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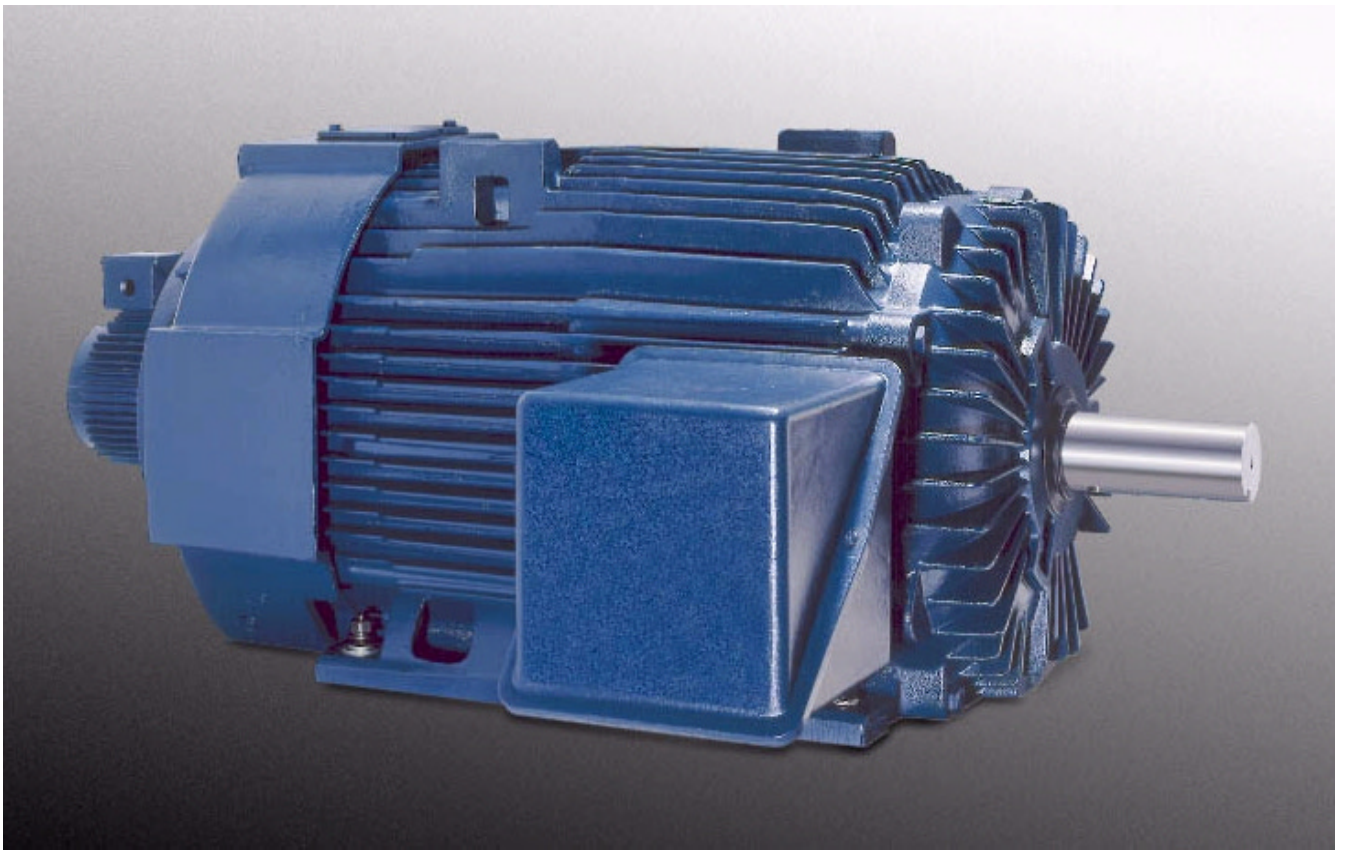

2AD280 Main Spindle Motor (Preliminary)

Project Planning

DOK-MOTOR*-2AD280*****-PR01-AE-P

283365

Indramat

Title 2AD280 Main Spindle Motor

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Document Typecode DOK-MOTOR*-2AD280*****-PR01-AE-P

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Purpose of Document This document

- introduces the 2AD280 spindle motor,
- specifies technical information about the structural features of the 2AD280 spindle motor,
- assists in selecting the main spindle motor relevant to your needs and applications, and,
- outlines the technical data for the 2AD280 main spindle motor.

Record of Revisions

Revision	Date	Remarks
01	03/99	Preliminary Release

Validity All rights are reserved with respect to the content of this documentation and the availability of the product.

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Contents

1 2AD280 Main Spindle Motor

2AD Main spindle motors are used with the DKR5 Vector drive in such applications as,

- Printing machines
- Converting machine
- Test stands

Power range

These motors feature:

- speed range of up to 2700 RPM.
- nominal power of up to 224 kW (300 hp)

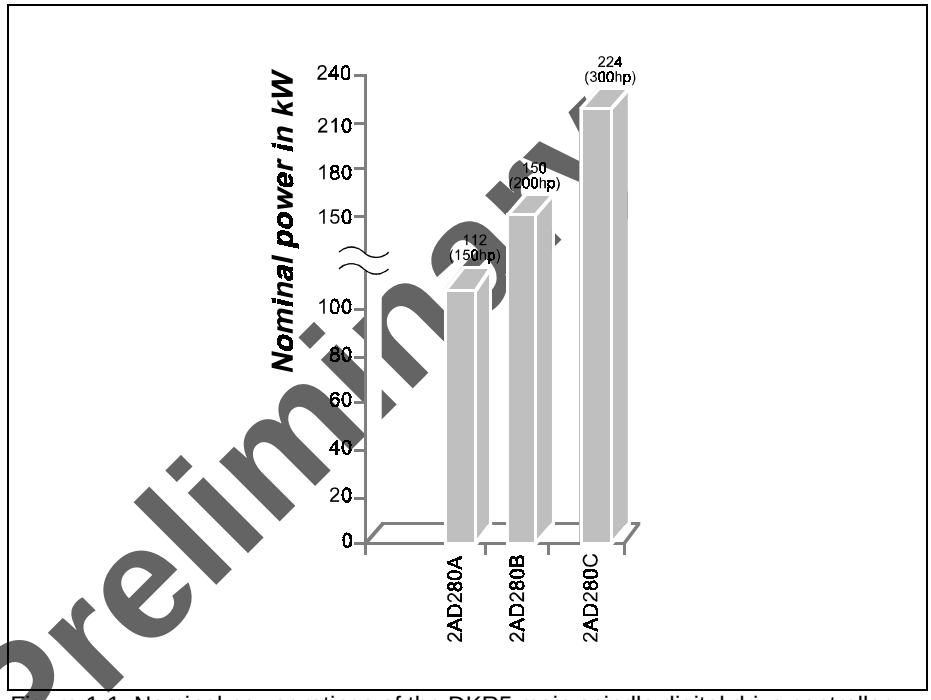


Figure 1-1: Nominal power ratings of the DKR5 main spindle digital drive controller

Motor feedback

The motor feedback measures the rotor's position and signals it to the drive. This process regulates motor speed and rotor position. The motor feedback has a resolution of 1/ 2,000,000th of a revolution.

Minimal maintenance

The 2AD280 main spindle motor is an asynchronous motor requiring no maintenance other than following a regular lubrication schedule.

2 Mechanical integration into the machine

2.1 Environmental conditions

Installation requirements: ambient temperature and altitude

The ratings outlined in this document are achieved under the following conditions:

- ambient temperatures of 0 °C (32 °F) to +40 °C (104 °F)
- installation altitudes of 0 to 1,000 meters (3,280 feet) above sea level

If the motors are to be used above this range, then the "Load capacity factors" must be taken into account. This de-rates the power data.

⇒ In cases like this, check to see if whether the power data still satisfies your application. To determine the load capacity factor, please check Figure 2-1. Values exceeding those depicted in the illustration for temperature or installation elevations are not recommended!

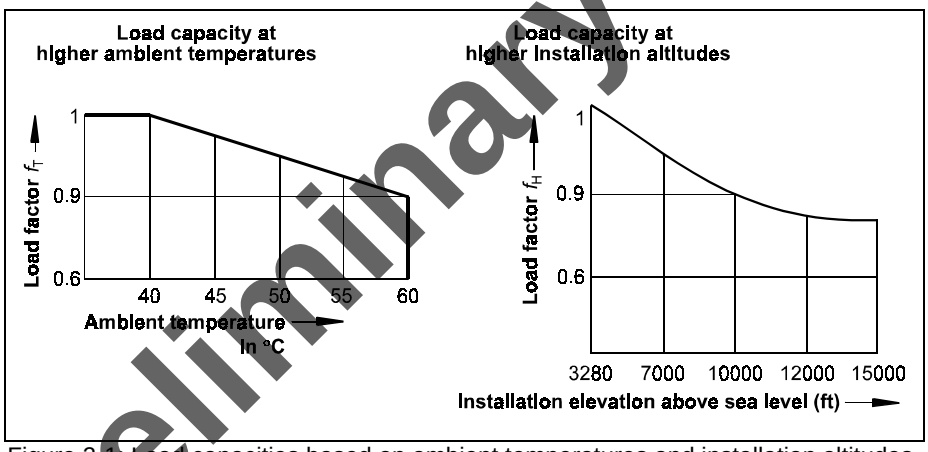


Figure 2-1: Load capacities based on ambient temperatures and installation altitudes

If either the ambient temperature **or** the installation elevation exceed the rated data:

⇒ Multiply the continuous torque at standstill data found in the selection lists with the load capacity factor which was determined.

