Rexroth
Bosch Group

Rexroth IndraDrive
Evolution in drive technology

More complete, more intelligent, greater safety

IndraDrive from Rexroth
More complete, more intelligent, greater safety

How can something be "more complete" than "complete", you are probably wondering. Fact is, our IndraDrive sets new standards in drive engineering that are best described by the apparent contradiction in terms: It offers greater safety in use, is more intelligent in its functions, and really does come "more complete" with software and hardware than all past generations of drive systems.

Whatever branch of industry you call your own, in IndraDrive you will find a complete, intelligent and above all future-proof solution to your automation tasks. The flexible combination of compact converters or modular inverters with high-dynamic linear and rotary motors makes IndraDrive predestined for intelligent single-axis as well as complex multiple-axis applications.

IndraDrive offers a host of application advantages, for example:

- Safety on Board conforming to EN 954-1, category 3, for "Safe Stop" and "Safe Motion"
- a wide power range from 1 kW to 110 kW
- openness for international interfaces
- integrated Motion Control with PLC conforming to IEC 61131-3
- highest performance and precision
- scalable power and functionality
- fast initial startup
- power regenerating and direct connection to mains supply from 380 V to 480 V
- integrated mains contactor and braking resistor

With the IndraDrive generation of drives, Rexroth sets yet another milestone in the development of modern automation components for more flexibility, productivity and precision

IndraDrive is the application-optimized drive solution with integrated safety technology, PLC and high-dynamic motors

Convincing in performance and functionality

Safety on Board
Safety technology certified as complying with EN 954-1, category 3, makes sure that people are protected even from moving axes. Unlike conventional safety concepts, this technology works without power contactors in the mains or motor supply lines and without additional speed monitors.

Integrated Motion Control with PLC conforming to IEC 61131-3
Motion Control with PLC conforming to IEC 61131-3 can be integrated as an optional feature that is fully committed to open standards. This makes it easier to implement customer know-how, and the costs of higher-level control systems and personnel training courses can be saved.

Integrated technology functions
Technology functions can be parameterized on the basis of the drive PLC to perform the most diverse process-oriented tasks. The user needs no programming know-how whatsoever for this work.

Open interfaces
Internationally recognized interfaces are available for communicating with higher-level machine control systems: SERCOS interface, PROFIBUS-DP, INTERBUS, CANopen, DeviceNet, analogue and parallel.

Fast and easy initial startup
The DriveTop startup assistant guides you reliably and quickly through the startup routine.

A unique platform
We have developed two versions of IndraDrive in order to better meet your individual requirements:
- with a compact converter system for power ratings up to 110 kW
- with a modular inverter system for up to 75 kW

Particularly economical drive solutions can be assembled from the common control units and the combination of versions.

A complete range of motors
The newly developed generation of IndraDyn motors meets all requirements in modern factory automation through a combination of model diversity and unique performance:
- synchronous and asynchronous servo motors of far greater compactness with higher power
- servo motors for potentially explosive areas – conforming to ATEX and UL/CSA
- linear and torque motors for innovative direct drive concepts
- synchronous and asynchronous motors for high-speed applications, e.g. motor spindles


Automation


Printing and paper converting machines


Conveying and storage technology


Glass processing machines


Handling and assembly systems


Woodworking machines


Plastics processing machines


Textile machines


Converting technology


Packaging and food processing machines


Machine tools

Standardized for all applications

IndraDrive is based on a uniform hardware platform that sets new standards with its unique continuity, flexibility and future adaptability.
All control components – from the simple frequency converter to the high-end servo drive with integrated Motion Control – are combinable with all IndraDrive C converters and IndraDrive M inverters.

A further example of continuity and flexibility: Indradrive C converters can be combined with IndraDrive M inverters to create extremely compact and economical drive packages.

