L-force catalogue

# Automation systems
# Drive solutions

# Controls
# Inverters
# Motors
# Gearboxes
# Engineering Tools

**Motors:** MD three-phase AC motors

Lenze
As easy as that.

# Contents of the L-force catalogue


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| | | A matter of principle: the right products for every application. | |
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**Selected portfolio**

**Additional portfolio**

# Lenze makes many things easy for you.

With our motivated and committed approach, we work together with you to create the best possible solution and set your ideas in motion - whether you are looking to optimise an existing machine or develop a new one. We always strive to make things easy and seek perfection therein. This is anchored in our thinking, in our services and in every detail of our products. It's as easy as that!

## 1

### Developing ideas

Are you looking to build the best machine possible and already have some initial ideas? Then get these down on paper together with us, starting with small innovative details and stretching all the way to completely new machines. Working together, we will develop an intelligent and sustainable concept that is perfectly aligned with your specific requirements.

## 2

### Drafting concepts

We see welcome challenges in your machine tasks, supporting you with our comprehensive expertise and providing valuable impetus for your innovations. We take a holistic view of the individual motion and control functions here and draw up consistent, end-to-end drive and automation solutions for you - keeping everything as easy as possible and as extensive as necessary.

## 3

### Implementing solutions

Our easy formula for satisfied customers is to establish an active partnership with fast decision-making processes and an individually tailored offer. We have been using this simple principle to meet the ever more specialised customer requirements in the field of mechanical engineering for many years.

## 4

### Manufacturing machines

Functional diversity in perfect harmony: as one of the few full-range providers in the market, we can provide you with precisely those products that you actually need for any machine task – no more and no less. Our L-force product portfolio, a consistent platform for implementing drive and automation tasks, is invaluable in this regard.

## 5

### Ensuring productivity

Productivity, reliability and new performance peaks on a daily basis – these are our key success factors for your machine. After delivery, we offer you cleverly devised service concepts to ensure continued safe operation. The primary focus here is on technical support, based on the excellent application expertise of our highly-skilled and knowledgeable after-sales team.

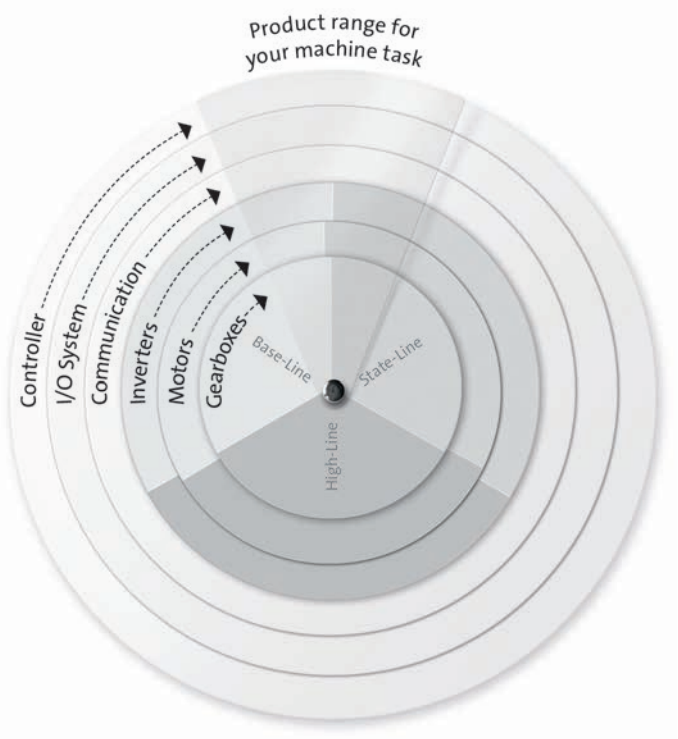
# A matter of principle: the right products for every application.

Lenze's extensive L-force product portfolio follows a very simple principle. The functions of our finely scaled products are assigned to the three lines Base-Line, State-Line or High-Line.

But what does this mean for you? It allows you to quickly recognise which products represent the best solution for your own specific requirements.

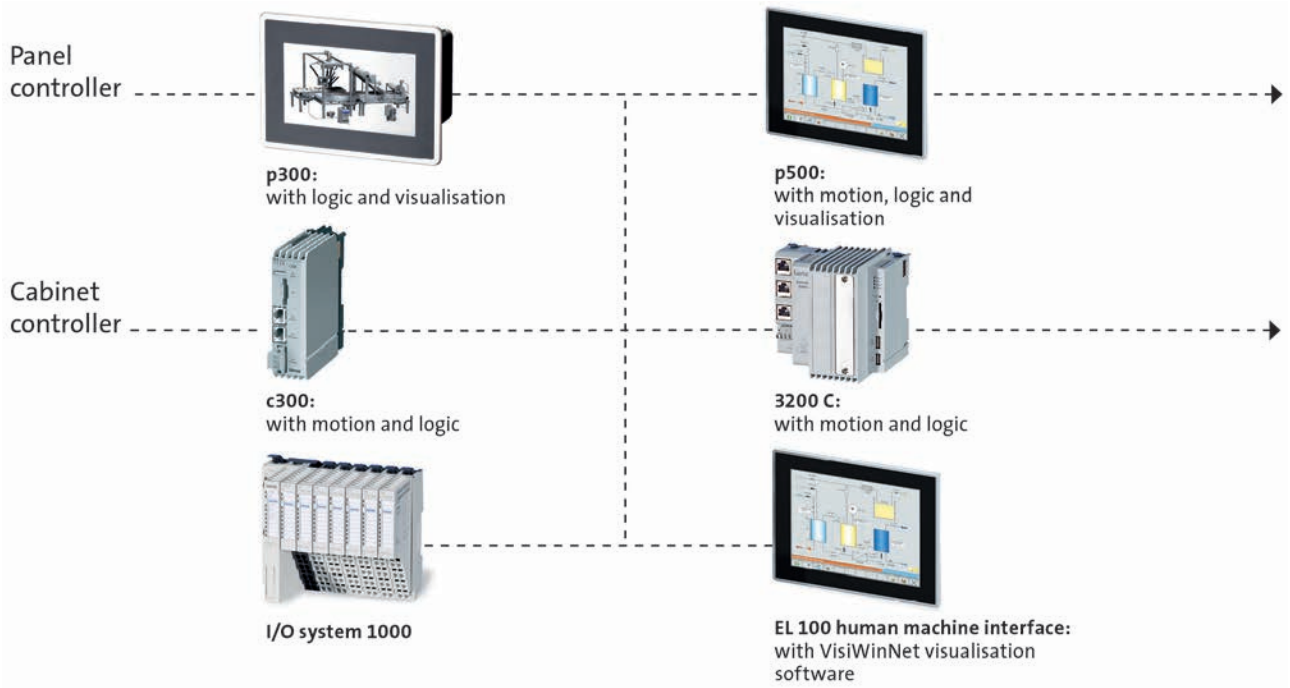
**Powerful products with a major impact:**
- Easy handling
- High quality and durability
- Reliable technologies in tune with the latest developments

Lenze products undergo the most stringent testing in our own laboratory. This allows us to ensure that you will receive consistently high quality and a long service life. In addition to this, five logistics centres ensure that the Lenze products you select are available for quick delivery anywhere across the globe. It's as easy as that!

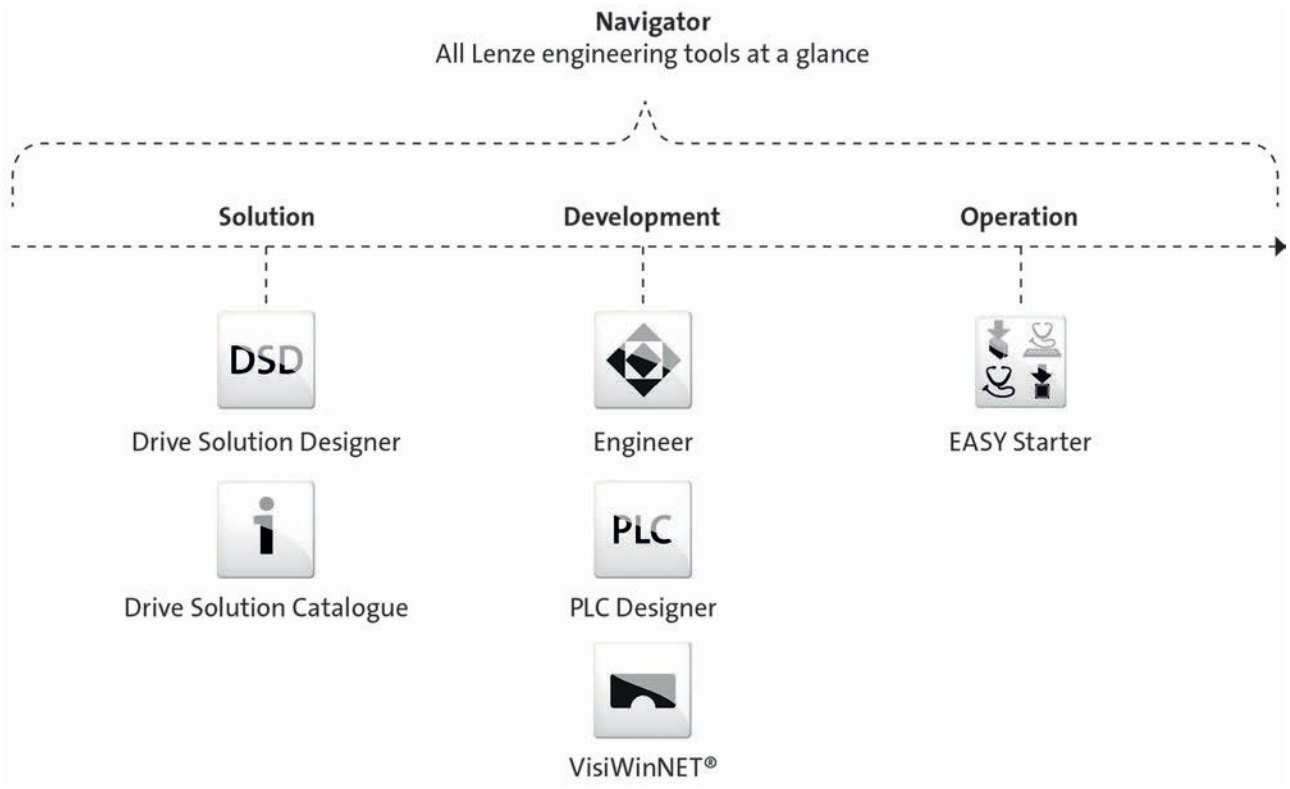


# L-force product portfolio

## Controls

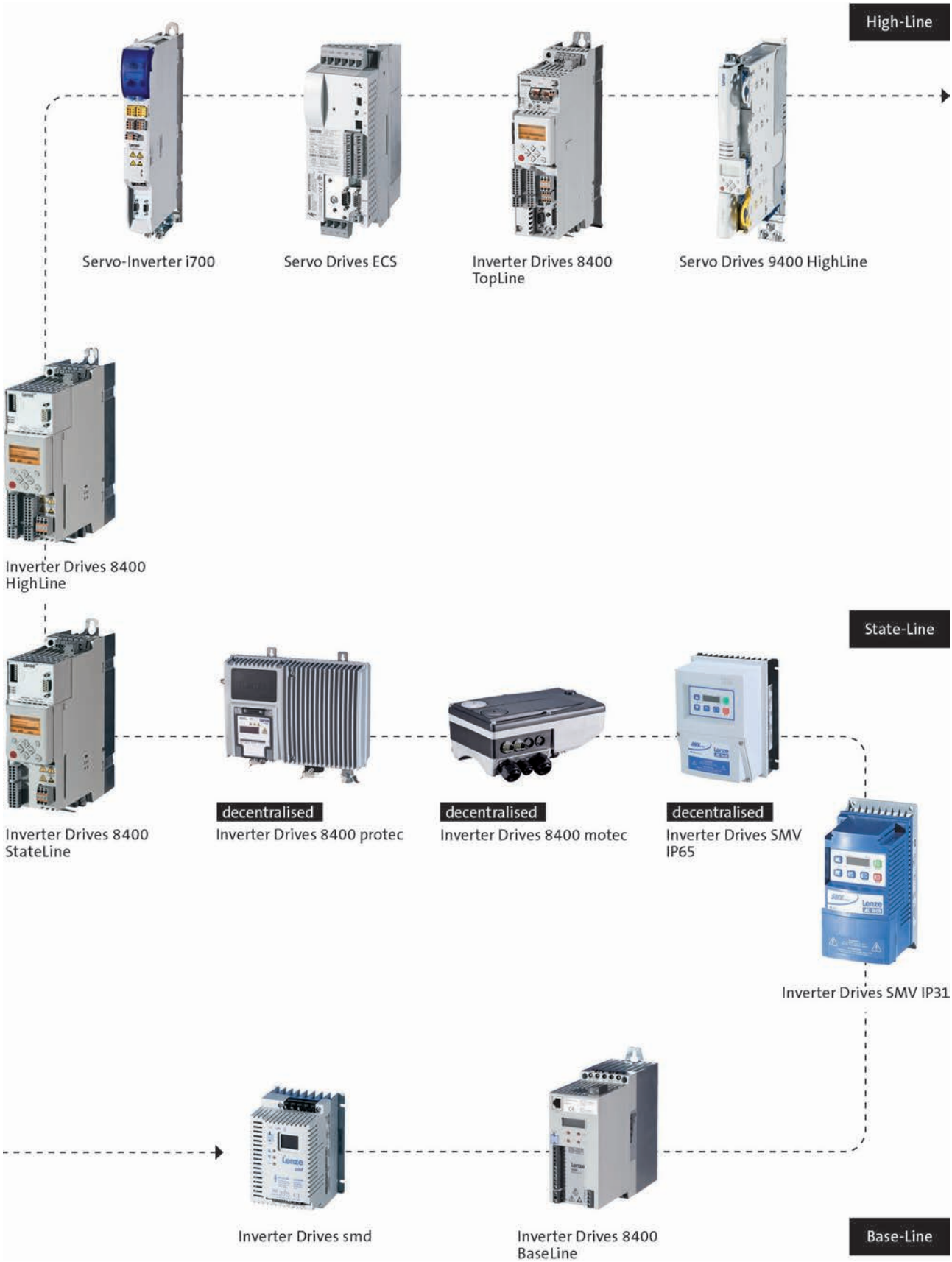



## Engineering Tools



# L-force product portfolio

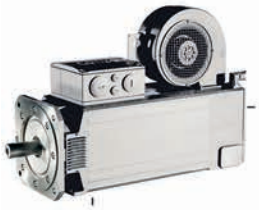
## Inverters



# L-force product portfolio

**Motors**

High-Line



MQA asynchronous servo motors

SDSGS synchronous servo motors

MDXKS synchronous servo motors

Synchronous servo motors MCS

Asynchronous servo motors MCA

Asynchronous servo motors SDSGA

State-Line

MF three-phase AC motors

MH three-phase AC motors

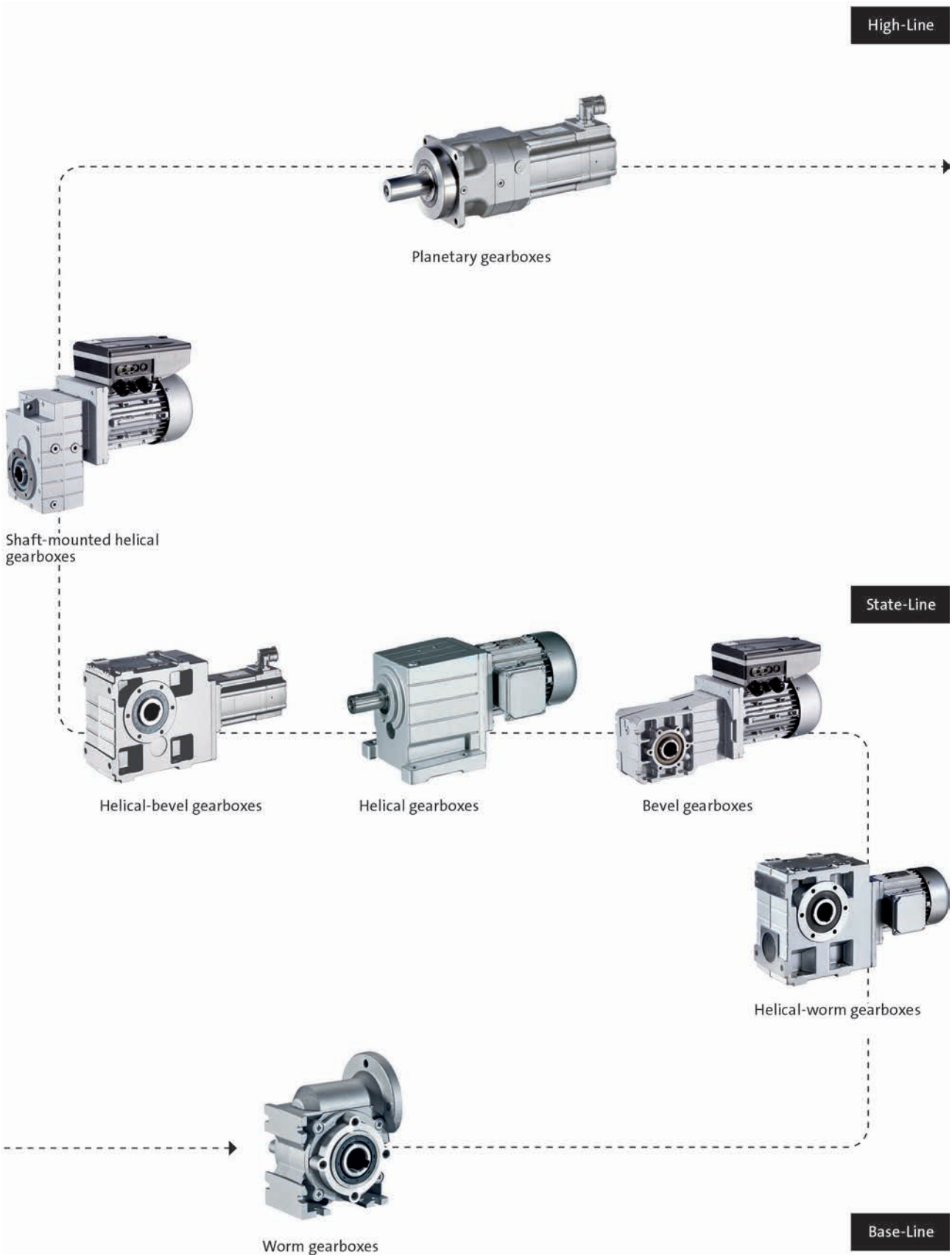
MD three-phase AC motors

Basic MD/MH three-phase AC motors

Base-Line

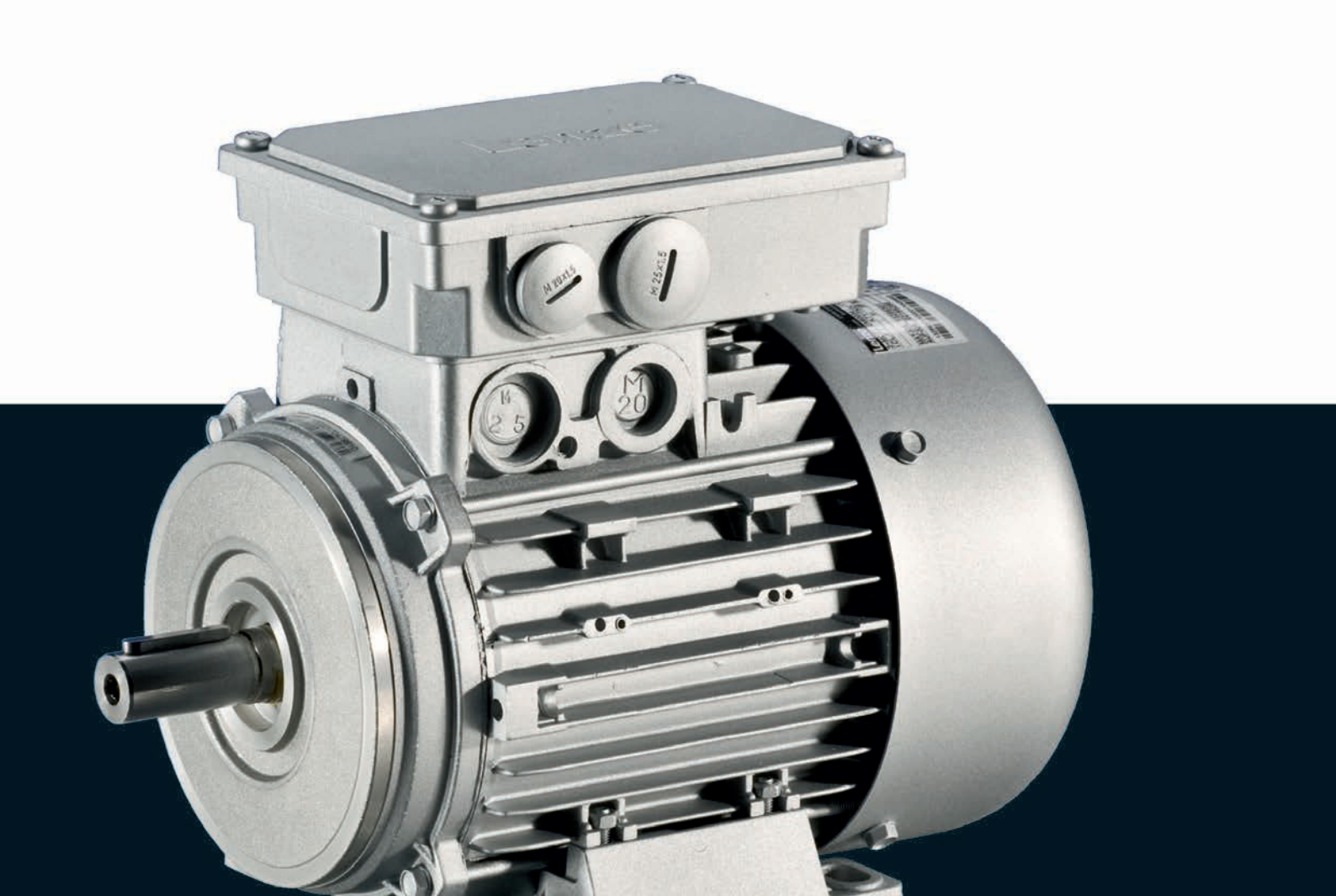
# L-force product portfolio

## Gearboxes



# MD three-phase AC motors

**0.12 to 22 kW**



# MD three-phase AC motors

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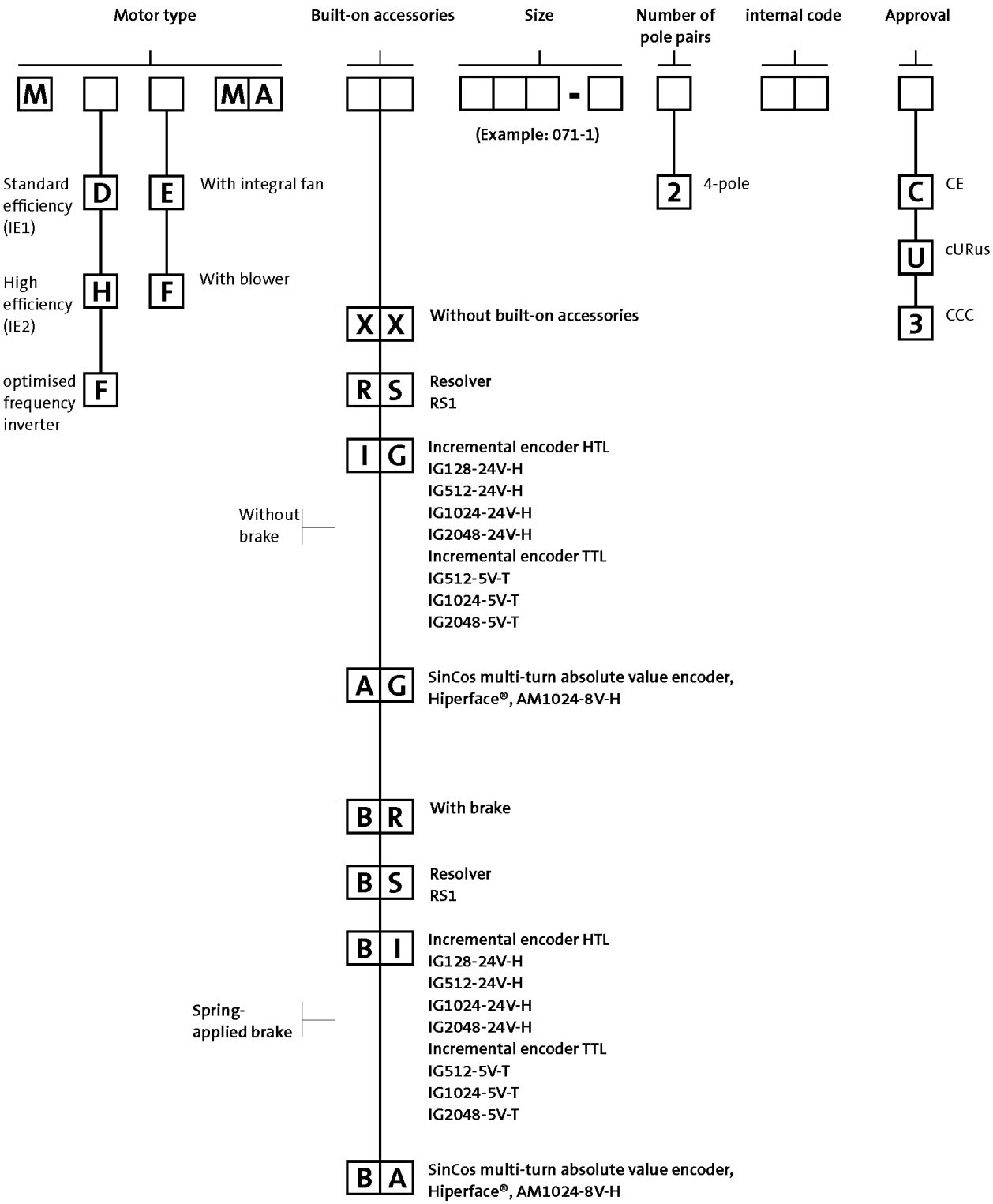
## List of abbreviations

| | | |
|---|---|---|
| $\eta_{100\,\%}$ | [%] | Efficiency |
| $\eta_{75\,\%}$ | [%] | Efficiency |
| $\eta_{50\,\%}$ | [%] | Efficiency |
| cos ϕ | | Power factor |
| $I_N$ | [A] | Rated current |
| $I_{max}$ | [A] | Max. current consumption |
| J | [kgcm²] | Moment of inertia |
| m | [kg] | Mass |
| $M_a$ | [Nm] | Starting torque |
| $M_b$ | [Nm] | Stalling torque |
| $M_{max}$ | [Nm] | Max. torque |
| $M_N$ | [Nm] | Rated torque |
| $n_N$ | [r/min] | Rated speed |
| $P_N$ | [kW] | Rated power |
| $P_{max}$ | [kW] | Max. power input |

| | | |
|---|---|---|
| $U_{max}$ | [V] | Max. mains voltage |
| $U_{min}$ | [V] | Min. mains voltage |
| $U_{N,\Delta}$ | [V] | Rated voltage |
| $U_{N,Y}$ | [V] | Rated voltage |