⇒ Make sure that the de-rated torque data are not exceeded by your application.

If **both** ambient temperature **and** installation elevation exceed rated data:

⇒ Multiply the determined load capacity factors f_T and f_H.

⇒ Multiply the determined value with the continuous torque data at standstill listed in the selection lists of the motor.

Ascertain that de-rated torque data are not exceeded by the application.

International Protection class

2AD280 motors are designed as "Totally enclosed, blower cooled" motors as defined in NEMA MG-1. The approximate DIN equivalent, as defined in DIN 40050, for motors with housing and cover is given below and protected against:

- contact with parts either moving or to which voltage is being applied, and,
- penetration by solid objects and water.

The category of protection is indicated by the abbreviation "IP" (**I**nternational **P**rotection), with two digits for the protection grade, e.g., IP 40

The first digit denotes the protection grade for contact and penetration by

foreign objects (see Table 2-2: Categories of environmental protection against foreign objects.)

The second digit denotes the protection grade for water (see Table 2-3: Categories of environmental protection against water.)

2AD280 motor surface	Protection category
Motor housing, output shaft, power, feedback and blower connections (only with Indramat cable assemblies)	IP44
Blower motor	IP53
Surface cooling	

Table 2-1: Protection class of 2AD280 motor

1st digit	Protection category (protection against contact and foreign objects)
0	No protection
1	Protection against penetration by solid objects with a diameter greater than 50 mm. No protection against deliberate penetration, e.g., hands, but will keep larger body surfaces out.
2	Protection against penetration by solid objects with a diameter greater than 12 mm. Keeps out fingers and similar objects.
3	Protection against penetration by solid objects with a diameter greater than 2.5 mm. Keeps out tools, wires and similar objects with a thickness greater than 2.5 mm.
4	Protection against penetration by solid objects with a diameter greater than 1 mm. Keeps out tools, wires and similar objects with a thickness greater than 1 mm.
5	Protection against dust deposits. Penetration by dust is not completely prevented. Does not permit dust to penetrate to the extent that it influences the operation of the equipment (protection against dust). Total protection against penetration.
6	Protection against dust (dust-proof). Total protection.

Table 2-2: Categories of environmental protection against foreign objects

2nd digit	Protection grade (protection against water)
0	No protection
1	Protection against vertically dripping water. Does not permit any damaging affects (dripping water).
2	Protection against vertically dripping water. Does not permit any damaging affects to equipment (housing) tilted up to15° in comparison to the normal position (water dripping at an angle).
3	Protection against water falling at an angle of up to 60° . Does not permit any damaging affects (spraying water).
4	Protection against water sprayed at the equipment (housing) from all directions. Does not permit any damaging affects (splashing water).
5	Protection against a jet of water sprayed from a nozzle onto the equipment (housing) and coming from all directions. Does not permit any damaging affects (jet of water).

Table 2-3: Categories of environmental protection against water

2.2 Mechanical Features

Construction type and installation position

The 2AD280 main spindle motor from Indramat is only available with B03, foot mount design only

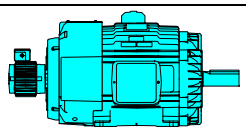
Motor	Installation positions per DIN IEC 34-7	Installation guidelines
B03		**Foot installation:** Do not permit the following loads on the motor feet: • Radial loads affecting the motor feet in the form of a traction force. In this case, alter the installation position. • Transmission of loads occurring at the drive. If possible, mount the motor and drive separately.

Table 2-4: Allowable installation position

Output shaft

Plain shaft:

For friction-locked shaft-hub connections.

The higher run quality and the backlash-free connection between shaft and hub are a significant advantage of this recommended design.

Output shaft with key:

For a form-fitting shaft-hub connection.

- Balanced with full key:

  The **rotor** is balanced with the key used in the shaft-hub assembly. The rotor is balanced **with** the **full key**. A balanced, interconnecting part (toothed wheel etc.) must be used. The keyway in the hub is not dependent upon the length of the key.

- Balancing with a half-key:

  The rotor is balanced with a half-key in the keyway. The mass ratios occurring at the keyway are comparable to those of a plain shaft. If a full key is inserted, then the projecting section of the key creates a state of imbalance. The **rotor with the full key is not balanced.**

The interconnecting part must equalize the rotor's state of imbalance. The keyway in the hub should correspond to the length of the key. Use a stepped key for shorter keyways.

Output shaft with seal

The motors are equipped with a neoprene shaft seal that keeps debris from entering the gap between the shaft surface and the front flange. The available shaft sealing ring option is equipped with a Forsheda seal that further restricts the entry of liquids and small, non-abrasive dust.

Please note the "Important installation guidelines" in Table 2-4: Allowable installation position.

Permissible shaft load

Radial shaft load:

The permissible radial force at the output shaft is dependent upon the bearing assembly and average speed. The diagrams in Figure 3-2 and Figure 3-3 , outline the values for:

- standard bearing assemblies, and,
- heavy-duty assemblies.

The heavy-duty assembly can take greater radial loads. The cylindrical roller bearing on side A (shaft end) of the bearing assembly absorbs the radial forces. This assembly should only be used in exceptional cases as it doubles the rate of lubricant consumption.

Motors with heavy-duty bearing assemblies may only be operated with radial loads. Sliding friction could otherwise damage the bearings. See Figure 3-2 for minimum radial loading values.

Bearing service life

Axial shaft loads:

Only very low axial loads are acceptable (see "Technical data"). Thus, the motors are not suited for helical toothed output pinions.

Mechanical service life:

Indramat 2AD280 main spindle motors are equipped with ball bearings, or roller bearings for belted applications, as specified by the typecode.

The mechanical service life of the bearings equals 20,000 working hours, if the radial loads and average speeds listed in section "Technical data" are maintained under normal loads.

Normal loads are:

- Radial loads:
  corresponding to the "Permissible radial loads" diagrams in Figure 3-2.
- Operating the motor within the permissible ambient temperature range of: 0° to +40°C.

Since lubrication consumption has a significant affect on bearing life, follow the recommended lubrication schedule in Table 2-5.

Lubricant consumption

Non-conforming loads cause the lubricant to be consumed faster, and has an adverse affect on bearing service life.

If higher average speeds occur with a heavy-duty bearing assembly, the lubricant can be consumed more quickly. Thus, the working life of the motor is limited to that period in which the lubricant is available.

Caution

Overgreasing causes premature failure

⇒ Overgreasing bearings can cause premature bearing and/or motor failure. The amount of grease added should be carefully controlled.

Note: **If lubrication instructions are shown on the motor nameplate, they will supersede this general instruction.**

Indramat's 2AD280 motors are pre-greased with a polyurea mineral oil NGLI grade 2 type grease unless stated otherwise in the motor nameplate. Some compatible brands of polyurea mineral base type grease are: Chevron SRI #2, Rykon Premium #2, Shell Oil Dolium R or Texaco Polystar RB.

Motors are properly lubricated at the time of manufacture. It is not necessary to lubricate at the time of installation unless the motor has been in storage for a period of 12 months or longer. Refer to the following lubrication procedure.

Lubrication Procedure

1. Stop motor. Disconnect and lock out of service.
2. Remove any contaminants from grease inlet area.
3. Remove filler and drain plugs. Refer to Figure 3-4 and Figure 3-5 for location of filler and drain plugs.
4. Check filler and drain holes for blockage and clean as needed.
5. Add proper type and amount of grease. Refer to Table 2-5: Re-lubrication time intervals and amount
6. Wipe off excess grease and replace filler and drain plugs.
7. Motor is now ready for operation.

	Motor bearing data		Blower fan bearing data	
Service condition	**1800 RPM and less**	**Over 1800 RPM**	**1800 RPM and less**	**Over 1800 RPM**
Standard	1 year	3 months	2 years	6 months
Severe	6 months	1 month	1 year	3 months
Seasonal	Lubricate at start of season, then follow above schedule			
Amount of grease	2.75 cu. In. (1.5 fluid oz.)		1.00 cu. In. (0.55 fluid oz.)	

Table 2-5: Re-lubrication time intervals and amount

Note: **For motors with heavy duty bearings, divide the above intervals by 3.**

Standard service: Up to 16 hours of operation per day, indoors, 100 °F maximum ambient.

Severe service: Greater than 16 hours of operation per day. Continuous operation under high ambient temperatures (100 °F to 150 °F) and/or any of the following conditions: dirty, moist locations, high vibration (above NEMA standards), heavy shock loading, or where shaft extension end is hot.

Seasonal service: The motor remains idle for a period of 6 months or more.

Balance class

The 2AD280 main spindle motor is dynamically balanced as per balance class R (reduced) as per DIN ISO 2373.

The motors are balanced to a vibration spec of 0.04 in/s (1.02 mm/s) at a speed of 750 RPM.

Cooling method

The 2AD280 series main spindle motors are always equipped with a blower on side B. An air flow fed over the surface of the motor via air baffles is used for cooling. One air stream direction is available for these axial blowers:

- Air flow from side B (rear) to side A (shaft end) of the motor (blowing)

There must be a sufficient supply of air for cooling once the motor is mounted. See the "Motor blower" section in the "Technical data" section for the average air requirements.

