Transnorm motors

Low voltage and high voltage design 200 kW up to 1000 kW

catalogue 01-2013

SENSE EXPERIENCE
EXPERIENCE VISION

VEM

Transnorm motors

Low voltage and
high voltage design
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Contents

The products featured in this catalogue can also be found in the interactive electronic catalogue.
Additional information about the company and the products of VEM available via internet:
www.vem-group.com.
The electronic catalogue can assist you in selecting and configuring VEM products. You can choose to print out data sheets and requests and the programme can display scaled and dimensioned drawings that can be downloaded in different 2D and 3D-data files. In addition to general information about VEM, you have access to catalogues, spare parts lists, operation and maintenance manuals, test certificates and connection diagrams of the individual product types.

Introduction
Technical explanations

Introduction

More power and efficiency for the future
Millions of electric motors from VEM are used around the world. The trademark VEM is known as a quality mark. Large size motors and special motors as well as standard motors and special drive solutions are used reliably in all kinds of industrial applications. Numerous installations are equipped with motors, generators and drive solutions for each sort of voltage range. They are delivering an optimal performance for decades even under extreme ambient conditions – dust and heat of a rolling mill, areas with risk of explosion in a chemical plant or humid saline sea air on board of ships. VEM products comply with all relevant standards and directives.

With the new energy efficient series for transnorm motors VEM extends its product range to 1000 kW in the low voltage range. At the same time this design series is also available in high voltage design for the power range up to 1080 kW.

In the power range up to 800 kW the efficiencies of the low voltage motors comply with efficiency class IE3 “Premium efficiency” according to E DIN EN 60034-30:2012. The increasing importance of energy efficiency and the always increasing requirements for environmental protection have led to the enhancement and output extension of the well-proven VEM design series.

Pump drives in a paper machine

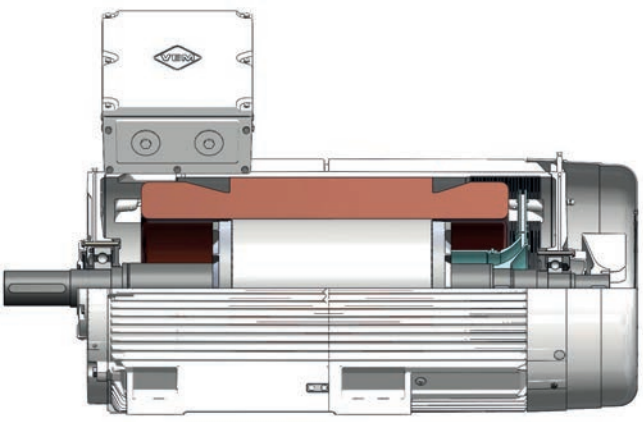
Technical characteristics
- Efficiency class IE3 *)
- Types of construction IM B3, IM B35 and IM V1 acc. to IEC
- Type of protection IP 55, as option IP 56 or IP 65
- Sturdy, die casted rotor in one piece
- Winding in thermal class 155, 180 as option, vacuum impregnation
- Optimised ventilation system with internal and external cooling from shaft size 355 MX
- Lubrication device with adjustable grease supply,
- Temperature monitoring with PTC (low voltage) or PT100 (high voltage design),
- spaciously designed terminal box,
- as standard designed with RFID transponder (Memory Motor),
- environmentally friendly paint system based on water-soluble paint

Advantages
- Energy efficient design and construction complying with efficiency class IE3 *)
- Storage of technical data and maintenance history via RFID transponder technology
- Sturdy grey cast iron design for the housing and the end shields
- Low vibration design
- Compact design with minimal installation dimensions
- High electric strength for mains and inverter operation
- Low noise operation
- Paint system for climate groups „moderate“ and „worldwide“ complying with IEC 721-2-1
- Modern system of modular design
- High operational reliability due to latest manufacturing methods

*) complying with draft E DIN EN 60034-30:2012

Many different operational options
The possible applications for motors of the new VEM generation are nearly without limits. They can be used as drives for the extraction of liquids or compression of gases as well as for operation in cement production plants, rolling mills and chemical plants. Together with frequency inverters they offer the possibility for the operator to optimally design the process management. The optimised winding design allows it to use these motors in connection with variable speed drives. For inverter feeding with inverter output voltages up to 690 V a special winding system based on mica as insulation material is available. The system for this design fulfils the requirements of curve B from IEC TS 60034-25.

Our customer service includes not only technical assistance in project planning, testing and commissioning, but also inspections by our service departments.



Detail drawing 1 – motor construction

The motors comply with all corresponding national and international regulations.

Development, design, production and testing are done according to the specification given in DIN ISO 9001 and this is certified by German Lloyd Certification GmbH.

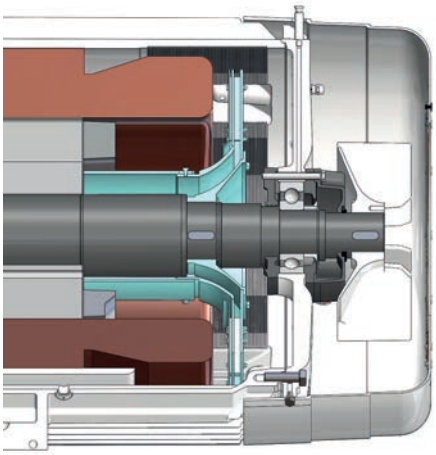
The motors comply with all corresponding EU standards. As option it is also possible to produce a design for operation in explosion protected areas of zone 2 and zone 22. The decision to produce our motors in Germany is another example of our quality philosophy.

Memory design

The RFID technology is used successfully by VEM for many years. Important data of the drive system is saved on an RFID tag, which is attached physically to the system. This optional design – named “memory design” – is used as standard for all motors of shaft size 400 and bigger (RFID system iID®2000, 13.56 MHz, based on ISO 15693). For smaller motors (including motors of shaft size 355) this technology is also available as additional option.
On the memory chip of this transponder (TAG) information is stored about selected name plate and motor data as well as additional technical specifications for accessory equipment, selected spare parts, information about motor maintenance and customer or user data if applicable.
In addition it is possible to actively maintain a maintenance journal.

Constructive details
With the new transnorm motors W42R/W52R the cooling system of pure rip cooling is left aside and an additional inner cooling system is installed.

Here a new innovative ventilation system with a special two-cycle inner fan is used. With it the rotor, the stator and the winding heads are optimally cooled.



Detail drawing 2 – cooling cycle on N-side

The sturdy housings produced by using latest casting technology are equipped with additional cooling ribs in the cooling channels. In connection with a new concept for pressure die casted rotors this design assists the cooling effect and allow for high efficiencies in connection with an extremely compact construction.

Standards and regulations

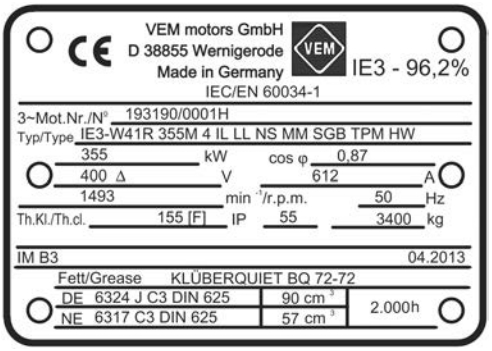
The motors comply with the relevant standards and regulations, particularly with the following:

Title	EN	IEC
Rotating electrical machines, rating and performance	EN 60034-1	IEC 60034-1 IEC 60085
Efficiency classes of three-phase asynchronous motors	EN 60034-30	IEC 60034-30
Rotating electrical machines, standard methods for determining losses and efficiency	EN 60034-2-1	IEC 60034-2-1
Three-phase asynchronous motors for general use, with standardised dimensions and outputs, frame sizes 56 – 315	EN 50347	IEC 60072
Terminal markings and direction of rotation for rotating electrical machines	EN 60034-8	IEC 60034-8
Rotating electrical machines – Part 18-1: Functional evaluation of insulation systems – General guidelines	EN 60034-18-1	IEC 60034-18-1
Rotating electrical machines, symbols for types of construction and erection	EN 60034-7	IEC 60034-7
Built-in thermal protection	-	IEC 60034-11
Rotating electrical machines, methods of cooling	EN 60034-6	IEC 60034-6
Rotating electrical machines, types of protection	EN 60034-5	IEC 60034-5
Rotating electrical machines, mechanical vibrations	EN 60034-14	IEC 60034-14
Rotating electrical machines, noise limits	EN 60034-9	IEC 60034-9
Rotating electrical machines, starting performance of induction cage motors up to 660 V, 50 Hz	EN 60034-12	IEC 60034-12
IEC standard voltages	-	IEC 60038
Explosive atmospheres – Part 0: Equipment – General requirements	EN 60079-0	IEC 60079-0
Explosive atmospheres – Part 15: Equipment protection by type of protection “n”	EN 60079-15	IEC 60079-15
Explosive atmospheres – Part 31: Equipment dust ignition protection by enclosure “t”	EN 60079-31	IEC 60079-311

VEM motors conform furthermore to various foreign regulations which are aligned to IEC 60034-1 or else have taken over the latter’s stipulations as European standard EN 60034-1.

Name plate

In standard design, the motor rating plate is normally marked in the German and English languages. Other languages may be used with non-EU languages available against extra price. The rating plate indicates the most important design data such as type designation and motor number, output, rated voltage and frequency, rated current, type of construction, degree of protection, power factor, speed, thermal class, bearing types and grease type. The data may vary according to type. In the case of motors with lubricating device, the quantity of grease per lubrication event and the lubricating intervals are also indicated on the rating plate or an additional plate.
The rating plates are fastened on the housing with grooved drive studs and cannot be lost. They may be made of aluminium or stainless steel (extra price). For additional plates it will be required to consult the manufacturer.



Example of name plate

VEM Transnorm motors

Example: **IE3-W42R 400 MX4 LL HW**

IE3	-	W	4	2	R	400	M	X	4	LL
1		2	3	4	5	6	7	8	9	10

1 Energy efficiency class
IE3 … Premium Efficiency acc. to E DIN EN 60034-30:2012.

2 Design version
W … Energy-saving motor

3 Design condition/Product generation
4 … Low voltage design
5 … High voltage design

4 Standard characteristic number/letter
1 … DIN/IEC, without inner cooling cycle
2 … DIN/IEC, with inner cooling cycle

5 Degree of cooling
R … Fin cooled, IC 411
O … Non-ventilated, IC 410
F … Forced-air cooled, IC 416
B … cooled with water jacket, IC 31W

6 Shaft height in mm
315, 355, 400, 450

7 Foot length
S ... short
M ... medium
L ... long

8 Symbols for different output
X, Y, Z ...

9 Pole number
2, 4, 6, ... pole-changing separated by dashes

10…11 Special symbols
LL … light duty bearing
… for further symbols refer to modifications summary in the main catalogue H01

Types of construction

The motors are available in types of construction IM B3, IM B35 and IM V1. Other types of construction on request.
The type of construction is designated on the nameplate according to Code I, EN 60034-7.

Bearing/Lubrication

VEM motors are equipped with anti-friction bearings from respected manufacturers. The rated bearing lifetime is at least 20000 h with the exploitation of the maximum permissible load. The rated bearing lifetime for motors installed in a horizontal position without additional axial loading is 40000 h in the case of coupling service.

The versions of the bearings can be taken from the overviews of the bearing arrangements. The respective flat grease nipples are contained in the tables of the design drawings. Motors in the normal versions with two deep groove ball bearings have preloaded bearings, where the preloading is implemented by a disk spring or a wave washer. Versions with cylindrical roller bearings on the D-end (heavy bearing arrangement VL) are excepted from the preloading. The most important prerequisite for achieving the normal bearing lifetime is correct lubrication, i.e. the use of the right kind of grease according to the application, the filling with the correct amount of grease and the maintenance of the subsequent lubrication periods. As standard the motors are designed with a lubrication device. Under normal service conditions, for version with lubrication device, 2000 or 4000 operational hours will apply. A grease of type Asonic GHY72 will be used as standard grease.

Information about bearing sizes, grease types and quantities and times for lubrication are to be taken from an additional plate (additional charge) attached to the motor. Bearings having a lubrication device should be lubricated through the lubrication nipple with the motor running and observing the quantity of grease and lubrication periods specified for the particular motor. The used grease is to be removed from the lubrication chamber in the external bearing cover after five lubrications. Information about bearing sizes, grease types and quantities and times for lubrication are to be taken from an additional plate (additional charge) attached to the motor. As is practised with all other motor series, the bearings are lubricated after they have been thoroughly cleaned. Use should be made of the same grade of grease. Only the grease types specified by the motor manufacturer are allowed to be used as equivalent grades. Care should be taken to fill the open space of the bearing to approx. two-thirds of its capacity with grease only. Filling the bearings and bearing covers to full capacity will lead to elevated bearing temperatures and thus to a higher rate of abrasion.

Use of cylindrical roller bearings
Relatively large radial forces or masses can be taken up at the end of the motor shaft by the use of cylindrical roller bearings (“heavy bearing arrangement” VL). Examples: belt drive, pinion or heavy couplings. The minimum radial force at the shaft end must be a quarter of the permissible radial force. The permissible shaft end load is to be taken into account. The information can be taken from the tables and diagrams in the design selection data.

Important Note:
If the radial force falls below the minimum value, damage to the bearings can be caused within a few hours. Test runs in no-load state only permissible for a short period.

If the specified minimum radial force is not reached, we recommend the use of grooved ball bearings (“easy bearing arrangement” LL). The bearings can be changed on request.

Loading of bearing and shaft end
The design of the bearing and the shaft can only be varied within certain limits because of the international standardization of asynchronous motors. Therefore, an optimum design size has been selected.

Permissible shaft end loading
The size of the permissible shaft end loading is determined by the following principle criteria:
– permissible bending of the shaft
– shaft end fatigue strength
– bearing lifetime

The permissible shaft end loading (radial and axial forces) is based on a rated bearing lifetime of 20000 hours and a security against fatigue failure of > 2.0.
The permissible axial shaft loads are available on request from the manufacturer.

Bearing control
For controlling the condition of the bearings the motors may be equipped with temperature sensors, shock pulse and vibration detectors or prepared for such equipment. The temperature sensors mounted to the bearing points may be of type PT100 which can be of two-, three- or four-wire circuit design.

These can be connected either in the main connection box or in separate additional boxes which are fixed to the main terminal box or motor housing depending on construction.

For high voltage design the connection is always done in an additional terminal box.

The wear monitoring function for the anti-friction bearings may be achieved by shock pulse detectors [SPM] mounted to the bearing end shields. This allows the wear to be monitored with mobile detecting units. For remote control it is also possible to use firmly wired shock pulse or vibration detectors.

Limit speeds

When operating the motors in excess of the rated speed care should be taken to observe the limit values of the anti-friction bearings, the strength of the rotating parts, the critical rotor speeds and the circumferential speed of the fans.

The limit speeds listed in the table below may already require precautions to be taken such as special fans, special bearings or special balancing.

Limit speeds

Type	Limit speeds at synchronous speed and 50 Hz							
	3000 rpm		1500 rpm		1000 rpm		750 rpm	
IE3-W41R 315 S, M	3800		3000		2000		1500	
IE3-W41R 315 MX	3600 [1]	3000 [2]	3000		2000		1500	
IE3-W41R 315 MY, L, LX	3600 [1]	3000 [2]	3000 [1]	2600 [2]	2000		1500	
IE3-W41R 355 M	3600 [1]	3000 [2]	3000 [1]	2600 [2]	2000		1500	
IE3-W42R 355 MX, L	3600 [1]	3000 [2]	3000 [1]	2600 [2]	2000		1500	
IE3-W42R/W52R 400, 450	3600 [1]	3000 [2]	3000 [1]	2600 [2]	2000		1500	

[1] light bearing [2] heavy bearing

The limit values apply accordingly for non-ventilated, forced-ventilated motors and motors with water jacket cooling, cooling types IC 410, 416 and 31W.

Use of insulated bearings

Magnetic asymmetries will in mains-operated motors induce a voltage along the shaft. This shaft voltage leads to compensating currents between rotor and stator, which flow through the anti-friction bearings. If the voltage exceeds a threshold value of 500 mV, the bearings may be damaged. In VEM standard motors this value will in no case be exceeded due to their design.

