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The Drive & Control Company

Rexroth
Bosch Group

Drive System Rexroth IndraDrive

Complete, intelligent and safe



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Discover the unlimited possibilities of Rexroth's automation systems. They integrate all control and drive components to provide optimum automation solutions: state-of-the-art, ultra-efficient, and highly future-proof.

Contents

Drive expertise	**04**
System overview	**08**
Selection guide	**10**
Power units IndraDrive C and M	**12**
Control units IndraDrive C and M	**36**
Multi-protocol-capable compact drive system IndraDrive Cs	**50**
Cabinet-free drive technology IndraDrive Mi	**54**
Firmware	**62**
Motion logic	**64**
Safety technology	**66**
Engineering and operation	**70**
Motors and gearboxes	**74**
Auxiliary components	**112**
Glossary	**136**
Formulas	**138**
Additional information	**140**

71511 EN/2013-11, **Bosch Rexroth AG**

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Rexroth IndraDrive and Rexroth IndraDyn cause a stir in the drive market

Solve your automation challenges easily, cost-efficiently and safely with systems from Rexroth.
IndraDrive sets new standards in drive technology with a combination of three product advantages:

- Scalable in power and functionality
- Consistent in technology, engineering and operation
- Open in communication

This means that IndraDrive has numerous application advantages to offer, e.g.:

- Easy realization of frequency converter to high-end servo applications by using a common platform for open and closed loop
- Scalable range of performance and functionality thanks to the free combination of control and power components
- Wide performance range from 100 W to 630 kW
- Internationally standardized interfaces from analog input to Multi-Ethernet interface
- Integrated safety technology compliant with EN 13849-1 Cat. 3 PL d and EN 62061 SIL 2 for Safe Stop and Safe Motion
- Intelligent motion logic with PLC according to IEC 61131-3
- Uniform operating philosophy
- Consistent engineering tool
- Direct power connection
- Common DC bus for exchanging energy in multiple-axis mode
- Energy-saving power recovery
- Motors with the highest level of efficiency



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IndraDrive has the power to convince

No matter what demands you make on your drive – IndraDrive offers an impressive array of key benefits:

- Integrated hardware platform
- Scalable functionality
- Unique safety concept



Safety on Board
Safety technology certified to EN 13849-1 Cat. 3 PL d and EN 62061 SIL 2, protects machine operators while the drives are in motion. In contrast to conventional safety designs, there is no longer any need for motor contactors, additional speed monitors or frequent power shutdown using the line contactor.

Integrated motion logic with IEC 61131-3 compliant PLC
Motion logic with IEC 61131-3 compliant PLC can be integrated as an optional feature that consistently applies open standards.
This makes it easier to bring in customer know-how and saves on higher-level control systems and personnel training courses.

Integrated technology functions
The technology functions can be configured on the basis of motion logic to perform a wide and diverse range of process-oriented tasks. This does not require any programming knowledge whatsoever on the user's part.

Open interfaces
Internationally recognized interfaces are available for communicating with higher-level machine control systems: sercos, PROFIBUS, Multi-Ethernet (sercos, PROFINET IO, EtherNet/IP, EtherCAT), CANopen, DeviceNet, analog and parallel.

A single software for all tasks
The engineering framework, IndraWorks, carries you through all the steps involved in project planning, programming, parameterization, operation and diagnostics.

A unique platform
In the interests of meeting your individual requirements, we have developed two versions of IndraDrive:

- IndraDrive C – compact converters
- IndraDrive M – modular inverters

Particularly economic drive solutions can be derived from the common control units and the combination of different versions.

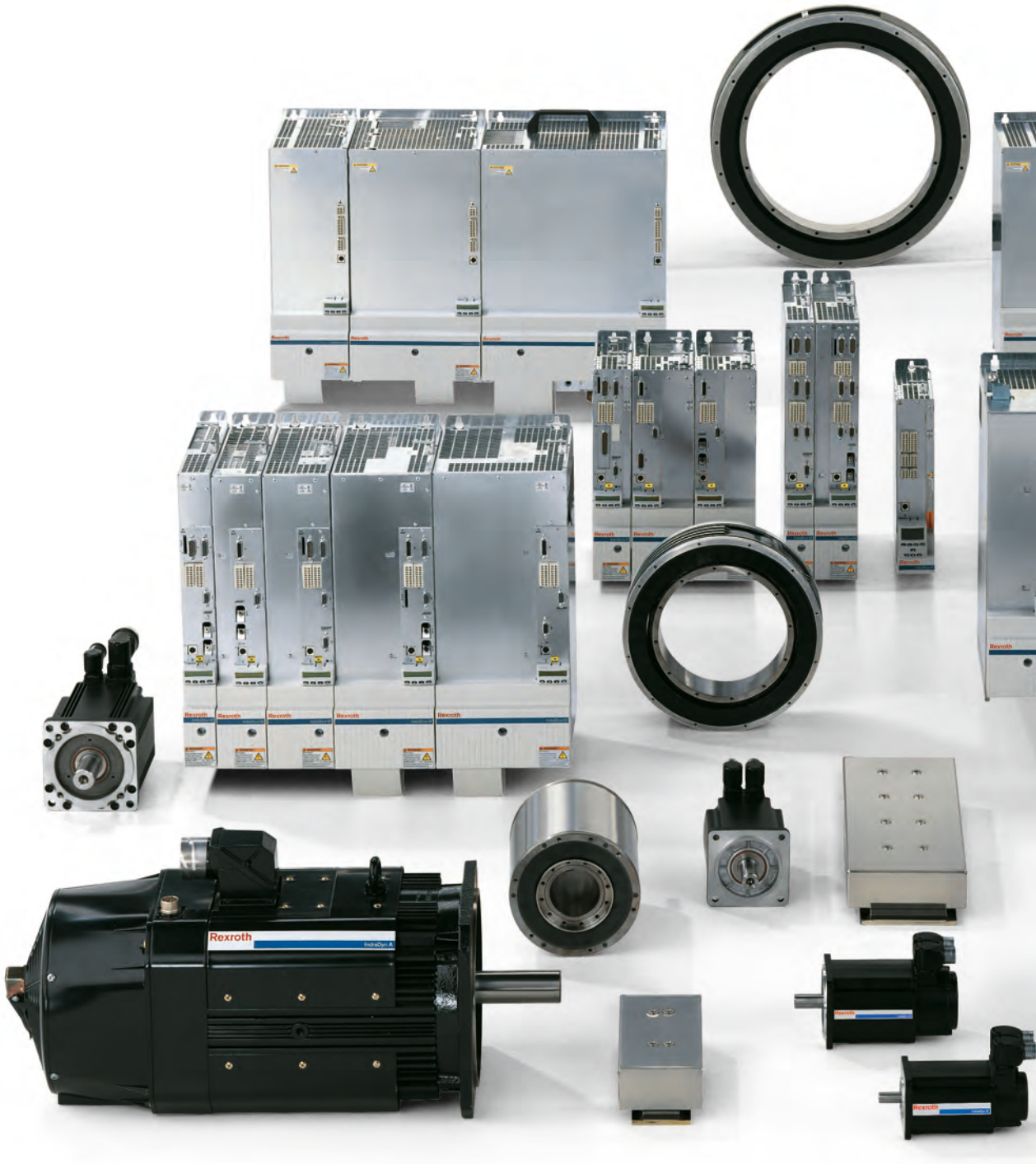
A complete range of motors
The newly developed generation of IndraDyn motors meets all the requirements of modern factory automation through its diversity of design and unique performance:

- Synchronous and asynchronous servo motors which are more compact and more powerful
- Servo motors designed for potentially explosive areas – conforming to ATEX and UL/CSA
- Synchronous and asynchronous motors for high-speed applications such as motor spindles

- Automation
- Printing and converting machines
- Conveying and storage systems
- Glass processing machines
- Handling and assembly systems
- Woodworking machines
- Plastics processing machines
- Semiconductor technology
- Food processing and packaging machines
- Textile machines
- Metal forming
- Machine tools

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Rexroth IndraDrive – complete, intelligent and safe



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IndraDrive stands for innovation all along the line. Therefore, choosing the new drive generation from Rexroth means that your every wish will be fulfilled.

Main features of the IndraDrive:

- Compact converters and modular inverters on one platform
- Ethernet-based communications hardware with multi-protocol support
- Ultra-compact drive unit consisting of control unit and servo motor
- Integrated motion logic with IEC-compliant PLC
- Drive-integrated safety technology
- Intelligent technology functions
- Integrated engineering framework for project planning, programming, operation and diagnostics
- Complete range of synchronous and asynchronous motors

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Rexroth IndraDrive – the complete system

Motors and gearboxes



Synchronous servo motors
IndraDyn S, MSK, MKE, MSM
Page 76 – 85



Asynchronous servo motors
IndraDyn A, MAD, MAF
Pages 86 – 93



Synchronous linear motors
IndraDyn L, MLF, MCL
Pages 94 – 97



Synchronous torque motors
IndraDyn T, MBT
Pages 98/99



Synchronous high-speed motors
IndraDyn H, MBS
Pages 100/101



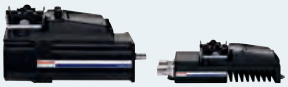
Asynchronous high-speed motors
1MB
Pages 102/103



Gearboxes for servo motors
GTE, GTM
Pages 104 – 107



Standard motors, geared motors
Pages 108 – 111



Power units



Compact drives featuring Ethernet-based communications
HCS01 converter – ECONOMY and BASIC UNIVERSAL versions
Pages 50 – 53

Converters
HCS02
Pages 16/17

HCS03
Pages 18/19

HCS04
Pages 20/23



Converters and inverters can be combined

Inverters
HMS (single-axis unit)
Pages 24 – 27

HMD

(double-axis unit)
Pages 28/29



Power supplies and inverters can be combined

Power supply units
HMV
Pages 30 – 33



Cabinet-free drive technology
KSM, KMS, KCU, Pages 54 – 61

Control units

For converters and inverters

Complete solutions for standard applications



BASIC OPEN LOOP
CSB...FC
Page 40



BASIC ANALOG
CSB...AN
Page 41



BASIC PROFIBUS
CSB...PB
Page 42



BASIC SERCOS
CSB...SE
Page 43

Individually configurable for standard and high-end applications



BASIC UNIVERSAL
CSB (single-axis control unit)
Page 44



BASIC UNIVERSAL
CDB (double-axis control unit)
Page 45



ADVANCED
CSH
Page 46

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Seamlessly coordinated

- Integrated system
- Scalable power
- Flexible function blocks
- Open communication standards
- Future-proof



Firmware

Basic package

OPEN LOOP/ CLOSED LOOP

The basic package contains all the functions for standard applications.

Extension packages

SERVO

Frictional torque compensation and compensation for backlash on reversal, axis and encoder error correction, probe, etc.

SYNCHRONIZATION

Electronic gears, electronic cam plate, etc.

MAIN SPINDLE

Spindle positioning, gear change, etc.

IndraMotion MLD

Motion logic conforming to IEC 61131-3

Technology packages based on IndraMotion MLD

Productivity Agent (predictive maintenance), function blocks, demand processing, special programmable limit switches, extended drive function, PLCopen library, etc.

Pages 62/63

Engineering & operation

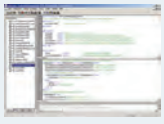


Operator panels
VCP, VCH, VEP
Page 47





Software module
PFM
Page 47



IndraWorks
Engineering software framework for start-up, programming, etc.
Pages 70/71

Cables and connectors



Power cables
RKL
Pages 134/135



Encoder cables
RKG
Pages 135



Fiber optic cables, bus connectors, etc.



Hybrid cable, terminal connector
RKH
Page 61

Auxiliary components



Mains filters
HNF, HNS, NFD
Page 114



Mains filters, mains choke
HNK
Page 115



Mains chokes
HNL
Pages 116/117
DC chokes
HLL
Page 118



Motor filters
HMF
Page 119



Brake resistors
HLR
Pages 121 – 123



Brake chopper
HLT
Page 120
Brake units
HLB
Page 124



Capacity modules
HLC
Page 125



Blower unit
HAB
Page 126

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Five steps to your drive solution



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	Step	Example	Help
1	**Determine your drive requirements** ▶ Torque, speed, power... ▶ Performance (control quality...) ▶ Interfaces, functions ▶ Single-axis or multi-axis drive	**Servo drive for a handling axis** ▶ RMS torque 4.5 Nm ▶ Maximum torque 8 Nm ▶ Speed 2,500 rpm ▶ PROFIBUS interface ▶ Simple servo functionality	**Drive sizing program** IndraSize Pages 72/73
2	**Select the power unit/ motor combination**	**IndraDrive C with IndraDyn S** **HCS02.1E-W0028-A-03-NNNN** **MSK050C-0300-NN-S1-UG0-NNNN** ▶ Standstill torque 5 Nm ▶ Maximum torque 15 Nm ▶ Maximum speed 4,700 rpm	**Power units** Pages 12 – 35 **Motors** Pages 74 – 111
3	**Identify the control unit performance and interfaces** ▶ Higher-level control system ▶ Encoder ▶ Inputs and outputs ▶ Safety technology	**Control unit BASIC PROFIBUS** **CSB01.1N-PB-ENS-NNN-NN-S-NN-FW** ▶ Standard performance ▶ PROFIBUS ▶ IndraDyn standard encoder ▶ Standard operator panel ▶ No additional options	**Control units** Pages 36 – 49
4	**Define the firmware function** ▶ Basic OPEN LOOP or CLOSED LOOP package ▶ Extension packages ▶ Motion logic ▶ Technology functions	**Basic CLOSED LOOP package** FWA-INDRV*-MPB-xxVRS-D5-1-NNN-NN ▶ No extension packages	**Firmware** Pages 62/63
5	**Select the accessories** ▶ Mains filters and mains chokes ▶ Brake resistors, brake units ▶ Capacity modules ▶ Cables and connectors ▶ Software	**Mains filter** NFD03.1-480-016 **Power cable** RKL4302/005.0 **Encoder cable** RKG4200/005.0 **Basic accessories** HAS01.1-065-NNN-CN **Shield connection** HAS02.1-002-NNN-NN **Software** SWA-IWORKS-D**-xxVRS-D0-DVD**-COPY	**Auxiliary components** Pages 112 – 135 **Engineering framework IndraWorks** Pages 70/71

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Rexroth IndraDrive – power units



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Customized for the desired number of axes and power level

- Wide power range – for all applications
- Converters and inverters can be combined – ideal for small axis groups
- Power supplies and inverters can be combined – ideal for large axis groups



IndraDrive C – compact converters

- Power range from 1.5 kW to 630 kW with maximum current from 12 A to 1,535 A
- High overload capacity
- Compact design for single-axis applications
- Can be connected to inverters for cost-effective solutions
- Direct mains connection from 200 V to 500 V



Converters and inverters can be combined

IndraDrive M – modular inverters

- Single-axis inverter with maximum current from 20 A to 350 A
- Double-axis inverter with maximum current from 12 A to 36 A
- Space-saving design for multi-axis applications
- Can be powered via power supply unit or converter
- Energy exchange via common DC bus
- Can be connected to a converter for cost-effective solutions



Power supplies and inverters can be combined

IndraDrive M – modular power supplies

- Power range from 15 kW to 120 kW
- Direct mains connection from 400 V to 480 V
- Energy-saving line regeneration
- Integrated mains contactor
- Integrated brake resistor



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IndraDrive – the clever combination of power units

Single-axis solution with a converter

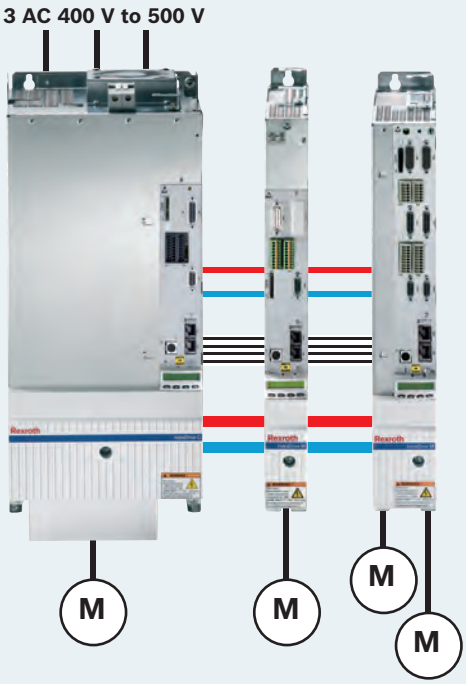
The IndraDrive C series of converters integrate inverter and power supply in one unit. The compact construction contains additional mains connection components, making it particularly suitable for single-axis applications.



Multi-axis solution with converters and inverters

A combination of IndraDrive C converters and modular IndraDrive M inverters is a particularly cost-effective solution for small axis groups.

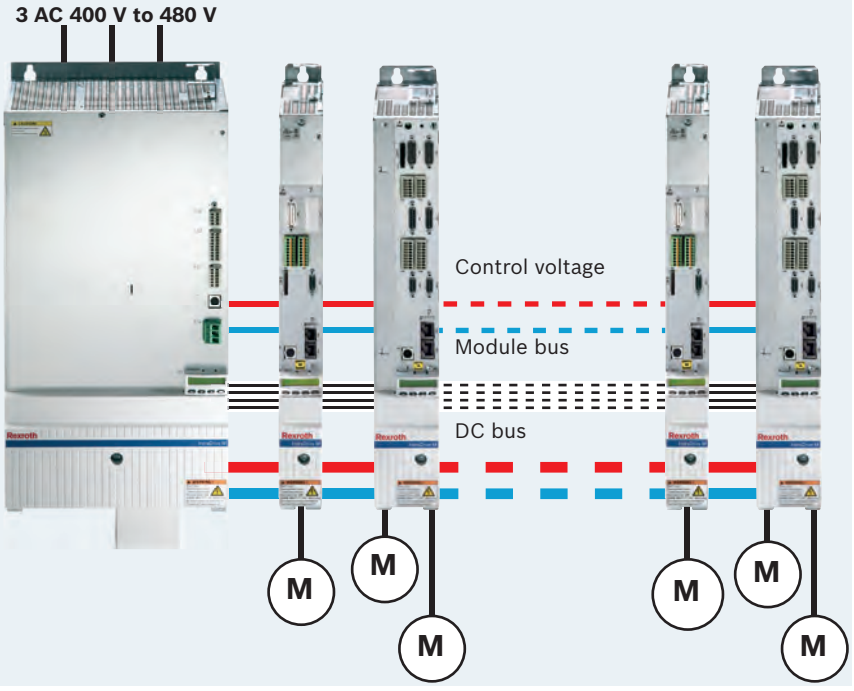
The converter for the first axis supplies the inverters of the other axes at the same time. In this case, a converter with sufficient power reserve must be selected in order to be able to supply the smaller inverters as well.



Multi-axis solution with power supplies and inverters

Multi-axis applications are the domain of the modular system IndraDrive M. Power supplies provide the necessary DC bus voltage for the inverters. Compact single-axis or double-axis inverters and power supplies with integrated mains connection components enable compact solutions for large axis groups.

Maximum energy efficiency can be achieved with power supplies that are capable of mains regeneration. Beside the power recovery encountered in regenerative operation of the drives, these devices also feature sinusoidal line currents, an overall power factor of 0.99 and a closed-loop DC bus.



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		IndraDrive C			**IndraDrive M**		
Power units		**Converter**			**Inverter**	**Power supply units, infeed**	**Power supply units, regenerative**
		HCS02	**HCS03**	**HCS04**	**HMS01/HMS02 HMD01**	**HMV01.1E**	**HMV01.1R HMV02.1R**
Mains voltage	V	1 AC 200 to 250 3 AC 200 to 500 (±10%)	3 AC 400 to 500 (+10%/–15%)	3 AC 380 to 480 (+10%/–15%)	–	3 AC 400 to 480 (+10%/–15%)	
Supply frequency	Hz	48 to 62			–	48 to 62	
DC bus continuous power	kW	2.1 to 14	13 to 85	–	–	18 to 120	
Continuous mechanical power[1]	kW	1.5 to 11	11 to 75	110 to 630	1.5 to 132	–	
Overload capacity		2.5x	1.5 to 2x	1.2 to 1.65x	1.5 to 2.5x	1.5x	1.5 to 2.5x
Switching frequency/ max. output frequency	kHz/Hz	4/400			4/400	–	
		8/800			8/800	–	
		12/1,200		–	12/1,200[2]	–	
		16/1,600		–	16/1,600[2]	–	
Output voltage	V	0 to 335 (at DC bus voltage DC 475 V) 0 to 400 (at DC bus voltage DC 570 V) 0 to 530 (at DC bus voltage DC 750 V)				–	
Suitable for cabinet depth	mm	300	400	600	HMx01: 400/HMx02: 300		
Mains contactor		External			–	Internal[3]	
Brake chopper		Internal		Internal or external	–	Internal[3]	
Brake resistor		Internal (optional: external)	External		–	Internal[3]	
Converter/inverter combination		Yes	Yes	Yes	Yes	–	
Control voltage DC 24 V		External (optional: internal)	Internal or external		External		
Protection category		IP20					
Installation height	m	1,000 above sea level, with derating to 4,000[4]					
Ambient temperature	°C	0 to +40, with derating to +55					
Relative air humidity	%	5 to 95 (as per EN 61800-5-1), no dewing					
Degree of contamination		2 (as per EN 61800-5-1)					
Cooling system		Air cooling					
CE mark		Complies with the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC					
Certification		EN 61800-5-1, EN 61800-3, UL 508C, C22.2 No. 14-05					
EMC		C3 (as per EN 61800-3)					

All data for nominal rating at 3 AC 400 V mains voltage and 4 kHz switching frequency

1) Applies to S1 mode on 4-pole standard motors 3 AC 400 V/50 Hz at 4 kHz switching frequency and a rotary frequency > 4 Hz

2) HMD01 and HMS02.1N-W0028 up to 8 kHz/800 Hz only

3) Not applicable for HMV01.1R-W0120

4) HCS04 up to 3,000 m

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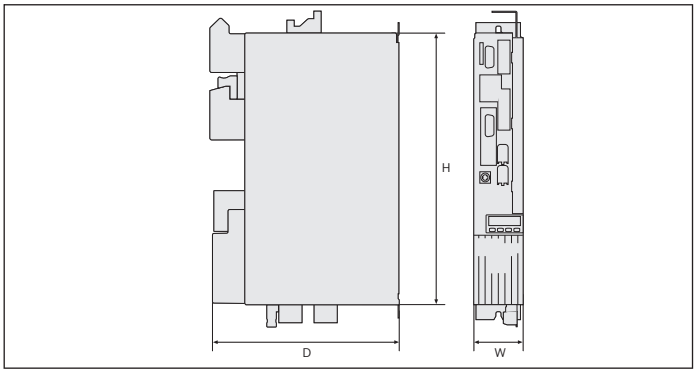
IndraDrive C – compact converters HCS02

		Converters			
Model		**HCS02.1E-W0012**	**HCS02.1E-W0028**	**HCS02.1E-W0054**	**HCS02.1E-W0070**
- with integrated control voltage supply		**-A-03-NNNV**	**-A-03-NNNV**	**-A-03-NNNV**	**-A-03-NNNV**
- with integrated temperature-dependent fan control		**-A-03-LNNN**	**-A-03-LNNN**	**-A-03-LNNN**	**-A-03-LNNN**
- no additional options		**-A-03-NNNN**	**-A-03-NNNN**	**-A-03-NNNN**	**-A-03-NNNN**
Performance data					
Continuous current[1)]	A	4.5	11.3	20.6	28.3
Maximum current	A	11.5	28.3	54	70.8
DC bus continuous power without/with choke	kW	2.1/2.1	5.1/5.1	7/10	9/14
Maximum output without/with choke	kW	5/5	8/10	12/16	14/19
Mains voltage	V	3 AC 200 to 500, 1 AC 200 to 250 (±10%)			
Continuous input mains current	A	6	13	19	30
Dependence of output on mains voltage		at U_{LN} < 400 V: 1% power reduction per 4 V at U_{LN} > 400 V: 1% power gain per 5 V			
DC bus terminal[2)]		–	•	•	•
DC bus capacity	µF	135	270	405	675
Brake resistor					
Brake resistor		Internal	Internal	Internal/external	Internal/external
Maximum braking energy consumption	kWs	1	5	9	13
Permanent braking power	kW	0.05	0.15	0.35/3.8	0.5/5.5
Maximum braking power	kW	4	10	18	25
Control voltage data					
Control voltage, internal	V	DC 24 (not for supply of motor holding brake)			
Control voltage, external	V	DC 24 ±20% (DC 24 ±5% when supplying motor holding brake)			
Power consumption without control unit and motor brake	W	12	14	23	23
Continuous current without control unit and motor brake	A	0.5	0.6	1	1
Mechanical data					
Width W	kW	65	65	105	105
Height H	mm	290	352		
Depth D	mm	252			
Weight	kg	2.9	3.8	6.7	6.8

All data for nominal rating at 3 AC 400 V mains voltage and 4 kHz switching frequency

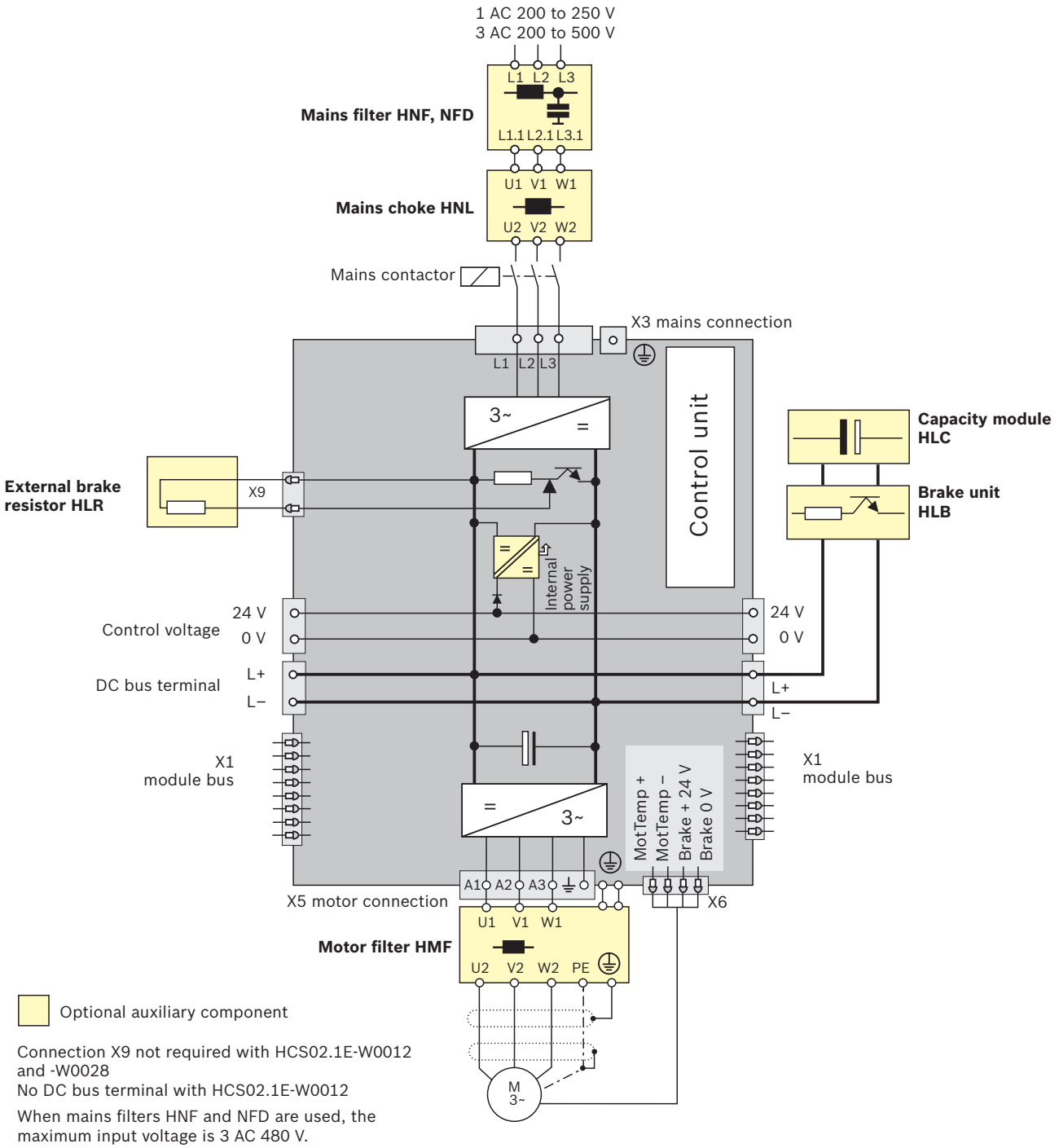
[1)] In case of output frequency less than 4 Hz the output current will be reduced; [2)] For the connection of additional units, such as HMS, HCS, HLB, HLC





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HCS02



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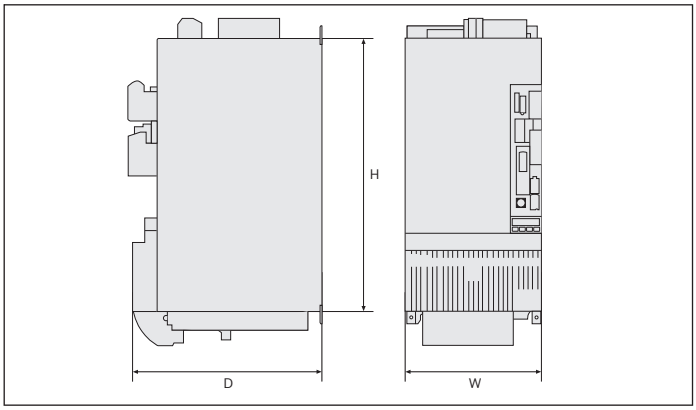
IndraDrive C – compact converters HCS03

		Converter			
Model		**HCS03.1E-W0070**	**HCS03.1E-W0100**	**HCS03.1E-W0150**	**HCS03.1E-W0210**
- with integrated control voltage supply		**-A-05-NNNV**	**-A-05-NNNV**	**-A-05-NNNV**	**-A-05-NNNV**
- with integrated control voltage supply and brake chopper		**-A-05-NNBV**	**-A-05-NNBV**	**-A-05-NNBV**	**-A-05-NNBV**
- with integrated control voltage supply, brake chopper and fan control		**-A-05-LNBV**	**-A-05-LNBV**	**-A-05-LNBV**	**-A-05-LNBV**
Performance data					
Continuous current[1)]	A	45	73	95	145
Maximum current	A	70	100	150	210
DC bus continuous power without/with choke	kW	13/25	24/42	34/56	42/85
Maximum output without/with choke	kW	20/40	33/59	54/89	68/124
Mains voltage	V	3 AC 400 to 500 (+10%/–15%)			
Continuous input mains current	A	50	80	106	146
Dependence of output on mains voltage		at U_{LN} < 400 V: 1% power reduction per 4 V decrease in voltage			
DC bus terminal[2)]		●	●	●	●
DC bus capacity	µF	940	1,440	1,880	4,700
Brake chopper					
Permanent braking power	kW	13.2	18.9	25.2	42.6
Maximum braking power	kW	42	63	97	137
Control voltage data					
Control voltage, internal	V	DC 24 (not for supply of motor holding brake)			
Control voltage, external	V	DC 24 ±20% (DC 24 ±5% when supplying motor holding brake)			
Power consumption without control unit and motor brake	W	22.5	25	25	30
Continuous current without control unit and motor brake	A	0.9	1	1	1.3
Mechanical data					
Width W	mm	125	225	225	350
Height H	mm	440			
Depth D	mm	315			
Weight	kg	13	20	20	38

All data for nominal rating at 3 AC 400 V mains voltage and 4 kHz switching frequency

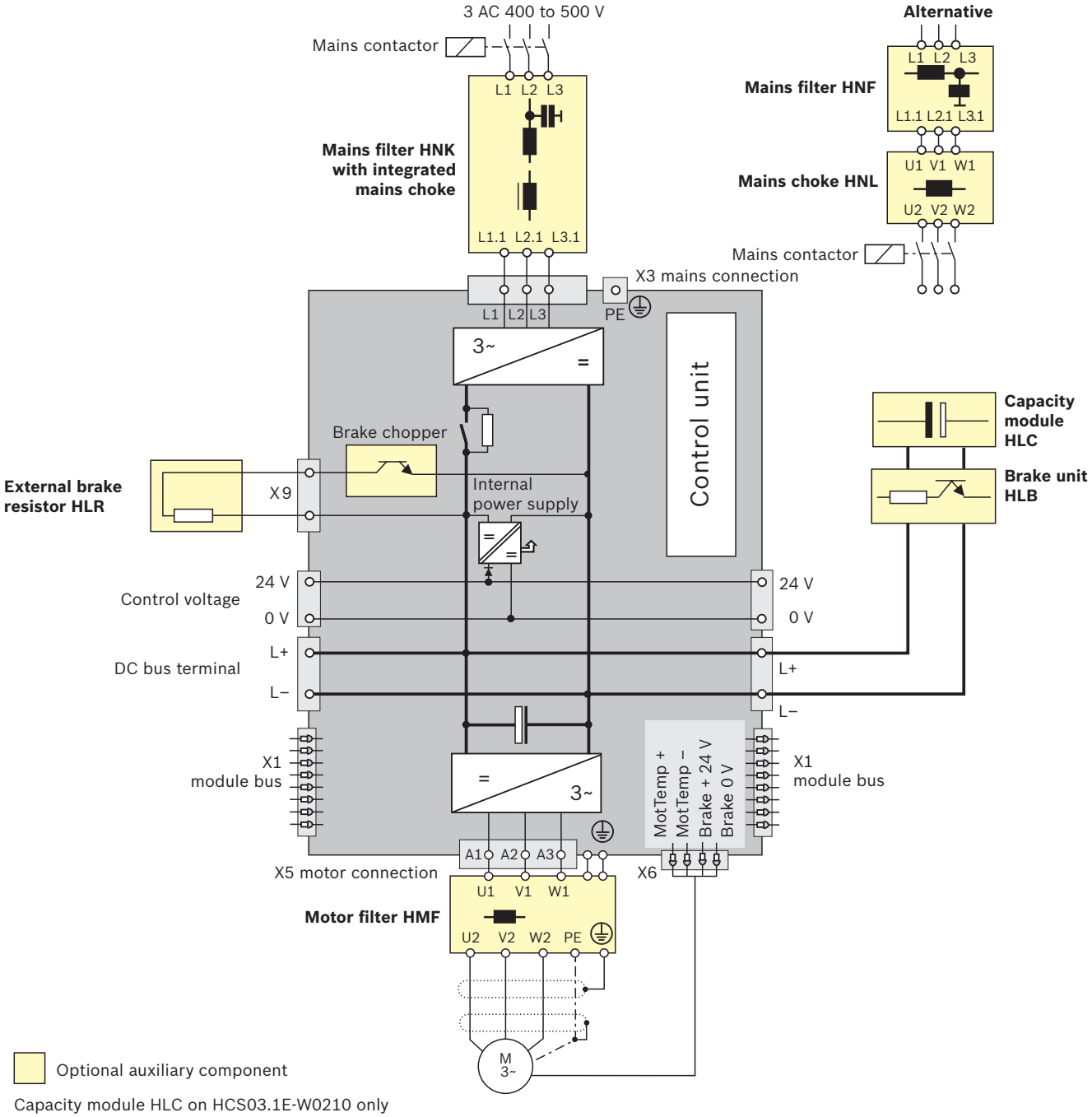
[1)] In case of output frequency < 4 Hz the output current will be reduced; [2)] For the connection of additional units, such as HMS, HCS, HLB, HLC





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HCS03



Capacity module HLC on HCS03.1E-W0210 only
When mains filter HNF is used, the maximum input voltage is 3 AC 480 V.

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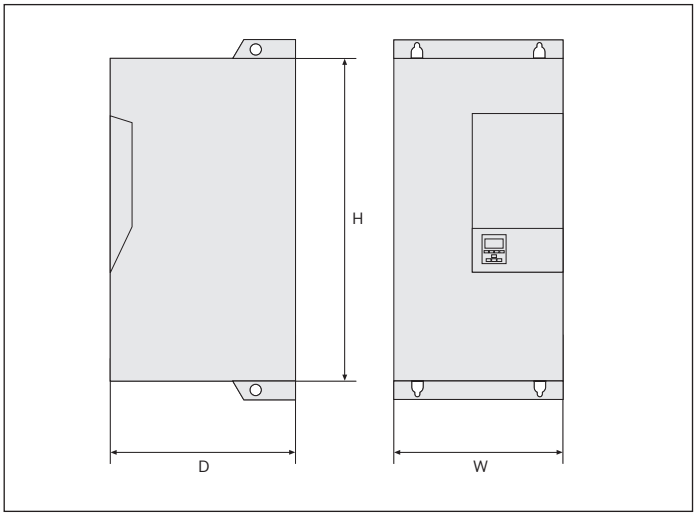
IndraDrive C – powerful converters HCS04

		Converter							
Model		**HCS04.2E-W0350-N-04-NNBN**	**HCS04.2E-W0420-N-04-NNBN**	**HCS04.2E-W0520-N-04-NNBN**	**HCS04.2E-W0640-N-04-NNNN**	**HCS04.2E-W0790-N-04-NNNN**	**HCS04.2E-W1010-N-04-NNNN**	**HCS04.2E-W1240-N-04-NNNN**	**HCS04.2E-W1540-N-04-NNNN**
Performance data with high continuous load[1]/high overload[2]									
Typical motor rating	kW	132/110	160/132	200/160	250/200	315/250	400/315	500/400	630/500
	hp	200/150	250/200	300/250	400/300	500/400	600/400	700/600	900/700
Continuous current	A	259/215	300/257	366/313	459/387	586/477	720/614	894/749	1,126/930
Maximum current 60 s	A	311/323	360/386	439/470	551/581	703/716	864/921	1,073/1,124	1,351/1,395
Maximum current 2 s	A	350/355	405/424	494/516	620/639	791/787	972/1,013	1,207/1,236	1,520/1,535
Continuous input mains current[3]	A	226/194	271/229	338/277	418/340	527/424	660/529	834/675	1,037/834
Mains voltage	V	3 AC 380 to 480 (+10%/–15%)							
DC bus terminal		•	•	•	•	•	•	•	•
DC bus capacity	mF	7.8	7.8	10.4	10.8	15.6	16.2	23.4	31.2
Brake chopper									
Brake chopper		internal	internal	internal	external	external	external	external	external
Permanent braking power	kW	85	100	120	200	200	400	400	400
Maximum brake power 10 s	kW	165	200	240	300	375	475	600	750
Control voltage data									
Control voltage, internal	V	DC 24 (not for supply of motor holding brake)							
Control voltage, external	V	DC 24 (±20%)							
Mechanical data									
Width W	mm	350	330	430	585	585	880	880	1,110
Height H	mm	782	950	950	950	950	1,150	1,150	1,150
Depth D	mm	380	380	380	380	380	380	380	380
Weight, approx.	kg	74	80	110	140	140	215	225	300

All data for nominal rating at 3 AC 400 V mains voltage and 4 kHz switching frequency with main or DC choke

[1] Overload 20% for 60 s, 35% for 2 s; [2] Overload 50% for 60 s, 65% for 2 s; [3] With DC choke HLL

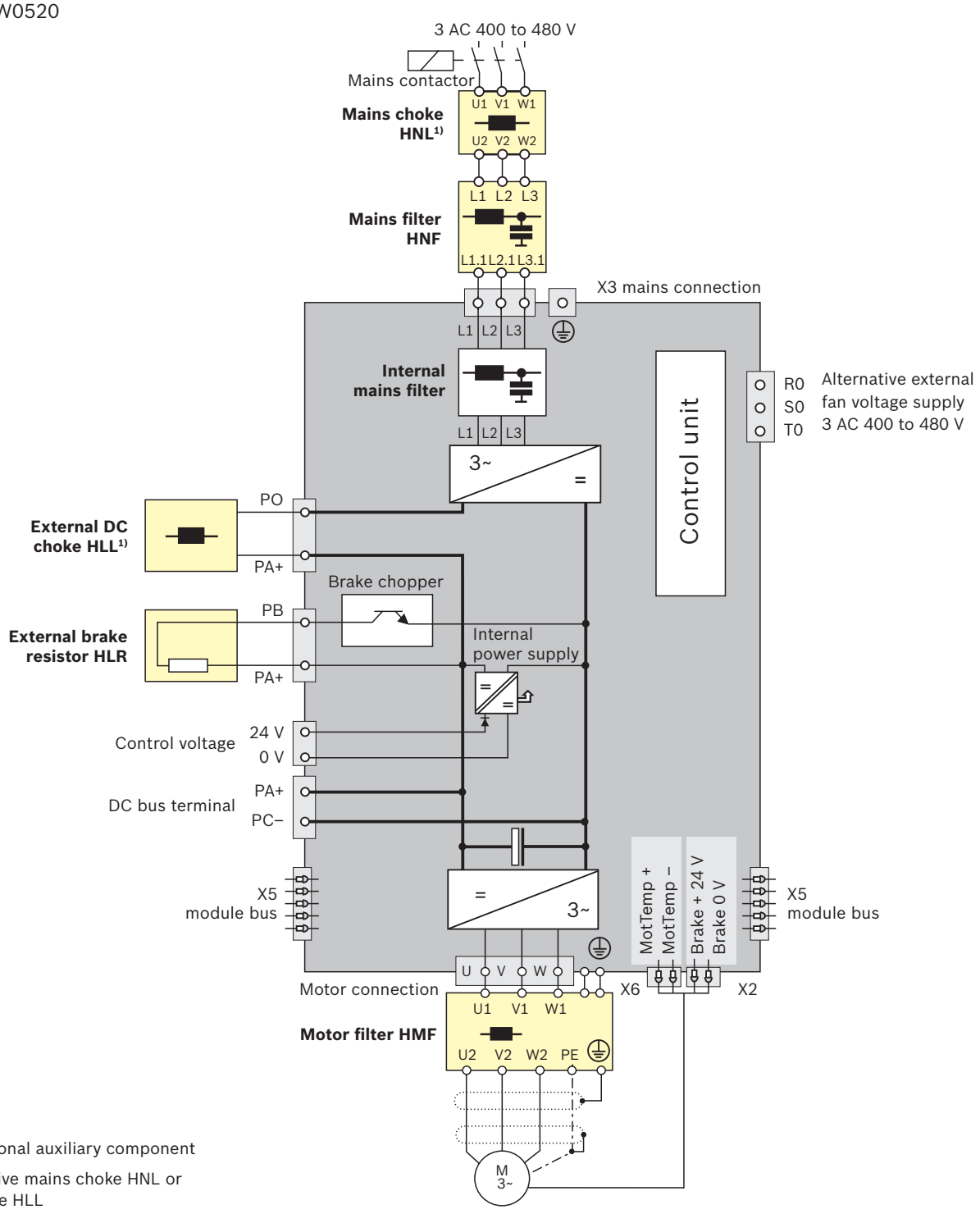




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HCS04

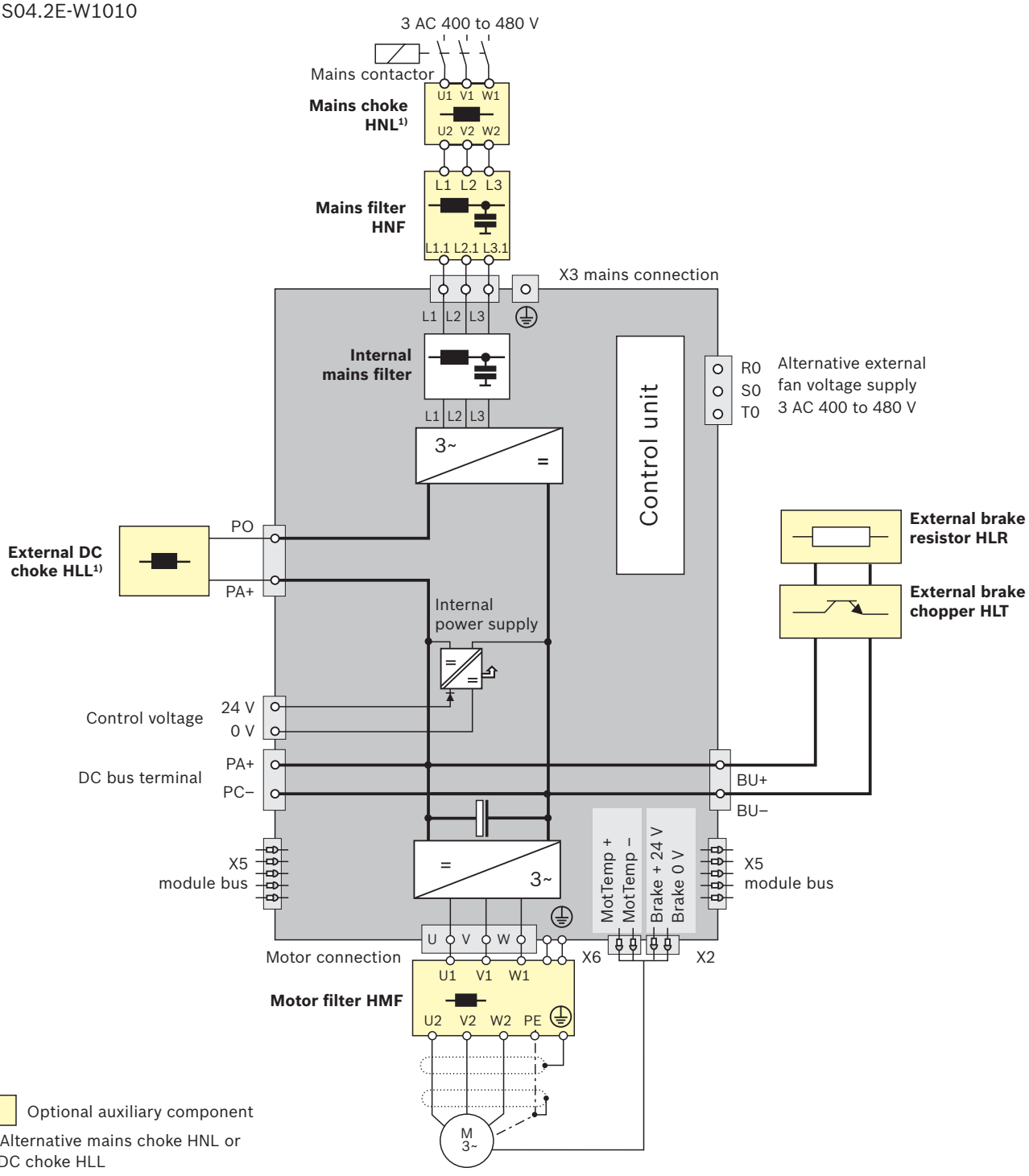
HCS04.2E-W0350
HCS04.2E-W0420
HCS04.2E-W0520



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HCS04

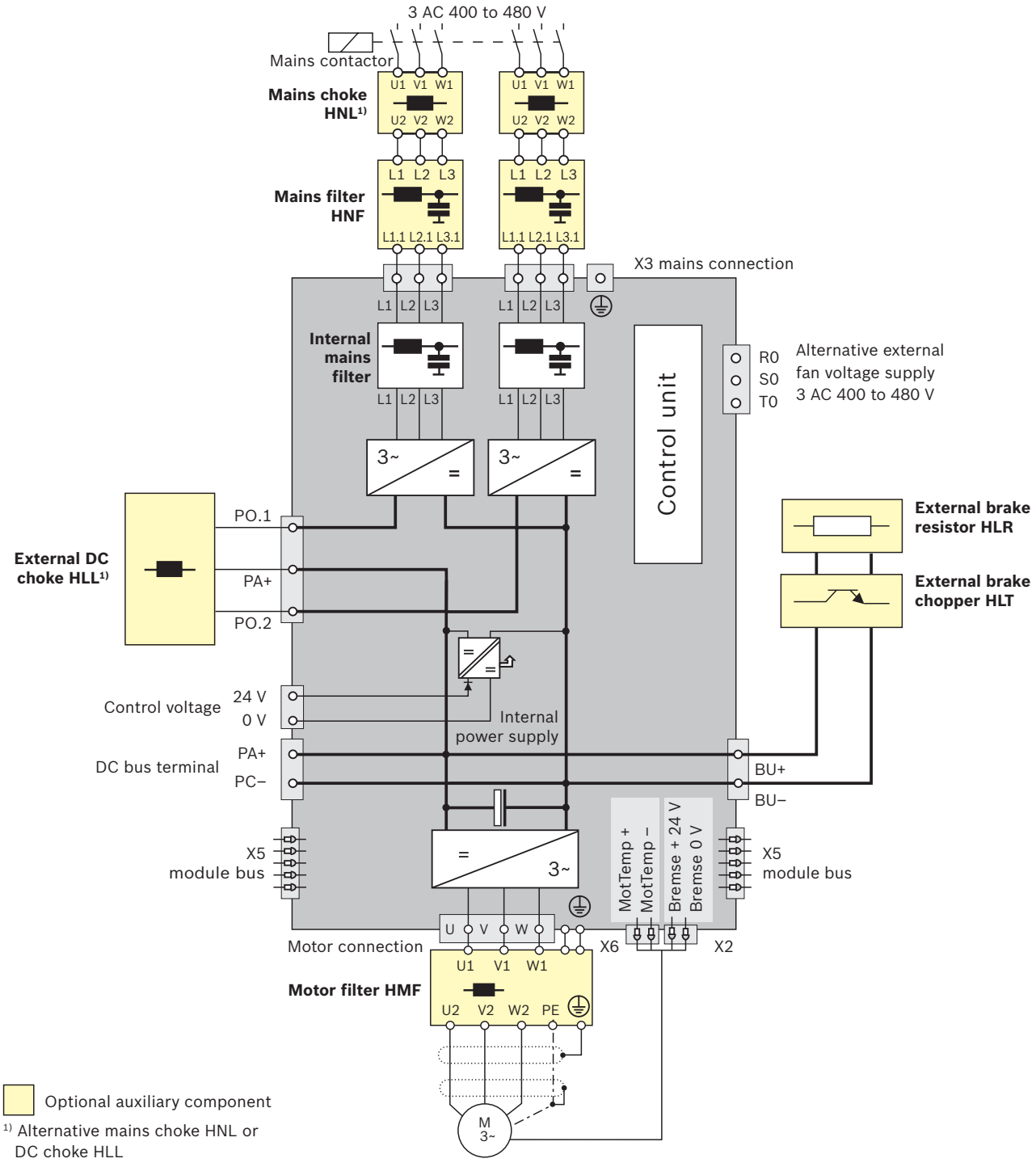
HCS04.2E-W0640
HCS04.2E-W0790
HCS04.2E-W1010



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HCS04

HCS04.2E-W1240
HCS04.2E-W1540



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IndraDrive M – modular single-axis inverter HMS01

