

# MS-SERIES

Hardware Manual  
MS-Series AC Servo Motors (1.1 to 35.8 Nm)





# MS-Series AC Servo Motors (1.1 to 35.8 Nm)

## **Hardware Manual**

3AFE68948908 REV B EN  
EFFECTIVE: 21.11.2007



# Safety instructions

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## What this chapter contains

This chapter contains the safety instructions which you must follow when installing, operating and servicing the motor. If ignored, physical injury or death may follow, or damage may occur to the motor, the drive or driven equipment. Read the safety instructions before you work on the unit.

## Use of warnings and notes

There are three types of safety instructions used in this manual:



**Dangerous voltage warning** warns of high voltage which can cause physical injury and/or damage to the equipment.



**General warning** warns about conditions, other than those caused by electricity, which can result in physical injury and/or damage to the equipment.



**Hot surface warning** warns of component surfaces that may become hot enough to cause burns if touched.

## Installation and maintenance work

These warnings are intended for all who work on the motor, motor cable or drive.

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**WARNING!** Ignoring the following instructions can cause physical injury or death, or damage to the equipment.

### **Only qualified professionals are allowed to install and maintain the motor.**

- Never work on the motor, the motor cable or the drive when input power is applied. After disconnecting the input power, always wait for 5 minutes to let the intermediate circuit capacitors discharge before you start working on the motor, the drive or the motor cable.
- Always ensure by measuring with a multimeter (impedance at least 1Mohm) that there is no voltage between the drive output phases U2, V2 and W2 and the ground.
- A rotating permanent magnet motor generates power causing the drive to become live even when it is stopped and the supply power switched off. Before maintenance work on the motor,
  - prevent the start-up of any other motors in the same mechanical system
  - make sure, that the shaft driven by the motor cannot rotate

### **Notes:**

- Even when the motor is stopped, the drive can be active and dangerous voltage present at the motor power input terminals U, V, W.
  - The ACSM1 drive supports the “Safe Torque Off” function. This however does not provide adequate protection during maintenance and installation work, so supply power must be switched off from the drive system.
- 



**WARNING!** Ignoring the following instructions can cause physical injury or death, or damage to the equipment.

- The motor is not field repairable. Never attempt to repair the motor; contact your local ABB representative or Authorized Service Center for replacement.
- Ensure sufficient cooling.

## Start-up and operation

These warnings are intended for all who plan the operation of the drive, start up or operate the drive.

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**WARNING!** Ignoring the following instructions can cause physical injury or death, or damage to the equipment.

- Before adjusting the drive and putting it into service, make sure that the motor and all driven equipment are suitable for operation throughout the speed range provided by the drive.
- The motor is intended to work with ACSM1-04 drive module. Be sure to use them within range of electrical and thermal specifications. The technical documentation of ACSM1-04 drive modules must be studied before attempting any work on, or with, the MS-series servo motor.
- Keep the operating current below the maximum current  $I_p$  or demagnetization of the motor magnets may occur.
- Do not control the motor with an AC contactor or disconnecting device (disconnecting means); instead, use the control panel or external commands via the I/O board of the drive or a field bus adapter.
- Stop the drive immediately and switch off the power if any abnormal smell, noise, smoke, heat or vibration is observed.

### Notes of ACSM1:

- If an external source for start command is selected and it is ON, the drive will start immediately after an input voltage break or a fault reset unless the drive is configured for 3-wire (pulse) start/stop.
- When the control location is not set to local, the stop key on the control panel will not stop the drive.



**WARNING!** The surfaces of the motor become hot when the drive is in use.

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# About this manual

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This chapter is to give users fundamental knowledge about specifications and instructions for use on MS series AC servomotors.

Users are required to acquire adequate knowledge of specifications and instructions of the servo drives in order to use them safely and properly.

## Compatibility

The manual is compatible with MS-Series AC servo motors used together with ACSM1-04 drive modules.

## Intended audience

This manual is intended for people who plan the installation, install, commission, use and service the motors. Read the manual before working on the motor. The reader is expected to know the fundamentals of electric motors.

## Contents

The chapters of this manual are briefly described below.

*Safety instructions* give safety instructions for the installation, commissioning, operation and maintenance of the motor.

*The MS-Series AC servo motors* describes the motors.

*Mechanical installation* instructs how to place and mount the motor.

*Electrical installation* instructs how to connect the motor to the drive.

*Installation checklist* contains a list for checking the mechanical and electrical installation of the motor.

*Maintenance* lists applicable maintenance recommendations and actions.

*Technical data* contains the technical specifications of the motor.

*Dimension drawings* contain the dimensional drawings of the motors.

## Inquiries

Address any inquiries about the product to the local ABB representative, quoting the type code and serial number of the unit. If the local ABB representative cannot be contacted, address inquiries to the ABB Oy, Drives.

# The MS-Series AC servo motors

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## What this chapter contains

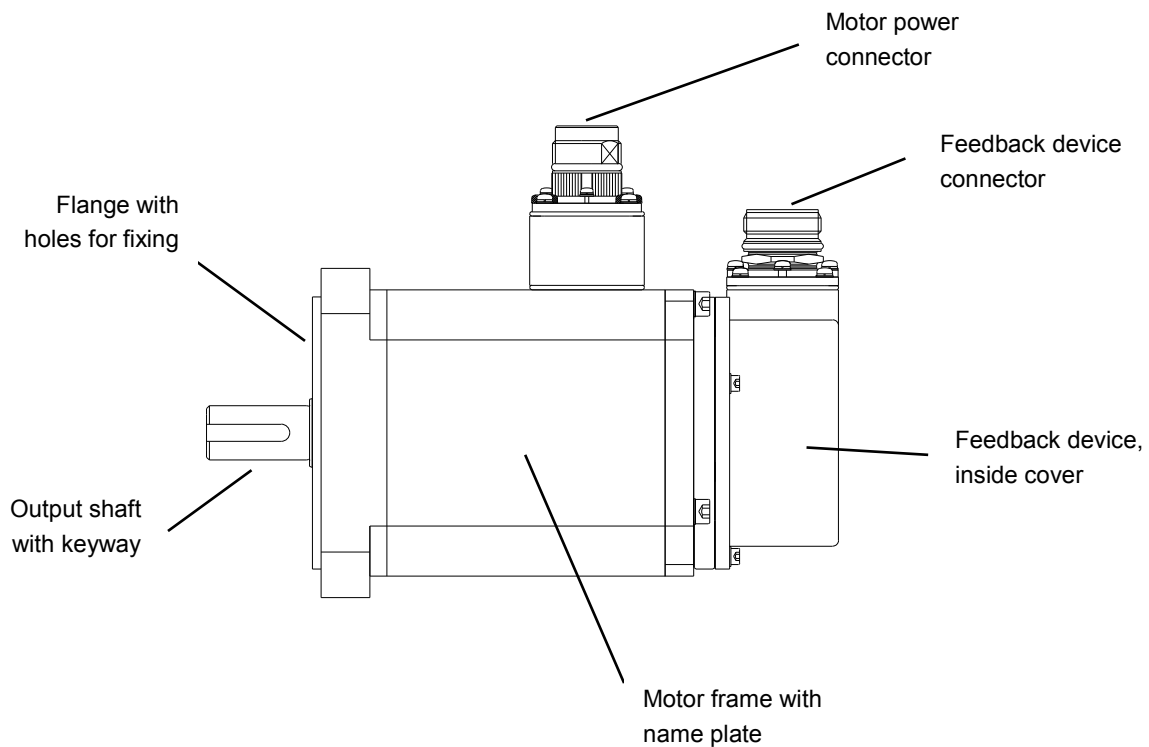
This chapter describes the MS-series AC servo motors in short.

## MS-Series AC servo motors

Together with the ABB high performance machinery drive ACSM1, the MS-Series servo motors offer cost-effective automation systems with an extensive functionality for various fields of applications.

