SIEMENS

SIMOVERT MV Medium-Voltage Drives 660 kVA to 7200 kVA

Catalog DA 63 · 2001

LARGE DRIVES

PATH SIMOVERT MV Engineering Tool

With the PATH SIMOVERT MV program, three-phase drives fed by frequency converters for SIMOVERT MV units can be configured easily and quickly.

The program is a powerful engineering tool which supports the user in all stages – from power supply to the motor. Any system perturbations are calculated and graphically displayed as well.

Menu-guided selection and layout of the frequency converters enable the system components and the motors necessary for a specific drive task to be determined. Automatically displayed information ensures fault-free planning.

A comprehensive help system also supports the first-time user of the program.

PATH SIMOVERT MV provides a logical and easy-to-use dialog procedure to guide the planning engineer towards a reliable, reproducible and economically efficient drive configuration, starting from the mechanical requirements of the machine and the drive task involved. The technical data of the frequency converters and motors, the selected system components and the necessary accessories are listed in detail.

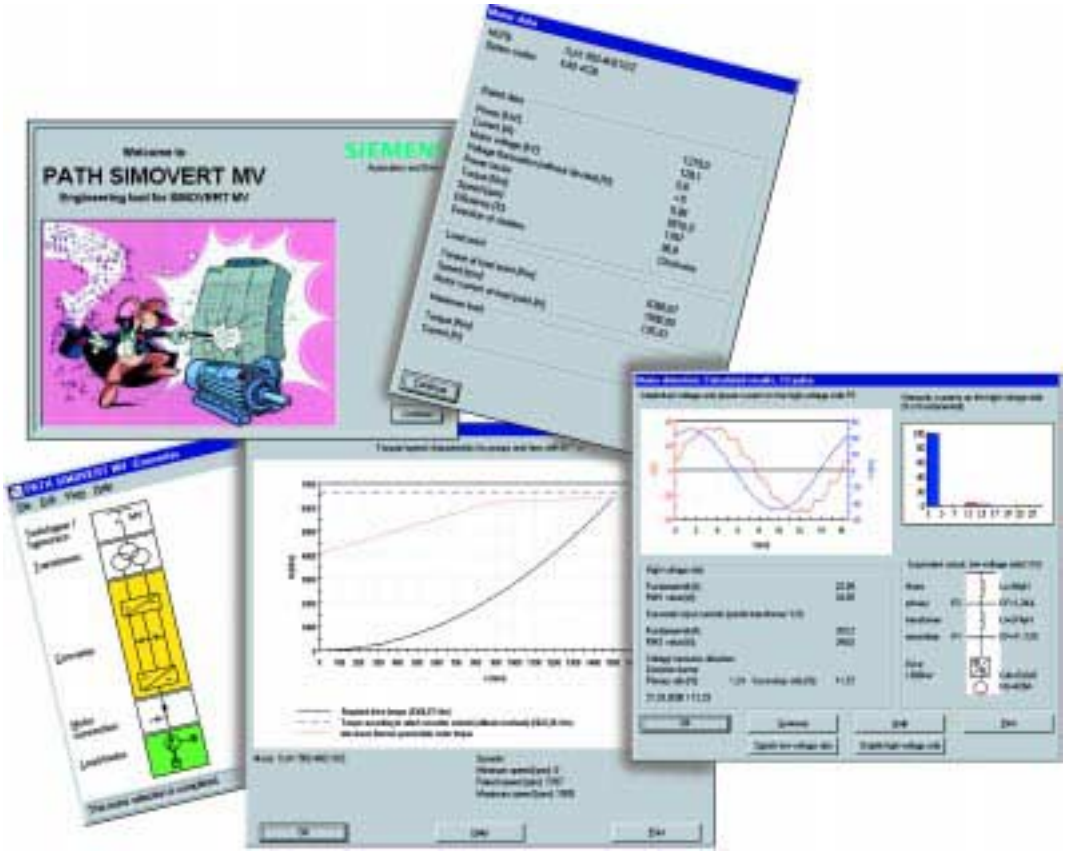
PATH SIMOVERT MV also includes a comfortable graphic display for showing

- torque, velocity and acceleration over time (version >1.0) and
- torque, current and output over the rotational speed.

The planning and configuring results can be stored on data carriers, printed on paper or copied to other user programs via the clipboard.

WINDOWS-based PATH SIMOVERT MV is available with an English user interface.

If you need the full version of PATH SIMOVERT MV please contact your local Siemens office and quote the following order number:
E86060-D5163-A100-A1-7600
You will find the address in the appendix to this catalog.



SIEMENS

SIMOVERT MV

Medium-Voltage Drives
660 kVA to 7200 kVA

Catalog DA 63 · 2001

No longer valid: Catalog DA 63 · 1999

Caution:

The technical data is intended to provide general information.
The Operating Instructions and the information/instructions on the products themselves must be observed when installing, operating and servicing the equipment.

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- We reserve the right to make changes to the technical data, selection and ordering data (Order Nos.) for accessories and their availability.
- All of the dimensions in this Catalog are in mm.

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SIMOVERT MV
Overview

Applications

1

Innovative standard solutions for all applications

SIMOVERT MV® are voltage-source DC link drive converters using three-level technology. They convert the three-phase system line supply with fixed voltage and fixed frequency, into a three-phase system with variable voltage and variable frequency. The fully-digital, open-loop control technology and the high-performance Vector Control with the innovative power semiconductors HV-IGBT (**H**igh-**V**oltage **I**nsulated **G**ate **B**ipolar **T**ransistor) on the inverter side and a twelve-pulse diode rectifier on the line side in the standard version guarantee high reliability, flexibility, security of investment for the future, low harmonics fed back into the line supply and low motor stressing.

SIMOVERT MV
The flexible, modular and high-performance solution

The design of this standard series is consistently modular. Thanks to its flexibility, it fulfills almost every customer requirement. SIMOVERT MV is available for the most important standard motor voltages, 2.3 kV, 3.3 kV, 4.16 kV, 6 kV and 6.6 kV. The standardized output range extends from 0.66 MVA to 7.2 MVA (dependent on the rated motor voltage) with air and water cooling – higher outputs are available on request.

SIMOVERT MV: The all-rounder

SIMOVERT MV can be used for an extremely wide range of applications.

In waterworks, district heating stations and water treatment plants:
Pumps for drinking water recovery and distribution, pumps for heating circuits, slurry pumps.

In the oil and natural gas industry:
Pumps and compressors

In machinery construction:
Fans, pumps and constant-torque drives

In the foodstuff industry:
Centrifugal drives (e.g. in the sugar industry), pumps, kneaders, mixers, mills, extruders

In marine engineering:
Propeller drives, bow thrusters, lateral thrusters

In the cement industry:
Conveyor belts, blowers and crushers

In open-pit mining:
Conveyor belt systems, vibrators, excavators, crushers

In wire and fine rolling mills:
Wire-drawing drives

In power utilities:
Pumps, blowers, coal crushers

In the paper industry:
Refiners, pumps

In underground mining:
Conveyor systems, shaft ventilation systems

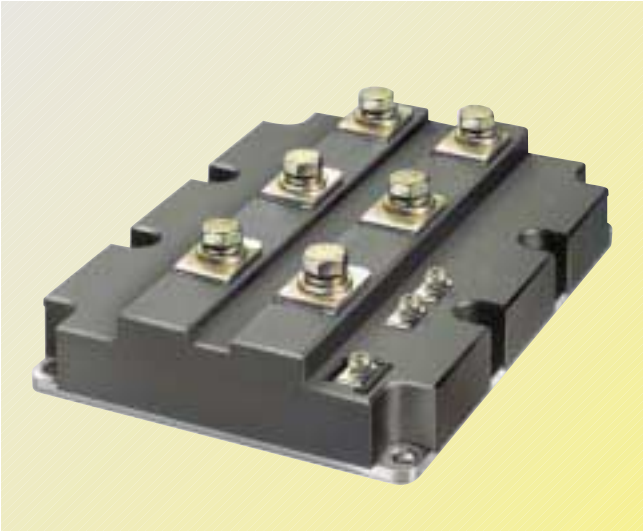


Fig. 1/1
Innovative HV-IGBT power semiconductor
(**H**igh-**V**oltage **I**nsulated **G**ate **B**ipolar **T**ransistor)

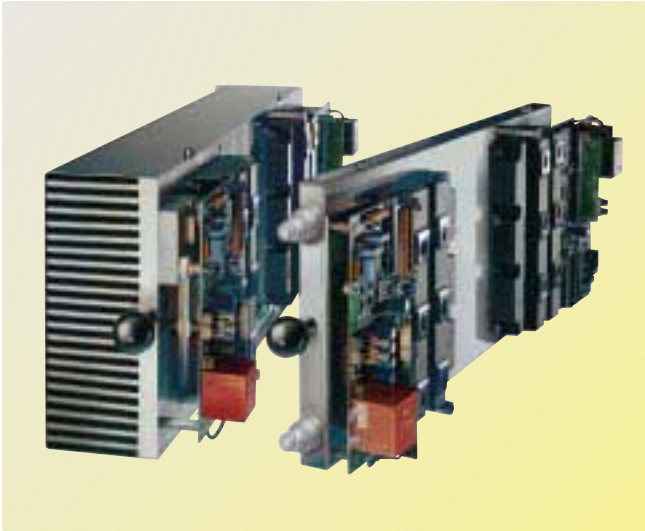


Fig. 1/2
Service-friendly using a modular design: Easily replaceable Power-Cards

SIMOVERT MV: The international solution

SIMOVERT MV is not only available for the most important international medium-voltage levels, but also for the most important international standards, such as:

- IEC
- EN
- DIN VDE

Other standards are available on request (refer to Page 3/18).

Further, SIMOVERT MV is optionally available for marine applications for the classification societies:

- American Bureau of Shipping
- Bureau Veritas
- Det Norske Veritas
- Germanischer Lloyd
- Lloyds Register

Focus on customer benefits

With the SIMOVERT MV drive system, the main focus is on customer benefits. The optimum drive solution can always be found as a result of standardized technology, a perfectly harmonized system comprising SIMOVERT MV and the H-compact, H-compact PLUS and H-modul 3 motors and an extremely comprehensive range of accessories.

SIMOVERT MV: Quality and environmental responsibility

SIMOVERT MV drive converters are manufactured according to the highest quality standards. The complete manufacturing process, i.e. development, mechanical design, production, contract administration and logistics supply center and sales/marketing have been certified from an independent body according to DIN ISO 9001.

It goes without saying that SIMOVERT MV fulfills all of the important criteria for environmental protection.

Fig. 1/3
Mounting rack of the Vector Control

Fig. 1/4
Optional single-phase uninterruptible power supply with MASTERGUARD (UPS)

Applications

SIMOVERT MV drive converters and H-compact, H-compact PLUS and H-modul 3 high-voltage motors: Optimally harmonized with one another

The SIMOVERT MV drive converters together with the well-proven H-compact, H-compact PLUS and H-modul 3 high-voltage motors form a high-performance drive package over a wide output and speed range. During development, the drive converter and motor were always considered as a single entity, and were harmonized with one another both from the perspective of cost-effectiveness as well as technically. This is the reason why a filter is not required between the drive converter and the motor. The motors are extremely rugged, which means that they can be simply operated under even the toughest application conditions.

The self-ventilated, rib-cooled motors **H-compact** (1LA1) are available in an output range from 0.55 MW to 3.6 MW. They offer significant advantages for applications where high torques are demanded even at low speeds. If the requirements are even more stringent, then the force-ventilated version (1PQ1) provides torques which are almost the same as the rated motor torque over a wide speed control range.

H-compact PLUS high-voltage motors (shaft height from 450 mm to 560 mm) cover an output range from 0.7 MW to 4.3 MW, while the **H-modul 3** series (shaft height 630 mm) covers an output range between 2.6 MW and 7 MW. The motors have a modular design and are available with three cooling types:

- open-circuit cooling (1RA4),
- air-to-water cooling (1RN4) and
- air-to-air cooling (1RQ4).

As a result of this variable cooling concept, the drives can be integrated into any plant or system configuration.

The motors are characterized by superb output, reliability and efficiency. This is mainly achieved as follows:

- Excellent operating data, expecially when it comes to efficiency and power factor
- High power density
- Compact type of construction
- Stiff rugged enclosure and bearing endshields manufactured out of cast iron
- All parts are provided with long-term corrosion protection
- MICALASTIC high voltage insulation using VPI technology (**V**acuum **P**ressure **I**mpregnation)

Examples of order numbers

SIMOVERT MV drive converter

e.g. **6 S E 8 0 1 5 – 1 B A 0 1 – Z**

6SE80 SIMOVERT MV drive converter

Output in 100 kVA

Cooling type
1 Air cooling
2 Water cooling

Rated supply voltage
A 2.3 kV
B 3.3 kV
C 4.16 kV
D 6.0 kV
E 6.6 kV

Version
A Drive converter with 12-pulse diode input

Function release

Control version
1 SIMOVERT MV with max. output frequency 100 Hz (standard)

Options
All of the options provided in the drive converter are listed here and specified with a supplementary code; options may have to be specified in plain text

H-compact motors

e.g. **1 L A 1 4 5 0 – 2 P V 0 0 – Z**

H-compact motors
1LA1 self-ventilated
1PQ1 force-ventilated

Frame size, coded (shaft height, output stage)

No. of poles (2, 4, 6, 8)

PWM drive converter operation

SIMOVERT MV drive converter

Voltage code
0 2.3 kV / 50 Hz
1 2.3 kV / 60 Hz
2 3.3 kV / 50 Hz
3 3.3 kV / 60 Hz
4 4.16 kV / 50 Hz
5 4.16 kV / 60 Hz

Type of construction code
0 IM B3
4 IM V1 with protective roof assembly
8 IM V1 without protective roof assembly

Special versions
Specify a code and, if required, describe in plain text

Examples of order numbers

H-compact PLUS and H-modul 3 motors

e.g. **1 R A 4 5 6 0 – 8 H V 2 0 – Z**

H-compact PLUS and H-modul 3 motors
1RA4 open-circuit ventilated
1RN4 with air/water cooler
1RQ4 with air/air cooler

Frame size, coded (shaft height, output stage)

No. of poles (4, 6, 8)

Cooling type
F Version with separately-driven fan
IP 55/IC86W (1RN4)
H Basic version with shaft-mounted fan
IP 23/IC01 (1RA4) and IP 55/IC81W (1RN4)
J Basic version with shaft-mounted fan, internal and external
IP 55/IC611 (1RQ4)

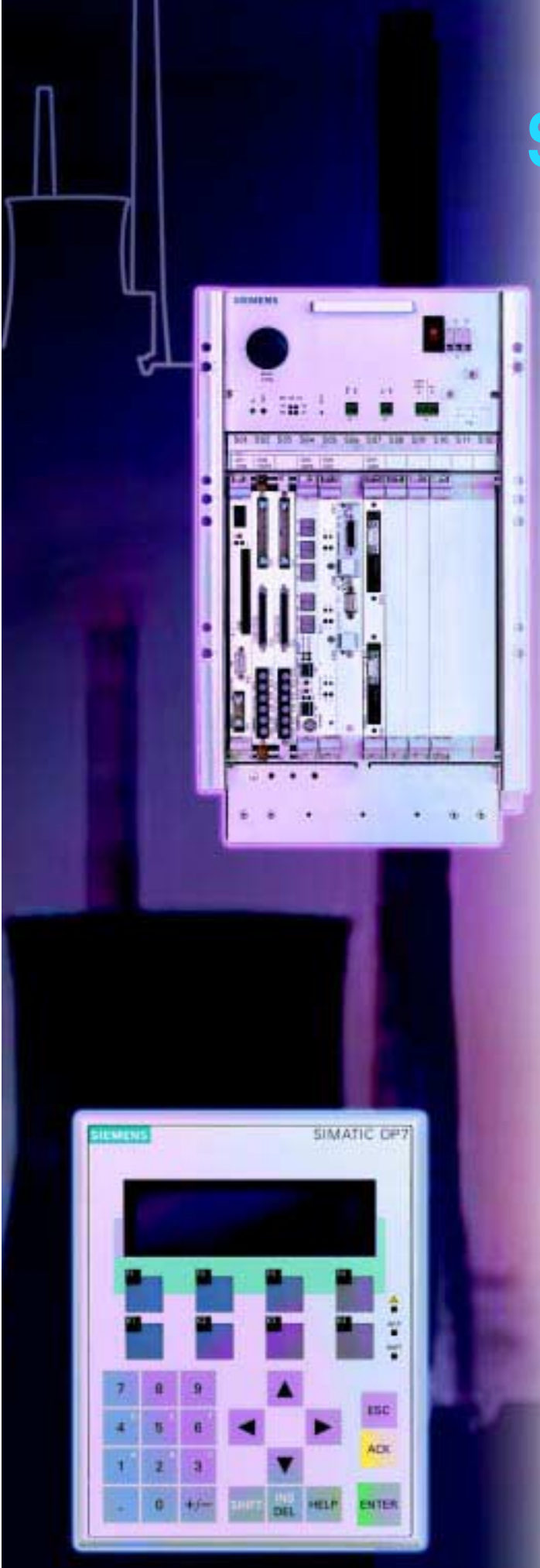
SIMOVERT MV drive converter

Voltage code
0 2.3 kV / 50 Hz
1 2.3 kV / 60 Hz
2 3.3 kV / 50 Hz
3 3.3 kV / 60 Hz
4 4.16 kV / 50 Hz
5 4.16 kV / 60 Hz

Type of construction code
0 IM B3
4 IM V1 with protective roof assembly (1RQ4) (only H-compact PLUS)
8 IM V1 without protective roof assembly (1RA4/1RN4) (only H-compact PLUS)

Special versions
Specify a code and, if required, describe in plain text

SIMOVERT MV
System description



Technical features

Line supply

SIMOVERT MV drives keep the line supply stressing low:

- The starting current is limited to the rated current
- There is only a low harmonic component in the line current due to the 12-pulse diode rectifier DFE (**D**iode **F**ront **E**nd) used as standard
- Low reactive power drawn (cos $\varphi_1 > 0.96$)
- Optional 24-pulse diode rectifier for applications where the harmonics fed back into the line supply must be kept as low as possible
- A value of cos $\varphi_1 = 1$ is possible using the AFE (**A**ctive **F**ront **E**nd) option; the reactive power of other loads can be compensated within the limits of the converter's power.

Incoming transformer

The SIMOVERT MV converter is connected to the medium-voltage line supply through a drive converter transformer. For the standard 12-pulse DFE, a three-winding transformer is required, and one five-winding transformer or two three-winding transformers for the optional 24-pulse DFE (see Page 6/17).

The SIMOVERT MV drive (drive converter and motor) is decoupled from the line supply through a transformer, resulting in:

- Defined short-circuit power
- Floating motor operation possible
- Emergency operation is possible when ground faults occur
- Low harmonics as a result of the 12-pulse DFE.

Drive converter

- Output range:
  – for air cooling
  660 to 7200 kVA;
  – for water cooling:
  800 to 7200 kVA
  – higher outputs on request
- Available for standardized medium voltage levels of 2.3 kV, 3.3 kV, 4.16 kV, 6 kV and 6.6 kV
- Ready-to-connect cabinet unit with degree of protection IP21
- Compact, modular design, hence extremely reliable and easy to service
- Standardized output range for air and water cooling
- The open-loop and closed-loop power supply is electrically isolated from the power section
- Short-circuit proof drive converter output (without supplementary measures)
- Fully-digital open and closed-loop control using a fast 32-bit RISC processor
- Vector Control with excellent control performance
- Frequency and speed control range up to 1:1000
- Speed resolution in the per mille range
- The drive is operated and monitored via the local operator panel, via a PC with the engineering system Drives ES, via the control terminal strip from a central control room or via PROFIBUS-DP from a higher-level supervisory process control system
- Operator prompting and messages from the drive converter are displayed in plain text on the operator panel
- Communications-capable in the automation environment via PROFIBUS-DP
- The circuit-breaker is controlled from the drive converter.

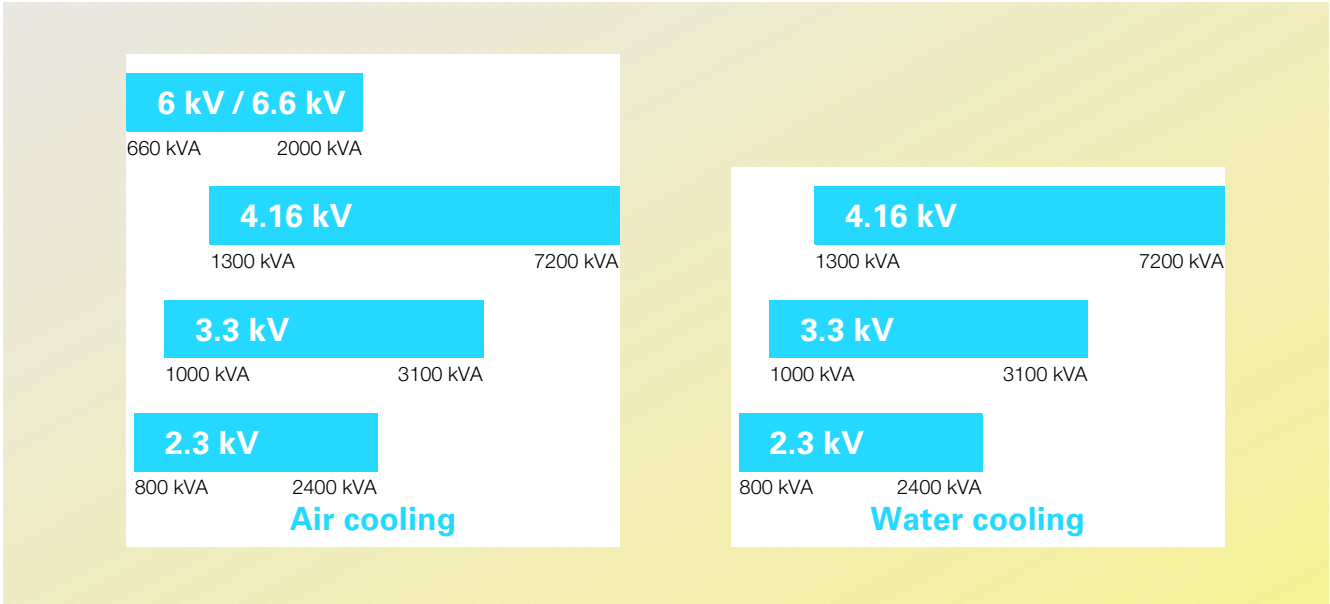


Fig. 2/1
SIMOVERT MV converter output range

Innovative HV-IGBT power semiconductors

The IGBT (**I**nsulated **G**ate **B**ipolar **T**ransistor) has established itself as a standard in low-voltage drive technology. A new generation has been created by consequentially developing the device for a higher blocking capability and a higher current-carrying capacity: The HV-IGBT (**H**igh-**V**oltage-IGBT).

Advantages of HV-IGBT devices over conventional IGCT thyristors (Integrated Gate Commutated Thyristors):

- The HV-IGBTs can be controlled by just using the voltage applied to the gate
- Together with the gating circuit, current and voltage transients can be influenced during turn-on and turn-off.
- Overvoltages caused by parasitic leakage inductances when the HV-IGBT is turned off are limited by the HV-IGBT in conjunction with the gating circuit
- The turn-on characteristics of the HV-IGBT can be optimally adapted to the free-wheeling diode: the diode turns off in the safe operating range
- The HV-IGBT does not require any snubber circuitry, thus resulting in a simple design, high utilization level and a high degree of reliability of the drive converter
- The required gating power is low
- HV-IGBTs limit, together with the gating circuit, short-circuit currents without any other circuitry required. This means that the SIMOVERT MV drive converter has a short-circuit proof output.

Operator control of the drive converter

The important control elements to operate the drive converter as well as measured value and status displays are combined in the OP7 operator panel.

With the help of the optional software Drive ES (Drive Engineering System), operation becomes particularly easy and user-friendly. Installed to a standard hardware platform (PC or programming unit PG), Drive ES also guarantees permanent provision of automation and drive data of a project in the STEP 7 Manager.

Further, the drive converter and the drive can be centrally controlled from a control room. A control terminal strip is provided for this purpose. All of the required control and measured value signals can be connected here or retrieved from here.

Beyond this, the drive converter can be integrated into a higher-level supervisory process control system. Communications between the external control and drive converter are realized via the serial PROFIBUS-DP interface.

Power section design

The power section of the SIMOVERT MV drive converter consists, as standard of the following:

- 12-pulse diode rectifier (DFE)
- Three-level voltage DC link with capacitors and crowbar thyristor
- Three-level inverter with three phase units

The power section design utilizing three-level technology has many advantages:

- The HV-IGBTs are only stressed with half of the DC link voltage
- For the same quality of the output current, the switching frequency is only approximately 1/4 of that required for 2-level technology; thus, the HV-IGBT losses are lower and the efficiency is increased
- Improved output current characteristic in comparison to two-level designs: The losses in the motor and the sound pressure level are lower.

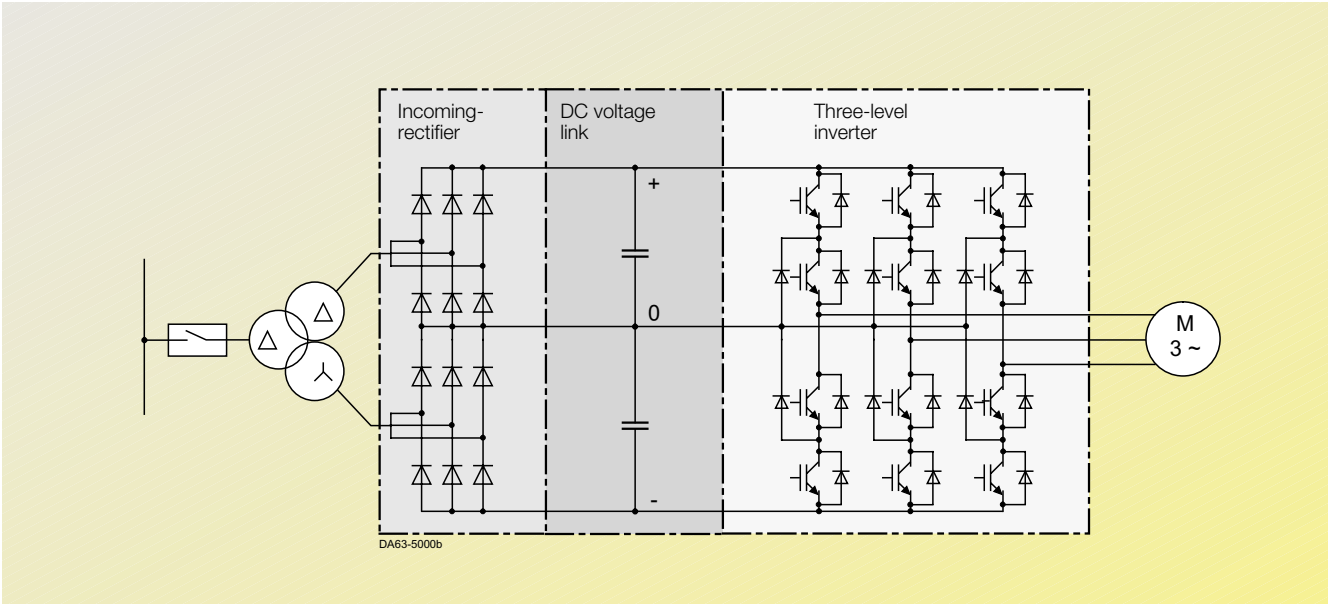


Fig. 2/2
Power section block diagram

Technical features

Power section design (continued)

Fig. 2/3
Modular and service-friendly:
Air-cooled HV-IGBT Power-Card
of the motor-side drive converter

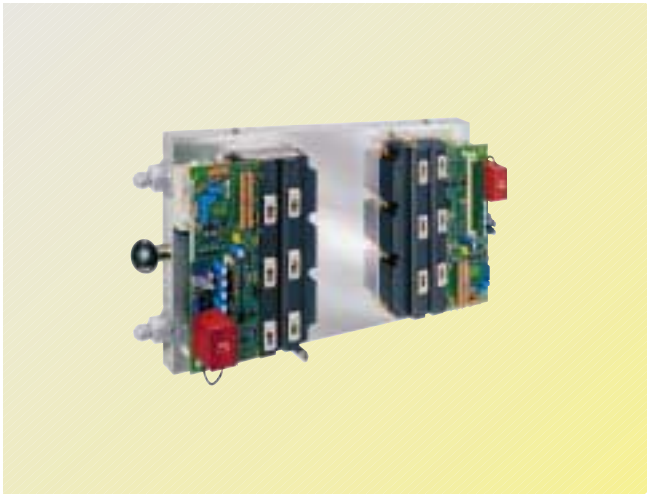


Fig. 2/4
Modular and service-friendly:
Water-cooled HV-IGBT Power-Card
of the motor-side drive converter

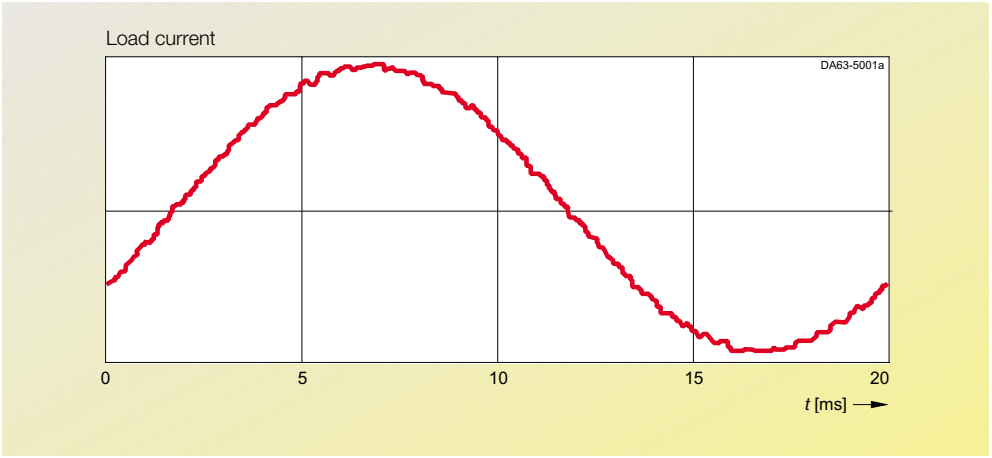


Fig. 2/5
SIMOVERT MV output current (current fundamental factor, typical g = 99 %)

Low motor stressing using a three-level circuit design

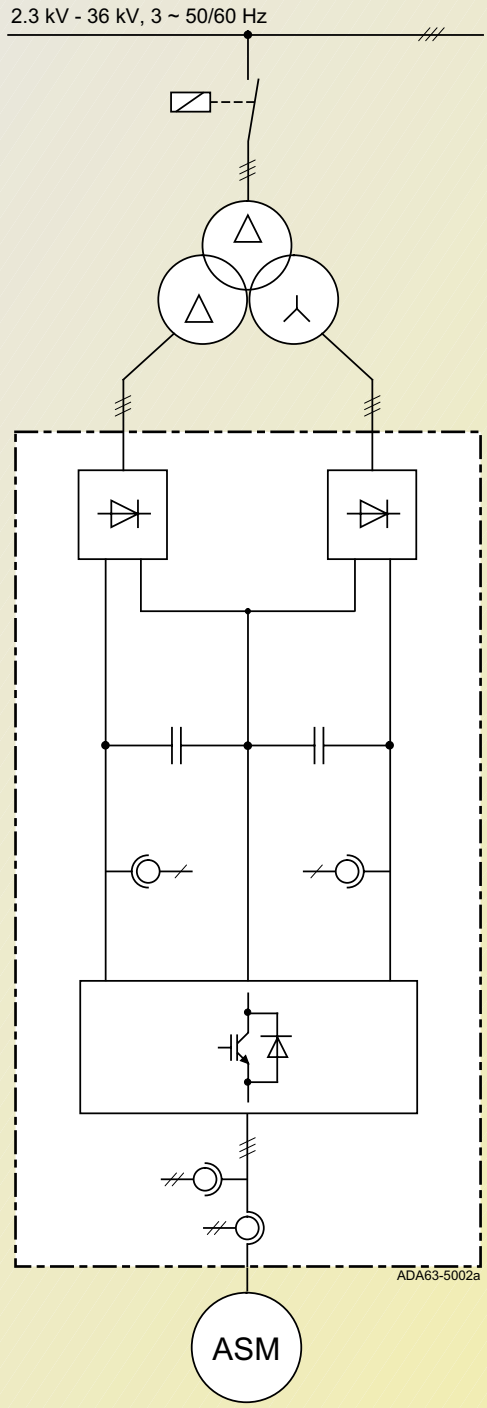
The motor-side inverter utilizes a three-level circuit design. This results, together with the properties of the HV-IGBT, in an essentially sinusoidal output current. The low harmonic component guarantees an excellent constant torque with respect to time over the complete speed control range and low motor losses.

Motors

When the SIMOVERT MV drive system was developed, the motors were involved in the overall design concept right from the very start. Thus, the SIMOVERT MV drive converters and the Siemens standard H-compact, H-compact PLUS and H-modul 3 motors are optimally harmonized with one another, both from the economic and technical perspectives. They do not require a special output filter for an optimum cost-effective solution.

With standard output frequencies of up to 100 Hz (higher frequencies on request), the drive converters are also suitable for feeding fast directly-coupled drives. SIMOVERT MV drive converters can feed any other medium-voltage, third-party induction motor: An optional output filter is all that is required.

This means that fixed-speed medium-voltage motors can be retrofitted to become variable-speed drives using a SIMOVERT MV drive converter.



Line supply

Circuit-breaker

Medium-voltage circuit-breaker, converter-controlled

Drive converter transformer

Three-winding transformer to adapt the voltage to the medium-voltage line supply. It provides two voltage systems, rotated through 30° electrical for 12-pulse line-side operation and less harmonic effects on the supply

Line-side drive converter

Series circuit of 2 uncontrolled diode rectifiers in a three-phase bridge circuit configuration to generate the DC link voltage

DC link capacitors

Maintenance-free and self-healing MKK capacitors in a parallel circuit configuration to smooth the DC link voltage. The number of capacitors depends on the drive converter output

DC link DC voltage PT

PT to sense the actual DC link voltage

Motor-side inverter

3-phase units comprising the HV-IGBT and diode Power-Cards.

Combined electronic PT and CT on the motor side

CT/PT to sense the actual output voltages and motor currents

Motor

Squirrel-cage induction motor with a medium-voltage winding

Fig. 2/6
Block diagram of a SIMOVERT MV drive

Open and closed-loop control functions

The field-oriented Vector Control is used for the motor-side closed-loop control of the SIMOVERT MV voltage DC link drive converter.

The Vector Control can either be operated as closed-loop frequency, speed or torque control.

The Vector Control achieves the same dynamic performance as that of a DC drive. This is made possible by the fact that the torque- and flux-generating current components are precisely controlled, independently of one another. Specified torques can be precisely maintained and limited using this vector control.

In the speed control range 1:10, the field-oriented control of the SIMOVERT MV does not require a speed encoder and is essentially independent of the motor parameters.

A speed encoder is required for the following SIMOVERT MV applications:

- High requirements are placed on the dynamic performance
- Closed-loop torque control/ constant-torque drives with a control range > 1:10
- Lowest speeds
- Highest speed accuracy.

The various control versions are listed in detail on Page 6/9.

Closed-loop control features

- Message system where plain text messages are output on the OP7 operator panel or on a printer
- Self-diagnostics of the control hardware, e.g. memory test
- Plain-text diagnostics for control hardware faults
- Fast multi-channel trace memory to record currents and voltages for drive diagnostics
- Time control using the DCF77 signal (optional radio clock)
- Non-volatile memory for reliable diagnostics, even if the power supply fails
- HV-IGBT modules are monitored with an individual signal for mounting slot
- Comfortable local operator control via the OP7 operator panel
- Highly accurate and stable actual value sensing using the innovative sigma-delta technique for reliable drive converter actual values (refer to Fig. 2/7).

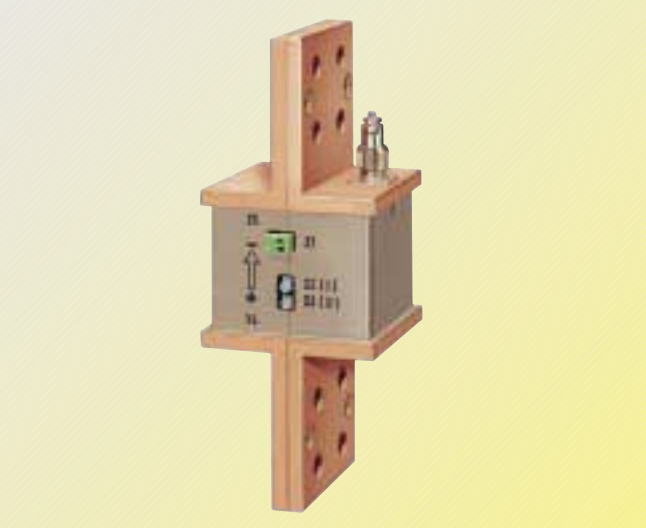


Fig. 2/7
Actual motor currents and output voltages are precisely sensed using a special, patented sigma-delta technique

Software functions

The basic software includes a broad scope of standard functions. These functions offer maximum ease of use and outstanding flexibility. Also, they ensure universal operating conditions and a high degree of operational reliability and safety.

Setpoint input

Setpoints can be entered as the sum of main and supplementary setpoints as follows:

- Internally: as fixed, motorized potentiometer or jog setpoint
- Externally: via the analog inputs, the serial interfaces or the option modules.

The fixed internal setpoints and the motorized potentiometer setpoint can be changed over or set from any of the interfaces via control commands.

Automatic restart (option L32)

This function automatically restarts a drive converter when mains power returns after a power failure.

Restart-on-the-fly circuit (option L31)

The restart-on-the-fly circuit allows the drive converter to be switched to a motor which is still rotating.

SIMOVERT MV drives can be controlled and monitored directly at the drive converter or externally.

At the unit via

- the standard OP7 operator panel
- a PC with the Drive ES engineering system

Remote control via

- the X100 control terminal strip
- PROFIBUS-DP

OP7 operator panel

The SIMOVERT MV drive can be locally controlled and monitored using the operator panel in the cabinet door.

The assignment of the keys is defined by the drive converter's software for open-loop and closed-loop control. The following functions can be selected:

- Display drive actual values
- Enter speed setpoints using the raise/lower keys or the numerical keys
- Read and delete messages
- Set minimum and maximum speed limits
- Preset two motor and setpoint data records
- Preset jog setpoints
- Menue-assisted functions for service and commissioning.

By entering the necessary parameters, the control mode can be set from remote to direct.

The following actual values can be displayed:

- Speed
- Motor voltage
- Motor current
- Motor output
- cos φ of the motor
- DC link voltage
- Operating time

The messages and actual values are displayed on a liquid-crystal display with 4 x 20 digits. The plain-text display is in the following languages (as standard):

- German
- English

Fig. 2/8
OP7 Operator panel

Control terminal strip

The drive converter includes the control terminal strip X100 to control and monitor the SIMOVERT MV drive from a control room. Both analog as well as digital inputs and outputs are available at this control terminal strip (refer to Page 6/10).

Fig. 2/9
Mounting rack with vector control

PROFIBUS-DP

PROFIBUS-DP is the standard bus system for Siemens drive technology for all applications at the field level.

PROFIBUS-DP is specified in the European Standard EN 50170, Volume 2, and permits cyclic data transfer between the SIMOVERT MV units and higher-level systems, e.g. SIMATIC S5/S7 and SIMADYN D.

Apart from the process control data, the PROFIBUS-DP also transports the information for parameterization of the drive.

Operator control and diagnostics

Integrating drives in SIMATIC S7 with Drive ES

The engineering and process control of SIMOVERT MV in combination with a SIMATIC S7 and STEP 7 ≥ V5.0 is particularly user-friendly and convenient.

If the optional Software Drive ES (Drive Engineering System) is installed on the same software platform (PC or PG) then the engineering of the complete system can take place via the STEP 7 Manager. Data transportation is handled by the S7 system bus PROFIBUS-DP (see Fig. 2/10).

The optional software Drive ES combines the previously individual steps of configuring (hardware configuring and parameter assignment) and the control functions between SIMATIC S7 and SIMOVERT MV in one software tool.

Fully integrated in the STEP 7 Manager, Drive ES for SIMOVERT MV consists of two components with different functions.

Drive ES Basic is used for convenient startup and diagnostics during operation of the plant. The great advantage is in the system-wide data management of drive and automation data of a project in the STEP 7 Manager.

Drive ES SIMATIC makes available the functionality of the software DVA_S7 für STEP 7 ≥ 5.0. The communication between SIMATIC S7 and Siemens drives (e. g. SIMOVERT MV) can then be configured using CPU function blocks and simple parameter assignment.

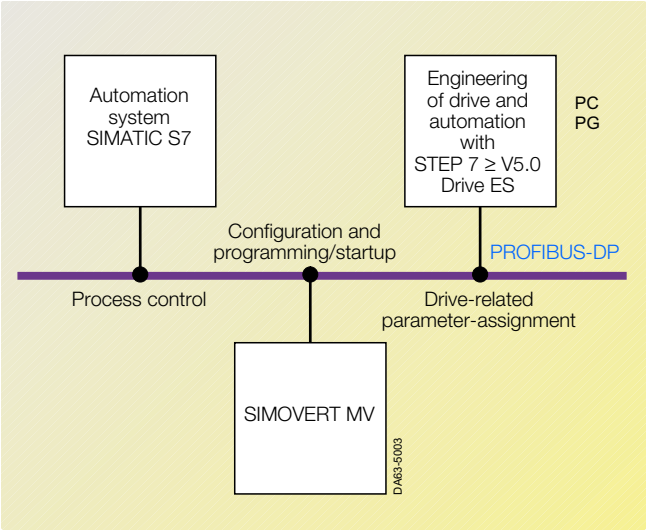


Fig. 2/10
Integration of SIMOVERT MV in the SIMATIC S7 automation system

Drive ES Basic features

Drive ES is based on the user interface of the STEP 7 Manager

- Control and diagnostics of basic unit parameters via tables which can be generated individually
- Reading, writing, administration, printing and comparison of parameter records
- Process data operation (control commands, setpoints)
- Use of script-files
- Online and offline operation.

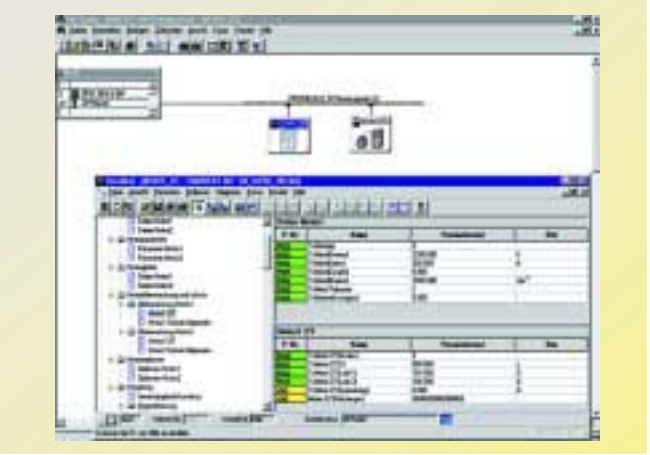


Fig. 2/11
Parameter assignment with Drive ES Basic

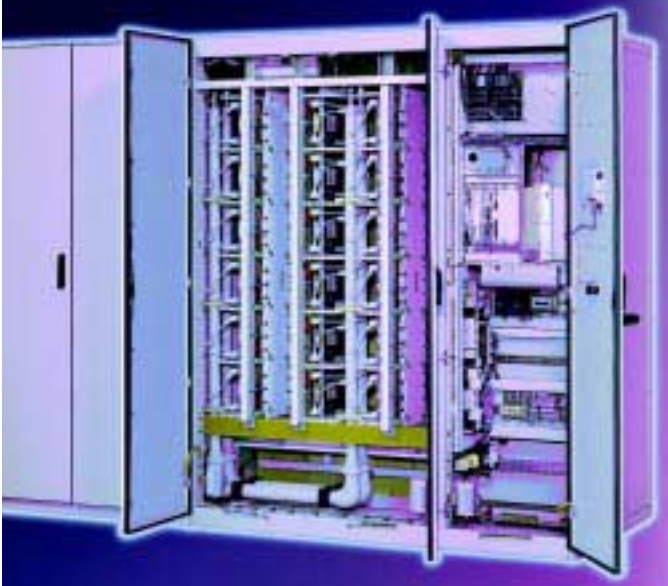
PC configuration (hardware and software requirements)

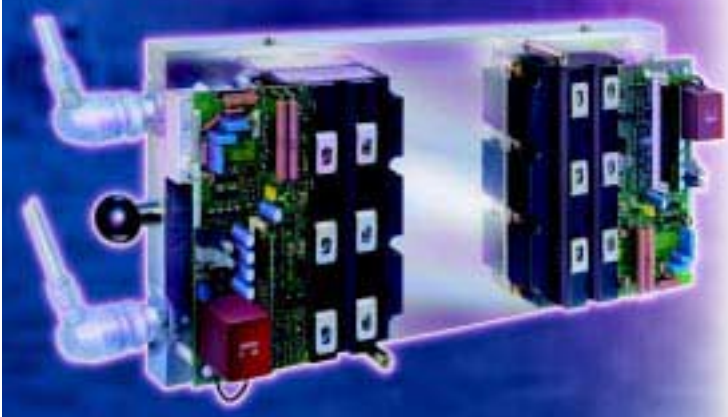
- Windows 95 or Windows NT
- ≥ 16 Mbyte RAM (32 Mbyte recommended)
- Hard disk space available: 10 Mbyte
- Monitor resolution: 800 x 600 or higher.

Overview: “Software environment for SIMOVERT MV”

System environment	Parameter assignment and start-up of drives	Parameter assignment of the PROFIBUS communication in the SIMATIC
SIMATIC S7 STEP 7 ≥ V5.0	Drive ES Basic (≥ V5.1)	Drive ES SIMATIC (CBP2-functionality)
Any automation system	Drive ES Basic (≥ V5.1) and USS (stand-alone)	

SIMOVERT MV
6SE80 Drive Converters





3

Design

General technical data

Power components	Diodes / HV-IGBT
Line-side drive converter • Standard • Option	 12-pulse diode rectifier (DFE, Diode Front End) 24-pulse diode rectifier (DFE) Active Front End (AFE)
Motor-side drive converter	3-level drive converter
Closed-loop control	Vector Control, fully-digital with RISC processor (32 bit)
Drive quadrants • 12/24-pulse DFE • AFE	 2 directions of rotation, motoring (2 quadrant) 2 directions of rotation, motoring and braking (4 quadrant)
Electrical isolation of the power section – open and closed-loop control	Fiber-optic cable
Auxiliary supply	3-ph./N/380 V/AC ±10 %, 50/60 Hz ± 3 % 3-ph./N/400 V/AC ±10 %, 50/60 Hz ± 3 % 3-ph./N/415 V/AC +6 % –10 %, 50/60 Hz ± 3 %
Air cooling Permissible ambient and coolant temperature • in operation • during storage • during transport	Forced air cooling using integrated fans 0 °C to +40 °C: 100 % load capacity (moisture condensation is not permissible) +40 °C to +45 °C: current de-rating, refer to Fig. 6/3 –40 °C to +70 °C, 2K3 –40 °C to +70 °C, 1K3
Water cooling Permissible ambient temperature • in operation • during storage • during transport Permissible coolant temperature (raw, unconditioned water) • inlet • outlet	Integrated water-to-water cooling unit +5 °C to +40 °C (moisture condensation is not permissible) –40 °C to +70 °C (without de-ionized water) –40 °C to +70 °C (without de-ionized water) +5 °C to +35 °C max. +40 °C
Installation altitude	≤ 1000 m above sea level: 100 % load capacity > 1000 m to 5000 m above sea level: Current de-rating, refer to Fig. 6/4 > 2000 m to 5000 m above sea level: additional voltage de-rating, refer to Fig. 6/5
Permissible humidity rating	Relative air humidity ≤ 95 % Moisture condensation is not permissible
Environmental class	Class 3K3 according to DIN IEC 721-3-3
Insulation	Degree of pollution 2 acc. to DIN VDE 0110, Part 1 Moisture condensation is not permissible
Degree of protection • Standard • Options	Acc. to DIN VDE 0470, IEC 60 529, EN 60 529 IP 21 (air cooling), IP 23 (water cooling) Refer to Page 3/19
Protective class	Class 1 in accordance with DIN VDE 0106, Part 1
Shock hazard protection	Acc. to DIN VDE 0106 Part 100 (VGB 4) and DIN VDE 0113 Part 1
Radio interference suppression	Acc. to EN 61 800-3 No radio interference suppression
Paint finish/color	For indoor use/gray RAL 7032
Mechanical strength For stationary applications • deflection • acceleration During transport • deflection • acceleration	Acc. to DIN IEC 60 068-2-6 0.075 mm in the frequency range 10 Hz to 58 Hz 9.8 ms^{-2} (1 x *g*) in the frequency range > 58 Hz to 500 Hz 3.5 mm in the frequency range 5 Hz to 9 Hz 9.8 ms^{-2} (1 x *g*) in the frequency range > 9 Hz to 500 Hz

General technical data

Fig. 3/1
Air-cooled drive converter SIMOVERT MV 6SE80

The SIMOVERT MV voltage-source DC link drive converters have rated outputs from 660 to 7200 kVA and are available as ready-to-connect cabinet units with degree of protection IP 21 (air cooling) or IP 23 (water cooling).

When developing the equipment, special significance was placed on the modular design.

For that reason, the SIMOVERT MV converter can be easily adapted for various requirements and allows for inexpensive, customized drive solutions.

The modular design not only makes SIMOVERT MV extremely compact, but also extremely service-friendly and enhances its availability. Components and parts are replaced in just a few minutes.

3

Rated data

Rated motor voltage	**2.3 kV**	**3.3 kV**	**4.16 kV**	**6 kV**	**6.6 kV**
Drive converter supply voltage[1])	2 × 1.2 kV	2 × 1.7 kV	2 × 2.2 kV[3])	2 × 1.2 kV	2 × 1.2 kV
Supply voltage tolerance[2])	± 10 %	± 10 %	± 10 %	± 10 %	± 10 %
Line supply frequency	50/60 Hz ± 3%	50/60 Hz ± 3 %	50/60 Hz ± 3 %	50/60 Hz ± 3 %	50/60 Hz ± 3 %
Line supply power factor, basic fundamental	> 0.96	> 0.96	> 0.96	> 0.96	> 0.96
Max. output frequency (standard)	100 Hz	100 Hz	100 Hz	66 Hz	66 Hz
optional	100–200 Hz on req.	100–200 Hz on req.	100–200 Hz on req.	–	–
Field-weakening range	1:4	1:4	1:4	–	–
Speed accuracy					
n > 10 %	0.4 × f_{slip}	0.4 × f_{slip}	0.4 × f_{slip}	0.4 × f_{slip}	0.4 × f_{slip}
n < 5 %	f_{slip}	f_{slip}	f_{slip}	f_{slip}	f_{slip}
in the field-weakening range	$f_{max}/f_n \times f_{slip}/3$	$f_{max}/f_n \times f_{slip}/3$	$f_{max}/f_n \times f_{slip}/3$	–	–
Torque accuracy					
in the constant flux range	< 2.5 % for n > 5 %	< 2.5 % for n > 5 %	< 2.5 % for n > 5 %	< 2.5 % for n > 5 %	< 2.5 % for n > 5 %
in the field-weakening range	< 5 %	< 5 %	< 5 %	–	–
Torque rise time	< 5 ms for n >10 %	< 5 ms for n >10 %	< 5 ms for n >10 %	< 8 ms for n >10 %	< 8 ms for n >10 %
Torque ripple	< 2 %	< 2 %	< 2 %	< 2 %	< 2 %

1) The drive converter supply voltage corresponds to the secondary idle voltage of the transformer.

2) –20 % tolerance of the drive converter supply voltage with capacity going down by the same degree.

3) Outputs > 4000 kVA require 2 × 2 × 2.2 kV infeeds.

Design

Rated data (continued)

The ready-to-connect drive converter cabinet is connected to the medium-voltage line supply of 3-ph. 2.3 kV AC up to 36 kV 50/60 Hz via a three-winding converter transformer and a circuit-breaker.

The basic version comprises:

- System cabinet with degree of protection IP 21 (air cooling) or IP 23 (water cooling)
- Line-side converter (12-pulse diode rectifier)
- DC link capacitors in a three-level arrangement
- DC link DC voltage PT
- Motor-side converter using three-level technology (HV-IGBTs)
- Combined motor-side digital PT and CT
- OP7 operator panel for operator control, monitoring and diagnostics
- Vector Control
- Insulation monitoring

Integrated IHV filter (**I**ntegrated **H**igh **V**oltage) in the 6.0 kV and 6.6 kV versions

For water cooling with integrated water-to-water cooling unit

The options consist of mechanical and electrical system components which can be additionally ordered depending on the particular application (see Page 3/18).

Examples of options:

- Increased degree of protection
- Output reactor (for 2.3 kV, 3.3 kV, and 4.16 kV)
- Sinusoidal EMC filter (for 2.3 kV, 3.3 kV, and 4.16 kV)
- Spare parts packages

Air-cooled converters for 6.0 kV and 6.6 kV

The air-cooled SIMOVERT MV drive converter for the rated motor voltages of 6.0 kV and 6.6 kV consists of a 2.3 kV standard converter and an **I**ntegrated **H**igh-**V**oltage filter (IHV filter).

The design of the 2.3 kV converter is maintained and completed by a further cabinet with the IHV filter.

The IHV filter is a fixed part of the 6.0/6.6 kV converter series and built in as a standard.

From the pulsed 2.3 kV output voltage of the inverter, the IHV filter generates a 6.0/6.6 kV sinusoidal voltage, which allows connecting also standard motors to the converter.

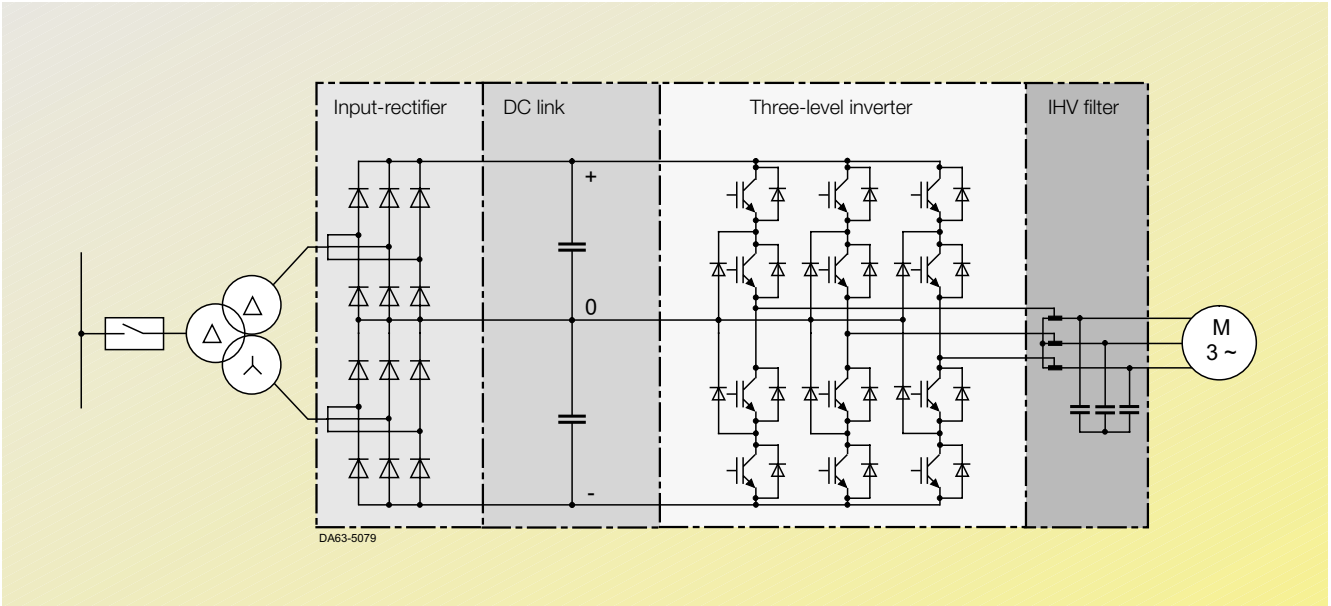


Fig. 3/2
Block diagram of the SIMOVERT MV converter for 6.0 and 6.6 kV motor voltage

Air-cooled converters for 6.0 kV and 6.6 kV (continued)

This has the following benefits:

Retrofit applications

Existing fixed speed motors turn to variable-speed drives when converters are added:

- The existing motor is suitable for converter-fed operation without derating, because there is no additional loss in the motor.
- No mechanical changeover at the driven machine is necessary, e.g. adjustment of the shaft height, of the foundation, of the coupling, the cooling system etc.
- The existing motor cables are preserved; no changes necessary.
- No supplementary output chokes are necessary with long motor cables.
- Bypass circuits can be realized without complications, since the motor voltage is equal to the mains voltage.

New configurations

- Standard medium-voltage drives can be put to use without extra measures and without derating.
- It is possible to use standard power cables for connecting the motor.
- No supplementary output chokes are necessary with long motor cables.

Please refer to the notes on Page 6/13 for configuration of 6.0 kV/6.6 kV drives.

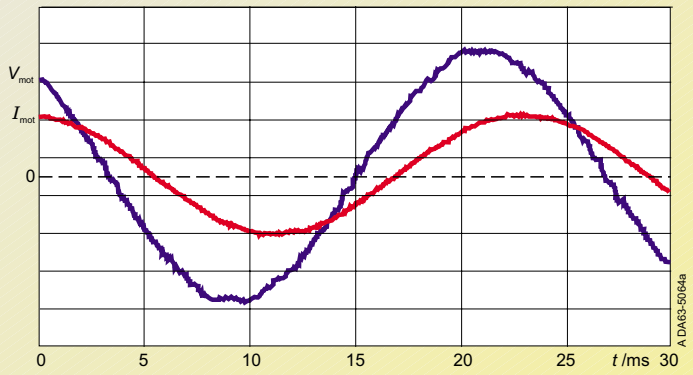


Fig. 3/3
Output current and output voltage of the SIMOVERT MV for 6.0 and 6.6 kV

Design

Water-cooled drive converters

A water-to-water cooling unit is an integral part of the water-cooled SIMOVERT MV converter.

The cooling unit is used to dissipate the power loss from the drive converter. It has an inner and an outer water circuit. The water of the outer circuit cools the inner circuit via the heat exchanger.

The closed and vented inner water circuit is filled with fine water. Fine water is de-ionized water with a conductivity between approx. 0.2 and 0.6 µS. The water's conductivity must be low since the heat sink, through which the water flows, is on the same voltage level as the HV-IGBT, and thus on the same level as the DC link.

Intake and outlet pipes are fitted between each phase stack. Cold water coming from the cooling unit flows into the inlet pipe, is heated up by the power loss in the HV-IGBT and then returns to the cooling unit via the outlet pipe (see Fig. 3/7).

The drive converter cabinet is mounted in a floor panel so that if there is a leak, the water is collected. A leakage water monitoring function immediately signals the control system if water is leaking.

Fig. 3/4
SIMOVERT MV with water cooling

Fig. 3/5
Cooling unit (closed and open)

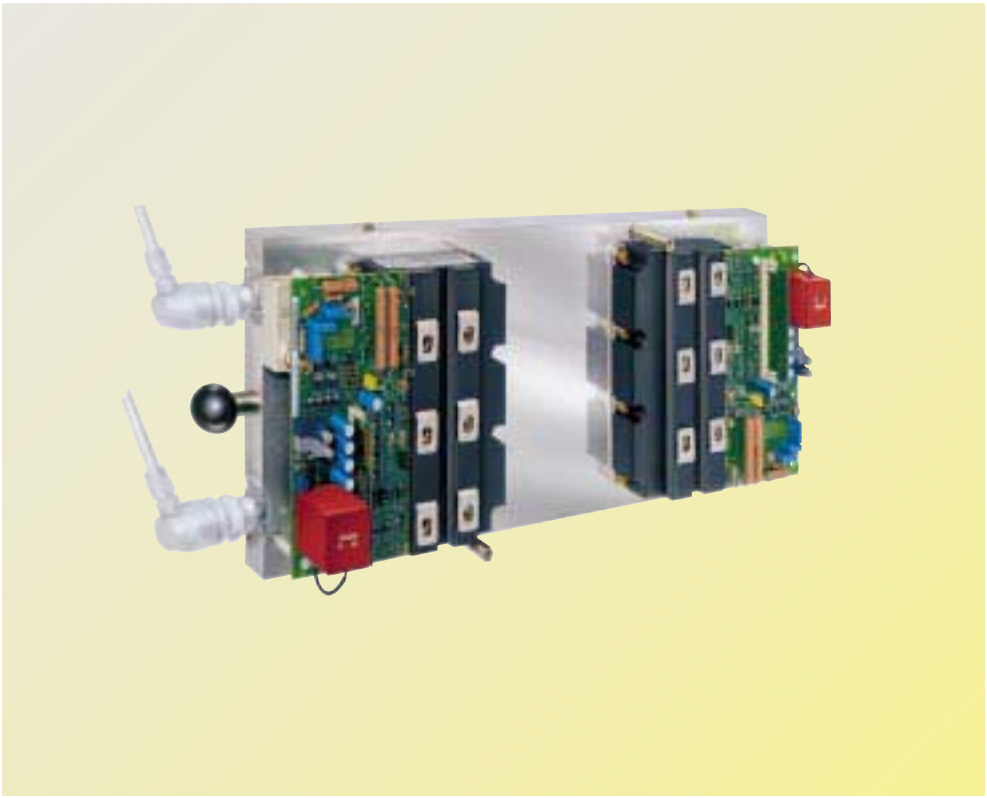


Fig. 3/6
Water-cooled Power-Card with pipe connections

The water-cooled Power-Card is a plug-in module just like the air-cooled Power-Card. If the Power-Card is to be replaced, the water circuit must be opened. This would mean that air would enter the water circuit which would have to be subsequently vented. In order to avoid this, the Power-Cards are equipped with special connectors. These connectors prevent air from entering the system. Thus, it is no longer necessary to subsequently vent the system, i.e. the drive converter is quickly operational again.

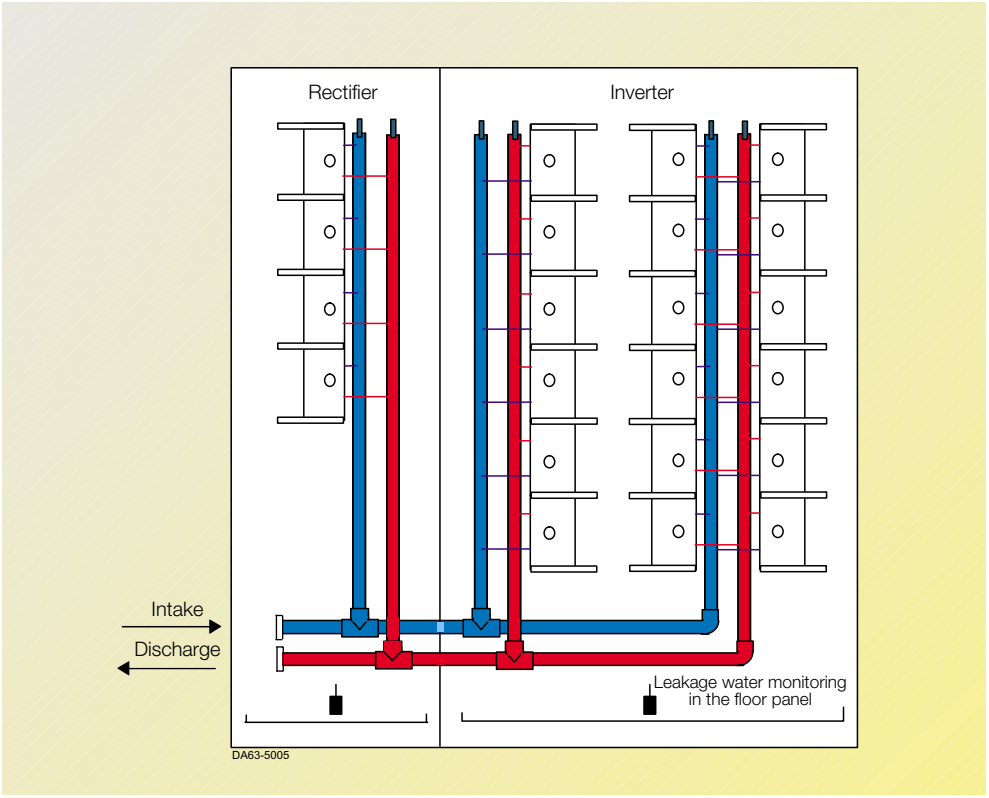


Fig. 3/7
Cooling of the converter power section

Selection and ordering data

Air-cooled SIMOVERT MV drive converters with 12-pulse diode input circuit (DFE) for constant and square-law load torque

Rated drive converter output	Rated output at the motor drive shaft	Order No.	Rated output current	Base load current	Short-time current	Input current at rated operating point	Input voltage	Power loss[1] at 50/60 Hz	Efficiency[1] at 50/60 Hz
P_N kVA	P kW		I_N A	I_0 A	I_K A	I_e A	U_e kV	P_V kW	η %
Rated motor voltage 2.3 kV									
800	640	**6SE8008-1AA01**	200	150	226	204	2 x 1.2	12	98.5
1000	810	**6SE8010-1AA01**	250	188	283	256	2 x 1.2	15	98.5
1200	980	**6SE8012-1AA01**	300	225	339	306	2 x 1.2	18	98.5
1400	1160	**6SE8014-1AA01**	350	263	396	360	2 x 1.2	20	98.6
1600	1320	**6SE8016-1AA01**	400	300	452	410	2 x 1.2	22	98.6
1800	1490	**6SE8018-1AA01**	450	338	509	460	2 x 1.2	25	98.7
2000	1660	**6SE8020-1AA01**	500	375	565	510	2 x 1.2	27	98.7
2200	1870	**6SE8022-1AA01**	550	413	622	560	2 x 1.2	29	98.7
2400	2040	**6SE8024-1AA01**	600	450	678	610	2 x 1.2	31	98.7
Rated motor voltage 3.3 kV									
1000	810	**6SE8010-1BA01**	175	140	210	178	2 x 1.7	15	98.5
1300	1060	**6SE8013-1BA01**	230	184	276	235	2 x 1.7	20	98.5
1500	1240	**6SE8015-1BA01**	260	208	312	266	2 x 1.7	23	98.5
1800	1490	**6SE8018-1BA01**	315	252	378	320	2 x 1.7	27	98.6
2100	1730	**6SE8021-1BA01**	370	296	444	375	2 x 1.7	30	98.6
2300	1890	**6SE8023-1BA01**	400	320	480	408	2 x 1.7	33	98.6
2600	2150	**6SE8026-1BA01**	460	368	552	465	2 x 1.7	37	98.6
2900	2310	**6SE8028-1BA01**	510	408	612	515	2 x 1.7	41	98.6
3100	2560	**6SE8031-1BA01**	550	440	660	560	2 x 1.7	42	98.7
Rated motor voltage 4.16 kV									
1300	1070	**6SE8013-1CA01**	180	135	203	184	2 x 2.2	20	98.5
1700	1410	**6SE8017-1CA01**	240	180	270	243	2 x 2.2	26	98.5
2000	1640	**6SE8020-1CA01**	280	210	316	284	2 x 2.2	30	98.5
2300	1890	**6SE8023-1CA01**	320	240	362	325	2 x 2.2	34	98.6
2600	2150	**6SE8026-1CA01**	360	270	407	370	2 x 2.2	37	98.6
2900	2400	**6SE8028-1CA01**	400	300	452	410	2 x 2.2	40	98.6
3300	2730	**6SE8033-1CA01**	460	345	520	470	2 x 2.2	46	98.6
3700	3060	**6SE8037-1CA01**	510	383	576	520	2 x 2.2	49	98.7
4000	3320	**6SE8040-1CA01**	550	413	622	562	2 x 2.2	51	98.7
Rated motor voltage 2 x 4.16 kV[3]									
4700	3900	**6SE8047-1CA01**	2 x 325	2 x 244	2 x 370	2 x 335	2 x 2 x 2.2	2 x 37	98.4
5200	4300	**6SE8052-1CA01**	2 x 360	2 x 270	2 x 410	2 x 370	2 x 2 x 2.2	2 x 40	98.5
5900	4900	**6SE8058-1CA01**	2 x 415	2 x 310	2 x 470	2 x 425	2 x 2 x 2.2	2 x 46	98.5
6700	5500	**6SE8067-1CA01**	2 x 460	2 x 345	2 x 520	2 x 470	2 x 2 x 2.2	2 x 49	98.6
7200	6000	**6SE8072-1CA01**	2 x 495	2 x 370	2 x 560	2 x 505	2 x 2 x 2.2	2 x 51	98.6

1) Without cooling system.
2) Plus 18 A pre-charging current for 20 sec.
3) Converter with power section in parallel connection.

Auxiliary power req. [3/AC/N/400 V][2]	Dimensions (with panels and doors)			Dimension drawing No.	Weight	Cooling air req.	Measuring surface sound press. level	Measuring surface level	Cable cross-section for line and motor sides max.
A	Width mm	Depth mm	Height mm	Page	kg	m^3/s	L_{pA} dB (A)	L_s dB (A)	mm^2 per phase
10	1818	1259	2570	7/2	1200	1.36	79	18	2 x 185
10	2418	1259	2570	7/3	1750	1.66	79	18	2 x 185
10	2418	1259	2570	7/3	1750	1.66	79	18	2 x 185
10	2418	1259	2570	7/3	1800	1.66	79	18	2 x 185
10	2418	1259	2570	7/3	1800	1.66	79	18	2 x 185
10	2418	1259	2570	7/3	1850	1.66	79	18	3 x 185
10	2418	1259	2570	7/3	1850	1.66	79	18	3 x 185
14	2418	1259	2570	7/3	1900	1.79	80	18	3 x 185
14	2418	1259	2570	7/3	1900	1.79	80	18	3 x 185
14	1818	1259	2570	7/4	1500	1.90	81	18	2 x 185
10	2418	1259	2570	7/5	2050	2.07	79	18	2 x 185
14	2418	1259	2570	7/5	2050	2.63	80	18	2 x 185
14	2418	1259	2570	7/5	2100	2.63	80	18	2 x 185
14	2418	1259	2570	7/5	2100	2.63	80	18	2 x 185
14	2418	1259	2570	7/5	2150	2.63	80	18	3 x 185
14	2418	1259	2570	7/5	2150	2.63	80	18	3 x 185
14	2418	1259	2570	7/5	2200	2.63	80	18	3 x 185
14	2418	1259	2570	7/5	2200	2.63	80	18	3 x 185
14	1818	1259	2570	7/4	1500	1.90	81	18	2 x 185
10	2418	1259	2570	7/5	2050	2.07	79	18	2 x 185
14	2418	1259	2570	7/5	2050	2.63	80	18	2 x 185
14	2418	1259	2570	7/5	2100	2.63	80	18	2 x 185
14	2418	1259	2570	7/5	2100	2.63	80	18	2 x 185
14	2418	1259	2570	7/5	2150	2.63	80	18	3 x 185
14	2418	1259	2570	7/5	2150	2.63	80	18	3 x 185
20	2418	1259	2570	7/5	2200	2.90	83	18	3 x 185
20	2418	1259	2570	7/5	2200	2.90	83	18	3 x 185
38	4218	1259	2570	7/6	3600	5.80	86	19	3 x 185
38	4218	1259	2570	7/6	3650	5.80	86	19	3 x 185
38	4218	1259	2570	7/6	3650	5.80	86	19	3 x 185
38	4218	1259	2570	7/6	3700	5.80	86	19	3 x 185
38	4218	1259	2570	7/6	3700	5.80	86	19	3 x 185

Selection and ordering data

Air-cooled SIMOVERT MV drive converters with 12-pulse diode input circuit (DFE) with sinusoidal EMC output filter (option L15) for square-law load torque

Rated drive converter output	Rated output at the motor drive shaft	Order No. with Order code +**L15**	Rated output current	Input current at rated operating point	Input voltage	Power loss[1]) at 50/60 Hz	Efficiency[1]) at 50/60 Hz
P_N kVA	P kW		I_N A	I_e A	U_e kV	P_V kW	η %
Rated motor voltage 2.3 kV[3])							
660	550	**6SE8008-1AA01-Z**	165	169	2 x 1.2	16	97.6
830	690	**6SE8010-1AA01-Z**	208	212	2 x 1.2	19	97.7
1000	830	**6SE8012-1AA01-Z**	250	256	2 x 1.2	22	97.8
1160	960	**6SE8014-1AA01-Z**	290	296	2 x 1.2	25	97.8
1330	1100	**6SE8016-1AA01-Z**	334	340	2 x 1.2	27	98.0
1500	1240	**6SE8018-1AA01-Z**	377	383	2 x 1.2	29	98.1
1660	1380	**6SE8020-1AA01-Z**	417	424	2 x 1.2	31	98.1
1830	1520	**6SE8022-1AA01-Z**	460	467	2 x 1.2	34	98.1
2000	1660	**6SE8024-1AA01-Z**	500	510	2 x 1.2	36	98.2
Rated motor voltage 3.3 kV[3])							
910	750	**6SE8010-1BA01-Z**	160	163	2 x 1.7	19	97.9
1180	980	**6SE8013-1BA01-Z**	206	210	2 x 1.7	24	98.0
1365	1130	**6SE8015-1BA01-Z**	239	243	2 x 1.7	28	97.9
1640	1360	**6SE8018-1BA01-Z**	287	292	2 x 1.7	32	98.0
1910	1590	**6SE8021-1BA01-Z**	334	340	2 x 1.7	35	98.2
2100	1740	**6SE8023-1BA01-Z**	367	373	2 x 1.7	38	98.2
2370	1970	**6SE8026-1BA01-Z**	415	422	2 x 1.7	41	98.3
2640	2190	**6SE8028-1BA01-Z**	462	470	2 x 1.7	46	98.3
2820	2340	**6SE8031-1BA01-Z**	493	500	2 x 1.7	47	98.3
Rated motor voltage 4.16 kV[3])							
1180	980	**6SE8013-1CA01-Z**	164	167	2 x 2.2	25	97.9
1550	1290	**6SE8017-1CA01-Z**	215	219	2 x 2.2	32	97.9
1820	1510	**6SE8020-1CA01-Z**	252	257	2 x 2.2	37	98.0
2090	1730	**6SE8023-1CA01-Z**	290	295	2 x 2.2	41	98.0
2370	1970	**6SE8026-1CA01-Z**	330	335	2 x 2.2	45	98.1
2640	2190	**6SE8028-1CA01-Z**	366	372	2 x 2.2	48	98.2
3000	2490	**6SE8033-1CA01-Z**	416	424	2 x 2.2	54	98.2
3370	2800	**6SE8037-1CA01-Z**	468	475	2 x 2.2	58	98.3
3640	3020	**6SE8040-1CA01-Z**	505	513	2 x 2.2	59	98.4

1) Without cooling system.
2) Plus 18 A pre-charging current for 20 sec.
3) When ordering, the plain text should include the rated motor current, the motor current in the rated operating point and the motor no-load current.