2.3 Electrical features

Terminal diagram

Figure 2-2 is a electrical connection diagram illustrating all the power, feedback and thermal connections to operate the 2AD280 main spindle motor.

The electrical connections of Indramat main spindle drives are standardized. This focuses the available variety. The electrical connections required for each application are outlined in the document, **"DKR5 Digital Controller; planning design manual"**, document no. xxx-xxxx-xxxx-xx.

This document is necessary when connecting the main spindle motor. It contains precise descriptions of the electrical connections, as well as guidelines for their proper layout.

The following electrical connections are on the main spindle motor:

- power connection
- motor NTC thermistor connection
- motor feedback connection,
- motor blower connection

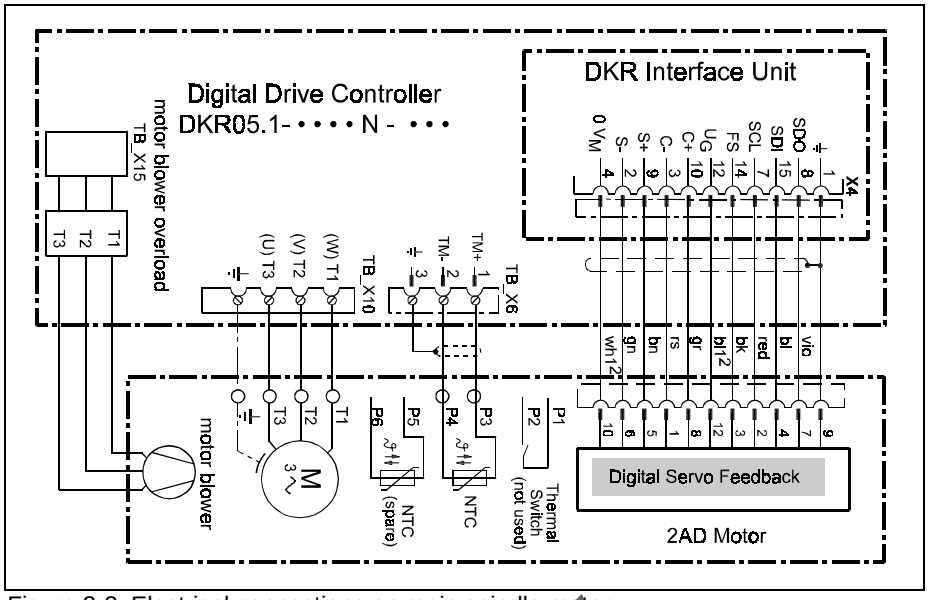


Figure 2-2: Electrical connections on main spindle motor

Power terminal

The power terminal in the 2AD280 main spindle motor is in a junction box. The position of the power terminal can be specified when the order is placed, but cannot be changed after delivery. The cable output direction out of the terminal box can be turned in increments of 90°. It can be changed after the motor is delivered.

Integrated into the power terminals are the connections for the:

- motor NTC thermistor, and,
- motor thermal switch

Motor thermal switch

The motor also has a normally closed thermostat for detection of overload conditions. These should not be connected with the NTC thermistor connections on the drive.

Motor NTC thermistor

The motor NTC thermistor is built into the motor windings. The monitoring of the NTC thermistor in the drive protects the motor against overheating. The drive sends out an appropriate error message if the motor is shutdown for thermal reasons.

Grounding: Motor Power

The 2AD280 is grounded by connecting a ground wire to the ground terminal located within the motor's terminal box.

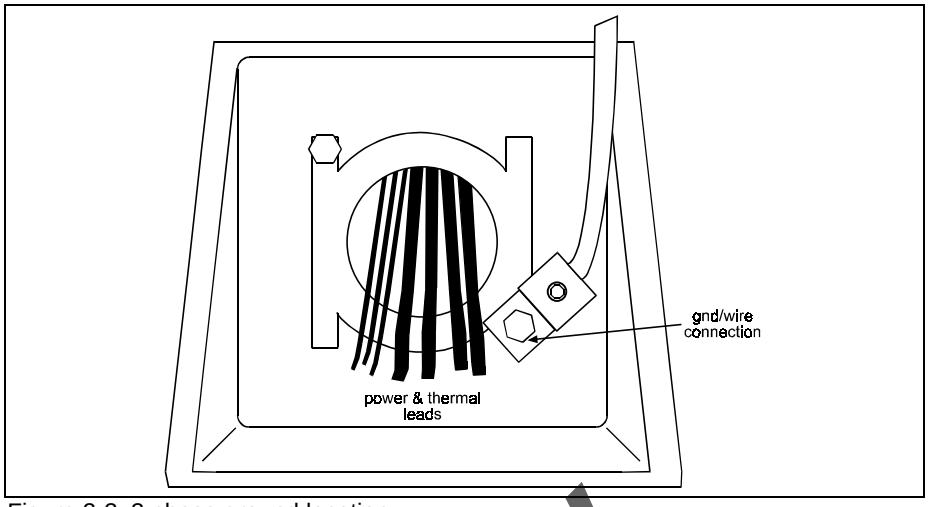


Figure 2-3: 3 phase ground location

Motor feedback

The motor feedback connection is found inside the rear face bracket over the top rear portion of the motor. An access panel must first be removed before the feedback connector can be mounted. The standard cable assembly used between the DKR5 and 2AD280 motor is the IKS0374. The position of the motor feedback connection cannot be changed once the motor is delivered.

Motor blower

The 2AD280 motor blower is wired for 460…460V, 50/60 Hz and has its own motor protection switch. This means it functions independently of the drive. The following figure illustrates the wiring scheme.

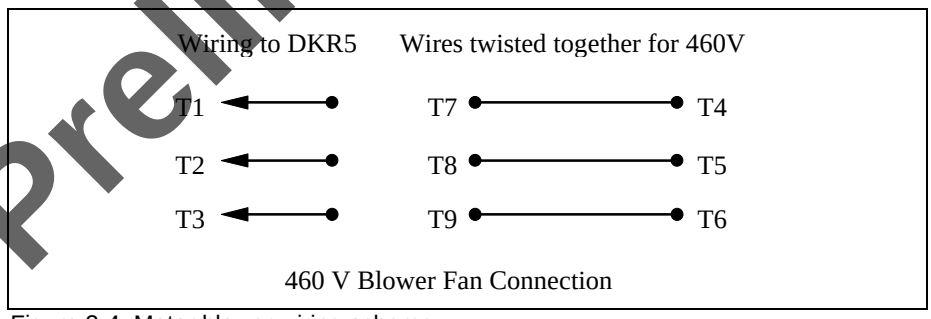


Figure 2-4: Motor blower wiring scheme

3 Technical Data - 2AD280

3.1 Main spindle motor

Designation	Symbol	Unit	2AD280		
Motor size			A	B	C
Windings designation			AS	AS	AD
Nominal power	P_n	kW	112	150	224
		hp	100	200	300
Nominal torque	M_n	Nm	594	792	1187
		lb-ft	438	584	875
Base motor speed	n	min^{-1}	1800		
standard assembly Peak speed	n_{max}	min^{-1}	2700		
heavy-duty assembly Peak speed	n_{max}	min^{-1}	2250		
Nominal current	I_n	A	170	230	330
Rotor inertia	J_M	kgm^2	2.11	2.51	3.62
		$lb\text{-}in\text{-}s^2$	18.82	22.36	32.24
Thermal time constant	t_{th}	min	240		
Minimum wire size*	A	AWG	4/0	350 mcm	500 mcm
Average sound pressure level at one meter	L_p	dB(A)	92	92	92
Weight	m	kg	1025	1070	1545
		lbs	2250	2350	3400
Ambient temperature		°C	0° - 40°		
		°F	32° - 104°		
Maximum installation altitude		m	1000 above sea level		
		ft	3280 above sea level		
Insulation classification DIN VDE 0530 part 1			F		
Balance class DIN ISO 2373			R		
International Protection			IP 55		

Table 3-1: Main spindle motor 2AD280 - nominal data

* for sizing information, see the DKR5 Project Planning manual, Mat. No.: ***TBA***

Motor / Drive Combination

			Motor / Drive Combination		
Designation	**Symbol**	**Unit**	2AD280A / DKR 5.1-W400	2AD280B / DKR 5.1-W600	2AD280C / DKR 5.1-W800
Peak Power	P_p	kW	168	224	336
		hp	225	300	450
Base motor speed	n	min^{-1}	1800		
Nominal torque	M_n	Nm	594	792	1187
		lb-ft	438	584	875
Peak torque	M_p	Nm	890	1187	1794
		lb-ft	657	875	1323
Rotor inertia	J_M	kgm^2	2.11	2.51	3.62
		$lb\text{-}in\text{-}s^2$	18.82	22.36	32.24

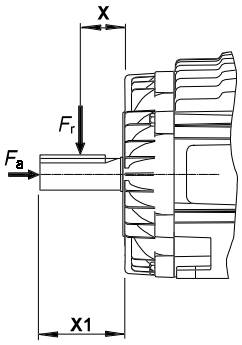
Table 3-2: 2AD280 / DKR5 selection list

2AD280 / DKR5 Speed torque curves

In preparation

Figure 3-1: 2AD280 / DKR5 Speed torque curves

Permissible shaft loading 2AD280 A/B



F_r Permissible radial force with a mechanical service life of L_h=20,000 working hours.