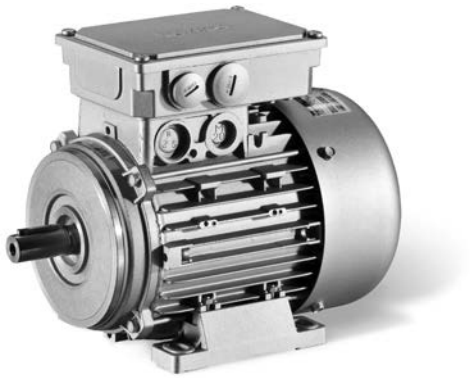
| | |
|---|---|
| CE | Communauté Européenne |
| CSA | Canadian Standards Association |
| DIN | Deutsches Institut für Normung e.V. |
| EMC | Electromagnetic compatibility |
| EN | European standard |
| IEC | International Electrotechnical Commission |
| IM | International Mounting Code |
| IP | International Protection Code |
| NEMA | National Electrical Manufacturers Association |
| UL | Underwriters Laboratory Listed Product |
| UR | Underwriters Laboratory Recognized Product |
| VDE | Verband deutscher Elektrotechniker (Association of German Electrical Engineers) |
| CCC | China Compulsory Certificate |
| GOST | Certificate for Russian Federation |
| cURus | Combined certification marks of UL for the USA and Canada |
| UkrSEPRO | Certificate for Ukraine |

## Product key


Motor type
Built-on accessories
Size
Number of pole pairs
internal code
Approval
M
MA
(Example: 071-1)
Standard efficiency (IE1)
D
E
With integral fan
High efficiency (IE2)
H
F
With blower
optimised frequency inverter
F
2
4-pole
C
CE
U
cURus
3
CCC
X X
Without built-on accessories
R S
Resolver
RS1
I G
Incremental encoder HTL
IG128-24V-H
IG512-24V-H
IG1024-24V-H
IG2048-24V-H
Incremental encoder TTL
IG512-5V-T
IG1024-5V-T
IG2048-5V-T
Without brake
A G
SinCos multi-turn absolute value encoder, Hiperface®, AM1024-8V-H
B R
With brake
B S
Resolver
RS1
B I
Incremental encoder HTL
IG128-24V-H
IG512-24V-H
IG1024-24V-H
IG2048-24V-H
Incremental encoder TTL
IG512-5V-T
IG1024-5V-T
IG2048-5V-T
Spring-applied brake
B A
SinCos multi-turn absolute value encoder, Hiperface®, AM1024-8V-H

## Product information

For a long time now, three-phase AC motors from Lenze have been established in virtually all industrial sectors. Based on our many years of experience in the field of drive and automation technology, we have developed motors, which will ensure that your demands in terms of productivity, quality and availability are perfectly met.
Three-phase AC motors from the L-force series are primarily characterised by their comprehensive modularity. The wide variety of options allows you to precisely adjust the drive characteristics in line with your application. We call this Rightsizing.



L-force MD three-phase AC motors are available in a power range from 0.12 to 22 kW and comply with efficiency class IE1 (standard efficiency) as per IEC 60034-30.

**Basic versions**
- The motors feature B3, B5 and B14 designs and dimensions standardised in line with IEC 60072-1 and/or DIN EN 50347 which makes then suitable for universal use.
- The thermal sensors integrated as standard allow for permanent temperature monitoring and are coordinated to the motor winding's temperature class F (155 °C).
- The motors of the basic version are adapted to ambient conditions by enclosure IP55.
- In tough operating conditions, the surface and corrosion protection system is provided to reliably protect the motor from aggresive media.

**Options**
- Various brake sizes – each available with several braking torques – can be combined with the three-phase AC motors.
- The LongLife version of the brake can easily reach 10 x $10^6$ switching cycles.
- A resolver and various incremental and absolute value encoders can be fitted for speed and position detection.
- For fast commissioning, the motors are also available with connectors for the power connection, brake, blower and feedback.
- Instead of an integral fan, the motor can optionally be equipped with a blower. No torque reduction is then necessary, even at speeds below 20 Hz.
- For drive tasks in decentralised applications, the motor can be ordered with the motec inverter connected to the terminal box.
- The motors are available with cURus, GOST-R, CCC and UkrSepro approval.

## Functions and features

| Size | | | | | |
|---|---|---|---|---|---|
| Motor | | 063 | 071 | 080 | 090 |
| **Design** | | B3<br>B5<br>B14 | | | |
| **Shaft journal** | | | | | |
| d x l | [mm] | 11 x 23 | 14 x 30 | 19 x 40 | 24 x 50 |
| **Spring-applied brake** | | | | | |
| Design | | Standard or LongLife design<br>Reduced or standard braking torque<br>With rectifier<br>With manual release lever<br>Low noise | | Standard or LongLife design<br>Reduced, standard or increased braking torque<br>With rectifier<br>With manual release lever<br>Low noise | |
| **Feedback** | | | | | |
| Design | | Resolver<br>Incremental encoder<br>Absolute value encoder (multi-turn) | | | |
| **Thermal sensor** | | | | | |
| Thermal contact | | TKO | | | |
| Thermal detector | | KTY83-110<br>KTY84-130 | | | |
| PTC thermistor | | PTC | | | |
| **Motor connection** | | | | | |
| Power connection | | Terminal box<br>ICN connector<br>HAN10E connector<br>HAN modular connector | | | |
| Brake connection | | Terminal box<br>ICN connector<br>HAN modular connector<br>HAN10E connector | | | |
| Blower connection | | Terminal box<br>ICN connector | | | |
| Feedback connection | | Terminal box<br>ICN connector | | | |
| Temperature sensor connection | | Terminal box<br>TKO or PTC at connector in the power connection<br>KTY at connector in the feedback connection | | | |
| **Shaft bearings** | | | | | |
| Position of the locating bearing | | Standard motors (B3, B5, B14): side B<br>Motors for gearbox direct mounting: side A | | | |
| Bearing type | | Deep-groove ball bearing with high-temperature resistant grease, 2 sealing discs or cover plates | | | |
| **Colour** | | | | | |
| | | Not coated<br>Primed<br>Paint in various corrosion-protection designs in accordance with RAL colours | | | |

## Functions and features

| | | | |
|---|---|---|---|
| **Size** | | | |
| Motor | | 100 | 112 |
| **Design** | | | |
| | | B3<br>B5<br>B14 | |
| **Shaft journal** | | | |
| d x l | [mm] | 28 x 60 | |
| **Spring-applied brake** | | | |
| Design | | Standard or LongLife design<br>Reduced, standard or increased braking torque<br>With rectifier<br>With manual release lever<br>Low noise | Standard design<br>Reduced, standard or increased braking torque<br>With rectifier<br>With manual release lever<br>Low noise |
| **Feedback** | | | |
| Design | | Resolver<br>Incremental encoder<br>Absolute value encoder (multi-turn) | |
| **Thermal sensor** | | | |
| Thermal contact | | TKO | |
| Thermal detector | | KTY83-110<br>KTY84-130 | |
| PTC thermistor | | PTC | |
| **Motor connection** | | | |
| Power connection | | Terminal box<br>ICN connector<br>HAN10E connector<br>HAN modular connector | |
| Brake connection | | Terminal box<br>ICN connector<br>HAN modular connector<br>HAN10E connector | |
| Blower connection | | Terminal box<br>ICN connector | |
| Feedback connection | | Terminal box<br>ICN connector | |
| Temperature sensor connection | | Terminal box<br>TKO or PTC at connector in the power connection<br>KTY at connector in the feedback connection | |
| **Shaft bearings** | | | |
| Position of the locating bearing | | Standard motors (B3, B5, B14): side B<br>Motors for gearbox direct mounting: side A | |
| Bearing type | | Deep-groove ball bearing with high-temperature resistant grease, 2 sealing discs or cover plates | |
| **Colour** | | | |
| | | Not coated<br>Primed<br>Paint in various corrosion-protection designs in accordance with RAL colours | |

## Functions and features

| | | | | |
|---|---|---|---|---|
| **Size** | | | | |
| Motor | | 132 | 160 | 180 |
| **Design** | | | | |
| | | B3<br>B5 | | |
| **Shaft journal** | | | | |
| d x l | [mm] | 38 x 80 | 42 x 110 | 48 x 110 |
| **Spring-applied brake** | | | | |
| Design | | Standard design<br>Reduced, standard or increased braking torque<br>With rectifier<br>With manual release lever<br>Low noise | | |
| **Feedback** | | | | |
| Design | | Resolver<br>Incremental encoder<br>Absolute value encoder (multi-turn) | | |
| **Thermal sensor** | | | | |
| Thermal contact | | TKO | | |
| Thermal detector | | KTY83-110<br>KTY84-130 | | |
| PTC thermistor | | PTC | | |
| **Motor connection** | | | | |
| Power connection | | Terminal box<br>ICN connector<br>HAN modular connector | Terminal box<br>HAN modular connector | Terminal box |
| Brake connection | | Terminal box<br>ICN connector<br>HAN modular connector | Terminal box<br>HAN modular connector | Terminal box |
| Blower connection | | Terminal box<br>ICN connector | | |
| Feedback connection | | Terminal box<br>ICN connector | | |
| Temperature sensor connection | | Terminal box<br>TKO or PTC at connector in the power connection<br>KTY at connector in the feedback connection | | Terminal box |
| **Shaft bearings** | | | | |
| Position of the locating bearing | | Standard motors (B3, B5, B14): side B<br>Motors for gearbox direct mounting: side A | | |
| Bearing type | | Deep-groove ball bearing with high-temperature resistant grease, 2 sealing discs or cover plates | | |
| **Colour** | | | | |
| | | Not coated<br>Primed<br>Paint in various corrosion-protection designs in accordance with RAL colours | | |

## Functions and features

### Surface and corrosion protection

For optimum protection of three-phase AC motors against ambient conditions, the surface and corrosion protection system (OKS) offers tailor-made solutions.

Various surface coatings ensure that the motors operate reliably even at high air humidity, in outdoor installation or in the presence of atmospheric impurities. Any colour from the RAL Classic collection can be chosen for the top coat. The three-phase AC motors are also available unpainted (no surface and corrosion protection).

| Surface and corrosion protection system | Applications | Measures |
|---|---|---|
| OKS-G<br>(primed) | • Dependent on subsequent top coat applied | • 2K PUR priming coat (grey) |
| OKS-S<br>(small) | • Standard applications<br>• Internal installation in heated buildings<br>• Air humidity up to 90% | • Surface coating as per corrosivity category C1 (in line with EN 12944-2) |
| OKS-M<br>(medium) | • Internal installation in non-heated buildings<br>• Covered, protected external installation<br>• Air humidity up to 95% | • Surface coating as per corrosivity category C2 (in line with EN 12944-2) |
| OKS-L<br>(high) | • External installation<br>• Air humidity above 95%<br>• Chemical industry plants<br>• Food industry | • Surface coating as per corrosivity category C3 (in line with EN 12944-2)<br>-<br>Optional measures:<br>• Motor recesses sealed off (on request) |

### Structure of surface coating

| Surface and corrosion protection system | Corrosivity category | Surface coating | Colour |
|---|---|---|---|
| | DIN EN ISO 12944-2 | Structure | |
| Without OKS<br>(uncoated) | | | |
| OKS-G<br>(primed) | | 2K PUR priming coat | |
| OKS-S<br>(small) | C1 | 2K-PUR top coat | Standard: RAL 7012<br>Optional: RAL Classic |
| OKS-M<br>(medium) | C2 | 2K PUR priming coat<br>2K-PUR top coat | |
| OKS-L<br>(high) | C3 | | |

5.7

## Motor – inverter assignment

**Rated frequency 50/60 Hz**

- Decentralised inverter 8400 motec (E84DVB)
- Inverter Drives 8400 (E84AV)

| Rated power | Product key | | |
|---|---|---|---|
| | Motor | Inverter | |
| $P_N$ | | | |
| [kW] | | | |
| 0.12 | MD□□□□□□063-12 | | E84AV□□□2512□□0 |
| 0.18 | MD□□□□□□063-32 | | |
| 0.25 | MD□□□□□□063-42<br>MD□□□□□□071-12 | | |
| 0.37 | MD□□□□□□071-32 | E84DVB□3714S□□□2□ | E84AV□□□3714□□0 |
| 0.55 | MD□□□□□□071-42<br>MD□□□□□□080-12 | E84DVB□5514S□□□2□ | E84AV□□□5514□□0 |
| 0.75 | MD□□□□□□080-32 | E84DVB□7514S□□□2□ | E84AV□□□7514□□0 |
| 1.10 | MD□□□□□□080-42<br>MD□□□□□□090-12 | E84DVB□1124S□□□2□ | E84AV□□□1124□□0 |
| 1.50 | MD□□□□□□090-32 | E84DVB□1524S□□□2□ | E84AV□□□1524□□0 |
| 2.20 | MD□□□□□□100-12 | E84DVB□2224S□□□2□ | E84AV□□□2224□□0 |
| 3.00 | MD□□□□□□100-32 | E84DVB□3024S□□□2□ | E84AV□□□3024□□0 |
| 4.00 | MD□□□□□□112-22 | E84DVB□4024S□□□2□ | E84AV□□□4024□□0 |
| 5.50 | MD□□□□□□132-12 | E84DVB□5524S□□□2□ | E84AV□□□5524□□0 |
| 7.50 | MD□□□□□□132-22 | E84DVB□7524S□□□2□ | E84AV□□□7524□□0 |
| 11.0 | MD□□□□□□160-22 | | E84AV□□□1134□□0 |
| 15.0 | MD□□□□□□160-32 | | E84AV□□□1534□□0 |
| 18.5 | MD□□□□□□180-12 | | E84AV□□□1834□□0 |
| 22.0 | MD□□□□□□180-32 | | E84AV□□□2234□□0 |

## Motor – inverter assignment

**Rated frequency 87 Hz**

- ► Decentralised inverter 8400 motec (E84DVB)
- ► Inverter Drives 8400 (E84AV)

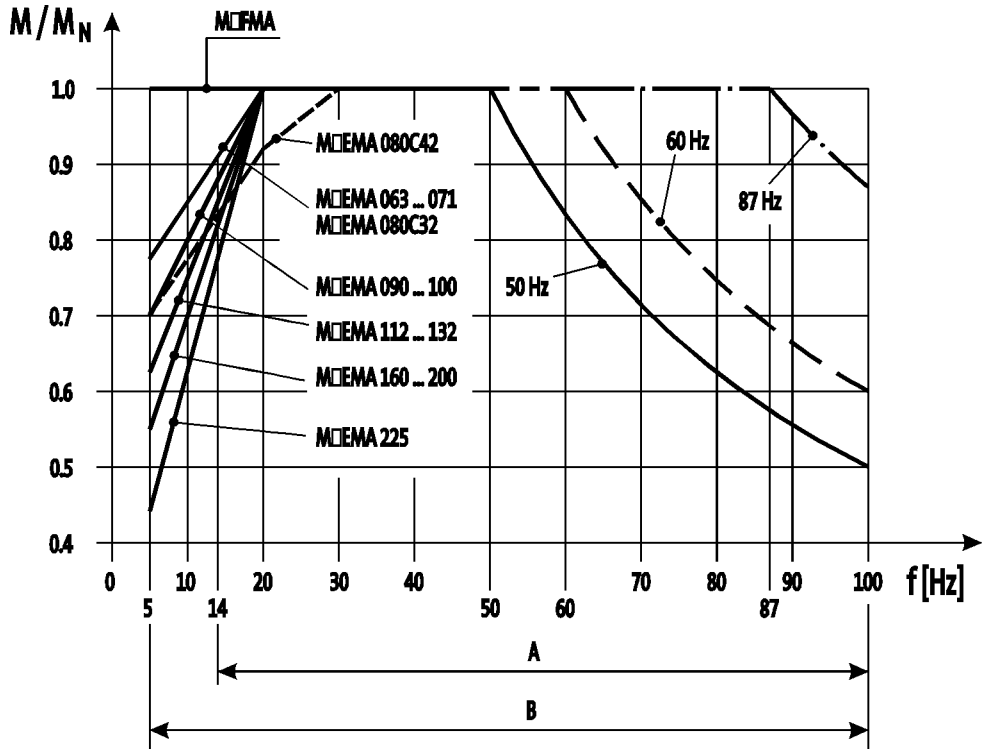
| Rated power | Product key | | |
|---|---|---|---|
| | Motor | Inverter | |
| $P_N$ | | | |
| [kW] | | | |
| 0.21 | MD□□□□□□063-12 | E84DVB□5514S□□□2□ | E84AV□□□5514□□0 |
| 0.33 | MD□□□□□□063-32 | | |
| 0.45 | MD□□□□□□063-42<br>MD□□□□□□071-12 | | |
| 0.66 | MD□□□□□□071-32 | E84DVB□7514S□□□2□ | E84AV□□□7514□□0 |
| 1.00 | MD□□□□□□071-42<br>MD□□□□□□080-12 | E84DVB□1124S□□□2□ | E84AV□□□1124□□0 |
| 1.35 | MD□□□□□□080-32 | E84DVB□1524S□□□2□ | E84AV□□□1524□□0 |
| 2.00 | MD□□□□□□080-42<br>MD□□□□□□090-12 | E84DVB□2224S□□□2□ | E84AV□□□2224□□0 |
| 2.70 | MD□□□□□□090-32 | E84DVB□3024S□□□2□ | E84AV□□□3024□□0 |
| 3.90 | MD□□□□□□100-12 | E84DVB□4024S□□□2□ | E84AV□□□4024□□0 |
| 5.40 | MD□□□□□□100-32 | E84DVB□5524S□□□2□ | E84AV□□□5524□□0 |
| 7.10 | MD□□□□□□112-22 | E84DVB□7524S□□□2□ | E84AV□□□7524□□0 |
| 9.70 | MD□□□□□□132-12 | | E84AV□□□1134□□0 |
| 13.2 | MD□□□□□□132-22 | | E84AV□□□1534□□0 |
| 19.3 | MD□□□□□□160-22 | | E84AV□□□2234□□0 |
| 26.4 | MD□□□□□□160-32 | | E84AV□□□3034□□0 |
| 32.4 | MD□□□□□□180-12 | | E84AV□□□3734□□0 |

## Dimensioning

**Torque derating at low motor frequencies**

Motor size-dependent torque reduction, taking into account the thermal response during operation on the inverter.

**Torque characteristics**




A = Operation with integral fan and brake
B = Operation with integral fan and brake control "Holding current reduction"

► The motor specifications stated in this catalogue for inverter operation apply to operation with a Lenze inverter. If you are uncertain, get in touch with the manufacturer of the inverter to ask whether the device is capable of driving the motor with the stated specifications (e.g. setting range, base frequency).

**You can use the Drive Solution Designer for precise drive dimensioning.**

The Drive Solution Designer helps you to carry out a fast and high-quality drive dimensioning.
The software includes well-founded and proven knowledge on drive applications and electro-mechanical drive components.

Please contact your Lenze sales office.

## Standards and operating conditions

| | | | |
|---|---|---|---|
| **Enclosure** | | | |
| EN 60529 | | | IP55 [1]<br>IP65 [1]<br>IP66 [1] |
| **Energy efficiency class** | | | |
| IEC 60034-30 | | | IE1 [2] |
| IEC 60034-2-1 | | | Methodology for measuring efficiency |
| **Conformity** | | | |
| CE | | | Low-Voltage Directive |
| | | | 2006/95/EC |
| EAC | | | TP TC 004/2011 (TR CU 004/2011) |
| **Approval** | | | |
| | | | UkrSEPRO |
| CCC | | | GB Standard 12350-2009 |
| CSA | | | CSA 22.2 No. 100 |
| cURus [3] | | | UL 1004-1<br>UL 1004-8<br>Power Conversion Equipment (File-No. E210321) |
| **Temperature class** | | | |
| IEC/EN 60034-1; utilisation | | | B |
| IEC/EN 60034-1; insulation system (enamel-insulated wire) | | | F |
| **Min. ambient operating temperature** | | | |
| | $T_{opr,min}$ | [°C] | -20 |
| **Max. ambient temperature for operation** | | | |
| | $T_{opr,max}$ | [°C] | 40 |
| With power reduction | $T_{opr,max}$ | [°C] | 60 |
| **Site altitude** | | | |
| Amsl | $H_{max}$ | [m] | 4000 |
| **Max. speed** | | | |
| | $n_{max}$ | [r/min] | 4500 |

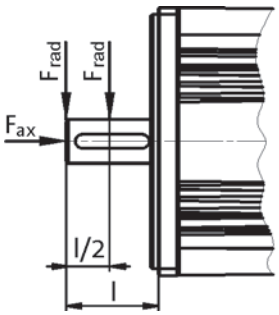
[1] Designs with different degrees of protection:
IP55 with brake (IP54 with manual release lever).
IP54 with resolver RS1.
IP54 with HTL incremental encoder IG128-24V-H.
[2] Only applies to 4-pole motors.
[3] Motor frame size 225, in preparation.

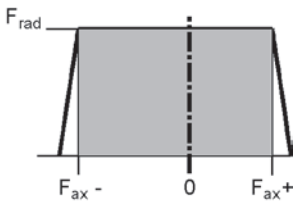
► In the European Union, the ErP Directive stipulates minimum efficiency levels for three-phase AC motors. Geared three-phase AC motors that do not conform with this Directive do not meet CE requirements and must not be marketed in the European Economic Area. For further information about the ErP Directive and the Lenze products to which it relates, please refer to the brochure entitled "International efficiency directives for three-phase AC motors".