Auxiliary power req. [3/AC/N/400 V][2]	Dimensions (with panels and doors)			Dimension drawing No.	Weight	Cooling air req.	Measuring surface sound press. level	Measuring surface level	Cable cross-section for line and motor sides max.
A	Width mm	Depth mm	Height mm	Page	kg	m^3/s	L_{pA} dB (A)	L_s dB (A)	mm^2 per phase
10	2718	1259	2570	7/2+7/10	2300	1.6	79	19	2 x 185
10	3318	1259	2570	7/3+7/10	2850	1.9	79	19	2 x 185
10	3318	1259	2570	7/3+7/10	3100	1.9	79	19	2 x 185
10	3318	1259	2570	7/3+7/10	3150	1.9	79	19	2 x 185
10	3318	1259	2570	7/3+7/10	3220	1.9	79	19	2 x 185
10	3318	1259	2570	7/3+7/10	3270	1.9	79	19	3 x 185
10	3318	1259	2570	7/3+7/10	3550	1.9	79	19	3 x 185
14	3318	1259	2570	7/3+7/10	3600	2.1	80	19	3 x 185
14	3318	1259	2570	7/3+7/10	3700	2.1	80	19	3 x 185
14	2718	1259	2570	7/4+7/10	2850	2.2	81	19	2 x 185
10	3318	1259	2570	7/5+7/10	3400	2.3	79	19	2 x 185
14	3318	1259	2570	7/5+7/10	3450	2.9	80	19	2 x 185
14	3318	1259	2570	7/5+7/10	3500	2.9	80	19	2 x 185
14	3318	1259	2570	7/5+7/10	3730	2.9	80	19	2 x 185
14	3318	1259	2570	7/5+7/10	3780	2.9	80	19	3 x 185
14	3318	1259	2570	7/5+7/10	3990	2.9	80	19	3 x 185
14	3318	1259	2570	7/5+7/10	4040	2.9	80	19	3 x 185
14	3318	1259	2570	7/5+7/10	4100	2.9	80	19	3 x 185
14	2718	1259	2570	7/4+7/10	3100	2.2	81	19	2 x 185
10	3618	1259	2570	7/5+7/10	3690	2.3	79	19	2 x 185
14	3618	1259	2570	7/5+7/10	3690	3.1	80	19	2 x 185
14	3618	1259	2570	7/5+7/10	3740	3.1	80	19	2 x 185
14	3618	1259	2570	7/5+7/10	4150	3.1	80	19	2 x 185
14	3618	1259	2570	7/5+7/10	4200	3.1	80	19	3 x 185
14	3618	1259	2570	7/5+7/10	4550	3.1	80	19	3 x 185
20	3618	1259	2570	7/5+7/10	4600	3.1	83	19	3 x 185
20	3618	1259	2570	7/5+7/10	4800	3.1	83	19	3 x 185

Selection and ordering data

Air-cooled SIMOVERT MV drive converters with 12-pulse diode input circuit (DFE) with integrated high voltage filter (IHV filter) for square-law load torque

Rated drive converter output	Rated output at the motor drive shaft	Order No.	Rated output current	Input current at rated operating point	Input voltage	Power loss[1]) at 50/60 Hz	Efficiency[1]) at 50/60 Hz
P_N kVA	P kW		I_N A	I_e A	U_e kV	P_V kW	η %
Rated motor voltage 6.0 kV[3])							
660	550	**6SE8008-1DA01**	65	170	2 x 1.2	17	97.5
1000	810	**6SE8010-1DA01**	95	257	2 x 1.2	25	97.6
1200	980	**6SE8012-1DA01**	115	310	2 x 1.2	30	97.6
1300	1080	**6SE8013-1DA01**	125	335	2 x 1.2	34	97.5
1500	1240	**6SE8015-1DA01**	145	387	2 x 1.2	39	97.5
1800	1490	**6SE8018-1DA01**	175	465	2 x 1.2	45	97.6
2000	1640	**6SE8020-1DA01**	190	515	2 x 1.2	50	97.6
Rated motor voltage 6.6 kV[3])							
660	550	**6SE8008-1EA01**	60	170	2 x 1.2	17	97.5
1000	810	**6SE8010-1EA01**	90	257	2 x 1.2	25	97.6
1200	980	**6SE8012-1EA01**	105	308	2 x 1.2	29	97.6
1300	1080	**6SE8013-1EA01**	116	335	2 x 1.2	33	97.5
1500	1240	**6SE8015-1EA01**	130	386	2 x 1.2	39	97.5
1800	1490	**6SE8018-1EA01**	160	463	2 x 1.2	44	97.6
2000	1640	**6SE8020-1EA01**	175	514	2 x 1.2	49	97.6

1) Without cooling system.
2) Plus 18 A pre-charging current for 20 sec.
3) When ordering, the plain text should include the rated motor current, the motor current in the operating point and the no-load motor current.

Auxiliary power req. [3/AC/N/400 V][2]	Dimensions (with panels and doors)			Dimension drawing No.	Weight	Cooling air req.	Measuring surface sound press. level	Measuring surface level	Cable cross-section for line and motor sides max.
A	Width mm	Depth mm	Height mm	Page	kg	m^3/s	L_{pA} dB (A)	L_s dB (A)	mm^2 per phase
12	3018	1259	2570	7/7	4550	1.9	79	19	2 x 185
12	3618	1259	2570	7/8	5500	2.2	79	19	2 x 185
12	3618	1259	2570	7/8	5500	2.2	79	19	2 x 185
12	3918	1259	2570	7/8	5600	2.2	79	19	2 x 185
12	3918	1259	2570	7/8	5600	2.2	79	19	2 x 185
12	4218	1259	2570	7/8	6450	3.2	80	19	3 x 185
12	4218	1259	2570	7/8	6500	3.2	80	19	3 x 185
12	3018	1259	2570	7/7	4550	1.9	79	19	2 x 185
12	3618	1259	2570	7/8	5500	2.2	79	19	2 x 185
12	3618	1259	2570	7/8	5500	2.2	79	19	2 x 185
12	3918	1259	2570	7/8	5600	2.2	79	19	2 x 185
12	3918	1259	2570	7/8	5600	2.2	79	19	2 x 185
12	4218	1259	2570	7/8	6450	3.2	81	19	3 x 185
12	4218	1259	2570	7/8	6500	3.2	81	19	3 x 185

Selection and ordering data

Water-cooled SIMOVERT MV drive converters with 12-pulse diode input circuit (DFE) for constant and square-law load torque

Rated drive converter output	Rated output at the motor drive shaft	Order No.	Rated output current	Base load current	Short-time current	Input current at rated operating point	Input voltage	Power loss[1]) at 50/60 Hz	Efficiency[1]) at 50/60 Hz
P_N kVA	P kW		I_N A	I_0 A	I_K A	I_e A	U_e kV	P_V kW	η %
Rated motor voltage 2.3 kV									
800	640	**6SE8008-2AA01**	200	150	226	204	2 x 1.2	12	98.5
1000	810	**6SE8010-2AA01**	250	188	283	256	2 x 1.2	15	98.5
1200	980	**6SE8012-2AA01**	300	225	339	306	2 x 1.2	18	98.5
1400	1160	**6SE8014-2AA01**	350	263	396	360	2 x 1.2	20	98.6
1600	1320	**6SE8016-2AA01**	400	300	452	410	2 x 1.2	22	98.6
1800	1490	**6SE8018-2AA01**	450	338	509	460	2 x 1.2	25	98.7
2000	1660	**6SE8020-2AA01**	500	375	565	510	2 x 1.2	27	98.7
2200	1870	**6SE8022-2AA01**	550	413	622	560	2 x 1.2	29	98.7
2400	2040	**6SE8024-2AA01**	600	450	678	610	2 x 1.2	31	98.7
Rated motor voltage 3.3 kV									
1000	810	**6SE8010-2BA01**	175	140	210	178	2 x 1.7	15	98.5
1300	1060	**6SE8013-2BA01**	230	184	276	235	2 x 1.7	20	98.5
1500	1240	**6SE8015-2BA01**	260	208	312	266	2 x 1.7	23	98.5
1800	1490	**6SE8018-2BA01**	315	252	378	320	2 x 1.7	27	98.6
2100	1730	**6SE8021-2BA01**	370	296	444	375	2 x 1.7	30	98.6
2300	1890	**6SE8023-2BA01**	400	320	480	408	2 x 1.7	33	98.6
2600	2150	**6SE8026-2BA01**	460	368	552	465	2 x 1.7	37	98.6
2900	2310	**6SE8028-2BA01**	510	408	612	515	2 x 1.7	41	98.6
3100	2560	**6SE8031-2BA01**	550	440	660	560	2 x 1.7	42	98.7
Rated motor voltage 4.16 kV									
1300	1070	**6SE8013-2CA01**	180	135	203	184	2 x 2.2	20	98.5
1700	1410	**6SE8017-2CA01**	240	180	270	243	2 x 2.2	26	98.5
2000	1640	**6SE8020-2CA01**	280	210	316	284	2 x 2.2	30	98.5
2300	1890	**6SE8023-2CA01**	320	240	362	325	2 x 2.2	34	98.6
2600	2150	**6SE8026-2CA01**	360	270	407	370	2 x 2.2	37	98.6
2900	2400	**6SE8028-2CA01**	400	300	452	410	2 x 2.2	40	98.6
3300	2730	**6SE8033-2CA01**	460	345	520	470	2 x 2.2	46	98.6
3700	3060	**6SE8037-2CA01**	510	383	576	520	2 x 2.2	49	98.7
4000	3320	**6SE8040-2CA01**	550	413	622	562	2 x 2.2	51	98.7
Rated motor voltage 2 x 4.16 kV[3])									
4700	3900	**6SE8047-2CA01**	2 x 325	2 x 244	2 x 370	2 x 335	2 x 2 x 2.2	2 x 37	98.4
5200	4300	**6SE8052-2CA01**	2 x 360	2 x 270	2 x 410	2 x 370	2 x 2 x 2.2	2 x 40	98.5
5900	4900	**6SE8059-2CA01**	2 x 415	2 x 310	2 x 470	2 x 425	2 x 2 x 2.2	2 x 46	98.5
6700	5500	**6SE8067-2CA01**	2 x 460	2 x 345	2 x 520	2 x 470	2 x 2 x 2.2	2 x 49	98.6
7200	6000	**6SE8072-2CA01**	2 x 495	2 x 370	2 x 560	2 x 505	2 x 2 x 2.2	2 x 51	98.6

1) Without cooling system.
2) Plus 18 A pre-charging current for 20 sec.
3) Converter with power section in parallel connection.
4) Raw water.

Loss to the environment	Auxiliary power req. [3/AC/N/400 V][2]	Dimensions (with panels and doors)			Dimension drawing No.	Weight	Cooling water required[4]	Measuring surface sound press. level	Measuring surface level	Cable cross-section for line and motor sides max.
		Width	Depth	Height				L_{pA}	L_s	
kW	A	mm	mm	mm	Page	kg	m^3/h	dB (A)	dB (A)	mm^2 per phase
2.6	14	2418	1259	2280	7/11	1900	8.0	73	18	2 x 185
2.8	14	3018	1259	2280	7/12	2450	8.0	73	18	2 x 185
3.1	14	3018	1259	2280	7/12	2450	8.0	73	18	2 x 185
3.4	14	3018	1259	2280	7/12	2500	8.0	73	18	2 x 185
3.7	14	3018	1259	2280	7/12	2500	8.0	73	18	2 x 185
4.1	14	3018	1259	2280	7/12	2550	8.0	73	18	3 x 185
4.5	14	3018	1259	2280	7/12	2550	8.0	73	18	3 x 185
4.9	14	3018	1259	2280	7/12	2600	8.0	73	18	3 x 185
5.4	14	3018	1259	2280	7/12	2600	8.0	73	18	3 x 185
2.6	14	2418	1259	2280	7/13	2200	8.0	73	18	2 x 185
2.8	14	3018	1259	2280	7/14	2750	8.0	73	18	2 x 185
2.9	14	3018	1259	2280	7/14	2750	8.0	73	18	2 x 185
3.2	14	3018	1259	2280	7/14	2800	8.0	73	18	2 x 185
3.6	14	3018	1259	2280	7/14	2800	8.0	73	18	2 x 185
3.8	14	3018	1259	2280	7/14	2850	8.0	73	18	3 x 185
4.2	14	3018	1259	2280	7/14	2850	8.0	73	18	3 x 185
4.7	14	3018	1259	2280	7/14	2900	8.0	73	18	3 x 185
5.0	14	3018	1259	2280	7/14	2900	8.0	73	18	3 x 185
3.0	14	2418	1259	2280	7/13	2200	8.0	73	18	2 x 185
3.2	14	3018	1259	2280	7/14	2750	8.0	73	18	2 x 185
3.4	14	3018	1259	2280	7/14	2750	8.0	73	18	2 x 185
3.8	14	3018	1259	2280	7/14	2800	8.0	73	18	2 x 185
4.3	14	3018	1259	2280	7/14	2800	8.0	73	18	2 x 185
4.5	14	3018	1259	2280	7/14	2850	8.0	73	18	3 x 185
5.1	14	3018	1259	2280	7/14	2850	8.0	73	18	3 x 185
5.6	14	3018	1259	2280	7/14	2900	8.0	73	18	3 x 185
5.9	14	3018	1259	2280	7/14	2900	8.0	73	18	3 x 185
8.5	20	4818	1259	2280	7/15	4300	16	76	19	3 x 185
9.0	20	4818	1259	2280	7/15	4350	16	76	19	3 x 185
10.1	20	4818	1259	2280	7/15	4350	16	76	19	3 x 185
11.1	20	4818	1259	2280	7/15	4400	16	76	19	3 x 185
11.8	20	4818	1259	2280	7/15	4400	16	76	19	3 x 185

Selection and ordering data

Water-cooled SIMOVERT MV drive converters with 12-pulse diode input circuit (DFE) with sinusoidal EMC output filter (option L15) for square-law load torque

Rated drive converter output	Rated output at the motor drive shaft	Order No. with Order code +**L15**	Rated output current	Input current at rated operating point	Input voltage	Power loss[1] at 50/60 Hz	Efficiency[1] at 50/60 Hz
P_N kVA	P kW		I_N A	I_e A	U_e kV	P_V kW	η %
Rated motor voltage 2.3 kV[3]							
760	605	**6SE8008-2AA01-Z**	190	194	2 x 1.2	18	97.6
1000	810	**6SE8010-2AA01-Z**	250	256	2 x 1.2	21	97.6
1200	980	**6SE8012-2AA01-Z**	300	306	2 x 1.2	25	97.9
1400	1160	**6SE8014-2AA01-Z**	350	360	2 x 1.2	28	98.0
1600	1320	**6SE8016-2AA01-Z**	400	410	2 x 1.2	31	98.1
1800	1490	**6SE8018-2AA01-Z**	450	460	2 x 1.2	33	98.2
2000	1660	**6SE8020-2AA01-Z**	500	510	2 x 1.2	36	98.2
2200	1870	**6SE8022-2AA01-Z**	550	560	2 x 1.2	39	98.2
2400	2040	**6SE8024-2AA01-Z**	600	610	2 x 1.2	41	98.2
Rated motor voltage 3.3 kV[3]							
1000	810	**6SE8010-2BA01-Z**	175	178	2 x 1.7	21	97.9
1300	1060	**6SE8013-2BA01-Z**	230	235	2 x 1.7	27	97.9
1500	1240	**6SE8015-2BA01-Z**	260	267	2 x 1.7	31	97.9
1800	1490	**6SE8018-2BA01-Z**	315	320	2 x 1.7	35	98.1
2100	1730	**6SE8021-2BA01-Z**	370	375	2 x 1.7	39	98.1
2300	1890	**6SE8023-2BA01-Z**	400	410	2 x 1.7	43	98.1
2600	2150	**6SE8026-2BA01-Z**	460	465	2 x 1.7	46	98.2
2900	2310	**6SE8028-2BA01-Z**	510	516	2 x 1.7	51	98.2
3100	2560	**6SE8031-2BA01-Z**	550	560	2 x 1.7	54	98.3
Rated motor voltage 4.16 kV[3]							
1235	1020	**6SE8013-2CA01-Z**	170	174	2 x 2.2	27	97.8
1700	1410	**6SE8017-2CA01-Z**	240	243	2 x 2.2	35	97.9
2000	1640	**6SE8020-2CA01-Z**	280	284	2 x 2.2	41	98.0
2300	1890	**6SE8023-2CA01-Z**	320	325	2 x 2.2	45	98.0
2600	2150	**6SE8026-2CA01-Z**	360	370	2 x 2.2	49	98.1
2900	2400	**6SE8028-2CA01-Z**	400	410	2 x 2.2	53	98.2
3300	2730	**6SE8033-2CA01-Z**	460	470	2 x 2.2	60	98.2
3700	3060	**6SE8037-2CA01-Z**	510	522	2 x 2.2	64	98.3
4000	3320	**6SE8040-2CA01-Z**	550	565	2 x 2.2	66	98.4

1) Without cooling system.
2) Plus 18 A pre-charging current for 20 sec.
3) When ordering, the plain text should include the rated motor current, the motor current in the operating point and the motor no-load current.
4) Raw water.

Loss to the environment	Auxiliary power req. [3/AC/N/400 V][2]	Dimensions (with panels and doors)			Dimension drawing No.	Weight	Cooling water required[4]	Measuring surface sound press. level	Measuring surface level	Cable cross-section for line and motor sides max.
		Width	Depth	Height				L_{pA}	L_S	
kW	A	mm	mm	mm	Page	kg	m^3/h	dB (A)	dB (A)	mm^2 per phase
6.4	14	3318	1259	2280	7/11+7/17	3000	8.0	73	19	2 x 185
6.6	14	3918	1259	2280	7/12+7/17	3800	8.0	73	19	2 x 185
7.0	14	3918	1259	2280	7/12+7/17	3800	8.0	73	19	2 x 185
8.2	14	3918	1259	2280	7/12+7/17	3920	8.0	73	19	2 x 185
8.9	14	3918	1259	2280	7/12+7/17	3920	8.0	73	19	2 x 185
9.0	14	3918	1259	2280	7/12+7/17	4250	8.0	73	19	3 x 185
9.1	14	3918	1259	2280	7/12+7/17	4250	8.0	73	19	3 x 185
9.7	14	3918	1259	2280	7/12+7/17	4400	8.0	73	19	3 x 185
10.5	14	3918	1259	2280	7/12+7/17	4400	8.0	73	19	3 x 185
6.5	14	3318	1259	2280	7/13+7/17	3550	8.0	73	19	2 x 185
7.1	14	3918	1259	2280	7/14+7/17	4150	8.0	73	19	2 x 185
7.4	14	3918	1259	2280	7/14+7/17	4150	8.0	73	19	2 x 185
7.7	14	3918	1259	2280	7/14+7/17	4430	8.0	73	19	2 x 185
8.8	14	3918	1259	2280	7/14+7/17	4430	8.0	73	19	2 x 185
9.0	14	3918	1259	2280	7/14+7/17	4690	8.0	73	19	3 x 185
9.1	14	3918	1259	2280	7/14+7/17	4690	8.0	73	19	3 x 185
9.3	14	3918	1259	2280	7/14+7/17	4750	8.0	73	19	3 x 185
10.0	14	3918	1259	2280	7/14+7/17	4750	8.0	73	19	3 x 185
8.0	14	3318	1259	2280	7/13+7/17	3800	8.0	73	19	2 x 185
3.2	14	4218	1259	2280	7/14+7/17	4390	8.0	73	19	2 x 185
9.0	14	4218	1259	2280	7/14+7/17	4390	8.0	73	19	2 x 185
10.5	14	4218	1259	2280	7/14+7/17	4850	8.0	73	19	2 x 185
10.9	14	4218	1259	2280	7/14+7/17	4850	8.0	73	19	2 x 185
11.8	14	4218	1259	2280	7/14+7/17	5250	8.0	73	19	3 x 185
12.0	14	4218	1259	2280	7/14+7/17	5250	8.0	73	19	3 x 185
14.0	14	4218	1259	2280	7/14+7/17	5500	8.0	73	19	3 x 185
14.5	14	4218	1259	2280	7/14+7/17	5500	8.0	73	19	3 x 185

Options

Description of the options

Order Code	Description of the option	Comment	Use with SIMOVERT MV in version				
			2.3 kV 3.3 kV 4.16 kV air-cooled	2 x 4.16 kV air-cooled	6.0 kV 6.6 kV air-cooled	2.3 kV 3.3 kV 4.16 kV water-cooled	2 x 4.16 kV water-cooled
Circuit versions / special options							
L01	**24-pulse diode rectifier** A 24-pulse diode rectifier can be used if harmonics fed back into the line supply are to be kept to a minimum. A 600 mm wide extra cabinet will be required for the diode rectifier.		●	■	●	●	■
	Active Front End The Active Front End is an active line-side converter and offers a high degree of operational reliability when the drive is connected to weak networks. It can be operated from the line supply without drawing reactive power, and it can even compensate the reactive power of other loads connected to the line supply within the limits of its own power reserves.		■	–	■	■	–
	Braking chopper with braking resistor A braking chopper with braking resistor is available so that drives using diode rectifiers can be braked.		■	■	■	■	■
	Other standards E.g. in accordance with IEEE, UL, NEMA		■	■	■	■	■
Water-cooled version							
Plate-type heat exchanger with stainless steel plates							
W01	Water-to-water cooling unit with redundant pumps and a stainless steel plate-type heat exchanger	Partially redundant	–	–	–	●	●
W02	Water-to-water cooling unit with redundant pumps and redundant stainless steel plate-type heat exchanger. The pumps and heat-exchanger can be replaced while the drive is operational	Fully redundant	–	–	–	●	●
Plate-type heat exchanger with titanium plates							
W10	Water-to-water cooling unit, non-redundant, with a titanium plate-type heat exchanger (without titanium piping on the raw-water side). Application: For aggressive raw water supplies, such as salt water	Non-redundant	–	–	–	●	●
W11	Water-to-water cooling unit with redundant pumps and a titanium plate heat exchanger (without titanium piping on the raw-water side). Application: For aggressive raw water supplies, such as salt water	Partially redundant	–	–	–	●	●
W12	Water-to-water cooling unit with redundant pumps and a redundant titanium plate-type heat exchanger (without titanium piping on the raw-water side). Application: For aggressive raw water supplies, such as salt water	Fully redundant	–	–	–	●	●
Others							
W50	3-way valve to control the de-ionized water temperature		–	–	–	●	●

● Option possible ■ On request – Not available

Order Code	Description of the option	Comment	Use with SIMOVERT MV in version				
			2.3 kV 3.3 kV 4.16 kV air-cooled	2 x 4.16 kV air-cooled	6.0 kV 6.6 kV air-cooled	2.3 kV 3.3 kV 4.16 kV water-cooled	2 x 4.16 kV water-cooled
Mechanical versions							
M09	**Special paint finish according to RAL ...** Deviating from the standard RAL 7032		●	●	●	●	●
M11	**Dust protection** Doors with filter elements. Front-mounted so that the filter element can be replaced with the doors closed and the drive converter operational. **Caution:** When filter elements are used, the output must be limited to 98 % of the rated output.		●	●	●	–	–
M23	**Degree of protection IP 23** With fan cover, corresponding to IP 23. **Note:** Converter cabinet height changes by a small degree (see dimension drawings).		●	●	●	–	–
M41	**Degree of protection IP 41** Wire-mesh doors (1 mm) and fan cover IP 21		●	●	●	–	–
M43	**Degree of protection IP 43** With cover		–	–	–	●	●
M54	**Prepared for degree of protection IP 54** Cabinet doors without air intake openings. Cabinets without roof assembly and floor panels. The air is drawn in and discharged through air ducts which must be fitted to the system (Please note the engineering information on Page 6/6).	**Note:** When supplied, the degree of protection is not IP 54! **Caution:** Not possible in conjunction with option L17.	●	●	●	–	–
M57	**Degree of protection IP 54** Cabinet with internal air-to-water cooler.		–	–	–	●	■
M59	**Cabinet doors without air intake openings** Air intake from below through floor panels with cut-outs.		●	●	●	–	–
M60	**Locks** Doors can be locked using integrated safety locks.		●	●	●	●	●
M61	**Wall mounting** The auxiliary devices can be mounted in a 600 mm wide supplementary cabinet.		■	■	■	■	■
M63	**Connecting panel for cable entry** 600 mm wide supplementary cabinet so that power cables can be connected from various directions (e.g. from above) deviating from the standard.		●	■	●	●	■
M65	**Emergency operation in the event of fan failure** Operation can be continued at a lower output (emergency operation) when a fan fails. Refer to Page 6/6 for specifications.	In conjunction with option L08 or L15 on request	●	■	■	–	–
M66	**Suitable for marine applications** According to the marine classification societies: Lloyds Register, American Bureau of Shipping, Germanischer Lloyd, Bureau Veritas, Det Norske Veritas	Includes the options M09, M57, L33, and L55	–	–	–	■	■

● Option possible ■ On request – Not available

3

Options

Description of the options (continued)

Order Code	Description of the option	Comment	Use with SIMOVERT MV in version				
			2.3 kV 3.3 kV 4.16 kV air-cooled	2 x 4.16 kV air-cooled	6.0 kV 6.6 kV air-cooled	2.3 kV 3.3 kV 4.16 kV water-cooled	2 x 4.16 kV water-cooled
Electrical options							
L08	**Output reactor for output frequency of up to 100 Hz** This is required to limit the capacitive re-charging currents of the motor feeder cables. Required for cables 100 m and longer, so that operation is possible for longer distances up to approx. 1000 m. The output reactor is installed in a 600 mm wide supplementary cabinet.	Higher frequencies on request	●	●	–	●	●
L15	**Sinusoidal EMC output filter** For 3rd-party and old motors. Installed in 900 mm wide supplementary cabinet. With 4.16 kV, from 1700 kVA: installation in a 1200 mm wide supplementary cabinet. Related notes on Page 6/19. **Important:** When ordering filters please specify the rated motor current, the motor current at the rated operating point and the no-load motor current (in plain text)!		●	–	–	●	–
L17	**UPS** The uninterruptible power supply (UPS) buffers the electronics power supply (1-ph. 230 V AC N/PE) and protects the open-loop and closed-loop control from temporary line faults (stored energy time c. 10 min.). The unit is integrated in the control cabinet.		●	●	●	●	●
L33	**Internal cabinet lighting and socket connector outlet 230 V, 1-phase** This is triggered using a motion sensor, including protective contact socket outlet.		●	●	●	●	●
L34	**Redundant fans** The drive converter can still be operated when a fan fails. Refer to Page 6/6 for specifications.	In conjunction with options L08 or L15 on request	●	■	■	–	–
L45	**EMERGENCY OFF/STOP pushbutton function (plant emergency off/stop)** This pushbutton is mounted in the door, contacts are wired to terminals, for the STOP function without EMERGENCY OFF identification (yellow backing plate) For use on the plant side.		●	●	●	●	●
L50	**Additional lights and switches** 5 signaling lights: Off/Ready, On, Alarm, Fault, Local, 1 Key switch Remote/Local		●	●	●	●	●
L55	**Anti-condensation heating** The rating is dependent on the cabinet size (a multiple of 90 W), externally connected to 230 V AC.		●	●	●	●	●
L70	**Analog display instruments** 3 supplementary measuring instruments in the door (96 x 96 mm) to display parameterizable signals, e.g.: • Speed • Motor voltage • Motor current		●	●	●	●	●
K75	**Auxiliary voltage other than 3-ph. 400 V AC/N** Voltage should be quoted in plain text. With K75 the auxiliary voltage is wired via the Control Terminal Strip X860 (see Page 6/10): If the auxiliary supply is 380 V to 415 V without N conductor, it is connected via the standard control terminal strip X5.		●	●	●	●	●
X99	**Other output data** If the configuration requires other electrical data for the converter's rating plate, then these data should be specified with the code X99 and in plain text.		■	■	■	■	■

● Option possible ■ On request – Not available

Order Code	Description of the option	Comment	Use with SIMOVERT MV in version				
			2.3 kV 3.3 kV 4.16 kV air-cooled	2 x 4.16 kV air-cooled	6.0 kV 6.6 kV air-cooled	2.3 kV 3.3 kV 4.16 kV water-cooled	2 x 4.16 kV water-cooled
Analog inputs and outputs							
	Standard: 2 Inputs 4 to 20 mA → 130 ms cycle time 4 Outputs 4 to 20 mA → 4 ms cycle time						
E74	**Analog ± 10 V** 2 Inputs ± 10 V; → 4 ms cycle time 4 Outputs ± 10 V; → 4 ms cycle time	**Important:** Only one option per converter can be ordered! Cable length: 200 m max	●	●	●	●	●
E84	**Analog ± 20 mA** 2 Inputs ± 20 mA; → 130 ms cycle time 4 Outputs ± 20 mA; → 4 ms cycle time		●	●	●	●	●
E85	**Analog 4 ... 20 mA** 2 Inputs 4 ... 20 mA; → 4 ms cycle time 4 Outputs 4 ... 20 mA; → 4 ms cycle time		●	●	●	●	●
Closed-loop control options (software)							
L31	**Restart-on-the-fly** The drive converter is switched to a motor which is coasting down		●	●	●	●	●
L32	**Automatic restart** The restart function automatically powers up a drive converter when power returns after it has been shut down due to power failure. Condition: Synchronizing voltage from the medium-voltage level and secure auxiliary infeed for open-loop and closed-loop control necessary	Option L31 automatically included	■	■	■	■	■
L35	**Max. output frequency > 100 Hz** Increased output frequencies of the closed-loop control to max. 200 Hz on request	Not available with options L15 and L08	●	●	–	●	●
Thermistor motor protection devices, PT100 evaluation							
L81	**Motor temperature shutdown** Thermistor motor protection evaluation device 3RN1011-1CB00 to evaluate the motor temperature for shutdown. The output contacts are connected in the internal shutdown circuit of the unit		●	●	●	●	●
L82	**Motor temperature alarm** Thermistor motor protection evaluation device 3RN1011-1CB00 to evaluate the motor temperature for alarm. The output contacts are connected in the internal alarm circuit of the unit		●	●	●	●	●
L83	**Motor temperature alarm (for explosion-proof motors)** Thermistor motor protection evaluation device 3RN1013-1BW10 with PTB approval to evaluate the motor temperature for alarm for explosion-proof motors. The output contacts are connected in the internal alarm circuit of the unit		●	●	●	●	●
L84	**Motor temperature shutdown (for explosion-proof motors)** Thermistor motor protection evaluation device 3RN1013-1BW10 with PTB approval to evaluate the motor temperature for shutdown for explosion-proof motors. The output contacts are connected in the internal shutdown circuit of the device		●	●	●	●	●
L86	**PT100 evaluation device, 6-channel** PT100 evaluation device with two groups of three measuring channels each in two-wire circuit, with automatic cable compensation when device is powered on. Each measuring channel can be parameterized individually.		●	●	●	●	●
L87	**PT100 evaluation device, 6-channel for explosion protection**		●	●	●	●	●

● Option possible ■ On request – Not available

Options

Description of the options (continued)

Order Code	Description of the option	Comment	Use with SIMOVERT MV in version				
			2.3 kV 3.3 kV 4.16 kV air-cooled	2 x 4.16 kV air-cooled	6.0 kV 6.6 kV air-cooled	2.3 kV 3.3 kV 4.16 kV water-cooled	2 x 4.16 kV water-cooled
Technology							
K23	**Technology Module PM5 with Communications Module CBP2 for PROFIBUS-DP** The Technology Module allows technological functions to be created for any application (CFC). For communication with higher-level automation via PROFIBUS-DP, the CBP2 module is necessary. (The standard package always contains one CBP2 for PROFIBUS-DP or USS)	The modules are delivered as integral parts of the open-loop and closed-loop frames (software not included)	●	●	●	●	●
Documentation							
D10	**Customer-specific circuit diagrams** Customer-specific circuit diagrams incl. options are supplied with the drives		●	●	●	●	●
D13	**Documentation on CD** CD-ROM with manuals and standard circuits as PDF files. Language: German/English		■	■	■	■	■
D76	**Documentation in English**		●	●	●	●	●
D72	**Documentation in Italian**	Circuit diagrams are in English	■	■	■	■	■
D77	**Documentation in French**		■	■	■	■	■
D78	**Documentation in Spanish**		■	■	■	■	■
	Supplementary documentation in other languages		■	■	■	■	■
Spare parts							
R01	**Spare parts package 1 (small)** Contents: – One inverter Power-Card – Electronic components of the rectifier – Power supply (IGBT gating) – Fan In addition to water cooling: – Heat exchanger plate package – Various seals – Service material for valves, filters, and seals – Ion exchanger resin – Conductivity measuring cell – Solenoid valve – SITOP power supply		●	●	●	●	●
R02	**Spare parts package 2 (medium)** Contents: – Half of an inverter phase – Electronic components of the rectifier – Power supply (IGBT control) – Various spare parts for pre-charging and crowbar thyristor – Battery, power supply, operator panel – Processor module, ITSP2-module – Actual value sensing and leakage water detection – Insulation monitoring – Components of the electronic terminal strip – Switching elements in the door – Fan In addition to water cooling: – Contents of spare parts package 1 (R01), and in addition – Pump – Conductivity transducer – Flow measurement system – Liquid level limit contactor – Leakage water monitoring – Pt100 temperature sensor – Safety valve – SIMATIC modules		●	●	●	●	●

● Option possible ■ On request – Not available

Order Code	Description of the option	Comment	Use with SIMOVERT MV in version				
			2.3 kV 3.3 kV 4.16 kV air-cooled	2 x 4.16 kV air-cooled	6.0 kV 6.6 kV air-cooled	2.3 kV 3.3 kV 4.16 kV water-cooled	2 x 4.16 kV water-cooled
Spare parts (continued)							
R03	**Spare parts package 3 (large)** Contents: – One complete inverter phase – Two complete rectifier Power-Cards – Electronic components of the rectifier – Power supply (IGBT control) – Complete spare parts package for pre-charging and crowbar thyristor – Complete spare parts package for open-loop and closed-loop control – Fan In addition to water cooling: – Contents of spare parts package 2 (R02), and in addition – Pump with motor – Thermometer – Air relief valve – Display for flow and pressure monitoring – Swing valve		●	●	●	●	●

Spare parts to be ordered separately:

If spare parts packages are not to be ordered together with a converter, but separately or following up, the spare parts package has the Order No. 6SE8000-0RR10.
When ordering, the complete Order No. of the corresponding converter should be specified in plain text, as well as the Order Codes of all options.

Example:

The Order No. for the converter is 6SE8010-1AA01, and the customer wishes to have the spare parts package 2 (R02).
Then the Order No. for the separate spare parts is: 6SE8000-0RR10-Z
Plain text: package R02 for converter No. 6SE8010-1AA01

Service modules							
S01	**OnCall Service "Around the Clock" (Module 1)** In addition to the standard support hotline during normal office hours you have access to highly competent experts from the technical industry customer service. Services: – Telephone advice – Remote support by online service "Hotline"/ TELESERVICE [1]) – Service hours 24 h on 365 days a year – Answer time guaranteed in contract [2])		■	■	■	■	■
S02	**Module 1 and "OnCall Service" (Module 2)** The service module S01 also comprises the OnCall Service. The OnCall Service offers you access to highly qualified experts for interference suppression at the customer's. Services: – Service Module 1 – Specialist on-call service personnel – Service hours 24 h on 365 days a year – Reaction time guaranteed in contract [3])		■	■	■	■	■
S03	**Module 1 + 2 with "System Support" (Module 3)** The service modules S01 and S02 also comprise the system support. A specialist services your system at regular intervals. Services: – Services Module 1 and Module 2 – Carrying out preventive measures – Troubleshooting, optimising – Advice, exchange of experiences		■	■	■	■	■

● Option possible ■ On request – Not available

Footnotes on Page 3/24.

Description of the options (continued)

Integration of drives into SIMATIC S7 with Drive ES

Scope of supply	Order No.	Supply format	Documentation
Option software Drive ES			
Drive ES Basic from V 5.1	6SW1700-0JA00-0AA0	CD-ROM	German/English
Drive ES SIMATIC	6SW1700-0JC00-0AA0	CD-ROM	German/English

Option package Drive ES SIMATIC for SIMATIC S7 (STEP 7 ≥ 5.0)

- **Communication software "PROFIBUS-DP" for**
  S7-300 with CPU 315-2DP, CPU 318-2
  S7-400 with CPU 413-2DP/CPU 414-2DP/CPU 416-2DP/CPU 417-4 and
  S7-400 with CP 443-5 (component library DRVDPS7)
  S7-300 with CP 342-5 (component library DRVDPS7C)
- **Communication software "USS-Protokoll" for**
  S7-200 with CPU 214/CPU 215/CPU 216
  (Programming tool STEP-7-Micro/Dos or STEP-7-Micro/Win required, driver program DRVUSS2)
  S7-300 with CP 340-1C
  S7-400 with CP 441 (component library DRVUSSS7)
- **Block library for PCS 7**
  Image and control blocks for
  SIMOVERT MASTERDRIVES Vector Control
  MICRO-/MIDIMASTER (in preparation)
  SIMOVERT MASTERDRIVES Motion Control (in preparation)
  SIMOVERT MV (on request)
- **STEP-7-Slave-Object manager**
  for comfortable configuration of drives and
  for acyclic PROFIBUS-DP communication with drives
- **SETUP program**
  for installation of the software in the STEP-7 environment

Footnotes for Page 3/23

1) Drive must be suitable for TELESERVICE
2) Answer times: within 3 h (faster answer times on request)
3) Reaction times: Germany within 6 h
   Europe within 10 h
   Overseas within 15 h

Answer time is the time slot between the customer calling the responsible office and the answer call from the OnCall Service for the purpose of remote support (telephone advice and/or Teleservice).

Reaction time is the time slot between the customer's request for service personnel (after telephone advice and/or Teleservice) and leaving of the latter. In general, leaving starts with the next possible flight facility (in Europe and overseas).

SIMOVERT MV
Motors

Rib-cooled H-compact high-voltage motors

Technical data

The H-compact high-voltage motors are rib-cooled squirrel-cage induction motors. They have an extremely compact type of construction. Together with SIMOVERT MV drive converters, they form a high-performance drive system in the output range from 0.55 MW to 3.6 MW (shaft heights 450 to 630). The motors are available in two different versions:

- Self-ventilated (1LA1)
- Force-ventilated (1PQ1)

They are especially suitable for applications which require

- high efficiency and/or
- high torques even at low speeds.

The essential features of the motors include:

- Enclosed design with degree of protection IP 55, optional up to IP 66
- Optimized efficiency for a high degree of cost-effectiveness
- High power density
- Compact type of construction
- Torsionally stiff, rugged cast iron enclosure and bearing endshields
- Reliable bearing design with either rolling-contact or sleeve bearings
- All of the parts have long-term corrosion protection
- MICALASTIC VPI high-voltage insulation (**V**acuum **P**ressure **I**mpregnation)
- Filters are not required between the drive converter and the motor
- Low noise
- Essentially maintenance-free

Fig. 4/1
1LA1 high-voltage motor, type of construction IM B3 (horizontal)

Fig. 4/2
1LA1 high-voltage motor, type of construction IM V1 (vertical)

Cooling principle

H-compact motors have two cooling air circuits: an enclosed inner cooling air circuit and an open outer cooling air circuit.

The air is blown through the inner cooling air circuit using a shaft-mounted fan; the heat is dissipated to the outer cooling air circuit through the motor enclosure which acts like a heat exchanger. In the outer cooling air circuit, the air is blown over the cooling ribs of the motor enclosure. This is realized using a shaft-mounted fan for self-ventilated 1LA1 motors or using a separately-driven fan, integrated in the fan shroud, for force-ventilated 1PQ1 motors.

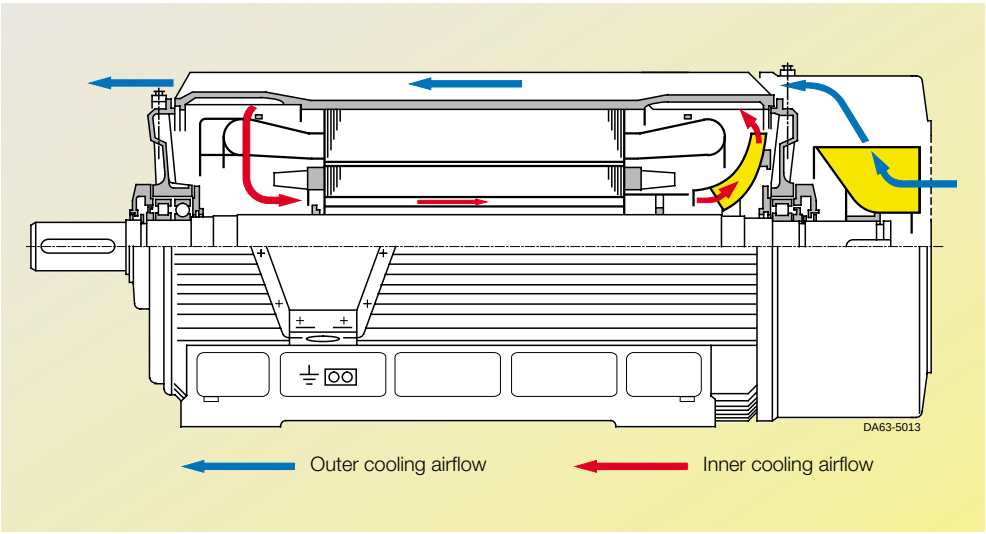


Fig. 4/3
Cooling principle of H-compact motors

Overview of the standard version and most important options

	Standard	Option	Code
Standards and regulations	IEC, VDE, DIN, ISO, EN		
Type of construction	IM B3, IM V1		
Degree of protection	IP 55[1])		**K49**
		IP 56	**K51**
		IP 64	**L93**
		IP 65	**K50**
		IP 66	**L94**
Cooling type	IC 411 (1LA1, self-ventilated)	IC 416 (1PQ1, force-ventilated separately-driven fan supply voltage: 400 V / 50 Hz or 460 V / 60 Hz tolerances: voltage ± 10 %, frequency ± 3 %)	
Bearing design	Rolling-contact bearings	Sleeve bearings with natural cooling	**K96**
		Sleeve bearings with circulating oil cooling	**K96 + L60**
Monitoring functions		6 slot resistance thermometers PT100 in the stator winding in a three- or four-wire circuit	**A54**
		6 PTC thermistors for alarm and shutdown in the stator winding	**A16**
		PT100 resistance thermometer in the bearings	
		for rolling-contact bearing motor versions	**A78**
		for sleeve-bearing motor versions	**A79**
		Measuring nipples for shock pulse measurement at the DE and NDE (for rolling-contact bearings)	**G50**
		Bently Nevada shaft vibration probe (for sleeve bearings)	**A02**
Anti-condensation heating		Supply voltages	
		110 – 120 V	**M12**
		220 – 240 V	**M13**
		400 V	**L08**
		500 V	**L09**
Terminal box arrangement	DE right, Cable entry from below	DE left, cable entry from below	**K10**
Special paint finish		Standard color RAL 7030	**K26**
		Non-standard color	**Y54**
Mounting rotary pulse encoders		HOG 16 D 1024 I with integrated shaft grounding (Hübner Berlin)	**H76**

Additional options as with fixed-speed motors or on request

Noise

The table contains the noise emission values for H-compact motors of the 1LA1 series. They apply to the following conditions:

- No-load operation with sinusoidal infeed at the quoted frequency
- Measuring methods in accordance with DIN EN 21680-1
- Tolerance +3 dB(A)
- Bearing design as listed and standard fan

Type 1LA1 Frame size	No. of poles	Measuring surface level L_a dB(A)	Measuring surface sound pressure level at 50 Hz L_{pA} dB(A)	Measuring surface sound pressure level at 60 Hz L_{pA} dB(A)	Allowance under load approx. dB(A)	dependent on rotating direction [2])
450	2	16	77	81	1	yes
	4	16	79	83	2	no
	6	16	73	77	3	no
	8	16	69	73	4	no
500	2	16	80	83	1	yes
	4	16	81	85	2	yes
	6	16	75	79	3	yes
	8	16	72	76	4	yes
560	2	17	82	85	1	yes
	4	17	83	88	2	yes
	6	17	78	82	3	yes
	8	17	74	78	4	yes
630	4	18	85	90	2	yes
	6	18	80	84	3	yes
	8	18	76	80	4	yes

1) Please specify code **K49** for easier order processing.

2) If yes, Order Code **K97** (clockwise rotating direction / **K98** (anti-clockwise rotation) obligatory

Rib-cooled H-compact high-voltage motors

Technical data

For operation with the SIMOVERT MV converter, noise will increase by c. +5 dB(A) at the quoted operating points.

Following measures can be taken to reduce noise emissions:

Noise reduction elements	Noise reduction approx. dB(A)
Air intake damper (LED)	4
Air intake damper + sound protection sheath (LED + SDM)	6
Sound-absorbing cover (SSH)	8

Self-ventilated 1LA1 motors

The technical data of the self-ventilated H-compact motors (1LA1 series) for operation with SIMOVERT MV is listed on the following pages:

- For fan and pump drives ($M \sim n^2$)
- For constant-torque drives (M = const)

Force-ventilated 1PQ1 motors

The technical data of H-compact force-ventilated motors (1PQ1 series) is available on request.

Installation altitude, cooling air temperature

Permissible output P relative to the rated output P_N as a function of the cooling air temperature and installation altitude.

Cooling air temperature	Installation altitude above sea level				
	1000 m	1500 m	2000 m	2500 m	3000 m
30 °C	100 %	100 %	100 %	98 %	95 %
35 °C	100 %	100 %	97 %	94 %	91 %
40 °C	100 %	97 %	93 %	90 %	87 %
45 °C	95 %	92 %	88 %	85 %	83 %
50 °C	90 %	87 %	84 %	81 %	
55 °C	85 %	82 %			
60 °C	80 %				

4

Explanations and secondary conditions

Insulation system	MICALASTIC VPI, temperature rise class F
Utilization	According to temperature rise class F: refer to the technical data According to temperature rise class B: the specified outputs and torques are reduced to 88 %
Output and torque	For continuous duty S1
Coolant temperature Installation altitude	40 °C 0 – 1000 m De-rating for different cooling-medium temperatures and/or installation altitudes, refer to “Installation altitude, cooling air temperature”
Voltage range	Rated (thermal) for ± 5 % voltage fluctuation For continuous operation with voltage fluctuations in the range of ± 10 %, it is necessary to de-rate the output or reduce the torque by 5 %
Overload capability	The motors can withstand 150 % rated current at rated voltage and rated frequency for 2 min.
Tolerances	According to DIN EN 60 034 Efficiency – 0.1 (1 – η) Power factor – (1 – cos φ) / 6 Slip ± 20 % Starting current + 20 % Starting torque – 15 % to + 25 % Stall torque – 10 % Moment of inertia ± 10 %
Directions of rotation, fan versions	1LA1 frame size 450: For clockwise and counter-clockwise rotation (fan operation is independent of the direction of rotation) 1LA1 frame sizes 500 to 630: Either for clockwise or counter-clockwise rotation, it is not possible to provide external fans which are independent of rotating direction. Separately-driven fans are required for motor design independent of rotating direction (1PQ1 series); Outputs and operating data on request

Comments regarding the technical data

The technical data specified in the following only refer to the main applications as fan and pump drives ($M \sim n^2$) and constant-torque drives (M = const.).

It goes without saying that other load characteristics are possible. The characteristics of the thermally permissible torque as a function of the frequency for H-compact high-voltage motors with 50 or 60 Hz rated frequency and self (1LA1) or force ventilation (1PQ1) are shown in Fig. 4/4.

Refer to Page 6/12 for additional information.

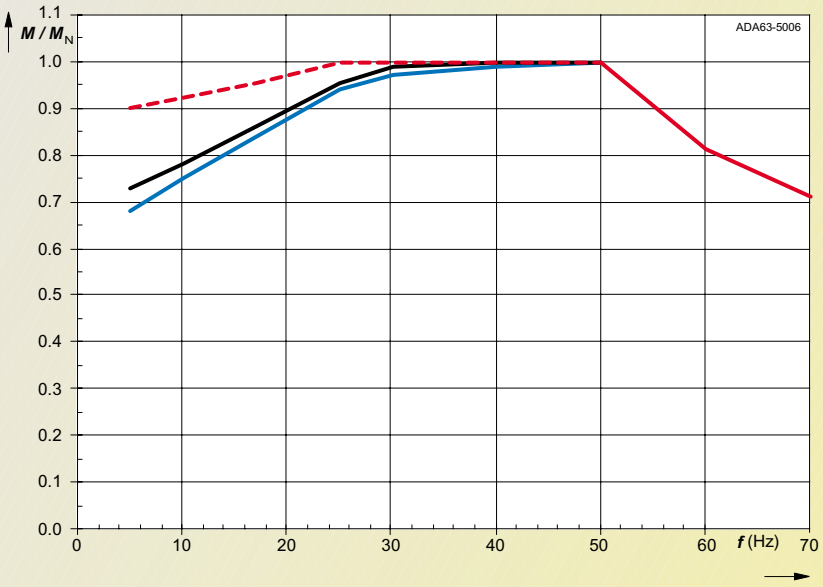
2-pole 1LA1 motors

Fast converter drives with 2-pole motors require special planning regarding their mechanical specifications (limiting speed, bearing type, rotor design, adjustment to the foundation). If speeds higher than 3,000 rpm are required (i.e. also motors with rated frequencies of 60 Hz), please always ask for the selection and ordering data.

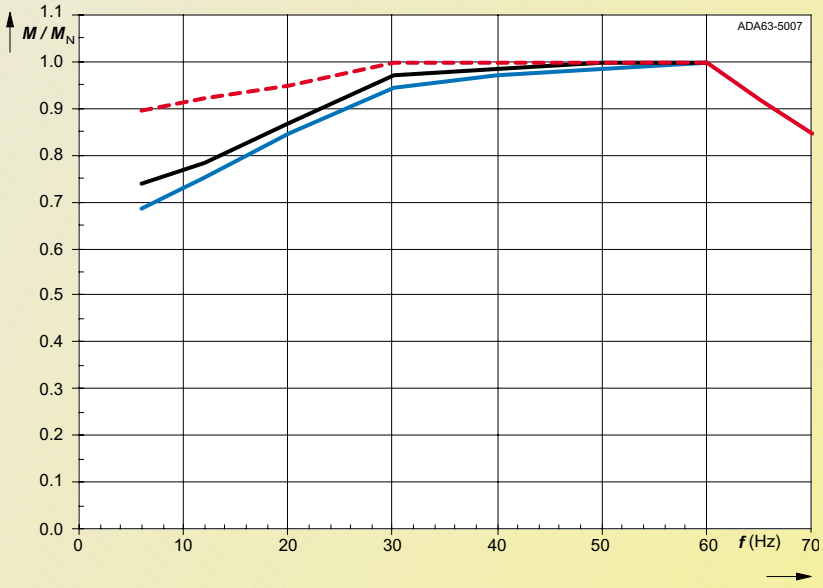
1LA1 motors for 6.0 kV and 6.6 kV

SIMOVERT MV drive converters for output voltages of 6.0 kV and 6.6 kV include an output filter. Please refer to the relating notes on Page 3/5 and 6/13 respectively.
The selection and ordering data of the motors for drive converter operation correspond to those for mains operation.
The data is available on request, or with the engineering tool PATH SIMOVERT MV.

Rated frequency: 50 Hz



Rated frequency: 60 Hz



1LA1 Size 450-560
1LA1 Size 630
1PQ1 Size 450-630
1LA1 / 1PQ1 Size 450-630 (field weakening)

Fig. 4/4
Thermally permissible torque characteristic as a function of the frequency with self-ventilated motors (1LA1) and force-ventilated motors (1PQ1)

Rib-cooled H-compact high-voltage motors

Selection and ordering data · 1LA1 motors · Pump and fan drives ($M \sim n^2$)

Rated output	Frame size	Order No.	Operating data at rated output: Rated speed	Eff-iciency	Power factor	Power loss	Rated current	Rated torque	Starting torque (Direct online starting)	Starting current (Direct online starting)	Stall torque	Moment of inertia
P_N kW			n_N rpm	η %	cos φ_1	P_V kW	I_N A	M_N Nm	M_A/M_N	I_A/I_N	M_K/M_N	J kgm^2
2.3 kV 50 Hz												
3000 rpm, 2-pole												
640	450	**1LA1450-2PV0□**	2974	96.4	0.92	23.9	182	2055	0.55	5.6	2.3	12.0
760	450	**1LA1452-2PV0□**	2977	96.7	0.92	25.9	215	2438	0.65	6.5	2.7	14.0
880	450	**1LA1454-2PV0□**	2978	96.9	0.93	28.2	245	2822	0.75	6.6	2.8	15.0
960	500	**1LA1500-2PV0□**	2980	96.8	0.93	31.7	270	3076	0.60	6.0	2.5	17.0
1100	500	**1LA1502-2PV0□**	2980	97.0	0.93	34.0	305	3525	0.60	6.0	2.5	19.0
1280	500	**1LA1504-2PV0□**	2982	97.2	0.93	36.9	355	4099	0.70	6.5	2.7	21.0
1400	560	**1LA1560-2PV0□**	2984	97.1	0.91	41.8	400	4480	0.45	5.7	2.5	28.0
1570	560	**1LA1562-2PV0□**	2985	97.3	0.92	43.6	440	5023	0.45	6.0	2.6	30.0
1700	560	**1LA1564-2PV0□**	2986	97.4	0.92	45.4	475	5437	0.50	6.5	2.8	32.0
1860	560	**1LA1566-2PV0□**	2986	97.5	0.92	47.7	520	5948	0.50	6.5	2.8	34.0
1500 rpm, 4-pole												
690	450	**1LA1450-4PV0□**	1482	96.1	0.85	28.0	210	4446	0.90	5.0	2.0	11.8
760	450	**1LA1452-4PV0□**	1483	96.3	0.85	29.2	235	4894	1.00	5.3	2.1	13.1
850	450	**1LA1454-4PV0□**	1484	96.4	0.85	31.7	260	5470	1.00	5.3	2.1	14.6
1070	500	**1LA1500-4PV0□**	1489	96.9	0.86	34.2	320	6863	0.80	5.5	2.1	30.0
1200	500	**1LA1502-4PV0□**	1489	97.1	0.86	35.8	360	7696	0.75	5.3	2.0	33.5
1330	500	**1LA1504-4PV0□**	1489	97.1	0.86	39.7	400	8530	0.80	5.5	2.0	37.0
1500	560	**1LA1560-4PV0□**	1491	97.1	0.87	44.8	445	9608	0.70	5.5	2.1	54.0
1630	560	**1LA1562-4PV0□**	1491	97.1	0.87	48.7	485	10440	0.70	5.5	2.0	59.0
1800	560	**1LA1564-4PV0□**	1491	97.2	0.87	51.9	530	11529	0.70	5.3	2.0	64.0
2000	560	**1LA1566-4PV0□**	1491	97.3	0.87	55.5	590	12810	0.70	5.5	2.0	72.0
2250	630	**1LA1630-4PV0□**	1493	97.4	0.88	60.1	660	14392	0.60	5.6	2.3	137.0
1000 rpm, 6-pole												
550	450	**1LA1450-6PV0□**	988	95.7	0.85	24.7	170	5316	0.80	5.3	2.1	20.3
620	450	**1LA1452-6PV0□**	988	95.9	0.85	26.5	190	5993	0.80	5.2	2.1	22.8
700	450	**1LA1454-6PV0□**	989	96.1	0.85	28.4	215	6759	0.80	5.4	2.1	25.6
830	500	**1LA1500-6PV0□**	990	96.3	0.86	31.9	250	8007	0.90	5.5	2.1	45.0
950	500	**1LA1502-6PV0□**	990	96.5	0.87	34.5	285	9164	0.80	5.3	2.0	50.0
1060	500	**1LA1504-6PV0□**	991	96.6	0.86	37.3	320	10215	0.90	5.6	2.2	56.0
1180	560	**1LA1560-6PV0□**	992	96.7	0.87	40.3	350	11360	0.70	5.2	2.0	89.0
1330	560	**1LA1562-6PV0□**	992	96.9	0.87	42.5	395	12804	0.75	5.4	2.0	98.0
1460	560	**1LA1564-6PV0□**	993	97.0	0.87	45.2	435	14041	0.70	5.4	2.0	108.0
1640	560	**1LA1566-6PV0□**	993	97.1	0.87	49.0	485	15772	0.75	5.4	2.0	121.0
2000	630	**1LA1630-6PV0□**	995	97.0	0.89	61.9	580	19196	0.55	5.6	2.3	234.0
2300	630	**1LA1632-6PV0□**	995	97.1	0.89	68.7	670	22075	0.60	5.8	2.4	269.0
750 rpm, 8-pole												
570	500	**1LA1500-8PV0□**	740	95.4	0.84	27.5	178	7356	0.75	5.1	2.1	44.0
640	500	**1LA1502-8PV0□**	740	95.5	0.84	30.2	200	8259	0.75	5.0	2.1	49.0
720	500	**1LA1504-8PV0□**	740	95.6	0.84	33.1	225	9292	0.75	5.2	2.1	55.0
830	560	**1LA1560-8PV0□**	742	95.9	0.84	35.5	260	10683	0.80	5.4	2.2	89.0
920	560	**1LA1562-8PV0□**	742	95.9	0.85	39.3	285	11841	0.75	5.3	2.1	98.0
1020	560	**1LA1564-8PV0□**	742	96.1	0.85	41.4	315	13128	0.75	5.2	2.1	108.0
1150	560	**1LA1566-8PV0□**	743	96.3	0.84	44.2	355	14781	0.75	5.5	2.2	121.0
1400	630	**1LA1630-8PV0□**	745	96.5	0.83	50.8	440	17946	0.55	5.7	2.4	230.0
1650	630	**1LA1632-8PV0□**	745	96.7	0.84	56.3	510	21151	0.50	5.3	2.2	265.0
1850	630	**1LA1634-8PV0□**	746	96.8	0.84	61.2	570	23683	0.55	5.8	2.4	294.0
2040	630	**1LA1636-8PV0□**	745	96.9	0.85	65.3	620	26150	0.50	5.2	2.1	320.0

Type of construction	
IM B3	**0**
IM V1 with prot. roof assembly	**4**
IM V1 without prot. roof assembly	**8**

Partial load values for pump and fan drives												Dimension drawing
P/P_N = 75%				P/P_N = 50%				P/P_N = 25%				
P kW	n rpm	η %	cos φ_1	P kW	n rpm	η %	cos φ_1	P kW	n rpm	η %	cos φ_1	page
480	2704	96.6	0.92	320	2362	96.7	0.90	160	1876	96.5	0.84	7/18 – 7/25
570	2707	96.9	0.92	380	2364	96.9	0.90	190	1877	96.7	0.83	7/18 – 7/25
660	2707	97.0	0.92	440	2365	97.0	0.90	220	1878	96.8	0.83	7/18 – 7/25
720	2709	96.9	0.92	480	2366	97.0	0.91	240	1878	96.8	0.85	7/18 – 7/21
825	2709	97.1	0.93	550	2366	97.1	0.92	275	1878	97.0	0.87	7/18 – 7/21
960	2710	97.3	0.93	640	2367	97.3	0.91	320	1878	97.1	0.86	7/18 – 7/21
1050	2712	97.1	0.91	700	2368	97.0	0.89	350	1879	96.8	0.82	7/20 – 7/21
1180	2713	97.2	0.91	785	2368	97.1	0.89	395	1879	96.9	0.82	7/20 – 7/21
1275	2714	97.3	0.91	850	2369	97.2	0.89	425	1880	96.9	0.81	7/20 – 7/21
1395	2714	97.4	0.92	930	2369	97.4	0.90	465	1880	97.1	0.82	7/20 – 7/21
520	1349	96.3	0.85	345	1179	96.3	0.83	175	937	96.1	0.73	7/18 – 7/25
570	1350	96.4	0.85	380	1180	96.4	0.82	190	937	96.2	0.73	7/18 – 7/25
640	1350	96.6	0.85	425	1180	96.6	0.82	215	937	96.4	0.72	7/18 – 7/25
805	1354	97.0	0.85	535	1182	97.0	0.82	270	939	96.7	0.73	7/18 – 7/25
900	1354	97.1	0.86	600	1182	97.1	0.83	300	939	96.9	0.74	7/18 – 7/25
1000	1354	97.1	0.85	665	1183	97.1	0.83	335	939	96.8	0.73	7/18 – 7/25
1125	1355	97.0	0.86	750	1183	97.0	0.83	375	939	96.7	0.74	7/18 – 7/25
1225	1355	97.1	0.86	815	1183	97.1	0.84	410	939	96.8	0.75	7/18 – 7/25
1350	1355	97.2	0.86	900	1183	97.2	0.84	450	939	96.9	0.76	7/18 – 7/25
1500	1356	97.3	0.86	1000	1184	97.2	0.84	500	940	96.9	0.75	7/18 – 7/25
1690	1358	97.4	0.86	1125	1185	97.2	0.82	565	940	96.7	0.71	7/18 – 7/21
415	900	96.0	0.84	275	786	96.2	0.82	140	625	95.9	0.74	7/18 – 7/25
465	900	96.1	0.84	310	786	96.3	0.82	155	625	96.1	0.74	7/18 – 7/25
525	900	96.3	0.85	350	787	96.4	0.82	175	625	96.1	0.74	7/18 – 7/25
620	901	96.3	0.86	415	787	96.6	0.83	205	625	96.3	0.74	7/18 – 7/25
715	900	96.5	0.86	475	787	96.7	0.84	240	625	96.5	0.76	7/18 – 7/25
795	901	96.7	0.86	530	787	96.8	0.83	265	625	96.5	0.74	7/18 – 7/25
885	902	96.8	0.87	590	788	96.8	0.85	295	626	96.6	0.77	7/18 – 7/25
1000	902	97.0	0.87	665	788	97.0	0.84	335	626	96.7	0.76	7/18 – 7/25
1095	903	97.1	0.86	730	788	97.1	0.84	365	626	96.8	0.75	7/18 – 7/25
1230	903	97.1	0.87	820	788	97.1	0.85	410	626	96.8	0.77	7/18 – 7/25
1500	904	97.1	0.89	1000	789	97.0	0.87	500	626	96.6	0.80	7/18 – 7/25
1725	904	97.2	0.89	1150	789	97.0	0.86	575	626	96.7	0.77	7/18 – 7/25
428	673	95.6	0.82	285	589	95.7	0.79	143	468	95.2	0.68	7/18 – 7/25
480	673	95.8	0.82	320	589	95.8	0.79	160	468	95.4	0.68	7/18 – 7/25
540	673	95.9	0.82	360	589	95.8	0.79	180	468	95.4	0.68	7/18 – 7/25
625	675	96.1	0.83	415	590	96.0	0.79	208	469	95.5	0.68	7/18 – 7/25
690	675	96.1	0.84	460	590	96.1	0.80	230	469	95.6	0.69	7/18 – 7/25
765	675	96.2	0.84	510	590	96.2	0.80	255	469	95.7	0.70	7/18 – 7/25
865	675	96.3	0.82	575	590	96.2	0.78	290	469	95.6	0.67	7/18 – 7/25
1050	678	96.5	0.81	700	592	96.3	0.76	350	470	95.5	0.64	7/18 – 7/25
1240	677	96.6	0.83	825	592	96.4	0.79	415	470	95.8	0.68	7/18 – 7/25
1390	678	96.7	0.82	925	592	96.4	0.78	465	470	95.7	0.66	7/18 – 7/25
1530	677	96.8	0.84	1020	592	96.7	0.80	510	470	96.1	0.70	7/18 – 7/25

Rib-cooled H-compact high-voltage motors

Selection and ordering data · 1LA1 motors · Pump and fan drives ($M \sim n^2$)

Rated output	Frame size	Order No.	Operating data at rated output: Rated speed	Eff-iciency	Power factor	Power loss	Rated current	Rated torque	Starting torque (Direct online starting)	Starting current (Direct online starting)	Stall torque	Moment of inertia
P_N kW			n_N rpm	η %	cos φ_1	P_V kW	I_N A	M_N Nm	M_A/M_N	I_A/I_N	M_K/M_N	J kgm^2
2.3 kV 60 Hz												
1800 rpm, 4-pole												
780	450	**1LA1450-4PV1☐**	1783	96.0	0.86	32.5	235	4179	1.00	5.2	2.1	11.8
870	450	**1LA1452-4PV1☐**	1785	96.2	0.85	34.4	265	4656	1.10	5.8	2.3	13.1
970	450	**1LA1454-4PV1☐**	1785	96.4	0.85	36.2	295	5191	1.10	5.7	2.3	14.6
1160	500	**1LA1500-4PV1☐**	1789	96.8	0.86	38.3	350	6192	0.80	5.7	2.1	30.0
1320	500	**1LA1502-4PV1☐**	1789	96.9	0.87	42.2	395	7074	0.70	5.5	2.0	33.5
1500	500	**1LA1504-4PV1☐**	1790	97.0	0.86	46.4	450	8004	0.80	5.9	2.1	37.0
1650	560	**1LA1560-4PV1☐**	1791	96.7	0.87	56.3	490	8801	0.70	5.5	2.0	54.0
1840	560	**1LA1562-4PV1☐**	1792	96.9	0.87	58.9	550	9808	0.80	6.2	2.3	59.0
2000	560	**1LA1564-4PV1☐**	1791	97.0	0.87	61.9	590	10666	0.70	5.5	2.0	64.0
2250	560	**1LA1566-4PV1☐**	1792	97.2	0.87	64.8	670	11993	0.70	5.9	2.2	72.0
1200 rpm, 6-pole												
640	450	**1LA1450-6PV1☐**	1189	95.9	0.84	27.4	200	5141	0.80	5.7	2.2	20.3
730	450	**1LA1452-6PV1☐**	1190	96.1	0.83	29.6	230	5860	0.80	5.9	2.3	22.8
800	450	**1LA1454-6PV1☐**	1189	96.1	0.85	32.5	245	6428	0.80	5.5	2.1	25.6
900	500	**1LA1500-6PV1☐**	1191	96.4	0.86	33.6	275	7219	0.80	5.6	2.1	45.0
1000	500	**1LA1502-6PV1☐**	1191	96.5	0.87	36.3	300	8022	0.80	5.8	2.2	50.0
1140	500	**1LA1504-6PV1☐**	1191	96.6	0.87	40.1	340	9143	0.80	5.8	2.1	56.0
1330	560	**1LA1560-6PV1☐**	1192	96.6	0.87	46.8	395	10658	0.70	5.3	2.0	89.0
1500	560	**1LA1562-6PV1☐**	1193	96.8	0.87	49.6	445	12011	0.70	5.7	2.1	98.0
1660	560	**1LA1564-6PV1☐**	1193	96.9	0.87	53.1	495	13289	0.70	5.6	2.1	108.0
1860	560	**1LA1566-6PV1☐**	1193	97.1	0.87	55.6	550	14887	0.70	5.9	2.2	121.0
2230	630	**1LA1630-6PV1☐**	1195	96.7	0.89	76.1	650	17825	0.50	6.1	2.4	234.0
900 rpm, 8-pole												
630	500	**1LA1500-8PV1☐**	890	95.6	0.84	29.0	196	6760	0.75	5.3	2.2	44.0
700	500	**1LA1502-8PV1☐**	890	95.9	0.84	29.9	220	7511	0.75	5.5	2.3	49.0
790	500	**1LA1504-8PV1☐**	890	95.8	0.84	34.6	245	8476	0.65	4.9	2.0	55.0
900	560	**1LA1560-8PV1☐**	892	96.0	0.84	37.5	280	9635	0.75	5.5	2.3	89.0
1000	560	**1LA1562-8PV1☐**	893	96.1	0.84	40.6	310	10694	0.75	5.8	2.3	98.0
1130	560	**1LA1564-8PV1☐**	892	96.3	0.84	43.4	350	12097	0.75	5.6	2.3	108.0
1250	560	**1LA1566-8PV1☐**	893	96.4	0.84	46.7	385	13367	0.75	5.7	2.3	121.0
1500	630	**1LA1630-8PV1☐**	895	96.4	0.85	56.0	460	16004	0.45	5.1	2.1	230.0
1800	630	**1LA1632-8PV1☐**	895	96.6	0.85	63.4	550	19205	0.45	5.0	2.1	265.0
2000	630	**1LA1634-8PV1☐**	895	96.7	0.86	68.3	600	21339	0.40	4.8	2.0	294.0
2160	630	**1LA1636-8PV1☐**	895	96.8	0.86	71.4	650	23046	0.45	5.0	2.1	320.0

Type of construction	
IM B3	**0**
IM V1 with prot. roof assembly	**4**
IM V1 without prot. roof assembly	**8**

Partial load values for pump and fan drives												Dimension drawing
P/P_N = 75%				P/P_N = 50%				P/P_N = 25%				
P kW	n rpm	η %	cos φ_1	P kW	n rpm	η %	cos φ_1	P kW	n rpm	η %	cos φ_1	page
585	1622	96.2	0.85	390	1414	96.3	0.82	195	1129	96.0	0.72	7/18 – 7/25
655	1624	96.3	0.84	435	1414	96.2	0.80	220	1130	95.7	0.70	7/18 – 7/25
730	1624	96.4	0.84	485	1414	96.3	0.81	245	1130	95.9	0.71	7/18 – 7/25
870	1627	96.8	0.85	580	1417	96.6	0.82	290	1131	96.2	0.72	7/18 – 7/25
990	1627	96.9	0.86	660	1417	96.8	0.83	330	1131	96.4	0.74	7/18 – 7/25
1125	1628	97.1	0.85	750	1417	97.0	0.82	375	1131	96.6	0.72	7/18 – 7/25
1240	1628	96.6	0.86	825	1417	96.5	0.84	415	1131	96.1	0.75	7/18 – 7/25
1380	1629	96.8	0.85	920	1418	96.5	0.81	460	1132	96.0	0.71	7/18 – 7/25
1500	1628	97.0	0.87	1000	1417	96.9	0.84	500	1131	96.5	0.76	7/18 – 7/25
1690	1629	97.1	0.86	1125	1418	96.9	0.83	565	1132	96.5	0.73	7/18 – 7/25
480	1092	96.0	0.83	320	943	96.0	0.81	160	753	95.6	0.71	7/18 – 7/25
550	1083	96.2	0.83	365	943	96.1	0.79	185	753	95.6	0.70	7/18 – 7/25
600	1082	96.3	0.85	400	942	96.3	0.83	200	753	95.9	0.74	7/18 – 7/25
675	1083	96.5	0.86	450	943	96.4	0.83	225	753	96.0	0.74	7/18 – 7/25
750	1083	96.6	0.86	500	943	96.5	0.83	250	753	96.1	0.74	7/18 – 7/25
855	1083	96.6	0.86	570	943	96.5	0.83	285	753	96.1	0.74	7/18 – 7/25
1000	1084	96.7	0.87	665	944	96.7	0.85	335	754	96.3	0.77	7/18 – 7/25
1125	1085	96.8	0.86	750	944	96.7	0.83	375	754	96.2	0.75	7/18 – 7/25
1245	1085	96.9	0.86	830	945	96.8	0.83	415	754	96.4	0.75	7/18 – 7/25
1395	1085	97.0	0.86	930	945	96.9	0.84	465	754	96.4	0.75	7/18 – 7/25
1675	1086	96.6	0.88	1115	945	96.4	0.85	560	755	95.8	0.77	7/18 – 7/25
473	810	95.6	0.82	315	706	95.5	0.79	158	564	94.9	0.68	7/18 – 7/25
525	810	95.9	0.82	350	706	95.7	0.77	175	564	95.0	0.66	7/18 – 7/25
593	810	95.9	0.83	395	706	95.8	0.81	198	564	95.4	0.71	7/18 – 7/25
675	812	95.9	0.83	450	707	95.7	0.79	225	565	95.1	0.69	7/18 – 7/25
750	812	95.9	0.82	500	707	95.6	0.77	250	565	94.9	0.65	7/18 – 7/25
848	812	96.2	0.83	565	707	96.0	0.79	283	565	95.4	0.68	7/18 – 7/25
938	812	96.3	0.82	625	707	96.0	0.78	313	565	95.3	0.67	7/18 – 7/25
1125	814	96.2	0.84	750	708	95.9	0.80	375	566	95.2	0.69	7/18 – 7/25
1350	814	96.4	0.84	900	708	96.1	0.81	450	566	95.5	0.71	7/18 – 7/25
1500	814	96.6	0.85	1000	708	96.4	0.82	500	565	95.8	0.73	7/18 – 7/25
1620	814	96.7	0.84	1080	708	96.5	0.82	540	565	95.9	0.72	7/18 – 7/25

Rib-cooled H-compact high-voltage motors

Selection and ordering data · 1LA1 motors · Constant-torque drives (*M* = const.)

