

3-PHASEN STEPPING MOTOR VRDM311x



09/99 EDITION

Features common to all motor types

- Test voltage to DIN EN 60034 part 1
- Insulation class F
- Run-out and perpendicularity to DIN 42955 N
- Paint: black (RAL 9005)

Security

Please observe before installation, operation, maintenance and repairs of the motors our security tips.

Should you not know these sheets, please ask for the data sheet " Security tips of the motors "

Motor specifications

The motor type specification is largely made up of the size and length.

For example: VRDM 31117 = 3-phase stepping motor of size 110 (i.e. the length of the connecting flange is approximately 110 mm) and of length 17 (i.e. the length of the motor [stator package and flanges] is approximately 170 mm)

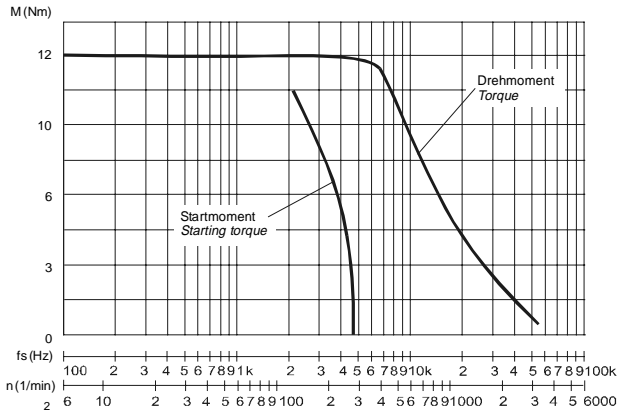
Motor type				VRDM 31117	VRDM 31122
Max. torque	M_m	Nm	LW ⁴⁾	12	17,5
Holding torque	M_H	Nm	LW ⁴⁾	13,5	19,7
Rotor inertia	J_R	kgcm ²		10,5	16
Number of steps ¹⁾	z	200 / 400 / 500 / 1000 / 2000 / 4000 / 5000 / 10000			
Step angle ¹⁾	α	°			
Systematic angle tolerance per step ²⁾	$\Delta\alpha_s$	'			
Max. starting frequency ¹⁾	f_{Aom} ³⁾	kHz	LW ⁴⁾	4,7	
Rated current of incoming cable	I_W	A	LW ⁴⁾	4,1	4,75
Winding resistance	R_W	Ω	LW ⁴⁾	1,8	1,9
Current rise constant	τ	ms			
Shaft load	See page 4				
Motor voltage	U	V	LW ⁴⁾	325	
Approximate weight	m	kg		8	11

Terms and symbols taken from DIN 42021 part 2

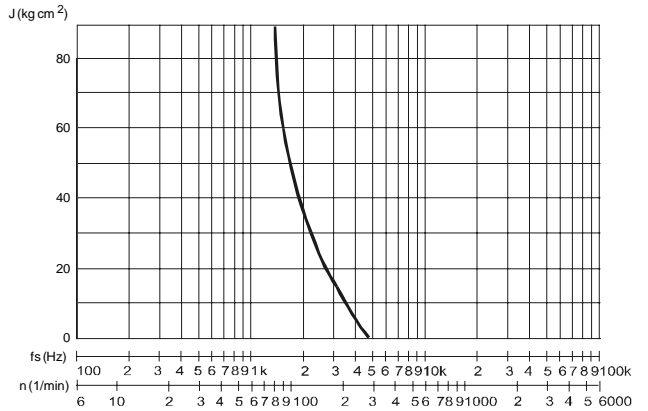
- ¹⁾ With suitable power drive
- ²⁾ Measured at 1000 steps / revolution, unit in minutes
- ³⁾ f_{Aom} = Starting frequency at no load
- ⁴⁾ LW = Wall-mounted winding

