



**Variable speed drive
ALSPA MV1000**

ALSTOM

Power Conversion
General Drives

ALSPA MV1000 – Intelligent drive technology

Your drive requirements have been satisfied through the development of our ALSPA MV1000 range. This is a high performance unit for efficient low-loss variable speed control for power levels of 0.75 kW ... 45 kW.

ALSPA MV1000 complements our well-known ALSPA MD2000 series in the lower power range while using the same software and user-interface.

With ALSPA MV1000 and ALSPA MD2000 we provide the same drive technology from 0.75 kW up to 4500 kW.



Reduced capital investment and operating costs

with ALSPA MV1000, optimum process control guarantees benefits in efficiency, production quality and flexibility.

Low project design costs

through versatile user-orientated unit software. Technology-dependent application software provides individual solutions for different branches of industry.

High availability and reliability

Our quality assurance system is certificated to DIN EN ISO 9001. ALSPA MV1000 combines compact design with highest quality.

Easy commissioning

Simply enter the data shown on the motor rating plate to set the parameters for the field-orientated control. The sinusoidal motor current allows maximum use of motor power.

Multi-language service

The plain text display in several languages, ease of operation and comprehensive monitoring and diagnostics facilities simplify servicing.

Used throughout the world

ALSPA MV1000 complies with international specifications and standards, for example UL and CSA.

Electromagnetic compatibility

ALSPA MV1000 meets EMC directives with regard to emissions and immunity according to variable speed drive product standard IEC 61800-3 / EN 61800-3 for industrial networks and operation on public power supply networks. ALSPA MV1000 is compliant with interference resistance standard EN 50082-2.

Environment-compatible materials

Selected recyclable materials underline the advanced forward looking concept of our ALSPA MV1000.

Economy and ecology are our guides

Our objective is the economic use of material resources and power both in the manufacture of our equipment and during its use by customers.

ALSPA MV1000 – Drive technology to meet every need

The versatile hardware and software in the ALSPA MV1000 offers special solutions for individual and technological requirements. ALSPA MV1000 makes 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.

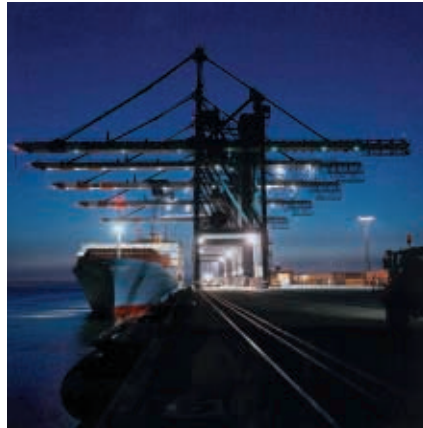
Custom application software is created by our engineers using the LogiCAD project design tool. The field-orientated control – a further development now integrated on a chip – allows you to step into a new dimension for control dynamics and precision with or without encoder feedback. Our long experience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

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

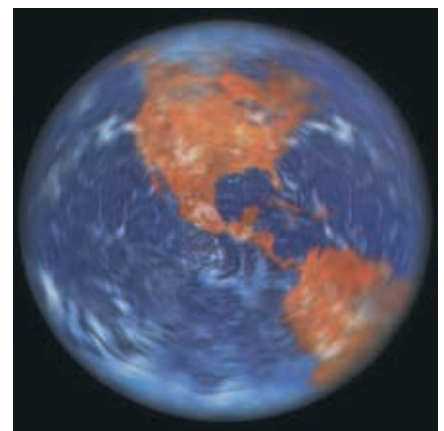
Technology controller, summation unit, multiplier, divider and logic modules can be configured using PC drive software.

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

4-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 ... 480 V as used in many different countries underlines the world-wide use of the ALSPA MV1000.



ALSPA MV1000 knows no language barriers. You and your international customers can communicate with the ALSPA MV1000 in several languages through the keypad.