Rated output	Frame size	Order No.	Operating data at rated output: Rated speed	Eff-iciency	Power factor	Power loss	Rated current	Rated torque	Starting torque (Direct online starting)	Starting current (Direct online starting)	Stall torque	Moment of inertia
P_N kW			n_N rpm	η %	cos φ_1	P_V kW	I_N A	M_N Nm	M_A/M_N	I_A/I_N	M_K/M_N	J kgm^2
2.3 kV 50 Hz												
3000 rpm, 2-pole												
640	450	**1LA1450-2PV0□**	2974	96.4	0.92	23.9	182	2055	0.55	5.6	2.3	12.0
760	450	**1LA1452-2PV0□**	2977	96.7	0.92	25.9	215	2438	0.65	6.5	2.7	14.0
880	450	**1LA1454-2PV0□**	2978	96.9	0.93	28.2	245	2822	0.75	6.6	2.8	15.0
960	500	**1LA1500-2PV0□**	2980	96.8	0.93	31.7	270	3076	0.60	6.0	2.5	17.0
1100	500	**1LA1502-2PV0□**	2980	97.0	0.93	34.0	305	3525	0.60	6.0	2.5	19.0
1280	500	**1LA1504-2PV0□**	2982	97.2	0.93	36.9	355	4099	0.70	6.5	2.7	21.0
1400	560	**1LA1560-2PV0□**	2984	97.1	0.91	41.8	400	4480	0.45	5.7	2.5	28.0
1570	560	**1LA1562-2PV0□**	2985	97.3	0.92	43.6	440	5023	0.45	6.0	2.6	30.0
1700	560	**1LA1564-2PV0□**	2986	97.4	0.92	45.4	475	5437	0.50	6.5	2.8	32.0
1860	560	**1LA1566-2PV0□**	2986	97.5	0.92	47.7	520	5948	0.50	6.5	2.8	34.0
1500 rpm, 4-pole												
690	450	**1LA1450-4PV0□**	1482	96.1	0.85	28.0	210	4446	0.90	5.0	2.0	11.8
760	450	**1LA1452-4PV0□**	1483	96.3	0.85	29.2	235	4894	1.00	5.3	2.1	13.1
850	450	**1LA1454-4PV0□**	1484	96.4	0.85	31.7	260	5470	1.00	5.3	2.1	14.6
1070	500	**1LA1500-4PV0□**	1489	96.9	0.86	34.2	320	6863	0.80	5.5	2.1	30.0
1200	500	**1LA1502-4PV0□**	1489	97.1	0.86	35.8	360	7696	0.75	5.3	2.0	33.5
1330	500	**1LA1504-4PV0□**	1489	97.1	0.86	39.7	400	8530	0.80	5.5	2.0	37.0
1500	560	**1LA1560-4PV0□**	1491	97.1	0.87	44.8	445	9608	0.70	5.5	2.1	54.0
1630	560	**1LA1562-4PV0□**	1491	97.1	0.87	48.7	485	10440	0.70	5.5	2.0	59.0
1800	560	**1LA1564-4PV0□**	1491	97.2	0.87	51.9	530	11529	0.70	5.3	2.0	64.0
2000	560	**1LA1566-4PV0□**	1491	97.3	0.87	55.5	590	12810	0.70	5.5	2.0	72.0
2250	630	**1LA1630-4PV0□**	1493	97.4	0.88	60.1	660	14392	0.60	5.6	2.3	137.0
1000 rpm, 6-pole												
550	450	**1LA1450-6PV0□**	988	95.7	0.85	24.7	170	5316	0.80	5.3	2.1	20.3
620	450	**1LA1452-6PV0□**	988	95.9	0.85	26.5	190	5993	0.80	5.2	2.1	22.8
700	450	**1LA1454-6PV0□**	989	96.1	0.85	28.4	215	6759	0.80	5.4	2.1	25.6
830	500	**1LA1500-6PV0□**	990	96.3	0.86	31.9	250	8007	0.90	5.5	2.1	45.0
950	500	**1LA1502-6PV0□**	990	96.5	0.87	34.5	285	9164	0.80	5.3	2.0	50.0
1060	500	**1LA1504-6PV0□**	991	96.6	0.86	37.3	320	10215	0.90	5.6	2.2	56.0
1180	560	**1LA1560-6PV0□**	992	96.7	0.87	40.3	350	11360	0.70	5.2	2.0	89.0
1330	560	**1LA1562-6PV0□**	992	96.9	0.87	42.5	395	12804	0.75	5.4	2.0	98.0
1460	560	**1LA1564-6PV0□**	993	97.0	0.87	45.2	435	14041	0.70	5.4	2.0	108.0
1640	560	**1LA1566-6PV0□**	993	97.1	0.87	49.0	485	15772	0.75	5.4	2.0	121.0
2000	630	**1LA1630-6PV0□**	995	97.0	0.89	61.9	580	19196	0.55	5.6	2.3	234.0
2300	630	**1LA1632-6PV0□**	995	97.1	0.89	68.7	670	22075	0.60	5.8	2.4	269.0
750 rpm, 8-pole												
570	500	**1LA1500-8PV0□**	740	95.4	0.84	27.5	178	7356	0.75	5.1	2.1	44.0
640	500	**1LA1502-8PV0□**	740	95.5	0.84	30.2	200	8259	0.75	5.0	2.1	49.0
720	500	**1LA1504-8PV0□**	740	95.6	0.84	33.1	225	9292	0.75	5.2	2.1	55.0
830	560	**1LA1560-8PV0□**	742	95.9	0.84	35.5	260	10683	0.80	5.4	2.2	89.0
920	560	**1LA1562-8PV0□**	742	95.9	0.85	39.3	285	11841	0.75	5.3	2.1	98.0
1020	560	**1LA1564-8PV0□**	742	96.1	0.85	41.4	315	13128	0.75	5.2	2.1	108.0
1150	560	**1LA1566-8PV0□**	743	96.3	0.84	44.2	355	14781	0.75	5.5	2.2	121.0
1400	630	**1LA1630-8PV0□**	745	96.5	0.83	50.8	440	17946	0.55	5.7	2.4	230.0
1650	630	**1LA1632-8PV0□**	745	96.7	0.84	56.3	510	21151	0.50	5.3	2.2	265.0
1850	630	**1LA1634-8PV0□**	746	96.8	0.84	61.2	570	23683	0.55	5.8	2.4	294.0
2040	630	**1LA1636-8PV0□**	745	96.9	0.85	65.3	620	26150	0.50	5.2	2.1	320.0

Type of construction	
IM B3	**0**
IM V1 with prot. roof assembly	**4**
IM V1 without prot. roof assembly	**8**

Constant-torque drive Speed-control range 1 : 2				1 : 5				1 : 10				Dimension drawing
P_{max} kW	M_{max} Nm	η %	cos φ_1	P_{max} kW	M_{max} Nm	η %	cos φ_1	P_{max} kW	M_{max} Nm	η %	cos φ_1	page
602	1932	96.4	0.92	480	1541	96.6	0.91	435	1397	96.6	0.91	7/18 – 7/25
714	2292	96.7	0.92	570	1829	96.9	0.91	517	1658	96.8	0.90	7/18 – 7/25
827	2653	96.9	0.92	660	2117	97.0	0.91	598	1919	97.0	0.91	7/18 – 7/25
902	2891	96.8	0.92	720	2307	96.8	0.92	653	2092	96.8	0.91	7/18 – 7/21
1034	3314	96.9	0.93	825	2644	97.0	0.93	748	2397	97.0	0.92	7/18 – 7/21
1203	3853	97.2	0.93	960	3074	97.2	0.92	870	2787	97.2	0.92	7/18 – 7/21
1316	4211	97.0	0.91	1050	3360	96.9	0.90	952	3046	96.8	0.90	7/20 – 7/21
1476	4722	97.1	0.92	1178	3767	97.1	0.91	1068	2416	97.0	0.90	7/20 – 7/21
1598	5111	97.2	0.92	1275	4078	97.1	0.91	1156	3697	97.1	0.90	7/20 – 7/21
1748	5591	97.4	0.92	1395	4461	97.3	0.91	1265	4045	97.2	0.90	7/20 – 7/21
650	4185	96.1	0.86	520	3336	96.3	0.84	470	3012	96.3	0.83	7/18 – 7/25
715	4597	96.3	0.86	570	3654	96.5	0.84	515	3299	96.4	0.83	7/18 – 7/25
800	5143	96.5	0.86	640	4102	96.6	0.84	580	3714	96.6	0.83	7/18 – 7/25
1005	6441	96.9	0.86	800	5117	97.0	0.85	730	4667	96.9	0.84	7/18 – 7/25
1130	7242	97.0	0.86	900	5757	97.1	0.85	815	5210	97.1	0.84	7/18 – 7/25
1250	8011	97.0	0.86	1000	6395	97.2	0.84	905	5784	97.1	0.84	7/18 – 7/25
1410	9026	97.0	0.87	1125	7190	96.9	0.85	1020	6516	96.8	0.84	7/18 – 7/25
1530	9788	97.0	0.87	1220	7798	97.0	0.86	1110	7091	96.9	0.85	7/18 – 7/25
1690	10818	97.1	0.87	1350	8628	97.1	0.86	1225	7825	97.1	0.85	7/18 – 7/25
1880	12030	97.2	0.87	1500	9584	97.2	0.86	1360	8686	97.2	0.85	7/18 – 7/25
2160	13797	97.4	0.87	1755	11201	97.2	0.85	1645	10497	97.1	0.84	7/18 – 7/25
515	4971	95.8	0.84	415	3993	96.2	0.84	375	3604	96.2	0.83	7/18 – 7/25
580	5598	96.0	0.84	465	4473	96.3	0.84	420	4036	96.3	0.83	7/18 – 7/25
660	6366	96.1	0.85	525	5049	96.4	0.84	475	4563	96.5	0.83	7/18 – 7/25
780	7514	96.4	0.86	625	6005	96.6	0.85	565	5425	96.6	0.84	7/18 – 7/25
895	8627	96.5	0.87	715	6872	96.8	0.86	645	6194	96.8	0.85	7/18 – 7/25
995	9579	96.6	0.86	795	7635	96.8	0.85	720	6910	96.8	0.84	7/18 – 7/25
1110	10680	96.7	0.87	885	8496	96.8	0.86	800	7675	96.8	0.85	7/18 – 7/25
1250	12021	96.9	0.87	1000	9596	97.0	0.86	905	8679	97.0	0.85	7/18 – 7/25
1370	13167	97.0	0.87	1095	10505	97.1	0.86	990	9491	97.1	0.85	7/18 – 7/25
1540	14805	97.0	0.87	1230	11801	97.2	0.87	1115	10692	97.1	0.86	7/18 – 7/25
1920	18428	97.0	0.89	1560	14970	97.0	0.89	1460	14015	96.9	0.88	7/18 – 7/25
2210	21190	97.1	0.89	1795	17720	97.0	0.88	1680	16115	97.0	0.87	7/18 – 7/25
535	6915	95.5	0.83	430	5515	95.8	0.81	388	5000	95.8	0.80	7/18 – 7/25
600	7765	95.6	0.83	480	6195	95.9	0.81	435	5615	95.9	0.80	7/18 – 7/25
675	8735	95.7	0.83	540	6970	96.0	0.81	490	6320	96.0	0.80	7/18 – 7/25
780	10040	95.9	0.84	625	8010	96.1	0.82	565	7265	96.0	0.80	7/18 – 7/25
865	11130	96.0	0.84	690	8880	96.2	0.83	625	8050	96.1	0.80	7/18 – 7/25
960	12340	96.1	0.85	765	9845	96.3	0.83	695	8925	96.2	0.82	7/18 – 7/25
1080	13895	96.2	0.83	865	11085	96.3	0.81	780	10050	96.3	0.80	7/18 – 7/25
1345	17225	96.5	0.83	1090	13995	96.3	0.80	1020	13100	96.2	0.79	7/18 – 7/25
1585	20305	96.6	0.84	1285	16495	96.5	0.82	1205	15440	96.4	0.81	7/18 – 7/25
1775	22735	96.7	0.83	1445	18470	96.6	0.81	1350	17285	96.5	0.80	7/18 – 7/25
1960	25100	96.8	0.85	1590	20395	96.8	0.83	1490	19090	96.7	0.82	7/18 – 7/25

Rib-cooled H-compact high-voltage motors

Selection and ordering data · 1LA1 motors · Constant-torque drives (*M* = const.)

Rated output	Frame size	Order No.	Operating data at rated output: Rated speed	Eff-iciency	Power factor	Power loss	Rated current	Rated torque	Starting torque	Starting current	Stall torque	Moment of inertia
									Direct online starting			
P_N kW			n_N rpm	η %	cos φ_1	P_V kW	I_N A	M_N Nm	M_A/M_N	I_A/I_N	M_K/M_N	J kgm^2
2.3 kV 60 Hz												
1800 rpm, 4-pole												
780	450	**1LA1450-4PV1☐**	1783	96.0	0.86	32.5	235	4179	1.00	5.2	2.1	11.8
870	450	**1LA1452-4PV1☐**	1785	96.2	0.85	34.4	265	4656	1.10	5.8	2.3	13.1
970	450	**1LA1454-4PV1☐**	1785	96.4	0.85	36.2	295	5191	1.10	5.7	2.3	14.6
1160	500	**1LA1500-4PV1☐**	1789	96.8	0.86	38.3	350	6192	0.80	5.7	2.1	30.0
1320	500	**1LA1502-4PV1☐**	1789	96.9	0.87	42.2	395	7074	0.70	5.5	2.0	33.5
1500	500	**1LA1504-4PV1☐**	1790	97.0	0.86	46.4	450	8004	0.80	5.9	2.1	37.0
1650	560	**1LA1560-4PV1☐**	1791	96.7	0.87	56.3	490	8801	0.70	5.5	2.0	54.0
1840	560	**1LA1562-4PV1☐**	1792	96.9	0.87	58.9	550	9808	0.80	6.2	2.3	59.0
2000	560	**1LA1564-4PV1☐**	1791	97.0	0.87	61.9	590	10666	0.70	5.5	2.0	64.0
2250	560	**1LA1566-4PV1☐**	1792	97.2	0.87	64.8	670	11993	0.70	5.9	2.2	72.0
1200 rpm, 6-pole												
640	450	**1LA1450-6PV1☐**	1189	95.9	0.84	27.4	200	5141	0.80	5.7	2.2	20.3
730	450	**1LA1452-6PV1☐**	1190	96.1	0.83	29.6	230	5860	0.80	5.9	2.3	22.8
800	450	**1LA1454-6PV1☐**	1189	96.1	0.85	32.5	245	6428	0.80	5.5	2.1	25.6
900	500	**1LA1500-6PV1☐**	1191	96.4	0.86	33.6	275	7219	0.80	5.6	2.1	45.0
1000	500	**1LA1502-6PV1☐**	1191	96.5	0.87	36.3	300	8022	0.80	5.8	2.2	50.0
1140	500	**1LA1504-6PV1☐**	1191	96.6	0.87	40.1	340	9143	0.80	5.8	2.1	56.0
1330	560	**1LA1560-6PV1☐**	1192	96.6	0.87	46.8	395	10658	0.70	5.3	2.0	89.0
1500	560	**1LA1562-6PV1☐**	1193	96.8	0.87	49.6	445	12011	0.70	5.7	2.1	98.0
1660	560	**1LA1564-6PV1☐**	1193	96.9	0.87	53.1	495	13289	0.70	5.6	2.1	108.0
1860	560	**1LA1566-6PV1☐**	1193	97.1	0.87	55.6	550	14887	0.70	5.9	2.2	121.0
2230	630	**1LA1630-6PV1☐**	1195	96.7	0.89	76.1	650	17825	0.50	6.1	2.4	234.0
900 rpm, 8-pole												
630	500	**1LA1500-8PV1☐**	890	95.6	0.84	29.0	196	6760	0.75	5.3	2.2	44.0
700	500	**1LA1502-8PV1☐**	890	95.9	0.84	29.9	220	7511	0.75	5.5	2.3	49.0
790	500	**1LA1504-8PV1☐**	890	95.8	0.84	34.6	245	8476	0.65	4.9	2.0	55.0
900	560	**1LA1560-8PV1☐**	892	96.0	0.84	37.5	280	9635	0.75	5.5	2.3	89.0
1000	560	**1LA1562-8PV1☐**	893	96.1	0.84	40.6	310	10694	0.75	5.8	2.3	98.0
1130	560	**1LA1564-8PV1☐**	892	96.3	0.84	43.4	350	12097	0.75	5.6	2.3	108.0
1250	560	**1LA1566-8PV1☐**	893	96.4	0.84	46.7	385	13367	0.75	5.7	2.3	121.0
1500	630	**1LA1630-8PV1☐**	895	96.4	0.85	56.0	460	16004	0.45	5.1	2.1	230.0
1800	630	**1LA1632-8PV1☐**	895	96.6	0.85	63.4	550	19205	0.45	5.0	2.1	265.0
2000	630	**1LA1634-8PV1☐**	895	96.7	0.86	68.3	600	21339	0.40	4.8	2.0	294.0
2160	630	**1LA1636-8PV1☐**	895	96.8	0.86	71.4	650	23046	0.45	5.0	2.1	320.0

Type of construction	
IM B3	**0**
IM V1 with prot. roof assembly	**4**
IM V1 without prot. roof assembly	**8**

Constant-torque drive Speed-control range 1 : 2				1 : 5				1 : 10				Dimension drawing
P_{max} kW	M_{max} Nm	η %	cos φ_1	P_{max} kW	M_{max} Nm	η %	cos φ_1	P_{max} kW	M_{max} Nm	η %	cos φ_1	page
740	3961	95.9	0.85	595	3176	95.9	0.84	540	2881	95.9	0.83	7/18 – 7/25
825	4410	96.2	0.85	660	3521	96.2	0.83	600	3198	96.1	0.82	7/18 – 7/25
920	4918	96.4	0.85	740	3947	96.3	0.84	670	3572	96.3	0.82	7/18 – 7/25
1100	5870	96.7	0.86	880	4687	96.6	0.84	800	4259	96.5	0.83	7/18 – 7/25
1255	6695	96.8	0.86	1000	5326	96.8	0.85	910	4844	96.7	0.84	7/18 – 7/25
1425	7597	97.0	0.86	1140	6070	97.0	0.84	1035	5508	96.9	0.83	7/18 – 7/25
1570	8369	96.6	0.87	1255	6681	96.4	0.86	1140	6066	96.2	0.85	7/18 – 7/25
1750	9322	96.8	0.86	1400	7449	96.5	0.84	1270	6755	96.4	0.83	7/18 – 7/25
1900	10125	96.9	0.87	1520	8090	96.8	0.86	1380	7342	96.7	0.85	7/18 – 7/25
2140	11399	97.1	0.87	1710	9098	96.9	0.85	1550	8271	96.8	0.84	7/18 – 7/25
610	4894	95.9	0.84	485	3882	96.0	0.83	440	3519	95.9	0.82	7/18 – 7/25
695	5574	96.1	0.83	555	4441	96.2	0.82	500	3998	96.1	0.81	7/18 – 7/25
760	6100	96.1	0.85	610	4839	96.3	0.84	550	4400	96.3	0.84	7/18 – 7/25
855	6853	96.4	0.86	685	5479	96.4	0.85	620	4956	96.4	0.84	7/18 – 7/25
950	7613	96.5	0.86	760	6078	96.6	0.85	690	5519	96.5	0.84	7/18 – 7/25
1085	8693	96.5	0.86	865	6917	96.6	0.85	785	6273	96.6	0.84	7/18 – 7/25
1265	10130	96.6	0.87	1010	8074	96.6	0.87	920	7349	96.5	0.86	7/18 – 7/25
1425	11403	96.7	0.87	1140	9108	96.7	0.86	1035	8272	96.6	0.85	7/18 – 7/25
1575	12600	96.9	0.87	1260	10065	96.8	0.86	1145	9142	96.8	0.85	7/18 – 7/25
1765	14118	97.0	0.87	1415	11302	97.0	0.86	1285	10258	96.9	0.85	7/18 – 7/25
2165	17297	96.6	0.89	1760	14048	96.4	0.88	1650	13166	96.3	0.87	7/18 – 7/25
598	6422	95.5	0.83	479	5138	95.6	0.81	435	4664	95.5	0.80	7/18 – 7/25
665	7135	95.8	0.83	532	5708	95.8	0.81	483	5183	95.7	0.80	7/18 – 7/25
750	8052	95.7	0.84	600	6442	95.9	0.83	545	5848	95.9	0.82	7/18 – 7/25
855	9153	95.9	0.84	684	7323	95.8	0.82	621	6648	95.7	0.81	7/18 – 7/25
950	10159	95.9	0.83	760	8127	95.8	0.80	690	7379	95.6	0.79	7/18 – 7/25
1074	11492	96.1	0.84	860	9194	96.1	0.82	780	8347	96.0	0.81	7/18 – 7/25
1188	12699	96.2	0.84	950	10159	96.2	0.81	863	9223	96.0	0.80	7/18 – 7/25
1455	15524	96.2	0.84	1185	12643	96.0	0.83	1110	11843	95.9	0.82	7/18 – 7/25
1746	18629	96.4	0.85	1422	15172	96.2	0.84	1332	14212	96.3	0.83	7/18 – 7/25
1940	20699	96.6	0.85	1580	16858	96.4	0.84	1480	15791	96.4	0.84	7/18 – 7/25
2095	22355	96.6	0.85	1705	18206	96.5	0.84	1598	17054	96.4	0.84	7/18 – 7/25

Rib-cooled H-compact high-voltage motors

Selection and ordering data · 1LA1 motors · Pump and fan drives ($M \sim n^2$)

Rated output	Frame size	Order No.	Operating data at rated output: Rated speed	Eff-iciency	Power factor	Power loss	Rated current	Rated torque	Starting torque (Direct online starting)	Starting current (Direct online starting)	Stall torque	Moment of inertia
P_N kW			n_N rpm	η %	cos φ_1	P_V kW	I_N A	M_N Nm	M_A/M_N	I_A/I_N	M_K/M_N	J kgm^2
3.3 kV 50 Hz												
3000 rpm, 2-pole												
920	500	**1LA1500-2PV2□**	2979	96.8	0.92	30.4	180	2949	0.55	5.8	2.4	17.0
1040	500	**1LA1502-2PV2□**	2980	97.0	0.93	32.2	200	3333	0.60	6.0	2.5	19.0
1180	500	**1LA1504-2PV2□**	2981	97.1	0.93	35.2	230	3780	0.65	6.5	2.6	21.0
1320	560	**1LA1560-2PV2□**	2985	97.0	0.91	40.8	260	4223	0.45	5.8	2.5	28.0
1460	560	**1LA1562-2PV2□**	2985	97.2	0.92	42.1	285	4671	0.45	6.0	2.5	30.0
1580	560	**1LA1564-2PV2□**	2985	97.2	0.92	45.5	310	5055	0.50	6.2	2.6	32.0
1780	560	**1LA1566-2PV2□**	2986	97.4	0.92	47.5	350	5692	0.55	6.5	2.8	34.0
1500 rpm, 4-pole												
760	450	**1LA1452-4PV2□**	1484	96.2	0.85	30.0	162	4891	1.00	5.3	2.1	13.1
850	450	**1LA1454-4PV2□**	1485	96.3	0.85	32.7	182	5466	1.10	5.5	2.3	14.6
1030	500	**1LA1500-4PV2□**	1489	96.8	0.86	34.0	215	6606	0.85	5.6	2.2	30.0
1180	500	**1LA1502-4PV2□**	1489	97.0	0.86	36.5	245	7568	0.85	5.5	2.1	33.5
1300	500	**1LA1504-4PV2□**	1490	97.1	0.86	38.8	270	8332	0.85	5.7	2.2	37.0
1460	560	**1LA1560-4PV2□**	1491	96.9	0.87	46.7	305	9351	0.70	5.4	2.0	54.0
1580	560	**1LA1562-4PV2□**	1492	97.1	0.86	47.2	330	10113	0.85	5.9	2.3	59.0
1750	560	**1LA1564-4PV2□**	1491	97.2	0.87	50.4	360	11209	0.70	5.5	2.0	64.0
1960	560	**1LA1566-4PV2□**	1491	97.3	0.87	54.4	405	12554	0.70	5.5	2.0	72.0
2150	630	**1LA1630-4PV2□**	1494	97.3	0.88	59.7	440	13743	0.55	5.5	2.3	137.0
2600	630	**1LA1632-4PV2□**	1494	97.5	0.88	66.7	530	16620	0.55	5.5	2.2	157.0
2900	630	**1LA1634-4PV2□**	1494	97.6	0.88	71.3	590	18537	0.50	5.5	2.2	171.0
3150	630	**1LA1636-4PV2□**	1494	97.7	0.88	74.2	640	20136	0.55	5.5	2.2	186.0
1000 rpm, 6-pole												
800	500	**1LA1500-6PV2□**	991	96.2	0.86	31.6	170	7709	0.90	5.7	2.2	45.0
880	500	**1LA1502-6PV2□**	991	96.4	0.86	32.9	186	8480	0.90	5.7	2.2	50.0
1000	500	**1LA1504-6PV2□**	992	96.5	0.86	36.3	210	9627	0.90	5.7	2.2	56.0
1100	560	**1LA1560-6PV2□**	993	96.6	0.87	38.7	230	10579	0.75	5.4	2.0	89.0
1240	560	**1LA1562-6PV2□**	993	96.8	0.87	41.0	260	11925	0.80	5.5	2.1	98.0
1360	560	**1LA1564-6PV2□**	993	96.9	0.87	43.5	280	13080	0.70	5.2	2.0	108.0
1520	560	**1LA1566-6PV2□**	993	97.0	0.87	47.0	315	14618	0.70	5.3	2.0	121.0
1900	630	**1LA1630-6PV2□**	995	97.0	0.89	58.8	385	18236	0.50	5.5	2.3	234.0
2220	630	**1LA1632-6PV2□**	995	97.1	0.89	66.3	450	21308	0.55	5.6	2.3	269.0
2480	630	**1LA1634-6PV2□**	995	97.2	0.89	71.4	500	23803	0.50	5.5	2.2	297.0
2700	630	**1LA1636-6PV2□**	995	97.3	0.89	74.9	550	25915	0.50	5.5	2.2	323.0
750 rpm, 8-pole												
800	560	**1LA1560-8PV2□**	741	95.8	0.85	35.1	172	10310	0.75	5.1	2.1	89.0
880	560	**1LA1562-8PV2□**	742	95.9	0.85	37.6	188	11326	0.75	5.4	2.2	98.0
990	560	**1LA1564-8PV2□**	742	96.0	0.84	41.3	215	12742	0.80	5.5	2.3	108.0
1100	560	**1LA1566-8PV2□**	742	96.2	0.84	43.5	240	14158	0.75	5.4	2.2	121.0
1330	630	**1LA1630-8PV2□**	745	96.5	0.84	48.2	285	17049	0.50	5.4	2.2	230.0
1570	630	**1LA1632-8PV2□**	745	96.6	0.84	55.3	340	20126	0.50	5.6	2.3	265.0
1780	630	**1LA1634-8PV2□**	745	96.7	0.84	60.7	385	22817	0.50	5.5	2.3	294.0
1960	630	**1LA1636-8PV2□**	745	96.8	0.85	64.8	415	25125	0.50	5.3	2.2	320.0

Type of construction	
IM B3	**0**
IM V1 with prot. roof assembly	**4**
IM V1 without prot. roof assembly	**8**

Partial load values for pump and fan drives												Dimension drawing
P/P_N = 75%				P/P_N = 50%				P/P_N = 25%				
P kW	n rpm	η %	cos φ_1	P kW	n rpm	η %	cos φ_1	P kW	n rpm	η %	cos φ_1	page
690	2709	96.8	0.92	460	2365	96.9	0.91	230	1878	96.7	0.86	7/18 – 7/21
780	2709	97.0	0.93	520	2366	97.0	0.92	260	1878	96.9	0.87	7/18 – 7/21
885	2710	97.2	0.93	590	2366	97.2	0.92	295	1878	97.1	0.87	7/18 – 7/21
990	2713	97.0	0.91	660	2368	97.0	0.89	330	1880	96.7	0.82	7/20 – 7/21
1095	2713	97.2	0.91	730	2368	97.1	0.89	365	1880	96.9	0.83	7/20 – 7/21
1185	2713	97.2	0.92	790	2368	97.2	0.90	395	1880	97.0	0.84	7/20 – 7/21
1335	2714	97.4	0.92	890	2369	97.3	0.90	445	1880	97.1	0.83	7/20 – 7/21
570	1350	96.4	0.85	380	1179	96.4	0.82	190	937	96.2	0.72	7/18 – 7/25
638	1351	96.5	0.84	425	1177	96.5	0.80	213	935	96.2	0.70	7/18 – 7/25
773	1354	96.9	0.85	515	1182	96.9	0.82	258	939	96.5	0.72	7/18 – 7/25
885	1354	97.0	0.85	590	1183	97.0	0.83	295	939	96.7	0.73	7/18 – 7/25
975	1355	97.1	0.85	650	1180	97.0	0.81	325	936	96.7	0.71	7/18 – 7/25
1095	1355	96.9	0.86	730	1183	96.9	0.83	365	939	96.5	0.74	7/18 – 7/25
1185	1356	97.0	0.85	790	1184	96.9	0.82	395	940	96.5	0.71	7/18 – 7/25
1313	1356	97.2	0.86	875	1184	97.2	0.84	438	940	96.9	0.74	7/18 – 7/25
1470	1356	97.3	0.86	980	1184	97.3	0.84	490	940	97.0	0.75	7/18 – 7/25
1613	1357	97.3	0.87	1075	1184	97.2	0.85	538	940	96.9	0.75	7/18 – 7/21
1950	1357	97.5	0.87	1300	1185	97.5	0.85	650	940	97.2	0.76	7/18 – 7/21
2175	1357	97.6	0.87	1450	1185	97.6	0.85	725	940	97.3	0.76	7/18 – 7/21
2363	1357	97.6	0.87	1575	1185	97.6	0.85	788	940	97.4	0.77	7/18 – 7/21
600	901	96.5	0.86	400	787	96.5	0.82	200	625	96.3	0.72	7/18 – 7/25
660	902	96.6	0.85	440	788	96.6	0.82	220	625	96.3	0.72	7/18 – 7/25
750	902	96.8	0.85	500	788	96.8	0.82	250	625	96.5	0.72	7/18 – 7/25
825	903	96.8	0.86	550	788	96.8	0.84	275	626	96.5	0.75	7/18 – 7/25
930	903	96.9	0.87	620	788	96.9	0.84	310	626	96.6	0.76	7/18 – 7/25
1020	903	97.1	0.87	680	788	97.1	0.84	340	626	96.8	0.76	7/18 – 7/25
1140	903	97.2	0.87	760	788	97.3	0.85	380	626	97.2	0.78	7/18 – 7/25
1425	904	97.0	0.88	950	789	96.9	0.86	475	626	96.4	0.79	7/18 – 7/25
1665	904	97.1	0.89	1110	789	97.1	0.87	555	626	96.7	0.79	7/18 – 7/25
1860	904	97.2	0.89	1240	789	97.2	0.87	620	626	96.9	0.80	7/18 – 7/25
2025	905	97.3	0.89	1350	789	97.3	0.87	675	627	96.9	0.80	7/18 – 7/25
600	674	95.9	0.84	400	590	95.9	0.80	200	468	95.5	0.70	7/18 – 7/25
660	675	96.0	0.83	440	590	96.0	0.80	220	469	95.5	0.69	7/18 – 7/25
745	675	96.1	0.83	495	590	96.0	0.79	248	469	95.4	0.68	7/18 – 7/25
825	675	96.3	0.83	550	590	96.2	0.79	275	469	95.7	0.68	7/18 – 7/25
1000	678	96.5	0.83	665	592	96.3	0.79	335	470	95.6	0.67	7/18 – 7/25
1180	678	96.6	0.82	785	592	96.5	0.78	395	470	95.9	0.66	7/18 – 7/25
1335	678	96.7	0.83	890	592	96.5	0.79	445	470	95.9	0.68	7/18 – 7/25
1470	677	96.8	0.84	980	592	96.7	0.80	490	470	96.1	0.70	7/18 – 7/25

Rib-cooled H-compact high-voltage motors

Selection and ordering data · 1LA1 motors · Constant-torque drives (*M* = const.)

Rated output	Frame size	Order No.	Operating data at rated output: Rated speed	Eff-iciency	Power factor	Power loss	Rated current	Rated torque	Starting torque (Direct online starting)	Starting current (Direct online starting)	Stall torque	Moment of inertia
P_N kW			n_N rpm	η %	cos φ_1	P_V kW	I_N A	M_N Nm	M_A/M_N	I_A/I_N	M_K/M_N	J kgm^2
3.3 kV 50 Hz												
3000 rpm, 2-pole												
920	500	**1LA1500-2PV2□**	2979	96.8	0.92	30.4	180	2949	0.55	5.8	2.4	17.0
1040	500	**1LA1502-2PV2□**	2980	97.0	0.93	32.2	200	3333	0.60	6.0	2.5	19.0
1180	500	**1LA1504-2PV2□**	2981	97.1	0.93	35.2	230	3780	0.65	6.5	2.6	21.0
1320	560	**1LA1560-2PV2□**	2985	97.0	0.91	40.8	260	4223	0.45	5.8	2.5	28.0
1460	560	**1LA1562-2PV2□**	2985	97.2	0.92	42.1	285	4671	0.45	6.0	2.5	30.0
1580	560	**1LA1564-2PV2□**	2985	97.2	0.92	45.5	310	5055	0.50	6.2	2.6	32.0
1780	560	**1LA1566-2PV2□**	2986	97.4	0.92	47.5	350	5692	0.55	6.5	2.8	34.0
1500 rpm, 4-pole												
760	450	**1LA1452-4PV2□**	1484	96.2	0.85	30.0	162	4891	1.00	5.3	2.1	13.1
850	450	**1LA1454-4PV2□**	1485	96.3	0.85	32.7	182	5466	1.10	5.5	2.3	14.6
1030	500	**1LA1500-4PV2□**	1489	96.8	0.86	34.0	215	6606	0.85	5.6	2.2	30.0
1180	500	**1LA1502-4PV2□**	1489	97.0	0.86	36.5	245	7568	0.85	5.5	2.1	33.5
1300	500	**1LA1504-4PV2□**	1490	97.1	0.86	38.8	270	8332	0.85	5.7	2.2	37.0
1460	560	**1LA1560-4PV2□**	1491	96.9	0.87	46.7	305	9351	0.70	5.4	2.0	54.0
1580	560	**1LA1562-4PV2□**	1492	97.1	0.86	47.2	330	10113	0.85	5.9	2.3	59.0
1750	560	**1LA1564-4PV2□**	1491	97.2	0.87	50.4	360	11209	0.70	5.5	2.0	64.0
1960	560	**1LA1566-4PV2□**	1491	97.3	0.87	54.4	405	12554	0.70	5.5	2.0	72.0
2150	630	**1LA1630-4PV2□**	1494	97.3	0.88	59.7	440	13743	0.55	5.5	2.3	137.0
2600	630	**1LA1632-4PV2□**	1494	97.5	0.88	66.7	530	16620	0.55	5.5	2.2	157.0
2900	630	**1LA1634-4PV2□**	1494	97.6	0.88	71.3	590	18537	0.50	5.5	2.2	171.0
3150	630	**1LA1636-4PV2□**	1494	97.7	0.88	74.2	640	20136	0.55	5.5	2.2	186.0
1000 rpm, 6-pole												
800	500	**1LA1500-6PV2□**	991	96.2	0.86	31.6	170	7709	0.90	5.7	2.2	45.0
880	500	**1LA1502-6PV2□**	991	96.4	0.86	32.9	186	8480	0.90	5.7	2.2	50.0
1000	500	**1LA1504-6PV2□**	992	96.5	0.86	36.3	210	9627	0.90	5.7	2.2	56.0
1100	560	**1LA1560-6PV2□**	993	96.6	0.87	38.7	230	10579	0.75	5.4	2.0	89.0
1240	560	**1LA1562-6PV2□**	993	96.8	0.87	41.0	260	11925	0.80	5.5	2.1	98.0
1360	560	**1LA1564-6PV2□**	993	96.9	0.87	43.5	280	13080	0.70	5.2	2.0	108.0
1520	560	**1LA1566-6PV2□**	993	97.0	0.87	47.0	315	14618	0.70	5.3	2.0	121.0
1900	630	**1LA1630-6PV2□**	995	97.0	0.89	58.8	385	18236	0.50	5.5	2.3	234.0
2220	630	**1LA1632-6PV2□**	995	97.1	0.89	66.3	450	21308	0.55	5.6	2.3	269.0
2480	630	**1LA1634-6PV2□**	995	97.2	0.89	71.4	500	23803	0.50	5.5	2.2	297.0
2700	630	**1LA1636-6PV2□**	995	97.3	0.89	74.9	550	25915	0.50	5.5	2.2	323.0
750 rpm, 8-pole												
800	560	**1LA1560-8PV2□**	741	95.8	0.85	35.1	172	10310	0.75	5.1	2.1	89.0
880	560	**1LA1562-8PV2□**	742	95.9	0.85	37.6	188	11326	0.75	5.4	2.2	98.0
990	560	**1LA1564-8PV2□**	742	96.0	0.84	41.3	215	12742	0.80	5.5	2.3	108.0
1100	560	**1LA1566-8PV2□**	742	96.2	0.84	43.5	240	14158	0.75	5.4	2.2	121.0
1330	630	**1LA1630-8PV2□**	745	96.5	0.84	48.2	285	17049	0.50	5.4	2.2	230.0
1570	630	**1LA1632-8PV2□**	745	96.6	0.84	55.3	340	20126	0.50	5.6	2.3	265.0
1780	630	**1LA1634-8PV2□**	745	96.7	0.84	60.7	385	22817	0.50	5.5	2.3	294.0
1960	630	**1LA1636-8PV2□**	745	96.8	0.85	64.8	415	25125	0.50	5.3	2.2	320.0

Type of construction	
IM B3	**0**
IM V1 with prot. roof assembly	**4**
IM V1 without prot. roof assembly	**8**

Constant-torque drive Speed-control range 1 : 2				1 : 5				1 : 10				Dimension drawing
P_{max} kW	M_{max} Nm	η %	cos φ_1	P_{max} kW	M_{max} Nm	η %	cos φ_1	P_{max} kW	M_{max} Nm	η %	cos φ_1	page
865	2772	96.7	0.93	690	2212	96.8	0.92	625	2005	96.7	0.91	7/18 – 7/21
978	3133	96.9	0.93	780	2500	96.9	0.93	707	2266	96.9	0.92	7/18 – 7/21
1109	3553	97.1	0.93	885	2835	97.1	0.93	802	2570	97.1	0.92	7/18 – 7/21
1241	3970	96.9	0.91	990	3167	96.8	0.90	898	2872	96.7	0.89	7/20 – 7/21
1372	4391	97.1	0.92	1095	3503	97.0	0.91	993	3176	96.9	0.90	7/20 – 7/21
1485	4752	97.1	0.93	1185	3791	97.1	0.92	1074	3437	97.0	0.91	7/20 – 7/21
1673	5350	97.3	0.92	1335	4269	97.2	0.91	1210	3871	97.1	0.91	7/20 – 7/21
715	4598	96.2	0.86	570	3655	96.4	0.84	515	3299	96.4	0.83	7/18 – 7/25
800	5140	96.4	0.85	640	4100	96.5	0.83	580	3720	96.5	0.82	7/18 – 7/25
965	6183	96.8	0.86	770	4924	96.9	0.84	700	4474	96.8	0.83	7/18 – 7/25
1100	7047	96.9	0.86	880	5628	97.0	0.85	800	5113	97.0	0.84	7/18 – 7/25
1220	7811	97.0	0.85	975	6233	97.1	0.84	880	5623	97.1	0.82	7/18 – 7/25
1370	8768	96.8	0.87	1095	6998	96.8	0.85	990	6325	96.7	0.84	7/18 – 7/25
1485	9500	96.9	0.86	1185	7571	96.8	0.84	1075	6864	96.8	0.85	7/18 – 7/25
1645	10527	97.1	0.87	1310	8371	97.1	0.85	1190	7600	97.0	0.85	7/18 – 7/25
1840	11775	97.2	0.87	1470	9393	97.2	0.86	1330	8494	97.2	0.85	7/18 – 7/25
2065	13190	97.2	0.88	1675	10720	97.2	0.87	1570	10030	97.1	0.86	7/18 – 7/21
2495	15950	97.4	0.88	2030	12960	97.4	0.87	1900	12130	97.4	0.87	7/18 – 7/21
2780	17790	97.5	0.88	2260	14460	97.5	0.87	2110	13530	97.4	0.87	7/18 – 7/21
3020	19330	97.6	0.88	2460	15700	97.6	0.87	2300	14700	97.5	0.87	7/18 – 7/21
750	7229	96.3	0.86	600	5771	96.6	0.84	545	5230	96.5	0.83	7/18 – 7/25
825	7939	96.5	0.86	660	6337	96.6	0.84	600	5757	96.6	0.83	7/18 – 7/25
940	9044	96.7	0.86	750	7200	96.9	0.84	680	6524	96.9	0.83	7/18 – 7/25
1035	9950	96.6	0.87	825	7916	96.8	0.85	745	7143	96.7	0.85	7/18 – 7/25
1165	11198	96.8	0.87	930	8922	96.9	0.86	845	8103	96.9	0.85	7/18 – 7/25
1280	12303	96.9	0.87	1020	9785	97.0	0.86	925	8868	97.0	0.85	7/18 – 7/25
1430	13748	96.9	0.88	1140	10937	97.1	0.87	1035	9925	97.1	0.86	7/18 – 7/25
1825	17507	96.9	0.89	1480	14225	96.8	0.88	1385	13313	96.7	0.87	7/18 – 7/25
2130	20456	97.0	0.89	1730	16620	97.0	0.88	1620	15555	97.0	0.88	7/18 – 7/25
2380	22839	97.1	0.89	1935	18545	97.2	0.89	1810	17342	97.1	0.88	7/18 – 7/25
2590	24880	97.3	0.89	2100	20215	97.3	0.89	1970	18920	97.2	0.88	7/18 – 7/25
752	9690	95.8	0.84	600	7733	96.0	0.83	545	7010	96.0	0.82	7/18 – 7/25
825	10646	95.9	0.84	660	8494	96.1	0.82	600	7700	96.0	0.81	7/18 – 7/25
930	11977	96.0	0.84	745	9556	96.1	0.82	675	8664	96.1	0.80	7/18 – 7/25
1035	13308	96.2	0.84	825	10618	96.3	0.82	750	9627	96.3	0.80	7/18 – 7/25
1275	16663	96.4	0.84	1035	13295	96.3	0.82	970	12443	96.2	0.81	7/18 – 7/25
1510	19310	96.5	0.84	1225	15697	96.4	0.82	1145	14690	96.3	0.81	7/18 – 7/25
1710	21903	96.7	0.84	1390	17796	96.6	0.82	1300	16666	96.5	0.81	7/18 – 7/25
1880	24118	96.8	0.85	1530	19596	96.7	0.83	1430	18340	96.7	0.82	7/18 – 7/25

Rib-cooled H-compact high-voltage motors

Selection and ordering data · 1LA1 motors · Pump and fan drives ($M \sim n^2$)

Rated output	Frame size	Order No.	Operating data at rated output: Rated speed	Eff-iciency	Power factor	Power loss	Rated current	Rated torque	Starting torque (Direct online starting)	Starting current (Direct online starting)	Stall torque (Direct online starting)	Moment of inertia
P_N kW			n_N rpm	η %	cos φ_1	P_V kW	I_N A	M_N Nm	M_A/M_N	I_A/I_N	M_K/M_N	J kgm^2
4.16 kV 50 Hz												
3000 rpm, 2-pole												
1040	500	**1LA1502-2PV4□**	2980	97.0	0.93	32.2	160	3333	0.60	6.0	2.5	19.0
1180	500	**1LA1504-2PV4□**	2981	97.1	0.93	35.2	182	3780	0.65	6.5	2.6	21.0
1320	560	**1LA1560-2PV4□**	2985	97.0	0.91	40.8	210	4223	0.45	5.8	2.5	28.0
1460	560	**1LA1562-2PV4□**	2985	97.2	0.92	42.1	225	4671	0.45	6.0	2.5	30.0
1580	560	**1LA1564-2PV4□**	2985	97.2	0.92	45.5	245	5055	0.50	6.2	2.6	32.0
1780	560	**1LA1566-2PV4□**	2986	97.4	0.92	47.5	275	5692	0.55	6.5	2.8	34.0
1500 rpm, 4-pole												
1030	500	**1LA1500-4PV4□**	1489	96.8	0.86	34.0	172	6606	0.85	5.6	2.2	30.0
1180	500	**1LA1502-4PV4□**	1489	97.0	0.86	36.5	196	7568	0.85	5.5	2.1	33.5
1300	500	**1LA1504-4PV4□**	1490	97.1	0.86	38.8	215	8332	0.85	5.7	2.2	37.0
1460	560	**1LA1560-4PV4□**	1491	96.9	0.87	46.7	240	9351	0.70	5.4	2.0	54.0
1580	560	**1LA1562-4PV4□**	1492	97.1	0.86	47.2	265	10113	0.85	5.9	2.3	59.0
1750	560	**1LA1564-4PV4□**	1491	97.2	0.87	50.4	285	11209	0.70	5.5	2.0	64.0
1960	560	**1LA1566-4PV4□**	1491	97.3	0.87	54.4	320	12554	0.70	5.5	2.0	72.0
2150	630	**1LA1630-4PV4□**	1494	97.3	0.88	59.7	350	13743	0.55	5.5	2.3	137.0
2600	630	**1LA1632-4PV4□**	1494	97.5	0.88	66.7	420	16620	0.55	5.5	2.2	157.0
2900	630	**1LA1634-4PV4□**	1494	97.6	0.88	71.3	470	18537	0.50	5.5	2.2	171.0
3150	630	**1LA1636-4PV4□**	1494	97.7	0.88	74.2	510	20136	0.55	5.5	2.2	186.0
1000 rpm, 6-pole												
1100	560	**1LA1560-6PV4□**	993	96.6	0.87	38.7	182	10579	0.75	5.4	2.0	89.0
1240	560	**1LA1562-6PV4□**	993	96.8	0.87	41.0	205	11925	0.80	5.5	2.1	98.0
1360	560	**1LA1564-6PV4□**	993	96.9	0.87	43.5	225	13080	0.70	5.2	2.0	108.0
1520	560	**1LA1566-6PV4□**	993	97.0	0.87	47.0	250	14618	0.70	5.3	2.0	121.0
1900	630	**1LA1630-6PV4□**	995	97.0	0.89	58.8	305	18236	0.50	5.5	2.3	234.0
2220	630	**1LA1632-6PV4□**	995	97.1	0.89	66.3	355	21308	0.55	5.6	2.3	269.0
2480	630	**1LA1634-6PV4□**	995	97.2	0.89	71.4	400	23803	0.50	5.5	2.2	297.0
2700	630	**1LA1636-6PV4□**	995	97.3	0.89	74.9	435	25915	0.50	5.5	2.2	323.0
750 rpm, 8-pole												
990	560	**1LA1564-8PV4□**	742	96.0	0.84	41.3	170	12742	0.80	5.5	2.3	108.0
1100	560	**1LA1566-8PV4□**	742	96.2	0.84	43.5	188	14158	0.75	5.4	2.2	121.0
1330	630	**1LA1630-8PV4□**	745	96.5	0.84	48.2	230	17049	0.50	5.4	2.2	230.0
1570	630	**1LA1632-8PV4□**	745	96.6	0.84	55.3	270	20126	0.50	5.6	2.3	265.0
1780	630	**1LA1634-8PV4□**	745	96.7	0.84	60.7	305	22817	0.50	5.5	2.3	294.0
1960	630	**1LA1636-8PV4□**	745	96.8	0.85	64.8	330	25125	0.50	5.3	2.2	320.0

Type of construction	
IM B3	**0**
IM V1 with prot. roof assembly	**4**
IM V1 without prot. roof assembly	**8**

Partial load values for pump and fan drives												Dimension drawing
P/P_N = 75%				P/P_N = 50%				P/P_N = 25%				
P kW	n rpm	η %	cos φ_1	P kW	n rpm	η %	cos φ_1	P kW	n rpm	η %	cos φ_1	page
780	2709	97.0	0.93	520	2366	97.0	0.92	260	1878	96.9	0.87	7/18 – 7/21
885	2710	97.2	0.93	590	2366	97.2	0.92	295	1878	97.1	0.87	7/18 – 7/21
990	2713	97.0	0.91	660	2368	97.0	0.89	330	1880	96.7	0.82	7/20 – 7/21
1095	2713	97.2	0.91	730	2368	97.1	0.89	365	1880	96.9	0.83	7/20 – 7/21
1185	2713	97.2	0.92	790	2368	97.2	0.90	395	1880	97.0	0.84	7/20 – 7/21
1335	2714	97.4	0.92	890	2369	97.3	0.90	445	1880	97.1	0.83	7/20 – 7/21
773	1354	96.9	0.85	515	1182	96.9	0.82	258	939	96.5	0.72	7/18 – 7/25
885	1354	97.0	0.85	590	1183	97.0	0.83	295	939	96.7	0.73	7/18 – 7/25
975	1355	97.1	0.85	650	1180	97.0	0.81	325	936	96.7	0.71	7/18 – 7/25
1095	1355	96.9	0.86	730	1183	96.9	0.83	365	939	96.5	0.74	7/18 – 7/25
1185	1356	97.0	0.85	790	1184	96.9	0.82	395	940	96.5	0.71	7/18 – 7/25
1313	1356	97.2	0.86	875	1184	97.2	0.84	438	940	96.9	0.74	7/18 – 7/25
1470	1356	97.3	0.86	980	1184	97.3	0.84	490	940	97.0	0.75	7/18 – 7/25
1613	1357	97.3	0.87	1075	1184	97.2	0.85	538	940	96.9	0.75	7/18 – 7/21
1950	1357	97.5	0.87	1300	1185	97.5	0.85	650	940	97.2	0.76	7/18 – 7/21
2175	1357	97.6	0.87	1450	1185	97.6	0.85	725	940	97.3	0.76	7/18 – 7/21
2363	1357	97.6	0.87	1575	1185	97.6	0.85	788	940	97.4	0.77	7/18 – 7/21
825	903	96.8	0.86	550	788	96.8	0.84	275	626	96.5	0.75	7/18 – 7/25
930	903	96.9	0.87	620	788	96.9	0.84	310	626	96.6	0.76	7/18 – 7/25
1020	903	97.1	0.87	680	788	97.1	0.84	340	626	96.8	0.76	7/18 – 7/25
1140	903	97.2	0.87	760	788	97.3	0.85	380	626	97.2	0.78	7/18 – 7/25
1425	904	97.0	0.88	950	789	96.9	0.86	475	626	96.4	0.79	7/18 – 7/25
1665	904	97.1	0.89	1110	789	97.1	0.87	555	626	96.7	0.79	7/18 – 7/25
1860	904	97.2	0.89	1240	789	97.2	0.87	620	626	96.9	0.80	7/18 – 7/25
2025	905	97.3	0.89	1350	789	97.3	0.87	675	627	96.9	0.80	7/18 – 7/25
745	675	96.1	0.83	495	590	96.0	0.79	248	469	95.4	0.68	7/18 – 7/25
825	675	96.3	0.83	550	590	96.2	0.79	275	469	95.7	0.68	7/18 – 7/25
1000	678	96.5	0.83	665	592	96.3	0.79	335	470	95.6	0.67	7/18 – 7/25
1180	678	96.6	0.82	785	592	96.5	0.78	395	470	95.9	0.66	7/18 – 7/25
1335	678	96.7	0.83	890	592	96.5	0.79	445	470	95.9	0.68	7/18 – 7/25
1470	677	96.8	0.84	980	592	96.7	0.80	490	470	96.1	0.70	7/18 – 7/25

Rib-cooled H-compact high-voltage motors

Selection and ordering data · 1LA1 motors · Pump and fan drives ($M \sim n^2$)

Rated output	Frame size	Order No.	Operating data at rated output: Rated speed	Eff-iciency	Power factor	Power loss	Rated current	Rated torque	Starting torque	Starting current	Stall torque	Moment of inertia
									Direct online starting			
P_N kW			n_N rpm	η %	cos φ_1	P_V kW	I_N A	M_N Nm	M_A/M_N	I_A/I_N	M_K/M_N	J kgm^2
4.16 kV 60 Hz												
1800 rpm, 4-pole												
1150	500	**1LA1500-4PV5☐**	1790	96.7	0.86	39.2	192	6138	0.80	5.8	2.1	30.0
1280	500	**1LA1502-4PV5☐**	1790	96.9	0.86	40.9	215	6831	0.80	5.9	2.1	33.5
1430	500	**1LA1504-4PV5☐**	1790	96.9	0.86	45.7	240	7631	0.80	5.7	2.1	37.0
1600	560	**1LA1560-4PV5☐**	1791	96.6	0.87	56.3	265	8536	0.70	5.4	2.0	54.0
1800	560	**1LA1562-4PV5☐**	1791	96.8	0.87	59.5	295	9600	0.70	5.6	2.0	59.0
1950	560	**1LA1564-4PV5☐**	1791	96.9	0.87	62.4	320	10399	0.60	5.5	2.0	64.0
2230	560	**1LA1566-4PV5☐**	1792	97.1	0.87	66.6	365	11885	0.70	6.0	2.2	72.0
2450	630	**1LA1630-4PV5☐**	1794	97.0	0.87	75.8	400	13047	0.50	5.9	2.3	137.0
2950	630	**1LA1632-4PV5☐**	1794	97.2	0.87	85.0	485	15702	0.50	6.1	2.4	157.0
3320	630	**1LA1634-4PV5☐**	1794	97.3	0.87	92.1	550	17672	0.50	5.8	2.2	171.0
3600	630	**1LA1636-4PV5☐**	1795	97.5	0.87	92.3	590	19161	0.55	6.2	2.4	186.0
1200 rpm, 6-pole												
1260	560	**1LA1560-6PV5☐**	1193	96.6	0.87	44.3	210	10093	0.70	5.4	2.0	89.0
1380	560	**1LA1562-6PV5☐**	1193	96.6	0.87	48.6	230	11055	0.70	5.3	2.0	98.0
1540	560	**1LA1564-6PV5☐**	1193	96.7	0.87	52.6	255	12328	0.70	5.7	2.1	108.0
1760	560	**1LA1566-6PV5☐**	1193	96.9	0.87	56.3	290	14089	0.70	5.7	2.1	121.0
2100	630	**1LA1630-6PV5☐**	1195	96.6	0.89	73.9	340	16793	0.50	5.7	2.3	234.0
2400	630	**1LA1632-6PV5☐**	1195	96.8	0.89	79.3	385	19183	0.50	6.0	2.4	269.0
2700	630	**1LA1634-6PV5☐**	1195	96.9	0.89	86.4	435	21587	0.50	5.6	2.2	297.0
2900	630	**1LA1636-6PV5☐**	1195	97.0	0.89	89.7	465	23181	0.50	5.7	2.2	323.0
900 rpm, 8-pole												
1120	560	**1LA1564-8PV5☐**	892	96.2	0.85	44.2	190	11990	0.75	5.7	2.3	108.0
1260	560	**1LA1566-8PV5☐**	892	96.3	0.85	48.4	215	13489	0.70	5.4	2.2	121.0
1500	630	**1LA1630-8PV5☐**	895	96.4	0.84	56.0	255	16004	0.50	5.6	2.4	230.0
1800	630	**1LA1632-8PV5☐**	895	96.6	0.85	63.4	305	19205	0.45	5.4	2.2	265.0
1960	630	**1LA1634-8PV5☐**	895	96.7	0.86	66.9	325	20912	0.40	4.9	2.0	294.0
2160	630	**1LA1636-8PV5☐**	895	96.8	0.86	71.4	360	23046	0.45	5.0	2.1	320.0

Type of construction	
IM B3	**0**
IM V1 with prot. roof assembly	**4**
IM V1 without prot. roof assembly	**8**

Partial load values for pump and fan drives												Dimension drawing
P/P_N = 75%				P/P_N = 50%				P/P_N = 25%				
P kW	n rpm	η %	cos φ_1	P kW	n rpm	η %	cos φ_1	P kW	n rpm	η %	cos φ_1	page
865	1627	96.7	0.85	575	1417	96.6	0.82	290	1131	96.2	0.72	7/18 – 7/25
960	1628	96.9	0.85	640	1417	96.7	0.82	320	1131	96.3	0.72	7/18 – 7/25
1075	1628	97.0	0.86	715	1417	97.0	0.83	360	1131	96.6	0.74	7/18 – 7/25
1200	1628	96.6	0.87	800	1417	96.5	0.84	400	1131	96.1	0.76	7/18 – 7/25
1350	1628	96.8	0.87	900	1417	96.6	0.84	450	1131	96.3	0.76	7/18 – 7/25
1465	1628	96.9	0.87	975	1417	96.9	0.84	490	1131	96.5	0.76	7/18 – 7/25
1675	1629	97.1	0.86	1115	1418	96.9	0.83	560	1132	96.5	0.73	7/18 – 7/25
1840	1630	96.9	0.86	1225	1419	96.7	0.83	615	1132	96.3	0.74	7/18 – 7/21
2215	1630	97.2	0.86	1475	1419	97.0	0.83	740	1132	96.6	0.73	7/18 – 7/21
2490	1631	97.3	0.86	1660	1419	97.2	0.83	830	1132	96.8	0.74	7/18 – 7/21
2700	1631	97.4	0.87	1800	1419	97.2	0.83	900	1132	96.8	0.74	7/18 – 7/21
945	1085	96.6	0.86	630	944	96.6	0.84	315	754	96.2	0.76	7/18 – 7/25
1035	1084	96.7	0.87	690	944	96.7	0.85	345	754	96.3	0.77	7/18 – 7/25
1155	1085	96.8	0.86	770	945	96.8	0.84	385	754	96.2	0.75	7/18 – 7/25
1320	1085	97.0	0.87	880	945	96.9	0.84	440	754	96.5	0.76	7/18 – 7/25
1575	1086	96.6	0.89	1050	945	96.4	0.87	525	754	95.9	0.79	7/18 – 7/25
1800	1086	96.7	0.88	1200	945	96.5	0.86	600	755	95.9	0.78	7/18 – 7/25
2025	1086	97.0	0.89	1350	945	96.8	0.87	675	755	96.4	0.80	7/18 – 7/25
2175	1086	97.0	0.89	1450	945	96.9	0.87	725	755	96.4	0.80	7/18 – 7/25
840	812	96.1	0.83	560	707	95.9	0.79	280	565	95.3	0.67	7/18 – 7/25
945	812	96.3	0.83	630	707	96.1	0.79	315	565	95.5	0.69	7/18 – 7/25
1125	814	96.0	0.82	750	709	95.6	0.77	375	566	94.8	0.66	7/18 – 7/25
1350	814	96.3	0.83	900	709	95.9	0.79	450	566	95.1	0.67	7/18 – 7/25
1470	814	96.5	0.84	980	708	96.3	0.82	490	566	95.8	0.72	7/18 – 7/25
1620	814	96.6	0.84	1080	708	96.4	0.81	540	566	95.8	0.72	7/18 – 7/25

Rib-cooled H-compact high-voltage motors

Selection and ordering data · 1LA1 motors · Constant-torque drives (*M* = const.)

Rated output	Frame size	Order No.	Operating data at rated output: Rated speed	Eff-iciency	Power factor	Power loss	Rated current	Rated torque	Starting torque (Direct online starting)	Starting current (Direct online starting)	Stall torque	Moment of inertia
P_N kW			n_N rpm	η %	cos φ_1	P_V kW	I_N A	M_N Nm	M_A/M_N	I_A/I_N	M_K/M_N	J kgm^2
4.16 kV 50 Hz												
3000 rpm, 2-pole												
1040	500	**1LA1502-2PV4□**	2980	97.0	0.93	32.2	160	3333	0.60	6.0	2.5	19.0
1180	500	**1LA1504-2PV4□**	2981	97.1	0.93	35.2	182	3780	0.65	6.5	2.6	21.0
1320	560	**1LA1560-2PV4□**	2985	97.0	0.91	40.8	210	4223	0.45	5.8	2.5	28.0
1460	560	**1LA1562-2PV4□**	2985	97.2	0.92	42.1	225	4671	0.45	6.0	2.5	30.0
1580	560	**1LA1564-2PV4□**	2985	97.2	0.92	45.5	245	5055	0.50	6.2	2.6	32.0
1780	560	**1LA1566-2PV4□**	2986	97.4	0.92	47.5	275	5692	0.55	6.5	2.8	34.0
1500 rpm, 4-pole												
1030	500	**1LA1500-4PV4□**	1489	96.8	0.86	34.0	172	6606	0.85	5.6	2.2	30.0
1180	500	**1LA1502-4PV4□**	1489	97.0	0.86	36.5	196	7568	0.85	5.5	2.1	33.5
1300	500	**1LA1504-4PV4□**	1490	97.1	0.86	38.8	215	8332	0.85	5.7	2.2	37.0
1460	560	**1LA1560-4PV4□**	1491	96.9	0.87	46.7	240	9351	0.70	5.4	2.0	54.0
1580	560	**1LA1562-4PV4□**	1492	97.1	0.86	47.2	265	10113	0.85	5.9	2.3	59.0
1750	560	**1LA1564-4PV4□**	1491	97.2	0.87	50.4	285	11209	0.70	5.5	2.0	64.0
1960	560	**1LA1566-4PV4□**	1491	97.3	0.87	54.4	320	12554	0.70	5.5	2.0	72.0
2150	630	**1LA1630-4PV4□**	1494	97.3	0.88	59.7	350	13743	0.55	5.5	2.3	137.0
2600	630	**1LA1632-4PV4□**	1494	97.5	0.88	66.7	420	16620	0.55	5.5	2.2	157.0
2900	630	**1LA1634-4PV4□**	1494	97.6	0.88	71.3	470	18537	0.50	5.5	2.2	171.0
3150	630	**1LA1636-4PV4□**	1494	97.7	0.88	74.2	510	20136	0.55	5.5	2.2	186.0
1000 rpm, 6-pole												
1100	560	**1LA1560-6PV4□**	993	96.6	0.87	38.7	182	10579	0.75	5.4	2.0	89.0
1240	560	**1LA1562-6PV4□**	993	96.8	0.87	41.0	205	11925	0.80	5.5	2.1	98.0
1360	560	**1LA1564-6PV4□**	993	96.9	0.87	43.5	225	13080	0.70	5.2	2.0	108.0
1520	560	**1LA1566-6PV4□**	993	97.0	0.87	47.0	250	14618	0.70	5.3	2.0	121.0
1900	630	**1LA1630-6PV4□**	995	97.0	0.89	58.8	305	18236	0.50	5.5	2.3	234.0
2220	630	**1LA1632-6PV4□**	995	97.1	0.89	66.3	355	21308	0.55	5.6	2.3	269.0
2480	630	**1LA1634-6PV4□**	995	97.2	0.89	71.4	400	23803	0.50	5.5	2.2	297.0
2700	630	**1LA1636-6PV4□**	995	97.3	0.89	74.9	435	25915	0.50	5.5	2.2	323.0
750 rpm, 8-pole												
990	560	**1LA1564-8PV4□**	742	96.0	0.84	41.3	170	12742	0.80	5.5	2.3	108.0
1100	560	**1LA1566-8PV4□**	742	96.2	0.84	43.5	188	14158	0.75	5.4	2.2	121.0
1330	630	**1LA1630-8PV4□**	745	96.5	0.84	48.2	230	17049	0.50	5.4	2.2	230.0
1570	630	**1LA1632-8PV4□**	745	96.6	0.84	55.3	270	20126	0.50	5.6	2.3	265.0
1780	630	**1LA1634-8PV4□**	745	96.7	0.84	60.7	305	22817	0.50	5.5	2.3	294.0
1960	630	**1LA1636-8PV4□**	745	96.8	0.85	64.8	330	25125	0.50	5.3	2.2	320.0

Type of construction	
IM B3	**0**
IM V1 with prot. roof assembly	**4**
IM V1 without prot. roof assembly	**8**

Constant-torque drive Speed-control range 1 : 2				1 : 5				1 : 10				Dimension drawing
P_{max} kW	M_{max} Nm	η %	cos φ_1	P_{max} kW	M_{max} Nm	η %	cos φ_1	P_{max} kW	M_{max} Nm	η %	cos φ_1	page
978	3133	96.9	0.93	780	2500	96.9	0.93	707	2266	96.9	0.92	7/18 – 7/21
1109	3553	97.1	0.93	885	2835	97.1	0.93	802	2570	97.1	0.92	7/18 – 7/21
1241	3970	96.9	0.91	990	3167	96.8	0.90	898	2872	96.7	0.89	7/20 – 7/21
1372	4391	97.1	0.92	1095	3503	97.0	0.91	993	3176	96.9	0.90	7/20 – 7/21
1485	4752	97.1	0.93	1185	3791	97.1	0.92	1074	3437	97.0	0.91	7/20 – 7/21
1673	5350	97.3	0.92	1335	4269	97.2	0.91	1210	3871	97.1	0.91	7/20 – 7/21
965	6183	96.8	0.86	770	4924	96.9	0.84	700	4474	96.8	0.83	7/18 – 7/25
1100	7047	96.9	0.86	880	5628	97.0	0.85	800	5113	97.0	0.84	7/18 – 7/25
1220	7811	97.0	0.85	975	6233	97.1	0.84	880	5623	97.1	0.82	7/18 – 7/25
1370	8768	96.8	0.87	1095	6998	96.8	0.85	990	6325	96.7	0.84	7/18 – 7/25
1485	9500	96.9	0.86	1185	7571	96.8	0.84	1075	6864	96.8	0.85	7/18 – 7/25
1645	10527	97.1	0.87	1310	8371	97.1	0.85	1190	7600	97.0	0.85	7/18 – 7/25
1840	11775	97.2	0.87	1470	9393	97.2	0.86	1330	8494	97.2	0.85	7/18 – 7/25
2065	13190	97.2	0.88	1675	10720	97.2	0.87	1570	10030	97.1	0.86	7/18 – 7/21
2495	15950	97.4	0.88	2030	12960	97.4	0.87	1900	12130	97.4	0.87	7/18 – 7/21
2780	17790	97.5	0.88	2260	14460	97.5	0.87	2110	13530	97.4	0.87	7/18 – 7/21
3020	19330	97.6	0.88	2460	15700	97.6	0.87	2300	14700	97.5	0.87	7/18 – 7/21
1035	9950	96.6	0.87	825	7916	96.8	0.85	745	7143	96.7	0.85	7/18 – 7/25
1165	11198	96.8	0.87	930	8922	96.9	0.86	845	8103	96.9	0.85	7/18 – 7/25
1280	12303	96.9	0.87	1020	9785	97.0	0.86	925	8868	97.0	0.85	7/18 – 7/25
1430	13748	96.9	0.88	1140	10937	97.1	0.87	1035	9925	97.1	0.86	7/18 – 7/25
1825	17507	96.9	0.89	1480	14225	96.8	0.88	1385	13313	96.7	0.87	7/18 – 7/25
2130	20456	97.0	0.89	1730	16620	97.0	0.88	1620	15555	97.0	0.88	7/18 – 7/25
2380	22839	97.1	0.89	1935	18545	97.2	0.89	1810	17342	97.1	0.88	7/18 – 7/25
2590	24880	97.3	0.89	2100	20215	97.3	0.89	1970	18920	97.2	0.88	7/18 – 7/25
930	11977	96.0	0.84	745	9556	96.1	0.82	675	8664	96.1	0.80	7/18 – 7/25
1035	13308	96.2	0.84	825	10618	96.3	0.82	750	9627	96.3	0.80	7/18 – 7/25
1275	16663	96.4	0.84	1035	13295	96.3	0.82	970	12443	96.2	0.81	7/18 – 7/25
1510	19310	96.5	0.84	1225	15697	96.4	0.82	1145	14690	96.3	0.81	7/18 – 7/25
1710	21903	96.7	0.84	1390	17796	96.6	0.82	1300	16666	96.5	0.81	7/18 – 7/25
1880	24118	96.8	0.85	1530	19596	96.7	0.83	1430	18340	96.7	0.82	7/18 – 7/25

Rib-cooled H-compact high-voltage motors

Selection and ordering data · 1LA1 motors · Constant-torque drives (*M* = const.)