MS-series motors are brushless, 8-pole AC permanent magnet synchronous servo motors with following characteristics:

- Reliable and maintenance free construction
- A robust brushless resolver as a feedback device
- A temperature protecting thermistor sensor (except MS461X motors)
- Shaft with keyway, motor delivered with half and full size key
- An optional holding brake



## Type code

The type code contains information on the specification and configuration of the motor. The main selections are described below. Not all selections are necessarily available for all types and some are only informational.

Type code:

MS	XXXX	N	X	0	08	E4	X	X	10
(1)	(2)	-	(3)	(4)	(5)	-	(6)	(7)	-

Selection	Alternatives	Note
(1) Product series	MS	MS-Series servo motors
(2) Motor size	461X 481X 483X 488X	Four flange sizes, each having motors with different lengths and torque characteristics (see technical specification details)
(3) Holding brake	4	Motor without holding brake
	9	Motor equipped with holding brake
(4) Feedback device (not selectable, only for information)	0	Resolver
(5) Output shaft (not selectable, only for information)	08	Shaft with keyway, without oil seal
(6) Nominal speed (not selectable, only for information)	1	1500 rpm
	2	2000 rpm
	3	3000 rpm
(7) Cable connector type (not selectable, only for information)	F	Connectors in 300mm flying leads
	C	Connectors in motor frame

## ABB product ordering codes

The MS-series motors product ordering codes are following:

Motor type (without brake)	Product ordering code
MS4612N4008E43F10	68846781
MS4614N4008E43F10	68847133
MS4813N4008E43C10	68847141
MS4815N4008E43C10	68847150
MS4817N4008E43C10	68847168
MS4836N4008E43C10	68847184
MS4839N4008E43C10	68847192
MS4884N4008E42C10	68847206
MS4887N4008E42C10	68847214
MS4889N4008E42C10	68847222

Motor type (with brake)	Product ordering code
MS4612N9008E43F10	68847257
MS4614N9008E43F10	68847265
MS4813N9008E43C10	68847273
MS4815N9008E43C10	68847290
MS4817N9008E43C10	68847303
MS4836N9008E43C10	68847320
MS4839N9008E43C10	68847338
MS4884N9008E42C10	68847346
MS4887N9008E42C10	68847354
MS4889N9008E42C10	68847371

## Operational guidelines

MS-series servo motors are self-cooling motors. The heat dissipation from motor surface is lead by natural convection to the ambient air and by heat conduction onto the machine construction. If heat dissipation is reduced, some de-rating to nominal values must be taken into account.

# Mechanical installation

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## What this chapter contains

This chapter guides the mechanical installation and use of MS-series AC servo motors.

## Delivery check and motor identification

After receiving the motor, please check the following:

- Examine that the appearance of the product is normal after the package is opened and there are no visible transportation damages.
- Verify that the part number indicated on the nameplate corresponds with the part number you have ordered.

The delivery box contains:

- MS-series servo motor
- A full key and a half key
- Quick Installation Guide

## Installation guidelines

Motor must be aligned and mounted so, that the output shaft is in line with the connected device and flange is even with its mounting surface. Motors are recommended to be installed using four hexagonal recess head bolts.



MS-series servo motors are intended for flange installation (acc. IEC 60034-7). The installation direction can be IM B5, IM V1 or IM V3. However, for vertical installation shaft upwards (IM V3), a special consideration must be paid for risk of liquid penetration into motor and possible damage.

When installing motor to a gear reducer, a coupling, a belt pulley or a pinion, use proper tools and never apply a severe shock to the motor by using hammer or such, as it may lead to a motor damage or malfunction.

Also motor output shaft load force limitations must be followed (see technical details) or motor damage or shortened bearing life may follow.

## Precautions for use



Never use the motor under such improper environment as subject to splashing water, corrosive gas, nuclear radiation, combustible materials etc. It may lead to a motor malfunction or risk of fire.

Use the motor under proper environment as follows:

- Indoor location free of corrosive or explosive gas
- Ambient temperature of 0 to 40°C
- Ambient humidity of 20 to 80% RH without condensation
- Ventilated air free of dust and excessive humidity
- Space accessible for checking and maintenance work

Please note, that the motor IP class is IP65 except for shaft opening without optional oil seal. Apply a cover over the motor when a considerably amount of water or oil splashes over the motor. It is recommended to install the motor with the connectors facing downwards.

## Storage and transportation

Never store the motor in presence of rain, splashing water, corrosive gas or fluid. Keep away from direct sunlight and keep the motor in temperature range of -10 to 85°C and humidity of 20 to 80% RH. Please consult your local ABB representative if the storage period is considerably long.

Do not carry the motor by the cable or shaft. It may result to a motor damage or personal injury.



# Electrical installation

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## What this chapter contains

This chapter guides the electrical connection of MS-series AC servo motors with ACSM1 drive.

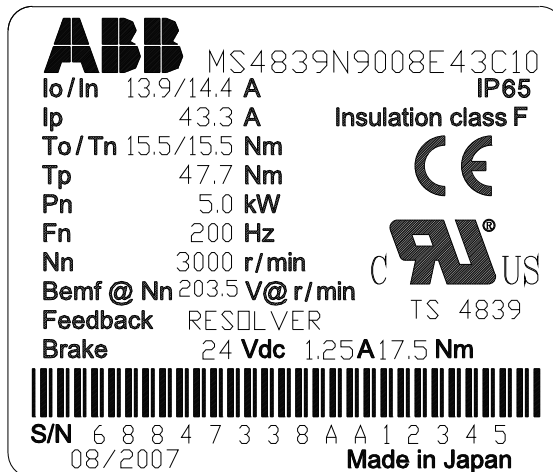
## Manuals for drive setup

Detailed instructions for electrical installation and connections can be found in ACSM1-04 Drive Modules Hardware manual (doc. 3AFE68797543).

ACSM1 drive parameter descriptions and guideline for commissioning can be found in ACSM1-04 Firmware manuals (doc. 3AFE68848261 or 3AFE68848270, depending on your choice of firmware variant).

## Motor name plate

The main electrical data and manufacturing information are indicated on the motor name plate attached to motor body.



- |              |                         |
|--------------|-------------------------|
| 1. MS...     | Motor type code         |
| 2. $I_0/I_1$ | Stall / Nominal current |
| 3. $I_p$     | Peak current            |
| 4. $T_0/T_n$ | Stall / Nominal torque  |
| 5. $P_n$     | Rated power             |
| 6. $F_n$     | Nominal frequency       |
| 7. $N_n$     | Nominal speed           |

8. Bemf@N <sub>n</sub>	Back-EMF voltage at nominal speed
9. Feedback	Feedback type resolver
10. Brake	Holding brake (if present) supply voltage and current, rated holding torque
11. Bar code	Containing serial number
12. S/N	Serial number, manufacturing month/year
13. IP65, Insulation class F	Protecting and insulation class
14. Approvals	CE and UL conformity labels

## Connecting cables

Ready made cables are available for connection between MS-series motors and ACSM1 drive modules. Cables are with following properties:

- PUR outer sheath with good flexibility and low adhesion
- flame retardant and halogen-free
- resistant to abrasion and oil
- conformity to UL and DESINA® -standards
- motor power cables include brake control leads
- minimum bending radius of 12 X D

### Resolver feedback cables

Product ordering code	Length [m]	Cable	Cable diameter D [mm]
68861721	5	(3x(2x0,14)+(2x0,14))	8.5 ± 0.3
68861730	10		
68861748	15		
68861756	20		
68861764	25		


### Motor power cables

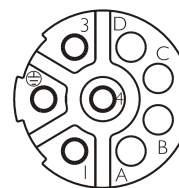
Product ordering code	Length [m]	Cable	Cable diameter D [mm]	Current rating * [A]
68822742 68823285 68823307 68823323 68823331	5 10 15 20 25	(4x1,5+(2x1,0))	11.2 ± 0.4	16
68867029 68867037 68867053 68867061 68867070	5 10 15 20 25	(4x2,5+(2x1,0))	12 ± 0.5	22
68867088 68867096 68867100 68867118 68867126	5 10 15 20 25	(4x4,0+(2x1,0))	14 ± 0.5	30

\* Cable current ratings according EN 60204-1, installation type E (open cable tray), PVC insulated copper conducts in an ambient temperature of + 40°C. The OEM/system manufacturer is responsible for selecting the cable cross section fulfilling the local regulations. Method of installation, grouping and ambient temperature affect on the cable current rating.