ALSPA MV1000 with universal communication facilities

Easy handling due to:

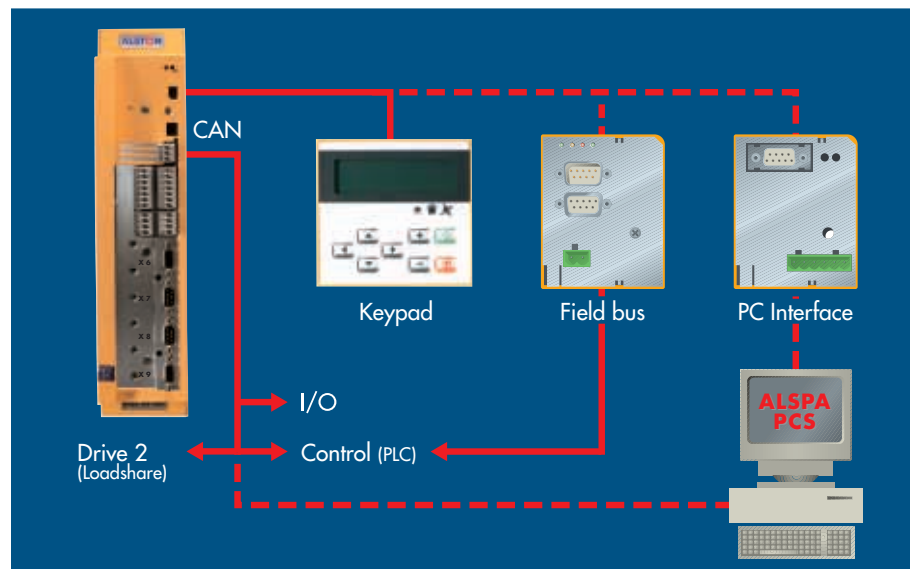
- Clearly structured menus
- 2-line plain text LCD display
- LEDs to indicate operating status
- 4 Keys for run/stop and motor potentiometer
- 4 cursor keys for adjusting parameters and checking status information



Keypad – the gateway to the drive:
Clips on,
Intelligent,
Parameter set can be saved and copied to another ALSPA MV1000

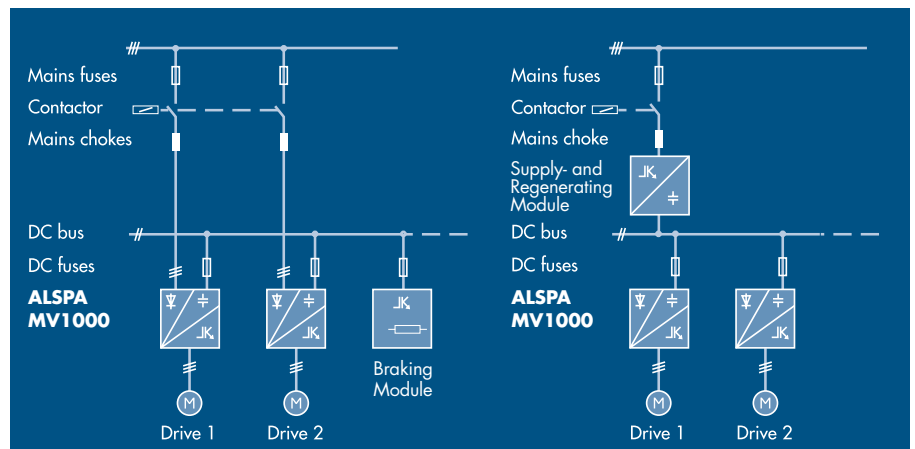
Interfaces – the key to automation

- Terminal strip as conventional interface
- CAN-BUS interface fitted as standard for connecting to CAL and CANopen components
- Optional field bus couplers for integration into automation systems (FIP, Profibus DP, Interbus S, Modbus Plus, Bitbus), connected as alternatives to keypad or PC interface