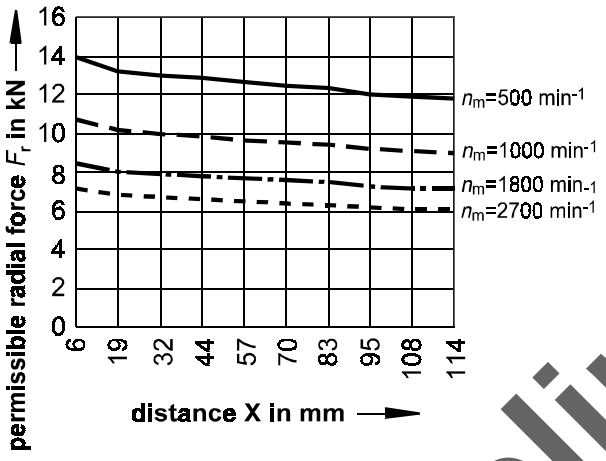
F_a Permissible axial force
Maximum permissible axial force equals 30 N in all mounting positions.

X Clearance between the point of action of the radial force F_r and the motor flange.

$X1$ Permissible radial force range F_r

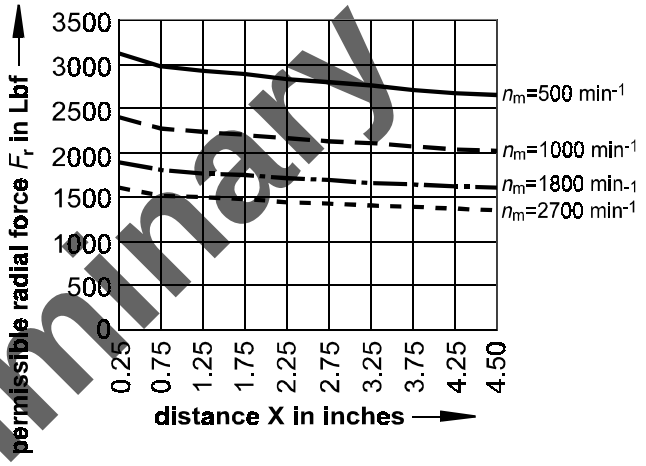
Metric

Standard bearing assembly

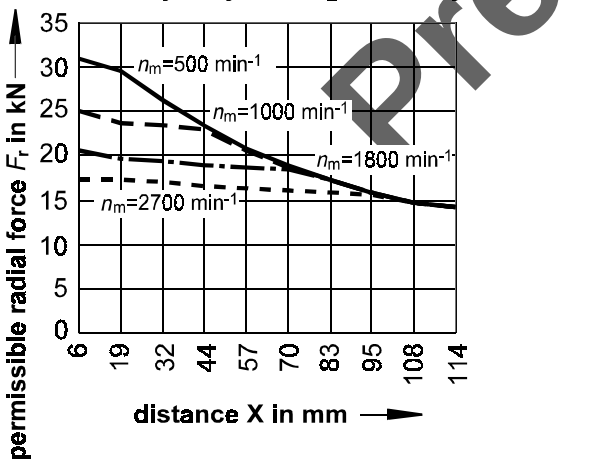


English

Standard bearing assembly



Heavy-duty bearing assembly



Heavy-duty bearing assembly

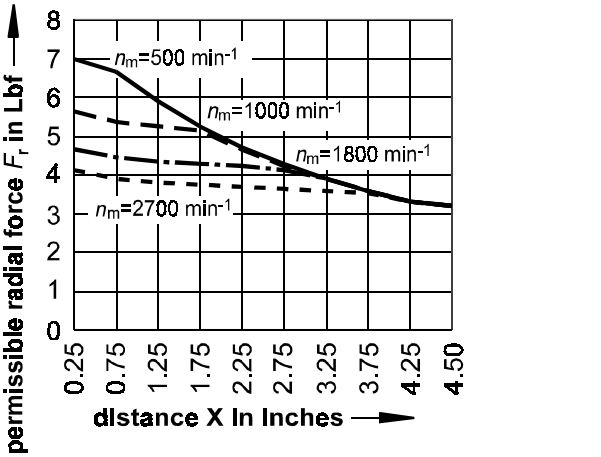
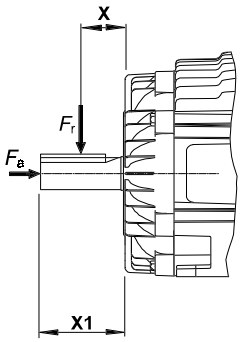


Figure 3-2: Main spindle motor 2AD280A/B - permissible shaft loading

Permissible shaft loading 2AD280 C



Fr Permissible radial force with a mechanical service life of L_h=20,000 working hours.

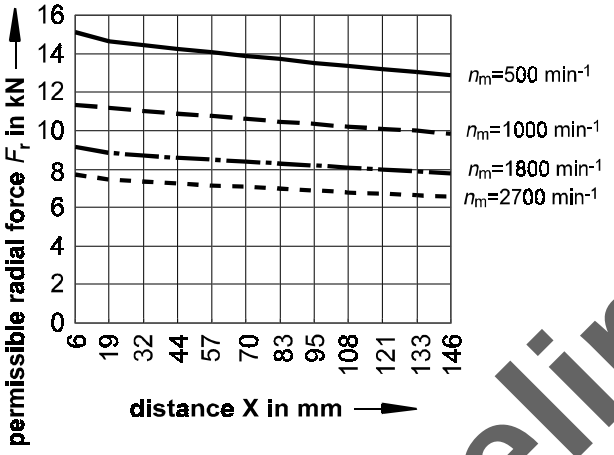
F_a Permissible axial force
Maximum permissible axial force equals 30 N in all mounting positions.

X Clearance between the point of action of the radial force F_r and the motor flange.

*X*1 Permissible radial force range F_r

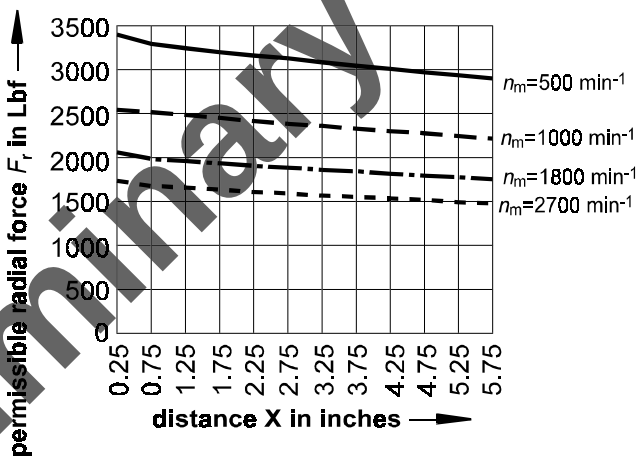
Metric

Standard bearing assembly

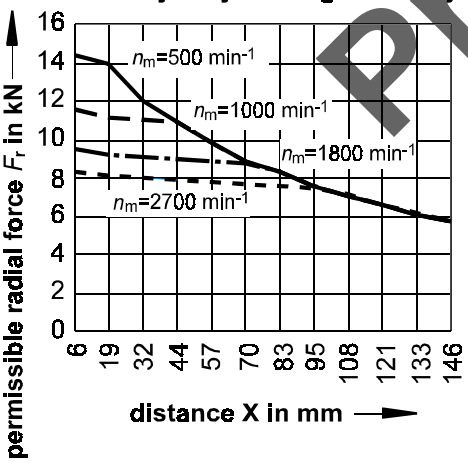


English

Standard bearing assembly



Heavy-duty bearing assembly



Heavy-duty bearing assembly

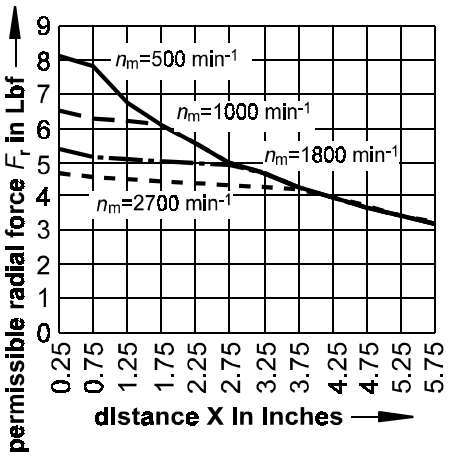


Figure 3-3: Main spindle motor 2AD280C - permissible shaft loading

3.2 Motor blower

Designation	Symbol	Unit	Axial blower
Air flow			B → A blowing
Power consumption	SN	VA	460
Nominal voltage	UN	V	3 x AC, 400V, 50/60Hz 3 x AC, 460V, 60Hz
Average air volume	V	CFM m^3/h	1100 1870

