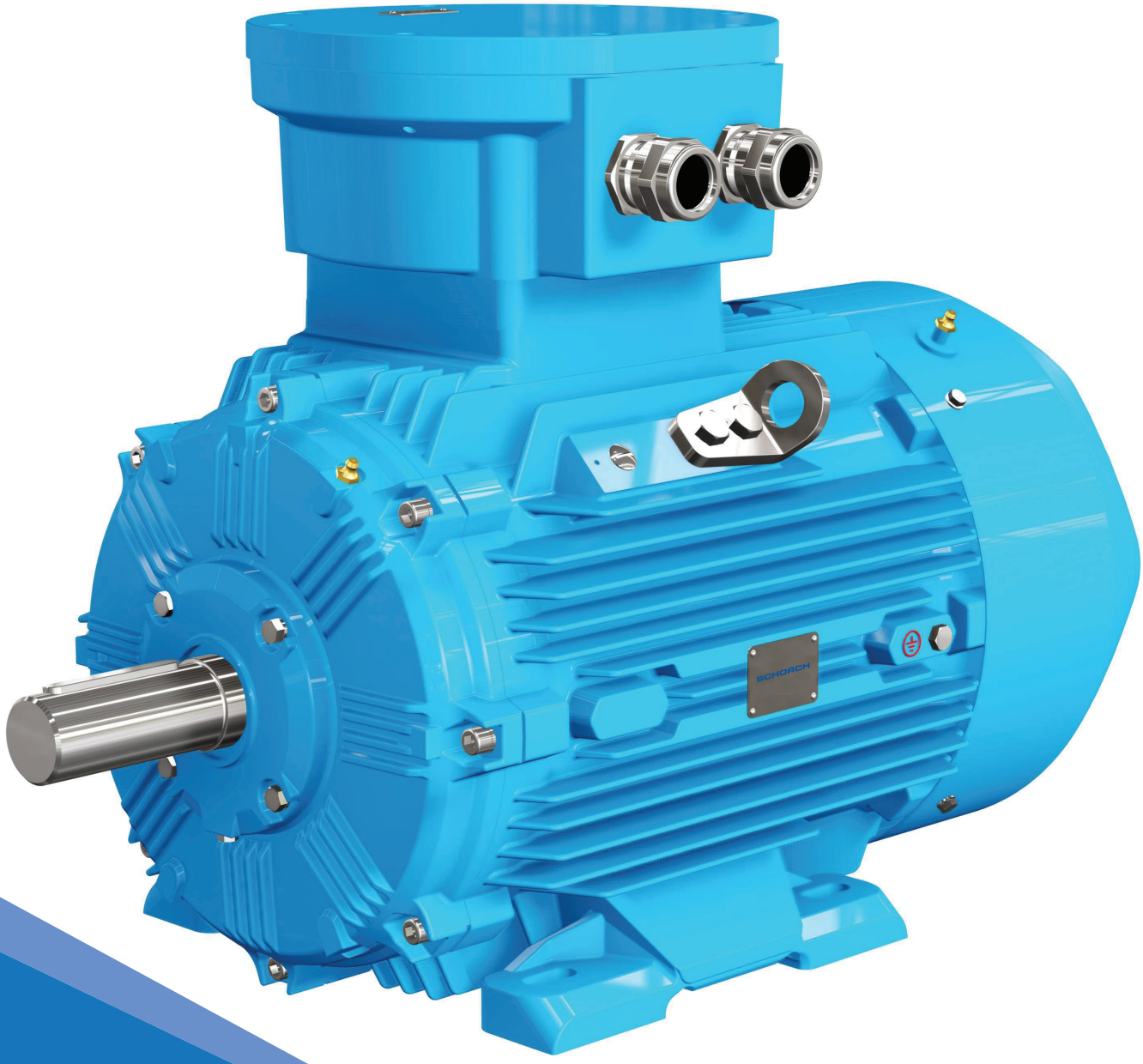


WEX3 Flameproof High Efficiency Three Phase Asynchronous Motor

SCHORCH

2 About Us

SCHORCH Company

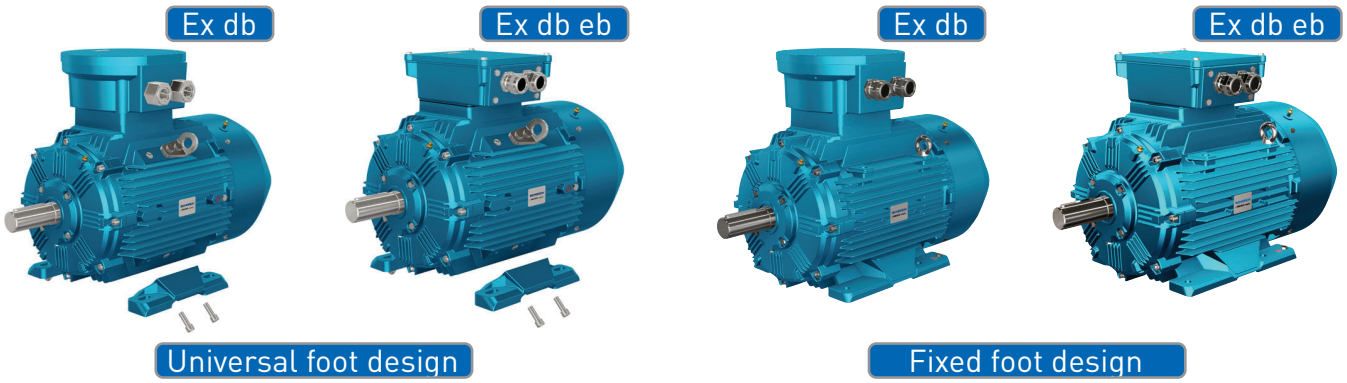
Since its establishment in 1882, SCHORCH has been synonymous with high-quality motors. SCHORCH provides customers with a variety of motors and drive systems worldwide, and provides customized products and services for different industries, such as oil and gas, chemical, power generation, water supply and wastewater treatment, shipbuilding, steel and metal processing industries, test stands , Tunnels, etc., we have been committed to meeting the needs of customers

Product overview

WEX3 series high efficiency flameproof three-phase asynchronous motor is jointly developed by European and Asian technical teams, fully absorbing the excellent genes of European explosion-proof motor design. Owning the new appearance design, its improves the safety performance of the motor, expands the explosion-proof type and enhances the frequency conversion ability.

Excellent features of WEX3 series motors

- IE3 Efficiency
- II 2G Ex db and db eb terminal box
- Universal foot and Fixed foot design
- VFD ready up to 690V
- Terminal box rotatable in 90° steps
- Various bearing configurations, ball, roller, angular
- Heater
- Auxiliary terminal boxes
- Painting schemes up to Cx



Applications

This series of motors can be used in the explosive circumstances that mixed with combustible gas or steam and air, such as oil, coal, chemical industry, metallurgy, electric power, oil and gas pipeline, mine, port, machinery industry, etc. It is an ideal driving equipment which is widely applied in various of machinery equipments, such as pumps, fans, compressors, conveyors, mixers, crushers, hoists, etc.