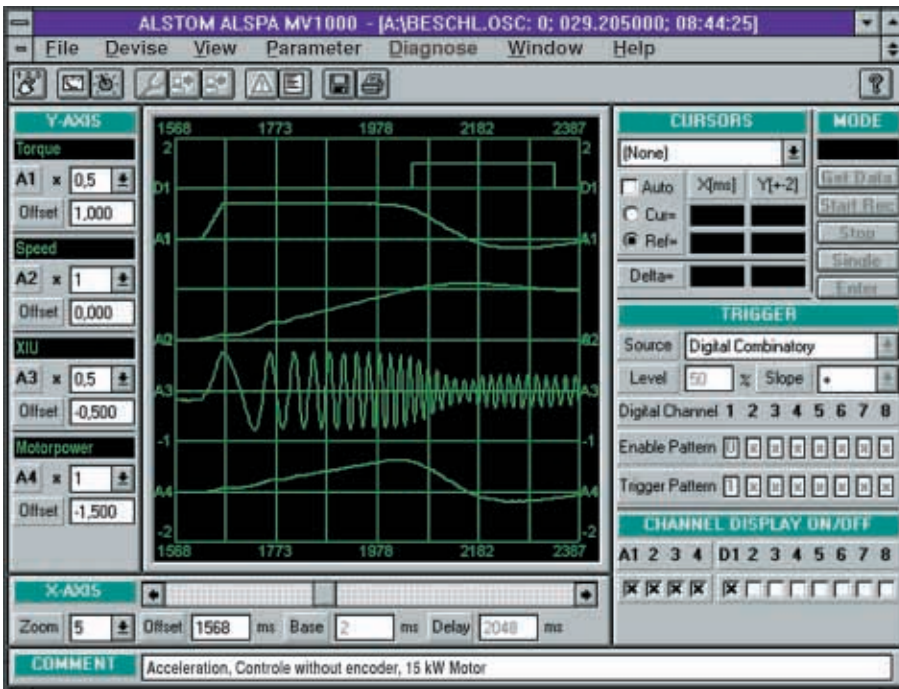


DC system bus – the power bus

- Power transfer
- Reduction of power required



ALSPA MV1000 – User-friendly with PC software



We supply an extraordinarily powerful frequency inverter monitoring and control software package for the PC to provide valuable support at the interface to the drive.

Oscilloscope facility under Microsoft® Windows™

Operation on a PC under Microsoft® Windows™

- Future-orientated with the oscilloscope on the PC with 1 ms sample time.
- The PC operating software provides guided commissioning, operating guidance and monitoring as well as valuable access to diagnostics and service facilities.
- Oscilloscope data saved on the PC can also be recalled, used and printed at a later time and comments can be added.
- Saving complete parameter sets on the PC and transferring these settings to other drives dramatically reduces system commissioning times.
- Simultaneous monitoring and control of several units via the serial PC interface is possible.
- You do not need an oscilloscope for commissioning and service. The built-in oscilloscope facility allows you to monitor the characteristics of every internal control variable on the PC screen. 4 analog and 8 digital channels could be recorded at the same time.

ALSPA MV1000 – Product data

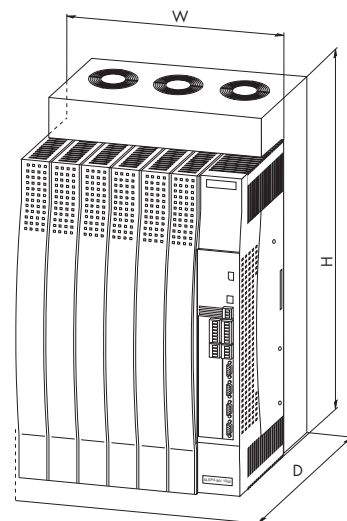
ALSPA MV1000 / 3AC 380 V ... 480 V

Series	Motor power rating at rated current ¹⁾ kW	Rated current ²⁾ at		Max. current 60 s		Power rating at type voltage		Frame size	Order No.
		400 V A	480 V A	400 V A	400 V kVA	415 V kVA	480 V kVA		
MV1003	0.75	2.5	2.5	3.8	1.7	1.8	2.0	1	203 397
MV1004	1.5	3.9	3.9	5.9	2.7	2.8	3.2	2	203 398
MV1007	3.0	7.0	7.0	10.5	4.9	5.0	5.8	2	203 399
MV1013	5.5	13.0	13.0	19.5	9.0	9.3	10.8	3	203 400
MV1018	7.5	17.5	15.7	26.3	12.1	12.6	14.5	3	203 401
MV1024	11.0	23.5	22.3	35.3	16.3	16.9	18.5	3	203 402
MV1032	15.0	32.0	30.4	48.0	22.2	23.0	25.0	4	203 403
MV1047	22.0	47.0	44.6	70.5	32.6	33.8	37.0	4	203 404
MV1059	30.0	59.0	56.0	88.5	40.9	42.4	46.6	4	203 405
MV1089	45.0	89.0	84.0	133.5	61.7	64.0	69.8	5	203 406