The operation of the frequency inverter may intensify these effects with the inverter construction having a decisive influence. Pulse inverters will, depending on the timing frequency and the pulse modulation, generate particularly high-frequency voltages and currents. Output filters in the inverter will minimize these effects. To avoid bearing damage, the motors as of frame size 315 MY designed for inverter operation will always be equipped with an insulated bearing on the N-side. High voltage motors always are fitted with an insulated bearing on both sides and with an earth brush on D-end. This design is also available as option for low voltage motors.

In addition to this precaution, care should be taken to provide for an appropriate earthing of the motor housing to allow the currents circulating between inverter and stator to flow off. Other important measures to reduce bearing currents are: preference of an IT network (network with neutral point grounded), a separate potential equalisation between motor housing and working machine, use of motor chokes at the inverter and use of Du/dt filters or sinusoidal filters.

Shaft ends

The definition of the motor ends is made in accordance to IEC 60034-7:
– D-end (DS): Drive end of the motor (driving side)
– N-end (NS): End opposite to the drive (the side positioned opposite the DS) (Non-driving side)
– Centring borings as specified in DIN 332, Sheets 1 and 2, Form DS.

The feather key and feather key ways are executed as specified in DIN 6885 Sheet 1, Form A. The feather key lengths comply with EN 50347.

Threads for press-on and dismantling devices

Shaft end diameters	Thread
from 50 to 85 mm	M20
from 85 to 130 mm	M24

The motors are always supplied with the feather key fitted.

The second shaft end is able to transfer 80 % of the full nominal output in the case of coupling drive. The output transmission capability of the second shaft end is, in the case of belt, chain or pinion drive, available on request. The drive elements with key ways, such as belt pulleys or couplings, are to be balanced with a half feather key inserted with a balance quality grade of at least G 6.3 as specified in DIN ISO 1940-1.

True running characteristics of shaft ends
The true running characteristics of the shaft ends are in accordance with EN 50347. Optionally, the values may be reduced by 50 % (extra price).

Noise behaviour

The noise measurement is carried out at rated output, rated voltage and rated frequency, as specified in DIN EN ISO 3741. According to EN 60034-9, the spatial mean value of the sound pressure level L_{pA} measured at a 1 m distance from the motor outline will be given as the noise intensity in dB(A).

Winding and insulation

Motors in low voltage design are constructed according to thermal class 155 [F]. Use is made of high-grade enamel-insulated wires and insulating sheet materials in conjunction with a low-solvent impregnating resin. The standard insulation system is intended for rated voltages up to 725 V [mains supply] and ensures a high mechanical and electrical strength and a long service life of the motors. A design according to thermal class 180 [H] is available against extra price. The windings are suitable for the use in frequency inverters with inverter input voltages from 420 V to 500 V (peak voltages $\hat{U} \leq 1800$ V and rate of voltage rise du/dt ≤ 5.0 kV/µs) and inverter input voltages above 500 V (peak voltages $\hat{U} \leq 2500$ V and rate of voltage rise du/dt ≤ 5.0 kV/µs). Special insulation systems are available.

For high voltage motors the well-proven insulation system VEMoDUR®-VPI-155 is used. It ensures highest product security and long service life in all applications. Only preformed coils are used for the three-phase double-layer windings. They are inserted into the open slots of the stator core. For winding insulation only insulations made of mica foil are used that are resistant against partial discharges and cementable. The main insulation in the slots and the winding head consists of low-solvent glass fibre ribbons with mica paper. To control the potential a low resistance semiconductive corona protection tape is used for the slots and winding head. The impregnation is done with epoxy resin in a VPI process followed by a rotating curing process. Thus winding insulation without cavities and tight fit of slot wedges is ensured. The components of the insulation system are ideally matched. Electric and thermal durability have been proven by long-term operational experience and functional evaluation according to IEC 60034-18. It is qualified as a reliable high voltage insulation system. In addition the high voltage insulation system is also qualified for use in connection with medium voltage frequency inverters complying with IEC 60034-18-42.

Rated voltage and frequency, low voltage design

In the basic version, motors are supplied for the following rated voltages and frequencies:

400/690 V Δ/Y, 50 Hz	380…420 V Δ/ 660…725 V Y, 50 Hz
500 V, 50 Hz	475…525 V, 50 Hz
480 V Δ/Y, 60 Hz	460…500 V Y, 60 Hz
600 V, 60 Hz	570…630 V, 60 Hz

The motors can be operated in networks in which the voltage at the rated frequency deviates from the rated value by up to ±5 % without changing the rated output. The tolerances for voltage and frequency comply with Zone A of EN 60034-1.

Rated voltage and frequency, high voltage design

For the standard series the motors are designed for rated voltage 6 kV and rated frequency 50 Hz. Voltage and frequency deviations during operation are possible complying with the specifications of EN 60034-1. Motors for voltage ranges ≤ 3.3 kV have higher rated output for similar designs, whereas motors for voltage ranges > 6.6 kV have lower rated output. All motors can be operated on a 60 Hz grid. With exception of 2-pole motors the rated voltage and the rated speed is changing proportionally with the frequency.

Rated output

The rated output applies to continuous operation as specified in EN 60034-1, related to a coolant temperature of 40 °C and an altitude of ≤ 1000 m above sea level, operat-ing frequency 50 Hz and rated voltage.

Motor torque

The design torque in Nm given at the motor shaft will be

$$M = 9550 \cdot \frac{P}{n}$$

where P = design output in kW
n = speed in rpm

The starting torque, pull-up torque and pull-out torque are given as multiples of the design torques in the motor selection data tables. If the voltage deviates from its rated value, the torques will change approximately quadratically.

Ambient temperature

The standard versions of all VEM motors are suitable for use under ambient temperatures from -20 °C to +40 °C. The motors can be used at ambient temperatures as low as -40 °C, but they have to be ordered accordingly.

For deviating ambient temperatures at places of installation below 1000 m above sea level, the following factors shall apply for defining the permissible output levels depending on thermal class:

Refrigerant temperature °C	10	15	20	25	30	35	40	45	50	55	60
Factor Th. Cl. F	1.21	1.17	1.14	1.10	1.07	1.03	1.00	0.95	0.90	0.85	0.80

Installation altitude

Unless specified otherwise by the customer, it is assumed that the place of installation is not higher than 1000 m above sea level.

If the motor is to be operated at an altitude above 1000 m but below 4000 m, the limit values for the overtemperature will not change while the rated output is subject to the following adjusting factors:

Installation altitude	Refrigerant temperature in °C					
above sea level in m	< 30	30 – 40	45	50	55	60
1500	1.04	0.97	0.93	0.89	0.84	0.79
2000	1.00	0.94	0.90	0.86	0.82	0.77
2500	0.96	0.90	0.86	0.83	0.78	0.74
3000	0.92	0.86	0.82	0.79	0.75	0.70
3500	0.88	0.82	0.79	0.75	0.71	0.67
4000	0.82	0.77	0.74	0.71	0.67	0.63

At an installation altitude > 4000 m, the limit values for the overtemperature are subject to agreement between manufacturer and customer.

Overload capacity

All motors can be subjected to the following overload conditions as specified in EN 60034-1:
– 1.5-fold rated current for 2 min.
– 1.6-fold rated torque for 15 sec.

Both conditions apply to rated voltage and rated frequency

Design efficiency and power factor

The efficiency η and the power factor cos φ are given in the lists of the motor selection data.

Restarting during residual field and phase opposition

After switching off an electrical motor its winding will for a short time be subject to a voltage system as a result of the decaying magnetic field. Upon restart, transient electrodynamic reactions may occur for the motor, whereas the most unfavourable case is phase opposition of the residual field against the electrical network. It is possible to restart all VEM motors after a network failure with 100 % residual field.

Motor protection

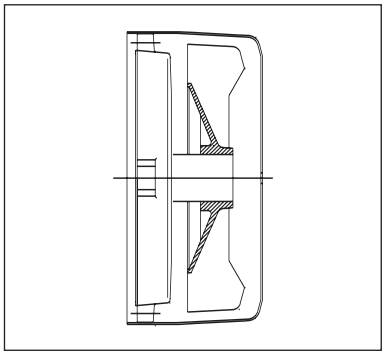
The following variations of motor protection are possible, if ordered:
– motor protection with thermistor temperature sensors in the stator winding (as standard from shaft size 400)
– bimetal temperature sensor as opener or closer in the stator winding
– silicon diodes KTY
– resistance thermometer to monitor winding or bearing temperature
– bearing vibration diagnosis

Duty types

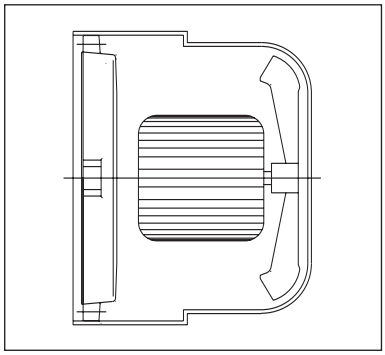
The figures in the tables refer to duty type S1, continuous duty. Special types of operation for switched operation, shorttime operation or electrical braking are possible on request.

Modular structure of the different series and modifications

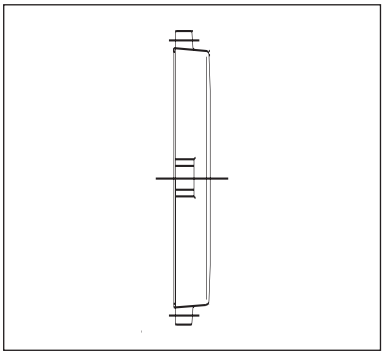
The design concept of the series permits the option of adding components to solve modern control tasks, such as a pulse generator, a tacho generator, brakes, a speed monitor and forced-ventilation units according to the customer's need.



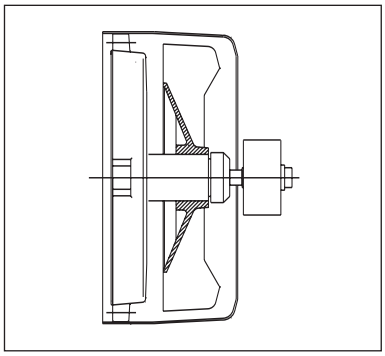
Standard version
Cooling method IC 411
Self-ventilation



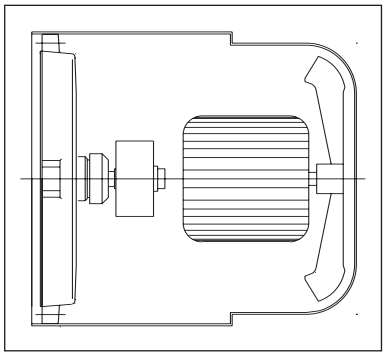
Special version
Cooling method IC 416
Forced-ventilation



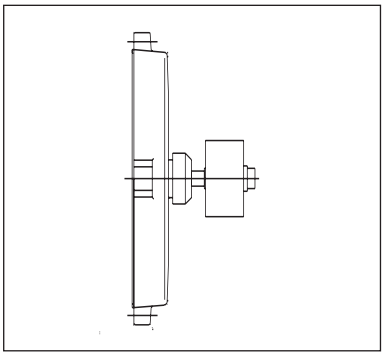
Special version
Cooling method IC 410
Non-ventilated



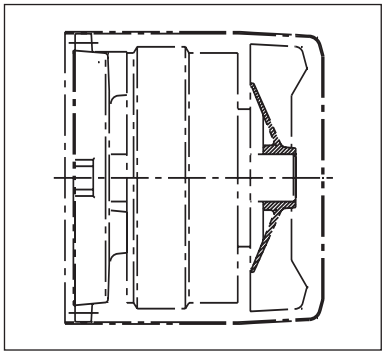
Special version
Cooling method IC 411
Self-ventilation
With built-on incremental sensor



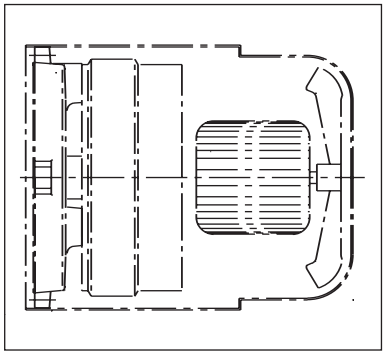
Special version
Cooling method IC 416
Forced-ventilation
With built-on incremental sensor



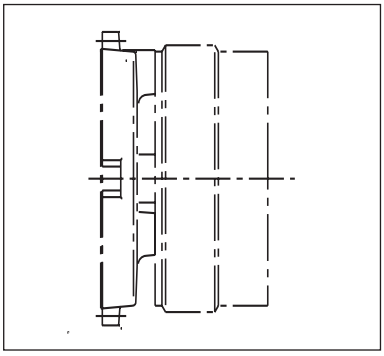
Special version
Cooling method IC 410
Non-ventilated
With built-in incremental sensor



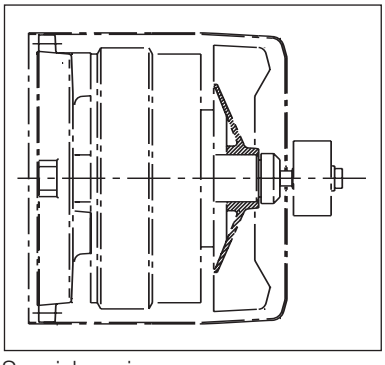
Special version
Cooling method IC 411
Self-ventilation, with built-on brake



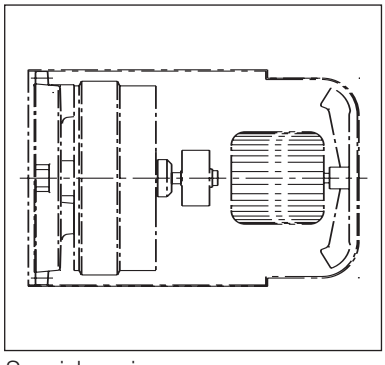
Special version
Cooling method IC 416
Forced-ventilation, with built-on brake



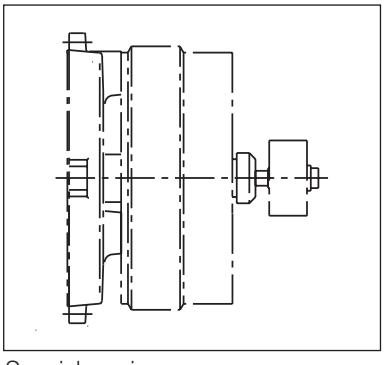
Special version
Cooling method IC 410
Non-ventilated, with built-on brake



Special version
Cooling method IC 411
Self-ventilated, with built-on brake
and incremental sensor



Special version
Cooling method IC 416
Forced-ventilation, with built-on
brake and incremental sensor



Special version
Cooling method IC 410
Non-ventilated, with built-on brake
and incremental sensor

Fits: Shaft ends

Shaft ends	m6
Mating components	H7

Tolerances – Electrical parameters

The following tolerances are permitted as specified in EN 60034-1:

Efficiency (when determined indirectly)	- 0.15 (1-η) for $P_N \leq 150$ kW - 0.1 (1-η) for $P_N > 150$ kW
Power factor	$\frac{1-\cos\varphi}{6}$ at least 0.02 at most 0.07
Slip (at standard load in warmed-up state)	± 20 % for $P_N \geq 1$ kW
Starting current (in the planned starting connection)	+ 20 % without lower limit
Starting torque	- 15 % and + 25 %
Pull-up torque	- 15 %
Pull-out torque	- 10 % (after application of this tolerance MK/M still at least 1.6)
Moment of inertia	± 10 %
Noise level (measurement area – sound intensity level)	+ 3 dB (A)

Tolerances – Mechanical parameters

Letter codes acc. Fit or tolerance to EN 50347	Meaning of the dimension	Fit or tolerance
B [a]	Spacing of feet fixing holes in axial direction	± 1 mm
P [a_1]	Diameter or width across corners of flange	- 1 mm
A [b]	Spacing of feet fixing holes across axial direction	± 1 mm
N [b_1]	Diameter of centring flange	h6
D, DA [d, d_1]	Diameter of the cylindrical shaft end	m6
M [e_1]	Pitch circle diameter of the mounting flange	± 0.8 mm
AB [f], AC [g]	Largest width of the motor (without terminal boxes)	+ 2 %
H [h]	Shaft height (lowest edge of foot to centre of shaft end)	-1 mm
L, LC [k, k_1]	Total length of the motor	+ 1 %
HD [p]	Total height of the motor (lowest edge of foot)	+ 2 %
K, K' [s, s_1]	Diameter of the mounting holes of the foot or flange	+ 3 %
GA, GC [t, t_1]	Lowest edge of shaft end to the upper edge of the key	+ 0.2 mm
F, FA [u, u_1]	Width of the key	h9
C, CA [w_1, w_2]	Distance from the centre of the first foot mounting hole to the shaft shoulder or flange face	± 3 mm
	Distance from the shaft shoulder to the flange face in the case of fixed bearing on D-end	± 0.5 mm
	Distance from the shaft shoulder to the flange face	± 3 mm
m	Motor mass	- 5 to + 10 %

Taking necessary manufacturing tolerances and deviations in materials in the case of the raw materials used into account, these tolerances are permitted for three-phase asynchronous motors. The following remarks are given in the standard:

1. A guarantee of all or any of the values as specified in the table is not mandatory. Guaranteed values to which the permissible deviations should apply must be specified expressly in tenders. The permissible deviations must comply with the table.
2. Attention is drawn to the differences in the interpretation of the concept of a "guarantee". In some countries, there is a differentiation between typical and declared values.
3. If a permissible deviation only applies in one direction, the value will not be limited in the other direction Bearing arrangement

Flange dimensions

Flange type acc. to EN 50347	Flange type acc. to DIN 42948	LA c_1	M e_1	N b_1	P a_1	S s_1	T f_1
FF 600	A 660	22	600	550	660	22	6
FF 740	A 800	25	740	680	800	22	6
FF 940	A1000	25	940	880	1000	28	6
FF 1080	A1150	32	1080	1000	1150	28	6

In EN 50347 the flanges FF with through hole are assigned to the shaft sizes.
The standard DIN 42948 is still valid for flanges A and C.