### Cable connections

Motor power and resolver feedback cable connections (viewed on the cable end connector). For holding brake control, an auxiliary 24 VDC is needed.

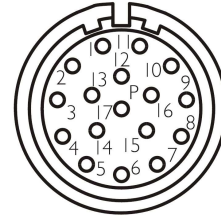
Motor power cable		
Motor end	Signal	Drive end
1	V	V2
2	PE	
3	U	U2
4	W	W2
A	Brake +	X2:1 <sup>(1)</sup>
B	Brake -	0 VDC <sup>(2)</sup>
C	nc	
D	nc	



<sup>(1)</sup> Auxiliary +24VDC power supply connected to terminal X2:2

<sup>(2)</sup> From auxiliary 24VDC power supply

Resolver feedback cable		
Motor end	Signal	Drive End
1	S1/COS+	7
3	S3/COS-	2
2	S2/SIN+	6
4	S4/SIN-	1
5	Thermistor +	3
6	Thermistor -	4
7	R1/EXT+	5
8	R2/EXT-	10
11	Shield	Connector housing



## Motor cable connection

Connect the motor power and feedback cable connectors as follows:

1. Set the cable plug into the connecting receptacle in motor housing. Set the correct position using guide notches inside the connector
2. Tighten the union nut of the connector by hand. Push the connector plug in further as tightened
3. Tighten the union nut as far as it will rotate manually without tools

For drive end of connection, details can be found on *ACSM1 Hardware Manual* (doc. 3AFE68797543) and *FEN-21 resolver feedback interface User's Manual* (doc. 3AFE68784859 ).



Take special care that the protective grounding has been made properly before starting up the drive.

# Installation checklist

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## Checklist

Check the mechanical and electrical installation of motor and drive before start-up. Go through the checklist below with another person. Read the *Safety instructions* on first pages of this manual before you work on the unit.

Check
<b>MECHANICAL INSTALLATION</b>
<input type="checkbox"/> The ambient operating conditions are allowable and cooling of motor is not prevented
<input type="checkbox"/> There has not been made any damage to motor during installation
<input type="checkbox"/> The motor is fastened properly to the driven equipment
<input type="checkbox"/> The driven equipment is ready and safe for start
<b>ELECTRICAL INSTALLATION</b>
<input type="checkbox"/> Motor cables are safely routed and supported, away from other cables
<input type="checkbox"/> Cables are fixed with proper strain relief
<input type="checkbox"/> The motor power cable and encoder cable connectors are fully tightened
<input type="checkbox"/> Protective grounding is properly made

# Maintenance

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## What this chapter contains

This chapter contains preventative maintenance instructions.

## Safety



**Warning!** Read the *Safety instructions* on the first pages of this manual before performing any maintenance on the equipment. Ignoring the safety instructions can cause injury or death.



Please note following:

- Always disconnect the power supply to the drive before beginning any maintenance work
- Make sure, that the machine driven by the motor is inhibited to make any operation and safety switches and valves are turned to off position to prevent energy supply to actuators
- The motor is using permanent magnets and can generate dangerous voltage if rotated even when disconnected from power supply
- The surface of the motor can be hot after intense load
- If a motor to be serviced is equipped with holding brake and there is a possibility of dangerous load movement without brake, make a mechanical locking or support to inhibit machine or part of it moving if the motor removed from the machine or the brake is accidentally released

No repair works are allowed to motors except by a qualified technician. Please consult your local ABB representative if there is a need for service.

## Maintenance procedures

MS-series servo motors are practically maintenance-free, so no specific maintenance program needs to be applied. There are no field replaceable parts in the motor, so if some malfunction or damage is suspected, replace the motor with identical unit.

However, variant application and operating environments makes it necessary to make some inspection on motor. The maintenance interval and actions depend on application conditions.

Maintenance tasks to be made:

- Check the motor periodically to detect abnormality in smell, sound, smoke, heat, vibration etc. If you find some suspicious behaviour, check the drive system and the machine driven by the motor
- Check that no dust or other material is accumulated on top of the motor, as this prevents proper cooling. Clean the motor surface in regular intervals depending on the surrounding environment conditions
- Check that motor fixing to driven machine and motor cables are not loosened due to vibration
- Check that there is not any damage or wearing in connecting cables. Replace if some signs of defect found.
- Check that there is not any corrosion in motor surfaces

## Technical data

### What this chapter contains

This chapter contains the technical specifications of the MS-series AC servo motors with the ACSM1 drive.

### Motor data

The following data tables show the MS-series motor technical data:

Power supply voltage			AC 400V					
Flange size of servomotor			□95		□115			
Model No. of servomotor			MS4612	MS4614	MS4813	MS4815	MS4817	
※	Rated output	$P_R$	kW	0,345	0,628	1	1,5	2
※	Rated torque	$T_R$	Nm	1,1	2	3,3	4,8	6,8
※	Stall torque	$T_S$	Nm	1,1	2	3,3	4,8	6,8
※	Instantaneous Max. torque	$T_P$	Nm	3,82	7,16	9,9	14,3	20,4
※	Rated rotat. speed	$N_R$	r/min	3000	3000	3000	3000	3000
	Max rotat. Speed	N Max	r/min	5000	5000	4500	4500	4500
※	Equiv. rated DC current	$I_R$	A rms	2,5	2,3	3,4	4,7	6,5
※	Equiv. stall DC current	$I_S$	A rms	2,3	2,2	3	4,3	6,1
	Instant. Max. current	$I_P$	A rms	8,3	8	9,3	13,3	18,7
	Nominal frequency	$F_n$	Hz	200	200	200	200	200
	Torque constant	$K_T$	Nm/A $\pm 10\%$	0,47	0,91	1,11	1,12	1,12
☆	Voltage constant (ph-ph)	$K_E$	V @ $n_N \pm 10\%$	85,4	164,9	202,3	202,6	203,2
☆	Resistance (ph-ph)	$R_a$	$\Omega \pm 10\%$	1,80	2,87	5,73	3,40	2,29
☆	Inductance (ph-ph)	$L_a$	mH $\pm 30\%$	10,00	17,80	21,87	12,60	9,27
	Mech. time constant	$\tau_m$	ms	0,7	0,6	1,7	1,4	1,2
	Elec. time constant	$\tau_e$	ms	5,6	6,2	3,8	3,7	4
	Moment of rotor inertia	$J_M$	$\text{kgm}^2 \times 10^{-4}$	0,61	1,08	2,59	3,6	4,7
	Moment of rotor inertia with brake	$J_{M+Brk}$	$\text{kgm}^2 \times 10^{-4}$	0,77	1,24	2,77	3,77	4,87
	Rated power rate	$Q_R$	kW/s	19,7	37,1	42,8	64	98,5
☆	Friction torque of shaft	$T_F$	Nm MAX	0,08	0,08	0,25	0,25	0,25
	Axial end play		mm MAX	0,2	0,2	0,5	0,5	0,5
	Allowable radial load (Note 5)		N	196	343	490	490	490
	Allowable axial load		N	68,6	98	98	98	98
	Mass		kg	1,6	2,5	4,7	5,7	6,7



