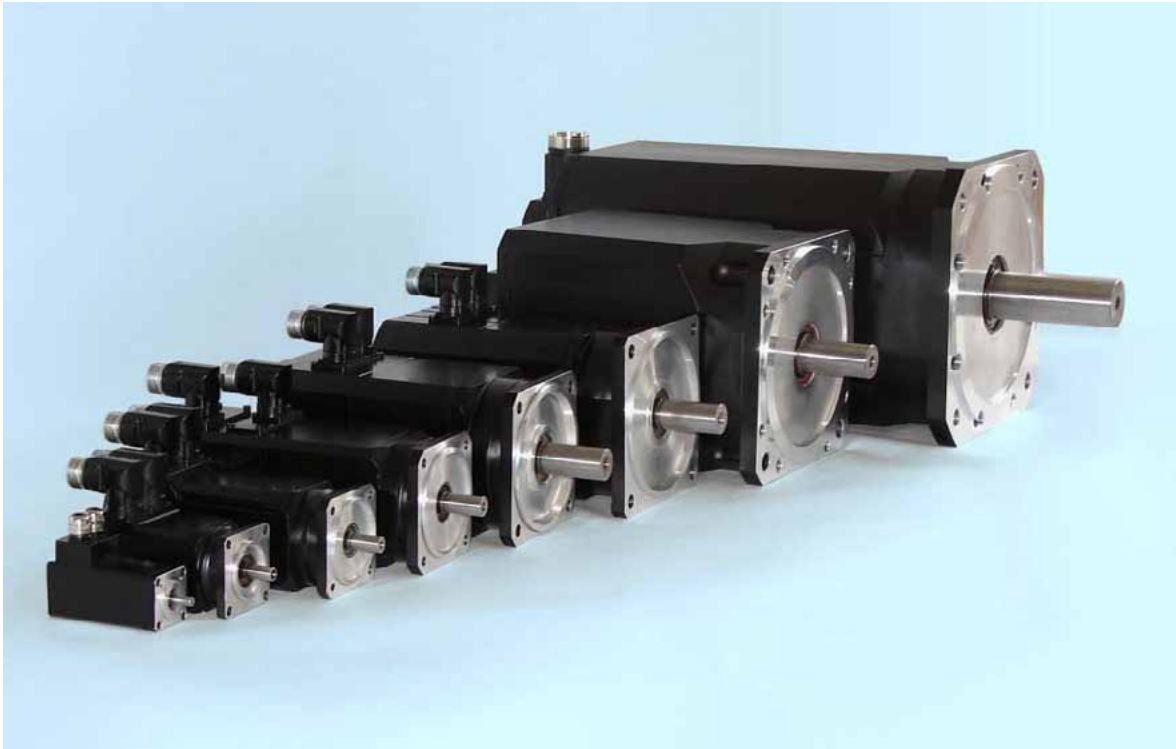


MR 74 AC SERVO MOTORS

AC Servo Motors with High Power Density



AC servo motors with rated torques between 0.1 and 70 Nm and eight different flange sizes, rated speeds up to 6,000 r.p.m., other speeds on request. All motors are available with brakes.

Main Characteristics

- maintenance-free, since brushless
- high dynamics
- compact dimensions due to high-performance neodymium magnet material
- built-in resolver for sinusoidal commutation, other position sensors as options
- IP 65 protection

ESR Drive System Packages

MR 74 servo motors are adapted to the digital and analog ESR servo drives. Servo drives and servo motors with or without gearbox, complete with position sensors and, if required, brakes are available as drive system packages. For further information, see the back of this data sheet.

Applications

Positioning and feed movements with high dynamics and accuracy in

- Handling and assembly systems
- Electronics production machinery
- Semiconductor production machinery
- Measuring and testing machinery
- Optical discs production machinery (CDs, DVDs, ...)
- Machine tools and metal working machinery
- Packaging machinery
- Textile machinery
- Plastics processing machinery
- Coiling machinery
- and many other applications

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Operating Principle of a Servo Drive System

General

A servo drive system consists of servo motor and servo drive. The three-phase winding of the motor is fed by the drive. The position sensor system of the motor guarantees the sinusoidal supply of the windings (sinusoidal commutation) and provides for a smooth motor operation, even at low speeds. Motor, position sensor system, and servo drive form a closed control loop.

Control loops

For torque control only, the current controller can be driven directly. In case of a difference between target and actual torque, the rate of the pulse width modulation is adjusted so that the current amplitude corresponds to the required torque.

In velocity mode, the speed control loop with underlying current controller is active. In case of a difference between target and actual speed, the frequency of the three-phase current is increased or reduced until the actual speed has reached the rated speed. The current controller regulates the current to the required torque.

A position control is integrated in the ESR digital servo drives. The position control loop is superimposed to the speed and current controller and ensures that the motor moves to a specified position. During that, adjustable acceleration and deceleration ramps are followed.

Construction of the Servo Motors

General

The series MR 74 AC servo motors are permanent-magnet three-phase synchronous motors for applications with high demands to dynamics and positioning accuracy at small construction volume and low weight.

The stator carries a three-phase winding, the rotor is equipped with neodymium iron boron magnets (NdFeB) at the surface. Due to its high remanence and field strength, this magnet material permits high dynamics and compact design of the motor.

Construction types and equipment An overview of the different types and the available equipment (holding brake, key, etc.) is given in the type code below.

Special design In addition to the stated types and equipment, special designs are possible, e. g. motors with hollow shafts, special flange, adjusted winding, etc. Motors with high-grade steel flange and shaft, e. g. for applications in the foods industry, are also available. If required, please contact ESR.

Type Code

The type code clearly identifies a servo motor equipped in a certain way.

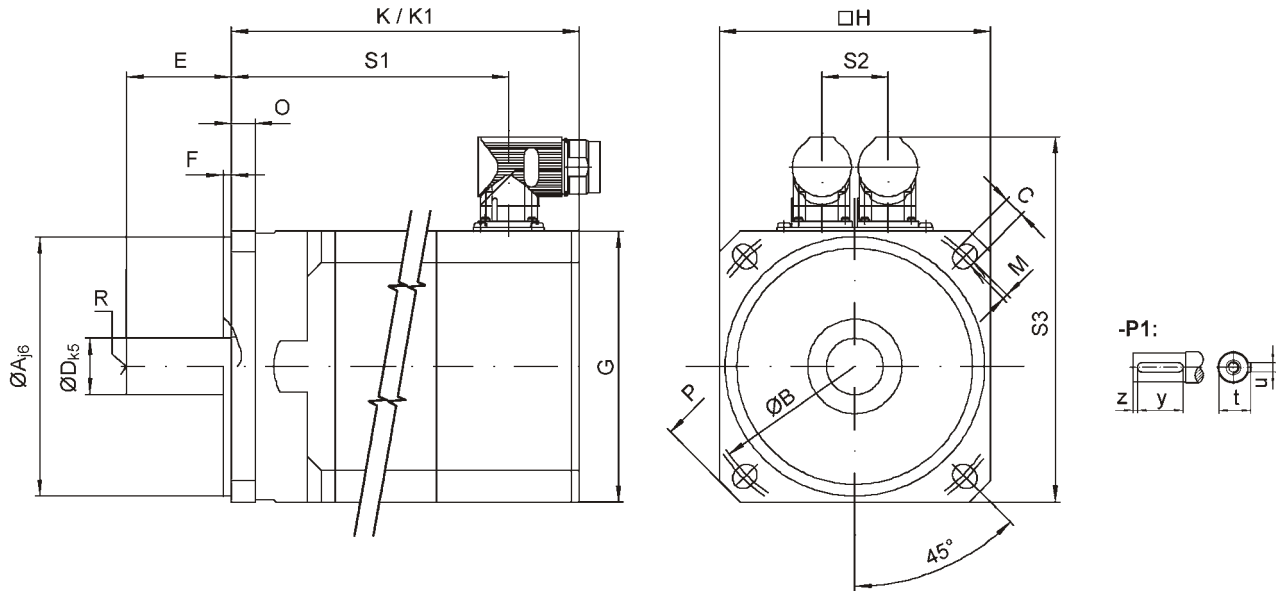
Example:

MR 74 **36** **4358** **U3** **N030** **G01** **A0D** **M0** **P0** **S0**



36	<p>Frame size and rotor length Xx first number: frame size (0..7) xX second number: rotor length (1..8)</p>	
4358	<p>Assembly code or other classification Internal coding of ESR, given for various feature combinations. Statement of the assembly code is not required if all other features unequal zero are stated and the customer-specific equipment is described. For above-mentioned example "MR 7436-U3-N030-G01-A0D" would be sufficient.</p>	
U3	<p>DC-bus voltage U3 motor for 320 V DC-bus voltage (corresponds to 230 V supply voltage) U5 motor for 560 V DC-bus voltage (corresponds to 400 V supply voltage)</p>	
N030	<p>Rated speed in 100 r.p.m., e. g. N030 = 3000 r.p.m. rated speed</p>	
G01	<p>Motor position sensor G01 with resolver (1 pole pair) (standard) G06 with high-res. incremental encoder (Heidenhain, 2048) G09 with Sincos (Hiperface) encoder, single-turn (Stegmann, 1024) G10 with Sincos (Hiperface) encoder, multi-turn (Stegmann, 1024)</p>	<p>G11 with EnDat encoder, single-turn G12 with EnDat encoder, multi-turn other motor position sensors on request (MR 740x available with G01, only)</p>
A0D	<p>Motor connection A0D rotatable connectors (standard) (MR 741x – MR 746x) A0G straight connectors (standard) (MR 747x)</p>	<p>AK1 cable connection 1 m (MR 740x)</p>
M0	<p>Holding brake M0 without holding brake (standard)</p>	<p>MS with holding brake</p>
P0	<p>Shaft, key P0 shaft, flat (standard)</p>	<p>P1 shaft with key</p>
S0	<p>Special design (described by text) S0 motor in standard design S1 motor with special winding S2 motor with special shaft</p>	<p>S3 motor with special flange SU motor with UL certification SK other special design</p>

