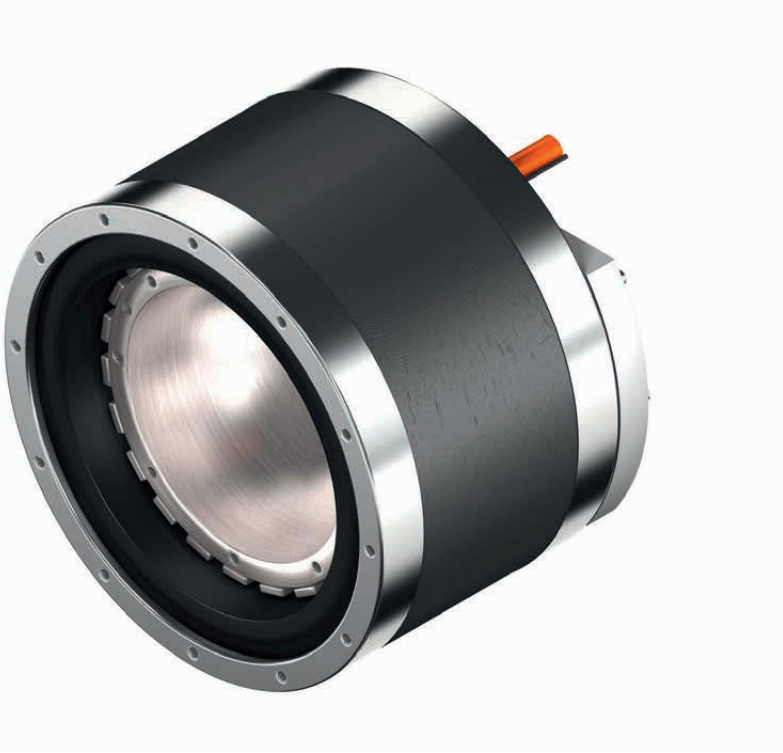
HIWIN®

Motion Control & Systems



Assembly Instructions

Torque motors TMR, TMRW

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Contents

1. General information

1.1 About these assembly instructions

1.1.1 Version management

Table 1.1 **Version management**

Version	Date	Notes
03-0	March 2017	Update and various additions: New model TMRWG, new chapter "Connecting liquid cooling", new data sheets
02-3	October 2016	Update of "Declaration of Conformity"
02-2	January 2016	Update of "Declaration of Conformity"
02-1	October 2015	Various adjustments, additions
02-0	November 2014	Various adjustments, additions
01-1	June 2014	Layout adaptation, additions
01-0	April 2014	Initial creation of common assembly instructions for TMR and TMRW

1.1.2 Requirements

We assume that

- operating personnel are trained in the safe operation practices for torque motors and torque motor components, and have read and understood these assembly instructions in full;
- maintenance personnel maintain and repair the torque motors and torque motor components in such a way that they pose no danger to people, property or the environment.

1.1.3 Availability

These assembly instructions must remain constantly available to all persons who work with or on the torque motors and their components.

1.2 Depictions used in these assembly instructions

1.2.1 Instructions

Instructions are indicated by triangular bullet points in the order in which they are to be carried out.
Results of the actions carried out are indicated by ticks.

Example:

▶ Position the torque motor over the mounting holes.
▶ Place the mounting bolts into the mounting holes and tighten in a spiral pattern to a torque of 10 Nm.

✓ Torque motor is mounted.

1.2.2 Lists

Lists are indicated by bullet points.

Example:
Torque motors and their components must not be operated:

- Outdoors
- In potentially explosive atmospheres
- ...

1.2.3 Depiction of safety notices

Safety notices are always indicated using a signal word and sometimes also a symbol for the specific risk (see chapter 1.2.4, Symbols used).
The following signal words and risk levels are used:

⚠ DANGER!
Imminent danger! Noncompliance with the safety notices will result in serious injury or death!

⚠ WARNING!
Potentially dangerous situation! Noncompliance with the safety notices runs the risk of serious injury or death!

⚠ CAUTION!
Potentially dangerous situation! Noncompliance with the safety notices runs the risk of slight to moderate injury!

ATTENTION!
Potentially dangerous situation! Noncompliance with the safety notices runs the risk of damage to property or environmental pollution!

1.2.4 Symbols used

The following symbols are used in these assembly instructions and on the components:

Table 1.2 **Warning signs**

	Warning of dangerous electrical voltage!		Warning of hot surfaces!
	Warning of magnetic fields!		Substance hazardous to the environment!
	Warning! Danger of crushing!		

Table 1.3 **Mandatory signs**

	Wear protective gloves!		Isolate before work!

1.2.5 Information

NOTE Describes general information and recommendations.

1.3 Warranty and liability

The manufacturer's "General conditions of sale and delivery" apply.

1.4 Manufacturer's details

Table 1.4 **Manufacturer's details**

Address	HIWIN GmbH Brücklesbünd 2 77654 Offenburg Germany
Phone	+49 (0) 781 932 78-0
Technical customer service	+49 (0) 781 932 78-77
Fax	+49 (0) 781 932 78-90
Technical customer service fax	+49 (0) 781 932 78-97
E-mail	info@hiwin.de
Website	www.hiwin.de

1.5 Copyright

1.6 Product monitoring

Please inform the manufacturer of:

- Accidents
- Potential sources of danger in the torque motors
- Anything in these assembly instructions which is difficult to understand

2. Basic safety notices

⚠ WARNING!

Danger from strong magnetic fields!
Strong magnetic fields around components pose a health risk to persons with implants (e.g. cardiac pacemakers) that are affected by magnetic fields.
- ▶ Persons with implants that are affected by magnetic fields should maintain a safe distance of at least 0.3 m from components.

ATTENTION!

Risk of physical damage to watches and magnetic storage media.
Strong magnetic forces can damage watches and magnetic storage media near the components.
- ▶ Do not bring watches or magnetic storage media into the vicinity (< 100 mm) of components.

2.1 Intended use

Torque motors are components of a rotary drive system for the precise positioning in terms of time and location of fixed mounted loads, e.g. system components, within an automated system.
Torque motors are designed for installation and operation in any position. The loads being moved must be solidly mounted to the rotor.
Torque motor components must not be used outdoors or in potentially explosive atmospheres.
Torque motor components may only be used for the intended purpose as described.
- Torque motors must be operated within their specified performance limits (see chapter 12).
- Proper use of the torque motors includes observing the assembly instructions and following the maintenance and repair specifications.
- Use of the torque motor components for any other purpose shall be considered improper use.
- Use only genuine spare parts from HIWIN GmbH.

2.2 Reasonably foreseeable misuse

Torque motors must not be operated:
- Outdoors
- In potentially explosive atmospheres

2.3 Conversions and modifications

Conversions or modifications to the torque motors are not permitted.

2.4 Residual risks

During normal operation, there are no residual risks associated with the torque motor components. Warnings about risks that may arise during maintenance and repair work are provided in the relevant sections.

2.5 Personnel requirements

Only authorised and competent persons may carry out work on the torque motor components. They must be familiar with the safety equipment and regulations before starting work (see Table 2.1).

Table 2.1 **Personnel requirements**

Activity	Qualification
Normal operation	Trained personnel
Cleaning	Trained personnel
Maintenance	Trained specialist personnel of the operator or manufacturer
Repairs	Trained specialist personnel of the operator or manufacturer

2.6 Protective equipment

Table 2.2 **Personal protective equipment**

Operating phase	Personal protective equipment
Normal operation	When in the vicinity of the torque motor components, the following personal protective equipment is required: ○ Safety shoes
Cleaning	When cleaning the torque motor components, the following personal protective equipment is required: ○ Safety shoes
Maintenance and repairs	When carrying out maintenance and repairs, the following personal protective equipment is required: ○ Safety shoes

2.7 Labels on torque motor components

2.7.1 Warning symbols

Table 2.3 **Warning symbols**

Pictogram	Type and source of danger	Protective measures
	Danger from strong magnetic fields!	Persons whose health may be endangered by strong magnetic fields must keep a safe distance (1 m) from the torque motor components!
 	Danger of electric shock!	Disconnect the power supply of the torque motor components before maintenance or repairs!
	Danger from hot surfaces!	Let hot surfaces cool down before touching them!

2.7.2 CE mark on type plate

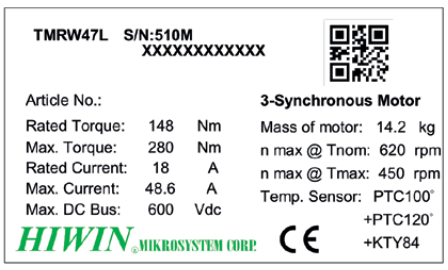


Fig. 2.1 **Type plate**

3. Description of the torque motor components

3.1 Field of application

Torque motors are components of a rotary drive system for the precise positioning in terms of time and location of fixed mounted loads, e.g. system components, within an automated system.
Torque motors are designed for installation and operation in any position. The loads being moved must be firmly attached to the rotor.
The torque motors are supplied as ready-to-install components. As supplied, the rotor and stator are secured with installation clamps.

3.2 Design of the torque motor components (example of TMRW)

Stator:
The stators of TMRW motors comprise the outer ring with cooling channels for liquid cooling and the inner ring with the laminations and the windings cast in epoxy resin.
The stators of TMR motors do not have cooling channels on the outer ring. The inner ring likewise comprises the laminations and windings cast in epoxy resin.
Rotor:
On both TMR and TMRW motors, the rotor consists of nickel-plated steel with rare-earth magnets. The rotor is mounted on the rotatable part of the customer's machine.

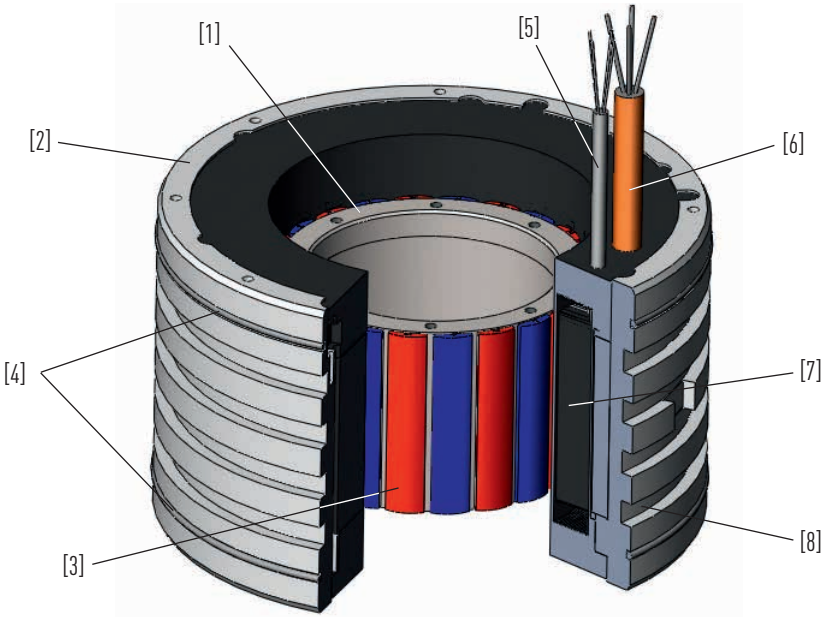


Fig. 3.1 **Design of the torque motors**

Table 3.1 **Main components of a torque motor**

Number	Description
1	Rotor
2	Stator
3	Rare-earth magnets
4	Groove for O-ring
5	Temperature sensor cable
6	Motor cable
7	Motor winding
8	Cooling channels for water cooling (TMRW)

3.3 Functional description

TMR and TMRW series torque motors are ready-to-install motor elements consisting of a stator and rotor. In terms of design, they are internal rotor motors. The rotor is in the form of a ring. Their high power density enables high acceleration rates and hence short cycle times. In electrical terms, they are three-phase servo motors with a higher number of poles. The TMRW series is equipped with cooling channels.

3.3.1 Characteristics

- Brushless motor
- Hollow shaft rotor
- Wear-free
- High power density
- Maintenance-free

3.3.2 Benefits

- High efficiency
- Extremely dynamic
- Low maintenance costs
- Compact installation dimensions
- Simple control

NOTE

When integrating a direct drive, ensure high rigidity between torque transmission and recording the control variable (usually position measurement).

NOTE

Resonances within the control circuit bandwidth degrade performance, since the motor is free from backlash.

3.3.3 TMR specifications

Table 3.2 **TMR torque motors**

Type	Outer diameter [mm]	Continuous torque [Nm]	Peak torque [Nm]	Installed in HIWIN rotary table (see "Rotary Tables" catalogue)
TMR03	110	3.5	10.5	TMS0
TMR07	110	7.0	20.9	TMS0
TMR12	150	5.6	16.9	TMS1
TMR14	150	11.3	33.8	TMS1
TMR16	150	16.9	50.6	TMS1
TMR18	150	22.5	67.5	TMS1
TMR32	193	10.0	30.0	TMS3
TMR34(L)	193	20.0	60.0	TMS3
TMR38(L)	193	40.0	120.0	TMS3
TMR3C(L)	193	60.0	180.0	TMS3
TMR74(L)	291	50.0	150.0	TMS7
TMR76(L)	291	75.0	225.0	TMS7
TMR7C(L)	291	150.0	450.0	TMS7

Drawings of the available components are provided in the appendix to these assembly instructions, or in the internet at **www.hiwin.de**.

3.3.4 TMRW specifications

Table 3.3 **TMRW torque motors (torque data with water cooling)**

Type	Outer diameter [mm]	Continuous torque [Nm]	Peak torque [Nm]
TMRW13(L)	160	18.8	35.6
TMRW15(L)	160	31.3	59.4
TMRW17(L)	160	43.8	83.1
TMRW1A(L)	160	62.5	118.8
TMRW1F(L)	160	93.8	178.1
TMRW23(L)	198	35.0	66.5
TMRW25(L)	198	59.0	112.0
TMRW27(L)	198	82.5	156.0
TMRW2A(L)	198	117.5	223.0
TMRW2F(L)	198	176.0	334.5
TMRW43(L)	230	63.5	120.0
TMRW45(L)	230	106.0	203.0
TMRW47(L)	230	148.0	280.0
TMRW4A(L)	230	205.0	390.0
TMRW4F(L)	230	307.0	583.0
TMRW73(L)	310	145.0	275.0
TMRW75(L)	310	240.0	456.0
TMRW77(L)	310	335.0	640.0
TMRW7A(L)	310	480.0	910.0
TMRW7F(L)	310	720.0	1,360.0
TMRWA3(L)	385	260.0	490.0
TMRWA5(L)	385	430.0	810.0
TMRWA7(L)	385	600.0	1,100.0
TMRWAA(L)	385	860.0	1,600.0
TMRWAF(L)	385	1,290.0	2,400.0
TMRWD3(L)	485	400.0	750.0
TMRWD5(L)	485	660.0	1,230.0
TMRWD7(L)	485	930.0	1,760.0
TMRWDA(L)	485	1,340.0	2,470.0
TMRWDF(L)	485	2,000.0	3,600.0
TMRWG3(L)	565	515.0	1,002.0
TMRWG5(L)	565	930.0	1,700.0
TMRWG7(L)	565	1,255.0	2,360.0
TMRWGA(L)	565	1,810.0	3,340.0
TMRWGF(L)	565	2,720.0	5,020.0

Drawings of the available components are provided in the appendix to these assembly instructions, or in the internet at **www.hiwin.de**.

4. Transport and installation

4.1 Delivery of TMR, TMRW

⚠ WARNING!

Risk of crushing from strong forces of attraction!
Danger of injury from crushing and damage to the rotor or stator caused by very strong forces of attraction.
- Make sure that the installation clamps are not removed until the rotor and stator are secured by a mounting!
- If the rotor is supplied separately, it is essential to be aware of the strong magnetic fields.

4.1.1 Delivery state

TMR and TMRW torque motors are usually supplied pre-assembled. To avoid damage during transit, the rotor is fixed in the stator using installation clamps (see Fig. 4.1 and Fig. 4.2).

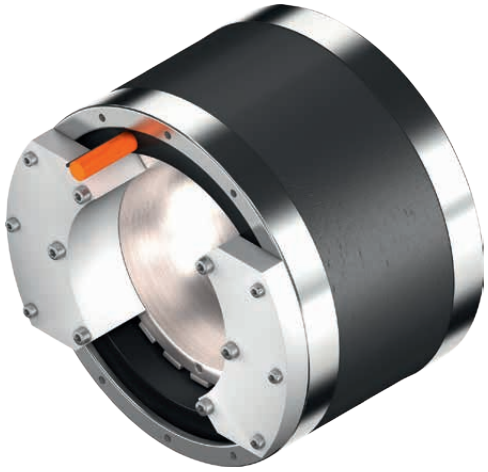


Fig. 4.1 **TMR torque motor with installation clamps**

Fig. 4.2 **TMRW torque motor with installation clamps**

4.1.2 Packaging

As supplied, the torque motor components are wrapped in film inside padded cardboard packaging.

- ▶ Do not remove the film wrapping until just before installation.

4.1.3 Scope of delivery

- Rotor, which is secured in the stator by installation clamps
- Stator with (TMRW) or without (TMR) cooling channels, plus motor and temperature sensor cables with open cable ends
- 2 O-rings (only TMRW)
- Type plate
- Safety notices

It is possible to have the rotor supplied separately.

4.2 Transport to the installation site

⚠ WARNING!

Danger from strong magnetic fields!

Strong magnetic fields generated by the components (where the rotor or rotor and stator are supplied separately) pose a health risk to persons with implants (e.g. cardiac pacemakers) that are affected by magnetic fields.

- ▶ Persons with implants that are affected by magnetic fields should maintain a safe distance of at least 0.3 m from components.

ATTENTION!

Risk of physical damage to watches and magnetic storage media.

Strong magnetic forces can damage watches and magnetic storage media near the components.

- ▶ Do not bring watches or magnetic storage media into the vicinity (< 100 mm) of components.

ATTENTION!

Damage to torque motor components!

Torque motor components may be damaged by mechanical loads.

- ▶ During transport, do not transport any additional loads on the components!
- ▶ Secure components against tilting!

There are no magnetic fields around components in their original packaging.

NOTE

- ▶ Transport torque motor components to the installation site using a suitable hoist (pay attention to weights – see appendix).
- ▶ Ensure even load distribution while lifting.

4.3 Requirements at the installation site

4.3.1 Ambient conditions

Ambient temperature	+5 °C to +40 °C
Installation site	flat, dry, vibration-free
Atmosphere	not corrosive, not explosive

4.3.2 Safety equipment to be provided by the operator

Possible safety equipment/measures:

- Personal protective equipment in accordance with UVV (German accident prevention regulations)
- Zero-contact protective equipment
- Mechanical protective equipment

4.4 Storage

⚠ WARNING!

Danger from strong magnetic fields!
Strong magnetic fields around components pose a health risk to persons with implants (e.g. cardiac pacemakers) that are affected by magnetic fields.

- Persons with implants that are affected by magnetic fields should maintain a safe distance of at least 0.3 m from components.

NOTE

There are no magnetic fields around components in their original packaging.

- Store the torque motor components in their transport packaging.
- Do not store the torque motor in explosive atmospheres or in environments exposed to chemicals.
- Only store the torque motor components in dry, frost-free areas with a corrosion-free atmosphere.
- Make sure that the motors are not subjected to vibrations or impacts while in storage.
- Clean and protect used torque motor components before storage.
- The ambient temperature for storing the motors should be between –10 and +50 °C.
- When storing the components, attach signs warning of magnetic fields.

4.5 Unpacking and installing

ATTENTION!

Damage to torque motor components!
Torque motor components may be damaged by mechanical loads.

- During transport, do not transport any additional loads on the components!
- Secure components against tilting!

NOTE

The torque motor may only be installed and operated indoors.

- Remove protective film.
- Carefully transport components to the designated installation site.
- Ensure that the maintenance points are easily accessible.
- Dispose of packaging in an environmentally friendly way.

5. Assembly and connection

⚠ DANGER!

Danger from electrical voltage!
Before and during assembly, disassembly and repair work, dangerous currents may flow.
- Work may only be carried out by a qualified electrician and with the power supply disconnected!
- Before carrying out work on the torque motor, disconnect the power supply and protect it from being switched back on!

⚠ WARNING!

Risk of crushing from strong forces of attraction!
Danger of injury from crushing and damage to the rotor or stator caused by very strong forces of attraction.
- Make sure that the installation clamps are not removed until the rotor and stator are secured by a mounting!

⚠ WARNING!

Danger from heavy loads!
Lifting heavy loads may damage your health.
- Use a hoist of an appropriate size when positioning heavy loads!
- Observe applicable occupational health and safety regulations when handling suspended loads!

The torque motor components may only be assembled by specialist personnel. NOTE

Do not use any spacers, shims or similar items when installing the torque motors. NOTE

For a closed control loop, a suitable position measuring system must be integrated. NOTE

5.1 Requirements to the adjacent construction

5.1.1 Rotor

To rule out any problems with the motor's operation resulting from the influence of the magnets, a gap of approx. 1 mm should be maintained between the connection construction and the magnets. In Table 5.1 and Table 5.2 you can also find the maximum values for the external and internal diameter of the connection construction as well as the requirements for the evenness of the assembly surface.

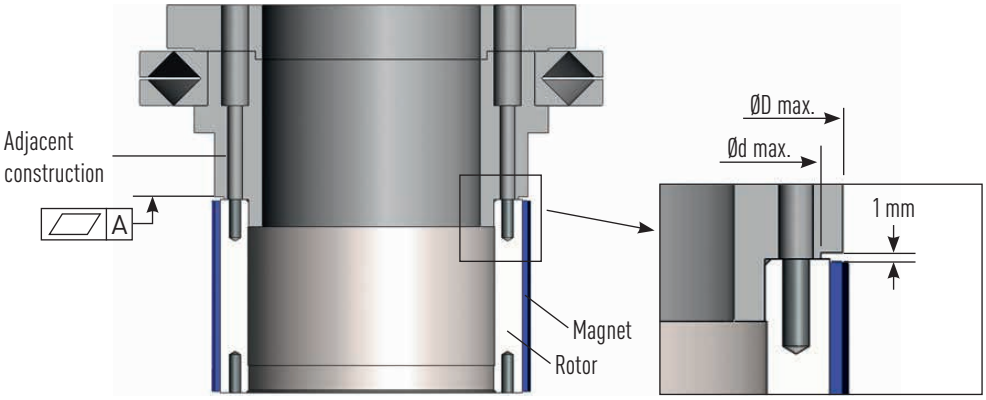


Fig. 5.1 **Rotor with connection construction**

Table 5.1 **Requirements for rotor installation – TMR**

Motor type	ØD [mm]	Ød [mm]	Evenness A [mm]	Evenness B [mm]
TMR0X	57	48.5	0.05	0.05
TMR1X	83.5	73	0.05	0.05
TMR3X	136	127	0.05	0.05
TMR7X	232	220	0.10	0.10

Table 5.2 **Requirements for rotor installation – TMRW**

Motor type	ØD [mm]	Ød [mm]	Evenness A [mm]	Evenness B [mm]
TMRW1X	84.5	76	0.05	0.05
TMRW2X	118	110	0.05	0.05
TMRW4X	168	158	0.10	0.10
TMRW7X	232	217	0.10	0.10
TMRWAX	298	284.5	0.10	0.10
TMRWDX	383	370	0.15	0.15
TMRWGX	458	447	0,15	0,15

5.1.2 Stator

The recommended value for the tolerance of the housing internal diameter (and the stator mounting holes) is H7. Please consult Table 5.1 and Table 5.2 (evenness B) for the values for the evenness of the stator mounting surface. To ensure that the O-rings do not become damaged, which could cause leaks, we recommend applying a bevel to the housing (for dimensions see Fig. 5.2).

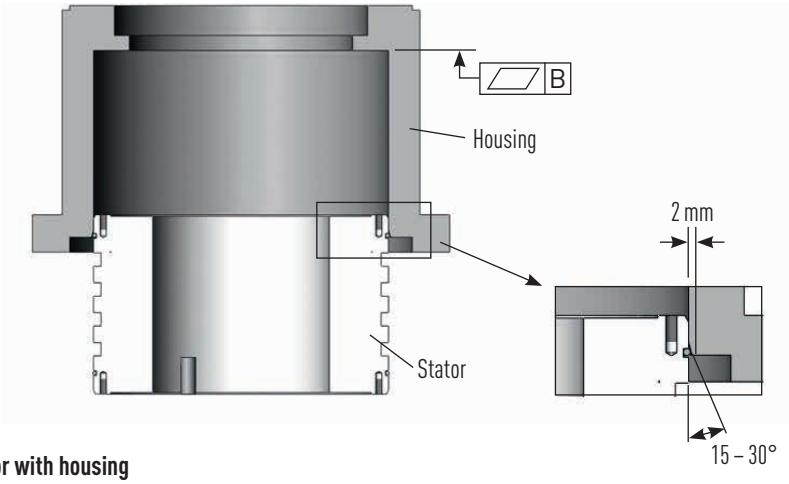


Fig. 5.2 **Stator with housing**

5.1.3 Concentricity between rotor and stator

When installing HIWIN torque motors, ensure maximum concentricity between stator and rotor. Tolerance values for axial offset lie between ± 0.1 mm (TMR models and TMRW series TMRW1X, TMRW2X, TMRW4X and TMRW7X), ± 0.2 mm (TMRW series TMRWAX and TMRWDX) and 0.25 mm (TMRWGX).

5.1.3.1 Radial forces between rotor and stator

If the concentricity tolerance values are not observed, radial forces will arise between the stator and rotor.

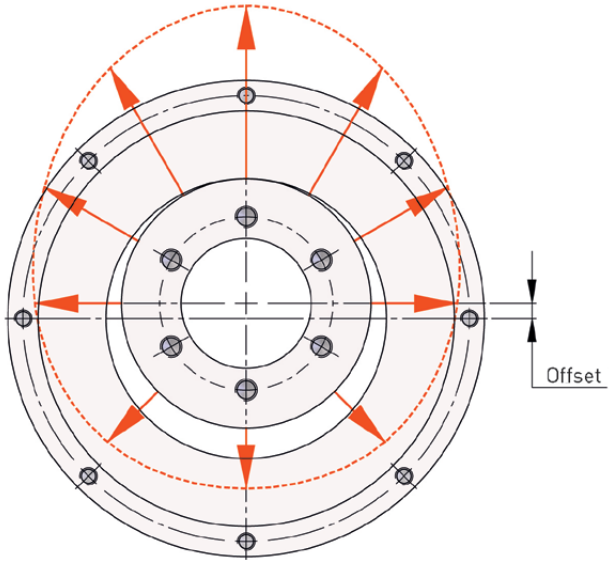


Fig. 5.3 **Diagram of the radial forces that arise if concentricity between stator and rotor is not maintained**

Table 5.3 **Overview of radial forces for a torque motor with an active length of 100 mm**

Series	Radial forces [N/100 mm]	Series	Radial forces [N/100 mm]
TMRW1X	2,273	**TMR0**	1,346
TMRW2X	3,162	**TMR1**	1,787
TMRW4X	4,650	**TMR3**	1,878
TMRW7X	6,347	**TMR7**	2,121
TMRWAX	7,651		
TMRWDX	9,106		
TMRWGX	5.158		

For torque motors with different active lengths, the radial force can be calculated using the following formula:

Force = table value × L/100

L is the active length of the laminated core. Values for the active lengths (L) of the laminated core are provided in Table 5.4:

Table 5.4 **Active lengths L for series TMR and TMRW**

Series	Active length L [mm]	Series	Active length L [mm]
TMR_2	20	**TMRW_3**	30
TMR_3	32.5	**TMRW_5**	50
TMR_4	40	**TMRW_7**	70
TMR_6	60	**TMRW_A**	100
TMR_7	65	**TMRW_F**	150
TMR_8	80		
TMR_C	120		

5.1.3.2 Axial forces between stator and rotor

When introducing the rotor into the stator, axial forces of 10 N per magnet arise between the two components. These forces arise regardless of the axial position of the rotor in the stator.

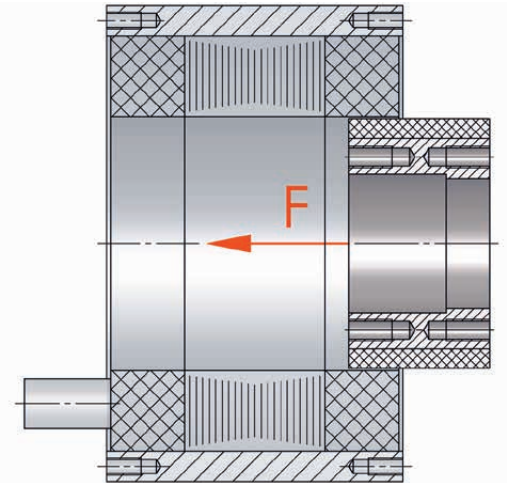


Fig. 5.4 **Diagram of the axial forces arising between stator and rotor**

5.1.4 Connection to a cooling system (TMRW)

TMRW torque motors can be operated with or without water cooling. Cooling channels for this purpose are located in the outer ring of the stator. O-rings limit the cooling channels at the outer edges and prevent the escape of coolant.

To ensure good coolant circulation, the inlets and outlets for the coolant must be located in a line with the outlet for the motor cable.

NOTE

For the recommended positions for the coolant inlets and outlets for the respective series, please see Table 5.5.

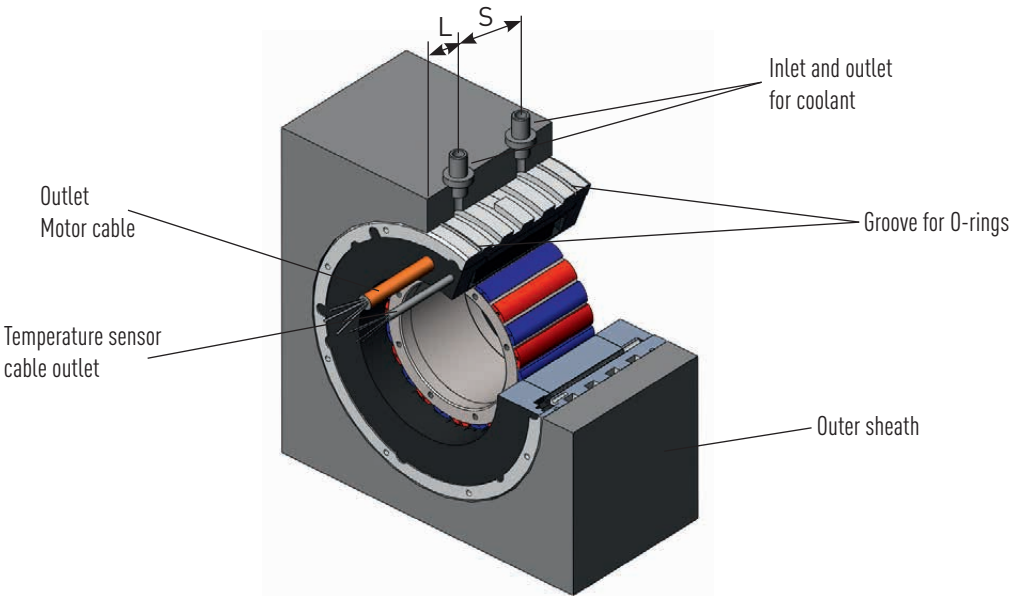


Fig. 5.5 **Diagram of the cooling system with TMRW torque motors**

Table 5.5 **Recommended positions for coolant inlets and outlets**

L [mm]	S [mm]				
	20	**40**	**60**	**90**	**140**
25	TMRW13(L) TMRW43(L)	TMRW15(L) TMRW45(L)	TMRW17(L) TMRW47(L)	TMRW1A(L) TMRW4A(L)	TMRW1F(L) TMRW4F(L)
30	TMRW23(L)	TMRW25(L)	TMRW27(L)	TMRW2A(L)	TMRW2F(L)
35	TMRW73(L) TMRWA3(L) TMRWG3(L)	TMRW75(L) TMRWA5(L) TMRWG5(L)	TMRW77(L) TMRWA7(L) TMRWG7(L)	TMRW7A(L) TMRWAA(L) TMRWGA(L)	TMRW7F(L) TMRWAF(L) TMRWGF(L)
43	TMRWD3(L)	TMRWD5(L)	TMRWD7(L)	TMRWDA(L)	TMRWDF(L)

5.1.4.1 Dimensions of the cooling channels

Fig. 5.6 shows a schematic diagram of the dimensions of the cooling channels. You can find the respective values for X, Y and the internal diameter of the coolant inlets and outlets from Table 5.6.

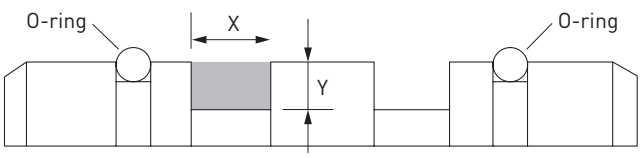


Fig. 5.6 **Dimensions of the cooling channels**

Table 5.6 **Dimensions of the cooling channels**

Motor type	X [mm]	Y [mm]	Ø[1] [mm]	Motor type	X [mm]	Y [mm]	Ø[1] [mm]
TMRW13(L)	8	5	8	**TMRWA3(L)**	8	5	8
TMRW15(L)	8	5	8	**TMRWA5(L)**	8	5	8
TMRW17(L)	9	5	8	**TMRWA7(L)**	9	5	8
TMRW1A(L)	8	5	8	**TMRWAA(L)**	8	5	8
TMRW1F(L)	9	5	8	**TMRWAF(L)**	9	5	8
TMRW23(L)	8	5	8	**TMRWD3(L)**	8	5	8
TMRW25(L)	8	5	8	**TMRWD5(L)**	8	5	8
TMRW27(L)	9	5	8	**TMRWD7(L)**	9	5	8
TMRW2A(L)	8	5	8	**TMRWDA(L)**	8	5	8
TMRW2F(L)	9	5	8	**TMRWDF(L)**	9	5	8
TMRW43(L)	8	5	8	**TMRWG3(L)**	8	5	10
TMRW45(L)	8	5	8	**TMRWG5(L)**	8	5	10
TMRW47(L)	9	5	8	**TMRWG7(L)**	9	5	10
TMRW4A(L)	8	5	8	**TMRWGA(L)**	8	5	10
TMRW4F(L)	9	5	8	**TMRWGF(L)**	9	5	10
TMRW73(L)	8	5	8				
TMRW75(L)	8	5	8				
TMRW77(L)	9	5	8				
TMRW7A(L)	8	5	8				
TMRW7F(L)	9	5	8				

[1] Internal diameter of coolant inlet and outlet

5.1.4.2 O-ring specifications for TMRW torque motors

Table 5.7 **O-rings for sealing the water cooling system with TMRW components**

Motor type	Article number	Type of O-ring	O-ring thickness [mm]	O-ring internal diameter [mm]
TMRW1X	20-000500	Viton	2.62	152
TMRW2X	20-000501	Viton	2.62	190
TMRW4X	20-000502	Viton	2.62	222
TMRW7X	20-000503	Viton	2.50	296
TMRWAX	20-000504	Viton	4.00	370
TMRWDX	20-000506	Viton	4.00	465
TMRWGX	20-000536	Viton	4.00	550

5.1.4.3 Position of coolant inlet and outlet with horizontal mounting position

Regardless of whether the motor cable points up or down, the coolant outlet should be located on top and the inlet underneath (see Fig. 5.7). **In addition, the coolant inlet and outlet must be in a line with the motor cable outlet.**

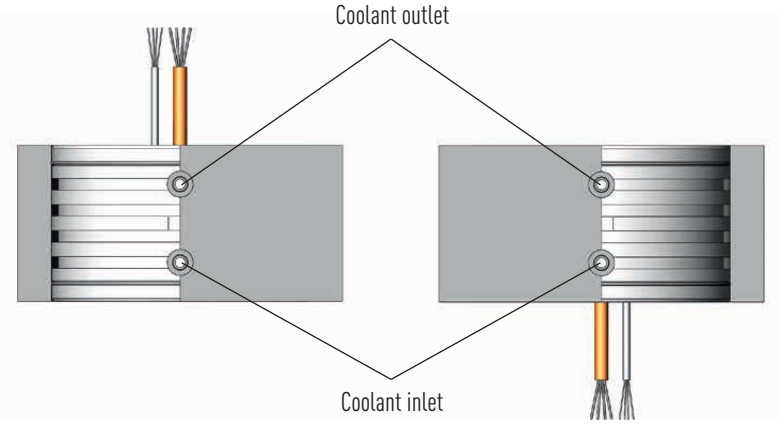


Fig. 5.7 **Coolant inlet and outlet in horizontal mounting position**

5.1.4.4 Position of coolant inlet and outlet in vertical mounting position

The orientation of the coolant inlet and outlets can be freely decided depending on the customer's requirements, **but make sure that they are located in a line with the outlet for the motor cable.**

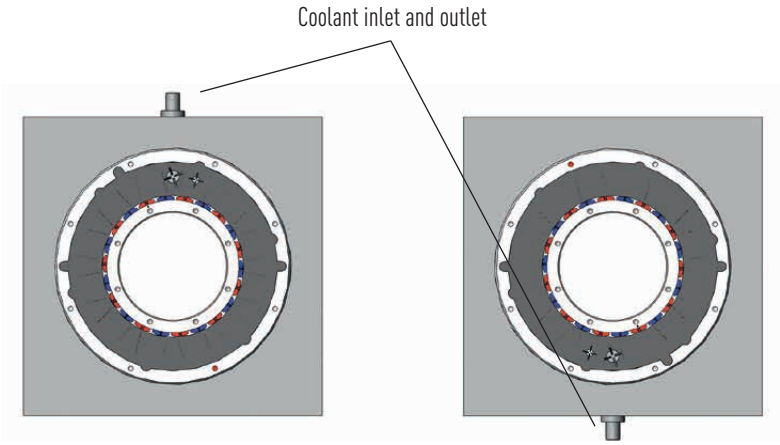


Fig. 5.8 **Coolant inlet and outlet in vertical mounting position**

5.2 Assembling the torque motor

Torque motors can be installed in two ways:

- Stator and rotor are installed together. As standard, the installation clamps are located on the motor cable outlet side. If the customer so requires, the installation clamps can be fitted on the other side instead.
- Stator and rotor are installed successively. To do this, an insertion aid is built based on the customer's mechanical data.

The procedures for both alternatives are described below, demonstrated with the example of a TMRW torque motor.

5.2.1 Installing the stator and rotor together

⚠ WARNING!

Danger from strong magnetic fields!

Strong magnetic fields around the torque motors pose a health risk to persons with implants (e.g. cardiac pacemakers) that are affected by magnetic fields.

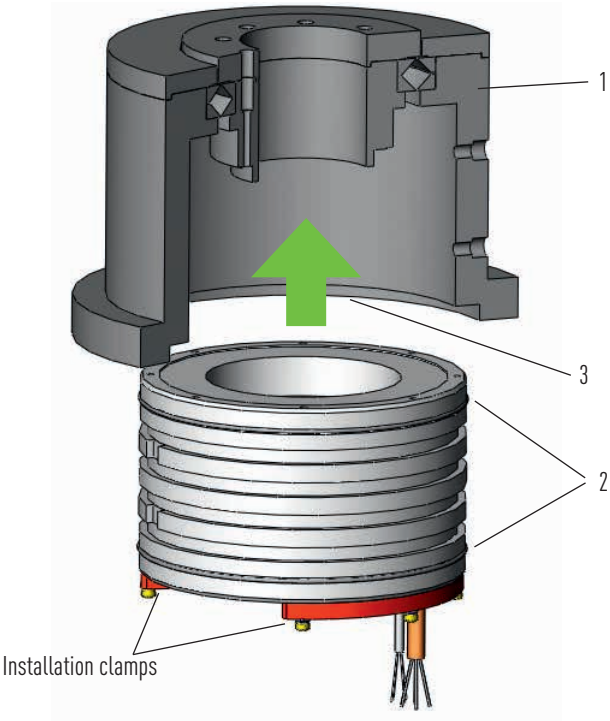
▶ Persons with implants that are affected by magnetic fields should maintain a safe distance of at least 1 m from components.

⚠ WARNING!

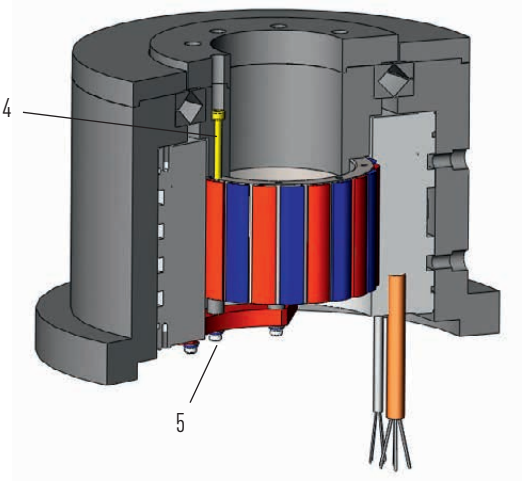
Risk of crushing from strong forces of attraction!

Danger of injury from crushing and damage to the rotor or stator caused by very strong forces of attraction.

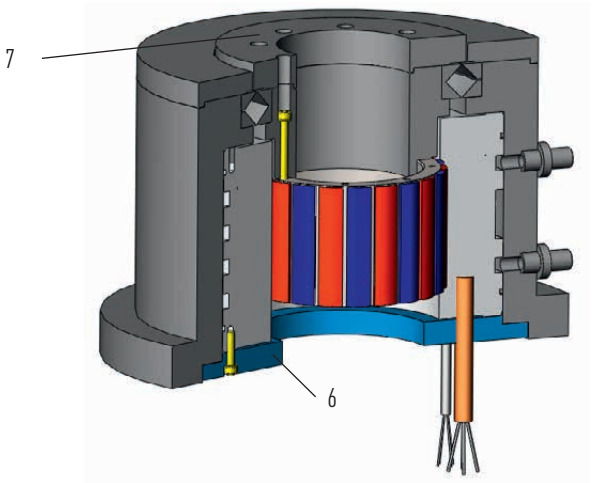
▶ Make sure that the installation clamps are not removed until the rotor and stator are secured by a mounting!



1. Fit the housing, connection construction and bearing.
2. Place the two O-rings into the respective grooves provided on the stator. Take care that the O-rings do not become twisted.
3. Place the stator (with installation clamps) into the housing. Ensure that the coolant inlets and outlets are aligned flush with the motor cable outlet. In addition, take care not to damage the O-rings, in order to prevent leaks. See also chapter 5.1.2.



4. Secure the rotor to the connection construction. Observe the tightening torques for the mounting bolts (see Table 5.8 and Table 5.9).
5. Undo the bolts on the installation clamps and remove the clamps.



6. Install the baseplate and tighten the stator's mounting bolts. Observe the tightening torques for the mounting bolts (see Table 5.8 and Table 5.9).
7. Move the rotor to check that it rotates easily and smoothly.
8. Fit the remaining parts, such as the connections to the coolant inlets and outlets, and the encoder.

5.2.2 Installing the stator and rotor separately

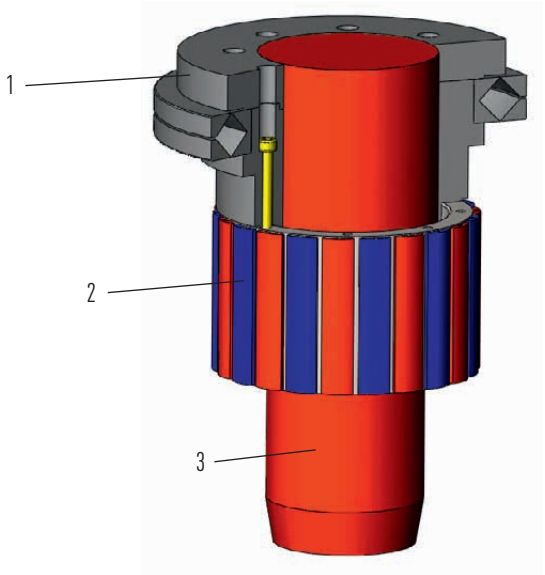
⚠ WARNING!

Danger from strong magnetic fields!
Strong magnetic fields around the torque motors pose a health risk to persons with implants (e.g. cardiac pacemakers) that are affected by magnetic fields.
- ▶ Persons with implants that are affected by magnetic fields should maintain a safe distance of at least 1 m from components.

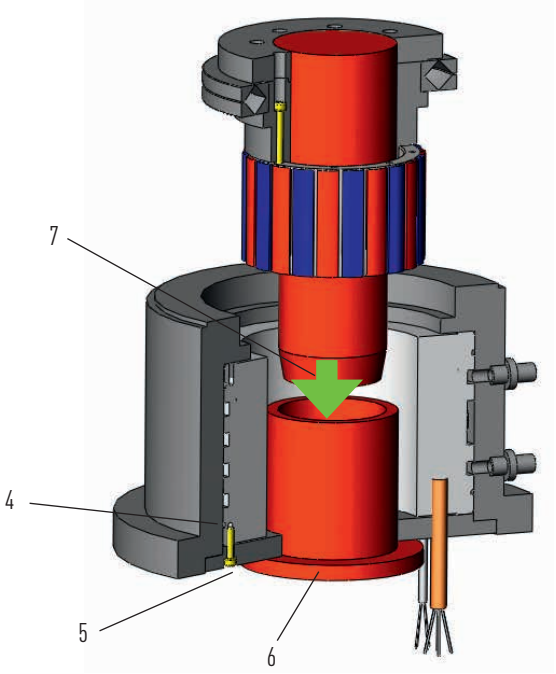
⚠ WARNING!

Risk of crushing from strong forces of attraction!
Danger of injury from crushing and damage to the rotor or stator caused by very strong forces of attraction.
- ▶ Make sure that the installation clamps are not removed until the rotor and stator are secured by a mounting!

Requirements for the insertion aid:
- The insertion aid has to absorb the magnetic forces of attraction
- The insertion aid has to absorb the overturning torque generated by the magnets. **Guidance must be ensured before the overturning torques occur,** hence the length of the guiding aid must be greater than the height of the rotor.
- The insertion aid should slide easily; the recommended fit pairing is H7/f7.