Power supply voltage			AC 400V					
Flange size of servomotor			□142		□190			
Model No. of servomotor			MS4836	MS4839	MS4884	MS4887	MS4889	
※	Rated output	$P_R$	kW	3,3	4,9	4	6	7,5
※	Rated torque	$T_R$	Nm	10,5	15,5	19,1	28,6	35,8
※	Stall torque	$T_S$	Nm	10,5	15,5	19,1	28,6	35,8
※	Instantaneous Max. torque	$T_P$	Nm	31,5	47,7	47,7	71,5	89,5
※	Rated rotat. speed	$N_R$	r/min	3000	3000	2000	2000	2000
	Max rotat. Speed	$N_{Max}$	r/min	4500	4500	3000	3000	3000
※	Equiv. rated DC current	$I_R$	A rms	9,5	14,4	11,7	18,1	20,9
※	Equiv. stall DC current	$I_S$	A rms	9,1	13,9	11,2	17,7	20,3
	Instant. Max. current	$I_P$	A rms	27,8	43,3	28,6	44,8	51,3
	Nominal frequency	$F_n$	Hz	200	200	133	133	133
	Torque constant	$K_T$	Nm/A $\pm 10\%$	1,15	1,121	1,69	1,612	1,76
☆	Voltage constant (ph-ph)	$K_E$	V @ $n_N$ $\pm 10\%$	208,7	203,5	204,8	195,1	212,9
☆	Resistance (ph-ph)	$R_a$	$\Omega$ $\pm 10\%$	0,93	0,49	0,85	0,41	0,30
☆	Inductance (ph-ph)	$L_a$	mH $\pm 30\%$	6,47	4,02	9,33	5,47	4,27
	Mech. time constant	$\tau_m$	ms	1,2	1	1,3	1	0,8
	Elec. time constant	$\tau_e$	ms	6,9	8,2	11	13,2	14,2
	Moment of rotor inertia	$J_M$	kgm <sup>2</sup> x 10 <sup>-4</sup>	11,6	17,2	29,5	43,3	57
	Moment of rotor inertia with brake	$J_{M+Brk}$	kgm <sup>2</sup> x 10 <sup>-4</sup>	11,7	17,2	29,98	44	57,7
	Rated power rate	$Q_R$	kW/s	95,1	140	123,2	188,8	224,6
☆	Friction torque of shaft	$T_F$	Nm MAX	0,34	0,45	0,49	0,69	0,78
	Axial end play		mm MAX	0,5	0,5	0,5	0,5	0,5
	Allowable radial load (Note 5)		N	490	490	784	784	784
	Allowable axial load		N	98	98	392	392	392
	Mass		kg	8	11,2	15	17	21

Note 1: The above tables show values without optional parts (i.e. without brake and oil seal).

Note 2: The items marked by ※ show values when the motor is mounted on heat sink plate of specific size in the ambient temperature of 40°C.

The dimensions of heat sink:

- Aluminium plate of 305×305×T12 mm for MS4612, MS4614
- Aluminium plate of 450×450×T25 mm for MS4813, MS4815, MS4817, MS4836, MS4839
- Aluminium plate of 600×600×T25 mm for MS4884, MS4887, MS4889
- Aluminium plate of 700×700×T25 mm for MS4927

Note 3: The items marked by ☆ are to be inspected before delivery.

Note 4: Each value is to be measured at 20 - 30°C. Values with no tolerance are nominal values.

Note 5: The allowable radial load is to be applied on the shaft at 20 mm from the mounting surface.

Technical specification	
Mounting	IM B5, V1, V3
Cooling	Self cooling IC 0041
Motor pole pairs	4
Operating temperature	0 .. +40 °C
Insulation class	F
Thermal protection	PTC thermistor in stator winding (MS4612 and 4614 without thermistor)
Compliance	CE and UL (MS4612 and 4614 UL approval pending)
Degree of protection	IP 65, except for shaft entry part

## De-rating

MS-series motors are specified to be used in ambient temperature of 0 to 40°C. For use in operating environment outside this range, please consult your local ABB representative or ABB Oy, Drives.

## Combined motor and drive performance

MS-series motors can be used in different combinations with ACSM1 drive modules. Following combined performance data apply within ACSM1 ratings. De-rating of ambient temperature, supply voltage and installation altitude has to be taken into account.

Motor drive combination has been selected so, that the different motor nominal and peak current/torque values can be selected. ACSM1 continuous current value has been de-rated with 25% for possible cyclic load cases. For more optimal selection of drive package, the DriveSize/MCSize software tool should be used.

Motor Type	M <sub>n</sub> [Nm]	M <sub>max</sub> [Nm]	I <sub>n</sub> [A]	I <sub>max</sub> [A]	Drive Type	I <sub>2cont8k cyclic load</sub> [A]	I <sub>2max</sub> [A]	Combined M <sub>n</sub> [Nm]	Combined M <sub>max</sub> [Nm]
MS4612	1,1	3,82	2,5	8,3	ACSM1-04Ax-02A5-4	1,9	5,3	0,8	2,4
					ACSM1-04Ax-03A0-4	2,3	6,3	1,0	2,9
					ACSM1-04Ax-04A0-4	3,0	8,4	1,1	3,8
MS4614	2	7,16	2,3	8	ACSM1-04Ax-02A5-4	1,9	5,3	1,6	4,7
					ACSM1-04Ax-03A0-4	2,3	6,3	2,0	5,6
					ACSM1-04Ax-04A0-4	3,0	8,4	2,0	7,2
MS4813	3,3	9,9	3,4	9,3	ACSM1-04Ax-03A0-4	2,3	6,3	2,2	6,7
					ACSM1-04Ax-04A0-4	3,0	8,4	2,9	8,9
					ACSM1-04Ax-05A0-4	3,8	10,5	3,3	9,9
MS4815	4,8	14,3	4,7	13,3	ACSM1-04Ax-05A0-4	3,8	10,5	3,8	11,3
					ACSM1-04Ax-07A0-4	4,1	14,7	4,2	14,3
					ACSM1-04Ax-09A5-4	7,1	16,6	4,8	14,3
MS4817	6,8	20,4	6,5	18,7	ACSM1-04Ax-07A0-4	4,1	14,7	4,3	16,0
					ACSM1-04Ax-09A5-4	7,1	16,6	6,8	18,1
					ACSM1-04Ax-012A-4	9,0	21,0	6,8	20,4
MS4836	10,5	31,5	9,5	27,8	ACSM1-04Ax-09A5-4	7,1	16,6	7,9	18,8
					ACSM1-04Ax-012A-4	9,0	21,0	9,9	23,8
					ACSM1-04Ax-016A-4	9,8	28,0	10,5	31,5
MS4839	15,5	47,7	14,4	43,3	ACSM1-04Ax-024A-4	18,0	42,0	15,5	46,3
					ACSM1-04Ax-031A-4	23,3	54,0	15,5	47,7
MS4884	19,1	47,7	11,7	28,6	ACSM1-04Ax-012A-4	9,0	21,0	14,7	35,0
					ACSM1-04Ax-016A-4	9,8	28,0	15,9	46,7
					ACSM1-04Ax-024A-4	18,0	42,0	19,1	47,7
MS4887	28,6	71,5	18,1	44,8	ACSM1-04Ax-024A-4	18,0	42,0	28,4	67,0
					ACSM1-04Ax-031A-4	23,3	54,0	28,6	71,5
MS4889	35,8	89,5	20,9	51,3	ACSM1-04Ax-024A-4	18,0	42,0	30,8	73,3
					ACSM1-04Ax-031A-4	23,3	54,0	35,8	89,5

## Feedback device

Standard feedback device is a brushless resolver with following specifications:

- Number of pole pairs 1
- Excitation signal amplitude AC 7 V<sub>rms</sub>
- excitation signal frequency 10 kHz

## Holding brake

The motor can optionally have a built-in brake for holding the motor and driven axis static, when the drive is stopped or disconnected.

The brake is electrically releasing type. When the brake is de-energized, a spring force clamps the brake disk coupled to the rotor. This will close the brake and hold the shaft. When supply voltage is applied to the brake armature, the electrically generated magnetic field will override the spring force and the brake opens.