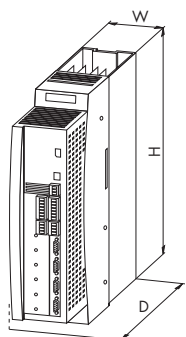
1) Maximum permitted motor rating based on 2, 4 or 6-pole standard motors at 400 V mains voltage

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

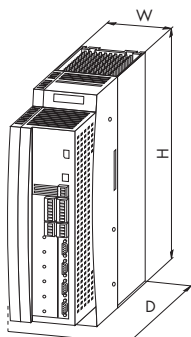
Dimensions mm	H	W	D	Weight ca. kg
Size 1	350	78	250	3,5
Size 2	350	97	250	5,0
Size 3	350	135	250	7,5
Size 4	350	250	250	12,5
Size 5	591	340	285	36,5



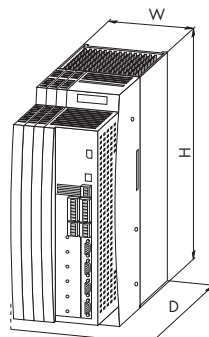
Frame size 5



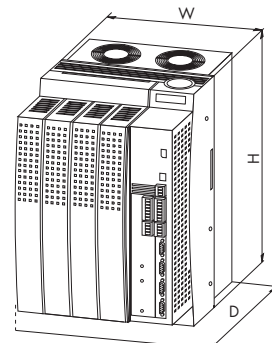
Frame size 1



Frame size 2



Frame size 3



Frame size 4

ALSPA MV1000 – Technical data

- Control structures available:
 - Frequency control (VVVF)
 - 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 -10 V ... +10 V, one of which can also be set for line current 0 (4) ... 20 mA
 - 2 adjustable scaleable analog outputs at separate potential (-10 V ... +10 V)
 - 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 ride-through on mains failure
- Capture spinning motor without torque surge (synchronous restart)
- Automatic restart after mains failure, adjustable to 10 s

Mains supply voltage:	3AC 380 V -15 % ... 480 V +10 % DC 537 V -15 % ... 678 V +10 % for operation on mains with star point earthed. Operation on mains with star point not earthed (IT-networks) on request.
Mains frequency:	45 ... 65 Hz
Mains power factor:	$\lambda_N \approx 0.90$ inductive; $\cos \varphi_1 > 0.95$
Overload capacity:	150 % for 60 s; 1 minute every 10 minutes
Output voltage:	3AC 0 V to input voltage ¹⁾
Rated current and power:	See table product data
Output frequency:	0 to 400 Hz
Min. operating frequency:	With/without encoder 0 Hz/0.5 Hz
Encoder:	f_{\max} encoder input 500 kHz; line count adjustable; 2 channels + complement
Efficiency at rated point:	> 0.97
Speed adjustment range:	For speed control without encoder motoric 1:100 / generative 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 ... 8 ms
Frequency accuracy on frequency control:	< 0.02 %
Protection class:	IP 20, IP 41 for through-mounting, IP 54 cold plate version on request
Cooling:	Forced air cooling from MV1004 upwards
Ambient temperature:	
- During operation	0 ... +40 °C, up +50 °C with derating of 2.5 %/K
- Storage	-25 ... +55 °C
Altitude:	< 1000 m above msl Up to 4000 m with derating of 0.5 % per 100 m
Relative humidity:	< 85 % at 28 °C, condensation not permitted
Electromagnetic compatibility (EMC):	To EMC-product standard for electrical drives EN 61800-3 (IEC 61800-3)
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. 50 m 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

1) 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 application 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.