4 Product Description

Nomenclature

WEX3 160M1-2

- 160M1-2 — Specification code:
  - **160** - motor center height
  - **M** - length of the motor
  - **1** - core length
  - **2** - number of poles(speed)
- WEX3 — Product code: WEX3 series, IE3 premium efficiency

Ex-mark

Ex db eb IIC T4 Gb

- Gb — Equipment protection level
- T4 — Temperature class
- IIC — Equipment grouping
- db eb — Type of protection, (db for flameproof enclosure -main body, eb for increased safety terminal box)
- Ex — Mark, Explosion-proof

Ex db IIC T4 Gb

- Gb — Equipment protection level
- T4 — Temperature class
- IIC — Equipment grouping
- db — Type of protection flameproof enclosure "db'
- Ex — Mark, Explosion-proof

Ex tb IIIC T130°C Db

- Db — Equipment protection level
- T130°C — Temperature class
- IIIC — Equipment grouping: Group IIIC conductive dust, IP6X.
- tb — Type of protection Dust explosion-proof type , Zone 21
- Ex — Mark, Explosion-proof

Ex tc IIIB T130°C Dc

- Dc — Equipment protection level
- T130°C — Temperature class
- IIIB — Equipment grouping: Group IIIB Non conductive dust. IP5X.
- tc — Type of protection, Dust explosion-proof type, Zone 22
- Ex — Mark, Explosion-proof

In order to ensure the universal application of the motors within future global markets, conformity certificates have been issued for the motors through various international certification authorities and notified bodies.