The brake is intended only for holding static shaft position. It is not rated for dynamic braking or emergency stopping device to assure the safety of the machine. If necessary, provide the safety stopping means by the machine functions and external, safety approved devices.

To ensure correct operation of the brake, it is controlled with ACSM1 drive functionality; see firmware manuals for mechanical brake control (doc. 3AFE68848261 or 3AFE68848270, depending on your choice of firmware variant).

Holding brake technical specifications:

Model number of servomotor			MS4612	MS4614	MS4813	MS4815	MS4817	MS4836	MS4839	MS4884	MS4887	MS4889
Rated voltage	V		24	24	24	24	24	24	24	24	24	24
Static friction torque	T <sub>s</sub>	Nm MIN	1,27	2,39	9,3	9,3	9,3	13,5	17,5	32	50	50
Power consumption (at 20°C)	W		8	8	17,9	17,9	17,9	30	30	34,7	25	25
Releasing time	tar	ms MAX	30	30	20	20	20	20	20	50	140	140
Absorbing time	ta	ms MAX	60	60	90	90	90	90	90	170	110	110

## Thermal protection

For protection from damage of excessive thermal overload, the MS-series AC servo motors are equipped with PTC-type of thermistor, excluding MS461X motors, which needs protection via calculated temperature rising using ACSM1 thermal protection function.

Thermistor specifications:

Temperature T °C	Resistance R Ω
155 – 5K	≤ 550
155 + 5K	≥ 1330
155 +20K	≥ 4000


For MS4612 and MS4614 motors, following parameters need to be set in ACSM1 to activate the thermal protection function:

Motor characteristic value	MS4612	MS4614
Motor nominal temperature rise °C	75.7	74.2
Motor thermal time constant s	1332	1452

For information about how to set motor thermal protection parameters, see appropriate ACSM1 firmware manual.

## Approvals

The MS-series motors have a declaration of conformity with the provisions of Low Voltage Directive 2006/95/EC and there is a CE symbol applied in the motor name plate to verify this.

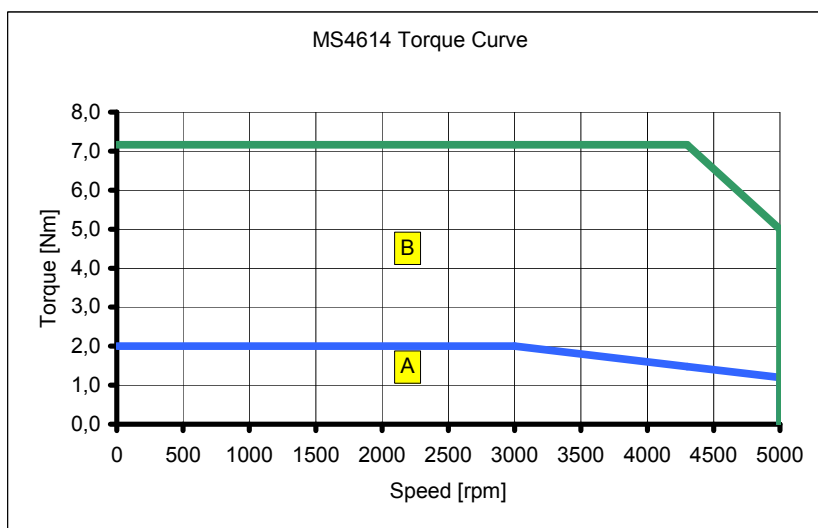
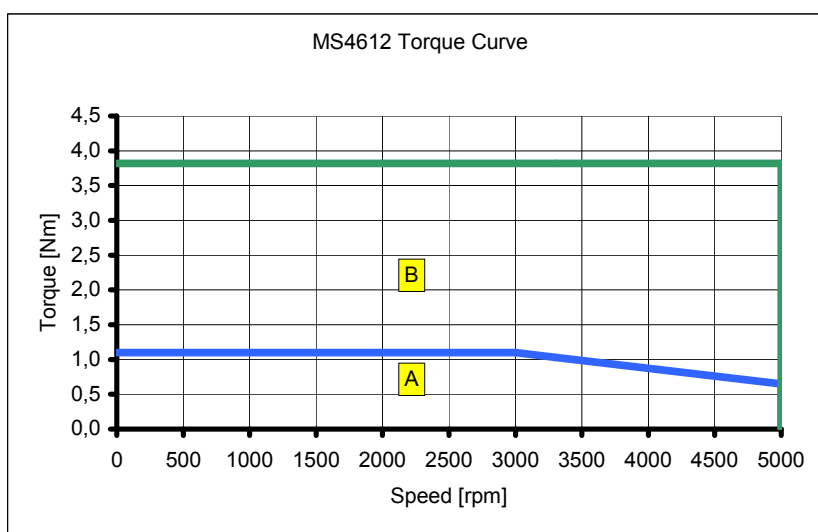
The MS-series motors are recognized by the Underwriters Laboratories Inc.® authorities and there is a  , UL Recognized Component Mark certified by UL to both Canadian and U.S. requirements, applied in the motor name plate. For the MS4612 and MS4614 motors, the approval is valid from revision B motors and is identified with above mentioned marking in motor name plate.

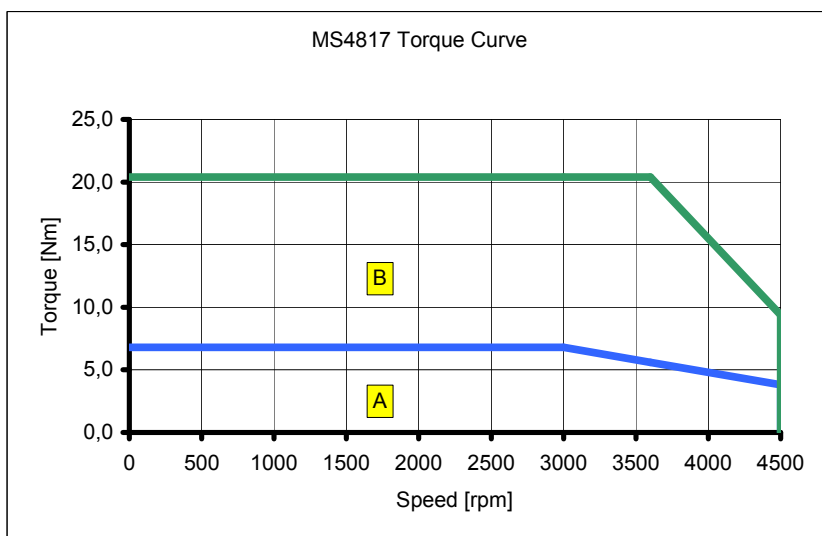
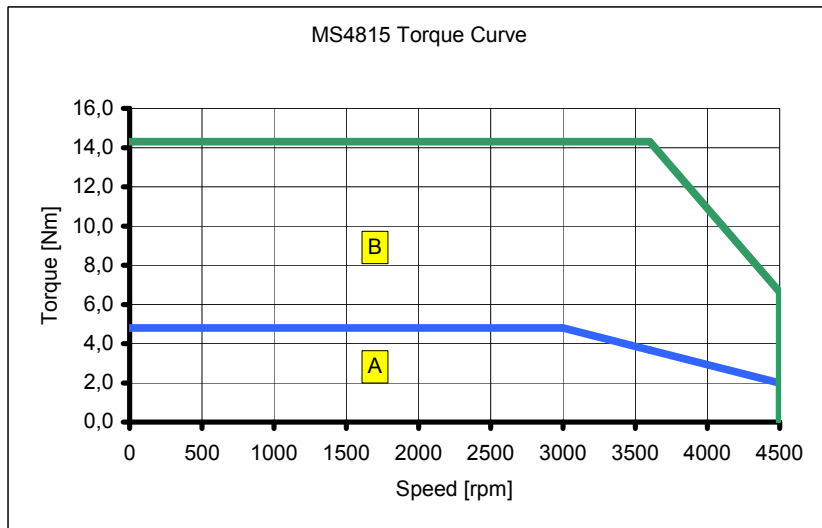
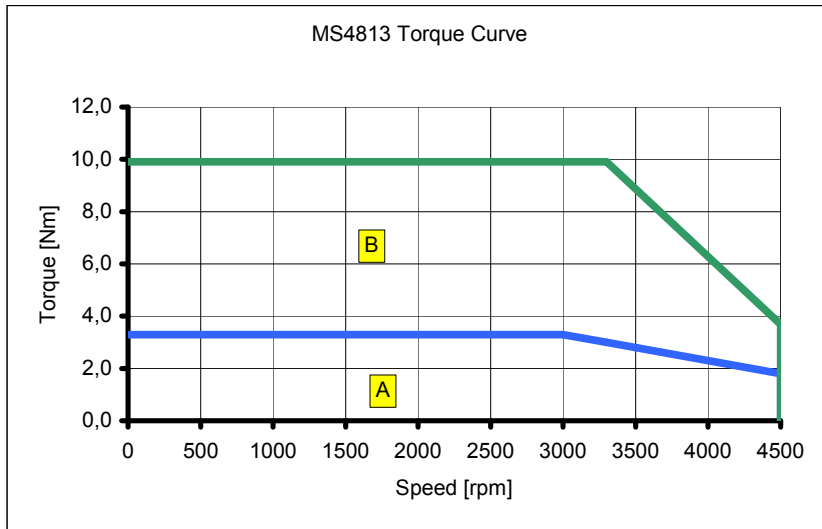
## Motor speed/torque curves