Tolerances for dimension N (b1) see corresponding dimensional tables
LA (c_1) length of engagement

Bearing

Type	Type of construction	D-end (DS)												N-end (NS)			Figure of bearing		
		Light bearing LL Pressure spring					Heavy bearing VL							Pressure spring			DS	DS	NS
		Bearing typ	Plate washer	Type	units	V-Ring	γ-Ring	Bearing typ	Plate washer	V-Ring	γ-Ring	Bearing typ	V-Ring	Type	units	LI	VL	LI
IE3-W41R 315 S2, M2	IM B3 IM V1	6316 C3	170	-	-	80A	-	NU 316 E	170	80A	-	6316 C3	80A	-	-	1	2	3
IE3-W41R 315 MX2, MY2, L2, LX2	IM B3 IM V1	6317 C3	180	-	-	-	85	NU 317 E	180	-	85	6317 C3 Q317 C3	85A	-	-	1	2	3
IE3-W41R 315 S4, M4	IM B3 IM V1	6317 C3	180	-	-	85A	-	NU 317 E	180	85A	-	6316 C3 Q316 C3	80A	-	-	1	2	3
IE3-W41R 315 MX4, MY4 IE3-W41R 315 L4, LX4	IM B3 IM V1	6320 J C3	215	-	-	-	100	NU 320 E	215	-	100	6317 C3 Q317 C3	85A	-	-	1	2	3
IE3-W41R 315 S6, M6, MX6, MY6 W41R 315 S8, M8, MX8, MY8		6320 J C3	215	-	-	-	100	NU 320 E	215	-	100	6317 C3 Q317 C3	85A	-	-	1	2	3
IE3-W41R 355 M2	IM B3 IM V1	6317 C3	180	-	-	-	85	NU 317 E	180	-	85	6317 C3 Q317 C3	85A	-	-	1	2	3
IE3-W41R 355 M4, 6	IM B3 IM V1	6324 J C3	260	-	-	-	120	NU 324 E	260	-	120	6317 C3 Q317 C3	85A	-	-	1	2	3
W41R 355 MY8, M8	IM B3 IM V1	6324 J C3	260	-	-	-	120	NU 324 E	260	-	120	6317 C3 Q317 C3	85A	-	-	1	2	3
W42R 355 MX2, L2	IM B3 IM V1	6317 C3	180	-	-	-	85	NU 317 E	180	-	85	6317 C3 Q317 C3	85A	- -	- -	1	2	3
W42R 355 MX4, 6, 8; L4, 6, 8	IM B3 IM V1	6324 J C3	260	-	-	-	120	NU 324 E	260	-	120	6317 C3 Q317 C3	85A	- -	- -	1	2	3
W42R/W52R 400 M2, MX2, L2	IM B3	6317 C3	-	0D12110 1.1200	12	-	85	NU 317 E	-	-	85	6317 C3	85A	-	-	4	2	3
	IM V1	7317B		-	-	-	85	7218B+NU218 E	-	-	90	6317 C3	85A	0D12110 1.1200	12	1	5	6
W42R/W52R 400 M4, 6, 8; MX4, 6, 8; L4, 6, 8	IM B3	6324 J C3	-	0D22400 1.4310	12	-	120	NU 324 E	-	-	120	6319 C3	85A	-	-	4	2	3
	IM V1	7324B		-	-	-	85	7226B+NU226 E	-	-	90	6319 C3	85A	0D12110 1.1200	21	1	5	6
W42R/W52R 450 M2, MX2, L2	IM B3	6317 C3	-	0D12110 1.1200	12	-	85	NU 317 E	-	-	85	6317 C3	85A	-	-	4	2	3
W42R/W52R 450 M4, 6, 8; MX4, 6, 8; L4, 6, 8	IM B3	6326 J C3	-	0D22400 1.4310	18	-	130	NU 326 E	-	-	130	6322 C3	110A	-	-	4	2	3

Light bearings LL

High voltage designs W52R

Type	Type of construction	D-end Anti-friction bearing			Pressure spring		N-end *) Anti-friction bearing			Figure	
		LL	VL	γ-Ring	Type	units	Standard	insulated	V-Rimg	DS	NS
W52R 400 M2, MX2, L2	IM B3 IM V1	6317 C3	NU 317 E	85			6317 C3	6317 MC3 VL0241	85A		
W52R 400 M4, 6, 8; MX4, 6, 8; L4, 6, 8	IM B3 IM V1	6324 J C3	NU 324 E	120	0D22400 1.4310	12	6319 C3	6319 MC3 VL0241	85A		
W52R 450 M2, MX2, L2	IM B3 IM V1	6317 C3	NU 317 E				6317 C3	6317 MC3 VL0241	85A		
W42R 450 M4, 6, 8; MX4, 6, 8; L4, 6, 8	IM B3	6326 J C3	NU 326 E				6322 C3	6322 MC3 VL0241			

*) fixed bearing

Figures

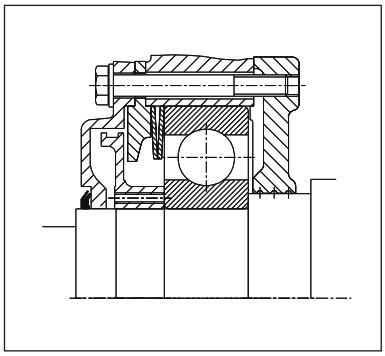


Figure 1

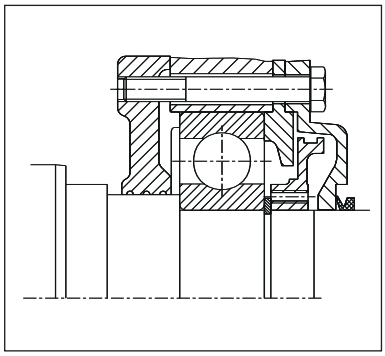


Figure 2

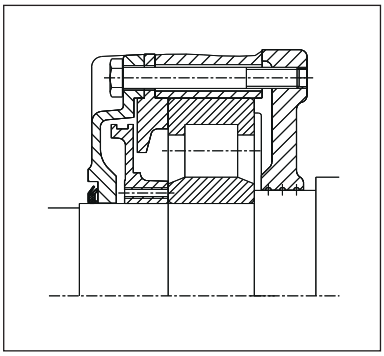


Figure 3

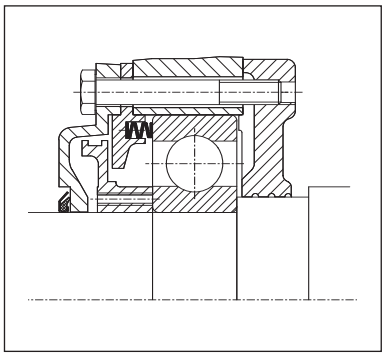


Figure 4

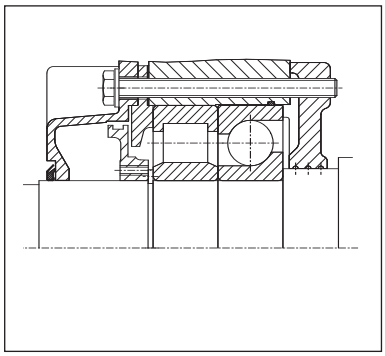


Figure 5

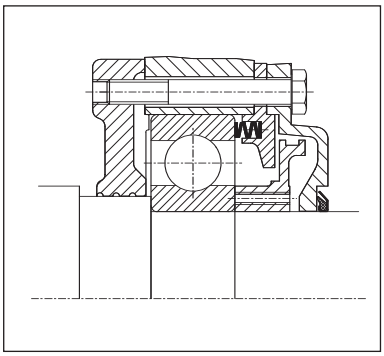


Figure 6

Low voltage motors

Motor selection data

Dimensions

Terminal boxes

General technical data

The most important technical data is summarized in the following table.
Detailed information can be found in the catalogue part “Technical explanations”.

Product line	motor with squirrel-cage rotor, IEC/DIN
Sizes	315 to 450
Rated output	55 – 1.000 kW 2-, 4-, 6- and 8-poles
Material of housing	grey cast iron with cast-on feet
Rated torque	350 Nm to 8100 Nm
Efficiency marking/ efficiency determination	EN 60034-30/EN 60034-2-1, method of residual losses
Types of circuit	motors with one speed are designed with Δ/Y-circuit as standard.
Insulation of stator winding	thermal class 155, as option 155 [F(B)], 180 acc. to EN 60034-1 (IEC 60034-1)
Type of protection	IP 55, as option IP 56, IP 65 acc. to EN 60034-5 (IEC 60034-5)
Type of cooling	acc. to EN 60034-6 (IEC 60034-6) self-ventilation, IC 411(series W4.R) forced ventilation, IC 416 (series W4. F) non-ventilated, IC 410 (series W4. O) with water jacket cooling, IC 31W (series W4. B)
Coolant temperature/ altitude of site	as standard -20 °C to +40 °C, as option -40 °C to +60 °C altitude of site 1000 m above sea level
Rated voltage	standard voltage acc. to EN 60038 400/690 V Δ/Y, 50 Hz, 500 V, 690 V 460 V, 480 V, 60 Hz Rated voltage ranges A and B acc. to IEC 60034-1
Types of construction	IM B3, IM B35, IM V1 and derived types of construction acc. to EN 60034-7
Colour system	Standard colour system “moderate”, colour shade RAL 7031, blue-grey, Special colour system “world wide”, colour shade RAL 7031, blue-grey
Vibration grade	As standard grade “A” for motors without special vibration requirements
Shaft end	Acc. to DIN 748 (IEC 60072), balancing “with half key”
Transponder	RFID System iID®2000 (13.56 MHz based on ISO 15693), as standard from size 400, available as option for sizes 315 to 355
Limit speeds	Please refer to tables about limit speeds.
Bearing design	Please refer to tables about bearings
Motor weights	Please refer to the technical selection lists.
Terminal boxes	Grey cast iron, please refer to paragraph about terminal boxes
Documentation	An operation and maintenance manual, a connection diagram and a safety data sheet is attached to each motor.
Tolerances	Please refer to paragraph about tolerances in the technical explanations.
Options	Please refer to paragraph about modifications in the technical explanations.

Low-voltage asynchronous motors with squirrel-cage rotor
Energy saving motors, Premium Efficiency IE3

Surface ventilation, type of cooling IC 411, duty type S1, continuous duty
thermal class 155, degree of protection IP 55

