5 Overload)

Constant Torque 1.5 Overload Rating @690V 60Hz		MicroCubicle™	12 Pulse Unit	Interbridge Reactor	12 Pulse Transformer* (IP00)
A	HP	Order Reference	Order Reference	Order Reference	Order Reference
50	50	MV3062A6A1	MV3R140A6A1	MV3IBTA045A7	MV3TPT045A690/690
61	60	MV3077A6A1	MV3R140A6A1	MV3IBTA055A7	MV3TPT055A690/690
82	75	MV3099A6A1	MV3R140A6A1	MV3IBTA075A7	MV3TPT075A690/690
98	100	MV3125A6A1	MV3R364A6A1	MV3IBTA090A7	MV3TPT090A690/690
119	125	MV3144A6A1	MV3R364A6A1	MV3IBTA110A7	MV3TPT110A690/690
142	150	MV3192A6A1	MV3R364A6A1	MV3IBTA132A7	MV3TPT132A690/690
170	200	MV3242A6A1	MV3R364A6A1	MV3IBTA160A7	MV3TPT160A690/690
211	250	MV3289A6A1	MV3R566A6A1	MV3IBTA200A7	MV3TPT200A690/690
260	300	MV3336A6A1	MV3R566A6A1	MV3IBTA250A7	MV3TPT250A690/690
292	350	MV3382A6A1	MV3R566A6A1	MV3IBTA280A7	MV3TPT280A690/690

\* For alternative 12 Pulse Transformer Voltages, please refer to options section. For ratings above 315kW please refer to ALSTOM Power Conversion

## Optional items

### Drive Data Manager™

#### Order Reference

MVS3000-4001	Drive Data Manager™
MVS3001-4001	Drive Data Manager™ Lead 3m and IP65 Door Mounting Kit

### PC Programming Tools

ALSPA "Drive Coach" is a PC based programming tool providing a superior programming and diagnostic viewing environment.

Facilities include:

- drive parameter editing
- upload parameters from drive to PC
- download parameters from PC to drive
- save parameters to disk
- save history record to disk
- view history record
- archiving
- hypertext help facility
- Windows™ based

#### Order Reference

MVS3004-4001	ALSPA Drive Coach
GDS1009-4001	PC programming lead 3m

### Dynamic Brake Unit

#### Order Reference

#### AC Input Voltage 380-440V

MV3058A4A1	MV3DB045S5
MV3071A4A1	MV3DB045S5
MV3086A4A1	MV3DB092S5
MV3105A4A1	MV3DB092S5
MV3140A4A1	MV3DB092S5
MV3168A4A1	MV3DB247S5
MV3204A4A1	MV3DB247S5
MV3244A4A1	MV3DB247S5
MV3292A4A1	MV3DB247S5
MV3364A4A1	MV3DB247S5
MV3449A4A1	On Request
MV3503A4A1	On Request
MV3566A4A1	On Request

#### AC Input Voltage 460-525V

MV3052A5A1	MV3DB045S5
MV3065A5A1	MV3DB045S5
MV3077A5A1	MV3DB092S5
MV3096A5A1	MV3DB092S5
MV3124A5A1	MV3DB092S5
MV3156A5A1	MV3DB247S5
MV3180A5A1	MV3DB247S5
MV3240A5A1	MV3DB247S5
MV3302A5A1	MV3DB247S5
MV3361A5A1	On Request
MV3414A5A1	On Request
MV3477A5A1	On Request

#### AC Input Voltage 575-690V

MV3062A6A1	MV3DB061S6
MV3077A6A1	MV3DB061S6
MV3099A6A1	MV3DB061S6
MV3125A6A1	MV3DB185S6
MV3144A6A1	MV3DB185S6
MV3192A6A1	MV3DB185S6
MV3242A6A1	MV3DB185S6
MV3289A6A1	On Request
MV3336A6A1	On Request
MV3382A6A1	On Request

## Dynamic Braking Resistors

The following dynamic braking resistors units are rated to the full duty of the previous 'in-situ' dynamic braking units.