Dimensions



	A _{ig}	B	C	D _{k5}	E	F	G	H	K*	K1*	M	O	P	R	S1	S2	S3	t	u _{hg}	y	z	
MR 7401	25	32	M3	6 _{h6}	16	2	37	37	83	113						16.5	71	6.9	2 _{h6}	10	3	
MR 7402									98	128												
MR 7411	40	63	5.5	9	20	2.5	55	55	99	143	1	7	74	M4	68	27	95	10.2	3	16	2	
MR 7412									119	163					88							
MR 7414									159	203					128							
MR 7422	60	75	6	11	23	2,5	70	70	127	176		8	90	M4	104	28	112	12.5	4	16	4	
MR 7424									167	216					144							
MR 7432	80	100	7	14	30	3	87	90	130	174		9	115	M4	104	28	130	16	5	20	5	
MR 7434									170	214					144							
MR 7436									210	254					184							
MR 7442	110	130	9	24	50	3.5	114	115	146	201	2	10	150	M8	116	28	155	27	8	40	5	
MR 7444									186	241					156							
MR 7446									226	281					196							
MR 7452	130	165	11	32	58	3.5	128	140	156	215		12	190	M12	127	28	175.5	35	10	50	5	
MR 7454									196	255					167							
MR 7458									276	335					247							
MR 7465	180	215	15	32 _{k6}	58	4	98	190	242	296		15	250	M10		31		35.3	10	40	9	
MR 7466									257	311												
MR 7467									287	341												
MR 7474	230	265	14.5	42 _{k6}	110	4	128	240	379	446		18	300	M12		50		45	12	90	8	
MR 7476									446	514												
MR 7478									514	582												

* K = without brake (-M0), K1 = with brake (-MS) – referring to motors with resolver (-G01), other dimensions see respective drawings

All dimensions in millimeters. CAD files are available on request (DXF/2D).

Mechanical Data

Mounting standards	Flange motor, flange according to DIN 42 677; special flange on request
Mounting positions	Any
Construction types	Abbreviation acc. to DIN IEC 34 part 7: IM B 5; special construction types on request
Flange accuracy	Standard acc. to DIN 42 955; higher accuracy on request
Connection	Connector, rotatable (except for MR 740x: cable connection and MR 747x: straight connector)
Cooling	Self-cooling
Bearings lubrication	K3N acc. to DIN 51 825 part 1
Varnishing	Matt black RAL 9005
Bearing shields and enclosure	High-quality light-alloy
Vibration intensity	Rotor dynamically balanced according to vibration intensity stage R, S according to DIN EN 60034-14 (VDE 0530-14) on request
Rotor	Rotor with rare earth permanent magnets
Protection Class	IP 65, shaft sealing with radial seal
Shaft end	Acc. to DIN 748, part 3, with more precise fit k5, threaded on centerline similar to DIN 332 Bl. 2 Standard shaft without keyway; shaft with keyway as option Special shaft ends on request

Motor Shaft

Permissible mechanical load Basis: service life of ball bearings 20,000 h, application of radial force F_R to shaft center at motor speed 3,000 r.p.m. (up to +50% at 1,100 r.p.m. and -30% at 6,000 r.p.m.), no simultaneous loading with max. F_R and F_A .

Motor Size	MR	740x	741x	742x	743x	744x	745x	746x	747x
Radial force F_R	N	160/190*	200	270	350	560	980	1350	1700
Axial force F_A	N	31/17*	85	85	120	185	340	255	320

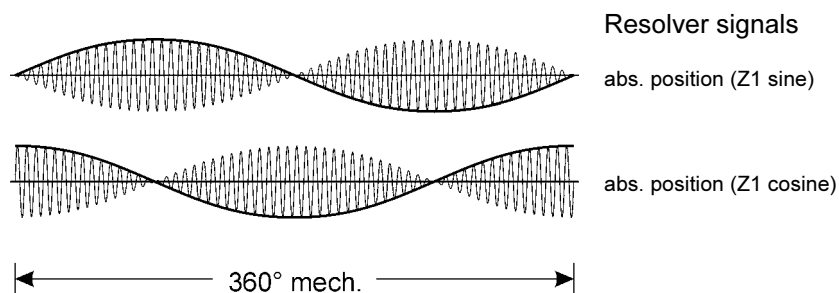
* without/with brake

Electrical Data

General	The motors are three-phase synchronous motors with 3 pole pairs. They comply with the DIN EN 60034-1 (VDE 0530) Rules for Electrical Machines.
Voltage	The motors are designed for connection to servo drives with DC-bus voltages of 320 V or 560 V, see back of this data sheet. Other voltages on request.
Insulation	Insulation class F acc. to DIN VDE 0530. Suitable for use in tropical climates.
Performance	The rated output in the technical specifications applies to operating conditions defined according to DIN EN 60834-1 (VDE 0530): installation location below 1000m above sea level, cooling air temperature ≤ 40 °C, operating mode S1.
Winding protection	<p>The servo drive monitors the power consumption of the motor using an I^2t circuit and protects it against overloading.</p> <p>In addition to the monitoring by the servo drive, the winding is monitored by PTC resistors installed in the motor, options on request. If the permissible winding temperature is exceeded, the servo drive responds to the abrupt rise of the PTC resistance.</p>

Motor Position Sensors

General	For determining position and speed, the servo motors are equipped with a motor position sensor. Two types of position sensors are available: resolvers and optical position sensors including Sincos (Hiperface), high-resolution incremental, or EnDat encoders. Usually, resolvers are used. Sincos (Hiperface), high-resolution incremental, and EnDat encoders can be used in connection with digital servo drives. They are intended for applications in which high accuracy and dynamics or low speed ripple are required. The multi-turn types additionally provide an absolute position determination for 4096 revolutions.
Resolvers (Option -G01)	Resolvers are inexpensive and robust sensors with magnetic position acquisition. A 1-pole-pair brushless hollow-shaft resolver with a transmission ratio of 1 : 0.5 working according to the transmitter principle is used. In the servo drive, the exact rotor position is determined from the analog resolver signals.



Optical position sensors: In connection with the digital servo drives and the ESR multi-axis servo system, a high-resolution incremental encoder, a Sincos (Hiperface) encoder, or an EnDat encoder (with optical position acquisition) can be used.

High-resolution incremental encoder
(Option -G06)

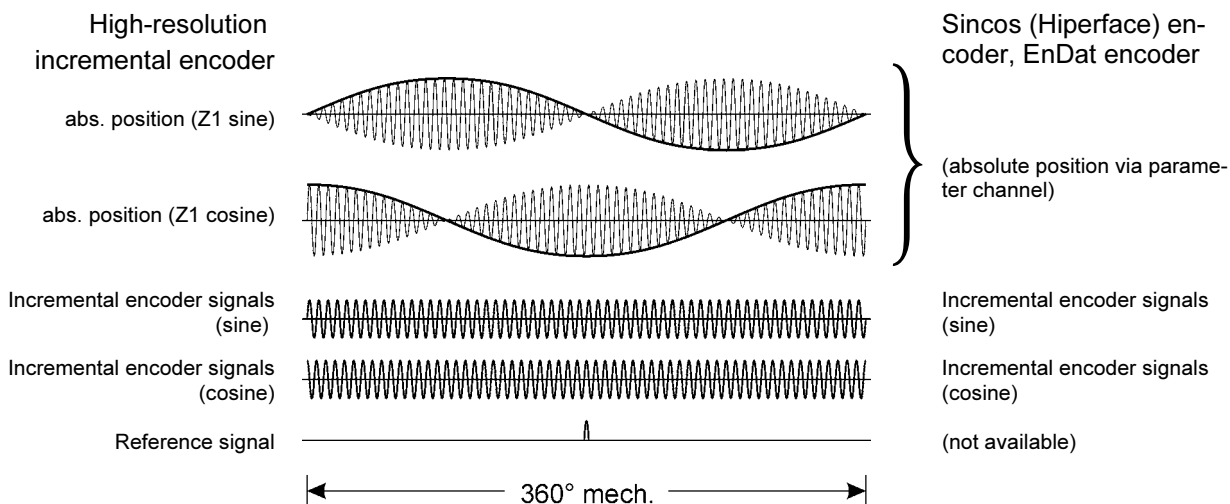
The high resolution improves control quality and smooth running. Furthermore, by using analog incremental signals a reduction of the band width is achieved compared to the transmission of the actual position value via incremental encoder with rectangular output signals.

Sincos (Hiperface) encoder
(Option -G09 and -G10)

The high-resolution incremental encoder passes a reference signal once per revolution (zero pulse). Before the encoder has passed the reference signal for the first time, the position information of the rotor is acquired via a second track (Z1 track) ("rough" commutation). As soon as the reference signal has been passed once, the position is determined from the incremental signals, the position information is highly accurate.

EnDat encoder
(Option -G11 and -G12)

With Sincos (Hiperface) and EnDat encoders, the sinusoidal and cosinusoidal incremental signals are transmitted to the servo drive via the process data channel. The parameter channel (serial RS 485 interface) serves for transmitting the absolute rotor position information.



Single-turn With the single-turn types of optical motor position sensors (option -G06, -G09, or -G11), the position acquisition for several revolutions is transmitted to a software counter in the servo drive. Therefore, for positioning operating modes, a reference run has to be carried out after each switch-off and switch-on of the control supply voltage in order to determine the absolute position of the axis.

Multi-turn With the multi-turn types (option -G10 or -G12), the position is determined for 4096 revolutions in the encoder. It is read from the motor position sensor after each switch-off and switch-on of the control supply voltage so that a reference run is not required.

Holding Brake

General Option -MS

The optional holding brake is a permanent-magnet brake. The supply voltage of the brake is 24 V DC +6% –10%.

The brake is designed as holding brake, it usually serves for holding the motor shaft at standstill. Occasional load brakings, e. g. in case of an emergency-stop, are permitted. It is recommended to protect the brake rectifier using a voltage-dependent resistor (varistor).

Function

The braking force is generated by permanent magnets. There is no air gap in the magnetic circuit. To lift the brake, a magnetic field of opposing polarity to the permanent magnet is built up. A spring element lifts the armature disk in axial direction until there is an air gap between the friction surfaces.