GB/T19001-2016/ISO 9001: 2015 for the Quality Management System

GB/T 28001-2011/OHSAS 18001: 2007 for the Occupational Healty and Safety Management System

- Explosion proof types: gas explosion proof, dust explosion proof
- Gas explosion proof: Ex db eb IIB/IIC T4 Gb(the main body is flameproof type and the terminal box is increased safety type), Ex db IIB/IIC T4 Gb(both the main body and the terminal box are flameproof type)
- Dust explosion-proof: Ex tb IIIC T130°C Db(conductive dust Zone 21, IP6X), Ex tc IIIB T130°C Dc(non-conductive dust Zone 22, IP6X)

GB/T24001-2016/ISO14001: 2015 for the Environmental Management System

Explosion protection certifications

CNEX GLOBE for Europe

IECEx CNEX 19.0007X Ex db eb IIB/IIC T4 Gb
IECEx CNEX 19.0007X Ex db IIB/IIC T4 Gb
IECEx CNEX 19.0007X Ex tb IIIC T130°C Db
IECEx CNEX 19.0007X Ex tc IIIB T130°C Dc

CE 0470 Ex II2 G Ex db eb IIB/IIC T4 Gb, CNEX 19ATEX 0006X
CE 0470 Ex II2 G Ex db IIB/IIC T4 Gb, CNEX 19ATEX 0006X
CE 0470 Ex II2 D Ex tb IIIC T130°C Db, CNEX 19ATEX 0006X
CE Ex II3 D Ex tc IIIB T130°C Dc, CNEX 19ATEX 0006X

Specification

Specification		
	Standard product	Options
Frame size	80 to 355	-
Rated power	0.37 to 375kW	-
Efficiency level	IE3	-
Number of poles	2P, 4P, 6P, 8P	10P, 12P, 14P, 16P
Rated voltage	400V	On request
Frequency	50Hz	60Hz
Duty	S1	S2-S10
Ambient temperature	-20°C to +40°C	-40°C to +60°C
Altitude	≤1000 m	On request
Humidity	≤90%	-
Mounting option	B3, B5, B35, B14, V1	B34,V6 etc.
Terminal box position	Top	Right hand side ,left hand side
Type of cable entry	Cable grand	-
Enclosure	IP55	IP66,IP56,IP65
Inverter operation	Inverter use ready up to 500V acc. to IEC60034-25: 2014 chapter 18	Reinforced insulation required for operation at 690V acc. to IEC60034-25: 2014 chapter 7
Insulation	Class F	Class H
Cooling type	IC411	-
Shaft key	Type A	
Lubrication	80 to 280 Sealed 315 to 355 Regreasing	160 to 280 Regreasing
Connection	<4kW: "Y" connection ≥4kW : "Δ" connection	-
Fan material	Engineered plastic	Cast aluminum
Rotation direction	Clockwise rotation at drive end	On request
Winding temperature measurement	Thermistors (PTC)80 to 355	RTDs 160 to 355
Bearing temperature measurement	-	RTDs 160 to 355
Anti condensation heater	-	80 to 355
Vibration monitoring	-	160 to 355
Paint specification (equivalent to IEC12944)	C3	C4,C5,Cx