Motor selection and order data

Design point 400 V, 50 Hz

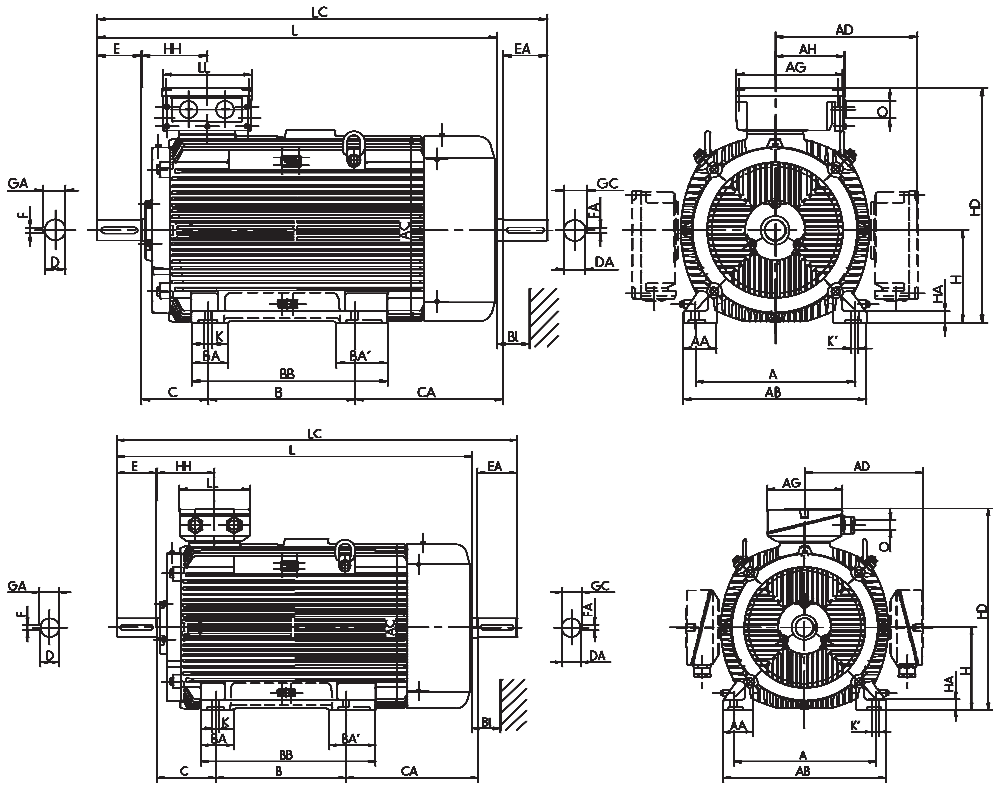
Type	P_B	M_B	n_B	IE-Klasse	$\eta_{4/4B}$	$\eta_{3/4B}$	$\eta_{1/2B}$	$\cos \varphi_B$	I_B 400 V	I_A/I_B	M_A/M_B	M_S/M_B	M_K/M_B	J	m (IM B3)
					n. EN 60034-2-1										
	kW	Nm	rpm		100 %	75 %	50 %	-	A	-	-	-	-	kgm²	kg
Synchronous speed 3000 rpm – 2-pole design															
IE3-W41R 315 S2	110	353	2980	IE3-	95.2	95.0	94.0	0.88	190	10.0	2.1	2.0	3.2	1.21	750
IE3-W41R 315 M2	132	423	2980	IE3-	95.4	95.0	94.5	0.89	224	10.0	2.0	1.8	3.0	1.44	815
IE3-W41R 315 MX2	160	513	2980	IE3-	95.7	95.7	95.0	0.90	268	8.5	2.3	1.7	2.6	2.37	1095
IE3-W41R 315 MY2	200	641	2980	IE3-	95.8	95.9	95.5	0.91	331	8.3	2.6	1.6	2.4	2.82	1200
IE3-W41R 315 L2	250	800	2985	IE3-	95.8	96.0	95.9	0.93	405	9.0	2.3	1.2	2.3	3.66	1460
IE3-W41R 315 LX2	315	1008	2985	IE3-	95.8	95.8	95.8	0.92	516	8.5	2.8	1.6	2.5	4.43	1700
IE3-W41R 355 M2	355	1136	2985	IE3-	96.0	96.0	96.0	0.92	580	7.7	1.9	1.5	3.8	4.20	2000
W42R 355 MX2	400	1278	2990		95.8	95.8	95.3	0.91	665	8.5	1.5	1.2	2.5	5.50	2200
W42R 355 L2	500	1597	2990		95.8	95.8	95.3	0.90	840	9.0	2.0	1.3	3.0	7.10	2445
W42R 400 M2	560	1790	2988		95.8	95.8	95.3	0.88	965	7.2	1.5	1.4	2.5	8.44	3060
W42R 400 MX2	630	2014	2988		95.8	95.8	95.3	0.89	1070	7.3	1.6	1.4	2.5	9.41	3200
W42R 400 L2	710	2269	2988		95.8	95.8	95.3	0.90	1195	7.6	1.7	1.4	2.0	10.41	3400
W42R 450 M2	800	2557	2988		95.8	95.8	95.3	0.88	1375	6.7	1.3	1.2	2.3	14.14	4200
W42R 450 MX2	900	2876	2989		95.8	95.8	95.3	0.88	1450	7.7	1.7	1.4	2.5	16.01	4400
W42R 450 L2	1000	3194	2990		95.8	95.8	95.3	0.90	1675	7.1	1.5	1.3	2.4	17.94	4600
Synchronous speed 1500 rpm – 4-pole design															
IE3-W41R 315 S4	110	706	1487	IE3-	95.4	95.0	94.3	0.82	203	9.5	1.9	1.7	2.7	1.96	760
IE3-W41R 315 M4	132	849	1485	IE3-	95.6	95.4	95.0	0.83	240	9.0	2.2	1.9	2.7	2.27	850
IE3-W41R 315 MX4	160	1026	1490	IE3-	95.8	95.5	95.0	0.84	287	9.5	2.1	2.0	3.2	4.01	1120
IE3-W41R 315 MY4	200	1282	1490	IE3-	96.0	95.8	95.5	0.87	346	9.5	2.1	1.7	2.7	4.82	1250
IE3-W41R 315 L4	250	1602	1490	IE3-	96.2	96.2	96.0	0.87	431	9.4	2.2	1.8	2.7	5.93	1450
IE3-W41R 315 LX4	315	2019	1490	IE3-	96.0	96.0	96.0	0.87	544	9.5	2.3	1.7	2.9	6.82	1630
IE3-W41R 355 M4	355	2271	1493	IE3-	96.2	96.2	95.5	0.87	612	8.1	1.3	1.0	2.7	7.90	2150
W42R 355 MX4	400	2557	1494		96.0	96.0	95.5	0.84	719	8.0	1.7	1.4	2.4	9.50	2400
W42R 355 L4	500	3205	1490		96.0	96.0	95.5	0.84	899	7.2	1.6	1.2	2.2	10.00	2500
W42R 400 M4	560	3582	1493		96.0	96.0	95.5	0.84	1006	9.0	3.4	2.9	3.9	12.60	2900
W42R 400 MX4	630	4030	1493		96.0	96.0	95.5	0.85	1119	9.0	3.6	3.0	4.2	14.33	3100
W42R 400 L4	710	4542	1493		96.0	96.0	95.5	0.85	1261	9.0	3.9	3.1	4.2	16.29	3450
W42R 450 M4	800	5117	1493		96.0	96.0	95.5	0.84	1438	9.0	3.2	2.8	3.6	22.76	4200
W42R 450 MX4	900	5757	1493		96.0	96.0	95.5	0.86	1580	9.0	3.1	2.8	3.4	25.34	4400
W42R 450 L4	1000	6397	1493		96.0	96.0	95.5	0.86	1755	9.0	3.3	2.9	3.5	28.07	4600
Synchronous speed 1000 rpm – 6-pole design															
IE3-W41R 315 S6	75	723	990	IE3-	94.6	94.0	93.5	0.86	133	8.2	1.8	1.4	2.3	5.55	1060
IE3-W41R 315 M6	90	868	990	IE3-	94.9	94.0	93.0	0.86	159	8.5	2.2	1.7	2.8	6	1100
IE3-W41R 315 MX6	110	1061	990	IE3-	95.1	95.0	94.5	0.86	194	8.5	2.5	1.7	2.7	6.67	1210
IE3-W41R 315 L6	132	1271	992	IE3-	95.4	95.0	94.5	0.87	230	9.0	2.8	2.0	3.2	8.6	1550
IE3-W41R 355 M6	160	1536	995	IE3-	95.6	95.0	94.6	0.82	295	8.0	2.1	1.5	2.7	8.2	1850
IE3-W42R 355 MX6	200	1919	995	IE3-	95.8	95.2	95.0	0.83	363	8.0	1.8	1.3	2.5	12.10	2200
IE3-W42R 355 L6	250	2402	994	IE3-	95.8	95.5	95.0	0.81	468	7.0	1.8	1.3	2.3	14.00	2400
IE3-W42R 355 LX6	315	3032	992	IE3-	95.8	95.5	95.3	0.86	554	7.4	2.5	2.0	2.7	14.00	2400
IE3-W42R 400 MY6	355	3407	995		95.8	95.5	94.5	0.85	632	8.0	2.0	1.6	2.6	16.54	2900
W42R 400 M6	400	3847	993		95.8	95.5	94.5	0.87	696	7.0	1.8	1.5	2.3	16.54	2900
W42R 400 MX6	450	4327	993		95.8	95.7	94.6	0.83	821	7.3	1.8	1.5	2.1	18.44	3100
W42R 400 L6	500	4808	993		95.8	95.6	94.5	0.83	911	7.5	1.9	1.7	2.2	20.63	3200
W42R 450 M6	560	5385	993		95.8	95.6	94.5	0.87	973	6.6	1.6	1.5	2.0	29.26	4200
W42R 450 MX6	630	6052	994		95.8	95.8	94.5	0.85	1121	6.7	1.6	1.5	1.9	33.00	4400
W42R 450 L6	710	6821	994		95.8	95.8	94.6	0.85	1264	7.0	1.7	1.6	1.9	37.50	4600
Synchronous speed 750 rpm – 8-pole design															
W42R 315 S8	55	707	743		93.8	93.8	92.5	0.81	104	7.5	1.7	1.5	2.4	5.55	1060
W41R 315 M8	75	968	740		94.3	93.8	93.5	0.80	144	7.8	1.8	1.8	2.6	6	1100
W41R 315 MX8	90	1154	745		94.6	94.0	93.5	0.79	175	8.2	2.5	2.0	2.8	6.67	1250
W41R 315 L8	110	1410	745		94.9	94.0	93.5	0.80	210	8.3	2.2	1.9	2.8	10	1550
W41R 355 M8	132	1692	745		95.1	95.0	94.0	0.81	248	7.0	1.2	1.0	2.7	9.5	1850
W42R 355 MX8	160	2054	744		95.4	95.0	94.0	0.80	303	6.8	1.3	1.0	2.5	13.40	2200
W42R 355 L8	200	2570	743		95.6	95.5	94.0	0.77	393	6.5	1.6	1.0	2.7	15.80	2400
W42R 355 LX8	250	3213	743		95.6	95.4	93.8	0.78	487	6.4	2.5	1.9	2.5	15.80	2400
W42R 400 MY8	315	4048	743		95.6	95.5	94.5	0.78	611	6.4	2.5	1.9	2.5	17.94	3000
W42R 400 M8	355	4550	745		95.6	95.5	94.5	0.76	708	6.6	1.9	1.7	2.3	17.94	3000
W42R 400 MX8	400	5134	744		95.6	95.6	94.6	0.73	831	6.1	1.8	1.7	1.9	19.99	3150
W42R 400 L8	450	5776	744		95.6	95.6	94.6	0.72	947	6.4	2.0	1.7	2.0	22.34	3300
W42R 450 M8	500	6418	744		95.6	95.6	94.5	0.69	1098	5.8	1.6	1.4	1.8	30.80	4200
W42R 450 MX8	560	7178	745		95.6	95.6	94.6	0.77	1103	6.2	1.8	1.7	1.8	36.17	4400
W42R 450 L8	630	8075	745		95.6	95.6	94.6	0.76	1257	6.3	1.8	1.6	1.8	40.71	4600

Changes reserved due to future developments.

Low-voltage asynchronous motors with squirrel-cage rotor
Energy saving motors, Premium Efficiency IE3

Size 315
Surface ventilation, type of cooling IC 411, degree of protection IP 55

Type of construction IM B3 [IM 1001]



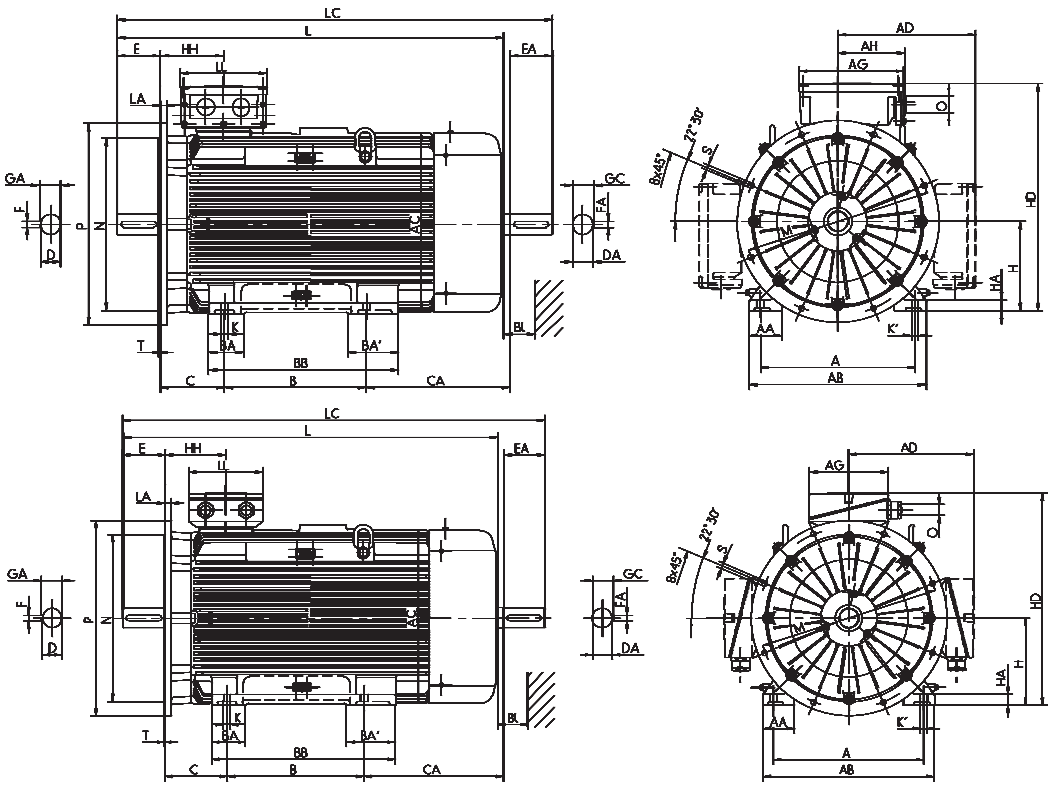
Type designation	Flange size	A b	AA n	AB f	AC g	AD g1	B a	BA m	BA' m1	BB e	C w1	CA w2	D d	DA d1	DB*)	E l	EA l1	F u	FA u1
IE3-W41R 315 S2	A660	508	126	590	550	416	406	120	120	503	216	316	65	65	M20	140	140	18	18
IE3-W41R 315 M2	A660	508	126	590	550	416	457	120	150	554	216	320	65	65	M20	140	140	18	18
IE3-W41R 315 MX2	A660	508	110	590	610	494	457	120	150	554	216	495	65	65	M20	140	140	18	18
IE3-W41R 315 MY2	A660	508	110	590	610	494	457	120	120	573	216	495	65	65	M20	140	140	18	18
IE3-W41R 315 L2	A660	508	110	590	610	494	508	120	120	624	216	564	65	65	M20	140	140	18	18
IE3-W41R 315 LX2	A660	508	110	590	610	494	508	120	120	624	216	684	65	65	M20	140	140	18	18
IE3-W41R 315 S4	A660	508	126	590	550	416	406	120	120	503	216	316	80	70	M20	170	140	22	20
IE3-W41R 315 M4	A660	508	126	590	550	416	457	120	150	554	216	320	80	70	M20	170	140	22	20
IE3-W41R 315 MX4	A660	508	110	590	610	494	457	120	150	554	216	495	80	70	M20	170	140	22	20
IE3-W41R 315 MY4	A660	508	110	590	610	494	457	120	120	573	216	495	80	70	M20	170	140	22	20
IE3-W41R 315 L4	A660	508	110	590	610	494	508	120	120	624	216	564	80	70	M20	170	140	22	20
IE3-W41R 315 LX4	A660	508	110	590	610	494	508	120	120	624	216	684	80	70	M20	170	140	22	20
IE3-W41R 315 S6	A660	508	110	590	610	494	406	120	150	554	216	495	80	70	M20	170	140	22	20
IE3-W41R 315 M6	A660	508	110	590	610	494	457	120	120	573	216	495	80	70	M20	170	140	22	20
IE3-W41R 315 MX6	A660	508	110	590	610	494	457	120	120	573	216	495	80	70	M20	170	140	22	20
IE3-W41R 315 L6	A660	508	110	590	610	494	508	120	120	624	216	564	80	70	M20	170	140	22	20
W41R 315 S8	A660	508	110	590	610	494	406	120	150	554	216	495	80	70	M20	170	140	22	20
W41R 315 M8	A660	508	110	590	610	494	457	120	120	573	216	495	80	70	M20	170	140	22	20
W41R 315 MX8	A660	508	110	590	610	494	508	120	120	624	216	564	80	70	M20	170	140	22	20
W41R 315 L8	A660	508	110	590	610	494	508	120	120	624	216	564	80	70	M20	170	140	22	20

*) Centre holes acc. to DIN 332-DS

Low-voltage asynchronous motors with squirrel-cage rotor
Energy saving motors, Premium Efficiency IE3