		Single-axis inverter								
Model - no additional options		**HMS01.1N-W0020-A-07-NNNN**	**HMS01.1N-W0036-A-07-NNNN**	**HMS01.1N-W0054-A-07-NNNN**	**HMS01.1N-W0070-A-07-NNNN**	**HMS01.1N-W0110-A-07-NNNN**	**HMS01.1N-W0150-A-07-NNNN**	**HMS01.1N-W0210-A-07-NNNN**	**HMS01.1N-W0300-A-07-NNNN**	**HMS01.1N-W0350-A-07-NNNN**
Performance data										
Continuous current[1)]	A	12,1	21,3	35	42,4	68,5	100	150	150	250
Maximum current	A	20	36	54	70	110	150	210	300	350
DC bus capacity	mF	–								4,9
Control voltage data										
Control voltage, external	V	DC 24 ±20% (DC 24 ±5% when supplying motor holding brake)								
Power consumption without control unit and motor brake	W	10	15	10	16	34	23	75	100	218[2)]
Continuous current without control unit and motor brake	A	0,4	0,7	0,4	0,7	1,4	1	3,1	4,2	9,1[2)]
Mechanical data										
Width W	mm	50	50	75	100	125	150	200	200	350
Height H	mm	440[3)]								
Depth D	mm	309								
Weight	kg	5,3	5,3	6,7	7,9	11	12,7	16,4	16,4	31,7

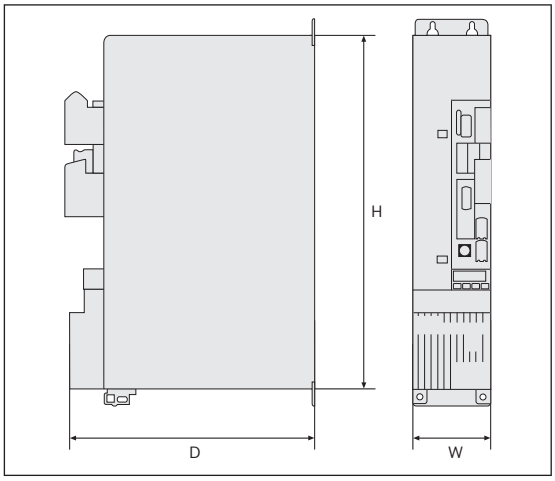
All data apply to nominal rating at 3 AC 400 V mains voltage and 4 kHz switching frequency

[1)] In case of output frequency less than 4 Hz the output current will be reduced

[2)] Including auxiliary filter HAB

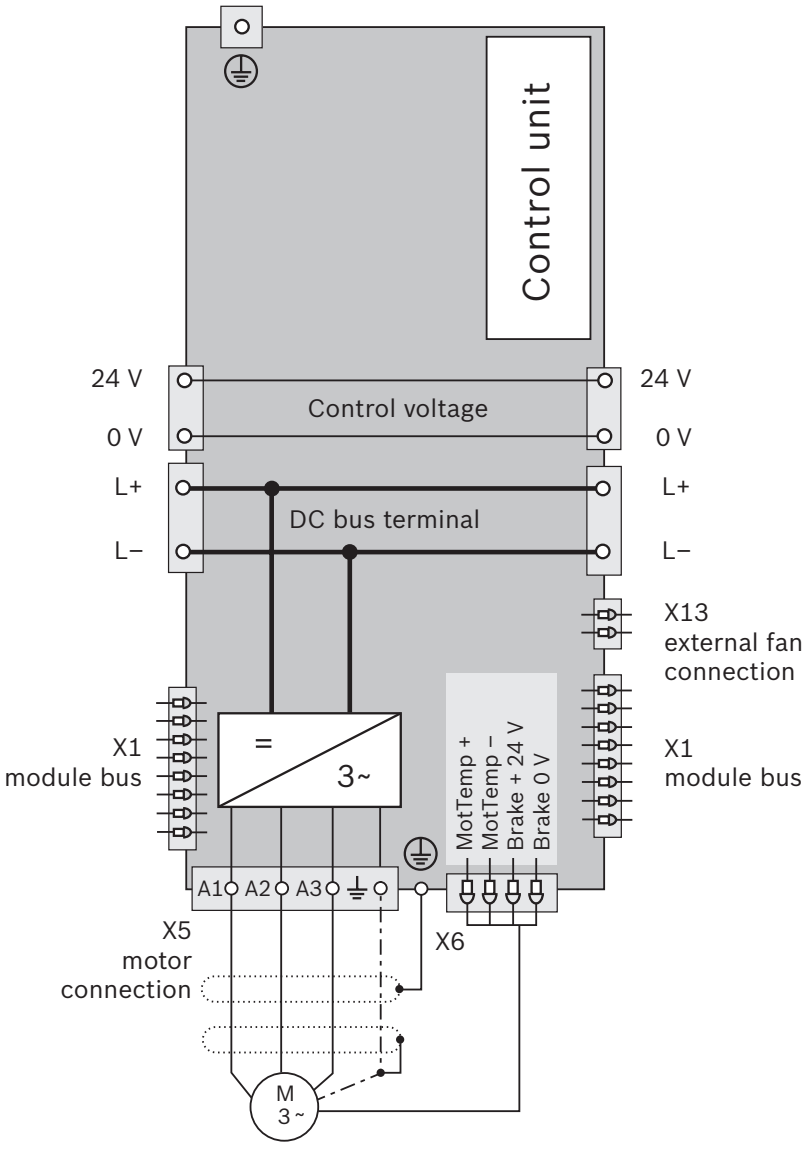
[3)] Overall height HSM01.1N-W0350 with auxiliary fan HAB: 748 mm





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HMS01



Connection X13 only with HMS01.1N-W0350

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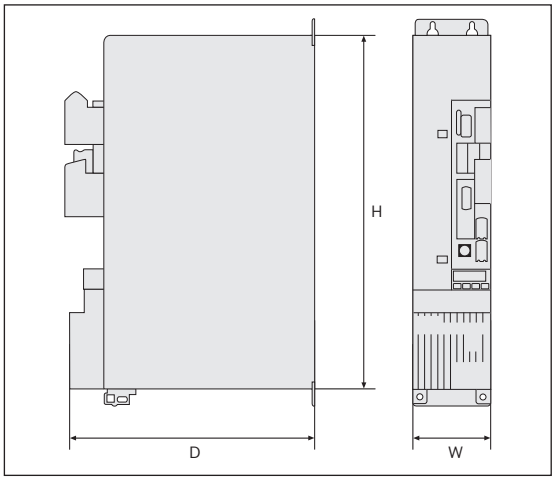
IndraDrive M – modular single-axis inverter HMS02

		Single-axis inverter	
Model - no additional options		**HMS02.1N-W0028-A-07-NNNN**	**HMS02.1N-W0054-A-07-NNNN**
Performance data			
Continuous current[1)]	A	13,8	25
Maximum current	A	28	54
DC bus capacity	mF	0,14	0,27
Control voltage data			
Control voltage, external	V	DC 24 ±20% (DC 24 ±5% when supplying motor holding brake)	
Power consumption without control unit and motor brake	W	13	17
Continuous current without control unit and motor brake	A	0,5	0,7
Mechanical data			
Width W	mm	50	75
Height H	mm	352	
Depth D	mm	252	
Weight	kg	3,5	5

All data apply to nominal rating at 3 AC 400 V mains voltage and 4 kHz switching frequency

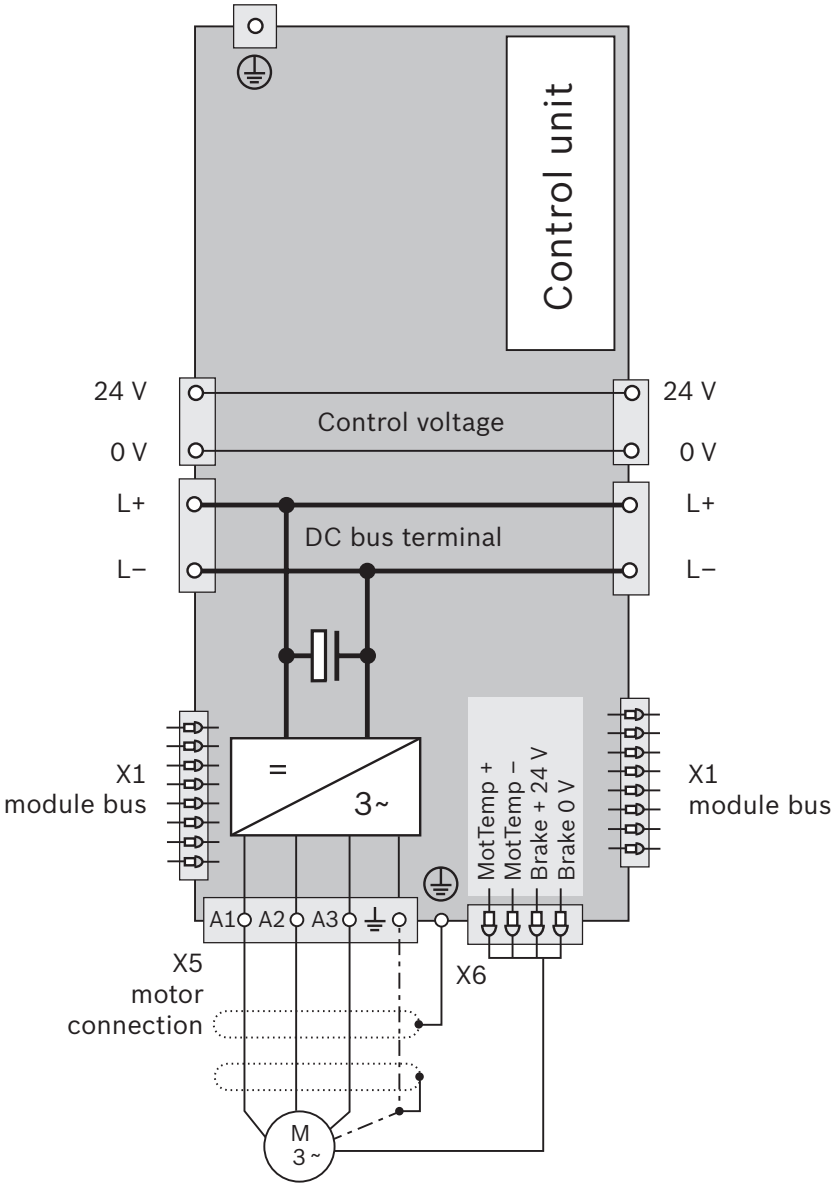
[1)] In case of output frequency less than 4 Hz the output current will be reduced





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HMS02



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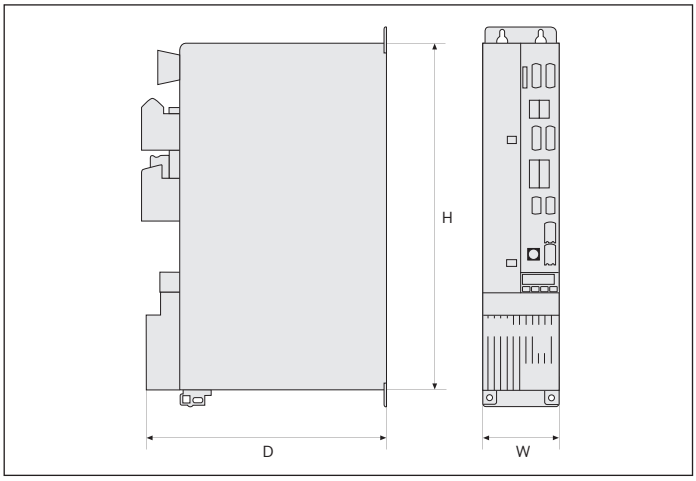
IndraDrive M – modular double-axis inverter HMD01

		Double-axis inverter		
Model - no additional options		**HMD01.1N-W0012-A-07-NNNN**	**HMD01.1N-W0020-A-07-NNNN**	**HMD01.1N-W0036-A-07-NNNN**
Performance data				
Continuous current per inverter (axis)[1)]	A	7	10	20
Maximum current per inverter (axis)	A	12	20	36
Control voltage data				
Control voltage, external	V	DC 24 ±20% (DC 24 ±5% when supplying motor holding brake)		
Power consumption without control unit and motor brake	W	17	17	11
Continuous current without control unit and motor brake	A	0.7	0.7	0.5
Mechanical data				
Width W	mm	50	50	75
Height H	mm		440	
Depth D	mm		309	
Weight	kg	5.5	5.7	7.5

All data apply to nominal rating at 3 AC 400 V mains voltage and 4 kHz switching frequency

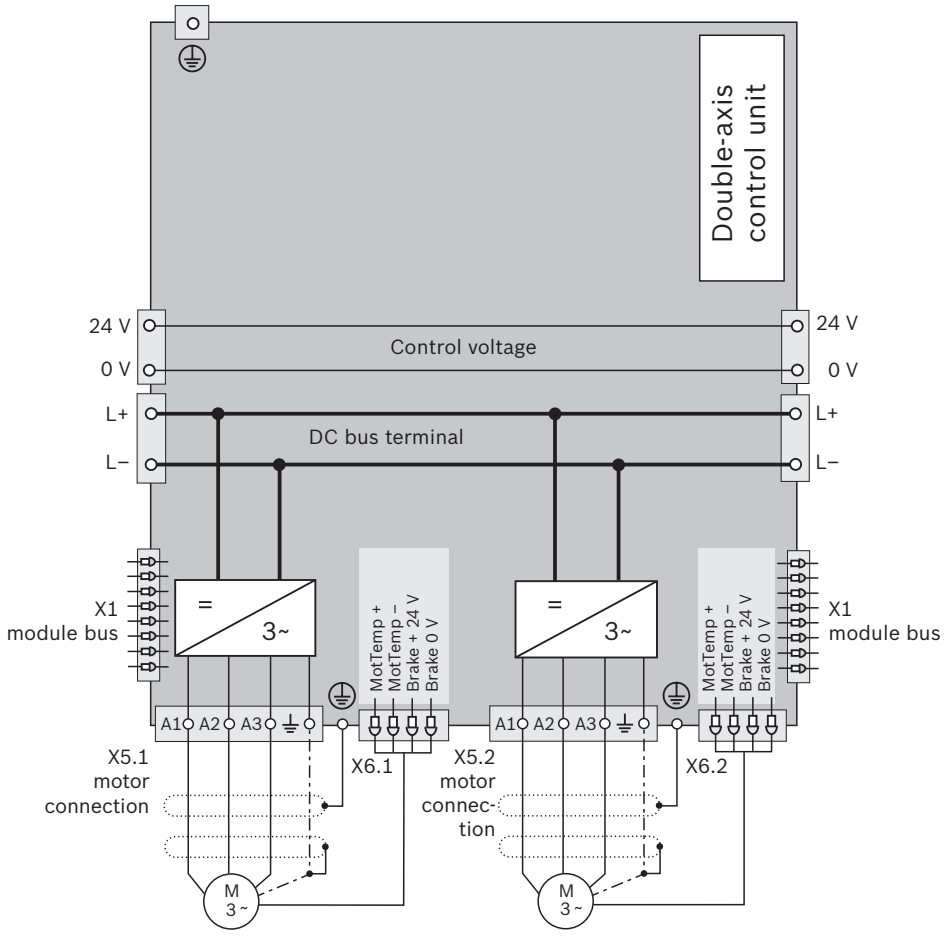
1) In case of output frequency less than 4 Hz the output current will be reduced





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HMD01

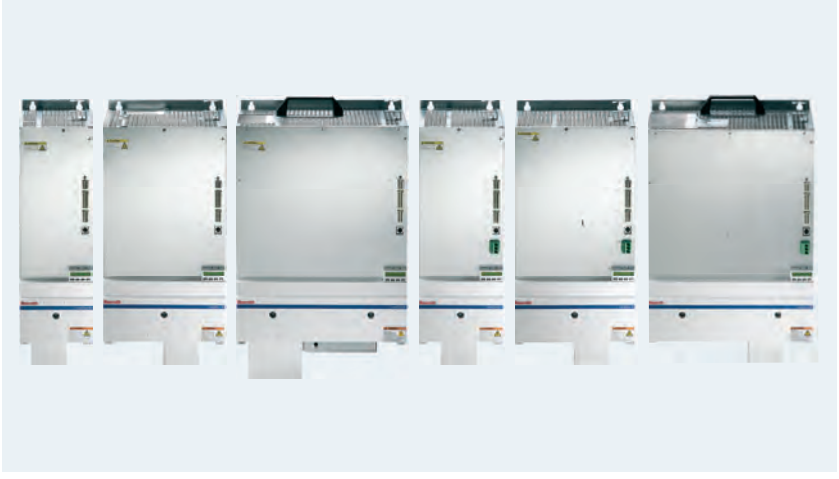


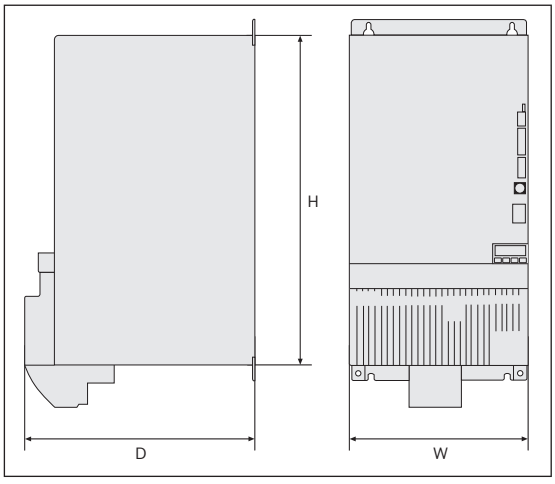
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IndraDrive M – modular power supplies HMV01 and HMV02

		Infeed modules			Regenerative modules				
Model - no additional options		**HMV01.1E-W0030-A-07-NNNN**	**HMV01.1E-W0075-A-07-NNNN**	**HMV01.1E-W0120-A-07-NNNN**	**HMV01.1R-W0018-A-07-NNNN**	**HMV01.1R-W0045-A-07-NNNN**	**HMV01.1R-W0065-A-07-NNNN**	**HMV01.1R-W0120-A-07-NNNN**	**HMV02.1R-W0015-A-07-NNNN**
Performance data									
DC bus continuous power without/with choke	kW	18/30	45/75	72/120	–/18	–/45	–/65	–/120	–/15
Maximum output	kW	45	112	180	45	112	162	180	29
Mains voltage	V	3 AC 400 to 480 (+10/–15%)							
Continuous input mains current	A	51	125	200	26	65	94	181	23
Dependence of output on mains voltage		at U_{LN} < 400 V: 1% power reduction per 4 V							
		at U_{LN} > 400 V: 1% power gain per 4 V			at U_{LN} > 400 V: no power gain				
DC bus capacity	µF	1,410	3,760	5,640	705	1,880	2,820	4,950	700
DC bus voltage range	V	DC 435 to 710			DC 750 (regulated)				
Brake resistor									
Brake resistor		Internal						External	Internal
Maximum braking energy consumption	kWs	100	250	500	80	100	150	–	40
Permanent braking power	kW	1.5	2	2.5	0.4	0.4	0.4	–	0.3
Maximum braking power	kW	36	90	130	36	90	130	–	33
Control voltage data									
Control voltage, external	V	DC 24 ±5%							
Power consumption	W	25	30	55	31	41	108	224[1)]	27
Continuous current	A	1	1.3	2.3	1.3	1.9	4.5	13[1)]	1.1
Mechanical data									
Width W	mm	150	250	350	175	250	350	350	150
Height H	mm	440[2)]							352
Depth D	mm	309							252
Weight	kg	13.5	22	32	13.5	20	31	34.5	9.5

In the case of the HMV01.1R the continuous output and maximum output data also apply for feedback mode.
All data apply to nominal rating at 3 AC 400 V mains voltage. Connection option for auxiliary components, such as HLB, HLC, etc.
[1)] Including blower unit HAB
[2)] Overall height HMV01.1R-W0120 with blower unit HAB: 748 mm

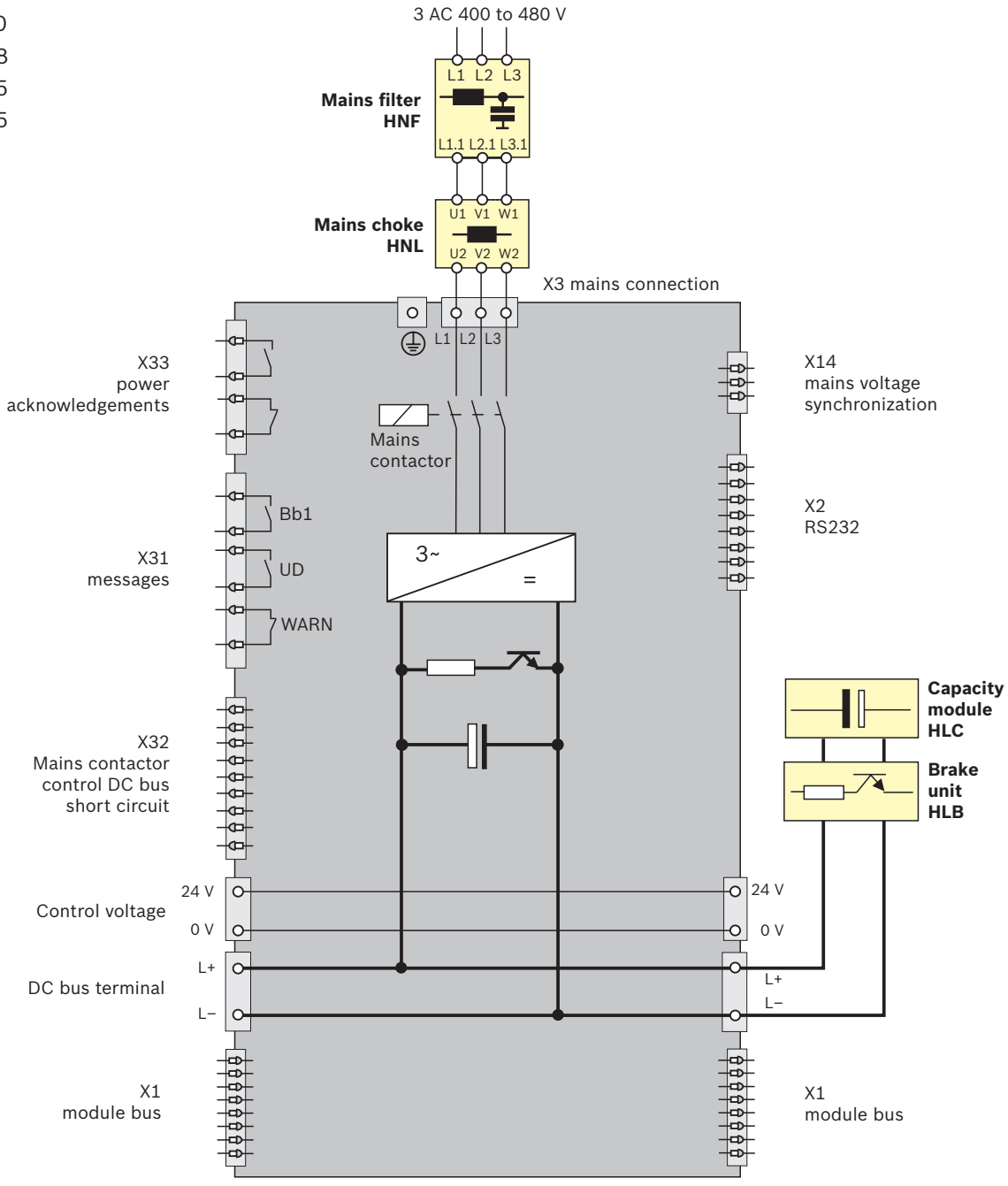




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HMV01

HMV01.1E-W0030
HMV01.1E-W0075
HMV01.1E-W0120
HMV01.1R-W0018
HMV01.1R-W0045
HMV01.1R-W0065



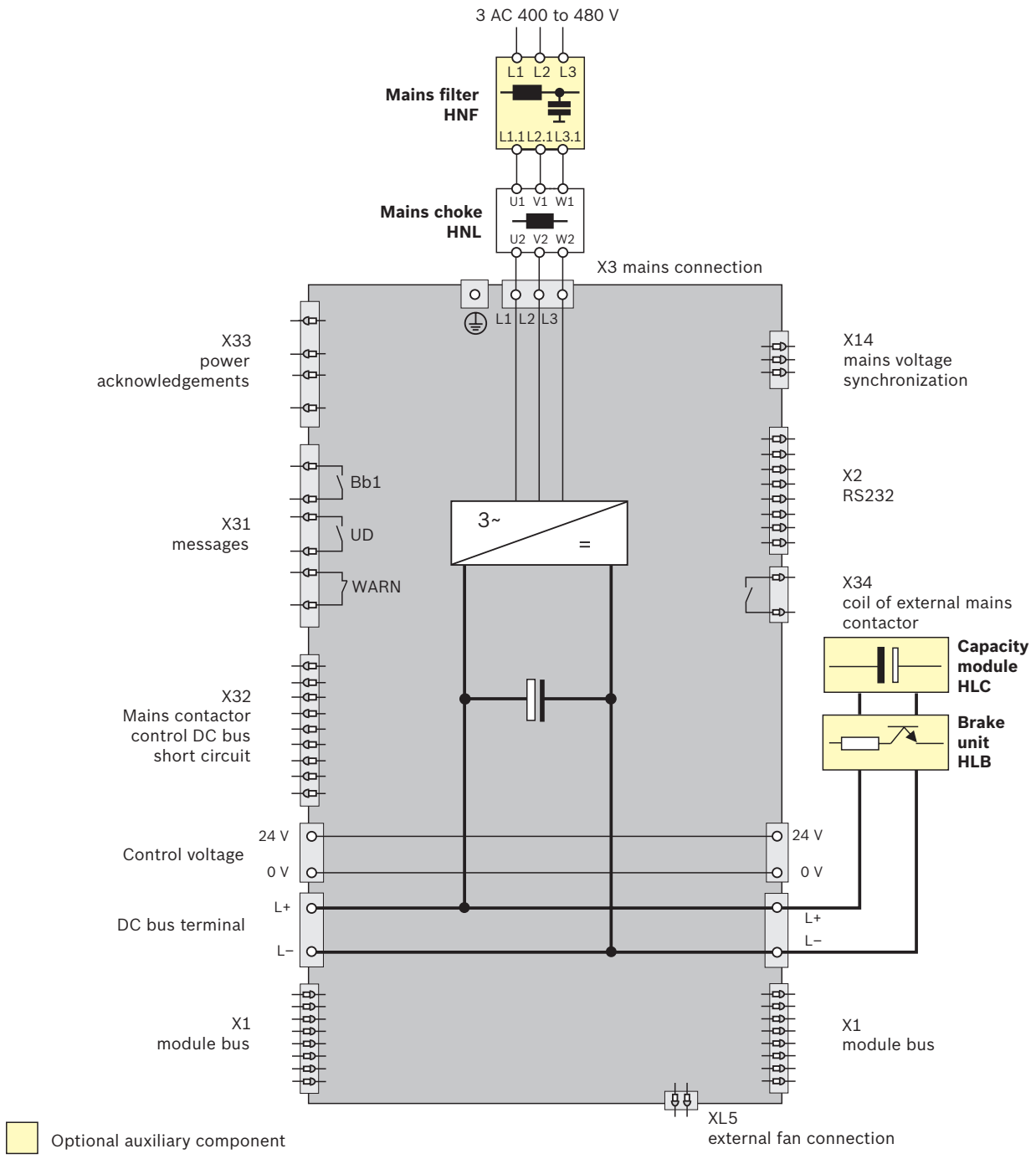
Optional auxiliary component

Mains choke HNL always required with HMV01.1R
Connection X14 on HMV01.1R only

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HMV01

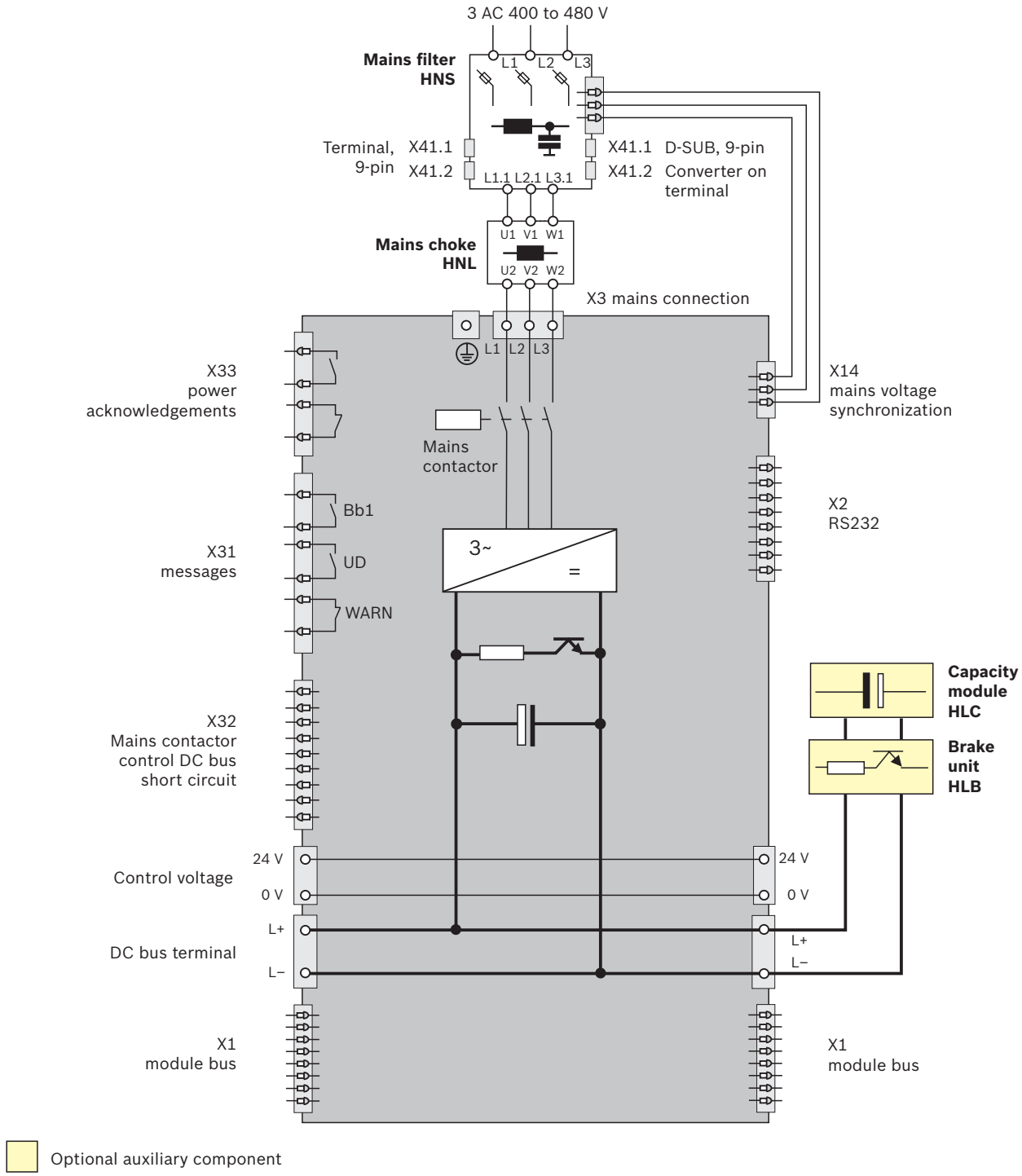
HMV01.1R-W0120



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HMV02

HMV02.1R-W0015

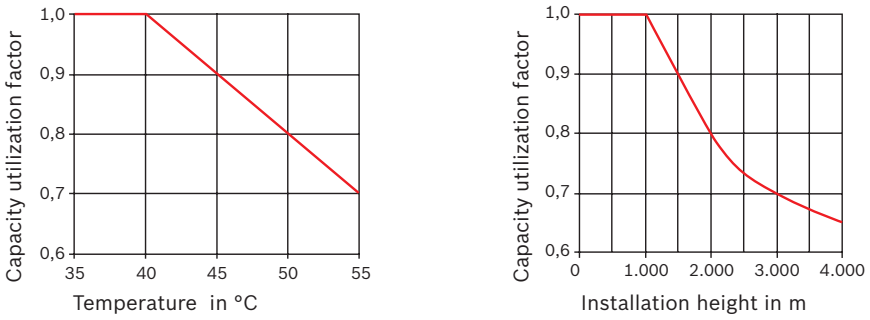


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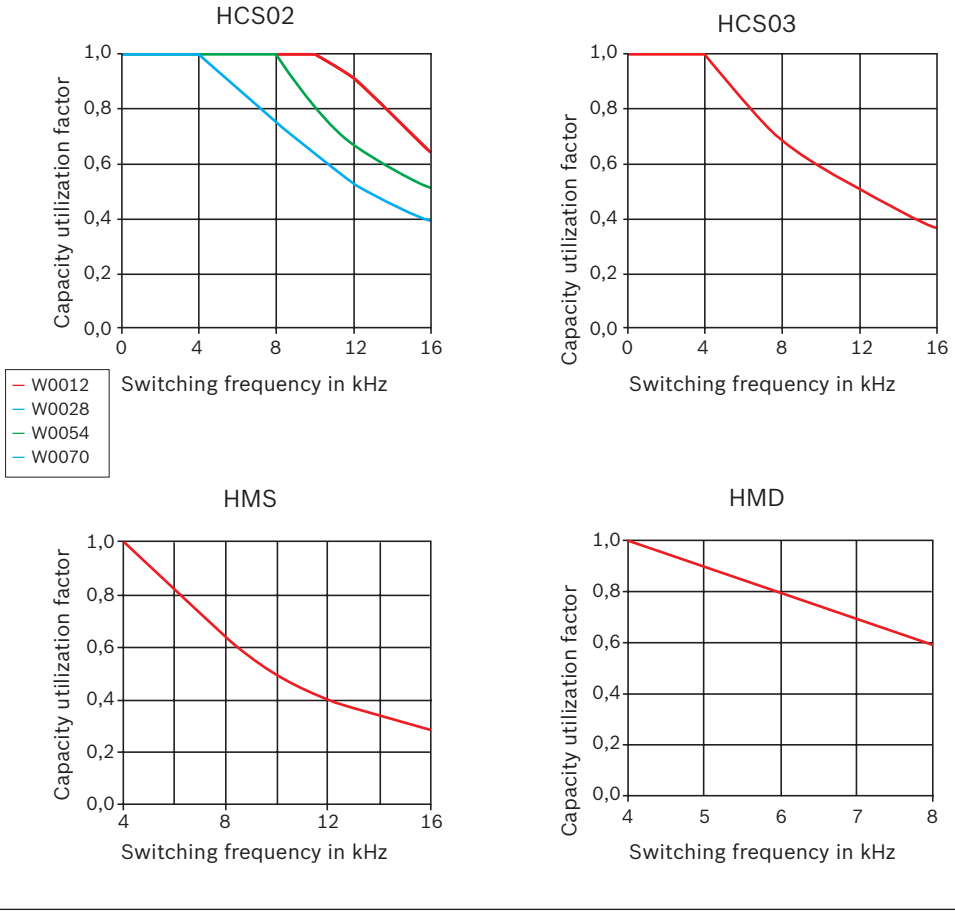
Derating under differing operating conditions

Where installation conditions differ, the performance data of the power units decrease according to the capacity utilization factors for:

- Continuous current
- DC bus continuous output
- Permanent braking power



Compared with operation at 4 kHz switching frequency, the output currents of the power units decrease at higher switching frequencies. Please refer to these diagrams for the capacity utilization factors relevant for your application.



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Rexroth IndraDrive – control units



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Scalable performance and functionality

- Individual solutions for standard to high-end applications
- Integrated motion logic with innovative technology functions
- Open interfaces for international use
- Certified safety technology



We can supply control units tailored to your specific application, ranging from standard to high-end applications. Integrated motion logic, numerous technology functions, certified safety technology and standardized interfaces leave nothing to be desired.

BASIC control units – standard performance and functionality

These control units constitute the economic solution for all standard applications with moderate requirements in terms of performance and interface flexibility. A standard encoder interface for IndraDyn motors is already featured among the BASIC control units. The BASIC UNIVERSAL control units have an additional extension slot available.

The following BASIC control units are available to choose from:

- BASIC OPEN LOOP
- BASIC ANALOG
- BASIC PROFIBUS
- BASIC SERCOS
- BASIC UNIVERSAL – single-axis
- BASIC UNIVERSAL – double-axis



ADVANCED control units – maximum flexibility and performance

These control units meet the highest requirements in terms of performance. Virtually any application can be tackled with the wide range of communication and encoder interfaces as well as analog or digital inputs and outputs.

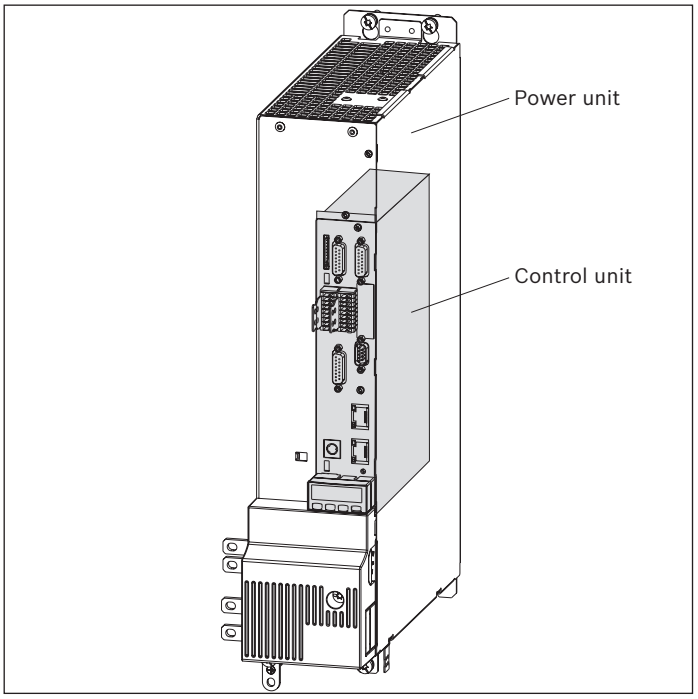


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IndraDrive – tailored performance and functionality

All IndraDrive control units – from the simple frequency converter to the high-end servo drive with integrated motion control – are compatible with all IndraDrive C converters and IndraDrive M inverters.

The control units differ in performance, function and configuration. When combined with the various firmware versions and operating panels, every conceivable requirement can be met. This flexible system concept opens up the full range of options when it comes to tackling your individual application – always providing the optimum technical and economical solution.



Overview	Single-axis BASIC OPEN LOOP	Single-axis BASIC ANALOG	Single-axis BASIC PROFIBUS	Single-axis BASIC SERCOS	Single-axis BASIC UNIVERSAL	Double-axis BASIC[6] UNIVERSAL	Single-axis ADVANCED
Control communication							
Analog/digital for Open Loop operation	●	–	–	–	–	–	–
Analog interface	–	●	–	–	–	–	○[1]
Parallel interface	–	–	–	–	○	–	○
PROFIBUS	–	–	●	–	○	○	○
sercos II	–	–	–	●	○	○	○
sercos III	–	–	–	–	○	○	○
Multi-Ethernet	–	–	–	–	○	○[3]	○
CANopen	–	–	–	–	○	–	○
DeviceNet	–	–	–	–	○	–	○
Configurations							
Option 1	–	●[2]	●[2]	●[2]	●[2]	●/●	●
Option 2	–	–	–	–	●	●/●	●
Option 3	–	–	–	–	–	–	●
Safety option	–	●	●	●	●	●/●	●
Slot for MultiMediaCard	–	–	–	–	●	●	●

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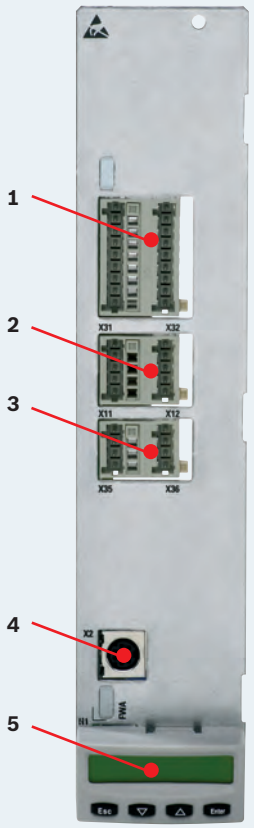
Options		Single-axis BASIC OPEN LOOP	Single-axis BASIC ANALOG	Single-axis BASIC PROFIBUS	Single-axis BASIC SERCOS	Single-axis BASIC UNIVERSAL	Double-axis BASIC[6] UNIVERSAL	Single-axis ADVANCED
Encoder interfaces								
IndraDyn motors MSK, MKE, MAD und MAF, Hiperface®, 1 V_{pp} and 5 V TTL[4]		–	●	●	●	●	○	○
MHD and MKD motors		–	–	–	–	○	○	○
EnDat 2.1, 1 V_{pp} and 5 V TTL[5]		–	–	–	–	○	○	○
Safety options compliant with EN 13849-1 and EN 62061								
Safe Torque Off (category 3 PL e/SIL 3)		–	○	○	○	○	○	○
Safe Motion (category 3 PL d/SIL 2)		–	–	–	–	–	○	○
Extensions								
Encoder emulation		–	●	–	–	○	○	○
Analog I/O extension		–	–	–	–	○	○	○
Digital I/O extension		–	–	–	–	–	–	○
Digital I/O with SSI interface		–	–	–	–	–	–	○
Cross communication		–	–	–	–	–	–	○
Software module								
MultiMediaCard		–	–	–	–	○	○	○
Operator panel								
Standard		●	●	●	●	●	●	●
Comfort		○	○	○	○	○	○	○
Cycle times								
Current control	µs	125						62.5
Speed control	µs	250						125
Position control	µs	500						250
PWM frequency								
4/8 kHz		●/●	●/●	●/●	●/●	●/●	●/●	●/●
12/16 kHz		–/–	–/–	–/–	–/–	–/–	–/–	●/●
Inputs/outputs								
Digital inputs/of which utilizable for probes		8/–	5/–	5/1	5/1	5/1	18/2	7/2
Digital inputs/outputs (user-defined settings)		–	4	3	3	3	4	4
Analog inputs		2	2	–	–	–	1	1
Analog outputs		2	–	–	–	–	2	2
Relay outputs		3	1	1	1	1	1	1
Interfaces								
RS232		●	●	●	●	●	●	●
Control voltage data								
Control voltage	V	DC 24						
Power consumption without options	W	7.5	8	7.5	7.5	6.5	7.5	6
Continuous current without options	A	0.31	0.33	0.31	0.31	0.27	0.31	0.25

● Standard
○ Optional
[1] In conjunction with additional options
[2] Encoder interface for IndraDyn motors
[3] Only with sercos III and EtherCAT
[4] Supply voltage 12 V
[5] Supply voltage 5 V
[6] Only in connection with power unit HMD

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BASIC OPEN LOOP – for applications without an encoder

This control unit is specifically designed for frequency converter applications without an encoder.
The target speed can be set via analog or digital inputs.
Status signals and diagnostic messages are output via digital outputs or isolated relay contacts.
For an easy start-up, use the VCP 01 standard operator panel or a PC with the Rexroth IndraWorks software.



1 Interfaces Digital inputs and outputs Analog inputs and outputs	**3 Interfaces** Analog inputs and outputs	**5 Operator panel** Standard operator panel
2 Interfaces Relay outputs	**4 Serial interface** RS232	

The simple step-by-step guide to ordering your BASIC OPEN LOOP control unit:

CSB01.1N-FC-NNN-NNN-NN-S-NN-FWW

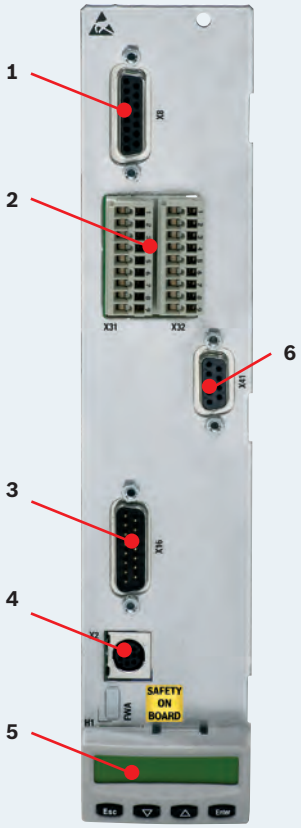
Single-axis BASIC

Control communication
FC = Frequency Converter Interface

Operator panel
S = Standard

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BASIC ANALOG – proven technology, cost-effective



This control component allows you to enjoy the many benefits of digital drive technology on controls with the conventional ±10 V analog interface. In addition, it gives you the added option of expanding your control equipment at any time to include other communication interfaces by exchanging the control component while retaining the control cabinet setup.

The default speed is set via the analog input. Signals, such as “Control enable” or “Drive stop”, are exchanged by the control system and control unit via digital inputs and outputs.

The encoder emulation inside the drive systematizes the actual positions for the control system. There is a choice between the straightforward incremental encoder signal or SSI format.

The correct interface for connecting the IndraDyn motors or other standardized encoders, such as Hiperface®, is already integrated.

1 Encoder interface
IndraDyn motors, Hiperface®, 1 V_{pp} and 5 V TTL

2 Interfaces
Digital inputs and outputs
Analog inputs
Relay output

3 Encoder emulation

4 Serial interface
RS232

5 Operator panel
Standard operator panel

6 Safety option
Safe Torque Off

SAFETY ON BOARD

The simple step-by-step guide to ordering your BASIC ANALOG control unit:

CSB01.1N-AN-ENS-NNN-L2-S-NN-FW

Single-axis BASIC

Control communication
AN = Analog interface

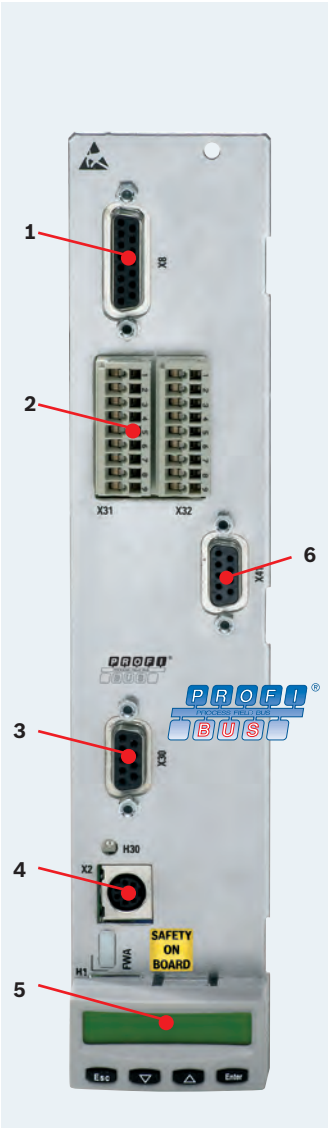
Encoder interface
ENS = IndraDyn motors, Hiperface®, etc.

Operator panel
S = Standard

Safety technology
L2 = Safe Torque Off
NN = No safety technology

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BASIC PROFIBUS – ideal for factory automation



The PROFIBUS fieldbus interface has been used successfully for many years in automated manufacturing technology and process automation.
This bus system is the means by which the control system cyclically exchanges with the bus users all the specified and actual values, including status signals and diagnostic messages.
The correct interface for connecting the IndraDyn motors or other standardized encoders, such as Hiperface®, is already integrated.
Start-up with the IndraWorks engineering tool is a convenient option via PROFIBUS.

1 Encoder interface IndraDyn motors, Hiperface®, 1 V_{pp} and 5 V TTL	**3 Control communication** PROFIBUS	**5 Operator panel** Standard operator panel
2 Interfaces Digital inputs and outputs Relay output	**4 Serial interface** RS232	**6 Safety option** Safe Torque Off

SAFETY ON BOARD

The simple step-by-step guide to ordering your BASIC PROFIBUS control unit:

CSB01.1N-PB-ENS-NNN-L2-S-NN-FW

Single-axis BASIC

Control communication
PB = PROFIBUS

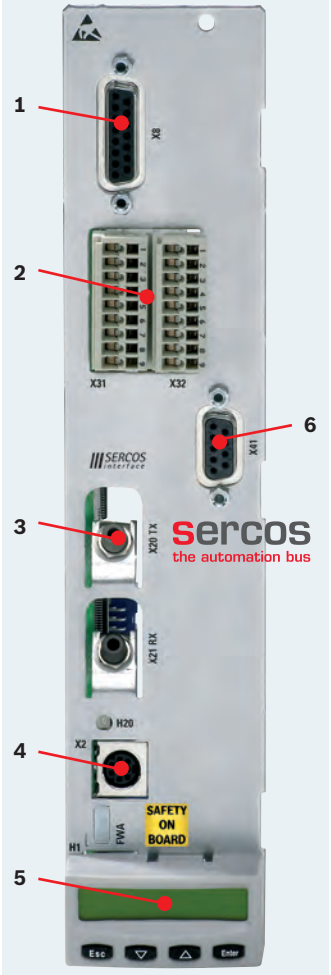
Encoder interface
ENS = IndraDyn motors, Hiperface®, etc.

Operator panel
S = Standard

Safety technology
L2 = Safe Torque Off
NN = No safety technology

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BASIC SERCOS – precise and cost-effective



Only sercos II[1)] lets you enjoy all the advantages of digital intelligent drive technology. One distinguishing feature of sercos II is its extremely short cycle time required for the transfer of all target and actual values between the control system and control units. In conjunction with the exact synchronization of all drives, sercos II guarantees maximum dynamics and precision.

Signal transfer via fiber optics guarantees the secure exchange of real-time data with minimal wiring.

The correct interface for connecting the IndraDyn motors or other standardized encoders, such as Hiperface®, is already integrated.

With the engineering tool, IndraWorks, one convenient start-up option is via the sercos service channel and the other is via the RS232 interface.

[1)] sercos II, the internationally standardized drive interface (IEC 61491/EN 61491), facilitates optimum compatibility of digital drives and controls made by different manufacturers while exploiting the respective product attributes to maximum effect.

1 Encoder interface IndraDyn motors, Hiperface®, 1 V_{pp} and 5 V TTL	**3 Control communication** sercos II	**5 Operator panel** Standard operator panel
2 Interfaces Digital inputs and outputs Relay output	**4 Serial interface** RS232	**6 Safety option** Safe Torque Off

SAFETY ON BOARD

The simple step-by-step guide to ordering your BASIC SERCOS control unit:

CSB01.1N-SE-ENS-NNN-L2-S-NN-FW

Single-axis BASIC

Control communication
SE = sercos II

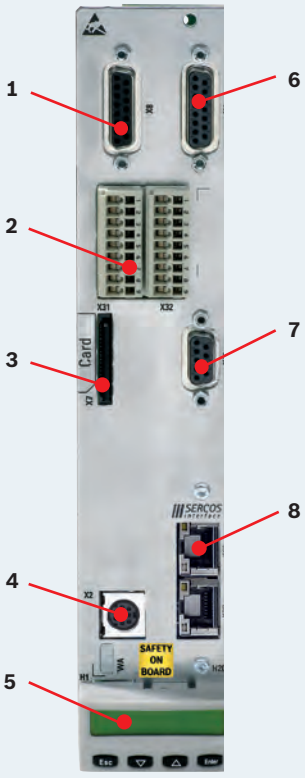
Encoder interface
ENS = IndraDyn motors, Hiperface®, etc.