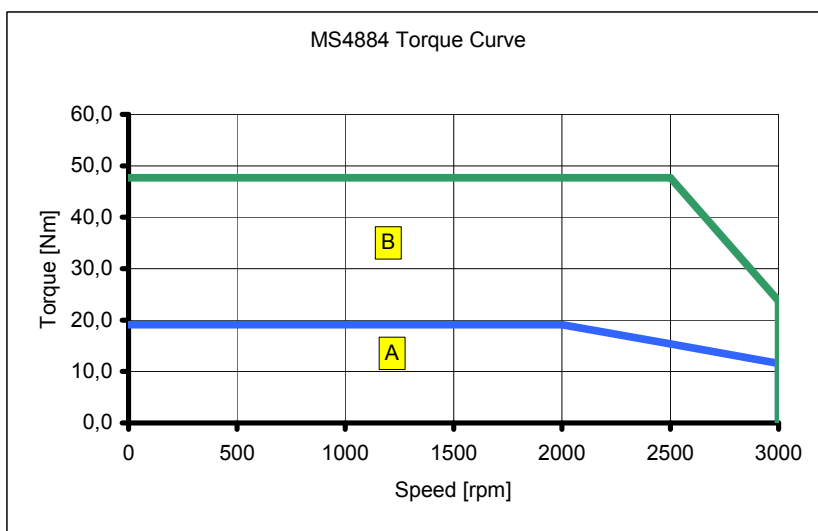
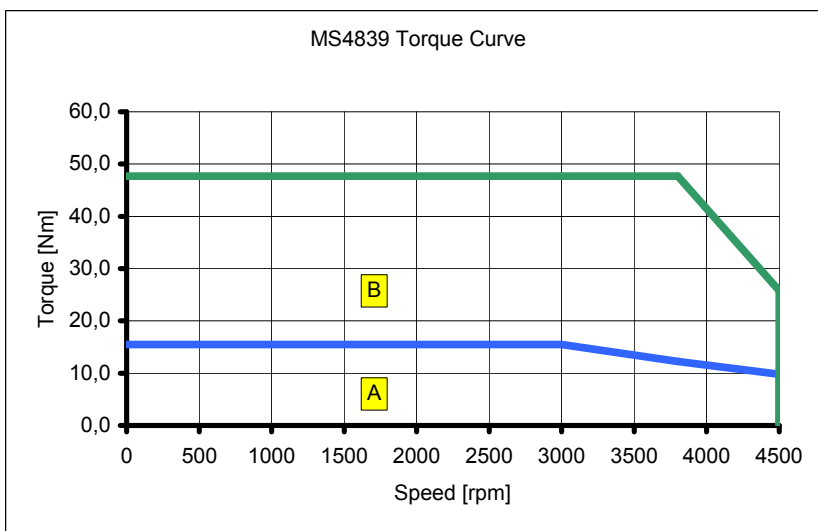
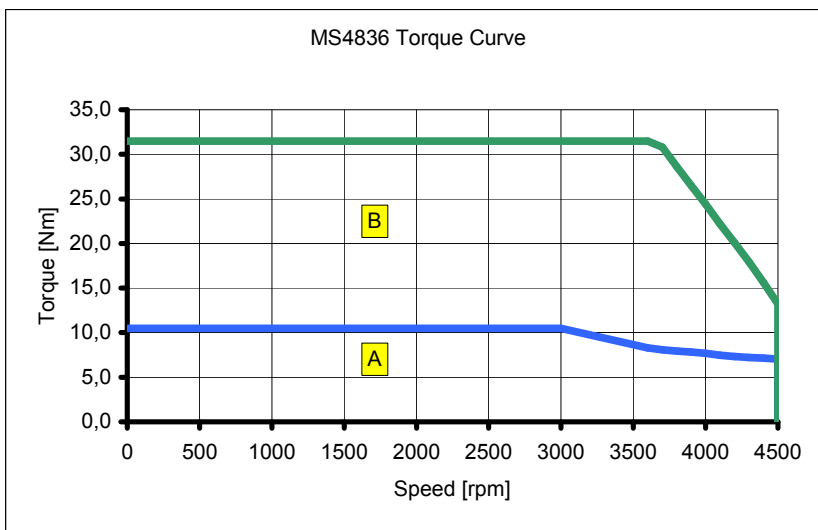
The characteristics are based on line-to-line voltage of 480 VDC (rectified from 400 VAC).

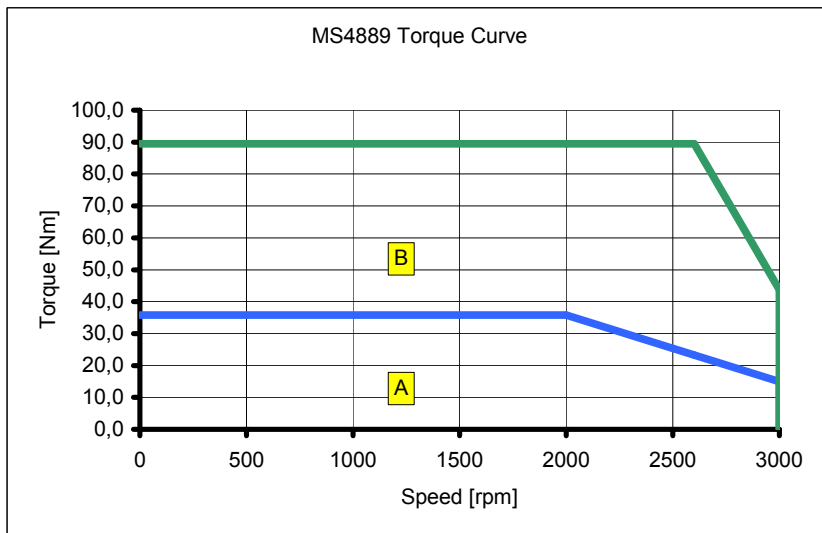
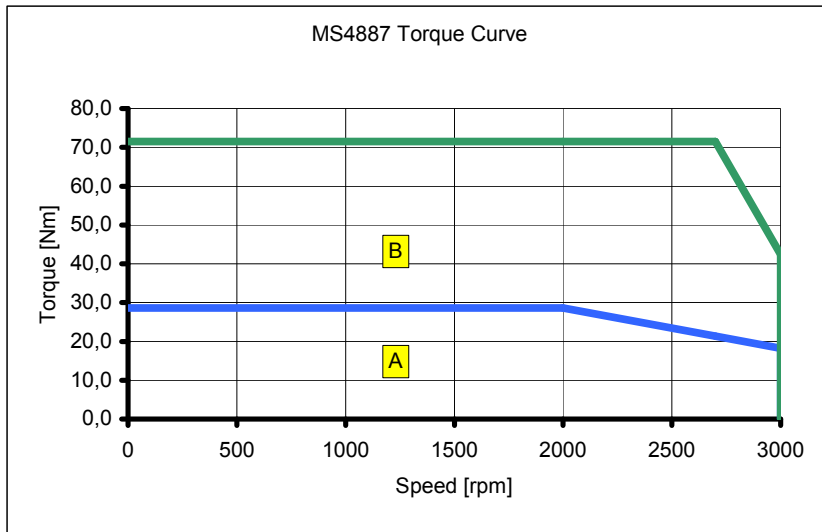
**A** Continuous operating zone