Size 315
Surface ventilation, type of cooling IC 411, degree of protection IP 55

Type of construction IM B35 [IM 2001]
Flange dimensions see page 15



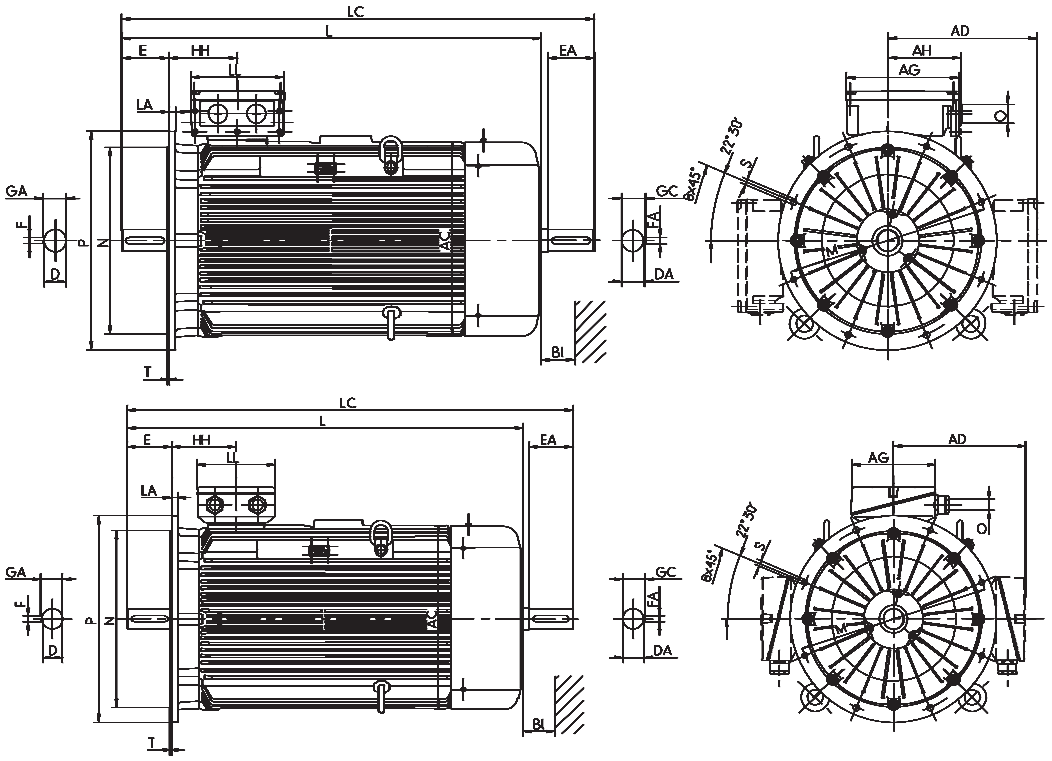
Type designation	GA t	GC t1	H h	HA c	HD p	HD**) p	HH A	K s	K' s'	L k	LC k1	KK Type	AG x	LL z	AH -	O r	Bl Bl
IE3-W41R 315 S2	69	69	315	44	731	610	211	28	35	1050	1218	KK 200 A	282	242	-	M63 x 1.5	55
IE3-W41R 315 M2	69	69	315	44	731	610	211	28	35	1105	1273	KK 200 A	282	242	-	M63 x 1.5	55
IE3-W41R 315 MX2	69	69	315	44	809	628	230	28	35	1220	1398	KK 400 B	415	340	265	M63 x 1.5	55
IE3-W41R 315 MY2	69	69	315	44	809	628	230	28	35	1270	1448	KK 400 B	415	340	265	M63 x 1.5	55
IE3-W41R 315 L2	69	69	315	44	809	628	230	28	35	1390	1568	KK 400 B	415	340	265	M63 x 1.5	55
IE3-W41R 315 LX2	69	69	315	44	809	628	230	28	35	1510	1688	KK 400 B	415	340	265	M63 x 1.5	55
IE3-W41R 315 S4	85	74.5	315	44	731	610	211	28	35	1080	1248	KK 200 A	282	242	-	M63 x 1.5	55
IE3-W41R 315 M4	85	74.5	315	44	731	610	211	28	35	1135	1303	KK 200 A	282	242	-	M63 x 1.5	55
IE3-W41R 315 MX4	85	74.5	315	44	809	628	230	28	35	1250	1428	KK 400 B	415	340	265	M63 x 1.5	55
IE3-W41R 315 MY4	85	74.5	315	44	809	628	230	28	35	1300	1478	KK 400 B	415	340	265	M63 x 1.5	55
IE3-W41R 315 L4	85	74.5	315	44	809	628	230	28	35	1420	1598	KK 400 B	415	340	265	M63 x 1.5	55
IE3-W41R 315 LX4	85	74.5	315	44	809	628	230	28	35	1540	1718	KK 400 B	415	340	265	M63 x 1.5	55
IE3-W41R 315 S6	85	74.5	315	44	809	628	230	28	35	1250	1428	KK 400 B	415	340	265	M63 x 1.5	55
IE3-W41R 315 M6	85	74.5	315	44	809	628	230	28	35	1300	1478	KK 400 B	415	340	265	M63 x 1.5	55
IE3-W41R 315 MX6	85	74.5	315	44	809	628	230	28	35	1300	1478	KK 400 B	415	340	265	M63 x 1.5	55
IE3-W41R 315 L6	85	74.5	315	44	809	628	230	28	35	1420	1598	KK 400 B	415	340	265	M63 x 1.5	55
W41R 315 S8	85	74.5	315	44	809	628	230	28	35	1250	1428	KK 400 B	415	340	265	M63 x 1.5	55
W41R 315 M8	85	74.5	315	44	809	628	230	28	35	1300	1478	KK 400 B	415	340	265	M63 x 1.5	55
W41R 315 MX8	85	74.5	315	44	809	628	230	28	35	1420	1598	KK 400 B	415	340	265	M63 x 1.5	55
W41R 315 L8	85	74.5	315	44	809	628	230	28	35	1420	1598	KK 400 B	415	340	265	M63 x 1.5	55

**) Terminal box left/right

Low-voltage asynchronous motors with squirrel-cage rotor
Energy saving motors, Premium Efficiency IE3

Size 315
Surface ventilation, type of cooling IC 411, degree of protection IP 55

Type of construction IM B5 [IM 3001] up to size 315 MY
Type of construction IM V1 [IM 3011]
Flange dimensions see page 15



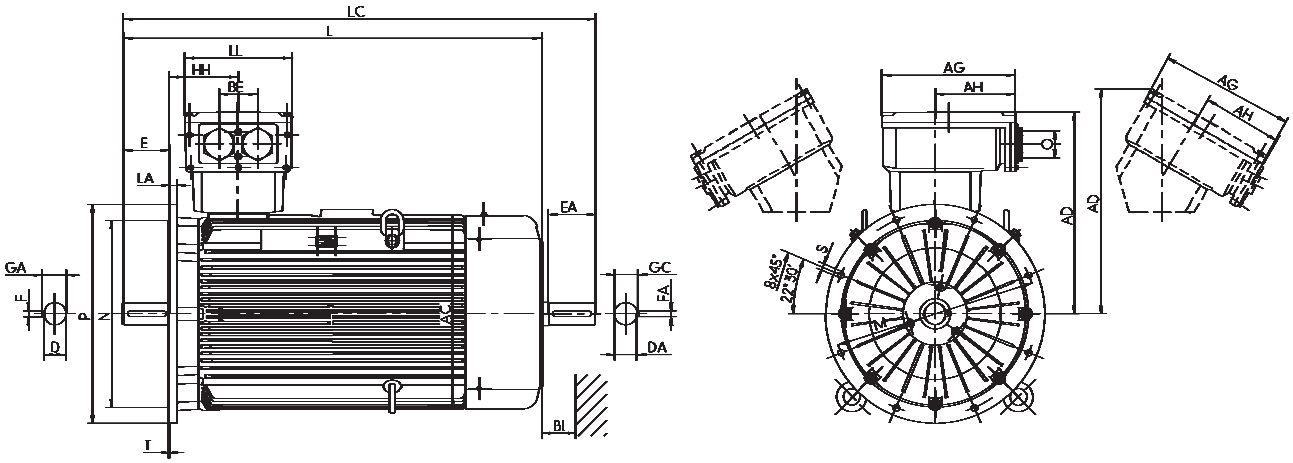
Type designation	Flange size	AC g	AD**) g1	D d	DA d1	DB*)	E l	EA l1	F u	FA u1	GA t	GC t1	H h	HH A	L k	LC k1	KK Type	AG x	LL z	AH -	O r	BI BI
IE3-W41R 315 S2	FF 600	550	416	65	65	M20	140	140	18	18	69	69	315	211	1050	1218	KK 200 A	282	242	-	M63 x 1.5	55
IE3-W41R 315 M2	FF 600	550	416	65	65	M20	140	140	18	18	69	69	315	211	1105	1273	KK 200 A	282	242	-	M63 x 1.5	55
IE3-W41R 315 MX2	FF 600	610	494	65	65	M20	140	140	18	18	69	69	315	230	1250	1398	KK 400 B	415	340	265	M63 x 1.5	55
IE3-W41R 315 MY2	FF 600	610	494	65	65	M20	140	140	18	18	69	69	315	230	1270	1448	KK 400 B	415	340	265	M63 x 1.5	55
IE3-W41R 315 L2	FF 600	610	494	65	65	M20	140	140	18	18	69	69	315	230	1390	1568	KK 400 B	415	340	265	M63 x 1.5	55
IE3-W41R 315 LX2	FF 600	610	494	65	65	M20	140	140	18	18	69	69	315	230	1510	1688	KK 400 B	415	340	265	M63 x 1.5	55
IE3-W41R 315 S4	FF 600	550	416	80	70	M20	170	140	22	20	85	74.5	315	211	1080	1248	KK 200 A	282	242	-	M63 x 1.5	55
IE3-W41R 315 M4	FF 600	550	416	80	70	M20	170	140	22	20	85	74.5	315	211	1135	1303	KK 200 A	282	242	-	M63 x 1.5	55
IE3-W41R 315 MX4	FF 600	610	494	80	70	M20	170	140	22	20	85	74.5	315	230	1250	1428	KK 400 B	415	340	265	M63 x 1.5	55
IE3-W41R 315 MY4	FF 600	610	494	80	70	M20	170	140	22	20	85	74.5	315	230	1300	1478	KK 400 B	415	340	265	M63 x 1.5	55
IE3-W41R 315 L4	FF 600	610	494	80	70	M20	170	140	22	20	85	74.5	315	230	1420	1598	KK 400 B	415	340	265	M63 x 1.5	55
IE3-W41R 315 LX4	FF 600	610	494	80	70	M20	170	140	22	20	85	74.5	315	230	1540	1718	KK 400 B	415	340	265	M63 x 1.5	55
IE3-W41R 315 S6	FF 600	610	494	80	70	M20	170	140	22	20	85	74.5	315	230	1250	1428	KK 400 B	415	340	265	M63 x 1.5	55
IE3-W41R 315 M6	FF 600	610	494	80	70	M20	170	140	22	20	85	74.5	315	230	1300	1478	KK 400 B	415	340	265	M63 x 1.5	55
IE3-W41R 315 MX6	FF 600	610	494	80	70	M20	170	140	22	20	85	74.5	315	230	1300	1478	KK 400 B	415	340	265	M63 x 1.5	55
IE3-W41R 315 L6	FF 600	610	494	80	70	M20	170	140	22	20	85	74.5	315	230	1420	1598	KK 400 B	415	340	265	M63 x 1.5	55
W41R 315 S8	FF 600	610	494	80	70	M20	170	140	22	20	85	74.5	315	230	1250	1428	KK 400 B	415	340	265	M63 x 1.5	55
W41R 315 M8	FF 600	610	494	80	70	M20	170	140	22	20	85	74.5	315	230	1300	1478	KK 400 B	415	340	265	M63 x 1.5	55
W41R 315 MX8	FF 600	610	494	80	70	M20	170	140	22	20	85	74.5	315	230	1420	1598	KK 400 B	415	340	265	M63 x 1.5	55
W41R 315 L8	FF 600	610	494	80	70	M20	170	140	22	20	85	74.5	315	230	1420	1598	KK 400 B	415	340	265	M63 x 1.5	55

*) Centre holes acc. to DIN 332-DS
**) Terminal box left/right

Low-voltage asynchronous motors with squirrel-cage rotor
Energy saving motors, Premium Efficiency IE3

Sizes 355 to 450
Surface ventilation, type of cooling IC 411, degree of protection IP 55

Type of construction IM V1 [IM 3011]
Flange dimensions see page 15



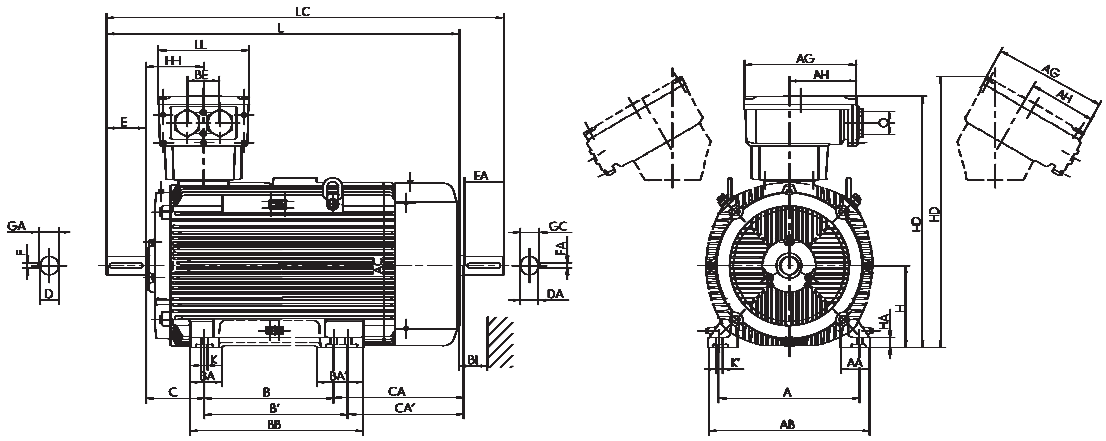
Type designation	Flange size	AC g	AD g1	AD**) g1	D d	DA d1	DB*)	E l	EA l1	F u	FA u1	GA t	GC t1	H h	HH A	L k	LC k1	KK Type	AG x	LL z	AH -	BE -	O r	BI BI
IE3-W41R 355 M2	FF 740	715	736	817	80	80	M20	170	170	22	22	85	85	355	44	1530	1715	KK 630 A	496	390	301	140	M72 x 2	60
IE3-W41R 355 M4	FF 740	715	736	817	100	80	M24	210	170	28	22	106	85	355	44	1570	1755	KK 630 A	496	390	301	140	M72 x 2	60
(IE3)W41R 355 M6, 8	FF 740	715	736	817	100	80	M24	210	170	28	22	106	85	355	44	1570	1755	KK 630 A	496	390	301	140	M72 x 2	60
(IE3)W42R 355 MX6, 8	FF 740	715	-	812	100	80	M24	210	170	28	22	106	85	355	44	1770	1955	KK 630 A	496	390	301	140	M72 x 2	60
W42R 355 MX2	FF 740	715	-	812	80	80	M20	170	170	22	22	85	85	355	44	1730	1915	KK 1000 A	615	474	385	200	M72 x 2	60
W42R 355 L2	FF 740	715	-	812	80	80	M20	170	170	22	22	85	85	355	44	1730	1915	KK 1000 A	615	474	385	200	M72 x 2	60
W42R 355 MX4	FF 740	715	-	812	100	80	M24	210	170	28	22	106	85	355	44	1770	1955	KK 1000 A	615	474	385	200	M72 x 2	60
W42R 355 L4	FF 740	715	-	812	100	80	M24	210	170	28	22	106	85	355	44	1770	1955	KK 1000 A	615	474	385	200	M72 x 2	60
(IE3)W42R 355 L6, 8, LX6, 8	FF 740	715	-	812	100	80	M24	210	170	28	22	106	85	355	44	1770	1955	KK 1000 A	615	474	385	200	M72 x 2	60
W42R 400 M, MX2	FF 940	810	-	873	80	80	M20	170	170	22	22	85	85	400	50	1963	2161	KK 1000 A	615	474	385	200	M80 x 2	100
W42R 400 L2	FF 940	810	-	873	80	80	M20	170	170	22	22	85	85	400	50	1963	2161	KK 1000 A	615	474	385	200	M80 x 2	100
W42R 400 M, MX4, 6, 8	FF 940	810	-	873	110	80	M24	210	170	28	22	116	85	400	50	2003	2201	KK 1000 A	615	474	385	200	M80 x 2	100
W42R 400 L4, 6, 8	FF 940	810	-	873	110	80	M24	210	170	28	22	116	85	400	50	2003	2201	KK 1000 A	615	474	385	200	M80 x 2	100
W42R 450 M, MX2	FF 1080	910	-	920	90	75	M24	170	140	25	20	95	79.5	450	55	2060	2225	KK 1000 A	615	474	385	200	M80 x 2	100
W42R 450 L2	FF 1080	910	-	920	90	75	M24	170	140	25	20	95	79.5	450	55	2060	2225	KK 1000 A	615	474	385	200	M80 x 2	100
W42R 450 M, MX4, 6, 8	FF 1080	910	-	920	120	100	M24	210	170	32	28	127	106	450	55	2100	2335	KK 1000 A	615	474	385	200	M80 x 2	100
W42R 450 L4, 6, 8	FF 1080	910	-	920	120	100	M24	210	170	32	28	127	106	450	55	2100	2335	KK 1000 A	615	474	385	200	M80 x 2	100