Power units

Converters from 1,5 kW to 11 kW – the most compact in their class, ideal for single-axis applications

Converters from 15 kW to 110 kW – can be combined with modular inverters to create economical and compact drive solutions

Modular inverters up to 75 kW – ideal for multiple-axis applications

Control units

Control units are available in different versions:

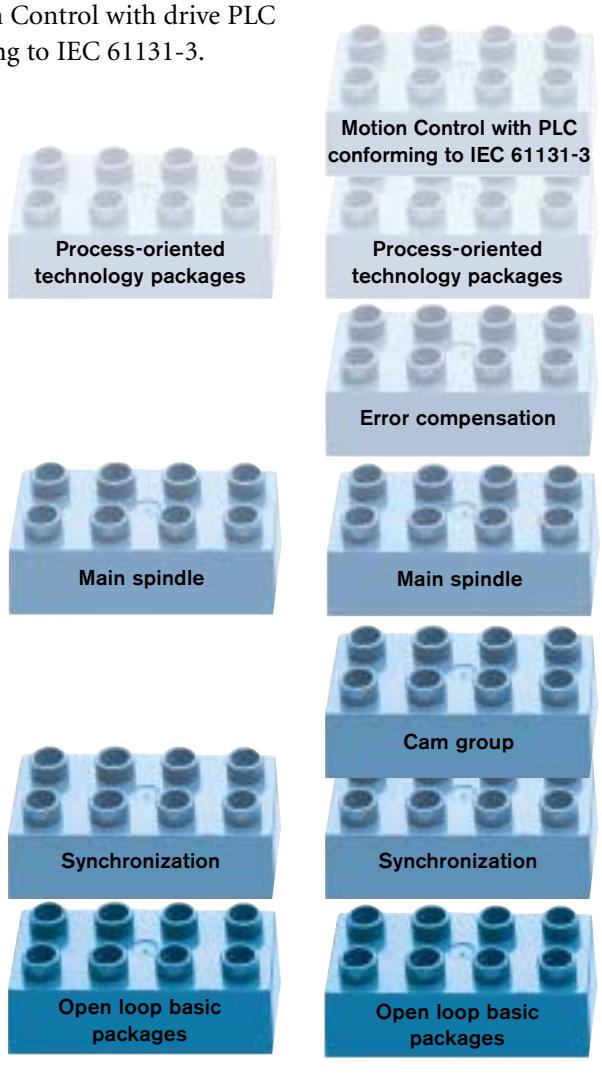
Basic
with sufficient performance and functionality for standard applications

Advanced
for applications requiring the highest performance and interface flexibility

Scalable for your individual application

The basic packages already include all essential functionalities for standard applications, such as positioning block mode, position control, and speed and torque control.
Extension packages are also available, e.g. for electronic axis synchronization, cam switches, error compensation, main spindle functions or Motion Control with drive PLC conforming to IEC 61131-3.

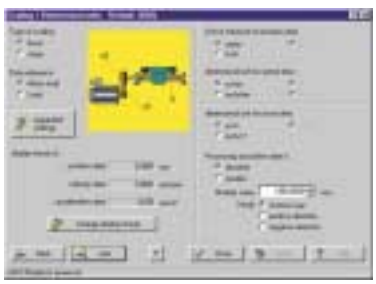
Complex process functions are implemented by means of application-oriented technology packages. Programming is easy and requires no special programming know-how.
The technology packages can also be used within the freely programmable PLC.



Fast initial startup and easy operation with DriveTop

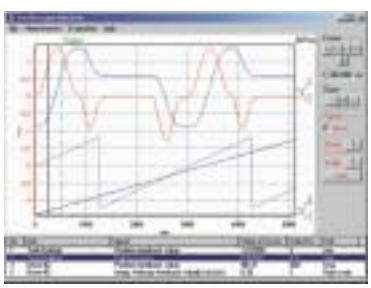
The DriveTop startup assistant makes it easier in many ways for you to start up your machine.

Parameters are entered in standard units of measurements

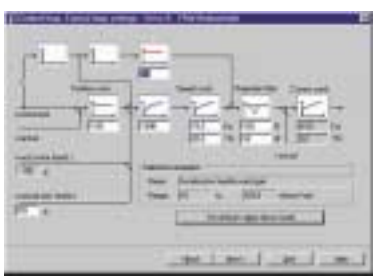


Positioning data are entered with graphic assistance

Integrated four-channel oscilloscope



Easy optimization of control circuit settings



Startup assistant
DriveTop guides the startup operator in interactive mode. The system automatically asks for the relevant data according to the mode of operation. All values are entered in standard units of measurement (e.g. mm, inch) in order to cut time-consuming conversion calculations. The values entered stand in direct relationship to the mechanical components. They can be selected from a large selection of positioning modes which are presented in graphic form. All the data can be saved in a file. Data blocks can be uploaded and downloaded through an RS232 interface or field bus.