Characteristic curves

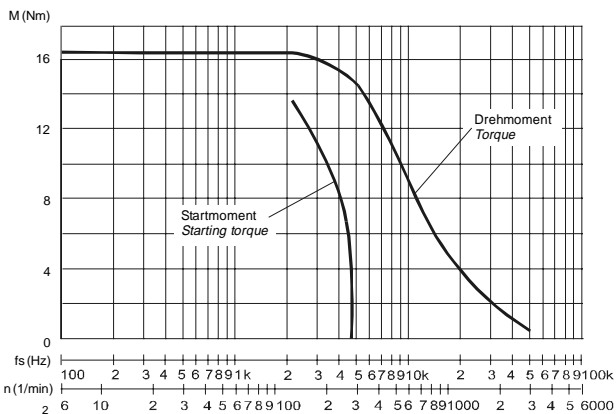
Torque characteristics of VRDM 31117/50
(LW 325V operation with WDP-004; 325VDC; In = 4,1A; 1000SpR)



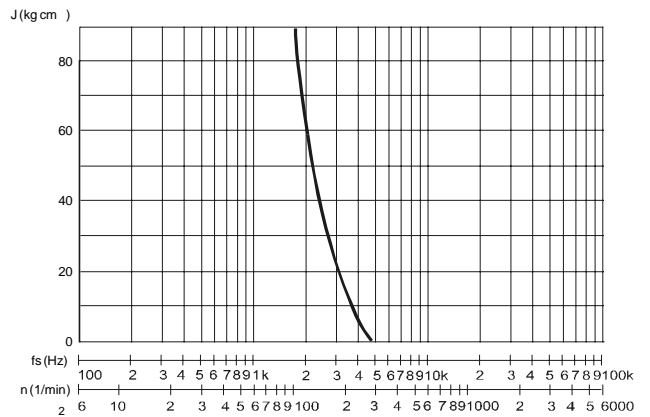
Starting / stopping characteristics of VRDM 31117/50
(in relation of the load inertia)



Torque characteristics of VRDM 31122/50
(LW 325V operation with WDP-004; 325VDC; In = 4,8A; 1000SpR)



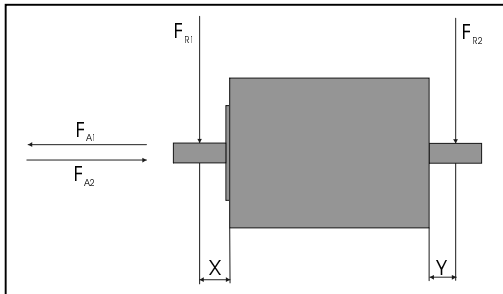
Starting / stopping characteristics of VRDM 31122/50
(in relation of the load inertia)



* 1000 SpR = 1000 Steps / revolution

Shaft load

Even when the motors are used perfectly correctly, their service life is still limited by the service life of the bearing. The bearing must not be changed by the customer because this operation partially demagnetises the motor, causing it to loose power.



Conditions:

- Nominal bearing life ²⁾ $L_{10h} = 20,000$ hours
- Speed $n = 600$ rpm
- Ambient temperature $= 40$ °C
(≈ 80 °C bearing temperature)
- Rated torque $= 100$ % c.d.f.
- Point of application of forces $X = 20$ mm
 $Y = 20$ mm

Motor		VRDM 31117; VRDM 31122
Max. radial force Front F_{R1}	100 % c.d.f.	300 N
Max. radial force 2nd shaft end F_{R2}	100 % c.d.f.	150 N ¹⁾
Max. axial force Pull F_{A1}	100 % c.d.f.	330 N
Max. axial force Push F_{A2}	100 % c.d.f.	60 N