Rated output	Frame size	Order No.	Operating data at rated output: Rated speed	Eff-iciency	Power factor	Power loss	Rated current	Rated torque	Starting torque	Starting current	Stall torque	Moment of inertia
									Direct online starting			
P_N kW			n_N rpm	η %	cos φ_1	P_V kW	I_N A	M_N Nm	M_A/M_N	I_A/I_N	M_K/M_N	J kgm^2
4.16 kV 60 Hz												
1800 rpm, 4-pole												
1150	500	**1LA1500-4PV5□**	1790	96.7	0.86	39.2	192	6138	0.80	5.8	2.1	30.0
1280	500	**1LA1502-4PV5□**	1790	96.9	0.86	40.9	215	6831	0.80	5.9	2.1	33.5
1430	500	**1LA1504-4PV5□**	1790	96.9	0.86	45.7	240	7631	0.80	5.7	2.1	37.0
1600	560	**1LA1560-4PV5□**	1791	96.6	0.87	56.3	265	8536	0.70	5.4	2.0	54.0
1800	560	**1LA1562-4PV5□**	1791	96.8	0.87	59.5	295	9600	0.70	5.6	2.0	59.0
1950	560	**1LA1564-4PV5□**	1791	96.9	0.87	62.4	320	10399	0.60	5.5	2.0	64.0
2230	560	**1LA1566-4PV5□**	1792	97.1	0.87	66.6	365	11885	0.70	6.0	2.2	72.0
2450	630	**1LA1630-4PV5□**	1794	97.0	0.87	75.8	400	13047	0.50	5.9	2.3	137.0
2950	630	**1LA1632-4PV5□**	1794	97.2	0.87	85.0	485	15702	0.50	6.1	2.4	157.0
3320	630	**1LA1634-4PV5□**	1794	97.3	0.87	92.1	550	17672	0.50	5.8	2.2	171.0
3600	630	**1LA1636-4PV5□**	1795	97.5	0.87	92.3	590	19161	0.55	6.2	2.4	186.0
1200 rpm, 6-pole												
1260	560	**1LA1560-6PV5□**	1193	96.6	0.87	44.3	210	10093	0.70	5.4	2.0	89.0
1380	560	**1LA1562-6PV5□**	1193	96.6	0.87	48.6	230	11055	0.70	5.3	2.0	98.0
1540	560	**1LA1564-6PV5□**	1193	96.7	0.87	52.6	255	12328	0.70	5.7	2.1	108.0
1760	560	**1LA1566-6PV5□**	1193	96.9	0.87	56.3	290	14089	0.70	5.7	2.1	121.0
2100	630	**1LA1630-6PV5□**	1195	96.6	0.89	73.9	340	16793	0.50	5.7	2.3	234.0
2400	630	**1LA1632-6PV5□**	1195	96.8	0.89	79.3	385	19183	0.50	6.0	2.4	269.0
2700	630	**1LA1634-6PV5□**	1195	96.9	0.89	86.4	435	21587	0.50	5.6	2.2	297.0
2900	630	**1LA1636-6PV5□**	1195	97.0	0.89	89.7	465	23181	0.50	5.7	2.2	323.0
900 rpm, 8-pole												
1120	560	**1LA1564-8PV5□**	892	96.2	0.85	44.2	190	11990	0.75	5.7	2.3	108.0
1260	560	**1LA1566-8PV5□**	892	96.3	0.85	48.4	215	13489	0.70	5.4	2.2	121.0
1500	630	**1LA1630-8PV5□**	895	96.4	0.84	56.0	255	16004	0.50	5.6	2.4	230.0
1800	630	**1LA1632-8PV5□**	895	96.6	0.85	63.4	305	19205	0.45	5.4	2.2	265.0
1960	630	**1LA1634-8PV5□**	895	96.7	0.86	66.9	325	20912	0.40	4.9	2.0	294.0
2160	630	**1LA1636-8PV5□**	895	96.8	0.86	71.4	360	23046	0.45	5.0	2.1	320.0

Type of construction	
IM B3	**0**
IM V1 with prot. roof assembly	**4**
IM V1 without prot. roof assembly	**8**

Constant-torque drive Speed-control range 1 : 2				1 : 5				1 : 10				Dimension drawing
P_{max} kW	M_{max} Nm	η %	cos φ_1	P_{max} kW	M_{max} Nm	η %	cos φ_1	P_{max} kW	M_{max} Nm	η %	cos φ_1	page
1090	5813	96.7	0.86	875	4659	96.6	0.84	795	4232	96.5	0.83	7/18 – 7/25
1215	6478	96.8	0.86	975	5191	96.8	0.84	885	4710	96.7	0.83	7/18 – 7/25
1360	7251	96.9	0.86	1085	5776	96.9	0.85	985	5242	96.9	0.84	7/18 – 7/25
1520	8103	96.5	0.87	1215	6468	96.3	0.86	1105	5880	96.2	0.85	7/18 – 7/25
1710	9114	96.7	0.87	1370	7293	96.6	0.86	1240	6598	96.4	0.85	7/18 – 7/25
1850	9862	96.9	0.87	1480	7877	96.7	0.86	1345	7156	96.6	0.85	7/18 – 7/25
2120	11291	97.1	0.87	1695	9018	96.9	0.85	1540	8190	96.8	0.84	7/18 – 7/25
2375	12642	96.9	0.87	1935	10291	96.7	0.86	1815	9651	96.6	0.85	7/18 – 7/21
2860	15219	97.2	0.87	2330	12389	97.0	0.86	2185	11616	96.9	0.85	7/18 – 7/21
3220	17135	97.3	0.87	2625	13957	97.1	0.86	2455	13052	97.1	0.85	7/18 – 7/21
3490	18567	97.4	0.87	2845	15125	97.2	0.86	2665	14166	97.2	0.85	7/18 – 7/21
1195	9561	96.6	0.87	960	7670	96.5	0.86	870	6948	96.4	0.85	7/18 – 7/25
1310	10487	96.6	0.87	1050	8391	96.6	0.87	950	7588	96.5	0.86	7/18 – 7/25
1465	11719	96.7	0.87	1170	9346	96.7	0.86	1060	8463	96.6	0.85	7/18 – 7/25
1670	13358	96.9	0.87	1340	10695	96.9	0.86	1215	9700	96.8	0.85	7/18 – 7/25
2035	16265	96.5	0.89	1660	13252	96.4	0.89	1555	12411	96.3	0.88	7/18 – 7/25
2330	18613	96.7	0.89	1895	15124	96.5	0.88	1775	14163	96.4	0.88	7/18 – 7/25
2620	20937	96.9	0.89	2135	17042	96.8	0.89	2000	15960	96.7	0.88	7/18 – 7/25
2815	22489	97.0	0.89	2290	18276	96.9	0.89	2145	17115	96.8	0.88	7/18 – 7/25
1064	11390	96.0	0.84	851	9112	96.0	0.82	773	8273	95.9	0.80	7/18 – 7/25
1197	12815	96.2	0.84	958	10252	96.2	0.82	869	9307	96.1	0.81	7/18 – 7/25
1455	15524	96.0	0.83	1185	12643	95.8	0.81	1110	11843	95.6	0.80	7/18 – 7/25
1746	18629	96.3	0.84	1422	15172	96.1	0.82	1332	14212	95.9	0.81	7/18 – 7/25
1901	20285	96.5	0.85	1548	16520	96.4	0.84	1450	15475	96.3	0.83	7/18 – 7/25
2095	22355	96.6	0.85	1706	18206	96.5	0.84	1598	17054	96.4	0.83	7/18 – 7/25

H-compact PLUS and H-modul 3 modular high-voltage motors

Technical data

The H-compact PLUS and H-modul 3 high-voltage motor series are compact squirrel-cage induction motors with modular cooling. Together with SIMOVERT MV drive converters, they form a high-performance drive system.

The two motor series differ in shaft heights:

H-compact PLUS
Shaft heights 450, 500, 560 mm
Output range 0.7 MW to 4.3 MW

H-modul 3
Shaft height 630 mm
Output range 2.6 MW to 7.0 MW.

The motors are available in the following cooling versions:

- Open-circuit ventilation (1RA4)
- Air-to-water cooling (1RN4) with shaft-mounted fan, optionally with separately-driven fan
- Air-to-air cooling (1RQ4)

Fig. 4/5
H-compact PLUS high-voltage motor (1RQ4 series)

The motors have the following features:

- Enclosed design, degree of protection IP 55 (1RN4, 1RQ4) or IP 23 (1RA4)
- Modular cooling
- Excellent operating data, especially when it comes to efficiency and power factor
- High power density
- Compact type of construction
- Torsionally stiff rugged enclosure and bearing endshields
- Reliable bearing design with either rolling-contact or sleeve bearings
- All parts have long-term corrosion protection
- MICALASTIC VPI high-voltage insulation (**V**acuum **P**ressure **I**mpregnation)
- A filter is not required between the drive converter and motor
- Low noise
- Essentially maintenance-free

Fig. 4/6
H-modul 3 high-voltage motor (1RQ4 series)

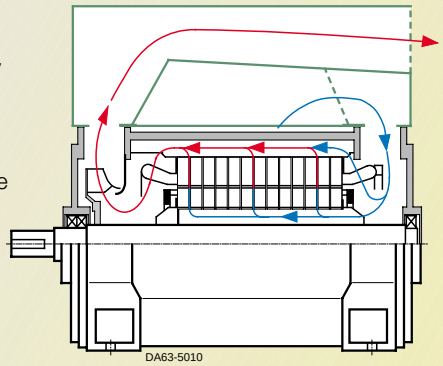
Technical data (continued)

Cooling principle

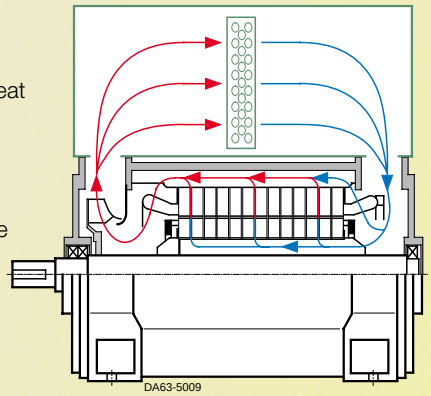
For the 1RA4 open-circuit ventilated version, the cooling air is drawn in from the ambient air, blown through the inside of the motor and discharged through the air guide assembly (refer to Fig. 4/7a).

The air-to-water heat exchanger (Fig. 4/7b) and the air-to-air cooler (Fig. 4/7c) versions have an enclosed inner cooling air circuit. The air in this circuit is blown through the motor using an internal fan (shaft-mounted or separately-driven fan for 1RN4, shaft-mounted fan for 1RQ4). The motor heat losses are dissipated through the inner cooling circuit to the cooling water or cooling air circuit. For the 1RQ4, a shaft-mounted fan on the non-drive end blows the air in the outer cooling air circuit through the cooler.

1RA4 series open-circuit ventilation



1RN4 series with air-to-water heat exchanger



1RQ4 series with air-to-air heat exchanger

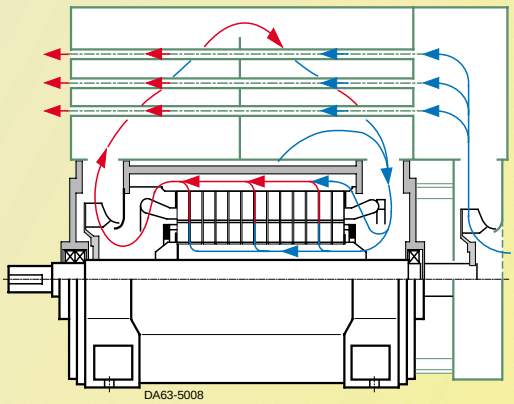


Fig. 4/7
Cooling principle of the H-compact PLUS motors

Overview of the standard version and the most important options

	Standard	Option	Code
Standards and regulations	IEC, VDE, DIN, ISO, EN		
Type of construction	IM B3, IM V1		
Degree of protection	IP 55 (1RN4, 1RQ4) IP 23 (1RA4)	IP 56 (1RN4, 1RQ4)	**K51**
Cooling type	IC 81W (1RN4, air-to-water heat exchanger, shaft-mounted fan for inner cooling air circuit) IC 611 (1RQ4, air-to-air heat exchanger) IC 01 (1RA4, open-circuit ventilation)	IC 86W (1RN4, air-to-water heat exchanger, separately-driven fan for the inner cooling air circuit)	
Bearings	Rolling-contact bearings	Sleeve bearings with natural cooling Sleeve bearings with circulating oil cooling	**K96** **K96+L60**
Monitoring functions	6 PT100 slot resistance thermometers in the stator winding in a three or four-wire circuit	6 PTC thermistors for alarm and shutdown in the stator winding (only H-compact PLUS)	**A16**
		PT100 resistance thermometers in the bearings rolling-contact bearings sleeve bearings	 **A40** **A41**
	Measuring nipples for shock pulse measurement on the DE and NDE (for rolling-contact bearings)	Bently Nevada shaft vibration probes (for sleeve bearings)	**A02**
Anti-condensation heating	220 – 240 V supply voltage	Supply voltage: 110 – 120 V 400 V 500 V	 **M12** **L08** **L09**
Terminal box arrangement	NDE, right, cable entry from below	NDE, left, cable entry from below	**K10**
Special paint finish		RAL 7030 color Non-standard color	**K26** **Y54**
Mounting rotary pulse encoders		HOG 16 D 1024 I with integrated shaft grounding (Hübner Berlin)	**H76**

Additional options as with fixed-speed motors or on request

Pump and fan drives

The technical data of the H-compact PLUS high-voltage motors (1RA4, 1RN4 and 1RQ4) and H-modul 3 for operation with SIMOVERT MV for pump and fan drives ($M \sim n^2$) is listed on the following pages.

Constant-torque drives

Technical data for the following motors for constant-torque drives (M = const)

- 1RA4 or
- 1RN4 with shaft- or separately-driven fan for the inner cooling circuit

is available on request.

Noise

Noise data in converter operation is available on request.

Technical data (continued)

Installation altitude, cooling-medium temperature

Permissible output P relative to the rated output P_N as a function of the cooling air temperature and installation altitude.

1RA4/1RN4 motors

Cooling-medium temperature		Installation altitude above sea level						
Water	Air	1000 m	1500 m	2000 m	2500 m	3000 m	3500 m	4000 m
15 °C	30 °C	100 %	100 %	100 %	98 %	95 %	91 %	87 %
20 °C	35 °C	100 %	100 %	97 %	94 %	90 %	86 %	82 %
25 °C	40 °C	100 %	96 %	93 %	89 %	85 %	81 %	76 %
30 °C	45 °C	96 %	92 %	88 %	84 %	80 %	75 %	
35 °C	50 °C	91 %	87 %	83 %	79 %	74 %		
40 °C	55 °C	86 %	82 %	77 %				
45 °C	60 °C	81 %	76 %					

1RQ4 motors

Cooling-medium temperature	Installation altitude above sea level						
Air	1000 m	1500 m	2000 m	2500 m	3000 m	3500 m	4000 m
30 °C	100 %	100 %	100 %	98 %	94 %	90 %	85 %
35 °C	100 %	100 %	97 %	93 %	88 %	84 %	78 %
40 °C	100 %	96 %	92 %	87 %	82 %	77 %	71 %
45 °C	95 %	91 %	86 %	81 %	76 %	70 %	
50 °C	90 %	85 %	80 %	74 %			
55 °C	84 %	78 %	73 %				
60 °C	77 %	71 %					

4

Explanations and secondary conditions

Insulation system	MICALASTIC® VPI, temperature rise class F
Utilization	According to temperature rise class F: refer to the technical data According to temperature rise class B: the specified outputs and torques are reduced to 88 %
Output and torque	For continuous duty S1
Coolant temperature Installation altitude	40 °C 0 – 1000 m De-rating for different cooling-medium temperatures and/or installation altitudes, refer to table “Installation altitude, cooling-medium temperature” see tables above
Voltage range	Rated (thermal) for ± 5 % voltage fluctuations For continuous operation in the range of ± 10 % voltage fluctuations, it is necessary to derate the output or reduce the torque by 5 %
Overload capability	The motors can withstand 150 % rated current at rated voltage and rated frequency for 2 min.
Tolerances	According to DIN EN 60 034 Efficiency – 0.1 (1 – η) Power factor – (1 – cos φ) / 6 Slip ± 20 % Starting current + 20 % Starting torque – 15 % to + 25 % Stall torque – 10 % Moment of inertia ± 10 %
Directions of rotation, fan versions	Either for clockwise or counter-clockwise direction of rotation. It is not possible to provide a fan which is independent of the direction of rotation Separately-driven fan is available on request

Comments regarding the technical data

The technical data specified in the following only refers to the main applications as fan and pump drives ($M \sim n^2$).

Naturally, other load characteristics are possible. The characteristics of the thermally permissible torque as a function of the frequency for H-compact PLUS and H-modul 3 high-voltage motors with 50 or 60 Hz rated frequency are shown in Fig. 4/8.

For further information refer to Page 6/12.

H-compact PLUS and H-modul 3 motors for 6.0 kV and 6.6 kV

SIMOVERT MV drive converters for output voltages of 6.0 kV and 6.6 kV include an output filter. Please refer to the related notes on Page 3/5 and 6/13 respectively.

The selection and ordering data of the motors for drive converter operation correspond to those for direct-online operation. The data is available on request, or with the engineering tool PATH SIMOVERT MV.

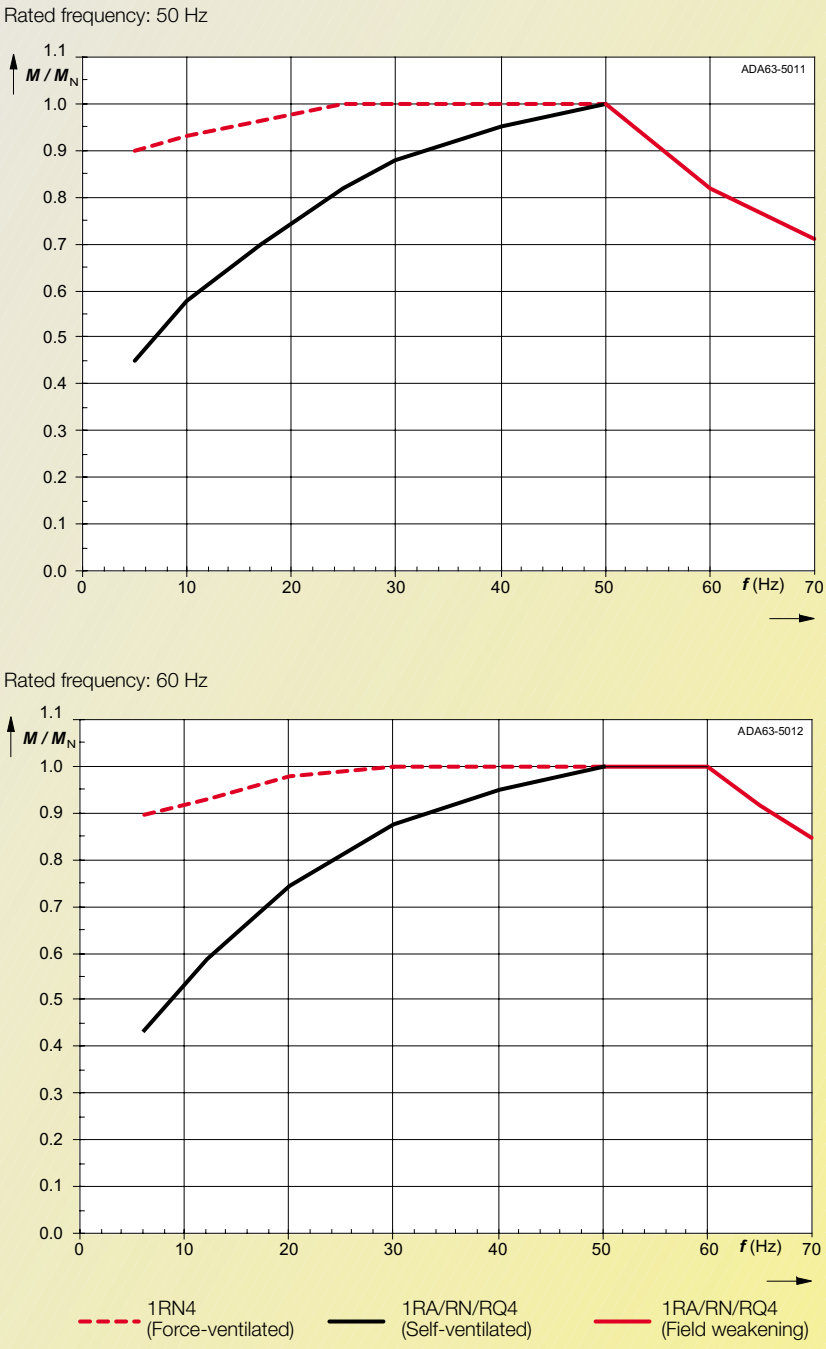


Fig. 4/8
Characteristics of the thermally permissible torque as a function of the frequency for H-compact PLUS and H-modul 3 high-voltage motors

Selection and ordering data · 1RA4 open-circuit ventilated motors, 1RN4 air-to-water cooled motors · Pump and fan drives ($M \sim n^2$)

Rated output	Frame size	Order No.	Operating data at rated output: Rated speed	Eff-iciency	Power factor	Power loss	Rated current	Rated torque	Starting torque (Direct online starting)	Starting current (Direct online starting)	Stall torque	Moment of inertia
P_N kW			n_N rpm	η %	cos φ_1	P_V kW	I_N A	M_N Nm	M_A/M_N	I_A/I_N	M_K/M_N	J kgm^2
2.3 kV 50 Hz												
1500 rpm, 4-pole												
1520	450	**1R□4450-4HV0□**	1480	96.2	0.89	60.0	445	9807	0.65	4.8	2.0	21
1700	450	**1R□4452-4HV0□**	1482	96.3	0.89	65.3	500	10954	0.70	5.1	2.0	23
1920	450	**1R□4454-4HV0□**	1482	96.4	0.89	71.7	560	12372	0.60	4.8	1.9	26
2180	450	**1R□4456-4HV0□**	1483	96.6	0.89	76.7	640	14037	0.65	5.1	2.0	29
1000 rpm, 6-pole												
1100	450	**1R□4450-6HV0□**	985	95.3	0.85	54.2	340	10664	0.75	4.6	1.9	29
1240	450	**1R□4452-6HV0□**	986	95.6	0.85	57.1	385	12009	0.75	4.7	1.9	33
1440	450	**1R□4454-6HV0□**	985	95.6	0.87	66.3	435	13960	0.75	4.6	1.8	36
1700	450	**1R□4456-6HV0□**	986	95.9	0.87	72.7	510	16464	0.75	4.8	1.9	41
1960	500	**1R□4500-6HV0□**	988	95.9	0.86	83.8	600	18944	0.75	4.9	1.9	57
2200	500	**1R□4502-6HV0□**	988	96.1	0.87	89.3	660	21264	0.75	4.8	1.9	65
750 rpm, 8-pole												
860	450	**1R□4450-8HV0□**	740	94.9	0.84	46.2	270	11098	0.85	5.0	2.0	37
960	450	**1R□4452-8HV0□**	740	95.3	0.84	47.3	300	12388	0.85	5.0	2.0	41
1080	450	**1R□4454-8HV0□**	741	95.4	0.83	52.1	340	13918	0.80	5.1	2.0	46
1220	450	**1R□4456-8HV0□**	741	95.5	0.83	57.5	385	15722	0.80	5.1	2.0	52
1440	500	**1R□4500-8HV0□**	741	95.6	0.83	66.3	455	18557	0.75	4.8	1.9	70
1600	500	**1R□4502-8HV0□**	742	95.8	0.83	70.1	510	20591	0.80	4.9	1.9	80
1780	500	**1R□4504-8HV0□**	742	96.0	0.84	74.2	550	22908	0.80	4.9	1.9	88
1960	500	**1R□4506-8HV0□**	742	96.0	0.84	81.7	610	25225	0.80	4.9	1.9	99
2.3 kV 60 Hz												
1800 rpm, 4-pole												
1740	450	**1R□4450-4HV1□**	1781	96.5	0.89	63.1	510	9329	0.65	5.1	2.0	21
1940	450	**1R□4452-4HV1□**	1783	96.6	0.89	68.3	570	10390	0.70	5.5	2.1	23
2200	450	**1R□4454-4HV1□**	1782	96.7	0.89	75.1	640	11789	0.65	5.2	2.0	26
2500	450	**1R□4456-4HV1□**	1784	96.8	0.89	82.6	730	13382	0.65	5.4	2.1	29
1200 rpm, 6-pole												
1260	450	**1R□4450-6HV1□**	1186	95.7	0.85	56.6	390	10145	0.70	4.7	1.9	29
1420	450	**1R□4452-6HV1□**	1186	96.0	0.85	59.2	435	11433	0.75	4.8	1.9	33
1640	450	**1R□4454-6HV1□**	1186	96.0	0.87	68.3	495	13205	0.70	4.8	1.9	36
1940	450	**1R□4456-6HV1□**	1187	96.3	0.86	74.5	590	15607	0.75	5.0	2.0	41
2220	500	**1R□4500-6HV1□**	1189	96.3	0.86	85.3	670	17830	0.75	5.1	2.0	57
900 rpm, 8-pole												
1000	450	**1R□4450-8HV1□**	889	95.3	0.84	49.3	315	10742	0.80	4.9	1.9	37
1120	450	**1R□4452-8HV1□**	890	95.7	0.84	50.3	350	12017	0.85	5.1	2.0	41
1260	450	**1R□4454-8HV1□**	891	95.6	0.83	58.0	400	13504	0.75	5.0	2.0	46
1420	450	**1R□4456-8HV1□**	891	95.7	0.83	63.8	450	15219	0.75	5.0	2.0	52
1640	500	**1R□4500-8HV1□**	891	95.9	0.84	70.1	510	17577	0.75	4.9	1.9	70
1840	500	**1R□4502-8HV1□**	892	96.0	0.84	76.7	570	19698	0.75	4.9	1.9	80
2020	500	**1R□4504-8HV1□**	892	96.2	0.84	79.8	620	21625	0.75	4.9	1.9	88
2220	500	**1R□4506-8HV1□**	892	96.4	0.84	82.9	690	23766	0.80	5.1	2.0	99

open-circuit cooling	**A**
air-to-water cooling	**N**
Type of construction	
IM B3	**0**
IM V1 without prot. roof assembly	**8**

Selection and ordering data · 1RA4 open-circuit ventilated motors, 1RN4 air-to-water cooled motors · Pump and fan drives ($M \sim n^2$)

Rated output	Frame size	Order No.	Operating data at rated output: Rated speed	Eff-iciency	Power factor	Power loss	Rated current	Rated torque	Starting torque	Starting current	Stall torque	Moment of inertia
									Direct online starting			
P_N kW			n_N rpm	η %	cos φ_1	P_V kW	I_N A	M_N Nm	M_A/M_N	I_A/I_N	M_K/M_N	J kgm^2
3.3 kV 50 Hz												
1500 rpm, 4-pole												
1440	450	**1R□4450-4HV2□**	1481	96.1	0.89	58.4	295	9285	0.65	5.0	2.0	21
1620	450	**1R□4452-4HV2□**	1482	96.2	0.89	64.0	330	10439	0.70	5.2	2.0	23
1840	450	**1R□4454-4HV2□**	1483	96.4	0.89	68.7	375	11848	0.65	5.2	2.0	26
2100	450	**1R□4456-4HV2□**	1484	96.5	0.89	76.2	430	13513	0.70	5.4	2.1	29
2300	500	**1R□4500-4HV2□**	1485	96.4	0.88	85.9	475	14790	0.70	5.1	2.0	39
2500	500	**1R□4502-4HV2□**	1485	96.4	0.89	93.4	510	16076	0.70	5.0	2.0	42
2900	500	**1R□4504-4HV2□**	1485	96.7	0.89	99.0	590	18648	0.70	5.1	2.0	48
1000 rpm, 6-pole												
1040	450	**1R□4450-6HV2□**	985	95.2	0.85	52.4	225	10083	0.75	4.7	1.9	29
1180	450	**1R□4452-6HV2□**	985	95.2	0.85	59.5	255	11440	0.70	4.5	1.8	33
1380	450	**1R□4454-6HV2□**	986	95.6	0.87	63.5	290	13365	0.80	5.1	2.0	36
1620	450	**1R□4456-6HV2□**	987	95.8	0.86	71.0	340	15674	0.80	5.1	2.0	41
1860	500	**1R□4500-6HV2□**	988	95.7	0.86	83.6	395	17977	0.75	4.7	1.9	57
2100	500	**1R□4502-6HV2□**	989	96.1	0.87	85.2	440	20277	0.80	5.0	2.0	65
2340	500	**1R□4504-6HV2□**	990	96.2	0.87	92.4	490	22571	0.80	5.1	2.0	72
2560	500	**1R□4506-6HV2□**	990	96.4	0.87	95.6	530	24693	0.80	5.1	2.0	81
3000	560	**1R□4560-6HV2□**	990	96.5	0.86	108.8	630	28939	0.75	4.8	1.9	105
750 rpm, 8-pole												
820	450	**1R□4450-8HV2□**	740	94.6	0.84	46.8	180	10582	0.85	5.1	2.0	37
920	450	**1R□4452-8HV2□**	740	94.9	0.84	49.4	200	11872	0.85	5.0	1.9	41
1020	450	**1R□4454-8HV2□**	741	95.0	0.83	53.7	225	13145	0.85	5.1	2.0	46
1160	450	**1R□4456-8HV2□**	741	95.4	0.83	55.9	255	14949	0.85	5.3	2.1	52
1360	500	**1R□4500-8HV2□**	741	95.3	0.84	67.1	295	17526	0.75	4.6	1.8	70
1520	500	**1R□4502-8HV2□**	742	95.5	0.85	71.6	330	19562	0.80	4.9	1.9	80
1700	500	**1R□4504-8HV2□**	742	95.6	0.84	78.2	370	21878	0.85	5.1	2.0	88
1860	500	**1R□4506-8HV2□**	742	95.8	0.85	81.5	400	23938	0.80	4.8	1.9	99
2120	560	**1R□4560-8HV2□**	742	95.9	0.83	90.6	465	27286	0.70	4.7	1.8	123
2400	560	**1R□4562-8HV2□**	742	96.1	0.83	97.4	530	30889	0.70	4.7	1.8	141
2600	560	**1R□4564-8HV2□**	743	96.2	0.83	102.7	570	33419	0.75	5.0	1.9	158
2830	560	**1R□4566-8HV2□**	742	96.3	0.85	108.7	600	36424	0.70	4.7	1.8	173

open-circuit cooling	**A**
air-to-water cooling	**N**

Type of construction	
IM B3	**0**
IM V1 without prot. roof assembly	**8**

Cooling air flow for 1RA4	Cooling water flow for 1RN4	Partial load values for pump and fan drives												Dimension drawing
		P/P_N = 75%				P/P_N = 50%				P/P_N = 25%				
m^3/s	m^3/h	P kW	n rpm	η %	$\cos \varphi_1$	P kW	n rpm	η %	$\cos \varphi_1$	P kW	n rpm	η %	$\cos \varphi_1$	page
1.50	5.9	1080	1345	96.2	0.88	720	1175	96.4	0.86	360	933	96.2	0.78	7/26 – 7/31
1.50	6.3	1215	1346	96.4	0.86	810	1176	96.6	0.86	405	933	96.5	0.78	7/26 – 7/31
1.50	6.8	1380	1346	96.6	0.88	920	1176	96.7	0.85	460	934	96.5	0.77	7/26 – 7/31
1.50	7.5	1575	1347	96.7	0.88	1050	1176	96.9	0.86	525	934	96.7	0.77	7/26 – 7/31
2.15	8.7	1725	1351	96.6	0.89	1150	1180	96.7	0.87	575	937	96.6	0.79	7/26 – 7/31
2.15	9.1	1875	1351	96.6	0.89	1250	1180	96.8	0.88	625	937	96.7	0.81	7/26 – 7/31
2.15	9.3	2175	1351	96.9	0.89	1450	1180	97.1	0.88	725	938	97.0	0.81	7/26 – 7/31
1.20	5.0	780	896	95.4	0.84	520	783	95.7	0.82	260	622	95.5	0.72	7/26 – 7/31
1.20	5.5	885	895	95.8	0.85	590	783	96.0	0.83	295	622	95.8	0.75	7/26 – 7/31
1.20	6.2	1035	896	95.8	0.86	690	783	96.0	0.83	345	622	95.7	0.74	7/26 – 7/31
1.20	6.9	1215	897	96.0	0.85	810	783	96.2	0.82	405	622	95.9	0.73	7/26 – 7/31
1.70	7.7	1395	900	96.2	0.86	930	786	96.3	0.84	465	625	96.1	0.75	7/26 – 7/31
1.70	8.5	1575	900	96.3	0.86	1050	786	96.5	0.84	525	625	96.3	0.76	7/26 – 7/31
1.70	9.1	1755	900	96.5	0.86	1170	786	96.6	0.84	585	625	96.3	0.75	7/26 – 7/31
1.70	9.6	1920	900	96.6	0.86	1280	787	96.6	0.84	640	625	96.4	0.76	7/26 – 7/31
2.55	11.0	2250	901	96.6	0.85	1500	787	96.7	0.83	750	625	96.4	0.74	7/26 – 7/31
1.05	4.4	615	672	95.0	0.81	410	587	95.1	0.77	205	466	94.5	0.65	7/26 – 7/31
1.05	4.6	690	672	95.2	0.82	460	587	95.4	0.79	230	466	95.0	0.68	7/26 – 7/31
1.05	5.0	765	673	95.3	0.80	510	588	95.4	0.76	255	467	94.8	0.64	7/26 – 7/31
1.05	5.4	870	673	95.6	0.79	580	588	95.6	0.74	290	467	94.9	0.62	7/26 – 7/31
1.50	6.3	1020	675	95.7	0.83	680	590	95.8	0.81	340	468	95.5	0.71	7/26 – 7/31
1.50	6.7	1140	675	95.8	0.83	760	590	95.9	0.80	380	468	95.5	0.69	7/26 – 7/31
1.50	7.3	1275	675	95.9	0.82	850	590	95.9	0.78	425	468	95.4	0.67	7/26 – 7/31
1.50	7.8	1395	675	96.1	0.84	930	590	96.1	0.81	465	468	95.8	0.72	7/26 – 7/31
2.25	8.6	1590	675	96.2	0.82	1060	590	96.2	0.79	530	469	95.9	0.69	7/26 – 7/31
2.25	9.4	1800	676	96.3	0.83	1200	590	96.4	0.80	600	469	96.0	0.70	7/26 – 7/31
2.25	10.0	1950	676	96.5	0.82	1300	590	96.5	0.79	650	469	96.2	0.69	7/26 – 7/31
2.25	10.5	2125	676	96.6	0.84	1415	590	96.7	0.82	710	469	96.4	0.74	7/26 – 7/31

Selection and ordering data · 1RA4 open-circuit ventilated motors, 1RN4 air-to-water cooled motors · Pump and fan drives ($M \sim n^2$)

Rated output	Frame size	Order No.	Operating data at rated output: Rated speed	Eff-iciency	Power factor	Power loss	Rated current	Rated torque	Starting torque (Direct online starting)	Starting current (Direct online starting)	Stall torque (Direct online starting)	Moment of inertia
P_N kW			n_N rpm	η %	$\cos \varphi_1$	P_V kW	I_N A	M_N Nm	M_A/M_N	I_A/I_N	M_K/M_N	J kgm^2
4.16 kV 50 Hz												
1500 rpm, 4-pole												
1440	450	**1R□4450-4HV4□**	1481	96.1	0.89	58.4	235	9285	0.65	5.0	2.0	21
1620	450	**1R□4452-4HV4□**	1482	96.2	0.89	64.0	265	10439	0.70	5.2	2.0	23
1840	450	**1R□4454-4HV4□**	1483	96.4	0.89	68.7	300	11848	0.65	5.2	2.0	26
2100	450	**1R□4456-4HV4□**	1484	96.5	0.89	76.2	340	13513	0.70	5.4	2.1	29
2300	500	**1R□4500-4HV4□**	1485	96.4	0.88	85.9	375	14790	0.70	5.1	2.0	39
2500	500	**1R□4502-4HV4□**	1485	96.4	0.89	93.4	405	16076	0.70	5.0	2.0	42
2900	500	**1R□4504-4HV4□**	1485	96.7	0.89	99.0	470	18648	0.70	5.1	2.0	48
3260	500	**1R□4506-4HV4□**	1485	96.8	0.89	107.8	525	20963	0.75	5.2	2.0	53
3920	560	**1R□4560-4HV4□**	1486	96.8	0.90	129.6	620	25192	0.65	4.9	2.0	76
1000 rpm, 6-pole												
1040	450	**1R□4450-6HV4□**	985	95.2	0.85	52.4	178	10083	0.75	4.7	1.9	29
1180	450	**1R□4452-6HV4□**	985	95.2	0.85	59.5	200	11440	0.70	4.5	1.8	33
1380	450	**1R□4454-6HV4□**	986	95.6	0.87	63.5	230	13365	0.80	5.1	2.0	36
1620	450	**1R□4456-6HV4□**	987	95.8	0.86	71.0	270	15674	0.80	5.1	2.0	41
1860	500	**1R□4500-6HV4□**	988	95.9	0.86	79.5	315	17977	0.75	4.7	1.9	57
2100	500	**1R□4502-6HV4□**	989	96.1	0.87	85.2	350	20277	0.80	5.0	2.0	65
2340	500	**1R□4504-6HV4□**	990	96.2	0.87	92.4	390	22571	0.80	5.1	2.0	72
2560	500	**1R□4506-6HV4□**	990	96.4	0.87	95.6	425	24693	0.80	5.1	2.0	81
3000	560	**1R□4560-6HV4□**	990	96.5	0.86	108.8	500	28939	0.75	4.8	1.9	105
3380	560	**1R□4562-6HV4□**	991	96.7	0.86	115.3	560	32572	0.70	4.8	1.9	120
3750	560	**1R□4564-6HV4□**	991	96.7	0.87	128.0	620	36138	0.75	5.0	2.0	135
750 rpm, 8-pole												
820	450	**1R□4450-8HV4□**	740	94.6	0.84	46.8	144	10582	0.85	5.1	2.0	37
920	450	**1R□4452-8HV4□**	740	94.9	0.84	49.4	160	11872	0.85	5.0	1.9	41
1020	450	**1R□4454-8HV4□**	741	95.0	0.83	53.7	180	13145	0.85	5.1	2.0	46
1160	450	**1R□4456-8HV4□**	741	95.4	0.83	55.9	205	14949	0.85	5.3	2.1	52
1360	500	**1R□4500-8HV4□**	741	95.3	0.84	67.1	235	17526	0.75	4.6	1.8	70
1520	500	**1R□4502-8HV4□**	742	95.5	0.85	71.6	260	19562	0.80	4.9	1.9	80
1700	500	**1R□4504-8HV4□**	742	95.6	0.84	78.2	295	21878	0.85	5.1	2.0	88
1860	500	**1R□4506-8HV4□**	742	95.8	0.85	81.5	315	23938	0.80	4.8	1.9	99
2120	560	**1R□4560-8HV4□**	742	95.9	0.83	90.6	370	27286	0.70	4.7	1.8	123
2400	560	**1R□4562-8HV4□**	742	96.1	0.83	97.4	420	30889	0.70	4.7	1.8	141
2600	560	**1R□4564-8HV4□**	743	96.2	0.83	102.7	450	33419	0.75	5.0	1.9	158
2830	560	**1R□4566-8HV4□**	742	96.3	0.85	108.7	480	36424	0.70	4.7	1.8	173

open-circuit cooling	**A**
air-to-water cooling	**N**

Type of construction

IM B3	**0**
IM V1 with prot. roof assembly	**8**

Cooling air flow for 1RA4	Cooling water flow for 1RN4	Partial load values for pump and fan drives												Dimension drawing
		P/P_N = 75%				P/P_N = 50%				P/P_N = 25%				
m^3/s	m^3/h	P kW	n rpm	η %	$\cos \varphi_1$	P kW	n rpm	η %	$\cos \varphi_1$	P kW	n rpm	η %	$\cos \varphi_1$	page
1.50	5.9	1080	1345	96.2	0.88	720	1175	96.4	0.86	360	933	96.2	0.78	7/26 – 7/31
1.50	6.3	1215	1346	96.4	0.86	810	1176	96.6	0.86	405	933	96.5	0.78	7/26 – 7/31
1.50	6.8	1380	1346	96.6	0.88	920	1176	96.7	0.85	460	934	96.5	0.77	7/26 – 7/31
1.50	7.5	1575	1347	96.7	0.88	1050	1176	96.9	0.86	525	934	96.7	0.77	7/26 – 7/31
2.15	8.7	1725	1351	96.6	0.89	1150	1180	96.7	0.87	575	937	96.6	0.79	7/26 – 7/31
2.15	9.1	1875	1351	96.6	0.89	1250	1180	96.8	0.88	625	937	96.7	0.81	7/26 – 7/31
2.15	9.3	2175	1351	96.9	0.89	1450	1180	97.1	0.88	725	938	97.0	0.81	7/26 – 7/31
2.15	10.6	2445	1351	97.0	0.90	1630	1180	97.1	0.88	815	938	97.1	0.82	7/26 – 7/31
3.15	13.5	2940	1352	97.0	0.90	1960	1180	97.1	0.88	980	938	97.1	0.82	7/26 – 7/31
1.20	5.0	780	896	95.4	0.84	520	783	95.7	0.82	260	622	95.5	0.72	7/26 – 7/31
1.20	5.5	885	895	95.8	0.85	590	783	96.0	0.83	295	622	95.8	0.75	7/26 – 7/31
1.20	6.2	1035	896	95.8	0.86	690	783	96.0	0.83	345	622	95.7	0.74	7/26 – 7/31
1.20	6.9	1215	897	96.0	0.85	810	783	96.2	0.82	405	622	95.9	0.73	7/26 – 7/31
1.70	7.7	1395	900	96.2	0.86	930	786	96.3	0.84	465	625	96.1	0.75	7/26 – 7/31
1.70	8.5	1575	900	96.3	0.86	1050	786	96.5	0.84	525	625	96.3	0.76	7/26 – 7/31
1.70	9.1	1755	900	96.5	0.86	1170	786	96.6	0.84	585	625	96.3	0.75	7/26 – 7/31
1.70	9.6	1920	900	96.6	0.86	1280	787	96.6	0.84	640	625	96.4	0.76	7/26 – 7/31
2.55	11.0	2250	901	96.6	0.85	1500	787	96.7	0.83	750	625	96.4	0.74	7/26 – 7/31
2.55	11.5	2535	901	96.9	0.86	1690	787	97.0	0.84	845	625	96.8	0.75	7/26 – 7/31
2.55	12.5	2815	901	96.8	0.86	1845	787	96.9	0.84	940	625	96.7	0.76	7/26 – 7/31
1.05	4.4	615	672	95.0	0.81	410	587	95.1	0.77	205	466	94.5	0.65	7/26 – 7/31
1.05	4.6	690	672	95.2	0.82	460	587	95.4	0.79	230	466	95.0	0.68	7/26 – 7/31
1.05	5.0	765	673	95.3	0.80	510	588	95.4	0.76	255	467	94.8	0.64	7/26 – 7/31
1.05	5.4	870	673	95.6	0.79	580	588	95.6	0.74	290	467	94.9	0.62	7/26 – 7/31
1.50	6.3	1020	675	95.7	0.83	680	590	95.8	0.81	340	468	95.5	0.71	7/26 – 7/31
1.50	6.7	1140	675	95.8	0.83	760	590	95.9	0.80	380	468	95.5	0.69	7/26 – 7/31
1.50	7.3	1275	675	95.9	0.82	850	590	95.9	0.78	425	468	95.4	0.67	7/26 – 7/31
1.50	7.8	1395	675	96.1	0.84	930	590	96.1	0.81	465	468	95.8	0.72	7/26 – 7/31
2.25	8.6	1590	675	96.2	0.82	1060	590	96.2	0.79	530	469	95.9	0.69	7/26 – 7/31
2.25	9.4	1800	676	96.3	0.83	1200	590	96.4	0.80	600	469	96.0	0.70	7/26 – 7/31
2.25	10.0	1950	676	96.5	0.82	1300	590	96.5	0.79	650	469	96.2	0.69	7/26 – 7/31
2.25	10.5	2125	676	96.6	0.84	1415	590	96.7	0.82	710	469	96.4	0.74	7/26 – 7/31

Selection and ordering data · 1RA4 open-circuit ventilated motors, 1RN4 air-to-water cooled motors · Pump and fan drives ($M \sim n^2$)

Rated output	Frame size	Order No.	Operating data at rated output: Rated speed	Eff-iciency	Power factor	Power loss	Rated current	Rated torque	Starting torque (Direct online starting)	Starting current (Direct online starting)	Stall torque	Moment of inertia
P_N kW			n_N rpm	η %	cos φ_1	P_V kW	I_N A	M_N Nm	M_A/M_N	I_A/I_N	M_K/M_N	J kgm^2
4.16 kV 60 Hz												
1800 rpm, 4-pole												
1660	450	**1R□4450-4HV5□**	1782	96.3	0.89	63.8	270	8896	0.65	5.2	2.1	21
1860	450	**1R□4452-4HV5□**	1783	96.4	0.89	69.5	300	9962	0.65	5.2	2.0	23
2120	450	**1R□4454-4HV5□**	1784	96.6	0.89	74.6	340	11348	0.65	5.5	2.1	26
2380	450	**1R□4456-4HV5□**	1785	96.4	0.89	88.9	385	12732	0.75	5.9	2.3	29
2620	500	**1R□4500-4HV5□**	1786	96.6	0.88	92.2	430	14008	0.75	5.4	2.1	39
2880	500	**1R□4502-4HV5□**	1785	96.7	0.89	98.3	465	15407	0.70	5.2	2.1	42
3320	500	**1R□4504-4HV5□**	1786	96.9	0.89	106.2	535	17751	0.70	5.4	2.1	48
3760	500	**1R□4506-4HV5□**	1786	97.1	0.89	112.3	600	20104	0.70	5.3	2.1	53
4320	560	**1R□4560-4HV5□**	1786	96.8	0.90	142.8	690	23105	0.55	4.8	1.9	76
1200 rpm, 6-pole												
1220	450	**1R□4450-6HV5□**	1186	95.7	0.85	54.8	210	9823	0.75	4.8	1.9	29
1360	450	**1R□4452-6HV5□**	1186	95.8	0.85	59.6	230	10950	0.70	4.7	1.9	33
1580	450	**1R□4454-6HV5□**	1187	96.0	0.87	65.8	265	12711	0.75	5.1	2.0	36
1860	450	**1R□4456-6HV5□**	1188	96.2	0.86	73.5	310	14951	0.80	5.3	2.1	41
2120	500	**1R□4500-6HV5□**	1189	96.2	0.86	83.7	355	17027	0.70	4.9	1.9	57
2400	500	**1R□4502-6HV5□**	1188	96.3	0.87	92.2	400	19292	0.70	4.8	1.9	65
2680	500	**1R□4504-6HV5□**	1189	96.4	0.87	100.1	445	21524	0.70	5.0	1.9	72
2940	500	**1R□4506-6HV5□**	1189	96.6	0.87	103.5	485	23612	0.70	5.0	1.9	81
3400	560	**1R□4560-6HV5□**	1190	96.6	0.87	119.7	560	27287	0.70	4.9	1.9	105
3950	560	**1R□4562-6HV5□**	1191	96.9	0.86	126.4	660	31673	0.70	5.1	1.9	120
900 rpm, 8-pole												
960	450	**1R□4450-8HV5□**	890	95.1	0.84	49.5	166	10300	0.80	5.0	2.0	37
1060	450	**1R□4452-8HV5□**	890	95.5	0.84	49.9	184	11373	0.80	5.1	2.0	41
1200	450	**1R□4454-8HV5□**	891	95.5	0.83	56.5	210	12861	0.75	5.0	2.0	46
1360	450	**1R□4456-8HV5□**	891	95.7	0.83	61.1	240	14576	0.80	5.2	2.0	52
1560	500	**1R□4500-8HV5□**	891	95.6	0.84	71.8	270	16719	0.70	4.6	1.8	70
1760	500	**1R□4502-8HV5□**	892	95.7	0.84	79.1	305	18842	0.75	5.0	1.9	80
1940	500	**1R□4504-8HV5□**	892	96.0	0.84	80.8	335	20769	0.75	5.1	2.0	88
2120	500	**1R□4506-8HV5□**	892	96.2	0.84	83.7	365	22696	0.75	5.2	2.0	99
2440	560	**1R□4560-8HV5□**	893	96.3	0.84	93.7	420	26092	0.70	4.8	1.9	123
2750	560	**1R□4562-8HV5□**	893	96.5	0.84	99.7	470	29407	0.70	4.9	1.9	141
3000	560	**1R□4564-8HV5□**	893	96.6	0.84	105.6	510	32081	0.70	5.1	1.9	158
3250	560	**1R□4566-8HV5□**	893	96.7	0.85	110.9	550	34754	0.70	4.9	1.9	173

open-circuit cooling	**A**
air-to-water cooling	**N**

Type of construction

IM B3	**0**
IM V1 with prot. roof assembly	**8**

Cooling air flow for 1RA4	Cooling water flow for 1RN4	Partial load values for pump and fan drives												Dimension drawing
		P/P_N = 75%				P/P_N = 50%				P/P_N = 25%				
m^3/s	m^3/h	P kW	n rpm	η %	cos φ_1	P kW	n rpm	η %	cos φ_1	P kW	n rpm	η %	cos φ_1	page
1.80	6.7	1245	1619	96.4	0.88	830	1413	96.4	0.85	415	1123	96.1	0.77	7/26 – 7/31
1.80	7.2	1395	1619	96.5	0.88	930	1413	96.6	0.86	465	1123	96.3	0.78	7/26 – 7/31
1.80	7.9	1590	1620	96.6	0.88	1060	1413	96.6	0.85	530	1123	96.3	0.77	7/26 – 7/31
1.80	9.0	1785	1621	96.8	0.88	1190	1414	96.8	0.85	595	1123	96.5	0.76	7/26 – 7/31
2.55	9.6	1965	1625	96.7	0.88	1310	1415	96.7	0.86	655	1130	96.5	0.78	7/26 – 7/31
2.55	10.0	2160	1624	96.8	0.89	1440	1414	96.9	0.87	720	1129	96.7	0.80	7/26 – 7/31
2.55	10.5	2490	1625	97.0	0.89	1660	1415	97.0	0.87	830	1130	96.9	0.80	7/26 – 7/31
2.55	11.7	2820	1625	97.1	0.89	1880	1415	97.1	0.88	940	1130	97.0	0.81	7/26 – 7/31
3.80	14.5	3240	1624	96.9	0.90	2160	1415	97.0	0.89	1080	1130	96.9	0.84	7/26 – 7/31
1.45	5.5	915	1078	95.8	0.84	610	941	95.9	0.81	305	748	95.5	0.71	7/26 – 7/31
1.45	6.1	1020	1078	96.0	0.85	680	941	96.1	0.82	340	748	95.8	0.74	7/26 – 7/31
1.45	7.1	1185	1078	96.0	0.86	790	941	96.0	0.84	395	748	95.6	0.75	7/26 – 7/31
1.45	7.7	1395	1079	96.2	0.85	930	942	96.2	0.82	465	748	95.8	0.73	7/26 – 7/31
2.05	8.5	1590	1082	96.4	0.86	1060	942	96.4	0.84	530	753	96.1	0.75	7/26 – 7/31
2.05	9.4	1800	1080	96.5	0.87	1200	942	96.5	0.85	600	750	96.3	0.78	7/26 – 7/31
2.05	10.0	2010	1080	96.5	0.87	1340	942	96.5	0.85	670	751	96.3	0.77	7/26 – 7/31
2.05	10.6	2205	1080	96.6	0.87	1470	944	96.6	0.86	735	751	96.4	0.78	7/26 – 7/31
3.05	12.1	2550	1083	96.7	0.86	1700	943	96.7	0.84	850	753	96.4	0.76	7/26 – 7/31
3.05	12.7	2965	1083	96.9	0.85	1975	943	96.8	0.82	990	753	96.5	0.73	7/26 – 7/31
1.25	5.0	720	808	95.4	0.82	480	706	95.4	0.78	240	561	94.8	0.67	7/26 – 7/31
1.25	5.3	795	809	95.6	0.82	530	706	95.6	0.78	265	561	95.0	0.67	7/26 – 7/31
1.25	5.9	900	809	95.6	0.81	600	706	95.6	0.76	300	561	94.9	0.65	7/26 – 7/31
1.25	6.3	1020	809	95.8	0.81	680	706	95.6	0.76	340	561	94.9	0.64	7/26 – 7/31
1.80	7.0	1170	809	95.8	0.83	780	706	95.9	0.81	390	563	95.5	0.71	7/26 – 7/31
1.80	7.4	1320	810	95.9	0.83	880	707	95.9	0.80	440	563	95.5	0.70	7/26 – 7/31
1.80	8.0	1455	810	96.1	0.83	970	707	96.0	0.80	485	563	95.5	0.69	7/26 – 7/31
1.80	8.6	1590	810	96.3	0.83	1060	707	96.2	0.80	530	563	95.8	0.70	7/26 – 7/31
2.70	9.5	1830	812	96.4	0.82	1220	707	96.3	0.79	610	565	95.9	0.69	7/26 – 7/31
2.70	10.3	2063	812	96.5	0.83	1375	707	96.4	0.80	688	565	96.0	0.70	7/26 – 7/31
2.70	11.0	2250	812	96.6	0.83	1500	707	96.5	0.80	750	565	96.0	0.70	7/26 – 7/31
2.70	11.6	2438	812	96.6	0.84	1625	707	96.6	0.82	813	565	96.2	0.73	7/26 – 7/31

Selection and ordering data · 1RQ4 air-to-air cooled motors · Pump and fan drives ($M \sim n^2$)

Rated output	Frame size	Order No.	Operating data at rated output: Rated speed	Eff-iciency	Power factor	Power loss	Rated current	Rated torque	Starting torque (Direct online starting)	Starting current (Direct online starting)	Stall torque (Direct online starting)	Moment of inertia
P_N kW			n_N rpm	η %	cos φ_1	P_V kW	I_N A	M_N Nm	M_A/M_N	I_A/I_N	M_K/M_N	J kgm^2
2.3 kV 50 Hz												
1500 rpm, 4-pole												
1280	450	**1RQ4450-4JV0□**	1482	96.1	0.88	51.9	380	8248	0.75	5.3	2.2	22
1420	450	**1RQ4452-4JV0□**	1484	96.3	0.88	54.6	420	9137	0.65	5.3	2.1	24
1580	450	**1RQ4454-4JV0□**	1485	96.4	0.88	59.0	470	10160	0.65	5.4	2.2	27
1780	450	**1RQ4456-4JV0□**	1486	96.6	0.87	62.7	530	11439	0.60	5.4	2.1	30
1980	500	**1RQ4500-4JV0□**	1485	96.3	0.89	76.1	580	12732	0.75	5.2	2.1	42
2200	500	**1RQ4502-4JV0□**	1486	96.5	0.89	79.8	645	14138	0.80	5.5	2.2	45
2500	500	**1RQ4504-4JV0□**	1487	96.6	0.89	88.0	730	16055	0.75	5.5	2.1	51
1000 rpm, 6-pole												
920	450	**1RQ4450-6JV0□**	987	95.5	0.85	43.4	285	8901	0.80	4.9	2.0	31
1040	450	**1RQ4452-6JV0□**	987	95.6	0.86	47.9	320	10062	0.80	5.0	2.0	35
1220	450	**1RQ4454-6JV0□**	988	95.7	0.86	54.8	370	11792	0.80	5.1	2.1	38
1380	450	**1RQ4456-6JV0□**	989	96.1	0.85	56.0	425	13325	0.75	5.2	2.1	43
1600	500	**1RQ4500-6JV0□**	989	95.9	0.87	68.4	480	15449	0.80	5.2	2.0	62
1820	500	**1RQ4502-6JV0□**	990	96.3	0.87	69.9	550	17555	0.85	5.4	2.1	70
2040	500	**1RQ4504-6JV0□**	990	96.4	0.87	76.2	610	19677	0.85	5.4	2.1	77
2220	500	**1RQ4506-6JV0□**	990	96.5	0.87	80.5	660	21414	0.80	5.3	2.1	85
750 rpm, 8-pole												
740	450	**1RQ4450-8JV0□**	741	95.1	0.82	38.1	240	9536	0.85	5.2	2.1	39
820	450	**1RQ4452-8JV0□**	741	95.4	0.82	39.5	265	10567	0.85	5.2	2.1	43
900	450	**1RQ4454-8JV0□**	742	95.5	0.82	42.4	290	11583	0.90	5.7	2.2	48
1020	450	**1RQ4456-8JV0□**	742	95.7	0.82	45.8	325	13127	0.85	5.6	2.2	54
1180	500	**1RQ4500-8JV0□**	742	95.6	0.83	54.3	375	15186	0.85	5.2	2.1	74
1320	500	**1RQ4502-8JV0□**	743	96.0	0.83	55.0	415	16965	0.85	5.5	2.1	84
1460	500	**1RQ4504-8JV0□**	742	95.9	0.84	62.4	455	18790	0.75	4.9	1.9	92
1600	500	**1RQ4506-8JV0□**	742	96.1	0.85	64.9	490	20591	0.80	5.0	1.9	103

Type of construction	
IM B3	**0**
IM V1 with prot. roof assembly	**4**

Cooling air flow	Partial load values for pump and fan drives												Dimension drawing
	P/P_N = 75%				P/P_N = 50%				P/P_N = 25%				
m^3/s	P kW	n rpm	η %	cos φ_1	P kW	n rpm	η %	cos φ_1	P kW	n rpm	η %	cos φ_1	page
3.00	960	1346	96.1	0.88	640	1176	96.2	0.85	320	934	95.9	0.77	7/32 – 7/37
3.00	1065	1347	96.3	0.87	710	1176	96.3	0.84	355	934	96.0	0.75	7/32 – 7/37
3.00	1185	1348	96.5	0.86	790	1177	96.6	0.83	395	934	96.2	0.74	7/32 – 7/37
3.00	1335	1351	96.6	0.85	890	1178	96.7	0.82	445	935	96.3	0.71	7/32 – 7/37
4.20	1485	1351	96.4	0.89	990	1180	96.5	0.87	495	937	96.4	0.80	7/32 – 7/37
4.20	1650	1352	96.6	0.89	1100	1181	96.6	0.87	550	938	96.4	0.79	7/32 – 7/37
4.20	1875	1352	96.7	0.89	1250	1181	96.8	0.86	625	938	96.7	0.79	7/32 – 7/37
2.60	690	896	95.6	0.84	460	783	95.8	0.81	230	622	95.4	0.71	7/32 – 7/37
2.60	780	896	95.8	0.84	520	783	96.0	0.81	260	622	95.6	0.72	7/32 – 7/37
2.60	915	897	95.9	0.85	610	783	96.0	0.83	305	622	95.7	0.73	7/32 – 7/37
2.60	1035	898	96.2	0.83	690	784	96.3	0.80	345	623	96.0	0.69	7/32 – 7/37
3.55	1200	900	96.0	0.87	800	786	96.1	0.84	400	625	95.8	0.76	7/32 – 7/37
3.55	1365	900	96.2	0.86	910	787	96.2	0.83	455	625	95.9	0.74	7/32 – 7/37
3.55	1530	900	96.4	0.86	1020	787	96.4	0.83	510	625	96.1	0.74	7/32 – 7/37
3.55	1665	901	96.6	0.86	1110	787	96.6	0.84	555	625	96.3	0.76	7/32 – 7/37
1.95	555	672	95.2	0.78	370	588	95.1	0.73	185	467	94.3	0.61	7/32 – 7/37
1.95	615	673	95.4	0.79	410	588	95.4	0.75	205	467	94.7	0.62	7/32 – 7/37
1.95	675	673	95.5	0.77	450	588	95.4	0.71	225	467	94.5	0.58	7/32 – 7/37
1.95	765	673	95.7	0.77	510	588	95.6	0.71	255	467	94.7	0.58	7/32 – 7/37
2.65	885	675	95.6	0.82	590	590	95.6	0.78	295	469	95.1	0.66	7/32 – 7/37
2.65	990	676	96.0	0.80	660	590	95.9	0.75	330	469	95.2	0.63	7/32 – 7/37
2.65	1095	675	96.0	0.83	730	590	96.1	0.80	365	468	95.7	0.70	7/32 – 7/37
2.65	1200	675	96.1	0.84	800	590	96.1	0.81	400	468	95.8	0.71	7/32 – 7/37

Selection and ordering data · 1RQ4 air-to-air cooled motors · Pump and fan drives ($M \sim n^2$)

Rated output	Frame size	Order No.	Operating data at rated output: Rated speed	Eff-iciency	Power factor	Power loss	Rated current	Rated torque	Starting torque	Starting current	Stall torque	Moment of inertia
									Direct online starting			
P_N kW			n_N rpm	η %	cos φ_1	P_V kW	I_N A	M_N Nm	M_A/M_N	I_A/I_N	M_K/M_N	J kgm^2
2.3 kV 60 Hz												
1800 rpm, 4-pole												
1460	450	**1RQ4450-4JV1□**	1783	96.1	0.88	59.3	435	7819	0.65	5.3	2.2	22
1620	450	**1RQ4452-4JV1□**	1785	96.3	0.88	62.2	480	8667	0.65	5.6	2.2	24
1820	450	**1RQ4454-4JV1□**	1785	96.4	0.88	68.0	540	9737	0.70	5.8	2.3	27
2040	450	**1RQ4456-4JV1□**	1787	96.6	0.87	71.8	610	10901	0.60	5.6	2.2	30
2280	500	**1RQ4500-4JV1□**	1786	96.3	0.89	87.6	670	12191	0.75	5.5	2.2	42
2500	500	**1RQ4502-4JV1□**	1787	96.5	0.89	90.7	730	13359	0.80	5.9	2.3	45
2860	500	**1RQ4504-4JV1□**	1787	96.7	0.89	97.6	835	15283	0.75	5.8	2.3	51
1200 rpm, 6-pole												
1080	450	**1RQ4450-6JV1□**	1187	95.5	0.85	50.9	335	8688	0.75	4.9	2.0	31
1180	450	**1RQ4452-6JV1□**	1187	95.8	0.86	51.7	360	9493	0.75	4.9	2.0	35
1380	450	**1RQ4454-6JV1□**	1187	95.9	0.86	59.0	420	11102	0.70	4.9	2.0	38
1560	450	**1RQ4456-6JV1□**	1189	96.1	0.85	63.3	480	12529	0.70	5.2	2.1	43
1820	500	**1RQ4500-6JV1□**	1189	96.0	0.87	75.8	550	14617	0.75	5.2	2.0	62
2100	500	**1RQ4502-6JV1□**	1190	96.4	0.87	78.4	630	16852	0.80	5.6	2.2	70
2320	500	**1RQ4504-6JV1□**	1190	96.4	0.87	86.6	690	18617	0.80	5.5	2.1	77
900 rpm, 8-pole												
840	450	**1RQ4450-8JV1□**	891	95.3	0.82	41.4	270	9003	0.80	5.2	2.1	39
940	450	**1RQ4452-8JV1□**	892	95.5	0.82	44.3	300	10063	0.85	5.5	2.2	43
1040	450	**1RQ4454-8JV1□**	892	95.6	0.82	47.9	335	11134	0.85	5.6	2.3	48
1160	450	**1RQ4456-8JV1□**	892	95.8	0.82	50.9	370	12418	0.70	5.1	2.0	54
1360	500	**1RQ4500-8JV1□**	892	95.9	0.83	58.1	430	14559	0.85	5.5	2.1	74
1520	500	**1RQ4502-8JV1□**	893	96.1	0.83	61.7	480	16254	0.80	5.4	2.1	84
1680	500	**1RQ4504-8JV1□**	892	96.1	0.84	68.2	520	17985	0.75	5.2	2.0	92
1820	500	**1RQ4506-8JV1□**	893	96.3	0.85	69.9	560	19462	0.80	5.4	2.1	103

Type of construction	
IM B3	**0**
IM V1 with prot. roof assembly	**4**

Cooling air flow	Partial load values for pump and fan drives												Dimension drawing
	P/P_N = 75%				P/P_N = 50%				P/P_N = 25%				
m^3/s	P kW	n rpm	η %	cos φ_1	P kW	n rpm	η %	cos φ_1	P kW	n rpm	η %	cos φ_1	page
3.60	1095	1619	96.0	0.88	730	1413	95.9	0.85	365	1123	95.5	0.77	7/32 – 7/37
3.60	1215	1620	96.1	0.87	810	1414	96.0	0.84	405	1123	95.6	0.74	7/32 – 7/37
3.60	1365	1621	96.4	0.87	910	1414	96.3	0.84	455	1123	95.9	0.74	7/32 – 7/37
3.60	1530	1625	96.6	0.85	1020	1418	96.5	0.81	510	1124	96.1	0.70	7/32 – 7/37
5.10	1710	1622	96.4	0.89	1140	1415	96.4	0.87	570	1127	96.1	0.80	7/32 – 7/37
5.10	1875	1622	96.4	0.88	1250	1415	96.3	0.86	625	1127	96.0	0.78	7/32 – 7/37
5.10	2145	1623	96.7	0.88	1430	1415	96.6	0.86	715	1127	96.3	0.77	7/32 – 7/37
3.15	810	1078	95.7	0.84	540	941	95.7	0.81	270	748	95.3	0.72	7/32 – 7/37
3.15	885	1078	95.9	0.85	590	941	95.9	0.82	295	748	95.5	0.73	7/32 – 7/37
3.15	1035	1078	95.9	0.86	690	941	95.9	0.84	345	748	95.5	0.75	7/32 – 7/37
3.15	1170	1080	96.0	0.84	780	942	95.9	0.81	390	749	95.3	0.71	7/32 – 7/37
4.30	1365	1080	95.9	0.87	910	942	95.9	0.85	455	751	95.5	0.77	7/32 – 7/37
4.30	1575	1081	96.3	0.86	1050	943	96.2	0.83	525	751	95.7	0.74	7/32 – 7/37
4.30	1740	1081	96.4	0.86	1160	943	96.3	0.84	580	751	95.9	0.75	7/32 – 7/37
2.35	630	809	95.3	0.79	420	706	95.1	0.74	210	561	94.2	0.62	7/32 – 7/37
2.35	705	810	95.4	0.79	470	706	95.2	0.74	235	561	94.3	0.61	7/32 – 7/37
2.35	780	810	95.5	0.77	520	707	95.2	0.72	260	561	94.3	0.59	7/32 – 7/37
2.35	870	810	95.7	0.80	580	707	95.5	0.76	290	561	94.8	0.64	7/32 – 7/37
2.55	1020	810	95.9	0.81	680	707	95.7	0.77	340	563	95.0	0.66	7/32 – 7/37
2.55	1140	811	96.0	0.81	760	707	95.8	0.77	380	563	95.2	0.65	7/32 – 7/37
2.55	1260	810	96.1	0.83	840	707	95.9	0.79	420	563	95.4	0.69	7/32 – 7/37
2.55	1365	811	96.3	0.83	910	707	96.2	0.79	455	563	95.6	0.69	7/32 – 7/37

Selection and ordering data · 1RQ4 air-to-air cooled motors · Pump and fan drives ($M \sim n^2$)

Rated output	Frame size	Order No.	Operating data at rated output: Rated speed	Eff-iciency	Power factor	Power loss	Rated current	Rated torque	Starting torque (Direct online starting)	Starting current (Direct online starting)	Stall torque (Direct online starting)	Moment of inertia
P_N kW			n_N rpm	η %	$\cos \varphi_1$	P_V kW	I_N A	M_N Nm	M_A/M_N	I_A/I_N	M_K/M_N	J kgm^2
3.3 kV 50 Hz												
1500 rpm, 4-pole												
1240	450	**1RQ4450-4JV2□**	1483	95.9	0.88	53.0	255	7985	0.70	5.4	2.2	22
1360	450	**1RQ4452-4JV2□**	1484	96.1	0.88	55.2	280	8751	0.65	5.3	2.1	24
1520	450	**1RQ4454-4JV2□**	1484	96.2	0.88	60.0	315	9781	0.65	5.4	2.1	27
1700	450	**1RQ4456-4JV2□**	1487	96.5	0.86	61.7	360	10917	0.65	5.6	2.2	30
1920	500	**1RQ4500-4JV2□**	1486	96.3	0.89	73.8	390	12338	0.80	5.5	2.2	42
2100	500	**1RQ4502-4JV2□**	1487	96.3	0.88	80.7	435	13886	0.80	5.7	2.2	45
2400	500	**1RQ4504-4JV2□**	1488	96.6	0.88	84.5	495	15402	0.80	5.7	2.2	51
2680	500	**1RQ4506-4JV2□**	1487	96.7	0.88	91.5	550	17211	0.75	5.4	2.1	56
3200	560	**1RQ4560-4JV2□**	1488	96.7	0.90	109.2	640	20538	0.65	5.2	2.1	77
1000 rpm, 6-pole												
880	450	**1RQ4450-6JV2□**	986	95.3	0.85	43.4	190	8523	0.75	4.9	2.0	31
1000	450	**1RQ4452-6JV2□**	987	95.6	0.86	46.0	215	9675	0.85	5.3	2.1	35
1160	450	**1RQ4454-6JV2□**	988	95.7	0.86	52.1	245	11212	0.80	5.3	2.1	38
1320	450	**1RQ4456-6JV2□**	989	95.9	0.85	56.4	285	12745	0.80	5.4	2.2	43
1540	500	**1RQ4500-6JV2□**	989	95.8	0.87	67.5	325	14869	0.85	5.4	2.1	62
1760	500	**1RQ4502-6JV2□**	990	96.1	0.87	71.4	370	16977	0.85	5.5	2.1	70
1960	500	**1RQ4504-6JV2□**	990	96.3	0.87	75.3	410	18906	0.85	5.6	2.2	77
2140	500	**1RQ4506-6JV2□**	991	96.4	0.87	79.9	445	20621	0.85	5.7	2.2	85
2430	560	**1RQ4560-6JV2□**	992	96.5	0.86	88.1	510	23394	0.75	5.2	2.0	108
2750	560	**1RQ4562-6JV2□**	992	96.6	0.86	96.8	580	26474	0.75	5.2	2.0	123
3000	560	**1RQ4564-6JV2□**	992	96.7	0.86	102.4	630	28881	0.80	5.5	2.1	137
750 rpm, 8-pole												
700	450	**1RQ4450-8JV2□**	741	94.8	0.82	38.4	156	9021	0.90	5.5	2.1	39
780	450	**1RQ4452-8JV2□**	741	95.1	0.82	40.2	174	10052	0.85	5.3	2.1	43
860	450	**1RQ4454-8JV2□**	742	95.2	0.82	43.4	192	11068	0.90	5.5	2.3	48
980	450	**1RQ4456-8JV2□**	743	95.5	0.80	46.2	225	12595	0.90	5.7	2.2	54
1140	500	**1RQ4500-8JV2□**	743	95.5	0.83	53.7	250	14652	0.85	5.4	2.1	74
1280	500	**1RQ4502-8JV2□**	743	95.8	0.83	56.1	280	16451	0.85	5.5	2.1	84
1400	500	**1RQ4504-8JV2□**	742	95.8	0.84	61.4	305	18018	0.80	5.2	2.0	92
1540	500	**1RQ4506-8JV2□**	742	95.9	0.85	65.8	330	19819	0.85	5.2	2.0	103
1800	560	**1RQ4560-8JV2□**	743	95.9	0.84	77.0	390	23136	0.75	5.0	1.9	128
2000	560	**1RQ4562-8JV2□**	743	96.1	0.84	81.2	435	25707	0.70	5.0	1.9	146
2180	560	**1RQ4564-8JV2□**	744	96.3	0.84	83.8	470	27983	0.75	5.3	2.0	163
2400	560	**1RQ4566-8JV2□**	744	96.4	0.84	89.6	520	30806	0.80	5.4	2.0	178

Type of construction	
IM B3	**0**
IM V1 with prot. roof assembly	**4**

Cooling air flow	Partial load values for pump and fan drives												Dimension drawing
	P/P_N = 75%				P/P_N = 50%				P/P_N = 25%				
m^3/s	P kW	n rpm	η %	cos φ_1	P kW	n rpm	η %	cos φ_1	P kW	n rpm	η %	cos φ_1	page
3.00	930	1346	96.0	0.88	620	1176	96.2	0.85	310	934	96.0	0.76	7/32 – 7/37
3.00	1020	1346	96.2	0.87	680	1176	96.4	0.85	340	934	96.1	0.76	7/32 – 7/37
3.00	1140	1350	96.4	0.87	760	1177	96.5	0.85	380	934	96.2	0.76	7/32 – 7/37
3.00	1275	1352	96.6	0.84	850	1178	96.6	0.80	425	935	96.2	0.69	7/32 – 7/37
4.20	1440	1352	96.4	0.89	960	1181	96.5	0.86	480	938	96.2	0.78	7/32 – 7/37
4.20	1575	1352	96.4	0.88	1050	1181	96.5	0.86	525	938	96.2	0.77	7/32 – 7/37
4.20	1800	1353	96.7	0.88	1200	1182	96.8	0.85	600	938	96.5	0.76	7/32 – 7/37
4.20	2010	1353	96.9	0.88	1340	1181	96.9	0.86	670	938	96.7	0.78	7/32 – 7/37
4.55	2400	1353	96.9	0.90	1600	1181	96.9	0.88	800	938	96.8	0.81	7/32 – 7/37
2.60	660	896	95.6	0.84	440	783	95.7	0.82	220	622	95.3	0.72	7/32 – 7/37
2.60	750	897	95.7	0.84	500	784	95.8	0.80	250	622	95.3	0.70	7/32 – 7/37
2.60	870	897	95.8	0.85	580	784	95.9	0.81	290	622	95.5	0.71	7/32 – 7/37
2.60	990	898	96.0	0.83	660	784	96.0	0.79	330	623	95.4	0.68	7/32 – 7/37
3.55	1155	900	96.1	0.86	770	787	96.1	0.83	385	625	95.8	0.74	7/32 – 7/37
3.55	1320	900	96.2	0.86	880	787	96.3	0.83	440	625	95.9	0.74	7/32 – 7/37
3.55	1470	901	96.4	0.86	980	787	96.4	0.83	490	625	96.0	0.74	7/32 – 7/37
3.55	1605	901	96.5	0.86	1070	787	96.5	0.83	535	625	96.1	0.74	7/32 – 7/37
3.90	1825	902	96.6	0.85	1215	788	96.6	0.82	610	625	96.2	0.72	7/32 – 7/37
3.90	2065	902	96.7	0.85	1375	788	96.7	0.82	690	626	96.3	0.72	7/32 – 7/37
3.90	2250	902	96.8	0.86	1500	788	96.8	0.83	750	626	96.5	0.74	7/32 – 7/37
1.95	525	673	94.9	0.78	350	588	94.8	0.73	175	467	94.0	0.59	7/32 – 7/37
1.95	585	673	95.2	0.80	390	588	95.2	0.75	195	467	94.5	0.62	7/32 – 7/37
1.95	645	674	95.2	0.77	430	588	95.1	0.72	215	467	94.2	0.59	7/32 – 7/37
1.95	735	674	95.4	0.76	490	588	95.3	0.70	245	467	94.3	0.56	7/32 – 7/37
2.65	855	675	95.6	0.81	570	590	95.6	0.77	285	469	95.0	0.66	7/32 – 7/37
2.65	960	676	95.9	0.80	640	590	95.8	0.76	320	469	95.2	0.63	7/32 – 7/37
2.65	1050	675	95.9	0.82	700	590	95.9	0.78	350	469	95.4	0.68	7/32 – 7/37
2.65	1155	675	96.1	0.83	770	590	96.1	0.80	385	469	95.7	0.70	7/32 – 7/37
3.70	1350	676	96.1	0.83	900	590	96.2	0.79	450	469	95.8	0.69	7/32 – 7/37
3.70	1500	676	96.2	0.84	1000	590	96.3	0.81	500	469	95.9	0.71	7/32 – 7/37
3.70	1635	676	96.4	0.82	1090	591	96.4	0.79	545	469	95.9	0.67	7/32 – 7/37
3.70	1800	676	96.5	0.83	1200	591	96.5	0.80	600	469	96.1	0.69	7/32 – 7/37