## Permissible radial and axial forces

► Forces at an average speed of 2,000 rpm.

**Application of forces**




**Application of force at l/2**

| Bearing service life $L_{10}$ | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 10000 h | | | 20000 h | | | 30000 h | | | 50000 h | | |
| | $F_{rad}$ [N] | $F_{ax,-}$ [N] | $F_{ax,+}$ [N] | $F_{rad}$ [N] | $F_{ax,-}$ [N] | $F_{ax,+}$ [N] | $F_{rad}$ [N] | $F_{ax,-}$ [N] | $F_{ax,+}$ [N] | $F_{rad}$ [N] | $F_{ax,-}$ [N] | $F_{ax,+}$ [N] |
| 063 | 600 | -600 | 300 | 470 | -480 | 180 | 410 | -430 | 120 | 350 | -370 | 70 |
| 071 | 740 | -800 | 470 | 590 | -630 | 300 | 510 | -550 | 220 | 430 | -470 | 140 |
| 080 | 960 | -1090 | 580 | 770 | -860 | 350 | 670 | -760 | 250 | 570 | -650 | 140 |
| 090 | 1050 | -1160 | 630 | 840 | -920 | 390 | 730 | -800 | 280 | 620 | -690 | 160 |
| 100 | 1490 | -1490 | 910 | 1190 | -1160 | 580 | 1050 | -1010 | 430 | 890 | -860 | 270 |
| 112 | 2250 | -2330 | 1340 | 1790 | -1830 | 840 | 1570 | -1600 | 610 | 1330 | -1360 | 370 |
| 132 | 3300 | -2150 | 1190 | 2640 | -1670 | 710 | 2320 | -1440 | 480 | 1970 | -1210 | 250 |
| 160 | 3750 | -2700 | 1520 | 3000 | -2130 | 950 | 2640 | -1830 | 670 | 2250 | -1440 | 360 |
| 180 | 5620 | -3270 | 1790 | 4500 | -2580 | 1120 | 3960 | -2210 | 790 | 3375 | -1750 | 420 |
| 200 | 5620 | -3270 | 1790 | 4500 | -2580 | 1120 | 3960 | -2210 | 790 | 3375 | -1750 | 420 |
| 225 | 5200 | -3100 | 3900 | 3900 | -2100 | 2900 | 3300 | -1300 | 2100 | 2650 | -1000 | 1800 |

► The values for the bearing service life $L_{10}$ refer to an average speed of 2000 r/min. Depending on the ambient temperatures, the service life of the bearings is also reduced by the grease lifetime.
► Data for axial forces relate to the maximum radial force with the corresponding bearing service life.

## Permissible radial and axial forces

► Forces at an average speed of 2,000 rpm.

**Application of force at l**

| | $F_{rad}$ | $F_{ax,-}$ | $F_{ax,+}$ | $F_{rad}$ | $F_{ax,-}$ | $F_{ax,+}$ | $F_{rad}$ | $F_{ax,-}$ | $F_{ax,+}$ | $F_{rad}$ | $F_{ax,-}$ | $F_{ax,+}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | [N] | [N] | [N] | [N] | [N] | [N] | [N] | [N] | [N] | [N] | [N] | [N] |
| 063 | 400 | -600 | 300 | 370 | -480 | 180 | 320 | -430 | 120 | 300 | -370 | 70 |
| 071 | 680 | -800 | 470 | 540 | -630 | 300 | 470 | -550 | 220 | 400 | -470 | 140 |
| 080 | 880 | -1090 | 580 | 700 | -860 | 350 | 610 | -760 | 250 | 520 | -650 | 140 |
| 090 | 940 | -1160 | 630 | 750 | -920 | 390 | 660 | -800 | 280 | 560 | -690 | 160 |
| 100 | 1350 | -1490 | 910 | 1080 | -1160 | 580 | 940 | -1010 | 430 | 800 | -860 | 270 |
| 112 | 2040 | -2330 | 1340 | 1620 | -1830 | 840 | 1420 | -1600 | 610 | 1210 | -1360 | 370 |
| 132 | 3020 | -2150 | 1190 | 2420 | -1670 | 710 | 2120 | -1440 | 480 | 1800 | -1210 | 250 |
| 160 | 3410 | -2700 | 1520 | 2730 | -2130 | 950 | 2400 | -1830 | 670 | 2050 | -1440 | 360 |
| 180 | 4550 | -3270 | 1790 | 3640 | -2580 | 1120 | 3200 | -2210 | 790 | 2730 | -1750 | 420 |
| 200 | 4550 | -3270 | 1790 | 3640 | -2580 | 1120 | 3200 | -2210 | 790 | 2730 | -1750 | 420 |
| 225 | 4800 | -3100 | 3900 | 3600 | -2100 | 2900 | 3000 | -1300 | 2100 | 2400 | -1000 | 1800 |

► The values for the bearing service life $L_{10}$ refer to an average speed of 2000 r/min. Depending on the ambient temperatures, the service life of the bearings is also reduced by the grease lifetime.
► Data for axial forces relate to the maximum radial force with the corresponding bearing service life.

## Rated data for 50 Hz

### 4-pole motors

| | $P_N$ | $n_N$ | $U_{N,\Delta}$ [2] | $I_{N,\Delta}$ | $U_{N,Y}$ | $I_{N,Y}$ | $I_a/I_N$ |
|---|---|---|---|---|---|---|---|
| | | | ± 10 % | | ± 10 % | | |
| | [kW] | [r/min] | [V] | [A] | [V] | [A] | |
| MD□□□□□063-12 | 0.12 | 1425 | 230 | 0.85 | 400 | 0.49 | 3.10 |
| MD□□□□□063-32 | 0.18 | 1365 | 230 | 1.00 | 400 | 0.58 | 2.70 |
| MD□□□□□063-42 | 0.25 | 1370 | 230 | 1.40 | 400 | 0.82 | 2.90 |
| MD□□□□□071-12 | 0.25 | 1370 | 230 | 1.30 | 400 | 0.75 | 2.90 |
| MD□□□□□071-32 | 0.37 | 1410 | 230 | 1.60 | 400 | 0.95 | 3.30 |
| MD□□□□□071-42 | 0.55 | 1405 | 230 | 2.40 | 400 | 1.40 | 3.50 |
| MD□□□□□080-12 | 0.55 | 1390 | 230 | 2.50 | 400 | 1.40 | 3.80 |
| MD□□□□□080-32 | 0.75 | 1410 | 230 | 3.30 | 400 | 1.90 | 4.60 |
| MD□□□□□080-42 | 1.10 | 1390 | 230 | 4.80 | 400 | 2.80 | 4.40 |
| MD□□□□□090-12 | 1.10 | 1390 | 230 | 4.80 | 400 | 2.80 | 4.10 |
| MD□□□□□090-32 | 1.50 | 1410 | 230 | 6.60 | 400 | 3.80 | 4.80 |
| MD□□□□□100-12 | 2.20 | 1440 | 230 | 9.20 | 400 | 5.30 | 6.00 |
| MD□□□□□100-32 | 3.00 | 1430 | 230 | 12.5 | 400 | 7.20 | 4.60 |
| MD□□□□□112-22 | 4.00 | 1450 | 230 | 16.1 | 400 | 9.30 | 6.20 |
| MD□□□□□132-12 | 5.50 | 1450 | 230<br>400 [3] | 20.2<br>11.7 | 400 | 11.7 | 4.00 |
| MD□□□□□132-22 | 7.50 | 1455 | 230<br>400 [3] | 28.6<br>16.5 | 400 | 16.5 | 5.90 |

| | $M_N$ | $M_a$ | $M_b$ | cos ϕ | $\eta_{75\,\%}$ | $\eta_{100\,\%}$ | J [1] | m [1] |
|---|---|---|---|---|---|---|---|---|
| | [Nm] | [Nm] | [Nm] | | [%] | [%] | [kgcm²] | [kg] |
| MD□□□□□063-12 | 0.80 | 2.50 | 2.64 | 0.56 | 58.0 | 63.0 | 3.30 | 4.10 |
| MD□□□□□063-32 | 1.26 | 2.50 | 2.61 | 0.70 | 63.0 | 64.0 | 3.30 | 4.10 |
| MD□□□□□063-42 | 1.74 | 3.80 | 4.10 | 0.67 | 65.0 | 66.0 | 3.70 | 4.40 |
| MD□□□□□071-12 | 1.74 | 3.10 | 3.10 | 0.75 | 65.0 | 66.0 | 8.30 | 5.80 |
| MD□□□□□071-32 | 2.51 | 4.76 | 5.81 | 0.77 | 73.0 | 73.0 | 10.7 | 5.80 |
| MD□□□□□071-42 | 3.74 | 7.85 | 9.12 | 0.77 | 74.0 | 74.0 | 12.8 | 6.40 |
| MD□□□□□080-12 | 3.80 | 6.80 | 7.20 | 0.80 | 70.0 | 70.0 | 16.9 | 10.0 |
| MD□□□□□080-32 | 5.10 | 11.0 | 12.1 | 0.80 | 73.0 | 74.0 | 26.0 | 11.0 |
| MD□□□□□080-42 | 7.50 | 16.5 | 18.4 | 0.80 | 77.0 | 77.0 | 26.0 | 11.0 |
| MD□□□□□090-12 | 7.56 | 15.5 | 16.0 | 0.81 | 75.0 | 75.0 | 23.2 | 12.0 |
| MD□□□□□090-32 | 10.1 | 23.7 | 27.1 | 0.76 | 78.0 | 79.0 | 28.4 | 15.0 |
| MD□□□□□100-12 | 14.6 | 38.0 | 44.0 | 0.73 | 83.0 | 84.0 | 61.0 | 24.0 |
| MD□□□□□100-32 | 20.5 | 43.0 | 50.0 | 0.75 | 83.0 | 83.0 | 61.0 | 24.0 |
| MD□□□□□112-22 | 26.3 | 70.0 | 95.0 | 0.73 | 85.0 | 86.0 | 107 | 31.0 |
| MD□□□□□132-12 | 36.2 | 100 | 110 | 0.75 | 86.0 | 86.0 | 188 | 56.0 |
| MD□□□□□132-22 | 49.2 | 100 | 150 | 0.76 | 87.0 | 88.0 | 336 | 66.0 |

[1] Without accessories
[2] Operation at 87 Hz is possible with 4-pole motors whose rated data at 50 Hz displays the voltage values Δ 230 V.
With motor frame sizes 132-12 to 180-32, the required voltage must also be specified in your order.
[3] Star/delta start-up possible at 400 V.

## Rated data for 50 Hz

**4-pole motors**

| | $P_N$ | $n_N$ | $U_{N,\Delta}$ [2] | $I_{N,\Delta}$ | $U_{N,Y}$ | $I_{N,Y}$ | $I_a/I_N$ |
|---|---|---|---|---|---|---|---|
| | | | ± 10 % | | ± 10 % | | |
| | [kW] | [r/min] | [V] | [A] | [V] | [A] | |
| MD□□□□□160-22 | 11.0 | 1460 | 230<br>400 [3] | 36.5<br>21.0 | 400 | 21.0 | 7.00 |
| MD□□□□□160-32 | 15.0 | 1460 | 230<br>400 [3] | 48.4<br>27.8 | 400 | 27.8 | 7.10 |
| MD□□□□□180-12 | 18.5 | 1470 | 230<br>400 [3] | 57.8<br>32.8 | 400 | 32.8 | 6.80 |
| MD□□□□□180-32 | 22.0 | 1465 | 230<br>400 [3] | 67.4<br>38.8 | 400 | 38.8 | 7.30 |

| | $M_N$ | $M_a$ | $M_b$ | cos ϕ | $\eta_{75\,\%}$ | $\eta_{100\,\%}$ | J [1] | m [1] |
|---|---|---|---|---|---|---|---|---|
| | [Nm] | [Nm] | [Nm] | | [%] | [%] | [kgcm²] | [kg] |
| MD□□□□□160-22 | 71.9 | 150 | 204 | 0.85 | 89.2 | 89.0 | 610 | 110 |
| MD□□□□□160-32 | 98.1 | 214 | 288 | 0.87 | 89.7 | 90.0 | 750 | 130 |
| MD□□□□□180-12 | 120 | 260 | 313 | 0.90 | 90.7 | 90.5 | 1350 | 165 |
| MD□□□□□180-32 | 144 | 330 | 360 | 0.90 | 91.2 | 91.0 | 1550 | 175 |

[1] Without accessories
[2] Operation at 87 Hz is possible with 4-pole motors whose rated data at 50 Hz displays the voltage values Δ 230 V.
With motor frame sizes 132-12 to 180-32, the required voltage must also be specified in your order.
[3] Star/delta start-up possible at 400 V.

## Rated data for 60 Hz

### 4-pole motors

| | $P_N$ | $n_N$ | $U_{N,\Delta}$ [2] | $I_{N,\Delta}$ | $U_{N,Y}$ | $I_{N,Y}$ | $I_a/I_N$ |
|---|---|---|---|---|---|---|---|
| | | | ± 10 % | | ± 10 % | | |
| | [kW] | [r/min] | [V] | [A] | [V] | [A] | |
| MD□□□□□063-12 | 0.12 | 1735 | 265 | 0.69 | 460 | 0.40 | 4.00 |
| MD□□□□□063-32 | 0.18 | 1695 | 265 | 0.80 | 460 | 0.46 | 3.60 |
| MD□□□□□063-42 | 0.25 | 1680 | 265 | 1.30 | 460 | 0.75 | 3.80 |
| MD□□□□□071-12 | 0.25 | 1680 | 265 | 1.10 | 460 | 0.65 | 3.30 |
| MD□□□□□071-32 | 0.37 | 1720 | 265 | 1.50 | 460 | 0.84 | 3.90 |
| MD□□□□□071-42 | 0.55 | 1720 | 265 | 2.10 | 460 | 1.20 | 4.10 |
| MD□□□□□080-12 | 0.55 | 1700 | 265 | 2.10 | 460 | 1.20 | 4.30 |
| MD□□□□□080-32 | 0.75 | 1720 | 265 | 2.90 | 460 | 1.70 | 5.60 |
| MD□□□□□080-42 | 1.10 | 1705 | 265 | 4.20 | 460 | 2.40 | 5.40 |
| MD□□□□□090-12 | 1.10 | 1700 | 265 | 4.20 | 460 | 2.40 | 4.50 |
| MD□□□□□090-32 | 1.50 | 1720 | 265 | 5.80 | 460 | 3.40 | 5.70 |
| MD□□□□□100-12 | 2.20 | 1745 | 265 | 8.10 | 460 | 4.70 | 6.90 |
| MD□□□□□100-32 | 3.00 | 1740 | 265 | 10.8 | 460 | 6.30 | 5.30 |
| MD□□□□□112-22 | 4.00 | 1755 | 265 | 14.1 | 460 | 8.20 | 6.90 |
| MD□□□□□132-12 | 5.50 | 1755 | 265<br>460 [3] | 17.5<br>10.1 | 460 | 10.1 | 4.50 |
| MD□□□□□132-22 | 7.50 | 1760 | 265<br>460 [3] | 25.7<br>14.8 | 460 | 14.8 | 6.50 |

| | $M_N$ | $M_a$ | $M_b$ | cos ϕ | $\eta_{75\,\%}$ | $\eta_{100\,\%}$ | J [1] | m [1] |
|---|---|---|---|---|---|---|---|---|
| | [Nm] | [Nm] | [Nm] | | [%] | [%] | [kgcm²] | [kg] |
| MD□□□□□063-12 | 0.66 | 2.25 | 2.64 | 0.55 | 58.0 | 63.0 | 3.30 | 4.10 |
| MD□□□□□063-32 | 1.00 | 2.21 | 2.56 | 0.68 | 65.0 | 66.0 | 3.30 | 4.10 |
| MD□□□□□063-42 | 1.40 | 3.71 | 4.20 | 0.60 | 64.0 | 66.0 | 3.70 | 4.40 |
| MD□□□□□071-12 | 1.40 | 2.80 | 2.80 | 0.73 | 67.0 | 68.0 | 8.30 | 5.80 |
| MD□□□□□071-32 | 2.05 | 4.40 | 5.80 | 0.74 | 74.0 | 75.0 | 10.7 | 5.80 |
| MD□□□□□071-42 | 3.05 | 7.00 | 9.00 | 0.73 | 76.0 | 77.0 | 12.8 | 6.40 |
| MD□□□□□080-12 | 3.10 | 6.20 | 6.55 | 0.78 | 76.0 | 79.0 | 16.9 | 10.0 |
| MD□□□□□080-32 | 4.16 | 10.3 | 12.2 | 0.78 | 78.0 | 78.0 | 26.0 | 11.0 |
| MD□□□□□080-42 | 6.16 | 15.5 | 18.5 | 0.78 | 79.0 | 80.0 | 26.0 | 11.0 |
| MD□□□□□090-12 | 6.18 | 14.0 | 14.5 | 0.75 | 78.0 | 79.0 | 23.2 | 12.0 |
| MD□□□□□090-32 | 8.33 | 22.0 | 27.0 | 0.73 | 79.0 | 81.0 | 28.4 | 15.0 |
| MD□□□□□100-12 | 12.0 | 33.0 | 43.0 | 0.71 | 83.0 | 85.0 | 61.0 | 24.0 |
| MD□□□□□100-32 | 16.5 | 38.0 | 48.0 | 0.73 | 84.0 | 85.0 | 61.0 | 24.0 |
| MD□□□□□112-22 | 21.8 | 57.0 | 89.0 | 0.72 | 85.0 | 87.0 | 107 | 31.0 |
| MD□□□□□132-12 | 29.9 | 85.0 | 103 | 0.74 | 87.0 | 88.0 | 188 | 56.0 |
| MD□□□□□132-22 | 40.7 | 83.0 | 137 | 0.75 | 88.0 | 89.0 | 336 | 66.0 |

[1] Without accessories
[2] Operation at 87 Hz is possible with 4-pole motors whose rated data at 60 Hz displays the voltage values Δ 265 V.
With motor frame sizes 132-12 to 180-32, the required voltage must also be specified in your order.
[3] Star/delta start-up possible at 460 V.

## Rated data for 60 Hz

**4-pole motors**

| | $P_N$ | $n_N$ | $U_{N,\Delta}$ [2] | $I_{N,\Delta}$ | $U_{N,Y}$ | $I_{N,Y}$ | $I_a/I_N$ |
|---|---|---|---|---|---|---|---|
| | | | ± 10 % | | ± 10 % | | |
| | [kW] | [r/min] | [V] | [A] | [V] | [A] | |
| MD□□□□□160-22 | 11.0 | 1770 | 265<br>460 [3] | 31.7<br>18.3 | 460 | 18.3 | 7.60 |
| MD□□□□□160-32 | 15.0 | 1760 | 265<br>460 [3] | 40.7<br>23.5 | 460 | 23.5 | 7.60 |
| MD□□□□□180-12 | 18.5 | 1780 | 265<br>460 [3] | 48.5<br>28.0 | 460 | 28.0 | 7.20 |
| MD□□□□□180-32 | 22.0 | 1760 | 265<br>460 [3] | 57.2<br>33.0 | 460 | 33.0 | 7.60 |

| | $M_N$ | $M_a$ | $M_b$ | cos ϕ | $\eta_{75\,\%}$ | $\eta_{100\,\%}$ | J [1] | m [1] |
|---|---|---|---|---|---|---|---|---|
| | [Nm] | [Nm] | [Nm] | | [%] | [%] | [kgcm²] | [kg] |
| MD□□□□□160-22 | 59.5 | 122 | 187 | 0.84 | 91.1 | 90.0 | 610 | 110 |
| MD□□□□□160-32 | 81.2 | 171 | 265 | 0.87 | 92.6 | 92.0 | 750 | 130 |
| MD□□□□□180-12 | 99.3 | 203 | 287 | 0.90 | 93.0 | 92.0 | 1350 | 165 |
| MD□□□□□180-32 | 119 | 248 | 331 | 0.90 | 94.0 | 93.0 | 1550 | 175 |

[1] Without accessories
[2] Operation at 87 Hz is possible with 4-pole motors whose rated data at 60 Hz displays the voltage values Δ 265 V.
With motor frame sizes 132-12 to 180-32, the required voltage must also be specified in your order.
[3] Star/delta start-up possible at 460 V.

## Rated data for 87 Hz

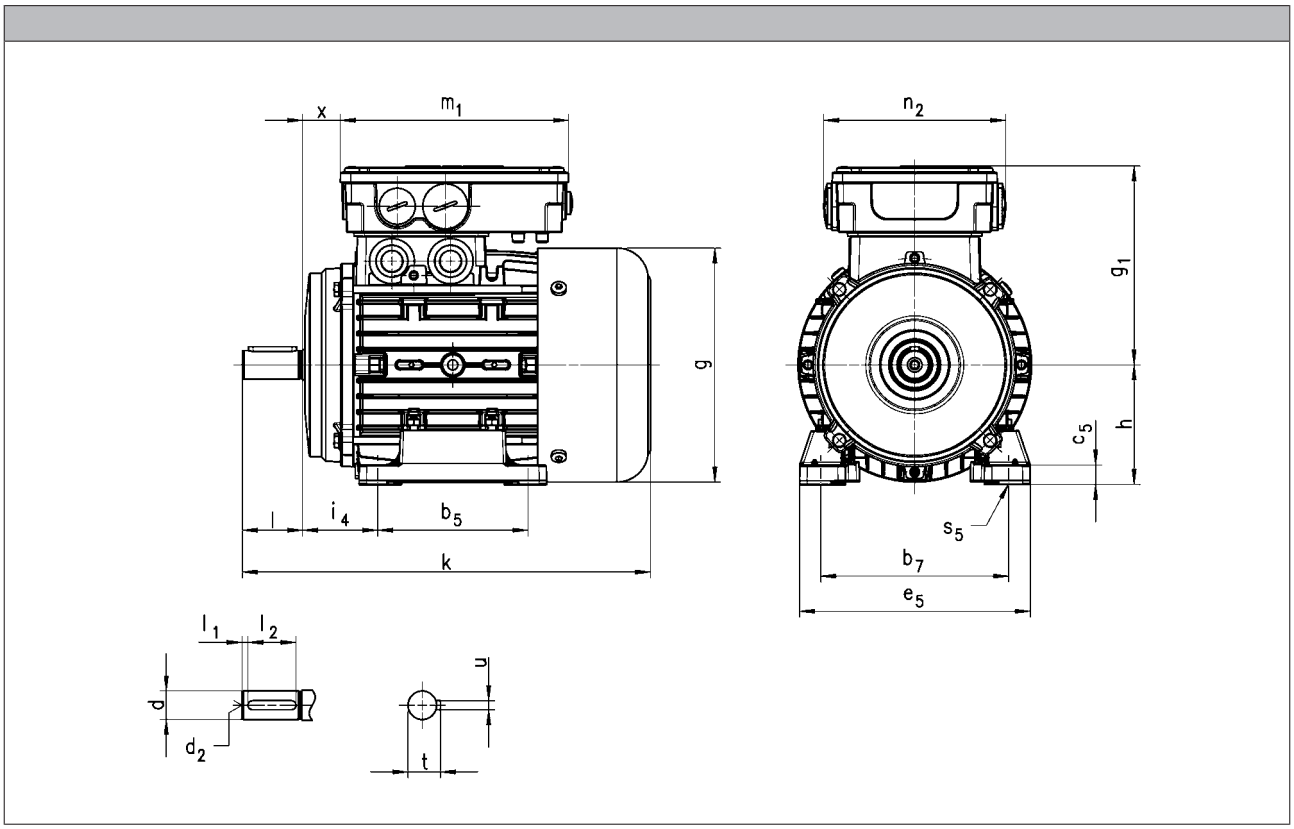
### 4-pole motors

| | $P_N$ | $n_N$ | $M_N$ | $M_{max}$ | $U_{N,\Delta}$ | $I_{N,\Delta}$ | cos ϕ | $\eta_{75\,\%}$ | $\eta_{100\,\%}$ | J [1] | m [1] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | ± 10 % | | | | | | |
| | [kW] | [r/min] | [Nm] | [Nm] | [V] | [A] | | [%] | [%] | [kgcm²] | [kg] |
| MD□□□□□063-12 | 0.21 | 2535 | 0.80 | 3.20 | 400 | 0.85 | 0.52 | 61.0 | 66.0 | 3.30 | 4.10 |
| MD□□□□□063-32 | 0.33 | 2475 | 1.26 | 5.00 | 400 | 1.00 | 0.65 | 68.0 | 71.0 | 3.30 | 4.10 |
| MD□□□□□063-42 | 0.45 | 2480 | 1.74 | 7.00 | 400 | 1.40 | 0.63 | 66.0 | 73.0 | 3.70 | 4.40 |
| MD□□□□□071-12 | 0.45 | 2480 | 1.74 | 7.00 | 400 | 1.30 | 0.74 | 66.0 | 68.0 | 8.30 | 5.80 |
| MD□□□□□071-32 | 0.66 | 2520 | 2.51 | 10.0 | 400 | 1.60 | 0.72 | 76.0 | 78.0 | 10.7 | 5.80 |
| MD□□□□□071-42 | 1.00 | 2515 | 3.74 | 15.0 | 400 | 2.40 | 0.74 | 79.0 | 80.0 | 12.8 | 6.40 |
| MD□□□□□080-12 | 1.00 | 2500 | 3.80 | 15.0 | 400 | 2.50 | 0.78 | 72.0 | 72.0 | 16.9 | 10.0 |
| MD□□□□□080-32 | 1.35 | 2520 | 5.10 | 20.0 | 400 | 3.30 | 0.80 | 75.0 | 77.0 | 26.0 | 11.0 |
| MD□□□□□080-42 | 2.00 | 2500 | 7.50 | 30.0 | 400 | 4.80 | 0.80 | 81.0 | 82.0 | 26.0 | 11.0 |
| MD□□□□□090-12 | 2.00 | 2500 | 7.56 | 30.0 | 400 | 4.80 | 0.78 | 77.0 | 77.0 | 23.2 | 12.0 |
| MD□□□□□090-32 | 2.70 | 2520 | 10.1 | 40.0 | 400 | 6.70 | 0.73 | 83.0 | 85.0 | 28.4 | 15.0 |
| MD□□□□□100-12 | 3.90 | 2550 | 14.6 | 60.0 | 400 | 9.20 | 0.71 | 87.0 | 88.0 | 61.0 | 24.0 |
| MD□□□□□100-32 | 5.40 | 2540 | 20.5 | 80.0 | 400 | 12.5 | 0.73 | 87.0 | 88.0 | 61.0 | 24.0 |
| MD□□□□□112-22 | 7.10 | 2560 | 26.3 | 105 | 400 | 16.1 | 0.71 | 87.0 | 88.0 | 107 | 31.0 |
| MD□□□□□132-12 | 9.70 | 2560 | 36.2 | 145 | 400 | 20.1 | 0.74 | 90.0 | 90.0 | 188 | 56.0 |
| MD□□□□□132-22 | 13.2 | 2565 | 49.2 | 200 | 400 | 28.6 | 0.75 | 90.0 | 90.0 | 336 | 66.0 |
| MD□□□□□160-22 | 19.3 | 2565 | 71.9 | 280 | 400 | 36.5 | 0.85 | 91.7 | 90.0 | 610 | 110 |
| MD□□□□□160-32 | 26.4 | 2565 | 98.1 | 390 | 400 | 48.4 | 0.86 | 91.9 | 92.0 | 750 | 130 |
| MD□□□□□180-12 | 32.4 | 2575 | 120 | 480 | 400 | 57.8 | 0.89 | 92.8 | 92.0 | 1350 | 165 |
| MD□□□□□180-32 | 38.7 | 2560 | 144 | 572 | 400 | 67.4 | 0.89 | 92.8 | 92.0 | 1550 | 175 |