Standards, codes, regulations and specifications

Standards			
Standard name	IEC	EN	GB
Rotating electrical machines Rating and operating behavior	IEC 60034-1	EN 60034-1	GB/T755
Process for determining losses and efficiency of rotating electrical machines by means of testing	IEC 60034-2-1	EN 60034-2-1	GB/T1032
Protection types of rotating electrical machines based on overall construction(IP-Code) - Introduction	IEC 60034-5	EN 60034-5	GB/T 4942.1
Classification of the cooling processes (IC code)	IEC 60034-6	EN 60034-6	GB/T 1993
Classification of the design types, the installation types and the terminal box location (IM-Code)	IEC 60034-7	EN 60034-7	GB/T 997
Terminal markings and direction of rotation	IEC 60034-8	EN 60034-8	GB 1971
Noise emission limit values	IEC 60034-9	EN 60034-9	GB/T 10069.3
Starting performance of three-phase motors with squirrel-cage rotor, except for pole-changing motors	IEC 60034-12	EN 60034-12	-
Mechanical vibrations of certain machines with a shaft height of 56 mm and higher;measurement, evaluation and limit values of the vibration	IEC 60034-14	EN 60034-14	GB/T 10068
Efficiency classification of three-phase motors with squirrel-cage rotors, except for pole-changing motors (IE code)	IEC 60034-30-1	EN 60034-30	GB18613
Balancing value	ISO 1940	-	-
IEC standard voltages IEC	IEC 60038	-	-
Evaluation and classifications of electric insulation according to its thermal behavior	IEC 60085	-	GB/T 11021
Three-phase induction motors for general use with standardized dimensions and powers	IEC 60072-1	EN 50347	GB/T 4772.1
Explosive atmosphere - Part 0: Equipment General requirements	IEC 60079-0	EN 60079-0	GB 3836.1
Explosive atmosphere - Part 1: Equipment protection through flameproof enclosure “d”	IEC 60079-1	EN 60079-1	GB 3836.2
Explosive atmosphere - Part 7:Equipment protection through increased safety “e”	IEC 60079-7	EN 60079-7	GB 3836.2
Electrical equipment for use in areas with inflammable dust - protection of the housing	IEC 60079-31	EN 60079-31	-

Mounting arrangements

Basic structural type	Foot mounted					
Mounting type code	B3	B6	B7	B8	V5	V6
Schematic diagram						
Frame size	80 to 355	80 to 160				

Basic structural type	FF flange mounted			Foot & FF flange options		
Mounting type code	B5	V1	V3	B35	V15	V36
Schematic diagram						
Frame size	80 to 280	80 to 355	80 to 160	80 to 355	80 to 160	

Basic structural type	FT flange mounted		Foot & FT flange mounted
Mounting type code	B14	V18	B34
Schematic diagram			
Frame size	80 to 112		

Ingress protection

WEX3 standard ingress protection is IP55. Depending on customer requirements, this range can be supplied with IP56, IP65 or IP66 ingress protection.

The protection level of the shell is mainly to prevent electric shock to human body or close to live parts or rotating parts, to prevent solid foreign matter from entering and to prevent harmful effects caused by water and oil, The code name and meaning of the protection form is shown in the table below.

Code	Meaning	First numeral	Meaning	Second numeral	Meaning
IP	Level of protection	5	Dust prevention	5	Protected against water spray (12.5L/min @ 0.3 bar)
		6	Dust tight	6	Protected against water jets or heavy seas (100L/min @ 1.0 bar)

Cooling method

The cooling methods for electrical machines are stated in code according to IEC 60034-6. The code consists of the letters IC (International Cooling) and a three-digit number.

The standard featured in this list are classified in the cooling method IC 411 (surface-cooled)

IC410 and IC416 cooling modes can be provided for special needs of users.

Insulation grade and temperature rise limit

Insulation grade and temperature rise limit (IEC60034-1)

Insulation grade	Limited temperature°C	The temperature rise limit K
B	130	80
F	155	105
H	180	125

WEX3 standard Insulation grade is F grade insulation, and the temperature rise limit is assessed as B grade (Δ80K), to further improve the service life in the power supply environment and service environment.Depending on customer requirements, this range can be supplied H grade insulation.

Noise levels

Noise levels are well below those specified in EN 60034-9. Noise measurements are performed according to EN ISO 1680 and EN 21680 according to class 2 in an anechoic room. The sound pressure level "Lp" and the sound power level "Lw" in dB(A) are indicated for the individual frame sizes in the operating datasheets. They apply for rated loads at 50 Hz, plus a tolerance of +3 dB(A). They apply for rated loads at 60Hz , 2P plus a tolerance of +5dB(A), and 4P or above: +3dB(A).