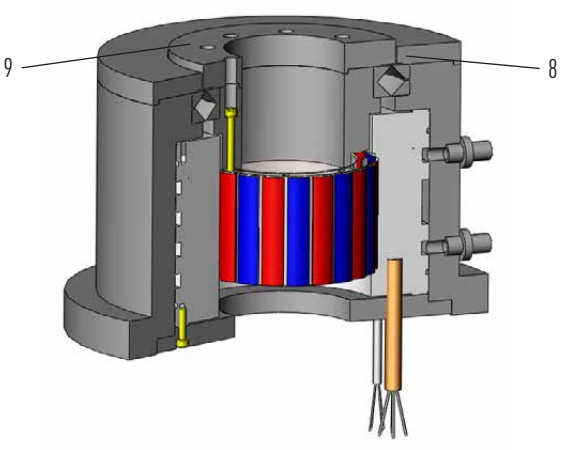
1. Fit the connection construction and bearing.
2. Install the rotor on the connection construction. Observe the tightening torques for the mounting bolts (see Table 5.8 and Table 5.9).
3. Secure the clamping fixture to the connection construction.



4. Place the two O-rings into the respective grooves provided on the stator. Take care that the O-rings do not become twisted.
5. Place the stator into the housing and tighten the mounting bolts. Observe the tightening torques for the mounting bolts (see Table 5.8 and Table 5.9). Ensure that the coolant inlets and outlets are aligned flush with the motor cable outlet. In addition, take care not to damage the O-rings, in order to prevent leaks. See also chapter 5.1.2.
6. If necessary, fit the insertion aid to the underside of the connection construction.
7. Fit the rotor to a solid base on the customer's machine.

NOTE

The rotor must be fitted with the insertion aid prior to installation, in order to prevent magnetic attraction between the rotor and stator and avoid other installation problems.



8. Fit the bearing and remove the insertion aid.
9. Move the rotor to check that it rotates easily and smoothly.
10. Fit the remaining parts, such as the connections to the coolant inlets and outlets, and the encoder.

5.2.3 Tightening torques for mounting bolts for rotor and stator

For the motor and stator, we recommend mounting bolts of strength class 12.9. Table 5.8 and Table 5.9 provide details of number and type of mounting holes and the recommended tightening torques.

Table 5.8 **Tightening torques for mounting bolts – TMRW**

Motor type	Mounting hole	Number of mounting holes	Tightening torque [Nm]
TMRW13(L) **TMRW15(L)** **TMRW17(L)** **TMRW23(L)** **TMRW25(L)** **TMRW27(L)**	M5 × 10DP	8	8
TMRW1A(L) **TMRW1F(L)** **TMRW2A(L)** **TMRW2F(L)**	M5 × 10DP	16	8
TMRW43(L) **TMRW45(L)** **TMRW73(L)** **TMRW75(L)** **TMRW77(L)**	M5 × 10DP	12	8
TMRW47(L) **TMRW4A(L)** **TMRW4F(L)** **TMRW7A(L)** **TMRW7F(L)**	M5 × 10DP	24	8
TMRWA3(L) **TMRWA5(L)** **TMRWA7(L)**	M6 × 12DP	12	12
TMRWAA(L) **TMRWAF(L)**	M6 × 12DP	24	12
TMRWD3(L) **TMRWD5(L)** **TMRWD7(L)**	M8 × 12DP	12	25
TMRWDA(L) **TMRWDF(L)** **TMRWG3(L)** **TMRWG5(L)** **TMRWG7(L)** **TMRWGA(L)** **TMRWGF(L)**	M8 × 12DP	24	25

Table 5.9 **Tightening torques for mounting bolts – TMR**

Motor-Type	Mounting hole		Number of mounting holes		Tightening torque [Nm]	
	Rotor	**Stator**	**Rotor**	**Stator**	**Rotor**	**Stator**
TMR03 **TMR07**	M5 × 10DP	M4 × 8DP	6	8	8	4
TMR12 **TMR14** **TMR16** **TMR18**	M5 × 10DP	M4 × 8DP	6	8	8	4
TMR32 **TMR34(L)** **TMR38(L)** **TMR3C(L)**	M8 × 15DP	M5 × 15DP	8	18	25	8
TMR74(L) **TMR76(L)** **TMR7C(L)**	M8 × 15DP	M5 × 15DP	8	18	25	8

5.3 Electrical connection

⚠ DANGER!

Danger from electrical voltage!
If torque motors are incorrectly earthed, there is a danger of electric shock.
- Before connecting the electrical power supply, ensure that the torque motor is correctly earthed via the PE rail in the switch cabinet!

⚠ DANGER!

Danger from electrical voltage!
Electrical currents may flow even if the motor is not moving.
- Ensure that the torque motor is disconnected from the power supply before the electrical connections are detached from the motors.
- After disconnecting the drive amplifier from the power supply, wait at least 5 minutes before touching live parts or breaking connections.
- For safety reasons, measure the voltage in the intermediate circuit and wait until it has fallen below 40 V.

5.3.1 Direction of rotation

If the motor cable is connected according to Table 5.10, the rotor will rotate in clockwise direction (view towards the rotor side without cable outlet)

Fig. 5.9 **Illustration of rotational direction of the rotor**

5.3.2 Motor and temperature sensor cable specifications

NOTE

Maximum length of the motor and temperature sensor cable: 8 m.
For longer cables, suitable filters must be fitted to prevent voltage peaks.

The standard length of the motor and temperature sensor cable is 1000 ± 50 mm for TMR (see Fig. 5.10) and 2000 ± 50 mm for TMRW (see Fig. 5.11).

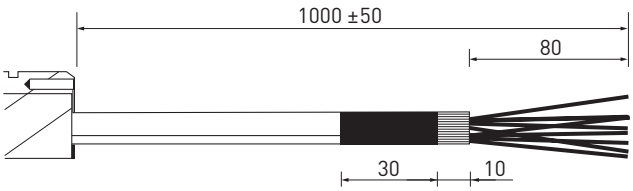


Fig. 5.10 **TMR motor and temperature sensor cable**

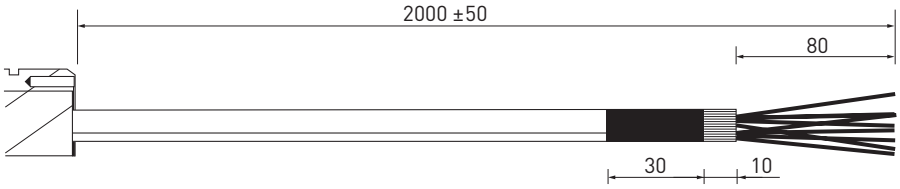


Fig. 5.11 **TMRW motor and temperature sensor cable**

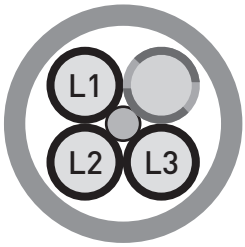
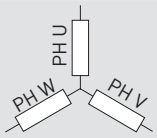


Fig. 5.12 **Cross-section of TMR and TMRW motor and temperature sensor cable**

IGUS Chainflex CF27 cables with UL and CE marking are used:

Table 5.10 **Motor cable wire format**

Colour	Number	Signal	Function	Diagram
Black-1	L1	PH U	Motor phase	
Black-2	L2	PH V	Motor phase	
Black-3	L3	PH W	Motor phase	
Green/yellow	Protective earth/ground		GND	

The cable size depends on the continuous current of the motor, and can be found from the following table.

Table 5.11 **Conductor cross-section and outer diameter of and motor – TMRW**

Conductor cross-section [mm²]	Outer diameter [mm]	Motor type
1.5	10.5	TMR0x, TMR1x, TMR3x, TMR7x TMRW13(L, TMRW15(L), TMRW17(L), TMRW1A(L), TMRW1F, TMRW23(L), TMRW25(L), TMRW27(L), TMRW2A(L), TMRW2F, TMRW43, TMRW45, TMRW47
2.5	12.5	TMRW43L, TMRW45L, TMRW47L, TMRW4A, TMRW4F, TMRW73, TMRW75, TMRW77, TMRW7A, TMRW7F, TMRWA3, TMRWA5
4.0	12.5	TMRW1FL, TMRW2FL, TMRW4AL, TMRW4FL, TMRW73L, TMRW75L, TMRW77L, TMRW7AL, TMRW7FL, TMRWA3L, TMRWA5L, TMRWA7, TMRWAA, TMRWD3, TMRWD5, TMRWD7, TMRWDA, TMRWG3, TMRWG5, TMRWG7
6.0	14.5	TMRWA7L, TMRWAAL, TMRWAF
10.0	18.0	TMRWAFL, TMRWD3L, TMRWD5L, TMRWD7L, TMRWDAL, TMRWDF, TMRWG3L, TMRWG5L, TMRWG7L, TMRWGA, TMRWGF
25.0	25.5	TMRWDFL, TMRWGAL, TMRWGFL

Table 5.12 **Temperature sensor cable**

Motor	Conductor type	Number and conductor cross section	Outer diameter [mm]
TMR	CF240	4 × 0.25 mm²	5.5
TMRW	CF240	8 × 0.14 mm²	7.5

5.3.3 Temperature sensor function and connection

5.3.3.1 Temperature monitoring

To protect the motor windings against thermal damage, every motor is equipped with a triple positive temperature coefficient (PTC) sensor, type SNM120 (in accordance with DIN 44082-M180). Since the degree of heating of the individual motor phases can be very different in direct drives, a PTC sensor is fitted in each phase winding (U, V and W). Each PTC element has a "quasi-switching" characteristic, i.e. the resistance suddenly increases close to the rated temperature (switching threshold, see Fig. 5.13). As a result of the low thermal capacity and good thermal contact with the motor winding, the PTC sensor responds very quickly to a temperature increase, thus ensuring reliable motor protection. The PTC elements located in every phase winding in HIWIN motors are wired in series; they connect via two wires.
With TMRW there is an additional temperature circuit with positive temperature coefficient (PTC), type SNM100, for redundant use or to distinguish between warning and danger temperatures.

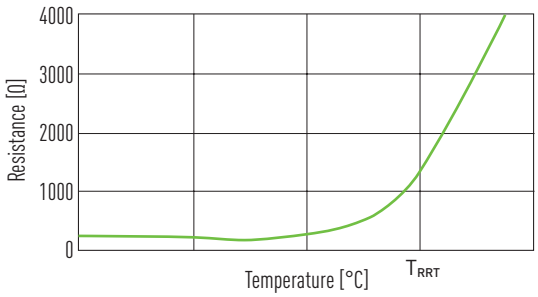


Fig. 5.13 **PTC sensors characteristic curve (T_{RRT} = rated response temperature)**

5.3.3.2 Temperature measurement

Some frequency converters have the capability of adjusting the temperature-dependent motor parameters according to the measured motor temperature. To determine the current motor temperature, it is usual to integrate a PTC thermistor into the motor.
The PTC thermistor has a nearly linear characteristic curve (see Fig. 5.14 and Fig. 5.15) and is therefore well suited to temperature measurement.
The PTC thermistor is placed between two phase windings in the motor. If an excessive temperature occurs in a phase winding that is not monitored, this cannot be displayed or evaluated immediately. Furthermore, the PTC thermistor has slow response characteristics compared to the "quasi-switching" PTC element, which are insufficient for rapid shutdown.

NOTE

It is not acceptable to evaluate the PTC thermistor for motor protection purposes.

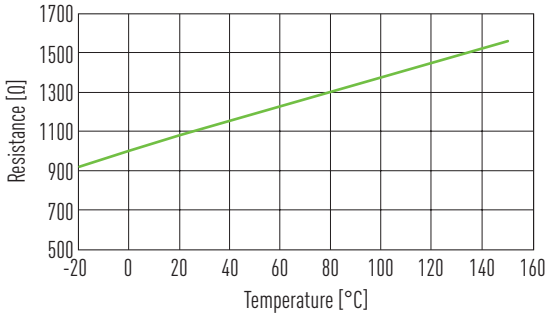


Fig. 5.14 **PT1000 sensors characteristic curve (standard)**

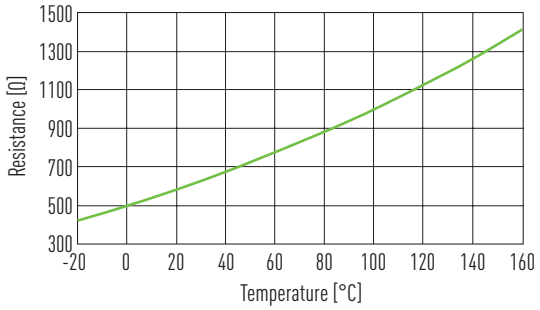


Fig. 5.15 **KTY84 sensors characteristic curve (option)**

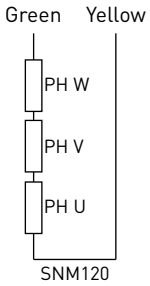


Fig. 5.16 **Temperature sensors: standard TMR**

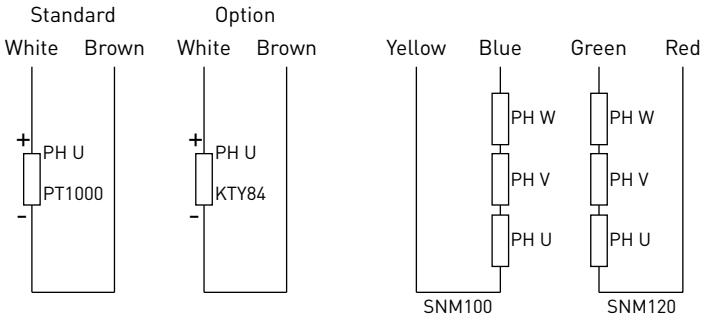


Fig. 5.17 **Type A temperature sensors: standard TMRW (PTC temperature circuits to distinguish between warning and danger temperature and PT1000)**

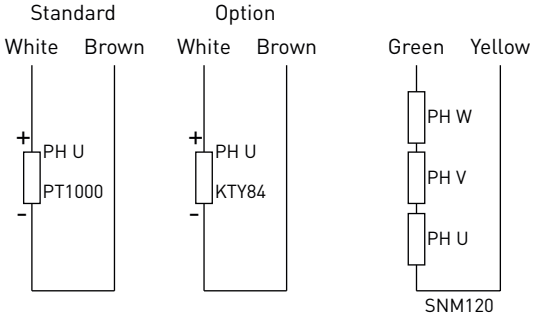


Fig. 5.18 **Type B temperature sensors: optional special version for TMR and TMRW**

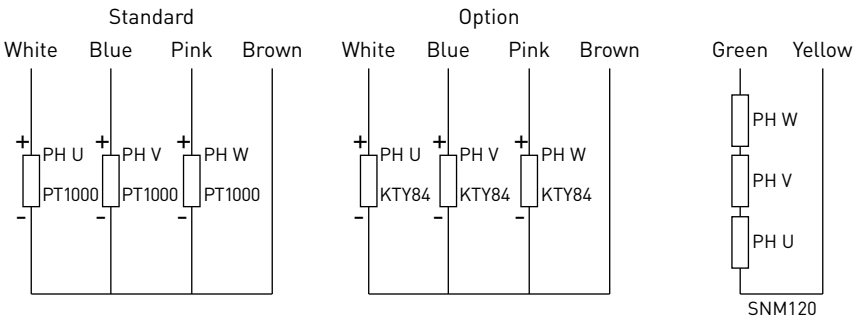


Fig. 5.19 **Type C temperature sensors: Optional special version for TMRW with three redundant PT1000 sensors**

NOTE

These PTC elements do not have a linear characteristic curve and therefore are not suitable for determining the current motor temperature.

NOTE

It is a mandatory requirement that the PTC elements are connected to protect the motor.

5.3.3.3 Connection to the drive amplifier

The temperature monitoring circuits can normally be connected directly to the drive control. If the protective separation requirements in accordance with EN 61800-5-1 are to be fulfilled, the sensors must be connected to the decoupling modules provided by the drive manufacturers.

5.3.4 Drive amplifier power supply – typical values

NOTE

Follow the installation instructions for the drive amplifier that is being used.

- The minimum cross-section of the mains connection cable depends on local requirements (see VDE 0100 Part 523, VDE 0298 Part 4), the ambient temperature and the drive amplifier's required rated current.

Table 5.13 **Typical values for the power supply**

Amplifier rated current [A]	Connected load [kVA]	Max. cable cross-section of the clamps [mm²]	Recommended fuse (gL) [A]
4.0	1.7	2.5	1 × 10
5.5	2.3	2.5	1 × 16
5.7	4.2	2.5	3 × 10
10	7.3	2.5	3 × 16
17	12.4	4.0	3 × 25

5.4 Connecting liquid cooling (TMRW linear motors)

The TMRW series can be connected to a liquid cooling system. The linear motor's continuous torque can therefore be increased without the additional input of process heat.

5.4.1 Setting up/connecting the liquid cooling system

For a detailed description of the positioning of the cooling water connections, please refer to section 5.1.4 "Connection to a cooling system (TMRW)". For detailed dimensions of the connection positions, please refer to the data sheets of the individual motors (see Appendix from Page 43).

The materials of the couplings and seals must be tested for their compatibility with the coolant and its constituents. Suitable connectors for a coolant circle are for example adaptors from the company Serto GmbH.
The recommended cooling conduit is a Jacoflon tube in a PTFE pipe with single-ply wire mesh. This can also be purchased from the company Serto GmbH.
Owing to their diffusion properties, we do not recommend the use of plastic hosing.

NOTE

**These recommendations are for outside products whose basic suitability is known to us.
Of course, equivalent products from other manufacturers may also be used. Our recommendations are intended to be an aid, not a stipulation. We never grant any warranties on the quality of outside products.**

Contact details:
SERTO GmbH
www.serto.de

5.4.2 Determination and meaning of inlet temperature

There are essentially two quantities that are important in the determination of the cooler's inlet temperature: The power density of the motor and condensation.

Power density:
The lower the cooler's inlet temperature, the larger the heat rate that can be drawn out of the motor. This raises the motor's power density.

Condensation:
The motor itself is impervious to condensation, but the latter can cause damage to the surrounding machinery, e.g. corrosion. The inlet temperature should therefore be no lower than 3 K below the ambient temperature.

NOTE

The basic rule of thumb for determining the inlet temperature is as follows:
- **As low as possible for high power densities**
- **As high as needed to prevent condensation**

5.4.3 Coolant: Type and requirements

ATTENTION!

Chemical reactions can cause damage to torque motors and machine components!
- Mixtures of monoethylene glycol and water without inhibitors must not be used.
- Examine combined materials for their compatibility.

The coolant is provided by the customer. Only water with an anticorrosive may be used as the coolant. This is important because untreated water can cause serious damage or disruption as a consequence of mineral scale, mould and algae formation, and corrosion, e.g.
- Reduced cooling efficiency
- Greater pressure losses in the cooling circuit
- Wear on elements in the cooling circuit (e.g. valves, gates, jets)

The cooling water must therefore contain an anticorrosive that reliably counteracts deposits and corrosion even under extreme conditions.
Owing to the risk of dirt and deposits, it is not recommended to use the machine's coolant/lubricant circuit. The coolant must be precleaned or filtered. Contaminated or unfiltered contaminant can clog the cooling circuit.

NOTE

Maximum particle size in the coolant used: < 100 µm

The water must fulfil the following requirements:
- Chloride concentration: c < 100 mg/l
- Sulphate concentration: c < 100 mg/l
- 6.5 ≤ ph value ≤ 9.5

The anticorrosive must fulfil the following requirements:
- (Mono)ethylene glycol basis
- The water and anticorrosive may not separate
- The anticorrosive used must be compatible with the cooler's adapters, hosing, and materials.

Check these requirements, specifically for material compatibility, with the manufacturer of the cooler or coolant!

Corrosion inhibitors include:
- Antifrogen N (made by Hoechst)

We recommend the following contact for dimensioning, design and operation of cooling systems:
BKW K-W-V GmbH
www.bkw-kuema.de

The following materials inside the motor come into contact with the coolant:
- Connections: nickel plated brass
- Viton sealing rings
- Cooling channels:
  Series TMRW1 to TMRW4: nickel plated aluminium; from series TMRW7: nickel plated steel
- Outer casing: nickel plated steel or carbon fibre (if ordered from HIWIN)

5.4.4 Dimensioning the cooler

The cooler's dimensions depend on the pressure drop and the motor power loss drawn into the cooling circuit. The calculations below take as their example an TMRW4A motor with water cooling.

The motor power loss can be calculated with the following formula.

$$P = \left(\frac{T}{K_m}\right)^2$$

P	Motor power loss [W]
T	Motor continuous torque [N]
K_m	Motor constant [N/√W]

The motor constant can be taken from the motor's data sheet. The continuous torque is the mean continuous torque in the actual application.

Figures from the data sheet:

Motor constant:	K_m	5,95 N/√W
Motor pressure drop:	Δp_m	1 bar

The example calculation uses the motor's continuous torque T_c = 91 Nm. The maximum value that can be used for T is T_{c_WC}

Coolant (water) properties:

Density	ρ	0.998 kg/dm³
Specific heat capacity	c	4.1813 kJ/kg K
Dyn. Viscosity at 20 °C	η	1.00 mPa s

$$P = \left(\frac{91\,Nm}{5.95\,Nm} \times \sqrt{W} \right)^2 = 233.91\,W$$

The resulting motor power loss is 233.91 W, which must be drawn off in the coolant.

Calculating the pressure drop first involves determining the volumetric flow rate used for cooling. This analyses the coolant's temperature changes at various volumetric flow rates.

$$\Delta\vartheta = \frac{P \times 60}{Q \times \rho \times c}$$

$\Delta\vartheta$	Change in coolant temperature [K]
P	Motor power loss [kW]
Q	Volumetric flow rate [l/min]
ρ	Coolant density [kg/dm³]
c	Specific heat capacity [kJ/kg K]

Table 5.14 **Change in coolant temperature as a function of volumetric flow rate**

Volumetric flow rate Q [l/min]	0.5	1	2	3	4	5	6	7	8	9	10
Change in coolant temperature $\Delta\vartheta$ [K]	6.73	3.36	1.68	1.12	0.84	0.67	0.56	0.48	0.42	0.37	0.34

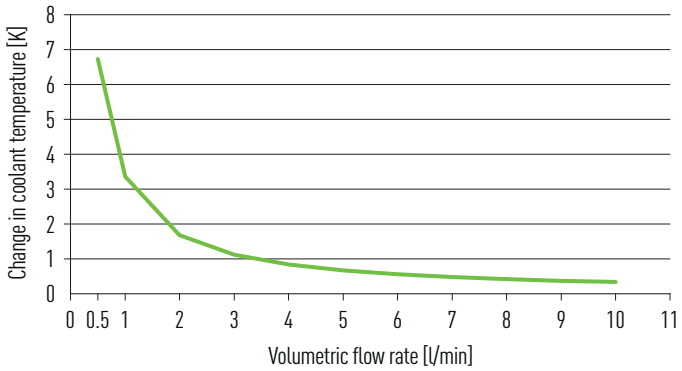


Fig. 5.20 **Change in coolant temperature (water) in kelvins under continuous current during TMRW4A motor downtime**

The graph shows that at low volumetric flow rates there are large temperature changes between the supply and return. Make sure that the temperature change is no greater than 5 K, otherwise disruptive temperature differences may occur on the motor's surface. A flow of 1 l/min would be adequate in the example shown.

Now the pressure drop can be calculated in the connecting cable. The decisive criteria here are the cable length and its internal diameter.

$$\Delta p_L = \frac{128 \times \eta \times L \times Q}{6{,}000{,}000 \times \pi \times d^4}$$

Δp_L	Pressure drop [bar]
η	Dyn. viscosity [mPa s]
L	Cable length [mm]
Q	Volumetric flow rate [ml/min]
d	Internal cable diameter [mm]

The following table lists the calculated pressure drops for a volumetric flow rate of 1 l/min (water) through various cable lengths and diameters.

Table 5.15 **Pressure drop in the cooling conduit as a function of diameter and cable length**

Cable length [mm]	Pressure drop 1/8" [bar]	Pressure drop 1/4" [bar]	Pressure drop 1/2" [bar]
1,000	0.07	0.004	0.0003
2,000	0.13	0.01	0.001
3,000	0.20	0.01	0.001
4,000	0.27	0.02	0.001
5,000	0.33	0.02	0.001
6,000	0.40	0.03	0.002
7,000	0.47	0.03	0.002
8,000	0.53	0.03	0.002
9,000	0.60	0.04	0.002
10,000	0.67	0.04	0.003
12,000	0.80	0.05	0.003
14,000	0.94	0.06	0.004
16,000	1.07	0.07	0.004
18,000	1.20	0.08	0.005
20,000	1.34	0.08	0.005

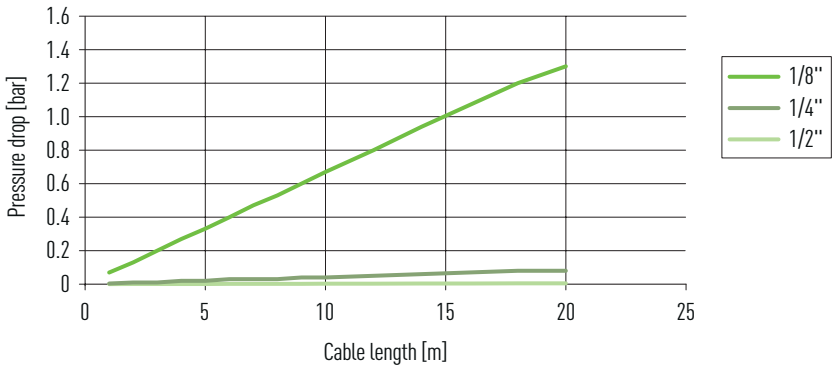


Fig. 5.21 **Pressure drop in the cooling conduit as a function of diameter and cable length**

The pressure drop increases sharply in a 1/8" hose. A hose of at least 1/4" is therefore recommended. The pressure loss over the whole system is obtained when the separate pressure drops are now added.

$$\Delta p = \Delta p_m + \Delta p_L$$

Δp Total pressure drop [bar]
Δp_L Pressure drop over the cable [bar]
Δp_m Pressure drop across the motor [bar]

$$\Delta p = 1\,bar + 0.01\,bar = 1.01\,bar$$

This motor requires a water cooler delivering about 240 W and 1 l/min under about 1.1 bar through a 3 m long 1/4" hose.

6. Commissioning

6.1 Switching on the torque motor

⚠ CAUTION!

Risk of burns!
The motor heats up during operation and thus touching the motor can lead to burns!
- Provide protective devices and warning notices at the motor!

ATTENTION!

Danger of material damage!
Danger of material damage through uncontrolled movements of the rotor in the case of a power cut!
- Make sure that suitable end stops are fitted at the end positions or that the parking brake (optional) is engaged!

NOTE

The operator should provide a controller pursuant to DIN EN ISO 12100 that prevents the machine from being started up unintentionally after power is restored, troubleshooting or the machine is stopped.

- Switch off the controller.
- Detach the motor cable.
- If applicable, connect the cable for the position measuring system.
- Switch on the controller.
- If applicable, check the position measuring system (see separate assembly instructions for the drive amplifier and position measuring system).
- Switch off the controller.
- Connect motor cable (see chapter 5.3).
- Switch on the controller.
- Perform test run at slow speed.
- Perform test under usage conditions.

✓ Torque motor is ready for operation.

6.2 Programming

NOTE

The programming of the torque motor depends on the controller and drive amplifier used.
Observe the assembly instructions for the controller and drive amplifier!

7. Maintenance and cleaning

⚠ WARNING!

Unauthorised repairs on the system

Unauthorised work on the system creates the risk of injuries and may invalidate the warranty.

- The system must only be serviced by specialist personnel!

NOTE

Use only suitable, non-hazardous agents. Please observe the manufacturer's safety data sheets.

During maintenance:

- Secure the torque motor against being switched back on without authorisation.
- Disconnect the power supply of the torque motor.
- Secure the torque motor against being switched back on without authorisation.

NOTE

Ensure that permissible ambient conditions, voltage and current loads are observed!

- Direct drive components are maintenance-free because they work on a non-contact basis.

7.1 Cleaning

⚠ CAUTION!

Aggressive media

Using aggressive media for cleaning creates the risk of injury and of damaging the torque motor components.

- Use only suitable, non-hazardous agents.
- Check the safety data sheets!

Dirt can settle and accumulate over time on the torque motor components. The torque motor components must therefore be regularly checked for dirt and cleaned if necessary, e.g. using a 70% alcohol solution.

8. Faults

8.1 Faults with the motor

Table 8.1 **Fault table**

Fault	Possible cause	Remedy
Motor does not start	Supply lines disconnected	Check connections, plug contacts may be compressed, repair if necessary. The connectors have seals, which means that a certain screw connection resistance must be overcome.
	Fuse has tripped via motor protection	Check motor protection for the right settings, remedy defects if necessary
Motor turns in the wrong direction	Encoder setting wrong	Check settings
	Input phase fault	Change over two phases on the motor
Smell of burning	Controller setup parameters are incorrect	1. Check controller settings 2. Check cooling system
	Cooling system not working properly	
	Controller setting does not match the motor parameters	
Communication fault	Motor phase connected incorrectly	Check drive amplifier, check nominal value
Motor hums and has a high current consumption	Rotor is jammed	Check motor
	Brake jammed	Check air pressure and power supply
	Fault in encoder cable	Check encoder cable
	Problem with motor insulation	Check resistance values > 50 MΩ (phase/earth and phase/sensor)
Motor heats up too much (measure temperature)	Controller setting incorrect	Check controller settings
	Overload	Carry out power measurement, if necessary use a larger motor or reduce load
	Cooling insufficient	Rectify cooling air supply or open cooling air passages, retrofit external fan if necessary
	Ambient temperature too high	Observe permissible temperature range
	Rated duty cycle exceeded, e.g. duty cycle too long	Adjust motor's rated duty cycle to the necessary operating conditions
	Damaged bearings	Check bearings
Abnormal friction noise or friction torque too high	Motor alignment problem	Check installation
	Dirt in air gap	Remove dirt

8.2 Faults during operation with drive amplifier

The faults described in chapter 8.1 "Faults with the motor" can also occur while operating the motor with a drive amplifier. For interpretation of faults and information on how to remedy them, see the drive amplifier manufacturer's installation instructions.

9. Disposal

ATTENTION!

Danger caused by environmentally hazardous substances!
The danger to the environment depends on the type of substance used.
- Clean contaminated parts thoroughly before disposal!
- Clarify the requirements for safe disposal with disposal companies and, where appropriate, with the competent authorities!

Table 9.1 **Disposal**

Fluids	
Lubricants	Dispose of as hazardous waste in an environmentally friendly way
Soiled cleaning cloths	Dispose of as hazardous waste in an environmentally friendly way
Torque motor	
Cabling, electrical components	Dispose of as electrical waste
Polypropylene (PP) components	Dispose of separately
Aluminium components (housing)	Dispose of separately
Iron components	Dispose of separately
Copper components	Dispose of separately
Brass, nickel-plated components (plug connector materials)	Dispose of separately
Nitrile butadiene rubber (NBR) components (seals)	Dispose of separately
Stainless steel components (bolts)	Dispose of separately

10. Appendix 1: Type plate

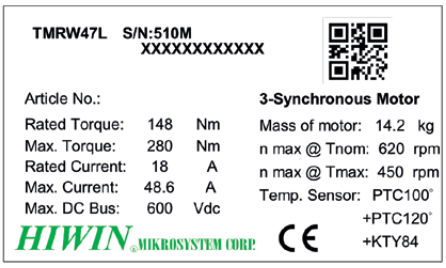
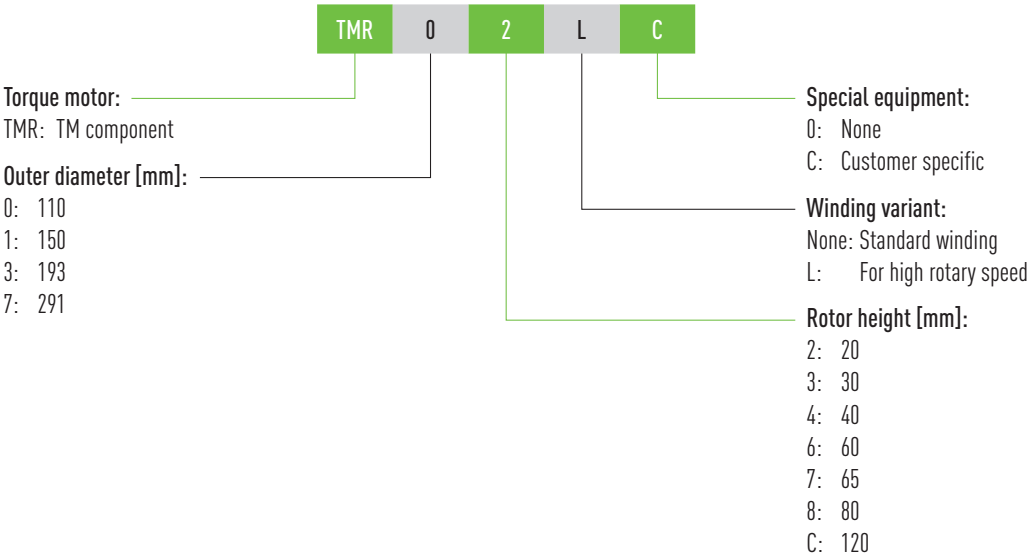


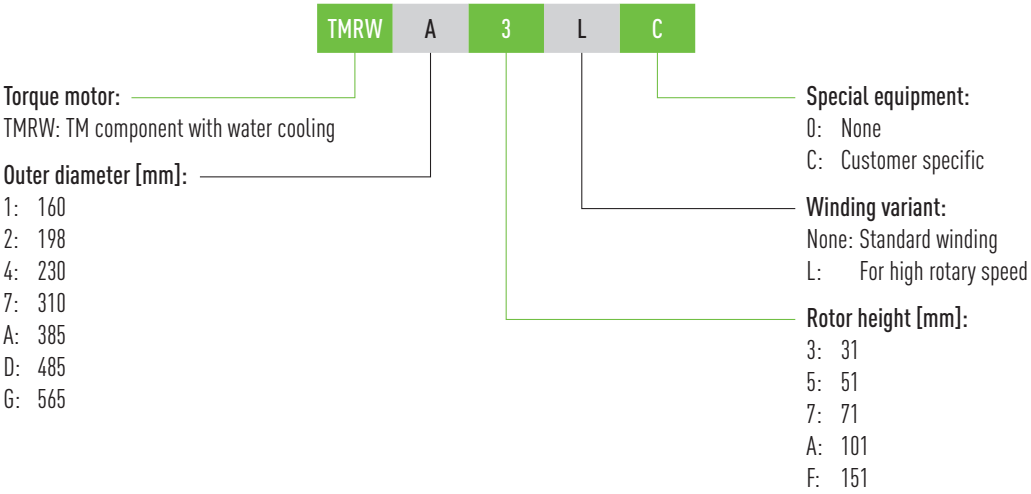
Fig. 10.1 **Type plate**

11. Appendix 2: Order codes

11.1 Order code TMR



11.2 Order code TMRW



12. Appendix 3: Data sheets

12.1 Data sheets for TMR

TMR03 Torque Motor

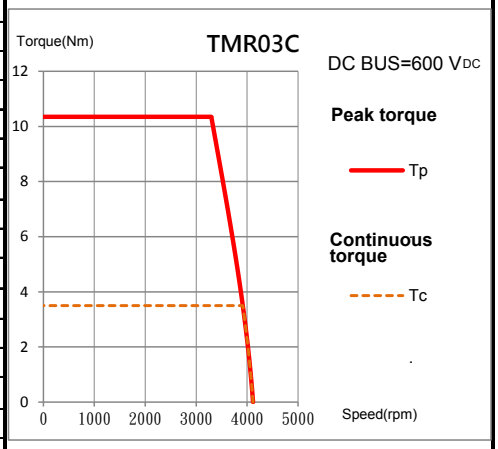
Electrical specifications

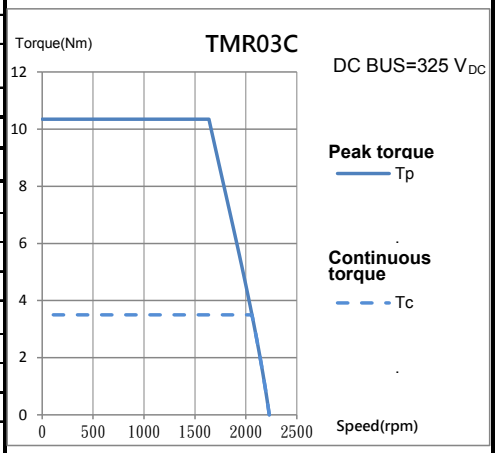
Winding code : FA	Symbol	Unit	
Continuous torque	T_c	Nm	3.5
Continuous current	I_c	A_{rms}	2.3
Stall torque	T_s	Nm	2.5
Stall current	I_s	A_{rms}	1.6
Peak torque(for 1sec.)	T_p	Nm	10.5
Peak current(for 1sec.)	I_p	A_{rms}	6.8
Torque constant	K_t	Nm/Arms	1.55
Electrical time constant	T_e	ms	2.1
Resistance (line to line at 25℃)	R_{25}	Ω	7.1
Inductance (line to line)	L	mH	15.2
Number of poles	2p		10
Back emf constant (line to line)	K_v	Vrms/rad/s	0.82
Motor constant (at 25℃)	K_m	Nm/√W	0.5
Thermal resistance	R_{th}	K/W	1.76
Thermal sensor			PTC SNM120
Max. DC BUS		V_{DC}	600
Thermal time constant	T_{th}	s	1930
Max. continuous power dissipation	P_c	W	76

Mechanical specifications

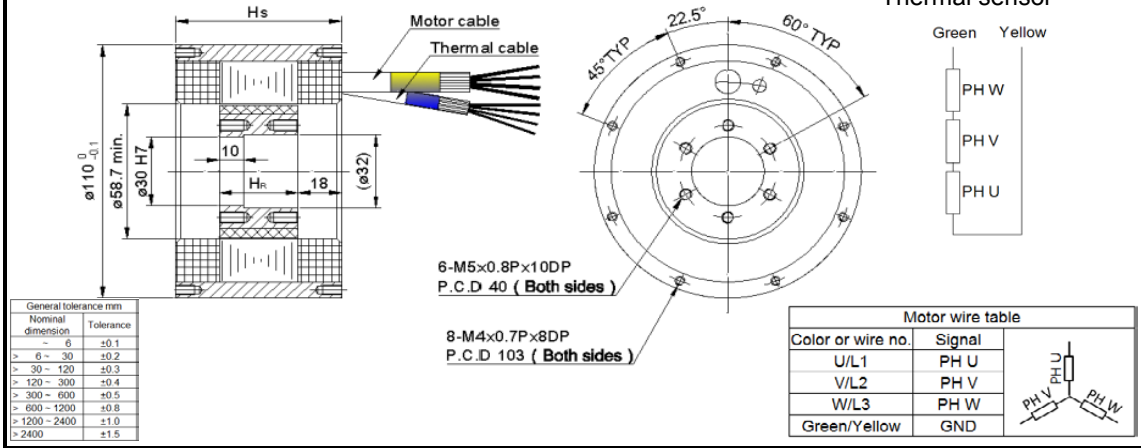
	Symbol	Unit	
Mass of motor	M_m	kg	2.6
Inertia of rotor	J	kgm^2	0.00018
Height of stator	H_S	mm	68.5
Height of rotor	H	mm	32.5

T-N curve





Thermal sensor



General tolerance mm	
Nominal dimension	Tolerance
~ 6	±0.1
> 6 ~ 30	±0.2
> 30 ~ 120	±0.3
> 120 ~ 300	±0.4
> 300 ~ 600	±0.5
> 600 ~ 1200	±0.8
> 1200 ~ 2400	±1.0
> 2400	±1.5

Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13
Date: 2017/1/16

Fig. 12.1 **Data sheet TMR03**

TMR07 Torque Motor

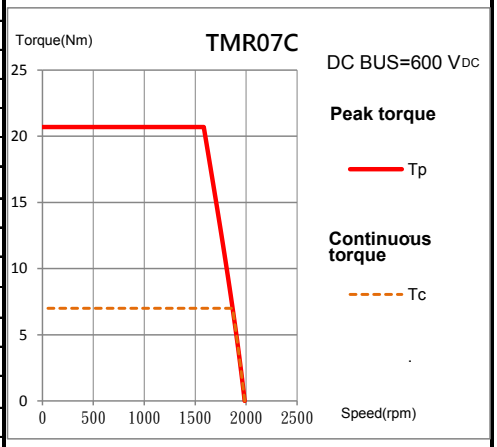
Electrical specifications

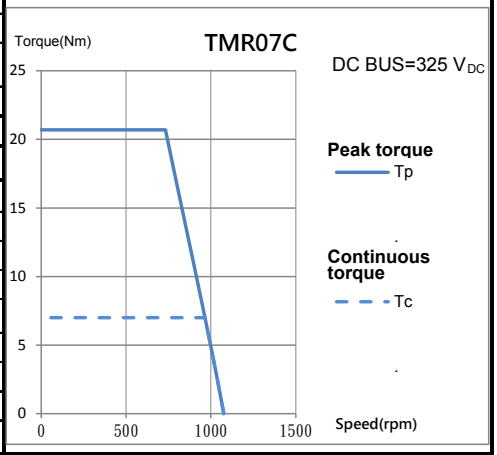
Winding code : FA	Symbol	Unit	
Continuous torque	T_c	Nm	7
Continuous current	I_c	A_{rms}	2.3
Stall torque	T_s	Nm	4.9
Stall current	I_s	A_{rms}	1.6
Peak torque(for 1sec.)	T_p	Nm	20.9
Peak current(for 1sec.)	I_p	A_{rms}	6.8
Torque constant	K_t	Nm/Arms	3.1
Electrical time constant	T_e	ms	2
Resistance (line to line at 25℃)	R_{25}	Ω	11.1
Inductance (line to line)	L	mH	22.2
Number of poles	2p		10
Back emf constant (line to line)	K_v	Vrms/rad/s	1.7
Motor constant (at 25℃)	K_m	Nm/√W	0.8
Thermal resistance	R_{th}	K/W	1.13
Thermal sensor			PTC SNM120
Max. DC BUS		V_{DC}	600
Thermal time constant	T_{th}	s	1980
Max. continuous power dissipation	P_c	W	120

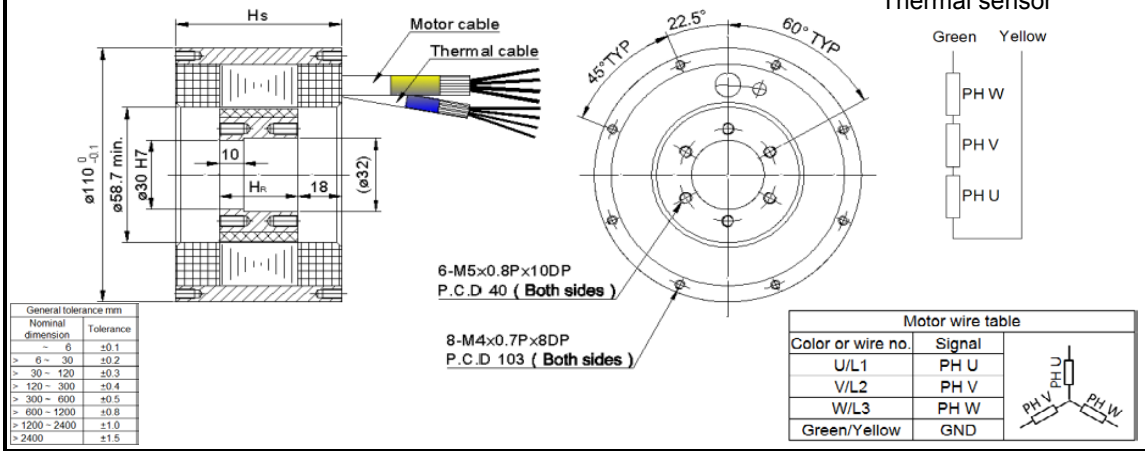
Mechanical specifications

	Symbol	Unit	
Mass of motor	M_m	kg	4.3
Inertia of rotor	J	kgm^2	0.00036
Height of stator	H_S	mm	101
Height of rotor	H	mm	65

T-N curve







General tolerance mm	
Nominal dimension	Tolerance
~ 6	±0.1
> 6 ~ 30	±0.2
> 30 ~ 120	±0.3
> 120 ~ 300	±0.4
> 300 ~ 600	±0.5
> 600 ~ 1200	±0.8
> 1200 ~ 2400	±1.0
> 2400	±1.5

Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13
Date: 2017/1/16

Fig. 12.2 **Data sheet TMR07**

TMR12 Torque Motor

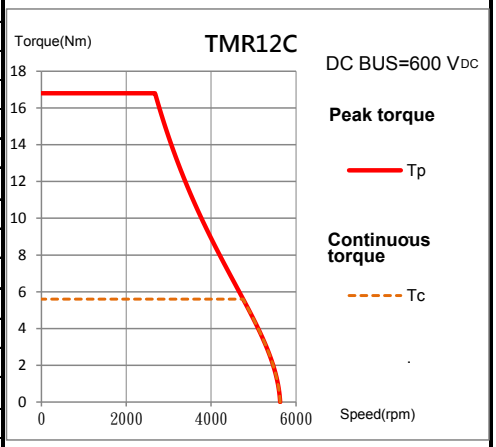
Electrical specifications

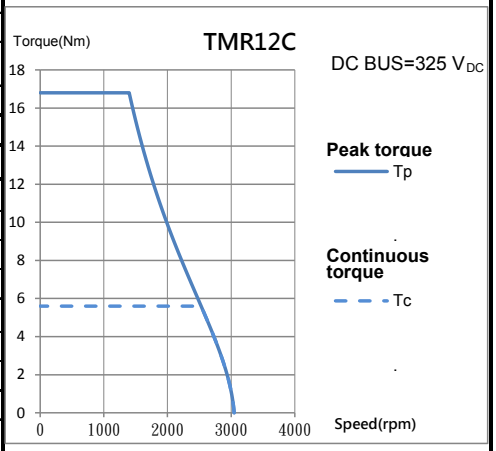
Winding code : LA	Symbol	Unit	
Continuous torque	T_c	Nm	5.6
Continuous current	I_c	A_{rms}	4.5
Stall torque	T_s	Nm	3.9
Stall current	I_s	A_{rms}	3.2
Peak torque(for 1sec.)	T_p	Nm	16.9
Peak current(for 1sec.)	I_p	A_{rms}	13.5
Torque constant	K_t	Nm/Arms	1.25
Electrical time constant	T_e	ms	3.2
Resistance (line to line at 25℃)	R_{25}	Ω	2.6
Inductance (line to line)	L	mH	8.2
Number of poles	2p		22
Back emf constant (line to line)	K_v	Vrms/rad/s	0.6
Motor constant (at 25℃)	K_m	Nm/√W	0.6
Thermal resistance	R_{th}	K/W	1.2
Thermal sensor			PTC SNM120
Max. DC BUS		V_{DC}	600
Thermal time constant	T_{th}	s	2210
Max. continuous power dissipation	P_c	W	107