Selection and ordering data · 1RQ4 air-to-air cooled motors · Pump and fan drives ($M \sim n^2$)

Rated output	Frame size	Order No.	Operating data at rated output: Rated speed	Eff-iciency	Power factor	Power loss	Rated current	Rated torque	Starting torque (Direct online starting)	Starting current (Direct online starting)	Stall torque (Direct online starting)	Moment of inertia (Direct online starting)
P_N kW			n_N rpm	η %	cos φ_1	P_V kW	I_N A	M_N Nm	M_A/M_N	I_A/I_N	M_K/M_N	J kgm^2
4.16 kV 50 Hz												
1500 rpm, 4-pole												
1240	450	**1RQ4450-4JV4□**	1483	95.9	0.88	53.0	205	7985	0.70	5.4	2.2	22
1360	450	**1RQ4452-4JV4□**	1484	96.1	0.88	55.2	225	8751	0.65	5.3	2.1	24
1520	450	**1RQ4454-4JV4□**	1484	96.2	0.88	60.0	250	9781	0.65	5.4	2.1	27
1700	450	**1RQ4456-4JV4□**	1487	96.5	0.86	61.7	285	10917	0.65	5.6	2.2	30
1920	500	**1RQ4500-4JV4□**	1486	96.3	0.89	73.8	310	12338	0.80	5.5	2.2	42
2100	500	**1RQ4502-4JV4□**	1487	96.3	0.88	80.7	345	13886	0.80	5.7	2.2	45
2400	500	**1RQ4504-4JV4□**	1488	96.6	0.88	84.5	390	15402	0.80	5.7	2.2	51
2680	500	**1RQ4506-4JV4□**	1487	96.7	0.88	91.5	435	17211	0.75	5.4	2.1	56
3200	560	**1RQ4560-4JV4□**	1488	96.7	0.90	109.2	510	20538	0.65	5.2	2.1	77
3500	560	**1RQ4562-4JV4□**	1489	96.9	0.90	112.0	560	22448	0.70	5.5	2.2	86
4000	560	**1RQ4564-4JV4□**	1489	97.1	0.89	119.5	640	25655	0.65	5.5	2.2	97
1000 rpm, 6-pole												
880	450	**1RQ4450-6JV4□**	986	95.3	0.85	43.4	150	8523	0.75	4.9	2.0	31
1000	450	**1RQ4452-6JV4□**	987	95.6	0.86	46.0	168	9675	0.85	5.3	2.1	35
1160	450	**1RQ4454-6JV4□**	988	95.7	0.86	52.1	195	11212	0.80	5.3	2.1	38
1320	450	**1RQ4456-6JV4□**	989	95.9	0.85	56.4	225	12745	0.75	5.4	2.2	43
1540	500	**1RQ4500-6JV4□**	989	95.8	0.87	67.5	255	14869	0.85	5.4	2.1	62
1760	500	**1RQ4502-6JV4□**	990	96.1	0.87	71.4	290	16977	0.85	5.5	2.1	70
1960	500	**1RQ4504-6JV4□**	990	96.3	0.87	75.3	325	18906	0.85	5.6	2.2	77
2140	500	**1RQ4506-6JV4□**	991	96.4	0.87	79.9	355	20621	0.85	5.7	2.2	85
2430	560	**1RQ4560-6JV4□**	992	96.5	0.86	88.1	405	23394	0.75	5.2	2.0	108
2750	560	**1RQ4562-6JV4□**	992	96.6	0.86	96.8	460	26474	0.75	5.2	2.0	123
3000	560	**1RQ4564-6JV4□**	992	96.7	0.86	102.4	500	28881	0.80	5.5	2.1	137
3240	560	**1RQ4566-6JV4□**	993	96.9	0.85	103.7	550	31160	0.75	5.5	2.1	149
750 rpm, 8-pole												
700	450	**1RQ4450-8JV4□**	741	94.8	0.82	38.4	124	9021	0.90	5.5	2.1	39
780	450	**1RQ4452-8JV4□**	741	95.1	0.82	40.2	138	10052	0.85	5.3	2.1	43
860	450	**1RQ4454-8JV4□**	742	95.2	0.82	43.4	152	11068	0.90	5.5	2.3	48
980	450	**1RQ4456-8JV4□**	743	95.5	0.80	46.2	178	12595	0.90	5.7	2.2	54
1140	500	**1RQ4500-8JV4□**	743	95.5	0.83	53.7	200	14652	0.85	5.4	2.1	74
1280	500	**1RQ4502-8JV4□**	743	95.8	0.83	56.1	225	16451	0.85	5.5	2.1	84
1400	500	**1RQ4504-8JV4□**	742	95.8	0.84	61.4	240	18018	0.80	5.2	2.0	92
1540	500	**1RQ4506-8JV4□**	742	95.9	0.85	65.8	260	19819	0.85	5.2	2.0	103
1800	560	**1RQ4560-8JV4□**	743	95.9	0.84	77.0	310	23136	0.75	5.0	1.9	128
2000	560	**1RQ4562-8JV4□**	743	96.1	0.84	81.2	345	25707	0.70	5.0	1.9	146
2180	560	**1RQ4564-8JV4□**	744	96.3	0.84	83.8	375	27983	0.75	5.3	2.0	163
2400	560	**1RQ4566-8JV4□**	744	96.4	0.84	89.6	410	30806	0.80	5.4	2.0	178

Type of construction	
IM B3	**0**
IM V1 with prot. roof assembly	**4**

Cooling air flow	Partial load values for pump and fan drives												Dimension drawing
	P/P_N = 75%				P/P_N = 50%				P/P_N = 25%				
m^3/s	P kW	n rpm	η %	$\cos \varphi_1$	P kW	n rpm	η %	$\cos \varphi_1$	P kW	n rpm	η %	$\cos \varphi_1$	page
3.00	930	1346	96.0	0.88	620	1176	96.2	0.85	310	934	96.0	0.76	7/32 – 7/37
3.00	1020	1346	96.2	0.87	680	1176	96.4	0.85	340	934	96.1	0.76	7/32 – 7/37
3.00	1140	1350	96.4	0.87	760	1177	96.5	0.85	380	934	96.2	0.76	7/32 – 7/37
3.00	1275	1352	96.6	0.84	850	1178	96.6	0.80	425	935	96.2	0.69	7/32 – 7/37
4.20	1440	1352	96.4	0.89	960	1181	96.5	0.86	480	938	96.2	0.78	7/32 – 7/37
4.20	1575	1352	96.4	0.88	1050	1181	96.5	0.86	525	938	96.2	0.77	7/32 – 7/37
4.20	1800	1353	96.7	0.88	1200	1182	96.8	0.85	600	938	96.5	0.76	7/32 – 7/37
4.20	2010	1353	96.9	0.88	1340	1181	96.9	0.86	670	938	96.7	0.78	7/32 – 7/37
4.55	2400	1353	96.9	0.90	1600	1181	96.9	0.88	800	938	96.8	0.81	7/32 – 7/37
4.55	2625	1353	97.1	0.90	1750	1182	97.3	0.88	875	939	97.2	0.81	7/32 – 7/37
4.55	3000	1354	97.2	0.89	2000	1182	97.2	0.87	1000	939	97.0	0.79	7/32 – 7/37
2.60	660	896	95.6	0.84	440	783	95.7	0.82	220	622	95.3	0.72	7/32 – 7/37
2.60	750	897	95.7	0.84	500	784	95.8	0.80	250	622	95.3	0.70	7/32 – 7/37
2.60	870	897	95.8	0.85	580	784	95.9	0.81	290	622	95.5	0.71	7/32 – 7/37
2.60	990	898	96.0	0.83	660	784	96.0	0.79	330	623	95.4	0.68	7/32 – 7/37
3.55	1155	900	96.1	0.86	770	787	96.1	0.83	385	625	95.8	0.74	7/32 – 7/37
3.55	1320	900	96.2	0.86	880	787	96.3	0.83	440	625	95.9	0.74	7/32 – 7/37
3.55	1470	901	96.4	0.86	980	787	96.4	0.83	490	625	96.0	0.74	7/32 – 7/37
3.55	1605	901	96.5	0.86	1070	787	96.5	0.83	535	625	96.1	0.74	7/32 – 7/37
3.90	1825	902	96.6	0.85	1215	788	96.6	0.82	610	625	96.2	0.72	7/32 – 7/37
3.90	2065	902	96.7	0.85	1375	788	96.7	0.82	690	626	96.3	0.72	7/32 – 7/37
3.90	2250	902	96.8	0.86	1500	788	96.8	0.83	750	626	96.5	0.74	7/32 – 7/37
2.60	2430	903	96.9	0.84	1620	788	96.8	0.81	810	626	96.4	0.71	7/32 – 7/37
1.95	525	673	94.9	0.78	350	588	94.8	0.73	175	467	94.0	0.59	7/32 – 7/37
1.95	585	673	95.2	0.80	390	588	95.2	0.75	195	467	94.5	0.62	7/32 – 7/37
1.95	645	674	95.2	0.77	430	588	95.1	0.72	215	467	94.2	0.59	7/32 – 7/37
1.95	735	674	95.4	0.76	490	588	95.3	0.70	245	467	94.3	0.56	7/32 – 7/37
2.65	855	675	95.6	0.81	570	590	95.6	0.77	285	469	95.0	0.66	7/32 – 7/37
2.65	960	676	95.9	0.80	640	590	95.8	0.76	320	469	95.2	0.63	7/32 – 7/37
2.65	1050	675	95.9	0.82	700	590	95.9	0.78	350	469	95.4	0.68	7/32 – 7/37
2.65	1155	675	96.1	0.83	770	590	96.1	0.80	385	469	95.7	0.70	7/32 – 7/37
3.70	1350	676	96.1	0.83	900	590	96.2	0.79	450	469	95.8	0.69	7/32 – 7/37
3.70	1500	676	96.2	0.84	1000	590	96.3	0.81	500	469	95.9	0.71	7/32 – 7/37
3.70	1635	676	96.4	0.82	1090	591	96.4	0.79	545	469	95.9	0.67	7/32 – 7/37
3.70	1800	676	96.5	0.83	1200	591	96.5	0.80	600	469	96.1	0.69	7/32 – 7/37

Selection and ordering data · 1RQ4 air-to-air cooled motors · Pump and fan drives ($M \sim n^2$)

Rated output	Frame size	Order No.	Operating data at rated output: Rated speed	Eff-iciency	Power factor	Power loss	Rated current	Rated torque	Starting torque (Direct online starting)	Starting current (Direct online starting)	Stall torque (Direct online starting)	Moment of inertia
P_N kW			n_N rpm	η %	cos φ_1	P_V kW	I_N A	M_N Nm	M_A/M_N	I_A/I_N	M_K/M_N	J kgm^2
4.16 kV 60 Hz												
1800 rpm, 4-pole												
1420	450	**1RQ4450-4JV5□**	1783	96.0	0.88	59.2	235	7605	0.65	5.4	2.2	22
1560	450	**1RQ4452-4JV5□**	1784	96.2	0.88	61.6	255	8350	0.65	5.5	2.2	24
1760	450	**1RQ4454-4JV5□**	1785	96.4	0.88	65.7	290	9416	0.65	5.6	2.2	27
1940	450	**1RQ4456-4JV5□**	1787	96.5	0.86	70.4	325	10367	0.60	5.6	2.2	30
2200	500	**1RQ4500-4JV5□**	1787	96.2	0.89	86.9	355	11756	0.75	5.8	2.3	42
2400	500	**1RQ4502-4JV5□**	1787	96.4	0.89	89.6	390	12825	0.75	5.6	2.2	45
2780	500	**1RQ4504-4JV5□**	1788	96.7	0.88	94.9	455	14847	0.75	6.0	2.3	51
3080	500	**1RQ4506-4JV5□**	1788	96.9	0.88	98.5	500	16450	0.75	5.8	2.3	56
3650	560	**1RQ4560-4JV5□**	1788	96.7	0.90	124.6	580	19497	0.65	5.6	2.2	77
4050	560	**1RQ4562-4JV5□**	1788	96.8	0.90	133.9	650	21631	0.65	5.5	2.2	86
1200 rpm, 6-pole												
1020	450	**1RQ4450-6JV5□**	1187	95.5	0.85	48.1	174	8206	0.75	5.1	2.1	31
1140	450	**1RQ4452-6JV5□**	1188	95.8	0.85	50.0	194	9163	0.85	5.5	2.2	35
1340	450	**1RQ4454-6JV5□**	1188	95.8	0.86	58.7	225	10771	0.75	5.2	2.1	38
1520	450	**1RQ4456-6JV5□**	1189	96.1	0.85	61.7	260	12208	0.70	5.3	2.2	43
1760	500	**1RQ4500-6JV5□**	1190	96.0	0.87	73.3	290	14123	0.85	5.7	2.2	62
2000	500	**1RQ4502-6JV5□**	1190	96.2	0.87	79.0	330	16049	0.80	5.7	2.2	70
2240	500	**1RQ4504-6JV5□**	1191	96.4	0.87	83.7	370	17960	0.85	5.9	2.3	77
2440	500	**1RQ4506-6JV5□**	1191	96.5	0.87	88.5	405	19564	0.85	5.9	2.3	85
2800	560	**1RQ4560-6JV5□**	1191	96.5	0.86	101.6	470	22448	0.65	5.2	2.0	108
3190	560	**1RQ4562-6JV5□**	1192	96.7	0.85	108.9	540	25553	0.70	5.5	2.1	123
3500	560	**1RQ4564-6JV5□**	1193	96.8	0.85	115.7	590	28024	0.80	5.9	2.2	137
3750	560	**1RQ4566-6JV5□**	1193	96.9	0.85	120.0	630	30019	0.75	5.9	2.2	149
900 rpm, 8-pole												
800	450	**1RQ4450-8JV5□**	891	95.1	0.82	41.2	142	8574	0.80	5.3	2.2	39
900	450	**1RQ4452-8JV5□**	892	95.4	0.82	43.4	160	9635	0.80	5.4	2.2	43
1000	450	**1RQ4454-8JV5□**	892	95.6	0.82	46.0	178	10705	0.85	5.6	2.2	48
1120	450	**1RQ4456-8JV5□**	893	95.7	0.81	50.3	200	11977	0.80	5.6	2.3	54
1300	500	**1RQ4500-8JV5□**	892	95.7	0.83	58.4	225	13917	0.85	5.5	2.1	74
1460	500	**1RQ4502-8JV5□**	893	96.1	0.83	59.3	255	15613	0.80	5.5	2.2	84
1600	500	**1RQ4504-8JV5□**	893	95.9	0.84	68.4	275	17110	0.80	5.6	2.1	92
1760	500	**1RQ4506-8JV5□**	893	96.2	0.85	69.5	300	18821	0.85	5.6	2.1	103
2060	560	**1RQ4560-8JV5□**	893	96.3	0.84	79.1	355	22029	0.70	5.2	2.0	128
2310	560	**1RQ4562-8JV5□**	893	96.4	0.85	86.3	390	24702	0.75	5.3	2.0	146
2500	560	**1RQ4564-8JV5□**	894	96.5	0.85	90.7	425	26704	0.75	5.4	2.1	163
2750	560	**1RQ4566-8JV5□**	894	96.6	0.85	96.8	465	29374	0.75	5.6	2.1	178

Type of construction	
IM B3	**0**
IM V1 with prot. roof assembly	**4**

Cooling air flow	Partial load values for pump and fan drives												Dimension drawing
	P/P_N = 75%				P/P_N = 50%				P/P_N = 25%				
m^3/s	P kW	n rpm	η %	cos φ_1	P kW	n rpm	η %	cos φ_1	P kW	n rpm	η %	cos φ_1	page
3.60	1065	1620	96.0	0.87	710	1413	96.0	0.85	355	1123	95.6	0.76	7/32 – 7/37
3.60	1170	1620	96.2	0.87	780	1414	96.1	0.84	390	1123	95.7	0.75	7/32 – 7/37
3.60	1320	1624	96.3	0.87	880	1417	96.3	0.84	440	1123	95.8	0.74	7/32 – 7/37
3.60	1455	1625	96.5	0.85	970	1418	96.4	0.82	485	1124	96.0	0.71	7/32 – 7/37
5.10	1650	1622	96.2	0.89	1100	1415	96.1	0.86	550	1127	95.8	0.78	7/32 – 7/37
5.10	1800	1622	96.4	0.89	1200	1415	96.4	0.86	600	1127	96.1	0.78	7/32 – 7/37
5.10	2085	1623	96.6	0.88	1390	1416	96.5	0.85	695	1127	96.1	0.75	7/32 – 7/37
5.10	2310	1623	96.8	0.88	1540	1416	96.7	0.85	770	1127	96.3	0.76	7/32 – 7/37
5.45	2740	1626	96.7	0.90	1825	1416	96.6	0.88	915	1130	96.4	0.81	7/32 – 7/37
5.45	3040	1626	97.0	0.90	2025	1416	96.9	0.88	1015	1130	96.7	0.82	7/32 – 7/37
3.15	765	1079	95.6	0.84	510	941	95.6	0.81	255	748	95.1	0.71	7/32 – 7/37
3.15	855	1079	95.8	0.83	570	942	95.7	0.80	285	748	95.2	0.69	7/32 – 7/37
3.15	1005	1080	95.8	0.85	670	942	95.8	0.82	335	748	95.2	0.72	7/32 – 7/37
3.15	1140	1080	96.0	0.83	760	942	96.0	0.80	380	749	95.4	0.69	7/32 – 7/37
4.30	1320	1081	96.0	0.86	880	943	95.9	0.82	440	751	95.5	0.73	7/32 – 7/37
4.30	1500	1081	96.2	0.86	1000	943	96.1	0.83	500	751	95.7	0.74	7/32 – 7/37
4.30	1680	1081	96.3	0.85	1120	943	96.2	0.82	560	751	95.6	0.72	7/32 – 7/37
4.30	1830	1081	96.4	0.86	1220	943	96.3	0.83	610	751	95.8	0.74	7/32 – 7/37
4.70	2100	1084	96.5	0.85	1400	944	96.4	0.83	700	753	96.0	0.74	7/32 – 7/37
4.70	2395	1084	96.7	0.84	1595	944	96.6	0.81	800	754	96.1	0.71	7/32 – 7/37
4.70	2625	1085	96.8	0.84	1750	944	96.6	0.80	875	754	96.1	0.70	7/32 – 7/37
4.70	2815	1085	96.8	0.84	1875	944	96.6	0.80	940	754	96.1	0.70	7/32 – 7/37
2.35	600	810	95.2	0.79	400	706	95.0	0.74	200	561	94.1	0.61	7/32 – 7/37
2.35	675	810	95.4	0.79	450	707	95.2	0.74	225	561	94.4	0.62	7/32 – 7/37
2.35	750	810	95.4	0.78	500	707	95.2	0.72	250	562	94.2	0.59	7/32 – 7/37
2.35	840	810	95.5	0.77	560	707	95.2	0.71	280	562	94.2	0.58	7/32 – 7/37
2.55	975	810	95.7	0.82	650	707	95.5	0.77	325	563	94.8	0.66	7/32 – 7/37
2.55	1095	811	95.9	0.81	730	707	95.7	0.77	365	563	95.0	0.65	7/32 – 7/37
2.55	1200	811	95.9	0.81	800	707	95.8	0.77	400	563	95.2	0.65	7/32 – 7/37
2.55	1320	811	96.2	0.83	880	707	96.1	0.79	440	563	95.5	0.68	7/32 – 7/37
4.45	1545	812	96.3	0.83	1030	707	96.3	0.79	515	565	95.9	0.69	7/32 – 7/37
4.45	1733	812	96.3	0.83	1155	707	96.2	0.80	578	565	95.7	0.69	7/32 – 7/37
4.45	1875	813	96.4	0.83	1250	707	96.3	0.80	625	565	95.7	0.70	7/32 – 7/37
4.45	2063	813	96.5	0.83	1375	707	96.3	0.79	688	565	95.7	0.68	7/32 – 7/37

Selection and ordering data · 1RA4 open-circuit-cooled motors, 1RN4 air-to-water cooled motors · Pump and fan drives ($M \sim n^2$)

Rated output	Frame size	Order No.	Operating data at rated output Rated speed	Efficiency	Power factor	Power loss	Rated current
P_N kW			n_N rpm	η %	cos φ_1	P_V kW	I_N A
4.16 kV 50 Hz							
1500 rpm, 4-pole							
5190	630	**1R□4633-4HV40**	1489	97.0	0.89	160.5	833
5880	630	**1R□4635-4HV40**	1490	97.2	0.89	169.4	941
6470	630	**1R□4637-4HV40**	1490	97.3	0.90	179.5	1024
6960	630	**1R□4638-4HV40**	1491	97.4	0.90	185.8	1100
1000 rpm, 6-pole							
4120	630	**1R□4635-6HV40**	992	96.8	0.85	136.2	693
4610	630	**1R□4637-6HV40**	993	97.0	0.86	142.6	764
5000	630	**1R□4638-6HV40**	993	97.1	0.86	149.3	828
5490	630	**1R□4639-6HV40**	994	97.2	0.86	158.1	908
750 rpm, 8-pole							
3140	630	**1R□4635-8HV40**	743	96.5	0.85	113.9	530
3430	630	**1R□4637-8HV40**	743	96.7	0.85	117.1	578
3680	630	**1R□4638-8HV40**	743	96.7	0.85	125.6	619
4020	630	**1R□4639-8HV40**	744	96.9	0.84	128.6	684
4.16 kV 60 Hz							
on request							

open-circuit cooling	**A**
air-to-water cooling	**N**

Selection and ordering data · 1RQ4 air-to-air cooled motors · Pump and fan drives ($M \sim n^2$)

Rated output	Frame size	Order No.	Operating data at rated output Rated speed	Efficiency	Power factor	Power loss	Rated current
P_N kW			n_N rpm	η %	cos φ_1	P_V kW	I_N A
4.16 kV 50 Hz							
1500 rpm, 4-pole							
4310	630	**1RQ4633-4JV40**	1490	96.8	0.89	142.5	693
4800	630	**1RQ4635-4JV40**	1491	97.0	0.89	148.5	770
5190	630	**1RQ4637-4JV40**	1492	97.2	0.89	149.5	831
5680	630	**1RQ4638-4JV40**	1492	97.2	0.88	163.6	920
1000 rpm, 6-pole							
3480	630	**1RQ4635-6JV40**	993	96.8	0.86	115.0	578
3770	630	**1RQ4637-6JV40**	993	96.9	0.87	120.6	620
4020	630	**1RQ4638-6JV40**	994	96.9	0.86	128.6	667
4310	630	**1RQ4639-6JV40**	994	97.1	0.86	128.7	715
750 rpm, 8-pole							
2600	630	**1RQ4635-8JV40**	744	96.5	0.84	94.3	444
2790	630	**1RQ4637-8JV40**	745	96.6	0.83	98.2	482
2940	630	**1RQ4638-8JV40**	745	96.6	0.84	103.5	502
3140	630	**1RQ4639-8JV40**	745	96.7	0.85	107.2	529
4.16 kV 60 Hz							
on request							

Type of construction
H-modul 3 for SIMOVERT MV only in IM B3 type of construction

Rated torque	Starting torque [1]	Starting current [2]	Stall torque [1]	Moment of inertia	Cooling air flow for 1RA4	Cooling water flow for 1RN4	Dimension drawing
	Direct online starting						
M_N Nm	M_A/M_N	I_A/I_N	M_K/M_N	J kgm^2	m^3/s	m^3/h	page
33287	0.54	4.6	2.0	150	4.4	22.7	7/38 – 7/45
37687	0.60	4.9	2.2	165	4.4	23.1	7/38 – 7/45
41469	0.63	5.1	2.2	180	4.4	24.6	7/38 – 7/45
44579	0.70	5.5	2.4	195	4.4	25.3	7/38 – 7/45
39663	0.57	4.5	2.0	190	3.5	18.2	7/38 – 7/45
44336	0.62	4.8	2.1	210	3.5	19.4	7/38 – 7/45
48087	0.69	5.2	2.3	230	3.5	19.5	7/38 – 7/45
52746	0.70	5.3	2.3	255	3.5	20.4	7/38 – 7/45
40359	0.60	4.3	1.9	255	3.1	15.6	7/38 – 7/45
44087	0.67	4.6	2.1	280	3.1	16.0	7/38 – 7/45
47300	0.65	4.6	2.0	310	3.1	17.3	7/38 – 7/45
51601	0.76	5.3	2.3	340	3.1	17.4	7/38 – 7/45

Rated torque	Starting torque [1]	Starting current [2]	Stall torque [1]	Moment of inertia	Cooling air flow	Dimension drawing
	Direct online starting					
M_N Nm	M_A/M_N	I_A/I_N	M_K/M_N	J kgm^2	m^3/s	page
27624	0.62	5.2	2.3	150	6.3	7/38 – 7/45
30744	0.65	5.5	2.5	170	6.3	7/38 – 7/45
33220	0.62	5.5	2.4	185	6.2	7/38 – 7/45
36357	0.61	5.5	2.4	200	6.2	7/38 – 7/45
33468	0.63	5.0	2.2	200	5.4	7/38 – 7/45
36257	0.66	5.2	2.2	215	5.4	7/38 – 7/45
38623	0.68	5.5	2.3	235	5.4	7/38 – 7/45
41409	0.68	5.5	2.4	260	5.4	7/38 – 7/45
33374	0.75	5.1	2.4	265	5.0	7/38 – 7/45
35764	0.81	5.5	2.5	290	5.0	7/38 – 7/45
37687	0.81	5.5	2.5	315	4.9	7/38 – 7/45
40251	0.80	5.5	2.5	350	4.9	7/38 – 7/45

1) Deviation by ±10 % possible
2) Deviation by ±5 % possible

Notes

SIMOVERT MV
Documentation

5

Documentation overview

General converter documentation

The general converter documentation contains:

- Converter description,
- Commissioning instructions,
- Maintenance instructions,
- Spare parts list,

as well as device-specific circuit and engineering data.

The documentation delivered with the converter is in German as a standard.

If the documentation should be in one of the languages in the box below, please state the relating code when ordering the SIMOVERT MV converter.

Language	Code
English	**D76**
French	**D77**
Spanish	**D78**
Italian	**D72**

The general converter documentation can also be ordered separately and individually

Documentation	Order No.
Converter description	**6SE800□–□AJ□□**
Commissioning instructions	**6SE800□–0BJ□□**
Maintenance instructions	**6SE800□–0CJ□□**

Converter with 12-pulse DFE	**1**			
Converter with air or water cooling		**0**		
Converter with air cooling		**1**		
Converter with water cooling		**2**		
German			**0**	**0**
English			**7**	**6**
French			**7**	**7**
Spanish			**7**	**8**
Italian			**7**	**2**

Supplementary documentation

Apart from the general device documentation you can also obtain

- detailed circuit diagrams for the converter including options, and
- CD-ROM with operation manuals and standard circuit diagrams as PDF files.

They are delivered in German/English (see options, Page 3/22).

SIMOVERT MV
Engineering information

6

Dimensioning the power section and drive

Engineering the drive system

Engineering tool PATH SIMOVERT MV

Engineering of frequency converter-fed drives with SIMOVERT MV can be carried out with the engineering tool PATH SIMOVERT MV (see 2nd cover page for description).

General notes on engineering

The following datasheet is for reference when selecting the suitable output of the main components needed for the drive. The ambient conditions at the place of installation must be taken into account.

For a specified quote, or for ordering, further data is required. Reference lists for this purpose are available on request.

Supply grid at the converter terminal (Point of Common Coupling PCC)			
Rated voltage	$U_{N\,grid}$	_____	kV
Rated frequency	$f_{N\,grid}$	_____	Hz
Short-circuit power	S_{Kmax}	_____	MVA (for calculating short-circuit fault)
	S_{Kmin}	_____	MVA (for calculating harmonics)
Driven Load			
Type (pump, fan, ...?)		_____	
Rated output at the drive shaft	P_{Load}	_____	kW
Speed at rated output	n_{Load}	_____	rpm
Load torque at rated output	T_{Load}	_____	Nm
Overload factor	T_{max}/T_{Load}	_____	
Overload duration	t	_____	s
Ambient temperature	T	_____	°C
Installation altitude	H	_____	m above sea level
Load characteristic	T(n) T(n)	~ n^2 = const. other	☐ ☐ ☐ (characteristic?)
Speed range		1 : ____	

Drive motor		**New Siemens motor** (Data from motor selection tables section 4)	**3rd-party or old motor only for square-load torque!**
Type / manufacturer		_____	_____ / _____
Rated output	$P_{N\,mot}$	_____ kW	_____ kW
Rated speed	$n_{N\,mot}$	_____ rpm	_____ rpm
Rated voltage	$U_{N\,mot}$	_____ kV	_____ kV
Power factor	cos $\varphi_{N\,mot}$	_____	_____
Efficiency	$\eta_{N\,mot}$	_____ %	_____ %
Rated current	$I_{N\,mot}$	_____ A	_____ A [1]
Current at rated operating point	I_{mot}		_____ A [1]
No-load current	I_0		_____ A [1]

SIMOVERT MV converter

The required converter power can be approximated from the motor output at rated load: $P_{mot} = P_{Load} / \eta_{mot}$ kW (plus overload, if required)

Required converter power $P_{conv} = \dfrac{P_{mot}}{\cos\varphi_{mot} \cdot k_H \cdot k_T \cdot k_U}$ kVA = _____ kVA

with k_T = _____ Current reduction factor with regard to ambient temperature acc. to Fig. 6/3
k_H = _____ Current reduction factor with regard to installation altitude acc. to Fig. 6/4
k_U = _____ Voltage reduction factor for installation altitude above 2000 m acc. to Fig. 6/5

		without sinusoidal EMC output filter [2] Selection data on Page: 3/8, 3/12, 3/14	**with sinusoidal EMC output filter** (Option L15) [2] Selection data on Page: 3/10, 3/12, 3/16
Type		6SE80____ - ____	6SE80____ - ____ - Z
Rated output	$P_{N\,conv} \geq P_{conv}$	_____ kVA	_____ kVA
Rated voltage	$U_{N\,conv}$	_____ kV	_____ kV
Power factor	cos φ_{conv}	approx. 0.98	approx. 0.98
Efficiency	η_{conv}	_____ %	_____ %
Rated current	$I_{N\,conv}$	_____ A	_____ A

Converter supply voltage $U_{conv} = U_{N\,conv} \cdot k_U$ = _____ kV

1) Data required when ordering for calculating the sinusoidal EMC/IHV output filter of the converter.

2) At 6 / 6.6 kV with IHV output filter.

Converter transformer

Approximated required transformer power: $S_{trans} = \frac{P_{mot}}{\cos\varphi_{conv} \cdot \eta_{conv} \cdot k_{trans}}$ kVA = _____ kVA

with k_{trans} = _____ reduction factor with regard to ambient temperature and installation altitude (to be clarified with the transformer manufacturer)

Type		_____	3-winding for 12-pulse supply
Rated output	$S_{N\,trans} \geq S_{trans}$	_____	kVA
Rated voltage primary side	$U_{N\,grid}$	_____	kV
Rated voltage secondary side	$U_{sec} = U_{conv}$	2 x _____	kV
Impedance voltage	u_k	_____	%
Insulation voltage secondary [1])		_____	kV
Vector group (Dd0 Dy5 recommended)		_____	
Design (oil / dry / cast resin)		_____	

To help determine the converter output options and the cabling between converter and motor, a selection diagram is shown in Fig. 6/1.

Please also refer to the further information from Page 6/19.

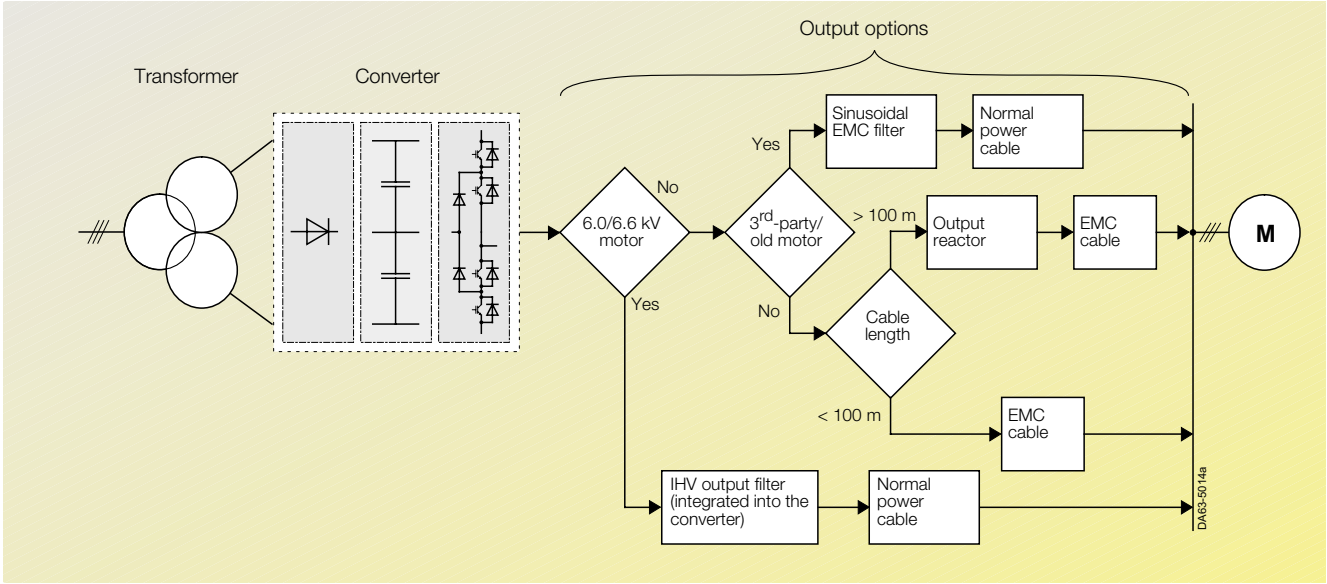


Fig. 6/1
Selection of the converter output options and the cabling to the motor

Nominal data and continuous operation of the drive converter

The drive converters are dimensioned according to the rated current of Siemens H-compact and H-compact PLUS and H-modul 3 high-voltage motors.

Rated motor voltages of 2.3 kV, 3.3 kV, 4.16 kV, 6.0 kV and 6.6 kV are used as a basis.

The drives are designed for continuous operation with the rated output current I_{UN}. If the rated current I_{UN} is used over a longer period of time (> 60 s), corresponding to the 100 % value of Fig. 6/2, then the unit reaches the maximum operating temperature specified.

1) Please also refer to the further information from Page 6/17.

Dimensioning the power section and drive

Overload capability of the drive converter

When **powering-up** the drive, the drive converter can be loaded with a higher current than the rated current I_N for up to 60 s. This maximum overload current for 60 s is:

- 1.13 I_N for drive converters for 2.3 kV
- 1.20 I_N for drive converters for 3.3 kV
- 1.13 I_N for drive converters for 4.16 kV

This is permissible since it may be assumed that the drive converter has still not reached the maximum temperature specified.

In operation, overload is only permissible if before overload the load current was less than the rated current I_N. For drives with overload duty, it is therefore necessary to use the following base load current for the required load:

- 0.75 I_N for drive converters for 2.3 kV
- 0.80 I_N for drive converters for 3.3 kV
- 0.75 I_N for drive converters for 4.16 kV

Thus, for a 560 s cycle time, the drives can be overloaded for 60 s with the following currents (refer to Fig. 6/2a):

- 1.13 I_N for drive converters for 2.3 kV
- 1.20 I_N for drive converters for 3.3 kV
- 1.13 I_N for drive converters for 4.16 kV

Drive converters for 6 kV and 6.6 kV as well as drive converters with Sinusoidal EMC filter (option L15) are not specified for overload. These drive converters are designed for drives with square-law load torque (pump and fan drives) and reach their maximum load at the rated current I_N.

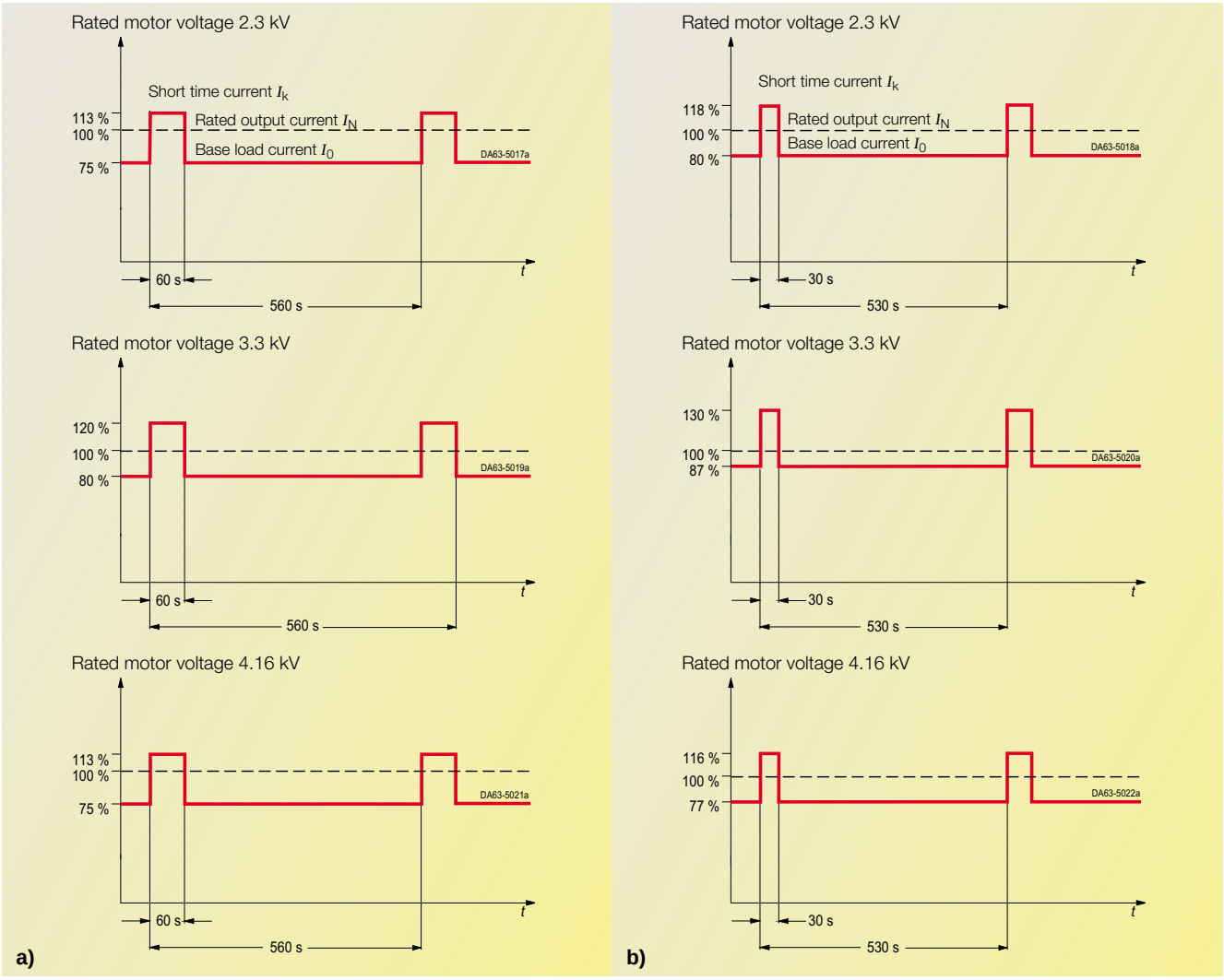


Fig. 6/2
Definition of the nominal as well as the overload and base load currents of the SIMOVERT MV drive converter for
a) a 60 s overload condition
b) a 30 s overload condition

Installation conditions and correction factors

If SIMOVERT MV drives are operated at installation altitudes of 1000 m above sea level and above or at ambient or cooling-medium temperatures > 40 °C, then the **current reduction factors** k_T and k_H, taken from Fig. 6/3 and Fig. 6/4 must be taken into account for the rated current.

The permissible continuous current I is given by:

$I \leq I_N \cdot k_H \cdot k_T$

I : permissible continuous current
I_N: rated current

Example:
Installation altitude 2000 m
Maximum ambient temperature 30 °C
Correction factor k_H = 0.9
Correction factor k_T = 1.0
$I \leq I_N \cdot 0.9 \cdot 1.0 = I_N \cdot 0.9$
The current must be de-rated for this particular example.

Hence, the converter may only be operated at 90% of its rated current.

At installation altitudes > 2000 m, in addition to a current de-rating the **voltage must be reduced** to comply with DIN VDE 0110/IEC 664-1. This reduction depends on the air and creepage distances in the drive.

The voltage reduction can be taken from Fig. 6/5 as voltage reduction factor k_U.

Example:
Drive 6SE8020-1CA01
Installation altitude 3000 m
Maximum ambient temperature 30 °C
2 × 3-ph. 2.2 kV AC, 2000 kVA, 280 A
Correction factor k_H = 0.84
Correction factor k_T = 1.0
Correction factor k_U = 0.9
$I \leq I_N \cdot 0.84 \cdot 1.0 = I_N \cdot 0.84$
Both the current and the voltage must be de-rated by 16% and 10% respectively.

The drive converter can still be operated from a line voltage 2 × 3-ph. 1.98 kV AC.

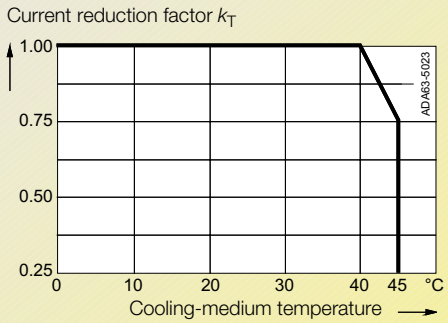


Fig. 6/3
Current reduction factor k_T as a function of the cooling-medium temperature

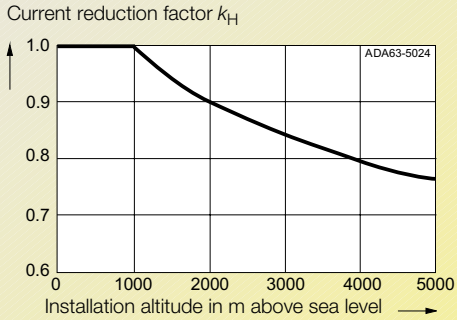


Fig. 6/4
Current reduction factor k_H as a function of the installation altitude

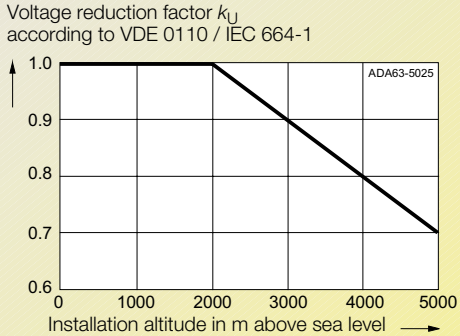


Fig. 6/5
Voltage reduction factor k_U as a function of the installation altitude

Dimensioning the power section and drive

Air cooling

Redundant fans (Option L34)

With the “redundant fan” option, when a fan fails, the drive converter can still be operated at its full output (please inquire for options **L08** (output choke) and **L15** (sinusoidal EMV output filter)).

Exceptions (see also the following table):

This option is not available for the following converter types:

- 2.3 kV 800 kVA, 1600 kVA and 2400 kVA
- 3.3 kV 1000 kVA, 2100 kVA and 3100 kVA
- 4.16 kV 1300 kVA, 2600 kVA and 4000 kVA
- 6/6.6 kV on request

The sound pressure level is increased by approx. 3 dB(A) when higher-rating fans are used.

Emergency operation for fan failure (Option M65)

With the “emergency operation in the event of fan failure“ option, when a fan fails, the drive converter can still be operated at reduced outputs according to the following table (please inquire for options **L08** (output choke) and **L15** (sinusoidal EMV output filter)).

Rated motor voltage											
2.3 kV			**3.3 kV**			**4.16 kV**			**6.0 kV / 6.6 kV**		
Rated output	Permissible output with option		Rated output	Permissible output with option		Rated output	Permissible output with option		Rated output	Permissible output with option	
	L34	M65		L34	M65		L34	M65		L34	M65
kVA	kVA	kVA	kVA	kVA	kVA	kVA	kVA	kVA	kVA	kVA	kVA
800	–	640	1000	–	800	1300	–	1000	660	on req.	on req.
1000	1000	800	1300	1300	1000	1700	1700	1360	1000	on req.	on req.
1200	1200	960	1500	1500	1200	2000	2000	1600	1200	on req.	on req.
1400	1400	1100	1800	1800	1440	2300	2300	1840	1300	on req.	on req.
1600	–	1300	2100	–	1700	2600	–	2100	1500	on req.	on req.
1800	1800	1440	2300	2300	1840	2900	2900	2300	1800	on req.	on req.
2000	2000	1600	2600	2600	2100	3300	3300	2640	2000	on req.	on req.
2200	2200	1800	2900	2900	2300	3700	3700	3000			
2400	–	1920	3100	–	2500	4000	–	3200			
						4700	–	on req.			
						5200	–	on req.			
						5900	–	on req.			
						6700	–	on req.			
						7200	–	on req.			

Note:

When engineering inlet and outlet air ducts for converter ventilation, care must be taken that the pressure drop at the air outlet is at least 800 Pa, and that the air rates quoted in the selection tables for the converters are observed (detailed information on request).

Water cooling

General information

The cooling unit dissipates drive converter power loss.

It comprises an inner de-ionized water circuit and an outer raw water cooling circuit (see Fig. 6/6).

The de-ionized water, which has been heated up in the inner cooling circuit of the drive converter, is pumped into the stainless steel water-to-water plate-type heat exchanger using a maintenance-free circulating water pump. The plate-type heat exchanger is connected to the raw water circuit at the customer's. The de-ionized water is cooled by the raw water of the external cooling circuit and then flows back to the drive converter (refer to Fig. 3/7).

The enclosed inner water circuit is filled with de-ionized water (completely de-salinated water) and is vented via a compensator (reservoir). Hence, this vessel must be situated at the highest point of the cooling circuit.

Cooling unit

Heat exchanger

Cooling water specifications in the raw water circuit:

- Chemically neutral, clean water with solids filtered out
- Max. grain size, of parts in the water ≤ 0.5 mm
- pH value 6.0 to 8.0
- Chlorides < 40 ppm
- Sulfates < 50 ppm
- Dissolved solids < 340 ppm
- Total hardness < 170 ppm
- Input pressure: min. 2 bar, max. 8 bar
- Cooling-water quantity: see converter selection tables in Part 3.

If values deviate from these, we recommend that the water is analyzed to ensure a long service lifetime of the heat exchanger.

For aggressive cooling water (also sea water), titanium heat exchanger plates should be used (option).

Monitoring equipment in the de-ionized-water circuit:

- Conductivity value measurement:
  The conductivity of the cooling water is between 0.2 µS/cm and 0.6 µS/cm. This value is continually monitored in order to ensure that the leakage currents in the drive converter, between different voltage levels and with respect to ground, remain low. When required, an ion exchanger is used, the charge (filling) of which must be replaced if high conductivity values occur. The ion exchanger filling usually lasts for at least 2 years after the first year, and can be replaced during operation without any risk.
- Temperature monitoring and display in the water intake and discharge
- Flow monitoring and evaluation
- A reservoir to equalize changes in the cooling water volume as a result of vaporization or temperature fluctuation
- Pressure display in the converter water intake

Monitoring equipment in the raw water circuit:

- Temperature monitoring in the water intake to the plate-type heat exchanger
- In order to avoid moisture condensation at low raw water temperatures, a control valve can be optionally installed. The flow quantity is only reduced (in order to reduce raw-water consumption) if the raw water does not contain any suspended solids which would then be deposited in the heat exchanger at low flow velocities.

Evaluation of the measuring data and control of the electrical equipment is carried out in the cooling unit before the data is sent to the drive converter.

Redundancy (option)

When requested, the cooling unit can be designed with redundancy or partial redundancy, i.e. two heat exchangers and two pumps are used, or only two pumps. In this case, defective parts can be replaced while the system is operational.

Water-to-air cooling unit (on request)

In the water-to-air cooling unit, the power loss is dissipated to the ambient air using a separately mounted heat exchanger. An intermediate water-glycol circuit is integrated if air temperatures of below 0 °C can be expected.

Technical data

Supply voltage	3-ph./N/PE/400 V AC ± 10 % 50/60 Hz ± 3 %
Raw-water circuit	
Water intake temperature	min. + 5 °C max. +35 °C
Water discharge temperature	max. +40 °C
Pressure drop	max. 1 bar

OVERT MV
g information

he power section and drive

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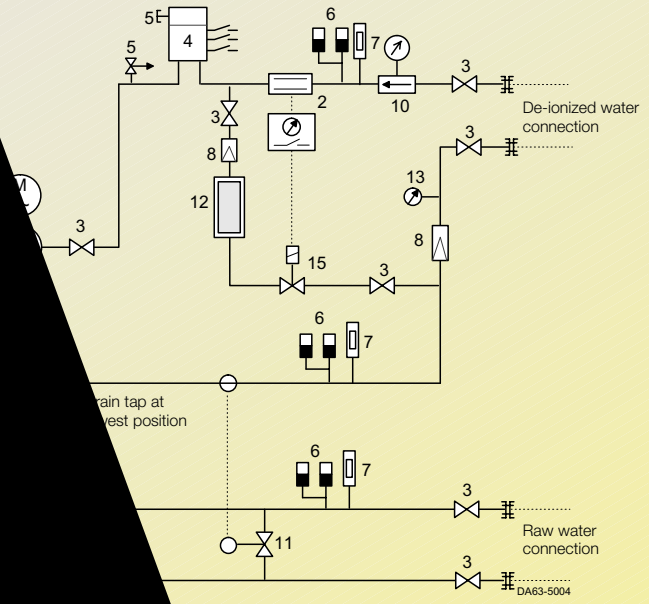


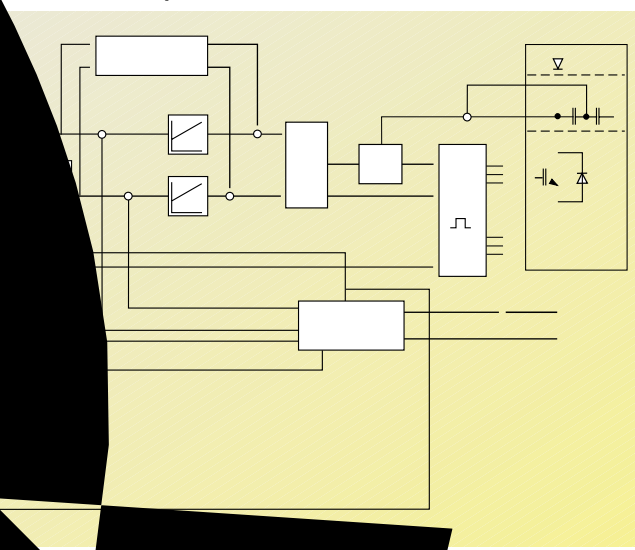
1 Heat exchanger
2 Conductivity measuring unit
3 Shut-off valve
4 Reservoir
5 Air vent
6 Double PT100
7 Block thermometer
8 Fine filter
9 Pump with motor
10 Flow monitor
11 Bypass control valve (option)
12 Ion exchanger
13 Manometer
14 Overpressure valve
15 Solenoid valve
16 Leakage water sensing

redundancy

at of a is the current components can be controlled independently of one another.

Using this Vector Control, specified torques can be maintained and effectively limited.

ontrol without speed encoder



Closed-loop speed control as field-oriented closed-loop control with speed encoder

Used for single-induction motor drives and high dynamic performance requirements even at low speeds and increased speed accuracy, e.g. positioning drives and drives for continuous material webs.

For this closed-loop speed control, a pulse encoder, e.g. incremental encoder with 1024 pulses/revolution or higher, is required. A DC tachometer is not adequate due to the accuracy requirements.

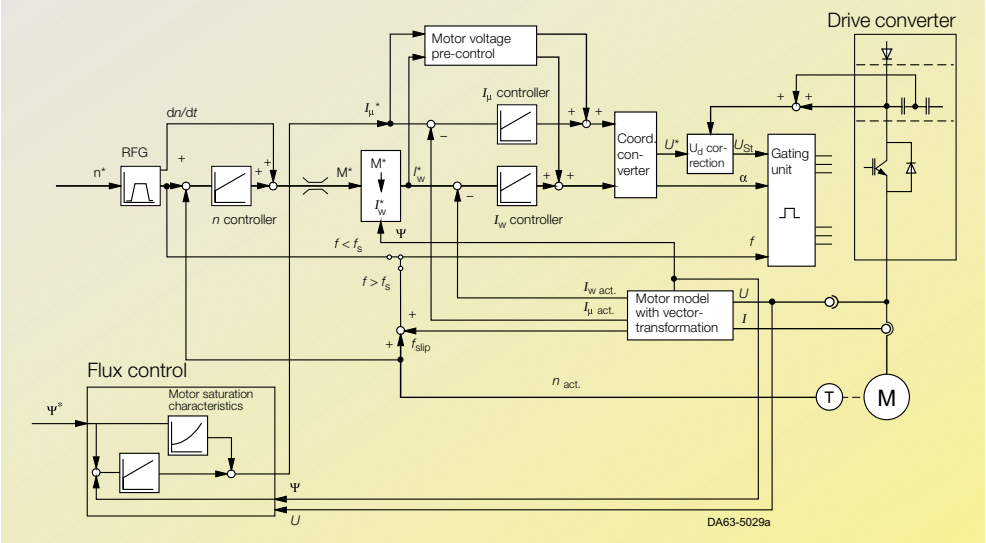


Fig. 6/8
Closed-loop speed control: Field-oriented closed-loop control with speed encoder

Closed-loop torque control as field-oriented closed-loop control with speed encoder

For single-induction motor drives for applications with high dynamic performance requirements, if for technical reasons a torque setpoint has to be entered, e.g. winder drives and slave drives with closed-loop tension control.

An incremental encoder is also required for this control concept, with preferably 1024 pulses/revolution or higher. A DC tachometer is not adequate due to the accuracy requirements.

Closed-loop control with or without speed encoder

In specific applications it is often unclear whether a speed encoder is needed or not.

A speed encoder is required if the following criteria apply:

- highest speed accuracy
- highest requirements on the dynamic performance
- closed-loop torque control in a control range > 1:10
- a defined or changing torque must be maintained for speeds below approx. 10 % of the rated motor speed.

Control terminal strip

Auxiliary power supply

The 400 V, 50 Hz auxiliary grid, which feeds the internal power supply GSV, the control electronics, the DC link pre-charge and the fans / the cooling system, is connected via the –X5 control terminal strip.

The user is responsible that the auxiliary power supply will be installed and connected-up according to the recognized regulations in that particular country as well as other regionally valid regulations. Cable dimensioning and fusing should be particularly observed.

Rated auxiliary current at 3/AC/N/400V (see converter selection tables)	Cross-section		Recommended fuse gL NH	
A	VDE mm^2	AWG	A	Type
10	4	10	25	**3NA3810**
20	10	6	35	**3NA3814**
38	16	4	63	**3NA3822**

Note:

The connection cross-sections are determined for copper cables at 40 °C (104 °F) ambient temperature.
Fuses of the type gL only provide reliable protection to the cables.

Option K75 allows connecting an auxiliary voltage other than 400 V/50 Hz to the –X860 terminal strip.

The converter has the –X100 control terminal strip to control and monitor the SIMOVERT MV drive from a control room.

The control terminal strip includes analog as well as digital inputs and outputs.

Control terminal strip (continued)

Function	Terminal	Type	Connected value Signal statuses	Comments
Control terminal strip –X5				
380 V, 400 V or 415 V auxiliary power supply	1 3 5 7 PE	I I I I I	L1 L2 L3 N PE	Cable diameter 16 mm^2 max.
Control terminal strip –X860 (only with option K75 and auxiliary voltage < 380 V or > 415 V, voltage must be quoted in plain text)				
480 V, 500 V or 690 V auxiliary power supply	1 3 5 7 PE	I I I I I	L1 L2 L3 N PE	Cable diameter 16 mm^2 max.
Control terminal strip –X100				
Safe power supply 230 V AC	6 16 PE	I I I	L1 N PE	e. g. through UPS power supply 1-ph./N/PE, 230 V AC ± 10 %, 50–60 Hz ± 3 % when connecting a UPS, two jumpers (X100: 3–4 and X100: 13–14) must be removed
External safety circuit	38 39	I I		When this function is used, the jumper fitted as standard must be removed and replaced by a NC contact
Safety shutdown	40 41	O O		**Safety shutdown prompted** NC contact 40–41 closed when safety shutdown is not prompted
Circuit-breaker connection	28 29	I I	 24 V DC	Feedback **CB ready for closing** active with contact 28–29 closed (can be set to contact open)
	30 31	I I	 24 V DC	Feedback **CB ON** active with contact 30–31 closed (can be set to contact open)
	32 33	I I	 24 V DC	Feedback **CB OFF** active with contact 32–33 closed (can be set to contact open)
	34 35 51	I I I	 24 V DC M 24 V	**Circuit-breaker "leading" contact** [1] active with contact 34–35 closed (can be set to contact open)
Permissible contact load: DC: 24 V / 10 A 110 V / 1 A 220 V / 0.3 A AC: 230 V / 6 A 400 V / 3 A	44 45	O O		**Circuit-breaker ON command** NO contact 44–45, ON command = contact closed [2]
	46 47	O O		**Circuit-breaker undervoltage release** NO contact 46–47, release = contact open
	48 49 50	O O O		**Circuit-breaker OFF command** NC contact 48–49, OFF command = contact open (use contacts only alternatively) [2] NO contact 49–50, OFF command = contact closed [2]
Output 24 V DC supply	52 53	O O	24 V DC M 24 V	electronics power supply 24 V DC, 0.8 A
Analog inputs (parameterizable)	A 212: 1 A 212: 2	I I		**Main actual value** (+) (–) Differential inputs, non-floating Input current 4–20 mA
	A 212: 5 A 212: 6	I I		**Supplementary actual value 1** (+) (–)
Digital inputs (parameterizable)	A 213: 1 A 213: 2	I I	 24 V DC	**ON command** [3] active with contact closed or contact closing (edge)
	A 213: 5 A 213: 6	I I	 24 V DC	**OFF1 command** [3] active with contact open
	A 214: 1 A 214: 2	I I	 24 V DC	**OFF2 command** [3] active with contact open
	A 214: 5 A 214: 6(7)	I I	 24 V DC (M 24 V)	Not occupied [3]
	A 215: 1 A 215: 2(3)	I I	 24 V DC (M 24 V)	Not occupied [3]
	A 215: 5 A 215: 6(7)	I I	 24 V DC (M 24 V)	Not occupied [3]
	A 216: 1 A 216: 2(3)	I I	 24 V DC (M 24 V)	Not occupied [3]
	A 216: 5 A 216: 6	I I	 24 V DC	**Acknowledge command** [3] active with contact closing (edge)

I = input
O = output

1) See notes on Page 6/16.
2) Pulse or continuous signal parameterizable (factory setting: continuous signal).
3) Factory setting

Function	Terminal	Type	Connected value Signal statuses	Comments
Control terminal strip –X100 (continued)				
Digital outputs (parameterizable)	A 219: 1 A 219: 2	O O		**Ready to power-up** signal [1] NO contact A 219: 1–2 closed [2]
	A 219: 5 A 219: 6	O O		**Ready** signal[1] NO contact A 219: 5–6 closed [2]
	A 220: 1 A 220: 2	O O		**Operation (run)** signal[1] NO contact A 220: 1–2 closed [2]
	A 220: 5 A 220: 6	O O		**Drive converter fault** signal [1] NO contact A 220: 5–6 closed [2]
	A 221: 1 A 221: 2	O O		**Drive converter alarm** signal [1] NO contact A 221: 1–2 closed [2]
	A 221: 5 A 221: 6	O O		**Drive turns rotating clockwise** signal [1] NO contact A 221: 5–6 closed [2]
	A 222: 1 A 222: 2	O O		**Local operation selected** signal (basic) [1] NO contact A 222: 1–2 closed [2]
	A 222: 5 A 222: 6	O O		**Remote operation selected** signal (reserve) [1] NO contact A 222: 5–6 closed [2]
Analog outputs (parameterizable)	A 217: 1 A 217: 3	O O		**Motor speed** [1] (+) (–) Outputs, non-floating Output current 4–20 mA
	A 217: 5 A 217: 7	O O		Not occupied [1] (+) (–)
	A 218: 1 A 218: 3	O O		Not occupied [1] (+) (–)
	A 218: 5 A 218: 7	O O		Not occupied [1] (+) (–)
Digital inputs for external auxiliaries (not parameterizable)	A 242: 1 A 242: 2(3)	I I	24 V DC (M24)	Feedback **external auxiliaries on** active with contact closed (jumper contact if not used)
Digital input for local/remote keylock switch	A 242: 5 A 242: 6(7)	I I	24 V DC (M24)	Input **keylock switch operating mode local/remote** selection local = contact closed
Digital inputs for external auxiliaries, motor, transformer e.g. for connecting PT100 or PTC analyzing (parameterizable)	A 243: 1 A 243: 2(3)	I I	24 V DC (M24)	**Transformer alarm 1** activ with contact open
	A 243: 5 A 243: 6(7)	I I	24 V DC (M24)	**Transformer fault 1** activ with contact open
	A 244: 1 A 244: 2(3)	I I	24 V DC (M24)	**Transformer alarm 2** activ with contact open
	A 244: 5 A 244: 6(7)	I I	24 V DC (M24)	**Transformer fault 2** activ with contact open
	A 245: 1 A 245: 2(3)	I I	24 V DC (M24)	**Motor alarm 1** activ with contact open
	A 245: 5 A 245: 6(7)	I I	24 V DC (M24)	**Motor fault 1** activ with contact open
Digital outputs for external auxiliaries, motor, transformer, cooling system (parameterizable)	A 246: 1 A 246: 2	O O		**External auxiliaries ON** command [1] NO contact A 246: 1–2, ON command = contact closed [2]
	A 246: 5 A 246: 6	O O		**Converter is off** signal [1] NO contact A 246: 5–6 closed [2]
	A 247: 1 A 247: 2	O O		**ACKNOWLEDGE external auxiliaries** command [1] NO contact A 247: 1–2, acknowledge command = contact closed [2]
	A 247: 5 A 247: 6	O O		**Transformer fault 1** signal [1] NO contact A 247: 5–6 closed [2]
Connecting a digital speed encoder	17 18	I I		**Track 1** Track 1 neg.
	19 20	I I		**Track 2** Track 2 neg.
	21 22	I I		**Track N** Track N neg.
	23	I		**Control track**
	25 27	I I	P 24 V M 24 V	SITOP **power supply**
				Input voltage range: Differential voltage –30 V to +30 V 0 signal –30 V to +4 V 1 signal +8 V to +30 V Pulse frequency: 100 kHz max. Phase difference between the track signals 200 ns min.

1) Factory setting
2) Can be set to contact open

O = output
I = input

Motors 2.3 kV, 3.3 kV, 4.16 kV

A filter is not required between the H-compact/H-compact PLUS, H-modul 3 high-voltage motors and SIMOVERT MV drive converters. The following measures guarantee reliable operation of the drive:

- The MICALASTIC VPI insulation system is optimally suited for the voltage stressing which occurs in converter operation.
- No dangerous bearing currents occur as insulated bearings are used on the drive end and a shaft-grounding device on the non-drive end. The following applies for the shaft grounding device: If no digital speed encoder is used (standard), it is mounted in a separate enclosure (no code is required when ordering). When a digital speed encoder is used, it is integrated there (code for digital speed encoder H76, refer to section 4).
- In order to effectively protect the bearings of the driven load, we recommend that insulated couplings are used.

  The rubber-elastic couplings used in most applications are already isolated. For almost all other applications, insulated couplings are available as standard from coupling manufacturers.

For the H-compact and H-compact PLUS and H-modul 3 high-voltage motors, the technical data for the following main applications are specified in section 4

- drives with square-law load torque, and
- constant-load torque drives.

They are valid for a cooling-medium temperature of 25 °C (water) or 40 °C (air), an installation altitude up to 1000 m as well as utilization in accordance with temperture rise class F. For other conditions, the factors specified in the tables on Pages 4/4 and 4/30 must be taken into account. If the motors may only be utilized in accordance with temperature rise Class B, then they must be de-rated down to 88 %.

Motors 2 x 4.16 kV

For increased output of the SIMOVERT MV converters, it is possible to connect two input rectifiers and two inverters in parallel. In so doing, a maximum output current of up to 7.2 MVA at an output voltage of 4.16 kV can be achieved.

In order to ensure balanced current between the two partial systems, the motor requires two electrically isolated winding systems which have no electrical phase offset (Fig. 6/9).

Separate winding systems are available for the high-voltage motors H-compact PLUS and H-modul 3. No output filter is required for these motors.

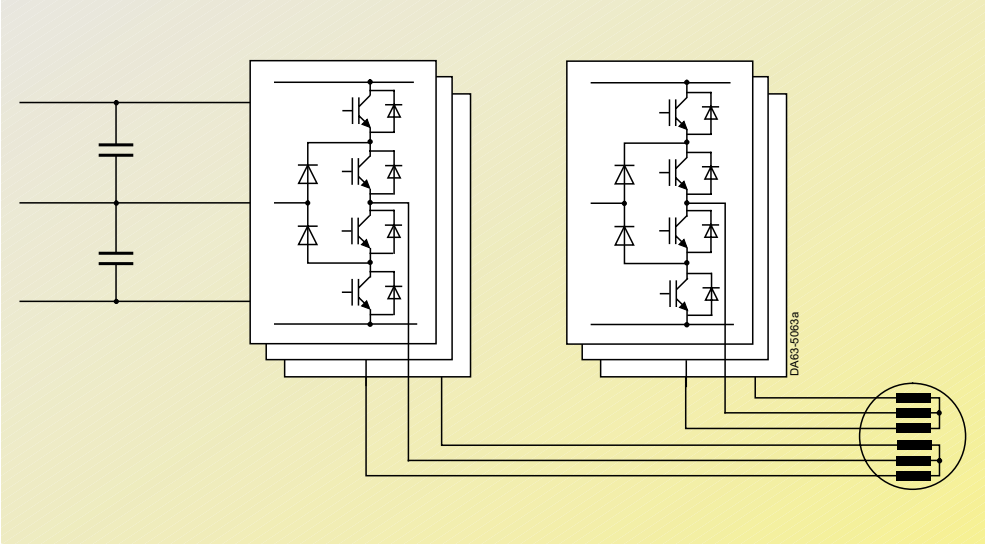


Fig. 6/9
Parallel connection: inverter side with two winding systems in the motor

Motors 6.0 kV and 6.6 kV

SIMOVERT MV drive converters for output voltages 6.0 kV and 6.6 kV have an IHV-Filter (**I**ntegrated **H**igh **V**oltage).

These motors can be connected directly to the line supply. No shaft grounding device and no insulated coupling are required.

Please take account of the following notes:

- Using 6.0/6.6 kV converters is allowed only for drives with square-load torque (and starting torque reduced accordingly), i.e. not for constant-torque drives.
- The permissible speed range is 1:10 max., the maximum output frequency is 66 Hz.

2-pole motors

Fast converter-fed drives with 2-pole motors require special measures regarding their mechanical design (limit and critical speed, bearings, rotor design, adaptation to the foundation).

For these applications, we recommend that you contact the factory.

For Retrofit applications, the motors must not show mechanical self-resonant frequency.

If required, affected speed ranges can be faded by the converter.

Explosion-proof motors

The motors are suitable for use in hazardous areas. Regarding the types of protection, the design corresponds to the fixed-speed motors.

In addition, the shaft grounding device has the type of protection EEx d IIC T6 (without rotary pulse encoder) / EEx de IIC T6 (with rotary pulse encoder).

Available types of protection for the motors:

Pressurized enclosure
EEx pe IIC T3 to DIN EN 50 016
Non sparking EEx n AIIC T3
to DIN EN 50 021

Please always inquire for motors with increased safety EEx e.

Drives with square-law load torque

Drives with square-law load torque ($M \sim n^2$) such as pumps and fans require the full torque at rated speed. Generally, increased starting torques or load surges do not occur. Thus, the drive converter does not have to be dimensioned for an overload condition.

The following applies when selecting a suitable drive converter for square-law load torques: The rated drive converter current must be at least as high as the motor current which flows at full torque at the required load operating point.

Constant-load torque drives

Self-ventilated motors cannot provide their full rated torque in continuous operation over the complete speed range. The continually permissible torque decreases with decreasing speed due to the reduced cooling effect (refer to diagrams 4/4 and 4/8).

With self-ventilated motors, the torque and output must be reduced according to the specific speed control range.

Depending on the speed control range, no or only a comparatively minor derating in torque, and hence in output, is necessary with force-ventilated motors.

In the selection and ordering data for constant-load torque drives in section 4, the required torque reduction, as a function of the speed control range, is already taken into account for every motor.

For frequencies above the rated frequency f_N, the motors are operated in the field-weakening range. In this case, the utilizable torque decreases with approximately f_N/f, the output remains constant. Also, a margin of ≥ 30 % to the stall torque must be considered, which decreases according to the function $(f_N/f)^2$.

The motor and drive converter assignment for constant-load torque drives (M = constant) is best made such that starting from the permissible torque, for continuous duty (S1), a 50 % overload is possible for 60 s. This means that there is generally sufficient reserve for breakaway and accelerating torques.

Thus, the base load current of the drive converter should be selected to be at least as high as the motor current at the full torque and at the required load point.

The engineering tool PATH SIMOVERT MV supports selection of the right motors and converters for specific applications.

EMC – Electromagnetic compatibility

Introduction to EMC

Electromagnetic compatibility (EMC) is the ability of electrical equipment to function fault-free in a specified electromagnetic environment, without influencing the environment in an inadmissible way.

Thus, EMC represents a quality feature for

- **Intrinsic noise immunity:** Immune to internal electrical faults and disturbances
- **Immunity to external disturbances:** Immunity to electromagnetic quantities which are external to the system
- **Level of noise emission:** Influencing the environment as a result of electromagnetic radiation

A noisy environment cannot be neglected for disturbance-free operation of the drive converter in a plant. Thus, special measures have to be observed when designing the plant together with its EMC layout.

Operational reliability and noise immunity

In order to achieve the best possible operational reliability and noise immunity of a complete plant or system (drive converter, automation, drive driven load etc.) the drive converter manufacturer and user must apply specific measures.

Perfect functioning of the drive converter and compliance with the relevant legislation (89/336/EC) can only be guaranteed if all of these measures are applied.

Noise emission

The IEC 1800-3 Product standard (corresponds to EN 61800-3) specifies certain requirements for drive converters with operating voltages under 1000 V, and is therefore not applicable for the power circuits of the SIMOVERT MV drive converter. The drive converter will meet the requirements on 3-ph. 400 V AC auxiliary voltage for industrial use if it is implemented according to the following instructions.

Use and operation

SIMOVERT MV drive converters are designed in accordance with EN 50081-2 and EN 50082-2 for use in industrial environments. They may not be operated from the public low-voltage network. They must always be operated with the cabinet doors closed.

Motor feeder cables

The motor feeder cables must be screened as standard. The screen must be grounded at both ends. When 6 kV and 6.6 kV drive converters, and the optional sinusodial EMC output filter, are used, the motor feeder cables need no screening (also refer to Fig. 6/1).

Connecting the system components

All of the system components which are connected through signal cables, must also be connected with potential bonding conductors (exception: Components with fiber-optic cable links).

Potential bonding rail and screen rail

Every cabinet has a potential bonding and grounding rail to simply connect-up the potential bonding conductors. All of the internal and external components must be connected with one another using this potential bonding rail.

All of the cabinets associated with the networked drives must be connected with one another through potential bonding cables (min.16 mm^2) (the customers PE connection is not adequate).

The screens of incoming and outgoing cables must be directly connected to the serrated screen rail. The screens should be connected through the largest possible surface area to establish the best electrical connection.