Vibration levels

Vibration limit (IEC60034-14)

Vibration severity grade	Mounting	Shaft center height H(mm)			
		56≤*H*≤132		*H*>132	
		Displacement /μm	Speed /(mm/s)	Displacement /μm	Speed /(mm/s)
A	Free suspended mounting	45	2.8	45	2.8
	Rigid mounting	-	-	37	2.3
B	Free suspended mounting	18	1.1	29	1.8
	Rigid mounting	-	-	24	1.5

Note: Grade "A" is applicable to motors with no special requirements on vibration. It is the default configuration. Grade "B" for motors with special vibration requirements

Bearing type

Frame sizes	Poles	Standard		Option 1		Option 2		Option 3	
		DE	NDE	DE	NDE	DE	NDE	DE	NDE
80	2~8	6204-2Z	6204-2Z	-	-	-	-	-	-
90	2~8	6205-2Z	6203-2Z	-	-	-	-	-	-
100	2~8	6206-2Z	6205-2Z	-	-	-	-	-	-
112	2~8	6206-2Z	6206-2Z	-	-	-	-	-	-
132	2~8	6208-2Z	6305-2Z	-	-	-	-	-	-
160	2~8	6309-2Z	6307-2Z	6309/C3	6307/C3	7309	6307	NU309	6307
180	2~8	6310-2Z	6308-2Z	6310/C3	6308/C3	7310	6308	NU310	6308
200	2~8	6312-2Z	6212-2Z	6312/C3	6212/C3	7312	6212	NU312	6212
225	2	6312-2Z	6312-2Z	6312/C3	6312/C3	7312	6312	NU312	6312
	4~8	6313-2Z	6312-2Z	6313/C3	6312/C3	7313	6312	NU313	6312
250	2	6313-2Z	6313-2Z	6313/C3	6313/C3	7313	6313	NU313	6313
	4~8	6314-2Z	6313-2Z	6314/C3	6313/C3	7314	6313	NU314	6313
280	2	6314-2Z	6314-2Z	6314/C3	6314/C3	7314	6314	NU314	6314
	4~8	6317-2Z	6314-2Z	6317/C3	6314/C3	7317	6314	NU317	6314
315	2	6316/C3	6316/C3	-	-	7316	6316	NU316	6316
	4~8	6319/C3	6319/C3	-	-	7319	6319	NU319	6319
355	2	6318/C3	6318/C3	-	-	7318	6318	NU318	6318
	4~8	6322/C3	6322/C3	-	-	7322	6322	NU322	6322

Note: 1. The standard configuration is deep groove ball bearing: H80~280 are sealed and maintainable, H315~355 are relubricated bearings;
2. Optional 1: Re-lubricated bearing, suitable for H160~280 motors
3. Optional 2: Angular contact ball bearing, which is mostly suitable for vertical installation of V1 and can bear larger axial load;
4. Optional 3: Cylindrical roller bearing, which is mostly suitable for horizontal motor installation and can bear larger radial load.

Bearing location

Motor standard design:

H80-H132 Non-drive end designed as the located bearing.

H160-H355 Drive end designed as the located bearing.

11 Bearing

Lubrication

Maintenance free - sealed for life bearings

Mounting type	Frame sizes	Poles	RT≤40°C
B3, B5, B35	80 to 280	2P	20000h
		4P	40000h

Relubrication intervals for horizontal construction type:

Mounting type	Frame sizes	Poles	Lubrication interval(h)			Grease quantity (g)
			40°C	50°C	60°C	
B3, B5, B35	160 to 355	2P	2500	1000	500	30
		4P	5000	2500	2000	40

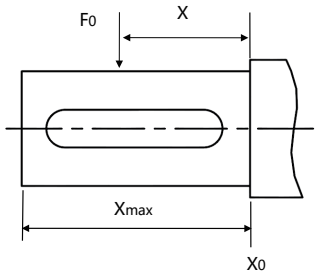
Note: 1. The table data is applicable to 50Hz motor. For 60Hz motor, the time interval should be multiplied by 0.8;
2. For vertical motor installation, the lubrication interval shall be divided by 2;
3. Re-greasing intervals should be halved for every 15°C rise above 70°C.