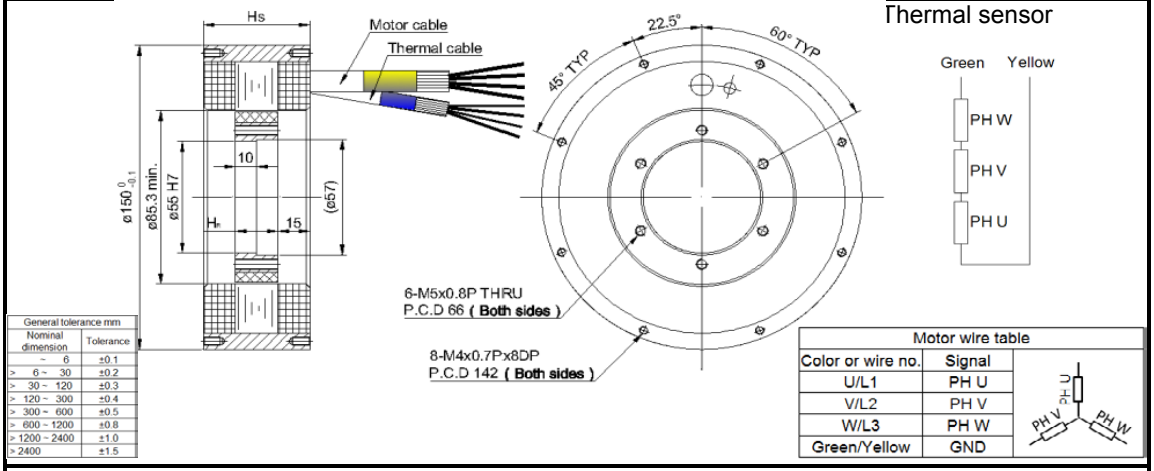
Mechanical specifications

	Symbol	Unit	
Mass of motor	M_m	kg	3.1
Inertia of rotor	J	kgm^2	0.00045
Height of stator	H_S	mm	50
Height of rotor	H	mm	20

T-N curve







General tolerance mm

Nominal dimension	Tolerance
~ 6	±0.1
> 6 ~ 30	±0.2
> 30 ~ 120	±0.3
> 120 ~ 300	±0.4
> 300 ~ 600	±0.5
> 600 ~ 1200	±0.8
> 1200 ~ 2400	±1.0
> 2400	±1.5

Motor wire table

Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13
Date: 2017/1/16

Fig. 12.3 **Data sheet TMR12**

TMR14 Torque Motor

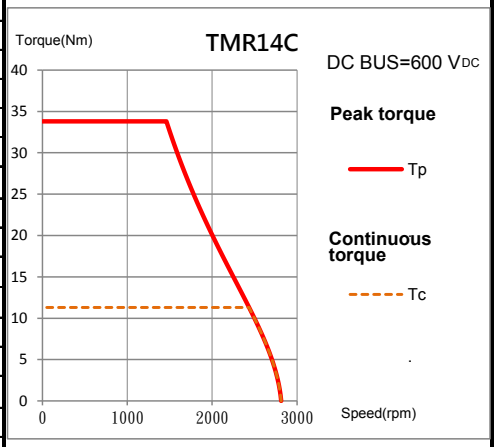
Electrical specifications

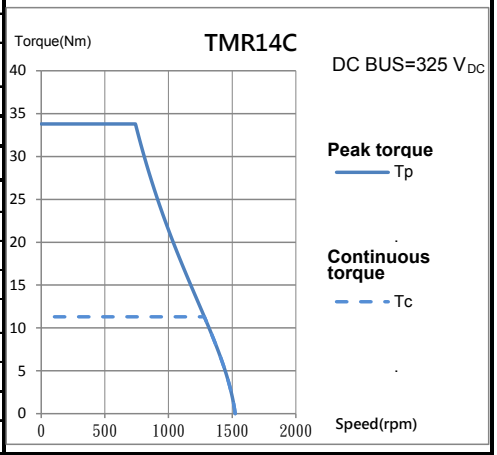
Winding code : LA	Symbol	Unit	
Continuous torque	T_c	Nm	11.3
Continuous current	I_c	A_{rms}	4.5
Stall torque	T_s	Nm	7.9
Stall current	I_s	A_{rms}	3.2
Peak torque(for 1sec.)	T_p	Nm	33.8
Peak current(for 1sec.)	I_p	A_{rms}	13.5
Torque constant	K_t	Nm/Arms	2.5
Electrical time constant	T_e	ms	3.6
Resistance (line to line at 25℃)	R_{25}	Ω	3.9
Inductance (line to line)	L	mH	14
Number of poles	2p		22
Back emf constant (line to line)	K_v	Vrms/rad/s	1.2
Motor constant (at 25℃)	K_m	Nm/√W	1
Thermal resistance	R_{th}	K/W	0.8
Thermal sensor			PTC SNM120
Max. DC BUS		V_{DC}	600
Thermal time constant	T_{th}	s	2290
Max. continuous power dissipation	P_c	W	161

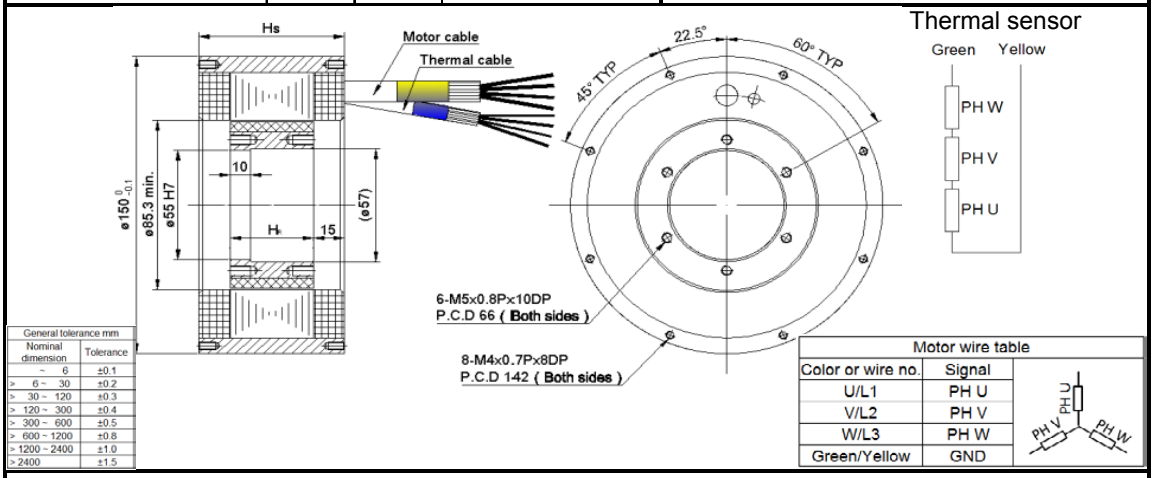
Mechanical specifications

	Symbol	Unit	
Mass of motor	M_m	kg	4.8
Inertia of rotor	J	kgm^2	0.00088
Height of stator	H_S	mm	70
Height of rotor	H	mm	40

T-N curve







Motor wire table

Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13
Date: 2017/1/16

Fig. 12.4 **Data sheet TMR14**

TMR16 Torque Motor

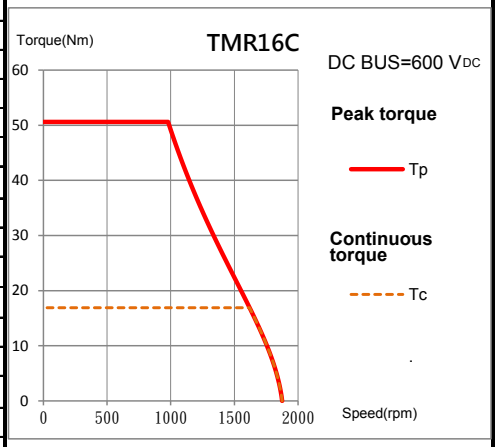
Electrical specifications

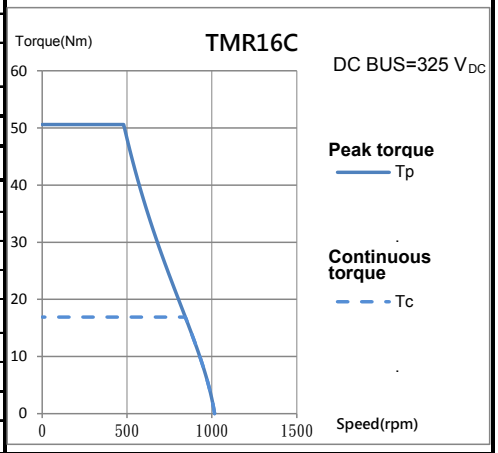
Winding code : LA	Symbol	Unit	
Continuous torque	T_c	Nm	16.9
Continuous current	I_c	A_{rms}	4.5
Stall torque	T_s	Nm	11.8
Stall current	I_s	A_{rms}	3.2
Peak torque(for 1sec.)	T_p	Nm	50.6
Peak current(for 1sec.)	I_p	A_{rms}	13.5
Torque constant	K_t	Nm/Arms	3.75
Electrical time constant	T_e	ms	3.8
Resistance (line to line at 25℃)	R_{25}	Ω	5.2
Inductance (line to line)	L	mH	20
Number of poles	2p		22
Back emf constant (line to line)	K_v	Vrms/rad/s	1.8
Motor constant (at 25℃)	K_m	Nm/√W	1.3
Thermal resistance	R_{th}	K/W	0.6
Thermal sensor			PTC SNM120
Max. DC BUS		V_{DC}	600
Thermal time constant	T_{th}	s	2460
Max. continuous power dissipation	P_c	W	215

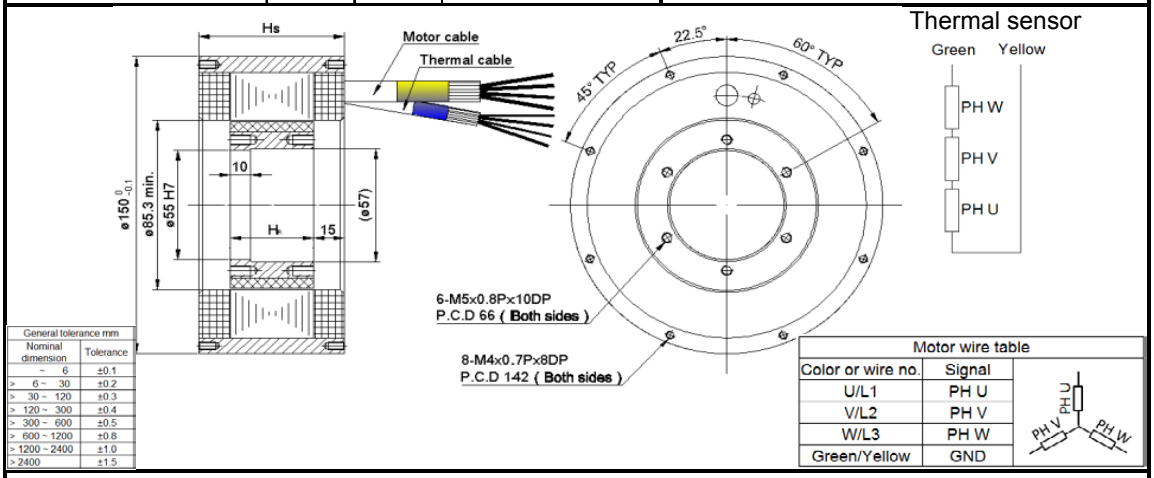
Mechanical specifications

	Symbol	Unit	
Mass of motor	M_m	kg	6.6
Inertia of rotor	J	kgm^2	0.00132
Height of stator	H_S	mm	90
Height of rotor	H	mm	60

T-N curve







General tolerance mm

Nominal dimension	Tolerance
~ 6	±0.1
> 6 ~ 30	±0.2
> 30 ~ 120	±0.3
> 120 ~ 300	±0.4
> 300 ~ 600	±0.5
> 600 ~ 1200	±0.8
> 1200 ~ 2400	±1.0
> 2400	±1.5

Motor wire table

Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13
Date: 2017/1/16

Fig. 12.5 **Data sheet TMR16**

TMR18 Torque Motor

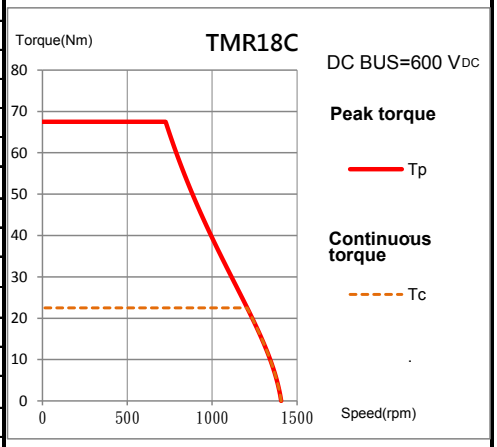
Electrical specifications

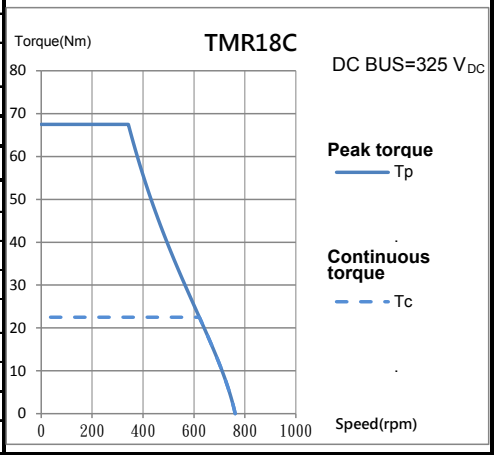
Winding code : LA	Symbol	Unit	
Continuous torque	T_c	Nm	22.5
Continuous current	I_c	A_{rms}	4.5
Stall torque	T_s	Nm	15.8
Stall current	I_s	A_{rms}	3.2
Peak torque(for 1sec.)	T_p	Nm	67.5
Peak current(for 1sec.)	I_p	A_{rms}	13.5
Torque constant	K_t	Nm/Arms	5
Electrical time constant	T_e	ms	4
Resistance (line to line at 25℃)	R_{25}	Ω	6.5
Inductance (line to line)	L	mH	26
Number of poles	2p		22
Back emf constant (line to line)	K_v	Vrms/rad/s	2.4
Motor constant (at 25℃)	K_m	Nm/√W	1.6
Thermal resistance	R_{th}	K/W	0.48
Thermal sensor			PTC SNM120
Max. DC BUS		V_{DC}	600
Thermal time constant	T_{th}	s	2520
Max. continuous power dissipation	P_c	W	269

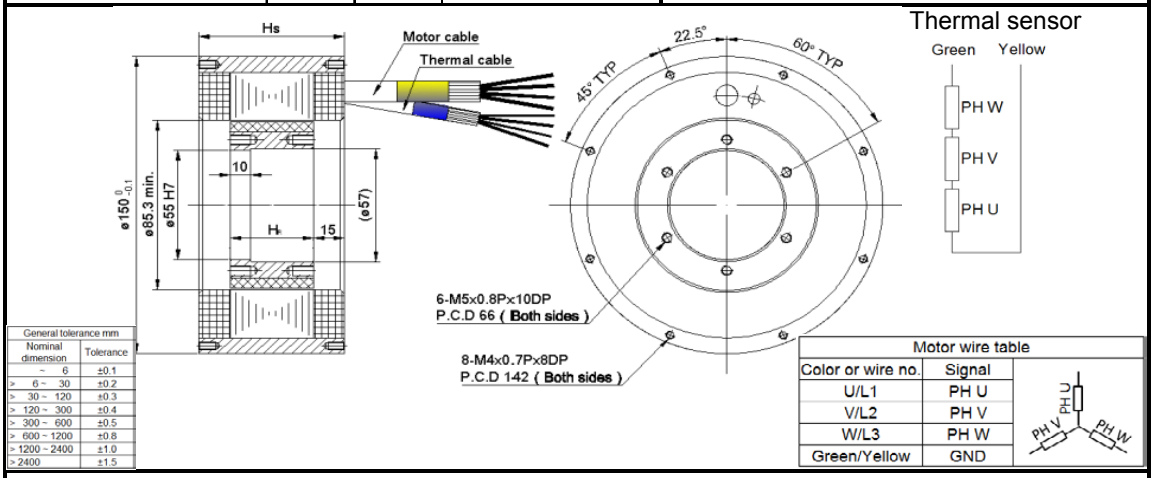
Mechanical specifications

	Symbol	Unit	
Mass of motor	M_m	kg	8.3
Inertia of rotor	J	kgm^2	0.00175
Height of stator	H_S	mm	110
Height of rotor	H	mm	80

T-N curve







General tolerance mm

Nominal dimension	Tolerance
~ 6	±0.1
> 6 ~ 30	±0.2
> 30 ~ 120	±0.3
> 120 ~ 300	±0.4
> 300 ~ 600	±0.5
> 600 ~ 1200	±0.8
> 1200 ~ 2400	±1.0
> 2400	±1.5

Motor wire table

Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13
Date: 2017/1/16

Fig. 12.6 **Data sheet TMR18**

R-UL-TMR32 Torque Motor

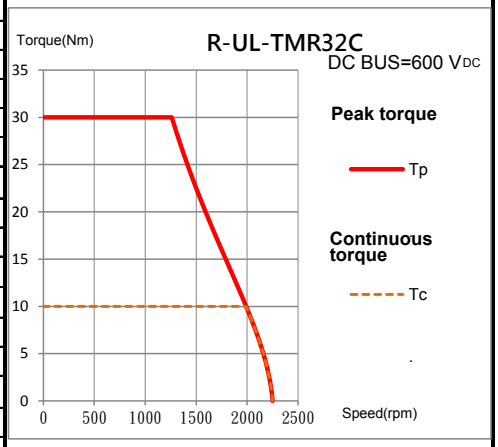
Electrical specifications

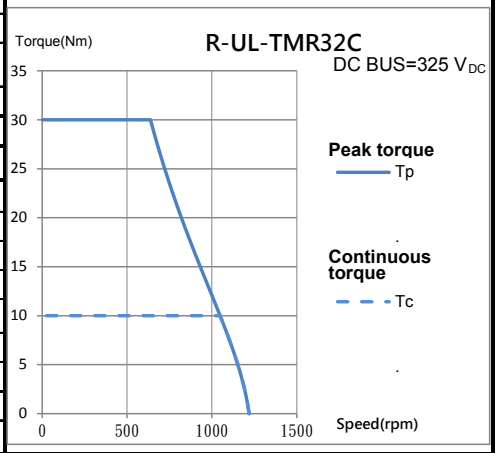
Winding code : LA	Symbol	Unit	
Continuous torque	T_c	Nm	10
Continuous current	I_c	A_{rms}	3.4
Stall torque	T_s	Nm	7
Stall current	I_s	A_{rms}	2.4
Peak torque(for 1sec.)	T_p	Nm	30
Peak current(for 1sec.)	I_p	A_{rms}	10.2
Torque constant	K_t	Nm/Arms	3
Electrical time constant	T_e	ms	4.1
Resistance (line to line at 25℃)	R_{25}	Ω	5
Inductance (line to line)	L	mH	20.6
Number of poles	2p		22
Back emf constant (line to line)	K_v	Vrms/rad/s	1.5
Motor constant (at 25℃)	K_m	Nm/√W	1.1
Thermal resistance	R_{th}	K/W	1.1
Thermal sensor			PTC SNM120
Max. DC BUS		V_{DC}	600
Thermal time constant	T_{th}	s	1980
Max. continuous power dissipation	P_c	W	118

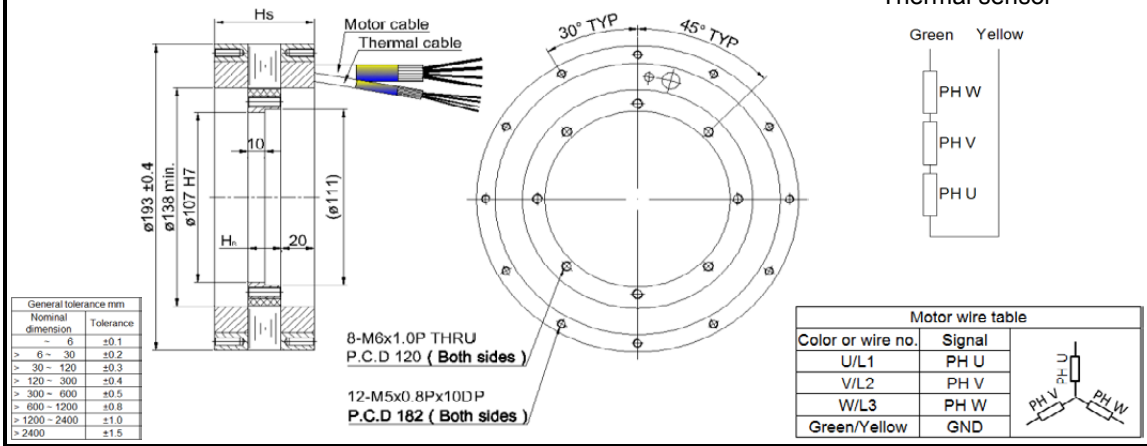
Mechanical specifications

	Symbol	Unit	
Mass of motor	M_m	kg	5.7
Inertia of rotor	J	kgm^2	0.002
Height of stator	H_S	mm	60
Height of rotor	H	mm	20

T-N curve







Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13
Date: 2017/1/16

Fig. 12.7 **Data sheet TMR32**

R-UL-TMR34 Torque Motor

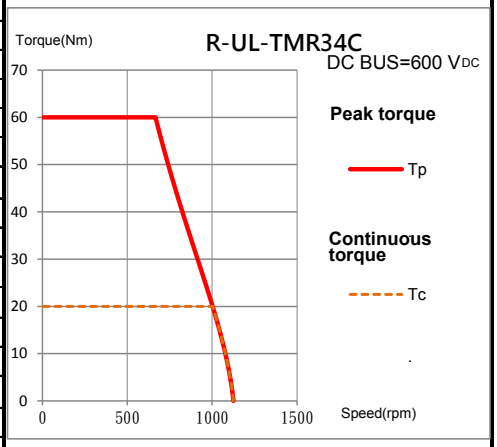
Electrical specifications

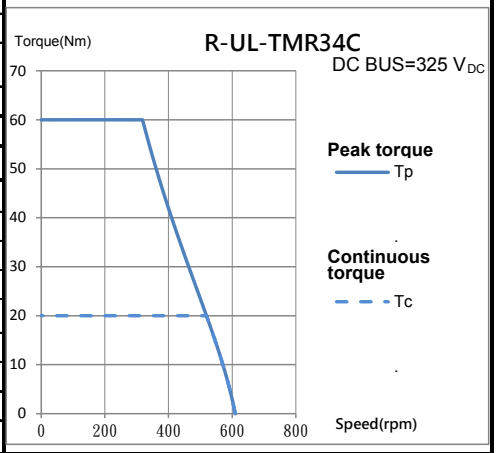
Winding code : LA	Symbol	Unit	
Continuous torque	T_c	Nm	20
Continuous current	I_c	A_{rms}	3.4
Stall torque	T_s	Nm	14
Stall current	I_s	A_{rms}	2.4
Peak torque(for 1sec.)	T_p	Nm	60
Peak current(for 1sec.)	I_p	A_{rms}	10.2
Torque constant	K_t	Nm/Arms	6
Electrical time constant	T_e	ms	4.6
Resistance (line to line at 25℃)	R_{25}	Ω	7.5
Inductance (line to line)	L	mH	34.6
Number of poles	2p		22
Back emf constant (line to line)	K_v	Vrms/rad/s	3
Motor constant (at 25℃)	K_m	Nm/√W	1.8
Thermal resistance	R_{th}	K/W	0.73
Thermal sensor			PTC SNM120
Max. DC BUS		V_{DC}	600
Thermal time constant	T_{th}	s	2020
Max. continuous power dissipation	P_c	W	177

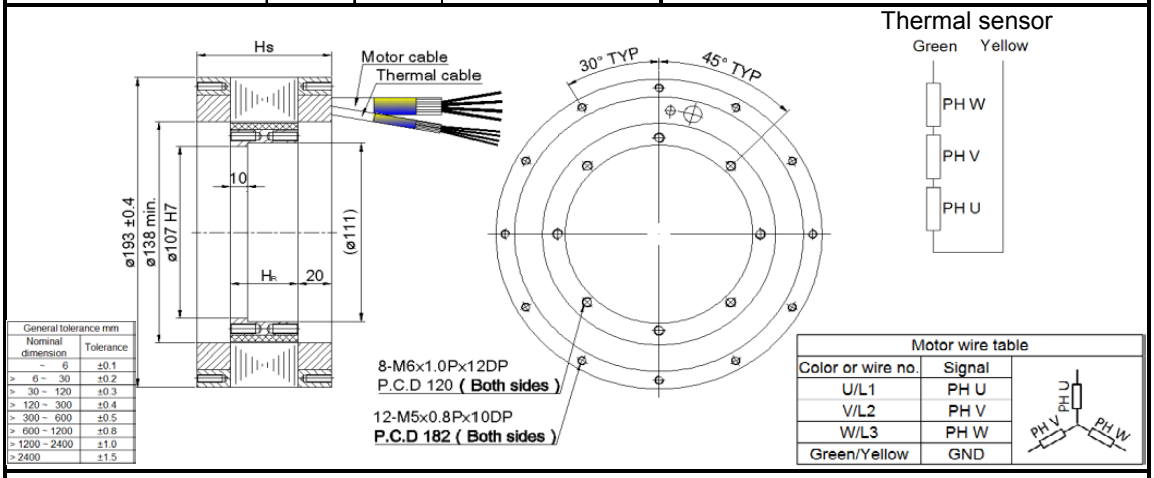
Mechanical specifications

	Symbol	Unit	
Mass of motor	M_m	kg	8.2
Inertia of rotor	J	kgm^2	0.005
Height of stator	H_S	mm	80
Height of rotor	H	mm	40

T-N curve







General tolerance mm	
Nominal dimension	Tolerance
~ 6	±0.1
> 6 ~ 30	±0.2
> 30 ~ 120	±0.3
> 120 ~ 300	±0.4
> 300 ~ 600	±0.5
> 600 ~ 1200	±0.8
> 1200 ~ 2400	±1.0
> 2400	±1.5

Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

PH U, PH V, PH W

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13
Date: 2017/1/16

Fig. 12.8 **Data sheet TMR34**

R-UL-TMR34L Torque Motor

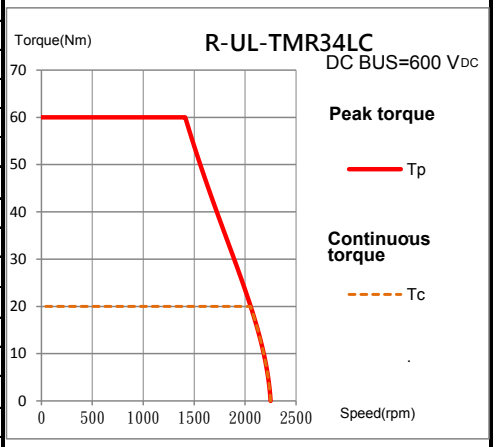
Electrical specifications

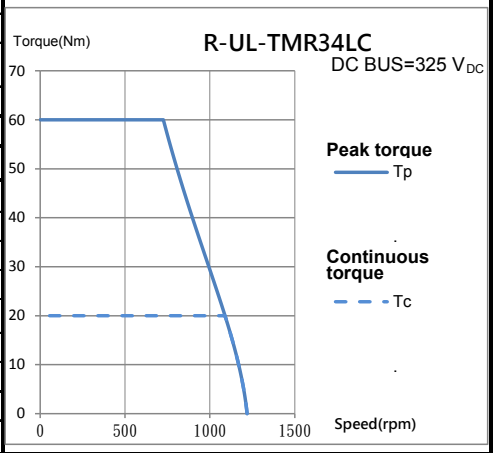
Winding code : SA	Symbol	Unit	
Continuous torque	T_c	Nm	20
Continuous current	I_c	A_{rms}	6.8
Stall torque	T_s	Nm	14
Stall current	I_s	A_{rms}	4.8
Peak torque(for 1sec.)	T_p	Nm	60
Peak current(for 1sec.)	I_p	A_{rms}	20.4
Torque constant	K_t	Nm/Arms	3
Electrical time constant	T_e	ms	4.6
Resistance (line to line at 25℃)	R_{25}	Ω	1.9
Inductance (line to line)	L	mH	8.7
Number of poles	2p		22
Back emf constant (line to line)	K_v	Vrms/rad/s	1.5
Motor constant (at 25℃)	K_m	Nm/√W	1.8
Thermal resistance	R_{th}	K/W	0.73
Thermal sensor			PTC SNM120
Max. DC BUS		V_{DC}	600
Thermal time constant	T_{th}	s	2020
Max. continuous power dissipation	P_c	W	179

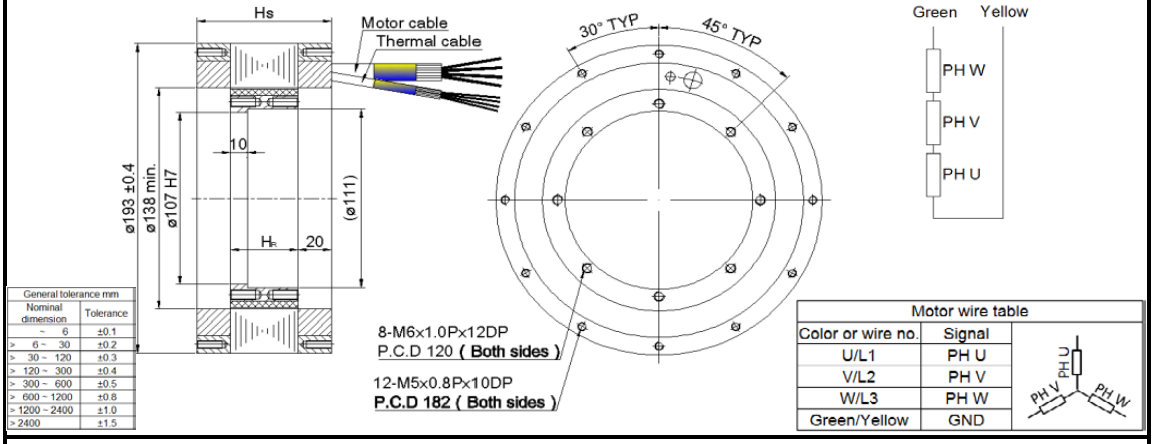
Mechanical specifications

	Symbol	Unit	
Mass of motor	M_m	kg	8.2
Inertia of rotor	J	kgm^2	0.005
Height of stator	H_S	mm	80
Height of rotor	H	mm	40

T-N curve







Motor wire table

Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13
Date: 2017/1/16

Fig. 12.9 **Data sheet TMR34L**

R-UL-TMR38 Torque Motor

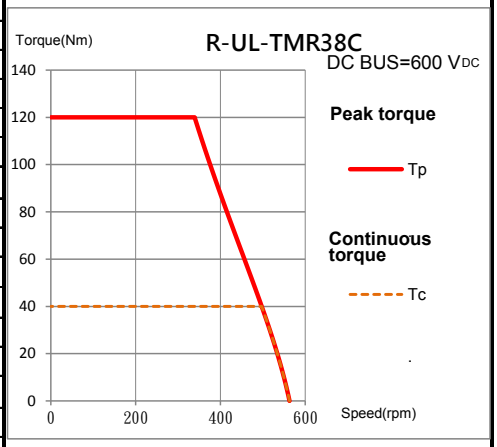
Electrical specifications

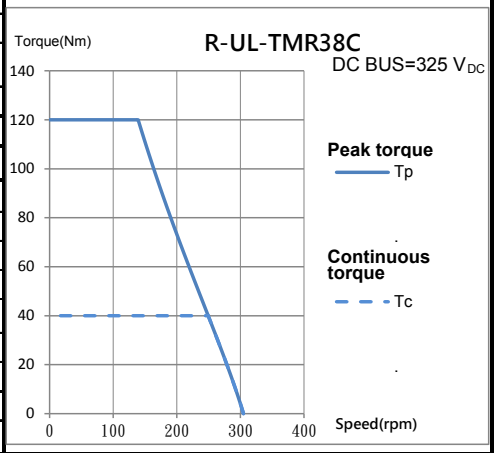
Winding code : LA	Symbol	Unit	
Continuous torque	T_c	Nm	40
Continuous current	I_c	A_{rms}	3.4
Stall torque	T_s	Nm	28
Stall current	I_s	A_{rms}	2.4
Peak torque(for 1sec.)	T_p	Nm	120
Peak current(for 1sec.)	I_p	A_{rms}	10.2
Torque constant	K_t	Nm/Arms	12
Electrical time constant	T_e	ms	4.5
Resistance (line to line at 25℃)	R_{25}	Ω	12
Inductance (line to line)	L	mH	53.57
Number of poles	2p		22
Back emf constant (line to line)	K_v	Vrms/rad/s	6
Motor constant (at 25℃)	K_m	Nm/√W	2.8
Thermal resistance	R_{th}	K/W	0.46
Thermal sensor			PTC SNM120
Max. DC BUS		V_{DC}	600
Thermal time constant	T_{th}	s	2130
Max. continuous power dissipation	P_c	W	283

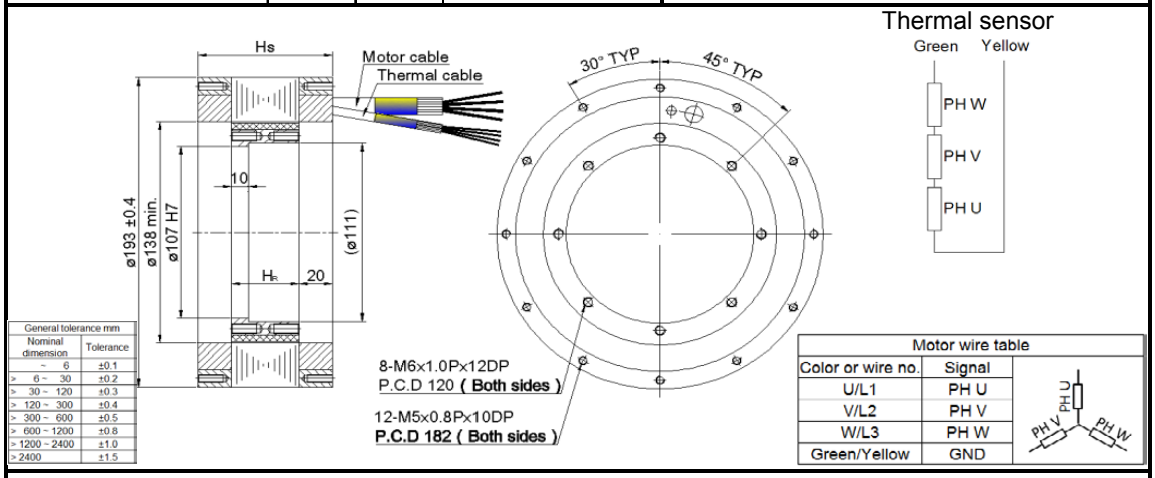
Mechanical specifications

	Symbol	Unit	
Mass of motor	M_m	kg	13.2
Inertia of rotor	J	kgm^2	0.009
Height of stator	H_S	mm	120
Height of rotor	H	mm	80

T-N curve







General tolerance mm	
Nominal dimension	Tolerance
~ 6	±0.1
> 6 ~ 30	±0.2
> 30 ~ 120	±0.3
> 120 ~ 300	±0.4
> 300 ~ 600	±0.5
> 600 ~ 1200	±0.8
> 1200 ~ 2400	±1.0
> 2400	±1.5

Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13
Date: 2017/1/16

Fig. 12.10 **Data sheet TMR38**

R-UL-TMR38L Torque Motor

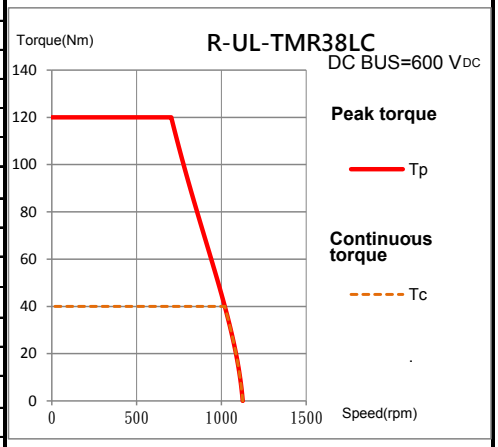
Electrical specifications

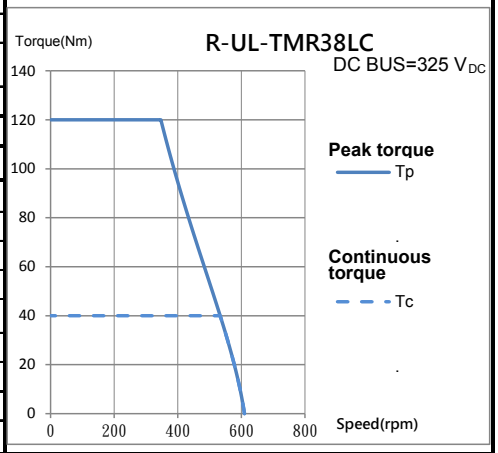
Winding code : SA	Symbol	Unit	
Continuous torque	T_c	Nm	40
Continuous current	I_c	A_{rms}	6.8
Stall torque	T_s	Nm	28
Stall current	I_s	A_{rms}	4.8
Peak torque(for 1sec.)	T_p	Nm	120
Peak current(for 1sec.)	I_p	A_{rms}	20.4
Torque constant	K_t	Nm/Arms	6
Electrical time constant	T_e	ms	5.4
Resistance (line to line at 25℃)	R_{25}	Ω	3
Inductance (line to line)	L	mH	16.3
Number of poles	2p		22
Back emf constant (line to line)	K_v	Vrms/rad/s	3
Motor constant (at 25℃)	K_m	Nm/√W	2.8
Thermal resistance	R_{th}	K/W	0.46
Thermal sensor			PTC SNM120
Max. DC BUS		V_{DC}	600
Thermal time constant	T_{th}	s	2130
Max. continuous power dissipation	P_c	W	283

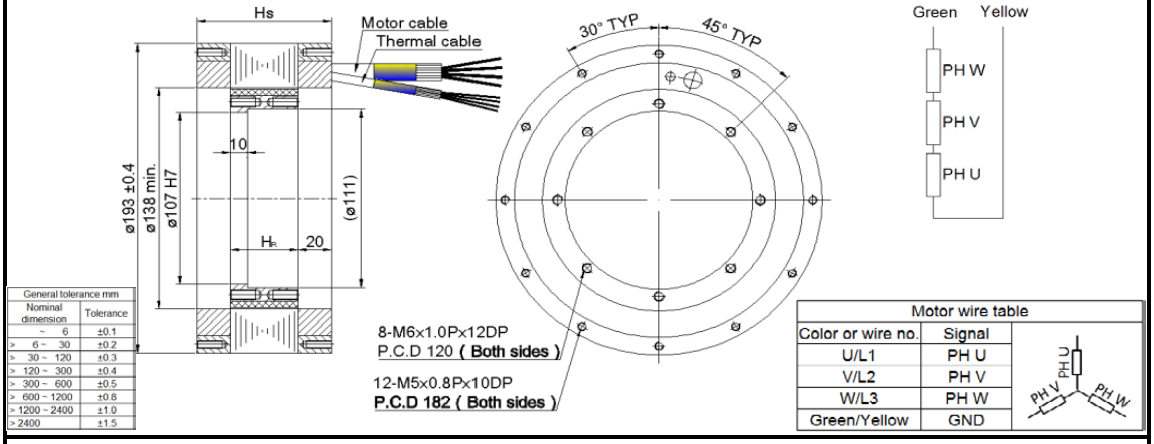
Mechanical specifications

	Symbol	Unit	
Mass of motor	M_m	kg	13.2
Inertia of rotor	J	kgm^2	0.009
Height of stator	H_S	mm	120
Height of rotor	H	mm	80

T-N curve







Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13
Date: 2017/1/16

Fig. 12.11 **Data sheet TMR38L**

R-UL-TMR3C Torque Motor

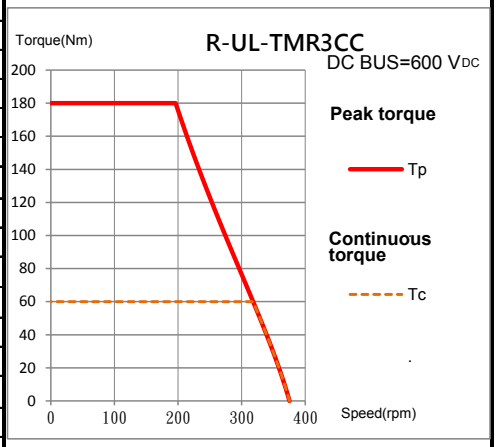
Electrical specifications

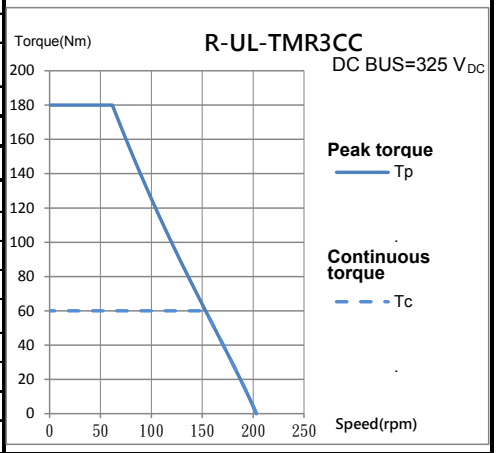
Winding code : LA	Symbol	Unit	
Continuous torque	T_c	Nm	60
Continuous current	I_c	A_{rms}	3.4
Stall torque	T_s	Nm	42
Stall current	I_s	A_{rms}	2.4
Peak torque(for 1sec.)	T_p	Nm	180
Peak current(for 1sec.)	I_p	A_{rms}	10.2
Torque constant	K_t	Nm/Arms	18
Electrical time constant	T_e	ms	4.9
Resistance (line to line at 25℃)	R_{25}	Ω	17.1
Inductance (line to line)	L	mH	84.4
Number of poles	2p		22
Back emf constant (line to line)	K_v	Vrms/rad/s	9
Motor constant (at 25℃)	K_m	Nm/√W	3.6
Thermal resistance	R_{th}	K/W	0.32
Thermal sensor			PTC SNM120
Max. DC BUS		V_{DC}	600
Thermal time constant	T_{th}	s	2170
Max. continuous power dissipation	P_c	W	404

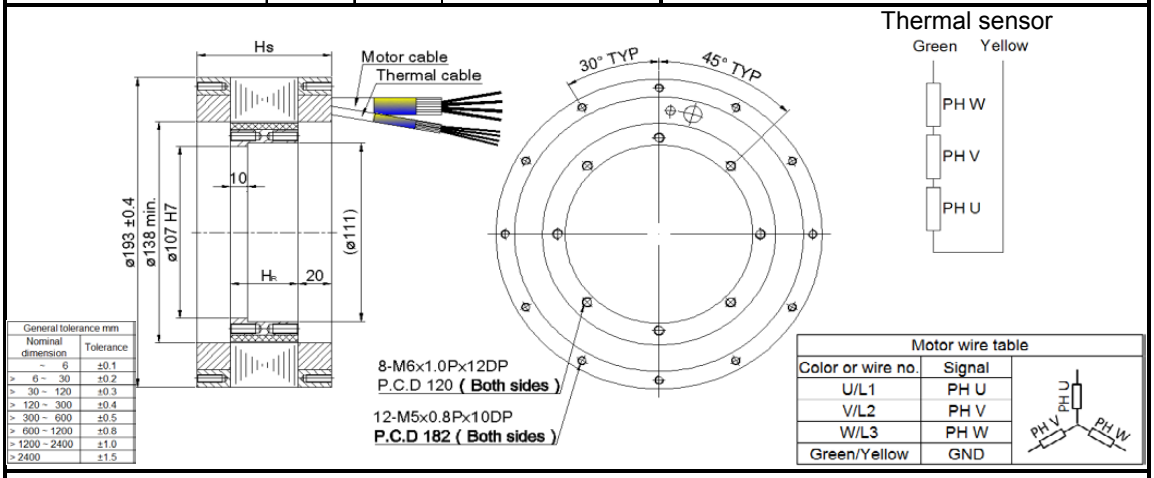
Mechanical specifications

	Symbol	Unit	
Mass of motor	M_m	kg	18.1
Inertia of rotor	J	kgm^2	0.014
Height of stator	H_S	mm	160
Height of rotor	H	mm	120

T-N curve







General tolerance mm

Nominal dimension	Tolerance
~ 6	±0.1
> 6 ~ 30	±0.2
> 30 ~ 120	±0.3
> 120 ~ 300	±0.4
> 300 ~ 600	±0.5
> 600 ~ 1200	±0.8
> 1200 ~ 2400	±1.0
> 2400	±1.5

