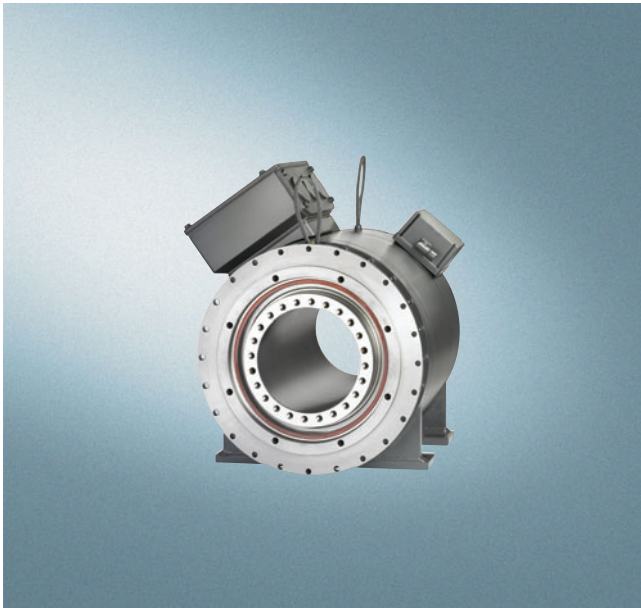


# Servo Motors for SIMOVERT MASTERDRIVES

## Synchronous Servo Motors

### 1FW3 Torque Motors Water Cooling

#### Overview



1FW3 Torque Motors

1FW3 complete torque motors 1FW3 are liquid-cooled, high-pole (slow running) permanent-magnet synchronous servo motors with a hollow-shaft rotor. The operating characteristics are essentially comparable to those of regular synchronous servo motors.

The 1FW3 complete torque motor ships as a fully assembled, complete unit. The range includes 2 outer diameters with various shaft lengths. The stator and the rotor have a flange with centering surfaces and tapped holes at the drive end (A end) which allow them to be integrated into the customer's machine.

Combined with the SIMOVERT MASTERDRIVES Motion Control drive system, 1FW3 torque motors form a powerful high-performance system. The built-in encoder systems for speed and position control can be selected specifically for the application.

#### Benefits

- High torque with a compact design and small construction dimensions
- High overload capacity
- No elasticity in the drive train
- No torsional backlash
- High availability, as the drive train contains no gearbox components that are subject to wear
- Low moment of inertia
- Directly flanged to the machine
- Hollow-shaft rotor design allows for flexible installation concepts

#### Application

- Extruder main drive
- Worm drives for injection molding machines
- Pull-roll drives for foil-stretching machines
- Roller drives in paper machines
- Cross-cutter drives in paper machines
- Packaging and textile machines
- Wire-drawing machines