Motor Size	MR	740x	741x	742x	743x	744x	745x	746x	747x
Holding torque (at 20 °C)	Nm	0.4	2.0	4.5	9	18	36	36	145
Rated voltage	V _{DC}	24	24	24	24	24	24	24	24
Rated current	A	0.33	0.46	0.50	0.75	1.0	1.1	1.1	2.1
Switching times on/off	ms	10/6	25/6	35/7	40/7	50/10	90/22	90/22	190/65
Moment of inertia	10 ⁻³ kg·m ²	0.0015	0.012	0.019	0.056	0.190	0.620	0.620	5.6
Weight	kg	0.08	0.21	0.38	0.53	1.10	1.90	3.25	9.5

Connection to the Servo Drive

General

For connection to the servo drive, the motor is equipped with two connectors. The motor phases (power) are connected with the servo drive using a shielded cable. The motor position sensor is connected with twisted-pair conductors via a multi-core shielded cable.

The optional brake is connected via the power supply cable. The motor temperature sensor is connected either via the motor position sensor connector (for resolvers) or the power supply cable (for high-resolution incremental encoder, Sincos (Hiperface) or EnDat).

Cables (ready-assembled, as well) and cable sets are available as accessories.

Torque Increase at Intermittent Duty S3

General

The typical working cycle of a servo drive consists of load phases in which the motor runs at high speed or torque interrupted by periods in which it is operated at reduced power or is standing still. Therefore, the design of the drive should not only consider the desired rated speed but the ratio of load and rest phases to specify a drive which meets the requirements optimally.

Operating modes in compliance with VDE 0530

The servo drive technology differs between the following operating modes:

- S1 = continuous duty
- S3 = intermittent duty; in this case, the ratio between load and rest phases is stated, e. g.
 - S3 25% = intermittent duty with a switch-on period of 25%
 - S3 40% = intermittent duty with a switch-on period of 40%

Torque increase

If the servo motor is used in S3 intermittent duty, it can be operated at a higher torque. The following table lists some examples for converting the values of the technical specifications of the motors.

Torque increase related to the rated torque in S1 continuous duty $M_{N S1}$:

Increased torque...		...related to rated torque
Increased standstill torque $M_{0 S3}$	S3 25%	$M_{0 S3 25\%} = 1.6 \cdot M_{N S1}$
	S3 40%	$M_{0 S3 40\%} = 1.4 \cdot M_{N S1}$
Increased rated torque $M_{N S3}$	S3 25%	$M_{N S3 25\%} = 1.54 \cdot M_{N S1}$
	S3 40%	$M_{N S3 40\%} = 1.34 \cdot M_{N S1}$

Notes for the Technical Data

General

Table "Technical Specifications" shows detailed electrical and mechanical data of the different motors which are grouped according to the DC-bus voltage:

- $U_{ZK} = 320$ V page 12ff
- $U_{ZK} = 560$ V page 17ff

Operating mode specification

The values in the tables of the technical specifications of the individual motors are basically stated for continuous duty S1.

Selection Criteria for Servo Motors and General Overview

Selection criteria

Major criteria for selecting a servo motor are:

- standstill torque $M_{0\ 200}$
- rated speed n_N
- torque at rated speed M_N
- ratio moment of inertia J_{motor} to J_{load}

On the basis of rated current I_N , the corresponding servo drive or servo power module is selected for the motor.

General overview

Values for standstill torque and rated speed can be found in the overview below. For an assignment of servo motors to ESR servo drives or servo power modules, see page 11ff (320 V) and page 16ff (560 V).

General

All other electrical and mechanical specifications of the different motors are listed in table "Technical Specifications":

- motors for 320 V from page 12
- motors for 560 V from page 17

$M_{0\ 200}$ [Nm]	$I_{0\ 200}$ [A _{rms}]	Motors for 320 V		Motors for 560 V	
		Order No.	n_N [r.p.m.]	Order No.	n_N [r.p.m.]
0.1	0.6	MR 7401-U3-N060:	6,000	–	–
0.2	1.0	MR 7402-U3-N060:	6,000	–	–
0.5	0.9	MR 7411-U3-N034:	3,400	MR 7411-U5-N060:	6,000
0.5	1.5	MR 7411-U3-N060:	6,000	–	–
0.9	1.2	MR 7412-U3-N034:	3,400	MR 7412-U5-N060:	6,000
0.9	2.1	MR 7412-U3-N060:	6,000	–	–
1.6	2.1	MR 7414-U3-N034:	3,400	MR 7414-U5-N060:	6,000
1.6	3.6	MR 7414-U3-N060:	6,000	–	–
1.8	2.9	MR 7422-U3-N034:	3,400	MR 7422-U5-N060:	6,000
1.8	4.9	MR 7422-U3-N060:	6,000	–	–
3.1	4.4	MR 7424-U3-N034:	3,400	MR 7424-U5-N060:	6,000
2.5	3.4	MR 7432-U3-N034:	3,400	MR 7432-U5-N060:	6,000
4.8	5.7	MR 7434-U3-N034:	3,400	MR 7434-U5-N060:	6,000
6.8	8.1	–	–	MR 7436-U5-N060:	6,000
5.0	3.8	–	–	MR 7442-U5-N030:	3,000
10	7.8	–	–	MR 7444-U5-N030:	3,000
14	11.5	–	–	MR 7446-U5-N030:	3,000
8.0	5.6	–	–	MR 7452-U5-N030:	3,000
15	10.6	–	–	MR 7454-U5-N030:	3,000
28	19.4	–	–	MR 7458-U5-N030:	3,000
27	13.2	–	–	MR 7465-U5-N030:	3,000
32	15.7	–	–	MR 7466-U5-N030:	3,000
40	20.4	–	–	MR 7467-U5-N030:	3,000
68	22.5	–	–	MR 7474-U5-N020:	2,000
93	29.4	–	–	MR 7476-U5-N020:	2,000
(115)	55.9	–	–	MR 7478-U5-N030:	3,000

Servo Motors for $U_{ZK} = 320$ V: Overview and Assignment

Order Number Motor	Rated Speed n_N [r.p.m.]	Rated Torque M_N [Nm]	Standstill Torque $M_{0.200}$ [Nm]	Standstill Current $I_{0.200}$ [A _{rms}]	Servo Drive or Servo Power Module with Rated Current ...
MR 7401-U3-N060	6,000	0.1	0.1	0.6	2 A
MR 7402-U3-N060	6,000	0.2	0.2	1.0	2 A
MR 7411-U3-N034	3,400	0.4	0.5	0.9	2 A
MR 7411-U3-N060	6,000	0.4	0.5	1.5	2 A
MR 7412-U3-N034	3,400	0.7	0.9	1.2	2 A
MR 7412-U3-N060	6,000	0.7	0.9	2.1	4 A
MR 7414-U3-N034	3,400	1.4	1.6	2.1	4 A
MR 7414-U3-N060	6,000	1.4	1.6	3.6	4 A
MR 7422-U3-N034	3,400	1.6	1.8	2.9	4 A
MR 7422-U3-N060	6,000	1.6	1.8	5.0	6 A
MR 7424-U3-N034	3,400	2.7	3.1	4.4	6 A
MR 7432-U3-N034	3,400	1.9	2.5	3.4	4 A
MR 7434-U3-N034	3,400	3.6	4.8	5.7	6 A

Other speeds on request.

Corresponding Servo Drives and Servo Power Modules with 320 V DC-Bus Voltage:

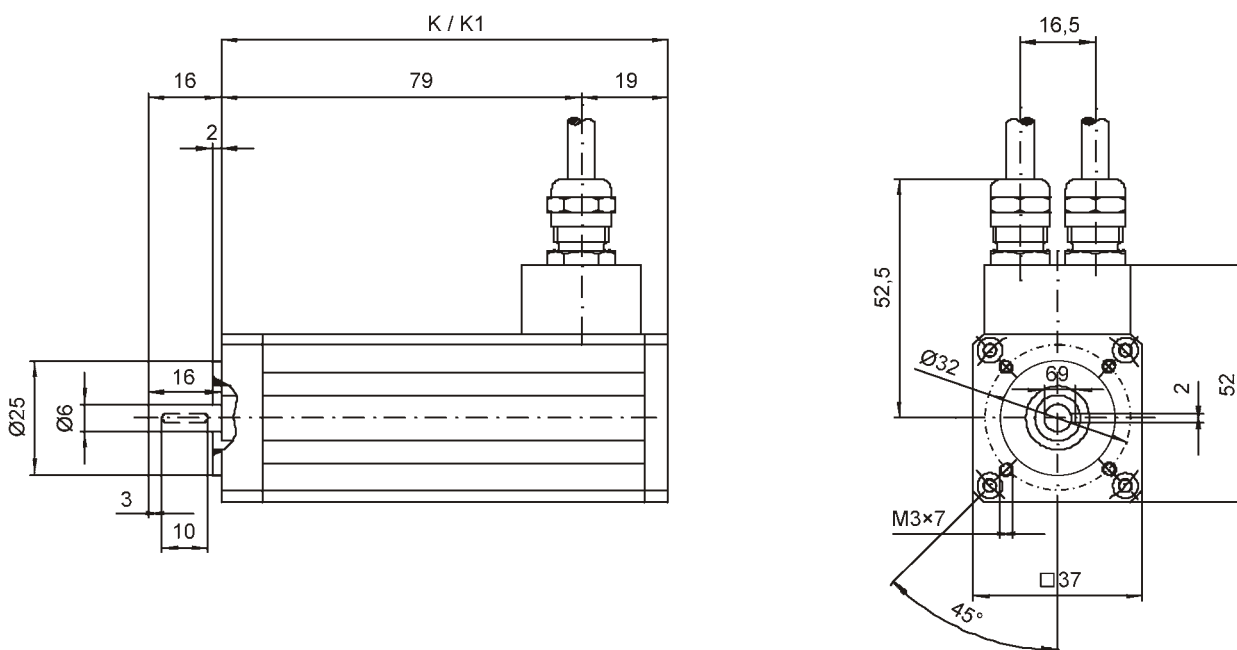
Servo Drive Family	TrioDrive D/xS	TrioDrive D	TrioDrive A	TrioDrive C
Design	compact	compact	compact	compact
Power supply	direct 230 V~	direct 230 V~	direct 230 V~	direct 230 V~
Technology	digital	digital	analog	multi-axis servo system
Rated current	2 A	BN 6756	BN 6751	BN 6651
	4 A	BN 6757	BN 6752	BN 6652
	6 A	BN 6758	BN 6753	BN 6653