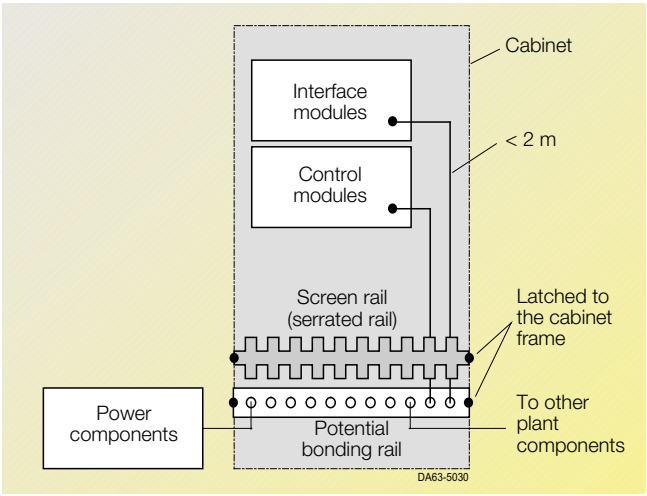


Fig. 6/10
Block diagram of the potential bonding rail and the screen rail

Use and operation (continued)

Protective grounding

The protective ground is connected to the cabinets and components via the protective conductor (PE). The grounding plate, and the terminal for the auxiliary power, are used for this purpose.

The protective ground is exclusively used to protect against indirect shock hazard and must be routed in addition to the potential bonding conductor. The protective conductor must be routed in accordance with DIN VDE 0100 and DIN VDE 0160.

When possible, the cabinet should be connected with the building ground through the largest possible surface area.

Signal cables, screening

Cables entering the cabinet from outside (e.g. from the terminal modules), may not be routed in a common cable duct together with the internal cabinet wiring.

All of the signal cables must be screened. The cable screen should be braided, as the screening performance of these screens is 5 times better than cables with foil-type screens. The cable screens should be connected at both ends. Single-ended grounding is only advantageous in a few exceptional cases.

For incoming screened cables (analog and digital signals), the screen must be clamped to the screen rail where the cable enters the cabinet. The cable must then be routed, screened up to the terminal module and up to the module. No screens are connected to the terminal modules/modules.

Serial connecting cables must be screened. The screen must make contact with the metalized connector housing.
In addition, it must also be connected to the screen rail. It is not permissible that the cable screen is connected to a ground pin of the connector.

It is not effective to use the connector housing and the front panels of the modules for screening. The screen cables must be connected at both ends to the screen rails of the cabinet.

Analog signal cables must always be screened, both in the cabinet as well as outside the cabinet.

Reserve cores in the cable can be grounded at both ends to enhance the screening effect.

Single-sided grounding of the cable screens

For analog signal cables, which conduct low signal levels (mV or µA), the cable screen is connected on one side to the screen rail in the cabinet (this avoids ground loops and inductive/parasitic interference at the line frequency). The open end of the screen can then be connected to the housing through a noise suppression capacitor (e.g. 0.1 µF 100 V MKT).

Routing cables

- All of the signal cables must be screened.
- The signal cables must be separated in accordance with signal groups.
- Cables with digital signals may not be routed together unscreened next to cables with analog signals. If shared signal cables are used, the individual signals must be mutually screened.
- Cables must be routed as close as possible to grounded sheet steel panels. This reduces noise signals which are inductively coupled in.
- Unnecessary cable lengths should be avoided since they result in additional coupling capacitances and coupling inductances.
- There must be a minimum clearance of > 20 cm between signal cables and power cables below 500 V AC; there must be a clearance > 30 cm to power cables above 1 kV AC.
- If possible, power cables should cross over one another at an angle of 90°.

Undampened contactors

It is not permissible to use undampened contactors in the converter cabinets. Thus, all of the contactors mounted in the factory are dampened. If undampened contactors are used in an adjacent cabinet, then the cabinets must be partitioned off using side panels.

Contactor coils which are connected to the same supply network as the converter auxiliary power supply, or located close to the drive converter, must be provided with surge limiters (RC elements, varistors).

Additional cabling

Any additional cabling in the cabinet should be kept as short as possible, and should be routed close to the cabinet housing or mounting panels.

Unscreened cables associated with the same circuit (outgoing and incoming conductor) should be twisted.

Circuit-breaker

The circuit-breaker, connected at the primary side of the incoming transformer, is part of the drive converter safety system. If a fault was to occur within the converter, then the energy discharged at the fault location must be limited. This is realized as a result of the inductance of the incoming transformer ($u_{K\,min}$ = 6 %), which limits the rate-of-rise and the circuit-breaker which trips as quickly as possible.

In order to guarantee these conditions, the circuit-breaker must have the following features:

- The complete release time of the circuit-breaker may not exceed 80 ms.
- The circuit-breaker must be equipped with an undervoltage release. The undervoltage release (undervoltage coil) is controlled through the release circuit, into which also the “undervoltage release” output of the converter is to be integrated. The power is supplied by the auxiliary voltage (safe supply) of the switching unit.

  Note:
  In converters, the undervoltage release is usually not supplied by voltage transformers connected to the main grid; undervoltage in the main grid will not lead to turn-off by the switching unit / voltage transformer.
- To prevent the converter from switching off showing sequential signals which cannot be assigned if the circuit-breaker is tripped externally, the converter must be powered off by means of a leading contact before the main circuit-breaker contacts open. In addition, a relating signal (“circuit-breaker external tripping”) is generated/emitted.

Circuit-breaker (continued)
Since many circuit-breakers have no mechanically leading contact, this contact may be realized in various ways:

1.) If a digital overcurrent relay is used, all **power-off conditions** of the circuit-breaker (internal and external, e.g. Buchholz release, ...) must be recorded and programmed on two release contacts with equivalent function. One release contact is wired to the "leading contact" input of the converter, the second to the undervoltage release of the circuit-breaker.

2.) The voltage at the undervoltage coil is checked by means of an optocoupler. The optocoupler output is wired to the "leading contact" input. Recommended optocoupler: e.g. Phoenix ST-OE 3 with short-circuit-proof 24 V direct voltage output, the exact type is determined by the auxiliary voltage of the switching unit (input data of the optocoupler, see Fig. 6/11).

- There must be a checkback signal for the circuit-breaker OPEN condition
- The circuit-breaker must have overcurrent time protection
- A mechanical interlock of the manual CLOSE command at the circuit-breaker prevents the converter from being destroyed due to uncoordinated power-on

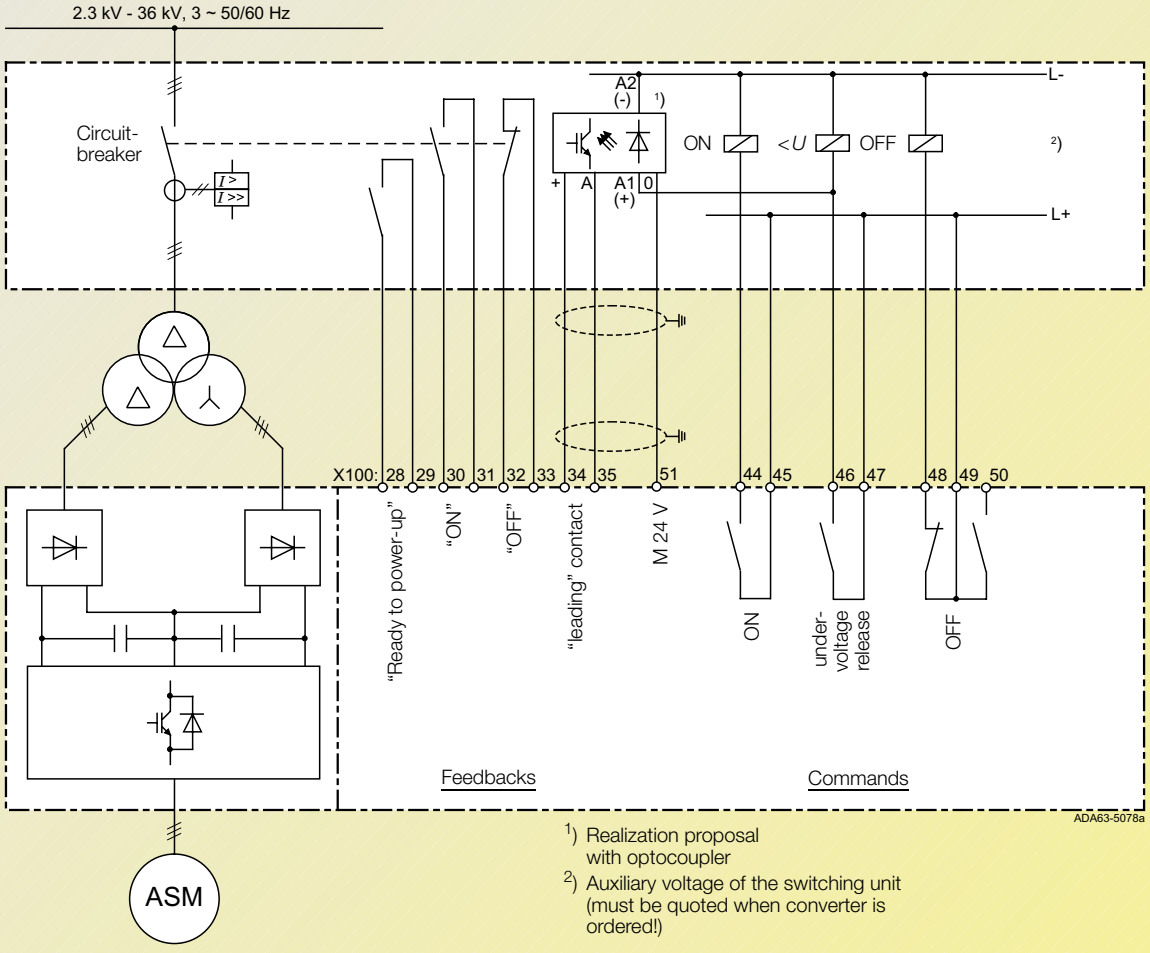


Fig. 6/11
Circuit-breaker control

Transformers

The SIMOVERT MV converter is connected to the medium-voltage system via a converter transformer. The standard 12-pulse DFE requires a three-winding transformer; the optional 24-pulse DFE two three-winding transformers or one five-winding transformer.

When the transformer is implemented, the SIMOVERT MV drive (converter and motor) is decoupled and electrically isolated from the mains supply:

- The short-circuit power is thus reduced to a value smaller than max. permissible
- The motor is operated ground-free
- Emergency operation in the event of ground faults (on req.)
- Low harmonic distortion through 12-pulse DFE

An insulation monitoring device in the converter monitors the insulation status between secondary transformer winding and motor.

Three-winding transformer

The secondary windings of the three-winding transformer have a phase angle of 30 ° el., resulting in 12-pulse infeed combined with lower harmonic distortion.

Apart from electrical and thermal stress during converter-fed operation, also the following properties have to be taken into account when engineering the transformer:

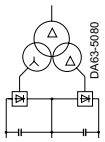
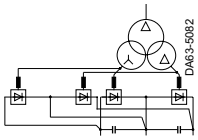
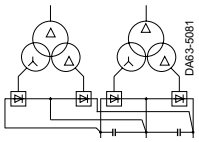
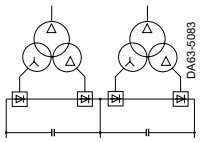
- Impedance voltage u_k: 6 % min.
- Tappings for voltage adjustments: 2 x ± 2.5 % or ± 5 % for operation with output filter. The winding tappings are usually located on the HV-side of the transformer.
- Secondary side insulation voltage, according to the following table.

Three-winding transformers for converters with power section in parallel circuit

The infeed on the line side can be carried out via a shared 12-pulse transformer circuit for both partial systems (see Fig. 6/12). Infeed is also possible via two separate 12-pulse transformers (see Fig. 6/13).

With the shared 12-pulse transformer circuit, commutating reactors with $u_k \geq 2$ % must be used in the corresponding rectifier cable. If there is enough space, the reactors must be fitted close to the transformer.

Transformer secondary voltages and related isolating voltages

		12-pulse infeed			24-pulse infeed	
			Parallel circuit	Parallel circuit		
Infeed with		1 Three-winding transformer	1 Three-winding transformer and commutating reactor (see Fig. 6/12)	2 Three-winding transformers* (see Fig. 6/13)	2 Three-winding transformers *	* Instead of the two 3-winding transformers, a 5-winding transformer can be used by arrangement with the manufacturer.
Circuitry						
Recommended vector group		Dy5 Dd0	Dy5 Dd0	Dy5 Dd0 Dy5 Dd0	Dy5 Dd0 +7.5 ° angle Dy5 Dd0 –7.5 ° angle	
Converter output voltage	Converter rated output	Transformer secondary voltage	Transformer secondary voltage	Transformer secondary voltage	Transformer secondary voltage	**Insulation voltage of the secondary windings**
kV	kVA	kV	kV	kV	kV	**kV**
2.3	800 – 2400	2 x 1.2	–	–	2 x 0.6 (2x)	**3.6**
3.3	1000 – 3100	2 x 1.7	–	–	2 x 0.85 (2x)	**7.2**
4.16	1300 – 4000	2 x 2.2	–	–	2 x 1.1 (2x)	**7.2**
2 x 4.16	4700 – 7200	–	2 x 2.2	2 x 2.2 (2x)	–	**7.2**
6.0/6.6	660 – 2000	2 x 1.2	–	–	2 x 0.6 (2x)	**12.0**

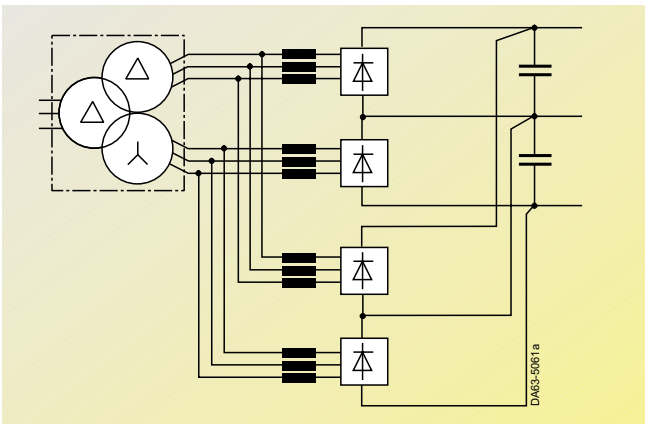


Fig. 6/12
Parallel circuit: Rectifier side with a shared 12-pulse converter transformer and commutating reactors

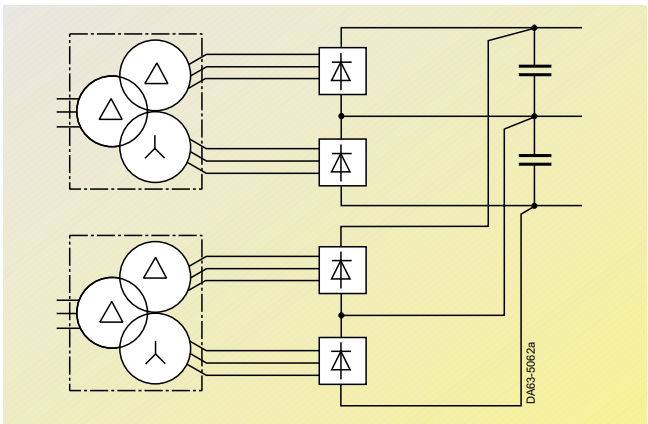


Fig. 6/13
Parallel circuit: Rectifier side with two 12-pulse converter transformers

Braking chopper and braking resistor

If brake operation is required for a SIMOVERT MV diode rectifier, an optional braking chopper with braking resistor can be implemented.

Like the motor-side inverter, the **braking chopper** in the output range P_{20} = 400 kW to 2000 kW consists of Power-Cards with HV-IGBT power semiconductors. This guarantees the same modular design as with the converter in standard design. The braking chopper design is automatically adapted to the cooling principle of the converter (air or water cooling).

For the braking chopper the same engineering information applies as with the power section dimensioning of the converter (Page 6/4 and 6/5).

An external load resistor is connected via two connectors (center tap not required) to serve as **braking resistor**. When the converter is installed, care must be taken that there is enough space around the unit for the power loss of the braking resistor; if necessary, the braking resistor should be installed outside the room.

Chopper braking data with external load resistor

Converter type output	Rated converter voltage	Braking resistance required (tolerance ± 20%)	Chopper braking power	
P_N kVA	U_N kV	R Ω	P_{20} kW	P_{DB} kW
800	2.3	26 – 4	400	170
1000 – 1400	2.3	13 – 20	800	150
1600 – 2400	2.3	8.68 – 13.3	1200	200
1000	3.3	40.8 – 62.6	500	300
1300 – 2100	3.3	20.4 – 31.2	1000	400
2300 – 3100	3.3	13.6 – 20.8	1500	500
1300	4.16	45.4 – 70	700	300
1700 – 2600	4.16	26.6 – 40.8	1200	500
2900 – 7200	4.16	16 – 24.5	2000	600

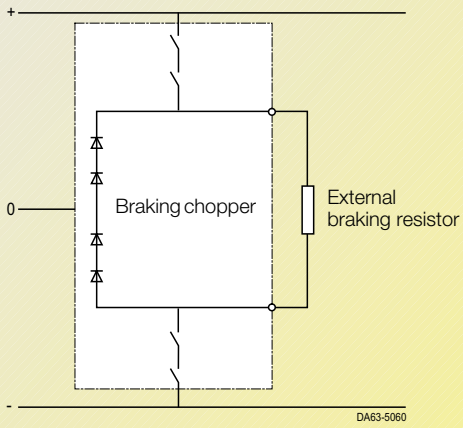
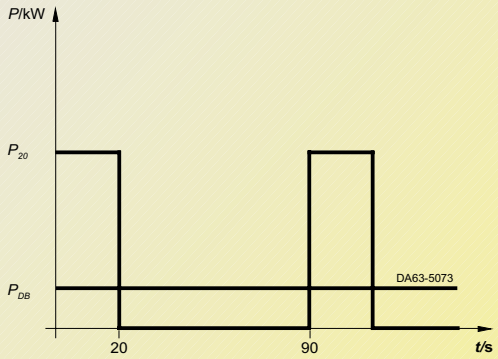


Fig. 6/14
Block diagram braking chopper with braking resistor



P_{DB} = Continuous output
P_{20} = Output permissible for 20 s every 90 s

Fig. 6/15
Load diagram

Output reactors

Output reactors limit capacitive pre-charging currents for long cables.

The maximum cable lengths which can be connected as standard without having to use reactors, are specified in the first table on this page. Longer cable lengths should be dimensioned according to the second table.

The reactors have iron cores and are suitable for drives with standard induction motors and a rated motor frequency (frequency at the start of field weakening) of up to 150 Hz.

The output reactors limit the rates-of-rise of the voltages at the motor winding due to cable capacitances.

Maximum cable length[1]) without output reactor

Rated drive converter output	Rated voltage	Maximum cable length	
		Screened cables	Unscreened cables
0.8 MVA to 7.2 MVA	2.3 kV to 4.16 kV	100 m	–
0.66 MVA to 2.0 MVA	6.0 kV to 6.6 kV	1000 m	1000 m

Maximum cable length[1]) with output reactor

No. of reactors in series		1 reactor	
Rated drive converter output	Rated voltage	Maximum cable length	
		Screened cables	
0.8 MVA to 7.2 MVA	2.3 kV to 4.16 kV	1000 m	

Sinusoidal EMC filter for third-party/old motors

If fixed-speed motors or non-Siemens motors are to be used for variable-speed drives together with SIMOVERT MV, then a sinusoidal EMC filter must be connected between the drive converter and motor. It should be observed that only loads with a square-law torque characteristic (fans and pumps) can be driven; field weakening is not permissible.

Constant-load torque drives on request.

When using sinusoidal EMC filters, the drive converter output quantities are almost sinusoidal. The voltage distortion for a 50 Hz output frequency is less than 5 % when a sinusoidal EMC filter is used. The stressing on motors, which are supplied via sinusoidal EMC filters, lies under the values according to DIN VDE 0530.

When using a sinusoidal EMC filter, the output must be reduced (see technical data part 3).

When ordering the sinusoidal EMC filter the motor rated current, the motor current in the operating point and the motor no-load current should be stated in plain text.

The possible output frequency lies in the range between 20 Hz and 66 Hz max.

Sinusoidal EMC filters are suitable for supplying Ex(pe) motors in EEx pe type of protection (see note on Page 6/13).

Note:
SIMOVERT MV drive converters for output voltages of 6.0 kV and 6.6 kV have an IHV output filter (**I**ntegrated **H**igh **V**oltage) as a standard. For this filter, the same engineering information applies as for the sinusoidal EMC filter.

Maximum cable lengths using sinusoidal EMC filters

Output	Rated voltage	Maximum cable length	
		Screened cables	Unscreened cables
0.66 MVA to 3.64 MVA [2])	2.3 kV to 4.16 kV	1000 m	1000 m

1) Distance between the drive converter and motor, depending on the current, for max. 3 parallel 3-conductor EMC cables.

2) Higher outputs on request.

Output cables

When SIMOVERT MV drive converters are operated without an output filter, then higher voltages occur at the motor terminals and therefore at the cable. These are caused by the switching edges.

The three-core halogene-free SIENOPYR medium-voltage motor connecting cables 3GSEGCH....FC and 3GSEH....FC are admirably suited for AC drives, directly fed from SIMOVERT MV. They have multi-core, bare copper conductors in accordance with IEC 60228 Class 2 and an inner semiconductive extruded layer.

The high quality core insulation using a special Ethylene-Propylene rubber (EPR) corresponding to IEC 60092-351 has excellent electrical and thermal properties. The external extruded semiconductive layer is according to IEC 60092-354. It can be easily removed from the insulating sheath without leaving any residual material (easy strip feature).

The core screen above it consists of two layers of copper tape. The cores are twisted; adjacent core screens are electrically connected to one another over the complete cable length. The common core layer consists of a halogene-free polyolefine compound.

For the 3GSEH.....FC type, an external sheath is provided above this (refer to Fig. 6/16).

The armoured (over all braiding) version 3GSEGCH....FC has spun bare copper wires over the complete core layer. This also has a helically applied copper tape which is covered by the isolating layer. We recommend this version in order to fulfill the relevant EMC requirements and to avoid disturbances with adjacent electrical equipment.

The red outer sheath of both types consists of a halogene-free olefine-copolymer (SHF1) according to IEC 60092-359

One of the most important features is the ease with which the insulation and the outer sheath are removed for all cable dimensions.

We recommend end connections for connecting the cable. The high-frequency capacitive leakage currents of the cable can be easily discharged to ground using these end caps.

Use

The output cables with the Order No. 5BG380 and 5BG381 are suitable for permanent routing in all rooms and outdoors.

Output cables with the Order No. 5BG382 are suitable for permanent routing under the ground.

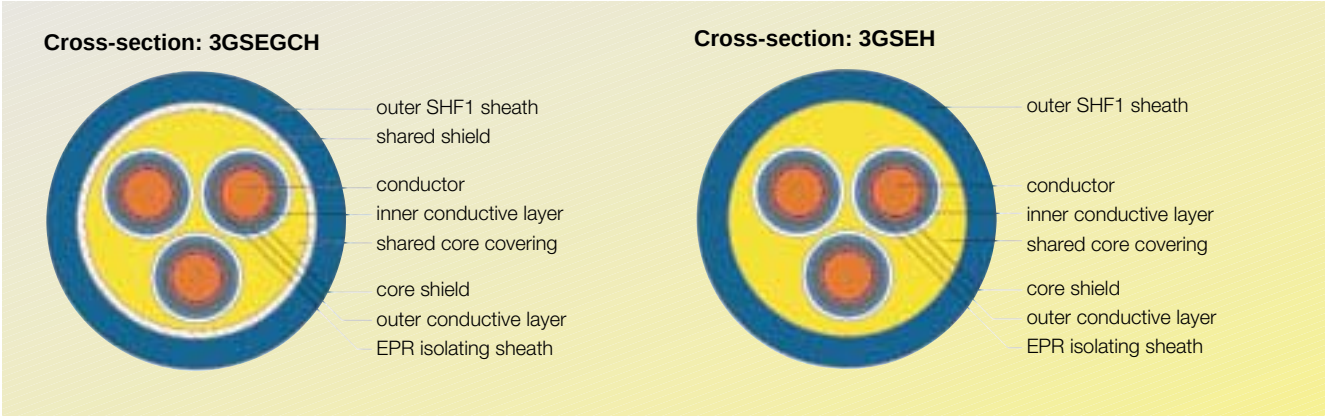


Fig. 6/16
Design of the SIENOPYR® medium-voltage motor connection cables 3GSEH and 3GSEGCH

General technical data

Rated voltage for drive converter operation	4.16 kV
AC test voltage	21 kV
Conductors	Copper, stranded, compressed, acc. to IEC 60228, Class 2
Inner semi-conductive layer Material: Wall thickness:	 Rubber 0.6 mm (nominal value)
Insulating layer Material: Wall thickness:	 Ethylene-Propylene rubber (EPR) acc. to IEC 60092-351 acc. to IEC 60092-354
Outer semi-conductive layer Material: Wall thickness:	 Rubber 0.7 mm (nominal value)
Core screen Nominal cross-section: • for a nominal conductor cross-section 35 to 120 mm² • for a nominal conductor cross-section 150 mm² The nominal cross-section of the core screen is the sum of the cross-sections of all indiv. core screens.	All of the cores are wound with two copper tapes 16 mm² 25 mm²
Core coding	Numbers are printed on the conductors 1-2-3 on the black external layer
Core sheath Material:	 Polyolefine compound, black
Armouring Cross-section:	Spun bare copper wires with a helically applied bare copper tape acc. to IEC 60092-354. approx. 0.5 conductor cross-section, geometrical
Sheath Material: Wall thickness:	 SHF1 compound acc. to IEC 60092-359, red acc. to IEC 60092-354
Cable coding on the sheath	*Year of manufac.* SIENOPYR *Type code* Rated voltage value kV FC IEC 60092-354
Coding is repeated every	 approx. 500 mm
Corrosive properties of the combustion gases	 Test acc. to IEC 60754-2
Smoke density	Test acc. to IEC 61034
Temperatures: Permissible operating temperature of the conductor Cable/ambient temperature when laying cable Cable temperature when routed	 max. 85 °C min. –10 °C, max. 55 °C min. –30 °C
Min. bending radii	15 x outer cable diameter
Strain Maximum permissible tension:	 50 N/mm² x (sum of the cross-sections of all conductors, mm²)
Permissible operating duration for a conductor fault to ground	In non-grounded networks: max. 8 h; however, a total of not more than 125 h within one year.

Current carrying capacity of the conductors

For continuous operation, at 45 °C ambient temperature; max. 6 cables, horizontally arranged, side-by-side, free air circulation around the cable bundle.

Core number: 3 Conductor cross-section in mm²	35	50	70	95	120	150
Current rating [A]	102	126	158	193	224	256

Correction factors

For other ambient temperatures, the maximum specified permissible currents must be multiplied by the following factors K:

Ambient temperature [°C]	30	35	40	45	50	55	60	65	70	75
Correction factor *k*	1.17	1.12	1.06	1.00	0.94	0.87	0.79	0.71	0.61	0.5

Output cable (continued)

Selection and ordering data

No. of conductors and nominal conductor cross-section (stranded)	Order No.	Conductor diameter	Outer diameter (Max. value)	Permissible bending radius (lowest value)	Weight per 1000 m net (nominal value)
mm²		approx. mm	mm	mm	approx. kg
3GSEH....3.6/6 kV FC	**Permanent routing indoors and outdoors**				
3 x 35	**5BG3 801**	7.0	48	720	3700
3 x 50	**5BG3 802**	8.1	51	765	4200
3 x 70	**5BG3 803**	9.8	53	795	5100
3 x 95	**5BG3 804**	11.4	57	855	6200
3 x 120	**5BG3 805**	12.7	60	900	7200
3 x 150	**5BG3 806**	14.2	63	945	7900
3GSEGCH....3.6/6 kV FC	**Permanent routing indoors and outdoors**				
3 x 35	**5BG3 811**	7.0	50	750	4000
3 x 50	**5BG3 812**	8.1	53	795	5100
3 x 70	**5BG3 813**	9.8	55	825	6100
3 x 95	**5BG3 814**	11.4	59	885	7100
3 x 120	**5BG3 815**	12.7	62	930	8300
3 x 150	**5BG3 816**	14.2	65	975	8600
3GSEGCY....3.6/6 kV FC	**Routing under the ground**				
3 x 35	**5BG3 821**	7.0	50	750	4000
3 x 50	**5BG3 822**	8.1	53	795	5100
3 x 70	**5BG3 823**	9.8	55	825	6100
3 x 95	**5BG3 824**	11.4	59	885	7100
3 x 120	**5BG3 825**	12.7	62	930	8300
3 x 150	**5BG3 826**	14.2	65	975	8600

Additional information, cross-sections and minimum ordering quantities on request.

Cable entrance fittings

We recommend the hybrid entrance fittings in combined cold-hot shrinking technology to connect the SIENOPYR ® medium-voltage cables to the SIMOVERT MV converter and the motor terminal box.

General technical data

Type designation	Hybrid entrance fitting
Approbations/Standards	to DIN VDE 0278-629-1 and to all important international standards
Use	For connecting SIENOPYR medium-voltage cables indoors and outdoors to the converter termination panel, terminal boxes and motor terminal boxes
Rated voltage	U_O/U = 3.6/6 kV
Maximum permissible operating voltage in AC grids	U_O/U = 4.2/7.2 kV
Test voltage	DIN VDE 0278-629-1
Current carrying capacity	to DIN VDE 0298 Part 4
Ambient temperature	–40 °C to +80 °C
Dynamic short circuit strength	63 kA
Max. permissible operating temp. at the conductor	90 °C
Installation instructions	MS 371-220
Fixing dimensions	acc. to customer's desire, when ordering factory-mounted entrance fittings please check with the factory

Cable entrance fittings (continued)

Selection and ordering data

No. of conductors and nominal conductor cross-section	Order No.	Conductor diameter (Max. value)	Outer diameter (Max. value)	Min. length indoors	Min. length outdoors
mm²		mm	mm	mm	mm
Three-stranded hybrid entrance fittings 3.6/6 kV					
3 x 35 + 3 x 25/3	**5GU9 813-□C□**	41.6	50	180	250
3 x 50 + 3 x 25/3	**5GU9 814-□C□**	45.3	54.4	180	250
3 x 70 + 3 x 35/3	**5GU9 815-□C□**	49	58.8	180	250
3 x 95 + 3 x 50/3	**5GU9 816-□C□**	54.7	65.6	180	250
3 x 120 + 3 x 70/3	**5GU9 817-□C□**	58.8	70.6	180	250
3 x 150 + 3 x 70/3	**5GU9 818-□C□**	63.9	76.7	180	250

Material set	**7**
Factory mounted	**8**
Indoors	**I**
Outdoors	**F**

The recommended cables can be purchased from:

Pirelli Kabel und Systeme
GmbH & Co. KG
Sales/marketing,
cables for industry
Austraße 99
D-96465 Neustadt bei Coburg
Tel. +49 (0) 9568-93-2902
Fax +49 (0) 9568-93-2058

1 Cable lug
2 Heat-shrinkable sleeving (non-tracking)
3 Silicone shield[1])
4 Field control element
5 Dividing cap
6 Ground wire

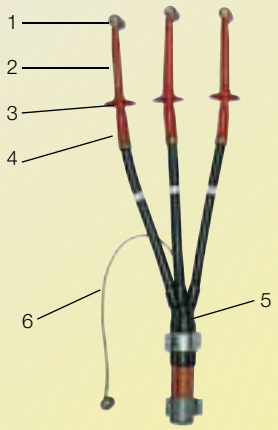
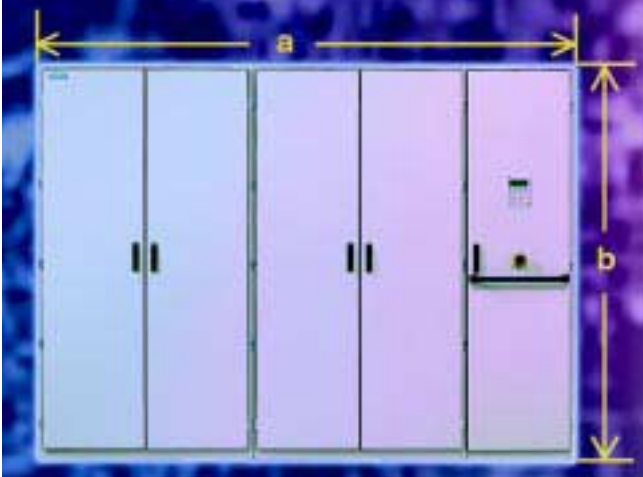


Fig. 6/17
Design of the three-stranded hybrid entrance fittings

1) Number and diameter are dependent on the use and the voltage level.

Notes

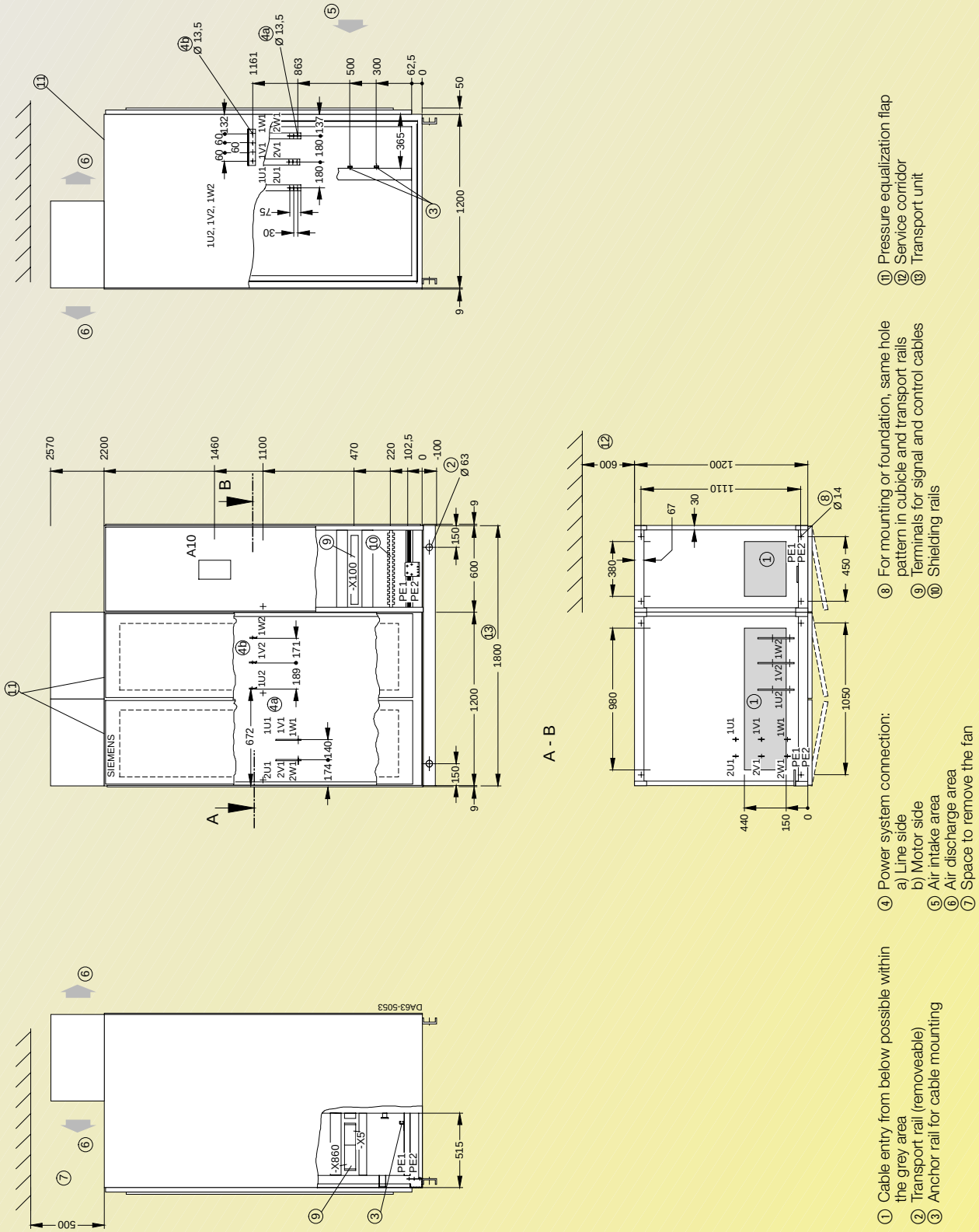
SIMOVERT MV
Dimension drawings



Note:
Dimension drawings subject to change. We reserve the right to change constructional details.

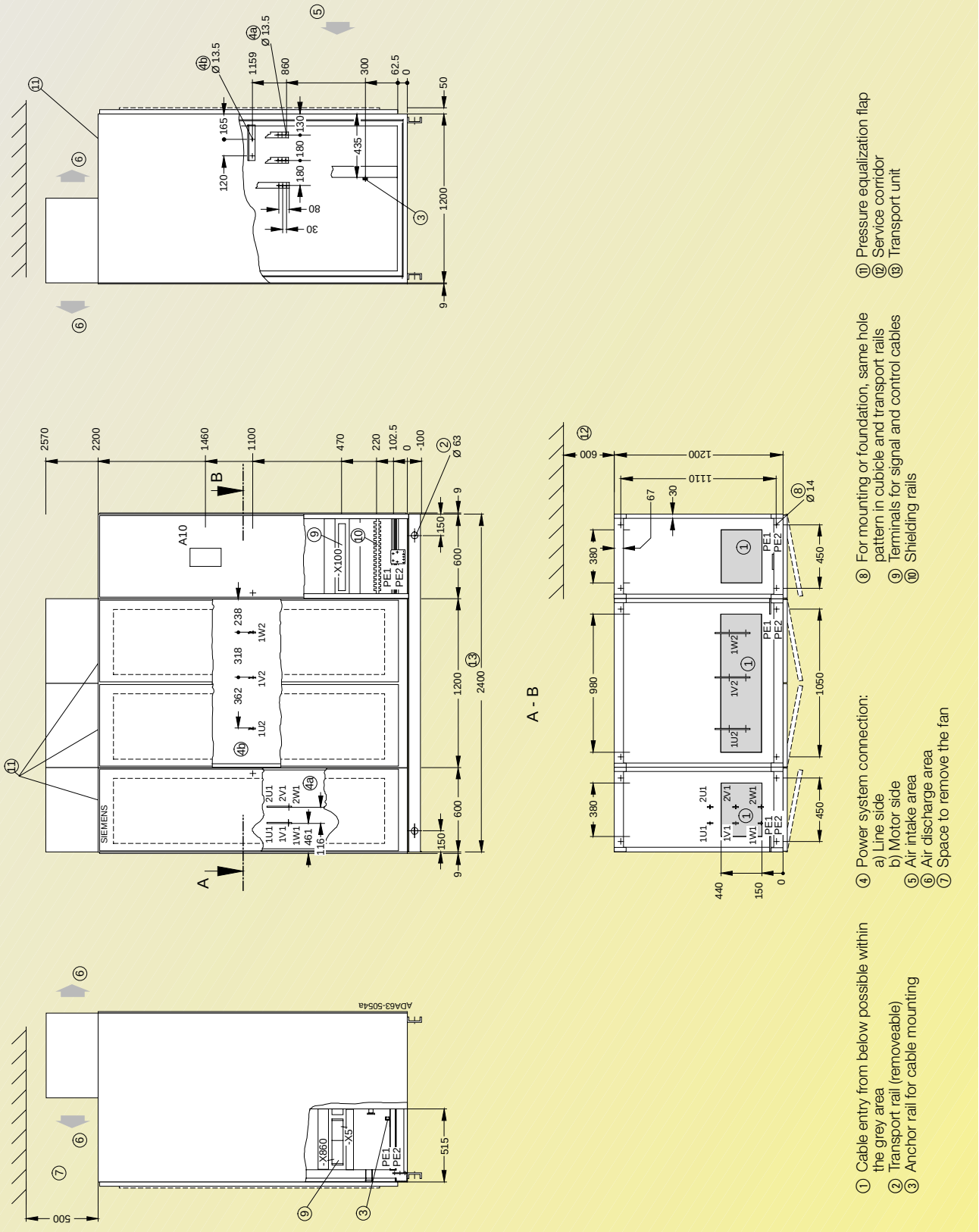
SIMOVERT MV converter

Air-cooled converters 2.3 kV 800 kVA degree of protection IP 21



① Cable entry from below possible within the grey area
② Transport rail (removeable)
③ Anchor rail for cable mounting
④ Power system connection:
a) Line side
b) Motor side
⑤ Air intake area
⑥ Air discharge area
⑦ Space to remove the fan
⑧ For mounting or foundation, same hole pattern in cubicle and transport rails
⑨ Terminals for signal and control cables
⑩ Shielding rails
⑪ Pressure equalization flap
⑫ Service corridor
⑬ Transport unit

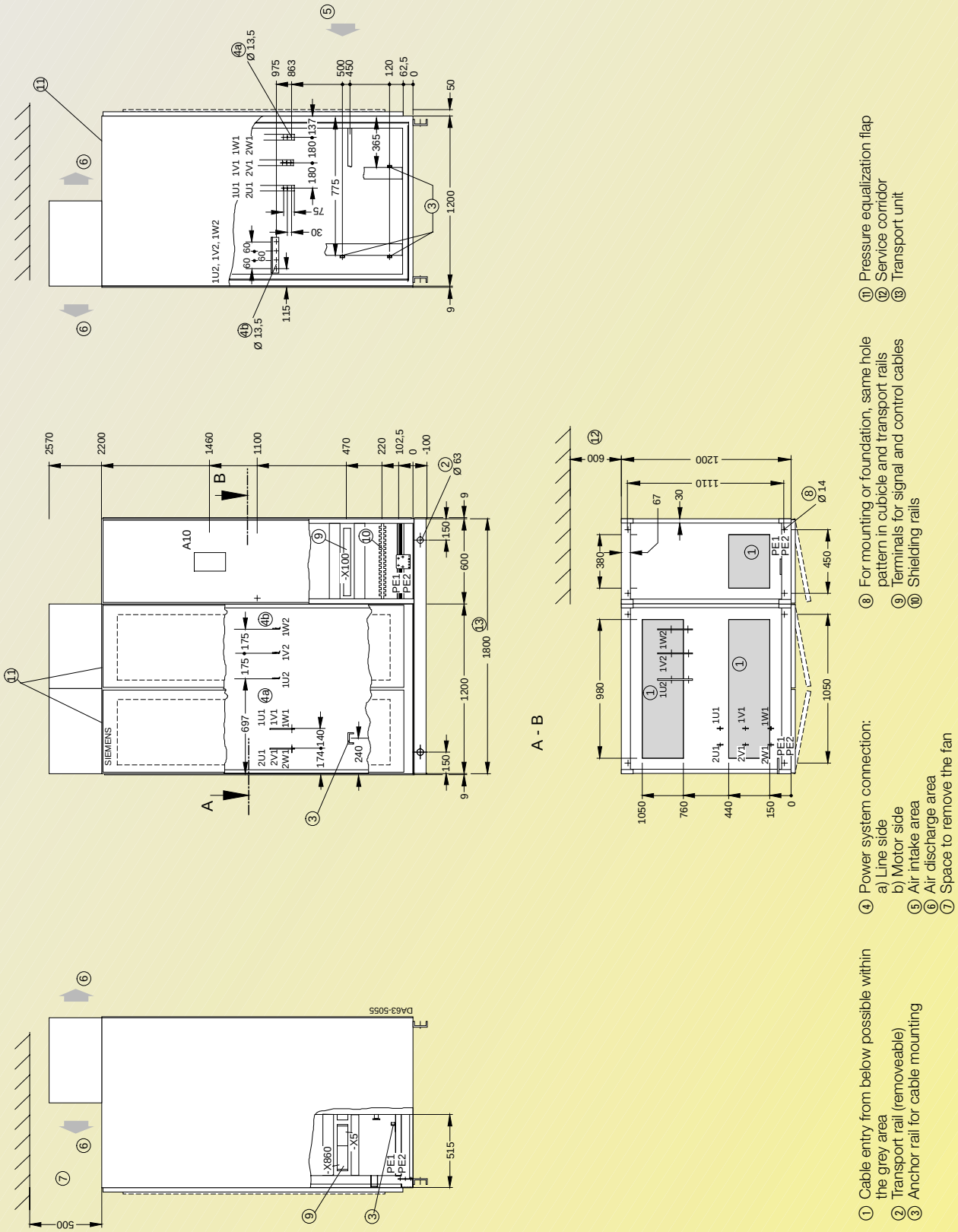
Air-cooled converters 2.3 kV 1000 kVA – 2400 kVA degree of protection IP 21



① Cable entry from below possible within the grey area
② Transport rail (removeable)
③ Anchor rail for cable mounting
④ Power system connection:
a) Line side
b) Motor side
⑤ Air intake area
⑥ Air discharge area
⑦ Space to remove the fan
⑧ For mounting or foundation, same hole pattern in cubicle and transport rails
⑨ Terminals for signal and control cables
⑩ Shielding rails
⑪ Pressure equalization flap
⑫ Service corridor
⑬ Transport unit

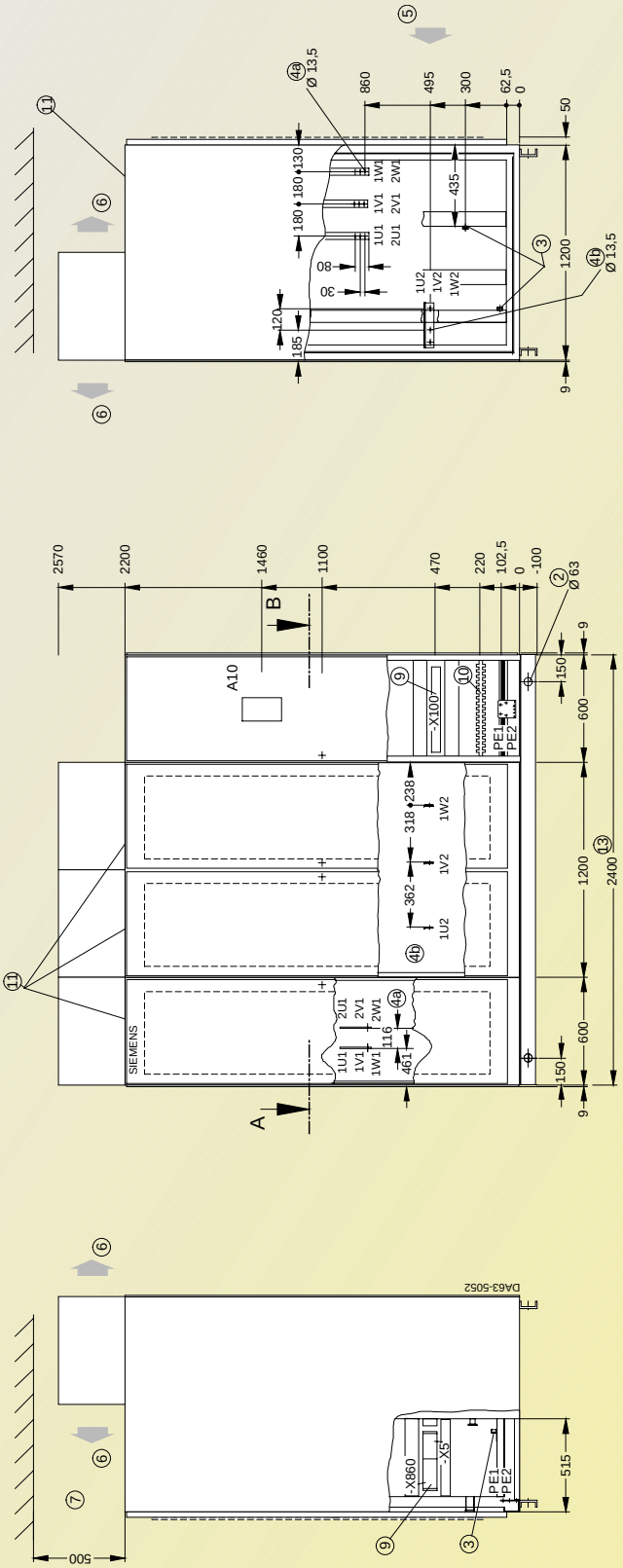
SIMOVERT MV converter

Air-cooled converters 3.3 kV 1000 kVA; 4.16 kV 1300 kVA degree of protection IP 21



① Cable entry from below possible within the grey area
② Transport rail (removeable)
③ Anchor rail for cable mounting
④ Power system connection:
a) Line side
b) Motor side
⑤ Air intake area
⑥ Air discharge area
⑦ Space to remove the fan
⑧ For mounting or foundation, same hole pattern in cubicle and transport rails
⑨ Terminals for signal and control cables
⑩ Shielding rails
⑪ Pressure equalization flap
⑫ Service corridor
⑬ Transport unit

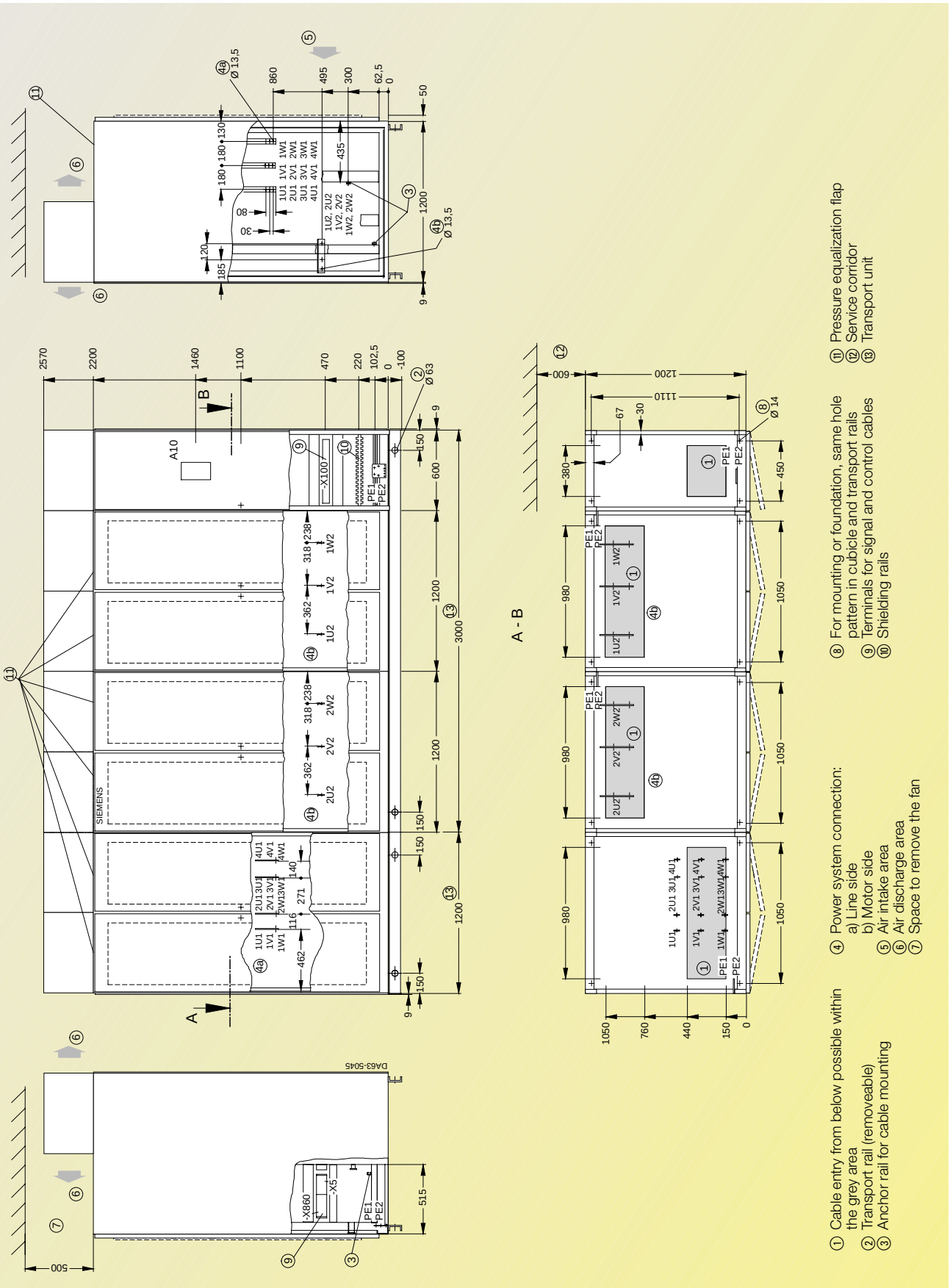
Air-cooled converters 3.3 kV 1300 kVA – 3100 kVA; 4.16 kV 1700 kVA – 4000 kVA degree of protection IP 21



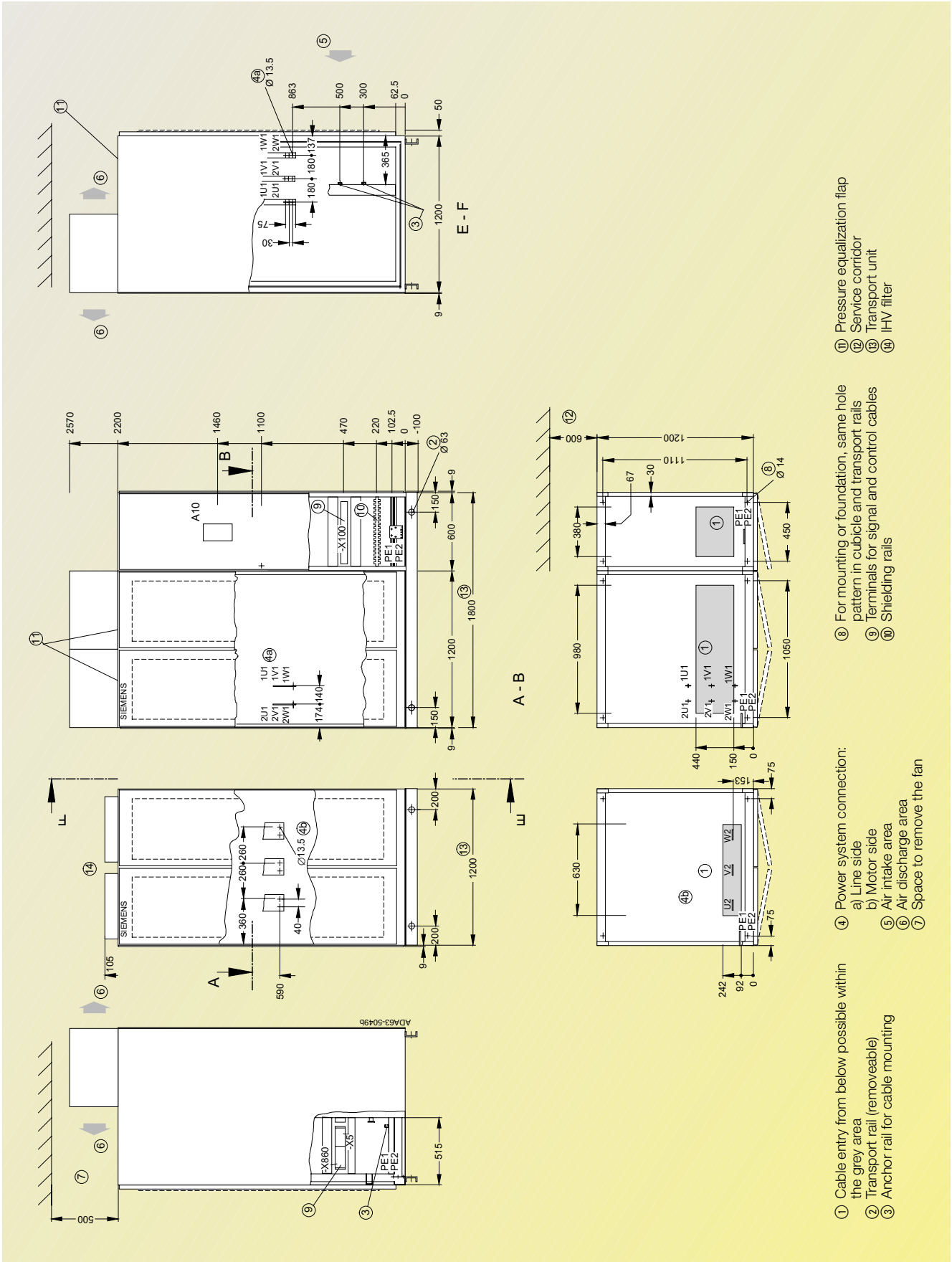
① Cable entry from below possible within the grey area
② Transport rail (removeable)
③ Anchor rail for cable mounting
④ Power system connection: a) Line side b) Motor side
⑤ Air intake area
⑥ Air discharge area
⑦ Space to remove the fan
⑧ For mounting or foundation, same hole pattern in cubicle and transport rails
⑨ Terminals for signal and control cables
⑩ Shielding rails
⑪ Pressure equalization flap
⑫ Service corridor
⑬ Transport unit

SIMOVERT MV converter

Air-cooled converters 2 x 4.16 kV 4700 kVA – 7200 kVA degree of protection IP 21 (parallel circuit)



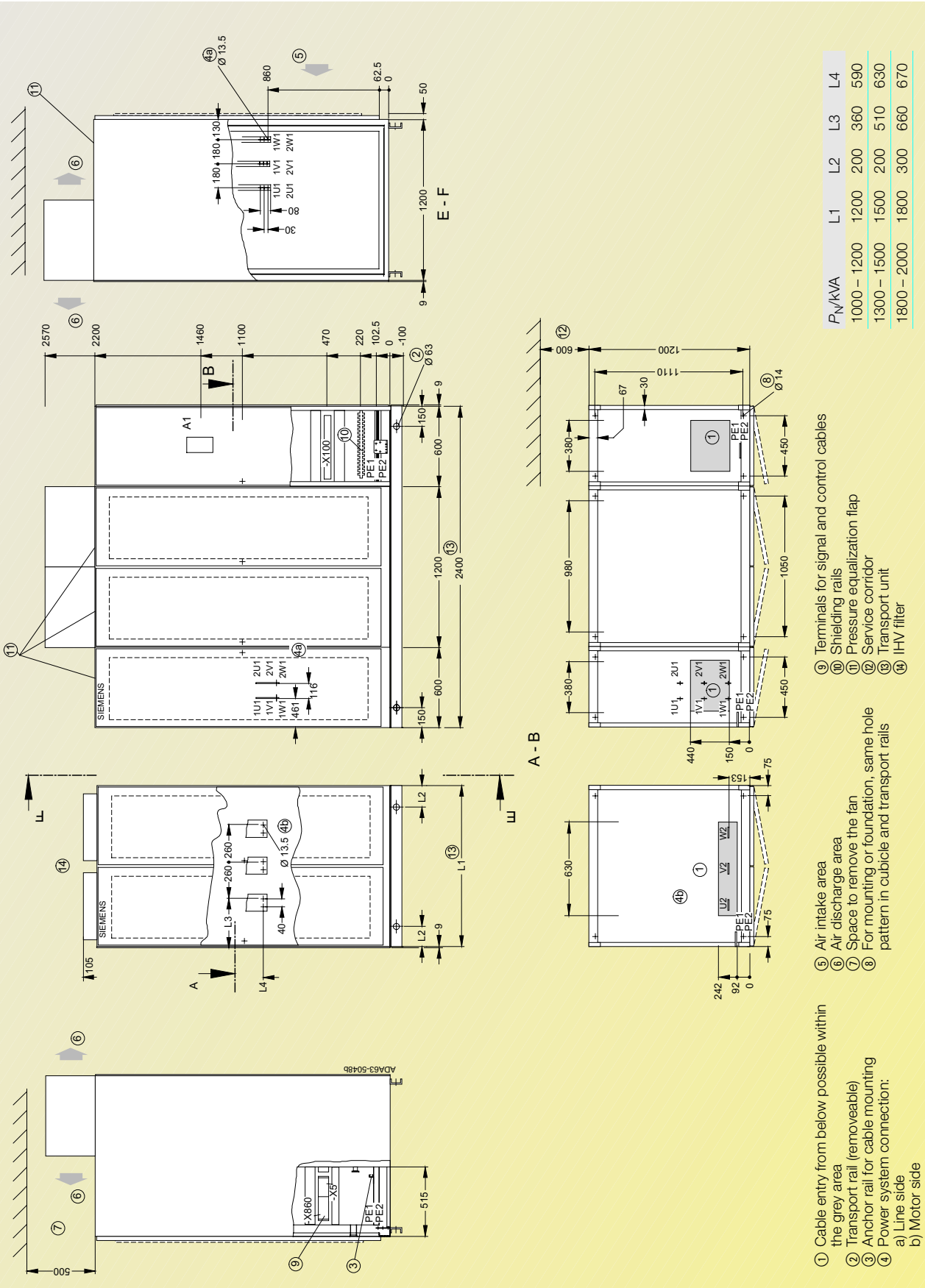
Air-cooled converters 6.0 kV 660 kVA; 6.6 kV 660 kVA degree of protection IP 21



① Cable entry from below possible within the grey area
② Transport rail (removeable)
③ Anchor rail for cable mounting
④ Power system connection:
a) Line side
b) Motor side
⑤ Air intake area
⑥ Air discharge area
⑦ Space to remove the fan
⑧ For mounting or foundation, same hole pattern in cubicle and transport rails
⑨ Terminals for signal and control cables
⑩ Shielding rails
⑪ Pressure equalization flap
⑫ Service corridor
⑬ Transport unit
⑭ IHV filter

SIMOVERT MV converter

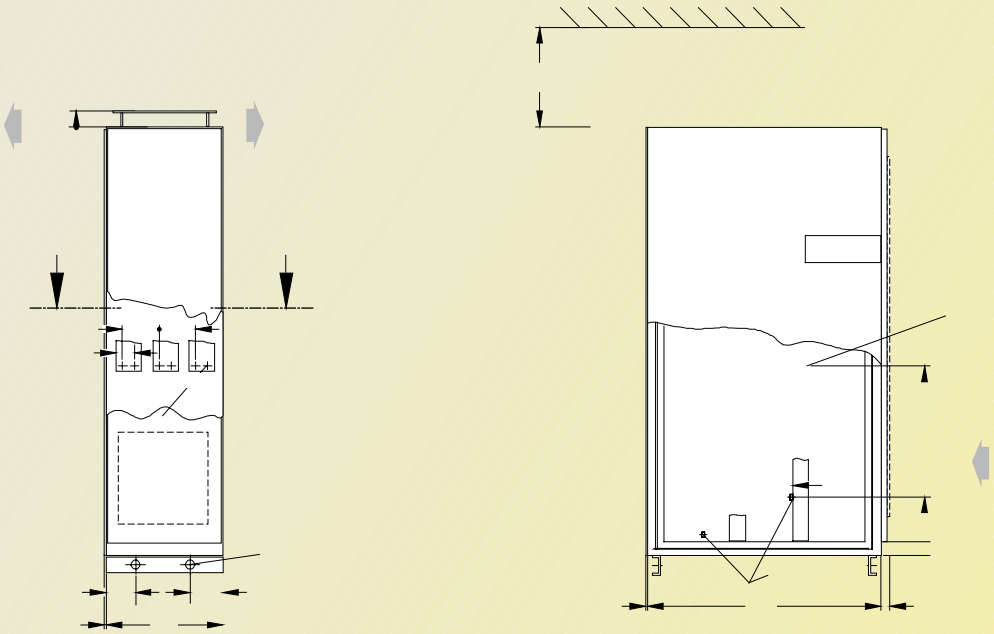
Air-cooled converters 6.0 kV 1000 kVA – 2000 kVA; 6.6 kV 1000 kVA – 2000 kVA degree of protection IP 21



P_N/kVA	L1	L2	L3	L4
1000 – 1200	1200	200	360	590
1300 – 1500	1500	200	510	630
1800 – 2000	1800	300	660	670

① Cable entry from below possible within the grey area
② Transport rail (removeable)
③ Anchor rail for cable mounting
④ Power system connection:
a) Line side
b) Motor side
⑤ Air intake area
⑥ Air discharge area
⑦ Space to remove the fan
⑧ For mounting or foundation, same hole pattern in cubicle and transport rails
⑨ Terminals for signal and control cables
⑩ Shielding rails
⑪ Pressure equalization flap
⑫ Service corridor
⑬ Transport unit
⑭ IHV filter

Output reactor for air cooling (option L08) degree of protection IP 21

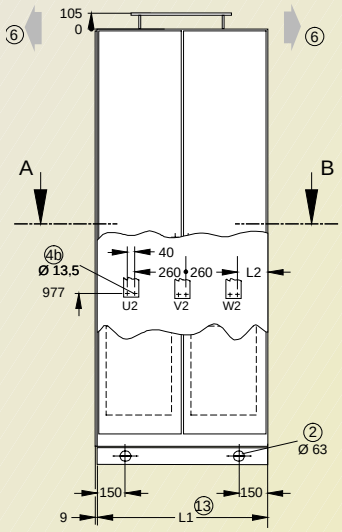


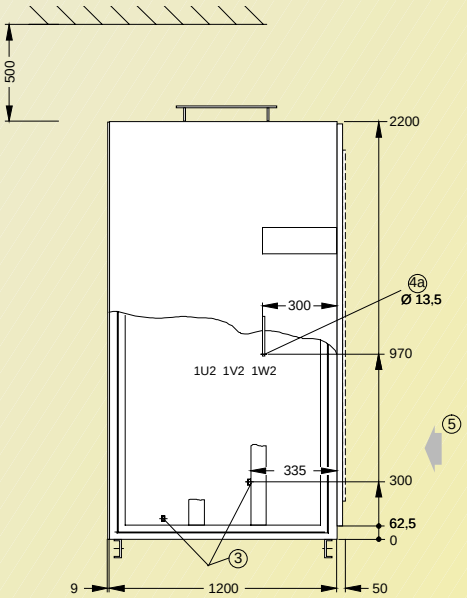
DA63-5056A

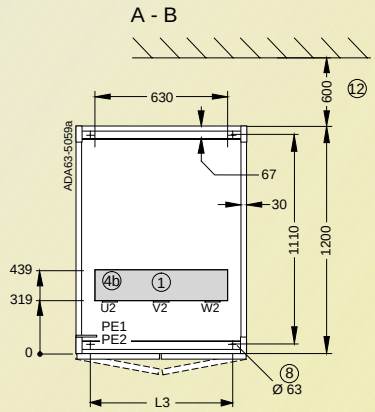
① Cable entry from below possible within the grey area
② Transport rail (removeable)
③ Anchor rail for cable mounting
④ Power system connection:
a) Drive converter side
b) Motor side
⑤ Air intake area
⑥ Air discharge area
⑧ For mounting or foundation, same hole pattern in cubicle and transport rails
⑪ Pressure equalization flap
⑫ Service corridor
⑬ Transport unit

SIMOVERT MV converter

Sinusoidal EMC output filter for air cooling (option L15) degree of protection IP 21



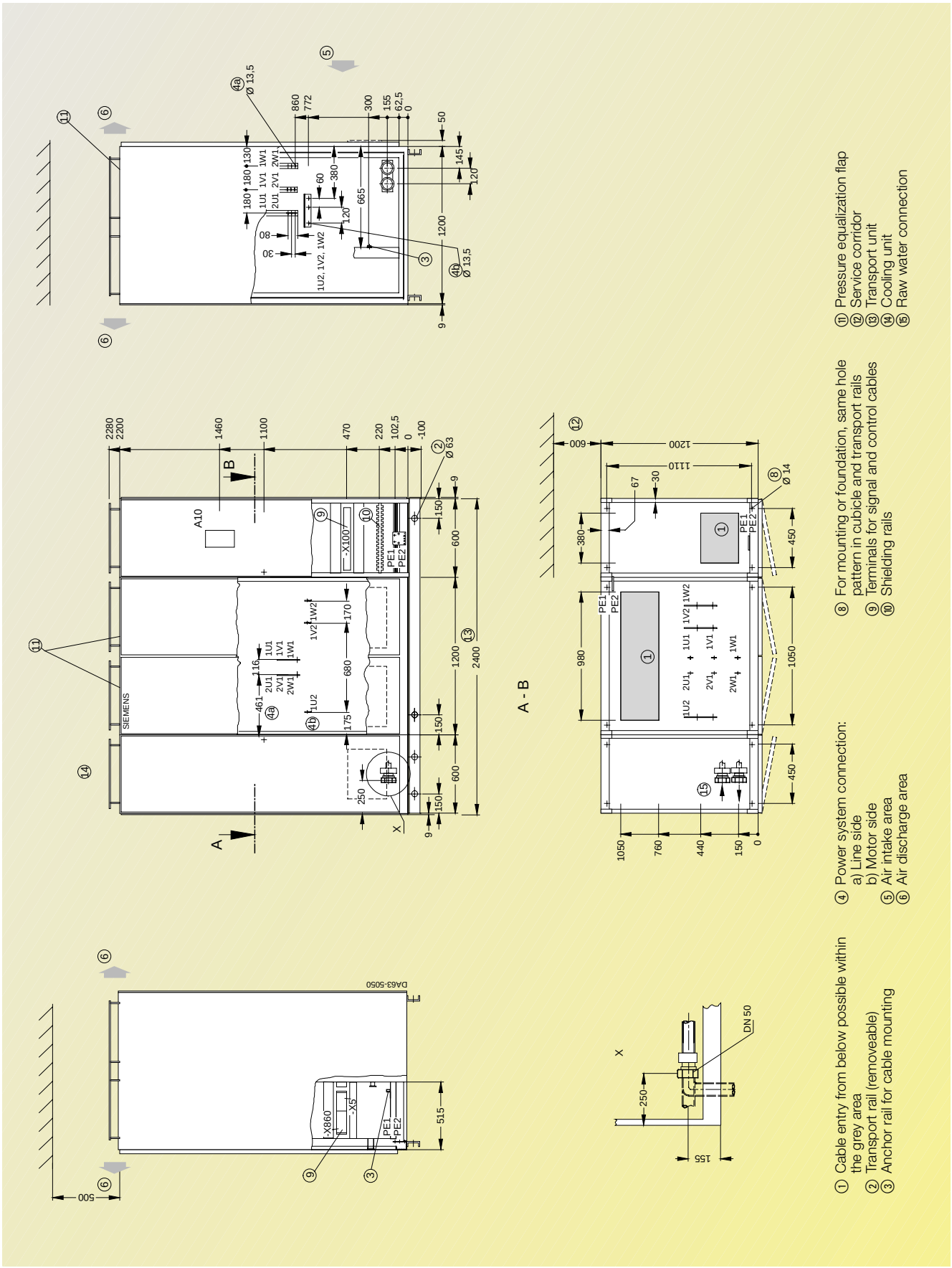




① Cable entry from below possible within the grey area
② Transport rail (removeable)
③ Anchor rail for cable mounting
④ Power system connection:
a) Line side
b) Motor side
⑤ Air intake area
⑥ Air discharge area
⑧ For mounting or foundation, same hole pattern in cubicle and transport rails
⑪ Pressure equalization flap
⑫ Service corridor
⑬ Transport unit

U_N/kV	P_N/kVA	L1	L2	L3
2.3 – 3.3	800 – 3100	900	170	750
4.16	1300	900	170	750
4.16	1700 – 4000	1200	320	1050

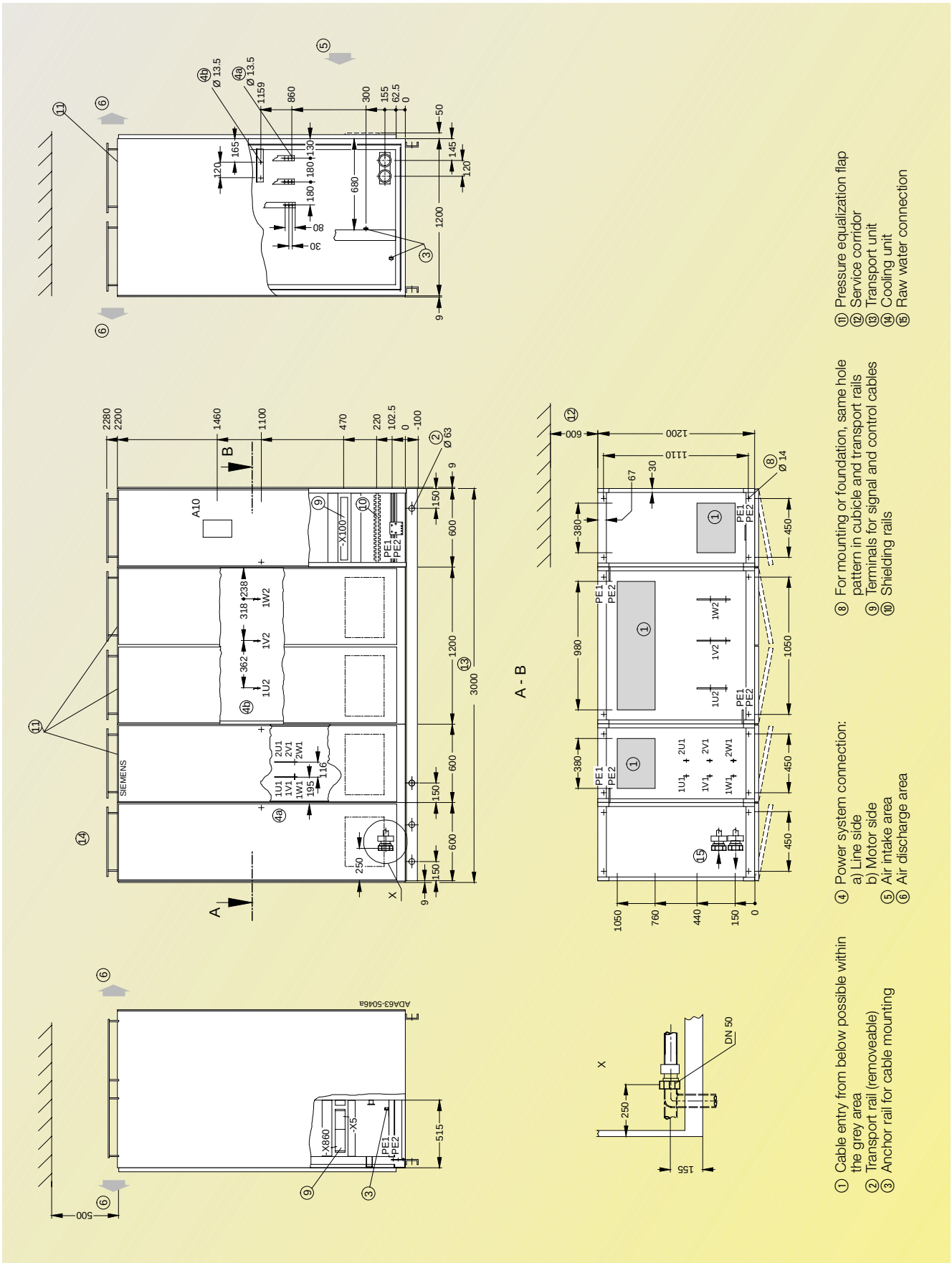
Water-cooled converters 2.3 kV 800 kVA degree of protection IP 23