Four-channel oscilloscope
A four-channel oscilloscope is available for checking the control equipment settings in the plant, for troubleshooting and for preventive maintenance. All measurements and their related settings are available for documentation in the form of a print-out or data file.

Offline mode
The plant-relevant operating modes and their corresponding parameters can be set in advance in offline mode.

Autotuning function
All controllers in IndraDrive are already pre-set and tuned to the connected motor in question. The autotuning function can be used for controller optimization if adaptations need to be made to the machine.

Adapting DriveTop to your machine
DriveTop is easy to adapt to your application or machine. During startup you then need to provide only data that is relevant for the selected application.

Stay on the safe side

The protection of persons from uncontrolled machine movements has absolute priority in all applications. With IndraDrive from Rexroth, the pioneer of drive-integrated safety technology, you are on the safe side. We have integrated diverse safety functions directly in the drive – without detour through a control system. Reliability is thus increased, while monitoring components are saved and wiring effort is reduced.

Convincing advantages

Exploit these advantages and use the integrated safety functions of our drives to provide effective protection for man and machine:

- high reliability through integrated, certified safety functions
- very fast reaction times (< 2 ms) when the internal monitors respond
- non-time-critical selection of safety functions, e.g. by the PLC
- fewer measurement systems or indicating devices required
- reduced certification costs for the customer
- use of any higher-level control systems
- shorter startup times, faster troubleshooting

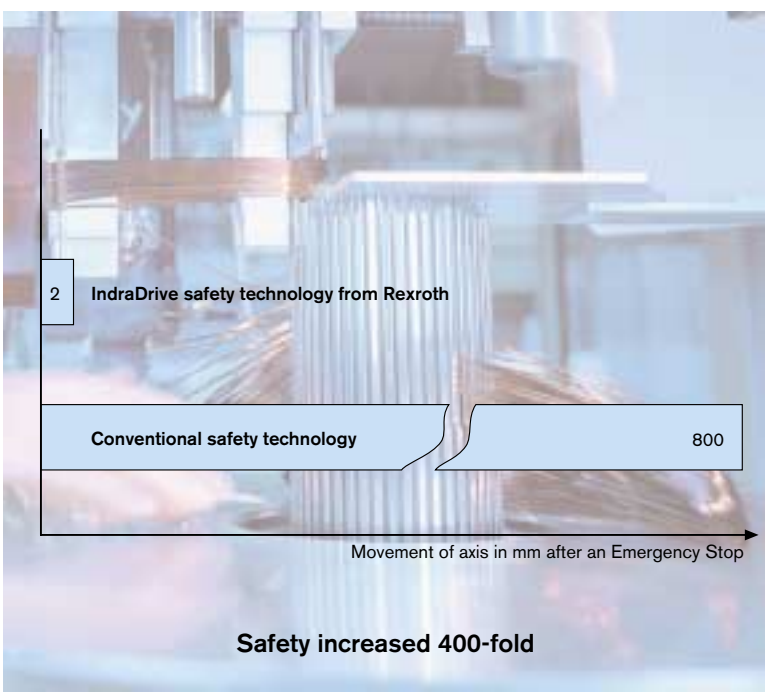
Maximum safety and highest drive dynamics

Redundant software and hardware components in the drive make it all possible. The non-contact monitoring of all set limit values enables very short response times of less than 2 ms. Once a fault is detected, all the drives are automatically stopped – depending on which stop category is selected (0, 1 or 2) – and immediate two-channel disconnection from mains.