Motor wire table

Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13
Date: 2017/1/16

Fig. 12.12 **Data sheet TMR3C**

R-UL-TMR3CL Torque Motor

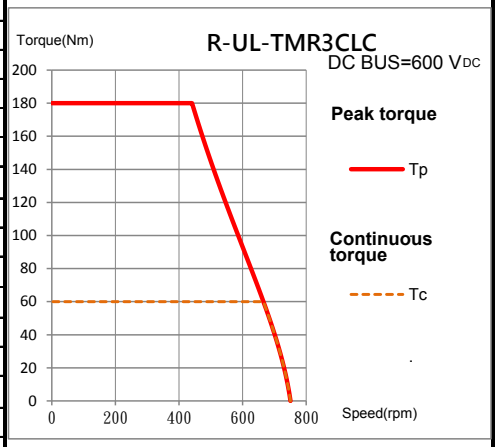
Electrical specifications

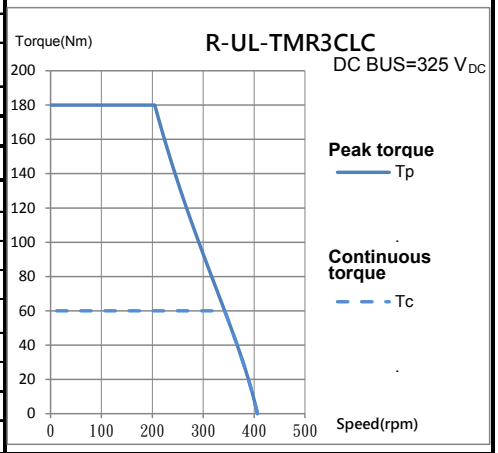
Winding code : SA	Symbol	Unit	
Continuous torque	T_c	Nm	60
Continuous current	I_c	A_{rms}	6.8
Stall torque	T_s	Nm	42
Stall current	I_s	A_{rms}	4.8
Peak torque(for 1sec.)	T_p	Nm	180
Peak current(for 1sec.)	I_p	A_{rms}	20.4
Torque constant	K_t	Nm/Arms	9
Electrical time constant	T_e	ms	5.9
Resistance (line to line at 25℃)	R_{25}	Ω	4.3
Inductance (line to line)	L	mH	25.3
Number of poles	2p		22
Back emf constant (line to line)	K_v	Vrms/rad/s	4.5
Motor constant (at 25℃)	K_m	Nm/√W	3.5
Thermal resistance	R_{th}	K/W	0.32
Thermal sensor			PTC SNM120
Max. DC BUS		V_{DC}	600
Thermal time constant	T_{th}	s	2170
Max. continuous power dissipation	P_c	W	406

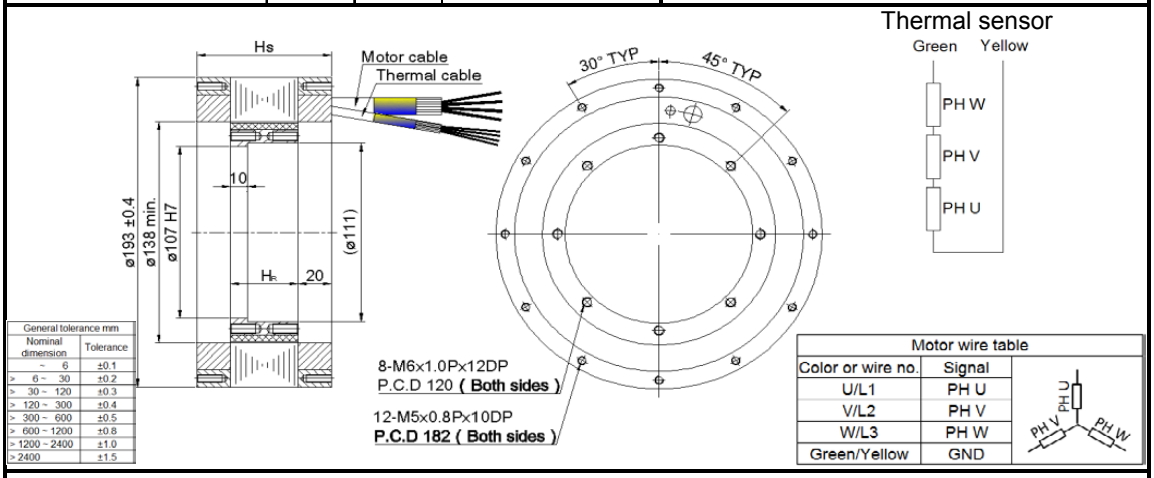
Mechanical specifications

	Symbol	Unit	
Mass of motor	M_m	kg	18.1
Inertia of rotor	J	kgm^2	0.014
Height of stator	H_S	mm	160
Height of rotor	H	mm	120

T-N curve







Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13
Date: 2017/1/16

Fig. 12.13 **Data sheet TMR3CL**

R-UL-TMR74 Torque Motor

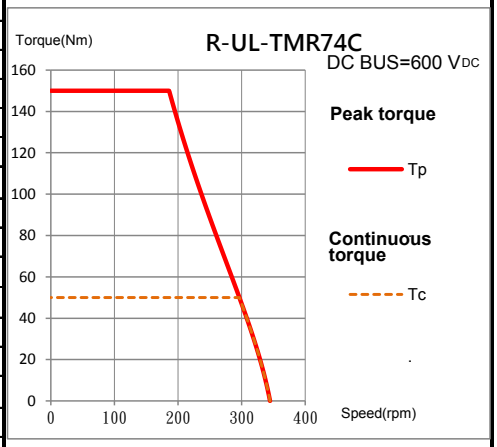
Electrical specifications

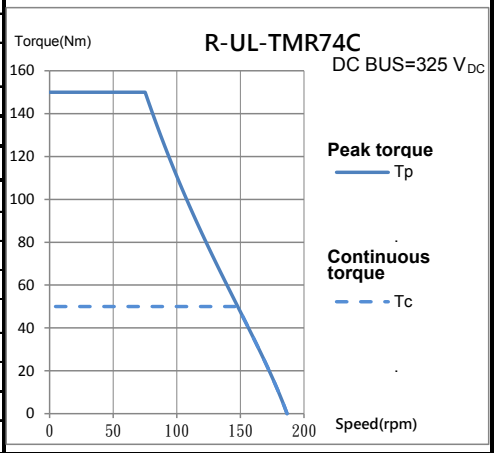
Winding code : LA	Symbol	Unit	
Continuous torque	T_c	Nm	50
Continuous current	I_c	A_{rms}	3.4
Stall torque	T_s	Nm	35
Stall current	I_s	A_{rms}	2.4
Peak torque(for 1sec.)	T_p	Nm	150
Peak current(for 1sec.)	I_p	A_{rms}	10.2
Torque constant	K_t	Nm/Arms	17
Electrical time constant	T_e	ms	4.3
Resistance (line to line at 25℃)	R_{25}	Ω	12.9
Inductance (line to line)	L	mH	55
Number of poles	2p		44
Back emf constant (line to line)	K_v	Vrms/rad/s	9.8
Motor constant (at 25℃)	K_m	Nm/√W	3.9
Thermal resistance	R_{th}	K/W	0.42
Thermal sensor			PTC SNM120
Max. DC BUS		V_{DC}	600
Thermal time constant	T_{th}	s	2230
Max. continuous power dissipation	P_c	W	304

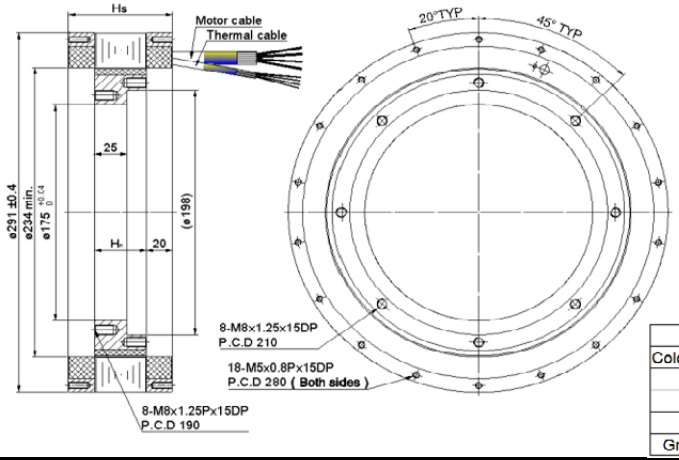
Mechanical specifications

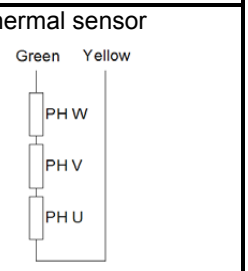
	Symbol	Unit	
Mass of motor	M_m	kg	15.9
Inertia of rotor	J	kgm^2	0.044
Height of stator	H_S	mm	80
Height of rotor	H	mm	40

T-N curve



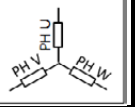






General tolerance mm	
Nominal dimension	Tolerance
~ 6	±0.1
> 6 ~ 30	±0.2
> 30 ~ 120	±0.3
> 120 ~ 300	±0.4
> 300 ~ 600	±0.5
> 600 ~ 1200	±0.8
> 1200 ~ 2400	±1.0
> 2400	±1.5

Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND



Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13
Date: 2017/1/16

Fig. 12.14 **Data sheet TMR74**

R-UL-TMR74L Torque Motor

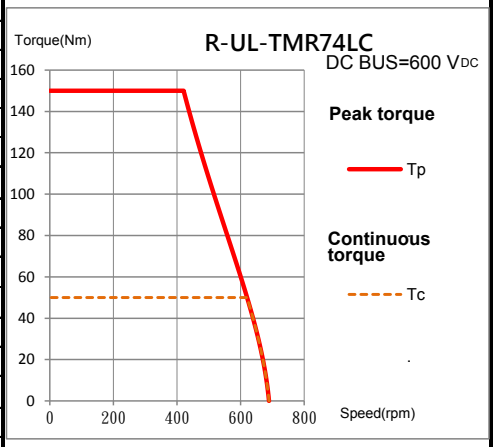
Electrical specifications

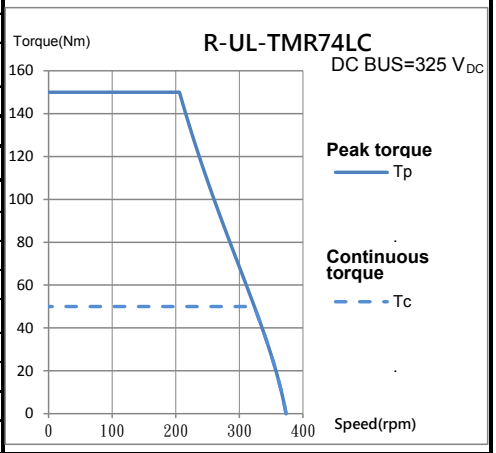
Winding code : SA	Symbol	Unit	
Continuous torque	T_c	Nm	50
Continuous current	I_c	A_{rms}	6.8
Stall torque	T_s	Nm	35
Stall current	I_s	A_{rms}	4.8
Peak torque(for 1sec.)	T_p	Nm	150
Peak current(for 1sec.)	I_p	A_{rms}	20.4
Torque constant	K_t	Nm/Arms	8.5
Electrical time constant	T_e	ms	4.3
Resistance (line to line at 25℃)	R_{25}	Ω	3.2
Inductance (line to line)	L	mH	13.8
Number of poles	2p		44
Back emf constant (line to line)	K_v	Vrms/rad/s	4.9
Motor constant (at 25℃)	K_m	Nm/√W	3.9
Thermal resistance	R_{th}	K/W	0.42
Thermal sensor			PTC SNM120
Max. DC BUS		V_{DC}	600
Thermal time constant	T_{th}	s	2230
Max. continuous power dissipation	P_c	W	302

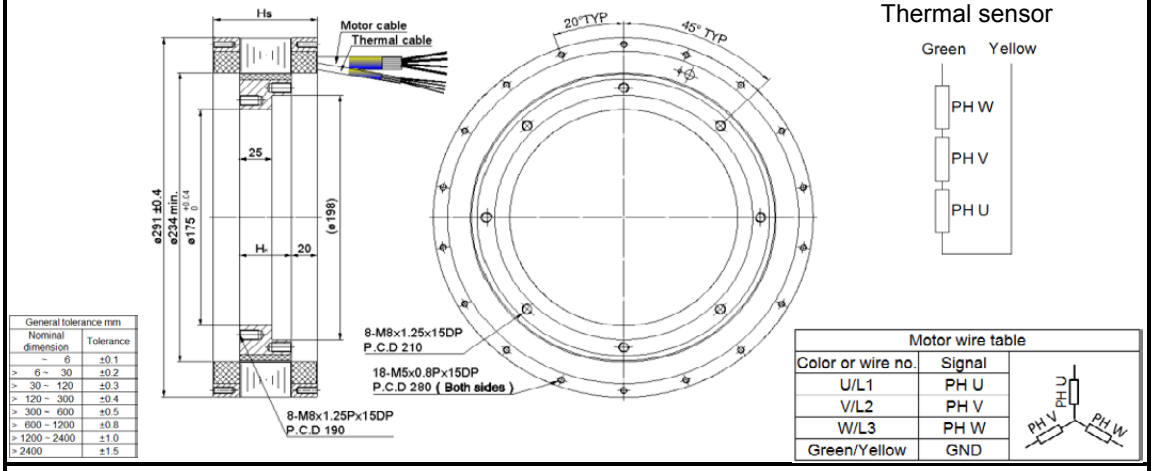
Mechanical specifications

	Symbol	Unit	
Mass of motor	M_m	kg	15.9
Inertia of rotor	J	kgm^2	0.044
Height of stator	H_S	mm	80
Height of rotor	H	mm	40

T-N curve







General tolerance mm	
Nominal dimension	Tolerance
~ 6	±0.1
> 6 ~ 30	±0.2
> 30 ~ 120	±0.3
> 120 ~ 300	±0.4
> 300 ~ 600	±0.5
> 600 ~ 1200	±0.8
> 1200 ~ 2400	±1.0
> 2400	±1.5

Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13
Date: 2017/1/16

Fig. 12.15 **Data sheet TMR74L**

R-UL-TMR76 Torque Motor

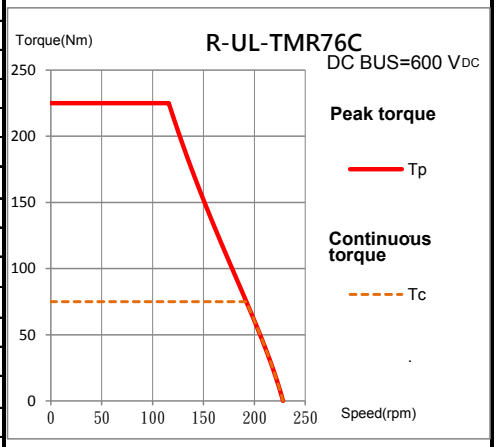
Electrical specifications

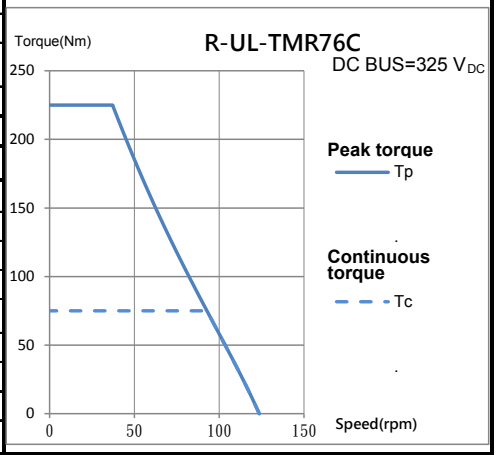
Winding code : LA	Symbol	Unit	
Continuous torque	T_c	Nm	75
Continuous current	I_c	A_{rms}	3.4
Stall torque	T_s	Nm	52.5
Stall current	I_s	A_{rms}	2.4
Peak torque(for 1sec.)	T_p	Nm	225
Peak current(for 1sec.)	I_p	A_{rms}	10.2
Torque constant	K_t	Nm/Arms	25.6
Electrical time constant	T_e	ms	4.5
Resistance (line to line at 25℃)	R_{25}	Ω	17
Inductance (line to line)	L	mH	76
Number of poles	2p		44
Back emf constant (line to line)	K_v	Vrms/rad/s	14.8
Motor constant (at 25℃)	K_m	Nm/√W	5.1
Thermal resistance	R_{th}	K/W	0.32
Thermal sensor			PTC SNM120
Max. DC BUS		V_{DC}	600
Thermal time constant	T_{th}	s	2330
Max. continuous power dissipation	P_c	W	401

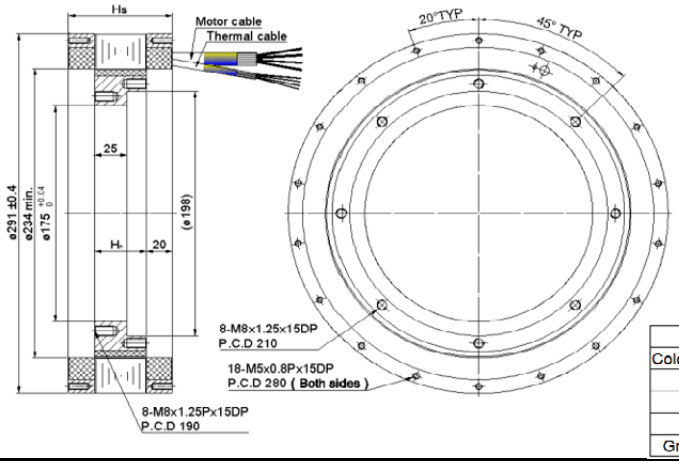
Mechanical specifications

	Symbol	Unit	
Mass of motor	M_m	kg	20.4
Inertia of rotor	J	kgm^2	0.061
Height of stator	H_S	mm	100
Height of rotor	H	mm	60

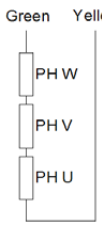
T-N curve





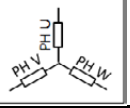


Thermal sensor



General tolerance mm	
Nominal dimension	Tolerance
~ 6	±0.1
> 6 ~ 30	±0.2
> 30 ~ 120	±0.3
> 120 ~ 300	±0.4
> 300 ~ 600	±0.5
> 600 ~ 1200	±0.8
> 1200 ~ 2400	±1.0
> 2400	±1.5

Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND



Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13
Date: 2017/1/16

Fig. 12.16 **Data sheet TMR76**

R-UL-TMR76L Torque Motor

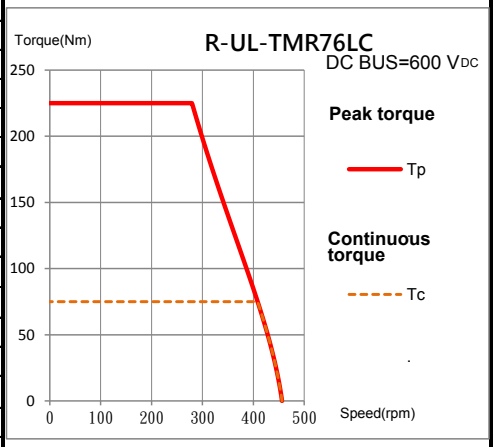
Electrical specifications

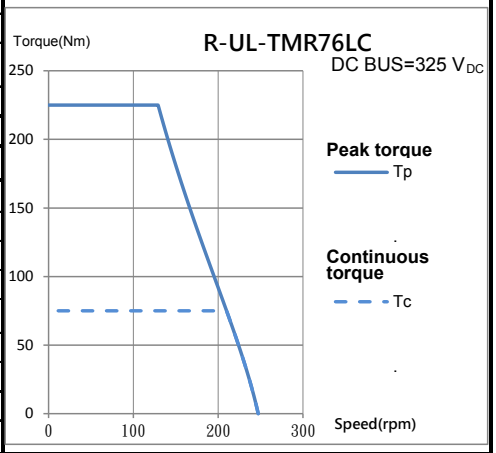
Winding code : SA	Symbol	Unit	
Continuous torque	T_c	Nm	75
Continuous current	I_c	A_{rms}	6.8
Stall torque	T_s	Nm	52.5
Stall current	I_s	A_{rms}	4.8
Peak torque(for 1sec.)	T_p	Nm	225
Peak current(for 1sec.)	I_p	A_{rms}	20.4
Torque constant	K_t	Nm/Arms	12.8
Electrical time constant	T_e	ms	4.4
Resistance (line to line at 25℃)	R_{25}	Ω	4.3
Inductance (line to line)	L	mH	19
Number of poles	2p		44
Back emf constant (line to line)	K_v	Vrms/rad/s	7.4
Motor constant (at 25℃)	K_m	Nm/√W	5
Thermal resistance	R_{th}	K/W	0.32
Thermal sensor			PTC SNM120
Max. DC BUS		V_{DC}	600
Thermal time constant	T_{th}	s	2330
Max. continuous power dissipation	P_c	W	406

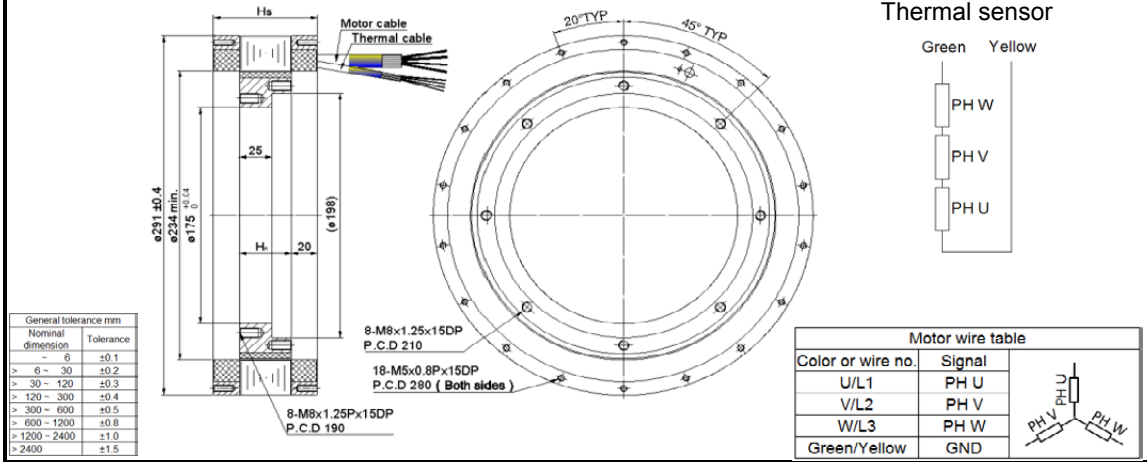
Mechanical specifications

	Symbol	Unit	
Mass of motor	M_m	kg	20.4
Inertia of rotor	J	kgm^2	0.061
Height of stator	H_S	mm	100
Height of rotor	H	mm	60

T-N curve







General tolerance mm

Nominal dimension	Tolerance
~ 6	±0.1
> 6 ~ 30	±0.2
> 30 ~ 120	±0.3
> 120 ~ 300	±0.4
> 300 ~ 600	±0.5
> 600 ~ 1200	±0.8
> 1200 ~ 2400	±1.0
> 2400	±1.5

Motor wire table

Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13
Date: 2017/1/16

Fig. 12.17 **Data sheet TMR76L**

R-UL-TMR7C Torque Motor

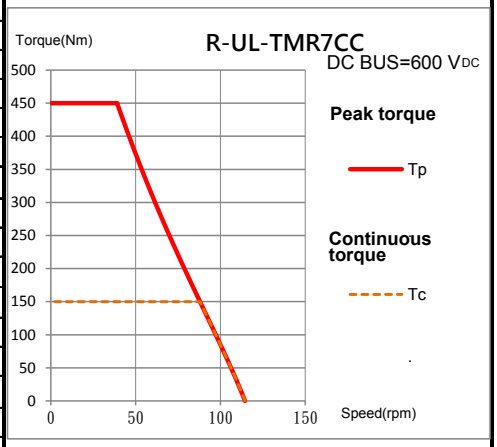
Electrical specifications

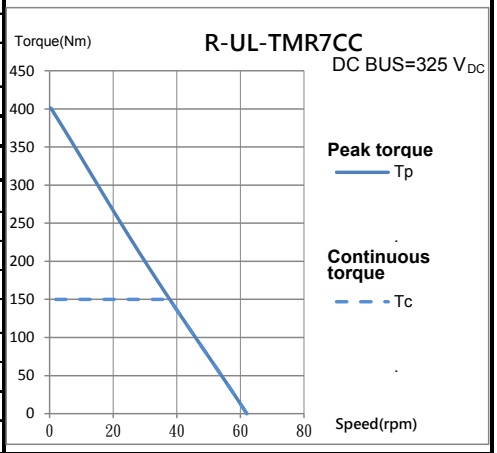
Winding code : LA	Symbol	Unit	
Continuous torque	T_c	Nm	150
Continuous current	I_c	A_{rms}	3.4
Stall torque	T_s	Nm	105
Stall current	I_s	A_{rms}	2.4
Peak torque(for 1sec.)	T_p	Nm	450
Peak current(for 1sec.)	I_p	A_{rms}	10.2
Torque constant	K_t	Nm/Arms	51.1
Electrical time constant	T_e	ms	5
Resistance (line to line at 25℃)	R_{25}	Ω	29
Inductance (line to line)	L	mH	145
Number of poles	2p		44
Back emf constant (line to line)	K_v	Vrms/rad/s	29.5
Motor constant (at 25℃)	K_m	Nm/√W	7.7
Thermal resistance	R_{th}	K/W	0.19
Thermal sensor			PTC SNM120
Max. DC BUS		V_{DC}	600
Thermal time constant	T_{th}	s	2350
Max. continuous power dissipation	P_c	W	685

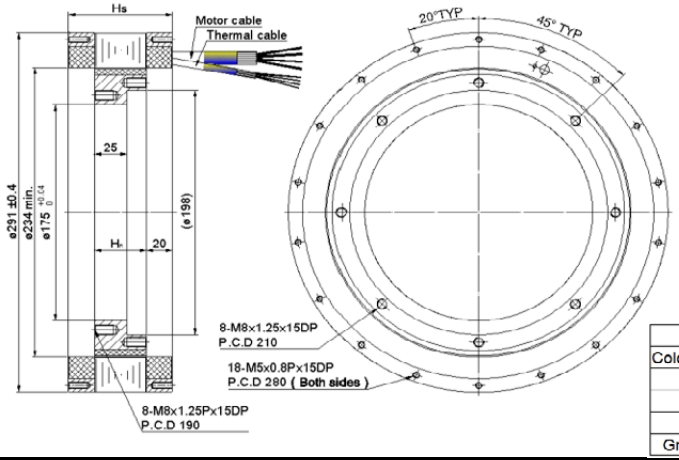
Mechanical specifications

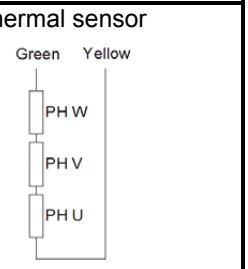
	Symbol	Unit	
Mass of motor	M_m	kg	33.7
Inertia of rotor	J	kgm^2	0.11
Height of stator	H_S	mm	160
Height of rotor	H	mm	120

T-N curve



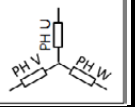






General tolerance mm	
Nominal dimension	Tolerance
~ 6	±0.1
> 6 ~ 30	±0.2
> 30 ~ 120	±0.3
> 120 ~ 300	±0.4
> 300 ~ 600	±0.5
> 600 ~ 1200	±0.8
> 1200 ~ 2400	±1.0
> 2400	±1.5

Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND



Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13
Date: 2017/1/16

Fig. 12.18 **Data sheet TMR7C**

R-UL-TMR7CL Torque Motor

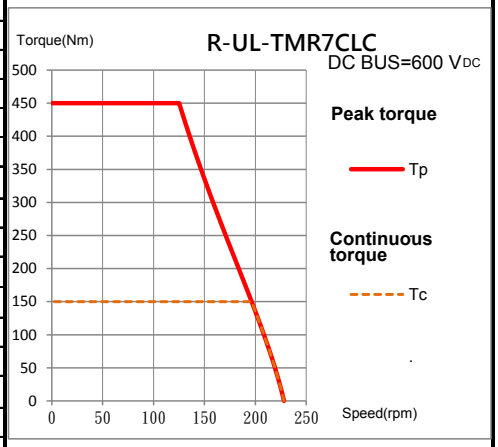
Electrical specifications

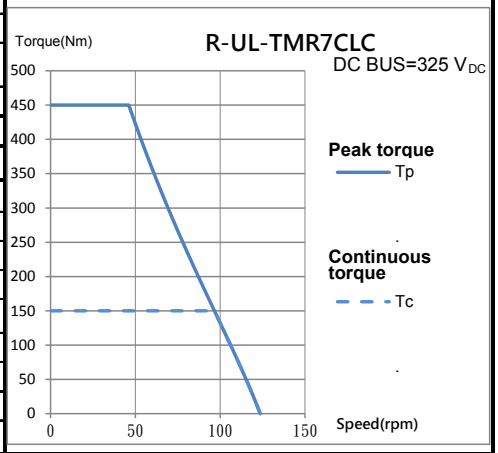
Winding code : SA	Symbol	Unit	
Continuous torque	T_c	Nm	150
Continuous current	I_c	A_{rms}	6.8
Stall torque	T_s	Nm	105
Stall current	I_s	A_{rms}	4.8
Peak torque(for 1sec.)	T_p	Nm	450
Peak current(for 1sec.)	I_p	A_{rms}	20.4
Torque constant	K_t	Nm/Arms	25.5
Electrical time constant	T_e	ms	5
Resistance (line to line at 25℃)	R_{25}	Ω	7.3
Inductance (line to line)	L	mH	36.3
Number of poles	2p		44
Back emf constant (line to line)	K_v	Vrms/rad/s	14.8
Motor constant (at 25℃)	K_m	Nm/√W	7.7
Thermal resistance	R_{th}	K/W	0.19
Thermal sensor			PTC SNM120
Max. DC BUS		V_{DC}	600
Thermal time constant	T_{th}	s	2350
Max. continuous power dissipation	P_c	W	690

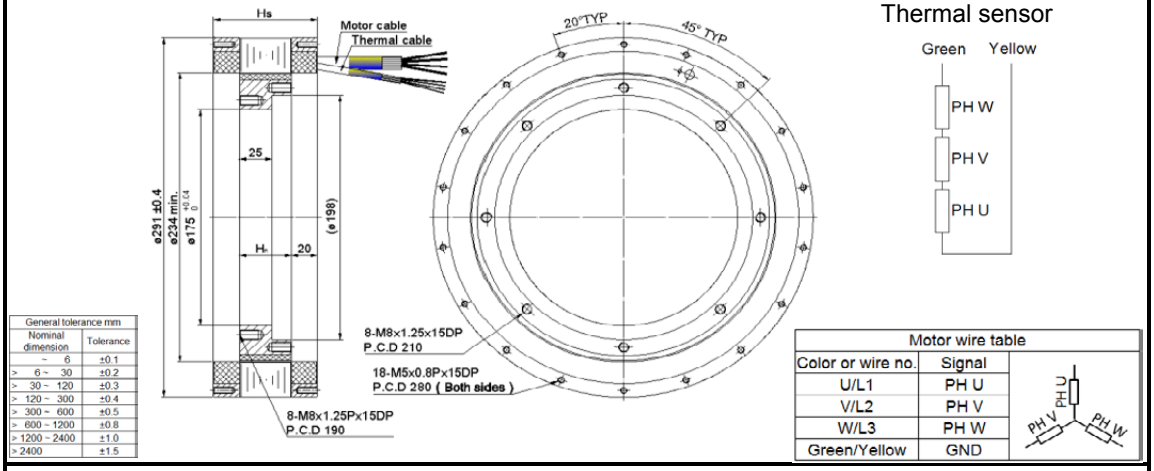
Mechanical specifications

	Symbol	Unit	
Mass of motor	M_m	kg	33.7
Inertia of rotor	J	kgm^2	0.11
Height of stator	H_S	mm	160
Height of rotor	H	mm	120

T-N curve







General tolerance mm	
Nominal dimension	Tolerance
~ 6	±0.1
> 6 ~ 30	±0.2
> 30 ~ 120	±0.3
> 120 ~ 300	±0.4
> 300 ~ 600	±0.5
> 600 ~ 1200	±0.8
> 1200 ~ 2400	±1.0
> 2400	±1.5

Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13
Date: 2017/1/16

Fig. 12.19 **Data sheet TMR7CL**

12.2 Data sheets for TMRW

TMRW13 Torque Motor DB001016

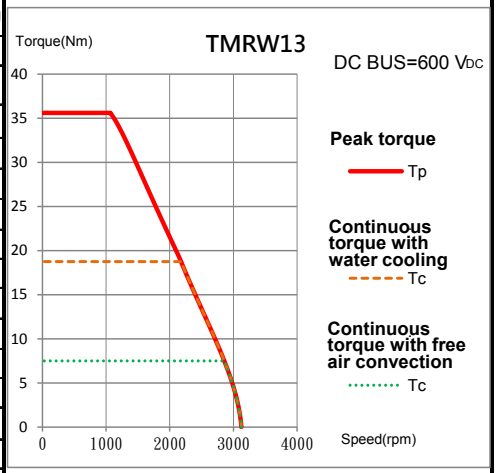
Electrical specifications

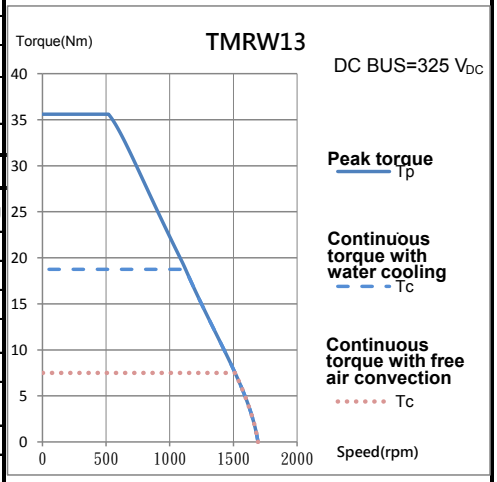
Winding code : LA	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	7.5	18.8
Continuous current	I_c	A_{rms}	4	10
Stall torque	T_s	Nm	5	13
Stall current	I_s	A_{rms}	2.8	7
Peak torque(for 1sec.)	T_p	Nm	35.6	
Peak current(for 1sec.)	I_p	A_{rms}	27	
Torque constant	K_t	Nm/Arms	1.87	
Electrical time constant	T_e	ms	3.2	
Resistance (line to line at 25℃)	R_{25}	Ω	3.3	
Inductance (line to line)	L	mH	10.5	
Number of poles	2p		22	
Back emf constant (line to line)	K_v	Vrms/rad/s	1.08	
Motor constant (at 25℃)	K_m	Nm/√W	0.84	
Thermal resistance	R_{th}	K/W	1.2	0.192
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.001	
Thermal time constant	T_{th}	s	2300	130
Max. continuous power dissipation	P_c	W	108	679
Rated speed(at 600VDC)		rpm	820	

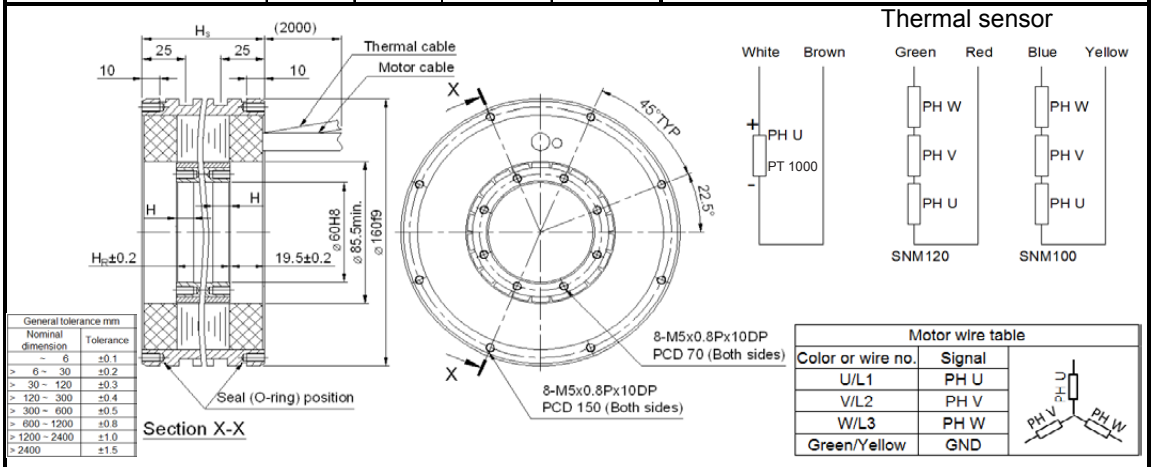
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	0.6	
Mass of stator	M_S	kg	3.7	
Height of stator	H_S	mm	70	
Height of rotor	H_R	mm	31	
Length of rotor centring fit	H	mm	10	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	2
Max. pressure drop	△p	bar	-	1

T-N curve







Motor wire table

Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.20 **Data sheet TMRW13**

TMRW13L Torque Motor DB001017

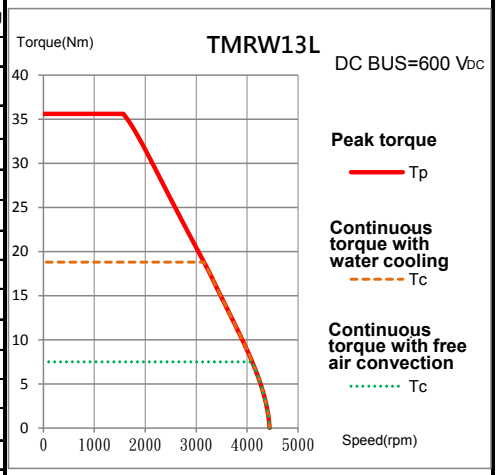
Electrical specifications

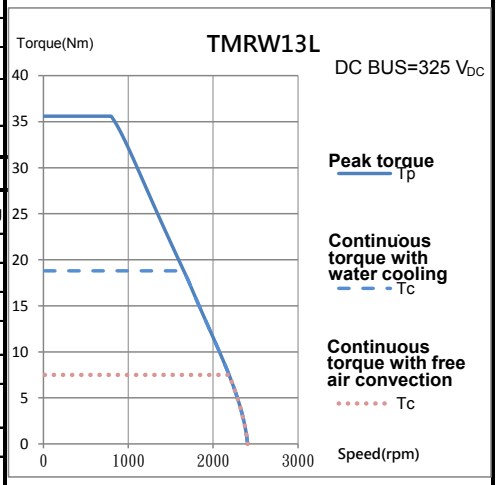
Winding code : PA	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	7.5	18.8
Continuous current	I_c	A_{rms}	5.7	14.4
Stall torque	T_s	Nm	5	13
Stall current	I_s	A_{rms}	4	10.1
Peak torque(for 1sec.)	T_p	Nm	35.6	
Peak current(for 1sec.)	I_p	A_{rms}	38.9	
Torque constant	K_t	Nm/Arms	1.32	
Electrical time constant	T_e	ms	3.2	
Resistance (line to line at 25℃)	R_{25}	Ω	1.6	
Inductance (line to line)	L	mH	5.1	
Number of poles	2p		22	
Back emf constant (line to line)	K_v	Vrms/rad/s	0.76	
Motor constant (at 25℃)	K_m	Nm/√W	0.85	
Thermal resistance	R_{th}	K/W	1.22	0.191
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.001	
Thermal time constant	T_{th}	s	2300	130
Max. continuous power dissipation	P_c	W	107	684
Rated speed(at 600VDC)		rpm	820	

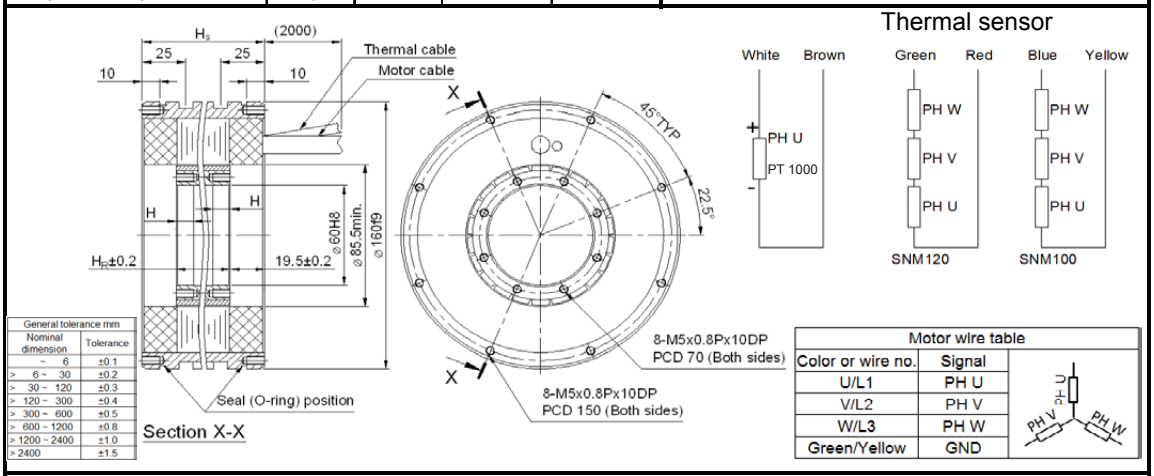
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	0.6	
Mass of stator	M_S	kg	3.7	
Height of stator	H_S	mm	70	
Height of rotor	H_R	mm	31	
Length of rotor centring fit	H	mm	10	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	2
Max. pressure drop	△p	bar	-	1

T-N curve







Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.21 **Data sheet TMRW13L**

TMRW15 Torque Motor

DB001018

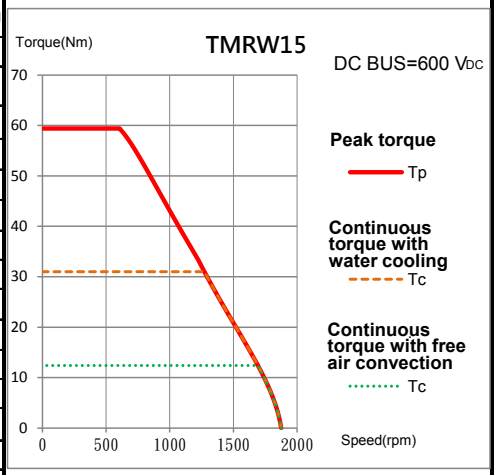
Electrical specifications

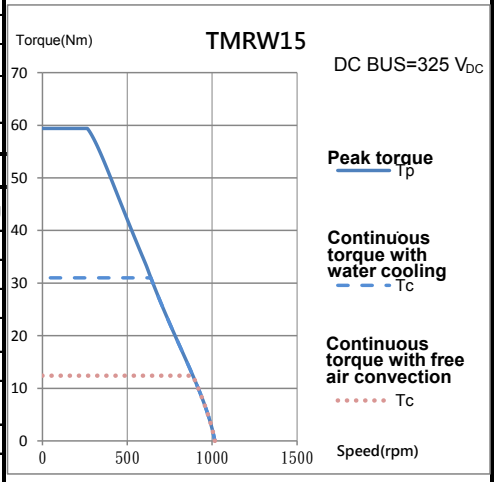
Winding code : LA	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	12.4	31.3
Continuous current	I_c	A_{rms}	4	10
Stall torque	T_s	Nm	9	22
Stall current	I_s	A_{rms}	2.8	7
Peak torque(for 1sec.)	T_p	Nm	59.4	
Peak current(for 1sec.)	I_p	A_{rms}	27	
Torque constant	K_t	Nm/Arms	3.1	
Electrical time constant	T_e	ms	3.6	
Resistance (line to line at 25℃)	R_{25}	Ω	4.88	
Inductance (line to line)	L	mH	17.5	
Number of poles	2p		22	
Back emf constant (line to line)	K_v	Vrms/rad/s	1.8	
Motor constant (at 25℃)	K_m	Nm/√W	1.15	
Thermal resistance	R_{th}	K/W	0.81	0.13
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.0016	
Thermal time constant	T_{th}	s	2720	98
Max. continuous power dissipation	P_c	W	160	1005
Rated speed(at 600VDC)		rpm	820	

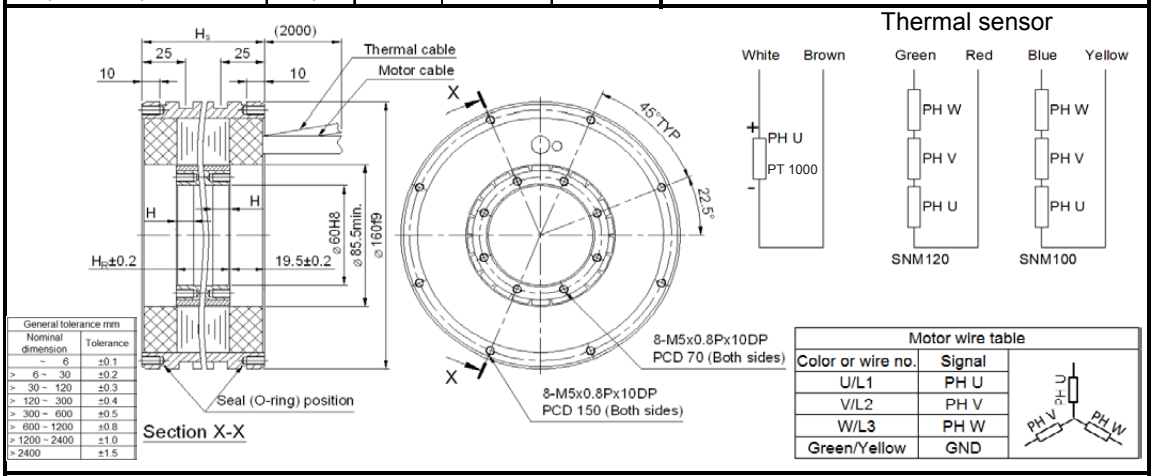
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	1	
Mass of stator	M_S	kg	5.1	
Height of stator	H_S	mm	90	
Height of rotor	H_R	mm	51	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	2.9
Max. pressure drop	△p	bar	-	1