Servo Motors for $U_{ZK} = 320$ V: Technical Specifications (1) – MR 740x and MR 7411

For the following types: MR 7401..-U3, MR 7402..-U3, or MR 7411..-U3 (type code see page 3)

Motors MR 7401 to MR 7411 for $U_{ZK} = 320$ V			MR 7401 -N060	MR 7402 -N060	MR 7411 -N034	MR 7411 -N060
Rated speed	n_N	r.p.m.	6,000	6,000	3,400	6,000
Rated output	P_N	W	56	113	120	220
Rated current	I_N	A_{rms}	0.6	0.9	0.9	1.5
Torque at rated speed	M_N	Nm	0.1	0.2	0.4	0.4
Standstill torque	$M_{0,200}$	Nm	0.1	0.2	0.5	0.5
Standstill current	$I_{0,200}$	A_{rms}	0.6	1.0	0.9	1.5
Peak torque	M_{max}	Nm	0.4	0.8	2.0	2.0
Peak current	I_{max}	A	2.8	4.3	3.5	6.0
Torque constant	K_t	Nm/ A_{rms}	0.2	0.2	0.4	0.2
Voltage constant	K_e	V/1000 r.p.m.	10.0	12.5	54.0	31.1
Resistance phase-phase	R_{u-v}	Ω	38.5	18.8	70.0	22.9
Inductivity phase-phase	L_{u-v}	mH	6.5	4.5	272	90.6
Electr. time constant	T_{el}	ms	0.17	0.24	3.31	3.95
Rotor inertia	J_R	10^{-3} kg m ²	0.006	0.008	0.0098	0.0098
Weight		kg	0.37	0.45	0.8	0.8

Note: The maximum achievable values depend on the servo drive used.



Dimensions in mm:

Motor Type		MR 7401	MR 7402	MR 741x
	Option	-G01	-G01	
Dimension K	-M0	83	98	see e. g. page 13
Dimension K1	-MS	113	128	

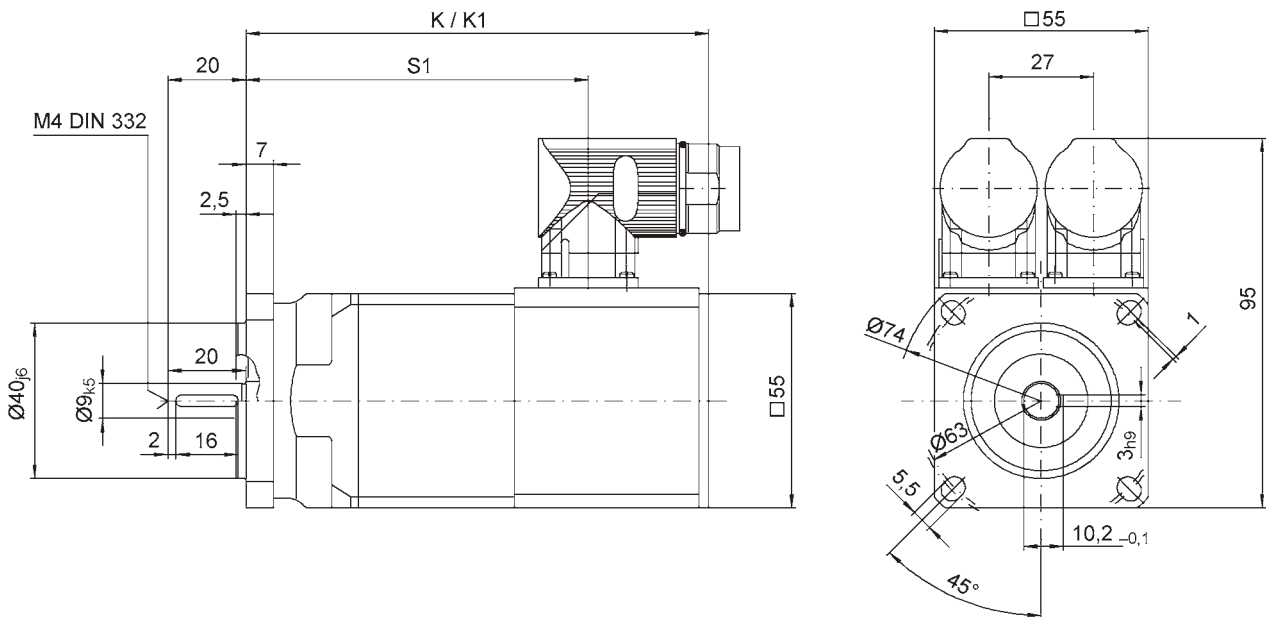
Assignment to the servo drives see page 11.

Servo Motors for $U_{ZK} = 320$ V: Technical Specifications (2) – MR 7412 and MR 7414

For the following types: MR 7412..-U3 and MR 7414..-U3 (type code see page 3)

Motors MR 7412 and MR 7414 for $U_{ZK} = 320$ V			MR 7412 -N034	MR 7412 -N060	MR 7414 -N034	MR 7414 -N060
Rated speed	n_N	r.p.m.	3,400	6,000	3,400	6,000
Rated output	P_N	W	250	430	500	870
Rated current	I_N	A_{rms}	1.2	2.0	2.0	3.6
Torque at rated speed	M_N	Nm	0.7	0.7	1.4	1.4
Standstill torque	$M_{0,200}$	Nm	0.9	0.9	1.6	1.6
Standstill current	$I_{0,200}$	A_{rms}	1.2	2.1	2.1	3.6
Peak torque	M_{max}	Nm	3.6	3.6	6.4	6.4
Peak current	I_{max}	A	4.9	8.5	8.4	14.6
Torque constant	K_t	Nm/ A_{rms}	0.6	0.3	0.7	0.4
Voltage constant	K_e	V/1000 r.p.m.	54.0	31.1	54.0	31.0
Resistance phase-phase	R_{u-v}	Ω	35.0	12.5	14.1	4.5
Inductivity phase-phase	L_{u-v}	mH	136	45.3	57.4	19.1
Electr. time constant	T_{el}	ms	3.88	3.62	4.07	4.24
Rotor inertia	J_R	10^{-3} kg m ²	0.0196	0.0196	0.0392	0.0392
Weight		kg	1.3	1.3	2.0	2.0

Note: The maximum achievable values depend on the servo drive used.



Dimensions in mm:

Motor Type	Option	MR 7411		MR 7412		MR 7414	
		-G01	-Gxx	-G01	-Gxx	-G01	-Gxx
Dimension K	-M0	99	max. 140	119	max. 160	159	max. 200
Dimension K1	-MS	143	max. 185	163	max. 205	203	max. 245
Dimension S1		68	68	88	88	128	128

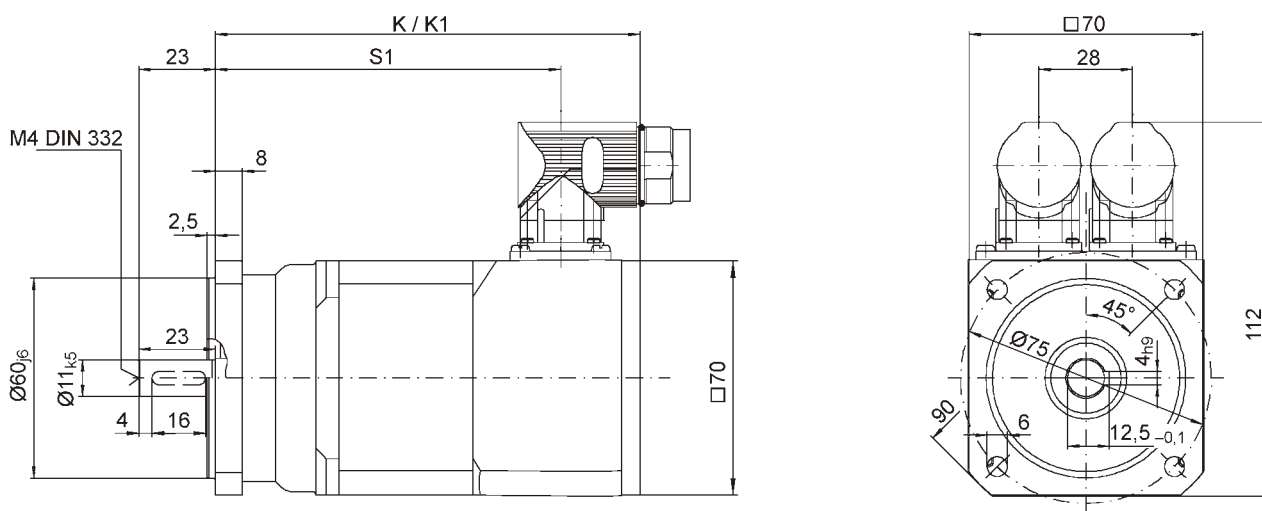
Assignment to the servo drives see page 11.

Servo Motors for $U_{ZK} = 320$ V: Technical Specifications (3) – MR 7422 and MR 7424

For the following types: MR 7422..-U3 or MR 7424..-U3 (type code see page 3)

Motors MR 7422 and MR 7424 for $U_{ZK} = 320$ V			MR 7422 -N034	MR 7422 -N060	MR 7424 -N034
Rated speed	n_N	r.p.m.	3,400	6,000	3,400
Rated output	P_N	W	570	1,000	960
Rated current	I_N	A_{rms}	2.9	4.9	4.4
Torque at rated speed	M_N	Nm	1.6	1.6	2.7
Standstill torque	$M_{0,200}$	Nm	1.8	1.8	3.1
Standstill current	$I_{0,200}$	A_{rms}	2.9	4.9	4.4
Peak torque	M_{max}	Nm	8.0	8.0	12.7
Peak current	I_{max}	A	12.7	22.0	17.9
Torque constant	K_t	Nm/ A_{rms}	0.6	0.3	0.6
Voltage constant	K_e	V/1000 r.p.m.	39.7	22.9	45.8
Resistance phase-phase	R_{u-v}	Ω	6.6	2.4	3.7
Inductivity phase-phase	L_{u-v}	mH	3.1	1.0	2.9
Electr. time constant	T_{el}	ms	0.47	0.42	0.77
Rotor inertia	J_R	10^{-3} kg m ²	0.058	0.058	0.099
Weight		kg	2.0	2.0	3.1

Note: The maximum achievable values depend on the servo drive used.