Safety category 3 – already certified in the drive

Ever since we first introduced drives with Safety on Board technology to the market back in 1999 we have been regarded as the pioneers in this field. The results of our ongoing further development work are safety functions that are convincingly implemented and certified as complying with EN 954-1, category 3:

- "Safe Stop"
- "Safe Operational Stop"
- "Safely Reduced Speed"
- "Safely Limited Increment"
- "Safely Limited Absolute Position"
- "Safe Direction of Rotation"
- “Safe Closing of Safety Door”



In the time it takes an operator in a protected area with conventional enabling to respond to an error, a linear axis with a ball screw spindle will have already covered a distance of 100 to 200 mm, and a linear motor a distance of 400 to 800 mm. IndraDrive safety technology detects the error within 2 ms and the axis moves a distance of no more than 2 mm.

Basic or Advanced
Always optimum performance and functionality

		BASIC		ADVANCED	
		Open Loop	Closed Loop	Open Loop	Closed Loop
Basic packages	**"Open loop" basic functions**				
	Motor control with U/f curve, incl. slip compensation, I x R compensation and stall protection, Automatic control circuit adjustment, Current and torque limiting, Speed ramp generator, Flying restart after power failure, Positioning by limit switches, Oscilloscope function	●	●	●	●
	"Closed loop" basic functions				
	Position, speed and torque control, Drive-controlled positioning, Drive-internal interpolation, Positioning block mode, Adjustable reaction to errors, Electronic type plate, Brake control, Position, current and torque limiting, Moving to fixed stop, Automatic control circuit adjustment, Automatic commutation adjustment, Path switching point with ON and OFF switching threshold, Setting the coordinate system	–	●	–	●
Extension packages	**Error compensation**				
	Easy backlash compensation	–	●	–	●
	Axis error correction	–	–	–	●
	Quadrant error correction	–	–	–	●
	Frictional torque compensation	–	–	–	●
	Touch probe with fast stop	–	1	–	2
	Main spindle functions				
	Parameter set changeover	–	–	●	●
	including gear change	–	–	–	●
	Field-oriented control	–	–	●	○
	Vector control, without encoder up to 2000 Hz	–	–	●	○
	Spindle positioning mode	–	–	–	●
	Drive-controlled swiveling for gear change	–	–	–	●
	Synchronization				
	Speed synchronization	●	●	●	●
	Angle synchronization	–	●	–	●
	Measuring wheel mode	–	●	–	●
	Real and virtual leading axis	●	●	●	●
	Cam plate (tabular value)	–	●	–	●
	Cam plate (analytical value)	–	–	–	coming soon
	Touch probe with time measurement	1	–	1	–
	Touch probe with synchronization function	–	1	–	2
	Cam group				
	Dynamic cam group	–	–	–	coming soon
Drive PLC	**Motion Control**				
	Freely programmable in compliance with IEC 61131-3, Programming system for AWL, ST, AS, CFC, KOP, FUP (online change, debugging, offline simulation), Integrated logic control, Single-axis Motion Control, 4 user tasks (periodic, unsolicited or event-controlled), System libraries, Motion library based on PLC open, Support of customer libraries	–	–	●	●
	Process-oriented technology packages	●	●		

IndraDrive control units differ in performance and configuration. Thanks to this flexibility it is possible to select the best suited and hence most economical version for each application:

Advanced control units offer the highest performance and can be equipped with the most diverse control, communication and encoder interfaces as well as additional options for safety technology, for example. Digital and analogue inputs and outputs are already permanently integrated – along with a relay output – for communication with higher-level control systems. Advanced control units have a level of performance to satisfy even the highest requirements imposed on control quality.

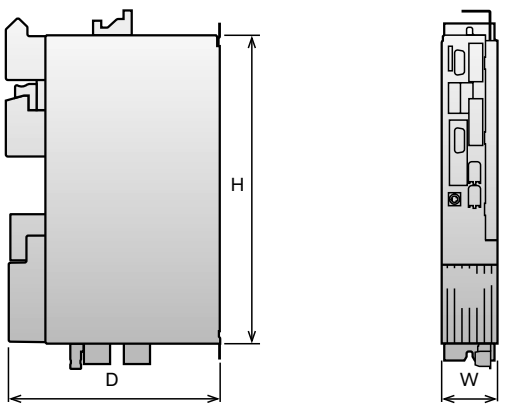
Basic control units are the economical solution for standard applications. Basic control units with fixed configurations can be used for applications which impose low requirements on interface flexibility. They are available with SERCOS interface, PROFIBUS and analogue interfaces, as well as with an encoder interface for IndraDyn S motors. Configurable Basic control components in single-axis as well as double-axis versions are also available for standard applications requiring additional option modules.
All control units are equipped with a standard display. A graphics-capable comfort display is also available as an option. The configurable control units can be equipped with a MultiMediaCard (MMC) for changing devices without a PC or, for example, for use as an extended program memory for the integrated PLC.