T-N curve







Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.22 **Data sheet TMRW15**

TMRW15L Torque Motor DB001019

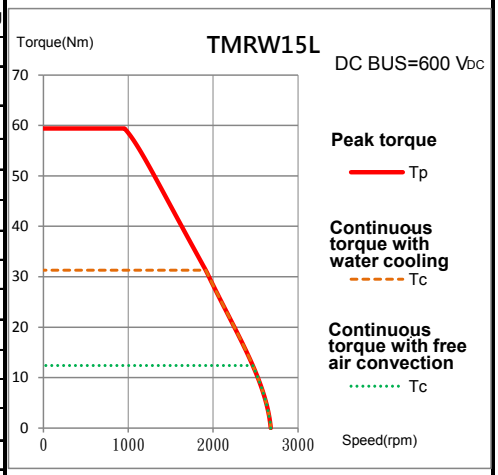
Electrical specifications

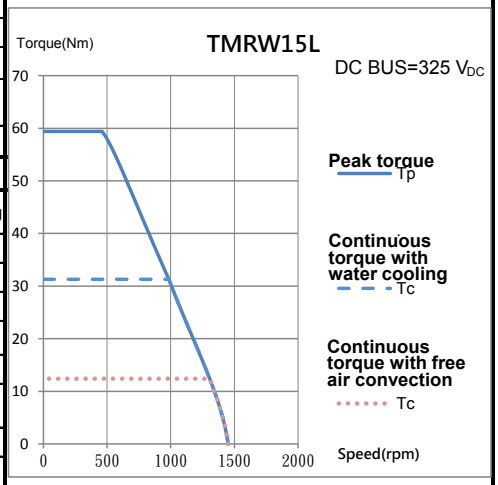
Winding code : PA	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	12.4	31.3
Continuous current	I_c	A_{rms}	5.7	14.4
Stall torque	T_s	Nm	9	22
Stall current	I_s	A_{rms}	4	10.1
Peak torque(for 1sec.)	T_p	Nm	59.4	
Peak current(for 1sec.)	I_p	A_{rms}	38.9	
Torque constant	K_t	Nm/Arms	2.18	
Electrical time constant	T_e	ms	3.4	
Resistance (line to line at 25℃)	R_{25}	Ω	2.36	
Inductance (line to line)	L	mH	8	
Number of poles	2p		22	
Back emf constant (line to line)	K_v	Vrms/rad/s	1.26	
Motor constant (at 25℃)	K_m	Nm/√W	1.16	
Thermal resistance	R_{th}	K/W	0.83	0.129
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.0016	
Thermal time constant	T_{th}	s	2720	98
Max. continuous power dissipation	P_c	W	157	1007
Rated speed(at 600VDC)		rpm	820	

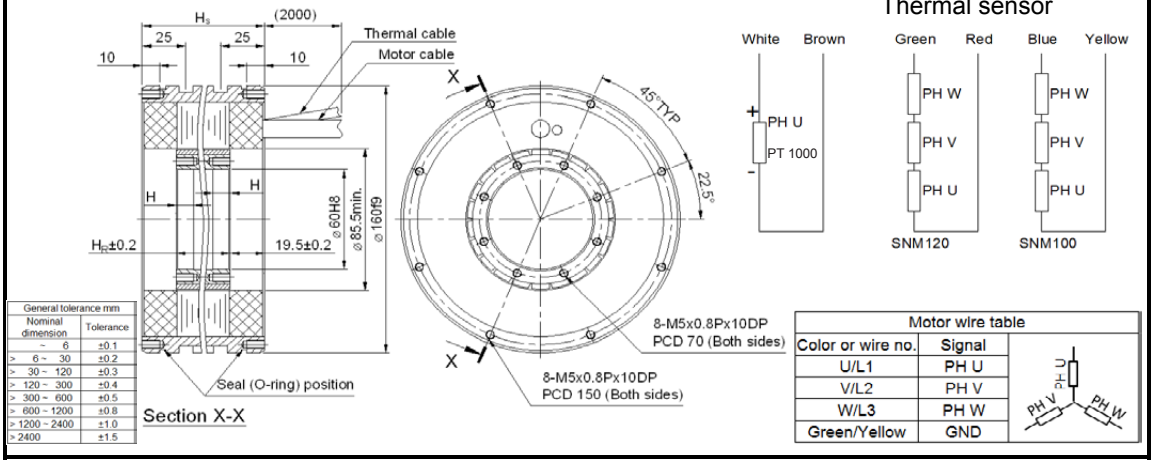
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	1	
Mass of stator	M_S	kg	5.1	
Height of stator	H_S	mm	90	
Height of rotor	H_R	mm	51	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	$\triangle\theta$	K	-	5
Minimum water flow	q	l/min	-	2.9
Max. pressure drop	$\triangle p$	bar	-	1

T-N curve







Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.23 **Data sheet TMRW15L**

TMRW17 Torque Motor DB001020

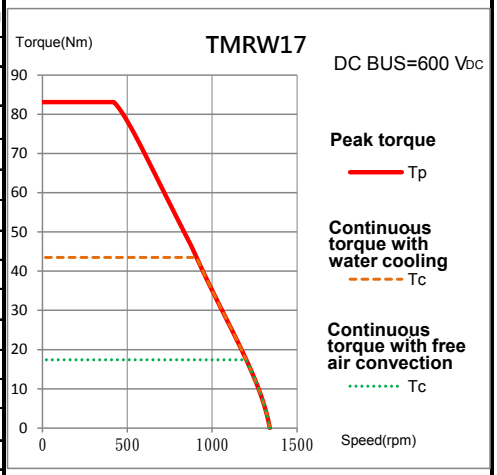
Electrical specifications

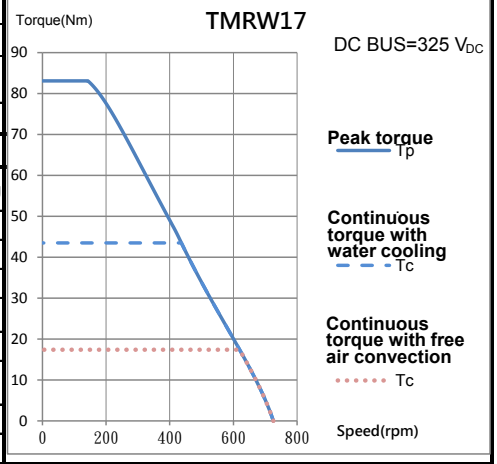
Winding code : LA	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	17.4	43.8
Continuous current	I_c	A_{rms}	4	10
Stall torque	T_s	Nm	12	31
Stall current	I_s	A_{rms}	2.8	7
Peak torque(for 1sec.)	T_p	Nm	83.1	
Peak current(for 1sec.)	I_p	A_{rms}	27	
Torque constant	K_t	Nm/Arms	4.36	
Electrical time constant	T_e	ms	3.3	
Resistance (line to line at 25℃)	R_{25}	Ω	6.83	
Inductance (line to line)	L	mH	22.5	
Number of poles	2p		22	
Back emf constant (line to line)	K_v	Vrms/rad/s	2.52	
Motor constant (at 25℃)	K_m	Nm/√W	1.36	
Thermal resistance	R_{th}	K/W	0.58	0.093
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.0023	
Thermal time constant	T_{th}	s	2910	110
Max. continuous power dissipation	P_c	W	224	1405
Rated speed(at 600VDC)		rpm	820	

Mechanical specifications

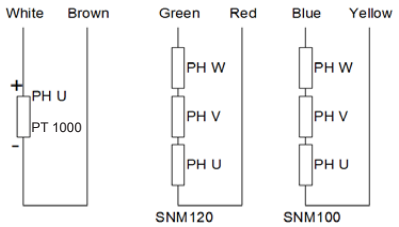
	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	1.4	
Mass of stator	M_S	kg	6.2	
Height of stator	H_S	mm	110	
Height of rotor	H_R	mm	71	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	4.1
Max. pressure drop	△p	bar	-	1

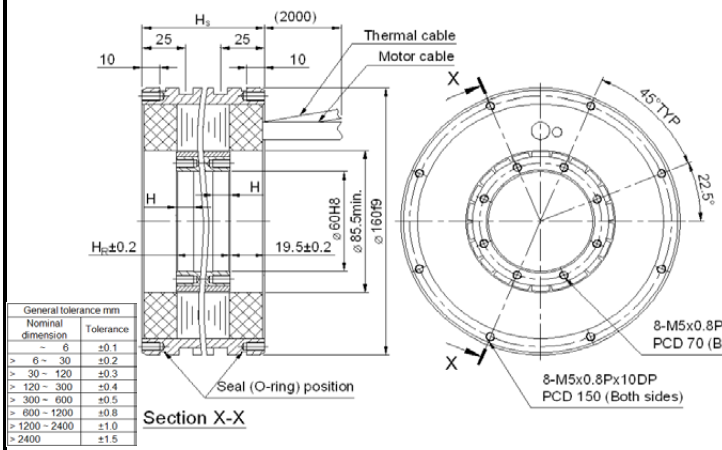
T-N curve





Thermal sensor





General tolerance mm

Nominal dimension	Tolerance
~ 6	±0.1
> 6 ~ 30	±0.2
> 30 ~ 120	±0.3
> 120 ~ 300	±0.4
> 300 ~ 600	±0.5
> 600 ~ 1200	±0.8
> 1200 ~ 2400	±1.0
> 2400	±1.5

Motor wire table

Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.24 **Data sheet TMRW17**

TMRW17L Torque Motor DB001021

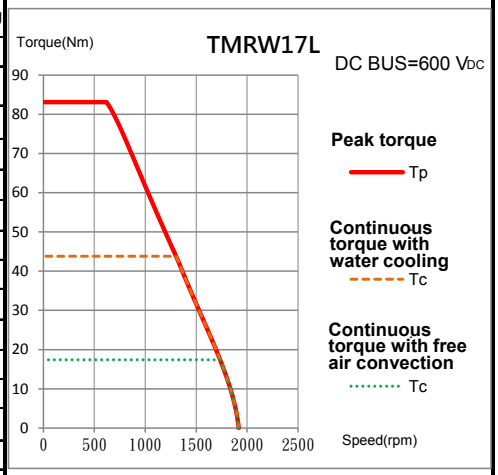
Electrical specifications

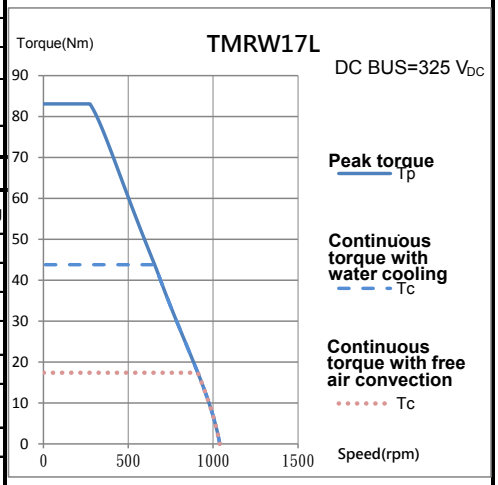
Winding code : PA	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	17.4	43.8
Continuous current	I_c	A_{rms}	5.7	14.4
Stall torque	T_s	Nm	12	31
Stall current	I_s	A_{rms}	4	10.1
Peak torque(for 1sec.)	T_p	Nm	83.1	
Peak current(for 1sec.)	I_p	A_{rms}	38.9	
Torque constant	K_t	Nm/Arms	3.06	
Electrical time constant	T_e	ms	3.6	
Resistance (line to line at 25℃)	R_{25}	Ω	3.32	
Inductance (line to line)	L	mH	11.9	
Number of poles	2p		22	
Back emf constant (line to line)	K_v	Vrms/rad/s	1.76	
Motor constant (at 25℃)	K_m	Nm/√W	1.37	
Thermal resistance	R_{th}	K/W	0.59	0.092
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.0023	
Thermal time constant	T_{th}	s	2910	110
Max. continuous power dissipation	P_c	W	222	1418
Rated speed(at 600VDC)		rpm	820	

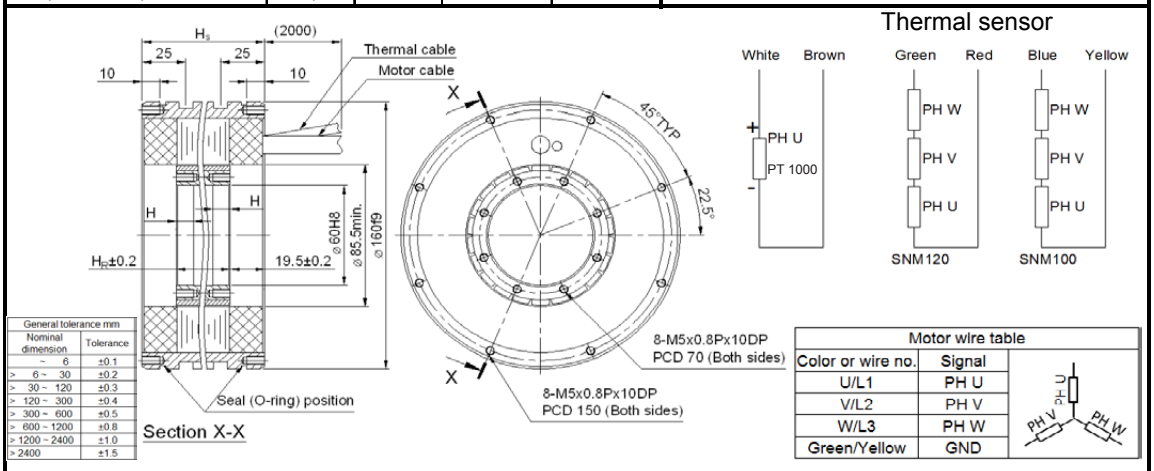
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	1.4	
Mass of stator	M_S	kg	6.2	
Height of stator	H_S	mm	110	
Height of rotor	H_R	mm	71	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	$\triangle\theta$	K	-	5
Minimum water flow	q	l/min	-	4.1
Max. pressure drop	$\triangle p$	bar	-	1

T-N curve







Thermal sensor

Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.25 **Data sheet TMRW17L**

TMRW1A Torque Motor DB001000

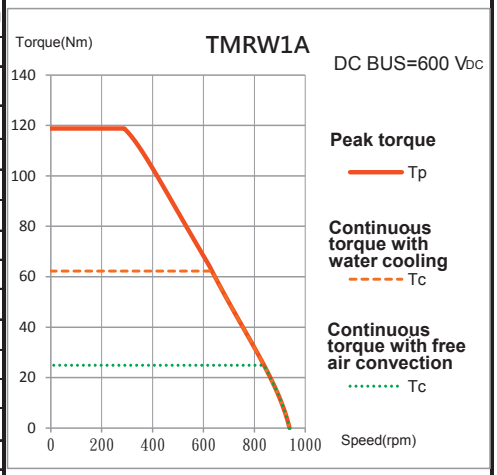
Electrical specifications

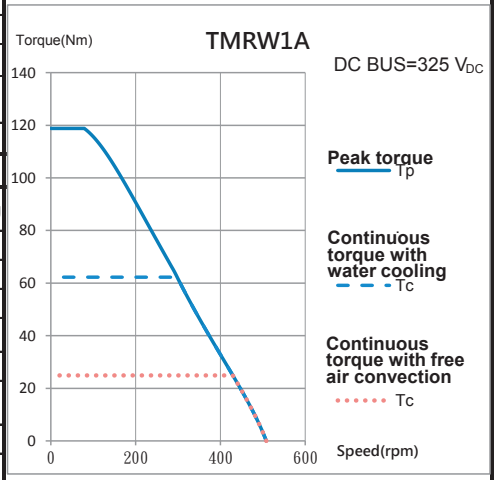
Winding code : LA	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	24.9	62.5
Continuous current	I_c	A_{rms}	4	10
Stall torque	T_s	Nm	17	44
Stall current	I_s	A_{rms}	2.8	7
Peak torque(for 1sec.)	T_p	Nm	118.8	
Peak current(for 1sec.)	I_p	A_{rms}	27	
Torque constant	K_t	Nm/Arms	6.23	
Electrical time constant	T_e	ms	4	
Resistance (line to line at 25℃)	R_{25}	Ω	7.7	
Inductance (line to line)	L	mH	31	
Number of poles	2p		22	
Back emf constant (line to line)	K_v	Vrms/rad/s	3.6	
Motor constant (at 25℃)	K_m	Nm/√W	1.83	
Thermal resistance	R_{th}	K/W	0.51	0.082
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.0033	
Thermal time constant	T_{th}	s	2690	74
Max. continuous power dissipation	P_c	W	253	1585
Rated speed(at 600VDC)		rpm	820	

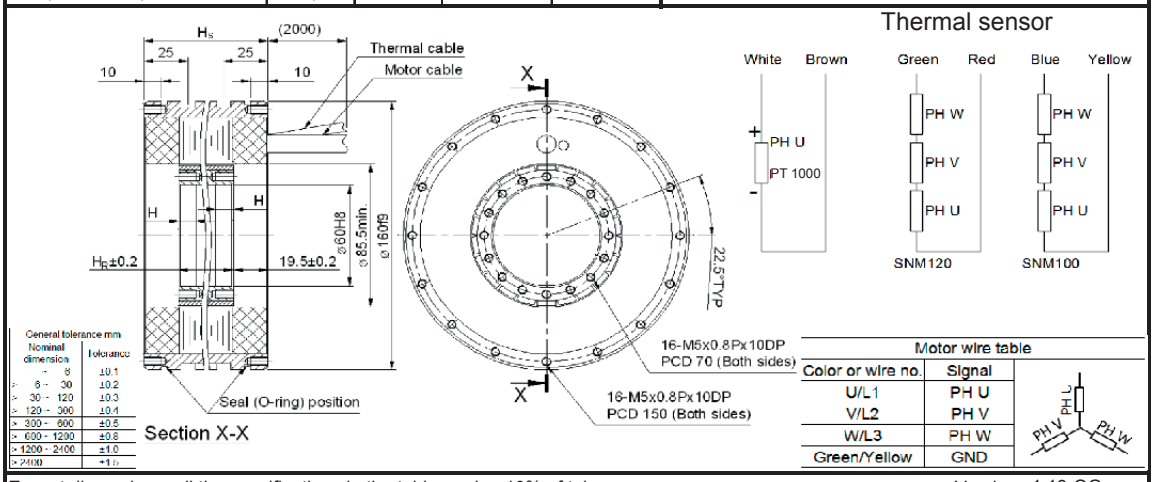
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	2	
Mass of stator	M_S	kg	8.6	
Height of stator	H_S	mm	140	
Height of rotor	H_R	mm	101	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	4.6
Max. pressure drop	△p	bar	-	1

T-N curve







Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.26 **Data sheet TMRW1A**

TMRW1AL Torque Motor DB001001

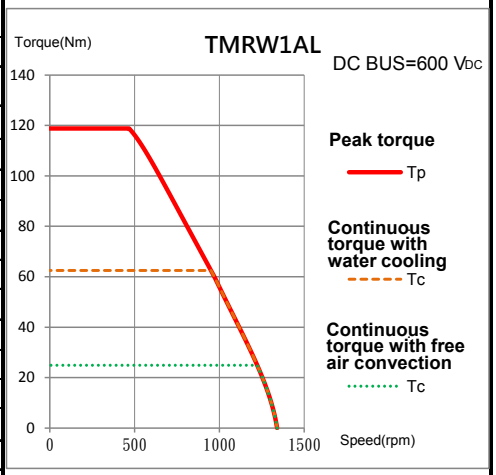
Electrical specifications

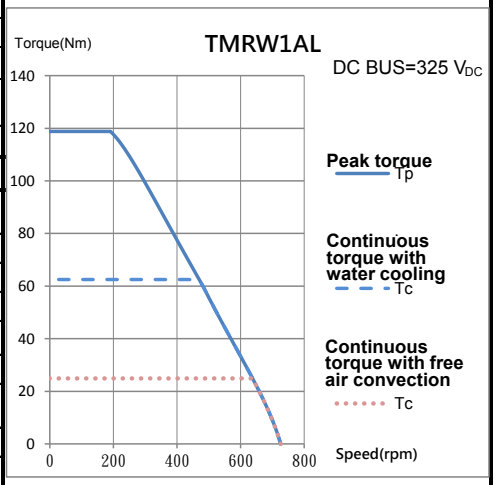
Winding code : PA	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	24.9	62.5
Continuous current	I_c	A_{rms}	5.7	14.4
Stall torque	T_s	Nm	17	44
Stall current	I_s	A_{rms}	4	10.1
Peak torque(for 1sec.)	T_p	Nm	118.8	
Peak current(for 1sec.)	I_p	A_{rms}	38.9	
Torque constant	K_t	Nm/Arms	4.36	
Electrical time constant	T_e	ms	3.9	
Resistance (line to line at 25℃)	R_{25}	Ω	3.8	
Inductance (line to line)	L	mH	14.8	
Number of poles	2p		22	
Back emf constant (line to line)	K_v	Vrms/rad/s	2.52	
Motor constant (at 25℃)	K_m	Nm/√W	1.83	
Thermal resistance	R_{th}	K/W	0.51	0.08
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.0033	
Thermal time constant	T_{th}	s	2690	74
Max. continuous power dissipation	P_c	W	254	1623
Rated speed(at 600VDC)		rpm	820	

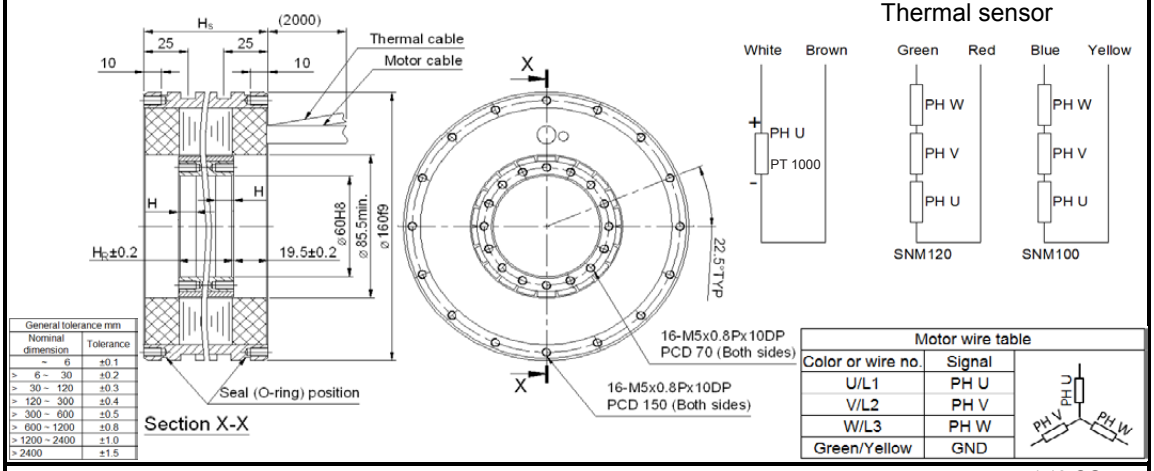
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	2	
Mass of stator	M_S	kg	8.6	
Height of stator	H_S	mm	140	
Height of rotor	H_R	mm	101	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	▵θ	K	-	5
Minimum water flow	q	l/min	-	4.7
Max. pressure drop	▵p	bar	-	1

T-N curve







General tolerance mm	
Nominal dimension	Tolerance
~ 6	±0.1
> 6 ~ 30	±0.2
> 30 ~ 120	±0.3
> 120 ~ 300	±0.4
> 300 ~ 600	±0.5
> 600 ~ 1200	±0.8
> 1200 ~ 2400	±1.0
> 2400	±1.5

Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.27 **Data sheet TMRW1AL**

TMRW1F Torque Motor

DB001002

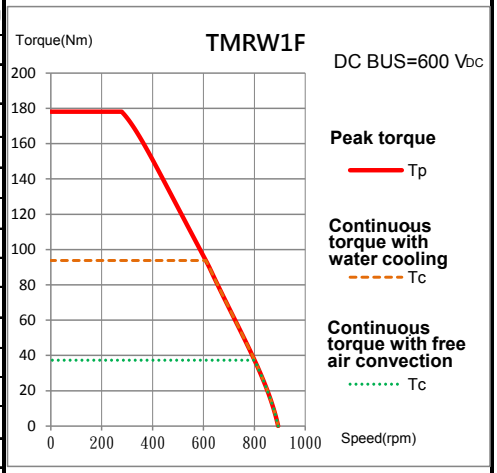
Electrical specifications

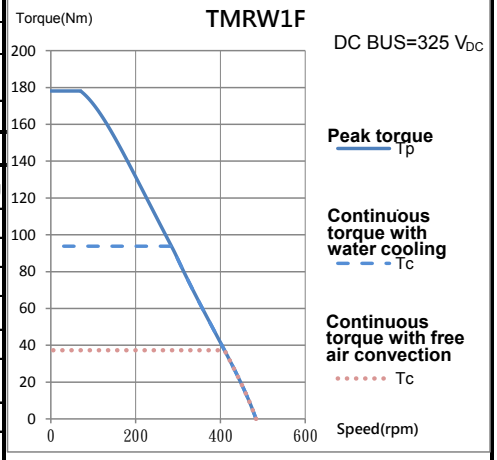
Winding code : PA	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	37.3	93.8
Continuous current	I_c	A_{rms}	5.7	14.4
Stall torque	T_s	Nm	26	66
Stall current	I_s	A_{rms}	4	10.1
Peak torque(for 1sec.)	T_p	Nm	178.1	
Peak current(for 1sec.)	I_p	A_{rms}	38.9	
Torque constant	K_t	Nm/Arms	6.55	
Electrical time constant	T_e	ms	3.9	
Resistance (line to line at 25℃)	R_{25}	Ω	5.5	
Inductance (line to line)	L	mH	21.7	
Number of poles	2p		22	
Back emf constant (line to line)	K_v	Vrms/rad/s	3.78	
Motor constant (at 25℃)	K_m	Nm/√W	2.28	
Thermal resistance	R_{th}	K/W	0.35	0.056
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.0049	
Thermal time constant	T_{th}	s	2890	92
Max. continuous power dissipation	P_c	W	367	2348
Rated speed(at 600VDC)		rpm	800	

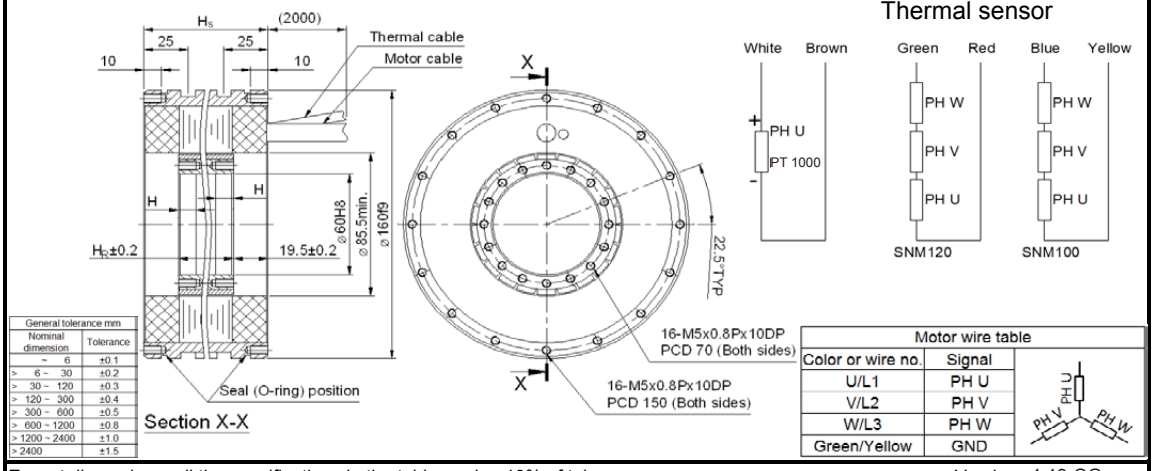
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	3	
Mass of stator	M_S	kg	12.2	
Height of stator	H_S	mm	190	
Height of rotor	H_R	mm	151	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	6.8
Max. pressure drop	△p	bar	-	1

T-N curve







Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.28 **Data sheet TMRW1F**

TMRW1FL Torque Motor DB001003

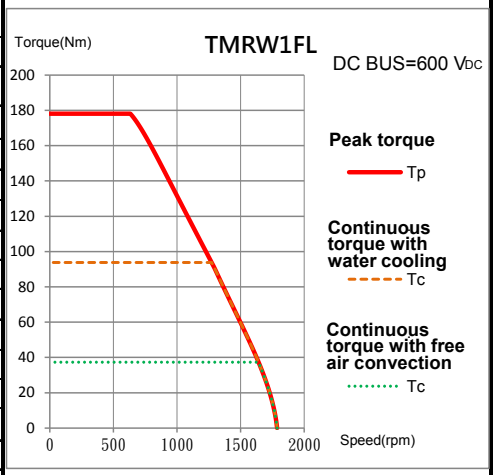
Electrical specifications

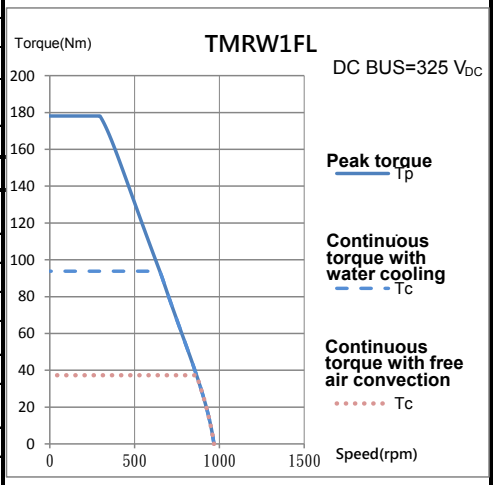
Winding code : PB	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	37.3	93.8
Continuous current	I_c	A_{rms}	11.4	28.8
Stall torque	T_s	Nm	26	66
Stall current	I_s	A_{rms}	8	20.2
Peak torque(for 1sec.)	T_p	Nm	178.1	
Peak current(for 1sec.)	I_p	A_{rms}	77.8	
Torque constant	K_t	Nm/Arms	3.27	
Electrical time constant	T_e	ms	4.3	
Resistance (line to line at 25℃)	R_{25}	Ω	1.37	
Inductance (line to line)	L	mH	5.9	
Number of poles	2p		22	
Back emf constant (line to line)	K_v	Vrms/rad/s	1.89	
Motor constant (at 25℃)	K_m	Nm/√W	2.28	
Thermal resistance	R_{th}	K/W	0.36	0.056
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.0049	
Thermal time constant	T_{th}	s	2890	92
Max. continuous power dissipation	P_c	W	366	2339
Rated speed(at 600VDC)		rpm	820	

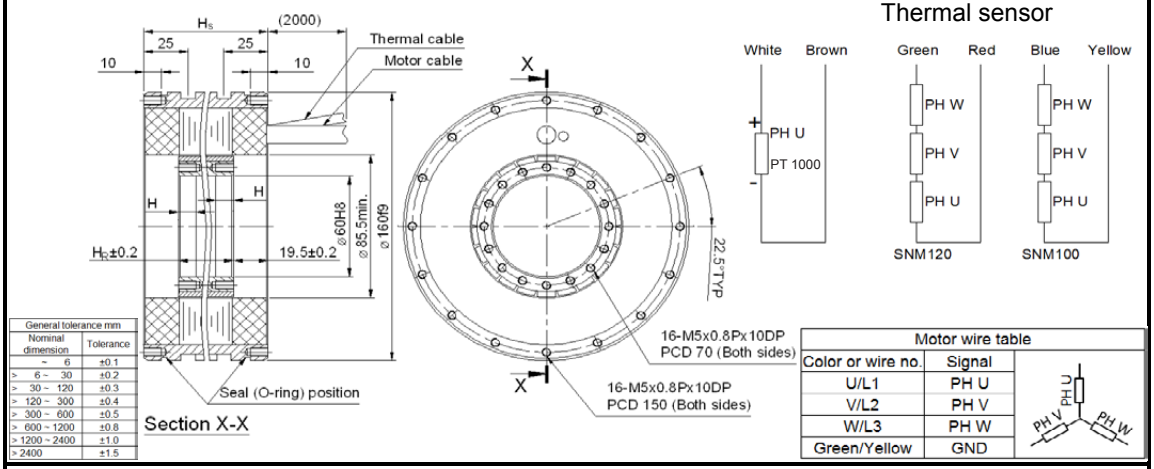
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	3	
Mass of stator	M_S	kg	12.2	
Height of stator	H_S	mm	190	
Height of rotor	H_R	mm	151	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	6.7
Max. pressure drop	△p	bar	-	1

T-N curve







Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.29 **Data sheet TMRW1FL**

TMRW23 Torque Motor

DB001022

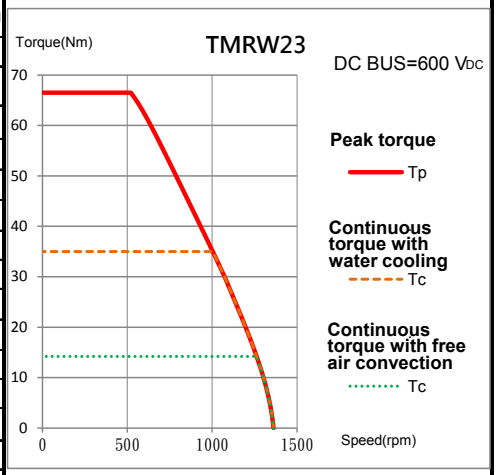
Electrical specifications

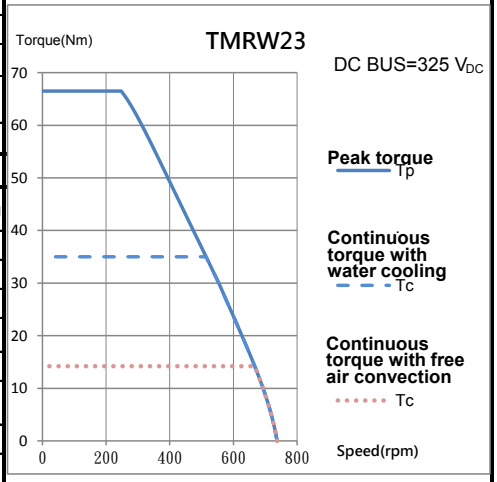
Winding code : PA	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	14.2	35
Continuous current	I_c	A_{rms}	3.3	8.3
Stall torque	T_s	Nm	10	25
Stall current	I_s	A_{rms}	2.3	5.8
Peak torque(for 1sec.)	T_p	Nm	66.5	
Peak current(for 1sec.)	I_p	A_{rms}	22.3	
Torque constant	K_t	Nm/Arms	4.29	
Electrical time constant	T_e	ms	5.8	
Resistance (line to line at 25℃)	R_{25}	Ω	4.3	
Inductance (line to line)	L	mH	24.95	
Number of poles	2p		22	
Back emf constant (line to line)	K_v	Vrms/rad/s	2.48	
Motor constant (at 25℃)	K_m	Nm/√W	1.68	
Thermal resistance	R_{th}	K/W	1.35	0.214
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.0027	
Thermal time constant	T_{th}	s	2750	180
Max. continuous power dissipation	P_c	W	96	609
Rated speed(at 600VDC)		rpm	820	

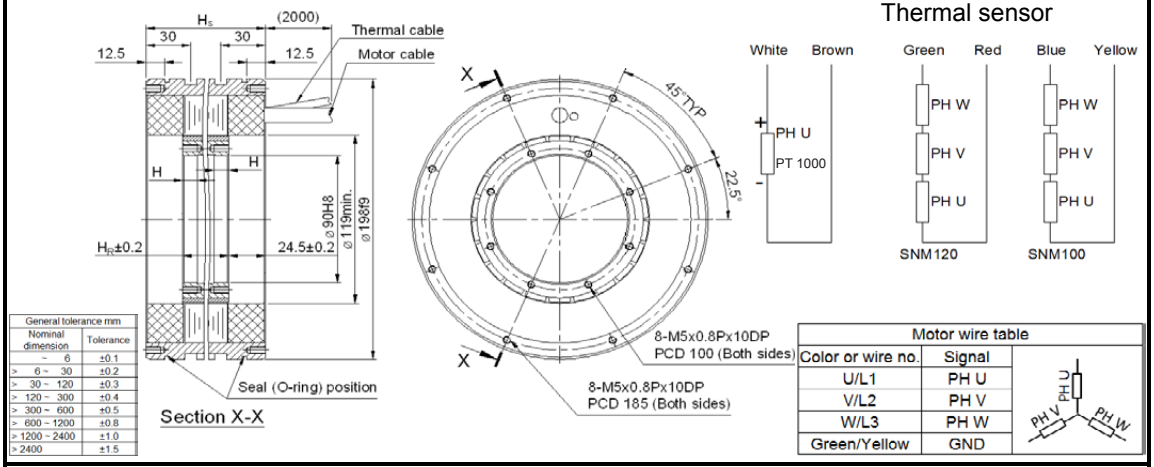
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	0.95	
Mass of stator	M_S	kg	6.1	
Height of stator	H_S	mm	80	
Height of rotor	H_R	mm	31	
Length of rotor centring fit	H	mm	10	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	1.8
Max. pressure drop	△p	bar	-	1

T-N curve







Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.30 **Data sheet TMRW23**

TMRW23L Torque Motor DB001023

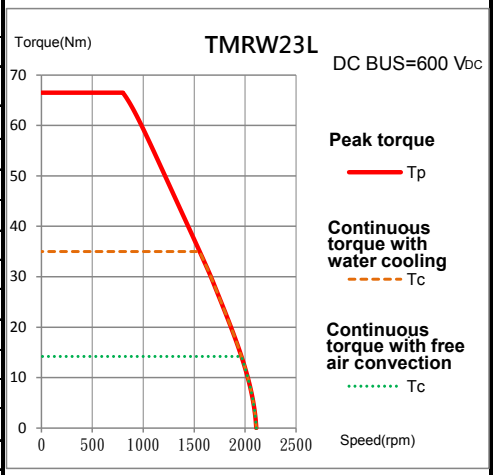
Electrical specifications

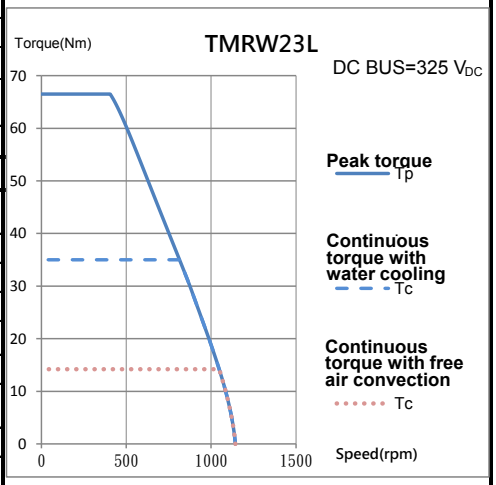
Winding code : SA	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	14.2	35
Continuous current	I_c	A_{rms}	4.9	12.3
Stall torque	T_s	Nm	10	25
Stall current	I_s	A_{rms}	3.4	8.6
Peak torque(for 1sec.)	T_p	Nm	66.5	
Peak current(for 1sec.)	I_p	A_{rms}	33.2	
Torque constant	K_t	Nm/Arms	2.8	
Electrical time constant	T_e	ms	6.1	
Resistance (line to line at 25℃)	R_{25}	Ω	1.9	
Inductance (line to line)	L	mH	11.5	
Number of poles	2p		22	
Back emf constant (line to line)	K_v	Vrms/rad/s	1.6	
Motor constant (at 25℃)	K_m	Nm/√W	1.72	
Thermal resistance	R_{th}	K/W	1.39	0.22
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.0027	
Thermal time constant	T_{th}	s	2750	180
Max. continuous power dissipation	P_c	W	93	592
Rated speed(at 600VDC)		rpm	820	

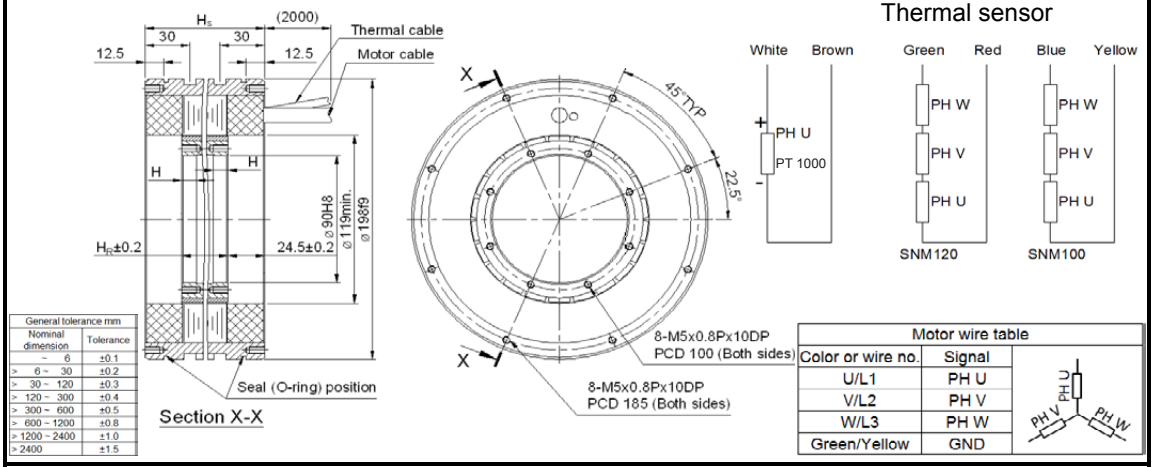
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	0.95	
Mass of stator	M_S	kg	6.1	
Height of stator	H_S	mm	80	
Height of rotor	H_R	mm	31	
Length of rotor centring fit	H	mm	10	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	1.7
Max. pressure drop	△p	bar	-	1

T-N curve







Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.31 **Data sheet TMRW23L**

TMRW25 Torque Motor

DB001024

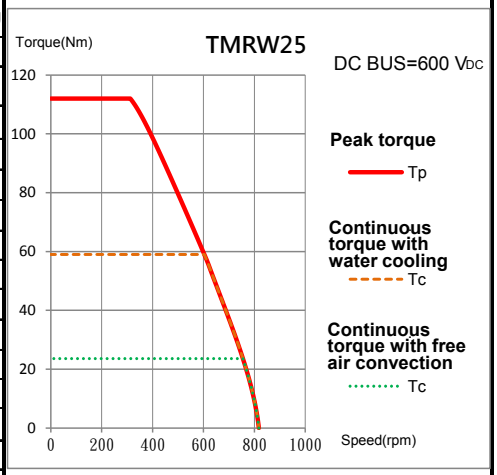
Electrical specifications

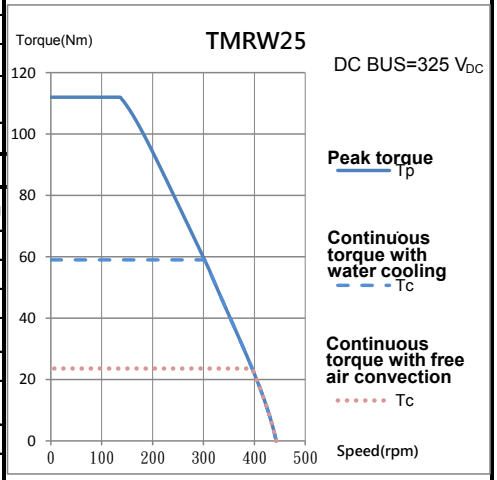
Winding code : PA	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	23.6	59
Continuous current	I_c	A_{rms}	3.3	8.3
Stall torque	T_s	Nm	17	41
Stall current	I_s	A_{rms}	2.3	5.8
Peak torque(for 1sec.)	T_p	Nm	112	
Peak current(for 1sec.)	I_p	A_{rms}	22.3	
Torque constant	K_t	Nm/Arms	7.16	
Electrical time constant	T_e	ms	6.8	
Resistance (line to line at 25℃)	R_{25}	Ω	5.7	
Inductance (line to line)	L	mH	39	
Number of poles	2p		22	
Back emf constant (line to line)	K_v	Vrms/rad/s	4.13	
Motor constant (at 25℃)	K_m	Nm/√W	2.45	
Thermal resistance	R_{th}	K/W	1.02	0.161
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.0045	
Thermal time constant	T_{th}	s	2570	110
Max. continuous power dissipation	P_c	W	127	808
Rated speed(at 600VDC)		rpm	750	

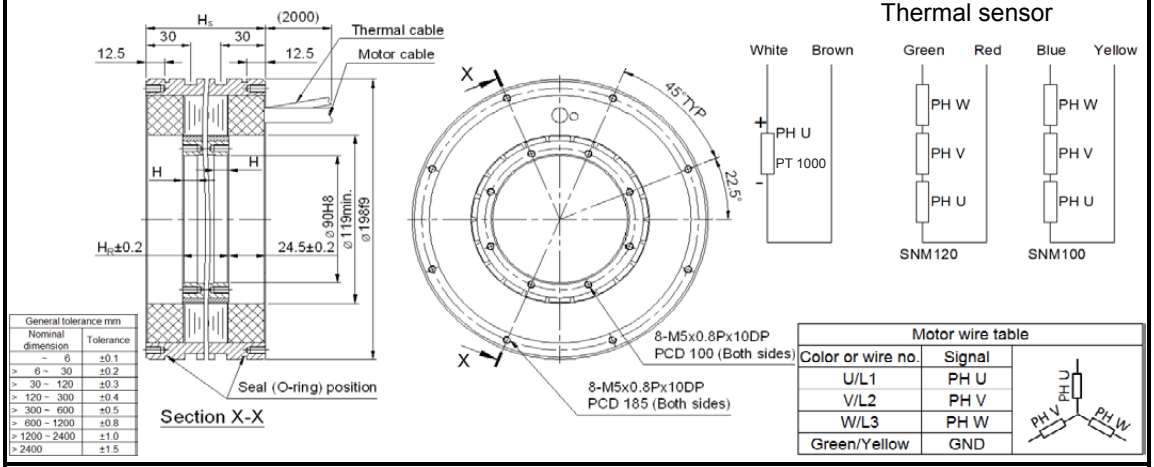
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	1.6	
Mass of stator	M_S	kg	8.4	
Height of stator	H_S	mm	100	
Height of rotor	H_R	mm	51	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	2.4
Max. pressure drop	△p	bar	-	1