Dimensions in mm:

Motor Type	Option	MR 7422		MR 7424	
		-G01	-Gxx	-G01	-Gxx
Dimension K	-M0	127	max. 167	167	max. 207
Dimension K1	-MS	176	max. 216	216	max. 256
Dimension S1		104	104	144	144

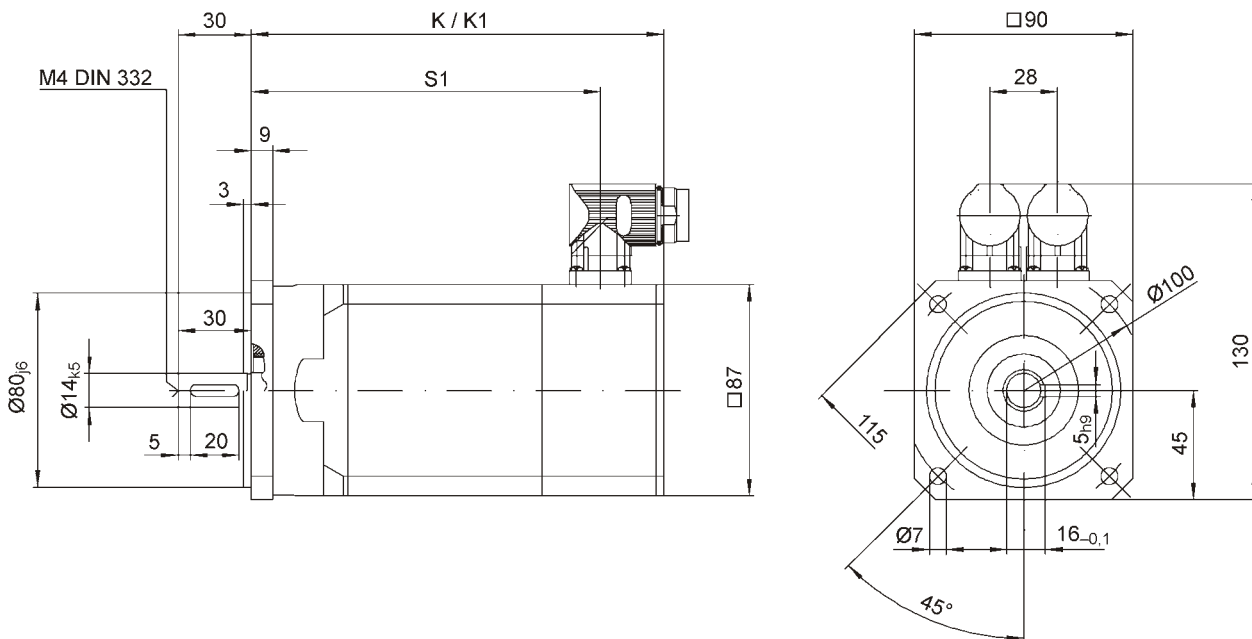
Assignment to the servo drives see page 11.

Servo Motors for $U_{ZK} = 320$ V: Technical Specifications (4) – MR 7432 and MR 7434

For the following types: MR 7432..-U3 or MR 7434..-U3 (type code see page 3)

Motors MR 7432 and MR 7434 for $U_{ZK} = 320$ V			MR 7432 -N034	MR 7434 -N034
Rated speed	n_N	r.p.m.	3,400	3,400
Rated output	P_N	W	680	1,280
Rated current	I_N	A_{rms}	2.7	4.5
Torque at rated speed	M_N	Nm	1.9	3.6
Standstill torque	$M_{0,200}$	Nm	2.5	4.8
Standstill current	$I_{0,200}$	A_{rms}	3.4	5.7
Peak torque	M_{max}	Nm	8.8	21.0
Peak current	I_{max}	A	16.4	35.0
Torque constant	K_t	Nm/ A_{rms}	0.7	0.8
Voltage constant	K_e	V/1000 r.p.m.	49.4	53.8
Resistance phase-phase	R_{u-v}	Ω	6.4	3.2
Inductivity phase-phase	L_{u-v}	mH	18.2	8.2
Electr. time constant	T_{el}	ms	2.83	2.59
Rotor inertia	J_R	10^{-3} kg m ²	0.08	0.16
Weight		kg	3.5	4.8

Note: The maximum achievable values depend on the servo drive used.



Dimensions in mm:

Motor Type	Option	MR 7432		MR 7434	
		-G01	-Gxx	-G01	-Gxx
Dimension K	-M0	130	max. 174	170	max. 214
Dimension K1	-MS	174	max. 213	214	max. 253
Dimension S1		104	104	144	144

Assignment to the servo drives see page 11.

Servo Motors for $U_{ZK} = 560$ V: Overview and Assignment

Order Number Motor	Rated Speed n_N [r.p.m.]	Rated Torque M_N [Nm]	Standstill Torque $M_{0.200}$ [Nm]	Standstill Current $I_{0.200}$ [A _{rms}]	Servo Drive or Servo Power Module with Rated Current ...
MR 7411-U5-N060	6,000	0.4	0.5	0.9	2 A
MR 7412-U5-N060	6,000	0.7	0.9	1.2	2 A
MR 7414-U5-N060	6,000	1.4	1.6	2.1	4 A
MR 7422-U5-N060	6,000	1.6	1.8	2.9	4 A
MR 7424-U5-N060	6,000	2.7	3.1	4.4	8 A
MR 7432-U5-N060	6,000	1.9	2.5	3.4	4 A
MR 7434-U5-N060	6,000	3.6	4.8	5.7	8 A
MR 7436-U5-N060	6,000	5	6.8	8.1	12 A/16 A
MR 7442-U5-N030	3,000	4	5	3.8	4 A
MR 7444-U5-N030	3,000	8	10	7.8	8 A
MR 7446-U5-N030	3,000	12	14	11.5	12 A/16 A
MR 7452-U5-N030	3,000	7	8	5.6	8 A
MR 7454-U5-N030	3,000	13	15	10.6	12 A
MR 7458-U5-N030	3,000	24	28	19.4	20 A
MR 7465-U5-N030	3,000	21	27	13.2	16 A/20 A
MR 7466-U5-N030	3,000	23	32	15.7	16 A/20 A
MR 7467-U5-N030	3,000	26	40	20.4	20 A/32 A
MR 7474-U5-N020	2,000	56	68	22.5	32 A
MR 7476-U5-N020	2,000	70	93	29.4	32 A
MR 7478-U5-N030	3,000	50	(115)	(55.9)	32 A

Other speeds on request.

Corresponding Servo Drives and Servo Power Modules with 560 V DC-Bus Voltage:

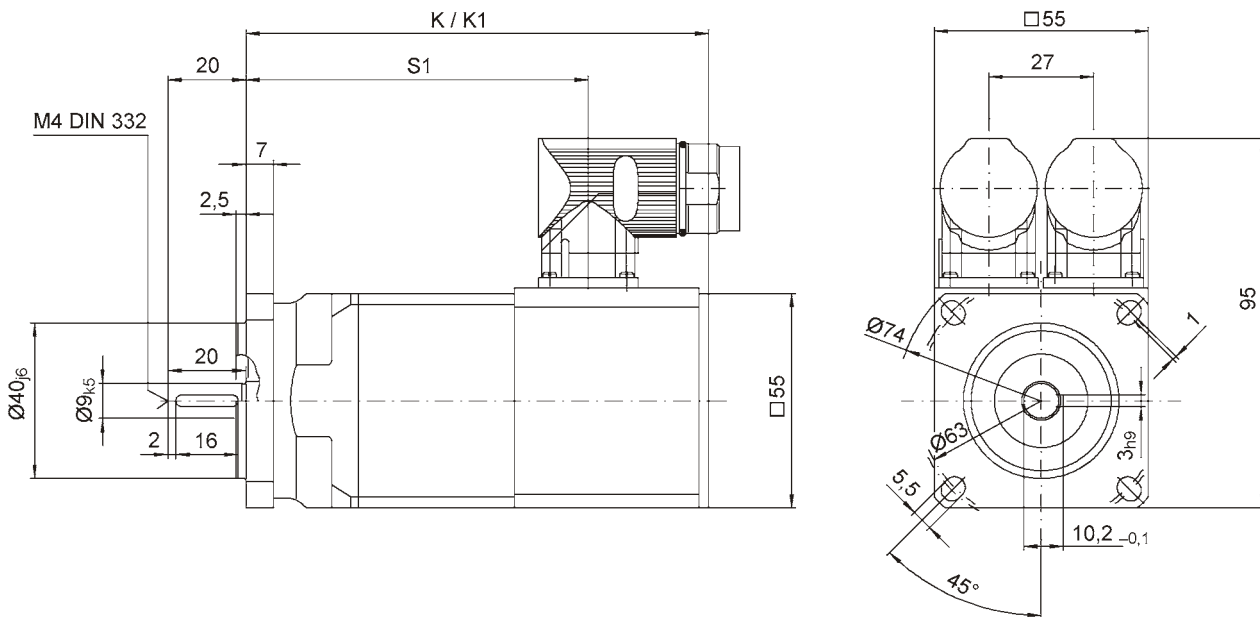
Servo Drive Family	MidiDrive D/xS	MidiDrive D	MaxiDrive	MidiDrive A	MidiDrive C	
Design	compact	compact	compact	compact	compact	
Power supply	direct 3 × 400/480 V	direct 3 × 400 V	direct 3 × 400 V	direct 3 × 400/480 V	direct 3 × 400/480 V	
Technology	digital	digital	digital	analog	multi-axis servo system	
Rated current	2 A	BN 6745	BN 6741	BN 6721	BN 6681	BN 6626
	4 A	BN 6746	BN 6742	BN 6722	BN 6682	BN 6627
	8 A	BN 6747	BN 6743	BN 6723	BN 6683	BN 6628
	12 A			BN 6724	BN 6684	BN 6629
	16 A	BN 6748				
	20 A			BN 6725	BN 6685	BN 6630
32 A	BN 6749					