Operator panel
S = Standard

Safety technology
L2 = Safe Torque Off
NN = No safety technology

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BASIC UNIVERSAL single-axis – flexible for customized solutions



Regardless of your preferred type of control communication, BASIC UNIVERSAL offers you a wide range of industry-standard interfaces. As a result, this control unit is well suited for a variety of applications – including those in your industry.
The correct interface for connecting the IndraDyn motors or other standardized encoders, such as Hiperface®, is already integrated. In addition, this control unit has an empty slot for the connection of another encoder, connection of the analog I/O extension or for the emission of emulated encoder signals.
An additional plug-in MultiMediaCard gives you the option of simple transmission or duplication of your drive parameters. This card can also be used to expand the memory for the motion logic integrated in the drive (firmware option).
For an easy start-up use a PC with the Rexroth IndraWorks software.

1 Encoder interface
IndraDyn motors, Hiperface®, 1 V_{pp} and 5 V TTL

2 Interfaces
Digital inputs and outputs
Relay output

3 Slot
MultiMediaCard



4 Serial interface
RS232

5 Operator panel
Standard operator panel

6 Option
Encoder interfaces
Analog I/O extension
Encoder emulation

7 Safety option
Safe Torque Off

SAFETY ON BOARD

8 Control communication
sercos III
PROFIBUS, etc.

The simple step-by-step guide to ordering your BASIC UNIVERSAL single-axis control unit:

CSB01.1C-SE-ENS-NNN-L2-S-NN-FW

Single-axis BASIC UNIVERSAL

Control communication
SE = sercos II
PB = PROFIBUS
PL = Parallel interface
CO = CANopen, DeviceNet
S3 = sercos III
ET = Multi-Ethernet
NN = Not equipped

Encoder interface
ENS = IndraDyn motors, Hiperface®, etc.

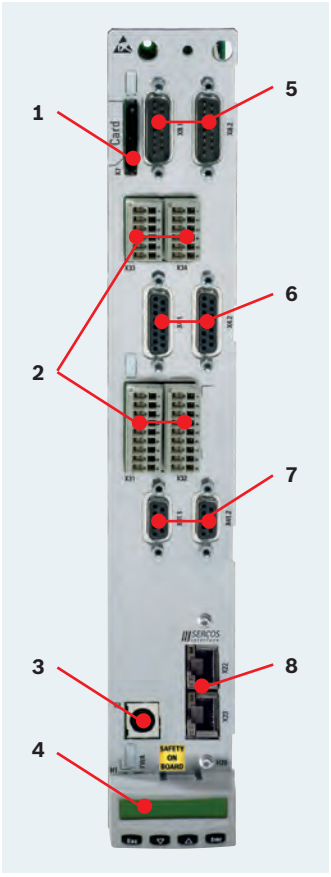
Operator panel
S = Standard

Safety technology
L2 = Safe Torque Off
NN = No safety technology

Option
ENS = IndraDyn motors, Hiperface®, etc.
EN1 = MHD, MKD motors
EN2 = EnDat 2.1, 1 V_{pp}, 5 V TTL
MA1 = Analog I/O extension
MEM = Encoder emulation
NNN = Not equipped

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BASIC UNIVERSAL double-axis – flexible, safe, space-saving



Many axes and limited installation space – these are typical requirements that can be met competently and economically with the BASIC UNIVERSAL double-axis control unit. With the BASIC UNIVERSAL double-axis, we have implemented all the functionality for two digital axes in a single control unit.

With certified safety technology conforming to EN 13849-1 and EN 62061, you are providing effective protection for both the machine and operator. Indeed, we have integrated a number of different safety functions, directly in the drive. This increases reliability while saving on monitoring components and minimizing installation work.

In terms of control communication you can choose between sercos II, PROFIBUS, sercos III and Multi-Ethernet. In the interests of meeting the specific demands of your individual application, IndraDrive offers additional options for the connection of various encoder systems, the connection of an analog I/O extension or for the emission of emulated encoder signals.

The double-axis control unit offers the ability of storing the axis-oriented drive parameters of both axes on the optional MultiMediaCard.

1 Slot
MultiMediaCard



2 Interfaces
Digital inputs and outputs
Analog inputs and outputs
Relay output

3 Serial interface
RS232

4 Operator panel
Standard operator panel

5 Option 3 and 4
Encoder interfaces
Analog I/O extension
Encoder emulation

6 Option 1 and 2
Encoder interfaces

7 Safety option
Safe Torque Off
Safe Motion

SAFETY ON BOARD

8 Control communication
sercos III
PROFIBUS, etc.

The simple step-by-step guide to ordering your BASIC UNIVERSAL double-axis control unit:

CDB01.1C-SE-ENS-EN2-NNN-MA1-S2-S-NN-FW

Double-axis BASIC UNIVERSAL

Control communication
SE = sercos II
PB = PROFIBUS
S3 = sercos III
ET = Multi-Ethernet
NN = Not equipped

Option 1 and 2
ENS = IndraDyn motors, Hiperface®, etc.
EN1 = MHD, MKD motors
EN2 = EnDat 2.1, 1 V_{pp}, 5 V TTL
NNN = Not equipped

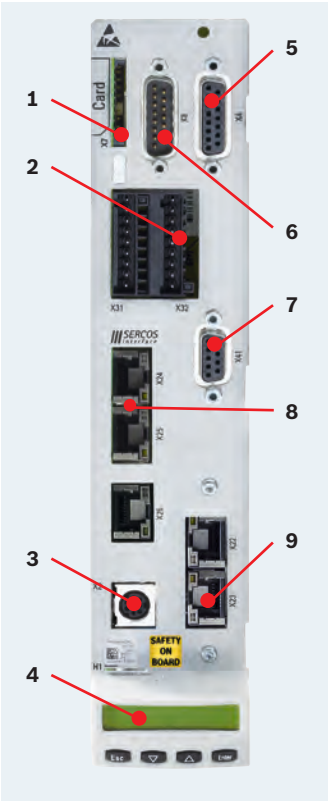
Operator panel
S = Standard

Safety technology
L2 = Safe Torque Off
S2 = Safe Motion
NN = No safety technology

Option 3 and 4
ENS = IndraDyn motors, Hiperface®, etc.
EN1 = MHD, MKD motors
EN2 = EnDat 2.1, 1 V_{pp}, 5 V TTL
MA1 = Analog I/O extension
MEM = Encoder emulation **NNN** = Not equipped

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ADVANCED – the security of maximum performance and flexibility



ADVANCED control units meet the highest demands in performance and dynamics. In addition to top performance, they support a wide and diverse range of control communication and encoder interfaces. Digital and analog inputs and outputs are already permanently integrated for communication with higher level control systems. These can also be expanded by digital or analog I/O extensions or by encoder emulation outputs. This high-performance control unit can be optionally equipped with safety technology certified as conforming to EN 13849-1 and EN 62061. The ADVANCED control unit is the ideal platform for the drive-integrated PLC, IndraMotion MLD.
All that is required to start up the drive is a PC and the engineering tool IndraWorks.

1 Slot
MultiMediaCard



2 Interfaces
Digital inputs and outputs
Analog inputs and outputs
Relay output

3 Serial interface
RS232

4 Operator panel
Standard operator panel

5 Option 1
Encoder interfaces

6 Option 2
Encoder interfaces
I/O extension
Encoder emulation

7 Safety option
Safe Torque Off
Safe Motion

8 Option 3
Encoder interfaces
Analog I/O extension
Encoder emulation
Digital I/O extension
Cross communication

SAFETY ON BOARD

9 Control communication
sercos III
PROFIBUS, etc.

The simple step-by-step guide to ordering your ADVANCED control unit:

CSH01.1C-SE-ENS-EN2-NNN-S2-S-NN-FW

Single-axis ADVANCED

Control communication
SE = sercos II
PB = PROFIBUS
PL = Parallel interface
CO = CANopen, DeviceNet
S3 = sercos III
ET = Multi-Ethernet
NN = Not equipped

Option 1 (encoder interface)
ENS = IndraDyn motors, Hiperface®, etc.
EN1 = MHD, MKD motors
EN2 = EnDat 2.1, 1 V_{pp}, 5 V TTL
NNN = Not equipped

Option 2
ENS = IndraDyn motors, Hiperface®, etc.
EN1 = MHD, MKD motors
EN2 = EnDat 2.1, 1 V_{pp}, 5 V TTL
MA1 = Analog I/O extension
MEM = Encoder emulation
NNN = Not equipped

Option 3
ENS = IndraDyn motors, Hiperface®, etc.
EN1 = MHD, MKD motors
EN2 = EnDat 2.1, 1 V_{pp}, 5 V TTL
MA1 = Analog I/O extension
MEM = Encoder emulation
MD1 = Digital I/O extension
MD2 = Digital I/O with SSI encoder interface
CCD = Cross communication
NNN = Not equipped

Safety technology
L2 = Safe Torque Off
S2 = Safe Motion
NN = No safety technology

Operator panel
S = Standard

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Accessories – add-ons for your control unit

These components can help you to capitalize on your drive – during start-up, operation and diagnostics.



Operator panel
All control units are equipped with a standard plug-in operating panel. This will guide you quickly and confidently through all the start-up steps – no PC is required.

Separate control terminals
For complex applications, especially in conjunction with the drive-integrated motion logic, we recommend the use of our compact control terminals IndraControl VCP. Connection is via the drive's serial interface.
From the simple text display right through to the graphics-capable touch screen, they always provide a particularly cost-effective solution for operation and visualization.
For more detailed information, please refer to the product catalog "Automation Systems and Control Components" (R911320438).



Software module
The optional MultiMediaCard allows you to transmit or duplicate your axis-oriented drive parameters quickly and easily – without a PC.
This software module comes in two versions:
- PFM02.1-016-NN-FW with drive firmware
- PFM02.1-016-NN-NW preformatted for simple parameter transfer

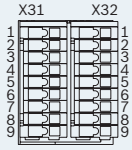


Interface cable
For start-up or operation connect your PC or a separate control terminal directly to the RS232 serial interface of the control unit.
- The pre-assembled PC interface cable IKB0041 is available in lengths of 2, 5, 10 or 15 m.
- The RKB0004 operator terminal cable is available in lengths of 2, 5 and 10 m.

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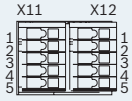
Overview of interfaces

Control communication

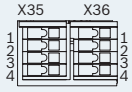


Analog/digital for Open Loop operation

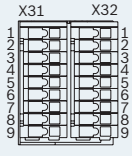
2 x 9-pin plug-in terminals
- 8 digital inputs



2 x 5-pin plug-in terminals
- 3 relay outputs (24 V DC and 230 V AC)

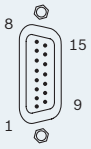


2 x 4-pin plug-in terminals
- 2 analog inputs
- 2 analog outputs

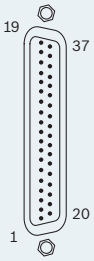


Analog interface

2 x 9-pin plug-in terminals
- Analog inputs ±10 V
- Digital inputs/outputs
- Relay output



D-SUB, 15-pin, male version
- Encoder emulation, incremental or absolute (SSI)
- Output frequency max. 1 MHz



Parallel interface

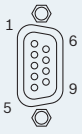
D-SUB, 37-pin, male version
- 16 inputs, reverse polarity protected
- 16 outputs, short-circuit proof
- DC-isolated

(Also suitable for input/output extension in conjunction with IndraMotion MLD)



sercos II

2 x fiber optic cable connections
- Choice of transfer rates 2, 4, 8 or 16 Mbaud



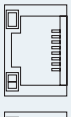
PROFIBUS

D-SUB, 9-pin,
female version



CANopen/DeviceNet

Open-style connector, 5-pin
- Selector switch for CANopen or DeviceNet



sercos III

2 x RJ45 plug-in connection

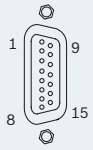


Multi-Ethernet

2 x RJ45 plug-in connection
- sercos III
- PROFINET IO
- EtherNet/IP
- EtherCAT

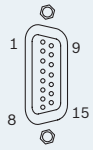
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Encoder interfaces



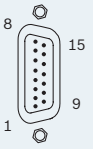
ENS encoder interfaces
for IndraDyn motors, Hiperface®,
1 V_{pp}, 5 V TTL

D-SUB, 15-pin, female version
- Encoder supply: 11.6 V/300 mA



EN1 encoder interface
for MHD and MKD motors

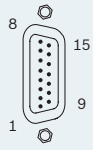
D-SUB, 15-pin, female version
- Encoder supply I2C: 8 V/250 mA
  or resolver: 18.2 V/70 mA



EN2 encoder interface
for EnDat 2.1, 1 Vpp, 5 V TTL

D-SUB, 15-pin, male version
- Encoder supply: 5 V/300 mA

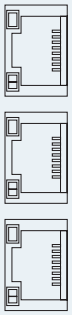
Encoder emulation



Encoder emulation **MEM**

D-SUB, 15-pin, male version
- Internal voltage supply
- Encoder signals DC-isolated
- Incremental or
- Absolute (SSI format)
- Output frequency max. 1 MHz

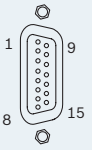
Cross communication



Cross communication **CCD**

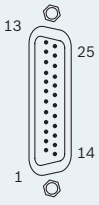
3 x RJ45 plug-in connection
- Master for connection of up to 9 slaves
  (sercos III)
- Ethernet engineering interface

Input/output extensions



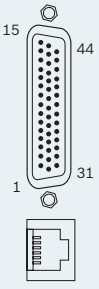
Analog I/O extension **MA1**

D-SUB, 15-pin, female version
- 2 analog input ports ±10 V
- 14 bit incl. 8-time oversampling
- 2 analog 12 bit output ports



Digital I/O extension **MD1**

D-SUB, 25-pin, male version
- External voltage supply from
  19 V to 30 V
- 12 inputs, reverse polarity protected
- 8 outputs, short-circuit proof

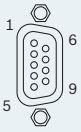


Digital I/O with SSI interface **MD2**

D-SUB, 44-pin, male version
- External voltage supply from
  19 V to 30 V
- 16 inputs, reverse polarity protected
- 16 outputs, short-circuit proof

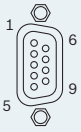
RJ11 plug-in connection for SSI measuring
encoder interface

Safety



Safe Torque Off **L2**

D-SUB, 9-pin, female version
- Supply voltage 24 V DC
- Drive signals A, B and inverse
- Acknowledgement
- Acknowledgement, inverse



Safe Motion **S2**

D-SUB, 9-pin, female version
- Supply voltage 24 V DC
- Mode selection panel inputs
- Acknowledgement, forced dormant
  error detection and diagnostics/
  safety door lock

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IndraDrive Cs – compact multi-protocol drive system



Bosch Rexroth AG, 71511 EN/2013-11

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Highly versatile, extremely compact drives

- Power range from 100 W to 9 kW
- Ethernet-based communications, multi-protocol support
- Innovative multi-encoder interface
- Extremely compact design
- Optional integrated safety technology



IndraDrive Cs – compact drives featuring Ethernet-based communications

The IndraDrive Cs offers new communications hardware with multi-protocol support which addresses today's increased need for open, seamless design.

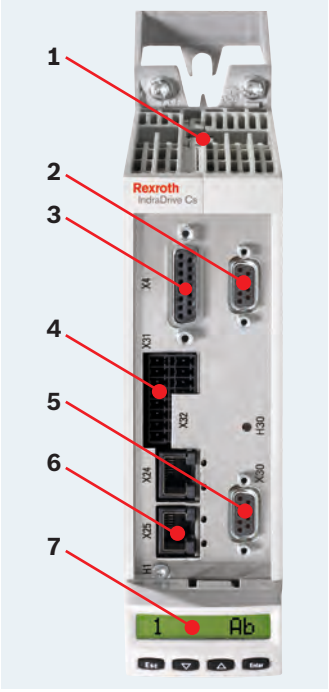
The drives support SERCOS III, PROFINET IO, EtherNet/IP and EtherCat. Connectivity via these Ethernet-based interfaces is provided by software-configurable communications hardware. Alternatively IndraDrive Cs can also be supplied with a conventional communications interface, for example PROFIBUS. The Rexroth solution gives users maximum communications flexibility with minimum engineering effort.

These impressive features plus the new multi-encoder interface which supports all standard encoder types plus an additional option slot make the IndraDrive Cs the ideal choice for highly specialized drive applications. Integrated safety technology together with IEC-compliant motion logic and industry-specific technology modules predestine the IndraDrive Cs for a very wide range of applications.



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IndraDrive Cs – universal, intelligent and cost-effective



In addition to compact design and highly impressive performance specifications, the IndraDrive Cs offers a comprehensive portfolio of Ethernet-based communications interfaces.

The new communications interface supports a whole range of protocols. The IndraDrive Cs will run with a broad spectrum of Ethernet-based communications protocols without any hardware modifications.
IndraDrive Cs is compatible with the most common encoder types. This is a standard feature of the drives, and it means that you have complete freedom to choose the best motor/encoder system for your application.

1	**Integrated brake resistor**	4	**Interfaces** Digital inputs and outputs Analog input	6	**Control communication** sercos III Multi-Ethernet
2	**Safety option** Safe Torque Off Safe Motion **SAFETY ON BOARD**	5	**Option** Encoder interface PROFIBUS CANopen Encoder emulation	7	**Operator panel** with programming module function
3	**Multi-encoder interface**				

The simple step-by-step guide to ordering your multi-protocol-capable compact drive system – IndraDrive Cs:

HCS01.1E-W0013-A-02-B-ET-EC-NN-NN-NN-FW

Maximum current
E.g. 0013 = 13 A

Protection category
A = IP20

Mains voltage
02 = 3 x AC 110 to 230 V
03 = 3 x AC 200 to 500 V

Control unit/control communication
E-S3 = ECONOMY with sercos III
B-ET = BASIC UNIVERSAL with Multi-Ethernet (sercos III, PROFINET IO, EtherNet/IP, EtherCAT)
A-CC = ADVANCED with sercos III master

Safety technology
L3 = Safe Torque Off
S4 = Safe Motion [1]
NN = No safety technology
L4 = Safe Torque Off with Safe Brake Control

Option[1]
EC = Multi-encoder interface
PB = PROFIBUS
NN = Not equipped
EM = Encoder emulation
CN = CANopen
ET = Multi-Ethernet [2]

Multi-encoder interface
EC = IndraDyn motors, Hiperface®, 1 V_{pp}, 5 V TTL, EnDat 2.1, Resolver

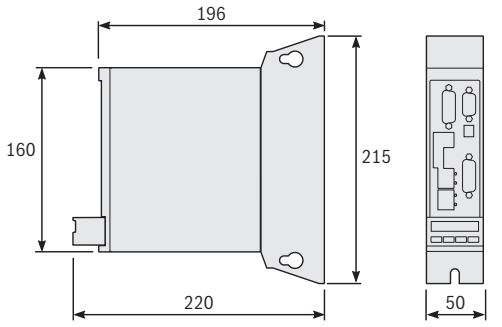
[1] Not available with ECONOMY version
[2] Only with ADVANCED version

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Performance data	Mains voltage	Size	Continuous current	Maximum current	DC bus continuous power without/with mains choke
	V		A_{eff}	A_{eff}	kW
HCS01.1E-W0003-A-02	3 AC 110 to 230 V[1)]	1	1.4	3.3	0.15/–
HCS01.1E-W0006-A-02		1	2.4	6.0	0.25/–
HCS01.1E-W0009-A-02		1	3.0	9.0	0.46/–
HCS01.1E-W0013-A-02		1	4.4	13.0	0.80/–
HCS01.1E-W0018-A-02		2	7.6	18.0	1.80/–
HCS01.1E-W0005-A-03	3 AC 200 to 500 V	1	2.0	5.0	0.46/–
HCS01.1E-W0008-A-03		1	2.7	8.0	0.86/–
HCS01.1E-W0018-A-03		2	7.6	18.0	1.70/–
HCS01.1E-W0028-A-03		2	11.5	28.0	2.60/4.00
HCS01.1E-W0054-A-03		3	21.0	54.0	9.00/14.00

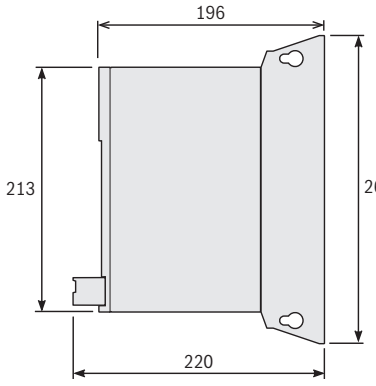
[1)] Single-phase power supply possible, derating with HCS01.1E-W0013 and -W0018

Size 1 dimensions



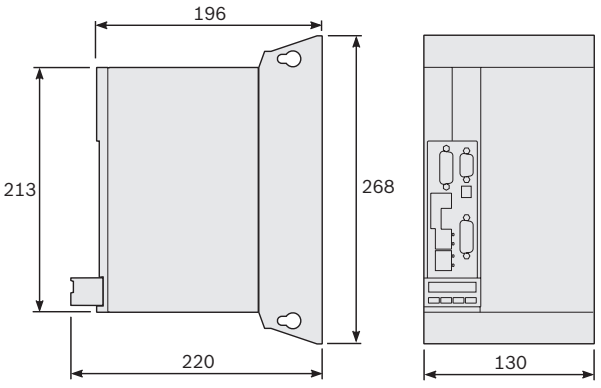


Size 2 dimensions





Size 3 dimensions





Technical features

- 2 series for direct connection to 110 – 230 V AC or 200 – 500 V AC
- Suitable for motors with continuous outputs of 0.05 to 9 kW
- Complete range of scalable drives
- Compatible with the IndraDrive family
- Digital inputs/outputs and analog input on board
- Intelligent operating panel with programming module function, supports device swap without a PC
- IEC-compliant motion logic IndraMotion MLD (optional)
- Integrated Safe Torque Off or Safe Motion safety technology up to category 4 PLe according to ISO 13849-1 and SIL 3 according to IEC 62061 (optional)
- Integrated brake resistor; external brake resistor can be connected as an alternative

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IndraDrive Mi –
Cabinet-free drive technology



Bosch Rexroth AG, 71511 EN/2013-11

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Compact and economically efficient

- Control cabinet size reduced by up to 90%
- Up to 90% less wiring thanks to hybrid cable technology for power supply and communication
- Reduction of energy loss in the cabinet by up to 90%



Motor-integrated servo drive KSM

With KSM, the motor-integrated servo drive series of IndraDrive Mi, Rexroth introduces another milestone in drive technology – electronic control system and servo motor combined in one ultra-compact unit.
This makes IndraDrive Mi the ideal solution for all applications where maximum flexibility and economic efficiency should come along with minimum space requirements.
In addition to its compact design, KSM combines the best characteristics of an IndraDrive and MSK servo motor – from the drive-integrated PLC according to IEC 61131-3 and safety technology up to protection category IP65.



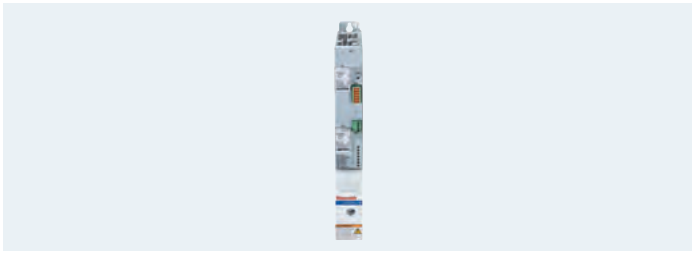
Motor-side servo drive KMS

The motor-side servo drive KMS, in protection category IP65, provides seamless integration of IndraDyn servo motors and 3rd party motors into a chain of IndraDrive Mi drives.



Electronic control system KCU

The electronic control system KCU allows all required connections for a daisy chain of up to 20 IndraDrive Mi – this reduces the installation workload to a minimum.



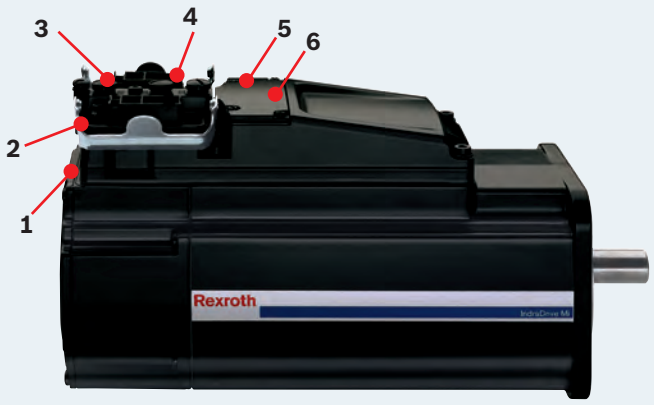
Accessories

- Hybrid cable – for communication and power supply
- Terminal connector – for terminating the drive chain
- Interface cable – for connection to a PC
- I/O cable – for linking digital I/O signals
- Interface cable – for Multi-Ethernet output



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IndraDrive Mi – Motor-integrated servo drive KSM



The compact control electronics of the motor-integrated servo drive KSM uses the lateral surface of the servo motor as a cooling element.
This reduces the control cabinet size by up to 90% compared to classical servo drive solutions and by up to 30% compared to other integrated solutions.

Another advantage of IndraDrive Mi is the significantly reduced installation work – a single cable is sufficient for power supply and communication via Multi-Ethernet.

1	**Display** Diagnosis LED	**4**	**Interfaces** 4 digital inputs and outputs, two of which can be used as quick inputs for probes
2	**Safety technology**	**5**	**Multi-Ethernet output**
3	**Connector sockets** Hybrid cable	**6**	**Programming module**

The simple step-by-step guide to ordering your motor-integrated servo drive KSM:

KSM02.1B-061C-35N-M1-HP0-ET-NN-D7-NN-FW

Control unit version
B = BASIC

Basic motor
- Overall size (e.g. “061”)
- Overall length (e.g. “C”)
- Winding (e.g. “35”)

Cooling system
N = Natural convection

Encoder
S1 = Single-turn encoder (Hiperface®), 128 signal periods
M1 = Multi-turn encoder (Hiperface®), 128 signal periods with 4096 revolutions absolute
S3 = Single-turn capacitive encoder (Hiperface®), 16 signal periods
M3 = Multi-turn capacitive encoder (Hiperface®), 16 signal periods with 4096 revolutions absolute

Electrical connection
H = Connector, hybrid

Other versions
TO = Multi-Ethernet output
NN = No

Supply voltage
D7 = DC 750 V

Safety technology
NN = No safety technology
L3 = Safe Torque Off (STO)
S3 = Safe Motion

Control communication
ET = Multi-Ethernet

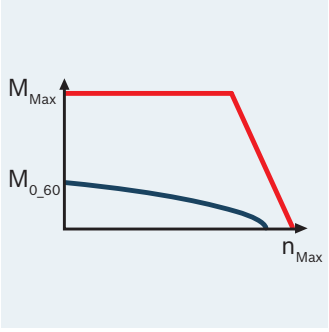
Holding brake
0 = Without holding brake
2 = With electrically released holding brake (DC 24 V)

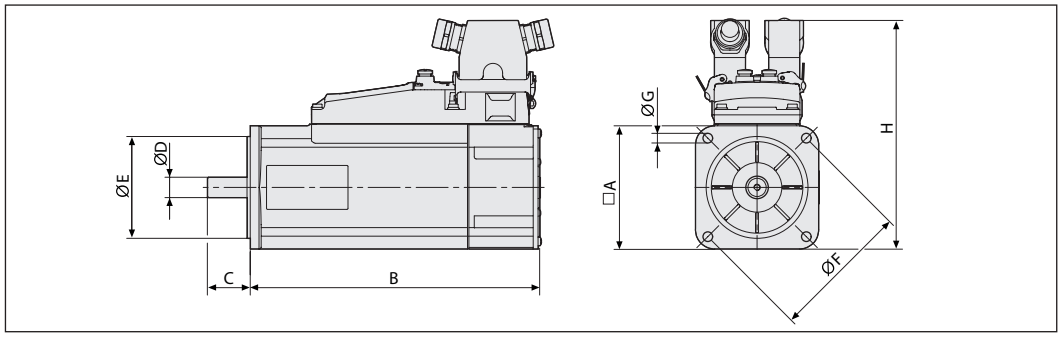
Shaft
G = Plain shaft with shaft sealing ring
P = Keyway conforming to DIN 6885-1 and shaft sealing ring

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Distributed servo drive		Maximum speed[1]	Continuous torque at standstill 60K	Maximum torque	Continuous current at standstill	Maximum current	Moment of inertia	Dimensions								Weight[2]
		n_{Max}	M_{0_60}	M_{Max}	I_0	I_{Max}	J_R	A	B	C	Ø D	Ø E	Ø F	Ø G	H	m
		rpm	Nm	Nm	A	A	kgm²	mm	mm	mm	mm	mm	mm	mm	mm	kg
KSM02.1B-041	C-42	5,500	2.2	9.4	1.5	6.8	0.00017	82	252	30	14	50	95	6.6	194	5.6/5.9
KSM02.1B-061	C-35	4,300	6	25	3.3	14.9	0.00087	115	271	40	19	95	130	9	219	9.6/10.1
	C-61	6,000	5.5	18	5.2	17.7	0.00087	115	271	40	19	95	130	9	219	9.6/10.1
KSM02.1B-071	C-24	3,400	10.5	35	4.6	17.7	0.00173	140	307	58	32	130	165	11	247	14.1/15.2
	C-35	4,700	10	28	6	17.7	0.00173	140	307	58	32	130	165	11	247	14.1/15.2
KSM02.1B-076	C-35	4,700	8.7	29	5.2	17.7	0.0043	140	290	50	24	110	165	11	247	14.6/15.7

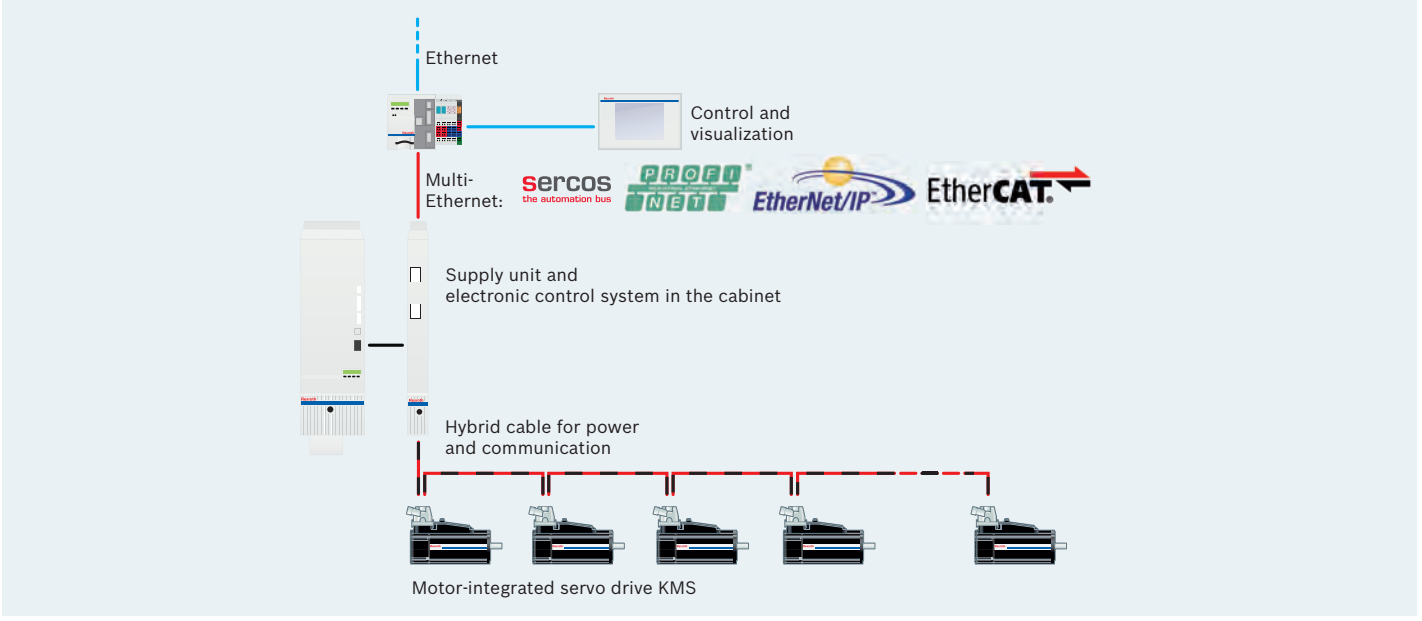
All data relate to the basic version of the distributed servo drive with encoder S1 and without holding brake
[1] At 750 V DC bus voltage; [2] Values without/with holding brake





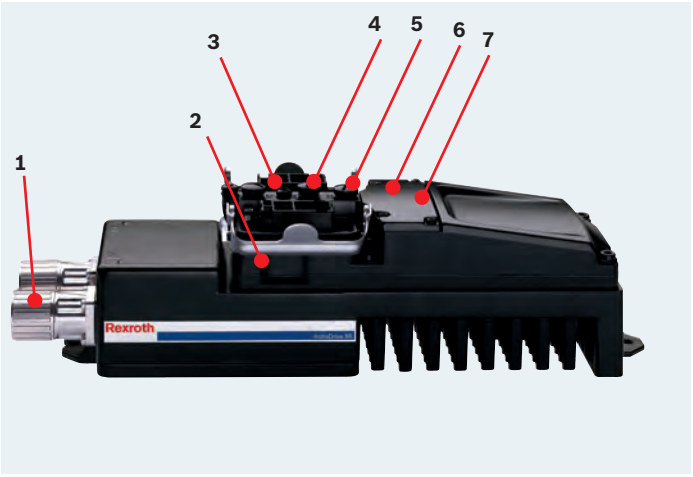
All advantages at a glance

- Multi-Ethernet communication for a variety of automation environments
- Control communication output to connect distributed peripherals
- SafeTorque Off (STO) function, including the easy creation of safety zones and SafeMotion
- Comprehensive firmware options (integrated motion logic, etc.)
- Various mechanical designs



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IndraDrive Mi – Motor-side servo drive KMS



1	**Motor interface** Encoder and power supply	5	**Interfaces** 4 digital inputs and outputs, two of which can be used as quick inputs for probes
2	**Display** Diagnosis LED		
3	**Safety technology**	6	**Multi-Ethernet output**
4	**Connector sockets** Hybrid cable	7	**Programming module**

The motor-side servo drive KMS enables users to seamlessly integrate a wide range of motors into an IndraDrive Mi drive chain.

It is the solution of choice when:

- MSK030 servo motors, which due to their size are not suitable for IndraDrive Mi, need to be integrated into a chain of drives
- MSK servo motors need to be integrated because space constraints preclude the use of motor-integrated KSM servo motors
- Additional 3rd-party motors in open-loop mode or with Hiperface® encoders need to be attached

As is the case with KSM distributed servo drives, a hybrid communications/power cable is used to connect the drives.

The simple step-by-step guide to ordering your motor-side servo drive KMS:

KMS02.1B-A 018-P-D7-ET-ENH-NN-NN-FW

Cooling system
A = Natural convection

Maximum current
018 = 18 A

Protection category
P = IP65

DC bus nominal voltage
D7 = DC 750 V

Control communication
ET = Multi-Ethernet

Encoder interface
ENH = Hiperface®
NNN = Without encoder[1)]

Safety technology
NN = No safety technology
L3 = Safe Torque Off (STO)
S3 = Safe Motion

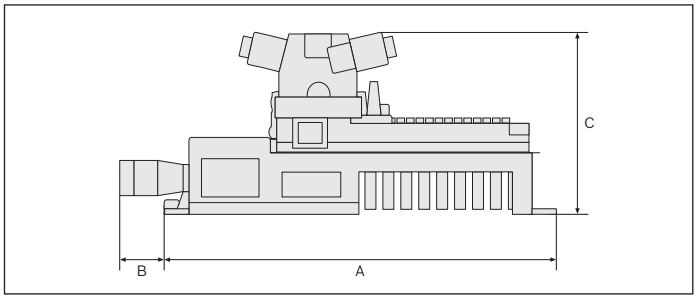
Other versions
TO = Multi-Ethernet output
NN = None

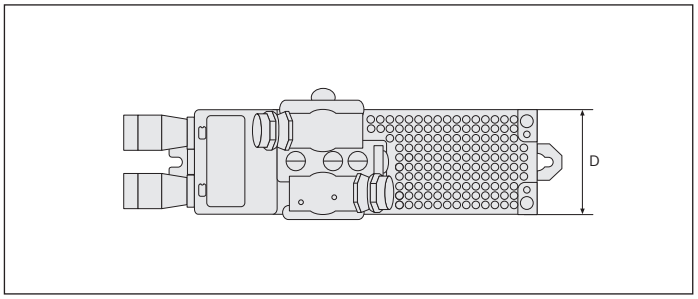
[1)] Without holding brake control

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Motor-side servo drive	Continuous current	Maximum current	Dimensions				Weight
	I_0	I_{Max}	A	B	C	D	m
	A	A	mm	mm	mm	mm	kg
KMS02.1B	6	18	316	25	147	87	2.5

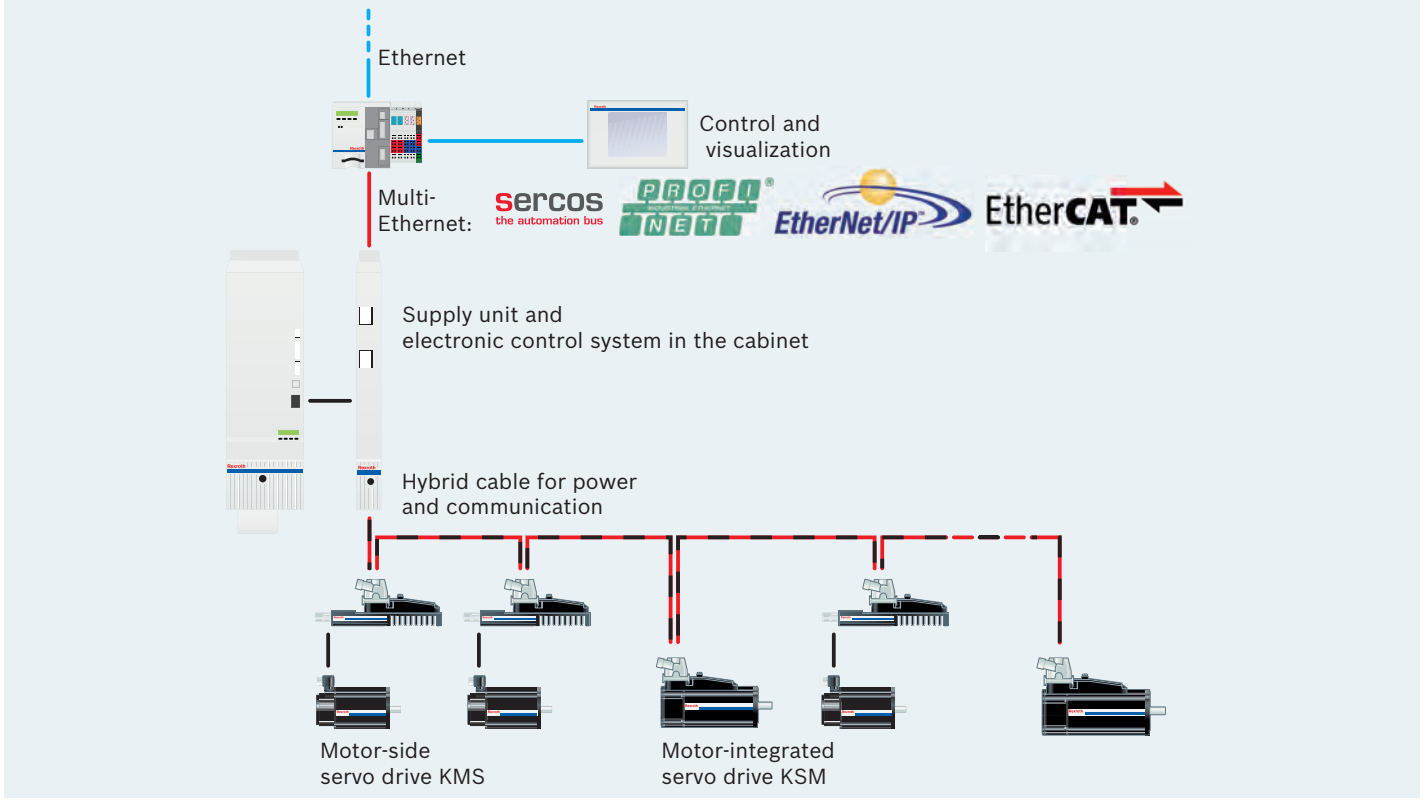
All data refer to the operation with 750 V DC bus voltage





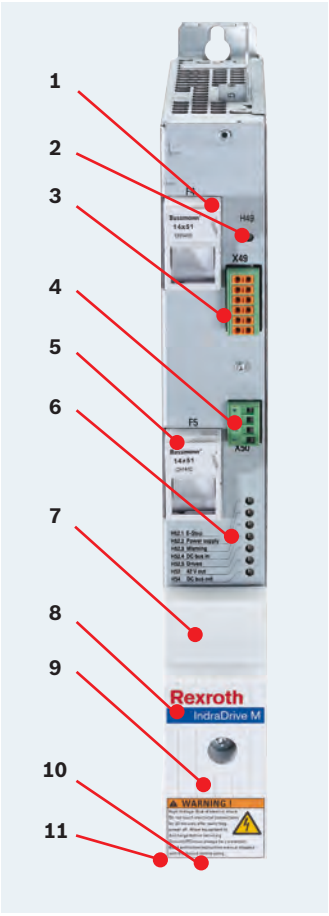
All advantages at a glance

- Multi-Ethernet communication for a variety of automation environments
- Control communication output to connect distributed peripherals
- Safe Torque Off (STO) function, including the easy creation of safety zones and Safe Motion
- Comprehensive firmware options (integrated motion logic, etc.)
- Integration of small servo or third-party motors (with or without encoders) Motors on KMS motor-side servo drives



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IndraDrive Mi – electronic control system KCU



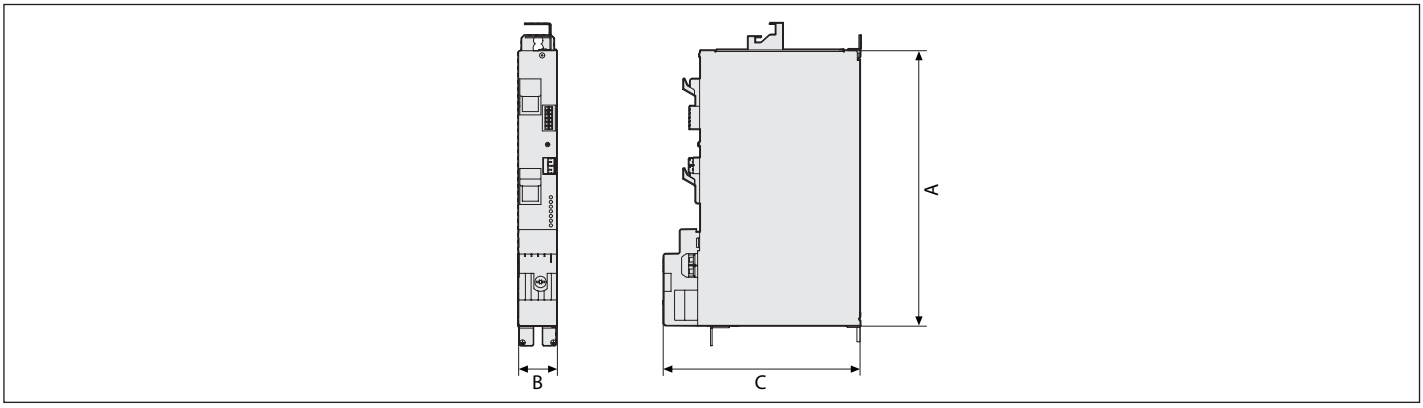
The compact electronic control system KCU allows all necessary connections to the IndraDrive Mi at a common coupling:

- Routing of the power supply from the DC bus of an IndraDrive converter or supply unit
- Supply of control voltage to the IndraDrive Mi
- Exchange of status and diagnostic messages between IndraDrive Mi and supply unit
- Protection of the DC bus connection with integrated fuses. Up to 20 IndraDrive Mi drives can be connected to a hybrid cable with a maximum length of 200 m.
- Multiple parallel drive chains possible

Up to 20 IndraDrive Mi units can be flexibly connected in series in one drive chain, with a max. cable length of 200 m – without any modifications to the cabinet.
If required, it is also possible to connect a number of KCU electronic control systems to a single supply unit in order to operate several IndraDrive Mi drive chains in parallel.

1	**Fuse** DC output L+	5	**Fuse** DC output L-	9	**DC input** DC bus
2	**Safety technology diagnosis display**	6	**Status and diagnosis display**	10	**Multi-Ethernet input**
3	**Safety technology**	7	**Input** Module bus	11	**Hybrid cable connection** Multi-Ethernet Control voltage DC bus voltage Status messages
4	**E-stop input**	8	**Input** Control voltage		

Electronic control system	Nominal voltage input	Nominal current input	Dimensions			Weight
			A	B	C	m
	V	A	mm	mm	mm	kg
KCU02.1N-ET-ET*-025-NN-N-NN-NW	DC 540 ... 750	25	352	50	252	3.8



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IndraDrive Mi – accessories

Hybrid cable and terminal connector

The significant reduction of installation work is one of the big advantages of the IndraDrive Mi – a single cable is sufficient for power supply and communication via Multi-Ethernet.

The hybrid cable RKH is supplied pre-assembled with plug-in connectors. Coded connectors ensure that the hybrid cable is connected with the correct polarity. From the wide range of connecting cables, select the suitable outgoing direction for your application.

Each cable with one or several IndraDrive Mi is terminated with a terminal connector RHS0014.



Interface cable

For linking digital I/O signals to the IndraDrive Mi, use the pre-assembled cable RSK0010.

The cables RKB0033 (M12-M12) and RKB0044 (M12-RJ45) can be used to integrate additional Multi-Ethernet-capable components in the IndraDrive Mi chain using a Multi-Ethernet output.

The safety technology is connected at the start of a safety technology zone using the cable RKB0033. The RBS0023 plug is attached to all other participants.





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Rexroth IndraDrive – firmware

BASIC Single-axis and double-axis versions		**ADVANCED** Single-axis version	
Technology functions	Technology functions	Motion control technology functions	Motion control technology functions
Motion logic[1)]		**Motion logic**	
OPEN LOOP main spindle	**BASIC main spindle**	**OPEN LOOP** main spindle	**ADVANCED main spindle**
OPEN LOOP synchronization	**BASIC** synchronization	**OPEN LOOP** synchronization	**ADVANCED** synchronization
	BASIC servo extension		**ADVANCED** servo extension
Extension packages		**Extension packages**	
OPEN LOOP	**CLOSED LOOP**	**OPEN LOOP**	**CLOSED LOOP**
Basic package		**Basic package**	

[1)] Not with double-axis version

The firmware can be tailored to your specific application in a number of flexible configurations:

- Basic OPEN LOOP package (frequency converter applications)
- Basic CLOSED LOOP package (servo and frequency converter applications)
- Extension packages (optional)
- Motion logic (IndraMotion MLD option)

The basic package is already sufficient to perform the majority of standard drive functions – from simple V/f control right through to positioning block mode.
Various extension packages provide you with the options of electronic synchronization, additional servo functions or main spindle operation.
The freely-programmable motion logic with integrated PLC conforming to IEC 61131-3 and ready-to-use technology functions enable simple execution of complex machine processes.

The simple step-by-step guide to ordering your IndraDrive firmware:

FWA-INDRV*-MPH-08VRS-D5-1-SNC-ML

Firmware IndraDrive

Firmware version
MPH = ADVANCED
MPB = BASIC single-axis
MPD = BASIC double-axis

Version
Version 08, current release

Languages
German, English, French, Italian, Spanish

Control
0 = OPEN LOOP
1 = CLOSED LOOP

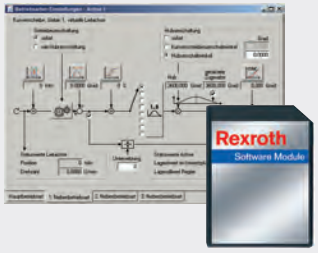
Drive PLC
MA = ADVANCED motion logic for complex technology functions
ML = With motion logic and technology functions
TF = Suitable for technology functions
NN = Without motion logic

Extension package
SRV = Servo extension
SNC = Electronic synchronization
MSP = Main spindle extension
ALL = All extensions
NNN = No extensions

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Customized functionality

- All standard functions already included
- Individual function extensions
- Industry-specific technology functions
- Integrated IEC-compliant motion logic



Basic packages	BASIC		ADVANCED	
	OPEN LOOP	CLOSED LOOP	OPEN LOOP	CLOSED LOOP
Basic functions				
Electronic type plate	•	•	•	•
Automatic control circuit adjustment				
Setpoint generator for control optimization				
Travel to fixed stop				
Adjustable error response				
Brake control				
Oscilloscope function				
Basic functions OPEN LOOP				
Motor control with V/f-curve, incl. slip compensation, I x R compensation and stall protection	•	•	•	•
Sensorless vector control				
Speed ramp generator				
Motorized potentiometer function				
Basic functions CLOSED LOOP				
Position, speed and torque control	–	•	–	•
Drive-controlled referencing				
Drive-controlled positioning				
Interpolation inside drive				
Positioning block mode				
Position, speed and torque limit				
Automatic commutation adjustment				
Path switching point with ON and OFF switching threshold				
Encoder emulation, incremental or absolute (SSI format)				
Automatic load detection				

[1] Not with double-axis control units

[2] BASIC control units are restricted in terms of performance

Extension packages	BASIC		ADVANCED	
	OPEN LOOP	CLOSED LOOP	OPEN LOOP	CLOSED LOOP
Servo extension				
Parameter block changeover	•[1]	•	•	•
Easy compensation of backlash on reversal	–	•	–	•
Axis error correction	–	–	–	•
Quadrant error correction	–	–	–	•
Frictional torque compensation	–	•	–	•
Probe with fast stop	–	1	–	2
Dynamic programmable limit switch	–	•	–	•
Main spindle				
Parameter block changeover	•[1]	•	•	•
Spindle positioning mode	–	•	–	•
Drive-controlled gear changes	–	–	–	•
Synchronization				
Parameter block changeover	•[1]	•	•	•
Speed synchronization	•	•	•	•
Angle synchronization	–	•	–	•
Measuring wheel mode	–	•	–	•
Real and virtual leading axis	•	•	•	•
Cam plate (tabular value)	–	•	–	•
Cam plate (analytical value)	–	–	–	•
Probe with time measurement	1	–	1	–
Probe with synchronization function	–	1	–	2
Dynamic programmable limit switch	–	•	–	•

Motion logic	BASIC		ADVANCED	
	OPEN LOOP	CLOSED LOOP	OPEN LOOP	CLOSED LOOP
IndraMotion MLD				
Freely programmable in compliance with IEC 61131-3	•[2]	•[2]	•	•
Programming system for IL, ST, FBD, LD, SFC and CFC				
4 freely configurable tasks (cyclic, free-running, event-controlled)				
Libraries: system-specific, drive-specific, PLCopen				
Support of customer libraries				
Process-oriented technology packages				

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Rexroth IndraMotion MLD – integrated motion logic

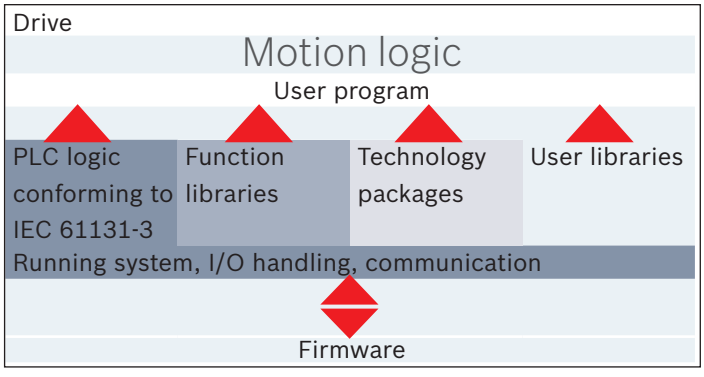
The world's first open drive
With IndraMotion MLD drive functions, motion control and processing logic merge to form a modern open automation platform for modular machine concepts. The drive-integrated motion logic reduces or even eliminates the need for higher-level control systems.