**B** Intermittent operating zone









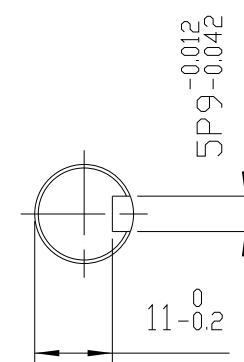
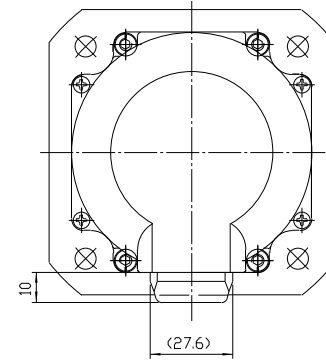
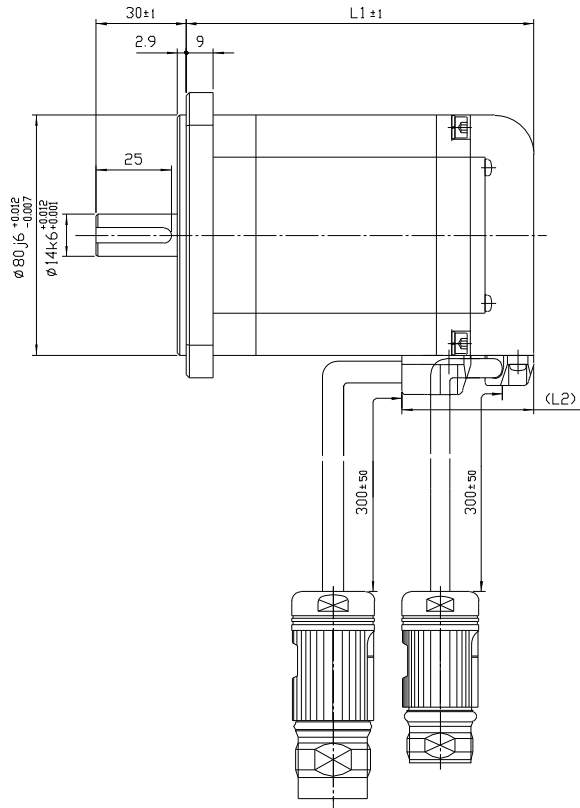
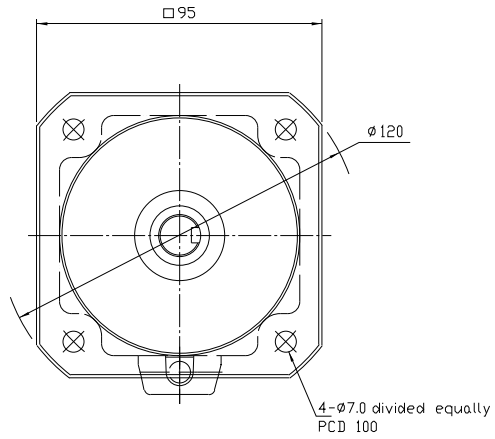


# Dimension drawings

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## What this chapter contains

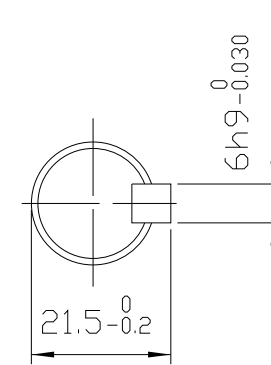
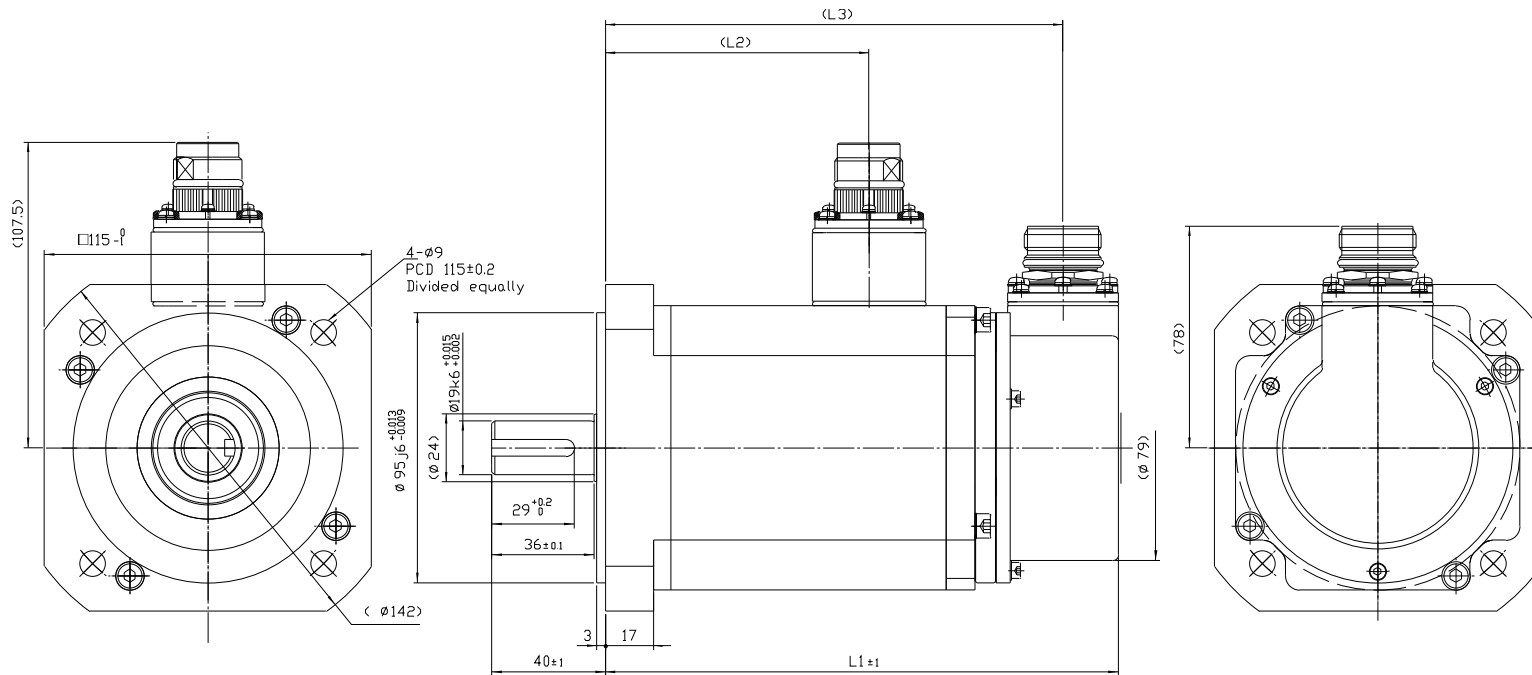
Dimension drawings of the MS-series AC servo motors are shown. The dimensions are given in millimetres.