Table 3-3: Main spindle motor 2AD280 - technical data - motor blower

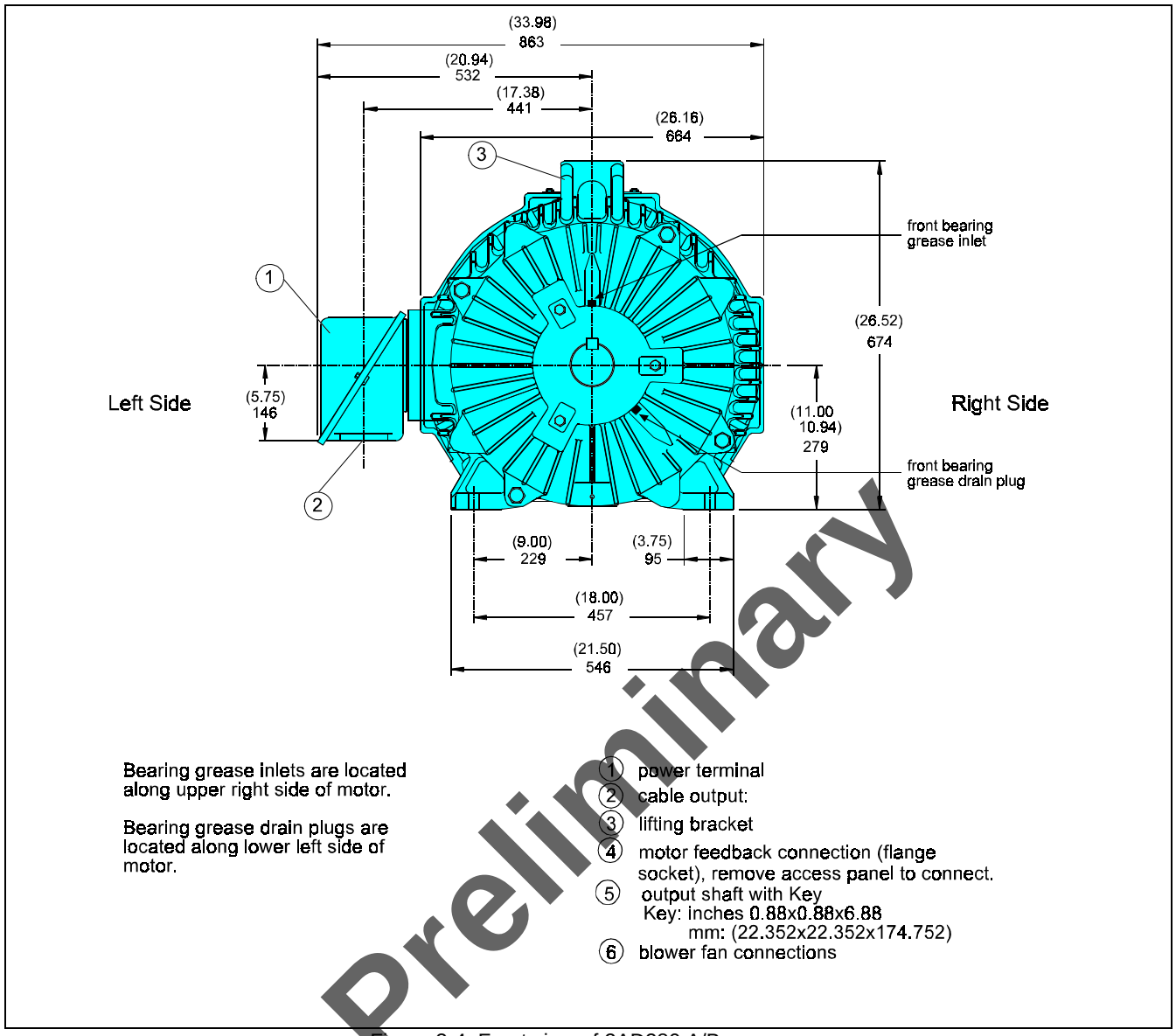


Figure 3-4: Front view of 2AD280 A/B

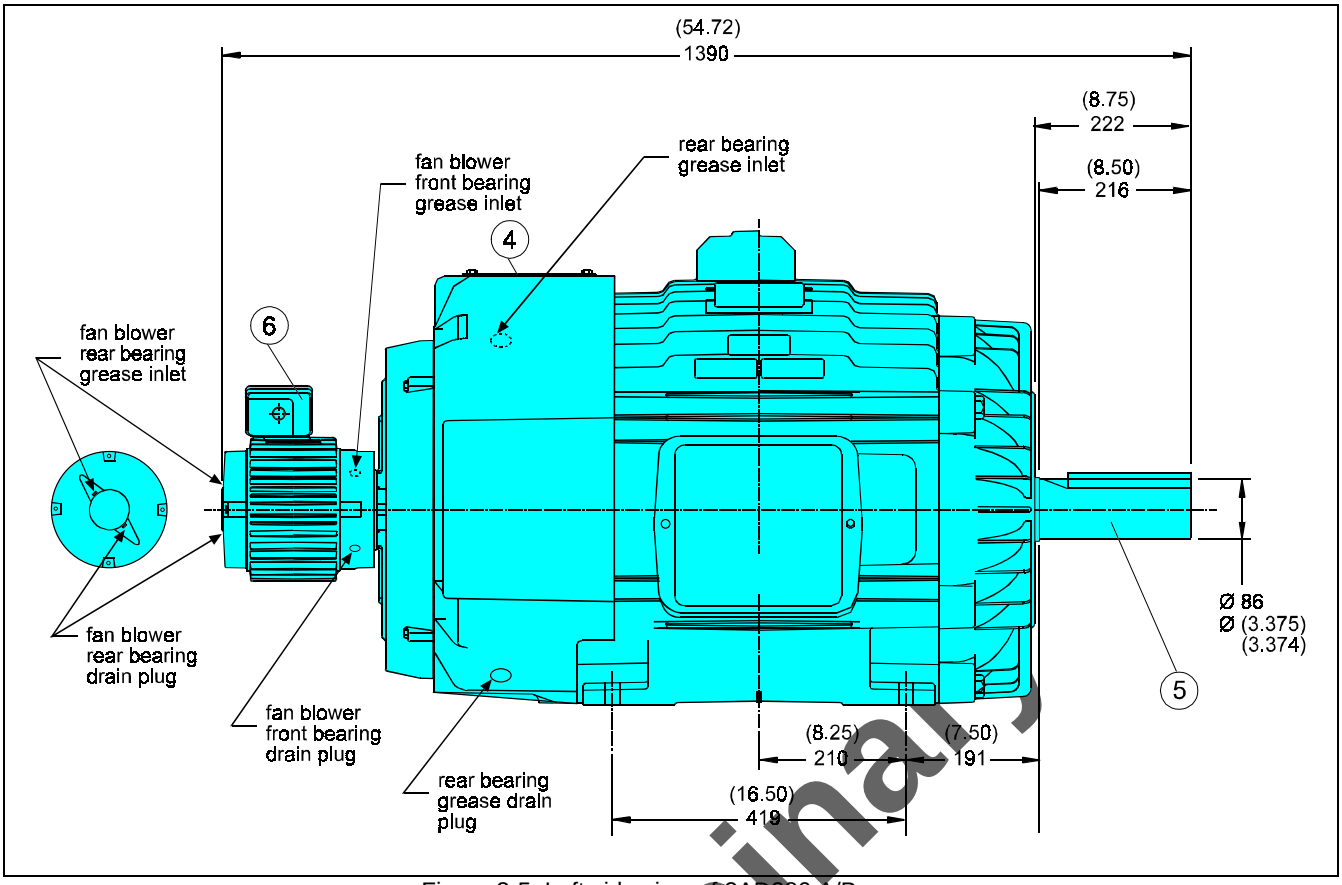