Please refer to ALSTOM for assistance with application with a lower duty and hence requiring a smaller dynamic braking resistor unit.

#### Order Reference

Dynamic Braking Unit DB Unit Order Reference	Dynamic Braking Resistor DB Resistor Order Reference
MV3DB045S5	MV3DBR045S4
MV3DB092S5	MV3DBR092S4
MV3DB247S5	MV3DBR247S4
MV3DB045S5	MV3DBR038S5
MV3DB092S5	MV3DBR076S5
MV3DB247S5	MV3DBR231S5
MV3DB061S6	MV3DBR061S6
MV3DB185S6	MV3DBR185S6

Order References for Size D units on Request

### EMC Filters & Ferrites - 6 Pulse & 6 Pulse Enhanced\*

A range of EMC Filters for use with ALSPA MV3000 inverters.

The filters will assist the user's installation to meet EMC emission requirements.

EMC Filter Order Reference	EMC Ferrite Order Reference
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#### AC Input Voltage 380-440V

MV3058A4A1	MV3FLT083A4A1	MV3FLT140B6A1
MV3071A4A1	MV3FLT083A4A1	MV3FLT140B6A1
MV3086A4A1	MV3FLT180A5A1	MV3FLT140B6A1
MV3105A4A1	MV3FLT180A5A1	MV3FLT140B6A1
MV3140A4A1	MV3FLT180A5A1	MV3FLT140B6A1
MV3168A4A1	MV3FLT180A5A1	MV3FLT566B6A1
MV3204A4A1	MV3FLT250A5X1	MV3FLT566B6A1
MV3244A4A1	MV3FLT250A5X1	MV3FLT566B6A1
MV3292A4A1	MV3FLT400A5X1	MV3FLT566B6A1
MV3364A4A1	MV3FLT400A5X1	MV3FLT566B6A1
MV3449A4A1	On Request	On Request
MV3503A4A1	On Request	On Request
MV3566A4A1	On Request	On Request

#### AC Input Voltage 460-525V

MV3052A5A1	MV3FLT180A5A1	MV3FLT140B6A1
MV3065A5A1	MV3FLT180A5A1	MV3FLT140B6A1
MV3077A5A1	MV3FLT180A5A1	MV3FLT140B6A1
MV3096A5A1	MV3FLT180A5A1	MV3FLT140B6A1
MV3124A5A1	MV3FLT180A5A1	MV3FLT140B6A1
MV3156A5A1	MV3FLT180A5A1	MV3FLT566B6A1
MV3180A5A1	MV3FLT180A5A1	MV3FLT566B6A1
MV3240A5A1	MV3FLT250A6X1	MV3FLT566B6A1
MV3302A5A1	MV3FLT320A6X1	MV3FLT566B6A1
MV3361A5A1	On Request	On Request
MV3414A5A1	On Request	On Request
MV3477A5A1	On Request	On Request

#### AC Input Voltage 575-690V

MV3062A6A1	MV3FLT150A6X1	MV3FLT140B6A1
MV3077A6A1	MV3FLT150A6X1	MV3FLT140B6A1
MV3099A6A1	MV3FLT150A6X1	MV3FLT140B6A1
MV3125A6A1	MV3FLT150A6X1	MV3FLT566B6A1
MV3144A6A1	MV3FLT150A6X1	MV3FLT566B6A1
MV3192A6A1	MV3FLT250A6X1	MV3FLT566B6A1
MV3242A6A1	MV3FLT250A6X1	MV3FLT566B6A1
MV3289A6A1	On Request	On Request
MV3336A6A1	On Request	On Request
MV3382A6A1	On Request	On Request

\* The enhanced configuration has an additional DC link choke to reduce the levels of harmonic distortion to the supply