[1] Without accessories

## Dimensions, self-ventilated (4-pole)

**Design B3**




| Motor type | MDEMAXX | | | | | | MDEMABR | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | k | g | $g_1$ | x | $m_1$ | $n_2$ | k | g | $g_1$ | x | $m_1$ | $n_2$ |
| | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] |
| 063 | 215 | 123 | 109 | 17 | 136 | 103 | 271 | 123 | 109 | 17 | 136 | 103 |
| 071 | 246 | 139 | 118 | 24 | | | 297 | 139 | 118 | 24 | | |
| 080 | 272 | 156 | 132 | 25 | 152 | 121 | 345 | 154 | 132 | 25 | 152 | 121 |
| 090 | 311 | 176 | 137 | 29 | | | 373 | 176 | 137 | 29 | | |
| 100 | 382 | 194 | 147 | 36 | | | 463 | 194 | 147 | 36 | | |
| 112 | 392 | 218 | 158 | 38 | | | 479 | 218 | 158 | 38 | | |
| 132 | 497 | 258 | 187 | 51 | 194 | 125 | 576 | 258 | 187 | 51 | 194 | 125 |
| 160 | 598 [1] | 310 | 220 | 69 | 253 | 152 | 703 [1] | 313 | 220 | 69 | 253 | 152 |
| | 642 [2] | | | | | | 747 [2] | | | | | |
| 180 | 671 | 348 | 239 | 75 | | | 784 | 351 | 239 | 75 | | |

[1] 160-22
[2] 160-32

## Dimensions, self-ventilated (4-pole)

**Design B3**

| Motor type | MDEMARS<br>MDEMAIG<br>MDEMAAG | | | | | | MDEMABS<br>MDEMABI<br>MDEMABA | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | k | g | $g_1$ | x | $m_1$ | $n_2$ | k | g | $g_1$ | x | $m_1$ | $n_2$ |
| | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] |
| 063 | 255 | 123 | 109 | 17 | 136 | 103 | 318 | 123 | 109 | 17 | 136 | 103 |
| 071 | 297 | 139 | 118 | 24 | | | 341 | 139 | 133 | 13 | 194 | 125 |
| 080 | 369 | 156 | 132 | 25 | 152 | 121 | 383 | 156 | 142 | 24 | | |
| 090 | 392 | 178 | 137 | 29 | | | 410 | 176 | 147 | 28 | | |
| 100 | 463 | 196 | 147 | 36 | | | 483 | 194 | 158 | 35 | | |
| 112 | 472 | 220 | 158 | 38 | | | 512 | 218 | 168 | 37 | | |
| 132 | 599 | 261 | 187 | 51 | 194 | 125 | 621 | 258 | 187 | 51 | | |
| 160 | 681 [1] | 313 | 220 | 69 | 253 | 152 | 789 [1] | 313 | 220 | 69 | 253 | 152 |
| | 725 [2] | | | | | | 833 [2] | | | | | |
| 180 | 750 | 351 | 239 | 75 | | | 863 | 351 | 239 | 75 | | |

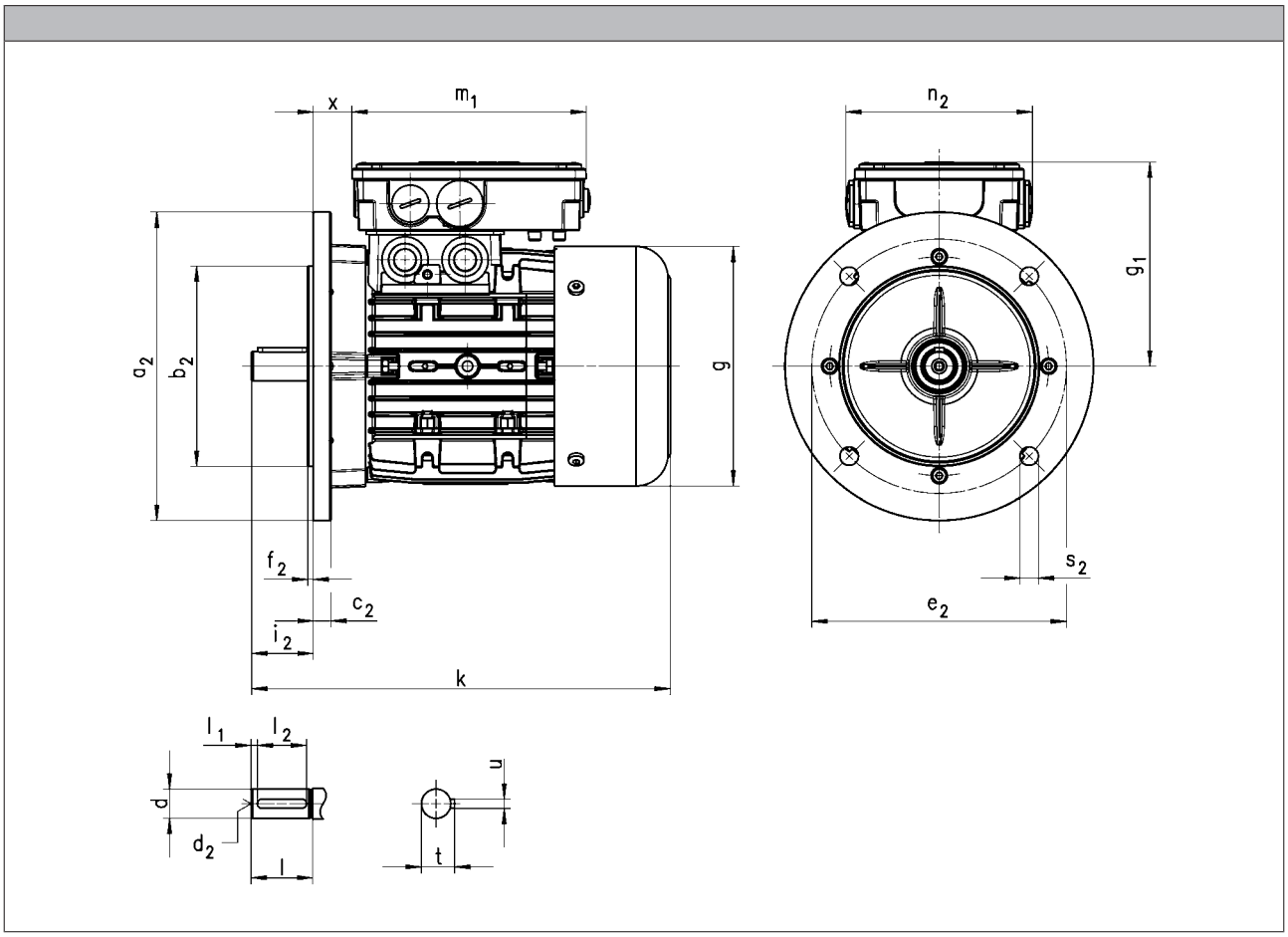
| | d | d | $d_2$ | l | $l_1$ | $l_2$ | t | u |
|---|---|---|---|---|---|---|---|---|
| | j6 | k6 | | | | | | |
| | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] |
| 063 | 11 | | M4 | 23 | 3.5 | 16 | 12.5 | 4.0 |
| 071 | 14 | | M5 | 30 | 4.0 | 22 | 16.0 | 5.0 |
| 080 | 19 | | M6 | 40 | | 32 | 21.5 | 6.0 |
| 090 | 24 | | M8 | 50 | 5.0 | 40 | 27.0 | 8.0 |
| 100 | 28 | | M10 | 60 | | 50 | 31.0 | |
| 112 | | | | | | | | |
| 132 | | 38 | M12 | 80 | | 70 | 41.0 | 10.0 |
| 160 | | 42 | M16 | 110 | | 100 | 45.0 | 12.0 |
| 180 | | 48 | | | | | 51.5 | 14.0 |

| | $b_7$ | $i_4$ | $b_5$ | $e_5$ | h | $c_5$ | $s_5$ |
|---|---|---|---|---|---|---|---|
| | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] |
| 063 | 100 | 40 | 80 | 120 | 63 | 10 | 7.0 |
| 071 | 112 | 45 | 90 | 134 | 71 | 11 | |
| 080 | 125 | 50 | 100 | 154 | 80 | 13 | 10.0 |
| 090 | 140 | 56 | | 174 | 90 | | |
| 100 | 160 | 63 | 140 | 194 | 100 | 15 | 12.0 |
| 112 | 190 | 70 | | 223 | 112 | 14 | |
| 132 | 216 | 89 | 178 | 260 | 132 | 18 | |
| 160 | 254 | 108 | 210 [1] | 305 | 160 | 22 | 14.5 |
| | | | 254 [2] | | | | |
| 180 | 279 | 121 | 241 [3] | 350 | 180 | 23 | |
| | | | 279 [4] | | | | |

[1] 160-22
[2] 160-32
[3] 180-12
[4] 180-32

## Dimensions, self-ventilated (4-pole)

**Design B5**




5.7

| Motor type | MDEMAXX | | | | | | MDEMABR | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | k | g | $g_1$ | x | $m_1$ | $n_2$ | k | g | $g_1$ | x | $m_1$ | $n_2$ |
| | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] |
| 063 | 215 | 123 | 109 | 17 | 136 | 103 | 271 | 123 | 109 | 17 | 136 | 103 |
| 071 | 246 | 139 | 118 | 24 | | | 297 | 139 | 118 | 24 | | |
| 080 | 272 | 156 | 132 | 25 | 152 | 121 | 345 | 154 | 132 | 25 | 152 | 121 |
| 090 | 311 | 176 | 137 | 29 | | | 373 | 176 | 137 | 29 | | |
| 100 | 382 | 194 | 147 | 36 | | | 463 | 194 | 147 | 36 | | |
| 112 | 392 | 218 | 158 | 38 | | | 479 | 218 | 158 | 38 | | |
| 132 | 497 | 258 | 187 | 51 | 194 | 125 | 576 | 258 | 187 | 51 | 194 | 125 |
| 160 | 598 [1] | 310 | 220 | 69 | 253 | 152 | 703 [1] | 313 | 220 | 69 | 253 | 152 |
| | 642 [2] | | | | | | 747 [2] | | | | | |
| 180 | 671 | 348 | 239 | 75 | | | 784 | 351 | 239 | 75 | | |

[1] 160-22
[2] 160-32

## Dimensions, self-ventilated (4-pole)

**Design B5**

| Motor type | MDEMARS<br>MDEMAIG<br>MDEMAAG | | | | | | MDEMABS<br>MDEMABI<br>MDEMABA | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | k | g | $g_1$ | x | $m_1$ | $n_2$ | k | g | $g_1$ | x | $m_1$ | $n_2$ |
| | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] |
| 063 | 255 | 123 | 109 | 17 | 136 | 103 | 318 | 123 | 109 | 17 | 136 | 103 |
| 071 | 297 | 139 | 118 | 24 | | | 341 | 139 | 133 | 13 | 194 | 125 |
| 080 | 369 | 156 | 132 | 25 | 152 | 121 | 383 | 156 | 142 | 24 | | |
| 090 | 392 | 178 | 137 | 29 | | | 410 | 176 | 147 | 28 | | |
| 100 | 463 | 196 | 147 | 36 | | | 483 | 194 | 158 | 35 | | |
| 112 | 472 | 220 | 158 | 38 | | | 512 | 218 | 168 | 37 | | |
| 132 | 599 | 261 | 187 | 51 | 194 | 125 | 621 | 258 | 187 | 51 | | |
| 160 | 681 [1] | 313 | 220 | 69 | 253 | 152 | 789 [1] | 313 | 220 | 69 | 253 | 152 |
| | 725 [2] | | | | | | 833 [2] | | | | | |
| 180 | 750 | 351 | 239 | 75 | | | 863 | 351 | 239 | 75 | | |

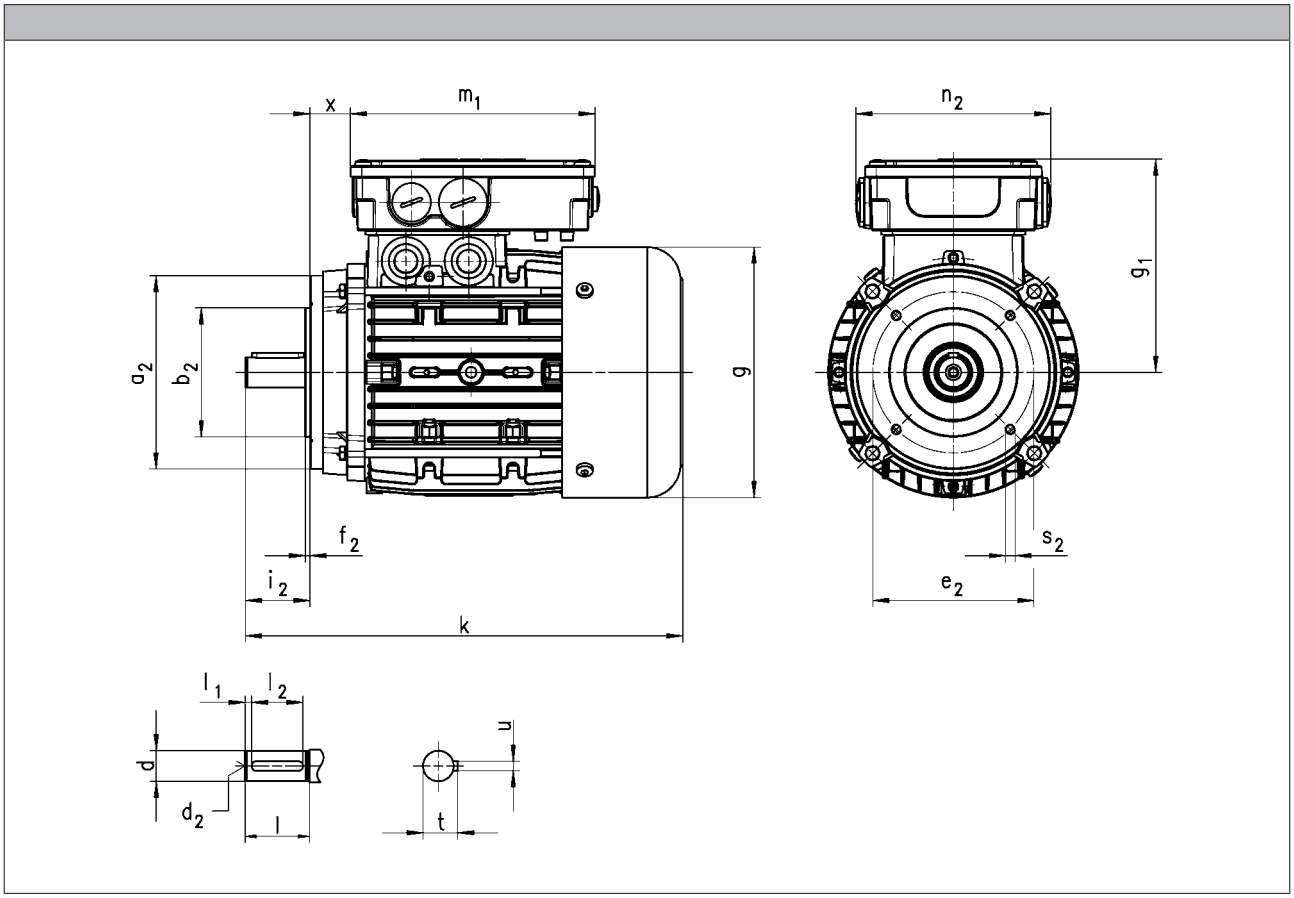
[1] 160-22
[2] 160-32

| | d | d | $d_2$ | l | $l_1$ | $l_2$ | t | u |
|---|---|---|---|---|---|---|---|---|
| | j6 | k6 | | | | | | |
| | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] |
| 063 | 11 | | M4 | 23 | 3.5 | 16 | 12.5 | 4.0 |
| 071 | 14 | | M5 | 30 | 4.0 | 22 | 16.0 | 5.0 |
| 080 | 19 | | M6 | 40 | | 32 | 21.5 | 6.0 |
| 090 | 24 | | M8 | 50 | 5.0 | 40 | 27.0 | 8.0 |
| 100 | 28 | | M10 | 60 | | 50 | 31.0 | |
| 112 | | | | | | | | |
| 132 | | 38 | M12 | 80 | | 70 | 41.0 | 10.0 |
| 160 | | 42 | M16 | 110 | | 100 | 45.0 | 12.0 |
| 180 | | 48 | | | | | 51.5 | 14.0 |

| | Flange size | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | $a_2$ | $b_2$ | $c_2$ | $e_2$ | $f_2$ | $s_2$ | $i_2$ |
| | | | j6 | | | | | -0.6 ... 0.5 |
| | | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] |
| 063 | FF115 | 140 | 95 | 10 | 115 | 3.0 | 10.0 | 23.0 |
| 071 | FF130 | 160 | 110 | | 130 | 3.5 | | 30.0 |
| 080 | FF165 | 200 | 130 | 11 | 165 | | 12.0 | 40.0 |
| 090 | | | | | | | | 50.0 |
| 100 | FF215 | 250 | 180 | 15 | 215 | 4.0 | 14.5 | 60.0 |
| 112 | | | | | | | | |
| 132 | FF265 | 300 | 230 | 20 | 265 | | | 80.0 |
| 160 | FF300 | 350 | 250 | 13 | 300 | 5.0 | 18.5 | 110 |
| 180 | | | | | | | | |

## Dimensions, self-ventilated (4-pole)

**Design B14**




5.7

| Motor type | MDEMAXX | | | | | | MDEMABR | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | k | g | $g_1$ | x | $m_1$ | $n_2$ | k | g | $g_1$ | x | $m_1$ | $n_2$ |
| | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] |
| 063 | 215 | 123 | 109 | 17 | 136 | 103 | 271 | 123 | 109 | 17 | 136 | 103 |
| 071 | 246 | 139 | 118 | 24 | | | 297 | 139 | 118 | 24 | | |
| 080 | 272 | 156 | 132 | 25 | 152 | 121 | 345 | 154 | 132 | 25 | 152 | 121 |
| 090 | 311 | 176 | 137 | 29 | | | 373 | 176 | 137 | 29 | | |
| 100 | 382 | 194 | 147 | 36 | | | 463 | 194 | 147 | 36 | | |
| 112 | 392 | 218 | 158 | 38 | | | 479 | 218 | 158 | 38 | | |