① Cable entry from below possible within the grey area
② Transport rail (removeable)
③ Anchor rail for cable mounting
④ Power system connection:
a) Line side
b) Motor side
⑤ Air intake area
⑥ Air discharge area
⑧ For mounting or foundation, same hole pattern in cubicle and transport rails
⑨ Terminals for signal and control cables
⑩ Shielding rails
⑪ Pressure equalization flap
⑫ Service corridor
⑬ Transport unit
⑭ Cooling unit
⑮ Raw water connection

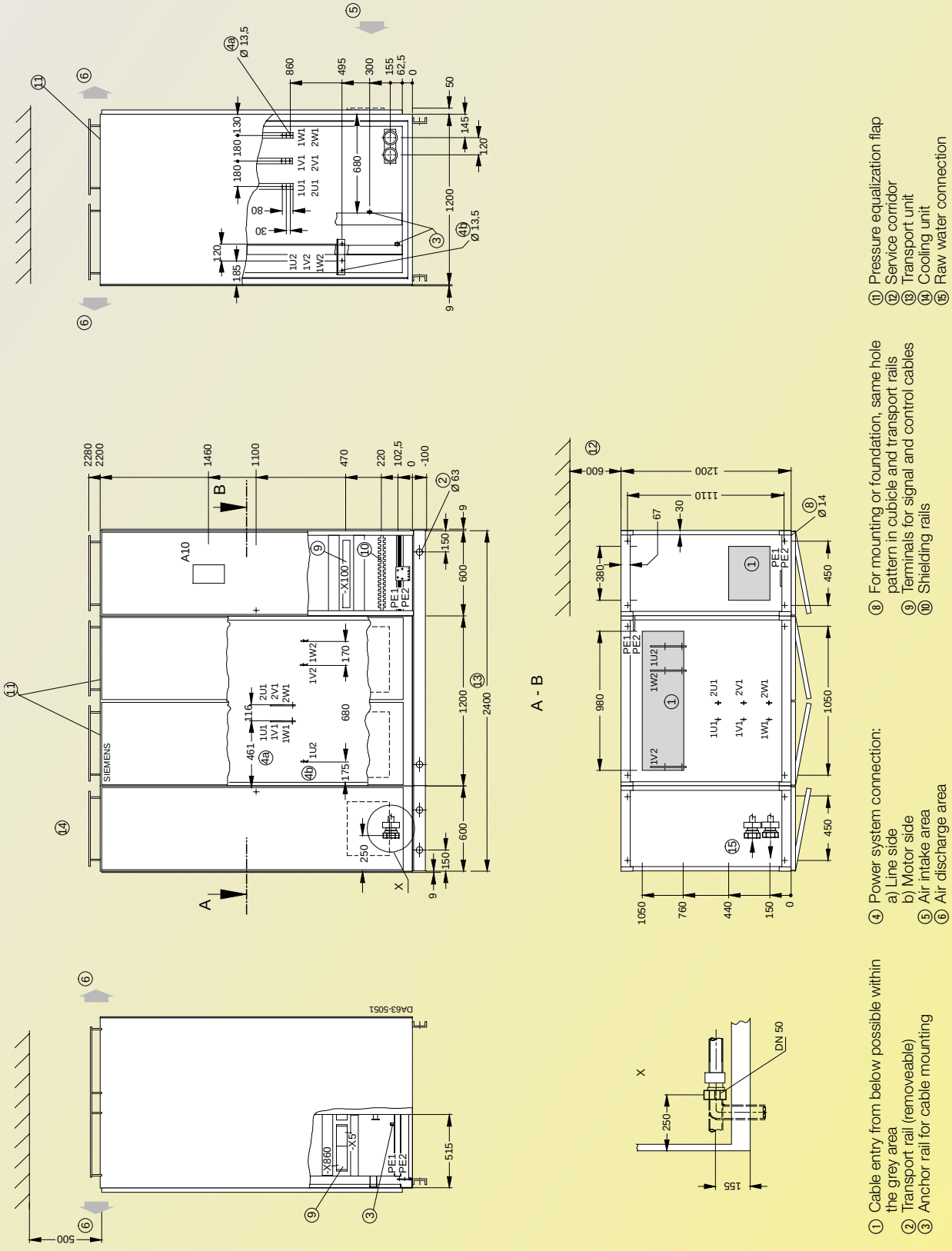
SIMOVERT MV converter

Water-cooled converters 2.3 kV 1000 kVA – 2400 kVA degree of protection IP 23



① Cable entry from below possible within the grey area
② Transport rail (removeable)
③ Anchor rail for cable mounting
④ Power system connection:
a) Line side
b) Motor side
⑤ Air intake area
⑥ Air discharge area
⑧ For mounting or foundation, same hole pattern in cubicle and transport rails
⑨ Terminals for signal and control cables
⑩ Shielding rails
⑪ Pressure equalization flap
⑫ Service corridor
⑬ Transport unit
⑭ Cooling unit
⑮ Raw water connection

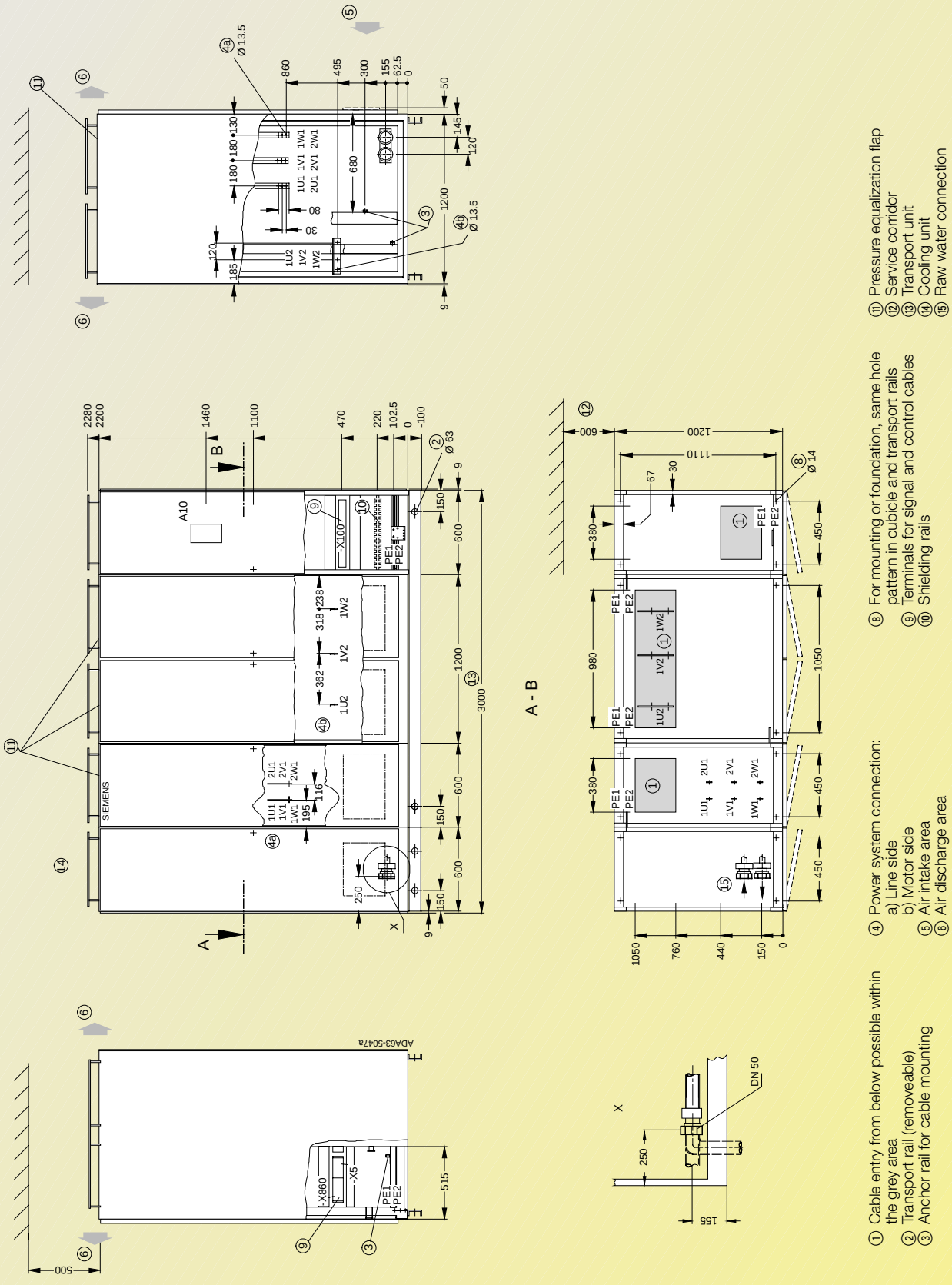
Water-cooled converters 3.3 kV 1000 kVA; 4.16 kV 1300 kVA degree of protection IP 23



① Cable entry from below possible within the grey area
② Transport rail (removeable)
③ Anchor rail for cable mounting
④ Power system connection: a) Line side b) Motor side
⑤ Air intake area
⑥ Air discharge area
⑧ For mounting or foundation, same hole pattern in cubicle and transport rails
⑨ Terminals for signal and control cables
⑩ Shielding rails
⑪ Pressure equalization flap
⑫ Service corridor
⑬ Transport unit
⑭ Cooling unit
⑮ Raw water connection

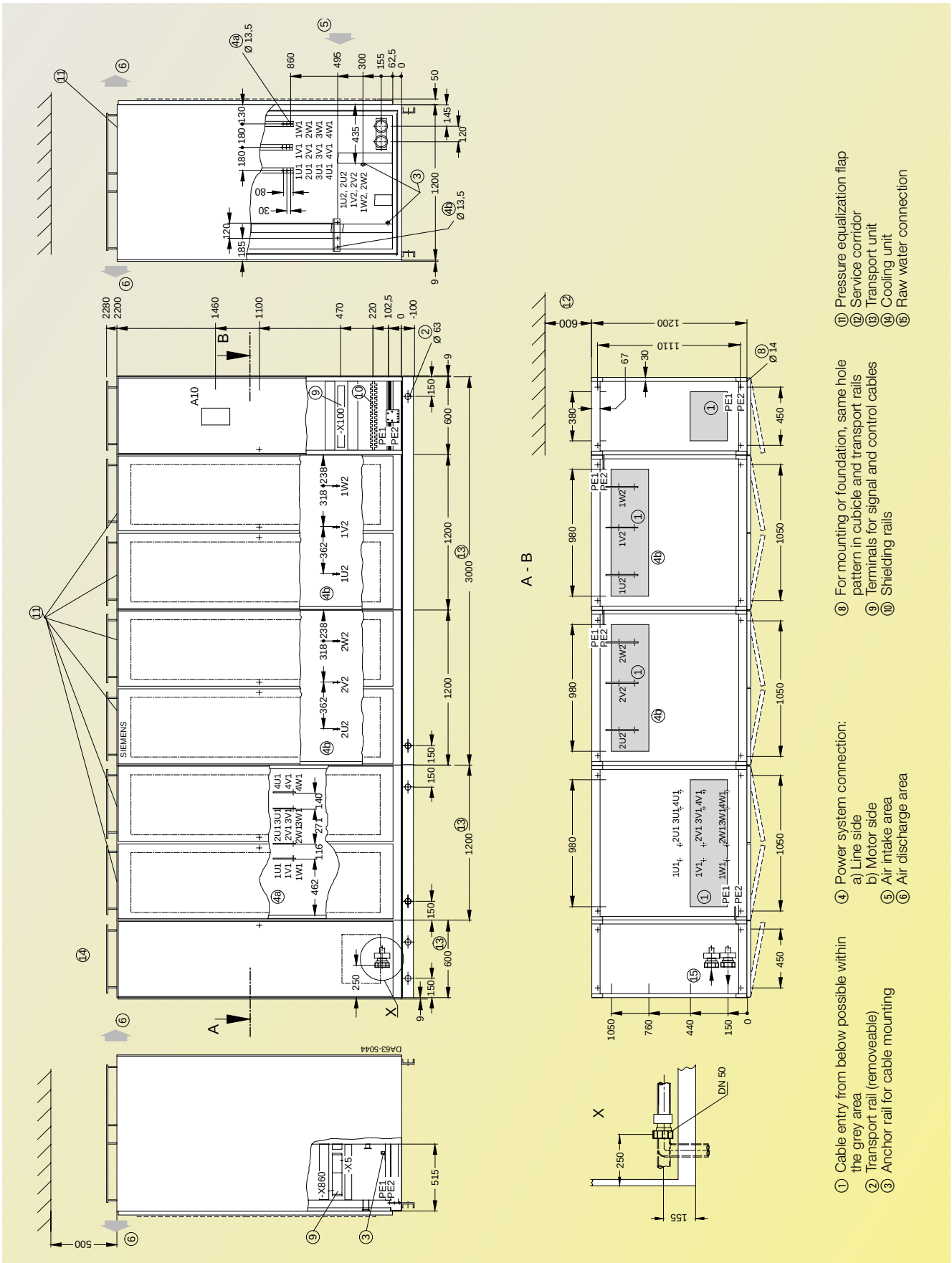
SIMOVERT MV drie converter

Water-cooled converters 3.3 kV 1300 kVA – 3100 kVA; 4.16 kV 1700 kVA – 4000 kVA degree of protection IP 23



① Cable entry from below possible within the grey area
② Transport rail (removeable)
③ Anchor rail for cable mounting
④ Power system connection:
a) Line side
b) Motor side
⑤ Air intake area
⑥ Air discharge area
⑧ For mounting or foundation, same hole pattern in cubicle and transport rails
⑨ Terminals for signal and control cables
⑩ Shielding rails
⑪ Pressure equalization flap
⑫ Service corridor
⑬ Transport unit
⑭ Cooling unit
⑮ Raw water connection

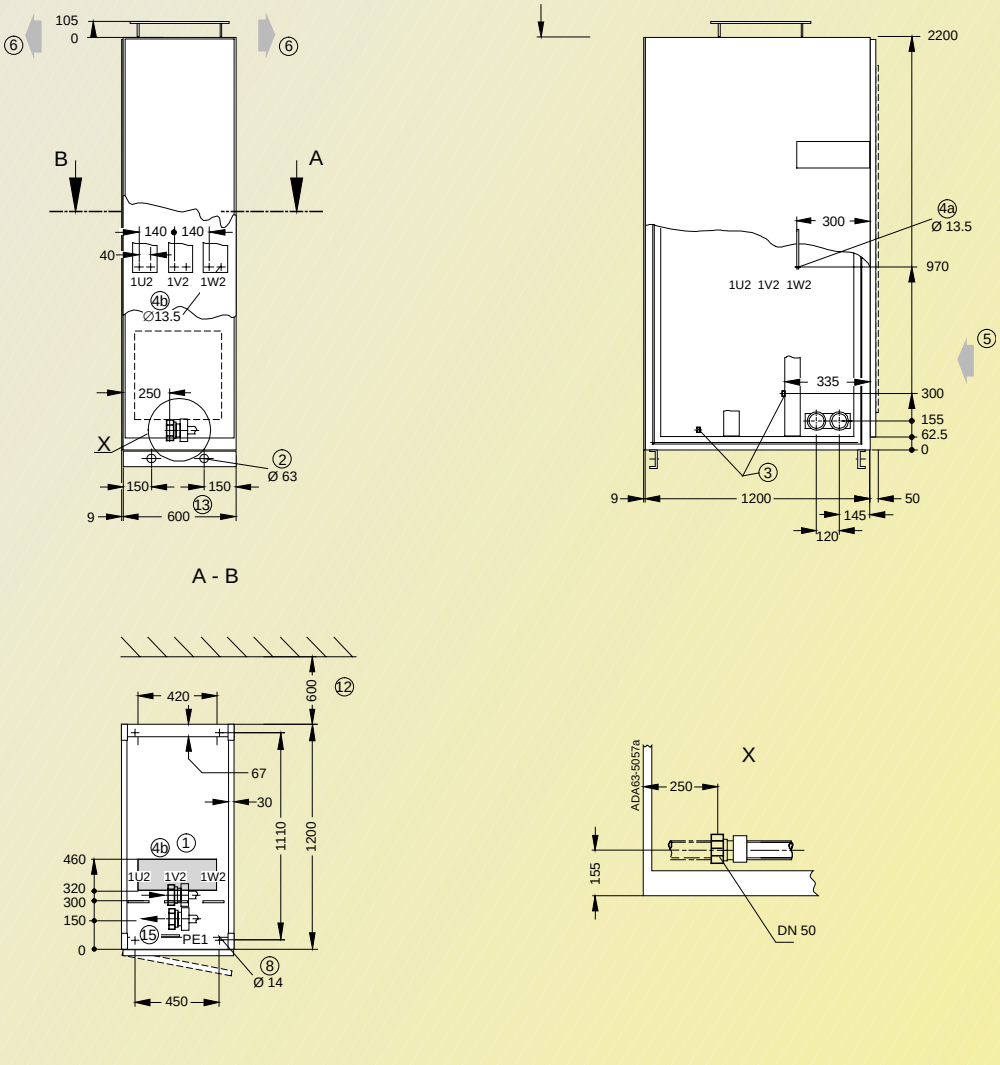
Water-cooled converters 2 x 4.16 kV 4700 kVA – 7200 kVA degree of protection IP 23 (parallel circuit)



① Cable entry from below possible within the grey area
② Transport rail (removeable)
③ Anchor rail for cable mounting
④ Power system connection:
a) Line side
b) Motor side
⑤ Air intake area
⑥ Air discharge area
⑧ For mounting or foundation, same hole pattern in cubicle and transport rails
⑨ Terminals for signal and control cables
⑩ Shielding rails
⑪ Pressure equalization flap
⑫ Service corridor
⑬ Transport unit
⑭ Cooling unit
⑮ Raw water connection

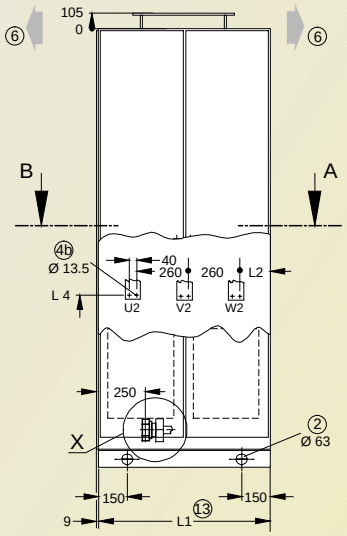
SIMOVERT MV converter

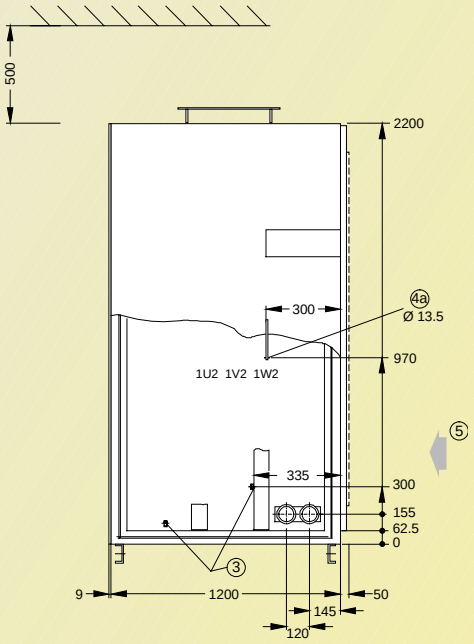
Output reactor for water cooling (option L08) degree of protection IP 23

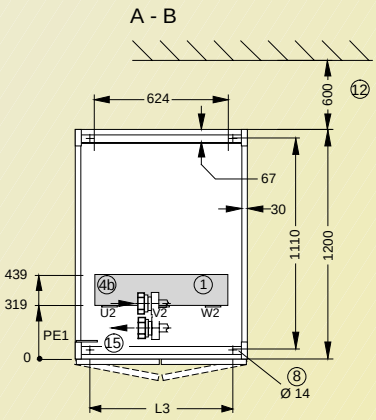


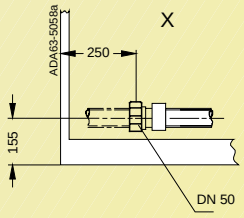
① Cable entry from below possible within the grey area
② Transport rail (removeable)
③ Anchor rail for cable mounting
④ Power system connection:
a) Drive converter side
b) Motor side
⑤ Air intake area
⑥ Air discharge area
⑧ For mounting or foundation, same hole pattern in cubicle and transport rails
⑫ Service corridor
⑬ Transport unit
⑮ Raw water connection

Sinusoidal EMC output filter for water cooling (option L15) degree of protection IP 23







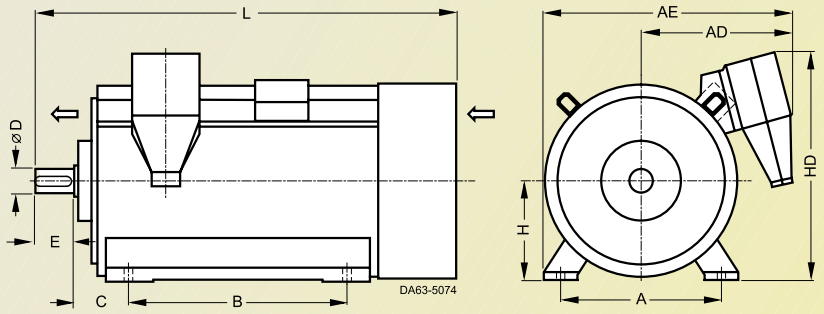


① Cable entry from below possible within the grey area
② Transport rail (removeable)
③ Anchor rail for cable mounting
④ Power system connection:
a) Drive converter side
b) Motor side
⑤ Air intake area
⑥ Air discharge area
⑧ For mounting or foundation, same hole pattern in cubicle and transport rails
⑫ Service corridor
⑬ Transport unit
⑮ Raw water connection

U_N/kV	P_N/kVA	L1	L2	L3	L4
2.3 – 3.3	800 – 3100	900	170	750	590
4.16	1300	900	170	750	630
4.16	1700 – 4000	1200	320	1050	670

High-voltage motors

H-compact 1LA1 rib-cooled, type of construction IM B3, rolling-contact bearing



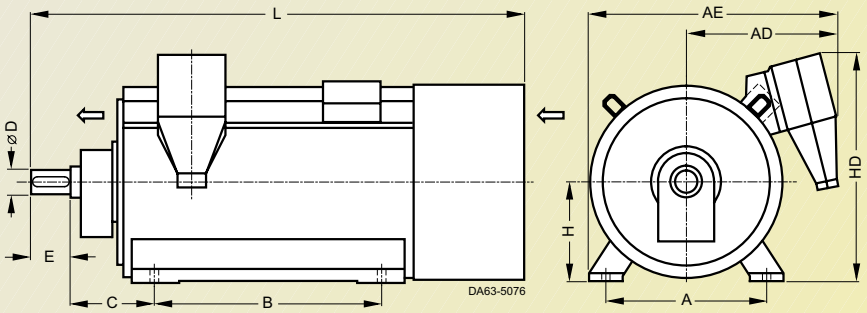
Order No.	Limit speed	Weight	A	AD	AE	B	C	D	E	H	HD	L
	rpm	t	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
2-pole												
1LA1450-2PV□0	3000	3.5	750	765	1215	1120	254	85	170	450	1050	2125
1LA1452-2PV□0	3000	3.7	750	765	1215	1120	254	85	170	450	1050	2125
1LA1454-2PV□0	3000	3.9	750	765	1215	1120	254	85	170	450	1050	2125
1LA1500-2PV□0	3000	4.7	Data on request (see comment on Page 4/5 or 6/13)									
1LA1502-2PV□0	3000	5.0										
1LA1504-2PV□0	3000	5.4										
4-pole												
1LA1450-4PV□0	2200	3.3	750	765	1215	1120	254	110	210	450	1050	2165
1LA1452-4PV□0	2200	3.5	750	765	1215	1120	254	110	210	450	1050	2165
1LA1454-4PV□0	2200	3.7	750	765	1215	1120	254	110	210	450	1050	2165
1LA1500-4PV□0	1900	4.9	850	800[1]	1315[1]	1250	280	120	210	500	1135[2]	2345
1LA1502-4PV□0	1900	5.2	850	800[1]	1315[1]	1250	280	120	210	500	1135[2]	2345
1LA1504-4PV□0	1900	5.5	850	800[1]	1315[1]	1250	280	120	210	500	1135[2]	2345
1LA1560-4PV□0	1800	6.8	950	855[1]	1435[1]	1400	315	130	250	560	1250[2]	2600
1LA1562-4PV□0	1800	7.0	950	855[1]	1435[1]	1400	315	130	250	560	1250[2]	2600
1LA1564-4PV□0	1800	7.3	950	855[1]	1435[1]	1400	315	140	250	560	1250[2]	2600
1LA1566-4PV□0	1800	7.8	950	1010	1590	1400	315	140	250	560	1315	2600
1LA1630-4PV□0	1500	11.2	1120	1100	1765	1600	335	170	300	630	1480	3076
1LA1632-4PV□0	1500	12.2	1120	1100	1765	1600	335	170	300	630	1480	3076
1LA1634-4PV□0	1500	12.8	1120	1100	1765	1600	335	170	300	630	1480	3076
1LA1636-4PV□0	1500	13.6	1120	1100	1765	1600	335	170	300	630	1480	3076
6-pole												
1LA1450-6PV□0	2000	3.4	750	765	1215	1120	254	120	210	450	1050	2165
1LA1452-6PV□0	2000	3.6	750	765	1215	1120	254	120	210	450	1050	2165
1LA1454-6PV□0	2000	3.8	750	765	1215	1120	254	120	210	450	1050	2165
1LA1500-6PV□0	1700	5.1	850	800	1315	1250	280	130	250	500	1135	2385
1LA1502-6PV□0	1700	5.3	850	800	1315	1250	280	130	250	500	1135	2385
1LA1504-6PV□0	1700	5.7	850	800[1]	1315[1]	1250	280	130	250	500	1135[2]	2385
1LA1560-6PV□0	1700	6.7	950	855[1]	1435[1]	1400	315	140	250	560	1250[2]	2600
1LA1562-6PV□0	1700	7.1	950	855[1]	1435[1]	1400	315	140	250	560	1250[2]	2600
1LA1564-6PV□0	1700	7.5	950	855[1]	1435[1]	1400	315	150	250	560	1250[2]	2600
1LA1566-6PV□0	1700	8.1	950	855[1]	1435[1]	1400	315	150	250	560	1250[2]	2600
1LA1630-6PV□0	1500	11.7	1120	945[1]	1610[1]	1600	335	180	300	630	1415[2]	3076
1LA1632-6PV□0	1500	12.7	1120	1100	1765	1600	335	180	300	630	1480	3076
1LA1634-6PV□0	1500	13.4	1120	1100	1765	1600	335	180	300	630	1480	3076
1LA1636-6PV□0	1500	14.1	1120	1100	1765	1600	335	180	300	630	1480	3076
8-pole												
1LA1500-8PV□0	1700	5.1	850	800	1315	1250	280	130	250	500	1135	2385
1LA1502-8PV□0	1700	5.3	850	800	1315	1250	280	130	250	500	1135	2385
1LA1504-8PV□0	1700	5.7	850	800	1315	1250	280	130	250	500	1135	2385
1LA1560-8PV□0	1700	6.7	950	855	1435	1400	315	140	250	560	1250	2600
1LA1562-8PV□0	1700	7.1	950	855	1435	1400	315	140	250	560	1250	2600
1LA1564-8PV□0	1700	7.5	950	855[1]	1435[1]	1400	315	150	250	560	1250[2]	2600
1LA1566-8PV□0	1700	8.1	950	855[1]	1435[1]	1400	315	150	250	560	1250[2]	2600
1LA1630-8PV□0	1500	11.5	1120	945[1]	1610[1]	1600	335	180	300	630	1415[2]	3076
1LA1632-8PV□0	1500	12.5	1120	945[1]	1610[1]	1600	335	180	300	630	1415[2]	3076
1LA1634-8PV□0	1500	13.3	1120	945[1]	1610[1]	1600	335	180	300	630	1415[2]	3076
1LA1636-8PV□0	1500	14.0	1120	1100	1765	1600	335	180	300	630	1480	3076

1) For rated currents I_N > 315 A this dimension increases by 155 mm.

2) For rated currents I_N > 315 A this dimension increases by 65 mm.

High-voltage motors

H-compact 1LA1 rib-cooled, type of construction IM B3, sleeve bearing

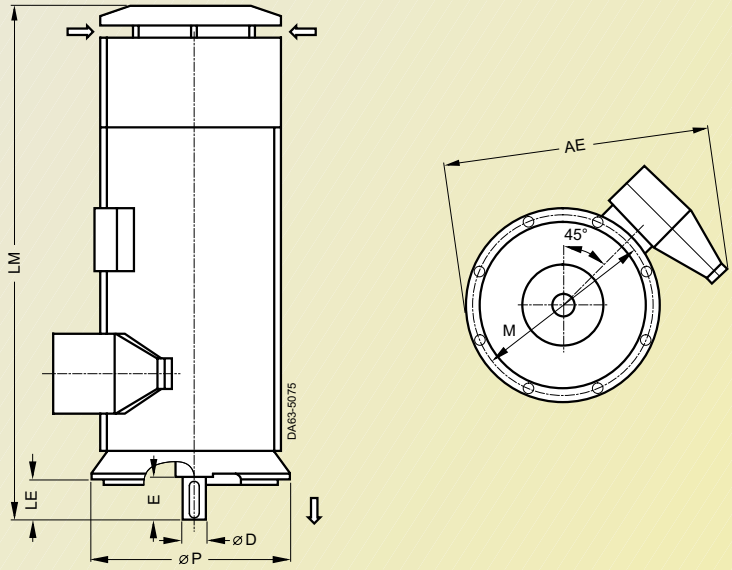


Order No.	Limit speed	Weight	A	AD	AE	B	C	D	E	H	HD	L
	rpm	t	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
2-pole												
1LA1450-2PV□0	3000	3.3	750	765	1215	1120	400	85	170	450	1050	2270
1LA1452-2PV□0	3000	3.5	750	765	1215	1120	400	85	170	450	1050	2270
1LA1454-2PV□0	3000	3.7	750	765	1215	1120	400	85	170	450	1050	2270
1LA1500-2PV□0	3000	4.5	850	800	1315	1250	450	95	170	500	1135	2475
1LA1502-2PV□0	3000	4.7	850	800[1]	1315[1]	1250	450	95	170	500	1135[2]	2475
1LA1504-2PV□0	3000	5.1	850	800[1]	1315[1]	1250	450	95	170	500	1135[2]	2475
1LA1560-2PV□0	3000	6.0	950	855[1]	1435[1]	1400	475	110	210	560	1250[2]	2720
1LA1562-2PV□0	3000	6.4	950	855[1]	1435[1]	1400	475	110	210	560	1250[2]	2720
1LA1564-2PV□0	3000	6.7	950	855[1]	1435[1]	1400	475	110	210	560	1250[2]	2720
1LA1566-2PV□0	3000	7.0	950	855[1]	1435[1]	1400	475	110	210	560	1250[2]	2720
4-pole												
1LA1450-4PV□0	2200	3.4	750	765	1215	1120	425	110	210	450	1050	2500
1LA1452-4PV□0	2200	3.6	750	765	1215	1120	425	110	210	450	1050	2500
1LA1454-4PV□0	2200	3.8	750	765	1215	1120	425	110	210	450	1050	2500
1LA1500-4PV□0	1900	5.0	850	800[1]	1315[1]	1250	450	120	210	500	1135[2]	2690
1LA1502-4PV□0	1900	5.3	850	800[1]	1315[1]	1250	450	120	210	500	1135[2]	2690
1LA1504-4PV□0	1900	5.6	850	800[1]	1315[1]	1250	450	120	210	500	1135[2]	2690
1LA1560-4PV□0	1800	6.9	950	855[1]	1435[1]	1400	530	130	250	560	1250[2]	2990
1LA1562-4PV□0	1800	7.1	950	855[1]	1435[1]	1400	530	130	250	560	1250[2]	2990
1LA1564-4PV□0	1800	7.4	950	855[1]	1435[1]	1400	530	140	250	560	1250[2]	2990
1LA1566-4PV□0	1800	7.9	950	1010	1590	1400	530	140	250	560	1315	2990
1LA1630-4PV□0	1800	11.6	1120	1100	1765	1600	580	170	300	630	1480	3508
1LA1632-4PV□0	1800	12.5	1120	1100	1765	1600	580	170	300	630	1480	3508
1LA1634-4PV□0	1800	13.1	1120	1100	1765	1600	580	170	300	630	1480	3508
1LA1636-4PV□0	1800	13.9	1120	1100	1765	1600	580	170	300	630	1480	3508
6-pole												
1LA1450-6PV□0	2000	3.5	750	765	1215	1120	425	120	210	450	1050	2500
1LA1452-6PV□0	2000	3.7	750	765	1215	1120	425	120	210	450	1050	2500
1LA1454-6PV□0	2000	3.9	750	765	1215	1120	425	120	210	450	1050	2500
1LA1500-6PV□0	1700	5.3	850	800	1315	1250	500	130	250	500	1135	2780
1LA1502-6PV□0	1700	5.5	850	800	1315	1250	500	130	250	500	1135	2780
1LA1504-6PV□0	1700	5.9	850	800[1]	1315[1]	1250	500	130	250	500	1135[2]	2780
1LA1560-6PV□0	1700	6.9	950	855[1]	1435[1]	1400	530	140	250	560	1250[2]	2990
1LA1562-6PV□0	1700	7.3	950	855[1]	1435[1]	1400	530	140	250	560	1250[2]	2990
1LA1564-6PV□0	1700	7.7	950	855[1]	1435[1]	1400	530	150	250	560	1250[2]	2990
1LA1566-6PV□0	1700	8.3	950	855[1]	1435[1]	1400	530	150	250	560	1250[2]	2990
1LA1630-6PV□0	1500	12.0	1120	945[1]	1610[1]	1600	580	180	300	630	1415[2]	3508
1LA1632-6PV□0	1500	13.0	1120	1100	1765	1600	580	180	300	630	1480	3508
1LA1634-6PV□0	1500	13.7	1120	1100	1765	1600	580	180	300	630	1480	3508
1LA1636-6PV□0	1500	14.5	1120	1100	1765	1600	580	180	300	630	1480	3508
8-pole												
1LA1500-8PV□0	1700	5.3	850	800	1315	1250	500	130	250	500	1135	2780
1LA1502-8PV□0	1700	5.5	850	800	1315	1250	500	130	250	500	1135	2780
1LA1504-8PV□0	1700	5.9	850	800	1315	1250	500	130	250	500	1135	2780
1LA1560-8PV□0	1700	6.9	950	855	1435	1400	530	140	250	560	1250	2990
1LA1562-8PV□0	1700	7.3	950	855	1435	1400	530	140	250	560	1250	2990
1LA1564-8PV□0	1700	7.7	950	855[1]	1435[1]	1400	530	150	250	560	1250[2]	2990
1LA1566-8PV□0	1700	8.3	950	855[1]	1435[1]	1400	530	150	250	560	1250[2]	2990
1LA1630-8PV□0	1500	11.8	1120	945[1]	1610[1]	1600	580	180	300	630	1415[2]	3508
1LA1632-8PV□0	1500	12.8	1120	945[1]	1610[1]	1600	580	180	300	630	1415[2]	3508
1LA1634-8PV□0	1500	13.6	1120	945[1]	1610[1]	1600	580	180	300	630	1415[2]	3508
1LA1636-8PV□0	1500	14.4	1120	1100	1765	1600	580	180	300	630	1480	3508

1) For rated currents I_N > 315 A this dimension increases by 155 mm.

2) For rated currents I_N > 315 A this dimension increases by 65 mm.

H-compact 1LA1 rib-cooled, type of construction IM V1 with canopy, rolling-contact bearing

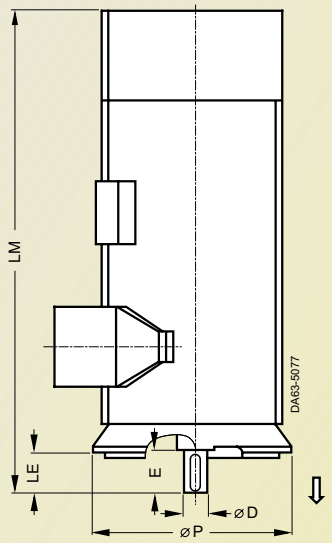


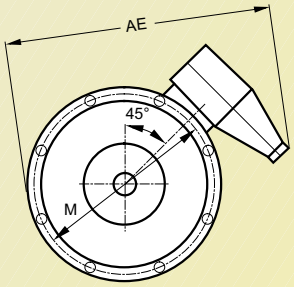
Order No.	Limit speed	Weight	AE	D	E	LE	LM	M	P
	rpm	t	mm	mm	mm	mm	mm	mm	mm
2-pole									
1LA1450-2PV□4	3000	3.2	1400	85	170	170	2465	940	1000
1LA1452-2PV□4	3000	3.4	1400	85	170	170	2465	940	1000
1LA1454-2PV□4	3000	3.6	1400	85	170	170	2465	940	1000
4-pole									
1LA1450-4PV□4	2100	3.3	1400	110	210	210	2505	940	1000
1LA1452-4PV□4	2100	3.5	1400	110	210	210	2505	940	1000
1LA1454-4PV□4	2100	3.7	1400	110	210	210	2505	940	1000
1LA1500-4PV□4	1800	4.9	1520[1])	120	210	210	2695	1080	1150
1LA1502-4PV□4	1800	5.2	1520[1])	120	210	210	2695	1080	1150
1LA1504-4PV□4	1800	5.5	1520[1])	120	210	210	2695	1080	1150
1LA1560-4PV□4	1600	6.7	1650[1])	130	250	250	2960	1200	1270
1LA1562-4PV□4	1600	6.9	1650[1])	130	250	250	2960	1200	1270
1LA1564-4PV□4	1600	7.2	1650[1])	140	250	250	2960	1200	1270
1LA1566-4PV□4	1600	7.7	1780	140	250	250	2960	1200	1270
6-pole									
1LA1450-6PV□4	1800	3.4	1400	120	210	210	2505	940	1000
1LA1452-6PV□4	1800	3.6	1400	120	210	210	2505	940	1000
1LA1454-6PV□4	1800	3.8	1400	120	210	210	2505	940	1000
1LA1500-6PV□4	1700	5.1	1520	130	250	250	2735	1080	1150
1LA1502-6PV□4	1700	5.3	1520	130	250	250	2735	1080	1150
1LA1504-6PV□4	1700	5.7	1520[1])	130	250	250	2735	1080	1150
1LA1560-6PV□4	1600	6.6	1650[1])	140	250	250	2960	1200	1270
1LA1562-6PV□4	1600	7.0	1650[1])	140	250	250	2960	1200	1270
1LA1564-6PV□4	1600	7.4	1650[1])	150	250	250	2960	1200	1270
1LA1566-6PV□4	1600	8.0	1650[1])	150	250	250	2960	1200	1270
1LA1630-6PV□4	1000	11.7	1820[1])	180	300	300	3370	1320	1400
1LA1632-6PV□4	1000	12.7	1950	180	300	300	3370	1320	1400
1LA1634-6PV□4	1000	13.4	1950	180	300	300	3370	1320	1400
1LA1636-6PV□4	1000	14.1	1950	180	300	300	3370	1320	1400
8-pole									
1LA1500-8PV□4	1700	5.1	1520	130	250	250	2735	1080	1150
1LA1502-8PV□4	1700	5.3	1520	130	250	250	2735	1080	1150
1LA1504-8PV□4	1700	5.7	1520	130	250	250	2735	1080	1150
1LA1560-8PV□4	1600	6.6	1650	140	250	250	2960	1200	1270
1LA1562-8PV□4	1600	7.0	1650	140	250	250	2960	1200	1270
1LA1564-8PV□4	1600	7.4	1650[1])	150	250	250	2960	1200	1270
1LA1566-8PV□4	1600	8.0	1650[1])	150	250	250	2960	1200	1270
1LA1630-8PV□4	1000	11.5	1820[1])	180	300	300	3370	1320	1400
1LA1632-8PV□4	1000	12.5	1820[1])	180	300	300	3370	1320	1400
1LA1634-8PV□4	1000	13.3	1820[1])	180	300	300	3370	1320	1400
1LA1636-8PV□4	1000	14.0	1950	180	300	300	3370	1320	1400

1) For rated currents I_N > 315 A this dimension increases by 130 mm.

High-voltage motors

H-compact 1LA1 rib-cooled, type of construction IM V1 without canopy, rolling-contact bearing



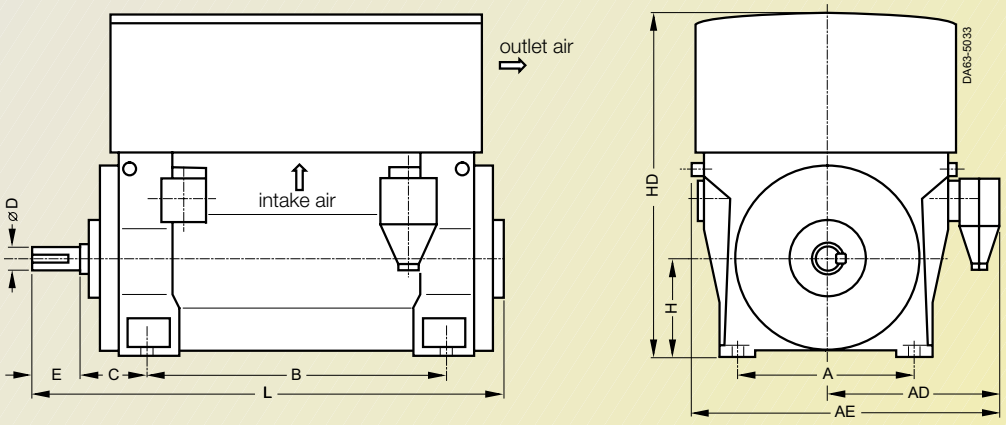


Order No.	Limit speed	Weight	AE	D	E	LE	LM	M	P
	rpm	t	mm	mm	mm	mm	mm	mm	mm
2-pole									
1LA1450-2PV□8	3000	3.2	1400	85	170	170	2275	940	1000
1LA1452-2PV□8	3000	3.4	1400	85	170	170	2275	940	1000
1LA1454-2PV□8	3000	3.6	1400	85	170	170	2275	940	1000
4-pole									
1LA1450-4PV□8	2100	3.3	1400	110	210	210	2315	940	1000
1LA1452-4PV□8	2100	3.5	1400	110	210	210	2315	940	1000
1LA1454-4PV□8	2100	3.7	1400	110	210	210	2315	940	1000
1LA1500-4PV□8	1800	4.9	1520[1])	120	210	210	2505	1080	1150
1LA1502-4PV□8	1800	5.2	1520[1])	120	210	210	2505	1080	1150
1LA1504-4PV□8	1800	5.5	1520[1])	120	210	210	2505	1080	1150
1LA1560-4PV□8	1600	6.7	1650[1])	130	250	250	2770	1200	1270
1LA1562-4PV□8	1600	6.9	1650[1])	130	250	250	2770	1200	1270
1LA1564-4PV□8	1600	7.2	1650[1])	140	250	250	2770	1200	1270
1LA1566-4PV□8	1600	7.7	1780	140	250	250	2770	1200	1270
6-pole									
1LA1450-6PV□8	1800	3.4	1400	120	210	210	2315	940	1000
1LA1452-6PV□8	1800	3.6	1400	120	210	210	2315	940	1000
1LA1454-6PV□8	1800	3.8	1400	120	210	210	2315	940	1000
1LA1500-6PV□8	1700	5.1	1520	130	250	250	2545	1080	1150
1LA1502-6PV□8	1700	5.3	1520	130	250	250	2545	1080	1150
1LA1504-6PV□8	1700	5.7	1520[1])	130	250	250	2545	1080	1150
1LA1560-6PV□8	1600	6.6	1650[1])	140	250	250	2770	1200	1270
1LA1562-6PV□8	1600	7.0	1650[1])	140	250	250	2770	1200	1270
1LA1564-6PV□8	1600	7.4	1650[1])	150	250	250	2770	1200	1270
1LA1566-6PV□8	1600	8.0	1650[1])	150	250	250	2770	1200	1270
1LA1630-6PV□8	1000	11.7	1820[1])	180	300	300	3180	1320	1400
1LA1632-6PV□8	1000	12.7	1950	180	300	300	3180	1320	1400
1LA1634-6PV□8	1000	13.4	1950	180	300	300	3180	1320	1400
1LA1636-6PV□8	1000	14.1	1950	180	300	300	3180	1320	1400
8-pole									
1LA1500-8PV□8	1700	5.1	1520	130	250	250	2545	1080	1150
1LA1502-8PV□8	1700	5.3	1520	130	250	250	2545	1080	1150
1LA1504-8PV□8	1700	5.7	1520	130	250	250	2545	1080	1150
1LA1560-8PV□8	1600	6.6	1650	140	250	250	2770	1200	1270
1LA1562-8PV□8	1600	7.0	1650	140	250	250	2770	1200	1270
1LA1564-8PV□8	1600	7.4	1650[1])	150	250	250	2770	1200	1270
1LA1566-8PV□8	1600	8.0	1650[1])	150	250	250	2770	1200	1270
1LA1630-8PV□8	1000	11.5	1820[1])	180	300	300	3180	1320	1400
1LA1632-8PV□8	1000	12.5	1820[1])	180	300	300	3180	1320	1400
1LA1634-8PV□8	1000	13.3	1820[1])	180	300	300	3180	1320	1400
1LA1636-8PV□8	1000	14.0	1950	180	300	300	3180	1320	1400

1) For rated currents I_N > 315 A this dimension increases by 130 mm.

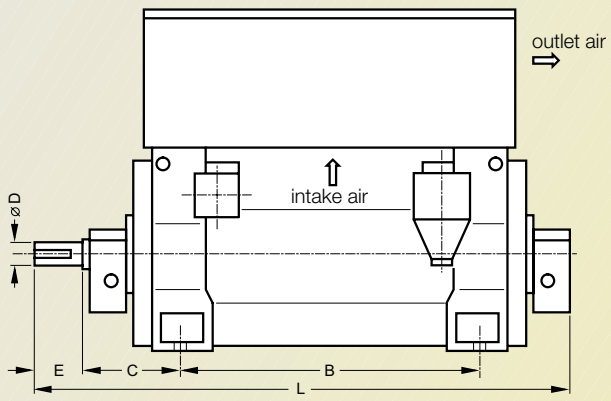
High-voltage motors

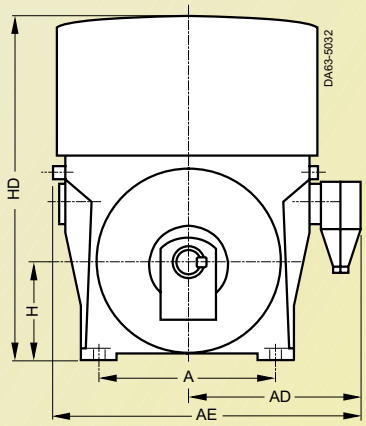
H-compact PLUS 1RA4 open-circuit cooling, type of construction IM B3, rolling-contact bearing



Order No.	Limit speed	Weight	A	AD	AE	B	C	D	E	H	HD	L
	rpm	t	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
4-pole												
1RA4450-4HV□0	1800	3.85	850	930	1620	1180	250	130	200	450	1390	1920
1RA4452-4HV□0	1800	4.05	850	930	1620	1180	250	130	200	450	1390	1920
1RA4454-4HV□0	1800	4.55	850	930	1620	1400	250	140	200	450	1390	2130
1RA4456-4HV□0	1800	4.80	850	930	1620	1400	250	140	200	450	1390	2130
1RA4500-4HV□0	1800	5.15	950	1000	1760	1320	280	150	200	500	1520	2230
1RA4502-4HV□0	1800	5.35	950	1000	1760	1320	280	150	200	500	1520	2230
1RA4504-4HV□0	1800	6.00	950	1000	1760	1500	280	160	240	500	1520	2480
1RA4506-4HV□0	1800	6.40	950	1220	1980	1500	280	160	240	500	1520	2480
1RA4560-4HV□0	1800	7.10	1060	1210	2040	1400	315	180	240	560	1750	2300
6-pole												
1RA4450-6HV□0	1200	3.95	850	930	1620	1180	250	130	200	450	1390	1920
1RA4452-6HV□0	1200	4.15	850	930	1620	1180	250	130	200	450	1390	1920
1RA4454-6HV□0	1200	4.50	850	930	1620	1400	250	140	200	450	1390	2130
1RA4456-6HV□0	1200	4.90	850	930	1620	1400	250	140	200	450	1390	2130
1RA4500-6HV□0	1200	5.25	950	1000	1760	1320	280	160	240	500	1520	2270
1RA4502-6HV□0	1200	5.65	950	1000	1760	1320	280	160	240	500	1520	2270
1RA4504-6HV□0	1200	6.20	950	1000	1760	1500	280	170	240	500	1520	2480
1RA4506-6HV□0	1200	6.55	950	1000	1760	1500	280	170	240	500	1520	2480
1RA4560-6HV□0	1200	7.20	1060	1070	1900	1400	315	180	240	560	1750	2300
1RA4562-6HV□0	1200	7.85	1060	1210	2040	1400	315	180	240	560	1750	2300
1RA4564-6HV□0	1200	8.65	1060	1210	2040	1600	315	190	280	560	1750	2570
8-pole												
1RA4450-8HV□0	900	3.90	850	930	1620	1180	250	130	200	450	1390	1920
1RA4452-8HV□0	900	4.10	850	930	1620	1180	250	130	200	450	1390	1920
1RA4454-8HV□0	900	4.50	850	930	1620	1400	250	140	200	450	1390	2130
1RA4456-8HV□0	900	4.90	850	930	1620	1400	250	140	200	450	1390	2130
1RA4500-8HV□0	900	5.30	950	1000	1760	1320	280	160	240	500	1520	2270
1RA4502-8HV□0	900	5.70	950	1000	1760	1320	280	160	240	500	1520	2270
1RA4504-8HV□0	900	6.20	950	1000	1760	1500	280	170	240	500	1520	2480
1RA4506-8HV□0	900	6.55	950	1000	1760	1500	280	170	240	500	1520	2480
1RA4560-8HV□0	900	7.20	1060	1070	1900	1400	315	180	240	560	1750	2300
1RA4562-8HV□0	900	7.70	1060	1070	1900	1400	315	180	240	560	1750	2300
1RA4564-8HV□0	900	8.55	1060	1070	1900	1600	315	190	280	560	1750	2570
1RA4566-8HV□0	900	9.00	1060	1070	1900	1600	315	190	280	560	1750	2570

H-compact PLUS 1RA4 open-circuit cooling, type of construction IM B3, sleeve bearing





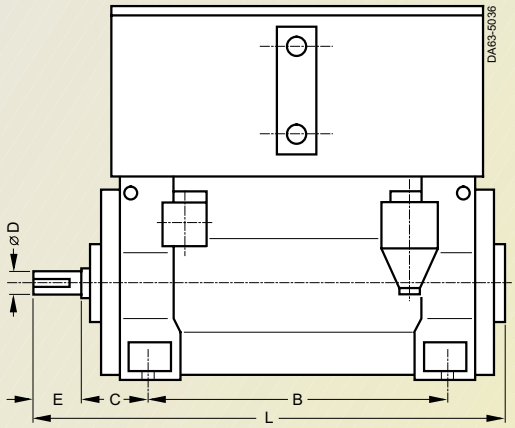
Order No.	Limit speed	Weight	A	AD	AE	B	C	D	E	H	HD	L
	rpm	t	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
4-pole												
1RA4450-4HV□0	1800	3.95	850	930	1620	1180	450	130	200	450	1390	2120
1RA4452-4HV□0	1800	4.15	850	930	1620	1180	450	130	200	450	1390	2120
1RA4454-4HV□0	1800	4.60	850	930	1620	1400	450	140	200	450	1390	2330
1RA4456-4HV□0	1800	4.95	850	930	1620	1400	450	140	200	450	1390	2330
1RA4500-4HV□0	1800	5.30	950	1000	1760	1320	500	150	200	500	1520	2580
1RA4502-4HV□0	1800	5.50	950	1000	1760	1320	500	150	200	500	1520	2580
1RA4504-4HV□0	1800	6.20	950	1000	1760	1500	500	160	240	500	1520	2830
1RA4506-4HV□0	1800	6.60	950	1220	1980	1500	500	160	240	500	1520	2830
1RA4560-4HV□0	1800	7.25	1060	1210	2040	1400	530	180	240	560	1750	2630
6-pole												
1RA4450-6HV□0	1200	4.05	850	930	1620	1180	450	130	200	450	1390	2120
1RA4452-6HV□0	1200	4.25	850	930	1620	1180	450	130	200	450	1390	2120
1RA4454-6HV□0	1200	4.65	850	930	1620	1400	450	140	200	450	1390	2330
1RA4456-6HV□0	1200	4.95	850	930	1620	1400	450	140	200	450	1390	2330
1RA4500-6HV□0	1200	5.45	950	1000	1760	1320	500	160	240	500	1520	2620
1RA4502-6HV□0	1200	5.80	950	1000	1760	1320	500	160	240	500	1520	2620
1RA4504-6HV□0	1200	6.35	950	1000	1760	1500	500	170	240	500	1520	2830
1RA4506-6HV□0	1200	6.75	950	1000	1760	1500	500	170	240	500	1520	2830
1RA4560-6HV□0	1200	7.45	1060	1070	1900	1400	530	180	240	560	1750	2670
1RA4562-6HV□0	1200	8.05	1060	1210	2040	1400	530	180	240	560	1750	2670
1RA4564-6HV□0	1200	8.85	1060	1210	2040	1600	530	190	280	560	1750	2940
8-pole												
1RA4450-8HV□0	900	4.00	850	930	1620	1180	450	130	200	450	1390	2120
1RA4452-8HV□0	900	4.25	850	930	1620	1180	450	130	200	450	1390	2120
1RA4454-8HV□0	900	4.65	850	930	1620	1400	450	140	200	450	1390	2330
1RA4456-8HV□0	900	5.00	850	930	1620	1400	450	140	200	450	1390	2330
1RA4500-8HV□0	900	5.50	950	1000	1760	1320	500	160	240	500	1520	2620
1RA4502-8HV□0	900	5.85	950	1000	1760	1320	500	160	240	500	1520	2620
1RA4504-8HV□0	900	6.35	950	1000	1760	1500	500	170	240	500	1520	2830
1RA4506-8HV□0	900	6.70	950	1000	1760	1500	500	170	240	500	1520	2830
1RA4560-8HV□0	900	7.40	1060	1070	1900	1400	530	180	240	560	1750	2670
1RA4562-8HV□0	900	7.95	1060	1070	1900	1400	530	180	240	560	1750	2670
1RA4564-8HV□0	900	8.75	1060	1070	1900	1600	530	190	280	560	1750	2940
1RA4566-8HV□0	900	9.25	1060	1070	1900	1600	530	190	280	560	1750	2940

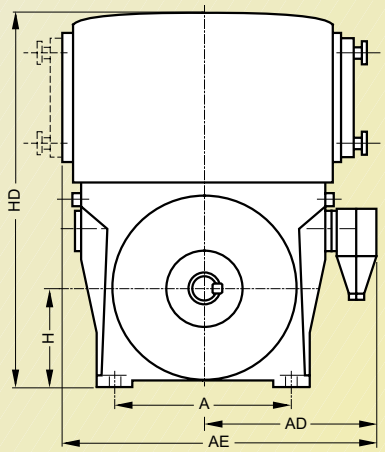
High-voltage motors

H-compact PLUS 1RA4 open-circuit cooling, type of construction IM V1 without canopy, rolling-contact bearing

Order No.	Limit speed	Weight	AC	AD	AE	D	E	K	LB	M	N	P
	rpm	t	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
4-pole												
1RA4450-4HV□8	1800	3.95	1520	930	1670	130	200	26	1720	1080	1000	1150
1RA4452-4HV□8	1800	4.15	1520	930	1670	130	200	26	1720	1080	1000	1150
1RA4454-4HV□8	1800	4.65	1520	930	1670	140	200	26	1930	1080	1000	1150
1RA4456-4HV□8	1800	4.90	1520	930	1670	140	200	26	1930	1080	1000	1150
1RA4500-4HV□8	1800	5.25	1640	1000	1810	150	200	26	1910	1180	1120	1250
1RA4502-4HV□8	1800	5.45	1640	1000	1810	150	200	26	1910	1180	1120	1250
1RA4504-4HV□8	1800	6.15	1640	1000	1810	160	240	26	2120	1180	1120	1250
1RA4506-4HV□8	1800	6.55	1640	1140	1950	160	240	26	2120	1180	1120	1250
1RA4560-4HV□8	1800	7.25	1890	1210	2100	180	240	26	2140	1320	1250	1400
6-pole												
1RA4450-6HV□8	1200	4.05	1520	930	1670	130	200	26	1720	1080	1000	1150
1RA4452-6HV□8	1200	4.25	1520	930	1670	130	200	26	1720	1080	1000	1150
1RA4454-6HV□8	1200	4.65	1520	930	1670	140	200	26	1930	1080	1000	1150
1RA4456-6HV□8	1200	5.00	1520	930	1670	140	200	26	1930	1080	1000	1150
1RA4500-6HV□8	1200	5.40	1640	1000	1810	160	240	26	1910	1180	1120	1250
1RA4502-6HV□8	1200	5.75	1640	1000	1810	160	240	26	1910	1180	1120	1250
1RA4504-6HV□8	1200	6.30	1640	1000	1810	170	240	26	2120	1180	1120	1250
1RA4506-6HV□8	1200	6.70	1640	1000	1810	170	240	26	2120	1180	1120	1250
1RA4560-6HV□8	1200	7.40	1890	1070	1960	180	240	26	2140	1320	1250	1400
1RA4562-6HV□8	1200	8.00	1890	1210	2100	180	240	26	2140	1320	1250	1400
1RA4564-6HV□8	1200	8.80	1890	1210	2100	190	280	26	2370	1320	1250	1400
8-pole												
1RA4450-8HV□8	900	4.00	1520	930	1670	130	200	26	1720	1080	1000	1150
1RA4452-8HV□8	900	4.20	1520	930	1670	130	200	26	1720	1080	1000	1150
1RA4454-8HV□8	900	4.65	1520	930	1670	140	200	26	1930	1080	1000	1150
1RA4456-8HV□8	900	5.00	1520	930	1670	140	200	26	1930	1080	1000	1150
1RA4500-8HV□8	900	5.45	1640	1000	1810	160	240	26	1910	1180	1120	1250
1RA4502-8HV□8	900	5.80	1640	1000	1810	160	240	26	1910	1180	1120	1250
1RA4504-8HV□8	900	6.30	1640	1000	1810	170	240	26	2120	1180	1120	1250
1RA4506-8HV□8	900	6.70	1640	1000	1810	170	240	26	2120	1180	1120	1250
1RA4560-8HV□8	900	7.35	1890	1070	1960	180	240	26	2140	1320	1250	1400
1RA4562-8HV□8	900	7.90	1890	1070	1960	180	240	26	2140	1320	1250	1400
1RA4564-8HV□8	900	8.70	1890	1070	1960	190	280	26	2370	1320	1250	1400
1RA4566-8HV□8	900	9.20	1890	1070	1960	190	280	26	2370	1320	1250	1400

H-compact PLUS 1RN4 air-to-water cooling, type of construction IM B3, rolling-contact bearing

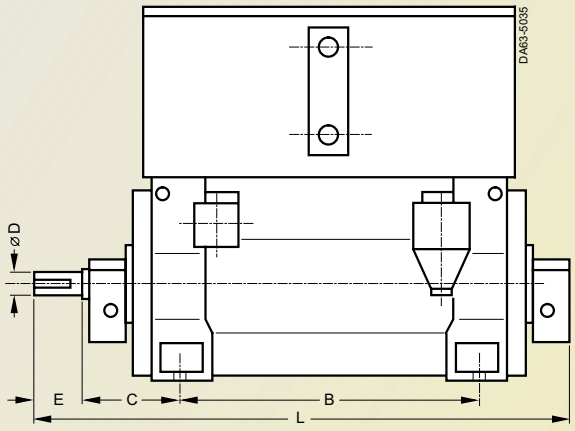


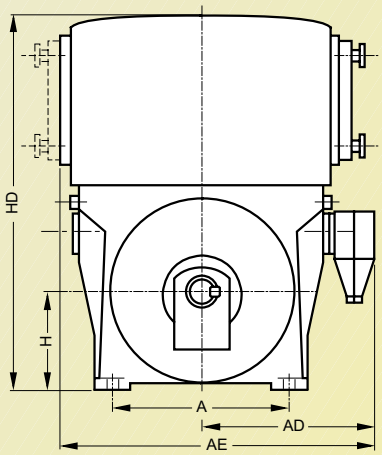


Order No.	Limit speed	Weight	A	AD	AE	B	C	D	E	H	HD	L
	rpm	t	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
4-pole												
1RN4450-4HV□0	1800	4.05	850	930	1620	1180	250	130	200	450	1620	1920
1RN4452-4HV□0	1800	4.20	850	930	1620	1180	250	130	200	450	1620	1920
1RN4454-4HV□0	1800	4.70	850	930	1620	1400	250	140	200	450	1620	2130
1RN4456-4HV□0	1800	4.95	850	930	1620	1400	250	140	200	450	1620	2130
1RN4500-4HV□0	1800	5.40	950	1000	1790	1320	280	150	200	500	1830	2230
1RN4502-4HV□0	1800	5.60	950	1000	1790	1320	280	150	200	500	1830	2230
1RN4504-4HV□0	1800	6.25	950	1000	1790	1500	280	160	240	500	1830	2480
1RN4506-4HV□0	1800	6.65	950	1220	2010	1500	280	160	240	500	1830	2480
1RN4560-4HV□0	1800	7.40	1060	1210	2060	1400	315	180	240	560	2040	2300
6-pole												
1RN4450-6HV□0	1200	4.10	850	930	1620	1180	250	130	200	450	1620	1920
1RN4452-6HV□0	1200	4.30	850	930	1620	1180	250	130	200	450	1620	1920
1RN4454-6HV□0	1200	4.70	850	930	1620	1400	250	140	200	450	1620	2130
1RN4456-6HV□0	1200	5.05	850	930	1620	1400	250	140	200	450	1620	2130
1RN4500-6HV□0	1200	5.55	950	1000	1790	1320	280	160	240	500	1830	2270
1RN4502-6HV□0	1200	5.90	950	1000	1790	1320	280	160	240	500	1830	2270
1RN4504-6HV□0	1200	6.45	950	1000	1790	1500	280	170	240	500	1830	2480
1RN4506-6HV□0	1200	6.85	950	1000	1790	1500	280	170	240	500	1830	2480
1RN4560-6HV□0	1200	7.50	1060	1070	1920	1400	315	180	240	560	2040	2300
1RN4562-6HV□0	1200	8.15	1060	1210	2060	1400	315	180	240	560	2040	2300
1RN4564-6HV□0	1200	8.95	1060	1210	2060	1600	315	190	280	560	2040	2570
8-pole												
1RN4450-8HV□0	900	4.10	850	930	1620	1180	250	130	200	450	1620	1920
1RN4452-8HV□0	900	4.25	850	930	1620	1180	250	130	200	450	1620	1920
1RN4454-8HV□0	900	4.70	850	930	1620	1400	250	140	200	450	1620	2130
1RN4456-8HV□0	900	5.05	850	930	1620	1400	250	140	200	450	1620	2130
1RN4500-8HV□0	900	5.55	950	1000	1790	1320	280	160	240	500	1830	2270
1RN4502-8HV□0	900	5.95	950	1000	1790	1320	280	160	240	500	1830	2270
1RN4504-8HV□0	900	6.45	950	1000	1790	1500	280	170	240	500	1830	2480
1RN4506-8HV□0	900	6.80	950	1000	1790	1500	280	170	240	500	1830	2480
1RN4560-8HV□0	900	7.50	1060	1070	1920	1400	315	180	240	560	2040	2300
1RN4562-8HV□0	900	8.00	1060	1070	1920	1400	315	180	240	560	2040	2300
1RN4564-8HV□0	900	8.85	1060	1070	1920	1600	315	190	280	560	2040	2570
1RN4566-8HV□0	900	9.35	1060	1070	1920	1600	315	190	280	560	2040	2570

High-voltage motors

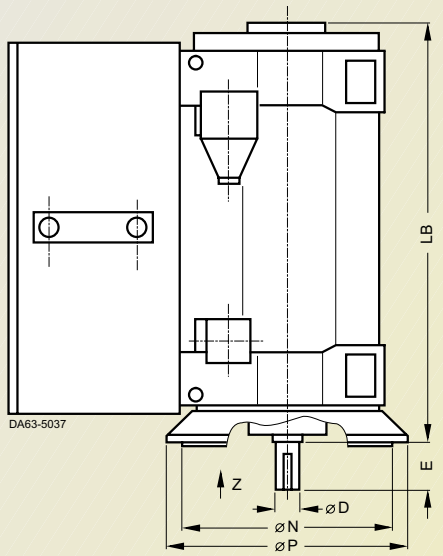
H-compact PLUS 1RN4 air-to-water cooling, type of construction IM B3, sleeve bearing

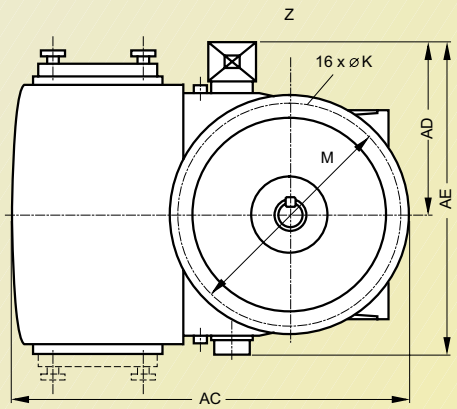




Order No.	Limit speed	Weight	A	AD	AE	B	C	D	E	H	HD	L
	rpm	t	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
4-pole												
1RN4450-4HV□0	1800	4.10	850	930	1620	1180	450	130	200	450	1620	2120
1RN4452-4HV□0	1800	4.30	850	930	1620	1180	450	130	200	450	1620	2120
1RN4454-4HV□0	1800	4.80	850	930	1620	1400	450	140	200	450	1620	2330
1RN4456-4HV□0	1800	5.10	850	930	1620	1400	450	140	200	450	1620	2330
1RN4500-4HV□0	1800	5.55	950	1000	1790	1320	500	150	200	500	1830	2580
1RN4502-4HV□0	1800	5.75	950	1000	1790	1320	500	150	200	500	1830	2580
1RN4504-4HV□0	1800	6.45	950	1000	1790	1500	500	160	240	500	1830	2830
1RN4506-4HV□0	1800	6.85	950	1220	2010	1500	500	160	240	500	1830	2830
1RN4560-4HV□0	1800	7.55	1060	1210	2060	1400	530	180	240	560	2040	2630
6-pole												
1RN4450-6HV□0	1200	4.20	850	930	1620	1180	450	130	200	450	1620	2120
1RN4452-6HV□0	1200	4.45	850	930	1620	1180	450	130	200	450	1620	2120
1RN4454-6HV□0	1200	4.85	850	930	1620	1400	450	140	200	450	1620	2330
1RN4456-6HV□0	1200	5.15	850	930	1620	1400	450	140	200	450	1620	2330
1RN4500-6HV□0	1200	5.70	950	1000	1790	1320	500	160	240	500	1830	2620
1RN4502-6HV□0	1200	6.10	950	1000	1790	1320	500	160	240	500	1830	2620
1RN4504-6HV□0	1200	6.60	950	1000	1790	1500	500	170	240	500	1830	2830
1RN4506-6HV□0	1200	7.00	950	1000	1790	1500	500	170	240	500	1830	2830
1RN4560-6HV□0	1200	7.75	1060	1070	1920	1400	530	180	240	560	2040	2670
1RN4562-6HV□0	1200	8.35	1060	1210	2060	1400	530	180	240	560	2040	2670
1RN4564-6HV□0	1200	9.15	1060	1210	2060	1600	530	190	280	560	2040	2940
8-pole												
1RN4450-8HV□0	900	4.20	850	930	1620	1180	450	130	200	450	1620	2120
1RN4452-8HV□0	900	4.40	850	930	1620	1180	450	130	200	450	1620	2120
1RN4454-8HV□0	900	4.85	850	930	1620	1400	450	140	200	450	1620	2330
1RN4456-8HV□0	900	5.15	850	930	1620	1400	450	140	200	450	1620	2330
1RN4500-8HV□0	900	5.75	950	1000	1790	1320	500	160	240	500	1830	2620
1RN4502-8HV□0	900	6.10	950	1000	1790	1320	500	160	240	500	1830	2620
1RN4504-8HV□0	900	6.60	950	1000	1790	1500	500	170	240	500	1830	2830
1RN4506-8HV□0	900	7.00	950	1000	1790	1500	500	170	240	500	1830	2830
1RN4560-8HV□0	900	7.70	1060	1070	1920	1400	530	180	240	560	2040	2670
1RN4562-8HV□0	900	8.25	1060	1070	1920	1400	530	180	240	560	2040	2670
1RN4564-8HV□0	900	9.05	1060	1070	1920	1600	530	190	280	560	2040	2940
1RN4566-8HV□0	900	9.55	1060	1070	1920	1600	530	190	280	560	2040	2940

H-compact PLUS 1RN4 air-to-water cooling, type of construction IM V1 without canopy, rolling-contact bearing