Open standards
Standardized programming languages and the integrated engineering framework IndraWorks simplify project planning, programming, operation and diagnostics. At the same time you are directly investing your valuable know-how in the drive and thereby safeguarding your competitive edge.
Programming is in compliance with IEC 61131-3 in the following languages:

- Instruction list (IL)
- Structured text (ST)
- Functional block diagram (FBD)
- Ladder diagram (LD)
- Sequential function chart (SFC)
- Continuous function chart (CFC)

The availability of standardized modules in the PLCopen-compliant function library gives you access to a multitude of motion functions.

Flexible programming
With user-definable programming you have the freedom and flexibility to configure your application to your requirements. Indeed, you have the latitude to combine innovative drive functions, extensive function libraries and process-oriented technology packages into one perfect automation solution.



Achieve your goals faster
Even large-scale and complex applications can be handled with ease with our ready-to-use function blocks and predefined technology packages. Combine them to form your own user program or simply use them as configurable functions.
Examples of items:

- PLCopen modules
- Programmable limit switch
- Print-mark control
- Register control
- Tension control
- Loop control
- Winder
- Demand processing
- Extended drive functions:
  - Variable retraction motion
  - Adaptive feedrate control
  - Analog force control and much more

Selected IndraMotion MLD function blocks and function libraries are available on DVD together with IndraWorks MLD, the simple, intuitive engineering tool for IndraDrive.

- Order code:
  SWA-IWORK-MLD-xxVRS-D0-DVD**-COPY

Innovative modules for any application

- Function library: Collection of function blocks conforming to IEC or PLCopen
- User library: Collection of function blocks developed by the user
- Technology packages: Process-oriented function blocks, e.g. tension control
- User program: Application-specific combination of different function blocks and technology packages

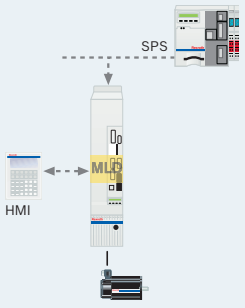
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Drive and control system seamlessly coordinated

- Highly-economic solution for single-axis and multi-axis applications without additional hardware
- Minimized engineering thanks to IEC- and PLCopen-compliant project planning
- Predefined technology packages for faster implementation

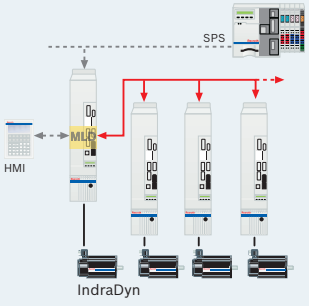


Single-axis solution



IndraMotion MLD-S
Integrated motion logic

Multi-axis solution



IndraMotion MLD-M
Integrated motion logic with cross communication

IndraMotion MLD		**MLD-S BASIC**	**MLD-S ADVANCED**	**MLD-M ADVANCED**
Number of axes		1	1	up to 10
Hardware requirement (master)		BASIC control unit CSB	ADVANCED control unit CSH	ADVANCED control unit CSH with option CCD
Firmware option		TF	ML/MA	ML/MA
Performance				
Processing time		Depends on the utilization of the BASIC drive	100 µs per 1,000 instructions in IL using bit and word processing	
Tasks				
Number of tasks		4		
Types of tasks		Cyclic, free-running, event-controlled		
Cycle time	ms	2	1	1
Program memory				
From firmware 04VRS	kB	Approx. 350		
From firmware 06VRS with option CCD	kB	–	4,000	
Retain data memory				
On control unit	byte	248	248	248
With option MD1, MD2 or CCD	kB	–	32	32
Programming				
Programming system		Rexroth IndraWorks MLD		
Programming languages		Instruction list (IL), Structured text (ST), Functional block diagram (FBD), Ladder diagram (LD), Sequential function chart (SFC), Continuous function chart (CFC)		
Program debug functions		Breakpoint, single-step, single cycle, write/force, monitoring, sampling trace, simulation, online change		
Libraries supplied		System-specific, drive-specific and PLCopen		
Control communication				
Interfaces		sercos II, sercos III, PROFIBUS, Multi-Ethernet, DeviceNet, CANopen, parallel interface, analog interface, analog/digital for OPEN LOOP mode, IndraMotion MLD		
Digital inputs and outputs				
Inputs		5[1)]	7	Depends on the number and type of control units and options used
Inputs/outputs (user-defined settings)		3[1)]	4	
Option MD1		–	12 I/8 O	
Option MD2		–	16 I/16 O	
Parallel interface		16 I/16 O	16 I/16 O	
Analog inputs and outputs				
On control unit		–	1 I/2 O	Depends on the number and type of control units and options used
With option MA1		2 I/2 O	2 I/2 O	

[1)] Applies to control unit CSB01.1C

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Safety on Board – integrated safety technology

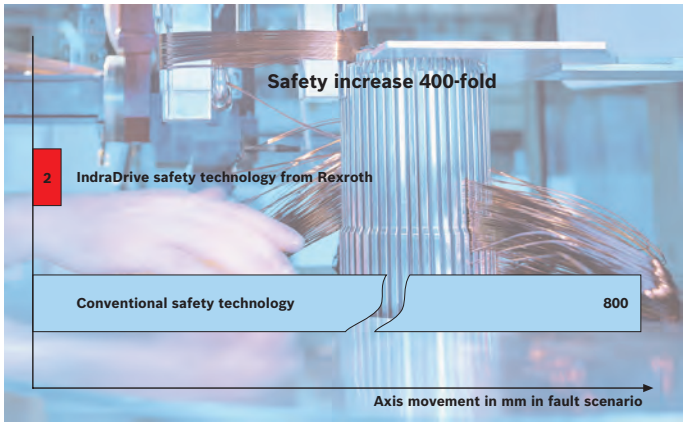
Whether for machine tools, printing and packaging or mounting, handling and robotics applications – protecting people from uncontrolled machine movements is top priority.

Clear guidelines issued by the EU
All machine manufacturers are obliged to carry out a hazard evaluation and risk analysis prior to construction. This is stipulated in the European Machinery Directive 2006/42/EC. Moreover, any potential hazards detected must be eliminated step by step. Safety should be integrated in the machinery and meet current standards in technology.

How safe can you get?
IndraDrive is redefining current standards in technology because IndraDrive integrates the safety directly in the drive, resulting in ultra-short response times. IndraDrive therefore demonstrates the current capacities and requirements of safety technology – IndraDrive is faster because the movement is monitored directly where it is generated. This is the critical advantage, especially when it comes to monitoring direct drives or other high-dynamic drives, for example.

Quickest response times with highest drive dynamics
With the new IndraDrive generation from Rexroth, a variety of safety functions are available right inside the drive – without any detours through the control. This increases reliability, saves on additional monitoring components and reduces installation cost and effort.
It is all made possible by redundant software and hardware components in the drive. The non-contacting monitoring of all set limit values enables very short response times of less than 2 ms. As soon as an error is detected, all the drives are automatically stopped depending on the stop category selected (0, 1 or 2).

Axis movements minimized thanks to ultra-short response times



Before a user in the protected area reacts to an error with an acknowledgement linked to contacts, a linear axis with a ball screw has already traveled 100 to 200 mm, linear motors have already traveled 400 to 800 mm. IndraDrive safety technology finds the error within 2 ms and the axis moves only 2 mm.

Safety functions inside the drive effectively protect people and machines

- High reliability due to certified integrated safety functions
- Extremely fast response times (< 2 ms) for fault detection by internal monitors
- No need for additional measuring systems or sensors
- Online dynamic sampling of the inputs and shutoff paths while work is in progress
- PROFIsafe interface with reduced configuration and installation effort and safe, distributed I/Os
- Reduced certification effort and short series start-up times

SAFETY ON BOARD

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Intelligent and safe

- Safety category 3, PL d, SIL 2
- Extensive safety functions
- Minimum response times
- Independent of the control system
- Straightforward integration in the machine

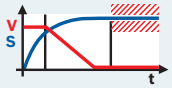




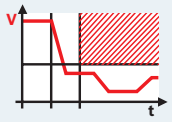
Safe Torque Off (STO)
Stop category 0 in accordance with ICE 60204-1:
Safe drive torque cut off



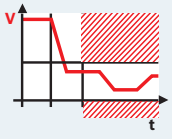
Safe Stop 1 (SS1)
Stop category 1 in accordance with ICE 60204-1:
Safely monitored stop, control or drive controlled with safe drive torque cut off



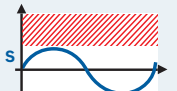
Safe Stop 2, Safe Operating Stop (SS2, SOS)
Stop category 2 in accordance with ICE 60204-1:
Safely monitored stop with safely monitored standstill at controlled torque



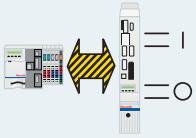
Safely Limited Speed (SLS)
If enable signal is given, a safely limited speed is monitored in special operating mode



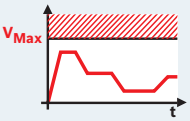
Safe Direction (SDI)
A safe direction (clockwise, counterclockwise) is also monitored in addition to safe motion



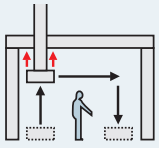
Safely Monitored Position (SMP)
A safely limited position range is also monitored in addition to safe motion



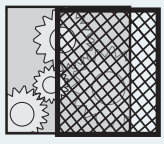
Safe Inputs/Outputs (SIO)
Dual-channel safety peripherals can be connected to the drive and made available to the controller via the safety bus



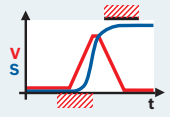
Safe Maximum Speed (SMS)
The maximum speed is safely monitored irrespective of the mode of operation



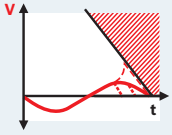
Safe Braking and Holding System (SBS)
The safe braking and holding system controls and monitors two independent brakes



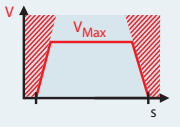
Safe Door Locking (SDL)
When all the drives in one protection zone are in safe status, the safety door lock is released



Safely Limited Increment (SLI)
If enable signal is given, a safely limited increment is monitored in special operating mode



Safely Monitored Deceleration (SMD)
Safely monitored deceleration ramp when stopping with predetermining characteristics



Safely Limited Position (SLP)
Monitoring of safe software limit switches



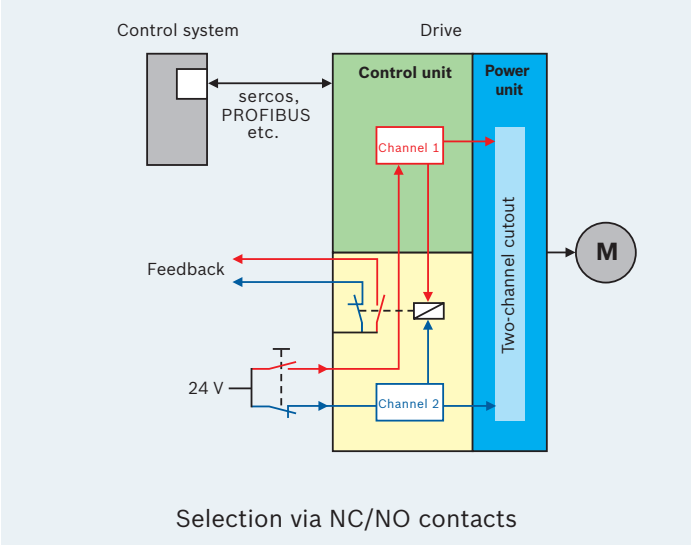
Safe Communication (SCO)
Selection/deselection of safety functions and transfer of process data (e.g. actual position values) via safety bus

All safety functions are certified as compliant with the standards EN ISO 13849-1:2006, EN 61800-5-2:2007, IEC 61508:1998-2000, EN 62061, ISO 13849-1:1999 EN 954-1:1996, EN ISO 13849-2:2003, EN 60204-1:1997, EN 50178-1:1997, EN 61800-3:2004, UL 508C R7.03, C22.2 No. 0.8-M86 (R2003), CAN/CSA C22.2 No. 14-95, NFPA 79:2007 ER1 through TÜV Rheinland and TÜV Rheinland North America Inc.

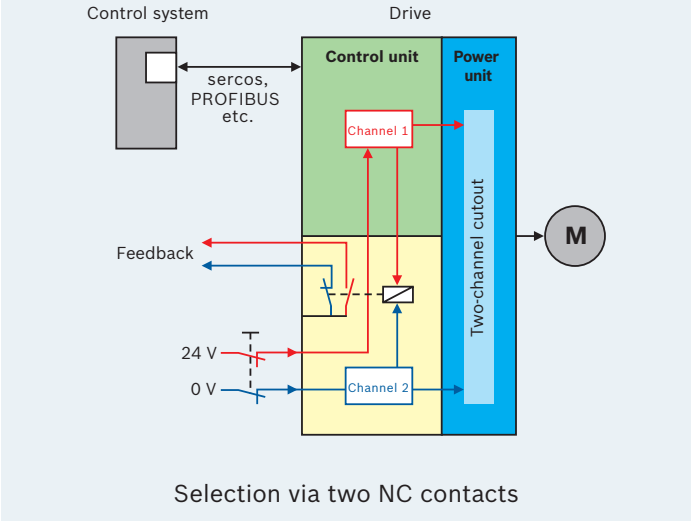
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Safety on Board – be on the safe side

Safe Torque Off (STO)
The STO option is the most cost-effective solution for preventing the drive from restarting unintentionally.
The power supply is cut off electronically on two channels.
The STO option is activated via two redundant 24 V signals.
This function can be selected with all control units except BASIC OPEN LOOP.



Selection via NC/NO contacts



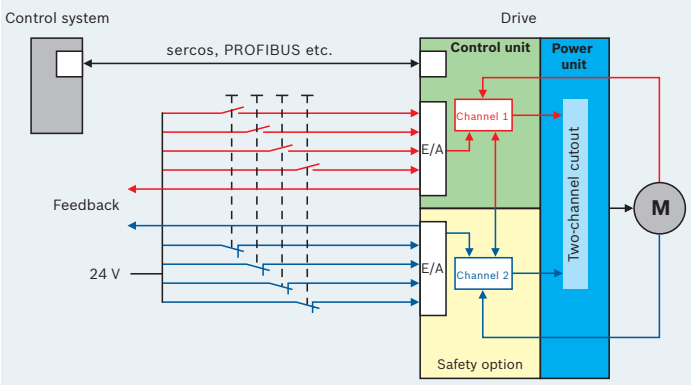
Selection via two NC contacts

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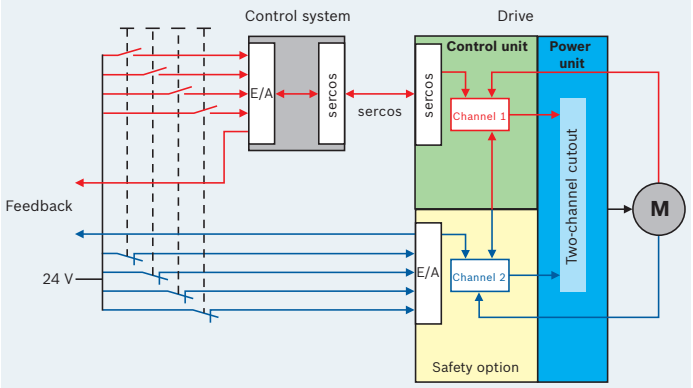
Safe Motion

The ADVANCED and BASIC UNIVERSAL double-axis control units offer you all the available safety functions – including safe motion and safe absolute position.

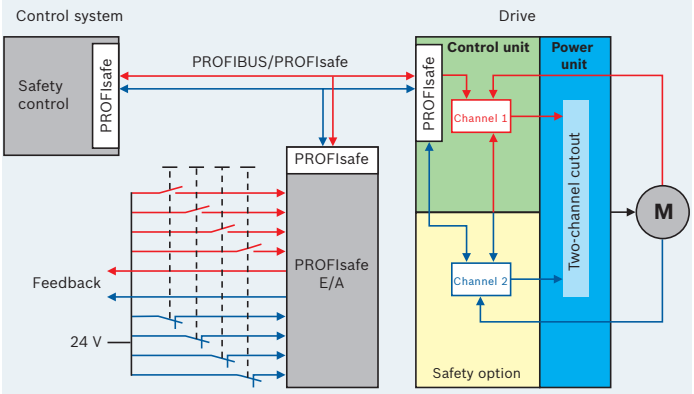
This safety is guaranteed by two redundant, diverse processor systems which carry out all the relevant calculations separately and monitor each other. The two-channel selection of the required safety function can be executed differently.



Selection and feedback via 24 V signals – the simplest way



Selection and feedback signal via control communication (channel 1) and 24 V signals (channel 2) – for simpler wiring



Selection and feedback signal via PROFIsafe – the user-friendly solution

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Rexroth IndraWorks – one tool for all engineering tasks

Simple and user-friendly, Rexroth IndraWorks is the ideal engineering environment for all Rexroth electrical control and drive systems. This engineering framework brings together in one integrated interface all the tools required for:

- Configuration
- Programming
- Parameterization
- Operation
- Visualization
- Diagnostics

Advantages

- Integrated software framework for all engineering tasks
- Application-oriented tools
- Intelligent user guidance
- User-friendly, menu-driven operation
- Standardized programming according to IEC 61131-3
- PLCopen-compliant module library
- Open-architecture through integrated FDT/DTM technology
- Cutting-edge Microsoft .NET technology

IndraWorks for IndraDrive is available on DVD:

- IndraWorks D – for drive engineering
  SWA-IWORKS-D**-xxVRS-D0-DVD**-COPY
- IndraWorks MLD – also includes support for IndraMotion MLD
  SWA-IWORKS-MLD-xxVRS-D0-DVD**-COPY

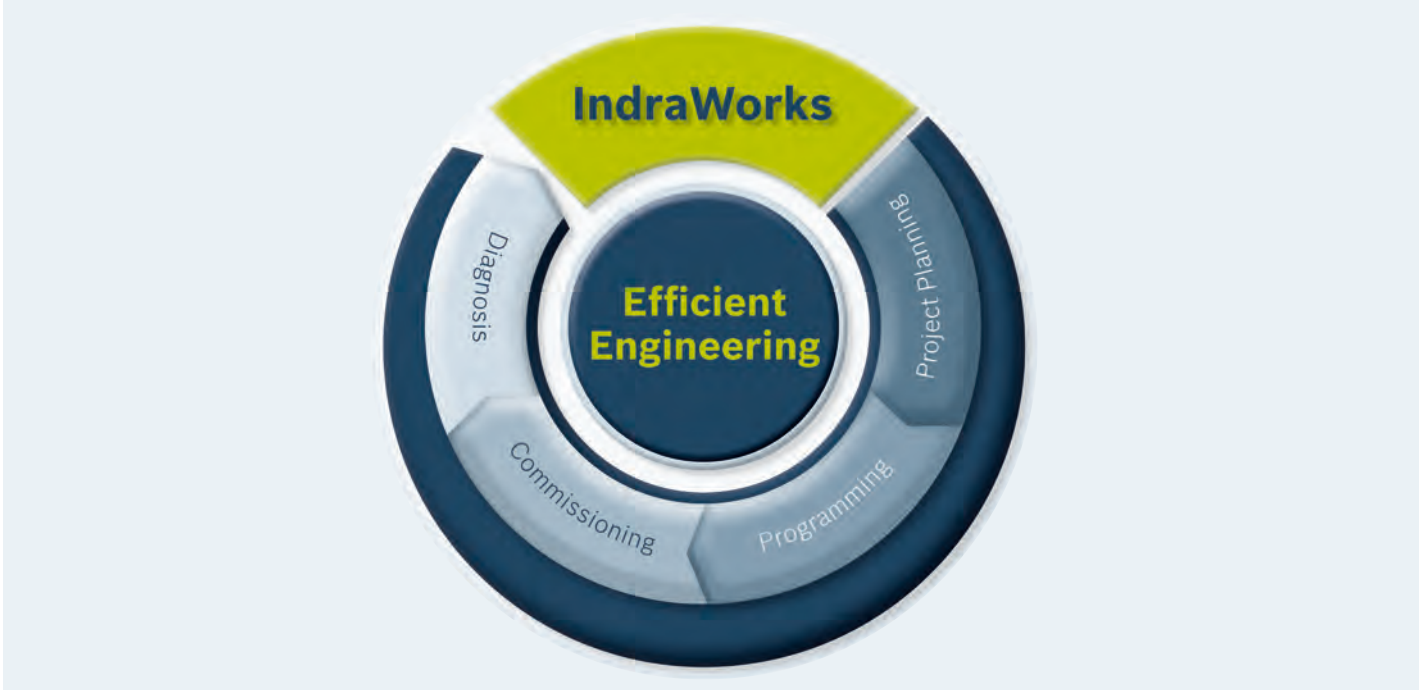
You receive a simple, connection-based service tool along with IndraWorks D and MLD:

- IndraWorks Ds – for service and commissioning of single drives (part of IndraWorks D and IndraWorks MLD, available on the Internet or as a separate DVD)
  SWA-IWORKS-DS*-xxVRS-D0-DVD**-COPY

IndraWorks D and IndraWorks MLD can be combined with the CamBuilder cam editor:

- CamBuilder SWS-IWORKS-CAM-xxVRS-D0

Rexroth IndraWorks – the integrated engineering framework for project planning, programming, parameterization, operation and monitoring



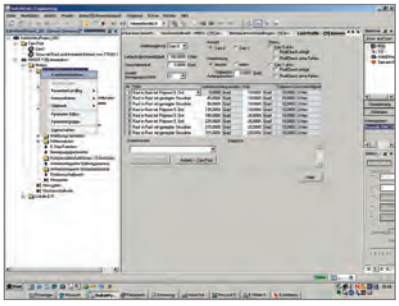
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IndraWorks – the universal engineering framework

- One tool for all automation tasks
- Guided start-up for rapid achievement of results
- Offline configuration of projects
- User-friendly programming environment



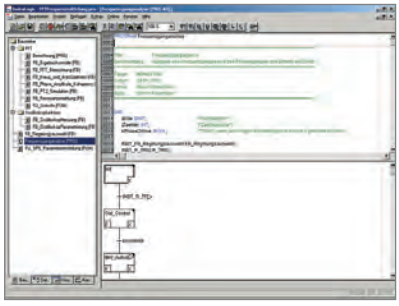
Start-up wizard



IndraWorks interactively guides you through all the steps of the startup process and only requires you to input the relevant data. All values to be input are directly related to the mechanics of the machine. This simplifies the input of data, along with allowing you to freely select measurement units.

You individually assemble the required sequence of movements from a large selection of positioning modes presented in graphic form. Once compiled, the set of parameters is saved in a file and can be easily transmitted to other machines via fieldbus or the RS232 serial interface.

Programming

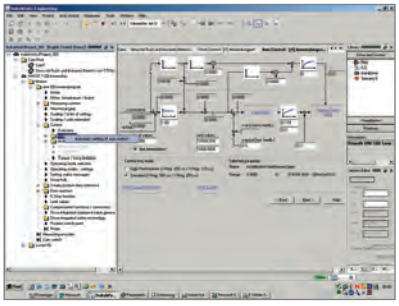


All functionality and programming modes according to IEC 61131-3 are available for the drive-integrated PLC.

With PLCopen function blocks, you can quickly and transparently integrate drive functionality into your PLC program.

Integrated technology functions
The configurable motion logic-based technology functions allow you to perform the full range of different process-oriented tasks – and require no programming skills.

Auto-tuning



Parameters for all internal control functions are automatically set when IndraDyn motors are connected.

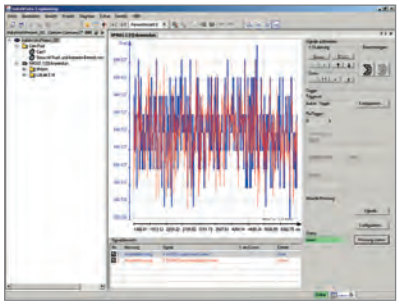
This setting is ideal for the majority of applications, requiring no further adjustment. Where requirements are more complex, the auto-tuning function is available to assist with adjusting the control settings to your machine.

Offline mode



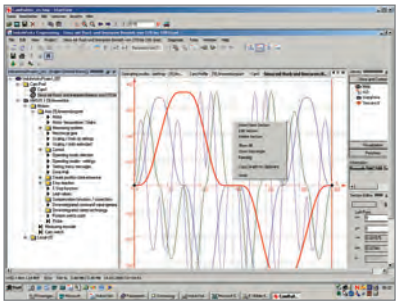
The machine-related modes of operation and the corresponding parameters can be set in advance offline and later transferred to the machine.

Four-channel oscilloscope



The integrated four-channel oscilloscope is available to assist with drive optimization, troubleshooting and preventive maintenance. For documentation purposes all the measurements and the related settings can be printed out or saved to a file.

CamBuilder (optional)



Rexroth CamBuilder is a graphics-based software tool for the convenient creation of electronic cams. With a few inputs, you can implement various applications easily and quickly. The established cams are directly transferable to Rexroth drives and controls.

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Rexroth IndraSize – rapid and safe sizing

IndraSize – the user-friendly program for drive sizing – is the quickest way to find the optimum drive for your machine. Regardless of whether you are using a conventional servo axis or direct drive, IndraSize allows you to define the ideal motor/drive combination in a few steps.

Mechanics

IndraSize is compatible with all standard drive mechanisms such as:

- Ball screw with rotating screw
- Ball screw with rotating nut
- Rack and pinion
- Belt and pulley
- Linear direct drive
- Rotary drive
- Roller
- Rotary knife
- Winder/unwinder
- Roll feed

With the aid of graphics you simply simulate your machine kinematics, combining the motor and the selected mechanical parts with the various transfer units:

- Coupling
- Belt drive
- Gears

Any number of these can be combined in any order.

Motion profile

With IndraSize you can freely compile a full motion profile from individual sequences of movements. If applicable, you may use higher-order equations of motion as e.g. polynominals or sinoids. Alternatively, import pre-assembled cams generated with the CamBuilder.



Moreover, IndraSize allows you to define typical applications very simply by inputting parameters. Applications can be configured in next to no time, such as:

- Roll feeds
- Flying cutoff
- Winders
- Cross cutters

Download

IndraSize can be downloaded from the Internet at: www.boschrexroth.com/indrasize

Mechanical system

	Ball screw with rotating screw		Ball screw with rotating nut
	Belt and pulley		Rack and pinion
	Linear direct drive		Rotary drive
	Rollers		

and much more

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Five steps to your drive solution

Regardless of whether you want to tackle a simple or complex drive task – whatever the case, IndraSize will lead you confidently through just five steps to success. Let the menu take you through the individual program steps from selecting the mechanical system and associated motion profile right through to the point where you are presented with the optimum motor/drive combination together with a table or curve showing its performance data.

Step 1:
Select mechanical system and motion profile



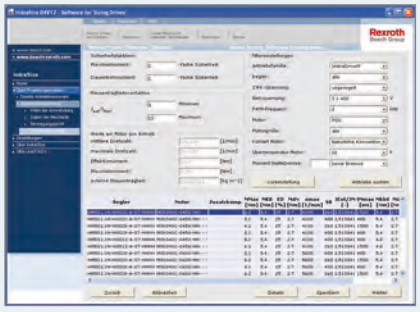
Step 2:
Input mechanical and link element data



Step 3:
Define the motion cycle



Step 4:
Select the drive from the filtered list generated



Step 5:
Check and save drive details



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Rexroth IndraDyn – motors and gearboxes



Bosch Rexroth AG, 71511 EN/2013-11

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A powerful family

- Extensive range including robust housed and high-speed motors
- Coverage of entire power range
- High-precision encoder systems
- Highly-dynamic synchronous linear motors
- Special hazardous duty designs conf. to ATEX or UL/CSA



IndraDyn S
- Synchronous servo motors MSK with maximum torque of 631 Nm
- Synchronous servo motors MKE with explosion-proof enclosure for potentially explosive atmospheres up to 187 Nm
- Ultra-compact synchronous servo motors MSM rated at up to 7.1 Nm can be connected to the IndraDrive Cs



IndraDyn A
- Air-cooled asynchronous servo motors MAD with power ratings up to 93 kW
- Liquid-cooled asynchronous servo motors MAF with power ratings up to 120 kW



IndraDyn L
- Synchronous ironcore linear motors MLF for feeding forces of up to 21,500 N
- Synchronous ironless linear motors MCL with maximum speeds of up to 1,400 m/min



IndraDyn T
- Synchronous torque motors MBT with torque ratings up to 13,800 Nm and speeds of up to 4,000 rpm



IndraDyn H
- Synchronous high-speed motors MBS for speeds of up to 22,500 rpm and maximum torques of up to 4,500 Nm



1 MB
- Asynchronous high-speed motors for speeds of up to 20,000 rpm and rated torques of up to 875 Nm



Servo gearboxes
- Standard planetary gearboxes GTE
- High-precision planetary gearboxes GTM



Standard and geared motors
- Wide range of motors made by well-known manufacturers for combining with IndraDrive



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IndraDyn S – MSK synchronous servo motors

The particularly outstanding features of the MSK range of motors are its wide power spectrum and narrow size increments. The high torque density of these synchronous servo motors allows a particularly compact design with maximum torques of up to 631 Nm.

Depending on the required accuracy, you can choose between encoder systems with low, medium, or high resolution. All encoder versions are available in a single-turn and multi-turn configuration.

With numerous additional options, the MSK motors can be upgraded and tailored exactly to the desired requirement. The MSK series is thus also ideal for applications beyond the typical standard applications of servo motors.

The combination with IndraDrive control units results in high-performance drive systems with flexible configuration that offer innovative solutions for new drive applications.

The wide performance range of the MSK series of motors is supplemented with a multitude of functional options.

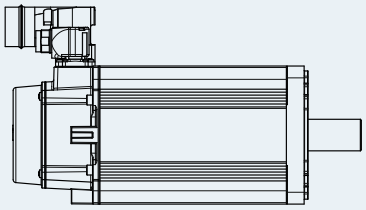


In addition to the different encoder systems, there is a wide choice of further options such as a shaft keyway, holding brake, and increased runout. For applications with high levels of continuous power, blower units for axial and radial mounting are available.

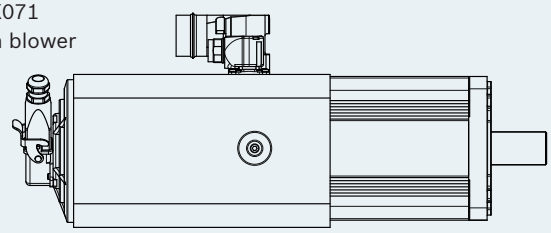
As with the MSK motors themselves, the blower motors also feature protection category IP65 as standard and are equipped with an integrated temperature sensor. This not only increases the reliability of the motors. The certified intrinsic safety of the blowers (“Thermally-Protected F” as per UL) also eliminates the need for an external motor circuit breaker. Liquid cooling is available for selected sizes for very high power applications.

Example MSK071

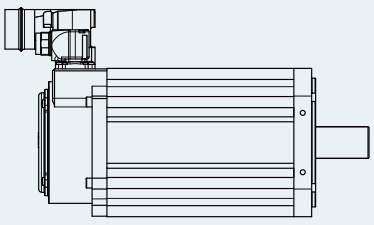
MSK071
Convection



MSK071
With blower



MSK071
Liquid cooling
system



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Compact and powerful

- Maximum torques up to 631 Nm
- Maximum speeds up to 9,000 rpm
- Encoder systems for a wide and diverse range of applications
- High protection category IP65
- Choice of cooling systems



The simple step-by-step guide to ordering your MSK servo motor:

MSK 060C-0600-NN-S1-U G 0-N N NN

Motor
- Overall size (e.g. “060”)
- Overall length (e.g. “C”)
- Winding (e.g. “0600”)

Cooling system
NN = Natural convection
Blower can be fitted optionally from size 060
FN[1] = Integrated liquid cooling system
SA = Integrated blower (only MSK133)

Encoder
S1 = Single-turn encoder (Hiperface®), 128 signal periods
M1 = Multi-turn encoder (Hiperface®), 128 signal periods with 4,096 revolutions absolute
S2[2] = Single-turn encoder (EnDat), 2,048 signal periods
M2[2] = Multi-turn encoder (EnDat) 2,048 signal periods with 4,096 revolutions absolute
S3 = Single-turn encoder (Hiperface®), 16 signal periods
M3 = Multi-turn encoder (Hiperface®), 16 signal periods with 4,096 revolutions absolute

Shaft
G = Plain shaft with shaft sealing ring
P = Keyway conforming to DIN 6885-1 and shaft sealing ring

Other versions
N = Standard
S[1] = Ex-protected version conforming to Equipment Group II, Category 3, G and D

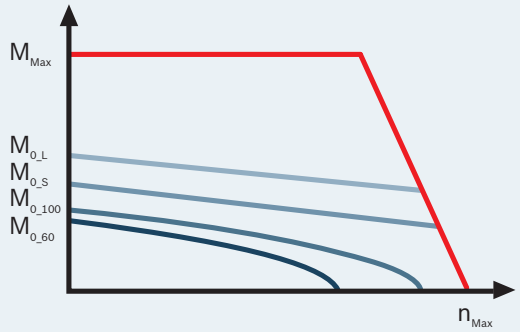
Shaft runout
N = Standard, in conjunction with S1/M1 or S3/M3 encoder only
R = Reduced, linear movement conforming to DIN 42955, in conjunction with S2 or M2 encoder only

Holding brake[1]
0 = Without holding brake
1 = With electr. released holding brake
2 = With heavy-duty holding brake
3 = With extra-heavy-duty holding brake

[1] Only for certain sizes
See the product documentation for an exact breakdown

[2] For sizes 040 to 131

Example curve



Continuous torque at standstill M_0

M_{0_L} = Liquid-cooled

M_{0_S} = Surface-ventilated

M_{0_100} = 100K, non-insulated design

M_{0_60} = 60K, insulated design

See the following pages for an overview of the motor data

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IndraDyn S – technical data

Type	Maximum speed[1]	Continuous torque at standstill				Maximum torque	Continuous current at standstill				Maximum current
		60K	100K	Blower	L cooling		60K	100K	Blower	L cooling	
	n_{Max}	M_{0_60}	M_{0_100}	M_{0_S}[2]	M_{0_L}[2]	M_{Max}	I_{0_60}	I_{0_100}	I_{0_S}[2]	I_{0_L}[2]	I_{Max}
	rpm	Nm	Nm	Nm	Nm	Nm	A	A	A	A	A
MSK030B-0900-NN	9.000	0,4	0,45	–	–	1,8	1,5	1,7	–	–	6,8
MSK030C-0900-NN	9.000	0,8	0,9	–	–	4	1,5	1,7	–	–	6,8
MSK040B-0450-NN	6.000	1,7	1,9	–	–	5,1	1,5	1,7	–	–	6
MSK040B-0600-NN	7.500	1,7	1,9	–	–	5,1	2	2,2	–	–	8
MSK040C-0450-NN	6.000	2,7	3,1	–	–	8,1	2,4	3,1	–	–	9,6
MSK040C-0600-NN	7.500	2,7	3,1	–	–	8,1	3,1	4,7	–	–	12,4
MSK043C-0600-NN	7.500	2,7	3,1	–	–	12,5	3,6	4,3	–	–	18,5
MSK050B-0300-NN	4.300	3	3,4	–	–	9	1,8	2	–	–	7,2
MSK050B-0450-NN	6.000	3	3,4	–	–	9	2,8	3,2	–	–	11,2
MSK050B-0600-NN	6.000	3	3,4	–	–	9	3,7	4,2	–	–	14,8
MSK050C-0300-NN	4.700	5	5,5	–	–	15	3,1	3,4	–	–	12,4
MSK050C-0450-NN	6.000	5	5,5	–	–	15	4,7	5,2	–	–	18,8
MSK050C-0600-NN	6.000	5	5,5	–	–	15	6,2	6,8	–	–	24,8
MSK060B-0300-NN	4.800	5	5,5	–	–	15	3	3,3	–	–	12
MSK060B-0600-NN	6.000	5	5,5	–	–	15	6,1	6,7	–	–	24,4
MSK060C-0300-NN	4.900	8	8,8	12	–	24	4,8	5,3	7,2	–	19,2
MSK060C-0600-NN	6.000	8	8,8	12	–	24	9,5	10,5	14,3	–	38
MSK061B-0300-NN	4.200	3,5	3,9	–	–	14	1,9	2,1	–	–	8,6
MSK061C-0200-NN	3.100	8	9	12	–	32	3,2	3,6	4,8	–	14,4
MSK061C-0300-NN	4.200	8	9	12	–	32	4,3	4,8	6,5	–	19,4
MSK061C-0600-NN	6.000	8	9	12	–	32	7,7	8,7	11,6	–	34,7
MSK070C-0150-NN	2.500	13	14,5	19,5	–	33	4,1	4,6	6,2	–	12,6
MSK070C-0300-NN	5.500	13	14,5	19,5	–	33	8,2	9,2	12,3	–	25
MSK070C-0450-NN	6.000	13	14,5	19,5	–	33	12,3	13,7	18,5	–	36,9
MSK070D-0150-NN	2.700	17,5	20	26,3	–	52,5	6,2	7,1	9,3	–	24,8
MSK070D-0300-NN	4.900	17,5	20	26,3	–	52,5	11	12,6	16,5	–	33
MSK070D-0450-NN	6.000	17,5	20	26,3	–	52,5	16,6	22	24,9	–	49,8
MSK070E-0150-NN	2.200	23	25	34,5	–	70	6,4	7	9,6	–	25,6
MSK070E-0300-NN	5.300	23	25	34,5	–	65	15,4	16,7	23,1	–	49,3
MSK070E-0450-NN	6.000	23	25	34,5	–	60	19,3	21	29	–	57,9
MSK071C-0200-NN	3.500	12	14	18	22,8	44	5,2	6,1	7,8	9,9	23,4
MSK071C-0300-NN	5.000	12	14	18	22,8	44	7,3	8,5	11	13,9	32,9
MSK071C-0450-NN	5.800	12	14	18	22,8	44	8,9	10,4	13,4	16,9	40,1
MSK071D-0200-NN	3.200	17,5	20	26,3	33,3	66	7,3	8,6	11	13,9	32,8
MSK071D-0300-NN	3.800	17,5	20	26,3	33,3	66	9,1	10,7	13,5	17,2	40,5
MSK071D-0450-NN	6.000	17,5	20	26,3	33,3	66	15,4	17,6	23,1	30,3	69,3
MSK071E-0200-NN	3.400	23	28	34,5	43,7	84	10,1	12,6	15,2	19	45,5
MSK071E-0300-NN	4.200	23	28	34,5	43,7	84	12,5	15,2	18,8	24,9	56,3
MSK071E-0450-NN	6.000	23	28	34,5	43,7	84	20	24,4	30	38	90,1
MSK075C-0200-NN	4.100	12	12,5	18	–	44	6,3	7,3	9,5	–	28,4
MSK075C-0300-NN	5.000	12	12,5	18	–	44	8,4	8,8	12,6	–	37,8
MSK075C-0450-NN	6.000	12	12,5	18	–	44	12,6	13,1	18,9	–	56,7
MSK075D-0200-NN	3.800	17	18,5	25,5	–	64	8,3	9	12,5	–	37,4
MSK075D-0300-NN	4.800	17	18,5	25,5	–	66	11,7	12,7	17,6	–	52,7
MSK075D-0450-NN	6.000	17	18,5	25,5	–	64	16,5	18	24,8	–	74,3
MSK075E-0200-NN	3.850	21	23	31,5	–	88	10,2	11,2	15,3	–	45,9
MSK075E-0300-NN	5.200	21	23	31,5	39,9	88	14,2	15,6	21,3	27	63,9
MSK075E-0450-NN	6.000	21	23	31,5	39,9	88	18,6	20,4	27,9	35,3	83,7
MSK076C-0300-NN	4.700	12	13,5	18	–	43,5	7,2	8,1	10,8	–	32,4
MSK076C-0450-NN	5.000	12	13,5	18	–	43,5	12,2	13,7	18,3	–	54,9

All specifications relate to the basic version of the motor with encoder S1, without holding brake

[1] At 750 V DC bus voltage

[2] S = Fan cooled. / L = Liquid cooled

[3] Flange size 150 mm for MSK071 with liquid cooling system

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Type	Moment of inertia	Dimensions										Weight
	J	A	B	B_S[2]	B_L[2]	C	Ø D	Ø E	Ø F	Ø G	H	m
	kgm²	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	kg
MSK030B-0900-NN	0,000013	54	152,5	–	–	20	9	40	63	4,5	98,5	1,3
MSK030C-0900-NN	0,00003	54	188	–	–	20	9	40	63	4,5	98,5	1,9
MSK040B-0450-NN	0,0001	82	155,5	–	–	30	14	50	95	6,6	124,5	2,8
MSK040B-0600-NN	0,0001	82	155,5	–	–	30	14	50	95	6,6	124,5	2,8
MSK040C-0450-NN	0,00014	82	185,5	–	–	30	14	50	95	6,6	124,5	3,6
MSK040C-0600-NN	0,00014	82	185,5	–	–	30	14	50	95	6,6	124,5	3,6
MSK043C-0600-NN	0,000083	82	185,5	–	–	30	14	50	95	6,6	124,5	3,6
MSK050B-0300-NN	0,00028	98	173	–	–	40	19	95	115	9	134,5	4
MSK050B-0450-NN	0,00028	98	173	–	–	40	19	95	115	9	134,5	4
MSK050B-0600-NN	0,00028	98	173	–	–	40	19	95	115	9	134,5	4
MSK050C-0300-NN	0,00033	98	203	–	–	40	19	95	115	9	134,5	5,4
MSK050C-0450-NN	0,00033	98	203	–	–	40	19	95	115	9	134,5	5,4
MSK050C-0600-NN	0,00033	98	203	–	–	40	19	95	115	9	134,5	5,4
MSK060B-0300-NN	0,00048	116	181	–	–	50	24	95	130	9	156	5,7
MSK060B-0600-NN	0,00048	116	181	–	–	50	24	95	130	9	156	5,7
MSK060C-0300-NN	0,0008	116	226	395	–	50	24	95	130	9	156	8,4
MSK060C-0600-NN	0,0008	116	226	395	–	50	24	95	130	9	156	8,4
MSK061B-0300-NN	0,00044	116	223	–	–	40	19	95	130	9	156	5,7
MSK061C-0200-NN	0,000752	116	264	432	–	40	19	95	130	9	156	8,3
MSK061C-0300-NN	0,000752	116	264	432	–	40	19	95	130	9	156	8,3
MSK061C-0600-NN	0,000752	116	264	432	–	40	19	95	130	9	156	8,3
MSK070C-0150-NN	0,00291	140	238	429	–	58	32	130	165	11	202	11,7
MSK070C-0300-NN	0,00291	140	238	429	–	58	32	130	165	11	202	11,7
MSK070C-0450-NN	0,00291	140	238	429	–	58	32	130	165	11	202	11,7
MSK070D-0150-NN	0,00375	140	268	459	–	58	32	130	165	11	202	14
MSK070D-0300-NN	0,00375	140	268	459	–	58	32	130	165	11	202	14
MSK070D-0450-NN	0,00375	140	268	459	–	58	32	130	165	11	202	14
MSK070E-0150-NN	0,00458	140	298	489	–	58	32	130	165	11	202	16,2
MSK070E-0300-NN	0,00458	140	298	489	–	58	32	130	165	11	202	16,2
MSK070E-0450-NN	0,00458	140	298	489	–	58	32	130	165	11	202	16,2
MSK071C-0200-NN	0,00173	140[3]	272	463	276	58	32	130	165	11	202	13,9
MSK071C-0300-NN	0,00173	140[3]	272	463	276	58	32	130	165	11	202	13,9
MSK071C-0450-NN	0,00173	140[3]	272	463	276	58	32	130	165	11	202	13,9
MSK071D-0200-NN	0,0023	140[3]	312	503	316	58	32	130	165	11	202	18
MSK071D-0300-NN	0,0023	140[3]	312	503	316	58	32	130	165	11	202	18
MSK071D-0450-NN	0,0023	140[3]	312	503	316	58	32	130	165	11	202	18
MSK071E-0200-NN	0,0029	140[3]	352	543	356	58	32	130	165	11	202	23,5
MSK071E-0300-NN	0,0029	140[3]	352	543	356	58	32	130	165	11	202	23,5
MSK071E-0450-NN	0,0029	140[3]	352	543	356	58	32	130	165	11	202	23,5
MSK075C-0200-NN	0,00352	140	307	498	–	58	32	130	165	11	202	14,8
MSK075C-0300-NN	0,00352	140	307	498	–	58	32	130	165	11	202	14,8
MSK075C-0450-NN	0,00352	140	307	498	–	58	32	130	165	11	202	14,8
MSK075D-0200-NN	0,0049	140	347	538	–	58	32	130	165	11	202	19
MSK075D-0300-NN	0,0049	140	347	538	–	58	32	130	165	11	202	19
MSK075D-0450-NN	0,0049	140	347	538	–	58	32	130	165	11	202	19
MSK075E-0200-NN	0,00613	140	387	578	391	58	32	130	165	11	202	22,5
MSK075E-0300-NN	0,00613	140	387	578	391	58	32	130	165	11	202	22,5
MSK075E-0450-NN	0,00613	140	387	578	391	58	32	130	165	11	202	22,5
MSK076C-0300-NN	0,0043	140	292,5	462	–	50	24	110	165	11	180	13,8
MSK076C-0450-NN	0,0043	140	292,5	462	–	50	24	110	165	11	180	13,8

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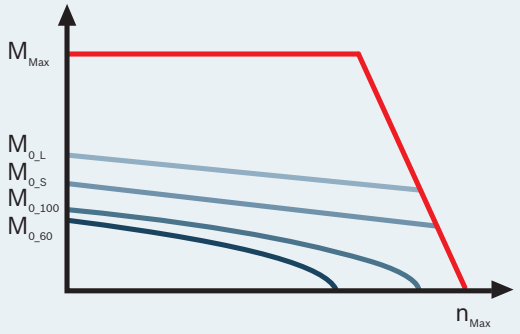
IndraDyn S – technical data

Type	Maximum speed[1]	Continuous torque at standstill				Maximum torque	Continuous current at standstill				Maximum current
		60K	100K	Blower	F cooling		60K	100K	Blower	F cooling	
	n_{Max}	M_{0_60}	M_{0_100}	M_{0_S}[2]	M_{0_L}[2]	M_{Max}	I_{0_60}	I_{0_100}	I_{0_S}[2]	I_{0_L}[2]	I_{Max}
	rpm	Nm	Nm	Nm	Nm	Nm	A	A	A	A	A
MSK100A-0200-NN	4.400	15	17	22,5	–	54	9,2	10,4	13,8	–	41,4
MSK100A-0300-NN	5.200	15	17	22,5	–	54	10,2	11,6	15,3	–	45,9
MSK100A-0450-NN	6.000	15	17	22,5	–	54	12	13,6	18	–	54
MSK100B-0200-NN	4.100	28	33	42	–	102	14,7	17,3	22,1	–	66,2
MSK100B-0300-NN	4.500	28	33	42	–	102	17,4	20,5	26,1	–	78,3
MSK100B-0400-NN	4.500	28	33	42	–	102	24,5	29,5	35,6	–	106,7
MSK100B-0450-NN	4.500	28	33	42	–	102	28,5	33,6	42,8	–	110,7
MSK100C-0200-NN	3.500	38	43,5	57	–	148	17,7	20,3	26,6	–	79,7
MSK100C-0300-NN	4.500	38	43,5	57	–	148	21,6	27	32,4	–	97,2
MSK100C-0450-NN	4.000	38	43,5	57	–	148	35,4	43,5	52,9	–	159,3
MSK100D-0200-NN	2.000	48	57	72	–	187	13	15,4	19,5	–	58,5
MSK100D-0300-NN	3.000	48	57	72	–	187	20,7	24,8	31,1	–	93,2
MSK100D-0350-NN	3.000	48	57	72	–	185	29,9	35,5	44,9	–	135
MSK101C-0200-NN	3.300	32	36,5	48	60,8	110	14,9	17	22,4	28,3	67,1
MSK101C-0300-NN	4.500	32	36,5	48	60,8	110	18,7	21,3	28,1	35,3	84,2
MSK101C-0450-NN	5.800	32	36,5	48	60,8	110	25,1	28,6	37,7	47,7	113
MSK101D-0200-NN	3.400	50	57	75	95	160	22,2	26,8	33,3	43,3	99,9
MSK101D-0300-NN	4.600	50	57	75	95	160	30,6	34,9	45,9	58,1	137,7
MSK101D-0450-NN	6.000	50	57	75	95	160	41,7	50,6	66	79,2	187,7
MSK101E-0200-NN	3.500	70	80,5	105,5	133	231	32,1	39	48,2	63,8	144,5
MSK101E-0300-NN	4.600	70	80,5	105	133	231	41,6	47,8	62,4	79	187,4
MSK101E-0450-NN	6.000	70	80,5	105	116	231	58,3	67,6	87,5	97	262,4
MSK103A-0300-NN	4.800	21	24	–	–	51	12,5	14,3	–	–	40
MSK103B-0300-NN	4.700	28	31	–	–	85	17	19	–	–	63
MSK103D-0300-NN	4.600	46	53	–	–	138	26,3	30,8	–	–	94,7
MSK131B-0200-NN	3.200	85	–	127,5	–	250	36,7	–	55,1	–	165
MSK131D-0200-NN	3.000	160	–	240	–	495	65,2	–	97,8	–	293,4
MSK133B-0202-SA	3.300	–	–	152	–	320	–	–	63	–	160
MSK133C-0202-SA	3.300	–	–	204	–	425	–	–	81	–	205
MSK133D-0202-SA	3.300	–	–	263	–	520	–	–	100	–	265
MSK133E-0202-SA	3.300	–	–	293	–	631	–	–	115	–	305
MSK133B-0203-FN	3.300	–	–	–	162	300	–	–	–	69,4	160
MSK133C-0203-FN	3.300	–	–	–	232,5	400	–	–	–	93	205
MSK133D-0203-FN	3.300	–	–	–	290	500	–	–	–	122,2	265
MSK133E-0203-FN	3.300	–	–	–	342	583	–	–	–	135,5	305