## Dimensions, self-ventilated (4-pole)

**Design B14**

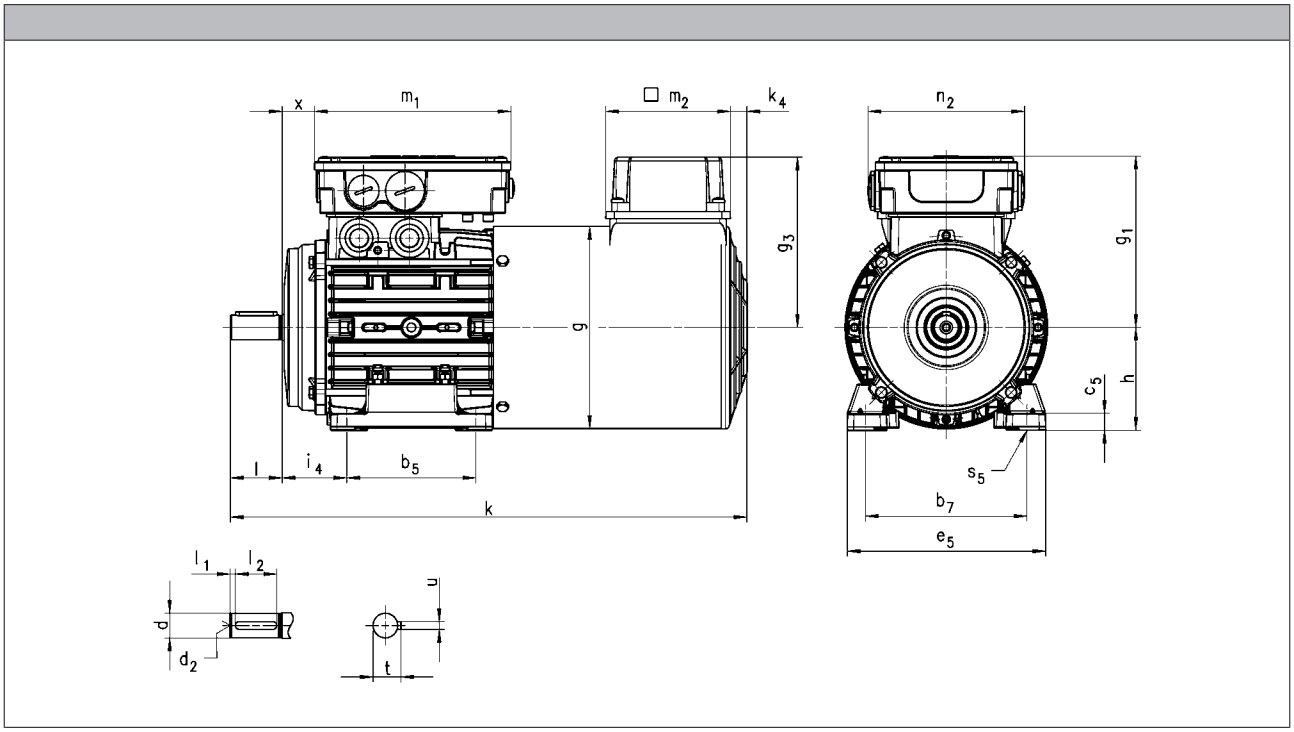
| Motor type | MDEMARS<br>MDEMAIG<br>MDEMAAG | | | | | | MDEMABS<br>MDEMABI<br>MDEMABA | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | k | g | $g_1$ | x | $m_1$ | $n_2$ | k | g | $g_1$ | x | $m_1$ | $n_2$ |
| | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] |
| 063 | 255 | 123 | 109 | 17 | 136 | 103 | 318 | 123 | 109 | 17 | 136 | 103 |
| 071 | 297 | 139 | 118 | 24 | | | 341 | 139 | 133 | 13 | 194 | 125 |
| 080 | 369 | 156 | 132 | 25 | 152 | 121 | 383 | 156 | 142 | 24 | | |
| 090 | 392 | 178 | 137 | 29 | | | 410 | 176 | 147 | 28 | | |
| 100 | 463 | 196 | 147 | 36 | | | 483 | 194 | 158 | 35 | | |
| 112 | 472 | 220 | 158 | 38 | | | 512 | 218 | 168 | 37 | | |

| | d | d | $d_2$ | l | $l_1$ | $l_2$ | t | u |
|---|---|---|---|---|---|---|---|---|
| | j6 | k6 | | | | | | |
| | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] |
| 063 | 11 | | M4 | 23 | 3.5 | 16 | 12.5 | 4.0 |
| 071 | 14 | | M5 | 30 | 4.0 | 22 | 16.0 | 5.0 |
| 080 | 19 | | M6 | 40 | | 32 | 21.5 | 6.0 |
| 090 | 24 | | M8 | 50 | 5.0 | 40 | 27.0 | 8.0 |
| 100 | 28 | | M10 | 60 | | 50 | 31.0 | |
| 112 | | | | | | | | |

| | Flange size | | | | | | |
|---|---|---|---|---|---|---|---|
| | | $a_2$ | $b_2$ | $e_2$ | $f_2$ | $s_2$ | $i_2$ |
| | | | j6 | | | | -0.6 ... 0.5 |
| | | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] |
| 063 | FT75 | 90 | 60 | 75 | 2.5 | M5x10 | 23.0 |
| 071 | FT85 | 105 | 70 | 85 | | M6x10 | 30.0 |
| 080 | FT100 | 120 | 80 | 100 | 3.0 | M6x12 | 40.0 |
| | FT130 | 160 | 110 | 130 | 3.5 | M8x14 | |
| 090 | FT115 | 140 | 95 | 115 | 3.0 | M8x16 | 50.0 |
| | FT130 | 160 | 110 | 130 | 3.5 | | |
| 100 | | | | | | M8x14 | 60.0 |
| 112 | | | | | | M8x16 | |

## Dimensions, forced ventilated (4-pole)

**Design B3**




| Motor type | MDFMAXX | | | | | | | | | MDFMABR | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | k | g | $g_1$ | x | $m_1$ | $n_2$ | $g_3$ | $k_4$ | $m_2$ | k | g | $g_1$ | x | $m_1$ | $n_2$ | $g_3$ | $k_4$ | $m_2$ |
| | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] |
| 063 | 345 | 123 | 109 | 17 | 136 | 103 | 115 | 12 | 95 | 385 | 123 | 109 | 17 | 136 | 103 | 115 | 12 | 95 |
| 071 | 373 | 138 | 118 | 24 | | | 122 | | | 410 | 138 | 118 | 24 | | | 122 | | |
| 080 | 400 | 156 | 132 | 25 | 152 | 121 | 132 | 13 | 96 | 455 | 156 | 132 | 25 | 152 | 121 | 132 | 13 | 96 |
| 090 | 434 | 176 | 137 | 29 | | | 141 | 22 | 95 | 487 | 176 | 137 | 29 | | | 141 | 22 | 95 |
| 100 | 491 | 194 | 147 | 36 | | | 150 | | | 552 | 194 | 147 | 36 | | | 150 | | |
| 112 | 494 | 218 | 158 | 38 | | | 162 | | | 575 | 218 | 158 | 38 | | | 162 | | |
| 132 | 612 | 257 | 187 | 51 | 194 | 125 | 182 | 32 | | 698 | 257 | 187 | 51 | 194 | 125 | 182 | 32 | |
| 160 | 747 [1] | 309 | 220 | 69 | 253 | 152 | 209 | 31 | 96 | 777 [1] | 309 | 220 | 69 | 253 | 152 | 209 | 31 | 96 |
| | 791 [2] | | | | | | | | | 821 [2] | | | | | | | | |
| 180 | 820 | 348 | 239 | 75 | | | | | | 886 | 348 | 239 | 75 | | | | | |

[1] 160-22
[2] 160-32

## Dimensions, forced ventilated (4-pole)

**Design B3**

| Motor type | MDFMARS<br>MDFMAIG<br>MDFMAAG | | | | | | | | | MDFMABS<br>MDFMABI<br>MDFMABA | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | k | g | $g_1$ | x | $m_1$ | $n_2$ | $g_3$ | $k_4$ | $m_2$ | k | g | $g_1$ | x | $m_1$ | $n_2$ | $g_3$ | $k_4$ | $m_2$ |
| | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] |
| 063 | 345 | 123 | 109 | 17 | 136 | 103 | 115 | 12 | 95 | 385 | 123 | 109 | 17 | 136 | 103 | 115 | 12 | 95 |
| 071 | 373 | 138 | 118 | 24 | | | 122 | | | 410 | 138 | 133 | 13 | 194 | 125 | 122 | | |
| 080 | 400 | 156 | 132 | 25 | 152 | 121 | 132 | 13 | 96 | 455 | 156 | 142 | 24 | | | 132 | 13 | 96 |
| 090 | 434 | 176 | 137 | 29 | | | 141 | 22 | 95 | 487 | 176 | 147 | 28 | | | 141 | 22 | 95 |
| 100 | 491 | 194 | 147 | 36 | | | 150 | | | 552 | 194 | 158 | 35 | | | 150 | | |
| 112 | 575 | 218 | 158 | 38 | | | 162 | | | 575 | 218 | 168 | 37 | | | 162 | | |
| 132 | 698 | 257 | 187 | 51 | 194 | 125 | 182 | 32 | | 698 | 257 | 187 | 51 | | | 182 | 32 | |
| 160 | 822 [1] | 309 | 220 | 69 | 253 | 152 | 209 | 31 | 96 | 835 [1] | 309 | 220 | 69 | 253 | 152 | 209 | 31 | 96 |
| | 866 [2] | | | | | | | | | 877 [2] | | | | | | | | |
| 180 | 886 | 348 | 239 | 75 | | | | | | 946 | 348 | 239 | 75 | | | | | |

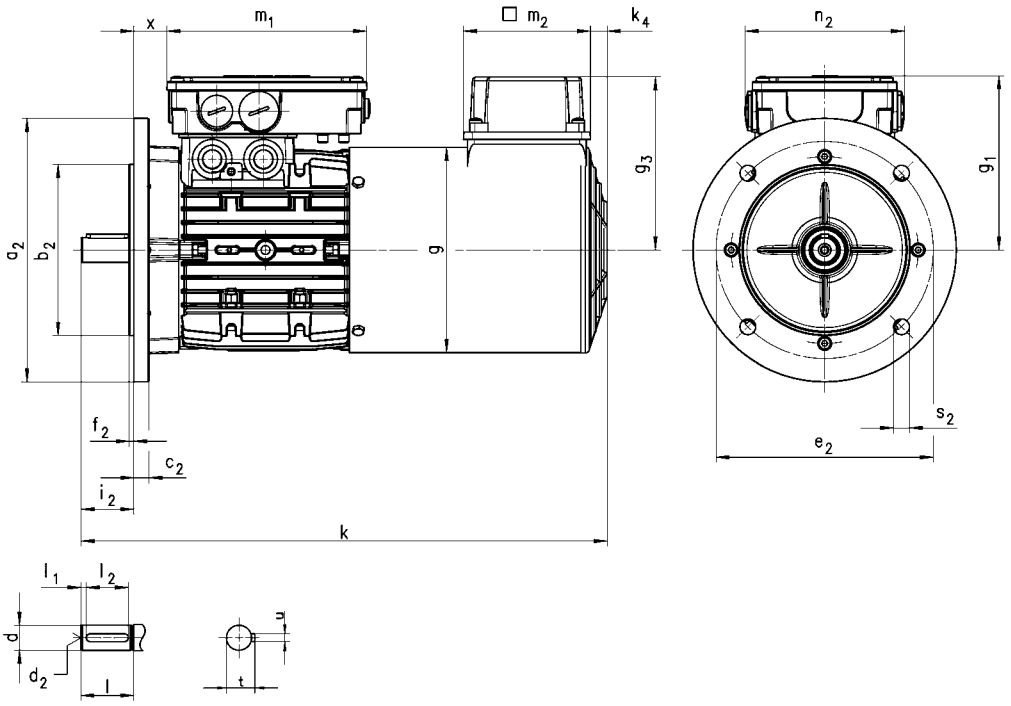
| | d | d | $d_2$ | l | $l_1$ | $l_2$ | t | u |
|---|---|---|---|---|---|---|---|---|
| | j6 | k6 | | | | | | |
| | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] |
| 063 | 11 | | M4 | 23 | 3.5 | 16 | 12.5 | 4.0 |
| 071 | 14 | | M5 | 30 | 4.0 | 22 | 16.0 | 5.0 |
| 080 | 19 | | M6 | 40 | | 32 | 21.5 | 6.0 |
| 090 | 24 | | M8 | 50 | 5.0 | 40 | 27.0 | 8.0 |
| 100 | 28 | | M10 | 60 | | 50 | 31.0 | |
| 112 | | | | | | | | |
| 132 | | 38 | M12 | 80 | | 70 | 41.0 | 10.0 |
| 160 | | 42 | M16 | 110 | | 100 | 45.0 | 12.0 |
| 180 | | 48 | | | | | 51.5 | 14.0 |

| | $b_7$ | $i_4$ | $b_5$ | $e_5$ | h | $c_5$ | $s_5$ |
|---|---|---|---|---|---|---|---|
| | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] |
| 063 | 100 | 40 | 80 | 120 | 63 | 10 | 7.0 |
| 071 | 112 | 45 | 90 | 134 | 71 | 11 | |
| 080 | 125 | 50 | 100 | 154 | 80 | 13 | 10.0 |
| 090 | 140 | 56 | | 174 | 90 | | |
| 100 | 160 | 63 | 140 | 194 | 100 | 15 | 12.0 |
| 112 | 190 | 70 | | 223 | 112 | 14 | |
| 132 | 216 | 89 | 178 | 260 | 132 | 18 | |
| 160 | 254 | 108 | 210 [1] | 305 | 160 | 22 | 14.5 |
| | | | 254 [2] | | | | |
| 180 | 279 | 121 | 241 [3] | 350 | 180 | 23 | |
| | | | 279 [4] | | | | |

[1] 160-22
[2] 160-32
[3] 180-12
[4] 180-32

## Dimensions, forced ventilated (4-pole)

**Design B5**




5.7

| Motor type | MDFMAXX | | | | | | | | | MDFMABR | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | k | g | $g_1$ | x | $m_1$ | $n_2$ | $g_3$ | $k_4$ | $m_2$ | k | g | $g_1$ | x | $m_1$ | $n_2$ | $g_3$ | $k_4$ | $m_2$ |
| | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] |
| 063 | 345 | 123 | 109 | 17 | 136 | 103 | 115 | 12 | 95 | 385 | 123 | 109 | 17 | 136 | 103 | 115 | 12 | 95 |
| 071 | 373 | 138 | 118 | 24 | | | 122 | | | 410 | 138 | 118 | 24 | | | 122 | | |
| 080 | 400 | 156 | 132 | 25 | 152 | 121 | 132 | 13 | 96 | 455 | 156 | 132 | 25 | 152 | 121 | 132 | 13 | 96 |
| 090 | 434 | 176 | 137 | 29 | | | 141 | 22 | 95 | 487 | 176 | 137 | 29 | | | 141 | 22 | 95 |
| 100 | 491 | 194 | 147 | 36 | | | 150 | | | 552 | 194 | 147 | 36 | | | 150 | | |
| 112 | 494 | 218 | 158 | 38 | | | 162 | | | 575 | 218 | 158 | 38 | | | 162 | | |
| 132 | 612 | 257 | 187 | 51 | 194 | 125 | 182 | 32 | | 698 | 257 | 187 | 51 | 194 | 125 | 182 | 32 | |
| 160 | 747 [1] | 309 | 220 | 69 | 253 | 152 | 209 | 31 | 96 | 777 [1] | 309 | 220 | 69 | 253 | 152 | 209 | 31 | 96 |
| | 791 [2] | | | | | | | | | 821 [2] | | | | | | | | |
| 180 | 820 | 348 | 239 | 75 | | | | | | 886 | 348 | 239 | 75 | | | | | |

[1] 160-22
[2] 160-32

## Dimensions, forced ventilated (4-pole)

**Design B5**

| Motor type | MDFMARS<br>MDFMAIG<br>MDFMAAG | | | | | | | | | MDFMABS<br>MDFMABI<br>MDFMABA | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | k | g | $g_1$ | x | $m_1$ | $n_2$ | $g_3$ | $k_4$ | $m_2$ | k | g | $g_1$ | x | $m_1$ | $n_2$ | $g_3$ | $k_4$ | $m_2$ |
| | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] |
| 063 | 345 | 123 | 109 | 17 | 136 | 103 | 115 | 12 | 95 | 385 | 123 | 109 | 17 | 136 | 103 | 115 | 12 | 95 |
| 071 | 373 | 138 | 118 | 24 | | | 122 | | | 410 | 138 | 133 | 13 | 194 | 125 | 122 | | |
| 080 | 400 | 156 | 132 | 25 | 152 | 121 | 132 | 13 | 96 | 455 | 156 | 142 | 24 | | | 132 | 13 | 96 |
| 090 | 434 | 176 | 137 | 29 | | | 141 | 22 | 95 | 487 | 176 | 147 | 28 | | | 141 | 22 | 95 |
| 100 | 491 | 194 | 147 | 36 | | | 150 | | | 552 | 194 | 158 | 35 | | | 150 | | |
| 112 | 575 | 218 | 158 | 38 | | | 162 | | | 575 | 218 | 168 | 37 | | | 162 | | |
| 132 | 698 | 257 | 187 | 51 | 194 | 125 | 182 | 32 | | 698 | 257 | 187 | 51 | | | 182 | 32 | |
| 160 | 822 [1] | 309 | 220 | 69 | 253 | 152 | 209 | 31 | 96 | 835 [1] | 309 | 220 | 69 | 253 | 152 | 209 | 31 | 96 |
| | 866 [2] | | | | | | | | | 877 [2] | | | | | | | | |
| 180 | 886 | 348 | 239 | 75 | | | | | | 946 | 348 | 239 | 75 | | | | | |

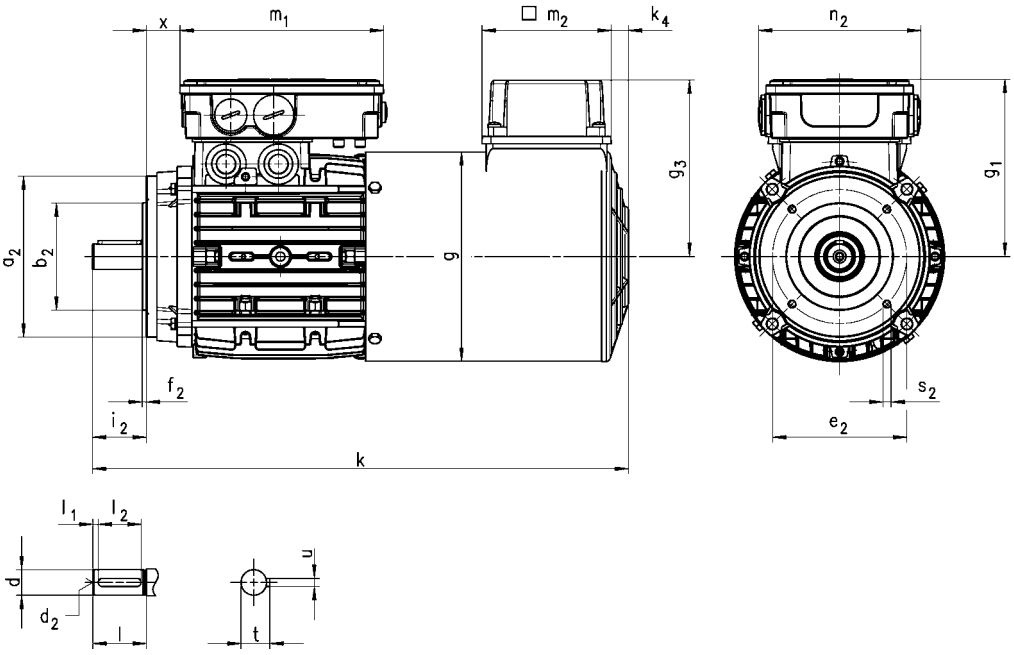
[1] 160-22
[2] 160-32

| | d | d | $d_2$ | l | $l_1$ | $l_2$ | t | u |
|---|---|---|---|---|---|---|---|---|
| | j6 | k6 | | | | | | |
| | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] |
| 063 | 11 | | M4 | 23 | 3.5 | 16 | 12.5 | 4.0 |
| 071 | 14 | | M5 | 30 | 4.0 | 22 | 16.0 | 5.0 |
| 080 | 19 | | M6 | 40 | | 32 | 21.5 | 6.0 |
| 090 | 24 | | M8 | 50 | 5.0 | 40 | 27.0 | 8.0 |
| 100 | 28 | | M10 | 60 | | 50 | 31.0 | |
| 112 | | | | | | | | |
| 132 | | 38 | M12 | 80 | | 70 | 41.0 | 10.0 |
| 160 | | 42 | M16 | 110 | | 100 | 45.0 | 12.0 |
| 180 | | 48 | | | | | 51.5 | 14.0 |

| | Flange size | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | $a_2$ | $b_2$ | $c_2$ | $e_2$ | $f_2$ | $s_2$ | $i_2$ |
| | | | j6 | | | | | -0.6 ... 0.5 |
| | | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] |
| 063 | FF115 | 140 | 95 | 10 | 115 | 3.0 | 10.0 | 23.0 |
| 071 | FF130 | 160 | 110 | | 130 | 3.5 | | 30.0 |
| 080 | FF165 | 200 | 130 | 11 | 165 | | 12.0 | 40.0 |
| 090 | | | | | | | | 50.0 |
| 100 | FF215 | 250 | 180 | 15 | 215 | 4.0 | 14.5 | 60.0 |
| 112 | | | | | | | | |
| 132 | FF265 | 300 | 230 | 20 | 265 | | | 80.0 |
| 160 | FF300 | 350 | 250 | 13 | 300 | 5.0 | 18.5 | 110 |
| 180 | | | | | | | | |

## Dimensions, forced ventilated (4-pole)

**Design B14**




| Motor type | MDFMAXX | | | | | | | | | MDFMABR | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | k | g | $g_1$ | x | $m_1$ | $n_2$ | $g_3$ | $k_4$ | $m_2$ | k | g | $g_1$ | x | $m_1$ | $n_2$ | $g_3$ | $k_4$ | $m_2$ |
| | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] |
| 063 | 345 | 123 | 109 | 17 | 136 | 103 | 115 | 12 | 95 | 385 | 123 | 109 | 17 | 136 | 103 | 115 | 12 | 95 |
| 071 | 373 | 138 | 118 | 24 | | | 122 | | | 410 | 138 | 118 | 24 | | | 122 | | |
| 080 | 400 | 156 | 132 | 25 | 152 | 121 | 132 | 13 | 96 | 455 | 156 | 132 | 25 | 152 | 121 | 132 | 13 | 96 |
| 090 | 434 | 176 | 137 | 29 | | | 141 | 22 | 95 | 487 | 176 | 137 | 29 | | | 141 | 22 | 95 |
| 100 | 491 | 194 | 147 | 36 | | | 150 | | | 552 | 194 | 147 | 36 | | | 150 | | |
| 112 | 494 | 218 | 158 | 38 | | | 162 | | | 575 | 218 | 158 | 38 | | | 162 | | |

5.7

## Dimensions, forced ventilated (4-pole)

**Design B14**

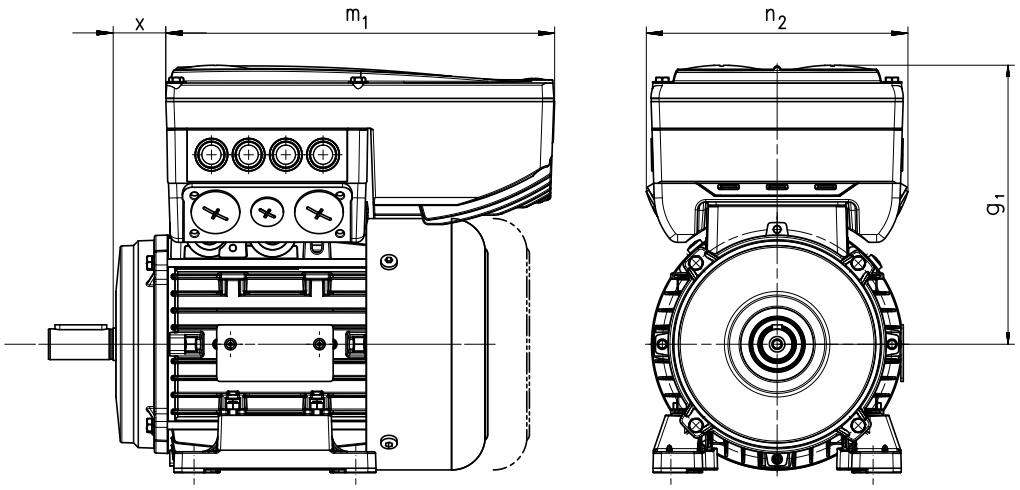
| Motor type | MDFMARS<br>MDFMAIG<br>MDFMAAG | | | | | | | | | MDFMABS<br>MDFMABI<br>MDFMABA | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | k | g | $g_1$ | x | $m_1$ | $n_2$ | $g_3$ | $k_4$ | $m_2$ | k | g | $g_1$ | x | $m_1$ | $n_2$ | $g_3$ | $k_4$ | $m_2$ |
| | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] |
| 063 | 345 | 123 | 109 | 17 | 136 | 103 | 115 | 12 | 95 | 385 | 123 | 109 | 17 | 136 | 103 | 115 | 12 | 95 |
| 071 | 373 | 138 | 118 | 24 | | | 122 | | | 410 | 138 | 133 | 13 | 194 | 125 | 122 | | |
| 080 | 400 | 156 | 132 | 25 | 152 | 121 | 132 | 13 | 96 | 455 | 156 | 142 | 24 | | | 132 | 13 | 96 |
| 090 | 434 | 176 | 137 | 29 | | | 141 | 22 | 95 | 487 | 176 | 147 | 28 | | | 141 | 22 | 95 |
| 100 | 491 | 194 | 147 | 36 | | | 150 | | | 552 | 194 | 158 | 35 | | | 150 | | |
| 112 | 575 | 218 | 158 | 38 | | | 162 | | | 575 | 218 | 168 | 37 | | | 162 | | |

| | d | d | $d_2$ | l | $l_1$ | $l_2$ | t | u |
|---|---|---|---|---|---|---|---|---|
| | j6 | k6 | | | | | | |
| | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] |
| 063 | 11 | | M4 | 23 | 3.5 | 16 | 12.5 | 4.0 |
| 071 | 14 | | M5 | 30 | 4.0 | 22 | 16.0 | 5.0 |
| 080 | 19 | | M6 | 40 | | 32 | 21.5 | 6.0 |
| 090 | 24 | | M8 | 50 | 5.0 | 40 | 27.0 | 8.0 |
| 100 | 28 | | M10 | 60 | | 50 | 31.0 | |
| 112 | | | | | | | | |

| | Flange size | | | | | | |
|---|---|---|---|---|---|---|---|
| | | $a_2$ | $b_2$ | $e_2$ | $f_2$ | $s_2$ | $i_2$ |
| | | | j6 | | | | -0.6 ... 0.5 |
| | | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] |
| 063 | FT75 | 90 | 60 | 75 | 2.5 | M5x10 | 23.0 |
| 071 | FT85 | 105 | 70 | 85 | | M6x10 | 30.0 |
| 080 | FT100 | 120 | 80 | 100 | 3.0 | M6x12 | 40.0 |
| | FT130 | 160 | 110 | 130 | 3.5 | M8x14 | |
| 090 | FT115 | 140 | 95 | 115 | 3.0 | M8x16 | 50.0 |
| | FT130 | 160 | 110 | 130 | 3.5 | | |
| 100 | | | | | | M8x14 | 60.0 |
| 112 | | | | | | M8x16 | |