# Servo Motors for SIMOVERT MASTERDRIVES

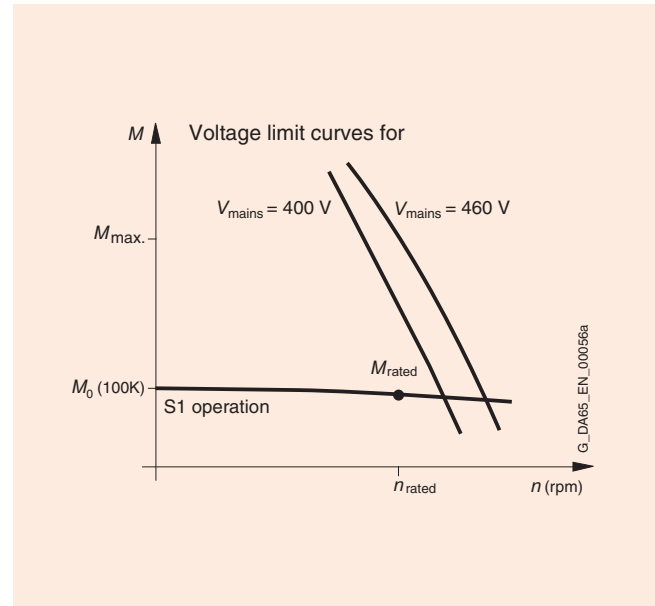
## Synchronous Servo Motors

1FW3 Torque Motors  
Water Cooling

### Technical Data

Motor type	Permanent-magnet synchronous motor
Magnet material	Rare-earth magnet material
Insulation of the stator winding (in accordance with EN 60034-1 and IEC 60034-1)	Temperature class F for a winding temperature rise of $\Delta T = 100$ K at a coolant (water) inlet temperature of $+25$ °C ( $+77$ °F)
Construction type (in accordance with EN 60034-7 and IEC 60034-7)	IM B14 for shaft height 200 IM B35 for shaft height 280
Degree of protection (in accordance with EN 60034-5 and IEC 60034-5)	IP54
Cooling (in accordance with EN 60034-6 and IEC 60034-6)	Water cooling
Thermal motor protection (in accordance with EN 60034-11 and IEC 60034-11)	KTY 84 temperature sensor in stator winding
Paint finish	Anthracite (RAL 7016)
2nd rating plate	A second rating plate is provided for all motors
Shaft end (in accordance with DIN 748-3 and IEC 60072-1)	Hollow shaft Inside diameter $d_i = 152$ mm (5.98 in) for SH 200 Inside diameter $d_i = 250$ mm (9.84 in) for SH 280
Radial eccentricity, concentricity, and axial eccentricity (in accordance with DIN 42955 and IEC 60072-1)	Tolerance class N (normal)
Vibration severity (in accordance with EN 60034-14 and IEC 60034-14)	Grade N (normal)
Sound pressure level (in accordance with EN ISO 1680)	1FW320. 70 dB (A) + 3 dB (A) tol. 1FW328. 70 dB (A) + 3 dB (A) tol.
Flange accuracy	Grade N (normal)
Bearings	Roller bearings with permanent grease lubrication (lubrication over the bearing lifetime). Relubrication unit (optional)
Encoder systems, integrated	<ul style="list-style-type: none"> <li>• Resolver, multipole, <math>2p=8</math>, standard</li> <li>• Incremental encoder sin/cos <math>1 V_{pp}</math>, (I-2,048), optional</li> <li>• Absolute encoder EnDat <sup>1)</sup> (A-2,048), optional</li> </ul>
Connection	Terminal box for power cable. Connector for encoder signals and KTY 84

### Characteristics



Torque-speed characteristic

1) The "Multiturn Absolute Value" function will be available in October 2004.