All specifications relate to the basic version of the motor with encoder S1, without holding brake

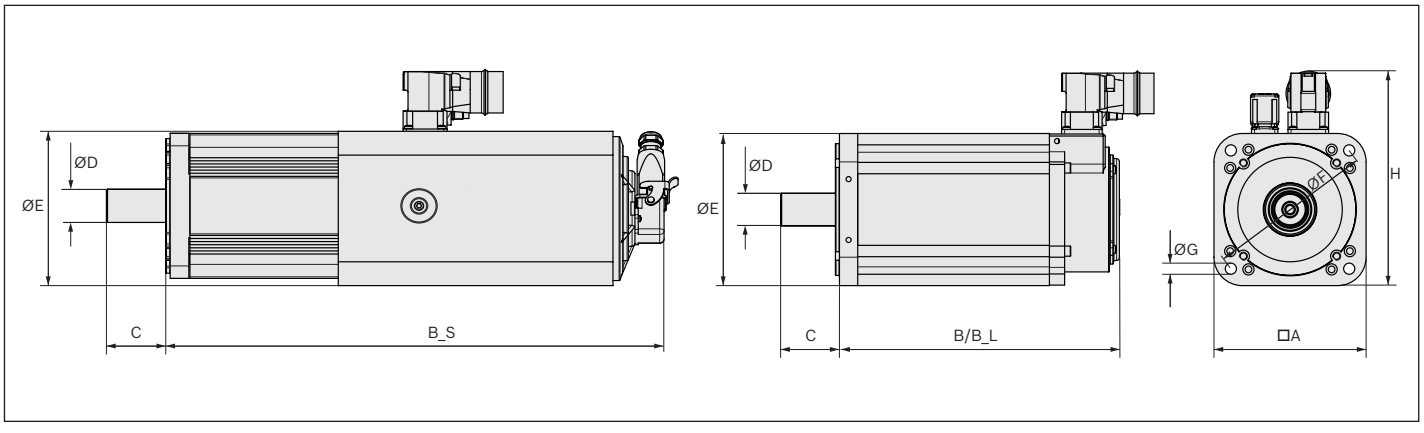
[1] At 750 V DC bus voltage

[2] S = Fan cooled. / L = Liquid cooled



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Type	Moment of inertia	Dimensions										Weight
	J	A	B	B_S[2)]	B_L[2)]	C	Ø D	Ø E	Ø F	Ø G	H	m
	kgm²	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	kg
MSK100A-0200-NN	0,011	192	302	475	–	60	32	130	215	14	262	23
MSK100A-0300-NN	0,011	192	302	475	–	60	32	130	215	14	262	23
MSK100A-0450-NN	0,011	192	302	475	–	60	32	130	215	14	262	23
MSK100B-0200-NN	0,0192	192	368	542	–	60	32	130	215	14	262	34
MSK100B-0300-NN	0,0192	192	368	542	–	60	32	130	215	14	262	34
MSK100B-0400-NN	0,0192	192	368	542	–	60	32	130	215	14	262	34
MSK100B-0450-NN	0,0192	192	368	542	–	60	32	130	215	14	262	34
MSK100C-0200-NN	0,0273	192	434	608	–	60	32	130	215	14	262	45,1
MSK100C-0300-NN	0,0273	192	434	608	–	60	32	130	215	14	262	45,1
MSK100C-0450-NN	0,0273	192	434	608	–	60	32	130	215	14	262	45,1
MSK100D-0200-NN	0,035	192	502	676	–	60	32	130	215	14	262	56
MSK100D-0300-NN	0,035	192	502	676	–	60	32	130	215	14	262	56
MSK100D-0350-NN	0,035	192	502	676	–	60	32	130	215	14	262	56
MSK101C-0200-NN	0,0065	192	349	523	349	80	38	180	215	14	262	28,3
MSK101C-0300-NN	0,0065	192	349	523	349	80	38	180	215	14	262	28,3
MSK101C-0450-NN	0,0065	192	349	523	349	80	38	180	215	14	262	28,3
MSK101D-0200-NN	0,00932	192	410	584	412	80	38	180	215	14	262	40
MSK101D-0300-NN	0,00932	192	410	584	412	80	38	180	215	14	262	40
MSK101D-0450-NN	0,00932	192	410	584	412	80	38	180	215	14	262	40
MSK101E-0200-NN	0,0138	192	501	675	502	80	38	180	215	14	262	53,5
MSK101E-0300-NN	0,0138	192	501	675	502	80	38	180	215	14	262	53,5
MSK101E-0450-NN	0,0138	192	501	675	502	80	38	180	215	14	262	53,5
MSK103A-0300-NN	0,00442	192	186	–	–	80	38	180	215	14	255	18
MSK103B-0300-NN	0,00594	192	211	–	–	80	38	180	215	14	255	22,5
MSK103D-0300-NN	0,00894	192	265	–	–	80	38	180	215	14	255	31,6
MSK131B-0200-NN	0,0232	260	470	685	–	110	48	250	300	18	337	84
MSK131D-0200-NN	0,0382	260	610	825	–	110	48	250	300	18	337	116
MSK133B-0202-SA	0,0476	260	–	582	–	110	48	250	300	18	346	91,6
MSK133C-0202-SA	0,068	260	–	632	–	110	48	250	300	18	370	111
MSK133D-0202-SA	0,078	260	–	682	–	110	48	250	300	18	370	127
MSK133E-0202-SA	0,09	260	–	732	–	110	48	250	300	18	370	146
MSK133B-0203-FN	0,0476	260	–	–	445	110	48	250	300	18	346	91,6
MSK133C-0203-FN	0,068	260	–	–	495	110	48	250	300	18	370	111
MSK133D-0203-FN	0,078	260	–	–	545	110	48	250	300	18	370	127
MSK133E-0203-FN	0,09	260	–	–	595	110	48	250	300	18	370	146



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IndraDyn S – MKE servo motors for potentially explosive areas

The MKE range of motors are specifically designed for use in production plants where an explosive mixture of air and flammable gases, vapors, mist or dust can occur:

- Chemical industry
- Mining
- Printing shops
- Woodworking
- Paint shops
- Mills
- Food processing industry
- Refineries
- Tank farms, and much more

Within the broad range of torques up to a maximum of 187 Nm, there is a choice of various sizes of motor with flameproof enclosures. Needless to say, all are ATEX certified and/or UL/CSA compliant. These motors can also be supplied with a range of options – holding brake, keyway and single-turn or multi-turn encoder systems.





Internationally recognized certification

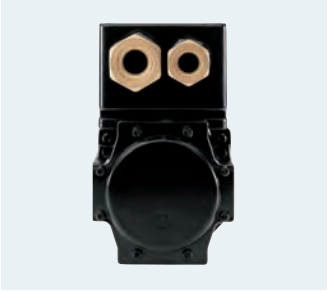
MKE motors have been certified as explosion-protected equipment by the German metrology institute providing scientific and technical services, the PTB Braunschweig, in accordance with Directive 94/9/EC.

With their explosion-proof enclosure, MKE motors are suitable for use in areas with flammable gases and vapors as specified in EN 60079-0/-1 (marking: Ex II 2G Ex d IIB T4 Gb X) as well as flammable dusts according to EN 60079-31 (marking: Ex II 2D Ex tc IIIC T135°C Dc IP6X X).

The certificates are recognized by all member states of the European Union as well as non-European members of the CENELEC.

MKE motors based on the American standard (UL/CSA) were certified directly by Underwriters Laboratories Inc. (UL) in the USA for use in areas with flammable gases, vapors and dusts in accordance with UL674 (marking: c UL us Class I Division 1 Groups C, D).

MKE098 and MKE118 also have the marking c UL us Class II Division 1 Groups F, G.



MKE as per ATEX – terminal box with Ex d cable connectors



MKE as per UL/CSA – terminal box with cables for conduit installation

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Ultra-safe

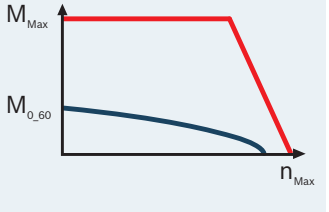
- Maximum torques up to 187 Nm
- Maximum speeds up to 9,000 rpm
- Range of encoder systems
- Explosion-proof enclosure
- Compliance with ATEX and UL/CSA

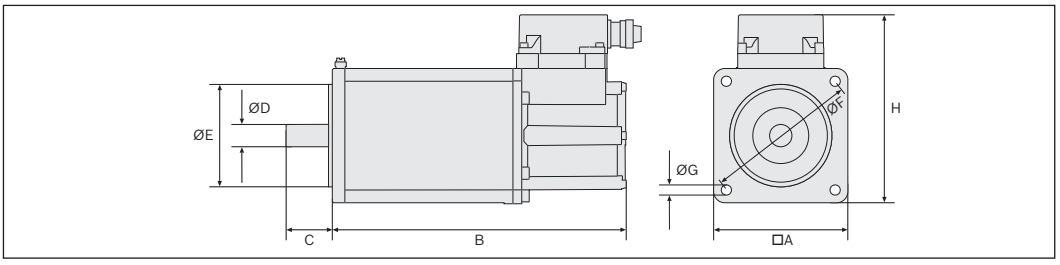


Motor		Maximum speed[1]	Continuous torque at standstill 60K	Maximum torque	Continuous current at standstill 60K	Maximum current	Moment of inertia	Dimensions								Weight[2]
		n_{Max}	M_{0_60}	M_{Max}	I_{0_60}	I_{Max}	J_R	A	B	C	Ø D	Ø E	Ø F	Ø G	H	m
		rpm	Nm	Nm	A	A	kgm²	mm	mm	mm	mm	mm	mm	mm	mm	kg
MKE037	B-144	9,000	0.9	4	3.3	15	0.00003	60	283	20	9	40	70	4.5	123	2.5/2.8
MKE047	B-144	7,000	2.7	11.3	5	22.6	0.00017	88	287	30	14	50	100	6.6	146	5.5/5.8
MKE098	B-047	4,500	12	43.5	9.8	44.3	0.0043	144	383	50	24	110	165	11	202	18/19.1
	B-058	5,000	12	43.5	12.4	55.9	0.0043	144	383	50	24	110	165	11	202	18/19.1
MKE118	B-024	4,000	28	102	15.3	69.1	0.0194	194	492	60	32	130	215	14	205	45/46
	B-058	4,500	28	102	28.4	127.6	0.0194	194	492	60	32	130	215	14	205	45/46
	D-012	2,000	48	187	13	58.5	0.0362	194	664	60	32	130	215	14	205	65/69.1
	D-027	3,000	48	187	22.1	99.6	0.0362	194	664	60	32	130	215	14	205	65/69.1
	D-035	3,000	48	187	29.8	134.3	0.0362	194	664	60	32	130	215	14	205	65/69.1

All specifications relate to the basic version of the motor with encoder A and without holding brake

[1] At 750 V DC bus voltage; [2] Values without/with holding brake





The simple step-by-step guide to ordering your MKE servo motor:

MKE037B-144-AG0-BENN

Motor
- Overall size (e.g. “037”)
- Overall length (e.g. “B”)
- Winding (e.g. “144”)

Encoder
- **A** = Single-turn encoder (Hiperface®), 128 signal periods
- **B**[1] = Single-turn encoder (EnDat), 2,048 signal periods
- **C** = Multi-turn encoder (Hiperface®), 128 signal periods with 4,096 revolutions absolute
- **D**[1] = Multi-turn encoder (EnDat), 2,048 signal periods with 4,096 revolutions absolute

Shaft
- **G** = Plain shaft with shaft sealing ring
- **P** = Keyway conforming to DIN 6885-1 and shaft sealing ring

[1] Not applicable to MKE037 and MKE047

[2] Version E only available with power connection option B

Cable entry
- **4** = Ø 13 – 16 mm
- **6** = Ø 17 – 19.5 mm
- **N** = Conforming to American standard (UL)

Housing design
- **E**[2] = Conforming to European standard (ATEX)
- **U** = Conforming to American standard (UL)

Line terminal
- **A** = On the A side
- **B** = On the B side
- **L** = Left
- **R** = Right

Holding brake
- **0** = Without holding brake
- **1** = With electr. released holding brake

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IndraDyn S –
MSM servo motors for IndraDrive Cs

Maintenance-free MSM motors are available in five sizes rated at up to 750 W continuous mechanical power.
These short-length motors feature high power density and minimized flange dimensions, making them the ideal choice in a wide range of application scenarios.
The IP54 motors come with an absolute encoder and optional holding brake, and they can easily be connected to IndraDrive Cs power units with a 3 AC 230 V line input.



Buffer battery for absolute encoder function
A buffer battery is needed for permanent storage of the axis position.
A battery box which is simple to install is available as an accessory.
Order code: SUP-E01-MSM-BATTERYBOX



As an alternative, the buffer voltage can be supplied directly at the power unit via a special encoder connector with additional terminal connections.
This permits the use of a central battery or an uninterrupted power supply (UPS) as a voltage supply – e.g. for a package consisting of several drives.
Order no. for D-SUB encoder connector with buffer voltage connection: RGS0001/K01
Order no. for pre-assembled encoder cable with RGS001 connector: RKG0041



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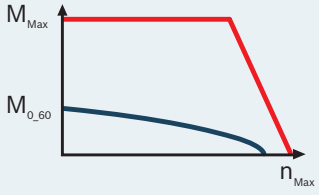
Dynamic and compact

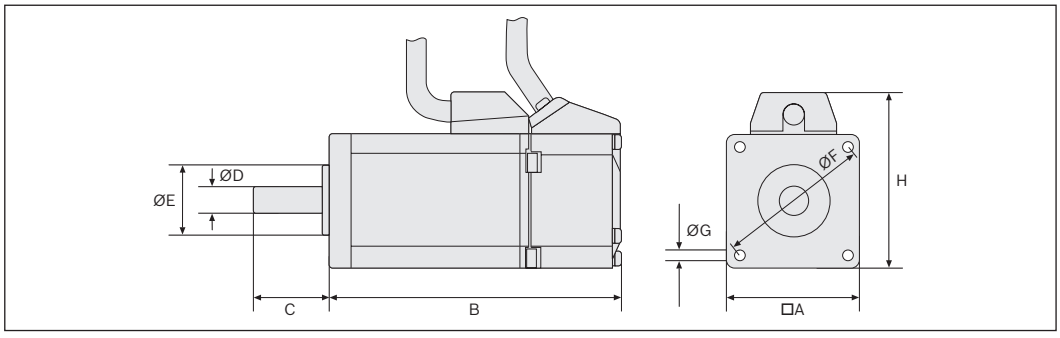
- Maximum torques up to 7.1 Nm
- Maximum speeds up to 5,000 rpm
- Multi-turn absolute encoder
- High dynamic performance
- High performance density



Motor	Rated power	Continuous torque at standstill 60K	Maximum torque	Maximum speed	Moment of inertia	Dimensions								Weight[1]
	P_N	M_{0_60}	M_{Max}	n_{Max}	J_R	A	B[1]	C	Ø D	Ø E	Ø F	Ø G	H	m
	W	Nm	Nm	rpm	kgm²	mm	mm	mm	mm	mm	mm	mm	mm	kg
MSM019A	50	0.16	0.48	5,000	0.0000025	38	72/102	25	8	30	45	3.4	51	0.32/0.53
MSM019B	100	0.32	0.95	5,000	0.0000051	38	92/122	25	8	30	45	3.4	51	0.47/0.68
MSM031B	200	0.64	1.91	5,000	0.0000140	60	79/115.5	30	11	50	70	4.5	73	0.82/1.3
MSM031C	400	1.3	3.8	5,000	0.0000260	60	98.5/135	30	14	50	70	4.5	73	1.2/1.7
MSM041B	750	2.4	7.1	4,500	0.0000870	80	112/149	35	19	70	90	6	93	2.3/3.1

[1] Values without/with holding brake





The simple step-by-step guide to ordering your MSM servo motor:

MSM 019 B -0300 -NN -M0 -C H 1

Size
019 = Flange 38 mm
031 = Flange 60 mm
041 = Flange 80 mm

Overall length (e.g. “B”)

Winding
0300 = Nominal speed 3000 rpm

Cooling system
NN = Natural convection

Encoder
M0[1] = Digital multi-turn absolute encoder with encoder resolution of 17 bits/revolution, 65,536 distinguishable revolutions

Holding brake
0 = Without holding brake
1 = With electrically released holding brake

Shaft
H[2] = Plain shaft without shaft sealing ring

Electrical connection
C = 220 mm cable

[1] Absolute encoder function with external buffer battery

[2] Shaft sealing ring retrofit possible

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IndraDyn A – MAD air-cooled asynchronous servo motors

With their impressive power density, the MAD range of motors is predestined for servo and main spindle applications, such as in machine tools, printing presses or metal forming technology.

High-resolution single-turn or multi-turn encoder systems and outstanding true running quality guarantee highest handling precision. In addition to the optional keyway and holding brake, these motors can also be supplied with a special bearing assembly for high-speed applications or for applications with increased radial load.

The motor protection category IP65 even includes the fan motor, making it suitable for harsh industrial use.

The easy-maintenance design of the motor means that it is even possible to exchange the fan while the motor is running – particularly advantageous in the printing industry.



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Robust and easy-maintenance

- Rated outputs of up to 93 kW
- Maximum speeds up to 11,000 rpm
- Encoder systems for a wide and diverse range of applications
- High protection category IP65, including fan motor
- Easy-maintenance motor design



The simple step-by-step guide to ordering your MAD asynchronous servo motor:

MAD 100C-0100-SA-S2-A H 0-05-N 1

Motor
- Size (e.g. “100”)
- Overall length (e.g. “C”)
- Winding (e.g. “0100”)

Cooling system

SA = Axial-flow fan

SL = Fan cowl

Encoder

S2 = Single-turn encoder (EnDat) 2,048 signal periods

M2 = Multi-turn encoder (EnDat) 2,048 signal periods with 4,096 revolutions absolute

S6[2)] = Single-turn encoder (EnDat) 2,048 signal periods for potentially explosive atmospheres

M6[2)] = Multi-turn encoder (EnDat) 2,048 signal periods with 4,096 revolutions absolute for potentially explosive atmospheres

C0 = Incremental encoder, 2,048 increments

Line terminal

Plug[1)]

A = On the A side

B = On the B side

L = Left

R = Right

Terminal box turntable

E = On the A side

H = On the B side

G = Left

D = Right

Vibration severity grade

1 = A

3[1)] = B

4[1)] = C

Bearing assembly

N = Standard

A[1)] = Fixed bearing A side

H[1)] = High-speed

V[1)] = Heavy duty

Construction

05 = Flange-mounted

35 = Flange-mounted or foot-mounted

Holding brake

0 = Without holding brake

1 = With electr. released holding brake

3[1)] = With electr. released holding brake, heavy duty

5[1)] = With electr. clamped holding brake

Shaft version e.g.

Plain shaft

H = Without seal ring

G = With seal ring (IP65)

F = With labyrinth seal Keyway

Q = Without seal ring

P = With seal ring (IP65)

R = With labyrinth seal

[1)] Only for certain sizes

[2)] Equipment group II 2G, type of protection EEx p d IIB T3 only in combination with fan cowl cooling option SL

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IndraDyn A – technical data

Motor		Rated speed	Maximum speed	Rated torque	Maximum torque	Rated power	Rated current	Moment of inertia	Dimensions								Weight
		n_N	n_{Max}	M_N	M_{Max}	P_N	I_N	J_R	A	B	C	Ø D	Ø E	Ø F	Ø G	H[1)]	m
		rpm	rpm	Nm	Nm	kW	A	kgm²	mm	mm	mm	mm	mm	mm	mm	mm	kg
MAD100	B-0050	500	3,000	34	75.1	1.8	5.3	0.019	192[2)]	462	60	32	130	215	14	287	43
	B-0100	1,000	6,000	31	74.7	3.2	8.9	0.019	192[2)]	462	60	32	130	215	14	287	43
	B-0150	1,500	9,000	30	68	4.7	12.9	0.019	192[2)]	462	60	32	130	215	14	287	43
	B-0200	2,000	11,000	28	66.2	5.9	14.6	0.019	192[2)]	462	60	32	130	215	14	287	43
	B-0250	2,500	11,000	25	61.5	6.5	16.2	0.019	192[2)]	462	60	32	130	215	14	287	43
	C-0050	500	3,000	51	112.3	2.7	8.2	0.0284	192[2)]	537	60	32	130	215	14	287	59
	C-0100	1,000	6,000	50	118.8	5.2	13.2	0.0284	192[2)]	537	60	32	130	215	14	287	59
	C-0150	1,500	9,000	48	110.4	7.5	19.7	0.0284	192[2)]	537	60	32	130	215	14	287	59
	C-0200	2,000	11,000	45	105.5	9.4	25.7	0.0284	192[2)]	537	60	32	130	215	14	287	59
	C-0250	2,500	11,000	40	91	10.5	27.8	0.0284	192[2)]	537	60	32	130	215	14	287	59
	D-0050	500	3,000	70	153.6	3.7	10.1	0.0392	192[2)]	612	60	32	130	215	14	287	72
	D-0100	1,000	6,000	64	146.5	6.7	19.3	0.0392	192[2)]	612	60	32	130	215	14	287	72
	D-0150	1,500	9,000	59	140.8	9.3	25.6	0.0392	192[2)]	612	60	32	130	215	14	287	72
	D-0200	2,000	11,000	54	129.8	11.3	27.2	0.0392	192[2)]	612	60	32	130	215	14	287	72
	D-0250	2,500	11,000	50	118.7	13.1	32.4	0.0392	192[2)]	612	60	32	130	215	14	287	72
MAD130	B-0050	500	3,000	95	208.8	5	12.8	0.084	260[2)]	570	110	42	250	300	18	368	100
	B-0100	1,000	6,000	100	230	10.5	26.9	0.084	260[2)]	570	110	42	250	300	18	368	100
	B-0150	1,500	9,000	85	200	13.4	34.9	0.084	260[2)]	570	110	42	250	300	18	368	100
	B-0200	2,000	10,000	80	187.2	16.8	43	0.084	260[2)]	570	110	42	250	300	18	368	100
	B-0250	2,500	10,000	75	176.5	19.6	47.2	0.084	260[2)]	570	110	42	250	300	18	368	100
	C-0050	500	3,000	140	307.9	7.3	19.7	0.108	260[2)]	640	110	42	250	300	18	368	122
	C-0100	1,000	6,000	125	305	13.1	36.2	0.108	260[2)]	640	110	42	250	300	18	368	122
	C-0150	1,500	9,000	117	275.2	18.4	48.9	0.108	260[2)]	640	110	42	250	300	18	368	122
	C-0200	2,000	10,000	110	252.9	23	57	0.108	260[2)]	640	110	42	250	300	18	368	122
	C-0250	2,500	10,000	100	250	26.2	62	0.108	260[2)]	640	110	42	250	300	18	368	122
	D-0050	500	3,000	180	395.6	9.4	24.2	0.164	260[2)]	770	110	42	250	300	18	368	165
	D-0100	1,000	6,000	170	417.8	17.8	43.7	0.164	260[2)]	770	110	42	250	300	18	368	165
	D-0150	1,500	9,000	155	374.6	24.3	61.5	0.164	260[2)]	770	110	42	250	300	18	368	165
	D-0200	2,000	10,000	150	340.7	31.4	71.3	0.164	260[2)]	770	110	42	250	300	18	368	165
	D-0250	2,500	10,000	120	310	31.4	72	0.164	260[2)]	770	110	42	250	300	18	368	165
MAD160	B-0050	500	3,000	220	483.9	11.5	26.1	0.25	316	748	110	55	300	350	18	420	201
	B-0100	1,000	6,000	200	520	20.9	43.5	0.25	316	748	110	55	300	350	18	420	201
	B-0150	1,500	6,000	190	440.1	29.9	61.6	0.25	316	748	110	55	300	350	18	420	201
	B-0200	2,000	6,000	160	375.3	33.5	75.8	0.25	316	748	110	55	300	350	18	420	201
	C-0050	500	3,000	240	528.2	12.6	27.6	0.311	316	838	110	55	300	350	18	420	238
	C-0100	1,000	6,000	225	530	23.6	52.9	0.311	316	838	110	55	300	350	18	420	238
	C-0150	1,500	6,000	215	496	33.8	75.3	0.311	316	838	110	55	300	350	18	420	238
	C-0200	2,000	6,000	210	494.2	44	93.9	0.311	316	838	110	55	300	350	18	420	238
MAD180	C-0050	500	3,000	325	715.5	17	38.2	0.458	320[2)]	979	140	60	300	350	18	469	334
	C-0100	1,000	6,000	300	620	31.4	69	0.458	320[2)]	979	140	60	300	350	18	447	334
	C-0150	1,500	6,000	270	681	42.4	88.6	0.458	320[2)]	979	140	60	300	350	18	447	334
	C-0200	2,000	6,000	250	594.4	52.4	104.6	0.458	320[2)]	979	140	60	300	350	18	447	334
	D-0050	500	3,000	390	857.8	20.4	39.7	0.594	320[2)]	1,089	140	60	300	350	18	447	403
	D-0100	1,000	6,000	370	901.5	38.7	82.4	0.594	320[2)]	1,089	140	60	300	350	18	447	403
	D-0150	1,500	6,000	340	794	53.4	107.4	0.594	320[2)]	1,089	140	60	300	350	18	447	403
	D-0200	2,000	6,000	300	768.2	62.8	117.4	0.594	320[2)]	1,089	140	60	300	350	18	447	403

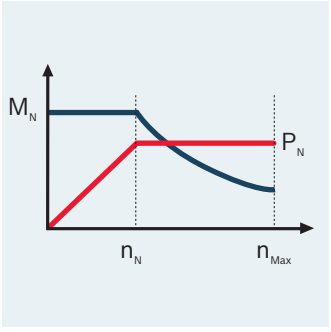
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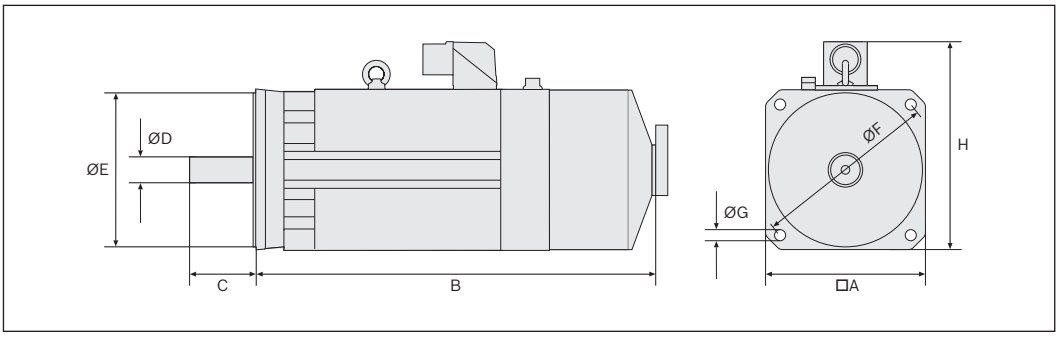
Motor		Rated speed	Maximum speed	Rated torque	Maximum torque	Rated power	Rated current	Moment of inertia	Dimensions								Weight
		n_N	n_{Max}	M_N	M_{Max}	P_N	I_N	J_R	A	B	C	Ø D	Ø E	Ø F	Ø G	H[1]	m
		rpm	rpm	Nm	Nm	kW	A	kgm²	mm	mm	mm	mm	mm	mm	mm	mm	kg
MAD225	C-0050	500	3,000	660	1,450	34.6	72	1.65	434[2]	1,240	140	75	350	400	18	572	610
	C-0100	1,000	3,750	640	1,450	67	121	1.65	434[2]	1,240	140	75	350	400	18	572	610
	C-0150	1,500	3,750	593	1,450	93.1	174	1.65	434[2]	1,240	140	75	350	400	18	572	610

All the specifications given relate to the basic version of the motor without a holding brake. The maximum speed depends on the bearing version.

1) Motor height H for version with terminal box, the values for a power connection with plug can deviate and are as follows:
MAD100 = 260 mm, MAD130 = 338 mm, MAD160 = 393 mm

2) Housing size > flange size A





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IndraDyn A –
MAF liquid-cooled asynchronous servo motors

The liquid-cooled motors in the MAF series are particularly suitable for applications demanding maximum torques in minimum amounts of space. At the same time the unique cooling system design ensures the thermal isolation of motor and machine and therefore maximum handling precision. The quick couplings with integrated leak-proofing simplify your maintenance work.

Options such as holding brakes, different encoder systems, vibration severity grades and shaft specifications allow you to tailor the MAF motors optimally to your specific application.



Bosch Rexroth AG, 71511 EN/2013-11

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Compact and powerful

- Rated outputs of up to 120 kW
- Maximum speeds up to 11,000 rpm
- Encoder systems for a wide and diverse range of applications
- High protection category IP65
- Liquid cooling with quick coupling



The simple step-by-step guide to ordering your MAF asynchronous servo motor:

MAF 100C-0100-FQ-S2-A H 0-05-N 1

Motor
- Size (e.g. “100”)
- Overall length (e.g. “C”)
- Winding (e.g. “0100”)

Cooling system connection
FQ = Connection thread
FR = Quick coupling (comprised in the delivery)

Encoder
S2 = Single-turn encoder (EnDat), 2,048 signal periods
M2 = Multi-turn encoder (EnDat) 2,048 signal periods with 4,096 revolutions absolute
S6[2)] = Single-turn encoder (EnDat), 2,048 signal periods for potentially explosive atmospheres
M6[2)] = Multi-turn encoder (EnDat), 2,048 signal periods with 4,096 revolutions absolute for potentially explosive atmospheres
C0 = Incremental encoder, 2,048 increments

Line terminal
Plug[1)]
A = On the A side
B = On the B side
L = Left
R = Right
Terminal box turntable
E = On the A side
H = On the B side
G = Left
D = Right

Vibration severity grade
1 = A
3[1)] = B
4[1)] = C

Bearing assembly
N = Standard
A[1)] = Fixed bearing A side
H[1)] = High-speed
V[1)] = Heavy duty

Construction
05 = Flange-mounted
35 = Flange-mounted or foot-mounted

Holding brake
0 = Without holding brake
1 = With electr. released holding brake
3[1)] = With electr. released holding brake, heavy duty
5[1)] = With electr. clamped holding brake

Shaft version e.g.
Plain shaft
H = Without seal ring
G = With seal ring (IP65)
F = With labyrinth seal
Keyway
Q = Without seal ring
P = With seal ring (IP65)
R = With labyrinth seal

[1)] Only for certain sizes
[2)] Equipment group II 2G, type of protection EEx p d IIB T3 only in combination with fan cowl cooling option SL

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IndraDyn A – technical data

Motor		Rated speed	Maximum speed	Rated torque	Maximum torque	Rated power	Rated current	Moment of inertia	Dimensions								Weight
		n_N	n_{Max}	M_N	M_{Max}	P_N	I_N	J_R	A	B	C	Ø D	Ø E	Ø F	Ø G	H[1)]	m
		rpm	rpm	Nm	Nm	kW	A	kgm²	mm	mm	mm	mm	mm	mm	mm	mm	kg
MAF100	B-0050	500	3,000	50	109.7	2.6	8.5	0.019	192	382	60	38	130	215	14	287	38
	B-0100	1,000	6,000	46	110	4.8	15.2	0.019	192	382	60	38	130	215	14	287	38
	B-0150	1,500	9,000	42	101.4	6.6	18.1	0.019	192	382	60	38	130	215	14	287	38
	B-0200	2,000	11,000	38	92.4	8	23.9	0.019	192	382	60	38	130	215	14	287	38
	B-0250	2,500	11,000	33	83.6	8.6	26	0.019	192	382	60	38	130	215	14	287	38
	C-0050	500	3,000	70	153.7	3.9	12.1	0.0284	192	457	60	38	130	215	14	287	52
	C-0100	1,000	6,000	68	154	7.5	19	0.0284	192	457	60	38	130	215	14	287	52
	C-0150	1,500	9,000	66	149.5	10.4	27.9	0.0284	192	457	60	38	130	215	14	287	52
	C-0200	2,000	11,000	64	145.2	13.4	36.7	0.0284	192	457	60	38	130	215	14	287	52
	C-0250	2,500	11,000	62	138.1	16.2	40.2	0.0284	192	457	60	38	130	215	14	287	52
	D-0050	500	3,000	88	193.3	4.6	14.5	0.032	192	532	60	38	130	215	14	287	64
	D-0100	1,000	6,000	84	190	8.8	27.1	0.032	192	532	60	38	130	215	14	287	64
	D-0150	1,500	9,000	79	185.3	12.4	32.7	0.032	192	532	60	38	130	215	14	287	64
	D-0200	2,000	11,000	80	182.3	16.8	43.1	0.032	192	532	60	38	130	215	14	287	64
	D-0250	2,500	11,000	75	177.5	19.6	45.8	0.032	192	532	60	38	130	215	14	287	64
MAF130	B-0050	500	3,000	116	254.7	6.1	14.7	0.079	260	408	110	42	250	300	18	338	81
	B-0100	1,000	6,000	112	254.7	11.7	28.4	0.079	260	408	110	42	250	300	18	338	81
	B-0150	1,500	9,000	115	264	18.1	43.7	0.079	260	408	110	42	250	300	18	338	81
	B-0200	2,000	10,000	100	220	20.9	52.7	0.079	260	408	110	42	250	300	18	338	81
	B-0250	2,500	10,000	90	210	23.6	55.5	0.079	260	408	110	42	250	300	18	338	81
	C-0050	500	3,000	155	340	8.1	21	0.101	260	478	110	42	250	300	18	338	106
	C-0100	1,000	6,000	150	330	15.7	38	0.101	260	478	110	42	250	300	18	338	106
	C-0150	1,500	9,000	145	329.8	22.8	53.2	0.101	260	478	110	42	250	300	18	338	106
	C-0200	2,000	10,000	135	314.7	28.3	69.8	0.101	260	478	110	42	250	300	18	338	106
	C-0250	2,500	10,000	125	298.4	32.7	75.5	0.101	260	478	110	42	250	300	18	338	106
	D-0050	500	3,000	230	506.3	12	32.3	0.151	260	608	110	42	250	300	18	338	147
	D-0100	1,000	6,000	220	500	23	50.7	0.151	260	608	110	42	250	300	18	338	147
	D-0150	1,500	9,000	200	484.4	31.4	72.6	0.151	260	608	110	42	250	300	18	338	147
	D-0200	2,000	10,000	200	461.4	41.9	93.9	0.151	260	608	110	42	250	300	18	338	147
	D-0250	2,500	10,000	190	432.1	49.7	113	0.151	260	608	110	42	250	300	18	338	147
MAF160	B-0050	500	3,000	270	594.5	14.1	34.3	0.23	316	618	110	60	300	350	18	393	197
	B-0100	1,000	6,000	260	592.7	27.2	73.7	0.23	316	618	110	60	300	350	18	393	197
	B-0150	1,500	6,000	250	570.8	39.3	89.5	0.23	316	618	110	60	300	350	18	393	197
	B-0200	2,000	6,000	240	550.1	50.3	108.5	0.23	316	618	110	60	300	350	18	393	197
	C-0050	500	3,000	340	747.8	17.8	47.4	0.26	316	708	110	60	300	350	18	393	227
	C-0100	1,000	6,000	325	746.4	34	91.2	0.26	316	708	110	60	300	350	18	393	227
	C-0150	1,500	6,000	300	681.4	47.1	109.5	0.26	316	708	110	60	300	350	18	393	227
	C-0200	2,000	6,000	285	677.4	59.7	136	0.26	316	708	110	60	300	350	18	393	227
MAF180	C-0050	500	3,000	435	986.2	22.8	50	0.49	320[2)]	792	140	60	300	350	18	449	322
	C-0100	1,000	6,000	400	957	41.9	93.9	0.49	320[2)]	792	140	60	300	350	18	449	322
	C-0150	1,500	6,000	365	858.1	57.3	128.8	0.49	320[2)]	792	140	60	300	350	18	449	322
	C-0200	2,000	6,000	318	739.2	66.6	154	0.49	320[2)]	792	140	60	300	350	18	449	322
	D-0050	500	3,000	500	1,100.2	26.2	60.4	0.61	320[2)]	902	140	60	300	350	18	449	382
	D-0100	1,000	6,000	460	1,094.5	48.2	94.8	0.61	320[2)]	902	140	60	300	350	18	449	382
	D-0150	1,500	6,000	435	1,013	68.3	146.1	0.61	320[2)]	902	140	60	300	350	18	449	382
	D-0200	2,000	6,000	400	1,008	83.8	168.5	0.61	320[2)]	902	140	60	300	350	18	449	382

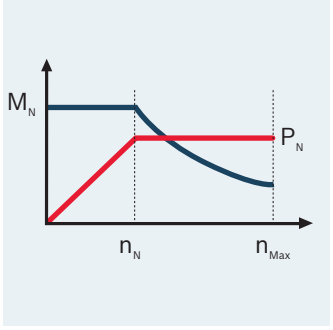
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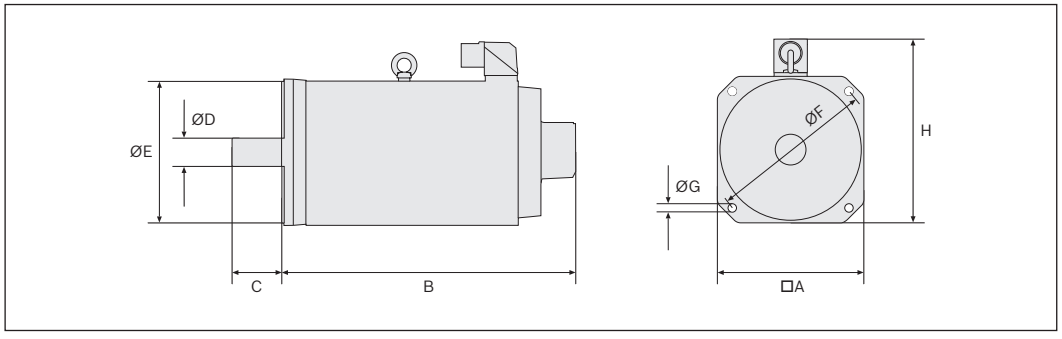
Motor		Rated speed	Maximum speed	Rated torque	Maximum torque	Rated power	Rated current	Moment of inertia	Dimensions								Weight
		n_N	n_{Max}	M_N	M_{Max}	P_N	I_N	J_R	A	B	C	Ø D	Ø E	Ø F	Ø G	H[1]	m
		rpm	rpm	Nm	Nm	kW	A	kgm^2	mm	mm	mm	mm	mm	mm	mm	mm	kg
MAF225	C-0050	500	3,000	860	1,750	45	98	1.65	434[2]	932	140	75	350	400	18	572	587
	C-0100	1,000	3,750	820	1,750	85.9	170	1.65	434[2]	932	140	75	350	400	18	572	587
	C-0150	1,500	3,750	764	1,750	120	215	1.65	434[2]	932	140	75	350	400	18	572	587

All the specifications given relate to the basic version of the motor without a holding brake. The maximum speed depends on the bearing version.

[1] Motor height H for version with terminal box, values for a power connection with plug can deviate and are as follows:
MAF100 = 260 mm, MAF130 = 338 mm, MAF160 = 393 mm

[2] Housing size > flange size A





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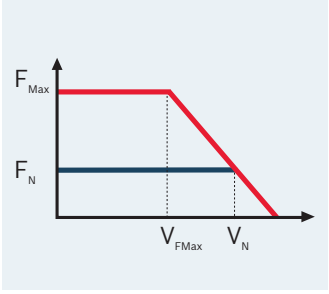
IndraDyn L –
MLF synchronous ironcore linear motors

Compact construction, high protection category and maximum forces of up to 21,500 N – these characteristics make the MLF synchronous linear motors well suited to meet the challenges posed by machine tools.

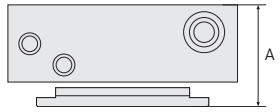
Given their low force ripple, the motors are particularly suitable for quickly transporting large masses in harsh environments. The motors are fully encapsulated in a stainless steel/titanium alloy sheet metal case, and they can be installed right in the machining area of machine tools.

There is a choice of sizes geared to typical requirements supplied in standard encapsulation or thermal encapsulation to minimize the heat that enters the machine. The combination of several linear motors – whether in series or parallel – gives rise to completely new machine concepts with greatly enhanced machining force.





Total



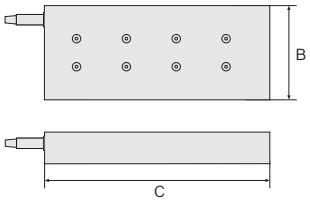
The simple step-by-step guide to ordering your IndraDyn L synchronous linear motor:

MLP140C-0170-FS-N0CN-NNNN

Motor

Vibration severity grade
S = Standard encapsulation
T = Thermal encapsulation

Primary part



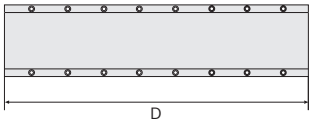
The simple step-by-step guide to ordering your IndraDyn L synchronous linear motor:

MLS140S-3A-150-NNNN

Motor
▶ Size (e.g. “140”)

Segment length D
0150 = 150 mm
0450 = 450 mm
0600 = 600 mm

Secondary part



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High dynamics and precision

- Maximum force of up to 21,500 N
- Graduated nominal speeds of up to 500 m/min
- Compact dimensions
- Complete stainless steel encapsulation in IP65
- Heat dissipation minimized by liquid cooling



Motor								Standard encapsulation				Thermal encapsulation			
		Continuous nominal force	Maximum force	Nominal speed	Maximum speed with Fmax	Continuous nominal current	Maximum current				Primary part weight				Primary part weight
		F_N	F_{Max}	v_N	v_{FMax}	I_N	I_{Max}	A	B	C	m_P	A	B	C	m_P
		N	N	m/min	m/min	A	A	mm	mm	mm	kg	mm	mm	mm	kg
MLP040	A-0300	250	800	500	300	3.8	18	61.4	100	210	4.7	73.9	108	235	6.1
	B-0150	370	1,150	300	150	3.9	18.7	61.4	100	285	6.1	73.9	108	310	8.1
	B-0250	370	1,150	400	250	5.6	28.3	61.4	100	285	6.1	73.9	108	310	8.1
	B-0300	370	1,150	500	300	6.3	36.9	61.4	100	285	6.1	73.9	108	310	8.1
MLP070	A-0150	550	2,000	200	150	4.5	29.6	61.4	130	285	8.4	73.9	138	310	10.9
	A-0220	550	2,000	360	220	6.1	40.5	61.4	130	285	8.4	73.9	138	310	10.9
	A-0300	550	2,000	450	300	8	42	61.4	130	285	8.4	73.9	138	310	10.9
	B-0100	820	2,600	200	100	4.6	23.6	61.4	130	360	10.4	73.9	138	385	13.4
	B-0120	820	2,600	220	120	5.9	42.8	61.4	130	360	10.4	73.9	138	385	13.4
	B-0150	820	2,600	260	150	7.3	56.8	61.4	130	360	10.4	73.9	138	385	13.4
	B-0250	820	2,600	400	250	10.4	57.1	61.4	130	360	10.4	73.9	138	385	13.4
	B-0300	820	2,600	450	300	11.6	67.7	61.4	130	360	10.4	73.9	138	385	13.4
	C-0120	1,200	3,800	180	120	9.2	56.9	61.4	130	510	14.5	73.9	138	535	18.4
	C-0150	1,200	3,800	250	150	11	65.9	61.4	130	510	14.5	73.9	138	535	18.4
	C-0240	1,200	3,800	350	240	15.6	107.9	61.4	130	510	14.5	73.9	138	535	18.4
	C-0300	1,200	3,800	450	300	18.4	106.7	61.4	130	510	14.5	73.9	138	535	18.4
MLP100	A-0090	1,180	3,750	150	90	5.9	34.2	61.4	160	360	13.5	73.9	168	385	17
	A-0120	1,180	3,750	190	120	7.4	40.5	61.4	160	360	13.5	73.9	168	385	17
	A-0150	1,180	3,750	220	150	9.2	50.8	61.4	160	360	13.5	73.9	168	385	17
	A-0190	1,180	3,750	290	190	11.9	69.2	61.4	160	360	13.5	73.9	168	385	17
	B-0120	1,785	5,600	190	120	12.2	71.2	61.4	160	510	18.7	73.9	168	535	23.3
	B-0250	1,785	5,600	350	250	24.1	142.6	61.4	160	510	18.7	73.9	168	535	23.3
	C-0090	2,310	7,150	170	90	12.1	83.6	61.4	160	660	24	73.9	168	685	29.7
	C-0120	2,310	7,150	190	120	15	84.9	61.4	160	660	24	73.9	168	685	29.7
	C-0190	2,310	7,150	290	190	24.2	147.1	61.4	160	660	24	73.9	168	685	29.7
MLP140	A-0120	1,680	5,200	190	120	12.1	70.8	61.4	200	360	17	73.9	208	385	21.2
	B-0090	2,415	7,650	160	90	14	79.3	61.4	200	510	24.5	73.9	208	535	30.1
	B-0120	2,415	7,650	190	120	17.8	103.8	61.4	200	510	24.5	73.9	208	535	30.1
	C-0050	3,150	10,000	110	50	14.6	78.6	61.4	200	660	32	73.9	208	685	38.9
	C-0120	3,150	10,000	190	120	20.7	122.9	61.4	200	660	32	73.9	208	685	38.9
	C-0170	3,150	10,000	250	170	28.5	137.8	61.4	200	660	32	73.9	208	685	38.9
	C-0350	3,150	10,000	400	350	47.1	231.1	61.4	200	660	32	73.9	208	685	38.9
MLP200	A-0090	2,415	7,450	170	90	12.9	69.6	61.4	260	360	23	73.9	268	385	28.3
	A-0120	2,415	7,450	190	120	14.8	81.3	61.4	260	360	23	73.9	268	385	28.3
	B-0040	3,465	10,900	100	40	13.8	74.2	61.4	260	510	33	73.9	268	535	40
	B-0120	3,465	10,900	190	120	21.8	128.6	61.4	260	510	33	73.9	268	535	40
	C-0090	4,460	14,250	170	90	22.9	117.9	61.4	260	660	42	73.9	268	685	50.7
	C-0120	4,460	14,250	190	120	28.4	165.6	61.4	260	660	42	73.9	268	685	50.7
	C-0170	4,460	14,250	220	170	35.6	162.6	61.4	260	660	42	73.9	268	685	50.7
	D-0060	5,560	17,750	140	60	25.2	126.2	61.4	260	810	51	73.9	268	835	61.3
	D-0100	5,560	17,750	180	100	44.8	204.4	61.4	260	810	51	73.9	268	835	61.3
	D-0120	5,560	17,750	190	120	47.5	201.5	61.4	260	810	51	73.9	268	835	61.3
MLP300	A-0090	3,350	11,000	160	90	17.2	99.3	–	–	–	–	87	368	385	40.8
	A-0120	3,350	11,000	190	120	21.6	129.9	–	–	–	–	87	368	385	40.8
	B-0070	5,150	16,300	140	70	28.4	141.9	–	–	–	–	87	368	535	58.3
	B-0120	5,150	16,300	190	120	38.2	223.5	–	–	–	–	87	368	535	58.3
	C-0060	6,720	21,500	110	60	29.6	143.1	–	–	–	–	87	368	685	74.9
	C-0090	6,720	21,500	150	90	35.8	205	–	–	–	–	87	368	685	74.9
	C-0120	6,720	21,500	180	120	45.2	300	–	–	–	–	87	368	685	74.9

All the specifications given are based on operation with liquid cooling and 540 V DC bus voltage.

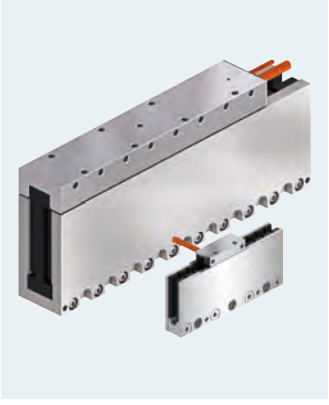
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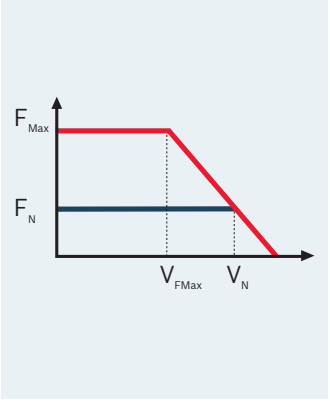
IndraDyn L – MCL synchronous ironless linear motors

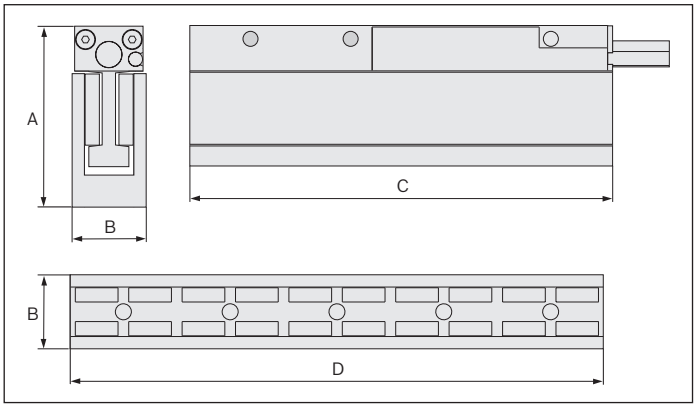
Ironless MCL linear motors position small masses with superior precision and maximum synchronization. Compared to iron core motors, these motors distinguish themselves with the ironless design of the primary part, which contains the fully potted three-phase copper winding. The U-shaped secondary part contains permanent magnets and encloses the primary part. This design means that there is no attraction or cogging force between the primary and secondary part and the force constant is linear. These aspects, combined with the relatively small moving masses of the primary part, create a high level of dynamics with a very high degree of precision.