## Dimensions, 8400 motec inverter

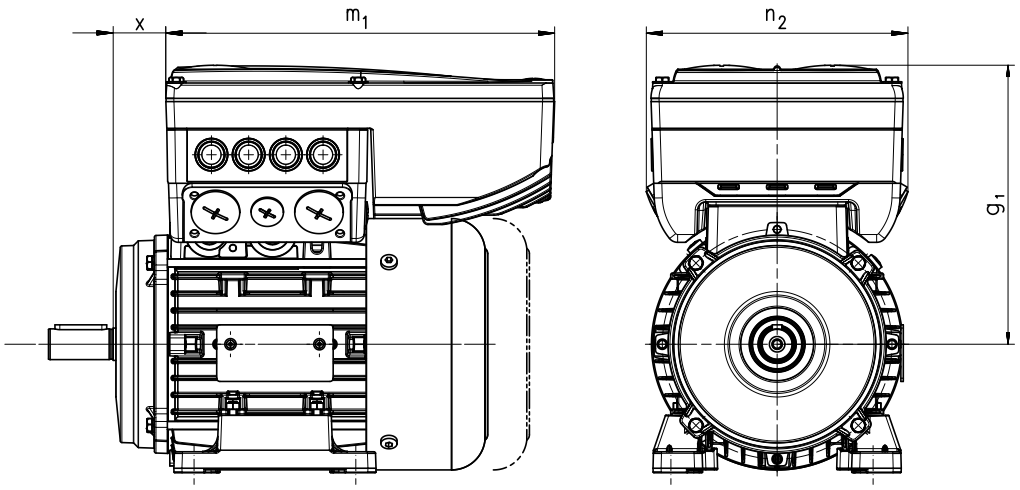
**Rated frequency 50/60 Hz**




| Product key | | | | | |
|---|---|---|---|---|---|
| Motor | Inverter | | | | |
| | | $g_{1,\ 50Hz}$ | $m_{1,\ 50Hz}$ | $n_{2,\ 50Hz}$ | $x_{50Hz}$ |
| | | [mm] | [mm] | [mm] | [mm] |
| MD□□□□□071-32 | E84DVB□3714S□□□2□ | 163 | 241 | 161 | 29.5 |
| MD□□□□□071-42 | E84DVB□5514S□□□2□ | | | | |
| MD□□□□□080-12 | | 172 | | | 32.5 |
| MD□□□□□080-32 | E84DVB□7514S□□□2□ | | | | |
| MD□□□□□080-42 | E84DVB□1124S□□□2□ | | | | |
| MD□□□□□090-12 | | 177 | | | 36.2 |
| MD□□□□□090-32 | E84DVB□1524S□□□2□ | | | | |
| MD□□□□□100-12 | E84DVB□2224S□□□2□ | 217 | 260 | 176 | 42.4 |
| MD□□□□□100-32 | E84DVB□3024S□□□2□ | | | | |
| MD□□□□□112-22 | E84DVB□4024S□□□2□ | 282 | 325 | 195 | 32.0 |
| MD□□□□□132-12 | E84DVB□5524S□□□2□ | 301 | | | 47.5 |
| MD□□□□□132-22 | E84DVB□7524S□□□2□ | | | | |

## Dimensions, 8400 motec inverter

**Rated frequency 87 Hz**




| Product key | | | | | |
|---|---|---|---|---|---|
| Motor | Inverter | | | | |
| | | $g_{1,\ 87Hz}$ | $m_{1,\ 87Hz}$ | $n_{2,\ 87Hz}$ | $x_{87Hz}$ |
| | | [mm] | [mm] | [mm] | [mm] |
| MD□□□□□□063-32 | E84DVB□3714S□□□2□ | 154 | 241 | 161 | 23.5 |
| MD□□□□□□063-42 | E84DVB□5514S□□□2□ | | | | |
| MD□□□□□□071-12 | | 163 | | | 29.5 |
| MD□□□□□□071-32 | E84DVB□7514S□□□2□ | | | | |
| MD□□□□□□071-42 | E84DVB□1124S□□□2□ | | | | |
| MD□□□□□□080-12 | | 172 | | | 32.5 |
| MD□□□□□□080-32 | E84DVB□1524S□□□2□ | | | | |
| MD□□□□□□080-42 | E84DVB□2224S□□□2□ | 201 | 260 | 176 | 31.5 |
| MD□□□□□□090-12 | | 206 | | | 35.2 |
| MD□□□□□□090-32 | E84DVB□3024S□□□2□ | | | | |
| MD□□□□□□100-12 | E84DVB□4024S□□□2□ | 272 | 325 | 195 | 29.9 |
| MD□□□□□□100-32 | E84DVB□5524S□□□2□ | | | | |
| MD□□□□□□112-22 | E84DVB□7524S□□□2□ | 282 | | | 32.0 |

## Spring-applied brakes

Three-phase AC motors can be fitted with a spring-applied brake. This is activated after the supply voltage is switched off (closed-circuit principle). For optimum adjustment of the brake motor to the application, a range of braking torques and control modes is available for every motor frame size. For applications with very high operating frequencies the brake is also available in a LongLife version, with reinforced mechanical brake components.

**Features**

**Versions**
- **Standard**
  - 1 x $10^6$ repeating switching cycles
  - 1 x $10^6$ reversing switching cycles
- **LongLife**
  - 10 x $10^6$ repeating switching cycles
  - 15 x $10^6$ reversing switching cycles

**Control**
- DC supply
- AC supply via rectifier in the terminal box

**Enclosure**
- Without manual release IP55
- With manual release IP54

**Friction lining**
- Non-asbestos, low wearing

**Options**
- Manual release
- UL/CSA approval
- Noise-reduced

**Assignment of 4-pole motors and brakes**

| Design | Standard | | LongLife | |
|---|---|---|---|---|
| Motor frame size | Size | Rated torque | Size | Rated torque |
| | Brake | | Brake | |
| | | $M_k$ | | $M_k$ |
| | | [Nm] | | [Nm] |
| 063-02<br>063-12<br>063-22<br>063-32<br>063-42 | 06<br>06 | 2.50<br>4.00 | 06 | 4.00 |
| 071-12<br>071-32 | 06<br>06<br>08 | 2.50<br>4.00<br>3.50 | 06<br>08 | 4.00<br>3.50 |
| 071-42 | 06<br>06<br>08<br>08 | 2.50<br>4.00<br>3.50<br>8.00 | 06<br>08<br>08 | 4.00<br>3.50<br>8.00 |
| 080-12<br>080-32 | 08<br>08<br>10 | 3.50<br>8.00<br>7.00 | 08<br>10 | 8.00<br>7.00 |
| 080-42 | 08<br>08<br>10<br>10 | 3.50<br>8.00<br>7.00<br>16.0 | 08<br>10<br>10 | 8.00<br>7.00<br>16.0 |

## Spring-applied brakes

**Assignment of 4-pole motors and brakes**

| Design | Standard | | LongLife | |
|---|---|---|---|---|
| Motor frame size | Size Brake | Rated torque $M_k$ [Nm] | Size Brake | Rated torque $M_k$ [Nm] |
| 090-12 | 08 | 3.50 | | |
| 090-32 | 08 | 8.00 | 08 | 8.00 |
| | 10 | 7.00 | 10 | 7.00 |
| | 10 | 16.0 | 10 | 16.0 |
| | 10 | 23.0 | | |
| 100-12 | 10 | 7.00 | | |
| | 10 | 16.0 | | |
| | 12 | 14.0 | 10 | 16.0 |
| | 12 | 32.0 | | |
| 100-32 | 10 | 7.00 | | |
| | 10 | 16.0 | 12 | 14.0 |
| | 12 | 14.0 | | |
| | 12 | 32.0 | 12 | 32.0 |
| | 12 | 46.0 | | |
| 112-22 | 12 | 14.0 | | |
| 112-32 | 12 | 32.0 | | |
| | 14 | 35.0 | | |
| | 14 | 60.0 | | |
| 132-12 | 14 | 35.0 | | |
| | 14 | 60.0 | | |
| | 16 | 60.0 | | |
| | 16 | 80.0 | | |
| 132-22 | 14 | 35.0 | | |
| 132-32 | 14 | 60.0 | | |
| | 16 | 60.0 | | |
| | 16 | 80.0 | | |
| | 16 | 100 | | |
| 160-22 | 16 | 60.0 | | |
| | 16 | 80.0 | | |
| | 18 | 80.0 | | |
| | 18 | 150 | | |
| 160-32 | 18 | 80.0 | | |
| | 18 | 150 | | |
| | 18 | 200 | | |
| 180-12 | 18 | 80.0 | | |
| | 18 | 150 | | |
| | 20 | 145 | | |
| | 20 | 260 | | |
| 180-32 | 18 | 80.0 | | |
| | 18 | 150 | | |
| | 20 | 145 | | |
| | 20 | 260 | | |
| | 20 | 315 | | |
| 180-42 | 18 | 80.0 | | |
| | 18 | 150 | | |
| | 20 | 145 | | |
| | 20 | 260 | | |
| | 20 | 315 | | |
| | 20 | 400 | | |

## Spring-applied brakes

**Direct connection without rectifier**

If the brake is activated directly without a rectifier, a freewheeling diode or a spark suppressor is required to protect against induction peaks.

- Supply voltages
  DC 24 V
  DC 180 V
  DC 205 V

**Connection via mains voltage with brake rectifier**

If the brake is not directly supplied with DC voltage, a rectifier is required. This is included in the scope of supply and is located in the terminal box of the motor. The rectifier converts the AC voltage of the connection into DC voltage. The following rectifiers are available:

**Half-wave rectifier, 6-pole**

- Ratio of supply voltage to brake coil voltage = 2.22
- Approved by UL/CSA
- Supply voltages
  AC 230 V
  AC 400 V
  AC 460 V

**Bridge rectifier, 6-pole**

- Ratio of supply voltage to brake coil voltage = 1.11
- Supply voltage
  AC 230 V

**Bridge/half-wave rectifier, 6-pole**

- Ratio of supply voltage to brake coil voltage
  up to overexcitation time = 1.11
  beyond overexcitation time = 2.22

**Supply voltages:**

- AC 230 V
- AC 400 V

## Spring-applied brakes

**Connection via mains voltage with brake rectifier**

**Bridge/half-wave rectifier, 6-pole**
- Ratio of supply voltage to brake coil voltage
  up to overexcitation time = 1.11
  beyond overexcitation time = 2.22

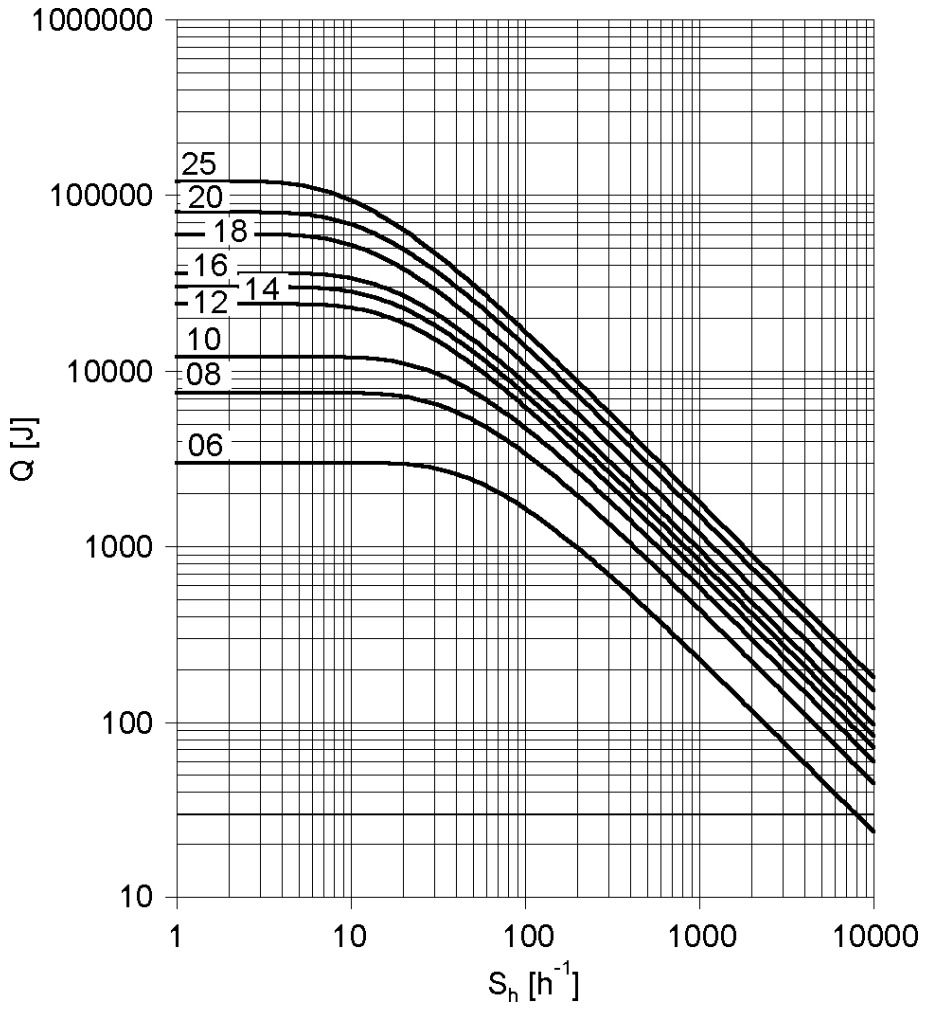
**Supply voltages:**
- AC 230 V
- AC 400 V

During the switching operation the bridge/half-wave rectifier functions as a bridge rectifier for the overexcitation time $t_{ü}$ and then as a half-wave rectifier. This combination optimises the performance of the brake – depending on the assignment of brake coil voltage and supply voltage:

- **Short-time overexcitation of the brake coil**
  Activating the brake coil for the overexcitation time $t_{ü}$ with twice the rated voltage allows the disengagement time to be reduced. The brake opens more quickly and wear on the friction lining is reduced.
  These features make this activation version particularly suitable for lifting applications. It is therefore only available in combination with a brake with increased braking torque.
- **Holding current reduction (cold brake)**
  By reducing the holding current, the bridge/half-wave rectifier is able to reduce the power input to the open brake. As the brake heats up less, this type of activation is known as "cold brake".

## Spring-applied brakes

**Permissible friction energy**




Q =Switching energy per switching cycle
$S_h$ =Operating frequency
Brake size = 06 to 25

## Spring-applied brakes

**Rated data with reduced braking torque**

► Please enquire for braking torques and maximum switching work values not listed here.

| Size | | | 06 | 08 | 10 | 12 | 14 | 16 | 18 | 20 | 25 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Power input** | | | | | | | | | | | |
| | $P_{in}$ | [kW] | 0.020 | 0.025 | 0.030 | 0.040 | 0.050 | 0.055 | 0.085 | 0.10 | 0.11 |
| **Braking torque** | | | | | | | | | | | |
| 100 | $M_B$ | [Nm] | 2.50 | 3.50 | 7.00 | 14.0 | 35.0 | 60.0 | 80.0 | 145 | 265 |
| 1000 | $M_B$ | [Nm] | 2.30 | 3.10 | 6.10 | 12.0 | 30.0 | 50.0 | 65.0 | 115 | 203 |
| 1200 | $M_B$ | [Nm] | 2.30 | 3.10 | 6.00 | 12.0 | 29.0 | 48.0 | 63.0 | 112 | 199 |
| 1500 | $M_B$ | [Nm] | 2.20 | 3.00 | 5.80 | 11.0 | 28.0 | 47.0 | 61.0 | 109 [1)] | 193 [1)] |
| 1800 | $M_B$ | [Nm] | 2.10 | 2.90 | 5.70 | 11.0 | 28.0 | 46.0 | 60.0 [1)] | | |
| 3000 | $M_B$ | [Nm] | 2.00 | 2.80 | 5.30 | 10.0 | 26.0 [1)] | 43.0 [1)] | | | |
| 3600 | $M_B$ | [Nm] | 2.00 | 2.70 | 5.20 | 10.0 [1)] | | | | | |
| **Maximum switching energy** | | | | | | | | | | | |
| 100 | $Q_E$ | [KJ] | 3.00 | 7.50 | 12.0 | 24.0 | 30.0 | 36.0 | 60.0 | 80.0 | 120 |
| 1000 | $Q_E$ | [KJ] | 3.00 | 7.50 | 12.0 | 24.0 | 30.0 | 36.0 | 60.0 | 80.0 | 120 |
| 1200 | $Q_E$ | [KJ] | 3.00 | 7.50 | 12.0 | 24.0 | 30.0 | 36.0 | 60.0 | 80.0 | 120 |
| 1500 | $Q_E$ | [KJ] | 3.00 | 7.50 | 12.0 | 24.0 | 30.0 | 36.0 | 60.0 | 24.0 [1)] | 36.0 [1)] |
| 1800 | $Q_E$ | [KJ] | 3.00 | 7.50 | 12.0 | 24.0 | 30.0 | 36.0 | 36.0 [1)] | | |
| 3000 | $Q_E$ | [KJ] | 3.00 | 7.50 | 12.0 | 24.0 | 18.0 [1)] | 11.0 [1)] | | | |
| 3600 | $Q_E$ | [KJ] | 3.00 | 7.50 | 12.0 | 7.00 [1)] | | | | | |
| **Transition operating frequency** | | | | | | | | | | | |
| | $S_{hü}$ | [1/h] | 79.0 | 50.0 | 40.0 | 30.0 | 28.0 | 27.0 | 20.0 | 19.0 | 15.0 |
| **Moment of inertia** | | | | | | | | | | | |
| | J | [kgcm²] | 0.015 | 0.061 | 0.20 | 0.45 | 0.63 | 1.50 | 2.90 | 7.30 | 20.0 |
| **Mass** | | | | | | | | | | | |
| | m | [kg] | 0.90 | 1.50 | 2.60 | 4.20 | 5.80 | 8.70 | 12.6 | 19.5 | 31.0 |

[1)] In the region of the load limit the value for friction energy $Q_{BW}$ can be reduced to 40 %.

## Spring-applied brakes

**Rated data with reduced braking torque**

► Activation via half-wave or bridge rectifier

| **Size** | | | 06 | 08 | 10 | 12 | 14 | 16 | 18 | 20 | 25 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Friction energy** | | | | | | | | | | | |
| | $Q_{BW}$ | [MJ] | 113 | 210 | 264 | 706 | 761 | 966 | 1542 | 2322 | 3522 |
| **Delay time** | | | | | | | | | | | |
| Engaging | $t_{11}$ | [ms] | 11.0 | 14.0 | 20.0 | 21.0 | 37.0 | 53.0 | 32.0 | 47.0 | 264 |
| **Rise time** | | | | | | | | | | | |
| Braking torque | $t_{12}$ | [ms] | 13.0 | 10.0 | 17.0 | 19.0 | 22.0 | 30.0 | 20.0 | 100 | 120 |
| **Engagement time** | | | | | | | | | | | |
| | $t_1$ | [ms] | 24.0 | | 37.0 | 40.0 | 59.0 | 83.0 | 52.0 | 147 | 384 |
| **Disengagement time** | | | | | | | | | | | |
| | $t_2$ | [ms] | 35.0 | 37.0 | 57.0 | 65.0 | 148 | 169 | 230 | 207 | 269 |

► Activation via bridge/half-wave rectifier

| **Design** | | | Holding current reduction (cold brake) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Size** | | | 06 | 08 | 10 | 12 | 14 | 16 | 18 | 20 | 25 |
| **Friction energy** | | | | | | | | | | | |
| | $Q_{BW}$ | [MJ] | 113 | 210 | 264 | 706 | 761 | 966 | 1542 | 2322 | 3522 |
| **Overexcitation time** | | | | | | | | | | | |
| | $t_{ü}$ | [ms] | 300 | | | | 1300 | | | | |
| **Min. rest time** | | | | | | | | | | | |
| | t | [ms] | 900 | | | | 3900 | | | | |
| **Delay time** | | | | | | | | | | | |
| Engaging | $t_{11}$ | [ms] | 12.0 | 22.0 | 35.0 | 49.0 | 61.0 | 114 | 83.0 | 126 | 304 |
| **Rise time** | | | | | | | | | | | |
| Braking torque | $t_{12}$ | [ms] | 14.0 | 16.0 | 30.0 | 45.0 | 37.0 | 65.0 | 52.0 | 269 | 138 |
| **Engagement time** | | | | | | | | | | | |
| | $t_1$ | [ms] | 26.0 | 38.0 | 66.0 | 93.0 | 97.0 | 180 | 134 | 395 | 443 |
| **Disengagement time** | | | | | | | | | | | |
| | $t_2$ | [ms] | 35.0 | 37.0 | 57.0 | 65.0 | 148 | 169 | 230 | 207 | 269 |

► The brake response and application times are guide values. The engagement time is 10 times longer with AC-side switching. With the maximum air gap the disengagement time $t_2$ – depending on the brake and control – is up to 4 times longer than the disengagement time with the rated air gap.

## Spring-applied brakes

### Rated data with standard braking torque

► Please enquire for braking torques and maximum switching work values not listed here.

| Size | | | 06 | 08 | 10 | 12 | 14 | 16 | 18 | 20 | 25 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Power input** | | | | | | | | | | | |
| | $P_{in}$ | [kW] | 0.020 | 0.025 | 0.030 | 0.040 | 0.050 | 0.055 | 0.085 | 0.10 | 0.11 |
| **Braking torque** | | | | | | | | | | | |
| 100 | $M_B$ | [Nm] | 4.00 | 8.00 | 16.0 | 32.0 | 60.0 | 80.0 | 150 | 260 | 400 |
| 1000 | $M_B$ | [Nm] | 3.70 | 7.20 | 14.0 | 27.0 | 51.0 | 66.0 | 121 | 206 | 307 |
| 1200 | $M_B$ | [Nm] | 3.60 | 7.00 | 14.0 | 27.0 | 50.0 | 65.0 | 118 | 201 | 300 |
| 1500 | $M_B$ | [Nm] | 3.50 | 6.80 | 13.0 | 26.0 | 48.0 | 63.0 | 115 | 195 [1)] | 291 [1)] |
| 1800 | $M_B$ | [Nm] | 3.40 | 6.70 | 13.0 | 26.0 | 47.0 | 61.0 | 112 [1)] | | |
| 3000 | $M_B$ | [Nm] | 3.20 | 6.30 | 12.0 | 24.0 | 44.0 [1)] | 57.0 [1)] | | | |
| 3600 | $M_B$ | [Nm] | 3.20 | 6.10 | 12.0 | 23.0 [1)] | | | | | |
| **Maximum switching energy** | | | | | | | | | | | |
| 100 | $Q_E$ | [KJ] | 3.00 | 7.50 | 12.0 | 24.0 | 30.0 | 36.0 | 60.0 | 80.0 | 120 |
| 1000 | $Q_E$ | [KJ] | 3.00 | 7.50 | 12.0 | 24.0 | 30.0 | 36.0 | 60.0 | 80.0 | 120 |
| 1200 | $Q_E$ | [KJ] | 3.00 | 7.50 | 12.0 | 24.0 | 30.0 | 36.0 | 60.0 | 80.0 | 120 |
| 1500 | $Q_E$ | [KJ] | 3.00 | 7.50 | 12.0 | 24.0 | 30.0 | 36.0 | 60.0 | 24.0 [1)] | 36.0 [1)] |
| 1800 | $Q_E$ | [KJ] | 3.00 | 7.50 | 12.0 | 24.0 | 30.0 | 36.0 | 36.0 [1)] | | |
| 3000 | $Q_E$ | [KJ] | 3.00 | 7.50 | 12.0 | 24.0 | 18.0 [1)] | 11.0 [1)] | | | |
| 3600 | $Q_E$ | [KJ] | 3.00 | 7.50 | 12.0 | 7.00 [1)] | | | | | |
| **Transition operating frequency** | | | | | | | | | | | |
| | $S_{hü}$ | [1/h] | 79.0 | 50.0 | 40.0 | 30.0 | 28.0 | 27.0 | 20.0 | 19.0 | 15.0 |
| **Moment of inertia** | | | | | | | | | | | |
| | J | [kgcm²] | 0.015 | 0.061 | 0.20 | 0.45 | 0.63 | 1.50 | 2.90 | 7.30 | 20.0 |
| **Mass** | | | | | | | | | | | |
| | m | [kg] | 0.90 | 1.50 | 2.60 | 4.20 | 5.80 | 8.70 | 12.6 | 19.5 | 31.0 |

[1)] In the region of the load limit the value for friction energy $Q_{BW}$ can be reduced to 40 %.