	Single-axis BASIC	Double-axis BASIC	Single-axis ADVANCED
Configuration			
Command communication	●	●	●
Option slot 1	fixed configuration	●/●	●
Option slot 2	●	●/●	●
Option slot 3	–	–	●
Option safety	–	–	●
Option display	–	–	●
Control communication interfaces			
SERCOS interface	○	○	○
PROFIBUS-DP	○	○	○
INTERBUS	○	–	○
CANopen	○	–	○
DeviceNet	○	–	○
Analogue interface	○	–	○
Parallel interface	○	–	○
Multi-encoder interfaces			
IndraDyn S motors incl. Hiperface® and $1V_{ss}$	●/○	○	○
MHD, MKD and MKE motors	○	○	○
EnDat 2.1 incl. $1V_{ss}$ + Z0 and 5 V TTL	○	○	○
Endat 2.2	coming soon	coming soon	coming soon
Safety options compliant with EN 954-1			
Drive lock Protection from unintended restarting	○	○	○
Safety technology in compliance with Safety Category 3 "Safe Stop" and "Safe Operational Stop" "Safely Reduced Speed" (RPM) "Safe Direction of Rotation" "Safely Limited Absolute Position" "Safe Closing of Safety Door "	–	○	○
Further options			
Analogue I/O extension	○	○	○
Encoder emulation	○	○	○
Digital I/O extension	–	–	○
Cross communication	coming soon	coming soon	coming soon
Software module			
MMC (MultiMediaCard)	○	○	○
Display			
Standard one line, four buttons	●	●	●
Comfort four lines, graphics-capable, four buttons	○	○	○

● Standard features
○ Option

IndraDrive C – Converters of compact format

Particularly economical solutions for both single-axis and multiple-axis applications with up to 11 kW rated motor power are possible using this series of space-saving converters. Already integrated in the compact design are a supply unit, a braking resistor, link circuit capacitors and axis inverters. The link circuit connection permits energy compensation for multiple-axis applications. Installation in compact 300-mm control cabinets is possible.

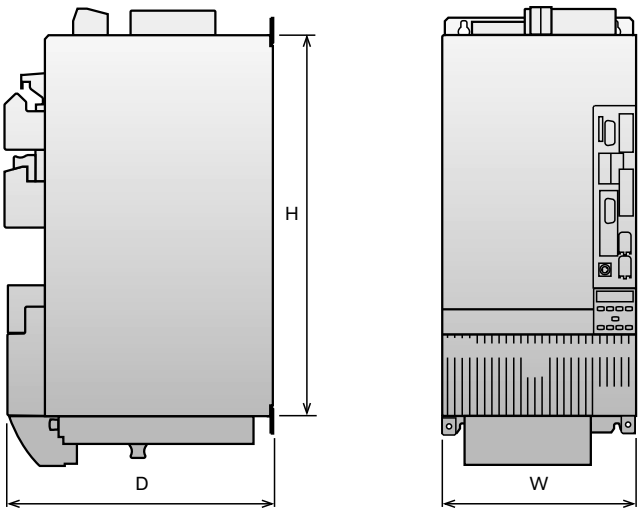


IndraDrive C		HCS02.1-W0012	HCS02.1-W0028	HCS02.1-W0054	HCS02.1-W0070
Rated current (S1)	A_{eff}	4,2	11	20	28
Maximum current (400 ms)	A_{eff}	12	28	54	70
Typical rated motor power	kW	1,5	4	7,5*	11*
Connection voltage of power unit		3 x 200 V ... 500 V AC ± 10 % 50 ... 60 Hz ± 2 %			
Connection voltage of control unit		24 V DC +/- 20 % or autonomous voltage supply from the link circuit			
Output frequency		0 ... 3000 Hz			
Braking resistor		internal	internal	internal/external	internal/external
Continuous braking power	kW	0,05	0,15	0,35/0,36	0,5/5,5
Maximum braking power (0,5 s)	kW	4	10	18	26
Width x Height x Depth	mm	65 x 295 x 265	65 x 350 x 265	105 x 350 x 265	105 x 350 x 265