Servo Motors for $U_{ZK} = 560$ V: Technical Specifications (1) – MR 7411 to MR 7414

For the following types: MR 7411..-U5, MR 7412..-U5 or MR 7414..-U5 (type code see page 3)

Motors MR 7411 to MR 7414 for $U_{ZK} = 560$ V			MR 7411 -N060	MR 7412 -N060	MR 7414 -N060
Rated speed	n_N	r.p.m.	6,000	6,000	6,000
Rated output	P_N	W	220	430	870
Rated current	I_N	A_{rms}	0.9	1.2	2.1
Torque at rated speed	M_N	Nm	0.4	0.7	1.4
Standstill torque	$M_{0,200}$	Nm	0.5	0.9	1.6
Standstill current	$I_{0,200}$	A_{rms}	0.9	1.2	2.1
Peak torque	M_{max}	Nm	2.0	3.6	6.4
Peak current	I_{max}	A	3.5	4.9	8.4
Torque constant	K_t	Nm/ A_{rms}	0.4	0.6	0.7
Voltage constant	K_e	V/1000 r.p.m.	54.0	54.0	54.0
Resistance phase-phase	R_{u-v}	Ω	70.0	35.0	14.1
Inductivity phase-phase	L_{u-v}	mH	272	136	57.4
Electr. time constant	T_{el}	ms	3.31	3.88	4.07
Rotor inertia	J_R	10^{-3} kg m ²	0.0098	0.0196	0.0392
Weight		kg	0.8	1.3	2.0

Note: The maximum achievable values depend on the servo drive used.



Dimensions in mm:

Motor Type	Option	MR 7411		MR 7412		MR 7414	
		-G01	-Gxx	-G01	-Gxx	-G01	-Gxx
Dimension K	-M0	99	max. 140	119	max. 160	159	max. 200
Dimension K1	-MS	143	max. 185	163	max. 205	203	max. 245
Dimension S1		68	68	88	88	128	128

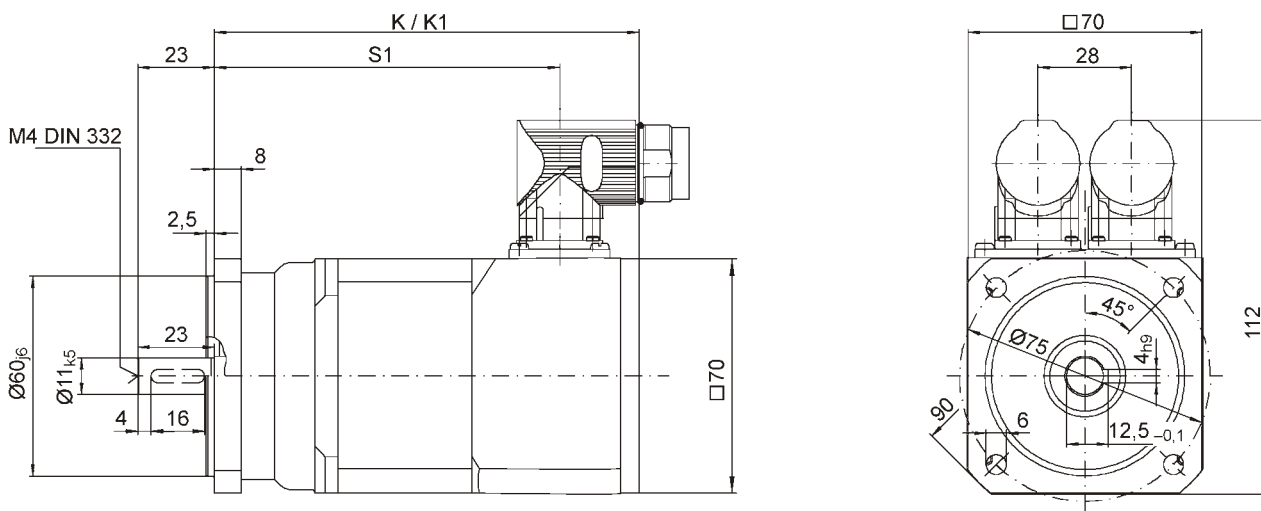
Assignment to the servo drives see page 16.

Servo Motors for $U_{ZK} = 560$ V: Technical Specifications (2) – MR 7422 and MR 7424

For the following types: MR 7422..-U5 or MR 7424..-U5 (type code see page 3)

Motors MR 7422 and MR 7424 for $U_{ZK} = 560$ V			MR 7422 -N060	MR 7424 -N060
Rated speed	n_N	r.p.m.	6,000	6,000
Rated output	P_N	W	1,000	1,700
Rated current	$4.4I_N$	A_{rms}	2.9	4.4
Torque at rated speed	M_N	Nm	1.6	2.7
Standstill torque	$M_{0,200}$	Nm	1.8	3.1
Standstill current	$I_{0,200}$	A_{rms}	2.9	4.4
Peak torque	M_{max}	Nm	8.0	12.7
Peak current	I_{max}	A	12.7	17.9
Torque constant	K_t	Nm/ A_{rms}	0.6	0.6
Voltage constant	K_e	V/1000 r.p.m.	39.7	45.8
Resistance phase-phase	R_{u-v}	Ω	6.6	3.7
Inductivity phase-phase	L_{u-v}	mH	3.1	2.9
Electr. time constant	T_{el}	ms	0.47	0.77
Rotor inertia	J_R	10^{-3} kg m ²	0.058	0.099
Weight		kg	2.0	3.1

Note: The maximum achievable values depend on the servo drive used.



Dimensions in mm:

Motor Type	Option	MR 7422		MR 7424	
		-G01	-Gxx	-G01	-Gxx
Dimension K	-M0	127	max. 167	167	max. 207
Dimension K1	-MS	176	max. 216	216	max. 256
Dimension S1		104	104	144	144

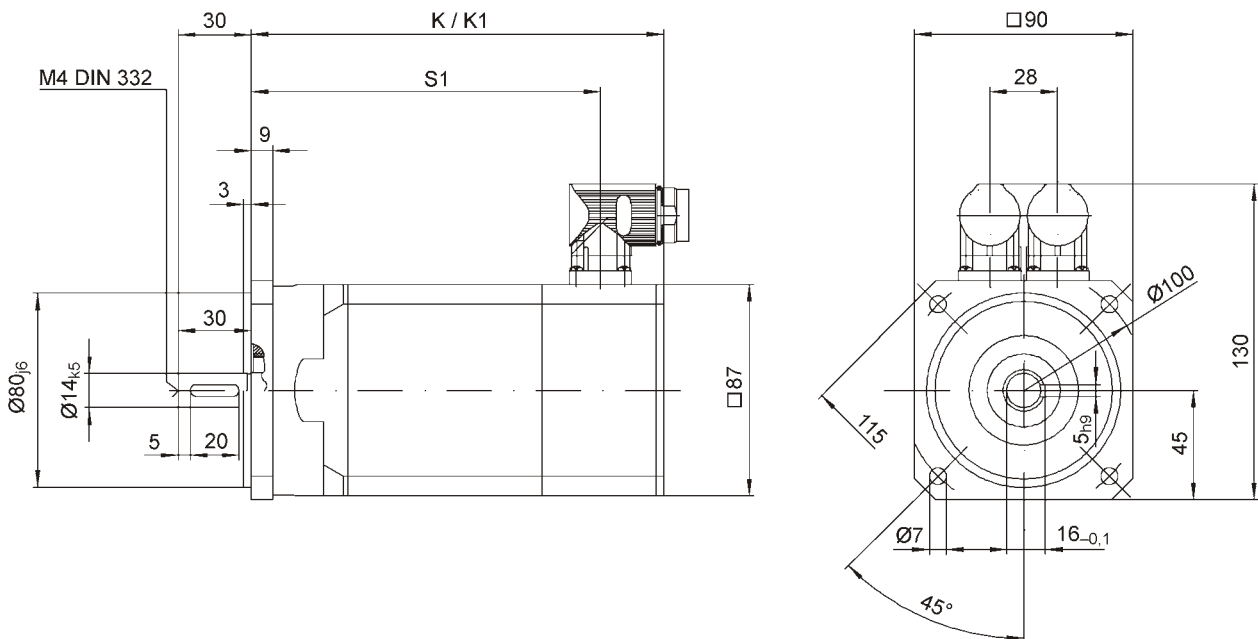
Assignment to the servo drives see page 16.

Servo Motors for $U_{ZK} = 560$ V: Technical Specifications (3) – MR 7432 to MR 7436

For the following types: MR 7432..-U5, MR 7434..-U5 or MR 7436..-U5 (type code see page 3)

Motors MR 7432 to MR 7436 for $U_{ZK} = 560$ V			MR 7432 -N060	MR 7434 -N060	MR 7436 -N060
Rated speed	n_N	r.p.m.	6,000	6,000	6,000
Rated output	P_N	W	1,200	2,260	3,260
Rated current	I_N	A_{rms}	2.7	4.5	6.1
Torque at rated speed	M_N	Nm	1.9	3.6	5.0
Standstill torque	$M_{0,200}$	Nm	2.5	4.8	6.8
Standstill current	$I_{0,200}$	A_{rms}	3.4	5.7	8.1
Peak torque	M_{max}	Nm	8.8	21.0	24.8
Peak current	I_{max}	A	16.4	35.0	41.5
Torque constant	K_t	Nm/ A_{rms}	0.7	0.8	0.8
Voltage constant	K_e	V/1000 r.p.m.	49.4	53.8	54.3
Resistance phase-phase	R_{u-v}	Ω	6.4	3.1	1.8
Inductivity phase-phase	L_{u-v}	mH	18.2	8.2	4.9
Electr. time constant	T_{el}	ms	2.83	2.59	2.72
Rotor inertia	J_R	10^{-3} kg m ²	0.08	0.16	0.24
Weight		kg	3.5	4.8	6.1

Note: The maximum achievable values depend on the servo drive used.