¹⁾ Version with terminal or plug and encoder

²⁾ In operating hours with a 10% probability of failure

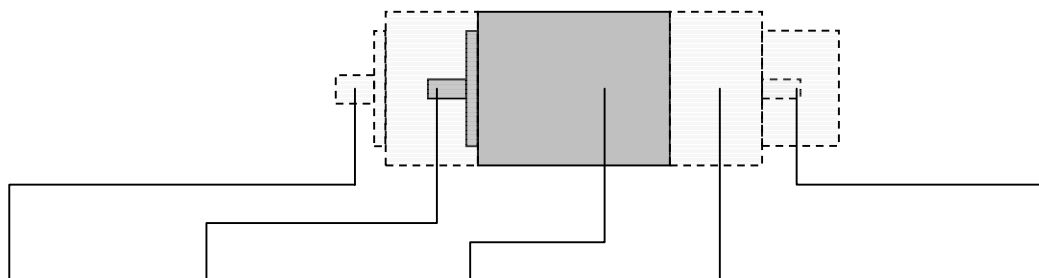


Warning:

The shaft must be supported if components are pressed onto the shaft ends.

Degree of protection

The degree of protection of your motor version is shown in the following diagram:



Gearbox	Front shaft exit	Type of connection		Options	
		Stranded wire	Terminal or plug	2nd shaft end	Holding brake, encoder
IP 54	IP 41	-	IP 56	IP 41	IP 56



Ambient conditions

Climate:

(with reference to DIN 50019 R14)

Temperature t: -25°C.....+40°C

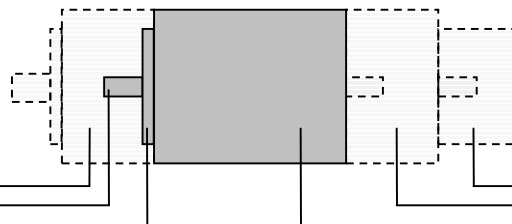
Atmospheric humidity U: ≤ 75 % RH annual average / 95 % RH on 30 days without condensation

Storage and transportation temperature:

-25°C to 70°C

Motor versions

Our flexible modular system and the latest version management techniques enable us to supply the following versions. The dimensions and a detailed information are shown in the variants section on page 9.



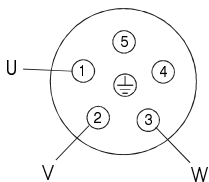
Gearbox	Shaft version		Centring collar	Motor type VRDM 3xx		Connection		Options
				Size	Length	Voltage	Type	
3:1 5:1 10:1	Feather key	Ø 19	Ø 56 mm	110	17 22	325 V	Terminal ¹⁾	2nd shaft end ²⁾
Plug							Holding brake ²⁾ Encoder ³⁾	

¹⁾ Terminal strip inside the motor, sealed with a cable gland, EMC-tested

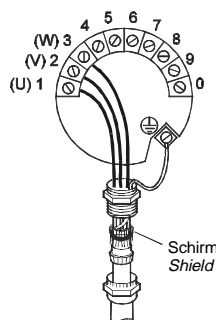
²⁾ Choice between 2nd shaft end or holding brake. Both cannot be fitted simultaneously

³⁾ With plug connection only (2nd shaft end or a holding brake is also possible)

Motor connection



Motor with plug



Motor with terminals

Notes:

The direction of rotation of the motor shaft can be inverted by swapping over two terminals (e.g. U, V or V, W).

Pin	Designation	Cable colour
1	U	Brown
2	V	Blue
3	W	Black
4	Not assigned	
5	Not assigned	
⊕	Shield drain wire	

These cable colours apply to SIG BERGER LAHR motor cables

Notes:

- Connect shield wire to both motor and device
- Protective earth is connected to the motor cable
- Outer terminal is the EMC terminal

Warning:

If the cables are connected in a terminal box, simply unscrew the four Phillips screws on the box. Do not remove the brake.

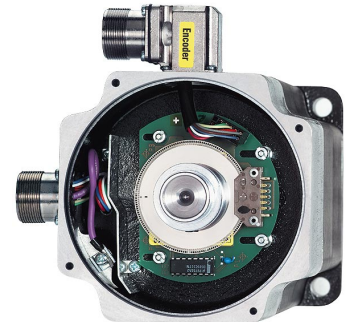
Encoder

3-phase stepping motors can optionally be fitted with encoders. The encoder returns the actual position if the power drive is equipped with a rotation monitoring circuit. The rotation monitoring circuit compares the setpoint and actual positions of the motor and signals an error if the difference between the two exceeds a certain limit (contouring error limit). This will detect overloading of the motor, for example.