Figure 3-5: Left side view of 2AD280 A/B

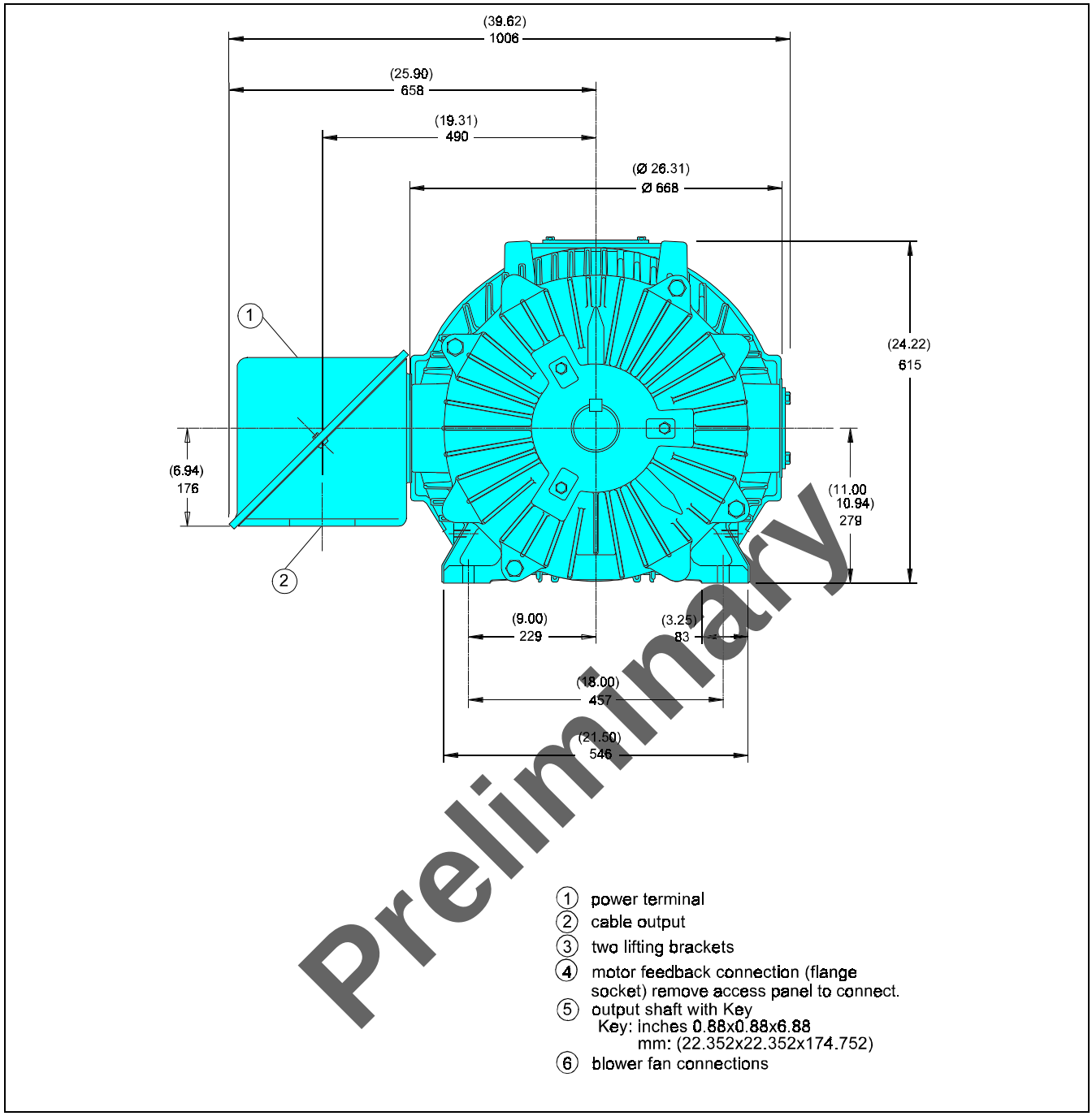


Figure 3-6: Front view of 2AD280 C

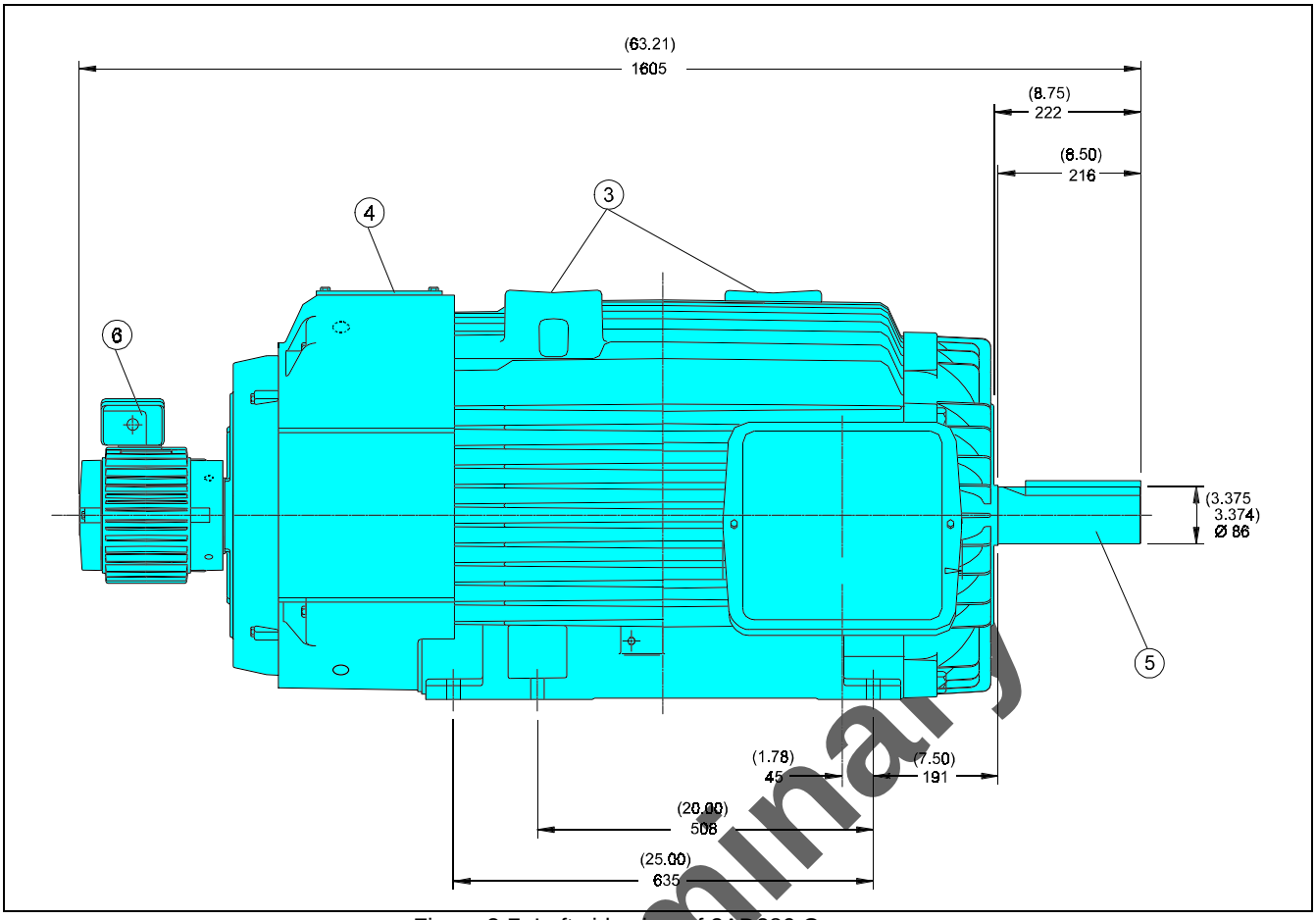
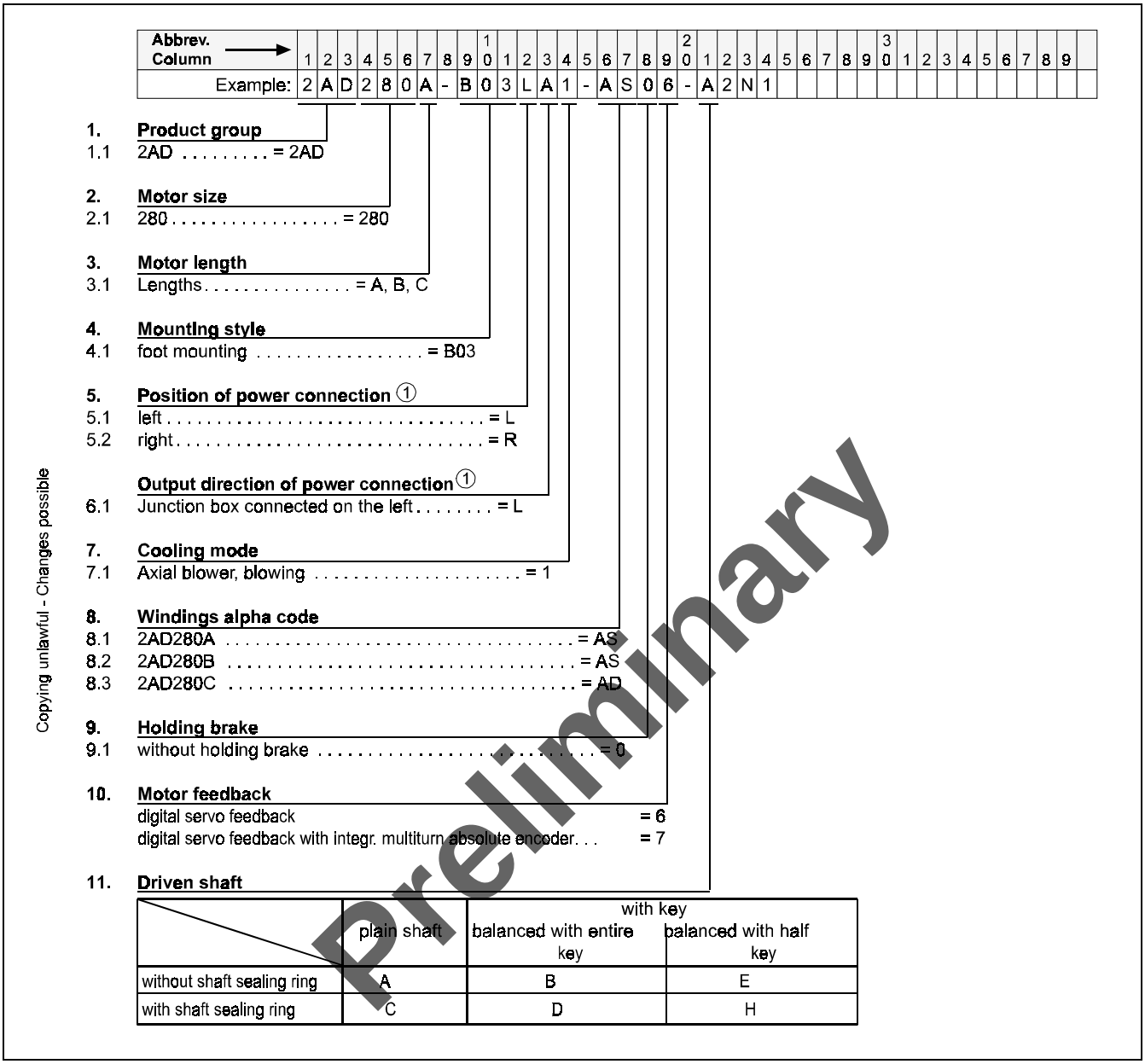