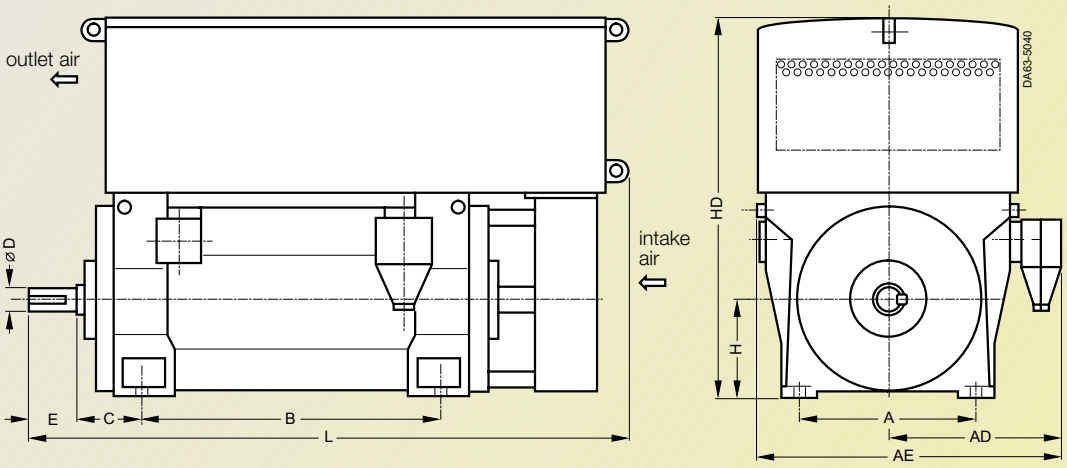




Order No.	Limit speed	Weight	AC	AD	AE	D	E	K	LB	M	N	P
	rpm	t	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
4-pole												
1RN4450-4HV□8	1800	4.15	1750	930	1670	130	200	26	1720	1080	1000	1150
1RN4452-4HV□8	1800	4.35	1750	930	1670	130	200	26	1720	1080	1000	1150
1RN4454-4HV□8	1800	4.85	1750	930	1670	140	200	26	1930	1080	1000	1150
1RN4456-4HV□8	1800	5.10	1750	930	1670	140	200	26	1930	1080	1000	1150
1RN4500-4HV□8	1800	5.50	1960	1000	1810	150	200	26	1910	1180	1120	1250
1RN4502-4HV□8	1800	5.70	1960	1000	1810	150	200	26	1910	1180	1120	1250
1RN4504-4HV□8	1800	6.40	1960	1000	1810	160	240	26	2120	1180	1120	1250
1RN4506-4HV□8	1800	6.80	1960	1140	1950	160	240	26	2120	1180	1120	1250
1RN4560-4HV□8	1800	7.55	2180	1210	2100	180	240	26	2090	1320	1250	1400
6-pole												
1RN4450-6HV□8	1200	4.25	1750	930	1670	130	200	26	1720	1080	1000	1150
1RN4452-6HV□8	1200	4.40	1750	930	1670	130	200	26	1720	1080	1000	1150
1RN4454-6HV□8	1200	4.85	1750	930	1670	140	200	26	1930	1080	1000	1150
1RN4456-6HV□8	1200	5.15	1750	930	1670	140	200	26	1930	1080	1000	1150
1RN4500-6HV□8	1200	5.65	1960	1000	1810	160	240	26	1910	1180	1120	1250
1RN4502-6HV□8	1200	6.05	1960	1000	1810	160	240	26	1910	1180	1120	1250
1RN4504-6HV□8	1200	6.55	1960	1000	1810	170	240	26	2120	1180	1120	1250
1RN4506-6HV□8	1200	6.95	1960	1000	1810	170	240	26	2120	1180	1120	1250
1RN4560-6HV□8	1200	7.65	2180	1070	1960	180	240	26	2090	1320	1250	1400
1RN4562-6HV□8	1200	8.25	2180	1210	2100	180	240	26	2090	1320	1250	1400
1RN4564-6HV□8	1200	9.10	2180	1210	2100	190	280	26	2320	1320	1250	1400
8-pole												
1RN4450-8HV□8	900	4.20	1750	930	1670	130	200	26	1720	1080	1000	1150
1RN4452-8HV□8	900	4.35	1750	930	1670	130	200	26	1720	1080	1000	1150
1RN4454-8HV□8	900	4.80	1750	930	1670	140	200	26	1930	1080	1000	1150
1RN4456-8HV□8	900	5.15	1750	930	1670	140	200	26	1930	1080	1000	1150
1RN4500-8HV□8	900	5.70	1960	1000	1810	160	240	26	1910	1180	1120	1250
1RN4502-8HV□8	900	6.05	1960	1000	1810	160	240	26	1910	1180	1120	1250
1RN4504-8HV□8	900	6.55	1960	1000	1810	170	240	26	2120	1180	1120	1250
1RN4506-8HV□8	900	6.95	1960	1000	1810	170	240	26	2120	1180	1120	1250
1RN4560-8HV□8	900	7.65	2180	1070	1960	180	240	26	2090	1320	1250	1400
1RN4562-8HV□8	900	8.15	2180	1070	1960	180	240	26	2090	1320	1250	1400
1RN4564-8HV□8	900	9.00	2180	1070	1960	190	280	26	2320	1320	1250	1400
1RN4566-8HV□8	900	9.45	2180	1070	1960	190	280	26	2320	1320	1250	1400

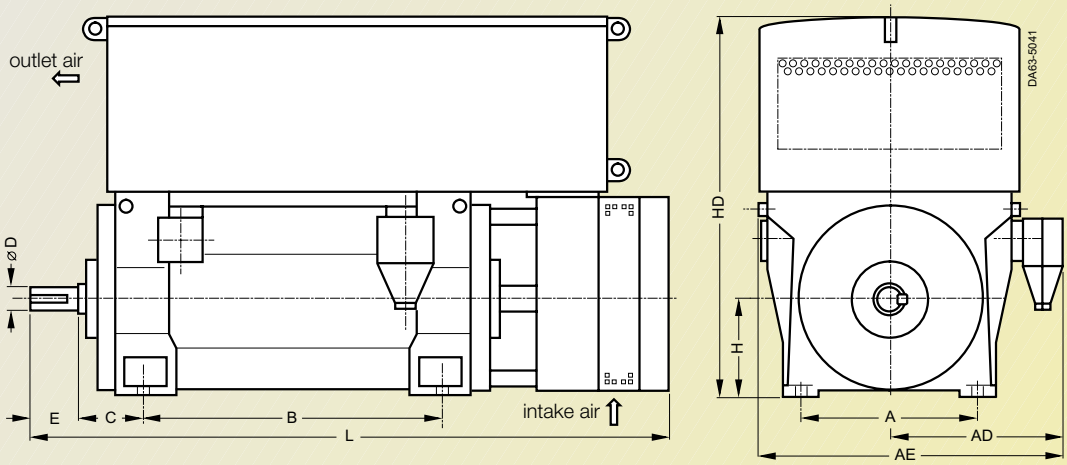
High-voltage motors

H-compact PLUS 1RQ4 air-to-air cooling, type of construction IM B3, rolling-contact bearing



Order No.	Limit speed	Weight	A	AD	AE	B	C	D	E	H	HD	L
	rpm	t	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
4-pole												
1RQ4450-4JV□0	1800	4.30	850	930	1620	1180	250	120	165	450	1810	2430
1RQ4452-4JV□0	1800	4.50	850	930	1620	1180	250	120	165	450	1810	2430
1RQ4454-4JV□0	1800	4.95	850	930	1620	1400	250	130	200	450	1810	2680
1RQ4456-4JV□0	1800	5.25	850	930	1620	1400	250	130	200	450	1810	2680
1RQ4500-4JV□0	1800	5.90	950	1000	1760	1320	280	140	200	500	2000	2660
1RQ4502-4JV□0	1800	6.10	950	1000	1760	1320	280	140	200	500	2000	2660
1RQ4504-4JV□0	1800	6.80	950	1000	1760	1500	280	150	200	500	2000	2870
1RQ4506-4JV□0	1800	7.15	950	1000	1760	1500	280	150	200	500	2000	2870
1RQ4560-4JV□0	1800	8.00	1060	1210	2040	1400	315	170	240	560	2260	2950
1RQ4562-4JV□0	1800	8.45	1060	1210	2040	1400	315	170	240	560	2260	2950
1RQ4564-4JV□0	1800	9.35	1060	1210	2040	1600	315	180	240	560	2260	3180
6-pole												
1RQ4450-6JV□0	1200	4.40	850	930	1620	1180	250	130	200	450	1810	2470
1RQ4452-6JV□0	1200	4.60	850	930	1620	1180	250	130	200	450	1810	2470
1RQ4454-6JV□0	1200	5.05	850	930	1620	1400	250	140	200	450	1810	2680
1RQ4456-6JV□0	1200	5.35	850	930	1620	1400	250	140	200	450	1810	2680
1RQ4500-6JV□0	1200	6.00	950	1000	1760	1320	280	150	200	500	2000	2660
1RQ4502-6JV□0	1200	6.40	950	1000	1760	1320	280	150	200	500	2000	2660
1RQ4504-6JV□0	1200	6.95	950	1000	1760	1500	280	160	240	500	2000	2910
1RQ4506-6JV□0	1200	7.35	950	1000	1760	1500	280	160	240	500	2000	2910
1RQ4560-6JV□0	1200	8.10	1060	1070	1900	1400	315	170	240	560	2260	2950
1RQ4562-6JV□0	1200	8.65	1060	1070	1900	1400	315	170	240	560	2260	2950
1RQ4564-6JV□0	1200	9.60	1060	1210	2040	1600	315	180	240	560	2260	3180
1RQ4566-6JV□0	1200	10.05	1060	1210	2040	1600	315	180	240	560	2260	3180
8-pole												
1RQ4450-8JV□0	900	4.35	850	930	1620	1180	250	130	200	450	1810	2470
1RQ4452-8JV□0	900	4.60	850	930	1620	1180	250	130	200	450	1810	2470
1RQ4454-8JV□0	900	5.05	850	930	1620	1400	250	140	200	450	1810	2680
1RQ4456-8JV□0	900	5.35	850	930	1620	1400	250	140	200	450	1810	2680
1RQ4500-8JV□0	900	6.05	950	1000	1760	1320	280	150	200	500	2000	2660
1RQ4502-8JV□0	900	6.40	950	1000	1760	1320	280	150	200	500	2000	2660
1RQ4504-8JV□0	900	6.95	950	1000	1760	1500	280	160	240	500	2000	2910
1RQ4506-8JV□0	900	7.35	950	1000	1760	1500	280	160	240	500	2000	2910
1RQ4560-8JV□0	900	8.10	1060	1070	1900	1400	315	170	240	560	2260	2950
1RQ4562-8JV□0	900	8.65	1060	1070	1900	1400	315	170	240	560	2260	2950
1RQ4564-8JV□0	900	9.50	1060	1070	1900	1600	315	180	240	560	2260	3180
1RQ4566-8JV□0	900	9.95	1060	1070	1900	1600	315	180	240	560	2260	3180

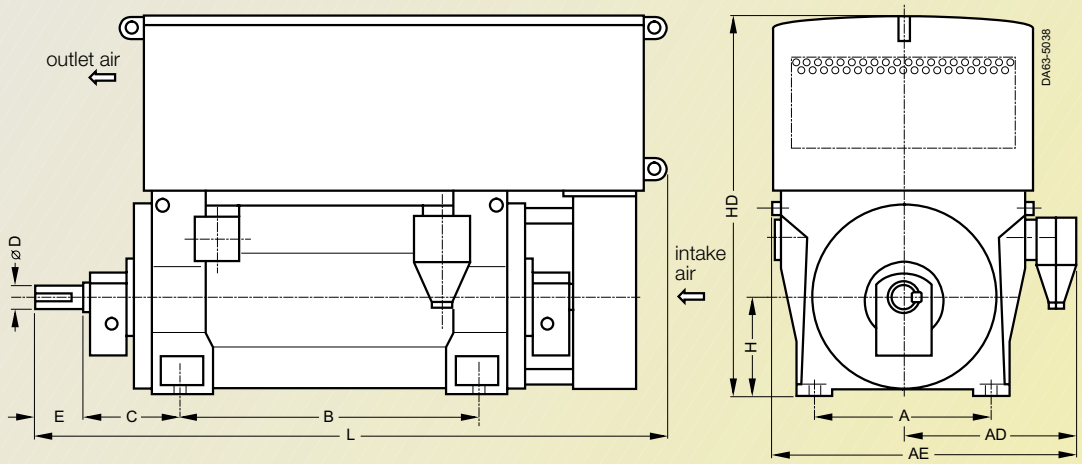
H-compact PLUS 1RQ4 air-to-air cooling, type of construction IM B3 with air intake damping, rolling-contact bearing



Order No.	Limit speed	Weight	A	AD	AE	B	C	D	E	H	HD	L
	rpm	t	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
4-pole												
1RQ4450-4JV□0	1800	4.34	850	930	1620	1180	250	120	165	450	1810	2760
1RQ4452-4JV□0	1800	4.54	850	930	1620	1180	250	120	165	450	1810	2760
1RQ4454-4JV□0	1800	4.99	850	930	1620	1400	250	130	200	450	1810	3010
1RQ4456-4JV□0	1800	5.29	850	930	1620	1400	250	130	200	450	1810	3010
1RQ4500-4JV□0	1800	5.95	950	1000	1760	1320	280	140	200	500	2000	3060
1RQ4502-4JV□0	1800	6.15	950	1000	1760	1320	280	140	200	500	2000	3060
1RQ4504-4JV□0	1800	6.85	950	1000	1760	1500	280	150	200	500	2000	3270
1RQ4506-4JV□0	1800	7.20	950	1000	1760	1500	280	150	200	500	2000	3270
1RQ4560-4JV□0	1800	8.06	1060	1210	2040	1400	315	170	240	560	2260	3340
1RQ4562-4JV□0	1800	8.51	1060	1210	2040	1400	315	170	240	560	2260	3340
1RQ4564-4JV□0	1800	9.41	1060	1210	2040	1600	315	180	240	560	2260	3570
6-pole												
1RQ4450-6JV□0	1200	4.44	850	930	1620	1180	250	130	200	450	1810	2800
1RQ4452-6JV□0	1200	4.64	850	930	1620	1180	250	130	200	450	1810	2800
1RQ4454-6JV□0	1200	5.09	850	930	1620	1400	250	140	200	450	1810	3010
1RQ4456-6JV□0	1200	5.39	850	930	1620	1400	250	140	200	450	1810	3010
1RQ4500-6JV□0	1200	6.05	950	1000	1760	1320	280	150	200	500	2000	3060
1RQ4502-6JV□0	1200	6.45	950	1000	1760	1320	280	150	200	500	2000	3060
1RQ4504-6JV□0	1200	7.00	950	1000	1760	1500	280	160	240	500	2000	3310
1RQ4506-6JV□0	1200	7.40	950	1000	1760	1500	280	160	240	500	2000	3310
1RQ4560-6JV□0	1200	8.16	1060	1210	2040	1400	315	170	240	560	2260	3340
1RQ4562-6JV□0	1200	8.71	1060	1210	2040	1400	315	170	240	560	2260	3340
1RQ4564-6JV□0	1200	9.66	1060	1210	2040	1600	315	180	240	560	2260	3570
1RQ4566-6JV□0	1200	10.11	1060	1210	2040	1600	315	180	240	560	2260	3570
8-pole												
1RQ4450-8JV□0	900	4.39	850	930	1620	1180	250	130	200	450	1810	2800
1RQ4452-8JV□0	900	4.64	850	930	1620	1180	250	130	200	450	1810	2800
1RQ4454-8JV□0	900	5.09	850	930	1620	1400	250	140	200	450	1810	3010
1RQ4456-8JV□0	900	5.39	850	930	1620	1400	250	140	200	450	1810	3010
1RQ4500-8JV□0	900	6.10	950	1000	1760	1320	280	150	200	500	2000	3060
1RQ4502-8JV□0	900	6.45	950	1000	1760	1320	280	150	200	500	2000	3060
1RQ4504-8JV□0	900	7.00	950	1000	1760	1500	280	160	240	500	2000	3310
1RQ4506-8JV□0	900	7.40	950	1000	1760	1500	280	160	240	500	2000	3310
1RQ4560-8JV□0	900	8.16	1060	1210	2040	1400	315	170	240	560	2260	3340
1RQ4562-8JV□0	900	8.71	1060	1210	2040	1400	315	170	240	560	2260	3340
1RQ4564-8JV□0	900	9.56	1060	1210	2040	1600	315	180	240	560	2260	3570
1RQ4566-8JV□0	900	10.01	1060	1210	2040	1600	315	180	240	560	2260	3570

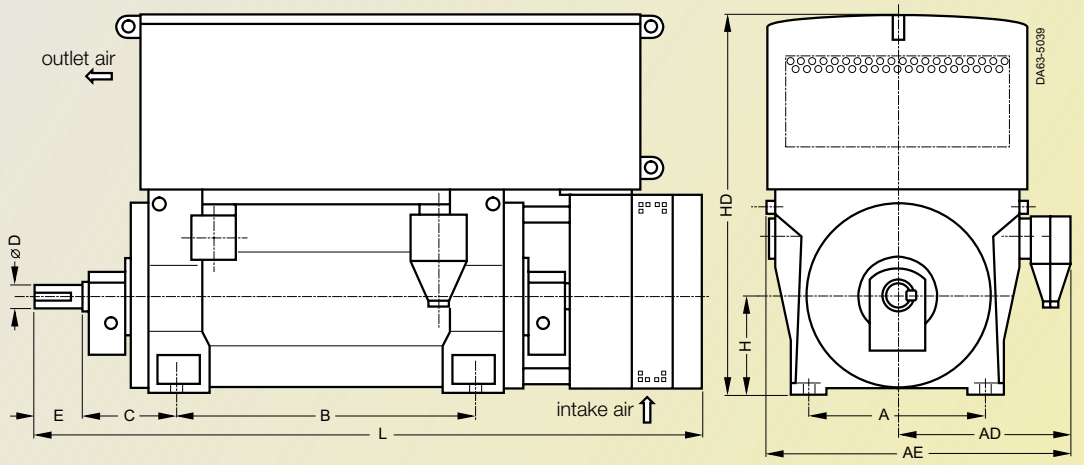
High-voltage motors

H-compact PLUS 1RQ4 air-to-air cooling, type of construction IM B3, sleeve bearing



Order No.	Limit speed	Weight	A	AD	AE	B	C	D	E	H	HD	L
	rpm	t	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
4-pole												
1RQ4450-4JV□0	1800	4.40	850	930	1620	1180	450	120	165	450	1810	2630
1RQ4452-4JV□0	1800	4.60	850	930	1620	1180	450	120	165	450	1810	2630
1RQ4454-4JV□0	1800	5.10	850	930	1620	1400	450	130	200	450	1810	2880
1RQ4456-4JV□0	1800	5.35	850	930	1620	1400	450	130	200	450	1810	2880
1RQ4500-4JV□0	1800	6.00	950	1000	1760	1320	500	140	200	500	2000	2880
1RQ4502-4JV□0	1800	6.25	950	1000	1760	1320	500	140	200	500	2000	2880
1RQ4504-4JV□0	1800	6.95	950	1000	1760	1500	500	150	200	500	2000	3090
1RQ4506-4JV□0	1800	7.30	950	1000	1760	1500	500	150	200	500	2000	3090
1RQ4560-4JV□0	1800	8.15	1060	1210	2040	1400	530	170	240	560	2260	3170
1RQ4562-4JV□0	1800	8.60	1060	1210	2040	1400	530	170	240	560	2260	3170
1RQ4564-4JV□0	1800	9.50	1060	1210	2040	1600	530	180	240	560	2260	3400
6-pole												
1RQ4450-6JV□0	1200	4.50	850	930	1620	1180	450	130	200	450	1810	2670
1RQ4452-6JV□0	1200	4.70	850	930	1620	1180	450	130	200	450	1810	2670
1RQ4454-6JV□0	1200	5.15	850	930	1620	1400	450	140	200	450	1810	2880
1RQ4456-6JV□0	1200	5.45	850	930	1620	1400	450	140	200	450	1810	2880
1RQ4500-6JV□0	1200	6.20	950	1000	1760	1320	500	150	200	500	2000	2880
1RQ4502-6JV□0	1200	6.50	950	1000	1760	1320	500	150	200	500	2000	2880
1RQ4504-6JV□0	1200	7.15	950	1000	1760	1500	500	160	240	500	2000	3130
1RQ4506-6JV□0	1200	7.55	950	1000	1760	1500	500	160	240	500	2000	3130
1RQ4560-6JV□0	1200	8.25	1060	1070	1900	1400	530	170	240	560	2260	3170
1RQ4562-6JV□0	1200	8.80	1060	1070	1900	1400	530	170	240	560	2260	3170
1RQ4564-6JV□0	1200	9.75	1060	1210	2040	1600	530	180	240	560	2260	3400
1RQ4566-6JV□0	1200	10.20	1060	1210	2040	1600	530	180	240	560	2260	3400
8-pole												
1RQ4450-8JV□0	900	4.50	850	930	1620	1180	450	130	200	450	1810	2670
1RQ4452-8JV□0	900	4.70	850	930	1620	1180	450	130	200	450	1810	2670
1RQ4454-8JV□0	900	5.10	850	930	1620	1400	450	140	200	450	1810	2880
1RQ4456-8JV□0	900	5.45	850	930	1620	1400	450	140	200	450	1810	2880
1RQ4500-8JV□0	900	6.20	950	1000	1760	1320	500	150	200	500	2000	2880
1RQ4502-8JV□0	900	6.55	950	1000	1760	1320	500	150	200	500	2000	2880
1RQ4504-8JV□0	900	7.05	950	1000	1760	1500	500	160	240	500	2000	3130
1RQ4506-8JV□0	900	7.45	950	1000	1760	1500	500	160	240	500	2000	3130
1RQ4560-8JV□0	900	8.25	1060	1070	1900	1400	530	170	240	560	2260	3170
1RQ4562-8JV□0	900	8.80	1060	1070	1900	1400	530	170	240	560	2260	3170
1RQ4564-8JV□0	900	9.65	1060	1070	1900	1600	530	180	240	560	2260	3400
1RQ4566-8JV□0	900	10.10	1060	1070	1900	1600	530	180	240	560	2260	3400

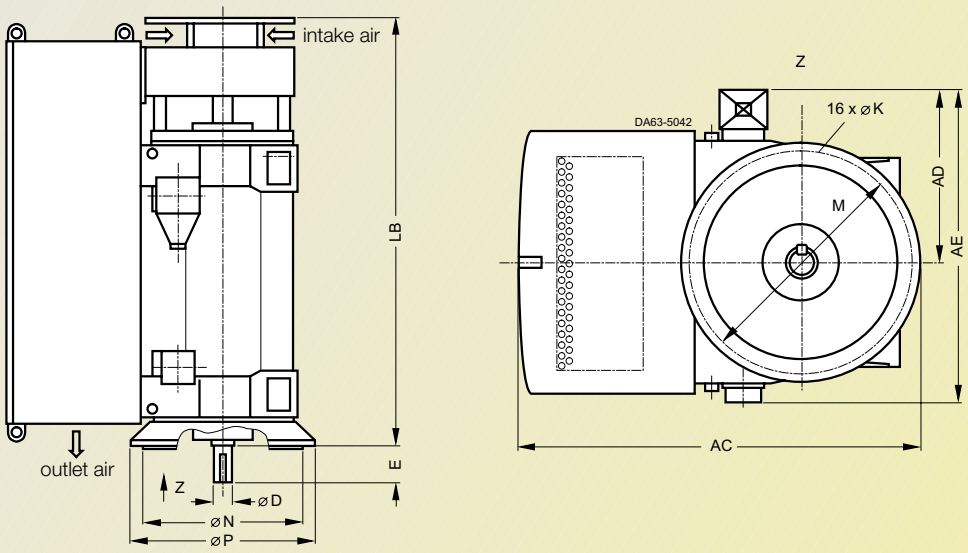
H-compact PLUS 1RQ4 air-to-air cooling, type of construction IM B3 with air intake damping, sleeve bearing



Order No.	Limit speed	Weight	A	AD	AE	B	C	D	E	H	HD	L
	rpm	t	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
4-pole												
1RQ4450-4JV□0	1800	4.44	850	930	1620	1180	450	120	165	450	1810	2960
1RQ4452-4JV□0	1800	4.64	850	930	1620	1180	450	120	165	450	1810	2960
1RQ4454-4JV□0	1800	5.14	850	930	1620	1400	450	130	200	450	1810	3210
1RQ4456-4JV□0	1800	5.39	850	930	1620	1400	450	130	200	450	1810	3210
1RQ4500-4JV□0	1800	6.05	950	1000	1760	1320	500	140	200	500	2000	3280
1RQ4502-4JV□0	1800	6.30	950	1000	1760	1320	500	140	200	500	2000	3280
1RQ4504-4JV□0	1800	7.00	950	1000	1760	1500	500	150	200	500	2000	3490
1RQ4506-4JV□0	1800	7.35	950	1000	1760	1500	500	150	200	500	2000	3490
1RQ4560-4JV□0	1800	8.21	1060	1210	2040	1400	530	170	240	560	2260	3560
1RQ4562-4JV□0	1800	8.66	1060	1210	2040	1400	530	170	240	560	2260	3560
1RQ4564-4JV□0	1800	9.56	1060	1210	2040	1600	530	180	240	560	2260	3790
6-pole												
1RQ4450-6JV□0	1200	4.54	850	930	1620	1180	450	130	200	450	1810	3000
1RQ4452-6JV□0	1200	4.74	850	930	1620	1180	450	130	200	450	1810	3000
1RQ4454-6JV□0	1200	5.19	850	930	1620	1400	450	140	200	450	1810	3210
1RQ4456-6JV□0	1200	5.49	850	930	1620	1400	450	140	200	450	1810	3210
1RQ4500-6JV□0	1200	6.25	950	1000	1760	1320	500	150	200	500	2000	3280
1RQ4502-6JV□0	1200	6.55	950	1000	1760	1320	500	150	200	500	2000	3280
1RQ4504-6JV□0	1200	7.20	950	1000	1760	1500	500	160	240	500	2000	3530
1RQ4506-6JV□0	1200	7.60	950	1000	1760	1500	500	160	240	500	2000	3530
1RQ4560-6JV□0	1200	8.31	1060	1210	2040	1400	530	170	240	560	2260	3560
1RQ4562-6JV□0	1200	8.86	1060	1210	2040	1400	530	170	240	560	2260	3560
1RQ4564-6JV□0	1200	9.81	1060	1210	2040	1600	530	180	240	560	2260	3790
1RQ4566-6JV□0	1200	10.26	1060	1210	2040	1600	530	180	240	560	2260	3790
8-pole												
1RQ4450-8JV□0	900	4.54	850	930	1620	1180	450	130	200	450	1810	3000
1RQ4452-8JV□0	900	4.74	850	930	1620	1180	450	130	200	450	1810	3000
1RQ4454-8JV□0	900	5.14	850	930	1620	1400	450	140	200	450	1810	3210
1RQ4456-8JV□0	900	5.49	850	930	1620	1400	450	140	200	450	1810	3210
1RQ4500-8JV□0	900	6.25	950	1000	1760	1320	500	150	200	500	2000	3280
1RQ4502-8JV□0	900	6.60	950	1000	1760	1320	500	150	200	500	2000	3280
1RQ4504-8JV□0	900	7.10	950	1000	1760	1500	500	160	240	500	2000	3530
1RQ4506-8JV□0	900	7.50	950	1000	1760	1500	500	160	240	500	2000	3530
1RQ4560-8JV□0	900	8.31	1060	1210	2040	1400	530	170	240	560	2260	3560
1RQ4562-8JV□0	900	8.86	1060	1210	2040	1400	530	170	240	560	2260	3560
1RQ4564-8JV□0	900	9.71	1060	1210	2040	1600	530	180	240	560	2260	3790
1RQ4566-8JV□0	900	10.16	1060	1210	2040	1600	530	180	240	560	2260	3790

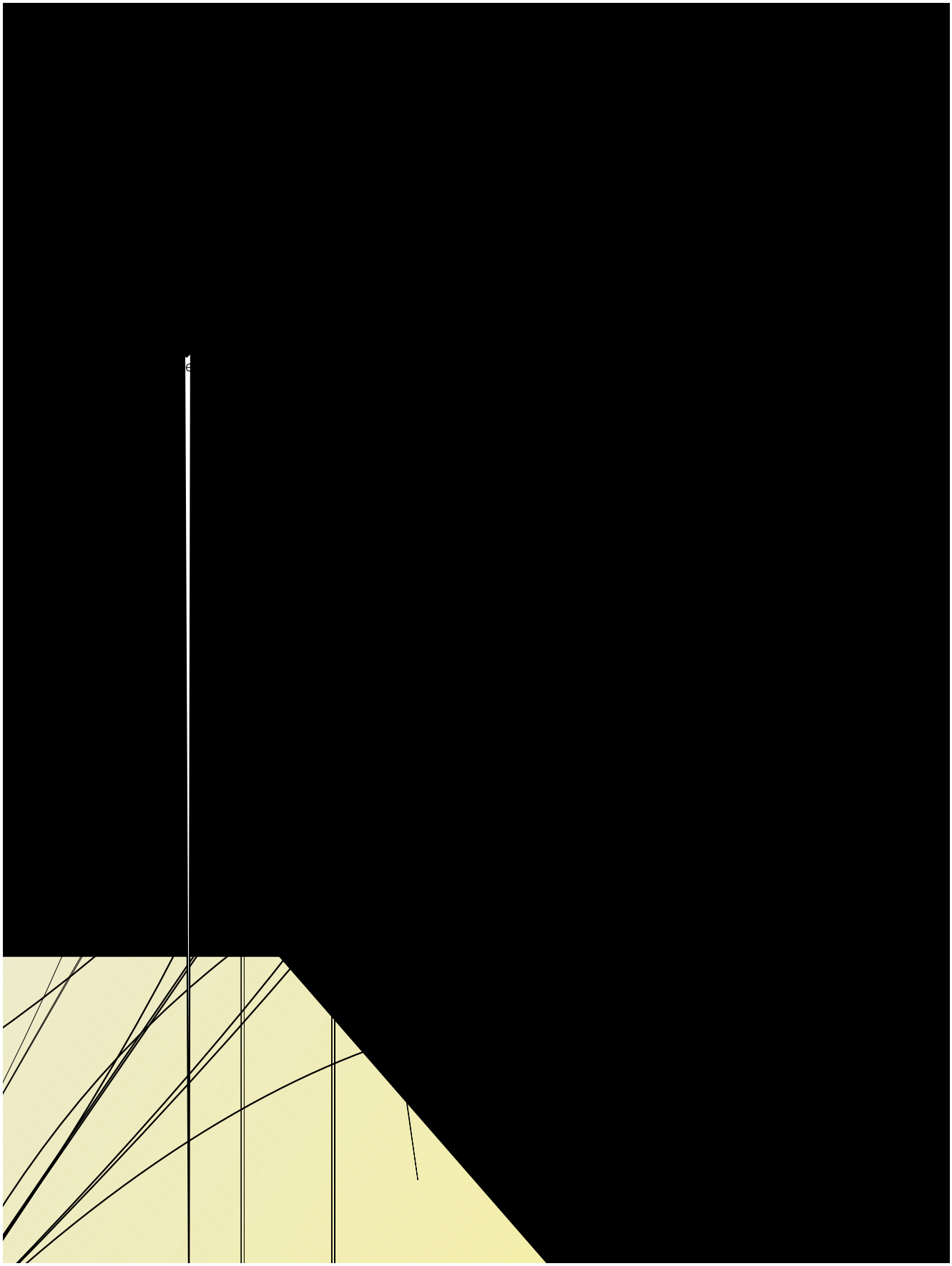
High-voltage motors

H-compact PLUS 1RQ4 air-to-air cooling, type of construction IM V1 with canopy, rolling-contact bearing



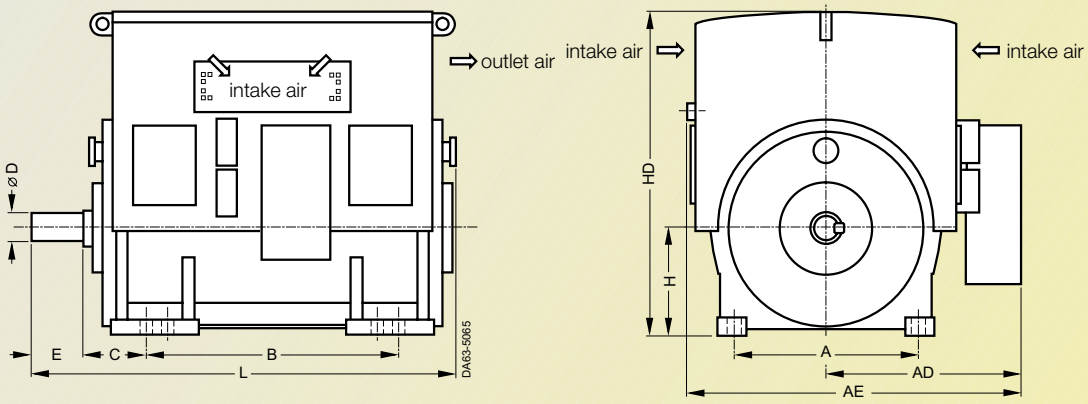
Order No.	Limit speed	Weight	AC	AD	AE	D	E	K	LB	M	N	P
	rpm	t	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
4-pole												
1RQ4450-4JV□4	1800	4.45	1940	930	1670	120	165	26	2360	1080	1000	1150
1RQ4452-4JV□4	1800	4.65	1940	930	1670	120	165	26	2360	1080	1000	1150
1RQ4454-4JV□4	1800	5.10	1940	930	1670	130	200	26	2570	1080	1000	1150
1RQ4456-4JV□4	1800	5.40	1940	930	1670	130	200	26	2570	1080	1000	1150
1RQ4500-4JV□4	1800	6.05	2130	1000	1810	140	200	26	2560	1180	1120	1250
1RQ4502-4JV□4	1800	6.25	2130	1000	1810	140	200	26	2560	1180	1120	1250
1RQ4504-4JV□4	1800	6.95	2130	1000	1810	150	200	26	2770	1180	1120	1250
1RQ4506-4JV□4	1800	7.30	2130	1000	1810	150	200	26	2770	1180	1120	1250
1RQ4560-4JV□4	1800	8.20	2400	1210	2100	170	240	26	2800	1320	1250	1400
1RQ4562-4JV□4	1800	8.60	2400	1210	2100	170	240	26	2800	1320	1250	1400
1RQ4564-4JV□4	1800	9.50	2400	1210	2100	180	240	26	3030	1320	1250	1400
6-pole												
1RQ4450-6JV□4	1200	4.50	1940	930	1670	130	200	26	2360	1080	1000	1150
1RQ4452-6JV□4	1200	4.70	1940	930	1670	130	200	26	2360	1080	1000	1150
1RQ4454-6JV□4	1200	5.20	1940	930	1670	140	200	26	2570	1080	1000	1150
1RQ4456-6JV□4	1200	5.50	1940	930	1670	140	200	26	2570	1080	1000	1150
1RQ4500-6JV□4	1200	6.20	2130	1000	1810	150	200	26	2560	1180	1120	1250
1RQ4502-6JV□4	1200	6.55	2130	1000	1810	150	200	26	2560	1180	1120	1250
1RQ4504-6JV□4	1200	7.10	2130	1000	1810	160	240	26	2770	1180	1120	1250
1RQ4506-6JV□4	1200	7.50	2130	1000	1810	160	240	26	2770	1180	1120	1250
1RQ4560-6JV□4	1200	8.30	2400	1070	1960	170	240	26	2800	1320	1250	1400
1RQ4562-6JV□4	1200	8.80	2400	1070	2100	170	240	26	2800	1320	1250	1400
1RQ4564-6JV□4	1200	9.75	2400	1210	2100	180	240	26	3030	1320	1250	1400
1RQ4566-6JV□4	1200	10.20	2400	1210	2100	180	240	26	3030	1320	1250	1400
8-pole												
1RQ4450-8JV□4	900	4.50	1940	930	1670	130	200	26	2360	1080	1000	1150
1RQ4452-8JV□4	900	4.70	1940	930	1670	130	200	26	2360	1080	1000	1150
1RQ4454-8JV□4	900	5.15	1940	930	1670	140	200	26	2570	1080	1000	1150
1RQ4456-8JV□4	900	5.50	1940	930	1670	140	200	26	2570	1080	1000	1150
1RQ4500-8JV□4	900	6.20	2130	1000	1810	150	200	26	2560	1180	1120	1250
1RQ4502-8JV□4	900	6.60	2130	1000	1810	150	200	26	2560	1180	1120	1250
1RQ4504-8JV□4	900	7.10	2130	1000	1810	160	240	26	2770	1180	1120	1250
1RQ4506-8JV□4	900	7.50	2130	1000	1810	160	240	26	2770	1180	1120	1250
1RQ4560-8JV□4	900	8.25	2400	1210	2040	170	240	26	2800	1320	1250	1400
1RQ4562-8JV□4	900	8.80	2400	1210	2040	170	240	26	2800	1320	1250	1400
1RQ4564-8JV□4	900	9.65	2400	1210	2040	180	240	26	3030	1320	1250	1400
1RQ4566-8JV□4	900	10.10	2400	1210	2040	180	240	26	3030	1320	1250	1400

H-compact PLUS 1RQ4 air-to-air cooling, type of construction IM V1 with canopy and with air intake damping, rolling-contact bearing



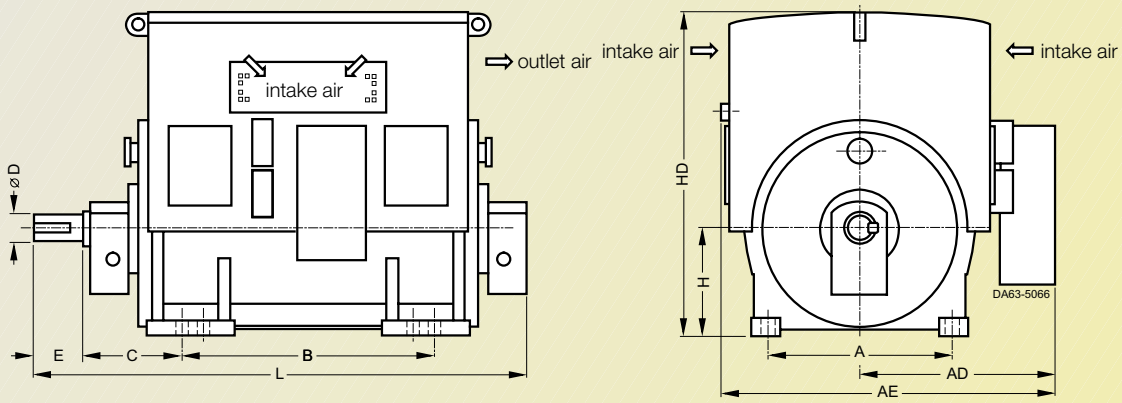
High-voltage motors

H-modul 3 1RA4 open-circuit cooling, type of construction IM B3, rolling-contact bearing



Order No.	Limit speed	Weight	A	AD	AE	B	C	D	E	H	HD	L
	rpm	t	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
4-pole												
1RA4633-4HV□0		9.95	1320	1330	2210	1600	335	200	280	630	2400	2500
1RA4635-4HV□0		10.65	1320	1330	2210	1600	335	200	280	630	2400	2500
1RA4637-4HV□0		11.70	1320	1330	2210	1800	335	220	280	630	2400	2740
1RA4638-4HV□0		12.25	1320	1330	2210	1800	335	220	280	630	2400	2740
6-pole												
1RA4635-6HV□0		10.25	1320	1330	2210	1600	335	220	280	630	2400	2500
1RA4637-6HV□0		10.80	1320	1330	2210	1600	335	220	280	630	2400	2500
1RA4638-6HV□0		11.80	1320	1330	2210	1800	335	220	280	630	2400	2740
1RA4639-6HV□0		12.55	1320	1330	2210	1800	335	220	280	630	2400	2740
8-pole												
1RA4635-8HV□0		10.15	1320	1330	2210	1600	335	220	280	630	2400	2500
1RA4637-8HV□0		10.80	1320	1330	2210	1600	335	220	280	630	2400	2500
1RA4638-8HV□0		11.70	1320	1330	2210	1800	335	220	280	630	2400	2740
1RA4639-8HV□0		12.45	1320	1330	2210	1800	335	220	280	630	2400	2740

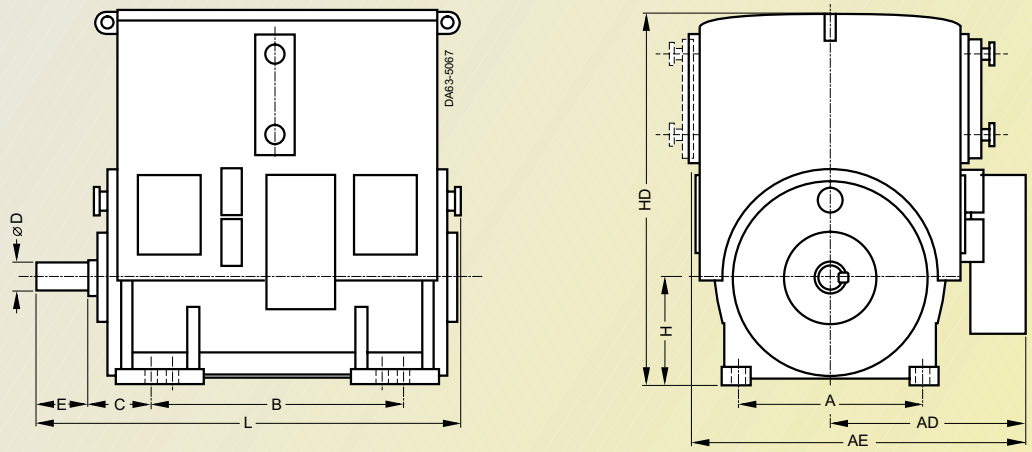
H-modul 3 1RA4 open-circuit cooling, type of construction IM B3, sleeve bearing



Order No.	Limit speed	Weight	A	AD	AE	B	C	D	E	H	HD	L
	rpm	t	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
4-pole												
1RA4633-4HV□0		10.25	1320	1330	2210	1600	600	200	280	630	2400	2970
1RA4635-4HV□0		10.95	1320	1330	2210	1600	600	200	280	630	2400	2970
1RA4637-4HV□0		11.95	1320	1330	2210	1800	600	220	280	630	2400	3210
1RA4638-4HV□0		12.50	1320	1330	2210	1800	600	220	280	630	2400	3210
6-pole												
1RA4635-6HV□0		10.50	1320	1330	2210	1600	600	220	280	630	2400	2970
1RA4637-6HV□0		11.05	1320	1330	2210	1600	600	220	280	630	2400	2970
1RA4638-6HV□0		12.10	1320	1330	2210	1800	600	220	280	630	2400	3210
1RA4639-6HV□0		12.85	1320	1330	2210	1800	600	220	280	630	2400	3210
8-pole												
1RA4635-8HV□0		10.40	1320	1330	2210	1600	600	220	280	630	2400	2970
1RA4637-8HV□0		11.05	1320	1330	2210	1600	600	220	280	630	2400	2970
1RA4638-8HV□0		12.00	1320	1330	2210	1800	600	220	280	630	2400	3210
1RA4639-8HV□0		12.70	1320	1330	2210	1800	600	220	280	630	2400	3210

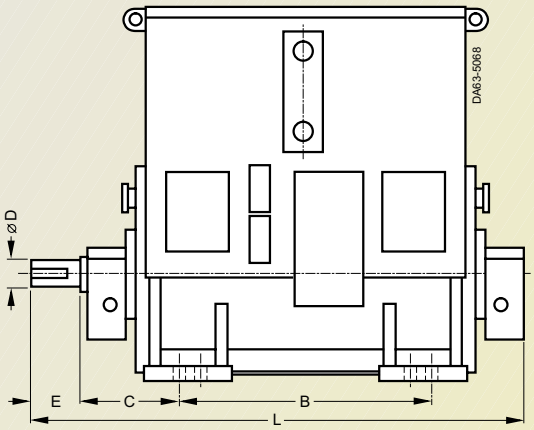
High-voltage motors

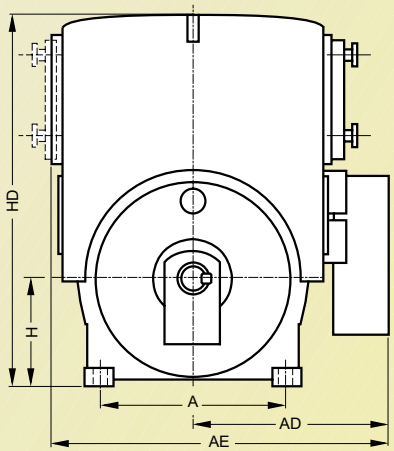
H-modul 3 1RN4 air-to-water cooling, type of construction IM B3, rolling-contact bearing



Order No.	Limit speed	Weight	A	AD	AE	B	C	D	E	H	HD	L
	rpm	t	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
4-pole												
1RN4633-4HV□0		10.40	1320	1330	2290	1600	335	200	280	630	2400	2500
1RN4635-4HV□0		11.10	1320	1330	2290	1600	335	200	280	630	2400	2500
1RN4637-4HV□0		12.15	1320	1330	2290	1800	335	220	280	630	2400	2740
1RN4638-4HV□0		12.70	1320	1330	2290	1800	335	220	280	630	2400	2740
6-pole												
1RN4635-6HV□0		10.65	1320	1330	2290	1600	335	220	280	630	2400	2500
1RN4637-6HV□0		11.20	1320	1330	2290	1600	335	220	280	630	2400	2500
1RN4638-6HV□0		12.30	1320	1330	2290	1800	335	220	280	630	2400	2740
1RN4639-6HV□0		13.00	1320	1330	2290	1800	335	220	280	630	2400	2740
8-pole												
1RN4635-8HV□0		10.60	1320	1330	2290	1600	335	220	280	630	2400	2500
1RN4637-8HV□0		11.20	1320	1330	2290	1600	335	220	280	630	2400	2500
1RN4638-8HV□0		12.15	1320	1330	2290	1800	335	220	280	630	2400	2740
1RN4639-8HV□0		12.90	1320	1330	2290	1800	335	220	280	630	2400	2740

H-modul 3 1RN4 air-to-water cooling, type of construction IM B3, sleeve bearing

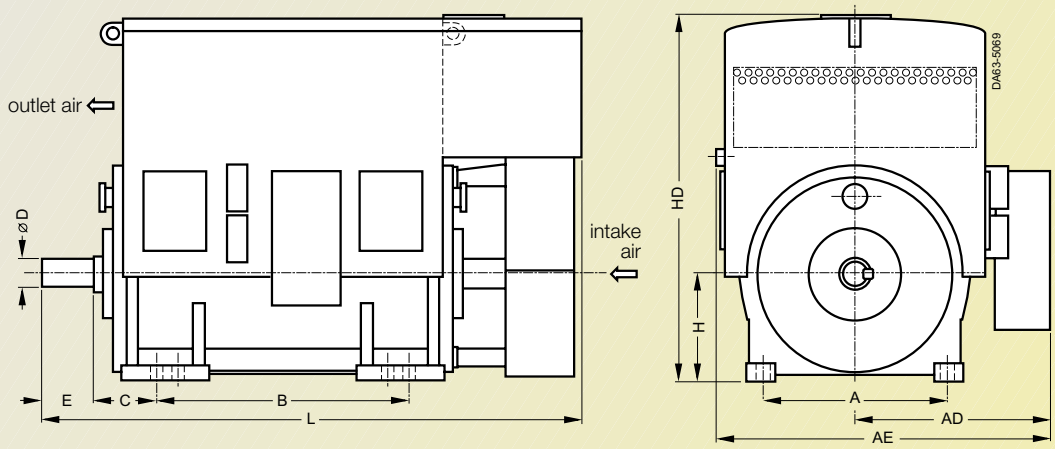




Order No.	Limit speed	Weight	A	AD	AE	B	C	D	E	H	HD	L
	rpm	t	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
4-pole												
1RN4633-4HV□0		10.65	1320	1330	2290	1600	600	200	280	630	2400	2970
1RN4635-4HV□0		11.35	1320	1330	2290	1600	600	200	280	630	2400	2970
1RN4637-4HV□0		12.40	1320	1330	2290	1800	600	220	280	630	2400	3210
1RN4638-4HV□0		13.00	1320	1330	2290	1800	600	220	280	630	2400	3210
6-pole												
1RN4635-6HV□0		10.95	1320	1330	2290	1600	600	220	280	630	2400	2970
1RN4637-6HV□0		11.50	1320	1330	2290	1600	600	220	280	630	2400	2970
1RN4638-6HV□0		12.55	1320	1330	2290	1800	600	220	280	630	2400	3210
1RN4639-6HV□0		13.30	1320	1330	2290	1800	600	220	280	630	2400	3210
8-pole												
1RN4635-8HV□0		10.85	1320	1330	2290	1600	600	220	280	630	2400	2970
1RN4637-8HV□0		11.50	1320	1330	2290	1600	600	220	280	630	2400	2970
1RN4638-8HV□0		12.45	1320	1330	2290	1800	600	220	280	630	2400	3210
1RN4639-8HV□0		13.15	1320	1330	2290	1800	600	220	280	630	2400	3210

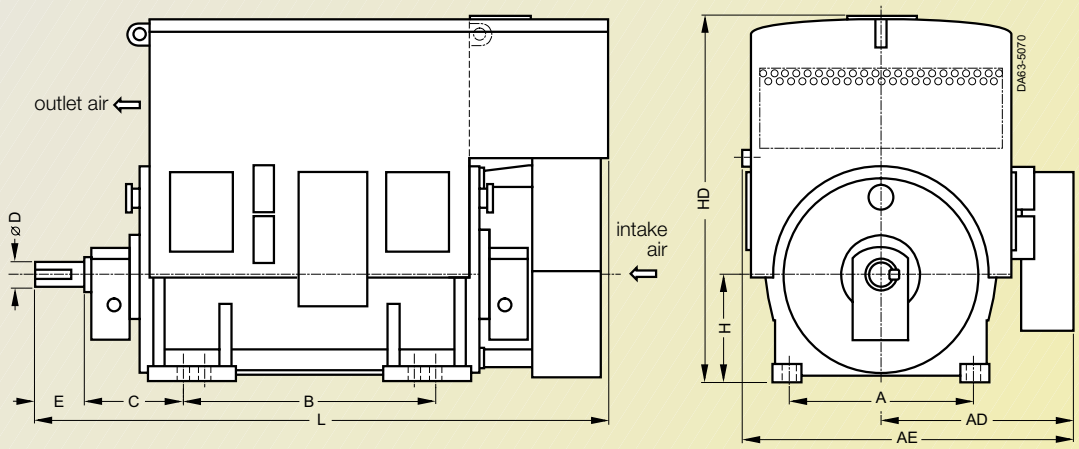
High-voltage motors

H-modul 3 1RQ4 air-to-air cooling, type of construction IM B3, rolling-contact bearing



Order No.	Limit speed	Weight	A	AD	AE	B	C	D	E	H	HD	L
	rpm	t	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
4-pole												
1RQ4633-4JV□0		11.10	1320	1330	2210	1600	335	190	280	630	2340	3140
1RQ4635-4JV□0		11.80	1320	1330	2210	1600	335	190	280	630	2340	3140
1RQ4637-4JV□0		12.90	1320	1330	2210	1800	335	200	280	630	2340	3380
1RQ4638-4JV□0		13.45	1320	1330	2210	1800	335	200	280	630	2340	3380
6-pole												
1RQ4635-6JV□0		11.40	1320	1330	2210	1600	335	200	280	630	2340	3140
1RQ4637-6JV□0		12.00	1320	1330	2210	1600	335	200	280	630	2340	3140
1RQ4638-6JV□0		12.90	1320	1330	2210	1800	335	200	280	630	2340	3380
1RQ4639-6JV□0		13.75	1320	1330	2210	1800	335	200	280	630	2340	3380
8-pole												
1RQ4635-8JV□0		11.20	1320	1180	2060	1600	335	200	280	630	2340	3140
1RQ4637-8JV□0		11.95	1320	1330	2210	1600	335	200	280	630	2340	3140
1RQ4638-8JV□0		12.90	1320	1330	2210	1800	335	200	280	630	2340	3380
1RQ4639-8JV□0		13.65	1320	1330	2210	1800	335	200	280	630	2340	3380

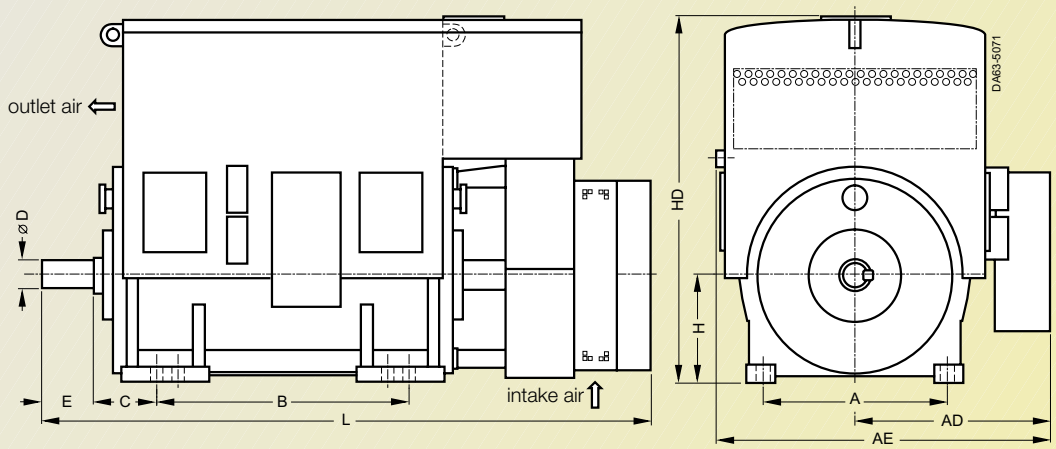
H-modul 3 1RQ4 air-to-air cooling, type of construction IM B3, sleeve bearing



Order No.	Limit speed	Weight	A	AD	AE	B	C	D	E	H	HD	L
	rpm	t	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
4-pole												
1RQ4633-4JV□0		11.35	1320	1330	2210	1600	600	200	280	630	2340	3400
1RQ4635-4JV□0		12.05	1320	1330	2210	1600	600	190	280	630	2340	3400
1RQ4637-4JV□0		13.15	1320	1330	2210	1800	600	190	280	630	2340	3640
1RQ4638-4JV□0		13.70	1320	1330	2210	1800	600	200	280	630	2340	3640
6-pole												
1RQ4635-6JV□0		11.65	1320	1330	2210	1600	600	200	280	630	2340	3400
1RQ4637-6JV□0		12.25	1320	1330	2210	1600	600	200	280	630	2340	3400
1RQ4638-6JV□0		13.15	1320	1330	2210	1800	600	200	280	630	2340	3640
1RQ4639-6JV□0		14.00	1320	1330	2210	1800	600	200	280	630	2340	3640
8-pole												
1RQ4635-8JV□0		11.45	1320	1330	2060	1600	600	200	280	630	2340	3400
1RQ4637-8JV□0		12.20	1320	1330	2210	1600	600	200	280	630	2340	3400
1RQ4638-8JV□0		13.15	1320	1330	2210	1800	600	200	280	630	2340	3640
1RQ4639-8JV□0		13.90	1320	1330	2210	1800	600	200	280	630	2340	3640

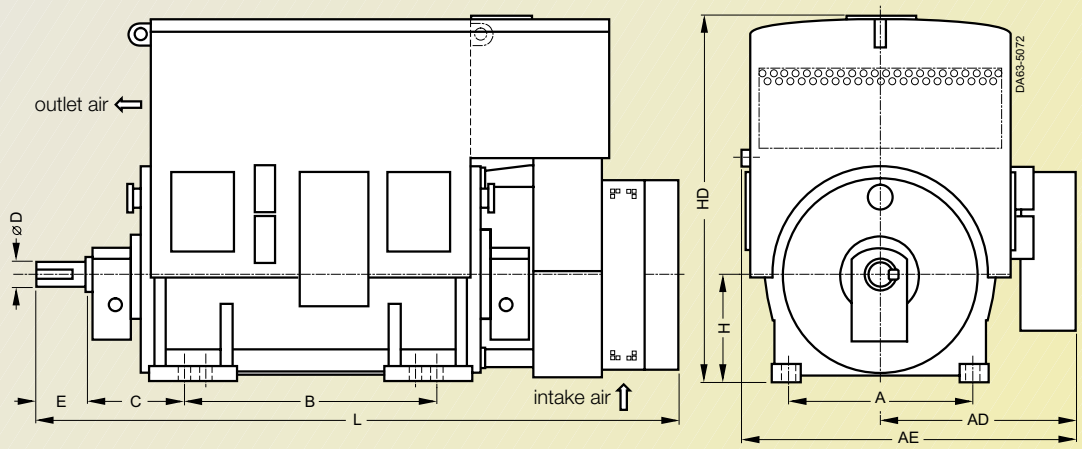
High-voltage motors

H-modul 3 1RQ4 air-to-air cooling, type of construction IM B3 with air intake damping, rolling-contact bearing



Order No.	Limit speed	Weight	A	AD	AE	B	C	D	E	H	HD	L
	rpm	t	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
4-pole												
1RQ4633-4JV□0		11.17	1320	1330	2210	1600	335	190	280	630	2340	3580
1RQ4635-4JV□0		11.87	1320	1330	2210	1600	335	190	280	630	2340	3580
1RQ4637-4JV□0		12.97	1320	1330	2210	1800	335	200	280	630	2340	3820
1RQ4638-4JV□0		13.52	1320	1330	2210	1800	335	200	280	630	2340	3820
6-pole												
1RQ4635-6JV□0		11.47	1320	1330	2210	1600	335	200	280	630	2340	3580
1RQ4637-6JV□0		12.07	1320	1330	2210	1600	335	200	280	630	2340	3580
1RQ4638-6JV□0		12.97	1320	1330	2210	1800	335	200	280	630	2340	3820
1RQ4639-6JV□0		13.82	1320	1330	2210	1800	335	200	280	630	2340	3820
8-pole												
1RQ4635-8JV□0		11.27	1320	1180	2060	1600	335	200	280	630	2340	3580
1RQ4637-8JV□0		12.02	1320	1330	2210	1600	335	200	280	630	2340	3580
1RQ4638-8JV□0		12.97	1320	1330	2210	1800	335	200	280	630	2340	3820
1RQ4639-8JV□0		13.72	1320	1330	2210	1800	335	200	280	630	2340	3820

H-modul 3 1RQ4 air-to-air cooling, type of construction IM B3 with air intake damping, sleeve bearing



Order No.	Limit speed	Weight	A	AD	AE	B	C	D	E	H	HD	L
	rpm	t	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
4-pole												
1RQ4633-4JV□0		11.42	1320	1330	2210	1600	600	200	280	630	2340	3840
1RQ4635-4JV□0		12.12	1320	1330	2210	1600	600	190	280	630	2340	3840
1RQ4637-4JV□0		13.22	1320	1330	2210	1800	600	190	280	630	2340	4080
1RQ4638-4JV□0		13.77	1320	1330	2210	1800	600	200	280	630	2340	4080
6-pole												
1RQ4635-6JV□0		11.72	1320	1330	2210	1600	600	200	280	630	2340	3840
1RQ4637-6JV□0		12.32	1320	1330	2210	1600	600	200	280	630	2340	3840
1RQ4638-6JV□0		13.22	1320	1330	2210	1800	600	200	280	630	2340	4080
1RQ4639-6JV□0		14.07	1320	1330	2210	1800	600	200	280	630	2340	4080
8-pole												
1RQ4635-8JV□0		11.52	1320	1330	2060	1600	600	200	280	630	2340	3840
1RQ4637-8JV□0		12.27	1320	1330	2210	1600	600	200	280	630	2340	3840
1RQ4638-8JV□0		13.22	1320	1330	2210	1800	600	200	280	630	2340	4080
1RQ4639-8JV□0		13.97	1320	1330	2210	1800	600	200	280	630	2340	4080

Notes

SIMOVERT MV
Appendix

A

Environment, Resources and Recycling, Certificates

Siemens AG has committed itself to protecting the environment and conserving valuable natural resources. This applies to both manufacturing and the products we sell.

As early as the development phase, the possible impact of future products and systems on the environment is taken into consideration. Our aim is to prevent environmental pollution or, at least, reduce it to a minimum and, in doing so, look beyond existing regulations and legislation.

Below are some of the most important environment-related aspects which are taken into account in the design of SIMOVERT MV.

The use of dangerous substances (such as arsenic, asbestos, beryllium, cadmium, CFC, halogens and many more) is avoided as early as the development phase.

Connections have been designed so that they are easy to service and materials are selected carefully with preference being given to those which can be recycled or disposed of without causing problems.

Materials for manufacturing purposes are identified in accordance with their recyclability. This applies, in particular, to components which contain unavoidable, hazardous materials. These components are installed or mounted in such a way that they can be easily separated, thus facilitating disposal in an environmentally-friendly manner. Wherever possible, recycled components are used.

Environmentally-compatible packaging materials (pressed board and PE foils) are used for shipping and storage. We also try to keep the amount of packaging material used to a minimum. If possible we pack our products in reusable packaging.

We have already made preparations to enable the converters to be disposed of after use in accordance with the regulations governing the disposal of electronic equipment (not yet in force).

This catalog is printed on chlorine-free bleached paper.


ZERTIFIKAT

DQS Deutsche Gesellschaft zur Zertifizierung von Managementsystemen mbH

Siemens AG

DIN EN ISO 9001


CERTIFICATE

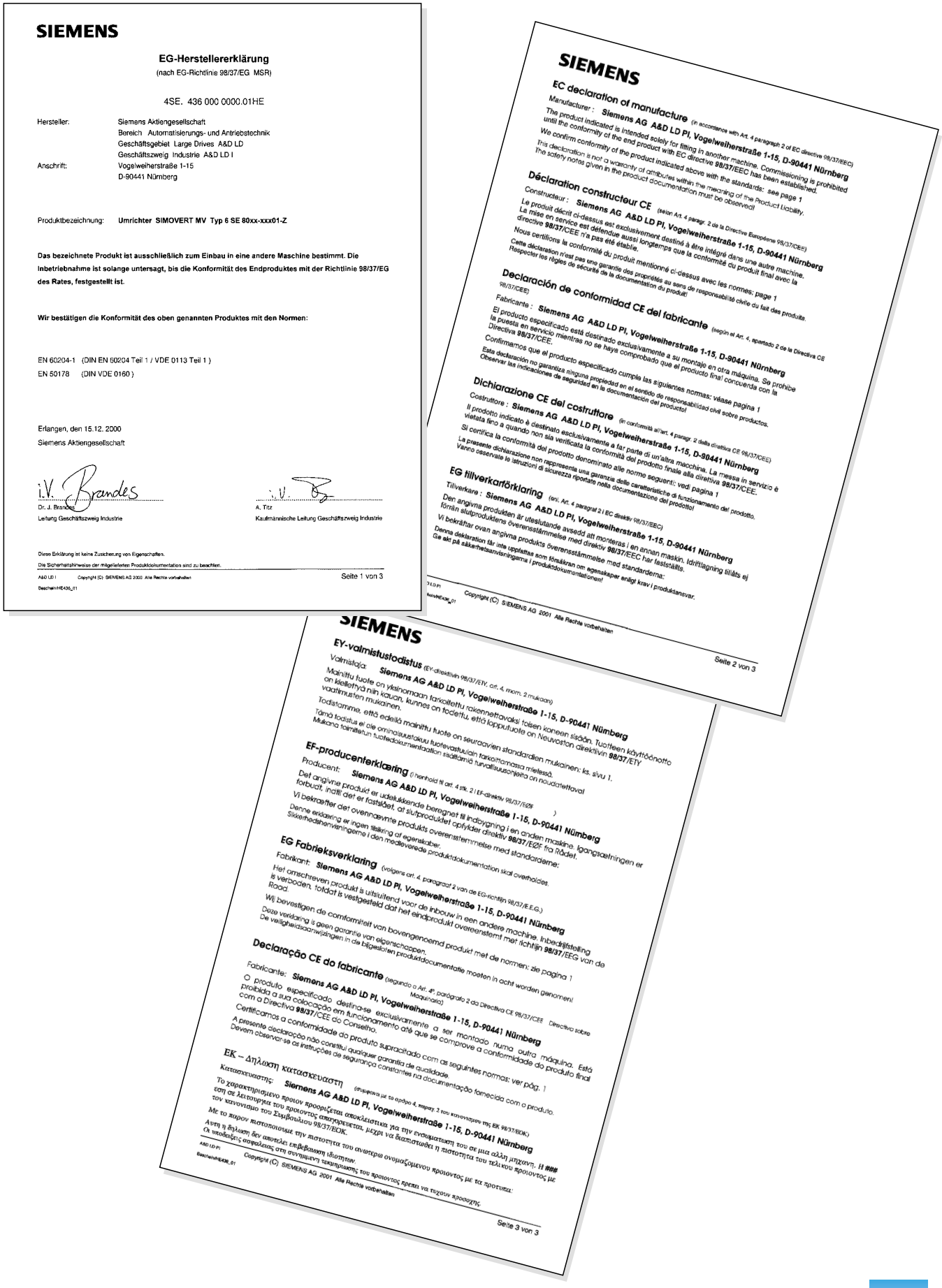
DQS Deutsche Gesellschaft zur Zertifizierung von Managementsystemen mbH

Siemens AG

environmental management system.

DIN EN ISO 14001

EC declaration of manufacture



SIEMENS

EG-Herstellererklärung
(nach EG-Richtlinie 98/37/EG MSR)

4SE. 436 000 0000.01HE

Hersteller: Siemens Aktiengesellschaft
Bereich Automatisierungs- und Antriebstechnik
Geschäftsgebiet Large Drives A&D LD
Geschäftszweig Industrie A&D LD I
Anschrift: Vogelweiherstraße 1-15
D-90441 Nürnberg

Produktbezeichnung: **Umrichter SIMOVERT MV Typ 6 SE 80xx-xxx01-Z**

Das bezeichnete Produkt ist ausschließlich zum Einbau in eine andere Maschine bestimmt. Die Inbetriebnahme ist solange untersagt, bis die Konformität des Endproduktes mit der Richtlinie 98/37/EG des Rates, festgestellt ist.

Wir bestätigen die Konformität des oben genannten Produktes mit den Normen:

EN 60204-1 (DIN EN 60204 Teil 1 / VDE 0113 Teil 1)
EN 50178 (DIN VDE 0160)

Erlangen, den 15.12. 2000
Siemens Aktiengesellschaft

i.V. Brandes
Dr. J. Brandes
Leitung Geschäftszweig Industrie

i.V.
A. Titz
Kaufmännische Leitung Geschäftszweig Industrie

Diese Erklärung ist keine Zusicherung von Eigenschaften.
Die Sicherheitshinweise der mitgelieferten Produktdokumentation sind zu beachten.

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EC declaration of manufacture (in accordance with Art. 4 paragraph 2 of EC directive 98/37/EEC)

Manufacturer : **Siemens AG A&D LD PI, Vogelweiherstraße 1-15, D-90441 Nürnberg**

The product indicated is intended solely for fitting in another machine. Commissioning is prohibited until the conformity of the end product with EC directive **98/37**/EEC has been established.

We confirm conformity of the product indicated above with the standards: see page 1

This declaration is not a warranty of attributes within the meaning of the Product Liability.
The safety notes given in the product documentation must be observed!

Déclaration constructeur CE (selon Art. 4 paragr. 2 de la Directive Européene 98/37/CEE)

Constructeur : **Siemens AG A&D LD PI, Vogelweiherstraße 1-15, D-90441 Nürnberg**

Le produit décrit ci-dessus est exclusivement destiné à être intégré dans une autre machine.
La mise en service est défendue aussi longtemps que la conformité du produit final avec la directive **98/37**/CEE n'a pas été établie.

Nous certifions la conformité du produit mentionné ci-dessus avec les normes: page 1

Cette déclaration n'est pas une garantie des propriétés au sens de responsabilité civile du fait des produits.
Respectez les règles de sécurité de la documentation du produit!

Declaración de conformidad CE del fabricante (según el Art. 4, apartado 2 de la Directiva CE 98/37/CEE)

Fabricante : **Siemens AG A&D LD PI, Vogelweiherstraße 1-15, D-90441 Nürnberg**

El producto especificado está destinado exclusivamente a su montaje en otra máquina. Se prohibe la puesta en servicio mientras no se haya comprobado que el producto final concuerda con la Directiva **98/37**/CEE.

Confirmamos que el producto especificado cumple las siguientes normas: véase pagina 1

Esta declaración no garantiza ninguna propiedad en el sentido de responsabilidad civil sobre productos.
Observar las indicaciones de seguridad en la documentación del producto!

Dichiarazione CE del costruttore (in conformità all'art. 4 paragr. 2 della direttiva CE 98/37/CEE)

Costruttore : **Siemens AG A&D LD PI, Vogelweiherstraße 1-15, D-90441 Nürnberg**

Il prodotto indicato è destinato esclusivamente a far parte di un'altra macchina. La messa in servizio è vietata fino a quando non sia verificata la conformità del prodotto finale alla direttiva **98/37**/CEE.

Si certifica la conformità del prodotto denominato alle norme seguenti: vedi pagina 1

La presente dichiarazione non rappresenta una garanzia delle caratteristiche di funzionamento del prodotto.
Vanno osservate le istruzioni di sicurezza riportate nella documentazione del prodotto!

EG tillverkarförklaring (enl. Art. 4 paragraf 2 i EC direktiv 98/37/EEC)

Tillverkare : **Siemens AG A&D LD PI, Vogelweiherstraße 1-15, D-90441 Nürnberg**

Den angivna produkten är utesluntande avsedd att monteras i en annan maskin. Idriftlägning tillåts ej förrän slutprodukten överensstämmelse med direktiv **98/37**/EEC har fastställts.

Vi bekräftar ovan angivna produkts överensstämmelse med standarderna:

Denna deklaration får inte uppfattas som försäkran om egenskaper enligt krav i produktansvar.
Ge akt på säkerhetsanvisningarna i produktdokumentationen!

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SIEMENS

EY-valmistustodistus (EY-direktiivin 98/37/EY, art. 4, mom. 2 mukaan)

Valmistaja: **Siemens AG A&D LD PI, Vogelweiherstraße 1-15, D-90441 Nürnberg**

Mainittu tuote on yksinomaan tarkoitettu rakennettavaksi tolsen koneen sisään. Tuotteen käyttöönotto on kielletty,ä niin kauan, kunnes on todettu, että lopputuote on Neuvoston direktiivin **98/37**/EIY vaatimusten mukainen.

Todistamme, että edellä mainittu tuote on seuraavien standardien mukainen: ks. sivu 1.

Tämä todistus ei ole ominaisuustakuu tuotevastuulain tarkoittamassa mielessä.

Mukana toimitetun tuotedokumentaation sisältämiä turvallisuusohjeita on noudatettavat

EF-producenterklæring (i henhold til art. 4 stk. 2 i EF-direktiv 98/37/EØF)

Producent: **Siemens AG A&D LD PI, Vogelweiherstraße 1-15, D-90441 Nürnberg**

Det angivne produkt er udelukkende beregnet til indbygning i en anden maskine. Igangsætningen er forbudt, indtil det er fastslået, at slutprodukt opfylder direktiv **98/37**/EØF fra Rådet.

Vi bekræfter det ovennævnte produkts overensstemmelse med standarderne:

Denne erklæring er ingen tilsikring af egenskaber.
Sikkerhedsanvisningerne i den medleverede produktdokumentation skal overholdes.

EG Fabrieksverklaring (volgens art. 4, paragraaf 2 van de EG-richtlijn 98/37/E.E.G.)

Fabrikant: **Siemens AG A&D LD PI, Vogelweiherstraße 1-15, D-90441 Nürnberg**

Het omschreven produkt is uitsluitend voor de inbouw in een andere machine. Inbedrijfstelling is verboden, totdat is vestgesteld dat het eindprodukt overeenstemt met richtlijn **98/37**/EEG van de Raad.

Wij bevestigen de conformiteit van bovengenoemd product met de normen: zie pagina 1

Deze veridaring is geen garantie van eigenschappen.
De veiligheidsaanwijzingen in de bijgeleiden produktdocumentatie moeten in acht worden genomen!

Declaração CE do fabricante (segundo o Art. 4º, parágrafo 2 da Directiva CE 98/37/CEE Directivo sobre Maquinario)

Fabricante: **Siemens AG A&D LD PI, Vogelweiherstraße 1-15, D-90441 Nürnberg**

O produto especificado destina-se exclusivamente a ser montado numa outra máquina. Está proibida a sua colocação em funcionamento até que se comprove a conformidade do produto final com a Directiva **98/37**/CEE do Conselho.

Certificamos a conformidade do produto supracitado com as seguintes normas: ver pág. 1

A presente declaração não constitui qualquer garantia de qualidade.
Devem observar-se as instruções de segurança constantes na documentação fornecida com o produto.

ΕΚ – Δήλωση κατασκευαστη (σύμφωνα με το εφάρο 4, παραγρ. 2 του κανονισμου της ΕΚ 98/37/ΕΟΚ)

Κατασκευαστης: **Siemens AG A&D LD PI, Vogelweiherstraße 1-15, D-90441 Nürnberg**

Το χαρακτηρισμενο προιον προορίζεται αποκλεισιστικα για την ενσωματωση του σε μια αλλη μηχανη. Η ### ση σε λειτουργια του προιοντος απαγορευεται, μεχρι να διαπιστωθει η πιστοτητα του τελικου προιοντος με τον κανονισμο του Συμβουλιου 98/37/ΕΟΚ.

Με το παρον πιστοποιουμε την πιστοτητα του ανωτερω ονομαζομενου προιοντος με τα προτυπα:

Αυτη η δηλωση δεν αποτελει επιβεβαιωση ιδιοτητων.
Οι υποδειξεις ασφαλειας στη συνημμενη τεκμηριωση του προιοντος πρεπει να τυχαιν προσοχης.

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Appendix

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Technical contents:
Siemens AG, A&D LD V7,
Nürnberg, Germany

General editing:
Siemens AG, A&D PT 5,
Erlangen, Germany

A

Issued by: Siemens AG
Automation and Drives Group (A&D)
Large Drives
P.O.Box 4743, D-90025 Nürnberg
Germany
http://www.ad.siemens.de

Order No.:
E86060–K5163–A101–A1–7600

Printed in the Federal Republic of Germany
KG K 0101 20.0 VOG 176 En/122084

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Further information can be obtained from our branch offices listed in the appendix of this catalog

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