ALSPA MV1000 – Optional items

ALSPA MV1000 Optional items			
Order	Order No.:	Dimensions H x W x D mm	Weight kg
	029.		
Keypad for MV1003 ... 1089	203 365	74 x 77 x 38	0.1
Keypad door mounting kit, including 2 m connection cable	206 849		0.3
Mains choke ¹⁾ for			
MV1003	203 347	115 x 95 x 82	1.2
MV1004	203 348	116 x 95 x 90	1.6
MV1007	203 349	138 x 119 x 95	2.6
MV1013	203 350	162 x 150 x 106	5.2
MV1018	203 351	192 x 180 x 120	8.2
MV1024	203 351	192 x 180 x 120	8.2
MV1032	203 352	190 x 190 x 125	9.0
MV1047	203 353	190 x 190 x 135	11.4
MV1059	203 354	235 x 230 x 125	14.2
MV1089	203 355	210 x 230 x 179	20.0
Mains filter ¹⁾ for			
MV1003	203 356	150 x 78 x 230	3.1
MV1004	203 357	150 x 78 x 230	3.2
MV1007	203 358	180 x 97 x 230	4.6
MV1013	203 359	260 x 135 x 230	11.6
MV1018	203 360	260 x 135 x 230	12.4
MV1024	203 360	260 x 135 x 230	12.4
MV1032	203 361	332 x 234 x 228	16.5
MV1047	203 362	332 x 234 x 228	17.3
MV1059	203 363	332 x 234 x 228	18.0
MV1089	203 364	474 x 323 x 285	32.3
Motor chokes for			
MV1003 ... 1007	220 083	75 x 155 x 155	4.0
MV1013 ... 1024	220 084	85 x 190 x 195	7.0
MV1032 ... 1047	209 672	120 x 254 x 210	10.0
MV1059 ... 1089	209 673	120 x 254 x 210	10.0
Motor filter for			
MV1003 ... 1007	203 376	170 x 170 x 120	4.0
MV1013 ... 1024	203 377	230 x 230 x 150	7.0
MV1032 ... 1047	203 378	260 x 260 x 160	10.0
MV1059 ... 1089	203 379	260 x 260 x 160	11.0
Field bus coupler			
ALSPA F8000 (FIP)	207 789	75 x 62 x 52	0.2
Profibus DP - Slave	207 776	75 x 62 x 52	0.2
Interbus S	207 780	75 x 62 x 52	0.2
Modbus Plus	207 779	75 x 62 x 52	0.2
Bitbus	207 775	75 x 62 x 52	0.2

ALSPA MV1000 Optional items

Order	Order No.:	Dimensions H x W x D mm	Weight kg
	029.		
Ferrit ring for			
MV1003 ... 1024	206 880	77 x 74 x 74	1.1
MV1032 ... 1089	206 881	77 x 86 x 86	1.3
Supply and regeneration module			
PS12 for 12 A mains current	203 370	350 x 135 x 250	7.5
PS24 for 24 A mains current	203 372	350 x 135 x 250	7.5
PS45 for 45 A mains current	203 388	350 x 250 x 250	12.5
Mains filter for			
PS12	203 384	245 x 135 x 230	4.7
PS24	203 385	365 x 135 x 230	12.2
PS45	203 387	372 x 241 x 285	36.0
Braking module including braking resistor / BM 12 Peak brake rating 12 kW, 0.5 % duty cycle/500 s Continuous braking power 100 W	203 366	350 x 52 x 186	2.6
Brake chopper without braking resistor / BC 32 Peak brake rating 32 kW, 1 % duty cycle/100 min Continuous braking power 19 kW	203 368	350 x 52 x 186	2.2
Braking resistor ²⁾			
1.4 kW, 100 Ohm, 25 % ED/120 s; 430 W 100 % ED	122 736	120 x 406 x 92	2.0
2.8 kW, 100 Ohm, 25 % ED/120 s; 800 W 100 % ED	122 737	120 x 606 x 92	2.7
2.8 kW, 56 Ohm, 25 % ED/120 s; 800 W 100 % ED	122 739	120 x 606 x 92	3.6
18 kW, 30 Ohm, 25 % ED/120 s; 6 kW 100 % ED	142 323	460 x 595 x 490	25.0
ALSPAPCS PC Drive Software V2.50	152 823		
9-pin data cable for PC interface, 2 m long	153 484		
Device-specific files for PC Drive Software V1.3	205 103		
PC interface RS 232/RS 422	204 538	86 x 62 x 52	0.2
CANopen components			
PC interface		Supply sources on request	
Mini PLC		Supply sources on request	
I/O		Supply sources on request	
Operating manual (enclosed with each unit) ALSPA MV1000 1.7 ... 70 kVA			
German	202 720	DIN A4	
English	202 721	DIN A4	
French	202 722	DIN A4	

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 MV1000 – Optional items

Mains choke

- Required to reduce the harmonic content and to limit mains feedback effects according to EN 50178 (VDE 0160)

Mains filter

- If the EMC standards for public power supply networks according to EN 61800-3 (IEC 61800-3) are required then mains filters and a ferrite ring are to be used in place of the mains choke to comply with limit curve A or B according to EN 55011.
- EN 55011 Class B is fulfilled with motor cable lengths of up to 50 m.
- The instructions on EMC-compliant installation stated in the operating manual must be observed.