# Servo Motors for SIMOVERT MASTERDRIVES

## Synchronous Servo Motors

### 1FW3 Torque Motors Water Cooling

#### Selection and Ordering Data

Rated Rotational Speed	Shaft Height	Rated Output	Rated Torque	Rated Current	Standstill Torque	1FW3 Torque Motors Water Cooling	Pole Pair Number	Rotor Moment of Inertia	Weight
$n_{\text{rated}}$		$P_{\text{rated}}$ at $\Delta T=100\text{ K}$	$M_{\text{rated}}$ at $\Delta T=100\text{ K}$	$I_{\text{rated}}$ at $\Delta T=100\text{ K}$	$M_0$ at $\Delta T=100\text{ K}$	Order No.		$J$	
rpm	SH	kW (HP)	Nm (lb <sub>f</sub> -ft)	A	Nm (lb <sub>f</sub> -ft)			kgm <sup>2</sup> (lb <sub>f</sub> -in-s <sup>2</sup> )	kg (lb)
250	200	7.9 (10.59)	300 (221.3)	24	315 (232.3)	1FW3 201 – 1 H7 2 – A A 0	14	0.22 (1.95)	127 (280)
		13.1 (17.56)	500 (368.8)	40	525 (387.2)	1FW3 202 – 1 H7 2 – A A 0	14	0.35 (3.1)	156 (344)
		19.6 (26.27)	750 (553.2)	63	788 (581.2)	1FW3 203 – 1 H7 2 – A A 0	14	0.47 (4.16)	182 (401.3)
		26.2 (35.12)	1000 (737.6)	80	1050 (774.5)	1FW3 204 – 1 H7 2 – A A 0	14	0.6 (5.31)	232 (511.6)
		39.3 (52.68)	1500 (1106.4)	124	1575 (1161.7)	1FW3 206 – 1 H7 2 – A A 0	14	0.85 (7.52)	279 (615.2)
		52.3 (70.11)	2000 (1475.2)	164	2100 (1549)	1FW3 208 – 1 H7 2 – A A 0	14	1.1 (9.73)	348 (767.3)
200	280	52.3 (70.11)	2500 (1844)	170	2625 (1936.2)	1FW3 281 – 1 G7 3 – A A 0	17	4.4 (38.94)	628 (1384.7)
		73.3 (98.26)	3500 (2581.6)	245	3675 (2710.7)	1FW3 283 – 1 G7 3 – A A 0	17	5.8 (51.33)	731 (1611.9)
		104.7 (140.35)	5000 (3688)	340	5250 (3872.4)	1FW3 285 – 1 G7 3 – A A 0	17	7.9 (69.91)	885 (1951.9)
		146.5 (196.38)	7000 (5163.2)	486	7350 (5421.4)	1FW3 288 – 1 G7 3 – A A 0	17	10.7 (94.69)	1090 (2403.5)

• Encoder systems:	Incremental encoder sin/cos 1 $V_{pp}$ Absolute encoder EnDat, 2,048 pulses/revolution 1) Resolver, multipole	A E S
• Construction type:	IM B14 (for shaft height 200) IM B35 (for shaft height 280)	2 3
• Terminal box on top:	Cable outlet diagonally to the right Cable outlet diagonally to the left Cable outlet axial non-drive end Cable outlet axial drive end	5 6 7 8

Other rated speeds on request.

1) The "Multiturn Absolute Value" function will be available in October 2004.