*Data with external choke

IndraDrive C – Converters for highest powers

These compact converters cover the entire range from 15 kW to 110 kW rated motor power and are ideal for 400-mm control cabinets. They come on request with braking transistor, braking resistor and line filter – optimally scaled for your drive application. And together with IndraDrive M inverters they provide you with a particularly economical and compact drive system for multiple-axis operations.

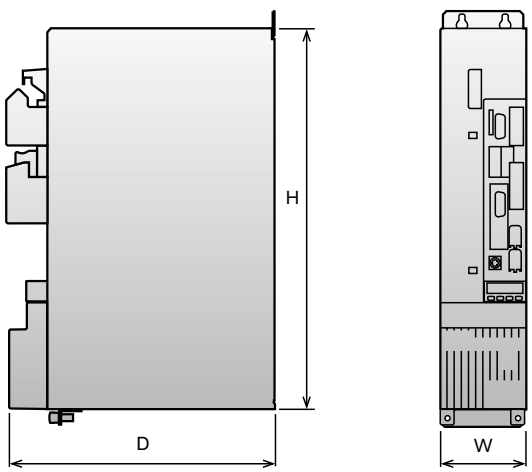


IndraDrive C		HCS03.1-W0070	HCS03.1-W0100	HCS03.1-W0150	HCS03.1-W0210	HCS03.1-W0350
Rated current (S1)	A_{eff}	40	62	95	145	210
Maximum current (400 ms)	A_{eff}	63	90	147	213	350
Typical rated motor power	kW	18	30	45	75	110
Connection voltage of power unit		3 x 200 V ... 500 V AC ± 10 % 50 ... 60 Hz ± 2 %				
Connection voltage of control unit		Autonomous voltage supply from the link circuit; external 24 V DC (±20%) stand-by supply available as option				
Output frequency		0 ... 2500 Hz (fp = 4 kHz) 0 ... 3000 Hz (fp = 16 kHz)				
External braking resistor, minimum value		18	13	7	3,5	1,9
Continuous braking power	kW	9	15	23	38	55
Maximum braking power t = 2 s	kW	30	44	74	110	180
Width x Height x Depth	mm	125 x 440 x 309	225 x 440 x 309	225 x 440 x 309	350 x 440 x 309	coming soon

*All data with external choke

IndraDrive M – Modular inverters

Particularly economical multiple-axis solutions with up to 75 kW can be implemented with the slim-line single-axis devices (HMS) and double-axis devices (HMD) of the IndraDrive M inverter system. The devices are optimized for high maximum currents from 20 A to 210 A and ensure that your machining processes perform with maximum dynamics. Supply units with power regenerating are also available.

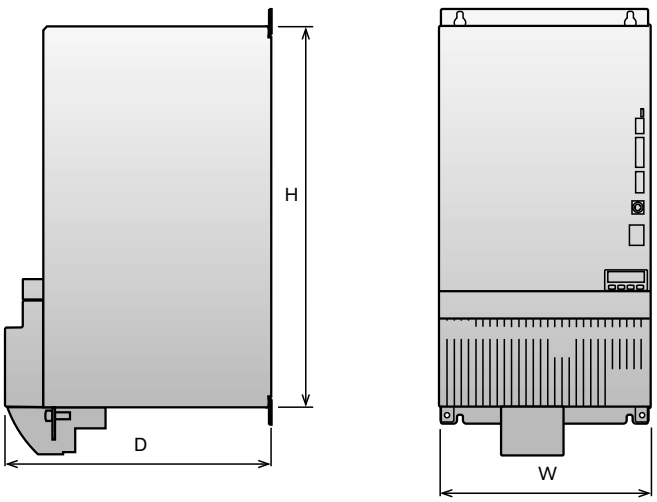


IndraDrive M		HMD01.1N-W0020	HMD01.1N-W0036	HMS01.1N-W0020	HMS01.1N-W0036
Rated current (S1) Maximum current (400 ms)	A_{eff} A_{eff}	10 20	18 36	12 20	20 36
Connection voltage		275 V ... 750 V DC			
Output frequency		0 ... 3000 Hz			
Width x Height x Depth	mm	50 x 440 x 309	75 x 440 x 309	50 x 440 x 309	50 x 440 x 309