The compact design features different mounting planes on primary and secondary parts, providing the highest flexibility in construction design. Optionally, the linear motors also come with a Hall sensor unit to detect the position for the initial commutation.

Typical areas in which ironless linear motors can be used are applications where it is important to move small masses at the maximum possible cycle speed with extremely high precision. That includes pick-and-place machines used in the semiconductor segment as well as those used in general automation processes.
The exceptionally smooth movement of the MCL motors also makes them perfect for use in measuring and testing machines.







The simple step-by-step guide to ordering your IndraDyn L synchronous linear motor:

MCP 040C-V070-NI-N0 CN-NNNN

Motor (primary part)
- Size (e.g. “040”)
- Overall length (e.g. “C”)
- Winding (e.g. “070”)

Hall sensor
N0 = Without Hall sensor
L0 = Digital Hall sensor[1)]
L1 = Analog Hall sensor[1)]

MCS 040-3S-0120-NNNN

Motor (secondary part)
- Size (e.g. “040”)

Segment length D
For MCS015:
0066 = 66 mm
0099 = 99 mm
0120 = 120 mm
0180 = 180 mm
0300 = 300 mm

[1)] Only for sizes MCP020-MCP070

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Linear motor without iron core

- Maximum force of up to 3,320 N
- Maximum speeds of up to 1,400 m/min
- Excellent synchronization, no cogging forces
- Low own weight, high acceleration and dynamics
- Simple integration thanks to various mounting planes



Type		Conti-nuous nom. force	Maximum force	Nom. speed	Maximum speed with Fmax	Rated current	Maximum current	Dimensions			Primary part weight
		F_N	F_{Max}	V_N	V_{FMax}	I_N	I_{Max}	A	B	C	m
		N	N	m/min	m/min	A	A	mm	mm	mm	kg
MCP015	A-L040	6	24	600	90	1.3	5.2	51	14.8	34	0.04
	B-L040	12	48	560	170	2.4	9.6	51	14.8	67	0.06
MCP020	B-V180	26	104	560	200	0.8	3.2	52	20.8	127	0.18
	B-V720	26	104	1,100	690	1.4	5.6	52	20.8	127	0.18
	C-V180	40	160	590	150	1.3	5.2	52	20.8	187	0.28
	C-V720	40	160	1,110	680	2.2	8.8	52	20.8	187	0.28
	D-V180	56	224	620	190	1.9	7.6	52	20.8	247	0.38
	D-V720	56	224	1,220	760	3.5	14	52	20.8	247	0.38
MCP030	B-V180	48	192	510	180	1.3	5.2	67	25	127	0.34
	B-V390	48	192	680	400	1.6	6.4	67	25	127	0.34
	C-V180	74	296	460	170	1.8	7.2	67	25	187	0.52
	C-V390	74	296	630	370	2.4	9.6	67	25	187	0.52
	D-V180	105	420	440	180	2.5	10	67	25	247	0.7
	D-V390	105	420	660	380	3.5	14	67	25	247	0.7
MCP040	B-V070	73	292	290	80	1.2	4.8	86.4	34.3	127	0.56
	B-V300	73	292	530	290	1.9	7.6	86.4	34.3	127	0.56
	C-V070	108	432	290	60	1.7	6.8	86.4	34.3	187	0.81
	C-V300	108	432	530	310	2.9	11.6	86.4	34.3	187	0.81
	E-V070	183	732	280	60	2.9	11.6	86.4	34.3	307	1.26
	E-V300	183	732	510	260	4.7	18.8	86.4	34.3	307	1.26
	G-V070	258	1,032	260	50	3.9	15.6	86.4	34.3	427	1.71
	G-V300	258	1,032	500	290	6.6	26.4	86.4	34.3	427	1.71
MCP070	C-V050	215	860	180	50	2.2	8.8	124	49.5	187	1.5
	C-V300	215	860	490	340	5.1	20.4	124	49.5	187	1.5
	D-V050	286	1,144	180	50	2.8	11.2	124	49.5	247	1.95
	D-V300	286	1,144	460	280	6.4	25.6	124	49.5	247	1.95
	F-V050	428	1,712	210	70	4.6	18.4	124	49.5	367	2.85
	F-V300	428	1,712	460	290	9.2	36.8	124	49.5	367	2.85
	M-V050	830	3,320	200	60	9	36	124	49.5	727	5.9
	M-V230	830	3,320	370	230	15.7	62.8	124	49.5	727	5.9

All the specifications given are based on operation with 300 V DC bus voltage (with 48 V for MCL015) and an optimum thermal connection.

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IndraDyn T – MBT synchronous torque motors

The IndraDyn T torque motors are liquid- cooled kit motors which have been optimized for high torques of up to 13,800 Nm. They consist of a stator with three-phase winding and a rotor with permanent magnets.
Typical areas of application for these motors mainly include direct drives in rotary tables or swivel axes in machining centers. However, they also offer innovative new approaches to solutions in mechanical engineering applications using robots, plastics processing machines, woodworking machines, lathes and special purpose machines.
The “cooling jacket” option on the MST stators consists of a closed-circuit cooling jacket, mounting flange and terminal box or plug. The rear side of the cooling jacket is open, and the rotor is attached to the machine shaft and mounting. This solution features an optimal mix of standard solution and design freedom for the integration of direct-drive technology. Reduced design effort and service-friendly mounting offer substantial additional cost advantages.



The simple step-by-step guide to ordering your IndraDyn T torque motor:

MST 530B-0070-FT-N0 CN-NNNN

Stator

Motor (stator)

- Size (e.g. “530”)
- Overall length (e.g. “B”)
- Winding (e.g. “0070”)

Liquid cooling system

FT = Open cooling jacket

FH = Closed cooling jacket in housing, flange-mounted

Electrical connection outlet

CN = Axial on side with larger Ø

SN = Axial on side with smaller Ø

RN[1)] = Radial on side with larger Ø

KR[1)] = Terminal box

PU[1)] = Plug, turnable

[1)] Depending on motor size

The simple step-by-step guide to ordering your IndraDyn T torque motor:

MRT 530B-3A-0410-NNNN

Rotor

Motor (rotor)

- Size (e.g. “530”)
- Overall length (e.g. “B”)

Internal diameter of rotor

The rotors can be supplied with different internal diameters.

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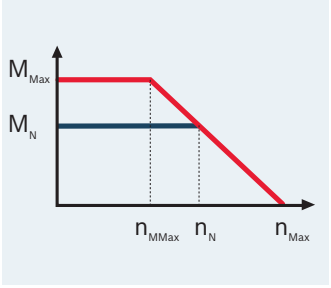
Powerful and direct

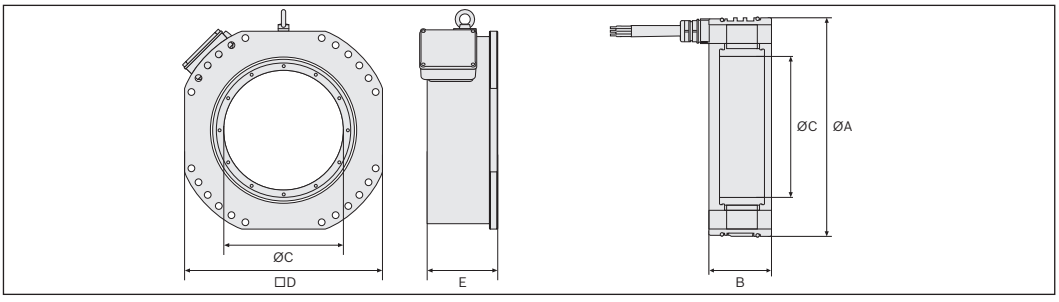
- Maximum torques up to 13,800 Nm
- Full torque even at standstill
- Extremely high overload capacity
- Optionally available with flange housing
- Easy assembly



Motor		Rated torque	Maximum torque	Speed at M_{max}	Rated speed	Rated current	Maximum current	Moment of inertia (rotor)[1]	Dimensions					Weight[2]
		M_N	M_{Max}	n_{MMax}	n_N	I_N	I_{Max}	J_R	Ø A	B	Ø C	Ø D	E	m
		Nm	Nm	rpm	rpm	A	A	kgm²	mm	mm	mm	mm	mm	kg
MST130	A-0200	9	15	900	2,000	7.5	16	0.0008	150	63	60	–	–	2.4/0.65
	C-0050	25	40	225	500	7.5	12	0.0018	150	103	60	–	–	5.1/1.5
	C-0200	25	40	900	2,000	15.2	38	0.0018	150	103	60	–	–	5.1/1.5
	E-0020	42	65	90	200	7.5	12	0.0029	150	143	60	–	–	7.7/2.2
MST160	A-0050	35	90	180	500	6.5	20	0.0059	180	95	80	–	–	5.6/2.4
	C-0050	70	180	180	500	13	40	0.0108	180	145	80	–	–	9.6/4.3
	E-0050	105	270	180	500	19.5	60	0.0158	180	195	80	–	–	13.9/6.2
MST210	A-0027	50	100	100	270	7	25	0.012	230	75	120	260	140	7.2/3
	C-0027	120	250	100	270	13	50	0.023	230	120	120	260	185	11.5/4.8
	C-0050	120	250	200	500	25	100	0.023	230	120	120	260	185	11.5/4.8
	D-0070	150	300	270	700	32	120	0.027	230	150	120	260	215	13.8/5.8
	E-0027	240	500	100	270	24	90	0.042	230	195	120	260	260	18.8/7.8
MST290	B-0018	220	460	70	180	14.8	60	0.08	310	105	200	385	172	13.5/6.2
	D-0002	350	700	10	25	6.3	25	0.11	310	135	200	385	202	20/9
	D-0004	350	700	17	45	10.4	30	0.11	310	135	200	385	202	20/9
	D-0018	350	700	70	180	26	100	0.11	310	135	200	385	202	20/9
	E-0004	575	1,150	16	40	12.5	50	0.17	310	195	200	385	262	25.1/11.6
	E-0018	575	1,150	70	180	35	125	0.17	310	195	200	385	262	25.1/11.6
MST360	B-0006	375	760	145	60	8.8	20	0.19	385	120	260	450	195	23/9.8
	B-0018	375	900	70	180	20	70	0.19	385	120	260	450	195	23/9.8
	D-0009	525	1,150	180	90	12	31	0.27	385	150	260	450	225	28.8/13.5
	D-0012	525	1,150	45	120	16.5	60	0.27	385	150	260	450	225	28.8/13.5
	D-0018	525	1,150	70	180	28	100	0.27	385	150	260	450	225	28.8/13.5
	E-0018	875	1,900	70	180	42	141	0.44	385	210	260	450	285	40.3/20.9
MST450	B-0012	540	1,200	45	120	22	70	0.45	480	120	350	570	200	31/13
	D-0006	810	1,800	25	60	18.8	50	0.64	480	150	350	570	230	38.7/17.9
	D-0012	810	1,800	45	120	33	100	0.64	480	150	350	570	230	38.7/17.9
	E-0006	1,400	3,250	25	60	32	88	1.01	480	210	350	570	290	54.2/27.7
	E-0012	1,400	3,250	45	120	46	125	1.01	480	210	350	570	290	54.2/27.7
MST530	B-0010	800	1,800	45	100	28.6	71	0.92	565	120	410	645	200	36/22
	C-0010	1,200	2,700	40	100	31.2	88	1.25	565	150	410	645	230	45/27.5
	E-0010	2,100	4,700	40	100	64	212	1.92	565	210	410	645	290	63/38.5
	G-0006	4,200	9,200	25	60	76	240	3.84	565	370	410	645	455	144/77
	G-0007	4,200	9,200	28	70	96	305	3.84	565	370	410	645	455	144/77
	G-0010	4,200	9,200	130	100	117	350	3.84	565	370	410	645	455	144/77
	L-0003	6,300	11,000	68	30	57.8	120	5.76	565	520	410	645	605	205/115
	L-0006	6,300	13,800	25	60	120	380	5.76	565	520	410	645	605	205/115
	L-0007	6,300	13,800	28	70	133	420	5.76	565	520	410	645	605	205/115

All the specifications given are based on operation with liquid cooling and 540 V DC bus voltage.
[1] Depends on rotor version; 2) Stator/rotor on open cooling jacket version

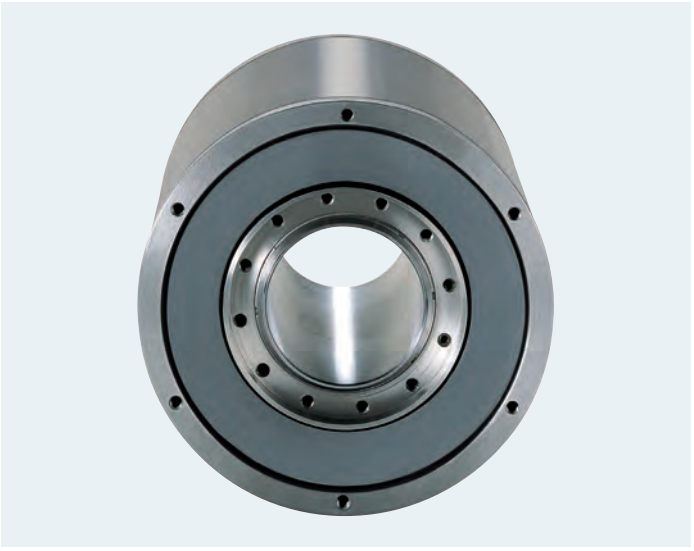




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IndraDyn H – MBS synchronous high-speed motors

The liquid-cooled high-speed IndraDyn H kit motors achieve maximum torques of up to 4,500 Nm with speeds of up to 30,000 rpm.
With their broad constant output power range, short ramp-up time and low rotor temperature they are predestined for motor spindles and other similar areas of application.
The new on board cooling system simplifies their integration in the machine and increases their cooling efficiency.
For extra easy assembly and disassembly we can supply the rotor on request with a step interference fit and the corresponding hydraulic connections.



The simple step-by-step guide to ordering your high-speed IndraDyn H motor:

MSS 182A-0100-FA-N0CN-NNNN

Stator

Motor (stator)

- Size (e.g. “182”)
- Overall length (e.g. “A”)
- Winding (e.g. “0100”)

The simple step-by-step guide to ordering your high-speed IndraDyn H motor:

MRS 182A-1N-0075-NNNN

Rotor

Motor (primary part)

- Size (e.g. “182”)
- Overall length (e.g. “A”)

Internal diameter of rotor

Corresponding internal diameters are available for every rotor size.
For further details see motor manual.

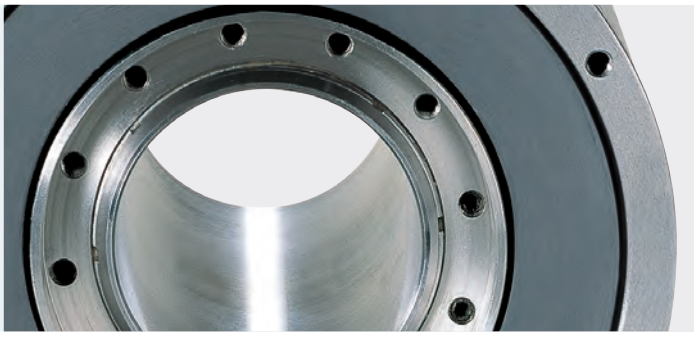
Rotor version

1N = Smooth bore
2N = Step interference fit with hydraulic connection

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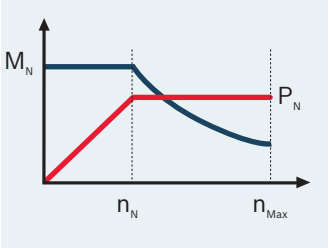
High dynamics and precision

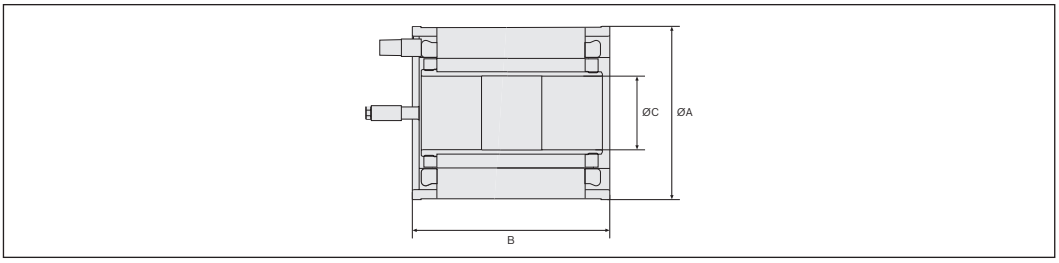
- Maximum torques of up to 4,500 Nm
- Maximum speeds up to 22,500 rpm
- Wide constant output power range
- Integrated cooling system
- Easy integration into the machine



Type		Rated speed	Maximum speed	Rated torque	Maximum torque	Rated power	Rated current	Maximum current	Moment of inertia[1]	Dimensions			Weight[2]
		n_N	n_{Max}	M_N	M_{Max}	P_N	I_N	I_{Max}	J	Ø A	B	Ø C	m
		rpm	rpm	Nm	Nm	kW	A	A	kgm²	mm	mm	mm	kg
MSS102	B-0800	8,000	22,500	10.7	36.7	8.96	16.9	52	0.003	120	156	46	5.8/2.1
	D-0800	8,000	22,500	20	45	16.8	24	69	0.004	120	206	46	7.2/3.1
	F-0300	3,000	18,000	32	75	10.1	15.3	35	0.006	120	306	46	11.2/5.1
	F-0800	8,000	22,500	26	68	21.8	43	100	0.006	120	306	46	11.2/5.1
MSS142	B-0700	7,000	19,000	27.5	67	20.2	45	100	0.011	160	181	58	9.6/4.2
	D-0700	7,000	19,000	40.5	90	29.7	65	140	0.014	160	231	58	16/6.5
	F-0700	7,000	19,000	53	113	38.9	84	180	0.017	160	281	58	21/8.3
MSS162	B-0400	4,000	16,500	50	115	20.9	42	110	0.014	180	206	68	22/6.9
	D-0400	4,000	16,500	70	160	29.3	64	170	0.018	180	256	68	28.1/8.8
	F-0310	3,100	15,500	90	200	29.2	64	170	0.022	180	306	68	28.2/10.6
	J-0200	2,000	10,000	120	275	25.1	50	130	0.028	180	381	68	46.1/13.4
MSS182	A-0100	1,000	6,000	12	30	1.25	3.7	11	0.009	200	82	85	6.9/2.7
	A-0250	2,500	12,000	12	30	3.1	5	15	0.009	200	82	85	6.9/2.7
	B-0280	2,800	12,000	100	230	29.3	64	170	0.031	200	232	85	32.1/9.6
	D-0260	2,600	12,000	140	320	38.1	71	200	0.039	200	282	85	38.9/11.8
	F-0200	2,000	12,000	200	450	41.9	71	200	0.053	200	382	85	43.5/16.3
MSS202	A-0200	2,000	11,000	105	270	22	45	130	0.05	220	215	96	25/12.8
	B-0150	1,500	8,200	141	353	22.2	46	128	0.064	220	265	96	40.7/16.2
	B-0210	2,100	11,500	128	320	28.1	52	144	0.064	220	265	96	40.7/16.2
	D-0170	1,700	9,300	163	407	29	53	147	0.077	220	315	96	37.6/19.6
	D-0360	3,600	12,500	136	333	51.3	102	197	0.077	–	315	–	37.6/19.6
	F-0120	1,200	6,600	194	484	24.3	45	125	0.104	220	415	96	63.7/26.9
MSS242	B-0100	1,000	6,000	250	575	26.2	68	180	0.119	270	275	110	66.7/22.5
	D-0070	700	4,200	375	860	27.5	49.5	180	0.167	270	375	110	92.3/31.7
	F-0060	600	3,600	425	970	26.7	68	180	0.193	270	425	110	105.1/36.5
MSS272	B-0065	650	3,000	400	900	27.2	71	200	0.268	300	330	135	90.4/35.5
	B-0080	800	3,200	400	900	33.5	82	250	0.268	300	330	135	90.4/35.5
	D-0050	500	2,200	525	1,200	27.5	71	200	0.335	300	405	135	112.3/44.5
	F-0040	400	1,800	650	1,500	27.2	71	200	0.403	300	465	135	134.2/53.5
MSS312	B-0035	350	1,500	650	1,550	23.8	62.5	170	0.617	340	380	170	128.7/55.0
	D-0028	280	1,200	820	1,950	24	59.5	160	0.751	340	455	170	154.1/67.4
	D-0060	600	2,400	820	1,950	51.5	93.2	250	0.751	340	455	170	154.1/67.4
	F-0028	280	1,200	975	2,275	28.6	62	180	0.885	340	530	170	179.5/79.5
	H-0025	250	1,100	1,125	2,750	29.5	62	180	1.064	340	630	170	215/95.6
	H-0085	850	3,400	1,100	2,750	97.9	197	570	1.064	340	630	170	215/95.6
MSS382	B-0025	250	1,000	1,375	2,875	36	85	250	1.525	405	430	240	178.5/77.6
	D-0020	200	800	1,775	3,700	37.2	101	250	1.911	405	530	240	242.7/97.2
	F-0018	180	720	2,170	4,500	40.9	83.6	250	2.296	405	630	240	262/116.8
MSS482	A-0200	2,000	4,000	120	275	25.1	40	210	0.604	510	115	345	59/16.2

All the specifications given are based on operation with liquid cooling and 540 V DC bus voltage. The indicated maximum speed is reached at a DC bus voltage of 750 V. [1] Depends on rotor version; [2] Stator/rotor with largest available internal diameter of rotor





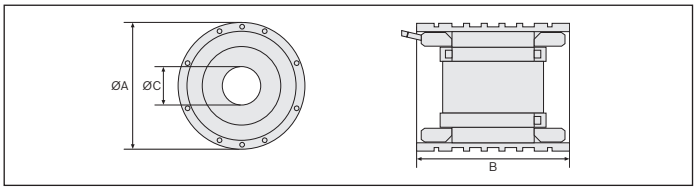
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1 MB – asynchronous high-speed motors

The liquid-cooled 1MB high-speed motors are maintenance-free asynchronous motors with high power density. For different performance requirements and installation situations, our product range offers 8 motor sizes with different overall lengths and diameters.

Typical areas of application of these motors are the main spindles of modern CNC machines and machining centers. These high-speed motors excel by their superb running smoothness and perfect servo quality for C-axis machining, thread cutting and spindle positioning.





The simple step-by-step guide to ordering your asynchronous high-speed motor 1MB:

1MS 310B-6B-A 2 / S010

Stator

Motor (stator)

- Size (e.g. “310”)
- Overall length (e.g. “B”)
- Winding (e.g. “6B”)

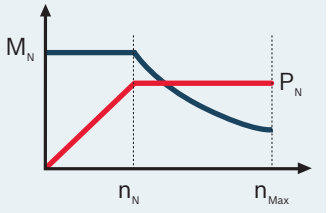
Special version

S010 = With several integrated temperature sensors (NTC thermistor, PTC thermistor, temperature switch)

Electrical connection

1 = Lines at the stator side brought out with larger outside diameter

2 = Lines at the stator side brought out with smaller outside diameter



The simple step-by-step guide to ordering your asynchronous high-speed motor 1MB:

1MR 310B-A 094

Rotor

Motor (primary part)

- Size (e.g. “310”)
- Overall length (e.g. “B”)

Internal diameter of rotor

For each rotor size, corresponding internal diameters are available. For further details see motor manual.

Rotor version

E.g. step interference with hydraulic connection

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Robust and reliable

- Rated torques up to 875 Nm
- Maximum speeds up to 20,000 rpm
- Large spindle cutoff
- Excellent running smoothness
- Easy integration into the machine



Motor		Rated speed	Maximum speed	Rated torque	Rated power	Rated current	Moment of inertia[3]	Dimensions			Weight[2]
		n_N	n_{Max}	M_N	P_N	I_N	J_R	Ø A	B	Ø C[1]	m
		rpm	rpm	Nm	kW	A	kgm²	mm	mm	mm	kg
1MS105	N-4A	4,500	15,000	15	7	29	0.0033	120	350	40.5	11.2/2.8
	N-4B	2,400	12,000	22	5.5	16.4	0.0033	120	350	40.5	11.2/2.8
1MS140	B-4A	7,500	20,000	7	5.5	18	0.0044	160	150	45	5.3/3.3
	B-4B	5,000	20,000	7	3.7	25	0.0044	160	150	45	5.3/3.3
	D-4B	4,000	16,000	14	6	43	0.0061	160	190	45	8.2/4.5
	F-4A	3,000	15,000	24	7.5	43	0.0082	160	240	45	11.8/6.1
	H-4B	3,000	15,000	34	10.5	58	0.0103	160	290	45	15.5/7.3
1MS160	B-4A	3,000	12,000	16	5	36	0.0084	180	160	60	6.8/5.3
	D-4A	3,000	12,000	32	10	48	0.0121	180	205	60	11.1/7.3
	D-4B	2,000	8,000	32	6.7	23.8	0.0121	180	205	60	11.1/7.3
	E-4B	1,000	4,000	33	3.5	19	0.0149	180	240	60	14.4/9.4
	F-4A	3,000	12,000	48	15	74	0.0161	180	255	60	15.8/10.2
	F-4B	3,000	12,000	48	15	45	0.0161	180	255	60	15.8/10.2
	F-4D	2,500	10,000	48	12.5	23.2	0.0161	180	255	60	15.8/10.2
	H-4A	3,000	12,000	64	20	58	0.0201	180	310	60	21/9.8
	N-4A	3,000	12,000	89	28	75	0.0267	180	385	60	28.1/12.7
	N-4B	2,000	8,000	89	18.6	60	0.0267	180	385	60	28.1/12.7
	N-4C	1,500	6,000	89	14	26	0.0267	180	385	60	28.1/12.7
1MS200	C-4A	1,500	6,000	57	9	50	0.041	220	240	66	21/15
	D-4B	1,500	6,000	85	13.5	48	0.037	220	295	66	29/19
	D-4C	5,000	20,000	59	31	75	0.037	220	295	66	29/19
	D-4D	2,500	10,000	85	22	59	0.037	220	295	66	29/19
	D-4E	1,500	6,000	85	13.5	84	0.037	220	295	66	29/19
	D-4F	6,000	18,000	49	31	82	0.037	220	295	66	29/19
	E-4B	1,800	7,200	85	16	41.4	0.059	220	330	66	34/22
	E-4C	3,900	15,600	74	30.2	65	0.059	220	330	66	34/22
	H-4B	1,500	6,000	124	19.5	68	0.069	220	380	66	41/26
	H-4D	1,500	6,000	124	19.5	52.6	0.069	220	380	66	41/26
1MS240	B-4A	1,000	4,000	62	6.5	46	0.078	270	270	72	29/19
	F-4A	1,000	4,000	123	13	74	0.12	270	360	72	48/29
	H-4B	1,000	4,000	169	18	56	0.153	270	430	72	62/37
1MS241	D-6A	1,000	4,000	112	12	62	0.135	270	290	111	38/24
	D-6C	1,000	4,000	112	12	27	0.135	270	290	111	38/24
	H-6C	1,800	7,200	202	32	75.5	0.227	270	410	111	63/39
	H-6D	850	3,400	202	18	66.4	0.227	270	410	111	63/39
	H-6G	800	3,200	202	16.9	39.7	0.227	270	410	111	63/39
1MS242	N-4B	1,700	6,800	185	33	98	0.135	270	440	71	81/37
1MS270	C-4B	1,500	6,000	190	30	96	0.258	300	400	120	82/52
1MS310	B-6B	1,000	4,000	260	27	75	0.477	340	385	125	84/65
	B-6D	700	2,800	260	19	81	0.477	340	385	125	84/65
	B-6E	440	1,760	260	12	58	0.477	340	385	125	84/65
	D-6B	800	3,200	340	28.5	81	0.492	340	450	125	108/80
	F-6A	400	1,600	480	20	61	0.723	340	520	125	133/97
	F-6B	900	3,600	480	35	111	0.723	340	520	125	133/97
1MS375	B-6B	600	2,400	636	40	120	1.39	405	520	170	162/106
	D-6B	600	2,400	875	55	150	1.73	405	620	170	205/132
	D-6D	300	1,200	875	27.5	94	1.73	405	620	170	205/132

All the specifications given are based on operation with liquid cooling and 540 V DC bus voltage.
[1] Available diameters depend on rotor version [2] Stator/rotor [3] Depending on the rotor version

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GTE – standard planetary gearboxes

Together with our dynamic MSK motors, the compact GTE range of planetary gearboxes guarantees high torques in all standard applications.
Typical areas of application include simple handling and automation systems with rack-and-pinion drives or synchronous belt drives.
Virtually all performance requirements can be met in these applications thanks to the subtle staggering of sizes and the high power density of the GTE gearboxes.
The single-stage or two-stage gearboxes can be supplied with a plain shaft or keyway.



The simple step-by-step guide to ordering your GTE planetary gearboxes:

GTE 060-NN 1-003 A-NN03

Gears
- ▶ Size (e.g. “040”)

Gear range
1 = Single-stage
2 = Two-stage

Transmission ratio
003 = Single-stage 3:1
004 = Single-stage 4:1
005 = Single-stage 5:1
008 = Single-stage 8:1
010 = Single-stage 10:1
012 = Two-stage 12:1
020 = Two-stage 20:1
040 = Two-stage 40:1

Output shaft and backlash
A = With keyway
B = Plain shaft

[1] Combination only possible with single-stage gearboxes

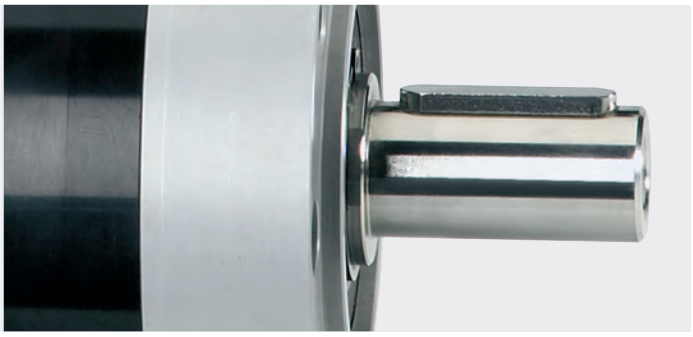
Motor/gearbox combination

Motor		GTE040	GTE060	GTE080	GTE120	GTE160
MSK	030	–	NN02	NN02	–	–
	040	–	–	NN03	NN03	–
	043	–	–	NN03	NN03	–
	050	–	–	–	NN20	NN20
	060	–	–	–	NN21[1]	NN21
	061	–	–	–	NN05[1]	NN05
	070	–	–	–	–	NN16
	071	–	–	–	–	NN16
	075	–	–	–	–	NN16
	076	–	–	–	–	NN06
	100	–	–	–	–	NN09[1]
KSM	041	–	–	NN03	NN03	–
	061	–	–	–	NN05[1]	NN05
	071	–	–	–	–	NN16
	076	–	–	–	–	NN06
MSM	019A	NN45	–	–	–	–
	019B	NN45	–	–	–	–
	031B	–	NN42	–	–	–
	031C	–	–	NN43	–	–
	041B	–	–	NN44	NN44	–

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Economical and compact

- Ideal for standard applications
- Low backlash
- Open choice of mounting positions
- Silent operation
- Lifetime lubrication



Gear	Transmission ratio		Maximum average input speed[6]		Maximum input speed[6]	Maximum output speed[6]	Nominal input torque[1) 3)]	Nominal output torque[1) 2) 3)]	Maximum input torque	Maximum output torque[1) 2) 3) 4)]	Backlash	Torsion stiffness	Efficiency[5]	Mass moment of inertia	Weight
			at 50% $M_{OUT\ N}$	at 100% $M_{OUT\ N}$	$n_{IN\ Max}$	$n_{OUT\ Max}$	$M_{IN\ N}$	$M_{OUT\ N}$	$M_{IN\ Max}$	$M_{OUT\ Max}$	–	D	η	J	m
	Stage	i	rpm	rpm	rpm	rpm	Nm	Nm	Nm	Nm	arcmin	Nm/arcmin	%	kgcm²	kg
GTE040	Single-stage	3	5,000	5,000	18,000	6,000	3.7	11	5.9	17.6	< 15	1	98	0.031	0.35
		4	5,000	5,000	18,000	4,500	3.8	15	6	24	< 15	1	98	0.022	0.35
		5	5,000	5,000	18,000	3,600	2.8	14	4.4	22	< 15	1	98	0.019	0.35
		8	5,000	5,000	18,000	2,250	0.8	6	1.25	10	< 15	1	96	0.017	0.35
		10	5,000	5,000	18,000	1,800	0.5	5	0.8	8	< 15	1	95	0.016	0.35
	Two-stage	12	5,000	5,000	18,000	1,500	1.7	20	2.7	32	< 19	1.1	96	0.029	0.45
		20	5,000	5,000	18,000	900	1	20	1.6	32	< 19	1.1	96	0.019	0.45
		40	5,000	5,000	18,000	450	0.5	18	0.73	29	< 19	1.1	94	0.016	0.45
GTE060	Single-stage	3	4,500	4,500	13,000	4,333	9.3	28	15	45	< 10	2.3	98	0.135	0.9
		4	4,500	4,500	13,000	3,250	9.5	38	15.25	61	< 10	2.3	98	0.093	0.9
		5	4,500	4,500	13,000	2,600	8	40	12.8	64	< 10	2.3	98	0.078	0.9
		8	4,500	4,500	13,000	1,625	2.3	18	3.63	29	< 10	2.3	97	0.065	0.9
		10	4,500	4,500	13,000	1,300	1.5	15	2.4	24	< 10	2.3	96	0.064	0.9
	Two-stage	12	4,500	4,500	13,000	1,083	3.7	44	5.83	70	< 12	2.5	96	0.127	1.1
		20	4,500	4,500	13,000	650	2.2	44	3.5	70	< 12	2.5	96	0.075	1.1
		40	4,500	4,500	13,000	325	1	40	1.6	64	< 12	2.5	94	0.064	1.1
GTE080	Single-stage	3	4,000	2,700	7,000	2,333	28.3	85	45.3	136	< 7	6	98	0.77	2.1
		4	3,850	2,500	7,000	1,750	28.8	115	46	184	< 7	6	98	0.52	2.1
		5	4,000	3,000	7,000	1,400	22	110	35.2	176	< 7	6	98	0.45	2.1
		8	4,000	4,000	7,000	875	6.3	50	10	80	< 7	6	97	0.39	2.1
		10	4,000	4,000	7,000	700	3.8	38	6.1	61	< 7	6	96	0.39	2.1
	Two-stage	12	4,000	3,750	7,000	583	10	120	16	192	< 9	6.5	97	0.72	2.6
		20	4,000	4,000	7,000	350	6	120	9.6	192	< 9	6.5	96	0.44	2.6
		40	4,000	4,000	7,000	175	2.8	110	4.4	176	< 9	6.5	94	0.39	2.6
GTE120	Single-stage	3	3,350	2,550	6,500	2,167	38.3	115	61.3	184	< 7	12	98	2.63	6
		4	3,400	2,500	6,500	1,625	38.8	155	62	248	< 7	12	98	1.79	6
		5	3,500	2,500	6,500	1,300	39	195	62.4	312	< 7	12	98	1.53	6
		8	3,500	3,500	6,500	813	15	120	24	192	< 7	12	97	1.32	6
		10	3,500	3,500	6,500	650	9.5	95	15.2	152	< 7	12	97	1.3	6
	Two-stage	12	3,500	2,650	6,500	542	21.7	260	34.7	416	< 9	13	96	2.56	8
		20	3,500	3,500	6,500	325	13	260	20.8	416	< 9	13	96	1.5	8
		40	3,500	3,500	6,500	163	5.8	230	9.2	368	< 9	13	94	1.3	8
GTE160	Single-stage	3	1,350	900	6,500	2,167	133.3	400	213.3	640	< 6	38	98	12.14	18
		4	1,450	1,000	6,500	1,625	112.5	450	180	720	< 6	38	98	7.78	18
		5	1,650	1,150	6,500	1,300	90	450	144	720	< 6	38	98	6.07	18
		8	2,150	1,550	6,500	813	56.3	450	90	720	< 6	38	97	4.63	18
	Two-stage	12	1,550	1,000	6,500	542	66.7	800	106.7	1,280	< 10	41	96	12.37	22
		20	2,050	1,400	6,500	325	40	800	64	1,280	< 10	41	96	6.65	22
		40	2,950	2,300	6,500	163	17.5	700	28	1,120	< 10	41	94	5.28	22

1) These values refer to an output shaft speed of 100 rpm on duty cycle KA = 1 as well as S1 mode for electrical machines and T = 30°C

2) Depends on the motor shaft diameter

3) With key, at tumescent load

4) Permissible for 30,000 output shaft revolutions

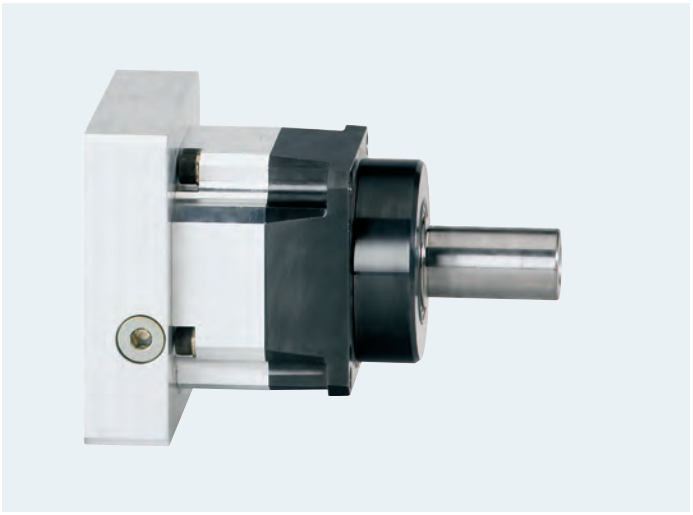
5) Depends on ratio, for output shaft speed = 100 rpm

6) Permissible operating temperature must be observed

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GTM – high-precision planetary gearboxes

Characterized by a particularly high power density and low backlash, the high-precision GTM range of planetary gearboxes has been designed for mounting directly on servo motors.
Their high degree of efficiency makes these gearboxes suitable for the S1 continuous operation and therefore ideal for use in printing presses, for example.
Combined with the dynamic IndraDyn motors they achieve the highest speeds, acceleration and optimum positioning accuracy.
The single-stage or two-stage gearboxes can be supplied with a plain shaft or keyway and also with reduced backlash on request.



The simple step-by-step guide to ordering your GTM planetary gearbox:

GTM 075-NN 1-004 A-NN03

Gears
- ▶ Size (e.g. “075”)

Gear range
1 = Single-stage
2 = Two-stage

Transmission ratio
004 = Single-stage 4:1
005 = Single-stage 5:1
007 = Single-stage 7:1
010 = Single-stage 10:1
020 = Two-stage 20:1
050 = Two-stage 50:1

Output shaft and backlash
A = With keyway
B = Plain shaft
C = Keyway and reduced backlash
D = Plain shaft and reduced backlash

[1] Combination only possible with single-stage gearboxes

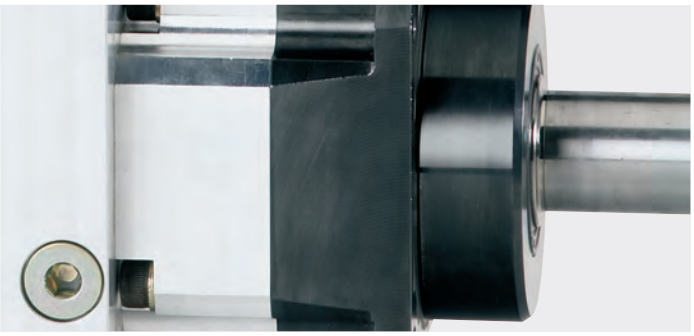
Motor/gearbox combination

	Motor	GTM060	GTM075	GTM100	GTM140	GTM180	GTM240
MSK	030	NN02	–	–	–	–	–
	040	NN03	NN03	–	–	–	–
	043	NN03	NN03	–	–	–	–
	050	–	NN20	NN20	NN20	–	–
	060	–	NN21	NN21	NN21	–	–
	061	–	NN05	NN05	NN05	–	–
	070	–	–	NN16	NN16	NN16	–
	071	–	–	NN16	NN16	NN16	–
	075	–	–	NN16	NN16	NN16	–
	076	–	–	NN06	NN06	–	–
	100	–	–	–	NN09	NN09	–
	101	–	–	–	NN19	NN19	–
	103	–	–	–	NN19	NN19	–
	131	–	–	–	–	NN15[1]	NN15[1]
	133	–	–	–	–	–	NN15[1]
KSM	041	NN03	NN03	NN03	–	–	–
	061	–	NN05	NN05	NN05	–	–
	071	–	–	NN16	NN16	NN16	–
	076	–	–	NN06	NN06	–	–
MAD	100	–	–	–	NN09	NN09	–
	130	–	–	–	–	NN11[1]	NN11[1]
	160	–	–	–	–	–	NN12[1]
MAF	100	–	–	–	–	NN08	–
	130	–	–	–	–	NN11[1]	NN11[1]

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High precision and load capacity

- High-precision gearing for highest positioning accuracy
- Minimum power dissipation in continuous operation
- Optimized gear tooth forming for silent operation
- Environment-resistant, hermetically sealed housing
- High acceleration torque is achievable through a compact and rigid construction



Gears	Transmission ratio		Nominal input speed	Maximum input speed	Maximum output speed	Nominal input torque	Nominal output torque	Maximum input torque	Maximum output torque	Backlash standard/ reduced	Torsion stiffness	Efficiency	Moment of inertia	Weight
			$n_{IN\ Nom}$	$n_{IN\ Max}$	$n_{OUT\ Max}$	$M_{IN\ Nom}$	$M_{OUT\ Nom}$	$M_{IN\ Max}$	$M_{OUT\ Max}$	–	D	η	J	m
			rpm	rpm	rpm	Nm	Nm	Nm	Nm	arcmin	Nm/arcmin	%	kgcm²	kg
GTM060	Single-stage	4	3,000	5,000	1,250	6.25	25	12.5	50	≤ 6/≤ 3	3.5	≥ 97	0.16	1.6
		5	4,000	6,300	1,260	5	25	10	50	≤ 6/≤ 3	3.5	≥ 97	0.16	1.6
		7	5,000	8,000	1,143	3.6	25	7.1	50	≤ 6/≤ 3	3.5	≥ 97	0.15	1.6
		10	6,000	10,000	1,000	2	20	4	40	≤ 6/≤ 3	3.5	≥ 97	0.14	1.6
	Two-stage	20	4,000	6,300	315	1.25	25	2.5	50	≤ 8/≤ 6	3.5	≥ 94	0.12	2.2
		50	6,000	10,000	200	0.5	25	1	50	≤ 8/≤ 6	3.5	≥ 94	0.1	2.2
GTM075	Single-stage	4	3,000	5,000	1,250	21.3	85	42.5	170	≤ 6/≤ 3	8.2	≥ 97	0.55	2.9
		5	4,000	6,300	1,260	20	100	40	200	≤ 6/≤ 3	8.2	≥ 97	0.47	2.9
		7	5,000	8,000	1,143	12.1	85	24.3	170	≤ 6/≤ 3	8.2	≥ 97	0.41	2.9
		10	6,000	10,000	1,000	6	60	11	110	≤ 6/≤ 3	8.2	≥ 97	0.38	2.9
	Two-stage	20	4,000	6,300	315	4.25	85	8.5	170	≤ 8/≤ 6	8.2	≥ 94	0.47	3.8
		50	6,000	10,000	200	2	100	4	200	≤ 8/≤ 6	8.2	≥ 94	0.47	3.8
GTM100	Single-stage	3	2,300	4,000	1,333	40	120	73.3	220	≤ 4/≤ 2	24	≥ 97	2.8	5.7
		4	2,500	4,000	1,000	42.5	170	85	340	≤ 4/≤ 2	24	≥ 97	2	5.7
		5	3,000	5,000	1,000	40	200	80	400	≤ 4/≤ 2	24	≥ 97	1.64	5.7
		7	4,000	6,300	900	24.3	170	48.6	340	≤ 4/≤ 2	24	≥ 97	1.36	5.7
		10	5,000	8,000	800	12	120	22	220	≤ 4/≤ 2	24	≥ 97	1.22	5.7
	Two-stage	20	3,000	5,000	250	8.5	170	17	340	≤ 6/≤ 4	24	≥ 94	1.56	7.5
		50	5,000	8,000	160	4	200	8	400	≤ 6/≤ 4	24	≥ 94	1.44	7.5
GTM140	Single-stage	3	1,800	3,200	1,067	93.3	280	186.7	560	≤ 4/≤ 2	48	≥ 97	8.2	11.5
		4	2,000	3,200	800	105	420	210	840	≤ 4/≤ 2	48	≥ 97	6.75	11.5
		5	2,500	4,000	800	100	500	200	1,000	≤ 4/≤ 2	48	≥ 97	5.54	11.5
		7	3,000	5,000	714	60	420	120	840	≤ 4/≤ 2	48	≥ 97	4.59	11.5
		10	4,000	6,300	630	28	280	56	560	≤ 4/≤ 2	48	≥ 97	4.1	11.5
	Two-stage	20	2,500	4,000	200	21	420	42	840	≤ 6/≤ 4	48	≥ 94	5.29	15
		50	4,000	6,300	126	10	500	20	1,000	≤ 6/≤ 4	48	≥ 94	4.96	15
GTM180	Single-stage	3	1,300	2,500	833	240	720	480	1,440	≤ 4/≤ 2	148	≥ 97	36	27
		4	1,500	2,500	625	255	1,020	510	2,040	≤ 4/≤ 2	148	≥ 97	24.5	27
		5	2,000	3,200	640	240	1,200	480	2,400	≤ 4/≤ 2	148	≥ 97	18.8	27
		7	2,500	4,000	571	145.7	1,020	291.4	2,040	≤ 4/≤ 2	148	≥ 97	14.5	27
		10	3,000	5,000	500	72	720	144	1,440	≤ 4/≤ 2	148	≥ 97	12.3	27
	Two-stage	20	2,000	3,200	160	51	1,020	102	2,040	≤ 6/≤ 4	148	≥ 94	6.95	35
		50	3,000	5,000	100	24	1,200	48	2,400	≤ 6/≤ 4	148	≥ 94	5.45	35
GTM240	Single-stage	3	800	2,000	667	600	1,800	1,000	3,000	≤ 4/≤ 2	340	≥ 97	128	62
		4	1,000	2,000	500	625	2,500	1,250	5,000	≤ 4/≤ 2	340	≥ 97	97.6	62
		5	1,200	2,500	500	600	3,000	1,200	6,000	≤ 4/≤ 2	340	≥ 97	76.4	62
		7	1,500	3,000	429	357.1	2,500	714.3	5,000	≤ 4/≤ 2	340	≥ 97	59.9	62
		10	2,000	3,500	350	180	1,800	300	3,000	≤ 4/≤ 2	340	≥ 97	51.1	62

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Standard and geared motors – for simple applications

For use with frequency converters we recommend combining IndraDrive with geared motors or three-phase asynchronous motors made by NORD Drive Systems or VEM Motors.

Upon request we can supply all-in-one solutions, comprising of control units and motors also sourced directly from Rexroth.

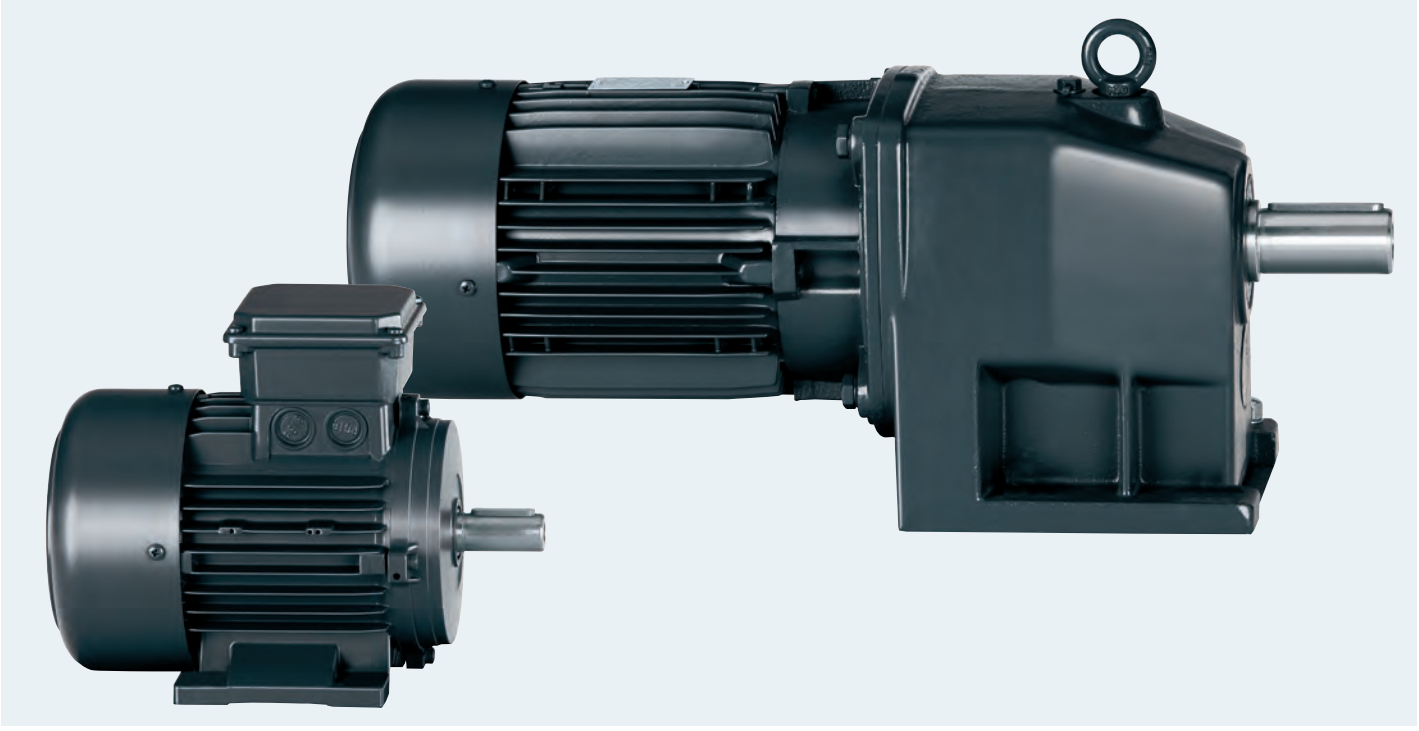
Our range of geared motors covers various types of gears of different performance categories:

- Spur gear motors with rated outputs of up to 160 kW and torques of up to 26,000 Nm
- Offset geared motors with rated outputs of up to 200 kW and torques of up to 200,000 Nm
- Bevel gear motors with rated outputs of up to 160 kW and torques of up to 32,000 Nm
- Worm gear motors with rated outputs of up to 15 kW and torques of up to 3,000 Nm

- Our range of three-phase asynchronous motors includes:
- Standard motors with rated outputs of up to 500 kW
- Energy-saving motors with rated outputs of up to 335 kW

These motors are particularly suitable for operation with frequency converters and boast the following features:

- Motor design conforming to DIN EN 60034 (IEC 72)
- Mounting dimensions and output correlation compliant with DIN 42673, 42677
- Robust, low-vibration version in gray cast iron
- Protection category IP55, higher protection category up to IP65 optional
- Insulation class F with thermal reserve, insulation class H optional
- Further options include brakes, encoders, position of terminal box, etc.