Permissible forces at the shaft end

Maximum radial force (for pulley drive system): The maximum allowable radial force F0(unit: N) for radial load is based on the premise that the load line (center of pulley) must be within the length of the motor shaft extension (the motor shaft elongation is shown in the installation size code E size). The radial force length X (mm) is the distance from the axial extension shoulder to the radial force F0 action line, so when the length X= Max, it is the total length of the axial extension (size value E). Maximum allowable radial force as below table.

Frame sizes	Radial force F0 (N)							
	2P		4P		6P		8P	
	X=0	X=max	X=0	X=max	X=0	X=max	X=0	X=max
80	720	600	760	630	860	720	980	820
90	780	650	810	670	940	780	1060	880
100	1100	900	1110	910	1310	1070	1480	1210
112	1090	900	1080	890	1290	1060	1460	1200
132	1730	1360	1740	1400	2000	1610	2330	1880
160	2950	2330	3050	2410	3420	2700	3870	3060
180	3420	2740	3460	2820	4080	3320	4430	3610
200	4390	3640	4500	3730	5270	4370	5790	4800
225	4340	3620	5050	4030	5870	4690	6470	5170
250	4910	4000	5710	4650	6520	5310	7180	5840
280	5380	4500	6870	5750	8090	6770	9120	7630
315	6400	5550	7500	6310	8420	7080	9120	7670
355	6770	6070	8620	7560	9910	8690	11590	10160

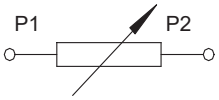
Permissible radial force Frame sizes 80~355



Bearing life

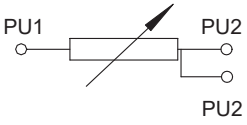
For standard ball bearings, under the action of allowable load, the bearing design life of the motor can meet the following requirements: at least 20000 hours for the 2-pole motor, 4 poles, 6 pole motor at least 30000 hours (refers to the motor life under normal operation at 50Hz and normal maintenance as required).

Thermistor PTC

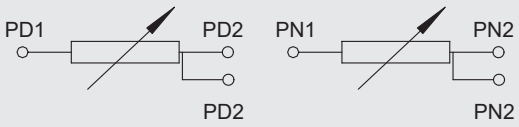
Name	PTC thermistor
Type	MZ6 145 D
Application	Motor overheating protection
Operating temperature and accuracy	145 ±5°C
Set position	1 in each phase, in series, at the highest temperature point embedded at the end of the winding at the drive end
Connection	Three components in series, two leads to the terminal box.
Color and marking of wiring	P1 & P2
Wiring diagram	
Frame	80 to 355

Note :(1) PTC operating temperature can be customized according to specifications
(2) PTO thermosensitive bimetal switch can be used according to specifications.

Winding Resistant Temperature Detector (RTD)

Name	Platinum Resistant Temperature Detector (RTD)
Type	PT100, three leads
Application	Motor winding temperature detection, high temperature protection
0°C resistance and precision	100± 0.12Ω (Class B tolerances)
Set position	1 in each phase, at the highest temperature point embedded at the end of the winding at the drive end
Connection	Each component has three lead wires to the terminal box
Lead Markings	U — PU1, PU2, PU2 ; V— PVl, PV2, PV2; W— PWl, PW2, PW2. If there are two elements in each phase winding, the lead of the other element is marked as: U— PU3, PU4 , PU4 ; V— PV3, PV4, PV4 ; W— PW3, PW4, PW4
Wiring diagram	
Frame	160 to 355

Bearing Resistant Temperature Detector (RTD)

Name	Platinum Resistant Temperature Detector (RTD)
Type	WZP-M, three leads, sealed metal body
Application	Motor winding temperature detection, over temperature protection
0°C resistance and precision	100± 0.12Ω (Class B tolerances)
Quantity	One per bearing
Set position	Embedded inside the endshield, the face of the sensor must contact the outer ring of the bearing
Connection	Each component has three lead wires to the terminal box.
Lead Markings	drive-end bearing (D E) — PDl, PD2, PD2 ; non-driven-end bearing (NDE) — PNl, PN2, PN2 If two elements are used for each end of the bearing, the lead of the other element is marked as: drive-end bearing (D E) - PD3, PD4, PD4 ; non-driven-end bearing (NDE) - PN3, PN4, Pn4
Wiring diagram	
Frame sizes	160 to 355

According to temperature measuring elements , K or T type thermocouples can be fitted as an alternative.