IndraDrive M		HMS01.1N-W0054	HMS01.1N-W0070	HMS01.1N-W0150	HMS01.1N-W0210
Rated current (S1) Maximum current (400 ms)	A_{eff} A_{eff}	28 54	42 70	90 150	140 210
Connection voltage		275 V ... 750 V DC			
Output frequency		0 ... 3000 Hz			
Width x Height x Depth	mm	75 x 440 x 309	100 x 440 x 309	150 x 440 x 309	200 x 440 x 309

IndraDrive M – Modular supply units

For the modular system of IndraDrive M inverters you have a choice of supply units with or without power regenerating, depending on the power requirement and application. Wiring in the control cabinet is minimized by integrated components such as mains contactors and braking resistors, and by direct connection to a mains voltage from 380 V to 480 V. Optional line filters suppress conducted interference, even without an additional transformer.



IndraDrive M		Voltage supply without power regenerating			Voltage supply with power regenerating		
		HMV01.1E-W0030	HMV01.1E-W0075	HMV01.1E-W0120	HMV01.1R-W0018	HMV01.1R-W0045	HMV01.1R-W0065
Link circuit power with throttle	kW	30	75	120	18	45	65
Link circuit power without throttle	kW	18	45	72	–	–	–
Maximum link circuit power	kW	45	112	180	45	112	162
Connection voltage		3 x 380 V ... 480 V AC 50 ... 60 Hz					
Control voltage		external 24 V DC					
Mains contactor		integrated					
Braking resistor		internal					
Continuous braking power	kW	1,5	2	2,5	0,4	0,4	0,4
Maximum braking power	kW	36	90	130	36	90	130
Energy consumption	kWs	100	250	500	80	100	150
Width x Height x Depth		150 x 440 x 309	200 x 440 x 309	350 x 440 x 309	175 x 440 x 309	250 x 440 x 309	350 x 440 x 309

A range of motors to satisfy all wishes

IndraDrive offers you a complete range of synchronous and asynchronous motors for translatory and rotary movements. The outstanding characteristic of this range is its unique diversity of motor types, models and power ratings.

Servo motors
for standard applications

- Rated torque from 0,4 Nm to 72 Nm
- Natural convection and surface ventilation
- Rated speed up to 9.000 min^{-1}
- Resolver with data memory for motor parameters
- Absolute encoder (option)
- Holding brake (option)

Servo motors
for the highest requirements

- Rated torque from 1,2 Nm to 240 Nm
- Natural convection, surface ventilation and liquid cooling
- Rated speed up to 7.500 min^{-1}
- High-resolution single- and multi-turn absolute encoders with data memory for motor parameters
- Holding brake (option)
- IP68 (option)

Servo motors
for potentially explosive areas

- Rated torque from 0,9 Nm to 48 Nm
- Natural convection
- Rated speed up to 9.000 min^{-1}
- Resolver with data memory for motor parameters
- High-resolution single- and multi-turn absolute encoders with data memory for motor parameters
- Holding brake (option)
- ATEX-conform version
- UL/CSA version (option)

Servo motors for high drive powers

- Drive range up to 93 kW
- Surface ventilation or liquid cooling
- High-resolution single- and multi-turn absolute encoders with data memory for motor parameters
- Incremental encoder (option)
- Holding brake (option)

Linear motors for the highest dynamics

- Feeding force up to 22.000 N
- Speed up to 600 m/min
- Liquid cooling (thermal encapsulation)

Kit motors for new machine concepts

- Rated torque up to 875 Nm
- Rated speed up to 6.500 min^{-1}
- Liquid cooling (thermal encapsulation)

High-torque motors for high torques

- Maximum torque up to 4.700 Nm
- Maximum speed up to 1.200 min^{-1}
- Liquid cooling (thermal encapsulation)

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