## Spring-applied brakes

**Rated data with standard braking torque**

► Activation via half-wave or bridge rectifier

| Size | | | 06 | 08 | 10 | 12 | 14 | 16 | 18 | 20 | 25 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Friction energy** | | | | | | | | | | | |
| | $Q_{BW}$ | [MJ] | 85.0 | 158 | 264 | 530 | 571 | 966 | 1542 | 2322 | 3522 |
| **Delay time** | | | | | | | | | | | |
| Engaging | $t_{11}$ | [ms] | 15.0 | | 28.0 | | 17.0 | 27.0 | 33.0 | 65.0 | 110 |
| **Rise time** | | | | | | | | | | | |
| Braking torque | $t_{12}$ | [ms] | 13.0 | 16.0 | 19.0 | 25.0 | | 30.0 | 45.0 | 100 | 120 |
| **Engagement time** | | | | | | | | | | | |
| | $t_1$ | [ms] | 28.0 | 31.0 | 47.0 | 53.0 | 42.0 | 57.0 | 78.0 | 165 | 230 |
| **Disengagement time** | | | | | | | | | | | |
| | $t_2$ | [ms] | 45.0 | 57.0 | 76.0 | 115 | 210 | 220 | 270 | 340 | 390 |

► Activation via bridge/half-wave rectifier

| Design | | | Holding current reduction (cold brake) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Size** | | | 06 | 08 | 10 | 12 | 14 | 16 | 18 | 20 | 25 |
| **Friction energy** | | | | | | | | | | | |
| | $Q_{BW}$ | [MJ] | 85.0 | 158 | 264 | 530 | 571 | 966 | 1542 | 2322 | 3522 |
| **Overexcitation time** | | | | | | | | | | | |
| | $t_{ü}$ | [ms] | 300 | | | | 1300 | | | | |
| **Min. rest time** | | | | | | | | | | | |
| | t | [ms] | 900 | | | | 3900 | | | | |
| **Delay time** | | | | | | | | | | | |
| Engaging | $t_{11}$ | [ms] | 16.0 | 25.0 | 31.0 | 48.0 | 33.0 | 58.0 | 80.0 | 102 | 154 |
| **Rise time** | | | | | | | | | | | |
| Braking torque | $t_{12}$ | [ms] | 14.0 | 27.0 | 21.0 | 43.0 | 49.0 | 64.0 | 109 | 157 | 168 |
| **Engagement time** | | | | | | | | | | | |
| | $t_1$ | [ms] | 30.0 | 52.0 | | 90.0 | 82.0 | 122 | 189 | 259 | 322 |
| **Disengagement time** | | | | | | | | | | | |
| | $t_2$ | [ms] | 45.0 | 57.0 | 76.0 | 115 | 210 | 220 | 270 | 340 | 390 |

► The brake response and application times are guide values. The engagement time is 10 times longer with AC-side switching. With the maximum air gap the disengagement time $t_2$ – depending on the brake and control – is up to 4 times longer than the disengagement time with the rated air gap.

## Spring-applied brakes

**Rated data with increased braking torque**

► Please enquire for braking torques and maximum switching work values not listed here.

| Size | | | 10 | 12 | 14 | 16 | 16 | 18 | 20 | 20 | 25 | 25 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Power input** | | | | | | | | | | | | |
| | $P_{in}$ | [kW] | 0.030 | 0.040 | 0.050 | 0.055 | 0.055 | 0.085 | 0.10 | 0.10 | 0.11 | 0.11 |
| **Braking torque** | | | | | | | | | | | | |
| 100 | $M_B$ | [Nm] | 23.0 | 46.0 | 75.0 | 100 | 125 | 200 | 315 | 400 | 490 | 600 |
| 1000 | $M_B$ | [Nm] | 20.0 | 39.0 | 64.0 | 83.0 | 103 | 162 | 249 | 317 | 376 | 461 |
| 1200 | $M_B$ | [Nm] | 20.0 | 39.0 | 62.0 | 81.0 | 101 | 158 | 244 | 309 | 367 | 449 |
| 1500 | $M_B$ | [Nm] | 19.0 | 38.0 | 60.0 | 78.0 | 98.0 | 153 | 237 [1)] | 300 [1)] | 356 [1)] | 436 [1)] |
| 1800 | $M_B$ | [Nm] | 19.0 | 37.0 | 59.0 | 77.0 | 96.0 | 150 [1)] | | | | |
| 3000 | $M_B$ | [Nm] | 17.0 | 34.0 | 55.0 [1)] | 71.0 [1)] | 89.0 [1)] | | | | | |
| 3600 | $M_B$ | [Nm] | 17.0 | 33.0 [1)] | | | | | | | | |
| **Maximum switching energy** | | | | | | | | | | | | |
| 100 | $Q_E$ | [KJ] | 12.0 | 24.0 | 30.0 | 36.0 | 36.0 | 60.0 | 80.0 | 80.0 | 120 | 120 |
| 1000 | $Q_E$ | [KJ] | 12.0 | 24.0 | 30.0 | 36.0 | 36.0 | 60.0 | 80.0 | 80.0 | 120 | 120 |
| 1200 | $Q_E$ | [KJ] | 12.0 | 24.0 | 30.0 | 36.0 | 36.0 | 60.0 | 80.0 | 80.0 | 120 | 120 |
| 1500 | $Q_E$ | [KJ] | 12.0 | 24.0 | 30.0 | 36.0 | 36.0 | 60.0 | 24.0 [1)] | 24.0 [1)] | 36.0 [1)] | 36.0 [1)] |
| 1800 | $Q_E$ | [KJ] | 12.0 | 24.0 | 30.0 | 36.0 | 36.0 | 36.0 [1)] | | | | |
| 3000 | $Q_E$ | [KJ] | 12.0 | 24.0 | 18.0 [1)] | 11.0 [1)] | 11.0 [1)] | | | | | |
| 3600 | $Q_E$ | [KJ] | 12.0 | 7.00 [1)] | | | | | | | | |
| **Transition operating frequency** | | | | | | | | | | | | |
| | $S_{hü}$ | [1/h] | 40.0 | 30.0 | 28.0 | 27.0 | 27.0 | 20.0 | 19.0 | 19.0 | 15.0 | 15.0 |
| **Moment of inertia** | | | | | | | | | | | | |
| | J | [kgcm²] | 0.20 | 0.45 | 0.63 | 1.50 | 1.50 | 2.90 | 7.30 | 7.30 | 20.0 | 20.0 |
| **Mass** | | | | | | | | | | | | |
| | m | [kg] | 2.60 | 4.20 | 5.80 | 8.70 | 8.70 | 12.6 | 19.5 | 19.5 | 31.0 | 31.0 |

[1)] In the region of the load limit the value for friction energy $Q_{BW}$ can be reduced to 40 %.

► Activation via half-wave or bridge rectifier

| Size | | | 10 | 12 | 14 | 16 | | 18 | 20 | | 25 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Friction energy** | | | | | | | | | | | | |
| | $Q_{BW}$ | [MJ] | 198 | 353 | 253 | 563 | 241 | 578 | 1596 | 580 | 2465 | 1409 |
| **Delay time** | | | | | | | | | | | | |
| Engaging | $t_{11}$ | [ms] | 10.0 | 16.0 | 11.0 | 22.0 | 17.0 | 24.0 | 46.0 | 17.0 | 77.0 | 38.0 |
| **Rise time** | | | | | | | | | | | | |
| Braking torque | $t_{12}$ | [ms] | 19.0 | 25.0 | | 30.0 | | 45.0 | 100 | | 120 | |
| **Engagement time** | | | | | | | | | | | | |
| | $t_1$ | [ms] | 29.0 | 41.0 | 36.0 | 52.0 | 47.0 | 69.0 | 146 | 117 | 197 | 158 |
| **Disengagement time** | | | | | | | | | | | | |
| | $t_2$ | [ms] | 109 | 193 | 308 | 297 | 435 | 356 | 378 | 470 | 451 | 532 |

## Spring-applied brakes

**Rated data with increased braking torque**

► Activation via bridge/half-wave rectifier

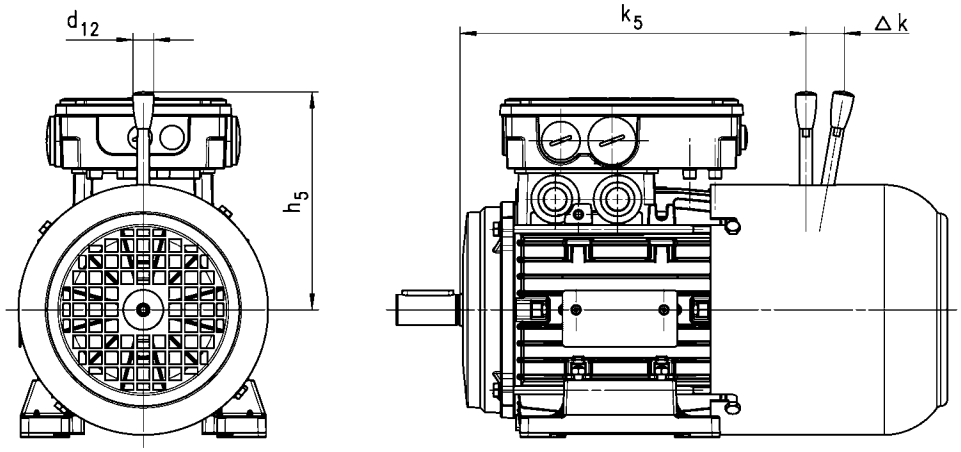
| Design | | | Holding current reduction (cold brake) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Size | | | 10 | 12 | 14 | 16 | | 18 | 20 | | 25 | |
| Friction energy | $Q_{BW}$ | [MJ] | 198 | 353 | 253 | 563 | 241 | 578 | 1596 | 580 | 2465 | 1409 |
| Overexcitation time | $t_{ü}$ | [ms] | 300 | | | 1300 | | | | | | |
| Min. rest time | t | [ms] | 900 | | | 3900 | | | | | | |
| Delay time | | | | | | | | | | | | |
| Engaging | $t_{11}$ | [ms] | 24.0 | 27.0 | 17.0 | 41.0 | 21.0 | 60.0 | 69.0 | 17.0 | 123 | 85.0 |
| Rise time | | | | | | | | | | | | |
| Braking torque | $t_{12}$ | [ms] | 44.0 | 43.0 | 37.0 | 55.0 | 37.0 | 113 | 148 | 100 | 190 | 270 |
| Engagement time | $t_1$ | [ms] | 68.0 | 70.0 | 54.0 | 97.0 | 57.0 | 173 | 217 | 334 | 313 | 355 |
| Disengagement time | $t_2$ | [ms] | 109 | 193 | 308 | 297 | 435 | 356 | 378 | 470 | 451 | 532 |

| Design | | | Over-excitation | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Size | | | 10 | 12 | 14 | 16 | | 18 | 20 | | 25 | |
| Friction energy | $Q_{BW}$ | [MJ] | 264 | 706 | 761 | 966 | | 1542 | 2322 | | 3522 | |
| Overexcitation time | $t_{ü}$ | [ms] | 300 | | | 1300 | | | | | | |
| Min. rest time | t | [ms] | 900 | | | 3900 | | | | | | |
| Delay time | | | | | | | | | | | | |
| Engaging | $t_{11}$ | [ms] | 29.0 | 54.0 | 31.0 | 70.0 | 46.0 | 86.0 | 103 | 55.0 | 171 | 135 |
| Rise time | | | | | | | | | | | | |
| Braking torque | $t_{12}$ | [ms] | 53.0 | 87.0 | 68.0 | 93.0 | 83.0 | 160 | 222 | 319 | 266 | 430 |
| Engagement time | $t_1$ | [ms] | 82.0 | 141 | 99.0 | 163 | 129 | 246 | 325 | 374 | 437 | 565 |
| Disengagement time | $t_2$ | [ms] | 53.0 | 81.0 | 117 | 141 | 168 | 151 | 160 | 167 | 184 | 204 |

► The brake response and application times are guide values. The engagement time is 10 times longer with AC-side switching. With the maximum air gap the disengagement time $t_2$ – depending on the brake and control – is up to 4 times longer than the disengagement time with the rated air gap.

## Spring-applied brakes

### Manual release lever




| | Brake | | | | |
|---|---|---|---|---|---|
| | | $k_5$ | Δ k | $h_5$ | $d_{12}$ |
| | | [mm] | [mm] | [mm] | [mm] |
| 063 | 06 | 178 | 29 | 107 | 13.0 |
| 071 | 06<br>08 | 205<br>206 | 29<br>27 | 107<br>116 | 13.0<br>13.0 |
| 080 | 08<br>10 | 224<br>239 | 27<br>28 | 116<br>132 | 13.0<br>13.0 |
| 090 | 08<br>10 | 238<br>251 | 27<br>28 | 116<br>132 | 13.0<br>13.0 |
| 100 | 10<br>12 | 305<br>307 | 28<br>37 | 132<br>161 | 13.0<br>13.0 |
| 112 | 12<br>14 | 320<br>323 | 37<br>41 | 161<br>195 | 13.0<br>24.0 |
| 132 | 14<br>16 | 400<br>406 | 41<br>55 | 195<br>240 | 24.0<br>24.0 |
| 160 | 16<br>18 | 505<br>509 | 55<br>59 | 240<br>279 | 24.0<br>24.0 |
| 180 | 18<br>20 | 540<br>546 | 59<br>74 | 279<br>319 | 24.0<br>24.0 |

The following combinations with manual release lever and motor connection in the same position are not possible:
- HAN connector with connection in position 1
- Inverter motec
- Terminal box of motor sizes 071, 080, 090 for brake and retracting (M□□MA BR/BS/BA/BI)

## Resolver

Stator-fed resolver with two stator windings offset by 90° and one rotor winding with transformer winding.

► The three-phase AC motors with resolver cannot be used for speed-dependent safety functions in connection with the SM 301 safety module.

| | | | | |
|---|---|---|---|---|
| **Product key** | | | | |
| | | | | RS1 |
| **Accuracy** | | | | |
| | | | ['] | -10 ... 10 |
| **Absolute positioning** | | | | |
| | | | | 1 revolution |
| **Max. input voltage** | | | | |
| DC | $U_{in,max}$ | | [V] | 10.0 |
| **Max. input frequency** | | | | |
| | $f_{in,max}$ | | [kHz] | 4.00 |
| **Ratio** | | | | |
| Stator / rotor | | ± 5 % | | 0.30 |
| **Rotor impedance** | | | | |
| | $Z_{ro}$ | | [Ω] | 51 + j90 |
| **Stator impedance** | | | | |
| | $Z_{so}$ | | [Ω] | 102 + j150 |
| **Impedance** | | | | |
| | $Z_{rs}$ | | [Ω] | 44 + j76 |
| **Min. insulation resistance** | | | | |
| At DC 500 V | R | | [MΩ] | 10.0 |
| **Number of pole pairs** | | | | |
| | | | | 1 |

## Incremental encoder and SinCos absolute value encoder

► The three-phase AC motors with incremental encoders or SinCos absolute value encoders cannot be used for speed-dependent safety functions in connection with the SM 301 safety module.

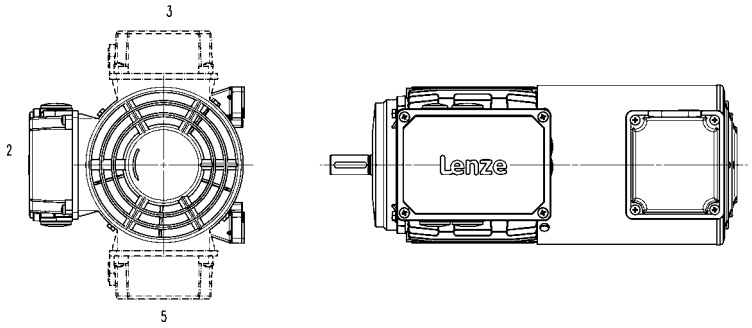
| **Encoder type** | | | HTL incremental | | | | TTL incremental | | | SinCos absolute value |
|---|---|---|---|---|---|---|---|---|---|---|
| **Product key** | | | IG128-24V-H | IG512-24V-H | IG1024-24V-H | IG2048-24V-H | IG512-5V-T | IG1024-5V-T | IG2048-5V-T | AM1024-8V-H |
| **Encoder type** | | | | | | | | | | Multi-turn |
| **Pulses** | | | 128 | 512 | 1024 | 2048 | 512 | 1024 | 2048 | 1024 |
| **Output signals** | | | HTL | | | | TTL | | | 1 Vss |
| **Interfaces** | | | A, B track | A, B, N track and inverted | | | | | | Hiperface |
| **Absolute revolutions** | | | 0 | | | | | | | 4096 |
| **Accuracy** | | ['] | -22.5 ... 22.5 | -2 ... 2 | | | | | | -0.8 ... 0.8 |
| **Min. input voltage** | | | | | | | | | | |
| DC | $U_{in,min}$ | [V] | 8.00 | | | | 4.75 | | | 7.00 |
| **Max. input voltage** | | | | | | | | | | |
| DC | $U_{in,max}$ | [V] | 26.0 | 30.0 | | | 5.25 | | | 12.0 |
| **Max. current consumption** | | | | | | | | | | |
| | $I_{max}$ | [A] | 0.040 | 0.15 | | | | | | 0.080 |
| **Limit frequency** | | | | | | | | | | |
| | $f_{max}$ | [kHz] | 30.0 | 160 | | | 300 | | | 200 |
| **Inverter assignment** | | | E84AVSC<br>E84AVHC | E84AVHC | | | E84AVTC<br>E94A<br>ECS<br>EVS93 | | | |

Inverters
- Inverter Drives 8400 StateLine (E84AVSC)
- Inverter Drives 8400 HighLine (E84AVHC)
- Inverter Drives 8400 TopLine (E84AVTC)

Servo-Inverters
- Servo Drives 9400 (E94A)
- 9300 servo inverters (EVS93)
- Servo Drives ECS

## Blowers

► The blower terminal box is available in positions 2, 3 or 5.




**Rated data for 50 Hz**

| Size | Number of phases | Connection method | | | | | |
|---|---|---|---|---|---|---|---|
| Motor | | | | | | | |
| | | | $U_{min}$ | $U_{max}$ | $P_{max}$ | $I_{max}$ | m |
| | | | [V] | [V] | [kW] | [A] | [kg] |
| 063 | 1 | | 230 | 277 | 0.027 | 0.11 | 2.00 |
| | 3 | Δ | 200 | 303 | 0.028 | 0.12 | |
| | | Y | 346 | 525 | | 0.070 | |
| 071 | 1 | | 230 | 277 | 0.027 | 0.10 | 2.10 |
| | 3 | Δ | 200 | 303 | 0.031 | 0.11 | |
| | | Y | 346 | 525 | | 0.060 | |
| 080 | 1 | | 230 | 277 | 0.029 | 0.11 | 2.30 |
| | 3 | Δ | 200 | 303 | 0.031 | | |
| | | Y | 346 | 525 | | 0.060 | |
| 090 | 1 | | 220 | 277 | 0.065 | 0.29 | 2.70 |
| | 3 | Δ | 200 | 303 | 0.091 | 0.38 | |
| | | Y | 346 | 525 | | 0.22 | |
| 100 | 1 | | 220 | 277 | 0.066 | 0.28 | 3.00 |
| | 3 | Δ | 200 | 303 | 0.091 | 0.37 | |
| | | Y | 346 | 525 | | 0.22 | |
| 112 | 1 | | 220 | 277 | 0.071 | 0.28 | 3.10 |
| | 3 | Δ | 200 | 303 | 0.097 | 0.35 | |
| | | Y | 346 | 525 | | 0.20 | |
| 132 | 1 | | 230 | 277 | 0.098 | 0.40 | 4.20 |
| | 3 | Δ | 200 | 303 | 0.12 | 0.58 | |
| | | Y | 346 | 525 | | 0.33 | |
| 160 | 1 | | 230 | 277 | 0.25 | 0.97 | 6.20 |
| | 3 | Δ | 200 | 303 | | 0.87 | |
| | | Y | 346 | 525 | | 0.50 | |
| 180 | 1 | | 230 | 277 | | 0.97 | 8.00 |
| | 3 | Δ | 200 | 303 | | 0.87 | |
| | | Y | 346 | 525 | | 0.50 | |

## Blowers

### Rated data for 50 Hz

| Size | Number of phases | Connection method | | | | | |
|---|---|---|---|---|---|---|---|
| Motor | | | | | | | |
| | | | $U_{min}$ | $U_{max}$ | $P_{max}$ | $I_{max}$ | m |
| | | | [V] | [V] | [kW] | [A] | [kg] |
| 200 | 1 | | 230 | 277 | 0.25 | 0.97 | 8.00 |
| | 3 | Δ | 200 | 303 | | 0.87 | |
| | | Y | 346 | 525 | | 0.50 | |
| 225 | | Δ | 200 | 400 | 0.28 | 1.10 | 15.0 |
| | | Y | 346 | 525 | 0.17 | 0.35 | |

### Rated data for 60 Hz

| Size | Number of phases | Connection method | | | | | |
|---|---|---|---|---|---|---|---|
| Motor | | | | | | | |
| | | | $U_{min}$ | $U_{max}$ | $P_{max}$ | $I_{max}$ | m |
| | | | [V] | [V] | [kW] | [A] | [kg] |
| 063 | 1 | | 230 | 277 | 0.032 | 0.12 | 2.00 |
| | 3 | Δ | 220 | 332 | 0.028 | 0.10 | |
| | | Y | 380 | 575 | | 0.060 | |
| 071 | 1 | | 230 | 277 | 0.033 | 0.12 | 2.10 |
| | 3 | Δ | 220 | 332 | 0.029 | 0.10 | |
| | | Y | 380 | 575 | | 0.060 | |
| 080 | 1 | | 230 | 277 | 0.037 | 0.14 | 2.30 |
| | 3 | Δ | 220 | 332 | 0.034 | 0.10 | |
| | | Y | 380 | 575 | | 0.060 | |
| 090 | 1 | | 220 | 277 | 0.065 | 0.25 | 2.70 |
| | 3 | Δ | | 332 | 0.077 | 0.33 | |
| | | Y | 380 | 575 | | 0.19 | |
| 100 | 1 | | 220 | 277 | 0.075 | 0.30 | 3.00 |
| | 3 | Δ | | 332 | 0.087 | 0.31 | |
| | | Y | 380 | 575 | | 0.18 | |
| 112 | 1 | | 220 | 277 | 0.094 | 0.37 | 3.10 |
| | 3 | Δ | | 332 | 0.10 | 0.31 | |
| | | Y | 380 | 575 | | 0.18 | |
| 132 | 1 | | 230 | 277 | 0.15 | 0.57 | 4.20 |
| | 3 | Δ | 220 | 332 | | 0.44 | |
| | | Y | 380 | 575 | | 0.25 | |
| 160 | | Δ | 220 | 332 | 0.36 | 0.93 | 6.20 |
| | | Y | 380 | 575 | | 0.56 | |
| 180 | | Δ | 220 | 332 | | 0.93 | 8.00 |
| | | Y | 380 | 575 | | 0.56 | |
| 200 | | Δ | 220 | 332 | | 0.93 | |
| | | Y | 380 | 575 | | 0.56 | |
| 225 | | Δ | 220 | 400 | 0.28 | 0.76 | 15.0 |
| | | Y | 380 | 575 | 0.26 | 0.43 | |

## Temperature monitoring

► The thermal sensors are integrated in the windings. The use of an additional motor protection switch is recommended.