*) Centre holes acc. to DIN 332-DS
**) Terminal box left/right

Low-voltage asynchronous motors with squirrel-cage rotor
Energy saving motors, Premium Efficiency IE3

Sizes 355 to 450
Surface ventilation, type of cooling IC 411, degree of protection IP 55

Type of construction IM B3 [IM 1002]
Flange dimensions see page 15



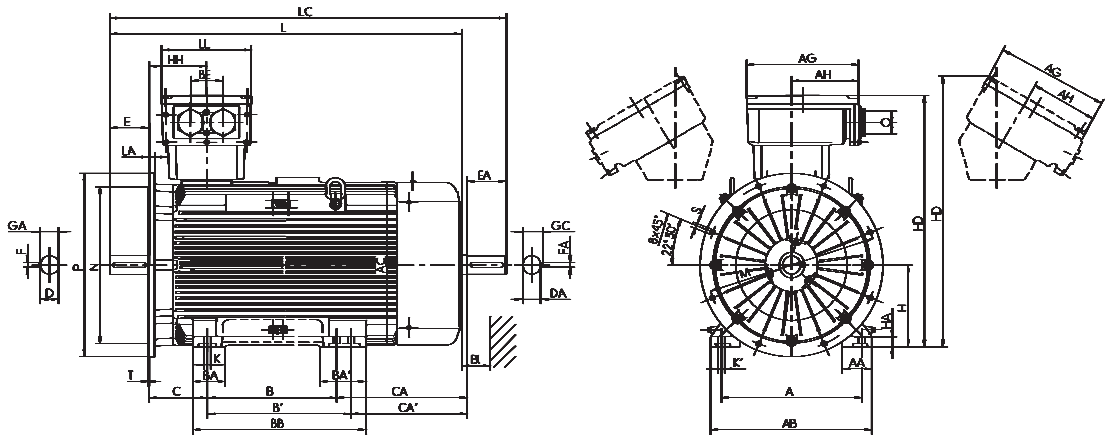
Type designation	Flange size	A b	AA n	AB f	AC g	B a	BA m	BA' m1	BB e	C w1	CA w2	D d	DA d1	DB*)	E l	EA l1	F u	FA u1
IE3-W41R 355 M2	FF 740	610	130	700	715	560	140	200	750	254	561	80	80	M20	170	170	22	22
IE3-W41R 355 M4	FF 740	610	130	700	715	560	140	200	750	254	561	100	80	M24	210	170	28	22
(IE3)W41R 355 M6, 8	FF 740	610	130	700	715	560	140	200	750	254	561	100	80	M24	210	170	28	22
(IE3)W42R 355 MX6, 8	FF 740	610	130	700	715	560	140	200	750	254	761	100	80	M24	210	170	28	22
W42R 355 MX2	FF 740	610	130	700	715	560	140	200	750	254	761	80	80	M20	170	170	22	22
W42R 355 L2	FF 740	610	130	700	715	630	140	200	750	254	691	80	80	M20	170	170	22	22
W42R 355 MX4	FF 740	610	130	700	715	560	140	200	750	254	761	100	80	M24	210	170	28	22
W42R 355 L4	FF 740	610	130	700	715	630	140	200	750	254	691	100	80	M24	210	170	28	22
(IE3)W42R 355 L6, 8, LX6, 8	FF 740	610	130	700	715	630	140	200	750	254	691	100	80	M24	210	170	28	22
W42R 400 M, MX2	FF 940	686	178	820	800	630	180	240	900	280	930	80	80	M20	170	170	22	22
W42R 400 L2	FF 940	686	178	820	800	710	180	240	900	280	850	80	80	M20	170	170	22	22
W42R 400 M, MX4, 6, 8	FF 940	686	178	820	800	630	180	240	900	280	930	110	80	M24	210	170	28	22
W42R 400 L4, 6, 8	FF 940	686	178	820	800	710	180	240	900	280	850	110	80	M24	210	170	28	22
W42R 450 M, MX2	FF 1080	800	180	940	910	1000	160	260	1270	250	665	90	75	M24	170	140	25	20
W42R 450 L2	FF 1080	800	180	940	910	1120	160	260	1270	250	545	90	75	M24	170	140	25	20
W42R 450 M, MX4, 6, 8	FF 1080	800	180	940	910	1000	160	260	1270	250	665	120	100	M24	210	170	32	28
W42R 450 L4, 6, 8	FF 1080	800	180	940	910	1120	160	260	1270	250	545	120	100	M24	210	170	32	28

*) Centre holes acc. to DIN 332-DS

Low-voltage asynchronous motors with squirrel-cage rotor
Energy saving motors, Premium Efficiency IE3

Sizes 355 to 450
Surface ventilation, type of cooling IC 411, degree of protection IP 55

Type of construction IM B35 [IM 2002]
Flange dimensions see page 15



Type designation	GA t	GC t1	H h	HA c	HD p	HD**) p	HH A	K s	K' s'	L k	LC k1	KK Type	AG x	LL z	AH -	BE -	O r	BI BI
IE3-W41R 355 M2	85	85	355	44	1091	1172	250	28	35	1530	1715	KK 630 A	496	390	301	140	M72 x 2	60
IE3-W41R 355 M4	106	85	355	44	1091	1172	250	28	35	1570	1755	KK 630 A	496	390	301	140	M72 x 2	60
(IE3)W41R 355 M6, 8	106	85	355	44	1091	1172	250	28	35	1570	1755	KK 630 A	496	390	301	140	M72 x 2	60
(IE3)W42R 355 MX6, 8	106	85	355	44	-	1167	265	28	35	1770	1955	KK 630 A	496	390	301	140	M72 x 2	60
W42R 355 MX2	85	85	355	44	-	1167	327	28	35	1730	1915	KK 1000 A	615	474	385	200	M72 x 2	60
W42R 355 L2	85	85	355	44	-	1167	327	28	35	1730	1915	KK 1000 A	615	474	385	200	M72 x 2	60
W42R 355 MX4	106	85	355	44	-	1167	327	28	35	1770	1955	KK 1000 A	615	474	385	200	M72 x 2	60
W42R 355 L4	106	85	355	44	-	1167	327	28	35	1770	1955	KK 1000 A	615	474	385	200	M72 x 2	60
(IE3)W42R 355 L6, 8, LX6, 8	106	85	355	44	-	1167	327	28	35	1770	1955	KK 1000 A	615	474	385	200	M72 x 2	60
W42R 400 M, MX2	85	85	400	50	-	1273	339	35	42	1963	2161	KK 1000 A	615	474	385	200	M80 x 2	100
W42R 400 L2	85	85	400	50	-	1273	339	35	42	1963	2161	KK 1000 A	615	474	385	200	M80 x 2	100
W42R 400 M, MX4, 6, 8	116	85	400	50	-	1273	339	35	42	2003	2201	KK 1000 A	615	474	385	200	M80 x 2	100
W42R 400 L4, 6, 8	116	85	400	50	-	1273	339	35	42	2003	2201	KK 1000 A	615	474	385	200	M80 x 2	100
W42R 450 M, MX2	95	79.5	450	55	-	1370	337	42	48	2060	2225	KK 1000 A	615	474	385	200	M80 x 2	100
W42R 450 L2	95	79.5	450	55	-	1370	337	42	48	2060	2225	KK 1000 A	615	474	385	200	M80 x 2	100
W42R 450 M, MX4, 6, 8	127	106	450	55	-	1370	337	42	48	2100	2335	KK 1000 A	615	474	385	200	M80 x 2	100
W42R 450 L4, 6, 8	127	106	450	55	-	1370	337	42	48	2100	2335	KK 1000 A	615	474	385	200	M80 x 2	100

**) Terminal box left/right

Terminal boxes

Standard design, VIK design

Type	Material	Intermediate flange	Dimensions AG x	LL z	AH -	BE -	Thread ingoing cables O r	max. cable diameter O $_{max}$ ..r$_{max}$	Terminal board	Number of terminals	Thread connecting bolt	Thread earth connector	Figure
Standard design													
KK 200 A	GG-15	-	282	242	-	-	M63 x 1.5	Ø 45 mm	SB 10	6	M10	M10	01
KK 400 A	GG-15	-	315	294	-	-	M63 x 1.5	Ø 45 mm	SB 12	6	M12	M10	01
KK 400 B	GG-15	-	415	340	265	-	M63 x 1.5	Ø 45 mm	KM 12	6	M12	LK	02
KK 400 B	GG-15	-	415	340	265	-	M72 x 2	Ø 56.5 mm	KM 12	6	M12	LK	02
KK 630 A	GG-15	straight	496	390	301	140	M72 x 2	Ø 56.5 mm	KLP 630-20	6	M20	LK	03G
KK 630 A	GG-15	inclined	496	390	301	140	M72 x 2	Ø 56.5 mm	KLP 630-20	6	M20	LK	03S
KK 1000 A	GG-15	straight	615	474	385	200	M72 x 2	Ø 56.5 mm	KLSO 1000	6	StS	LK	04G
KK 1000 A	GG-15	inclined	615	474	385	200	M72 x 2	Ø 56.5 mm	KLSO 1000	6	StS	LK	04S
KK 1000 A	GG-15	straight	615	474	385	200	M80 x 2	Ø 68 mm	KLSO 1000	6	StS	LK	04G
KK 1000 A	GG-15	inclined	615	474	385	200	M80 x 2	Ø 68 mm	KLSO 1000	6	StS	LK	04S
VIK-design													
KK 200 A-SB Ex e II	GG-15	-	335	270	200	-	M63 x 1.5	Ø 45 mm	KM 10/8	6	LK	LK	05
KK 400 A-SB Ex e II	GG-15	-	415	340	265	-	M63 x 1.5	Ø 45 mm	KM 16/12	6	LK	LK	05
KK 630 A Ex e II	GG-15	straight	496	390	301	140	M75 x 1.5	Ø 45 mm	KLP 630-20	6	LK	LK	06G
KK 630 A Ex e II	GG-15	inclined	496	390	301	140	M75 x 1.5	Ø 45 mm	KLP 630-20	6	LK	LK	06S
KK 1000 A Ex e II	GG-15	straight	615	474	385	200	M80 x 1.5	Ø 68 mm	KLSO 1000	6	StS	LK	07G
KK 1000 A Ex e II	GG-15	inclined	615	474	385	200	M80 x 1.5	Ø 68 mm	KLSO 1000	6	StS	LK	07S