Bosch Rexroth AG, 71511 EN/2013-11

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Cross reference for IEC standard motors

Mechanical motor output P_{Nom}	I_{Nom}	cos φ	η	Continous operation I_{Nom} (>10 min)	Overload operation 1.1 x I_{Nom} (1 min) I_{Nom} (9 min)	Overload operation 1.5 x I_{Nom} (1 min) I_{Nom} (4 min)	Overload operation 2 x I_{Nom} (2 s) I_{Nom} (18 s)
1.1 kW	2.6 A	0.79	76.6%	HCS02.1E-W0012 HMS01.1N-W0020 HMD01.1N-W0012	HCS02.1E-W0012 HMS01.1N-W0020 HMD01.1N-W0012	HCS02.1E-W0012 HMS01.1N-W0020 HMD01.1N-W0012	HCS02.1E-W0012 HMS01.1N-W0020 HMD01.1N-W0012
1.5 kW	3.4 A	0.81	78.8%	HCS02.1E-W0012 HMS01.1N-W0020 HMD01.1N-W0012	HCS02.1E-W0012 HMS01.1N-W0020 HMD01.1N-W0012	HCS02.1E-W0028 HMS01.1N-W0020 HMD01.1N-W0012	HCS02.1E-W0028 HMS01.1N-W0020 HMD01.1N-W0012
2.2 kW	5.2 A	0.76	81%	HCS02.1E-W0028 HMS01.1N-W0020 HMD01.1N-W0012	HCS02.1E-W0028 HMS01.1N-W0020 HMD01.1N-W0012	HCS02.1E-W0028 HMS01.1N-W0020 HMD01.1N-W0012	HCS02.1E-W0028 HMS01.1N-W0020 HMD01.1N-W0012
3 kW	6.7 A	0.79	82%	HCS02.1E-W0028 HMS01.1N-W0020 HMD01.1N-W0012	HCS02.1E-W0028 HMS01.1N-W0020 HMD01.1N-W0020	HCS02.1E-W0028 HMS01.1N-W0020 HMD01.1N-W0020	HCS02.1E-W0028 HMS01.1N-W0020 HMD01.1N-W0020
4 kW	8.8 A	0.78	84.2%	HCS02.1E-W0028 HMS01.1N-W0020 HMD01.1N-W0020	HCS02.1E-W0028 HMS01.1N-W0020 HMD01.1N-W0020	HCS02.1E-W0028 HMS01.1N-W0036 HMD01.1N-W0036	HCS02.1E-W0054[1)] HMS01.1N-W0036 HMD01.1N-W0036
5.5 kW	11.8 A	0.77	85.7%	HCS02.1E-W0054[1)] HMS01.1N-W0020 HMD01.1N-W0036	HCS02.1E-W0054[1)] HMS01.1N-W0036 HMD01.1N-W0036	HCS02.1E-W0054[1)] HMS01.1N-W0036 HMD01.1N-W0036	HCS02.1E-W0054[1)] HMS01.1N-W0036 HMD01.1N-W0036
7.5 kW	15 A	0.84	87%	HCS02.1E-W0054[1)] HMS01.1N-W0036 HMD01.1N-W0036	HCS02.1E-W0054[1)] HMS01.1N-W0036 HMD01.1N-W0036	HCS02.1E-W0070[1)] HMS01.1N-W0036 HMD01.1N-W0036	HCS02.1E-W0070[1)] HMS01.1N-W0036 HMD01.1N-W0036
11 kW	21 A	0.85	88.4%	HCS02.1E-W0070[1)] HMS01.1N-W0036	HCS02.1E-W0070[1)] HMS01.1N-W0054	HCS02.1E-W0070[1)] HMS01.1N-W0054	HCS03.1E-W0070[1)] HMS01.1N-W0054
15 kW	28 A	0.86	89.4%	HCS03.1E-W00701) HMS01.1N-W0054	HCS03.1E-W0070[1)] HMS01.1N-W0054	HCS03.1E-W0070[1)] HMS01.1N-W0070	HCS03.1E-W0070[1)] HMS01.1N-W0070
18.5 kW	34.5 A	0.86	90%	HCS03.1E-W0070[1)] HMS01.1N-W0054	HCS03.1E-W0070[1)] HMS01.1N-W0070	HCS03.1E-W0100[1)] HMS01.1N-W0110	HCS03.1E-W0100[1)] HMS01.1N-W0110
22 kW	42 A	0.84	90.5%	HCS03.1E-W00701) HMS01.1N-W0070	HCS03.1E-W0100[1)] HMS01.1N-W0110	HCS03.1E-W0100[1)] HMS01.1N-W0110	HCS03.1E-W0100[1)] HMS01.1N-W0110
30 kW	55.5 A	0.85	91.5%	HCS03.1E-W0100[1)] HMS01.1N-W0110	HCS03.1E-W0100[1)] HMS01.1N-W0110	HCS03.1E-W0150[1)] HMS01.1N-W0150	HCS03.1E-W0150[1)] HMS01.1N-W0150
37 kW	67 A	0.86	92.5%	HCS03.1E-W0100[1)] HMS01.1N-W0110	HCS03.1E-W0150[1)] HMS01.1N-W0150	HCS03.1E-W0150[1)] HMS01.1N-W0150	HCS03.1E-W0150[1)] HMS01.1N-W0150
45 kW	81 A	0.86	93%	HCS03.1E-W0150[1)] HMS01.1N-W0150	HCS03.1E-W0150[1)] HMS01.1N-W0150	HCS03.1E-W0210[1)] HMS01.1N-W0210	HCS03.1E-W0210[1)] HMS01.1N-W0210
55 kW	98.5 A	0.86	93.5%	HCS03.1E-W0210[1)] HMS01.1N-W0150	HCS03.1E-W0210[1)] HMS01.1N-W0210	HCS03.1E-W0210[1)] HMS01.1N-W0210	HCS03.1E-W0210[1)] HMS01.1N-W0210
75 kW	134 A	0.86	94.1%	HCS03.1E-W0210[1)] HMS01.1N-W0210	HCS03.1E-W0210[1)] HMS01.1N-W0210	HMS01.1N-W0350	HMS01.1N-W0350
90 kW	160 A	0.86	94.6%	HMS01.1N-W0350	HMS01.1N-W0350	HMS01.1N-W0350	HMS01.1N-W0350
110 kW	194 A	0.86	95.1%	HMS01.1N-W0350	HMS01.1N-W0350	–	–
132 kW	233 A	0.86	95.1%	HMS01.1N-W0350	HMS01.1N-W0350	–	–

The examples apply to the operation of 4-pole standard motors 3 AC 400 V/50 Hz at a 4 kHz switching frequency and a rotary frequency > 4 Hz. An external fan may be necessary depending on your application.

[1)] With HNL mains choke

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Cross reference for NEMA standard motors

Mechanical motor output P_{Nom}	I_{Nom}	cos φ	η	Continous operation I_{Nom} (>10 min)	Overload operation 1.1 x I_{Nom} (1 min) I_{Nom} (9 min)	Overload operation 1.5 x I_{Nom} (1 min) I_{Nom} (4 min)	Overload operation 2 x I_{Nom} (2 s) I_{Nom} (18 s)
1.5 hp	2.3 A	0.72	82.5%	HCS02.1E-W0012 HMS01.1N-W0020 HMD01.1N-W0012	HCS02.1E-W0012 HMS01.1N-W0020 HMD01.1N-W0012	HCS02.1E-W0012 HMS01.1N-W0020 HMD01.1N-W0012	HCS02.1E-W0012 HMS01.1N-W0020 HMD01.1N-W0012
2 hp	3.0 A	0.78	85.5%	HCS02.1E-W0012 HMS01.1N-W0020 HMD01.1N-W0012	HCS02.1E-W0012 HMS01.1N-W0020 HMD01.1N-W0012	HCS02.1E-W0012 HMS01.1N-W0020 HMD01.1N-W0012	HCS02.1E-W0012 HMS01.1N-W0020 HMD01.1N-W0012
3 hp	4 A	0.8	90.2%	HCS02.1E-W0028 HMS01.1N-W0020 HMD01.1N-W0012	HCS02.1E-W0028 HMS01.1N-W0020 HMD01.1N-W0012	HCS02.1E-W0028 HMS01.1N-W0020 HMD01.1N-W0012	HCS02.1E-W0028 HMS01.1N-W0020 HMD01.1N-W0012
5 hp	6.7 A	0.79	88.5%	HCS02.1E-W0028 HMS01.1N-W0020 HMD01.1N-W0012	HCS02.1E-W0028 HMS01.1N-W0020 HMD01.1N-W0020	HCS02.1E-W0028 HMS01.1N-W0020 HMD01.1N-W0020	HCS02.1E-W0028 HMS01.1N-W0020 HMD01.1N-W0020
7.5 hp	9.7 A	0.81	88.5%	HCS02.1E-W0054[1)] HMS01.1N-W0020 HMD01.1N-W0020	HCS02.1E-W0054[1)] HMS01.1N-W0020 HMD01.1N-W0036	HCS02.1E-W0054[1)] HMS01.1N-W0036 HMD01.1N-W0036	HCS02.1E-W0054[1)] HMS01.1N-W0036 HMD01.1N-W0036
10 hp	12.7 A	0.81	90.2%	HCS02.1E-W0054[1)] HMS01.1N-W0036 HMD01.1N-W0036	HCS02.1E-W0054[1)] HMS01.1N-W0036 HMD01.1N-W0036	HCS02.1E-W0054[1)] HMS01.1N-W0036 HMD01.1N-W0036	HCS02.1E-W0054[1)] HMS01.1N-W0036 HMD01.1N-W0036
15 hp	18.5 A	0.84	90.2%	HCS02.1E-W0070[1)] HMS01.1N-W0036 HMD01.1N-W0036	HCS02.1E-W0070[1)] HMS01.1N-W0036 HMD01.1N-W0036	HCS02.1E-W0070[1)] HMS01.1N-W0054 –	HCS02.1E-W0070[1)] HMS01.1N-W0054 –
20 hp	26 A	0.78	91%	HCS03.1E-W0070[1)] HMS01.1N-W0054	HCS03.1E-W0070[1)] HMS01.1N-W0054	HCS03.1E-W0070[1)] HMS01.1N-W0054	HCS03.1E-W0070[1)] HMS01.1N-W0054
25 hp	31.5 A	0.82	91.7%	HCS03.1E-W0070[1)] HMS01.1N-W0054	HCS03.1E-W0070[1)] HMS01.1N-W0054	HCS03.1E-W0100[1)] HMS01.1N-W0110	HCS03.1E-W0070[1)] HMS01.1N-W0110
30 hp	38.5 A	0.79	93%	HCS03.1E-W0070[1)] HMS01.1N-W0070	HCS03.1E-W0070[1)] HMS01.1N-W0070	HCS03.1E-W0100[1)] HMS01.1N-W0110	HCS03.1E-W0100[1)] HMS01.1N-W0110
40 hp	50 A	0.82	91.7%	HCS03.1E-W0100[1)] HMS01.1N-W0110	HCS03.1E-W0100[1)] HMS01.1N-W0110	HCS03.1E-W0100[1)] HMS01.1N-W0150	HCS03.1E-W0150[1)] HMS01.1N-W0150
50 hp	60.5 A	0.81	92.4%	HCS03.1E-W0100[1)] HMS01.1N-W0110	HCS03.1E-W0100[1)] HMS01.1N-W0110	HCS03.1E-W0150[1)] HMS01.1N-W0150	HCS03.1E-W0150[1)] HMS01.1N-W0150
60 hp	73.5 A	0.83	91.7%	HCS03.1E-W0150[1)] HMS01.1N-W0150	HCS03.1E-W0150[1)] HMS01.1N-W0150	HCS03.1E-W0210[1)] HMS01.1N-W0210	HCS03.1E-W0210[1)] HMS01.1N-W0210
75 hp	92 A	0.82	94.1%	HCS03.1E-W0150[1)] HMS01.1N-W0150	HCS03.1E-W0210[1)] HMS01.1N-W0150	HCS03.1E-W0210[1)] HMS01.1N-W0210	HCS03.1E-W0210[1)] HMS01.1N-W0210
100 hp	115 A	0.87	94.5%	HCS03.1E-W0210[1)] HMS01.1N-W0210	HCS03.1E-W0210[1)] HMS01.1N-W0210	HMS01.1N-W0350	HMS01.1N-W0350
125 hp	143 A	0.87	94.5%	HMS01.1N-W0210	HMS01.1N-W0350	HMS01.1N-W0350	HMS01.1N-W0350
150 hp	170 A	0.87	95.4%	HMS01.1N-W0350	HMS01.1N-W0350	HMS01.1N-W0350	HMS01.1N-W0350
200 hp	230 A	0.86	95%	HMS01.1N-W0350	HMS01.1N-W0350	–	–

The examples apply to the operation of 4-pole standard motors 3 AC 460 V/60 Hz at a 4 kHz switching frequency and a rotary frequency > 4 Hz. An external fan may be necessary depending on your application.

1) With HNL mains choke

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Cross references for motors on the HCS04 inverter

Mechanical motor output P_{Nom}	**I_{Nom}**	**cos φ**	**η**	**Overload operation 1.2 x I_{Nom} (1 min) I_{Nom} (9 min)**	**Overload operation 1.35 x I_{Nom} (2 s) I_{Nom} (28 s)**	**Overload operation 1.5 x I_{Nom} (1 min) I_{Nom} (9 min)**	**Overload operation 1.65 x I_{Nom} (2 s) I_{Nom} (28 s)**
110 kW 150 hp	204 A	0.85	95%	HCS04.2E-W0350	HCS04.2E-W0350	HCS04.2E-W0350	HCS04.2E-W0350
132 kW 200 hp	246 A	0.85	95%	HCS04.2E-W0350	HCS04.2E-W0350	HCS04.2E-W0420	HCS04.2E-W0420
160 kW 250 hp	300 A	0.86	96%	HCS04.2E-W0420	HCS04.2E-W0420	HCS04.2E-W0520	HCS04.2E-W0520
200 kW 300 hp	366 A	0.87	96%	HCS04.2E-W0520	HCS04.2E-W0520	HCS04.2E-W0640	HCS04.2E-W0640
250 kW 400 hp	459 A	0.87	96%	HCS04.2E-W0640	HCS04.2E-W0640	HCS04.2E-W0790	HCS04.2E-W0790
315 kW 500 hp	586 A	0.87	96%	HCS04.2E-W0790	HCS04.2E-W0790	HCS04.2E-W1010	HCS04.2E-W1010
400 kW 600 hp	720 A	0.87	96%	HCS04.2E-W1010	HCS04.2E-W1010	HCS04.2E-W1240	HCS04.2E-W1240
500 kW 700 hp	894 A	0.88	97%	HCS04.2E-W1240	HCS04.2E-W1240	HCS04.2E-W1540	HCS04.2E-W1540
630 kW 900 hp	1126 A	0.88	97%	HCS04.2E-W1540	HCS04.2E-W1540		

The examples apply to the operation of 4-pole standard motors at a 4 kHz switching frequency and a rotary frequency > 4 Hz. The power data in kW apply to a voltage of 3 AC 400 V/50 Hz and the power data in hp apply to a voltage of 3 AC 460 V/60 Hz. Either a mains choke or a DC choke is required when operating an HCS04 inverter.

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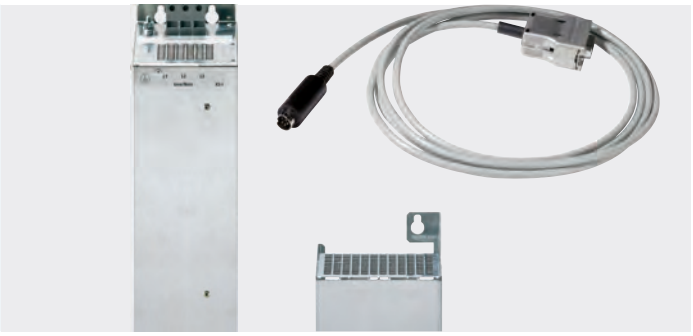
Auxiliary components



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Accessories for all requirements

- Filters and chokes for EMC-proof operation
- Components designed to absorb high braking forces
- Energy storage capacitors for dynamic sequences
- Accessories for simplified assembly and installation



Mains filters

Mains filters with integrated mains choke

Mains chokes

DC chokes

Motor filters

Brake choppers

Brake resistors

Brake units

Capacity modules

Blower unit



Other accessories

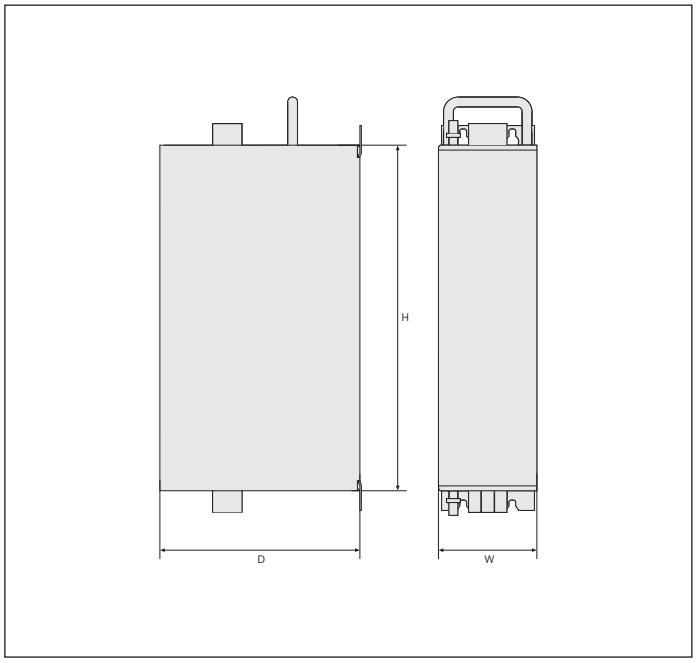
- Basic accessories for assembly and installation
- Shield connection for EMC-compatible connection of the motor cable to the power unit
- Control cabinet adapter for combining control units of different depths
- Auxiliary capacitor
- Electrical adaptors
- Flange assembly kit
- Control cabinet assembly kit
- Modular bus extension to bridge larger distances between drive groups

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Mains filters – for HMV power supply units and HCS converters

Mains filters ensure that the EMC limit values are adhered to and suppress leakage current generated by line capacitors. Our mains filters are optimally coordinated with the power units and are scalable in regards to current, number of drives and motor cable length. They can be combined with our shielded motor cables for trouble-free operation conforming to EN 61800-3, Category C3, Second environment, even with single cable lengths of up to 75 m.





Mains filters for HMV power supply units and HCS converters	Continuous current	Power dissipation	Width W	Height H	Depth D	Weight
	A	W	mm	mm	mm	kg
HNF01.1A-F240-E0051-A-480-NNNN	51	< 89	100	440	262	15
HNF01.1A-M900-E0051-A-480-NNNN	51	< 91	100	440	262	15
HNF01.1A-F240-E0125-A-480-NNNN	125	< 127	150	440	262	18
HNF01.1A-M900-E0125-A-480-NNNN	125	< 174	150	440	262	30
HNF01.1A-F240-E0202-A-480-NNNN	202	< 238	150	440	262	29
HNF01.1A-M900-E0202-A-480-NNNN	202	< 373	250	440	262	37
HNF01.1A-F240-R0026-A-480-NNNN	26	< 73	100	440	262	14
HNF01.1A-M900-R0026-A-480-NNNN	26	< 77	150	440	262	17
HNF01.1A-F240-R0065-A-480-NNNN	65	< 163	150	440	262	25
HNF01.1A-M900-R0065-A-480-NNNN	65	< 157	150	440	262	26
HNF01.1A-F240-R0094-A-480-NNNN	94	< 135	150	440	262	28
HNF01.1A-M900-R0094-A-480-NNNN	94	< 146	150	440	262	29
HNF01.1A-H350-R0180-A-480-NNNN	180	< 305	250	440	262	45
HNS02.1A-Q200-R0023-A-480-NNNN	23	< 75	80	352	265	15
HNF01.1B-A100-E0300-N-480-NNNN	300	60	260	306	135	13
HNF01.1B-A100-E0580-N-480-NNNN	580	125	260	306	135	15
HNF01.1B-A100-E0740-N-480-NNNN	740	210	280	356	170	25
For HCS converters						
NFD03.1-480-007	7	3.9	50	160	90	0.7
NFD03.1-480-016	16	6.4	55	220	90	1
NFD03.1-480-030	30	11.9	60	270	100	1.4
NFD03.1-480-055	55	25.9	90	220	105	2
NFD03.1-480-075	75	30.4	90	240	145	3.5
NFD03.1-480-130	130	38	100	240	160	4.7
NFD03.1-480-180	180	61	130	350	180	10

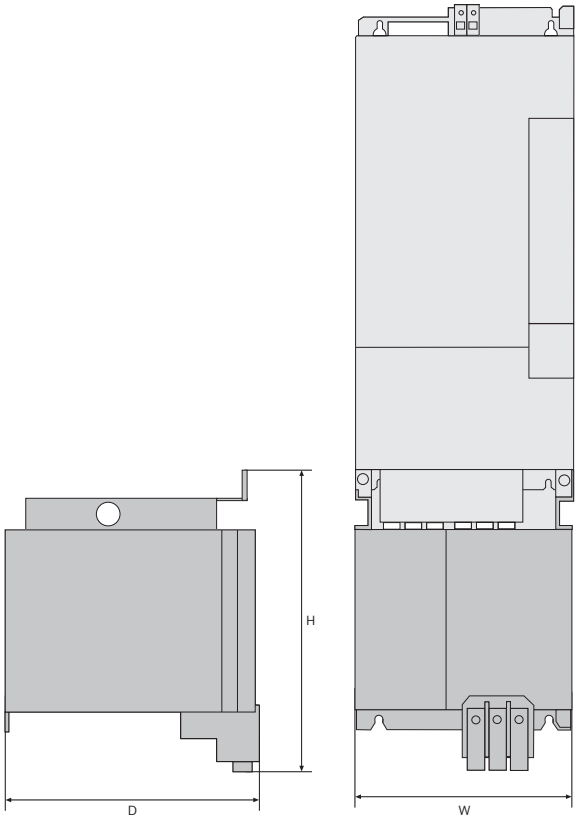
All data apply to nominal rating at 3 AC 400 V mains voltage. Please see the selection tables on the end of this chapter for exact assignments to the power units.

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Mains filters with integrated mains choke – for HCS03 converters

The combination of mains filter and mains choke in one unit simplifies assembly and installation. It is simply fitted underneath the converter to form one space-saving unit. It is also a particularly easy way to comply with the directives contained in EN 61800-3, Category C3, Second environment.





Example of assembly

Mains filters with integrated mains choke	Continuous current	Power dissipation	Nominal inductance	Capacitance	Width W	Height H	Depth D	Weight
	A	W	µH	µF	mm	mm	mm	kg
HNK01.1A-A075-E0050-A-500-NNNN	50	55	3 x 571	3 x 1.1	125	322.5	251.5	15
HNK01.1A-A075-E0080-A-500-NNNN	80	80	3 x 362	3 x 2.2	225	310	270	20
HNK01.1A-A075-E0106-A-500-NNNN	106	110	3 x 240	3 x 2.2	225	310	270	20
HNK01.1A-A075-E0146-A-500-NNNN	146	130	3 x 170	3 x 2.2	350	380	270	28

All data apply to nominal rating at 3 AC 400 V mains voltage. Please see the selection tables on the end of this chapter for exact assignments to the power units.

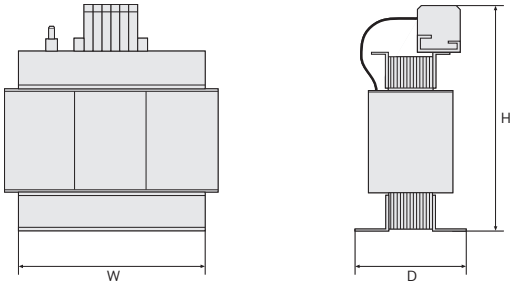
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Mains chokes – for HMV power supply units and HCS converters

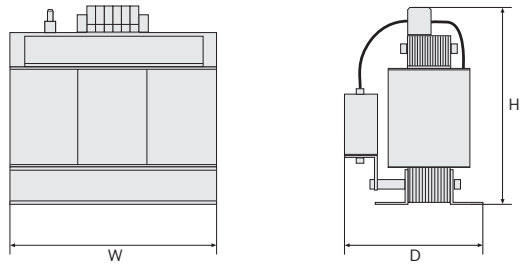
In connection with the mains chokes, converters and infeed power supply units realize higher DC bus continuous power. They reduce the harmonics in the line current while simultaneously preventing circuit feedback.
When using supply units with line regeneration, these components are always required.
This combination always complies to the permissible EMC values for industrial networks stipulated by EN 61000-2-4.



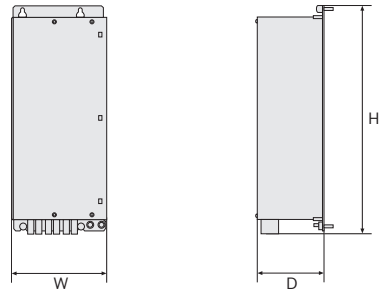
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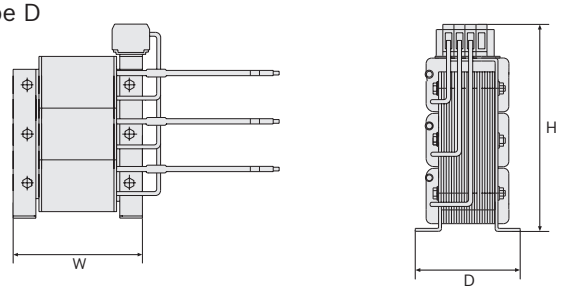
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Type C



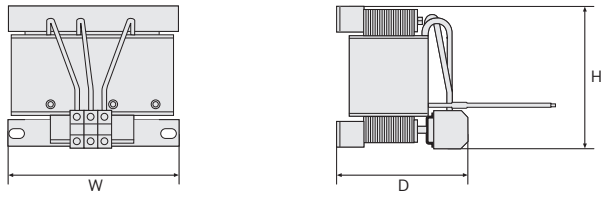
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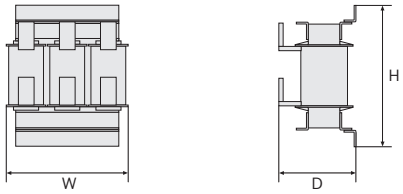
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Type E



Type F



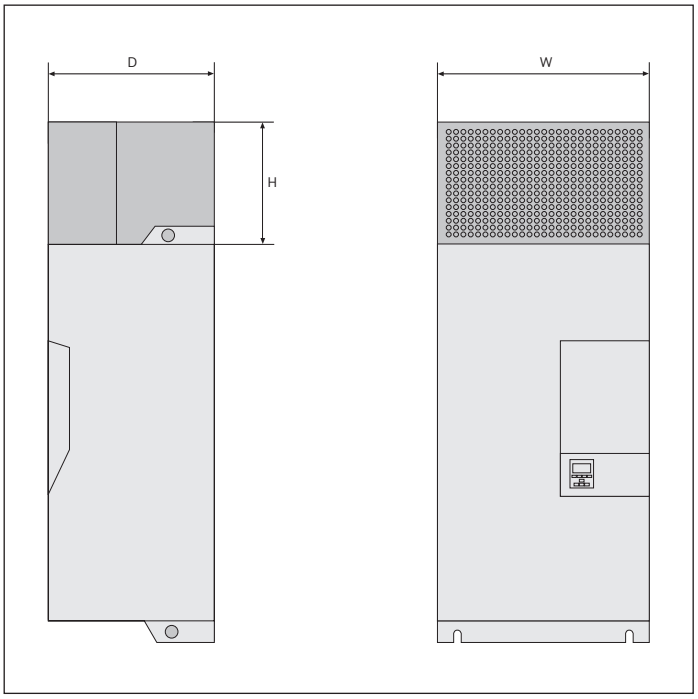
Mains choke	Continuous current	Power dissipation	Nominal inductance	Capacitance	Type	Width W	Height H	Depth D	Weight
	A	W	µH	µF		mm	mm	mm	kg
HNL01.1E-1000-N0012-A-500-NNNN	12	40	3 x 1,000	–	A	120	164	61	2.7
HNL01.1E-1000-N0020-A-500-NNNN	20	60	3 x 1,000	–	A	150	184	66.5	3.8
HNL01.1E-0600-N0032-A-500-NNNN	32	75	3 x 600	–	A	150	184	66.5	4.5
HNL01.1E-0400-N0051-A-480-NNNN	51	165	3 x 400	–	A	180	225	112	13.5
HNL01.1E-0200-N0125-A-480-NNNN	125	170	3 x 200	–	A	230	295	148	24
HNL01.1E-0100-N0202-A-480-NNNN	202	200	3 x 100	–	A	265	350	152	33
HNL01.1R-0980-C0026-A-480-NNNN	26	225	3 x 980	3 x 10	B	210	245	172	16
HNL01.1R-0590-C0065-A-480-NNNN	65	310	3 x 590	3 x 20	B	300	360	205	45
HNL01.1R-0540-C0094-A-480-NNNN	94	420	3 x 540	3 x 20	B	340	385	229	65
HNL01.1R-0300-C0180-A-480-NNNN	180	800	3 x 300	3 x 30	B	340	400	261	73
HNL02.1R-0980-C0023-A-480-NNNN[1)]	23	95	3 x 980	3 x 10	C	165	352	115	14
HNL01.1E-0571-N0050-A-500-NNNN	50	50	3 x 571	–	D	183	238	100	13
HNL01.1E-0362-N0080-A-500-NNNN	80	80	3 x 362	–	E	205	175	180	17
HNL01.1E-0240-N0106-A-500-NNNN	106	100	3 x 240	–	E	205	193	210	17
HNL01.1E-0170-N0146-A-500-NNNN	146	130	3 x 170	–	E	250	205	230	23
HNL01.1E-0098-N0280-N-690-NNNN	280	260	3 x 98	–	F	320	210	380	40
HNL01.1E-0085-N0315-N-690-NNNN	315	280	3 x 85	–	F	320	210	380	46
HNL01.1E-0066-N0365-N-690-NNNN	365	280	3 x 66	–	F	320	250	380	43
HNL01.1E-0060-N0475-N-690-NNNN	475	320	3 x 60	–	F	320	250	380	70
HNL01.1E-0038-N0650-N-690-NNNN	650	320	3 x 55	–	F	360	250	440	55
HNL01.1E-0032-N0760-N-690-NNNN	760	450	3 x 60	–	F	385	275	440	60
HNL01.1E-0038-N0540-N-690-NNNN	540	320	3 x 55	–	F	320	250	380	55
HNL01.1E-0026-N0620-N-690-NNNN	620	320	3 x 60	–	F	320	250	380	60

All data apply to nominal rating at 3 AC 400 V mains voltage. Please see the selection tables on the end of this chapter for exact assignments to the power units.
[1)] With integrated fan, supply voltage DC 24 V

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DC chokes – for HCS04 converters

HCS04 converters used with HLL DC chokes achieve higher continuous power in the DC bus.
They reduce the harmonics in the line current while simultaneously preventing circuit feedback.
These chokes are always required when the HCS04 converters are used in residential areas.



Motor filters	Continuous current	Power dissipation	Nominal inductance	Width W	Height H	Depth D	Weight
	A	W	µH	mm	mm	mm	kg
HLL01.1A-150U-N0290-C-008-0471-NNNN	290	210	150	360	240	377	32
HLL01.1A-138U-N0558-C-008-0558-NNNN	351	270	138	340	240	377	36
HLL01.1A-105U-N0486-C-008-0760-NNNN	574	345	105	440	240	377	53
HLL01.1A-095U-N0574-C-008-0840-NNNN	702	390	95	595	240	377	67
HLL01.1A-069U-N0702-C-008-1116-NNNN	702	495	69	595	240	377	67
HLL01.1A-063U-N0861-C-008-1260-NNNN	861	625	63	890	240	377	105
HLL01.1A-037U-N1160-C-008-1884-NNNN	1,160	700	37.5	890	240	377	115
HLL01.1A-034U-N1404-C-008-2232-NNNN	1,404	920	34.5	1,120	240	377	135

All data apply to nominal rating at 3 AC 400 V mains voltage.
Please see the selection tables on the end of this chapter for exact assignments to the power units.

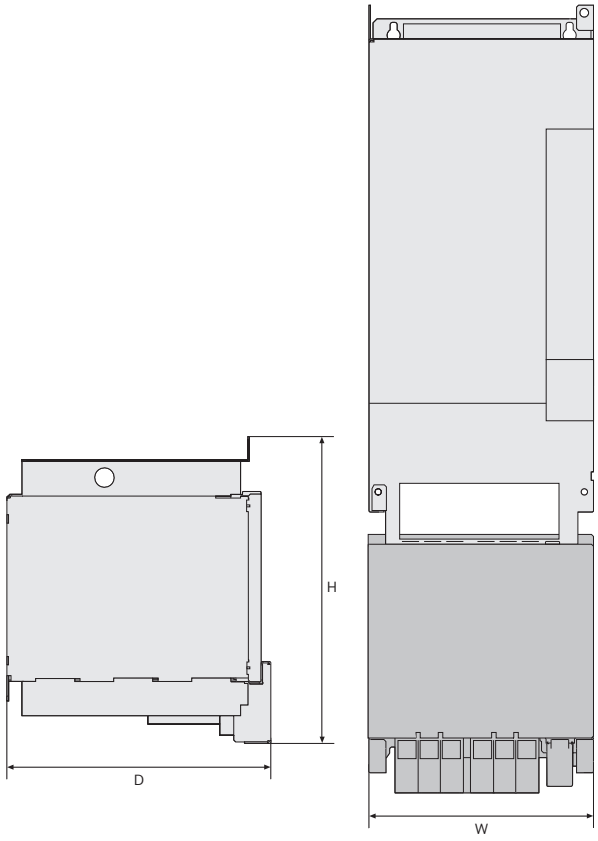
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Motor filters – for HCS converters

The combination of the steep switching curves of modern converters and long motor wires can often cause transient overvoltages on the motor terminals. This, along with the leakage current of the motor wires, can be reduced by using a motor filter on the inverter output.
This provides the following advantages:

- Voltage rise limited to values below 1 kV/µs
- Winding insulation protected by limiting the voltage peak to max. 1,000 V
- Operation of several motors connected in parallel on one frequency converter via long supply lines
- Compliance with increased EMC requirements thanks to reduced interference voltages





Assembly example for HMF...D0045 to ...D0145

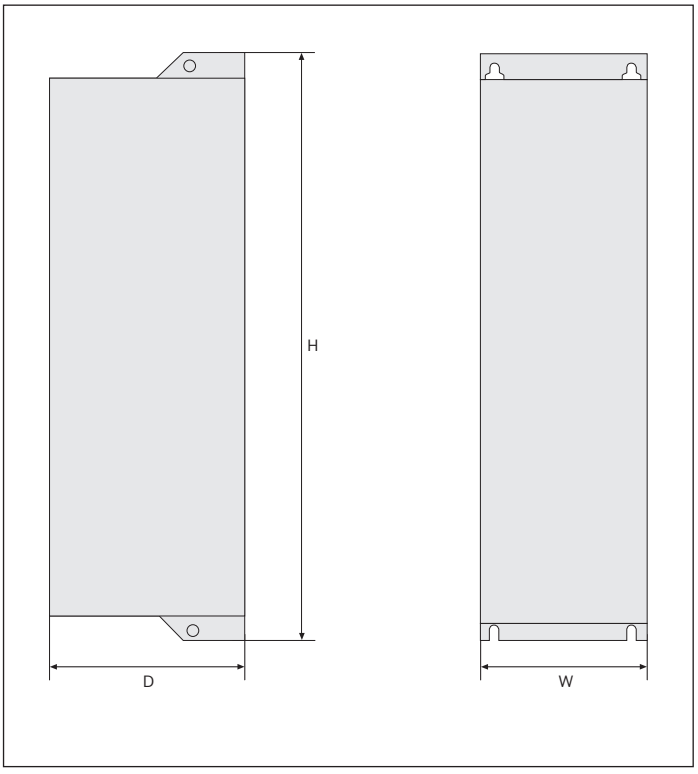
Motor filters	Continuous current	Power dissipation	Inductance	Width W	Height H	Depth D	Weight
	A	W	µH	mm	mm	mm	kg
HMF01.1N-N0K2-M0012-A-500-NNNN	12	25	3 x 900	155	162	92	5
HMF01.1N-N0K2-M0028-A-500-NNNN	28	50	3 x 450	210	182	130	11
HMF01.1A-N0K2-D0045-A-500-NNNN	45	120	3 x 160	125	330	270	15
HMF01.1A-N0K2-D0073-A-500-NNNN	72	160	3 x 100	225	315	270	15
HMF01.1A-N0K2-D0095-A-500-NNNN	95	190	3 x 78	225	315	270	20
HMF01.1A-N0K2-D0145-A-500-NNNN	145	220	3 x 50	350	400	260	20
HMF01.1N-N0K1-M0320-N-690-NNNN	314	475	in prep.	110	210	250	32
HMF01.1N-N0K1-M0480-N-690-NNNN	530	530	in prep.	200	245	250	58
HMF01.1N-N0K1-M0760-N-690-NNNN	759	600	in prep.	210	315	250	93
HMF01.1N-N0K1-M1190-N-690-NNNN	1,188	680	in prep.	230	370	250	120

All data apply to nominal rating at 3 AC 400 V mains voltage.
Please see the selection tables on the end of this chapter for exact assignments to the power units.

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Brake choppers – for HCS04 converters

Brake choppers are used together with an external braking resistor to increase the braking power.
The HLT brake chopper is controlled and monitored by the HCS04 converter.



Brake choppers	Braking power				Power dissipation	Width W	Height H	Depth D	Weight
	Duration	Max.	$t_{on\ time}$	$t_{cycle\ time}$					
	kW	kW	s	s	W	mm	mm	mm	kg
HLT01.1A-200K-N-007-NNNN	200	420	12	240	550	70	950	377	30
HLT01.1A-400K-N-007-NNNN	400	750	12	240	1,050	310	1,150	377	70

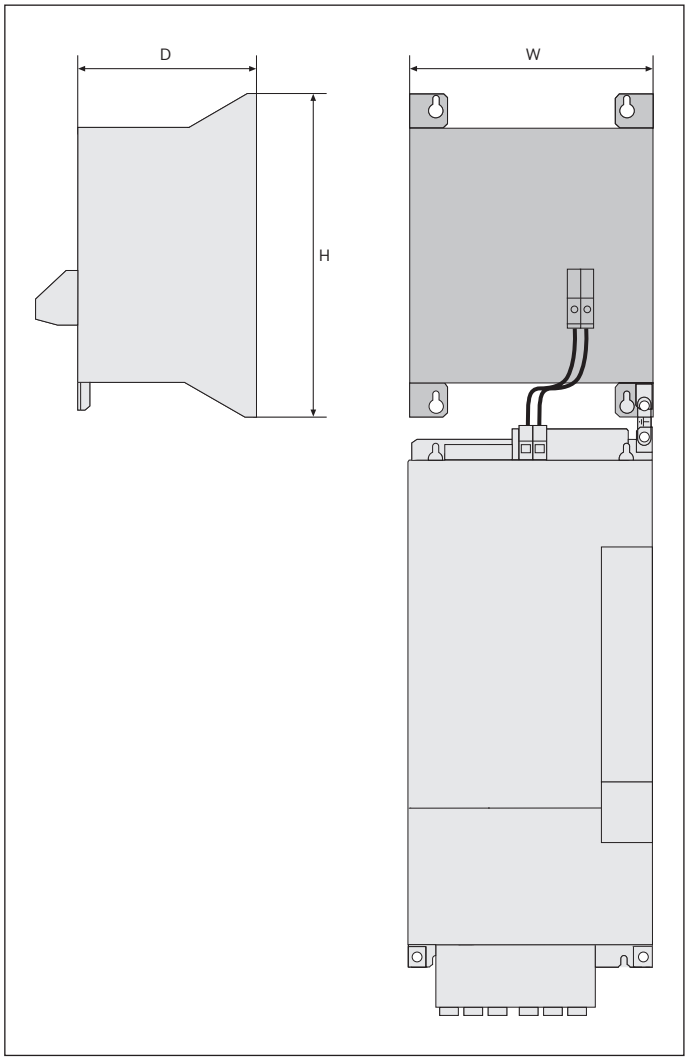
Please see the selection tables on the end of this chapter for exact assignments to the power units.

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Brake resistors – for HCS converters

When using the HCS03 converters in regenerative operation there is a choice of particularly compact brake resistors for various different levels of power consumption.
The brake resistor is mounted directly above the converter. This space-saving arrangement also simplifies the installation work. At the same time the converter's extracted air flow makes an effective cooling system.
The robust construction and high dielectric strength of the resistor elements enables high power and impulse loading. The resistor elements are flameproof and are protected from harmful environmental factors by their full encapsulation.





Brake resistor	Maximum energy consumption	Braking power				Resistance	Width W	Height H	Depth D	Weight
		Duration	Max.	$t_{on\ time}$	$t_{cycle\ time}$					
	kWs	kW	kW	s	s	Ω	mm	mm	mm	kg
HLR01.1N-0300-N17R5-A-007-NNNN	37	0.3	37	1	120	20.5	123	300	196	3
HLR01.1N-0470-N11R7-A-007-NNNN	56	0.47	56	1	120	13.7	223	300	210	4.5
HLR01.1N-0780-N07R0-A-007-NNNN	93	0.78	93	1	120	8.2	223	300	210	5.5
HLR01.1N-1K08-N05R0-A-007-NNNN	130	1.08	130	1	120	5.8	350	300	220	8
HLR01.1N-22k0-N03R5-B-007-NNNN	1,400	22	176	8	120	3.5	995	520	490	61
HLR01.1N-44k0-N03R3-B-007-NNNN	3,550	44	187	19	120	3.3	995	770	490	101
HLR01.1N-66k0-N02R1-B-007-NNNN	5,250	66	293	18	120	2.1	995	1,100	490	138

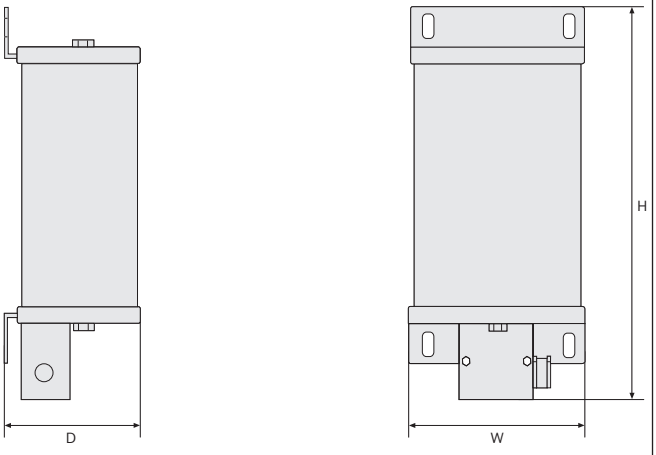
Please see the selection tables on the end of this chapter for exact assignments to the power units.

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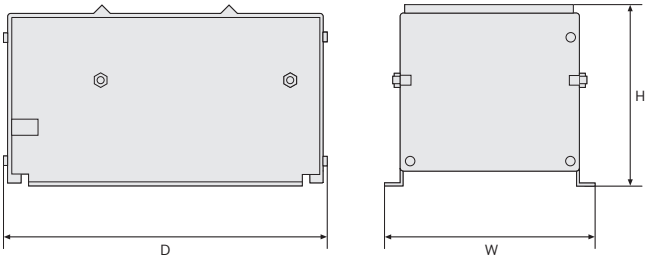
Brake resistors – for HCS converters in heavy-duty version

The heavy-duty version of the brake resistor must always be used in applications where high regeneration occurs over a relatively long period of time. This is the case, for example, when lowering large loads or when braking high mass moments of inertia.
Depending on the braking power required there is a choice of compact brake resistors of different power levels and designs for each converter.

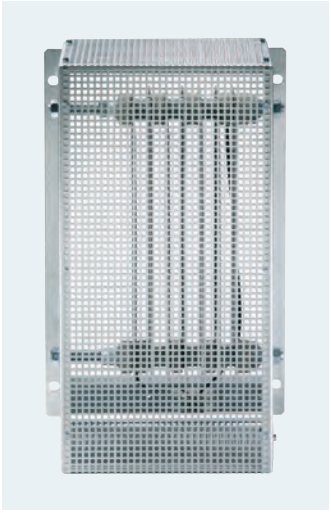
Type A



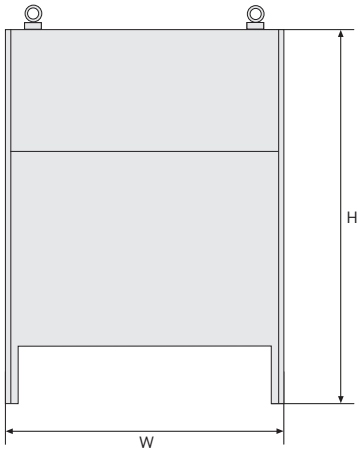
Type B



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Type C



D = 490 mm

Brake resistor	Maximum energy consumption	Braking power				Resistance	Type	Width W	Height H	Depth D	Weight
		Duration	Max.	$t_{on\ time}$	$t_{cycle\ time}$						
	kWs	kW	kW	s	s	Ω		mm	mm	mm	kg
HLR01.1N-01K8-N40R0-A-007-NNNN	72	1.8	18	4	120	40	A	275	549	120	6.6
HLR01.1N-03K8-N40R3-A-007-NNNN	300	3.8	18	16.7	120	40.3	B	490	270	300	9.5
HLR01.1N-02K4-N28R0-A-007-NNNN	100	2.4	26	3.9	120	28	A	275	649	120	7.9
HLR01.1N-05K5-N28R2-A-007-NNNN	420	5.5	26	16.2	120	28.2	B	490	270	400	13
HLR01.1N-01K6-N18R0-A-007-NNNU	109	1.6	34	3.3	120	20	A	185	649	120	5.2
HLR01.1N-03K5-N19R0-A-007-NNNN	252	3.5	31	8	120	21.3	B	300	270	490	9.5
HLR01.1N-04K5-N18R0-A-007-NNNN	432	4.5	33	13	120	20.2	B	400	270	490	13
HLR01.1N-06K5-N18R0-A-007-NNNN	686	6.5	33	21	120	20.2	B	400	270	490	13
HLR01.1N-10K0-N18R0-A-007-NNNN	1,080	10	33	32	120	20.2	B	600	270	490	22
HLR01.1N-02K0-N15R0-A-007-NNNU	137	2	40	3.4	120	16.7	A	185	749	120	6.2
HLR01.1N-05K0-N15R0-A-007-NNNN	360	5	40	9	120	16.9	B	400	270	490	13
HLR01.1N-07K0-N14R0-A-007-NNNN	672	7	43	16	120	15.7	B	600	270	490	22
HLR01.1N-09K5-N13R0-A-007-NNNN	1,003	9.5	46	22	120	14.6	B	600	270	490	22
HLR01.1N-14K5-N13R0-A-007-NNNN	1,566	14.5	46	34	120	14.6	B	800	270	490	33
HLR01.1N-04K5-N07R4-A-007-NNNN	246	4.5	81	3	120	8.3	B	300	270	490	9.5
HLR01.1N-08K5-N08R0-A-007-NNNN	612	8.5	75	8.2	120	9	B	600	270	490	22
HLR01.1N-11K0-N07R3-A-007-NNNN	1,056	11	82	13	120	8.2	B	600	270	490	22
HLR01.1N-15K0-N08R1-A-007-NNNN	1,584	15	74	21	120	9.1	B	800	270	490	33
HLR01.1N-24K0-N07R2-A-007-NNNN	2,592	24	83	31	120	8.1	C	795	710	490	80
HLR01.1N-06K5-N06R1-A-007-NNNN	356	6.5	98	3.6	120	6.9	B	400	270	490	13
HLR01.1N-12K5-N05R5-A-007-NNNN	900	12.5	109	8.3	120	6.2	B	800	270	490	33
HLR01.1N-17K0-N05R1-A-007-NNNN	1,632	17	117	14	120	5.7	B	1,000	270	490	43
HLR01.1N-23K0-N05R5-A-007-NNNN	2,429	23	109	22	120	6.2	C	595	710	490	56
HLR01.1N-36K0-N05R4-A-007-NNNN	3,888	36	111	35	120	6.1	C	995	710	490	93

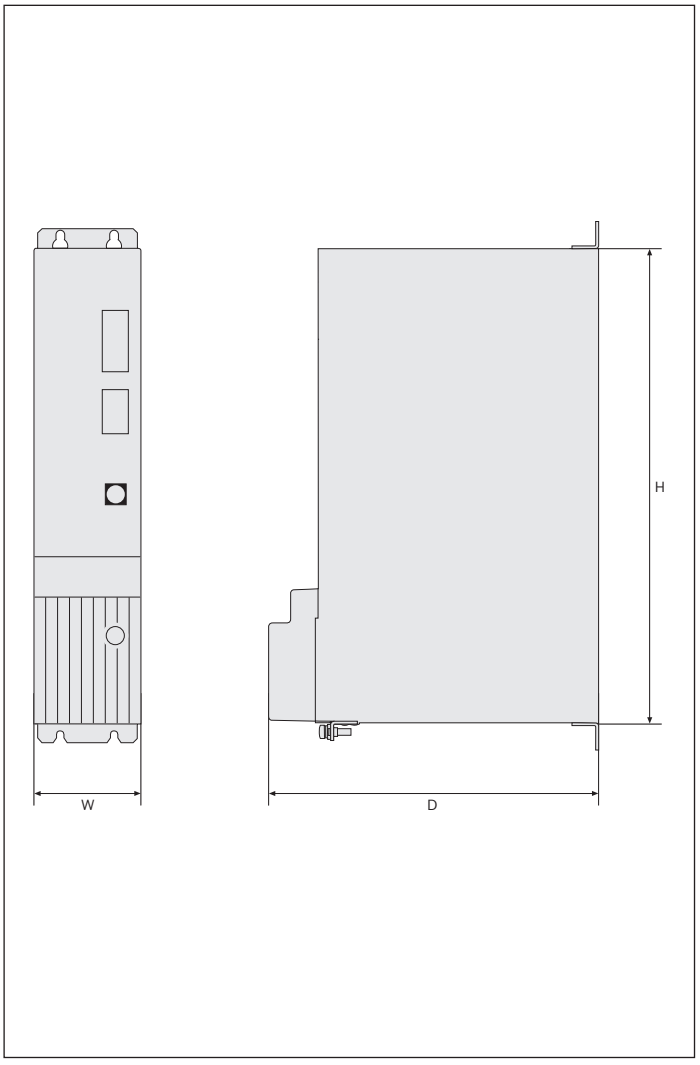
Please see the selection tables on the end of this chapter for exact assignments to the power units.