# Servo Motors for SIMOVERT MASTERDRIVES

## Synchronous Servo Motors

1FW3 Torque Motors  
Water Cooling

2

### Selection and Ordering Data

Motor Type (continued)	Standstill Current  $I_0$ at $\Delta T=100\text{ K}$  A	SIMOVERT MASTERDRIVES MC Inverter/Converter Rated Current		Power Cable with Complete Shield Motor connection via terminal box		
		$I_{\text{rated}}$  A	Order No. Inverter Converter	Terminal Box Type Cable Entry	Motor Cable Cross-Section 1) Max. Connect- able Cable Cross-Section mm <sup>2</sup>	Order No. Pre-Assembled Cable By the Meter
1FW3 201 – 1 . H72 – . AA0	25	25.5 25.5	<b>6SE7 022 – 6 T P 7 0</b> <b>6SE7 022 – 7 E P 7 0</b>	gk 230 1 x M32 x 1.5	<b>4 x 4</b> 4 x 16	<b>6FX 008 – 1BB31 – ■ ■ A0</b> 6FX 008 – 1BB61 – ■ ■ A0
1FW3 202 – 1 . H72 – . AA0	42	47 47	<b>6SE7 024 – 7 T D 7 1</b> <b>6SE7 024 – 7 E D 7 1</b>	gk 230 1 x M32 x 1.5	<b>4 x 10</b> 4 x 16	<b>6FX 008 – 1BB51 – ■ ■ A0</b> 6FX 008 – 1BB61 – ■ ■ A0
1FW3 203 – 1 . H72 – . AA0	66	72 72	<b>6SE7 027 – 2 T D 7 1</b> <b>6SE7 027 – 2 E D 7 1</b>	gk 420 1 x M40 x 1.5	<b>4 x 16</b> 4 x 35	<b>6FX 008 – 1BB61 – ■ ■ A0</b> 6FX 5 008 – 1BB35 – ■ ■ A0
1FW3 204 – 1 . H72 – . AA0	83	92 92	<b>6SE7 031 – 0 T E 7 0</b> <b>6SE7 031 – 0 E E 7 0</b>	gk 420 1 x M40 x 1.5	<b>4 x 25</b> 4 x 35	<b>6FX 5 008 – 1BB25 – ■ ■ A0</b> 6FX 5 008 – 1BB35 – ■ ■ A0
1FW3 206 – 1 . H72 – . AA0	131	124 124	<b>6SE7 031 – 2 T F 7 0</b> <b>6SE7 031 – 2 E F 7 0</b>	gk 630 2 x M50 x 1.5	<b>4 x 70</b> 2 x 4 x 50	<b>6FX 5 008 – 1BB70 – ■ ■ A0</b> 6FX 5 008 – 1BB50 – ■ ■ A0
1FW3 208 – 1 . H72 – . AA0	172	175 175	<b>6SE7 032 – 1 T G 7 0</b> <b>6SE7 032 – 1 E G 7 0</b>	gk 630 2 x M50 x 1.5	<b>2 x 4 x 50</b> 2 x 4 x 50	<b>6FX 5 008 – 1BB50 – ■ ■ A0</b> 6FX 5 008 – 1BB50 – ■ ■ A0
1FW3 281 – 1 . G73 – . AA0	179	175 175	<b>6SE7 032 – 1 T G 7 0</b> <b>6SE7 032 – 1 E G 7 0</b>	1XB7 700 3 x M75 x 1.5	<b>2 x 4 x 50</b> 3 x 4 x 120	<b>6FX 5 008 – 1BB50 – ■ ■ A0</b> 6FX 5 008 – 1BB12 – ■ ■ A0
1FW3 283 – 1 . G73 – . AA0	257	262 262	<b>6SE7 033 – 2 T G 7 0</b> <b>6SE7 033 – 2 E G 7 0</b>	1XB7 700 3 x M75 x 1.5	<b>2 x 4 x 70</b> 3 x 4 x 120	<b>6FX 5 008 – 1BB70 – ■ ■ A0</b> 6FX 5 008 – 1BB12 – ■ ■ A0
1FW3 285 – 1 . G73 – . AA0	357	423 423	<b>6SE7 035 – 1 T J 7 0</b> <b>6SE7 035 – 1 E K 7 0</b>	1XB7 700 3 x M75 x 1.5	<b>2 x 4 x 95</b> 3 x 4 x 120	<b>6FX 5 008 – 1BB05 – ■ ■ A0</b> 6FX 5 008 – 1BB12 – ■ ■ A0
1FW3 288 – 1 . G73 – . AA0	510	491 491	<b>6SE7 036 – 0 T J 7 0</b> <b>6SE7 036 – 0 E K 7 0</b>	1XB7 700 3 x M75 x 1.5	<b>3 x 4 x 95</b> 3 x 4 x 120	<b>6FX 5 008 – 1BB05 – ■ ■ A0</b> 6FX 5 008 – 1BB12 – ■ ■ A0

• Inverter • Converter	<b>T E</b>
• SIMOVERT MASTERDRIVES Motion Control Performance 2	<b>7</b>
Power Cable Model • MOTION-CONNECT 800 • MOTION-CONNECT 500	<b>8 5</b>

For information about length codes for power cables and signal cables, see "MOTION-CONNECT Connection System", Part 5.

1) The current carrying capacity of the power cables corresponds to IEC 60204-1 for **Routing Type C** under continuous duty conditions at an ambient air temperature of +40 °C (+104 °F), designed for  $I_0$  (100 K) PVC/PUR insulated cable.

The second line contains the maximum number of cable cross-sections that can be connected for other environmental conditions or routing types. PATH can be used to configure different environmental conditions.