Dimensions in mm:

Motor Type	Option	MR 7432		MR 7434		MR 7436	
		-G01	-Gxx	-G01	-Gxx	-G01	-Gxx
Dimension K	-M0	130	max. 174	170	max. 214	210	max. 254
Dimension K1	-MS	174	max. 213	214	max. 253	254	max. 293
Dimension S1		104	104	144	144	184	184

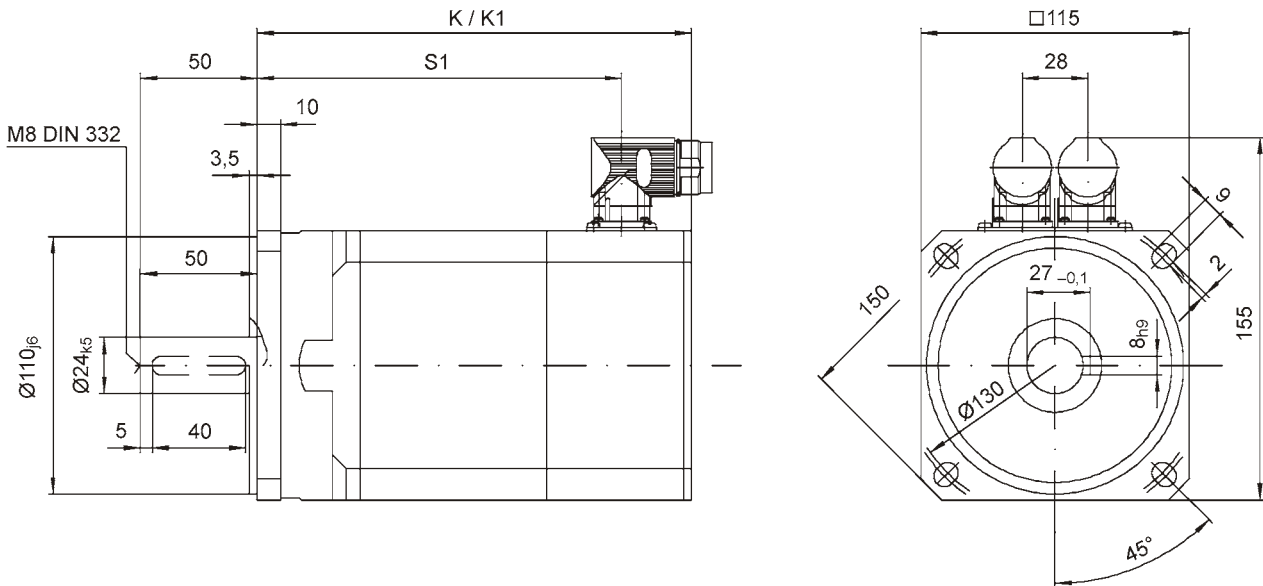
Assignment to the servo drives see page 16.

Servo Motors for $U_{ZK} = 560$ V: Technical Specifications (4) – MR 7442 to MR 7446

For the following types: MR 7442..-U5, MR 7444..-U5 or MR 7446..-U5 (type code see page 3)

Motors MR 7442 to MR 7446 for $U_{ZK} = 560$ V			MR 7442 -N030	MR 7444 -N030	MR 7446 -N030
Rated speed	n_N	r.p.m.	3,000	3,000	3,000
Rated output	P_N	W	1,250	2,510	3,760
Rated current	I_N	A_{rms}	3.8	7.8	11.5
Torque at rated speed	M_N	Nm	4.0	8.0	12.0
Standstill torque	$M_{0,200}$	Nm	5.0	10.0	14.0
Standstill current	$I_{0,200}$	A_{rms}	3.8	7.8	11.5
Peak torque	M_{max}	Nm	20.0	40.0	48.0
Peak current	I_{max}	A	15.3	30.7	45.9
Torque constant	K_t	Nm/ A_{rms}	1.0	1.0	1.0
Voltage constant	K_e	V/1000 r.p.m.	85.6	85.6	88.4
Resistance phase-phase	R_{u-v}	Ω	3.5	1.7	1.3
Inductivity phase-phase	L_{u-v}	mH	11.4	5.7	4.11
Electr. time constant	T_{el}	ms	3.29	3.29	3.21
Rotor inertia	J_R	10^{-3} kg m ²	0.28	0.64	0.96
Weight		kg	4.8	9.0	13.5

Note: The maximum achievable values depend on the servo drive used.



Dimensions in mm:

Motor Type	Option	MR 7442		MR 7444		MR 7446	
		-G01	-Gxx	-G01	-Gxx	-G01	-Gxx
Dimension K	-M0	146	max. 189	186	max. 229	226	max. 269
Dimension K1	-MS	201	max. 240	241	max. 280	281	max. 320
Dimension S1		116	116	156	156	196	196

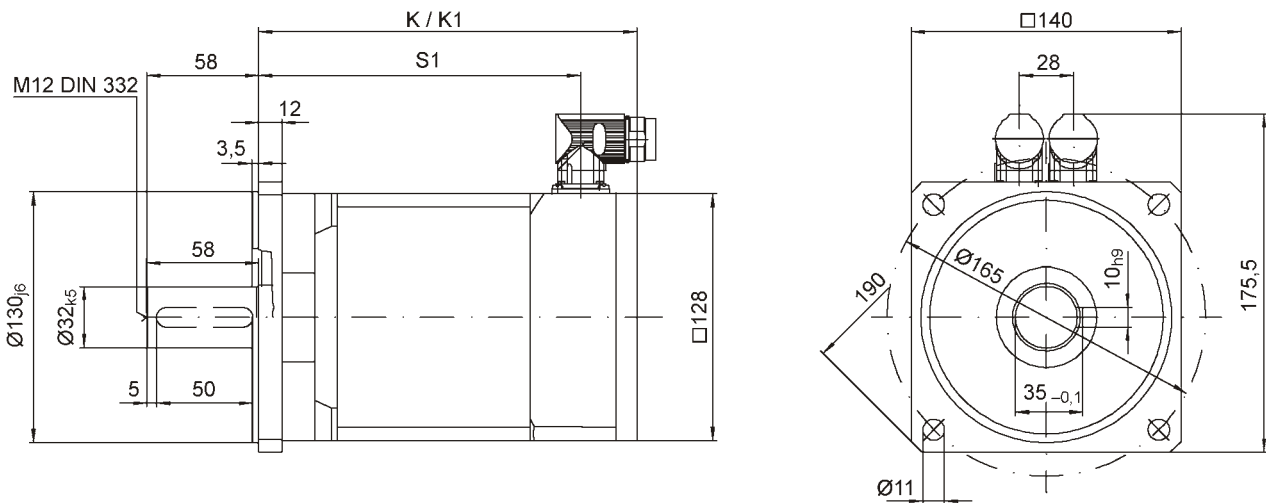
Assignment to the servo drives see page 16.

Servo Motors for $U_{ZK} = 560$ V: Technical Specifications (5) – MR 7452 to MR 7458

For the following types: MR 7452..-U5, MR 7454..-U5 or MR 7458..-U5 (type code see page 3)

Motors MR 7452 to MR 7458 for $U_{ZK} = 560$ V			MR 7452 -N030	MR 7454 -N030	MR 7458 -N030
Rated speed	n_N	r.p.m.	3,000	3,000	3,000
Rated output	P_N	kW	2.2	4.1	7.5
Rated current	I_N	A_{rms}	5.6	10.6	19.4
Torque at rated speed	M_N	Nm	7.0	13.0	24.0
Standstill torque	$M_{0,200}$	Nm	8.0	15.0	28.0
Standstill current	$I_{0,200}$	A_{rms}	5.6	10.6	19.4
Peak torque	M_{max}	Nm	28.0	52.0	96.0
Peak current	I_{max}	A	22.6	42.3	77.6
Torque constant	K_t	Nm/ A_{rms}	1.3	1.2	1.2
Voltage constant	K_e	V/1000 r.p.m.	90.1	90.1	83.1
Resistance phase-phase	R_{u-v}	Ω	2.4	1.2	0.7
Inductivity phase-phase	L_{u-v}	mH	12.1	3.0	0.9
Electr. time constant	T_{el}	ms	5.08	2.53	1.27
Rotor inertia	J_R	10^{-3} kg m ²	0.80	1.58	3.16
Weight		kg	7.5	11.0	18.0

Note: The maximum achievable values depend on the servo drive used.



Dimensions in mm:

Motor Type	Option	MR 7452		MR 7454		MR 7458	
		-G01	-Gxx	-G01	-Gxx	-G01	-Gxx
Dimension K	-M0	156	max. 202	196	max. 242	276	max. 322
Dimension K1	-MS	215	max. 262	255	max. 302	335	max. 382
Dimension S1		127	127	167	167	247	247

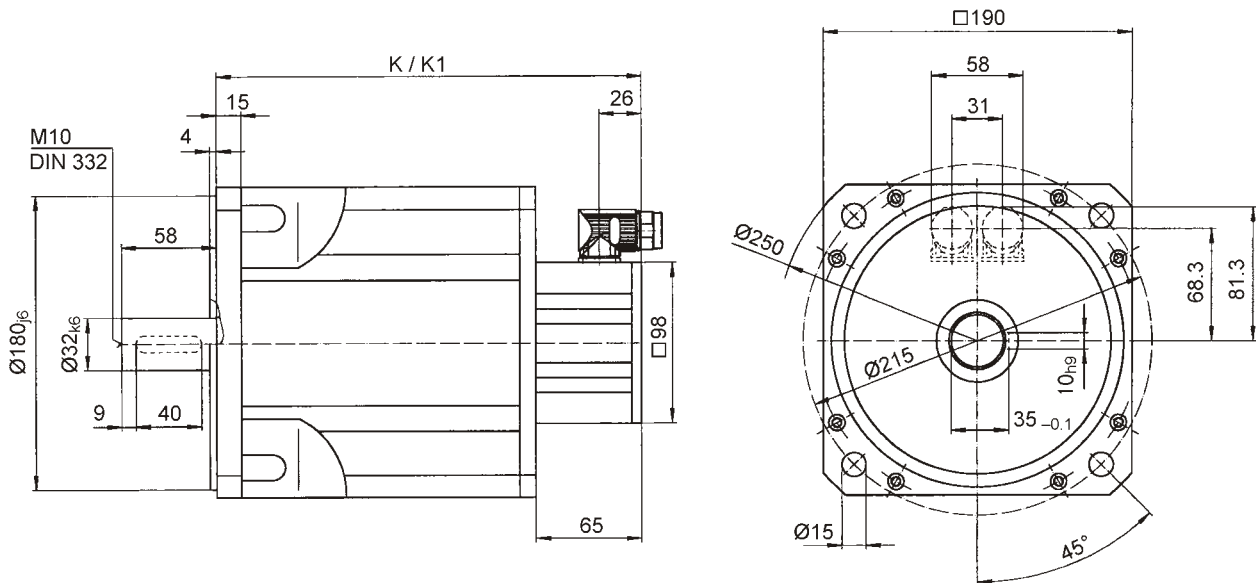
Assignment to the servo drives see page 16.