Figure 3-7: Left side view of 2AD280 C

3.3 Typecode



	plain shaft	with key: balanced with entire key	with key: balanced with half key
without shaft sealing ring	A	B	E
with shaft sealing ring	C	D	H

Figure 3-8: Main spindle motor 2AD280 - typecode page 1 of 2

Abbrev. Column →	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Example:	2	A	D	2	8	0	A	-	B	0	3	L	A	1	-	A	S	0	6	-	A	2	N	1																	

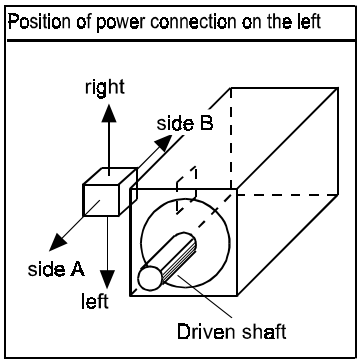
12. Shaft end side B
12.1 without shaft end side B . . . . . = 2

13. Bearings
13.1 Standard . . . . . = N
13.2 heavy-duty bearings . . . . . = V

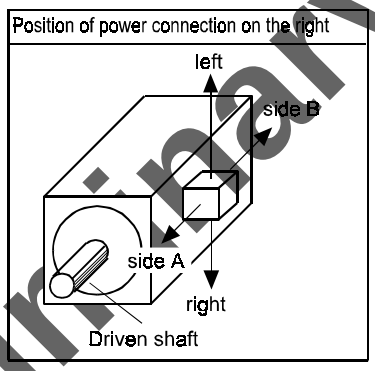
14. Vibration severity grade
14.1 R . . . . . = 1

Note:
① View from front (see picture 1 and 2)

Illustration example: 2AD280



Picture 1



Picture 2

Figure 3-9: Main spindle motor 2AD280 - typecode page 2 of 2

4 Condition at delivery

4.1 General Information

The merchandise is packed into a crate (2AD280) at delivery.

An envelope is attached to the crate. It contains a delivery slip and a sticker with information about the customer, delivery slip number, consignment and freight company. There are no other documents unless specifically requested.

The items can be unpacked without damaging them by simply removing the screws used to assemble the crate's panels.

4.2 Shipping papers

A single copy of the shipping papers is in an envelope included with the delivery. These papers list merchandise by name and order designation. If the listed contents is distributed over several transport containers, then such will be noted on the slip or freight papers.
The packaging on each motor lists the following information:

- type designation of the motor (typecode or description)
- customer
- delivery slip number
- consignment
- freight company

(Also see section 5, “Identifying the merchandise“.)

5 Identifying the merchandise

5.1 Delivery slip

One copy of the delivery slip is attached to the top of the carton. The listed contents can be distributed over several cartons (transport containers). This is noted on the delivery slip or consignment document.
The delivery slip identifies the merchandise by designation and item number.

5.2 Barcode sticker

A bar-code sticker on the motor packaging identifies the contents by type and job order.

In preparation

Figure 5-1: Bar-code sticker on the package of a 2AD280 (example)

5.3 Name plate

The motor has a name plate containing rating information. It is located towards the front of the air baffle on the upper right hand side on the motor (looking towards the motor shaft).

In preparation

Figure 5-2: Motor name plate (example: 2AD280)

6 Storage, Transport and Handling

6.1 Notes on the package

There are notes on the package concerning storage, transport and handling. These notes must be adhered.

Achtung
Hochwertige Elektronik
Attention
Fragile Electronics

Vor Nässe schützen
nicht belasten
Do not apply load
Do not drop

Nicht werfen
Nicht kanten
Do not tip
Keep dry

Figure 6-1: Transportation safety guidelines

6.2 Storage

Motors must be stored in a dust-free environment, free from the hazard of impact. The permissible ambient temperature range is -20°C to +80°C. Plastic protective sleeves are placed over the motor feedback connector. They only serve to protect against moisture and mechanical damage.

6.3 Transport and handling

Warning

Motor damage during handling and mounting
Improper transport and handling can damage the motor.
⇒ Therefore, please note the following instructions.

Maintain the following conditions during transport and when handling:

⇒ Use suitable transport devices. Note the weight of the components (weights are listed in the individual sections of the motor under the technical data or on the name plate of the motor).

⇒ Use shock-dampening for transporting if excessive shock could occur. Note the limit data in section 2.1 "Maximum vibration and shock stress"

⇒ Transport in horizontal position only.

⇒ Do not lift the motor at the surface cooling devices.

⇒ Use lifting devices with rigging bands.

⇒ The 2AD280A/B contain one lifting bracket on the top center of the motor; while, the 2AD280C contains two lifting brackets.

⇒ Do not damage either motor or output shaft!

⇒ Avoid impacts to the output shaft.

⇒ The protective plastic sleeve on the feedback connector housing and output shaft should not be removed until shortly before mounting the motor.

7 Safety guidelines for electrical drives

7.1 General information

- The safety guidelines contained in this document must, in general, be observed. Improper handling of this machinery and non-compliance with the warnings noted herein can cause property damage, lead to bodily injury or, in extreme cases, cause death. Indramat is not responsible for damage resulting from non-compliance with the warnings and notices specified herein.
- The problem-free and safe operation of the drives necessitates proper transport, storage, mounting, installation and careful use and maintenance.
- Only qualified personnel may work on or within the vicinity of the drives. Personnel is qualified if it is familiar with mounting, installation and operation of the product and all warnings and precautionary measures expressed herein. Qualified means trained or permitted to switch electric circuits on and off, to ground and label these. Personnel must be equipped with suitable safety equipment and trained in first aid.
- Use only those replacement parts specified by manufacturer.
- The safety guidelines and conditions for the specific application must be complied with.
- The motors are intended for mounting into machines intended for commercial use.
- There may be no commissioning until it has been ascertained that the machines in which the product has been mounted meet the EG guidelines 89/392/EWG (machine guidelines).
- They may only be operated if national EMC guidelines for the specific application are met. Within the EU, EMC guideline 89/336/EWG applies.

7.2 Notes on Protection against contact with electrical parts

Parts carrying voltages in excess of 50 volts can be dangerous to humans. Electrical components can inevitably conduct dangerous voltages. Great care must be taken when working or operating components with high voltages.

Danger

High Voltage!

Danger to life or serve injury!

⇒ Comply with general setup and safety guidelines when working on high voltage facilities.

⇒ After installation, check the permanent connection of the protective conductor at all electrical components for compliance with the terminal diagram.

⇒ Operation, even for quick measuring and testing purposes, is only permitted with permanently attached protective conductors of all electrical components.

⇒ Prior to accessing electrical parts with voltages greater than 50 volts, remove them from the power source. Secure against being switched back on.

⇒ Wait the discharge time of five (5) minutes after switching off before accessing the motor.

⇒ Points of electrical connections of the components are not to be touched when on.

⇒ Before switching the machine on, cover live parts to prevent contact.

⇒ Make sure that there is also sufficient protection against indirect contact (as per DIN EN50178/ed.11.94, section 5.3.2.3).

Warning

High current leakage!

Danger to life or serve injury!

⇒ Prior to switching on, connect the electrical devices of each drive controller, supply unit and the motor with the protective device to the grounding point.

⇒ The leakage current is greater than 3.5 mA. This necessitates a permanent connection to the power supply system (as per DIN EN50178/Edition11.94, section 5.3.2.3).

⇒ Before commissioning, even for testing purposes, always connect the protective conductor. High voltages could otherwise occur on the housing.

7.3 Notes on protecting "safely-isolated low voltages"

The connections and interfaces on drive components intended for signal voltages range from 5 to 30 volts. These electrical circuits are part of the safely-isolated electrical circuits (safely-isolated low voltages)

Warning

High electrical voltages from improper connections!
Danger to life or serve injury!
⇒ Only those devices, electrical components or lines may be connected to the signal voltages of these components if they are sufficiently and safely isolated as complying with set standards (per DIN EN50178/edition11.94, section 5.3.2.3).

7.4 Note on handling and mounting

Warning

Danger when handling!
Injury from shearing, cutting and poking.
⇒ Comply with setup and safety guidelines on handling and mounting.
⇒ Use suitable mounting, transport and special tools.
⇒ Squeezing and pinching can be prevented with precautionary measures.
⇒ Wear protective clothing, e.g., protective eye-wear, shoes and gloves.
⇒ Do not stand under hanging loads.
⇒ Spilled liquids must be wiped up immediately.

7.5 Guidelines on protection against dangerous movements

The causes of dangerous movements can be various:

- faulty control
- software error
- component failure
- faulty wiring and cabling
- error in encoder for signals and measured values
- error caused by improper use of components

These errors can occur either directly after powering up or anytime thereafter.

Danger

Danger movements!

Danger to life and servere injury or property damage!

⇒ The monitoring devices within the drive components largely exclude malfunctions. This alone should not be relied upon for personnel safety. Until the built-in monitors are activated, it should be assumed that a faulty drive motion can occur, the extent of which depends on the nature of the problem and the operating mode. Personnel protection is therefore dependent on and must be secured with monitoring devices or measures that are build into the machine. These are instituted in the machine by the manufacturer after a danger and error analysis has been complied. This in turn takes the safety measures for the machine into consideration as well.

⇒ Personnel may not remain within the motional range of the machine. Possible measures against accidental accessing of personnel are:

- protective fences
- protective railings
- protective covers
- and photo-sensors.

⇒ Make sure that fencing and covers are strong enough to absorb maximum motional energy.