Anti-condensation heater

Name	Anti-condensation heater												
Application	Prevent condensation within the motor, which would lead to low insulation resistance												
Temperature resistance of insulating material	≥250°C												
Rated voltage	AC single-phase, 220 - 240V (order schedule)												
Set position	Bound to the winding overhang												
Connection	Two lead wires to the terminal box												
lead Marking	H1 & H2												
Wiring diagram													
Frame sizes	80	90	100	112	132	160	180	200	225	250	280	315	355
Rated power of each heating element	30	30	30	30	40	40	50	50	60	60	60	80	110
Quantity	1	1	1	1	1	1	1	1	1	1	1	2	2

Frequencies above the rated frequency of 50 Hz

If the frequency continues to increase beyond the drive's rated value, the speed increases accordingly. The speeds corresponding to the maximum frequencies must not exceed the motor's speed limit. If a motor is operated above its rated frequency, it will generate more noise.

Noise generation of three-phase motors in frequency inverter operation

Due to the harmonic oscillations, noise levels are higher in frequency inverter operation than they are at mains frequency. Without the use of a sinusoidal phase filter, the increase on the U-type inverter is about 7-15 dB(A); on the I-type inverter, it is about 3 dB(A). If a filter is used with the U-type inverter, the noise levels at frequencies < 50 Hz do not exceed the values with mains operation. The noise increase from self-ventilated motors at frequencies > 50 Hz can be taken from the following table. Guideline values for the increase of the sound pressure level through increase of the fan noise

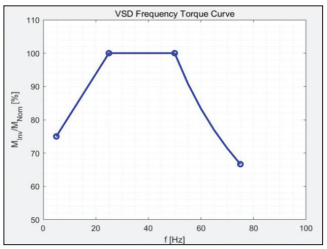
F [Hz]	Δ LP [dB(A)]
50	0
60	⩽ 5
70	⩽ 9
80	⩽12
87	⩽ 15

Three phase motors operated with a frequency inverter at constant voltage above 50 Hz

If the motor runs above the mains frequency, at a constant voltage, field weakening occurs. The flux of the motor drops inversely proportion to the frequency. In the range above the rated frequency (50 Hz to 75 Hz), the motor's output remains approximately constant i.e. the torque drops inversely proportion to the frequency

Torque characteristic on the frequency inverter, 50 Hz mains, Temperature class T4

Torque characteristic	Decreasing quadratic constant	Constant torque		Constant power
frequency	5-50Hz	5-50Hz	25-50 Hz	50-75Hz
Contol rang	1:10	10:1	1:2	1.5:1
Output/torque	-	75%T_N	100%T_N	100%P_N
Amb. -40°C～+ 50°C (H355,max ambient + 45°C)				



The following values of the permissible voltage loading capacity through voltage peaks (limit values of the terminals and winding insulation) are safe.

1. The air and creep sections of the terminals are designed for an effective rated voltage of 690 V on the basis of DIN EN 50019 - explosion protection type "Increased safety e". The permissible transient over voltage surge in frequency inverter operation of the motors is 2.15 kV phase-to-phase and phase-to-ground.
2. Standard windings for effective rated voltages up to 500 V have a peak-voltage resistance of 1.6kV phase-to-phase and phase-to-ground at continuous heating according to the heat class F. These motors can be used with frequency inverters with NO additional filter.
3. Standard windings for effective rated voltages of 690 V have a peak-voltage resistance of 1.6 kV phase-to-phase and phase-to-ground at continuous heating according to heat class F. These motors can be used with frequency inverters WITH an additional filter.
4. Special windings for an effective rated voltage of 690 V have a peak-voltage resistance of 2.15 kV phase-to- phase and phase-to-ground at continuous heating according to heat class F. These motors can be used with a frequency inverter WITHOUT additional filters. This special winding can be implemented in motors of frame size 315 or higher and requires a reduction of output. Efficiency according to manufacturer standard.

For more information on inverter operation, please consult instructions, inverter manufacturer or motor manufacturer. All performance characteristics according to IEC 60034-25:2014