T-N curve







General tolerance mm

Nominal dimension	Tolerance
~ 6	±0.1
> 6 ~ 30	±0.2
> 30 ~ 120	±0.3
> 120 ~ 300	±0.4
> 300 ~ 600	±0.5
> 600 ~ 1200	±0.8
> 1200 ~ 2400	±1.0
> 2400	±1.5

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.32 **Data sheet TMRW25**

TMRW25L Torque Motor DB001025

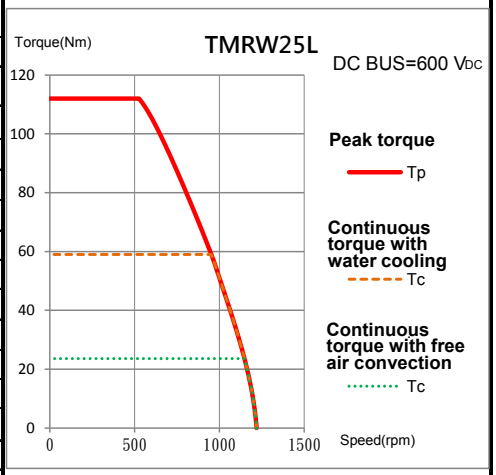
Electrical specifications

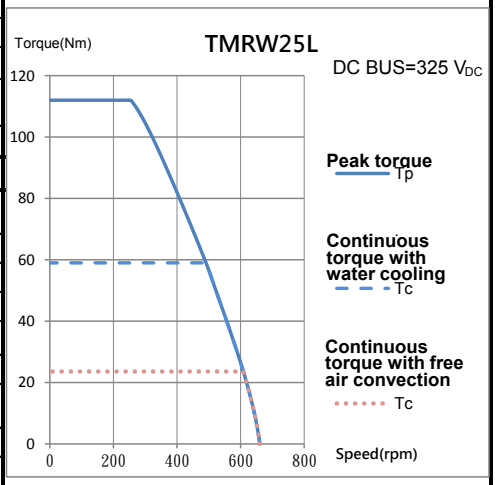
Winding code : SA	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	23.6	59
Continuous current	I_c	A_{rms}	4.9	12.3
Stall torque	T_s	Nm	17	41
Stall current	I_s	A_{rms}	3.4	8.6
Peak torque(for 1sec.)	T_p	Nm	112	
Peak current(for 1sec.)	I_p	A_{rms}	33.2	
Torque constant	K_t	Nm/Arms	4.8	
Electrical time constant	T_e	ms	6.5	
Resistance (line to line at 25℃)	R_{25}	Ω	2.5	
Inductance (line to line)	L	mH	16.23	
Number of poles	2p		22	
Back emf constant (line to line)	K_v	Vrms/rad/s	2.77	
Motor constant (at 25℃)	K_m	Nm/√W	2.49	
Thermal resistance	R_{th}	K/W	1.06	0.167
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.0045	
Thermal time constant	T_{th}	s	2570	110
Max. continuous power dissipation	P_c	W	123	778
Rated speed(at 600VDC)		rpm	820	

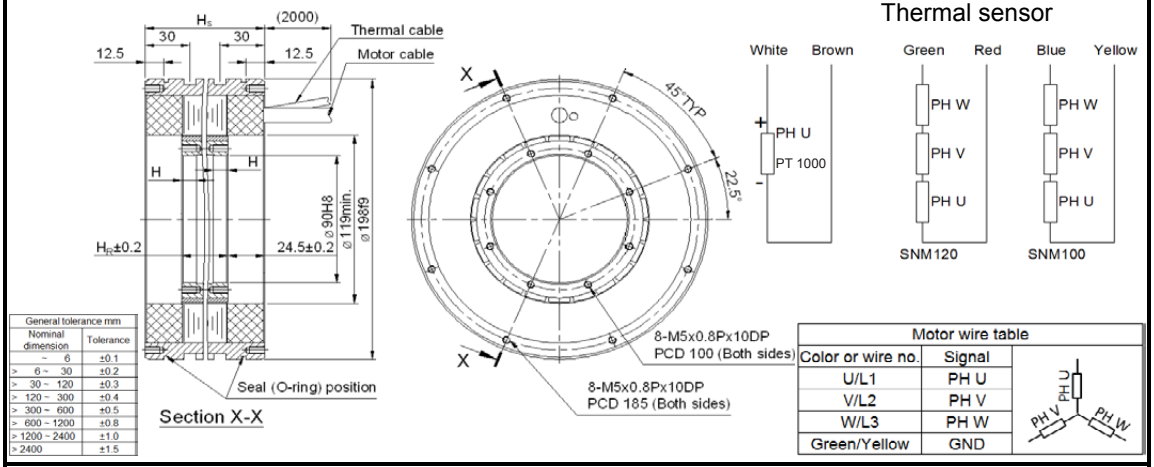
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	1.6	
Mass of stator	M_S	kg	8.4	
Height of stator	H_S	mm	100	
Height of rotor	H_R	mm	51	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	2.3
Max. pressure drop	△p	bar	-	1

T-N curve







Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.33 **Data sheet TMRW25L**

TMRW27 Torque Motor

DB001026

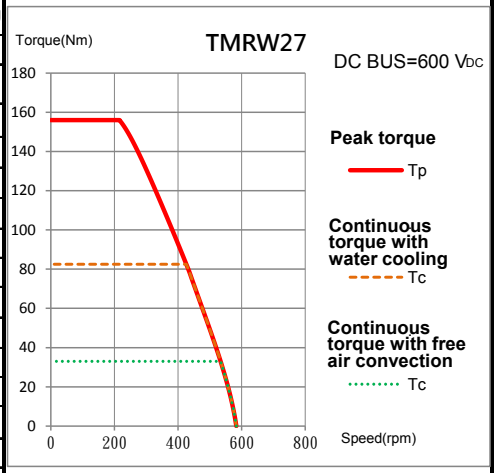
Electrical specifications

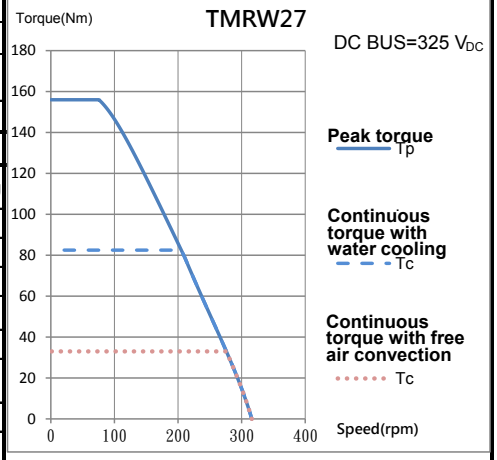
Winding code : PA	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	33	82.5
Continuous current	I_c	A_{rms}	3.3	8.3
Stall torque	T_s	Nm	23	58
Stall current	I_s	A_{rms}	2.3	5.8
Peak torque(for 1sec.)	T_p	Nm	156	
Peak current(for 1sec.)	I_p	A_{rms}	22.3	
Torque constant	K_t	Nm/Arms	10.03	
Electrical time constant	T_e	ms	6.5	
Resistance (line to line at 25℃)	R_{25}	Ω	7.8	
Inductance (line to line)	L	mH	50.7	
Number of poles	2p		22	
Back emf constant (line to line)	K_v	Vrms/rad/s	5.79	
Motor constant (at 25℃)	K_m	Nm/√W	2.92	
Thermal resistance	R_{th}	K/W	0.75	0.118
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.0063	
Thermal time constant	T_{th}	s	2680	120
Max. continuous power dissipation	P_c	W	174	1105
Rated speed(at 600VDC)		rpm	530	

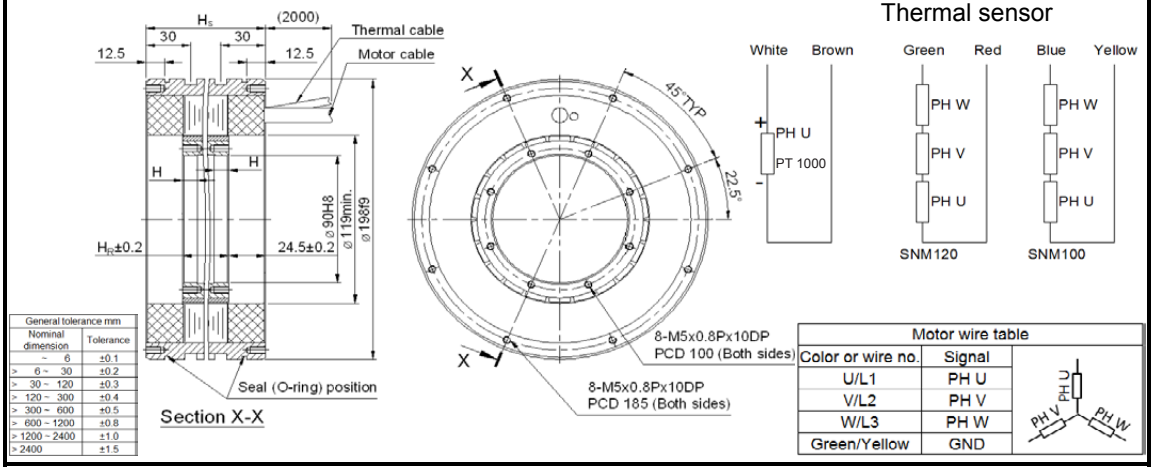
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	2.2	
Mass of stator	M_S	kg	10.2	
Height of stator	H_S	mm	120	
Height of rotor	H_R	mm	71	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	3.2
Max. pressure drop	△p	bar	-	1

T-N curve







Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.34 **Data sheet TMRW27**

TMRW27L Torque Motor DB001027

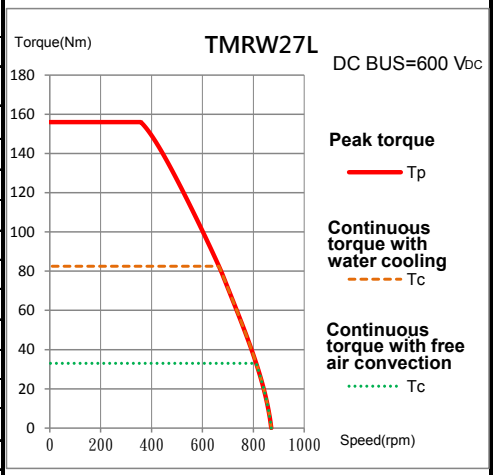
Electrical specifications

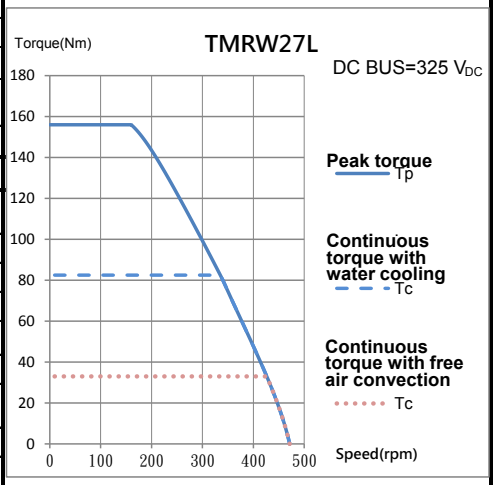
Winding code : SA	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	33	82.5
Continuous current	I_c	A_{rms}	4.9	12.3
Stall torque	T_s	Nm	23	58
Stall current	I_s	A_{rms}	3.4	8.6
Peak torque(for 1sec.)	T_p	Nm	156	
Peak current(for 1sec.)	I_p	A_{rms}	33.2	
Torque constant	K_t	Nm/Arms	6.72	
Electrical time constant	T_e	ms	6.5	
Resistance (line to line at 25℃)	R_{25}	Ω	3.5	
Inductance (line to line)	L	mH	22.72	
Number of poles	2p		22	
Back emf constant (line to line)	K_v	Vrms/rad/s	3.88	
Motor constant (at 25℃)	K_m	Nm/√W	2.94	
Thermal resistance	R_{th}	K/W	0.75	0.12
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.0063	
Thermal time constant	T_{th}	s	2680	120
Max. continuous power dissipation	P_c	W	172	1089
Rated speed(at 600VDC)		rpm	810	

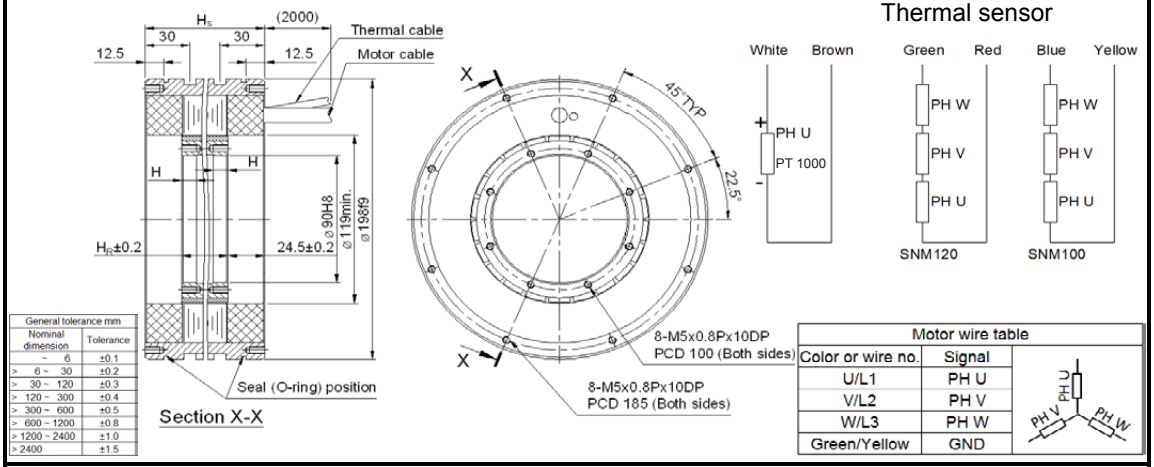
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	2.2	
Mass of stator	M_S	kg	10.2	
Height of stator	H_S	mm	120	
Height of rotor	H_R	mm	71	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	3.2
Max. pressure drop	△p	bar	-	1

T-N curve







Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.35 **Data sheet TMRW27L**

TMRW2A Torque Motor

DB001004

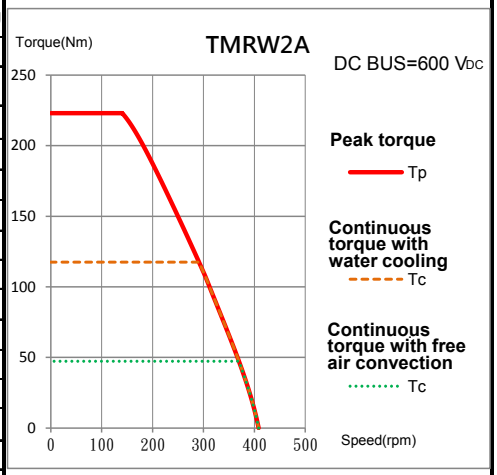
Electrical specifications

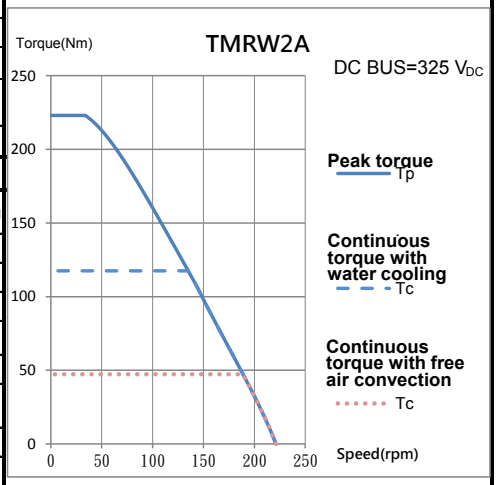
Winding code : PA	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	47.3	117.5
Continuous current	I_c	A_{rms}	3.3	8.3
Stall torque	T_s	Nm	33	82
Stall current	I_s	A_{rms}	2.3	5.8
Peak torque(for 1sec.)	T_p	Nm	223	
Peak current(for 1sec.)	I_p	A_{rms}	22.3	
Torque constant	K_t	Nm/Arms	14.32	
Electrical time constant	T_e	ms	7.4	
Resistance (line to line at 25℃)	R_{25}	Ω	9.6	
Inductance (line to line)	L	mH	70.8	
Number of poles	2p		22	
Back emf constant (line to line)	K_v	Vrms/rad/s	8.27	
Motor constant (at 25℃)	K_m	Nm/√W	3.78	
Thermal resistance	R_{th}	K/W	0.61	0.096
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.009	
Thermal time constant	T_{th}	s	2410	75
Max. continuous power dissipation	P_c	W	215	1361
Rated speed(at 600VDC)		rpm	360	

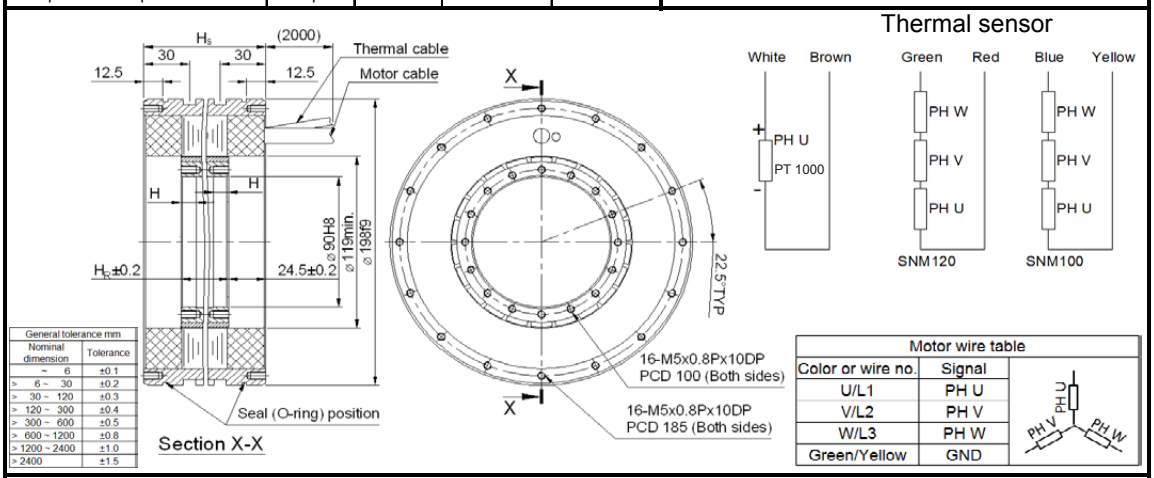
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	3.2	
Mass of stator	M_S	kg	14.2	
Height of stator	H_S	mm	150	
Height of rotor	H_R	mm	101	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	3.9
Max. pressure drop	△p	bar	-	1

T-N curve







General tolerance mm

Nominal dimension	Tolerance
~ 6	±0.1
> 6 ~ 30	±0.2
> 30 ~ 120	±0.3
> 120 ~ 300	±0.4
> 300 ~ 600	±0.5
> 600 ~ 1200	±0.8
> 1200 ~ 2400	±1.0
> 2400	±1.5

Motor wire table

Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.36 **Data sheet TMRW2A**

TMRW2AL Torque Motor DB001005

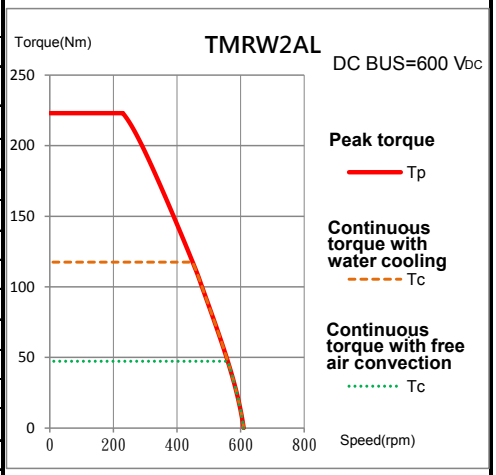
Electrical specifications

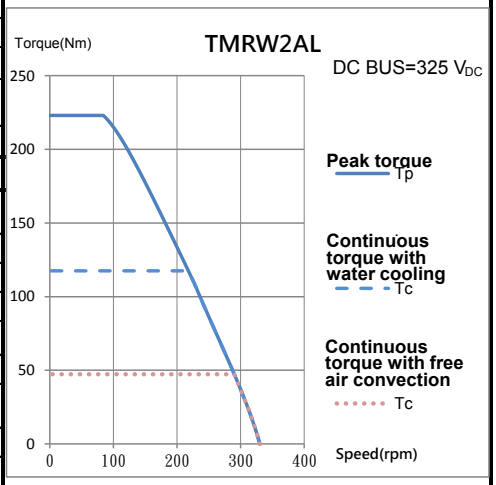
Winding code : SA	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	47.3	117.5
Continuous current	I_c	A_{rms}	4.9	12.3
Stall torque	T_s	Nm	33	82
Stall current	I_s	A_{rms}	3.4	8.6
Peak torque(for 1sec.)	T_p	Nm	223	
Peak current(for 1sec.)	I_p	A_{rms}	33.2	
Torque constant	K_t	Nm/Arms	9.6	
Electrical time constant	T_e	ms	6.5	
Resistance (line to line at 25℃)	R_{25}	Ω	5	
Inductance (line to line)	L	mH	32.46	
Number of poles	2p		22	
Back emf constant (line to line)	K_v	Vrms/rad/s	5.54	
Motor constant (at 25℃)	K_m	Nm/√W	3.52	
Thermal resistance	R_{th}	K/W	0.53	0.084
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.009	
Thermal time constant	T_{th}	s	2410	75
Max. continuous power dissipation	P_c	W	247	1556
Rated speed(at 600VDC)		rpm	550	

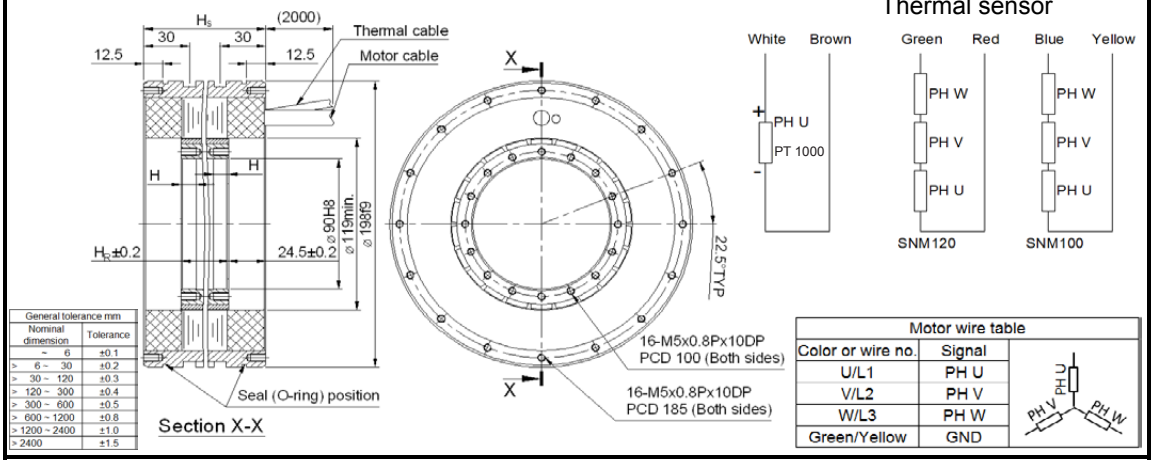
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	3.2	
Mass of stator	M_S	kg	14.2	
Height of stator	H_S	mm	150	
Height of rotor	H_R	mm	101	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	4.5
Max. pressure drop	△p	bar	-	1

T-N curve







Thermal sensor

Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.37 **Data sheet TMRW2AL**

TMRW2F Torque Motor

DB001006

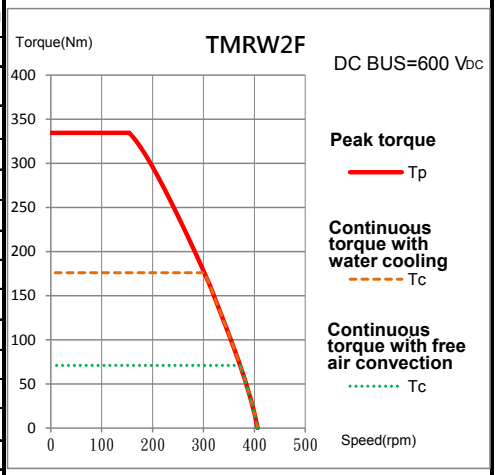
Electrical specifications

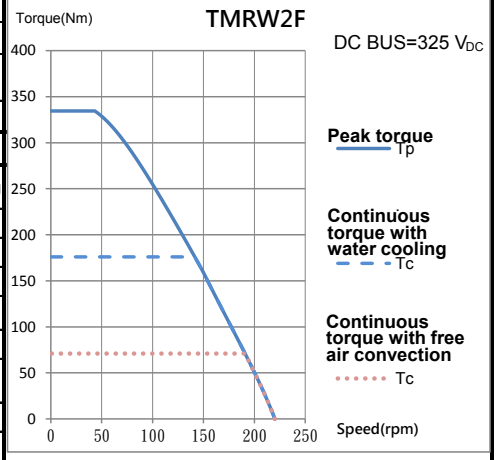
Winding code : SA	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	71	176
Continuous current	I_c	A_{rms}	4.9	12.3
Stall torque	T_s	Nm	50	123
Stall current	I_s	A_{rms}	3.4	8.6
Peak torque(for 1sec.)	T_p	Nm	334.5	
Peak current(for 1sec.)	I_p	A_{rms}	33.2	
Torque constant	K_t	Nm/Arms	14.39	
Electrical time constant	T_e	ms	7.2	
Resistance (line to line at 25℃)	R_{25}	Ω	6	
Inductance (line to line)	L	mH	43	
Number of poles	2p		22	
Back emf constant (line to line)	K_v	Vrms/rad/s	8.31	
Motor constant (at 25℃)	K_m	Nm/√W	4.83	
Thermal resistance	R_{th}	K/W	0.44	0.07
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.013	
Thermal time constant	T_{th}	s	2520	87
Max. continuous power dissipation	P_c	W	296	1867
Rated speed(at 600VDC)		rpm	370	

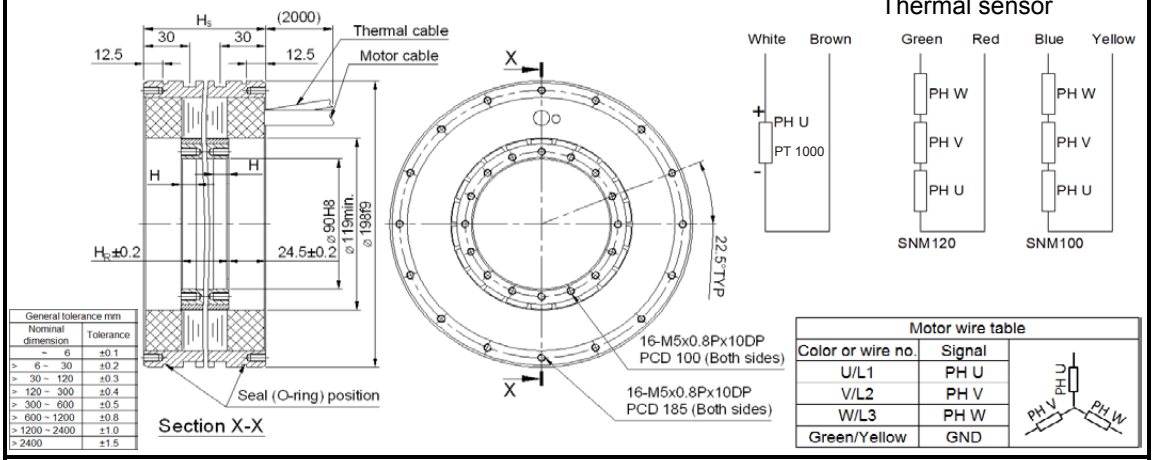
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	4.8	
Mass of stator	M_S	kg	20.1	
Height of stator	H_S	mm	200	
Height of rotor	H_R	mm	151	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	5.4
Max. pressure drop	△p	bar	-	1

T-N curve







Thermal sensor

Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.38 **Data sheet TMRW2F**

TMRW2FL Torque Motor DB001007

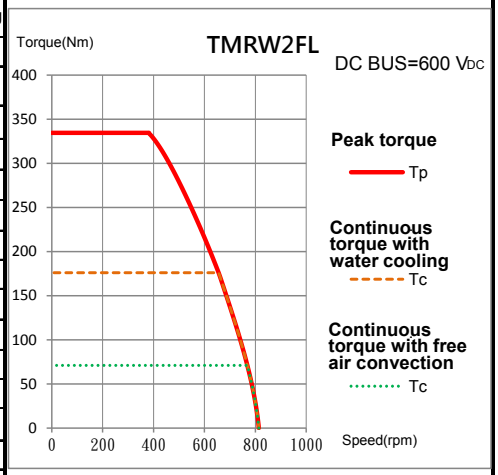
Electrical specifications

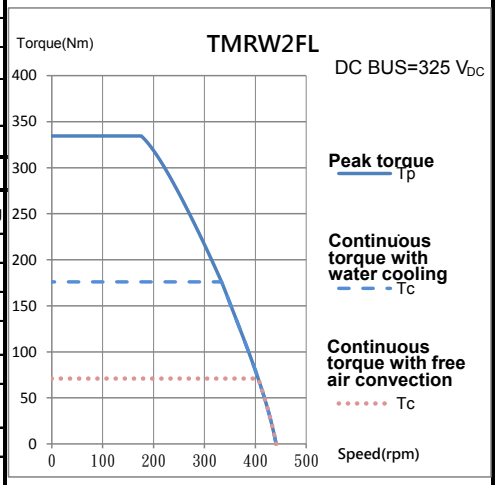
Winding code : SB	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	71	176
Continuous current	I_c	A_{rms}	9.9	24.6
Stall torque	T_s	Nm	50	123
Stall current	I_s	A_{rms}	6.9	17.2
Peak torque(for 1sec.)	T_p	Nm	334.5	
Peak current(for 1sec.)	I_p	A_{rms}	66.4	
Torque constant	K_t	Nm/Arms	7.2	
Electrical time constant	T_e	ms	6.9	
Resistance (line to line at 25℃)	R_{25}	Ω	1.5	
Inductance (line to line)	L	mH	10.4	
Number of poles	2p		22	
Back emf constant (line to line)	K_v	Vrms/rad/s	4.15	
Motor constant (at 25℃)	K_m	Nm/√W	4.78	
Thermal resistance	R_{th}	K/W	0.43	0.07
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.013	
Thermal time constant	T_{th}	s	2520	87
Max. continuous power dissipation	P_c	W	302	1869
Rated speed(at 600VDC)		rpm	760	

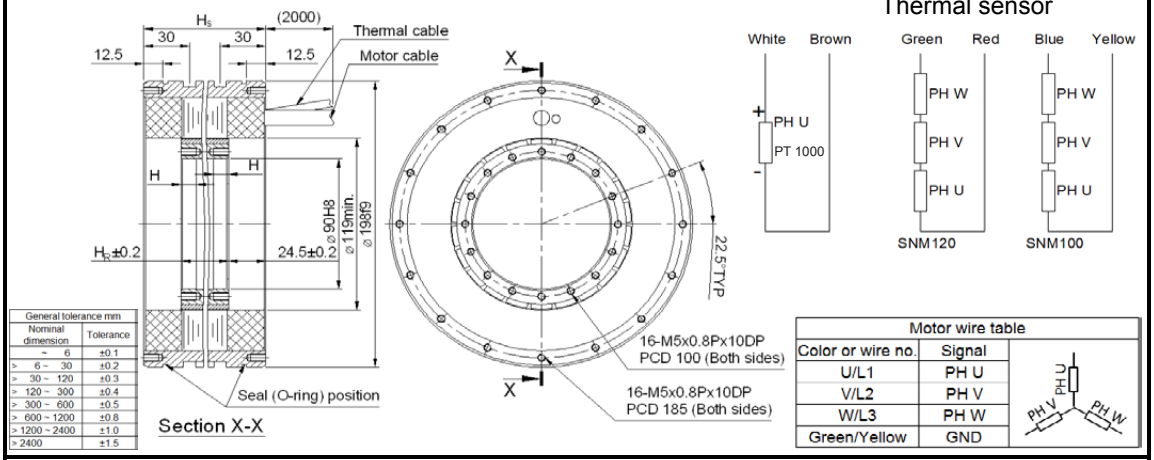
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	4.8	
Mass of stator	M_S	kg	20.1	
Height of stator	H_S	mm	200	
Height of rotor	H_R	mm	151	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	▵θ	K	-	5
Minimum water flow	q	l/min	-	5.4
Max. pressure drop	▵p	bar	-	1

T-N curve







Thermal sensor

Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.39 **Data sheet TMRW2FL**

TMRW43 Torque Motor

DB001028

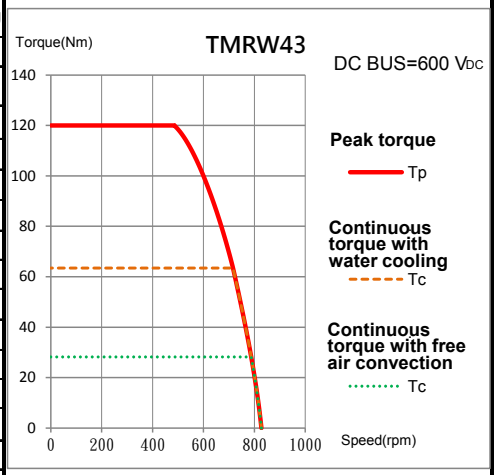
Electrical specifications

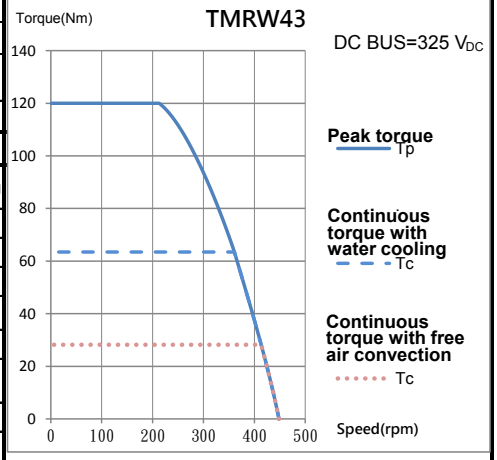
Winding code : PA	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	28.2	63.5
Continuous current	I_c	A_{rms}	4	9
Stall torque	T_s	Nm	20	44
Stall current	I_s	A_{rms}	2.8	6.3
Peak torque(for 1sec.)	T_p	Nm	120	
Peak current(for 1sec.)	I_p	A_{rms}	24.3	
Torque constant	K_t	Nm/Arms	7.06	
Electrical time constant	T_e	ms	4.1	
Resistance (line to line at 25℃)	R_{25}	Ω	4.38	
Inductance (line to line)	L	mH	17.9	
Number of poles	2p		22	
Back emf constant (line to line)	K_v	Vrms/rad/s	4.08	
Motor constant (at 25℃)	K_m	Nm/√W	2.75	
Thermal resistance	R_{th}	K/W	0.9	0.179
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.0085	
Thermal time constant	T_{th}	s	2420	140
Max. continuous power dissipation	P_c	W	144	730
Rated speed(at 600VDC)		rpm	780	

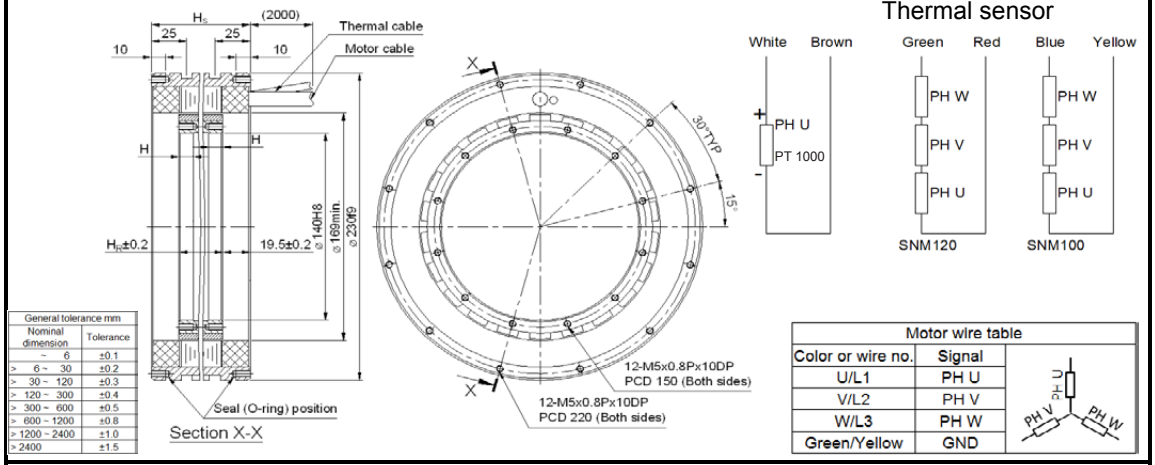
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	1.4	
Mass of stator	M_S	kg	5.8	
Height of stator	H_S	mm	70	
Height of rotor	H_R	mm	31	
Length of rotor centring fit	H	mm	10	
Water temperture difference for Pc	▵θ	K	-	5
Minimum water flow	q	l/min	-	2.1
Max. pressure drop	▵p	bar	-	1

T-N curve







General tolerance mm

Nominal dimension	Tolerance
~ 6	±0.1
> 6 ~ 30	±0.2
> 30 ~ 120	±0.3
> 120 ~ 300	±0.4
> 300 ~ 600	±0.5
> 600 ~ 1200	±0.8
> 1200 ~ 2400	±1.0
> 2400	±1.5

Motor wire table

Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.40 **Data sheet TMRW43**

TMRW43L Torque Motor DB001029

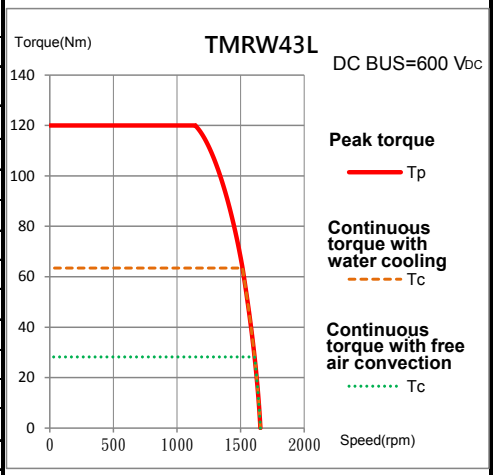
Electrical specifications

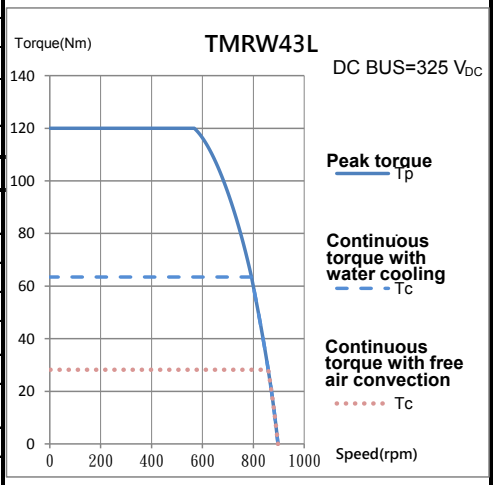
Winding code : PB	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	28.2	63.5
Continuous current	I_c	A_{rms}	8	18
Stall torque	T_s	Nm	20	44
Stall current	I_s	A_{rms}	5.6	12.6
Peak torque(for 1sec.)	T_p	Nm	120	
Peak current(for 1sec.)	I_p	A_{rms}	48.6	
Torque constant	K_t	Nm/Arms	3.53	
Electrical time constant	T_e	ms	3.5	
Resistance (line to line at 25℃)	R_{25}	Ω	1.1	
Inductance (line to line)	L	mH	3.83	
Number of poles	2p		22	
Back emf constant (line to line)	K_v	Vrms/rad/s	2.04	
Motor constant (at 25℃)	K_m	Nm/√W	2.74	
Thermal resistance	R_{th}	K/W	0.9	0.178
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.0085	
Thermal time constant	T_{th}	s	2420	140
Max. continuous power dissipation	P_c	W	144	733
Rated speed(at 600VDC)		rpm	820	

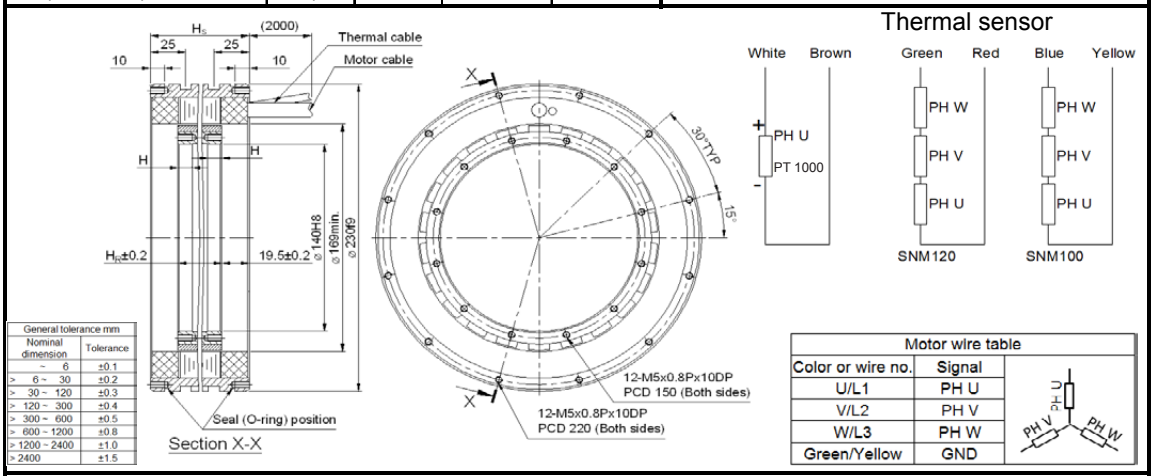
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	1.4	
Mass of stator	M_S	kg	5.8	
Height of stator	H_S	mm	70	
Height of rotor	H_R	mm	31	
Length of rotor centring fit	H	mm	10	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	2.1
Max. pressure drop	△p	bar	-	1

T-N curve







General tolerance mm	
Nominal dimension	Tolerance
~ 6	±0.1
> 6 ~ 30	±0.2
> 30 ~ 120	±0.3
> 120 ~ 300	±0.4
> 300 ~ 600	±0.5
> 600 ~ 1200	±0.8
> 1200 ~ 2400	±1.0
> 2400	±1.5

Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.41 **Data sheet TMRW43L**

TMRW45 Torque Motor DB001030

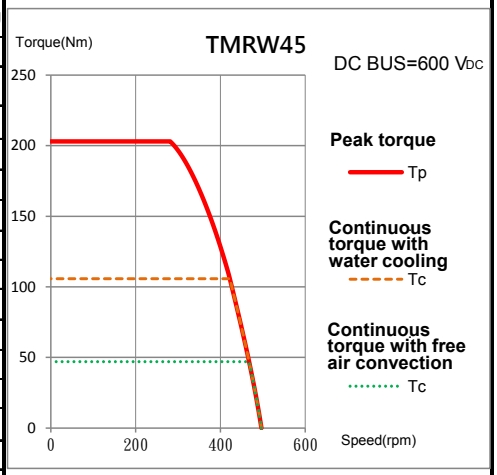
Electrical specifications

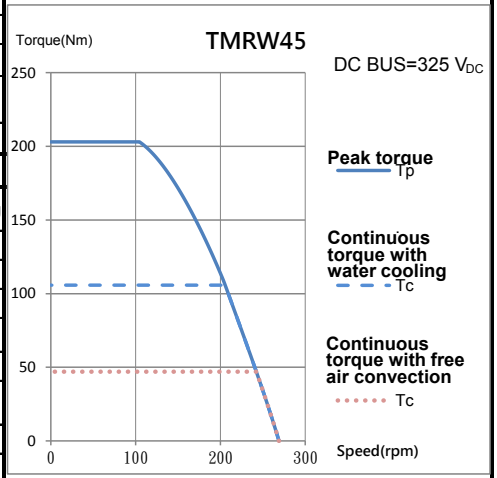
Winding code : PA	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	47	106
Continuous current	I_c	A_{rms}	4	9
Stall torque	T_s	Nm	33	74
Stall current	I_s	A_{rms}	2.8	6.3
Peak torque(for 1sec.)	T_p	Nm	203	
Peak current(for 1sec.)	I_p	A_{rms}	24.3	
Torque constant	K_t	Nm/Arms	11.76	
Electrical time constant	T_e	ms	4.3	
Resistance (line to line at 25℃)	R_{25}	Ω	6.01	
Inductance (line to line)	L	mH	26	
Number of poles	2p		22	
Back emf constant (line to line)	K_v	Vrms/rad/s	6.8	
Motor constant (at 25℃)	K_m	Nm/√W	3.91	
Thermal resistance	R_{th}	K/W	0.66	0.13
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.014	
Thermal time constant	T_{th}	s	2140	79
Max. continuous power dissipation	P_c	W	198	1002
Rated speed(at 600VDC)		rpm	460	