⇒ E-stop switches may be easily accessible and in the proximity of the user. Check the E-stop prior to commissioning to make sure it is operating properly.

⇒ Secure against unintentional startups of the drive via the E-stop loop or use a starting lockout.

⇒ Prior to accessing or entering the danger zone, bring the drives to a standstill.

⇒ Switch electrical equipment off via the main switch and secure it against being switched back on in the case of:

- maintenance and service work
- when cleaning
- prior to long operational breaks

⇒ The operation of high-frequency, remote control and radio equipment in the proximity of the machine's electronics and leads are to be avoided. If such must be used, then check, prior to initial start, both system and machine for possible malfunctions in all situations. It may be necessary to run a special EMC check on the machine.

8 Mounting and installation guidelines

- During mounting, pick the motor up only at the integrated lifting lugs using a crane.
- Avoid shocks or impacts to the output shaft or impact stress to the shaft, as these may damage the bearing assembly of the motor.
- Screw terminal box covers tightly into place!
- The screwed caps of the connectors must be tightened!
- Ground motor to the drive!
- Following manufacturer's circuit diagrams when wiring the motor!
- For Indramat's circuit diagrams see "Electrical connections of main spindle motors; project planning manual" (doc. no. 209-0042-4111). This assists in developing circuitry diagrams for the facility.

Danger

⇒ Do not pick up the motor from the blower assembly. The blower assembly is not designed to hold the weight of the motor.

9 Service Notes

9.1 Maintenance work

The following should be performed after the first year:

- clean the motor of excess dust, chips or similar
- clean the motor blower cooling unit
- check the air circulation over the motor

Note: Follow lubrication schedule

9.2 Contacting Customer Service

To rapidly and effective eliminate problems that may occur, our Service-Hotline is available.

⇒ Prior to any telephone contacts, please make note of the following:

- type data of the affected drive controllers and motors
- the problem
- fault and diagnostics display, if given

Our Service-Hotline is available 24 hours a day at 1-800-860-1055

⇒ If the motors are returned to us, then please make a copy of the following Fault Report, fill it out completely and include it with the motor.

⇒ Add the fault report to the machine documents so that the user of the machine can have access to it in the event repairs should become necessary.

This will ensure a rapid repair and help quickly locate any application-dependent problems.

Indramat

Fault Report
for digital AC drive DKR5

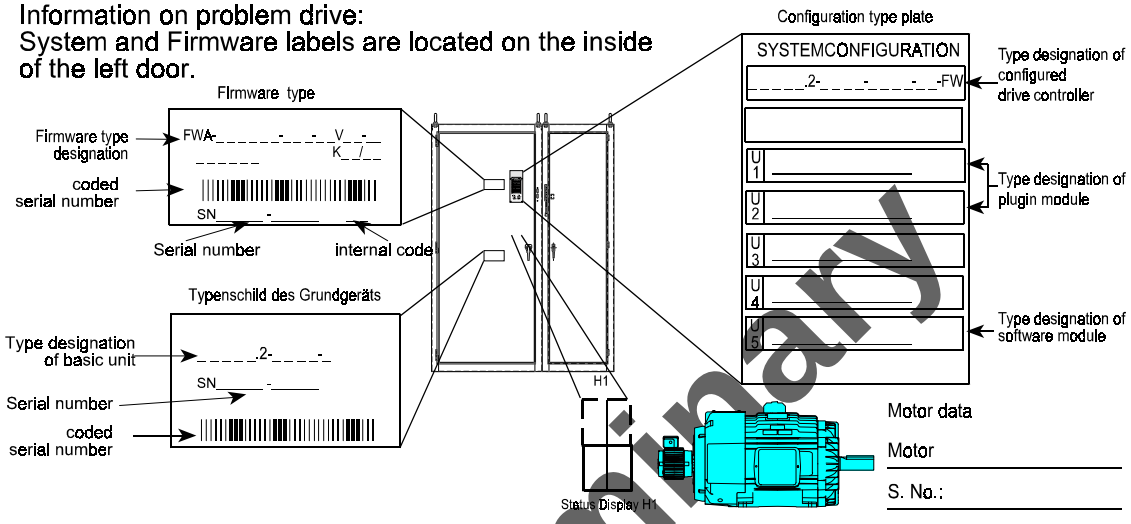
This fault report must be used to clarify faults and their causes. It is required to eliminate hidden, sporadic or applications-dependent problems.

- Include a fault report with all repairs
- Otherwise, send fault reports to the respective Indramat office or the address of Quality Assurance printed on the back.

INDRAMAT appreciates your cooperation and will respond quickly.

Fault report dated:	Co.:	Loc	Date:
	Dept.:	Name:	Tele

Information on problem drive:
System and Firmware labels are located on the inside of the left door.



Information about machine with problem:

Machine _____ Type: _____ Operat. hrs.: _____

Machine number: _____ Commissioning date: _____

Manufac. and type of machine control: _____

Machine axis designation at which problem occurred: _____

Outline problem in detail:

_____

_____

_____

Additional data:

Problem:	Causes:	Auxiliary problems:
☐ always present	☐ unknown	☐ mechanical problem
☐ at commissioning	☐ connection error	☐ mains section failure
☐ occurs sporadically	☐ external causes	☐ control failure
☐ occurs after ☐ hours	☐ mechanical damage	☐ motor failure
☐ occurs with stress	☐ loose line	☐ break in cable
☐ is temperature dependent	☐ moisture in unit	☐ blower defective
	☐ foreign object in unit	☐ feedback defective

☐ Additional information: _____

_____

_____

Is there an air conditioner In control cabinet ? Y / N ☐

Has this axis had problems before ?

How often: _____

Did the problems occur on specific dates or at certain times of the day?

_____

_____

Figure 9-1: Service report for 2AD280 spindle motor

10 Commissioning

The commissioning process is the same for all main spindle motors. It is described in Indramat's main spindle motor documentation entitled, "AC main spindle drives with regulated asynchronous motors or frameless spindle motors, applications description", doc. no.: 209-0041-4109!

11 Index

R

S

T

Customer Service

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USA Rexroth Corporation INDRAMAT Division 5150 Prairie Stone Parkway Hoffman Estates, Illinois 60192 Phone: 847/645-36 00 Fax: 847/645-62 01	**USA** Rexroth Corporation INDRAMAT Division 2110 Austin Avenue Rochester Hills, Michigan 48309 Phone: 810/853-82 90 Fax: 810/853-82 90	**INDRAMAT Service Hotlines** USA: 1-800-860-1055 Canada: 1-847-645-3600 (request Service Department) Latin America: (US Phone No.) 847-645-3600 (request Service Department)	**Canada** Basic Technologies Corporation Burlington Division 3426 Mainway Drive Burlington, Ontario Canada L7M 1A8 Phone: 905/335-55 11 Fax: 905/335-41 84
Mexico Motorización y Diseño de Controles, S.A. de C.V. Av. Dr. Gustavo Baz No. 288 Col. Parque Industrial la Ioma Apartado Postal No. 318 54060 Tlalnepantla Estado de Mexico Mexico Phone: 5/397 86 44 Fax: 5/398 98 88	**Argentina** Mannesmann Rexroth S.A.I.C. Division INDRAMAT Acassusso 48 41/7 1605 Munro (Buenos Aires) Argentina Phone: 01/756 01 40 01/756 02 40 Telex: 262 66 rexro ar Fax: 01/756 01 36	**Argentina** Nakase Asesoramiento Tecnico Diaz Velez 2929 1636 Olivos (Provincia de Buenos Aires) Argentina Phone: 01/790 52 30	**Brazil** Mannesmann Rexroth Automação Ltda. Divisão INDRAMAT Rua Georg Rexroth, 609 Vila Padre Anchieta BR-09.951-250 Diadema-SP Caixa Postal 377 BR-09.901-970 Diadema-SP Phone: 011/745 90 65 011/745 90 70 Fax: 011/745 90 50

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China Rexroth (China) Ltd. A-5F., 123 Lian Shan Street Sha He Kou District Dalian 116 023 P.R. China Phone: 0411/46 78 930 Fax: 0411/46 78 932	**Hong Kong** Rexroth (China) Ltd. 19 Cheung Shun Street 1st Floor, Cheung Sha Wan, Kowloon, Hong Kong Phone: 741 13 51/-54 or 741 14 30 Telex: 3346 17 GL REX HX Fax: 786 40 19 786 07 33	**India** Mannesmann Rexroth (India) Ltd. INDRAMAT Division Plot. 96, Phase III Peenya Industrial Area Bangalore - 560058 India Phone: 80/839 21 01 80/839 73 74 Telex: 845 5028 RexB Fax: 80/839 43 45	**Japan** Rexroth Co., Ltd. INDRAMAT Division I.R. Building Nakamachidai 4-26-44 Tsuzuki-ku, Yokohama 226 Japan Phone: 045/942-72 10 Fax: 045/942-03 41
Korea Rexroth-Seki Co Ltd. 1500-12 Da-Dae-Dong Saha-Gu, Pusan, 604-050 Korea Phone: 051/264 90 01 Fax: 051/264 90 10	**Korea** Seo Chang Corporation Ltd. Room 903, Jeail Building 44-35 Yoido-Dong Youngdeungpo-Ku Seoul, Korea Phone: 02/780-82 07 ~9 Fax: 02/784-54 08		

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Customer Service in Germany

Notes:


Indramat