Key size WxHxL [mm]:

Full key 5x5x25, half 5x2.5x25

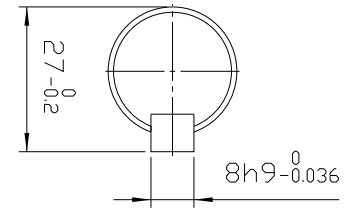
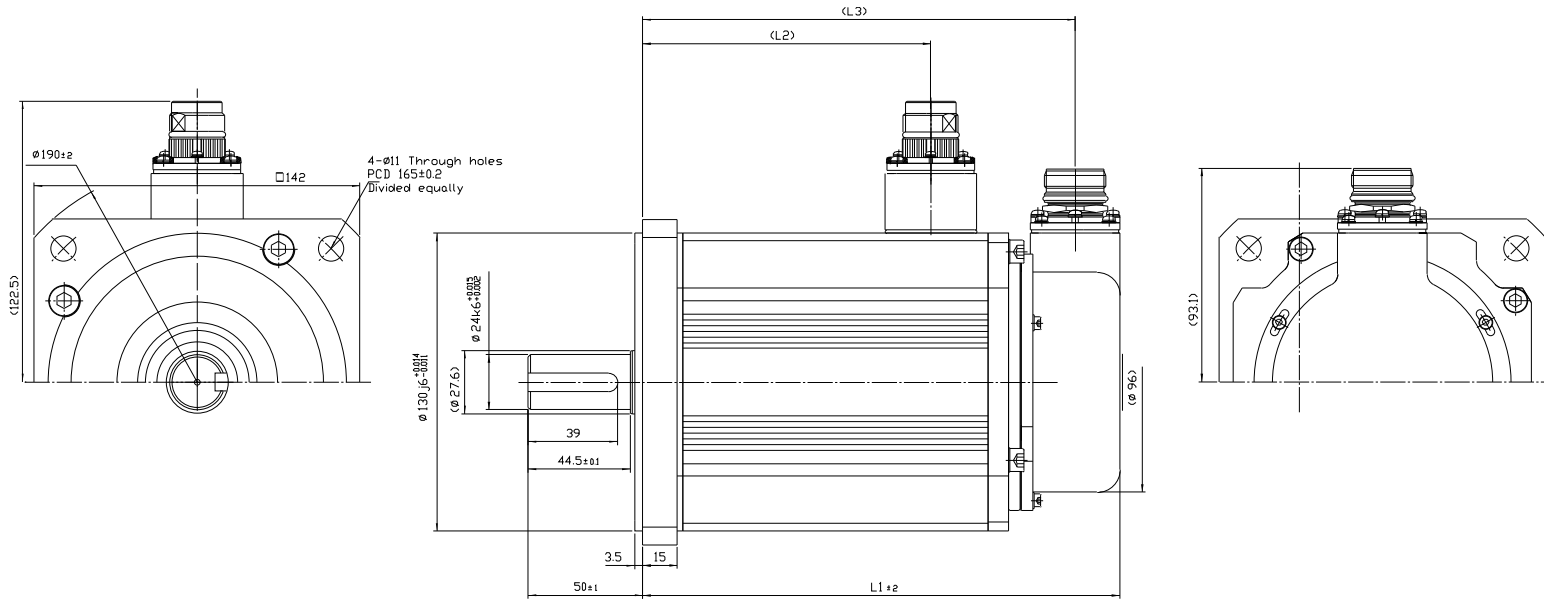
Motor size	MS4612		MS4614	
	W/O Brake	With brake	W/O Brake	With brake
L1 Motor length	90.1	121.1	115.7	152.3
L2 Cable entry position	39.2	70.2	43,8	80.4



Key size WxHxL [mm]:

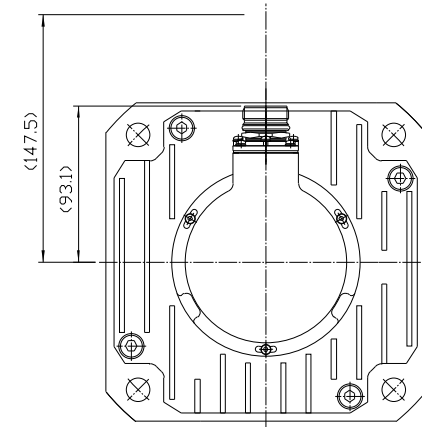
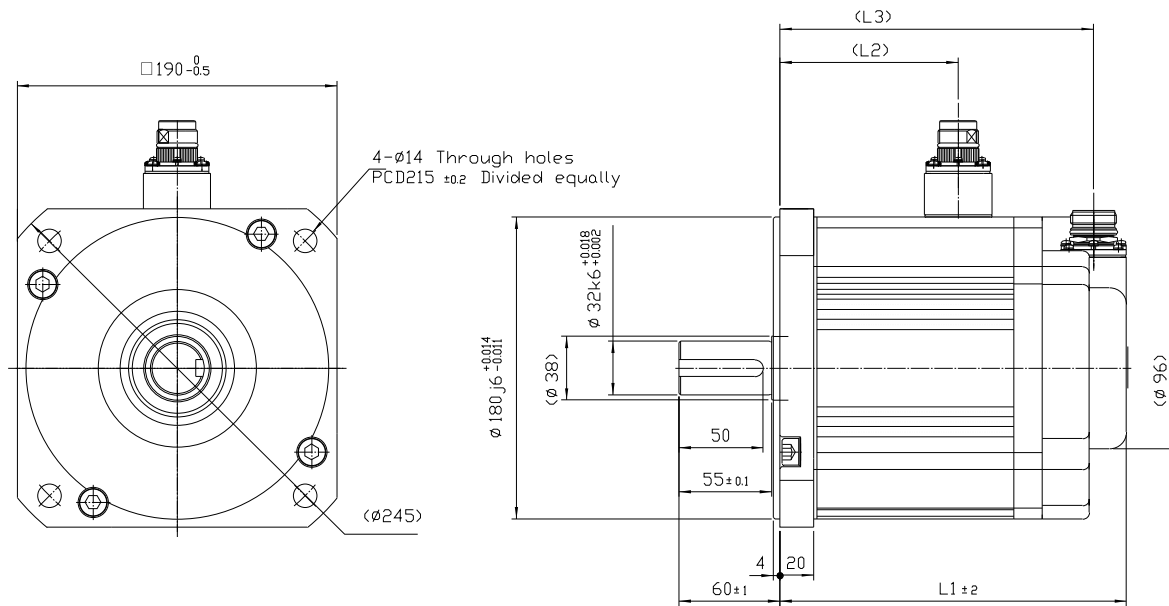
Full key 6x6x25, half 6x3x25

Motor size	MS4813		MS4815		MS4817	
	W/O Brake	With brake	W/O Brake	With brake	W/O Brake	With brake
L1 Motor length	162	194	180	212	198	230
L2 Power connector position	74.7	103.7	92.7	121.7	110.7	139.7
L3 Feedback connector position	143	171	161	189	179	207

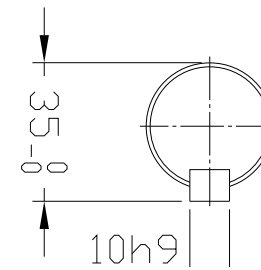


Key size WxHxL [mm]:  
Full key 8x7x35, half 8x3x35

Motor size	MS4836		MS4839	
	W/O Brake	With brake	W/O Brake	With brake
L1 Motor length	175.5	213.5	208	246
L2 Power connector position	93	127	125.5	159.5
L3 Feedback connector position	156	194	188.5	226.5



Motor size	MS4884		MS4887		MS4889	
	W/O Brake	With brake	W/O Brake	With brake	W/O Brake	With brake
Variable dimension [mm]						
L1 Motor length	182	231	206	252	230	276
L2 Power connector position	82	84	106	128	130	152
L3 Feedback connector position	162.5	211.5	186.5	232.5	210.5	265.5



Key size WxHxL [mm]:

Full key 10x8x45, half 10x4x45







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3AFE68948908 REV B EN  
EFFECTIVE: 21.11.2007