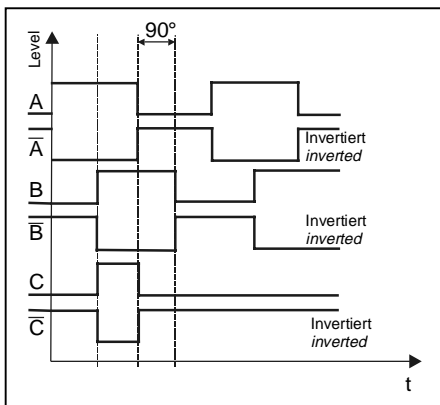
Motors fitted with an encoder normally have a plug connection, although a second shaft end or a holding brake can also be supplied.

Technical data

Resolution	1000 increments / revolution
Index pulse	1 pulse / revolution
Output	RS 422
Signals	A, B, I
Pulse waveshape	Square-wave
Supply voltage	5 V ± 5%
Current	Up to 0.15 A

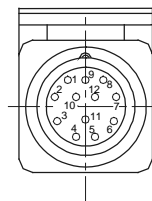


Timing diagram

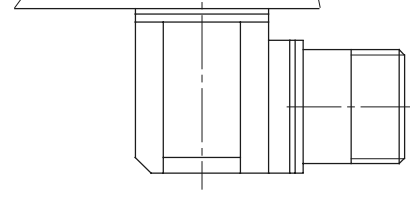


Connection

View A



Motor housing



← A

Pin	Designation
1	A
2	A (-)
3	B
4	B (-)
5	C, I
6	C (-), I (-)
7	5 VGND
8	+ 5
9	- SENSE
10	+ SENSE
11	Temperature sensor
12	Not assigned

Notes:

- A Temperature sensor is integrated.
- The shield drain wire must be connected to both the motor and the device.



Warning:

Any strands that are not used must be separately insulated (to prevent the risk of short-circuits).

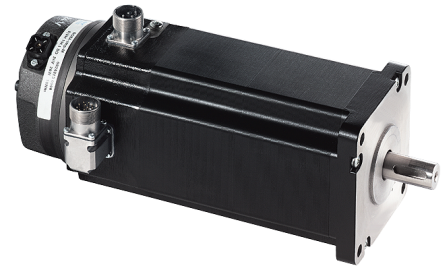


Holding brake

The holding brake is an electromagnetic spring-pressure brake which holds the motor shaft in position when there is no current to the motor (e.g. in the event of a power failure or emergency stop). This holding function is needed for applications in which weight on the shaft can cause excessive torque, e.g. the Z axes of handling equipment.

Technical data

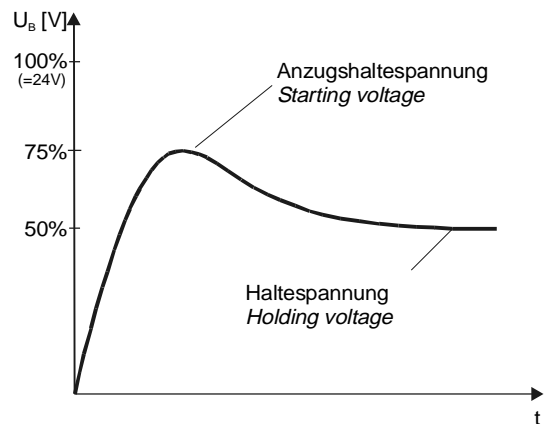
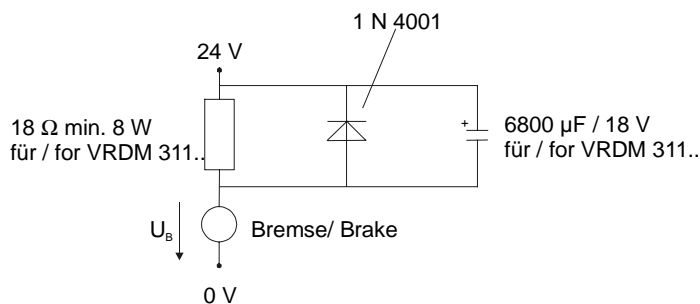
Rated voltage	24 V
Holding torque	16 Nm
Power consumption	28 W
Moment of inertia	0.35 kgcm ²
ON time (disengage brake)	60 ms
OFF time (engage brake)	30 ms
Weight	Approx. 2 kg