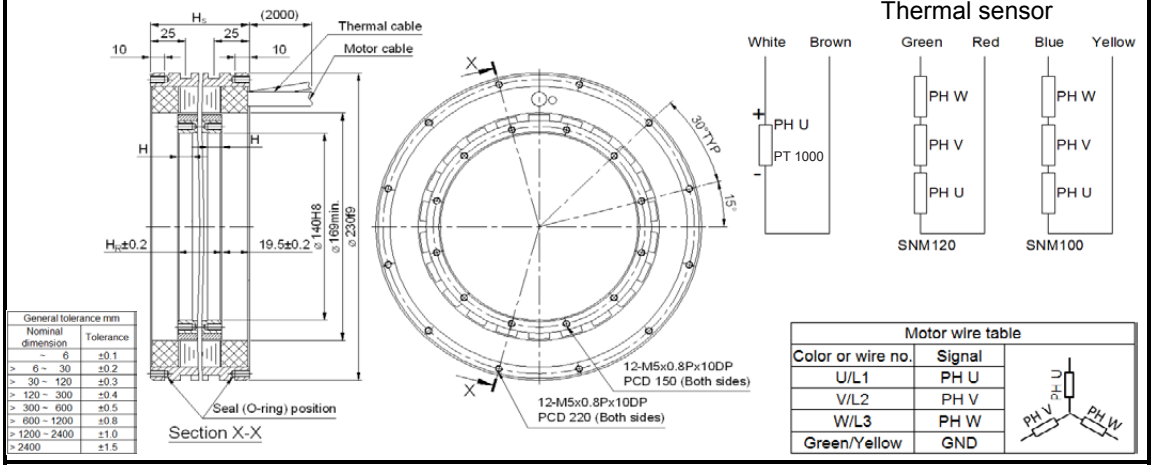
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	2.4	
Mass of stator	M_S	kg	7.8	
Height of stator	H_S	mm	90	
Height of rotor	H_R	mm	51	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	▵θ	K	-	5
Minimum water flow	q	l/min	-	2.9
Max. pressure drop	▵p	bar	-	1

T-N curve







General tolerance mm	
Nominal dimension	Tolerance
~ 6	±0.1
> 6 ~ 30	±0.2
> 30 ~ 120	±0.3
> 120 ~ 300	±0.4
> 300 ~ 600	±0.5
> 600 ~ 1200	±0.8
> 1200 ~ 2400	±1.0
> 2400	±1.5

Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.42 **Data sheet TMRW45**

TMRW45L Torque Motor DB001031

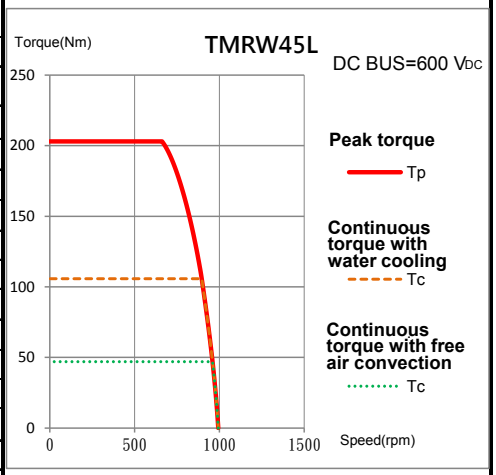
Electrical specifications

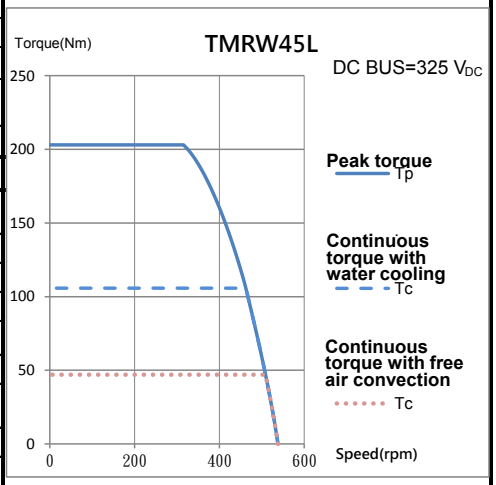
Winding code : PB	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	47	106
Continuous current	I_c	A_{rms}	8	18
Stall torque	T_s	Nm	33	74
Stall current	I_s	A_{rms}	5.6	12.6
Peak torque(for 1sec.)	T_p	Nm	203	
Peak current(for 1sec.)	I_p	A_{rms}	48.6	
Torque constant	K_t	Nm/Arms	5.88	
Electrical time constant	T_e	ms	4.3	
Resistance (line to line at 25℃)	R_{25}	Ω	1.5	
Inductance (line to line)	L	mH	6.38	
Number of poles	2p		22	
Back emf constant (line to line)	K_v	Vrms/rad/s	3.4	
Motor constant (at 25℃)	K_m	Nm/√W	3.92	
Thermal resistance	R_{th}	K/W	0.66	0.13
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.014	
Thermal time constant	T_{th}	s	2140	79
Max. continuous power dissipation	P_c	W	197	1001
Rated speed(at 600VDC)		rpm	820	

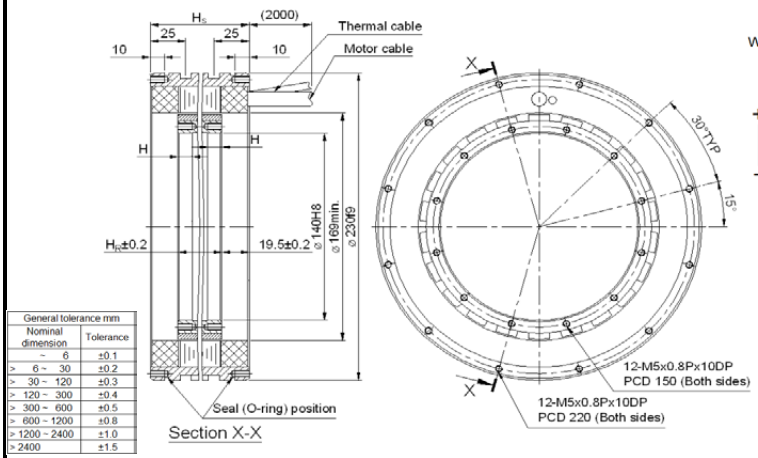
Mechanical specifications

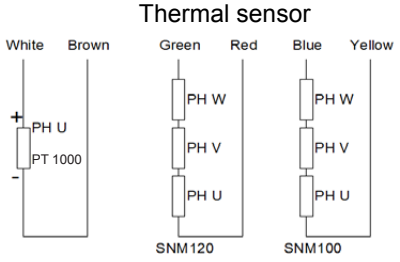
	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	2.4	
Mass of stator	M_S	kg	7.8	
Height of stator	H_S	mm	90	
Height of rotor	H_R	mm	51	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	2.9
Max. pressure drop	△p	bar	-	1

T-N curve



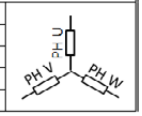






General tolerance mm	
Nominal dimension	Tolerance
~ 6	±0.1
> 6 ~ 30	±0.2
> 30 ~ 120	±0.3
> 120 ~ 300	±0.4
> 300 ~ 600	±0.5
> 600 ~ 1200	±0.8
> 1200 ~ 2400	±1.0
> 2400	±1.5

Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND



Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.43 **Data sheet TMRW45L**

TMRW47 Torque Motor

DB001032

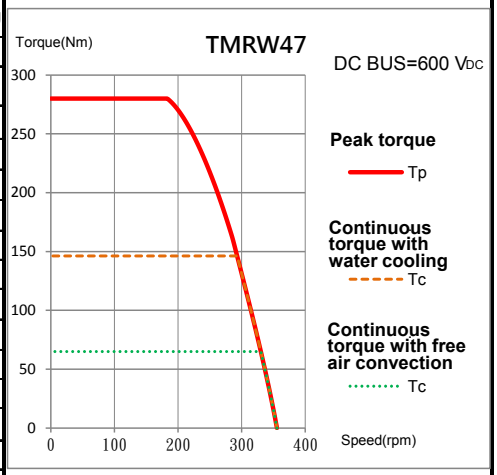
Electrical specifications

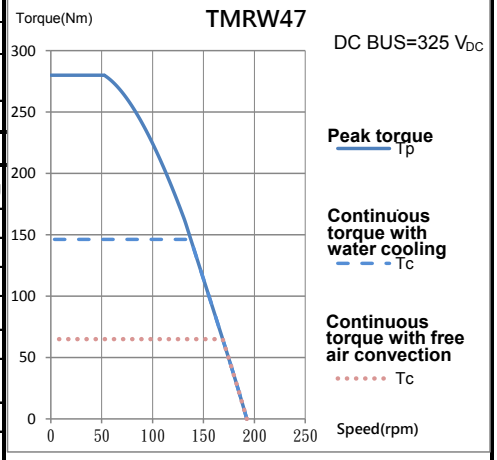
Winding code : PA	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	65	148
Continuous current	I_c	A_{rms}	4	9
Stall torque	T_s	Nm	46	104
Stall current	I_s	A_{rms}	2.8	6.3
Peak torque(for 1sec.)	T_p	Nm	280	
Peak current(for 1sec.)	I_p	A_{rms}	24.3	
Torque constant	K_t	Nm/Arms	16.47	
Electrical time constant	T_e	ms	4.7	
Resistance (line to line at 25℃)	R_{25}	Ω	7.63	
Inductance (line to line)	L	mH	35.7	
Number of poles	2p		22	
Back emf constant (line to line)	K_v	Vrms/rad/s	9.5	
Motor constant (at 25℃)	K_m	Nm/√W	4.8	
Thermal resistance	R_{th}	K/W	0.52	0.102
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.022	
Thermal time constant	T_{th}	s	2100	82
Max. continuous power dissipation	P_c	W	251	1272
Rated speed(at 600VDC)		rpm	330	

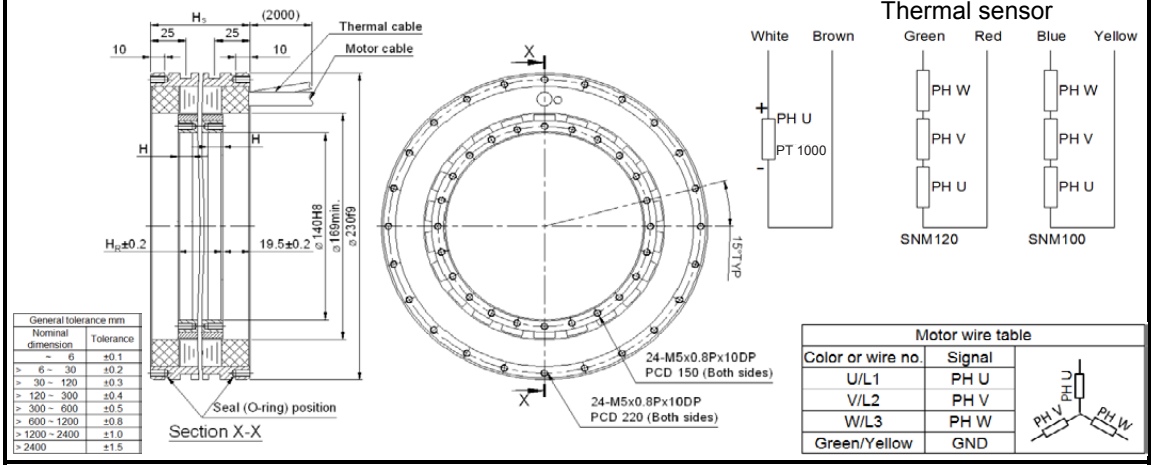
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	3.3	
Mass of stator	M_S	kg	9.6	
Height of stator	H_S	mm	110	
Height of rotor	H_R	mm	71	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	3.7
Max. pressure drop	△p	bar	-	1

T-N curve







Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.44 **Data sheet TMRW47**

TMRW47L Torque Motor DB001033

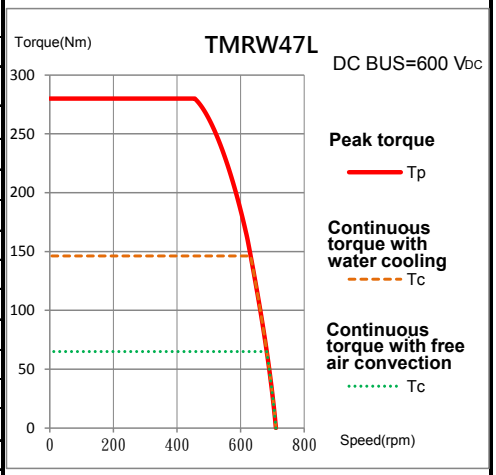
Electrical specifications

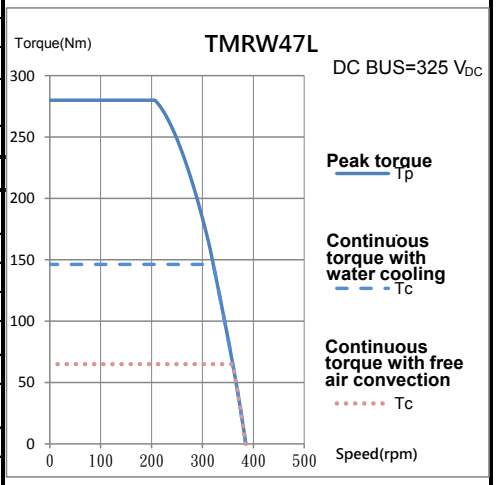
Winding code : PB	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	65	148
Continuous current	I_c	A_{rms}	8	18
Stall torque	T_s	Nm	46	104
Stall current	I_s	A_{rms}	5.6	12.6
Peak torque(for 1sec.)	T_p	Nm	280	
Peak current(for 1sec.)	I_p	A_{rms}	48.6	
Torque constant	K_t	Nm/Arms	8.23	
Electrical time constant	T_e	ms	4.7	
Resistance (line to line at 25℃)	R_{25}	Ω	1.9	
Inductance (line to line)	L	mH	8.93	
Number of poles	2p		22	
Back emf constant (line to line)	K_v	Vrms/rad/s	4.75	
Motor constant (at 25℃)	K_m	Nm/√W	4.81	
Thermal resistance	R_{th}	K/W	0.52	0.103
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.022	
Thermal time constant	T_{th}	s	2100	82
Max. continuous power dissipation	P_c	W	250	1268
Rated speed(at 600VDC)		rpm	680	

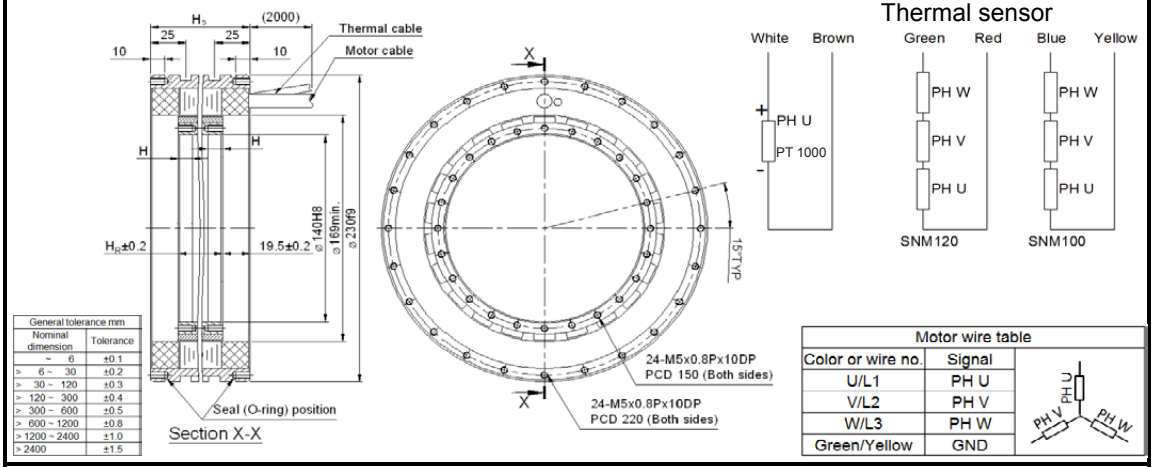
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	3.3	
Mass of stator	M_S	kg	9.6	
Height of stator	H_S	mm	110	
Height of rotor	H_R	mm	71	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	3.7
Max. pressure drop	△p	bar	-	1

T-N curve







Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.45 **Data sheet TMRW47L**

TMRW4A Torque Motor

DB001008

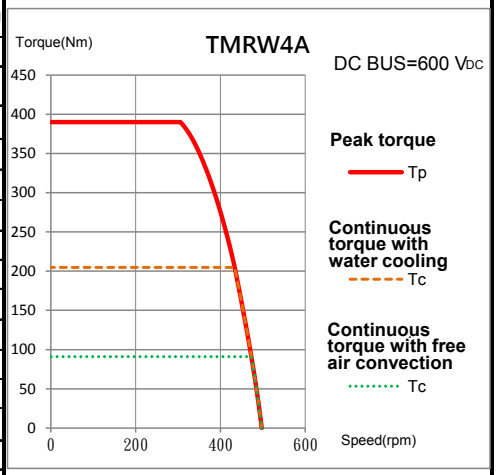
Electrical specifications

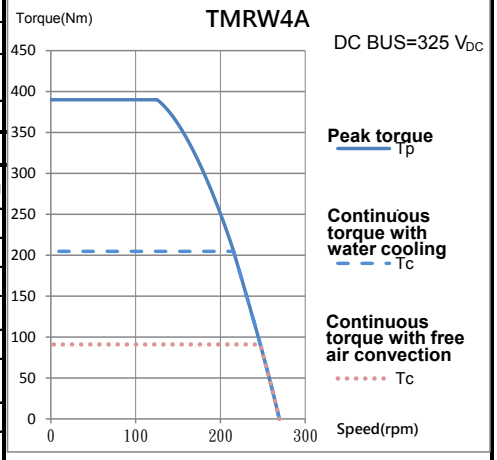
Winding code : PB	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	91	205
Continuous current	I_c	A_{rms}	8	18
Stall torque	T_s	Nm	64	144
Stall current	I_s	A_{rms}	5.6	12.6
Peak torque(for 1sec.)	T_p	Nm	390	
Peak current(for 1sec.)	I_p	A_{rms}	48.6	
Torque constant	K_t	Nm/Arms	11.76	
Electrical time constant	T_e	ms	4.8	
Resistance (line to line at 25℃)	R_{25}	Ω	2.5	
Inductance (line to line)	L	mH	12.1	
Number of poles	2p		22	
Back emf constant (line to line)	K_v	Vrms/rad/s	6.79	
Motor constant (at 25℃)	K_m	Nm/√W	5.87	
Thermal resistance	R_{th}	K/W	0.4	0.078
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.029	
Thermal time constant	T_{th}	s	1800	51
Max. continuous power dissipation	P_c	W	329	1666
Rated speed(at 600VDC)		rpm	470	

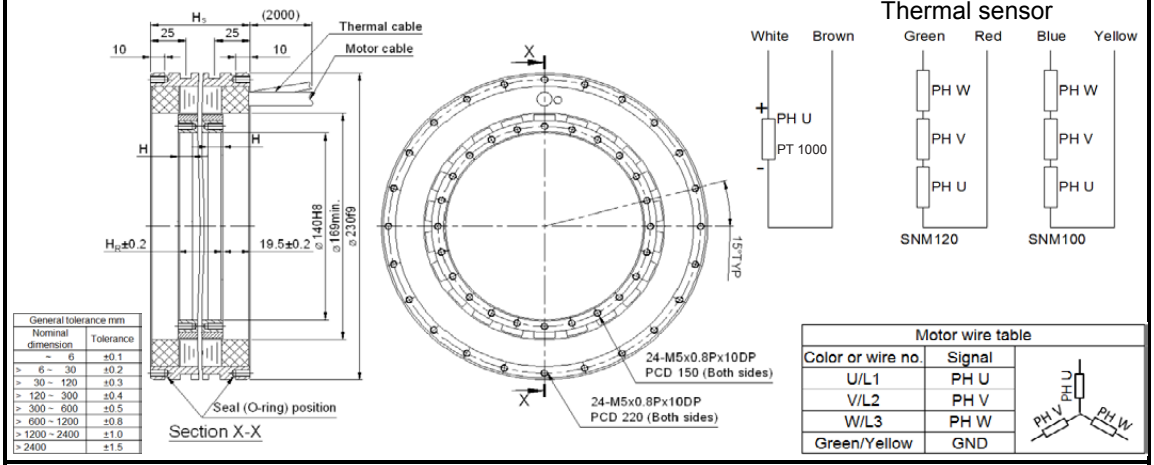
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	4.7	
Mass of stator	M_S	kg	12.7	
Height of stator	H_S	mm	140	
Height of rotor	H_R	mm	101	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	4.8
Max. pressure drop	△p	bar	-	1

T-N curve







General tolerance mm	
Nominal dimension	Tolerance
~ 6	±0.1
> 6 ~ 30	±0.2
> 30 ~ 120	±0.3
> 120 ~ 300	±0.4
> 300 ~ 600	±0.5
> 600 ~ 1200	±0.8
> 1200 ~ 2400	±1.0
> 2400	±1.5

Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

PH U
PH V
PH W

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.46 **Data sheet TMRW4A**

TMRW4AL Torque Motor DB001009

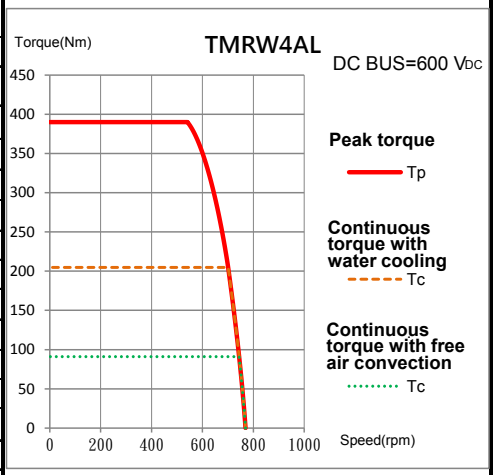
Electrical specifications

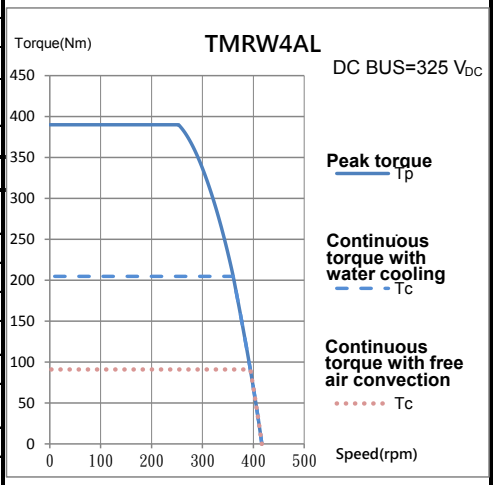
Winding code : SB	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	91	205
Continuous current	I_c	A_{rms}	12	27
Stall torque	T_s	Nm	64	144
Stall current	I_s	A_{rms}	8.4	18.9
Peak torque(for 1sec.)	T_p	Nm	390	
Peak current(for 1sec.)	I_p	A_{rms}	72.9	
Torque constant	K_t	Nm/Arms	7.61	
Electrical time constant	T_e	ms	4.3	
Resistance (line to line at 25℃)	R_{25}	Ω	1.06	
Inductance (line to line)	L	mH	4.57	
Number of poles	2p		22	
Back emf constant (line to line)	K_v	Vrms/rad/s	4.39	
Motor constant (at 25℃)	K_m	Nm/√W	6.01	
Thermal resistance	R_{th}	K/W	0.41	0.082
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.029	
Thermal time constant	T_{th}	s	1800	51
Max. continuous power dissipation	P_c	W	313	1585
Rated speed(at 600VDC)		rpm	740	

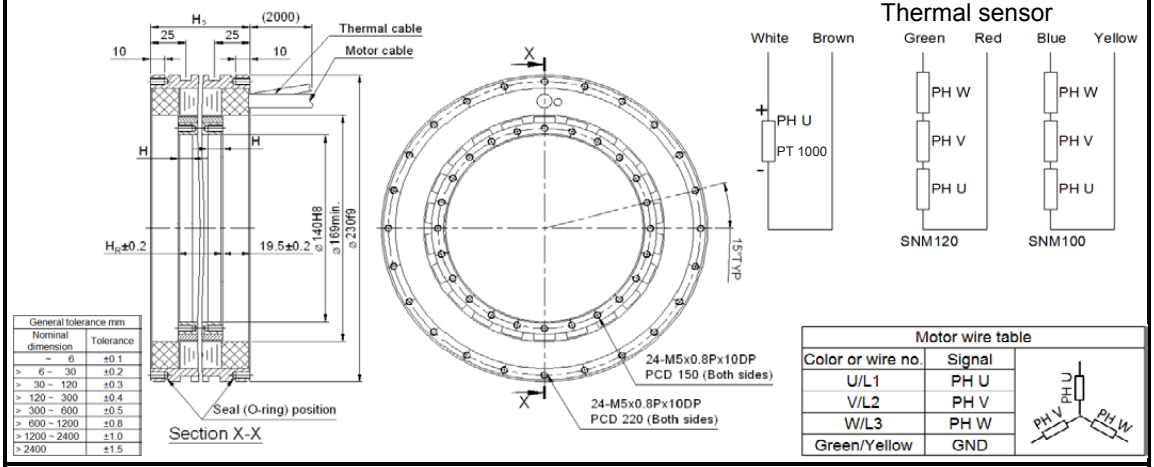
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	4.7	
Mass of stator	M_S	kg	12.7	
Height of stator	H_S	mm	140	
Height of rotor	H_R	mm	101	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	4.6
Max. pressure drop	△p	bar	-	1

T-N curve







Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.47 **Data sheet TMRW4AL**

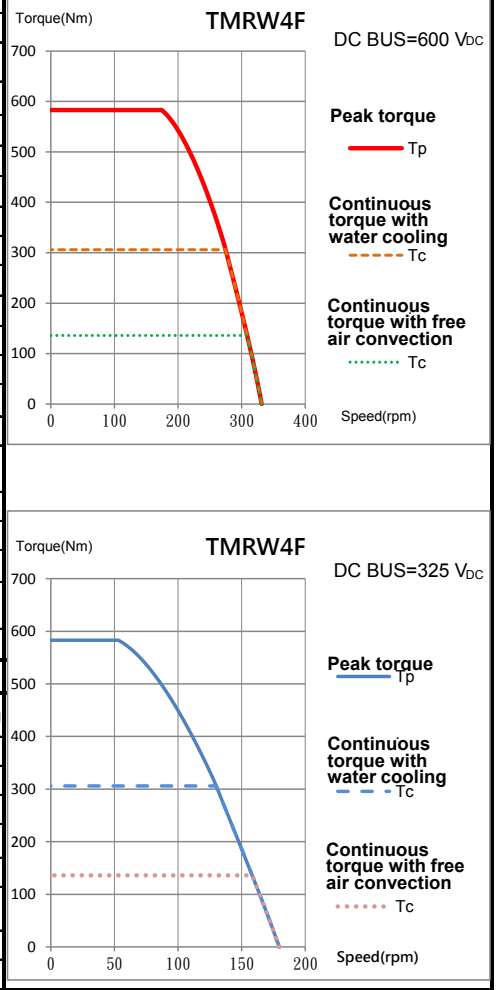
TMRW4F Torque Motor DB001010

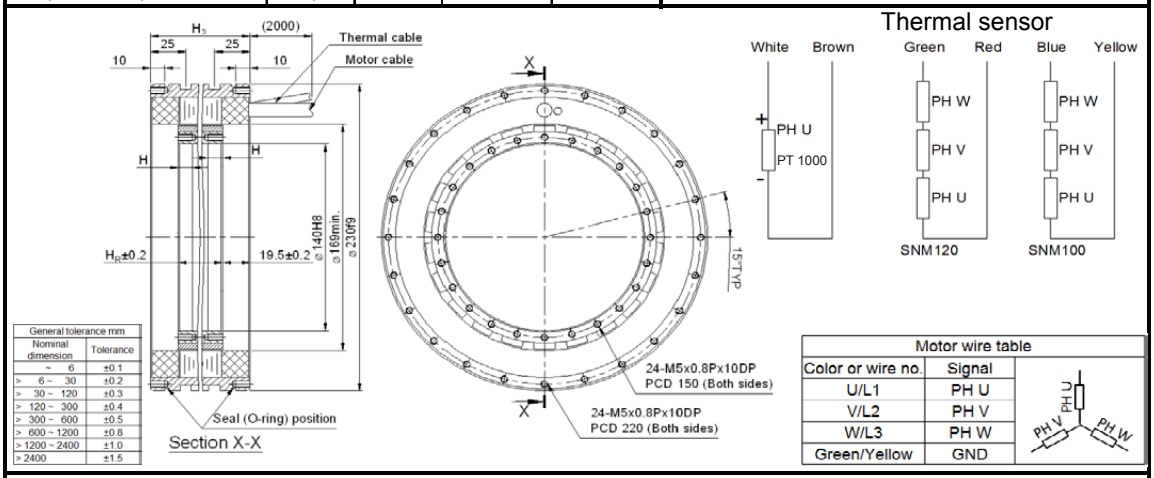
Electrical specifications

Winding code : PB	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	136	307
Continuous current	I_c	A_{rms}	8	18
Stall torque	T_s	Nm	95	215
Stall current	I_s	A_{rms}	5.6	12.6
Peak torque(for 1sec.)	T_p	Nm	583	
Peak current(for 1sec.)	I_p	A_{rms}	48.6	
Torque constant	K_t	Nm/Arms	17.65	
Electrical time constant	T_e	ms	5.2	
Resistance (line to line at 25℃)	R_{25}	Ω	3.66	
Inductance (line to line)	L	mH	19.13	
Number of poles	2p		22	
Back emf constant (line to line)	K_v	Vrms/rad/s	10.19	
Motor constant (at 25℃)	K_m	Nm/√W	7.26	
Thermal resistance	R_{th}	K/W	0.27	0.053
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.045	
Thermal time constant	T_{th}	s	2080	68
Max. continuous power dissipation	P_c	W	481	2439
Rated speed(at 600VDC)		rpm	300	

Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	7.1	
Mass of stator	M_S	kg	18.7	
Height of stator	H_S	mm	190	
Height of rotor	H_R	mm	151	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	7
Max. pressure drop	△p	bar	-	2





Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.48 **Data sheet TMRW4F**

TMRW4FL Torque Motor DB001011

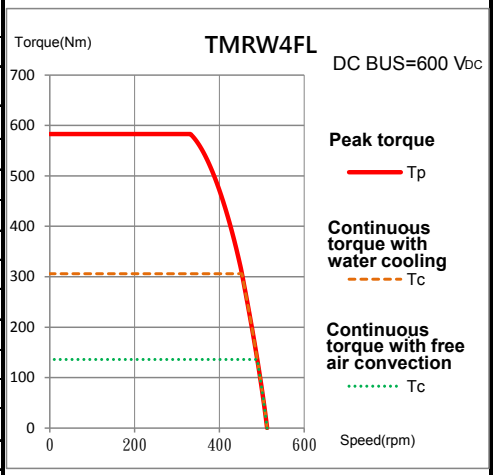
Electrical specifications

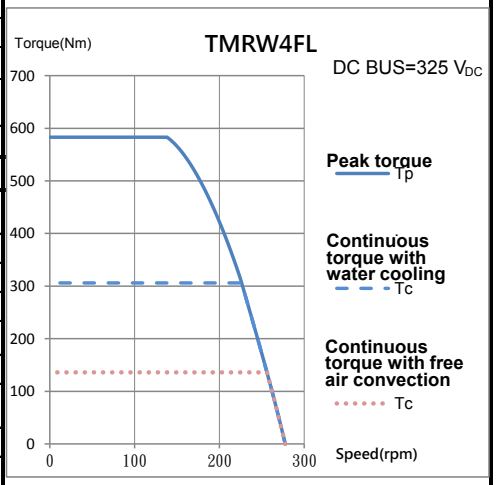
Winding code : SB	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	136	307
Continuous current	I_c	A_{rms}	12	27
Stall torque	T_s	Nm	95	215
Stall current	I_s	A_{rms}	8.4	18.9
Peak torque(for 1sec.)	T_p	Nm	583	
Peak current(for 1sec.)	I_p	A_{rms}	72.9	
Torque constant	K_t	Nm/Arms	11.42	
Electrical time constant	T_e	ms	4.4	
Resistance (line to line at 25℃)	R_{25}	Ω	1.58	
Inductance (line to line)	L	mH	6.9	
Number of poles	2p		22	
Back emf constant (line to line)	K_v	Vrms/rad/s	6.59	
Motor constant (at 25℃)	K_m	Nm/√W	7.36	
Thermal resistance	R_{th}	K/W	0.28	0.055
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.045	
Thermal time constant	T_{th}	s	2080	68
Max. continuous power dissipation	P_c	W	468	2372
Rated speed(at 600VDC)		rpm	480	

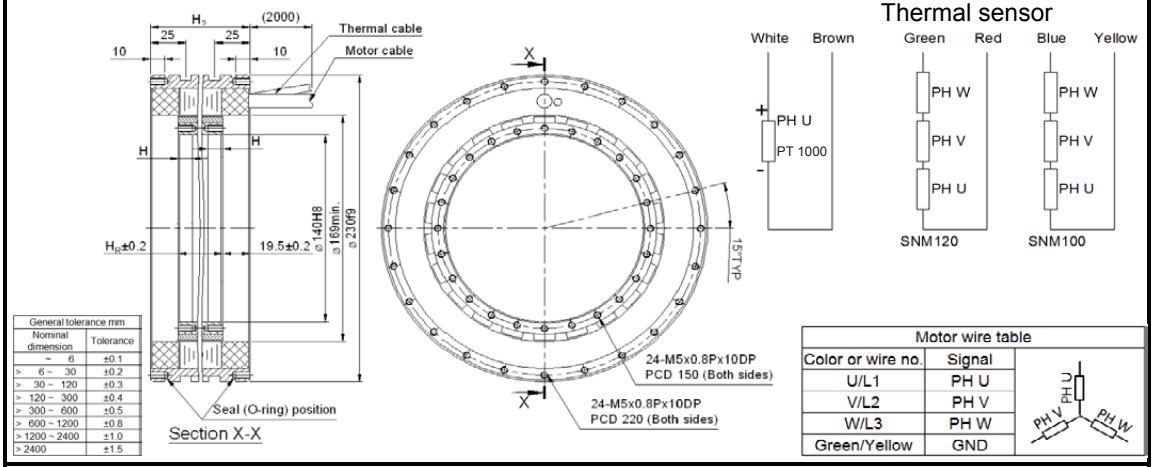
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	7.1	
Mass of stator	M_S	kg	18.7	
Height of stator	H_S	mm	190	
Height of rotor	H_R	mm	151	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	6.8
Max. pressure drop	△p	bar	-	2

T-N curve







Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.49 **Data sheet TMRW4FL**

TMRW73 Torque Motor

DB001034

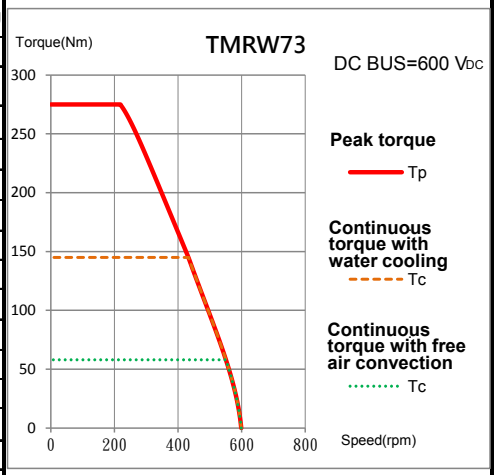
Electrical specifications

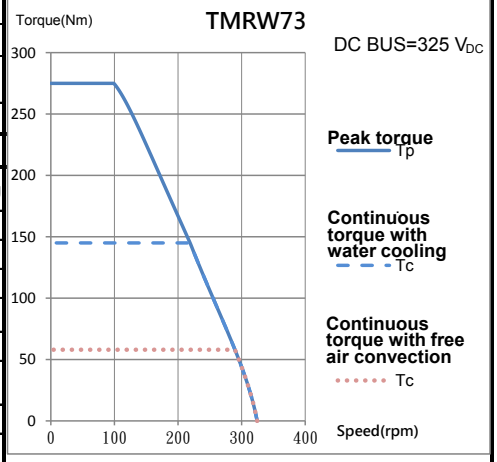
Winding code : SA	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	58	145
Continuous current	I_c	A_{rms}	6	15
Stall torque	T_s	Nm	41	102
Stall current	I_s	A_{rms}	4.2	10.5
Peak torque(for 1sec.)	T_p	Nm	275	
Peak current(for 1sec.)	I_p	A_{rms}	40.5	
Torque constant	K_t	Nm/Arms	9.77	
Electrical time constant	T_e	ms	5.6	
Resistance (line to line at 25℃)	R_{25}	Ω	2.86	
Inductance (line to line)	L	mH	16	
Number of poles	2p		44	
Back emf constant (line to line)	K_v	Vrms/rad/s	5.64	
Motor constant (at 25℃)	K_m	Nm/√W	4.67	
Thermal resistance	R_{th}	K/W	0.62	0.098
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.023	
Thermal time constant	T_{th}	s	4670	260
Max. continuous power dissipation	P_c	W	212	1326
Rated speed(at 600VDC)		rpm	410	

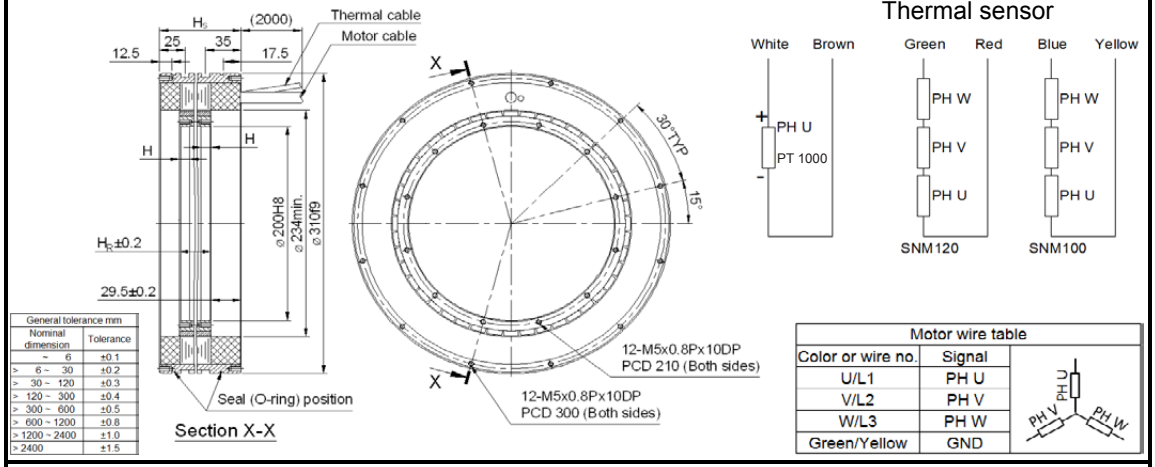
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	2.5	
Mass of stator	M_S	kg	14.2	
Height of stator	H_S	mm	80	
Height of rotor	H_R	mm	31	
Length of rotor centring fit	H	mm	10	
Water temperture difference for Pc	▵θ	K	-	5
Minimum water flow	q	l/min	-	3.8
Max. pressure drop	▵p	bar	-	1

T-N curve







Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.50 **Data sheet TMRW73**

TMRW73L Torque Motor DB001035

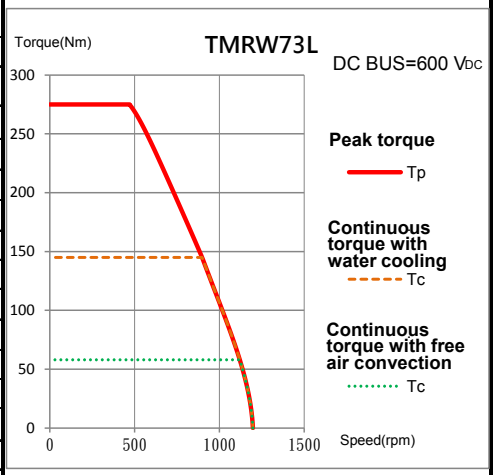
Electrical specifications

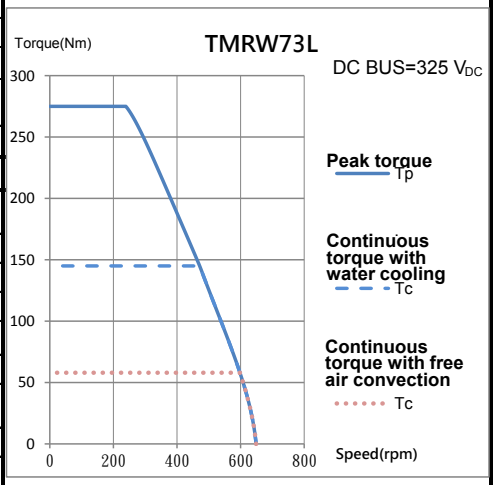
Winding code : SB	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	58	145
Continuous current	I_c	A_{rms}	12	30
Stall torque	T_s	Nm	41	102
Stall current	I_s	A_{rms}	8.4	21
Peak torque(for 1sec.)	T_p	Nm	275	
Peak current(for 1sec.)	I_p	A_{rms}	81	
Torque constant	K_t	Nm/Arms	4.89	
Electrical time constant	T_e	ms	5.6	
Resistance (line to line at 25℃)	R_{25}	Ω	0.72	
Inductance (line to line)	L	mH	4	
Number of poles	2p		44	
Back emf constant (line to line)	K_v	Vrms/rad/s	2.82	
Motor constant (at 25℃)	K_m	Nm/√W	4.65	
Thermal resistance	R_{th}	K/W	0.61	0.098
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.023	
Thermal time constant	T_{th}	s	4670	260
Max. continuous power dissipation	P_c	W	213	1336
Rated speed(at 600VDC)		rpm	410	

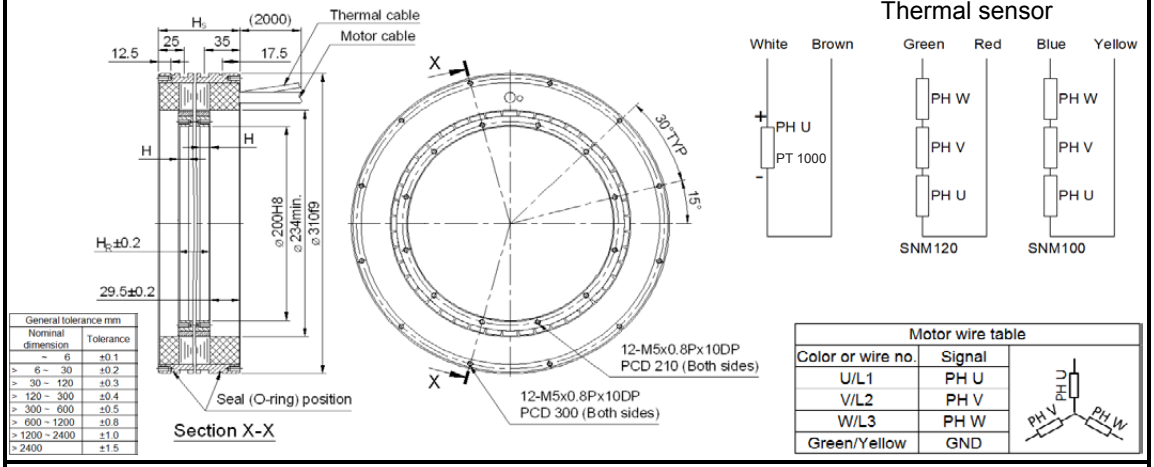
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	2.5	
Mass of stator	M_S	kg	14.2	
Height of stator	H_S	mm	80	
Height of rotor	H_R	mm	31	
Length of rotor centring fit	H	mm	10	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	3.9
Max. pressure drop	△p	bar	-	1

T-N curve







Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.51 **Data sheet TMRW73L**

TMRW75 Torque Motor

DB001036

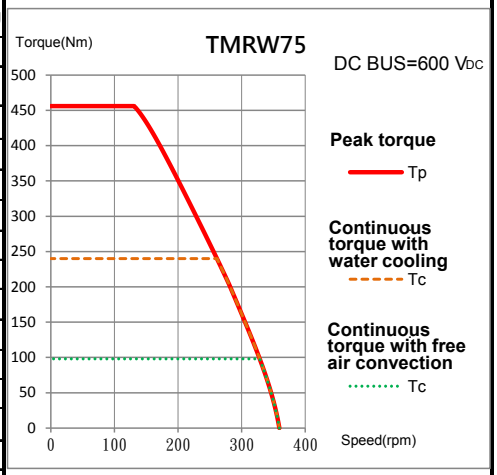
Electrical specifications

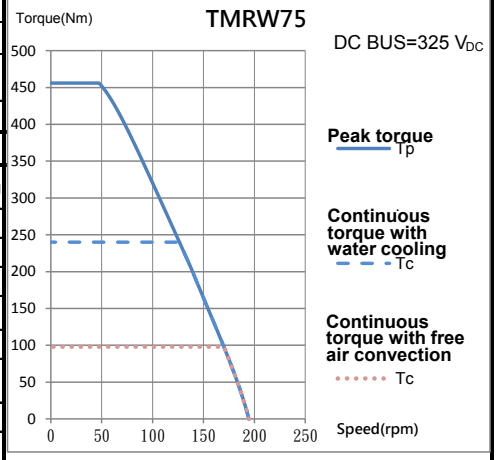
Winding code : SA	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	98	240
Continuous current	I_c	A_{rms}	6	15
Stall torque	T_s	Nm	69	168
Stall current	I_s	A_{rms}	4.2	10.5
Peak torque(for 1sec.)	T_p	Nm	456	
Peak current(for 1sec.)	I_p	A_{rms}	40.5	
Torque constant	K_t	Nm/Arms	16.3	
Electrical time constant	T_e	ms	5.6	
Resistance (line to line at 25℃)	R_{25}	Ω	4.19	
Inductance (line to line)	L	mH	23.45	
Number of poles	2p		44	
Back emf constant (line to line)	K_v	Vrms/rad/s	9.4	
Motor constant (at 25℃)	K_m	Nm/√W	6.52	
Thermal resistance	R_{th}	K/W	0.42	0.067
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.039	
Thermal time constant	T_{th}	s	4520	160
Max. continuous power dissipation	P_c	W	310	1940
Rated speed(at 600VDC)		rpm	320	