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Brake units – for HMV power supply units and HCS converters

The connection of brake units increases the continuous and peak regenerative power.
The brake unit also makes it possible to have the DC bus short circuit function available in the drive system.
This function makes it possible to brake the synchronous motors even in the event of a power failure.





Brake unit	Maximum energy consumption	Braking power				Width W	Height H	Depth D	Weight
		Duration	Max.	$t_{on\ time}$	$t_{cycle\ time}$				
	kWs	kW	kW	s	s	mm	mm	mm	kg
HLB01.1C-01K0-N06R0-A-007-NNNN	100	1	100	1	100	65	352	252	5.8
HLB01.1D-02K0-N03R4-A-007-NNNN	500	2	180	2.7	250	100	440	309	12.2

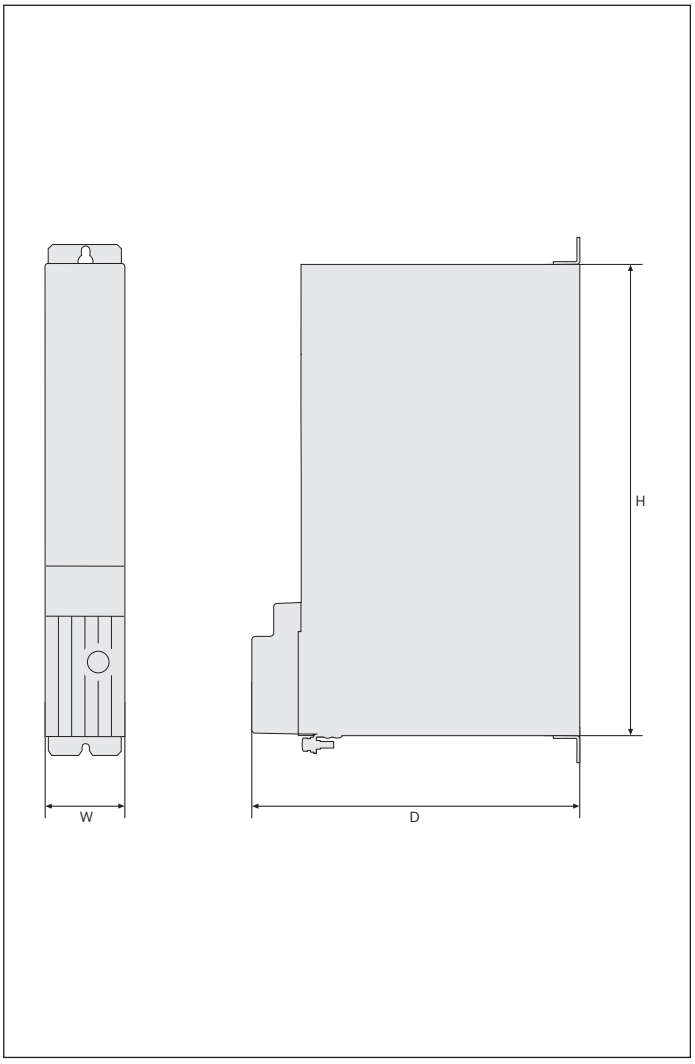
Please see the selection tables on the end of this chapter for exact assignments to the power units.

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Capacity modules – for HMV power supply units and HCS converters

Capacity modules improve the energy balance in applications where machining cycles take place in rapid succession, such as roll feeds or cross cutting lines. Connected to the DC bus, the capacity modules act as a temporary energy storage unit and reduce the heat loss in the control cabinet by relieving the braking resistor.
In the event of a power failure the reserve energy enables a controlled retraction motion. This protects the workpiece and the tool, e.g. in gear cutting machines.





Capacity modules	Capacitance	Width W	Height H	Depth D	Weight
	mF	mm	mm	mm	kg
HLC01.1C-01M0-A-007-NNNN	1	50	352	251.5	3.2
HLC01.1C-02M4-A-007-NNNN	2.4	50	352	251.5	4.3
HLC01.1D-05M0-A-007-NNNN	5	75	440	309	8.6

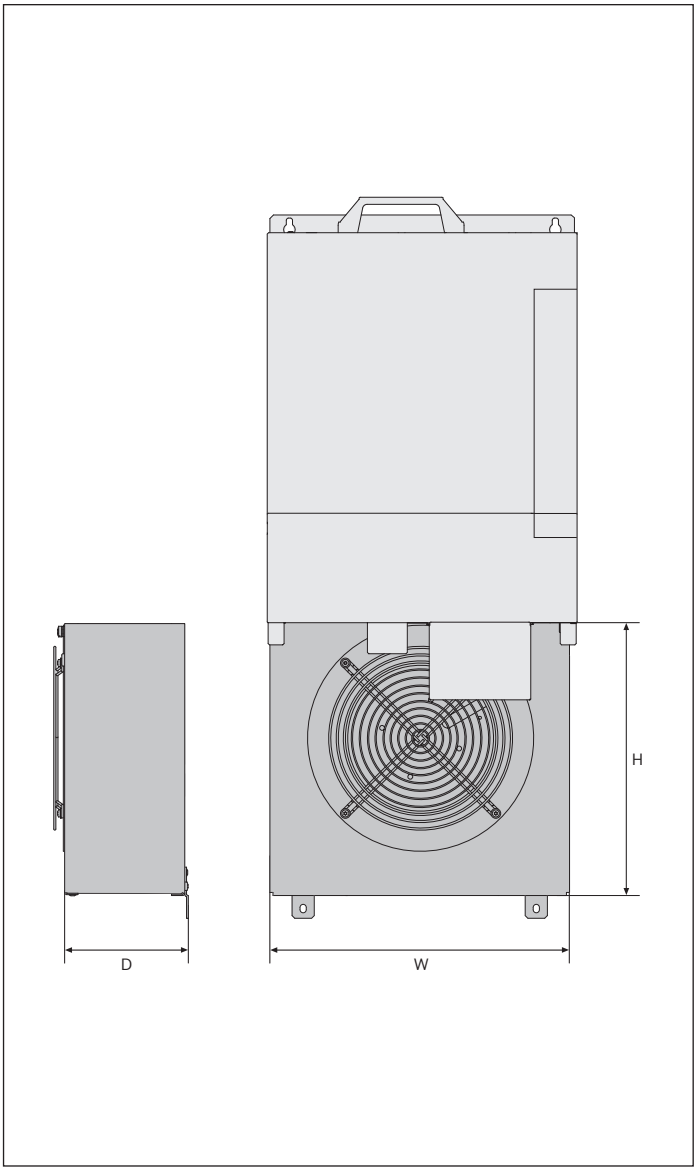
Please see the selection tables on the end of this chapter for exact assignments to the power units.

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Blower units – for HMV supply units and HMS inverters

The blower unit HAB01 is required for operating the supply unit HMV01.1R-W0120 and the inverter HMS01.1N-W0350. In a space-saving arrangement, it is mounted directly below the unit. The electrical connection is made via a simple plug-in connector.





Blower unit	Width W	Height H	Depth D	Weight
	mm	mm	mm	kg
HAB01.1-0350-1640-NN	350	308	152	7.5

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Other accessories

Basic accessories HAS01
The basic accessories contain all the mounting parts and fixing elements. Depending on the application, we supply these accessories complete with all the connecting bars for control voltage and DC bus.

Shield connection HAS02
The shield connection plate is an EMC-compatible method of connecting the motor cable to your control unit. It also serves as a cord grip.

Control cabinet adapter HAS03
The control cabinet adapters are used to combine HCS02 converters and their auxiliary components with units from the IndraDrive M series. Spacer bolts even out the lower unit depth thus creating an even frontage with a uniform installation height.

Auxiliary capacitor HAS04
Use the additional capacitor HAS04 to operate HCS02 and HCS03 inverters with an HNF mains filter even if the minimum number of attached control units is not reached.

Flange assembly kit HAS07
In the case of HCS04 converters which are installed with the HAS07 flange-mounting kit, the heat sinks are located outside the control cabinet. This reduces the air conditioning of the control cabinet interior to a minimum.

Control cabinet assembly kit HAS08
This assembly kit makes it easy to install the HCS04 converter in a Rittal TS8 control cabinet.

Module bus extension RKB0001
All the control units are fitted with a bus cable to transmit the control signals. Where there are relatively large distances between individual control units we can supply the necessary module bus extensions, in various lengths ranging from 0.5 m to 40 m.

Electrical adapters HAS05

HAS05.1-001	Use the HAS05.1-001 adapter to connect a HNK mains filter or a HMF motor filter to an HCS03.1E-W0070 converter.
HAS05.1-002	If you install both a mains filter and motor filter, please use the HAS05.1-002-NNN-NN adapter.
HAS05.1-003	You can use the HAS05.1-003 signal level converter to adjust the voltage level (5 – 30 V) of the encoder emulation signals to your application. The signal level converter is connected to the D-SUB connector of the control unit.
HAS05.1-004	You can use the HAS05.1-004 DC bus adapter to supply power to inverter units without using the standard connecting bars. Cables with a cross-section of up to 2 x 50 mm^2 per phase can be used.
HAS05.1-005	The HAS05.1-005 interface converter enables you to add RS485 connectivity to your IndraDrive. Pre-assembled cables are available to connect the level converter to the RS232 port of the control unit. The converters can either be clipped on to a DIN rail or attached directly to the mounting plate.

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Auxiliary components – cross reference

Components	HMV01.1E-W0030	HMV01.1E-W0075	HMV01.1E-W0120	HMV01.1R-W0018	HMV01.1R-W0045	HMV01.1R-W0065	HMV01.1R-W0120	HMV02.1R-W0015	HCS02.1E-W0012	HCS02.1E-W0028	HCS02.1E-W0054	HCS02.1E-W0070	HCS03.1E-W0070	HCS03.1E-W0100	HCS03.1E-W0150	HCS03.1E-W0210	HCS04.2E-W0350	HCS04.2E-W0420	HCS04.2E-W0520	HCS04.2E-W0640	HCS04.2E-W0790	HCS04.2E-W1010	HCS04.2E-W1240	HCS04.2E-W1540
Mains filter HNF																								
HNF01.1A-F240-E0051-A-480-NNNN	①											⑤2)	⑤2)											
HNF01.1A-M900-E0051-A-480-NNNN	②								④1)	④1)	④2)	④2)	④2)											
HNF01.1A-F240-E0125-A-480-NNNN		①												⑤2)	⑤2)									
HNF01.1A-M900-E0125-A-480-NNNN		②												④2)	④2)									
HNF01.1A-F240-E0202-A-480-NNNN			①													⑤2)								
HNF01.1A-M900-E0202-A-480-NNNN			②													④2)								
HNF01.1A-F240-R0026-A-480-NNNN				①					⑤1)	⑤1)	⑤2)													
HNF01.1A-M900-R0026-A-480-NNNN				②					④1)	④1)	④2)													
HNF01.1A-F240-R0065-A-480-NNNN					①																			
HNF01.1A-M900-R0065-A-480-NNNN					②																			
HNF01.1A-F240-R0094-A-480-NNNN						①																		
HNF01.1A-M900-R0094-A-480-NNNN						②																		
HNF01.1A-H350-R0180-A-480-NNNN							③																	
HNF01.1A-H350-R0180-A-480-NNNN																								
HNF01.1B-A100-E0300-N-480-NNNN																	⑧	⑧						
HNF01.1B-A100-E0580-N-480-NNNN																			⑧	⑧	⑧		⑧3)	⑧3)
HNF01.1B-A100-E0740-N-480-NNNN																						⑧		
Mains filter HNS																								
HNS02.1A-Q200-R0023-A-480-NNNN								④1)																
Mains filter NFD03																								
NFD03.1-480-007									⑦1)															
NFD03.1-480-016									⑦1)	⑦1)														
NFD03.1-480-030									⑦1)	⑦1)	⑦2)	⑦2)												
NFD03.1-480-055									⑦1)	⑦1)	⑦2)	⑦2)	⑨											
NFD03.1-480-075									⑦1)	⑦1)	⑦2)	⑦2)		⑨4)										
NFD03.1-480-130															⑨									
NFD03.1-480-180																⑨								

①18/280; ②40/1050; ③8/350; ④12/200; ⑤ 6/240; ⑥12/200; ⑦6/120; ⑧1/75; ⑨1/5

Notes: 18/280 = mains filter for up to 18 drives and a maximum total motor cable length of 280 m. These values must be reviewed for each application. Additional components may be necessary. Regardless of the number of axes, the effective total mains current must not exceed the maximum current rating of the mains filter.

The maximum length might be different in case of open-loop mode or when using unshielded cables.

1) Recommended values for group supply without DC bus connection, the maximum cable length for single drives is 75 m.

2) Recommended values for central supply: one inverter supplies power to other inverters, the maximum cable length for single drives is 75 m.

3) 2 mains filters HNF are required for operation.

4) Reduce nominal current to 75 A

Components	HMV01.1E-W0030	HMV01.1E-W0075	HMV01.1E-W0120	HMV01.1R-W0018	HMV01.1R-W0045	HMV01.1R-W0065	HMV01.1R-W0120	HMV02.1R-W0015	HCS02.1E-W0012	HCS02.1E-W0028	HCS02.1E-W0054	HCS02.1E-W0070	HCS03.1E-W0070	HCS03.1E-W0100	HCS03.1E-W0150	HCS03.1E-W0210
Mains filter with integrated HNK mains choke																
HNK01.1A-A075-E0050-A-500-NNNN													1/75			
HNK01.1A-A075-E0080-A-500-NNNN														1/75		
HNK01.1A-A075-E0106-A-500-NNNN															1/75	
HNK01.1A-A075-E0146-A-500-NNNN																1/75

Notes: 1/75 = mains filter for one drive, maximum motor cable length 75 m. These values must be reviewed for each application. Additional components may be necessary. The effective mains current must not exceed the maximum current rating of the mains filter. The maximum length might be different in case of open-loop mode or when using unshielded cables.

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Components	HMV01.1E-W0030	HMV01.1E-W0075	HMV01.1E-W0120	HMV01.1R-W0018	HMV01.1R-W0045	HMV01.1R-W0065	HMV01.1R-W0120	HMV02.1R-W0015	HCS01.1E-W0028	HCS02.1E-W0012	HCS02.1E-W0028	HCS02.1E-W0054	HCS02.1E-W0070	HCS03.1E-W0070	HCS03.1E-W0100	HCS03.1E-W0150	HCS03.1E-W0210	HCS04.2E-W0350	HCS04.2E-W0420	HCS04.2E-W0520	HCS04.2E-W0640	HCS04.2E-W0790	HCS04.2E-W1010	HCS04.2E-W1240	HCS04.2E-W1540
Motor filter HMF																									
HMF01.1N-N0K2-M0012-A-500-NNNN										●	●														
HMF01.1N-N0K2-M0028-A-500-NNNN												●	●												
HMF01.1A-N0K2-D0045-A-500-NNNN														●											
HMF01.1A-N0K2-D0073-A-500-NNNN															●										
HMF01.1A-N0K2-D0095-A-500-NNNN																●									
HMF01.1A-N0K2-D0145-A-500-NNNN																	●								
HMF01.1N-N0K1-M0320-N-690-NNNN																		●	●						
HMF01.1N-N0K1-M0480-N-690-NNNN																				●	●				
HMF01.1N-N0K1-M0760-N-690-NNNN																						●	●		
HMF01.1N-N0K1-M1190-N-690-NNNN																								●	●

Components	HMV01.1E-W0030	HMV01.1E-W0075	HMV01.1E-W0120	HMV01.1R-W0018	HMV01.1R-W0045	HMV01.1R-W0065	HMV01.1R-W0120	HMV02.1R-W0015	HCS01.1E-W0028	HCS02.1E-W0012	HCS02.1E-W0028	HCS02.1E-W0054	HCS02.1E-W0070	HCS03.1E-W0070	HCS03.1E-W0100	HCS03.1E-W0150	HCS03.1E-W0210	HCS04.2E-W0350	HCS04.2E-W0420	HCS04.2E-W0520	HCS04.2E-W0640	HCS04.2E-W0790	HCS04.2E-W1010	HCS04.2E-W1240	HCS04.2E-W1540
Mains choke HNL																									
HNL01.1E-0400-N0051-A-480-NNNN	●																								
HNL01.1E-0200-N0125-A-480-NNNN		●																							
HNL01.1E-0100-N0202-A-480-NNNN			●																						
HNL01.1R-0980-C0026-A-480-NNNN				●																					
HNL01.1R-0590-C0065-A-480-NNNN					●																				
HNL01.1R-0540-C0094-A-480-NNNN						●																			
HNL01.1R-0300-C0180-A-480-NNNN							●																		
HNL01.1E-1000-N0012-A-500-NNNN									●	●	●														
HNL01.1E-1000-N0020-A-500-NNNN												●													
HNL01.1E-0600-N0032-A-500-NNNN													●												
HNL01.1E-0571-N0050-A-500-NNNN														●											
HNL01.1E-0362-N0080-A-500-NNNN															●										
HNL01.1E-0240-N0106-A-500-NNNN																●									
HNL01.1E-0170-N0146-A-500-NNNN																	●								
HNL02.1R-0980-C0023-A-480-NNNN								●																	
HNL01.1E-0098-N0280-N-690-NNNN																		●							
HNL01.1E-0085-N0315-N-690-NNNN																			●						
HNL01.1E-0066-N0365-N-690-NNNN																				●					
HNL01.1E-0060-N0475-N-690-NNNN																					●				
HNL01.1E-0038-N0650-N-690-NNNN																						●			
HNL01.1E-0032-N0760-N-690-NNNN																							●		
HNL01.1E-0038-N0540-N-690-NNNN																								●[1]	
HNL01.1E-0026-N0620-N-690-NNNN																									●[1]

The effective total mains current of your application must not exceed the maximum rated current of the mains choke.

● Standard version [1] 2 mains chokes HNL are required for operation.

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Auxiliary components – cross reference

Components	HMV01.1E-W0030	HMV01.1E-W0075	HMV01.1E-W0120	HMV01.1R-W0018	HMV01.1R-W0045	HMV01.1R-W0065	HMV01.1R-W0120	HMV02.1R-W0015	HCS01.1E-W0028	HCS02.1E-W0012	HCS02.1E-W0028	HCS02.1E-W0054	HCS02.1E-W0070	HCS03.1E-W0070	HCS03.1E-W0100	HCS03.1E-W0150	HCS03.1E-W0210	HCS04.2E-W0350	HCS04.2E-W0420	HCS04.2E-W0520	HCS04.2E-W0640	HCS04.2E-W0790	HCS04.2E-W1010	HCS04.2E-W1240	HCS04.2E-W1540
DC choke HLL																									
HLL01.1A-150U-N0290-C-008-0471-NNNN																		●							
HLL01.1A-138U-N0558-C-008-0558-NNNN																			●						
HLL01.1A-105U-N0486-C-008-0760-NNNN																				●					
HLL01.1A-095U-N0574-C-008-0840-NNNN																					●				
HLL01.1A-069U-N0702-C-008-1116-NNNN																						●			
HLL01.1A-063U-N0861-C-008-1260-NNNN																							●		
HLL01.1A-037U-N1160-C-008-1884-NNNN																								●	
HLL01.1A-034U-N1404-C-008-2232-NNNN																									●

Components	HCS02.1E-W0054	HCS02.1E-W0070	HCS03.1E-W0070	HCS03.1E-W0100	HCS03.1E-W0150	HCS03.1E-W0210	HCS04.2E-W0350	HCS04.2E-W0420	HCS04.2E-W0520	HCS04.2E-W0640	HCS04.2E-W0790	HCS04.2E-W1010	HCS04.2E-W1240	HCS04.2E-W1540
Brake resistor HLR														
HLR01.1N-01K8-N40R0-A-007-NNNN	○													
HLR01.1N-03K8-N40R3-A-007-NNNN	○													
HLR01.1N-02K4-N28R0-A-007-NNNN		○												
HLR01.1N-05K5-N28R2-A-007-NNNN		○												
HLR01.1N-0300-N17R5-A-007-NNNN			●											
HLR01.1N-01K6-N18R0-A-007-NNNU			○											
HLR01.1N-03K5-N19R0-A-007-NNNN			○											
HLR01.1N-04K5-N18R0-A-007-NNNN			○											
HLR01.1N-06K5-N18R0-A-007-NNNN			○											
HLR01.1N-10K0-N18R0-A-007-NNNN			○											
HLR01.1N-0470-N11R7-A-007-NNNN				●										
HLR01.1N-02K0-N15R0-A-007-NNNU				○										
HLR01.1N-05K0-N15R0-A-007-NNNN				○										
HLR01.1N-07K0-N14R0-A-007-NNNN				○										
HLR01.1N-09K5-N13R0-A-007-NNNN				○										
HLR01.1N-14K5-N13R0-A-007-NNNN				○										
HLR01.1N-0780-N07R0-A-007-NNNN					●									
HLR01.1N-04K5-N07R4-A-007-NNNN					○									
HLR01.1N-08K5-N08R0-A-007-NNNN					○									
HLR01.1N-11K0-N07R3-A-007-NNNN					○									
HLR01.1N-15K0-N08R1-A-007-NNNN					○									
HLR01.1N-24K0-N07R2-A-007-NNNN					○									
HLR01.1N-1K08-N05R0-A-007-NNNN						●								
HLR01.1N-06K5-N06R1-A-007-NNNN						○								
HLR01.1N-12K5-N05R5-A-007-NNNN						○								
HLR01.1N-17K0-N05R1-A-007-NNNN						○								
HLR01.1N-23K0-N05R5-A-007-NNNN						○								
HLR01.1N-36K0-N05R4-A-007-NNNN						○								

● Standard version ○ Heavy-duty version

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Components	HCS02.1E-W0054	HCS02.1E-W0070	HCS03.1E-W0070	HCS03.1E-W0100	HCS03.1E-W0150	HCS03.1E-W0210	HCS04.2E-W0350	HCS04.2E-W0420	HCS04.2E-W0520	HCS04.2E-W0640	HCS04.2E-W0790	HCS04.2E-W1010	HCS04.2E-W1240	HCS04.2E-W1540
Brake resistor for lifting gears														
HLR01.1N-44k0-N03R3-B-007-NNNN							●			●[1]				
HLR01.1N-66k0-N02R1-B-007-NNNN								●	●		●[1]	●[1]	●[2]	●[2]
Brake resistor for running gears														
HLR01.1N-22k0-N03R5-B-007-NNNN							●	●[1]	●[1]	●[1]	●[2]	●[2]	●[3]	●[4]

● Standard version [1] 2 brake resistors HLR are required for operation. [2] 3 brake resistors HLR are required for operation.
[3] 4 brake resistors HLR are required for operation. [4] 5 brake resistors HLR are required for operation.

Components	HMV01.1E-W0030	HMV01.1E-W0075	HMV01.1E-W0120	HMV01.1R-W0018	HMV01.1R-W0045	HMV01.1R-W0065	HMV01.1R-W0120	HMV02.1R-W0015	HMS01.1N-W0020	HMS01.1N-W0036	HMS01.1N-W0054	HMS01.1N-W0070	HMS01.1N-W0110	HMS01.1N-W0150	HMS01.1N-W0210	HMS01.1N-W0300	HMS01.1N-W0350	HMS02.1N-W0028	HMS02.1N-W0054	HMD01.1N-W0012	HMD01.1N-W0020	HMD01.1N-W0036	HCS02.1E-W0012	HCS02.1E-W0028	HCS02.1E-W0054	HCS02.1E-W0070	HCS03.1E-W0070	HCS03.1E-W0100	HCS03.1E-W0150	HCS03.1E-W0210	HCS04.2E-W0350	HCS04.2E-W0420	HCS04.2E-W0520	HCS04.2E-W0640	HCS04.2E-W0790	HCS04.2E-W1010	HCS04.2E-W1240	HCS04.2E-W1540
Brake unit HLB																																					
HLB01.1C-01K0-N06R0-A-007-NNNN	○	○	○	○	○	○	○	●																●	●	●	○	○	○	○							
HLB01.1D-02K0-N03R4-A-007-NNNN	●	●	●	●	●	●	●																	○	○	○	●	●	●	●							
Brake chopper HLT																																		●	●			
HLT01.1A-200K-N-007-NNNN																																				●	●	●
HLT01.1A-400K-N-007-NNNN																																						
Capacity module HLC																																						
HLC01.1C-01M0-A-007-NNNN	○	○	○	○	○	○	○	●																●	●	●				○							
HLC01.1C-02M4-A-007-NNNN	○	○	○	○	○	○	○	●																●	●	●				○							
HLC01.1D-05M0-A-007-NNNN	●	●	●	●	●	●	●																	○	○	○				●							
Basic accessories HAS01																																						
HAS01.1-050-072-MN									●	●								●		●	●																
HAS01.1-065-072-CN																								●													
HAS01.1-065-NNN-CN																							●	●													
HAS01.1-075-072-MN											●								●			●															
HAS01.1-100-072-MN												●																									
HAS01.1-105-072-CN																									●	●											
HAS01.1-105-NNN-CN																									●	●											
HAS01.1-125-072-CN																											●										
HAS01.1-125-072-MN													●																								
HAS01.1-125-NNN-CN																											●										
HAS01.1-150-072-MN	●							●						●																							
HAS01.1-150-NNN-MN	●																																				
HAS01.1-150-NNN-M2								●																													
HAS01.1-175-072-MN				●																																	
HAS01.1-175-NNN-MN				●																																	
HAS01.1-200-072-MN															●	●																					
HAS01.1-225-072-CN																												●	●								
HAS01.1-225-NNN-CN																												●	●								
HAS01.1-250-072-MN		●			●																																
HAS01.1-250-NNN-MN		●			●																																
HAS01.1-350-072-MN			●			●	●										●																				
HAS01.1-350-NNN-CN																														●							
HAS01.1-350-NNN-MN			●			●	●																														

● Standard version ○ With control cabinet adapter HAS03 to even out the different unit depths

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Auxiliary components – cross reference

Components	HMS01.1N-W0020	HMS01.1N-W0036	HMS01.1N-W0054	HMS01.1N-W0070	HMS01.1N-W0110	HMS01.1N-W0150	HMS01.1N-W0210	HMS01.1N-W0300	HMS01.1N-W0350	HMS02.1N-W0028	HMS02.1N-W0054	HMD01.1N-W0012	HMD01.1N-W0020	HMD01.1N-W0036	HCS02.1E-W0012	HCS02.1E-W0028	HCS02.1E-W0054	HCS02.1E-W0070	HCS03.1E-W0070	HCS03.1E-W0100	HCS03.1E-W0150	HCS03.1E-W0210	HNK01.1A-...-E0050	HNK01.1A-...-E0080	HNK01.1A-...-E0106	HNK01.1A-...-E0146	KCU02.1N
Shield connection HAS02																											
HAS02.1-001-NNN-NN	●	●	●	●																							
HAS02.1-002-NNN-NN												●	●	●	●	●	●	●									
HAS02.1-003-NNN-NN					●	●	●	●																			
HAS02.1-004-NNN-NN																			●								
HAS02.1-005-NNN-NN																				●	●						
HAS02.1-006-NNN-NN																						●					
HAS02.1-007-NNN-NN																								●	●		
HAS02.1-008-NNN-NN																						●					
HAS02.1-009-NNN-NN																										●	
HAS02.1-010-NNN-NN											●																
HAS02.1-011-NNN-NN										●																	
HAS02.1-014-NNN-NN									●																		
HAS02.1-015-NNN-NN																											●

Components	HCS02.1E-W0012	HCS02.1E-W0028	HCS02.1E-W0054	HCS02.1E-W0070	HLB01.1C	HLC01.1C
Control cabinet adapter HAS03						
HAS03.1-002-NNN-NN	●	●			●	●
HAS03.1-004-NNN-NN			●	●		

Components	HCS02.1E-W0012	HCS02.1E-W0028	HCS02.1E-W0054	HCS02.1E-W0070	HCS03.1E-W0070	HCS03.1E-W0100	HCS03.1E-W0150	HCS03.1E-W0210
Auxiliary capacitor HAS04								
HAS04.1-001-NNN-NN		●	●	●				
HAS04.1-002-NNN-NN					●	●	●	●

Only required in combination with mains filter HNF or if power is supplied to other HMS01 inverters.

Components	HMV01.1E-W0030	HMV01.1E-W0075	HMV01.1E-W0120	HMV01.1R-W0018	HMV01.1R-W0045	HMV01.1R-W0065	HMV01.1R-W0120	HMV02.1R-W0015	HMS01.1N-W0020	HMS01.1N-W0036	HMS01.1N-W0054	HMS01.1N-W0070	HMS01.1N-W0110	HMS01.1N-W0150	HMS01.1N-W0210	HMS01.1N-W0300	HMS01.1N-W0350	HMS02.1N-W0028	HMS02.1N-W0054	HMD01.1N-W0012	HMD01.1N-W0020	HMD01.1N-W0036
Adapter HAS05 – DC bus connection																						
HAS05.1-004-NNL-NN	●	●	●	●	●	●	●	●					●	●	●	●	●					
HAS05.1-004-NNR-NN	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

Components	BASIC OPEN LOOP CSB01.1N-FC	BASIC ANALOG CSB01.1N-AN	BASIC PROFIBUS CSB01.1N-PB	BASIC SERCOS CSB01.1N-SE	BASIC UNIVERSAL single-axis CSB01.1C	BASIC UNIVERSAL double-axis CDB01.1C	ADVANCED CSH01.1C
Adapter HAS05 – signal level converter							
HAS05.1-003-NNN-NN		●			●[1]	●[1]	●[1]
Adapter HAS05 – RS232/485 converter							
HAS05.1-005-NNN-NN	●	●	●	●	●	●	●

● Standard version [1] For control units with MEM encoder emulation only [2] For control units with safety option (L1, S1)

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Components	BASIC OPEN LOOP	BASIC ANALOG	BASIC PROFIBUS	BASIC SERCOS	BASIC UNIVERSAL single-axis	BASIC UNIVERSAL double-axis	ADVANCED
	CSB01.1N-FC	CSB01.1N-AN	CSB01.1N-PB	CSB01.1N-SE	CSB01.1C	CDB01.1C	CSH01.1C
Adapter HAS05 – from D-SUB 9-pin connector (X41) to the terminal							
HAS05.1-007-NNN-NN		●[2)]	●[2)]	●[2)]	●[2)]	●[2)]	●[2)]

● Standard version [1)] For control units with MEM encoder emulation only [2)] For control units with safety option (L2, S2)

Components	HCS03.1E-W0070 with HMF motor filter	HCS03.1E-W0070 with HNK mains filter	HCS03.1E-W0070 with HMF motor filter and HNK mains filter
Adapter HAS05 – connection accessories			
HAS05.1-001-NNN-NN	●	●	●
HAS05.1-002-NNN-NN			●

Components	HCS04.2E-W0350	HCS04.2E-W0420	HCS04.2E-W0520	HCS04.2E-W0640	HCS04.2E-W0790	HCS04.2E-W1010	HCS04.2E-W1240	HCS04.2E-W1540
Flange assembly kit HAS07								
HAS07.1-350-NNN-NN	●							
HAS07.1-330-NNN-NN		●						
HAS07.1-430-NNN-NN			●					
HAS07.1-585-NNN-NN				●[1)]	●[1)]			

● Standard version [1)] When an external brake chopper HLT is used, the additional flange assembly kit HAS07.1-660-NNN-NN is required.

Components	HCS04.2E-W0350	HCS04.2E-W0420	HCS04.2E-W0520	HCS04.2E-W0640	HCS04.2E-W0790	HCS04.2E-W1010	HCS04.2E-W1240	HCS04.2E-W1540
Control cabinet assembly kit HAS08 for Rittal TS8, protection category IP23[1)]								
HAS08.1-002-P23-NN	●							
HAS08.1-003-P23-NN		●						
HAS08.1-004-P23-NN			●					
HAS08.1-005-P23-NN				●	●			
HAS08.1-006-P23-NN						●	●	
HAS08.1-007-P23-NN								●
Control cabinet assembly kit HAS08 for Rittal TS8, protection category IP54 with filter fan[2)]								
HAS08.1-002-P54-FL	●							
HAS08.1-003-P54-FL		●						
HAS08.1-004-P54-FL			●					
HAS08.1-005-P54-FL				●	●			
HAS08.1-006-P54-FL						●	●	
HAS08.1-007-P54-FL								●
Control cabinet assembly kit HAS08 for Rittal TS8, protection category IP54 with separate air guidance[3)]								
HAS08.1-002-P54-GL	●							
HAS08.1-003-P54-GL		●						
HAS08.1-004-P54-GL			●					
HAS08.1-005-P54-GL				●	●			
HAS08.1-006-P54-GL						●	●	
HAS08.1-007-P54-GL								●

● Standard version [1)] Prepared for mains choke HNL or DC choke HLL
[2)] Only with mains choke HNL [3)] Only with DC choke HLL

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Auxiliary components – connection cables

Motor	Power unit	Power cable	Extension
MSK030B-0900 MSK030C-0900 MSK040B-0450, -0600	HCS01.1E-W0003 HCS01.1E-W0005 HCS01.1E-W0008	RKL0014	RKL4305
MSK040C-0450, -0600 MSK043C-0600	HCS01.1E-W0018 HCS01.1E-W0028	RKL0019	
MSK050B-0300, -0450, -0600	HCS01.1E-W0054	RKL0053	
MSK050C-0300, -0450, -0600 MSK060B-0300, -0600 MSK060C-0300, -0600 MSK061B-0300 MSK061C-0200, -0300, -0600 MSK076C-0300, -0450	HCS02.1E-W0012 HCS02.1E-W0028 HMD01.1N-W0012 HMD01.1N-W0020 HMD01.1N-W0036 HMS01.1N-W0020 HMS01.1N-W0036 HMS02.1N-W0028	RKL4302	
	HCS02.1E-W0054 HCS02.1E-W0070 HCS03.1E-W0070 HMS01.1N-W0054 HMS01.1N-W0070 HMS02.1N-W0054	RKL4303	
MSK070C-0150, -0300, -0450 MSK070D-0150, -0300 MSK070E-0150, -0300	HCS01.1E-W0003 HCS01.1E-W0005 HCS01.1E-W0008	RKL0016	RKL4311
MSK071C-0200, -0300, -0450 MSK071D-0200, -0300, -0450 MSK071E-0200, -0300	HCS01.1E-W0018 HCS01.1E-W0028	RKL0017	
MSK075C-0200, -0300, -0450 MSK075D-0200, -0300 MSK075E-0200, -0300	HCS01.1E-W0054	RKL0050	
	HCS02.1E-W0012 HCS02.1E-W0028 HMD01.1N-W0012 HMD01.1N-W0020 HMD01.1N-W0036 HMS01.1N-W0020 HMS01.1N-W0036 HMS02.1N-W0028	RKL4306	
	HCS02.1E-W0054 HCS02.1E-W0070 HCS03.1E-W0070 HMS01.1N-W0054 HMS01.1N-W0070 HMS02.1N-W0054	RKL4307	

Motor	Power unit	Power cable	Extension
MSK070D-0450 MSK070E-0450	HCS01.1E-W0018 HCS01.1E-W0028	RKL0018	RKL4312
MSK071E-0450	HCS01.1E-W0054	RKL0052	
MSK075D-0450 MSK075E-0450 MSK103A-0300 MSK103B-0300	HCS02.1E-W0012 HCS02.1E-W0028 HMD01.1N-W0012 HMD01.1N-W0020 HMD01.1N-W0036 HMS01.1N-W0020 HMS01.1N-W0036 HMS02.1N-W0028	RKL4308	
	HCS02.1E-W0054 HCS02.1E-W0070 HCS03.1E-W0070 HMS01.1N-W0054 HMS01.1N-W0070 HMS02.1N-W0054	RKL4309	
	HCS03.1E-W0100 HCS03.1E-W0150 HMS01.1N-W0110 HMS01.1N-W0150 HMS01.1N-W0210	RKL4310	
MSK103D-0300	HCS01.1E-W0054	RKL0058	RKL4316
	HCS02.1E-W0012 HCS02.1E-W0028 HMD01.1N-W0012 HMD01.1N-W0020 HMD01.1N-W0036 HMS01.1N-W0020 HMS01.1N-W0036 HMS02.1N-W0028	RKL4313	
	HCS02.1E-W0054 HCS02.1E-W0070 HCS03.1E-W0070 HMS01.1N-W0054 HMS01.1N-W0070 HMS02.1N-W0054	RKL4314	
	HCS03.1E-W0100 HCS03.1E-W0150 HMS01.1N-W0110 HMS01.1N-W0150 HMS01.1N-W0210	RKL4315	
MSK100A-0200, -0300, -0450 MSK100B-0200 MSK100D-0200 MSK101C-0200	HCS01.1E-W0054	RKL0054	RKL4335
	HCS02.1E-W0012 HCS02.1E-W0028 HMD01.1N-W0012 HMD01.1N-W0020 HMD01.1N-W0036 HMS01.1N-W0020 HMS01.1N-W0036 HMS02.1N-W0028	RKL4325	
	HCS02.1E-W0054 HCS02.1E-W0070 HCS03.1E-W0070 HMS01.1N-W0054 HMS01.1N-W0070 HMS02.1N-W0054	RKL4320	

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Motor	Power unit	Power cable	Extension
MSK100B-0300	HCS01.1E-W0054	RKL0051	RKL4336
MSK100C-0200, -0300 MSK100D-0300 MSK101D-0200	HCS02.1E-W0012 HCS02.1E-W0028 HMD01.1N-W0012 HMD01.1N-W0020 HMD01.1N-W0036 HMS01.1N-W0020 HMS01.1N-W0036 HMS02.1N-W0028	RKL4326	
	HCS02.1E-W0054 HCS02.1E-W0070 HCS03.1E-W0070 HMS01.1N-W0054 HMS01.1N-W0070 HMS02.1N-W0054	RKL4321	
	HCS03.1E-W0100 HCS03.1E-W0150 HMS01.1N-W0110 HMS01.1N-W0150 HMS01.1N-W0210	RKL4343	
MSK100B-0400 MSK100B-0450 MSK101C-0300, -0450	HCS01.1E-W0054	RKL0056	RKL4337
	HCS02.1E-W0012 HCS02.1E-W0028 HMD01.1N-W0012 HMD01.1N-W0020 HMD01.1N-W0036 HMS01.1N-W0020 HMS01.1N-W0036 HMS02.1N-W0028	RKL4327	
	HCS02.1E-W0054 HCS02.1E-W0070 HCS03.1E-W0070 HMS01.1N-W0054 HMS01.1N-W0070 HMS02.1N-W0054	RKL4322	
MSK100C-0450 MSK100D-0350 MSK101D-0300 MSK101E-0200 MSK131B-0200	HCS01.1E-W0054	RKL0055	RKL4338
	HCS02.1E-W0054 HCS02.1E-W0070 HCS03.1E-W0070 HMS01.1N-W0054 HMS01.1N-W0070 HMS02.1N-W0054	RKL4323	
	HCS03.1E-W0100 HCS03.1E-W0150 HMS01.1N-W0110 HMS01.1N-W0150 HMS01.1N-W0210	RKL4328	

Motor	Power unit	Power cable	Extension
MSK101D-0450 MSK101E-0300	HCS02.1E-W0054 HCS02.1E-W0070 HCS03.1E-W0070 HMS01.1N-W0054 HMS01.1N-W0070	RKL4324	RKL4339
	HMS02.1N-W0054		
	HCS03.1E-W0100 HCS03.1E-W0150 HMS01.1N-W0110 HMS01.1N-W0150 HMS01.1N-W0210	RKL4329	
MSK101E-0450 MSK131D-0200	HCS02.1E-W0054 HCS02.1E-W0070 HCS03.1E-W0070 HMS01.1N-W0054 HMS01.1N-W0070	RKL4344	RKL4340
	HMS02.1N-W0054		
	HCS03.1E-W0100 HCS03.1E-W0150 HMS01.1N-W0110 HMS01.1N-W0150 HMS01.1N-W0210 HMS01.1N-W0300	RKL4330	
	HCS03.1E-W0210	RKL4349	
	HMS01.1N-W0350	RKL4783[1)]	RKL4342[1)]
MSK133B-0202-SA MSK133B-0203-FN	HCS03.1E-W0150 HMS01.1N-W0150 HMS01.1N-W0210 HMS01.1N-W0300	RKL4775	See documentation "Connection cables – selection data"
	HCS03.1E-W0210	RKL4787	
MSK133C-0202-SA MSK133C-0203-FN	HCS03.1E-W0150 HMS01.1N-W0150 HMS01.1N-W0210 HMS01.1N-W0300	RKL4727	
	HCS03.1E-W0210	RKL4728	
MSK133D-0202-SA MSK133E-0202-SA	HMS01.1N-W0210 HMS01.1N-W0300	RKL4729	
	HCS03.1E-W0210	RKL4730	
MSK133D-0203-FN MSK133E-0203-FN	HCS03.1E-W0100 HCS03.1E-W0150 HMS01.1N-W0110 HMS01.1N-W0150 HMS01.1N-W0210 HMS01.1N-W0300	2 x RKL4727	
	HCS03.1E-W0210	2 x RKL4728	

These tables are an extract from our extensive range of cables.
Cables for other motors can be found in our documentation entitled "Connection cables – selection data".
All specifications given apply to motors with natural convection at 60K.
Standard encoder cable RKG4200 for all motors.

[1)] For surface-cooled motor

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Glossary

▶ **A**

ADVANCED
Control units for maximum performance and dynamics with many configuration options

▶ **B**

BASIC
Control units for standard applications

Basic accessories
All the mounting parts and hardware, and the connecting bars for the control voltage and DC bus

Brake chopper
Brake transistor
Transistor which switches a brake resistor on and off

Braking power
Power which is recovered in regenerative operation of the motors

Brake resistor
For input power in regenerative operation (converted into heat)

Brake unit
All-in-one unit comprising brake resistor and braking transistor (brake chopper) used to increase the braking power

▶ **C**

Capacity module
Optional auxiliary component to store energy in the DC bus

CLOSED LOOP
Closed control loop (automatically regulated operation) in which the device being regulated is monitored using a measuring system and made available to the drive

Control cabinet adapter
Spacer bolts used to even out different unit depths

Control unit
The part of the drive unit comprising all the control functions and interfaces for installation in the power unit

Converter
Takes the mains voltage with its fixed amplitude and frequency and generates a three-phase alternating current with variable amplitude and frequency

▶ **D**

DC bus voltage
DC voltage generated from the AC network and used to supply the power units

Derating
Lowering of the specified data in the event of a change in operating conditions

Drive unit
Converter and inverter consisting of a power and a control unit, for the control of servo and standard motors.

▶ **E**

EMC
Electromagnetic compatibility

Encoder cable
Cable used to connect the motor encoder to the encoder interface of the control unit

▶ **F**

Firmware
Device-specific software for the drive functions

Functions library
Collection of function blocks conforming to IEC or PLCopen

▶ **I**

IndraDrive C
Compact drive series, converters

IndraDrive Cs
Ultra-compact, multi-protocol-capable drive series, inverters

IndraDrive M
Modular drive series, inverters and power supply units

IndraDrive Mi
Cabinet-free drive technology – inverter, control unit and synchronous servo motor in one unit

IndraDyn A
Air-cooled or liquid-cooled asynchronous servo motors

IndraDyn H
High-speed frameless (kit) motors

IndraDyn L
Synchronous linear motors

IndraDyn S
Synchronous servo motors, also for potentially explosive areas

IndraDyn T
Synchronous frameless (kit) torque motors

IndraMotion MLD
Integrated automation solution comprising drive functions, motion control and processing logic

IndraSize
Software tool used for sizing and selecting drives based on the machine data

IndraWorks
Engineering framework toolkit for project planning, parameterization, start-up, diagnostics, etc.

Inverter
Takes the DC bus voltage and generates a three-phase alternating current with variable amplitude and frequency

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▶ **M**

Mains choke
Used to increase the continuous DC bus output and to suppress harmonics

Mains filter
EMC filter for power supply units and converters used to reduce circuit feedback

Module bus
Bus connection between power units for exchanging internal control signals

Module bus extension
Optional bus connection used to bridge larger than average distances between individual drive control units

Motion logic
Integrated automation solution comprising drive functions, motion control and processing logic

Motor filter
Used to protect the motor winding from extreme voltage rises

Multi-Ethernet
General term for various Ethernet-based communications protocols (sercos III, PROFINET IO, EtherNet/IP, EtherCAT) that are covered by a single multiprotocol-capable hardware device

▶ **O**

OPEN LOOP
Open control loop (controlled operation) in which the device being controlled is not monitored using measuring techniques

▶ **P**

Power cable
Cable for connecting the motor to the power unit

Power recovery
Return of energy to the mains supply during regenerative operation of the drive

Power supply unit
Takes the mains voltage with fixed amplitude and frequency and generates a DC bus voltage

Power unit
The part of the drive control unit containing the power electronics to control the motors, used to hold the control unit

▶ **S**

Safety on Board
Safety technology integrated in the drive, certified in accordance with EN 13849-1 and EN 62061

sercos III
Serial Real-time Communications Standard Interface – open and serial real-time communication standard for high-precision motion control applications, designed by leading manufacturers of numerically controlled drives

Shield connection
Connection plate for EMC-compatible connection of the motor cable to the control unit

Software module
MultiMedia Card for simple transmission of axis-oriented drive parameters without the use of a PC

Switching frequency
Clock frequency of the pulse width modulation (PWM)

▶ **T**

Technology package
Process-oriented function blocks, e.g. tension control

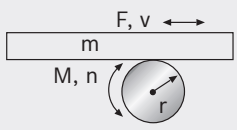
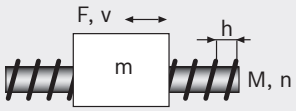
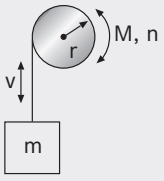
▶ **U**

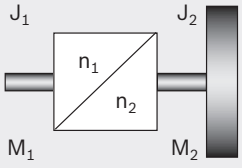
User library
Collection of function blocks developed by the user

User program
Application-specific combination of different function blocks/ technology packages

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Formulas

	Speed	Torque	Output	Mass moment of inertia
Roller, wheel, pinion and belt drive 	$n = \frac{v}{2 \cdot r \cdot \pi}$	$M = F \cdot r$	$P = \frac{F \cdot v}{60}$	$J = m \cdot r^2$
Ball screw drive 	$n = \frac{v \cdot 1000}{h}$	$M = \frac{F \cdot h}{2 \cdot \pi \cdot 1000}$	$P = \frac{F \cdot v}{60}$	$J = m \cdot \left(\frac{h}{2 \cdot \pi \cdot 1000} \right)^2$
Pulley drive 	$n = \frac{v}{2 \cdot \pi \cdot r}$	$M = m \cdot g \cdot r$	$P = \frac{m \cdot g \cdot v}{60}$	$J = m \cdot r^2$

	Speed	Torque	Transmission ratio	Mass moment of inertia
Gear conversion 	$n_1 = n_2 \cdot i$	$M_1 = \frac{M_2}{i}$	$i = \frac{n_1}{n_2}$	$J_1 = \frac{J_2}{i^2}$

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Miscellaneous

Rotational frequency	$\omega = \frac{2 \cdot \Pi \cdot n}{60}$	Effective electrical power	$P = U \cdot I \cdot \cos\phi \cdot \sqrt{3}$
Rotational kinetic energy	$W = \frac{J \cdot \omega^2}{2}$	Apparent electrical power	$S = U \cdot I \cdot \sqrt{3}$
Translational kinetic energy	$W = \frac{m}{2} \cdot \frac{(v)^2}{(60)^2}$	Reactive electrical power	$Q = U \cdot I \cdot \sin\phi \cdot \sqrt{3}$
Synchronous rpm	$n = \frac{f \cdot 60}{p}$	DC bus voltage	$U = U_{Netz} \cdot \sqrt{2}$
Synchronous speed	$v = 2 \cdot f \cdot Tp \cdot 60$	Force	$F = m \cdot a$

Unit conversion

Physical value	Name of unit	Conversion	Name of unit
Force	pound-force	1 lbf = 4.4482 N	Newton
Power	horsepower	1 hp = 745.7 W	Watt
Length	inch	1 in = 25.4 mm	millimeter
Length	foot	1 ft = 0.3048 m	meter
Weight	pound	1 lb = 0.4536 kg	kilogram

Legend

a – Acceleration in ms^{-2}	J – Mass moment of inertia in kgm^2	r – Radius in m
F – Force in N	M – Torque in Nm	S – Apparent power in VA
f – Frequency in s^{-1}	m – Weight in kg	U – Voltage in V
g – Gravitational acceleration 9.81 ms^{-2}	n – Rotational speed in rpm	v – Speed in m/min
h – Spindle pitch in mm	P – Power in W	W – Energy in Ws
I – Current in A	p – Pole pair number	Tp – Pole pitch in m
i – Transmission ratio	Q – Reactive power in var	ω – Rotational frequency in s^{-1}

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Documentation and further information

IndraDrive
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IndraDrive and
IndraDyn
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Selection Data
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Products online
Information about IndraDrive and IndraDyn is available at www.boschrexroth.com/electrics-catalog

Documentation online
Current documentation is also available at www.boschrexroth.com/mediadirectory

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LSA Control S.L. www.lsa-control.com comercial@lsa-control.com (+34) 960 62 43 01

Notes

LSA Control S.L. www.lsa-control.com comercial@lsa-control.com (+34) 960 62 43 01

The Drive & Control Company

Rexroth
Bosch Group

Bosch Rexroth AG
Bgm.-Dr.-Nebel-Str. 2
97816 Lohr, Germany
Phone +49(0)9352/18-0
Fax +49(0)9352/18-8400
www.boschrexroth.com/electrics

Local contact information can be found at:
www.boschrexroth.com/contact

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