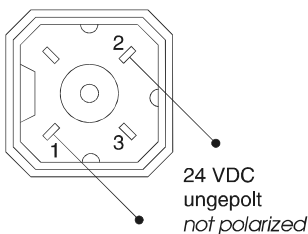
VRDM 31122 Encoder and brake

Drive circuit

The drive circuit must be electrically excited in order to disengage the brake. To prevent overheating, the excitation current should be reduced as soon as the brake is disengaged. The recommended circuit arrangement is shown in the following diagram.



Connection



The plug is supplied with the motor.

Plug designation: Hirschmann type G4 A 5M



Warning

For the brake to work reliably on Z axes with a holding brake, the static load torque must not exceed 25% of the motor's holding torque.

Variants

Motor mit Klemmen
Motor with terminal connection

Motor mit Stecker
Motor with plug connection

Paßfeder A6 x 6 x 25 DIN 6885
Feather key A6 x 6 x 25 DIN 6885

Motor mit Klemmen
Motor with terminal connection

Motor mit Stecker
Motor with plug connection

Welle hinten
Shaft at back

Motorstecker
Motor plug

Motor von vorn gesehen
Viewing motor from the front

Motor mit Klemmen:
Motor with terminal connection:
Kabelverschraubung
Pg16 für Kabel ø 9 bis ø 13
Cable gland PG 16 for cable diameter 9 to 13

Motorstecker
Motor plug

ohne Winkel
Straight entry

Abgewinkelt
Angle-entry

Motor von vorn gesehen
Viewing motor from the front

nach hinten zeigend
Pointing to the back

nach vorn zeigend
Pointing to the front

nach rechts zeigend
Pointing to the right

nach links zeigend
Pointing to the left

ohne Winkel
Straight entry

Encoderstecker
Encoder plug

nach hinten zeigend
Pointing to the back

nach vorn zeigend
Pointing to the front

nach rechts zeigend
Pointing to the right

nach links zeigend
Pointing to the left

ohne Winkel
Straight entry

Motor mit Encoder
Motor with encoder

Motor mit Bremse
Motor with brake

Encoderstecker
Encoder plug

Welle hinten
Shaft at back

Motorstecker
Motor plug

Motor von vorn gesehen
Viewing motor from the front

nach hinten zeigend
Pointing to the back

nach vorn zeigend
Pointing to the front

nach rechts zeigend
Pointing to the right

nach links zeigend
Pointing to the left

ohne Winkel
Straight entry

Encoderstecker
Encoder plug

nach hinten zeigend
Pointing to the back

nach vorn zeigend
Pointing to the front

nach rechts zeigend
Pointing to the right

nach links zeigend
Pointing to the left

ohne Winkel
Straight entry

Ansicht A View A

Motor mit Getriebe
Motor with gearbox

Untersetzung / Reduction ratio

3:1

5:1

10:1

Motor Typ <i>Motor type</i>	L <i>ohne Bremse Without brake</i>	LB <i>mit Bremse With brake</i>	Motor- Spannung <i>Motor voltage</i>
VRDM 31117	180	232.7	W 325 V
VRDM 31122	228	280.7	

Dear Customer

This page shows the motor variants that can be supplied as standard.