**TKO thermal contacts**

| Function | Operating temperature | Min. reset temperature | Max. reset temperature | Max. input current | Max. input voltage |
|---|---|---|---|---|---|
| | | | | | AC |
| | T | $T_{min}$ | $T_{max}$ | $I_{in,max}$ | $U_{in,max}$ |
| | -5 ... 5 | | | | |
| | [°C] | [°C] | [°C] | [A] | [V] |
| NC contact | 150 | 90.0 | 135 | 2.50 | 250 |

**PTC thermistor**

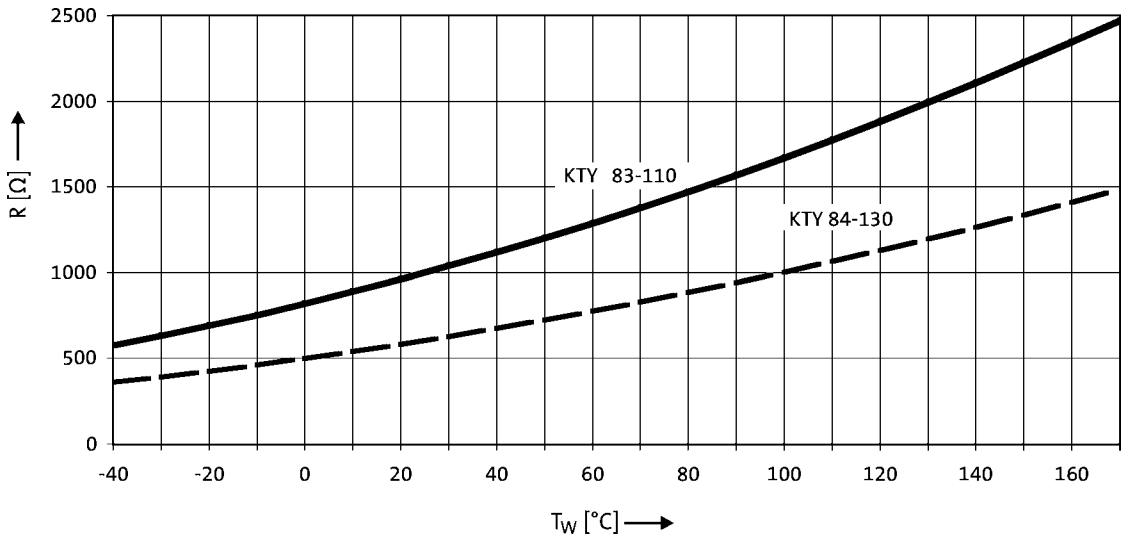
| Function | Operating temperature | Rated resistance | | | Standard |
|---|---|---|---|---|---|
| | | 155 °C | -20 °C | 140 °C | |
| | T | $R_N$ | $R_N$ | $R_N$ | |
| | -5 ... 5 | | | | |
| | [°C] | [Ω] | [Ω] | [Ω] | |
| Sudden change in resistance | 150 | 550 | 30.0 | 250 | DIN 44080<br>DIN VDE 0660 Part 303 |

## Temperature monitoring

### KTY temperature sensor

| | Function | Rated resistance | | | Max. input current | |
|---|---|---|---|---|---|---|
| | | 25 °C | 150 °C | 170 °C | 25 °C | 170 °C |
| | | $R_N$ | $R_N$ | $R_N$ | $I_{in,max}$ | $I_{in,max}$ |
| | | [Ω] | [Ω] | [Ω] | [A] | [A] |
| KTY83-110 | Continuous resistance change | 1000 | 2225 | 2471 | 0.010 | 0.002 |
| KTY84-130 | Continuous resistance change | 603 | 1334 | 1482 | 0.010 | 0.002 |

**Variation of resistance**




5.7

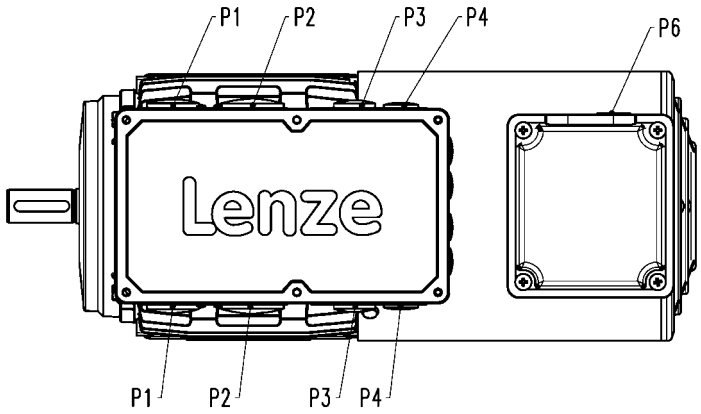
► If the detector is supplied with a measured current of 1 mA, the above relationship between the temperature and the resistance applies.

## Terminal box

The three-phase AC motors are designed for operation at a constant mains frequency and with an inverter.
For 50 Hz operation, the motors are operated in Δconfiguration at 230 V or in star configuration at 400 V.
For inverter operation, the base frequency has been specified as 87 Hz at a rated voltage of 400 V in Δconfiguration.

In the standard version, the motors are connected in the terminal box. As an option, the motors are also available with the connectors described on the following pages as long as the permissible ratings are not exceeded.

### Connections




| Motor type | M□□MAXX<br>M□□MABR<br>M□□MARS<br>M□□MAIG<br>M□□MAAG | M□□MABS<br>M□□MABI<br>M□□MABA |
|---|---|---|
| Built-on accessories | | |



| | $P_1$ | $P_2$ | $P_3$ | $P_4$ | $P_6$ | $P_1$ | $P_2$ | $P_3$ | $P_4$ | $P_6$ |
|---|---|---|---|---|---|---|---|---|---|---|
| | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] |
| 063 | M16x1.5 | M20x1.5 | | | | | | | | |
| 071 | | | | | | | | | | |
| 080 | M20x1.5 | M25x1.5 | | | | | | | | |
| 090 | | | | | | M25x1.5 | M32x1.5 | | | |
| 100 | | | | | | | | | | |
| 112 | | | | | M16x1.5 | | | M20x1.5 | M16x1.5 | M16x1.5 |
| 132 | M25x1.5 | M32x1.5 | | | | | | | | |
| 160 | M50x1.5 | M16x1.5 | M20x1.5 | M16x1.5 | | M50x1.5 | M16x1.5 | | | |
| 180 | | | | | | | | | | |
| 200 | | | | | | | | | | |
| 225 [1] | M12x1.5 | M63x1.5 | M50x1.5 | M12x1.5 | | M12x1.5 | M63x1.5 | M50x1.5 | M12x1.5 | |

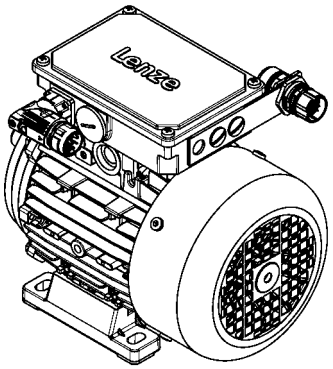
[1] The cable glands P1 to P4 are only arranged at the bottom.

## Plug connectors

ICN, HAN and M12 connectors (only for IG128-24V-H incremental encoder) are available for the three-phase AC motors.

## ICN connector

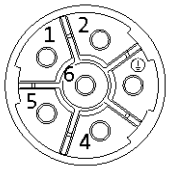
A connector is used for power, brake and temperature monitoring. The connections to the feedback system and the blower each employ a separate connector.




**Connection for power, brake and temperature monitoring**

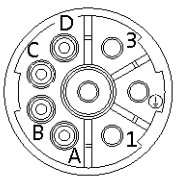
The connectors can be rotated through 270° and are fitted with a bayonet catch for SpeedTec connectors. As this connector is also compatible with conventional union nuts, existing mating connectors can continue to be used without difficulty. The motor connection is determined in the terminal box and must be checked before commissioning.

► ICN 6-pole

| Pin assignment | | | |
|---|---|---|---|
| Contact | Designation | Meaning | |
| 1 | BD1 / BA1 | Brake +/AC |  |
| 2 | BD2 / BA2 | Brake /AC | |
| PE | PE | PE conductor | |
| 4 | U | Phase U power | |
| 5 | V | Phase V power | |
| 6 | W | Phase W power | |



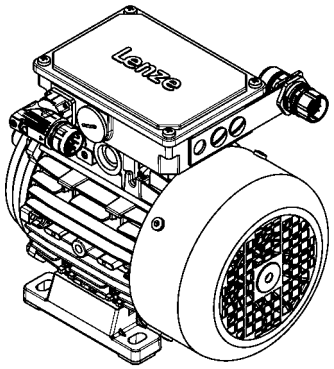
► ICN 8-pole

| Pin assignment | | | |
|---|---|---|---|
| Contact | Designation | Meaning | |
| 1 | U | Phase U power |  |
| PE | PE | PE conductor | |
| 3 | V | Phase V power | |
| 4 | W | Phase W power | |
| A | TB1 / TP1 / R1 | Thermal sensor: TKO/PTC/ +KTY | |
| B | TB2 / TP2 / R2 | Thermal sensor: TKO/PTC/-KTY | |
| C | BD1 / BA1 | Brake +/AC | |
| D | BD2 / BA2 | Brake /AC | |

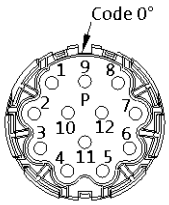
## ICN connector

**Feedback connection**

All encoder systems (apart from IG128-24V-H) are also available with an ICN connector fixed to the motor terminal box for exceptionally fast commissioning. The connectors are fitted with a bayonet fixing, which is also compatible with conventional union nuts. Existing mating connectors can therefore continue to be used without difficulty.

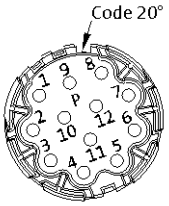



► Resolver

| Pin assignment | | | |
|---|---|---|---|
| Contact | Designation | Meaning | |
| 1 | +Ref | Transformer windings |  |
| 2 | -Ref | | |
| 3 | +VCC ETS | Supply: Electronic nameplate | |
| 4 | +COS | Cosine stator windings | |
| 5 | -COS | | |
| 6 | +SIN | Sine stator windings | |
| 7 | -SIN | | |
| 8 | | Not assigned | |
| 9 | | | |
| 10 | | | |
| 11 | +KTY | KTY temperature sensor | |
| 12 | -KTY | | |



► Hiperface incremental encoder and SinCos absolute value encoder

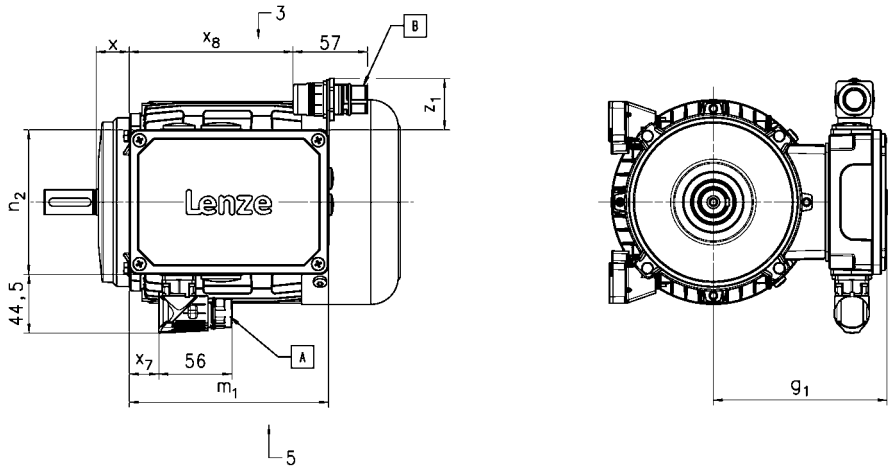
| Pin assignment | | | |
|---|---|---|---|
| Contact | Designation | Meaning | |
| 1 | B | Track B/+SIN |  |
| 2 | $A^-$ | Track A inverse/-COS | |
| 3 | A | Track A/+COS | |
| 4 | $+U_B$ | Supply + | |
| 5 | GND | Mass | |
| 6 | $Z^-$ | Zero track inverse/-RS485 | |
| 7 | Z | Zero track/+RS485 | |
| 8 | | Not assigned | |
| 9 | $B^-$ | Track B inverse/-SIN | |
| 10 | | Not assigned | |
| 11 | +KTY | KTY temperature sensor | |
| 12 | -KTY | | |

## ICN connector

**Dimensions of the connectors on the terminal box**

The following connector positions are possible:
- power connection (A) in position 5 and feedback connection (B) in position 3
- power connection (A) in position 3 and feedback connection (B) in position 5

With the following motors, the feedback connection (B) is only available in position 3 or 5:
- motor frame size 132 to 180



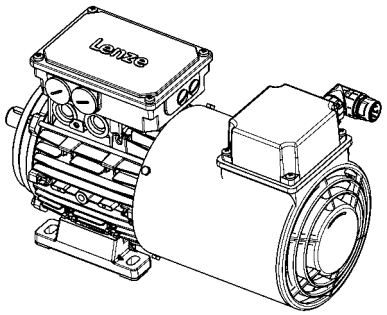

| Motor type | M□□MAXX<br>M□□MARS<br>M□□MAIG<br>M□□MAAG | M□□MABR<br>M□□MABS<br>M□□MABI<br>M□□MABA |
|---|---|---|

| | $g_1$ | x | $m_1$ | $n_2$ | $x_7$ | $x_8$ | $z_{1, max}$ |
|---|---|---|---|---|---|---|---|
| | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] |
| 063 | 109 | 17 | 136 | 103 | 16 | 109 | 43 |
| 071 | 118 | 24 | | | | | |
| 080 | 132 | 25 | 152 | 121 | 23 | 125 | 41 |
| 090 | 137 | 29 | | | | | |
| 100 | 147 | 36 | | | | | |
| 112 | 158 | 38 | | | | | |
| 132 | 187 | 51 | 194 | 125 | 27 | 166 | 71 |
| 160 | 220 | 69 | 253 | 152 | | 200 | 65 |
| 180 | 239 | 75 | | | | | |
| 200 | | 77 | | | | | |
| 225 | 348 | 68 | 354 | 204 | | 328 | 51 |

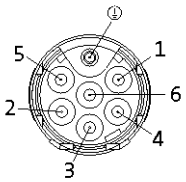
## ICN connector

**Blower connection**

The blower is also optionally available with an ICN connector fixed to the terminal box of the blower for exceptionally fast commissioning. The connectors are fitted with a bayonet fixing, which is also compatible with conventional union nuts. Existing counter plugs can therefore continue to be used without difficulty.

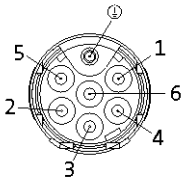



► Blower 1-ph

| Pin assignment | | | |
|---|---|---|---|
| Contact | Designation | Meaning | |
| PE | PE | PE conductor |  |
| 1 | U1 | Fan | |
| 2 | U2 | | |
| 3 | | Not assigned | |
| 4 | | | |
| 5 | | | |
| 6 | | | |



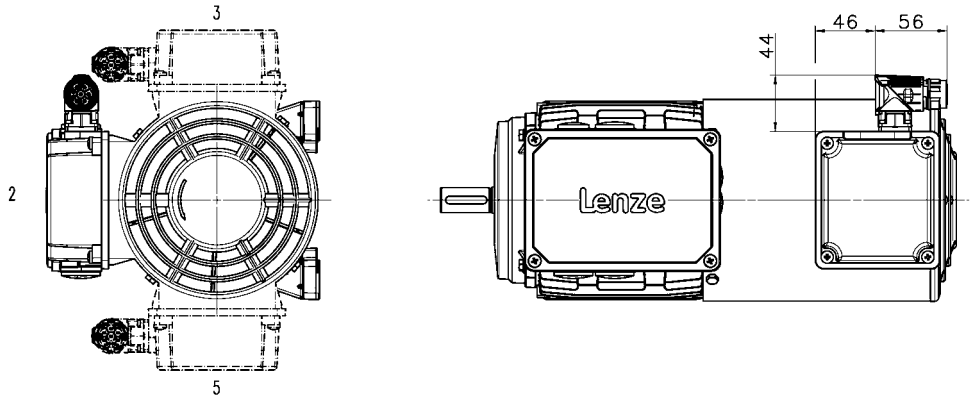
► Blower 3-ph

| Pin assignment | | | |
|---|---|---|---|
| Contact | Designation | Meaning | |
| PE | PE | PE conductor |  |
| 1 | U | Phase U power | |
| 2 | | Not assigned | |
| 3 | V | Phase V power | |
| 4 | | Not assigned | |
| 5 | | | |
| 6 | W | Phase W power | |

## ICN connector

### Blower connection

- The blower terminal box is available in positions 2, 3 or 5.
- In addition, the cover of the blower terminal box (including connectors) can be rotated progressively through 90° if necessary.



## M12 connector

**IG128-24V-H incremental encoder connection**

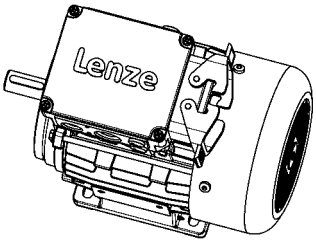
As a standard this incremental encoder is equipped with a connection cable of about 0.5 m length and with a common industry standard M12 connector at its end.

| Pin assignment | | | |
|---|---|---|---|
| Contact | Designation | Meaning | |
| 1 | $+U_B$ | Supply + | |
| 2 | B | Track B | |
| 3 | GND | Mass | |
| 4 | A | Track A | |

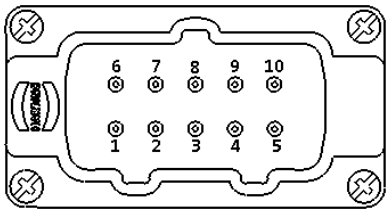
## HAN connector

### 10E

In the case of the rectangular HAN-10E connectors, all six ends of the three winding phases are taken out to the power contacts. The motor circuit is therefore determined in the mating connector.



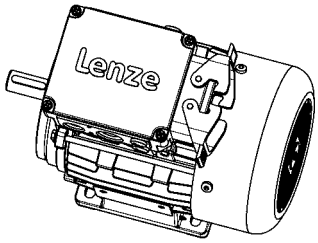

| Pin assignment | |
|---|---|
| Contact | Meaning |
| 1 | Terminal board: U1 |
| 2 | Terminal board: V1 |
| 3 | Terminal board: W1 |
| 4 | Brake +/AC |
| 5 | Brake -/AC |
| 6 | Terminal board: W2 |
| 7 | Terminal board: U2 |
| 8 | Terminal board: V2 |
| 9 | Thermal sensor: +KTY/PTC/TKO |
| 10 | Thermal sensor: KTY/PTC/TKO |



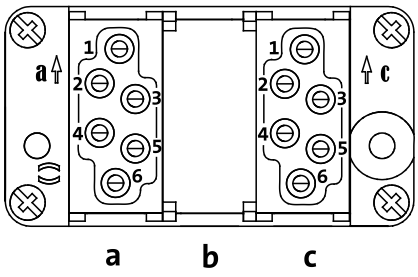
## HAN connector

### Modular

The connector is available with two different power modules (16 A or 40 A), depending on the rated motor current. The motor connection is determined in the terminal box and must be checked before commissioning.

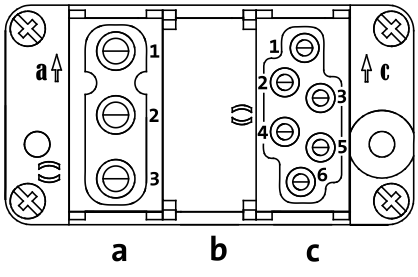



► HAN modular 16 A

| Pin assignment | | | |
|---|---|---|---|
| Module | Contact | Meaning | |
| A | 1 | Terminal board: U1 |  |
| | 2 | Terminal board: V1 | |
| | 3 | Terminal board: W1 | |
| B | | Dummy module | |
| C | 1 | Thermal sensor: +KTY/PTC/TKO | |
| | 2 | Brake +/AC | |
| | 3 | Brake -/AC | |
| | 4 | Rectifier: Switching contact | |
| | 5 | | |
| | 6 | Thermal sensor: KTY/PTC/TKO | |

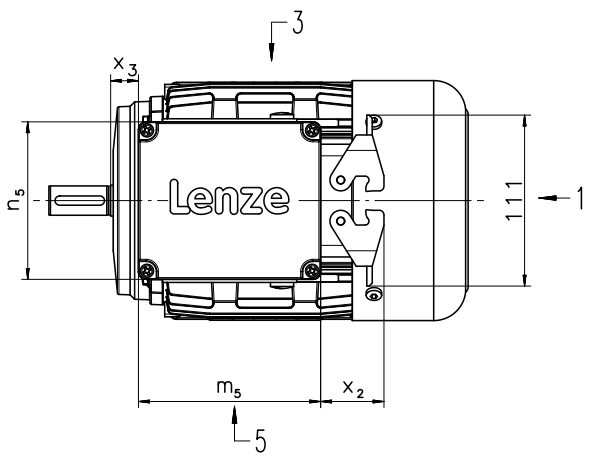


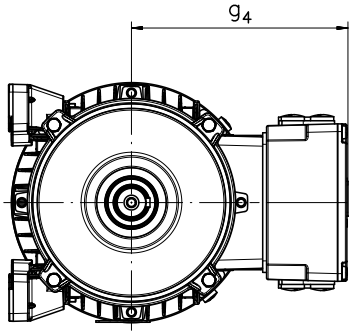
► HAN modular 40 A

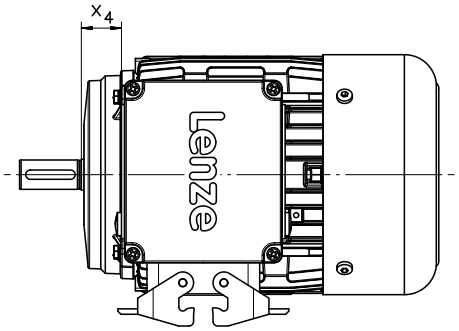
| Pin assignment | | | |
|---|---|---|---|
| Module | Contact | Meaning | |
| A | 1 | Terminal board: U1 |  |
| | 2 | Terminal board: V1 | |
| | 3 | Terminal board: W1 | |
| B | | Dummy module | |
| C | 1 | Thermal sensor: +KTY/PTC/TKO | |
| | 2 | Brake +/AC | |
| | 3 | Brake -/AC | |
| | 4 | Rectifier: Switching contact | |
| | 5 | | |
| | 6 | Thermal sensor: KTY/PTC/TKO | |

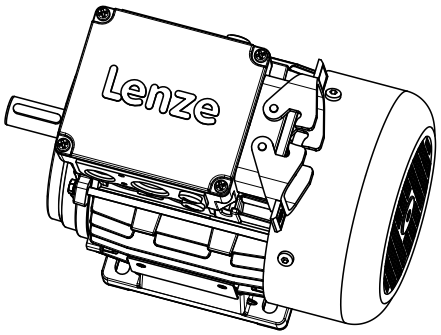
## HAN connector

► The connection position for the connector is shown in position 1. Positions 3 and 5 are also possible.




| Motor type | M□□MAXX<br>M□□MABR | | | | | |
|---|---|---|---|---|---|---|
| | $g_4$ | $m_5$ | $n_5$ | $x_2$ | $x_3$ | $x_4$ |
| | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] |
| 063 | 120 | 118 | 102 | 41 | 11 | 12 |
| 071 | 129 | | | | 16 | 17 |
| 080 | 138 | | | | 18 | 26 |
| 090 | 143 | | | | 22 | 30 |
| 100 | 154 | | | | 29 | 37 |
| 112 | 164 | | | | 28 | 36 |
| 132 [1)] | 233 | 120 | 180 | 47 | 48 | 18 |
| 160 | 248 | | | | 72 | 42 |

[1)] In the case of the B5 design motors, it is not possible to connect the connector at position 3 or 5.

Internet version

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