Ferrite ring

- To reduce high frequency interference radiated from the motor cable
- Installed at the inverter output
- Required with mains filter for compliance with line-based interference values to the limit curve according to EN 55011 Class A or B respectively

Motor filter

- The ALSPA motor filter is used to protect motors against transient over-voltages and to limit high rates of voltage rise at the inverter output to values typically below 1000 V μ s. The maximum voltage peaks occurring at the motor terminal box are limited for example to 1000 V with a motor cable of 100 m in length and 400 V inverter mains supply voltage.
- Standard asynchronous motors which benefit from modern insulation techniques and high quality insulation material are generally suitable for high insulation loads and operation through an inverter without a filter and with no limit on the operating life.
- The ALSPA motor filter is generally only recommended for older motors or those which have already been in use for a long time. If motors with unknown insulation characteristics or with no phase insulation separation at the heads of the windings are to be used, the motor filter must be connected after the inverter.
- The ALSPA motor filter does not affect the high frequency EMC interference radiation.

Motor choke

- On long cable runs (> 100 m shielded cable) a motor choke can be used instead of a motor filter.

- Motor filter or motor choke are also necessary when using very long motor cables or operating several motors on one inverter at the same time (group drives). In such cases the filter limits the recharge current peaks caused by the capacitance of the cable and significantly reduces the load on the inverter.

Braking module with built-in braking resistor BM12

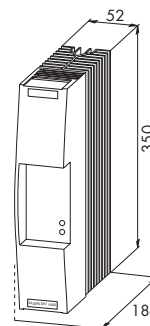
For sporadic braking of heavy flywheel masses for short term braking requirements.

Continuous braking power: 100 W
Peak braking power: 12 kW
Max. duty cycle: 0.5 % / 500 s

Brake chopper without braking resistor BC32

For frequent braking of heavy flywheel masses or for frequent/ongoing braking requirements. An external braking resistor rated according to the application is also required.

Continuous braking power: 19 kW
Peak braking power: 32 kW
Max. duty cycle: 1 % / 100 min.



Brake module, Brake chopper
(Dimensions in mm)

Supply and regeneration module

For energy feedback and DC system bus supply.

As the ALSPA MV1000 is supplied through the DC link connection the inverter requires no mains choke or mains filter.

A special mains filter is required for the supply and regeneration module. With the ferrite ring on the inverter output the limit value curve A according to EN 55011 is achieved.

Series	Supplying/Regenerating active power at $\pm U_G$		Shaft power of motors connected via inverter		Rated mains current	Frame size
	at mains voltage 400 V		at mains voltage 400 V			
	Rated power kW	Max. power kW	motoric kW	genera- toric kW		
ALSPA PS12	7.2	10.8	6.0 ¹⁾	8.5 ¹⁾	12	3
ALSPA PS24	14.4	21.6	12.0 ¹⁾	17.0 ¹⁾	24	3
ALSPA PS45	27.0	40.5	24.0 ²⁾	30.0 ²⁾	45	4

1) Inverter losses neglected; motor efficiency $\eta = 0.85$ assumed.

2) Inverter losses neglected; motor efficiency $\eta = 0.90$ assumed.

PC interface RS232/RS422

- Required for PC operation, parameter adjustment and monitoring with ALSPAPCS
- No external power supply needed
- Can be installed as an alternative to keypad or field bus coupler

CANopen components

The ALSPA MV1000 has a CAN interface as standard.

The following CAN components can be connected:

- **CAN PC interface** – allows PC operation under ALSPAPCS and simultaneous control via keypad or field bus coupler

- **CAN Mini PLC** – allows project design of the control with the ALSPA MV1000
- **CAN I/O** – expansion for the ALSPA MV1000

PC Drive Software ALSPAPCS

- Windows software for parameter adjustment, operation and visualisation on a PC using oscilloscope facility as a diagnostics tool

Device-specific files

- Preconfigured Windows-based image support for fast user-guided commissioning, parameter display and configuration for use with ALSPAPCS

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