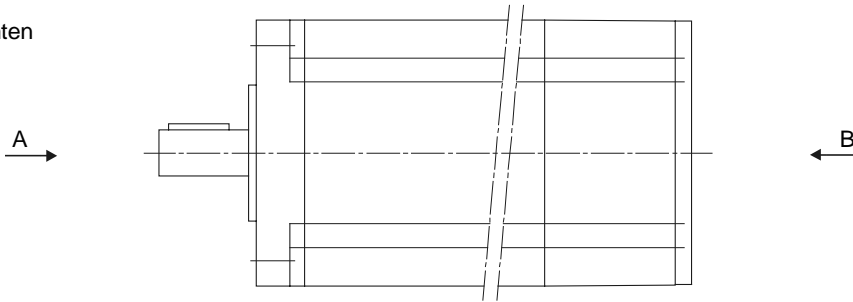
The next page contains the side views.

VRDM 311x

Variants

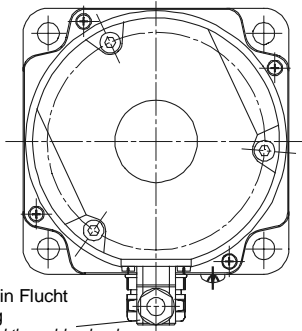
Seitenansichten der Motorvarianten
Views from the motor versions

Ansichten
Views



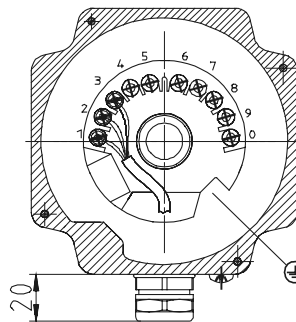
Motor mit Klemmen
Motor with terminal connection

Ansicht B



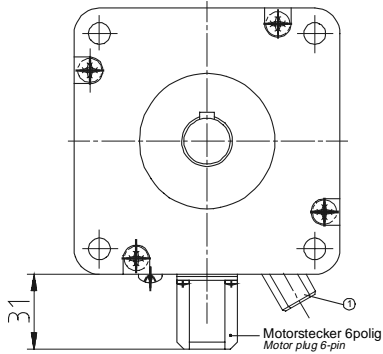
Haltebremsenstecker in Flucht der PG Verschraubung
Brake plug position behind the cable gland

Ansicht B
Ansicht ohne Bremse
View A
View without brake

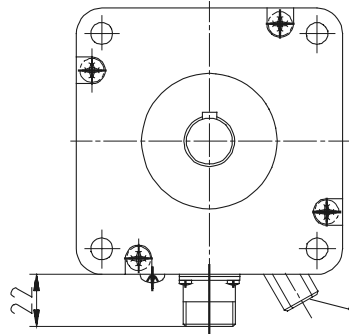


Motor mit Stecker
Motor with plug connection

Ansicht A
Ansicht mit Winkelstecker
View A
View with angle-entry plug

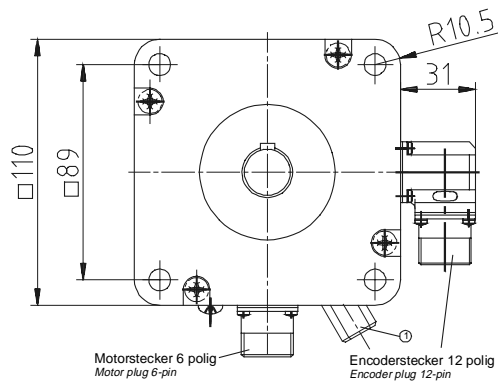


Ansicht A
Ansicht ohne Winkelstecker
View A
View without angle-entry plug



Motor mit Encoder
Motor with encoder

Ansicht A
Ansicht der Standardstecker
View A
View with standard plugs



① Steckerposition der Haltebremse (wenn vorhanden)
brake plug position