StS… current bar
LK… saddle terminal

Terminal boxes

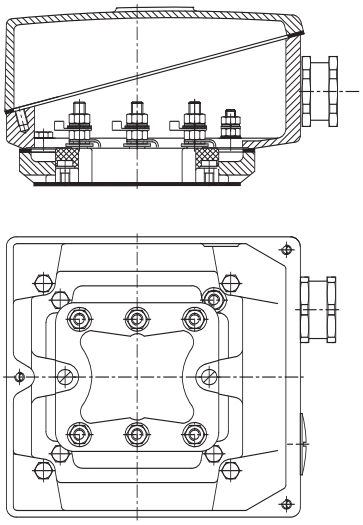


Figure 01
Terminal box 200A, 400A

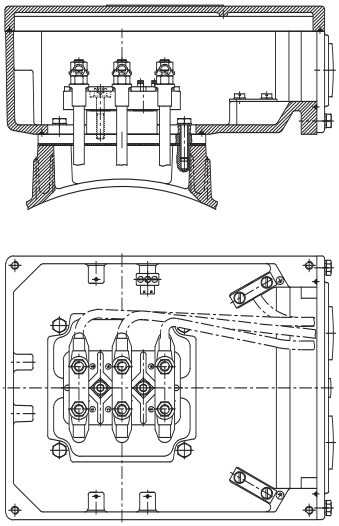


Figure 02
Terminal box 200B, 400B

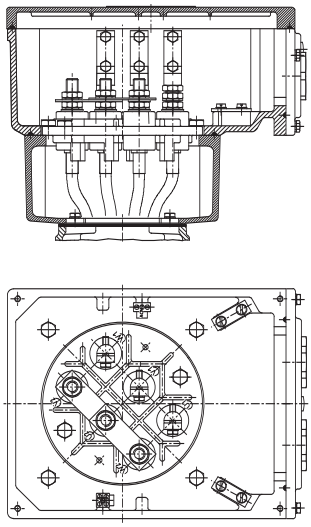


Figure 03G
Terminal box 630A, straight intermediate flange

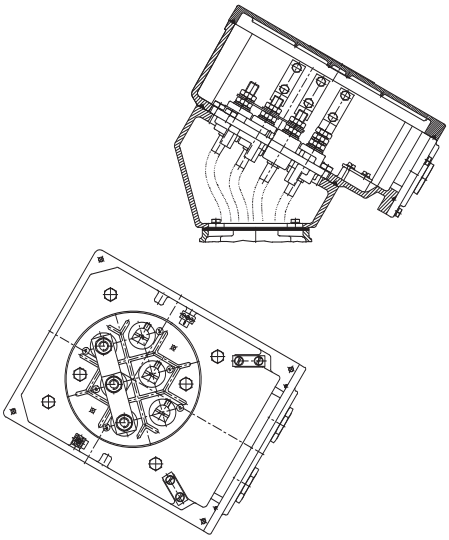


Figure 03S
Terminal box 630A, inclined intermediate flange

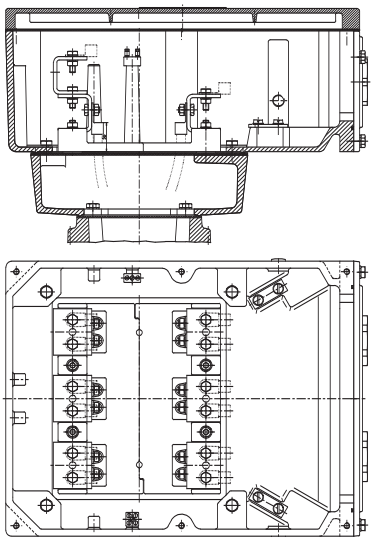


Figure 04G
Terminal box 1000A, straight intermediate flange

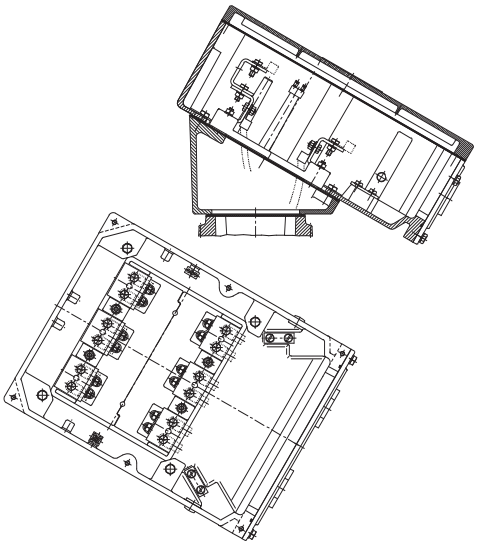


Figure 04S
Terminal box 1000A, inclined intermediate flange

Terminal boxes

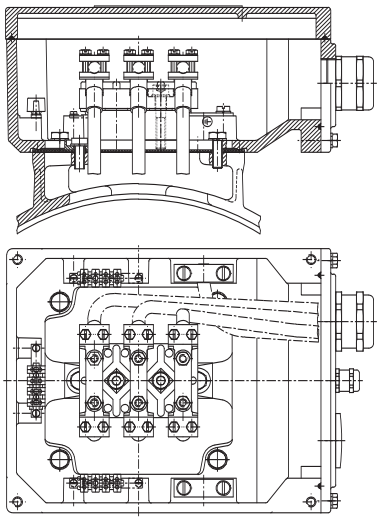


Figure 05
Terminal box 200B, 400B

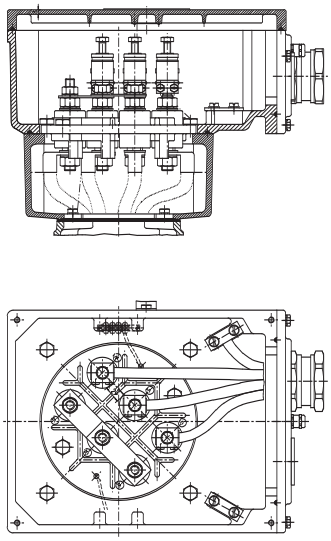


Figure 06G
Terminal box 630A Ex, straight intermediate flange

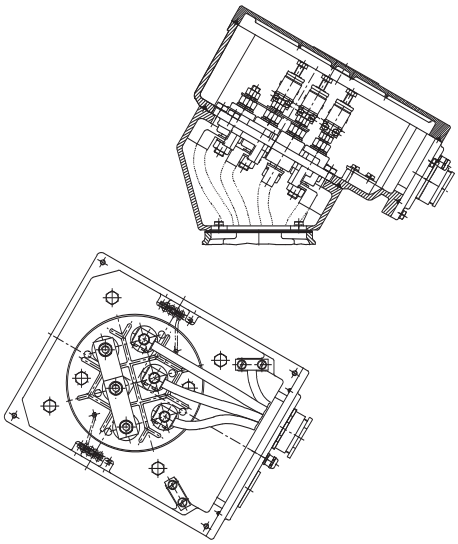


Figure 06S
Terminal box 630A Ex, inclined intermediate flange

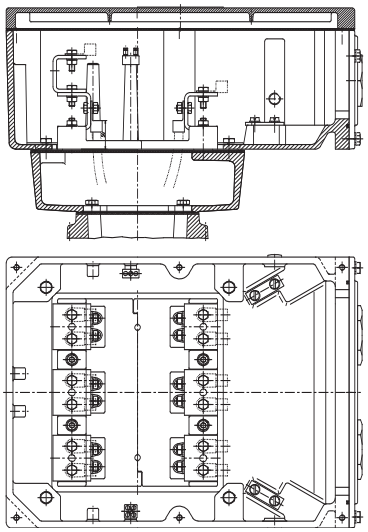


Figure 07G
Terminal box 1000A Ex, straight intermediate flange

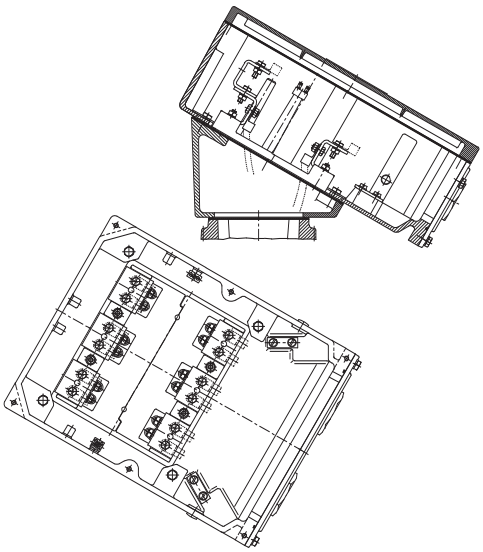
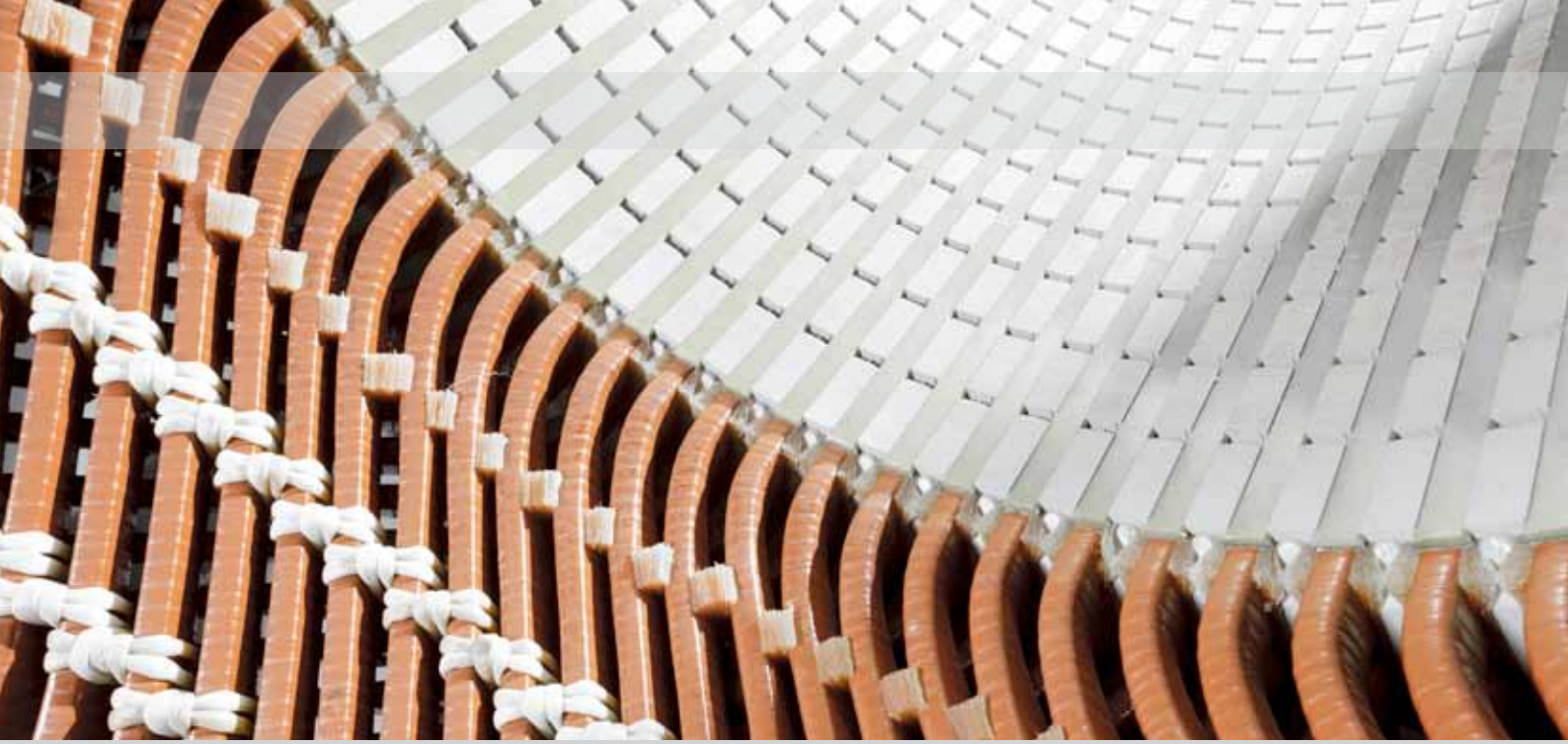


Figure 07S
Terminal box 1000A EX, inclined intermediate flange



High voltage motors

Motor selection data

Dimensions

Terminal boxes

General technical data

The most important technical data is summarized in the following table.
Detailed information can be found in the catalogue part “Technical explanations”.

Product line	motor with squirrel-cage rotor, IEC/DIN
Sizes	400 to 450
Rated output	400 – 1.080 kW 2-, 4-, and 6-poles
Material of housing	grey cast iron with cast-on feet
Rated torque	1300 Nm to 8700 Nm
Types of circuit	motors with one speed are designed with Y-circuit as standard.
Insulation of stator winding	thermal class 155, as option 155 [F(B)], 180 acc. to EN 60034-1 (IEC 60034-1)
Type of protection	IP 55, as option IP 56, IP 65 acc. to EN 60034-5 (IEC 60034-5)
Type of cooling	acc. to EN 60034-6 (IEC 60034-6) self-ventilation, IC 411(series W5.R) forced ventilation, IC 416 (series W5. F) non-ventilated, IC 410 (series W5. O) with water jacket cooling, IC 31W (series W5. B)
Coolant temperature/ altitude of site	as standard -20 °C to +40 °C, as option -40 °C to +60 °C altitude of site 1000 m above sea level
Rated voltage	2.2 …6.6 kV, 50 Hz or 60 Hz 9 …11 kV, 50 Hz or 60 Hz
Types of construction	IM B3, IM B35, IM V1 and derived types of construction acc. to EN 60034-7
Colour system	Standard colour system “moderate”, colour shade RAL 7031, blue-grey, Special colour system “world wide”, colour shade RAL 7031, blue-grey
Vibration grade	As standard grade “A” for motors without special vibration requirements
Shaft end	Acc. to DIN 748 (IEC 60072), balancing “with half key”
Transponder	RFID System iID®2000 (13.56 MHz based on ISO 15693), as standard
Limit speeds	Please refer to tables about limit speeds.
Bearing design	Please refer to tables about bearings
Motor weights	Please refer to the technical selection lists.
Terminal boxes	Grey cast iron, please refer to paragraph about terminal boxes
Documentation	An operation and maintenance manual, a connection diagram and a safety data sheet is attached to each motor.
Tolerances	Please refer to paragraph about tolerances in the technical explanations.
Options	Please refer to paragraph about modifications in the technical explanations.

High-voltage asynchronous motors with squirrel-cage rotor

Surface ventilation, type of cooling IC 411, duty type S1, continuous duty
thermal class 155, degree of protection IP 55

Motor selection and order data

Type	P_B	M_B	n_B	η_{95}	I_B 6 kV	cos φ_B	I_A/I_B	M_A/M_B	M_K/M_B	$J^{1)}$	m
	kW	Nm	rpm	%	A	-	-	-	-	kgm²	kg
2,0 … 6,6 kV, 50 Hz											
Synchronous speed 3000 rpm – 2-pole design											
W52R 400 M2	600	1920	2987	95.7	66	0.91	5.80	0.75	2.40	8.30	2700
W52R 400 MX2	670	2140	2987	95.9	74	0.91	5.80	0.75	2.40	9.00	2850
W52R 400 L2	750	2400	2987	96.1	82	0.91	6.00	0.80	2.45	9.70	3000
W52R 450 M2	830	2650	2988	96.1	91	0.91	5.30	0.65	2.15	13.50	3600
W52R 450 MX2	960	3070	2988	96.4	105	0.91	5.40	0.65	2.15	15.10	3850
W52R 450 L2	1080	3450	2989	96.5	117	0.92	5.75	0.70	2.30	16.90	4100
Synchronous speed 1500 rpm – 4-pole design											
W52R 400 M4	600	3940	1493	96.3	69	0.87	5.30	0.75	2.20	11.80	2900
W52R 400 MX4	670	4290	1493	96.4	76	0.88	5.30	0.75	2.20	13.10	3100
W52R 400 L4	750	4800	1493	96.5	85	0.88	5.50	0.80	2.25	14.60	3300
W52R 450 M4	900	5760	1493	96.6	101	0.89	5.50	0.75	2.20	22.50	4100
W52R 450 MX4	970	6200	1493	96.7	108	0.89	5.60	0.80	2.25	24.10	4200
W52R 450 L4	1060	6780	1493	96.8	117	0.90	5.50	0.75	2.20	26.50	4500
Synchronous speed 1000 rpm – 6-pole design											
W52R 400 M6	500	4800	995	95.9	63	0.80	5.50	0.75	2.40	19.50	3000
W52R 400 MX6	570	5470	994	96.0	71	0.80	5.35	0.70	2.30	21.80	3200
W52R 400 L6	630	6050	995	96.1	79	0.80	5.50	0.75	2.40	24.40	3400
W52R 450 M6	720	6910	996	96.4	84	0.86	6.00	0.90	2.40	36.80	4100
W52R 450 MX6	780	7480	996	96.5	89	0.87	5.90	0.85	2.35	40.60	4300
W52R 450 L6	860	8250	996	96.6	98	0.87	5.90	0.85	2.35	44.50	4500

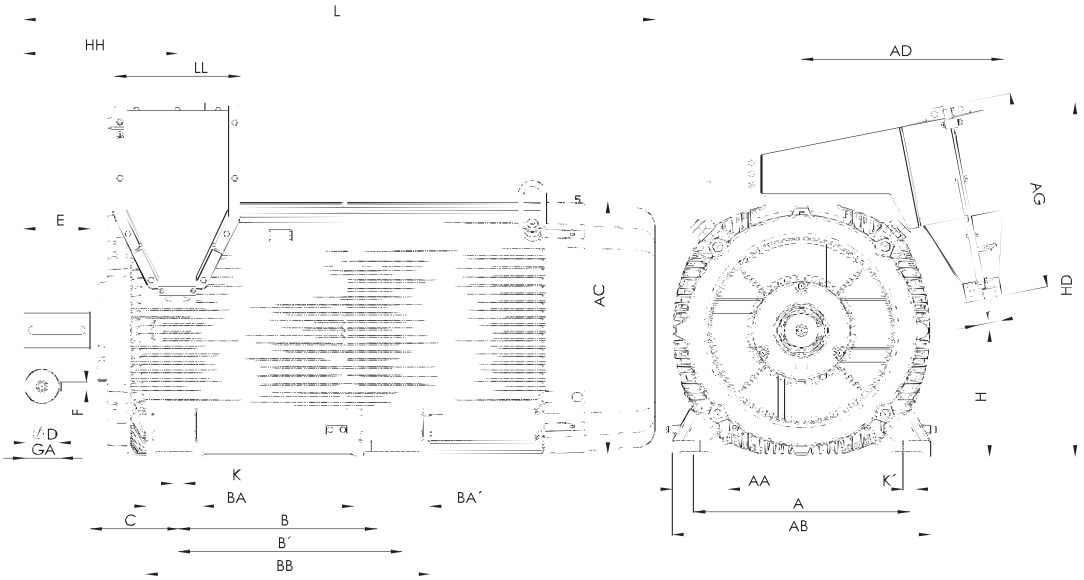
Type	P_B	M_B	n_B	η_{95}	I_B 10 kV	cos φ_B	I_A/I_B	M_A/M_B	M_K/M_B	$J^{1)}$	m
	kW	Nm	rpm	%	A	-	-	-	-	kgm²	kg
9 … 11 kV, 50 Hz											
Synchronous speed 3000 rpm – 2-pole design											
W52R 450 M2	750	2400	2989	95.7	50	0.91	5.70	0.70	2.30	13.50	3500
W52R 450 MX2	820	2620	2989	95.9	54	0.91	5.55	0.70	2.20	15.10	3800
W52R 450 L2	900	2880	2989	96.1	59	0.92	5.70	0.70	2.30	15.70	3850
Synchronous speed 1500 rpm – 4-pole design											
W52R 450 M4	720	4600	1494	96.2	49	0.89	5.70	0.75	2.30	21.00	3900
W52R 450 MX4	800	5120	1494	96.4	54	0.89	5.70	0.75	2.30	22.50	4000
W52R 450 L4	880	5630	1494	96.5	59	0.89	5.85	0.85	2.35	24.10	4200
Synchronous speed 1000 rpm – 6-pole design											
W52R 450 M6	530	5080	996	95.8	37	0.87	5.70	0.80	2.25	34.40	3900
W52R 450 MX6	570	5470	996	95.9	39	0.87	5.90	0.80	2.30	36.80	4000
W52R 450 L6	630	6040	996	96.1	44	0.87	5.75	0.80	2.25	40.60	4200

[1)] Changes reserved due to future developments.