Servo Motors for $U_{ZK} = 560$ V: Technical Specifications (6) – MR 7465 to MR 7467

For the following types: MR 7465..-U5, MR 7466..-U5 or MR 7467..-U5 (type code see page 3)

Motors MR 7465 to MR 7467 for $U_{ZK} = 560$ V			MR 7465 -N030	MR 7466 -N030	MR 7467 -N030
Rated speed	n_N	r.p.m.	3,000	3,000	3,000
Rated output	P_N	kW	6.6	7.2	8.2
Rated current	I_N	A_{rms}	13.5	15.0	17.9
Torque at rated speed	M_N	Nm	21.0	23.0	26.0
Standstill torque	$M_{0,200}$	Nm	27.0	32.0	40.0
Standstill current	$I_{0,200}$	A_{rms}	13.2	15.7	20.4
Peak torque	M_{max}	Nm	81.0	96.0	120.0
Peak current	I_{max}	A	51.2	61.1	79.2
Torque constant	K_t	Nm/ A_{rms}	1.6	1.5	1.5
Voltage constant	K_e	V/1000 r.p.m.	124	124	116
Resistance phase-phase	R_{u-v}	Ω	0.8	0.5	0.3
Inductivity phase-phase	L_{u-v}	mH	6.5	5.6	4.0
Electr. time constant	T_{el}	ms	8.5	10.7	12.0
Rotor inertia	J_R	10^{-3} kg m ²	3.6	3.9	4.6
Weight		kg	23.5	26.0	31.5

Note: The maximum achievable values depend on the servo drive used.



Dimensions in mm:

Motor Type	Option	MR 7465		MR 7466		MR 7467	
		-G01	-Gxx	-G01	-Gxx	-G01	-Gxx
Dimension K	-M0	242	262	257	277	287	307
Dimension K1	-MS	296	316	311	331	341	361

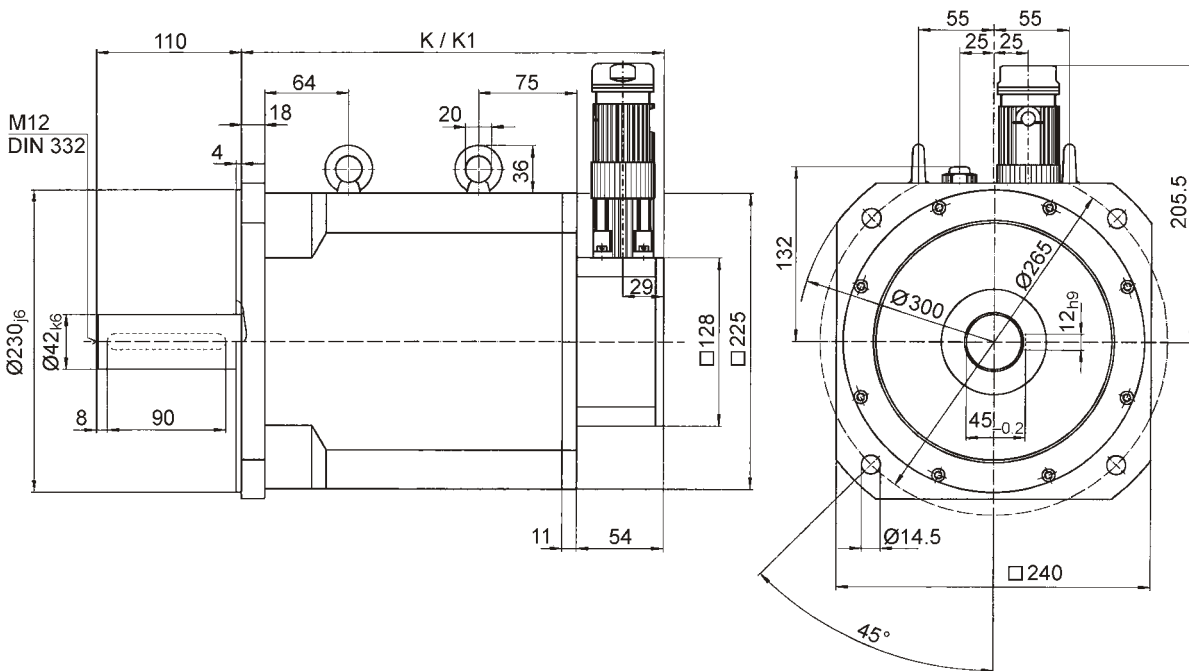
Assignment to the servo drives see page 16.

Servo Motors for $U_{ZK} = 560$ V: Technical Specifications (7) – MR 7474 to MR 7478

For the following types: MR 7474..-U5, MR 7476..-U5, or MR 7478..-U5 (type code see page 3)

Motors MR 7474 to MR 7478 for $U_{ZK} = 560$ V			MR 7474 -N020	MR 7476 -N020	MR 7478 -N030
Rated speed	n_N	r.p.m.	2,000	2,000	3,000
Rated output	P_N	kW	11.7	14.7	15.7
Rated current	I_N	A_{rms}	22.0	25.3	29.3
Torque at rated speed	M_N	Nm	56.0	70.0	50.0
Standstill torque	$M_{0,200}$	Nm	68.0	93.0	115.0
Standstill current	$I_{0,200}$	A_{rms}	22.5	29.4	55.9
Peak torque	M_{max}	Nm	204	279	345
Peak current	I_{max}	A	87.9	114.5	219
Torque constant	K_t	Nm/ A_{rms}	2.54	2.76	1.70
Voltage constant	K_e	V/1000 r.p.m.	182	192	124
Resistance phase-phase	R_{u-v}	Ω	0.30	0.19	0.06
Inductivity phase-phase	L_{u-v}	mH	8.0	6.1	1.9
Electr. time constant	T_{el}	ms	26.6	32.0	30.2
Rotor inertia	J_R	10^{-3} kg m ²	11.4	15.3	19.0
Weight		kg	56	73	89

Note: The maximum achievable values depend on the servo drive used.



Dimensions in mm:

Motor Type	Option	MR 7474		MR 7476		MR 7478	
		-G01	-Gxx	-G01	-Gxx	-G01	-Gxx
Dimension K	-M0	379	390	446	458	514	526
Dimension K1	-MS	446	458	514	526	582	594

Assignment to the servo drives see page 16.

Servo Drive System Packages by ESR Pollmeier GmbH

ESR – the complete servo drive system from a single source

General

The series MR 74 AC servo motors described in this data sheet are components of the ESR drive system packages. These consist of servo drives and servo motors with or without gearboxes, completely with position sensors and, if required, brakes. They are supplemented by software and accessories. All parts of the packages are matching and have been tested as combinations. This delivery from one single source guarantees trouble-free commissioning, reliable operation, and a definite system responsibility on the part of only one supplier.

System design

Our services include an individual drive system configuration. With many years of experience, we will be pleased to assist you at choosing the appropriate servo drive system for your application.

Drive system packages

The following drive system packages are available on the basis of the series MR 74 AC servo motors:

Digital Servo Drive Systems

Servo Drive Family	TrioDrive D/xS	MidiDrive D/xS	TrioDrive D	MidiDrive D	MaxiDrive
Power supply	230 V~ *	3 × 400/ 480 V *	230 V~	3 × 400 V	3 × 400 V
DC-bus voltage	320 V	560/680 V	320 V	560 V	560 V
Rated current (rms)	2 .. 6 A	2 .. 32 A	2 .. 6 A	2 .. 8 A	2 .. 20 A
Peak current (crest value)	8.5 .. 25.5 A	5.5 .. 90 A	5.5 .. 17 A	5.5 .. 22 A	5.5 .. 56 A
Rated torque	0.1 .. 3.6 Nm	0.4 .. 70 Nm	0.1 .. 3.6 Nm	0.4 .. 8 Nm	0.4 .. 26 Nm
Shaft power	0.5 .. 1.5 kW	0.5 .. 16 kW	0.5 .. 1.5 kW	0.5 .. 4.2 kW	0.5 .. 10 kW
Positioning control	option	option	option	option	yes
Field bus	option	option	option	option	option
Data sheet	6755.250 (D/AS) 6755.252 (D/CS) 6755.255 (D/PS) 6755.257 (D/ES)	6755.250 (D/AS) 6755.252 (D/CS) 6755.255 (D/PS) 6755.257 (D/ES)	6750.250	6730.250	6710.250

* wide-range inputs

Analog Servo Drive Systems, Multi-Axis Servo Systems

Servo Drive Family	TrioDrive A	MidiDrive A	TrioDrive C	MidiDrive C
Power supply	230 V~ *	3 × 400/480 V *	230 V~ *	3 × 400/480 V *
DC-bus voltage	320 V	560/680 V	320 V	560/680 V
Rated current (rms)	2 .. 6 A	2 .. 20 A	2 .. 6 A	2 .. 20 A
Peak current (crest value)	5.5 .. 17 A	5.5 .. 55 A	5.5 .. 17 A	5.5 .. 55 A
Rated torque	0.1 .. 3.6 Nm	0.4 .. 26 Nm	0.1 .. 3.6 Nm	0.4 .. 26 Nm
Shaft power	0.5 .. 1. kW	0.5 .. 10 kW	0.5 .. 1.8 kW	0.5 .. 11 kW
Data sheet	6650.250	6680.250	6620.250	6620.250

* wide-range inputs

The statements in this data sheet are for information, only. They do not guarantee properties. We reserve the right to make changes without notice.

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