Transnorm three-phase motors with squirrel-cage rotor for 2.2 … 6 kV

Sizes 400 to 450
Surface ventilation, type of cooling IC 411, degree of protection IP 55

Type of construction IM B3 [IM 1001]



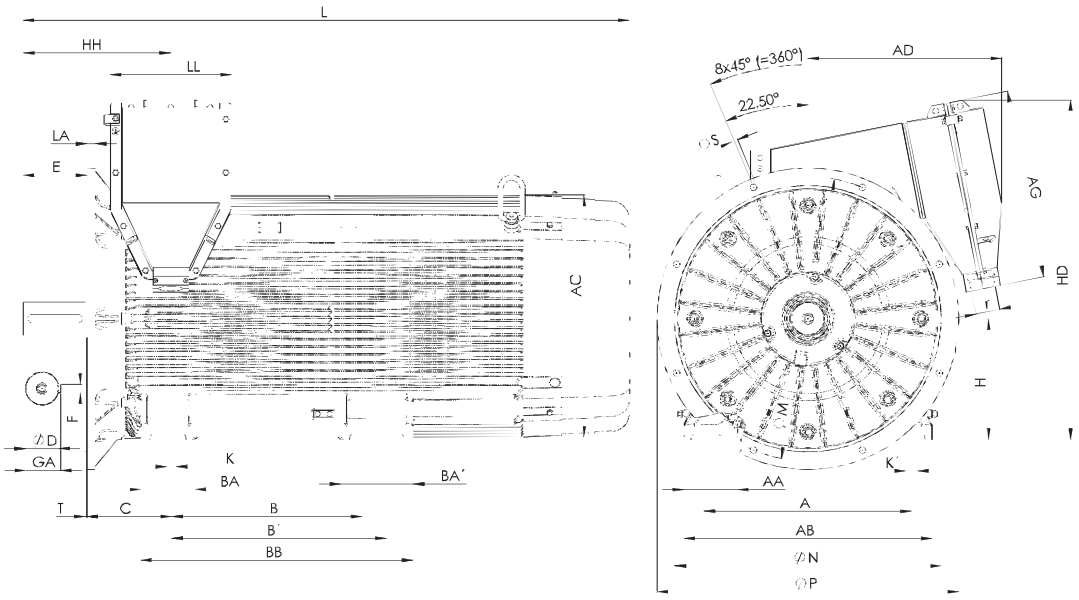
Type designation	Flange size	A b	AA n	AB f	AC g	AD -	B a	BA m	BA' m1	BB e	D d	DB*)	E l	F u
W52R 400 M, MX2	FF 940	686	178	820	800	796	630	180	240	800	80	M20	170	22
W52R 400 L2	FF 940	686	178	820	800	796	710	180	240	800	80	M20	170	22
W52R 400 M, MX4, 6, 8	FF 940	686	178	820	800	796	630	180	240	800	110	M24	210	28
W52R 400 L4, 6, 8	FF 940	686	178	820	800	796	710	180	240	800	110	M24	210	28
W52R 450 M, MX2	FF 1080	800	180	940	910	850	1000	160	260	1270	90	M24	170	25
W52R 450 L2	FF 1080	800	180	940	910	850	1120	160	260	1270	90	M24	170	25
W52R 450 M, MX4, 6, 8	FF 1080	800	180	940	910	850	1000	160	260	1270	120	M24	210	32
W52R 450 L4, 6, 8	FF 1080	800	180	940	910	850	1120	160	260	1270	120	M24	210	32

*) Centre holes acc. to DIN 332-DS

Transnorm three-phase motors with squirrel-cage rotor for 2.2 … 6 kV

Sizes 400 to 450
Surface ventilation, type of cooling IC 411, degree of protection IP 55

Type of construction IM B35 [IM 2001]
Flange dimensions see page 15

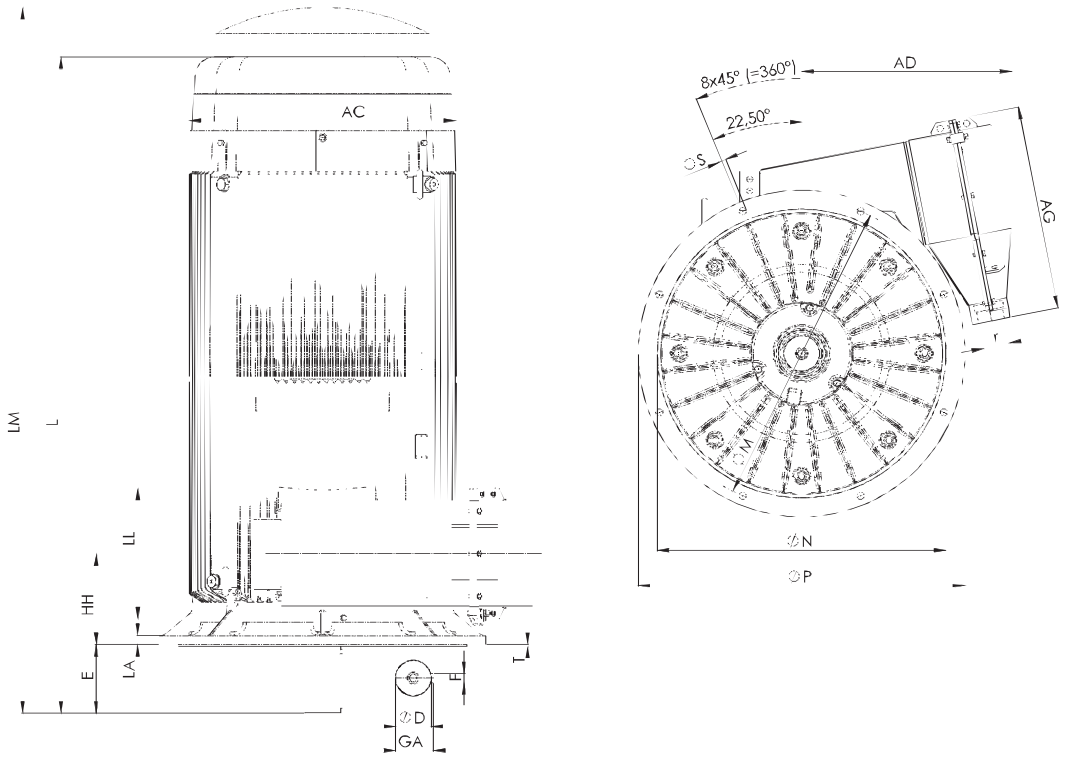


Type designation	GA t	H h	HA c	HD p	HH A	K s	K' s'	L k	KK Type	AG x	LL z	O r	Bl Bl
W52R 400 M, MX2	85	400	50	1153	339	35	42	1963	6 kV	624	398	40	100
W52R 400 L2	85	400	50	1153	339	35	42	1990	6 kV	624	398	40	100
W52R 400 M, MX4, 6, 8	116	400	50	1153	339	35	42	2003	6 kV	624	398	40	100
W52R 400 L4, 6, 8	116	400	50	1153	339	35	42	2280	6 kV	624	398	40	100
W52R 450 M, MX2	95	450	55	1370	337	42	48	2060	6 kV	624	398	40	100
W52R 450 L2	95	450	55	1370	337	42	48	2340	6 kV	624	398	40	100
W52R 450 M, MX4, 6, 8	127	450	55	1370	337	42	48	2100	6 kV	624	398	40	100
W52R 450 L4, 6, 8	127	450	55	1370	337	42	48	2480	6 kV	624	398	40	100

Transnorm three-phase motors with squirrel-cage rotor for 2.2 … 6 kV

Sizes 400 to 450
Surface ventilation, type of cooling IC 411, degree of protection IP 55

Type of construction IM V1 [IM 3011]
Flange dimensions see page15



Type designation	Flange size	AC g	AD g1	AD**) g1	D d	DB*)	E l	F u	GA t	H h	HA c	L k	LM k1	KK Type	AG x	LL z	O r	BI BI
W52R 400 M, MX2	FF940	800	-	865	80	M20	170	22	85	400	50	1963	2113	6 kV	624	398	40	100
W52R 400 L2	FF940	800	-	865	80	M20	170	22	85	400	50	1990	2113	6 kV	624	398	40	100
W52R 400 M, MX4, 6, 8	FF940	800	-	865	110	M24	210	28	116	400	50	2003	2153	6 kV	624	398	40	100
W52R 400 L4, 6, 8	FF940	800	-	865	110	M24	210	28	116	400	50	2280	2380	6 kV	624	398	40	100
W52R 450 M, MX2	FF1080	910	-	920	90	M24	170	25	95	450	55	2060	2210	6 kV	624	398	40	100
W52R 450 L2	FF1080	910	-	920	90	M24	170	25	95	450	55	2340	2490	6 kV	624	398	40	100
W52R 450 M, MX4, 6, 8	FF1080	910	-	920	120	M24	210	32	127	450	55	2100	2250	6 kV	624	398	40	100
W52R 450 L4, 6, 8	FF1080	910	-	920	120	M24	210	32	127	450	55	2480	2630	6 kV	624	398	40	100

*) Centre holes acc. to DIN 332-DS
**) Terminal box left/right

Terminal boxes

The terminal box is a welded construction and because of its vertical spacing allows an easy and fast connection of all commercially available connecting cables including the fitting of all common cable end plugs (connecting cable and cable end plug are not included in the scope of delivery of the motor). The terminal box is design for type of protection IP 55. Other types of protection on request. The arrangement of terminals is done according to DIN 42962.

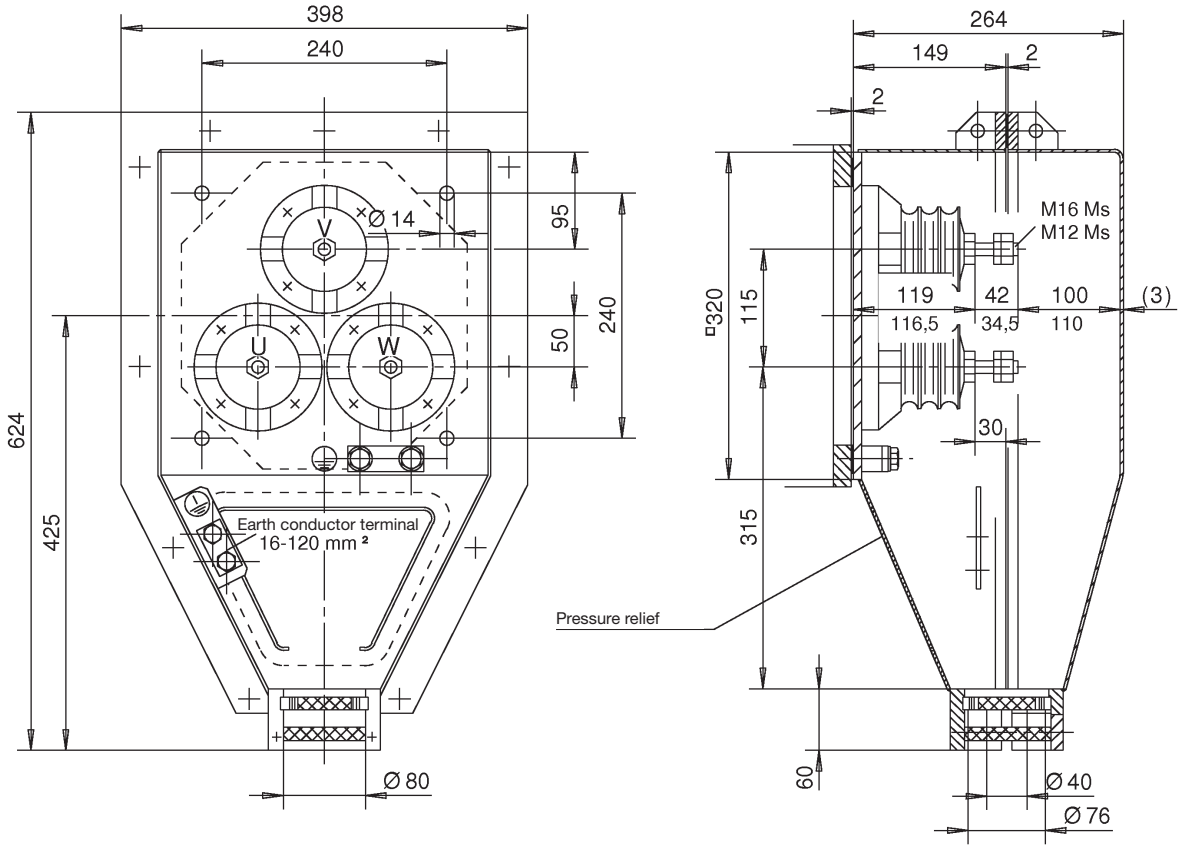
Seen from the drive end of the motor the terminal box is mounted on the stator housing with the cable entry from below and on the right side. On request the terminal box can also be mounted with cable entry from below on the left side. In addition the terminal box can be rotated for 90° or 180° if the space available is sufficient. Mounting and rotation of the terminal box must be stated in the order.

The terminal box consists of a lower part which is screwed to the motor housing and a cover which can be removed by loosening the screws. The lower part is used for attaching the cast resin lead-through terminals and the earth terminal. In the lead-through terminals the current stems are installed secure against twisting. The connecting cables are clamped on the current stems by using cable lugs (not included in the scope of delivery of the motor). The terminal box is designed for resistance against short circuits. When a short circuit happens on the motor side or from the mains, the forces resulting from the short circuit current are securely covered by the mounted parts (cast resin lead-through terminals).

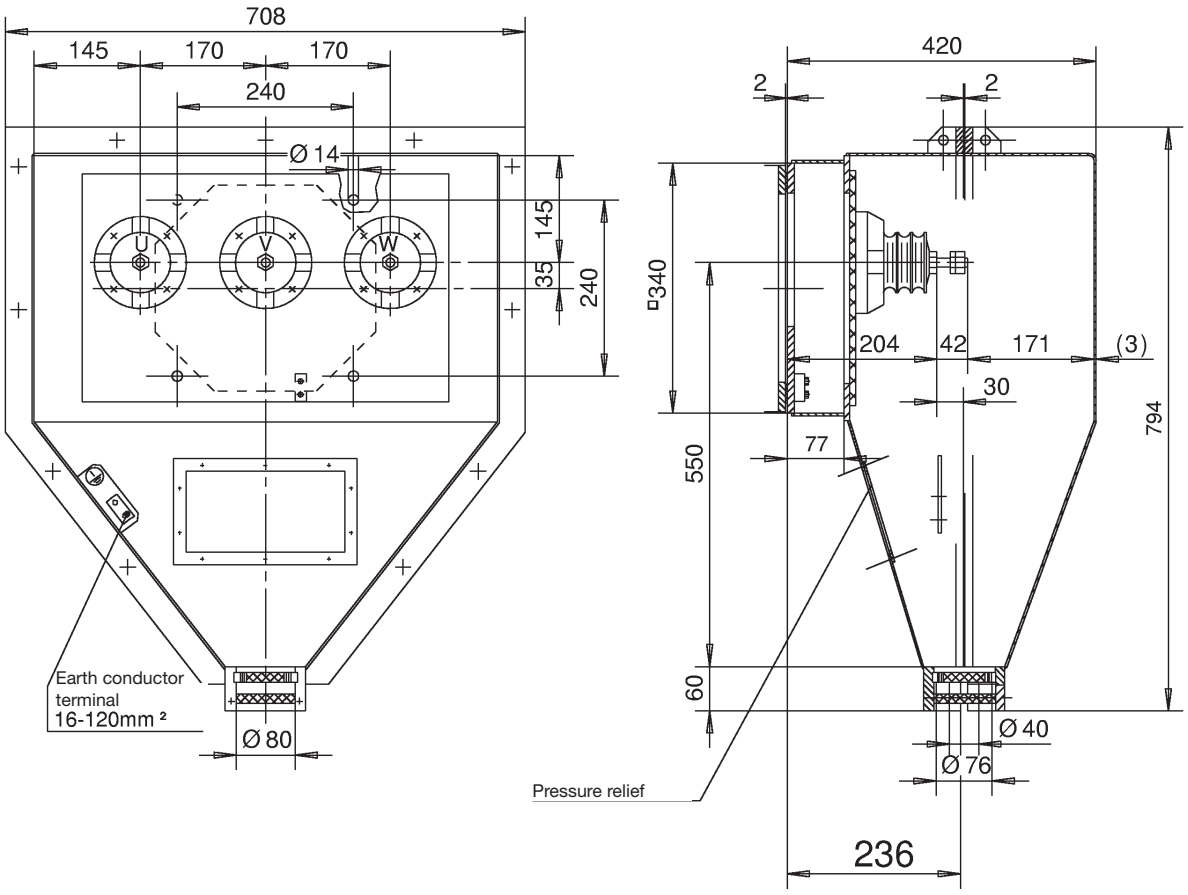
In addition the terminal box is short-circuit-proof. The pressure overload resulting from a possible electric arc is immediately dissipated by a pressure release in the lower part of the terminal box.

Short circuit power
200 MVA at 6 kV 0.2 s current stem M12
400 MVA at 6 kV 0.2 s current stem M16
400 MVA at 10 kV 0.2 s current stem M16

Terminal box rated output 6 kV / rated current max. 250 A



Terminal box rated output 10 kV ±10 %/rated current 315 A (400 A)



Notes

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EXPERIENCE VISION

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