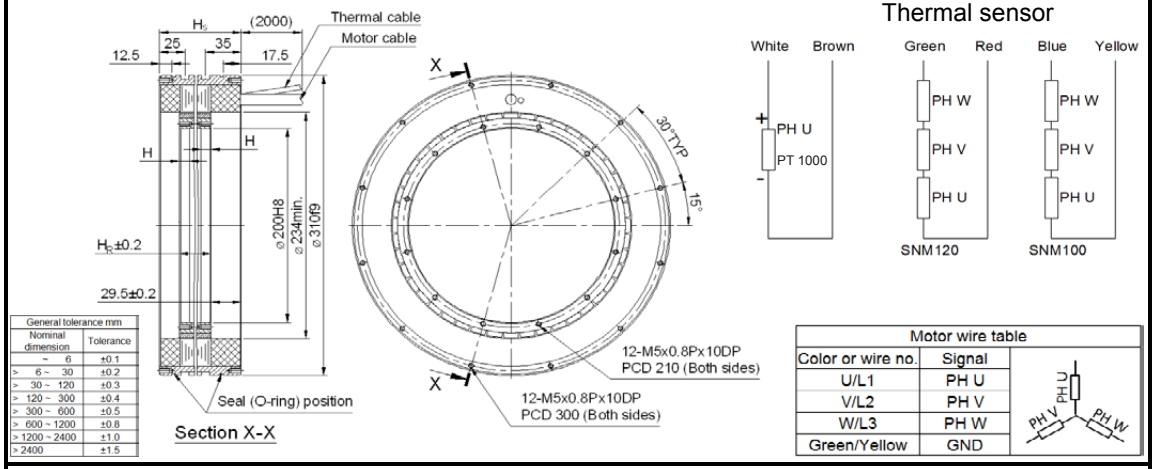
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	4.1	
Mass of stator	M_S	kg	18.9	
Height of stator	H_S	mm	100	
Height of rotor	H_R	mm	51	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	5.6
Max. pressure drop	△p	bar	-	1

T-N curve







Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.52 **Data sheet TMRW75**

TMRW75L Torque Motor DB001037

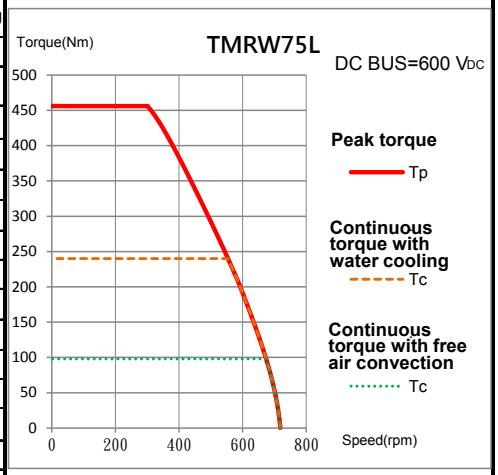
Electrical specifications

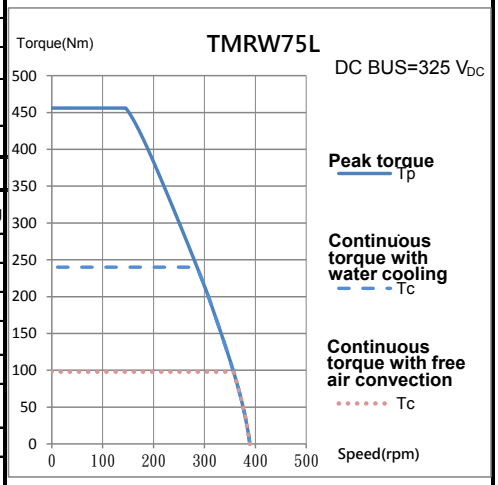
Winding code : SB	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	98	240
Continuous current	I_c	A_{rms}	12	30
Stall torque	T_s	Nm	69	168
Stall current	I_s	A_{rms}	8.4	21
Peak torque(for 1sec.)	T_p	Nm	456	
Peak current(for 1sec.)	I_p	A_{rms}	81	
Torque constant	K_t	Nm/Arms	8.15	
Electrical time constant	T_e	ms	5.6	
Resistance (line to line at 25℃)	R_{25}	Ω	1.05	
Inductance (line to line)	L	mH	5.86	
Number of poles	2p		44	
Back emf constant (line to line)	K_v	Vrms/rad/s	4.7	
Motor constant (at 25℃)	K_m	Nm/√W	6.51	
Thermal resistance	R_{th}	K/W	0.42	0.067
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.039	
Thermal time constant	T_{th}	s	4520	160
Max. continuous power dissipation	P_c	W	311	1944
Rated speed(at 600VDC)		rpm	410	

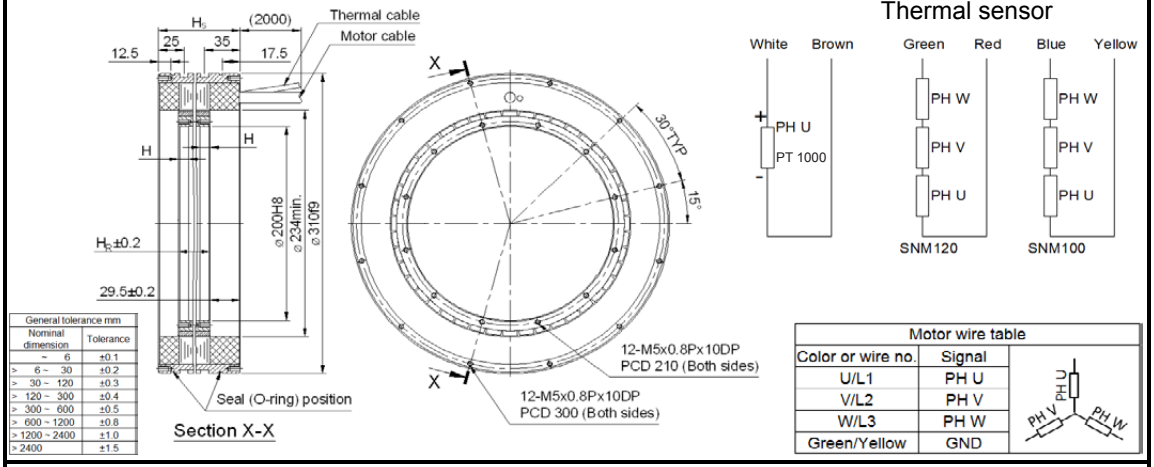
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	4.1	
Mass of stator	M_S	kg	18.9	
Height of stator	H_S	mm	100	
Height of rotor	H_R	mm	51	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	5.6
Max. pressure drop	△p	bar	-	1

T-N curve







Thermal sensor

Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.53 **Data sheet TMRW75L**

TMRW77 Torque Motor

DB001038

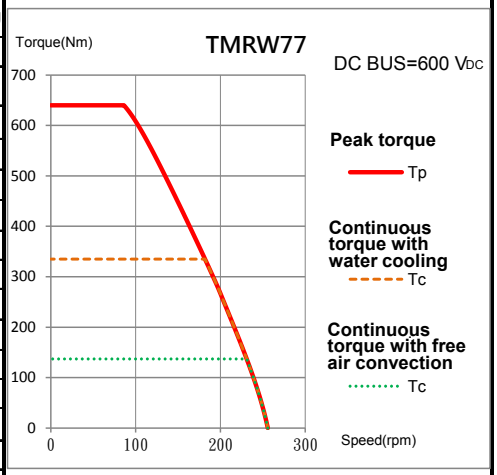
Electrical specifications

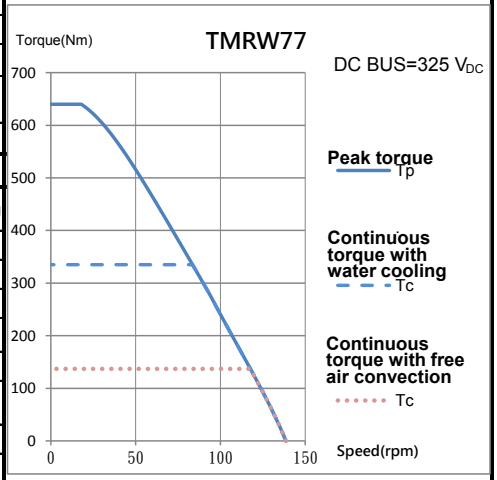
Winding code : SA	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	137	335
Continuous current	I_c	A_{rms}	6	15
Stall torque	T_s	Nm	96	235
Stall current	I_s	A_{rms}	4.2	10.5
Peak torque(for 1sec.)	T_p	Nm	640	
Peak current(for 1sec.)	I_p	A_{rms}	40.5	
Torque constant	K_t	Nm/Arms	22.8	
Electrical time constant	T_e	ms	5.6	
Resistance (line to line at 25℃)	R_{25}	Ω	5.52	
Inductance (line to line)	L	mH	30.9	
Number of poles	2p		44	
Back emf constant (line to line)	K_v	Vrms/rad/s	13.2	
Motor constant (at 25℃)	K_m	Nm/√W	7.92	
Thermal resistance	R_{th}	K/W	0.32	0.051
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.059	
Thermal time constant	T_{th}	s	4450	170
Max. continuous power dissipation	P_c	W	409	2558
Rated speed(at 600VDC)		rpm	230	

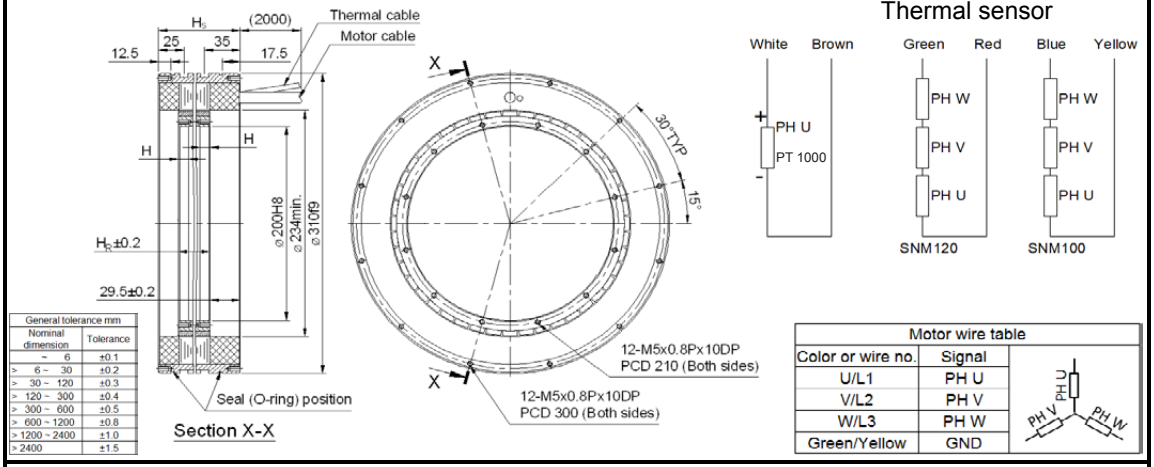
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	5.7	
Mass of stator	M_S	kg	23.7	
Height of stator	H_S	mm	120	
Height of rotor	H_R	mm	71	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	7.4
Max. pressure drop	△p	bar	-	1

T-N curve







Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.54 **Data sheet TMRW77**

TMRW77L Torque Motor DB001039

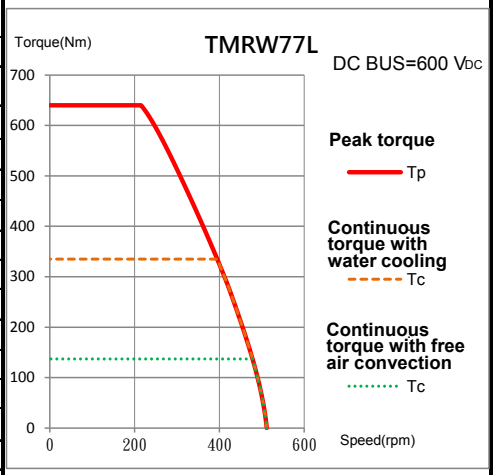
Electrical specifications

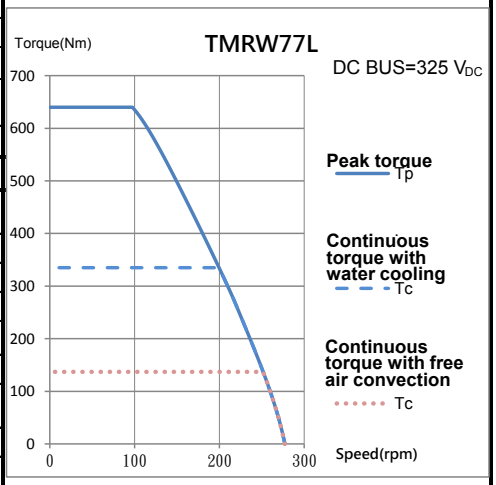
Winding code : SB	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	137	335
Continuous current	I_c	A_{rms}	12	30
Stall torque	T_s	Nm	96	235
Stall current	I_s	A_{rms}	8.4	21
Peak torque(for 1sec.)	T_p	Nm	640	
Peak current(for 1sec.)	I_p	A_{rms}	81	
Torque constant	K_t	Nm/Arms	11.4	
Electrical time constant	T_e	ms	5.6	
Resistance (line to line at 25℃)	R_{25}	Ω	1.38	
Inductance (line to line)	L	mH	7.73	
Number of poles	2p		44	
Back emf constant (line to line)	K_v	Vrms/rad/s	6.6	
Motor constant (at 25℃)	K_m	Nm/√W	7.94	
Thermal resistance	R_{th}	K/W	0.32	0.051
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.059	
Thermal time constant	T_{th}	s	4450	170
Max. continuous power dissipation	P_c	W	408	2551
Rated speed(at 600VDC)		rpm	410	

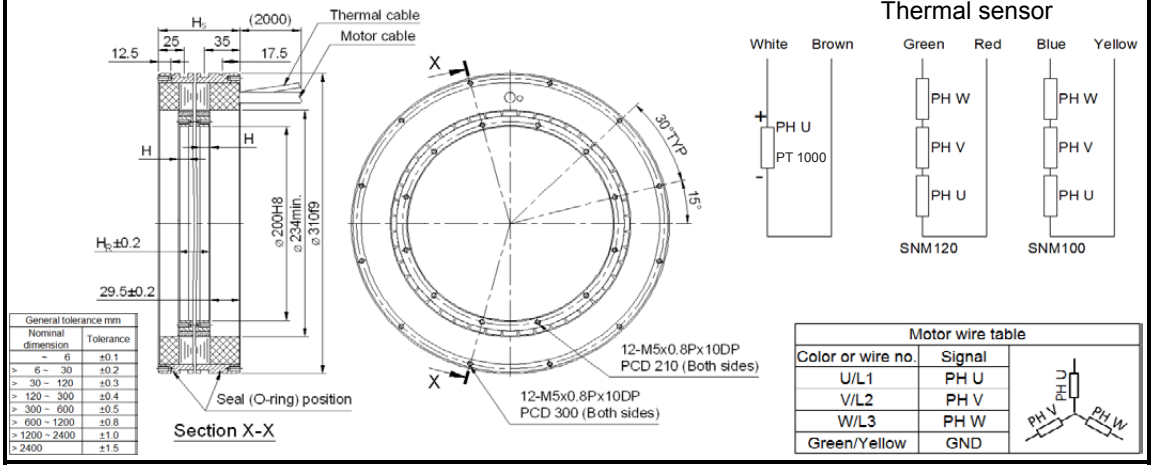
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	5.7	
Mass of stator	M_S	kg	23.7	
Height of stator	H_S	mm	120	
Height of rotor	H_R	mm	71	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	7.3
Max. pressure drop	△p	bar	-	1

T-N curve







Thermal sensor

Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.55 **Data sheet TMRW77L**

TMRW7A Torque Motor DB001012

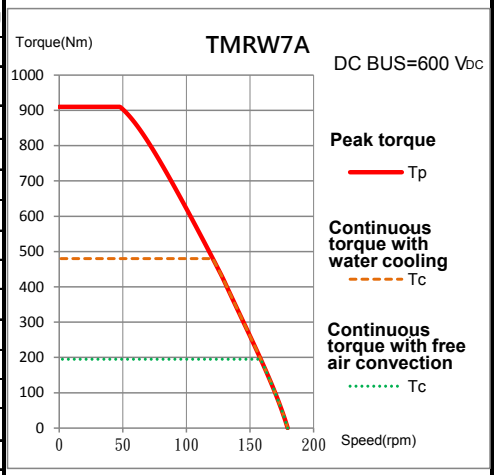
Electrical specifications

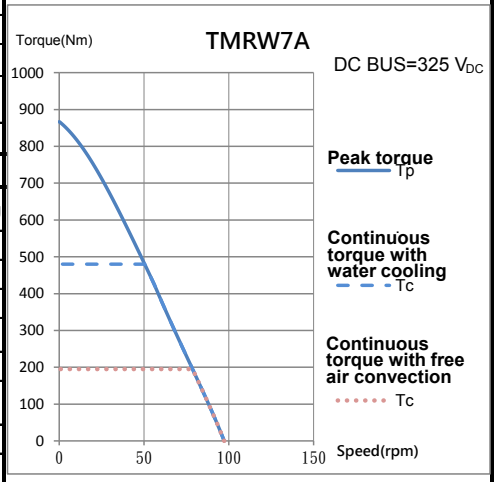
Winding code : SA	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	195	480
Continuous current	I_c	A_{rms}	6	15
Stall torque	T_s	Nm	137	336
Stall current	I_s	A_{rms}	4.2	10.5
Peak torque(for 1sec.)	T_p	Nm	910	
Peak current(for 1sec.)	I_p	A_{rms}	40.5	
Torque constant	K_t	Nm/Arms	32.56	
Electrical time constant	T_e	ms	5.6	
Resistance (line to line at 25℃)	R_{25}	Ω	7.52	
Inductance (line to line)	L	mH	42.07	
Number of poles	2p		44	
Back emf constant (line to line)	K_v	Vrms/rad/s	18.8	
Motor constant (at 25℃)	K_m	Nm/√W	9.68	
Thermal resistance	R_{th}	K/W	0.23	0.037
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.079	
Thermal time constant	T_{th}	s	3300	120
Max. continuous power dissipation	P_c	W	557	3483
Rated speed(at 600VDC)		rpm	150	

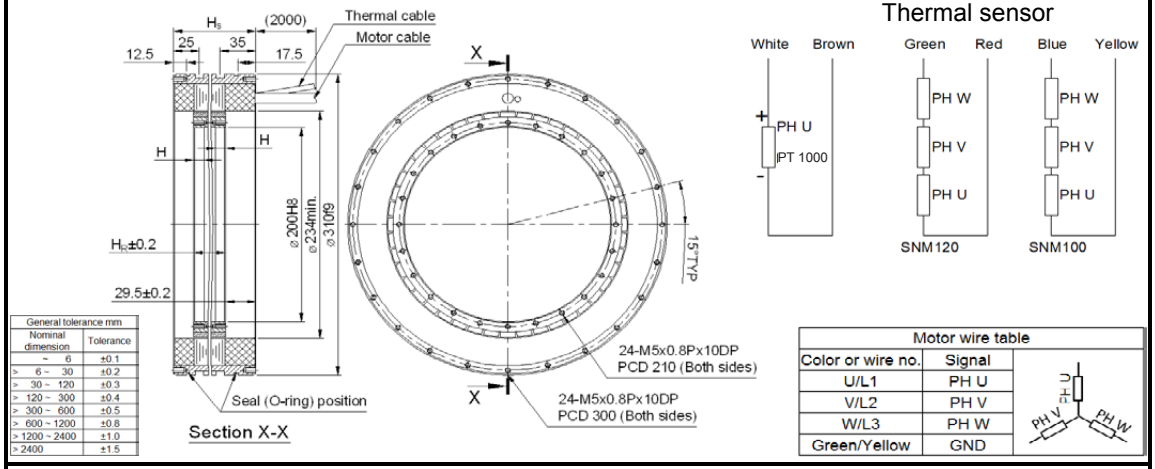
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	8.1	
Mass of stator	M_S	kg	30.9	
Height of stator	H_S	mm	150	
Height of rotor	H_R	mm	101	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	10
Max. pressure drop	△p	bar	-	1

T-N curve







General tolerance mm

Nominal dimension	Tolerance
~ 6	±0.1
> 6 ~ 30	±0.2
> 30 ~ 120	±0.3
> 120 ~ 300	±0.4
> 300 ~ 600	±0.5
> 600 ~ 1200	±0.8
> 1200 ~ 2400	±1.0
> 2400	±1.5

Motor wire table

Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.56 **Data sheet TMRW7A**

TMRW7AL Torque Motor DB001013

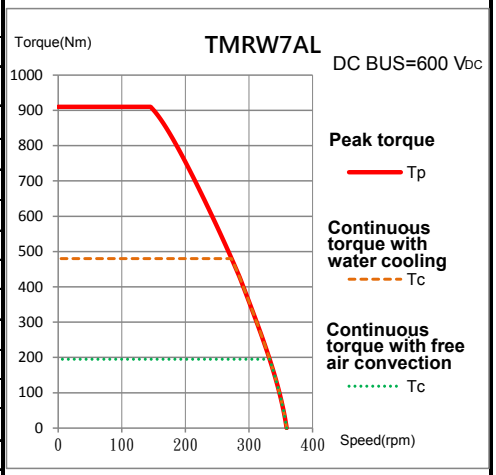
Electrical specifications

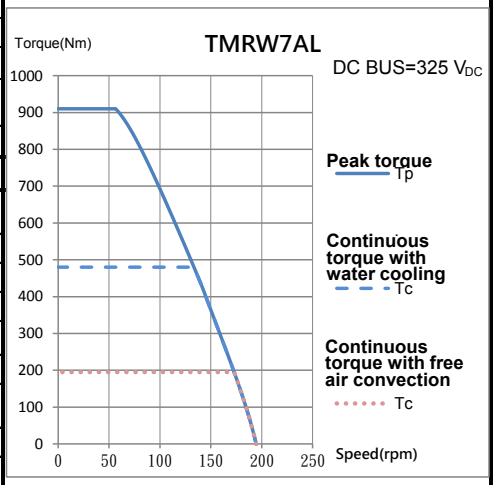
Winding code : SB	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	195	480
Continuous current	I_c	A_{rms}	12	30
Stall torque	T_s	Nm	137	336
Stall current	I_s	A_{rms}	8.4	21
Peak torque(for 1sec.)	T_p	Nm	910	
Peak current(for 1sec.)	I_p	A_{rms}	81	
Torque constant	K_t	Nm/Arms	16.28	
Electrical time constant	T_e	ms	5.6	
Resistance (line to line at 25℃)	R_{25}	Ω	1.88	
Inductance (line to line)	L	mH	10.52	
Number of poles	2p		44	
Back emf constant (line to line)	K_v	Vrms/rad/s	9.4	
Motor constant (at 25℃)	K_m	Nm/√W	9.68	
Thermal resistance	R_{th}	K/W	0.23	0.037
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.079	
Thermal time constant	T_{th}	s	3300	120
Max. continuous power dissipation	P_c	W	557	3483
Rated speed(at 600VDC)		rpm	330	

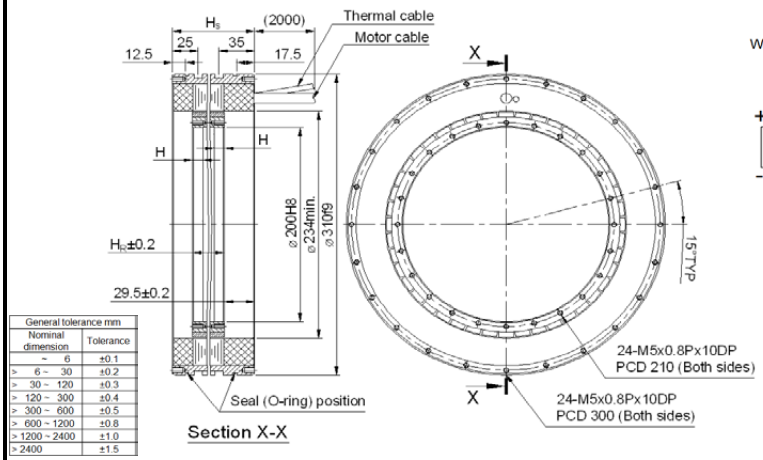
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	8.1	
Mass of stator	M_S	kg	30.9	
Height of stator	H_S	mm	150	
Height of rotor	H_R	mm	101	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	▵θ	K	-	5
Minimum water flow	q	l/min	-	10
Max. pressure drop	▵p	bar	-	1

T-N curve

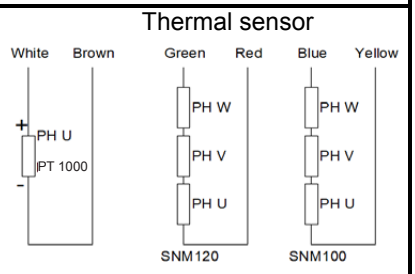






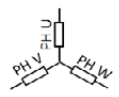
General tolerance mm

Nominal dimension	Tolerance
~ 6	±0.1
> 6 ~ 30	±0.2
> 30 ~ 120	±0.3
> 120 ~ 300	±0.4
> 300 ~ 600	±0.5
> 600 ~ 1200	±0.8
> 1200 ~ 2400	±1.0
> 2400	±1.5



Motor wire table

Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND



Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.57 **Data sheet TMRW7AL**

TMRW7F Torque Motor DB001014

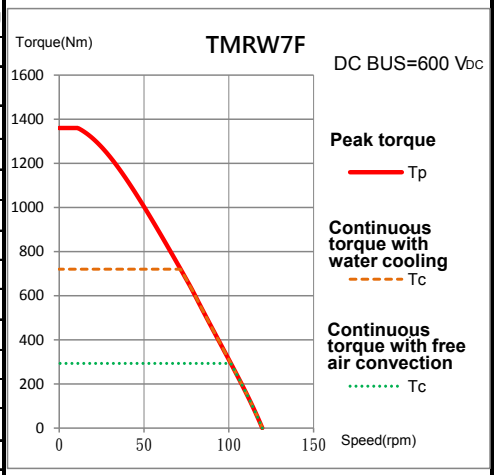
Electrical specifications

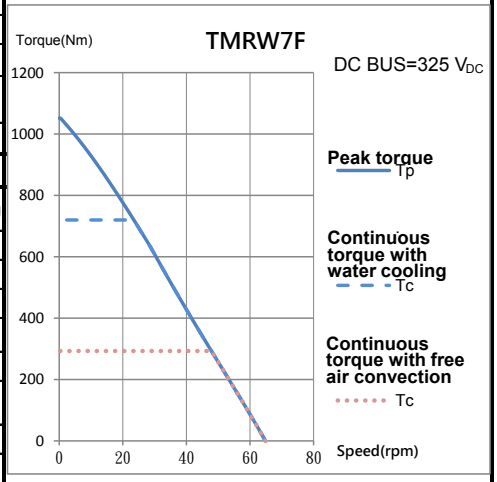
Winding code : SA	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	293	720
Continuous current	I_c	A_{rms}	6	15
Stall torque	T_s	Nm	205	504
Stall current	I_s	A_{rms}	4.2	10.5
Peak torque(for 1sec.)	T_p	Nm	1360	
Peak current(for 1sec.)	I_p	A_{rms}	40.5	
Torque constant	K_t	Nm/Arms	48.85	
Electrical time constant	T_e	ms	5.6	
Resistance (line to line at 25℃)	R_{25}	Ω	10.84	
Inductance (line to line)	L	mH	60.68	
Number of poles	2p		44	
Back emf constant (line to line)	K_v	Vrms/rad/s	28.2	
Motor constant (at 25℃)	K_m	Nm/√W	12.11	
Thermal resistance	R_{th}	K/W	0.16	0.026
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.11	
Thermal time constant	T_{th}	s	3400	100
Max. continuous power dissipation	P_c	W	803	5022
Rated speed(at 600VDC)		rpm	100	

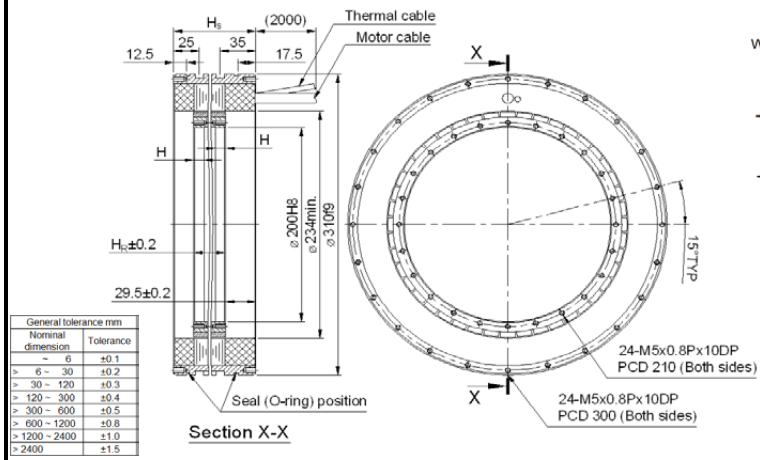
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	12.1	
Mass of stator	M_S	kg	43.6	
Height of stator	H_S	mm	200	
Height of rotor	H_R	mm	151	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	14.4
Max. pressure drop	△p	bar	-	1

T-N curve

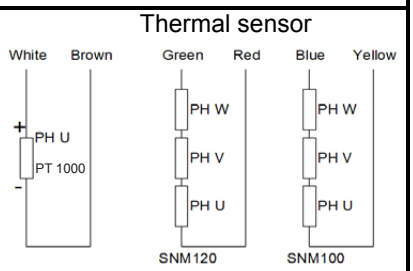






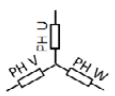
General tolerance mm

Nominal dimension	Tolerance
~ 6	±0.1
> 6 ~ 30	±0.2
> 30 ~ 120	±0.3
> 120 ~ 300	±0.4
> 300 ~ 600	±0.5
> 600 ~ 1200	±0.8
> 1200 ~ 2400	±1.0
> 2400	±1.5



Motor wire table

Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND



Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.58 **Data sheet TMRW7F**

TMRW7FL Torque Motor DB001015

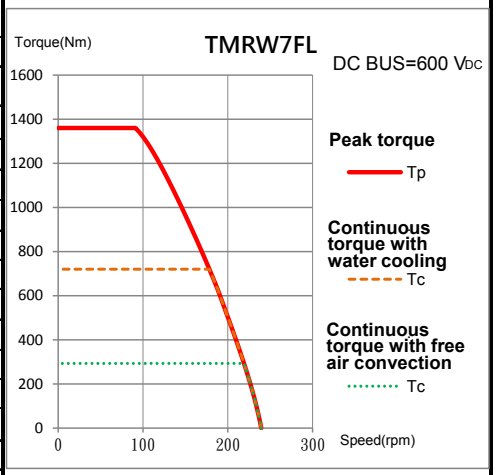
Electrical specifications

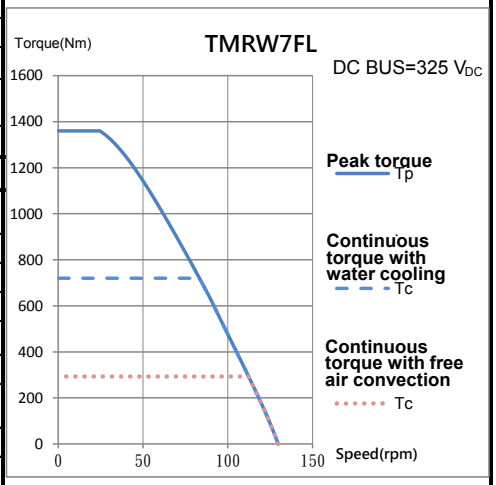
Winding code : SB	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	293	720
Continuous current	I_c	A_{rms}	12	30
Stall torque	T_s	Nm	205	504
Stall current	I_s	A_{rms}	8.4	21
Peak torque(for 1sec.)	T_p	Nm	1360	
Peak current(for 1sec.)	I_p	A_{rms}	81	
Torque constant	K_t	Nm/Arms	24.45	
Electrical time constant	T_e	ms	5.8	
Resistance (line to line at 25℃)	R_{25}	Ω	2.5	
Inductance (line to line)	L	mH	14.6	
Number of poles	2p		44	
Back emf constant (line to line)	K_v	Vrms/rad/s	14.1	
Motor constant (at 25℃)	K_m	Nm/√W	12.61	
Thermal resistance	R_{th}	K/W	0.18	0.028
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.11	
Thermal time constant	T_{th}	s	3400	100
Max. continuous power dissipation	P_c	W	740	4630
Rated speed(at 600VDC)		rpm	210	

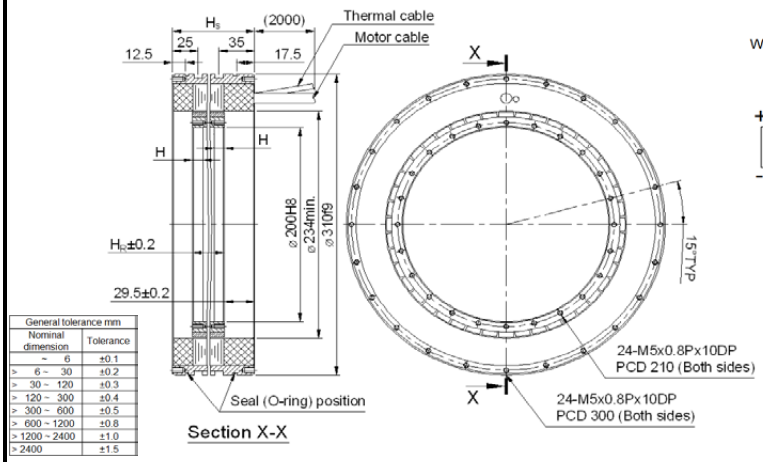
Mechanical specifications

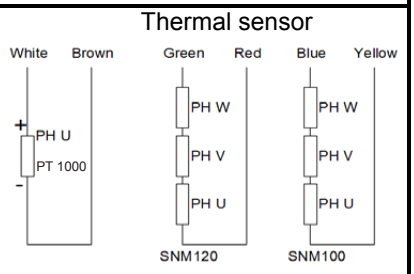
	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	12.1	
Mass of stator	M_S	kg	43.6	
Height of stator	H_S	mm	200	
Height of rotor	H_R	mm	151	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	▵θ	K	-	5
Minimum water flow	q	l/min	-	13.3
Max. pressure drop	▵p	bar	-	1

T-N curve

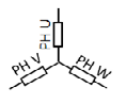








Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND



Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.59 **Data sheet TMRW7FL**

TMRWA3 Torque Motor DB001040

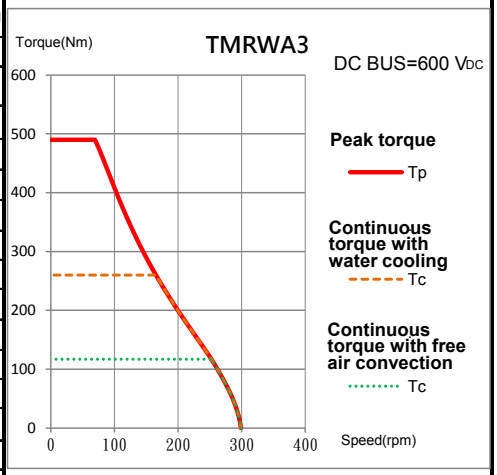
Electrical specifications

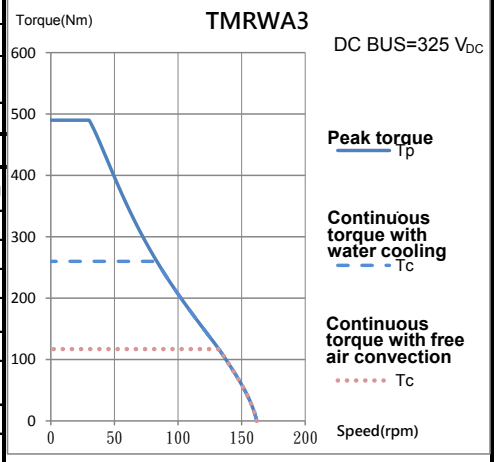
Winding code : SA	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	117	260
Continuous current	I_c	A_{rms}	6	15
Stall torque	T_s	Nm	82	182
Stall current	I_s	A_{rms}	4.2	10.5
Peak torque(for 1sec.)	T_p	Nm	490	
Peak current(for 1sec.)	I_p	A_{rms}	40.5	
Torque constant	K_t	Nm/Arms	19.57	
Electrical time constant	T_e	ms	10	
Resistance (line to line at 25℃)	R_{25}	Ω	3.57	
Inductance (line to line)	L	mH	35.7	
Number of poles	2p		66	
Back emf constant (line to line)	K_v	Vrms/rad/s	11.3	
Motor constant (at 25℃)	K_m	Nm/√W	8.43	
Thermal resistance	R_{th}	K/W	0.49	0.079
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.065	
Thermal time constant	T_{th}	s	3020	280
Max. continuous power dissipation	P_c	W	264	1653
Rated speed(at 600VDC)		rpm	250	

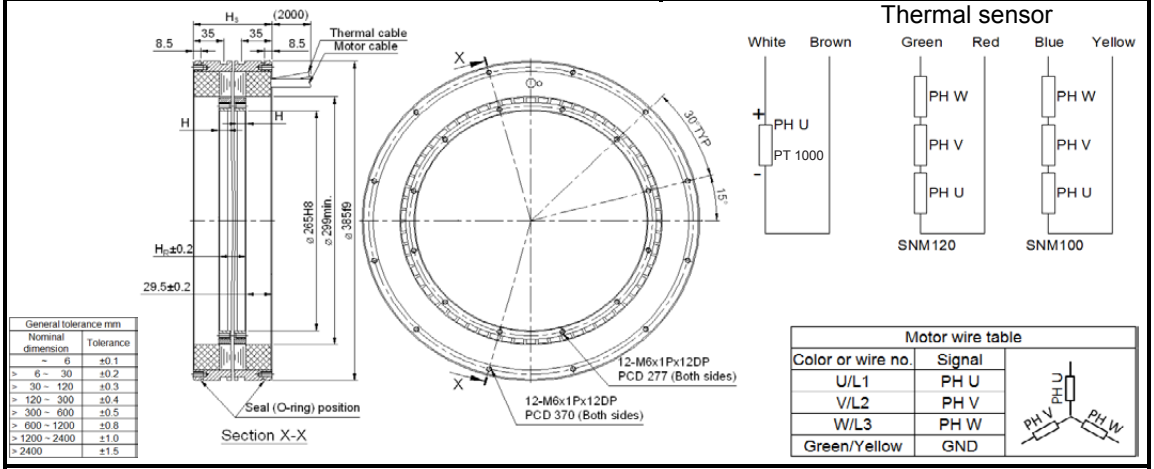
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	3.1	
Mass of stator	M_S	kg	20.1	
Height of stator	H_S	mm	90	
Height of rotor	H_R	mm	31	
Length of rotor centring fit	H	mm	10	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	4.8
Max. pressure drop	△p	bar	-	1

T-N curve







Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.60 **Data sheet TMRWA3**

TMRWA3L Torque Motor DB001041

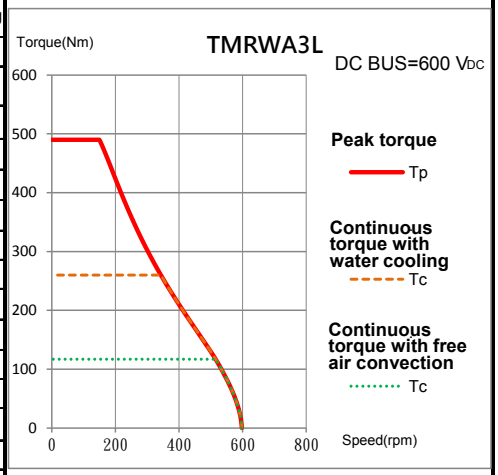
Electrical specifications

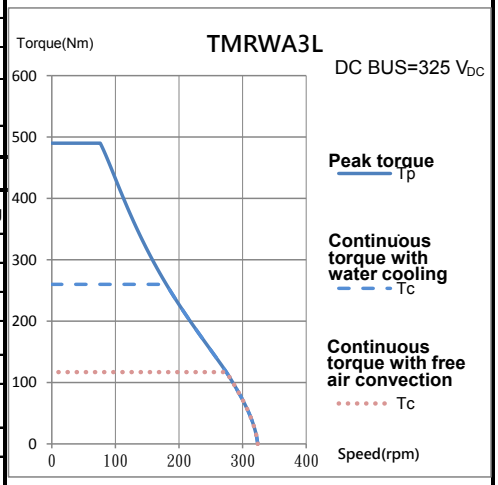
Winding code : SB	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	117	260
Continuous current	I_c	A_{rms}	12	30
Stall torque	T_s	Nm	82	182
Stall current	I_s	A_{rms}	8.4	21
Peak torque(for 1sec.)	T_p	Nm	490	
Peak current(for 1sec.)	I_p	A_{rms}	81	
Torque constant	K_t	Nm/Arms	9.79	
Electrical time constant	T_e	ms	10	
Resistance (line to line at 25℃)	R_{25}	Ω	0.89	
Inductance (line to line)	L	mH	8.93	
Number of poles	2p		66	
Back emf constant (line to line)	K_v	Vrms/rad/s	5.65	
Motor constant (at 25℃)	K_m	Nm/√W	8.44	
Thermal resistance	R_{th}	K/W	0.49	0.079
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.065	
Thermal time constant	T_{th}	s	3020	280
Max. continuous power dissipation	P_c	W	263	1647
Rated speed(at 600VDC)		rpm	270	

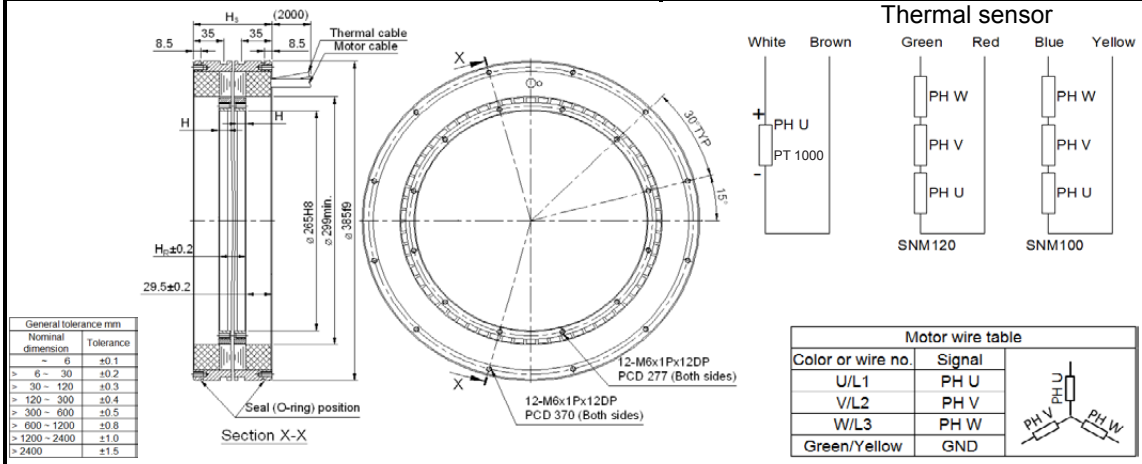
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	3.1	
Mass of stator	M_S	kg	20.1	
Height of stator	H_S	mm	90	
Height of rotor	H_R	mm	31	
Length of rotor centring fit	H	mm	10	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	4.8
Max. pressure drop	△p	bar	-	1

T-N curve







General tolerance mm	
Nominal dimension	Tolerance
~ 6	±0.1
> 6 ~ 30	±0.2
> 30 ~ 120	±0.3
> 120 ~ 300	±0.4
> 300 ~ 600	±0.5
> 600 ~ 1200	±0.8
> 1200 ~ 2400	±1.0
> 2400	±1.5

Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.61 **Data sheet TMRWA3L**

TMRWA5 Torque Motor

DB001042

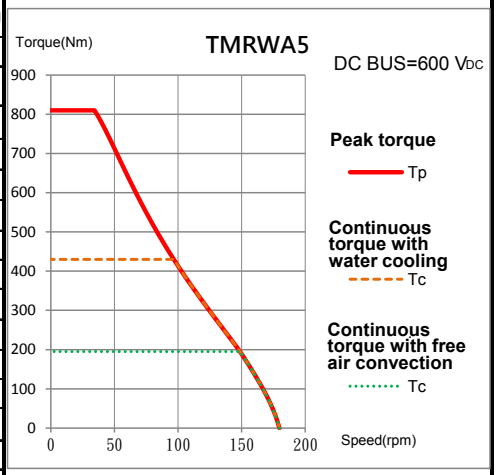
Electrical specifications

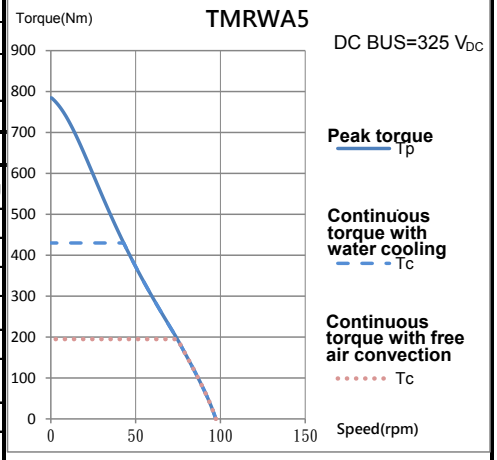
Winding code : SA	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	195	430
Continuous current	I_c	A_{rms}	6	15
Stall torque	T_s	Nm	137	301
Stall current	I_s	A_{rms}	4.2	10.5
Peak torque(for 1sec.)	T_p	Nm	810	
Peak current(for 1sec.)	I_p	A_{rms}	40.5	
Torque constant	K_t	Nm/Arms	32.6	
Electrical time constant	T_e	ms	7.5	
Resistance (line to line at 25℃)	R_{25}	Ω	7.1	
Inductance (line to line)	L	mH	53.4	
Number of poles	2p		66	
Back emf constant (line to line)	K_v	Vrms/rad/s	18.8	
Motor constant (at 25℃)	K_m	Nm/√W	9.96	
Thermal resistance	R_{th}	K/W	0.25	0.04
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.1	
Thermal time constant	T_{th}	s	3180	120
Max. continuous power dissipation	P_c	W	525	3287
Rated speed(at 600VDC)		rpm	140	

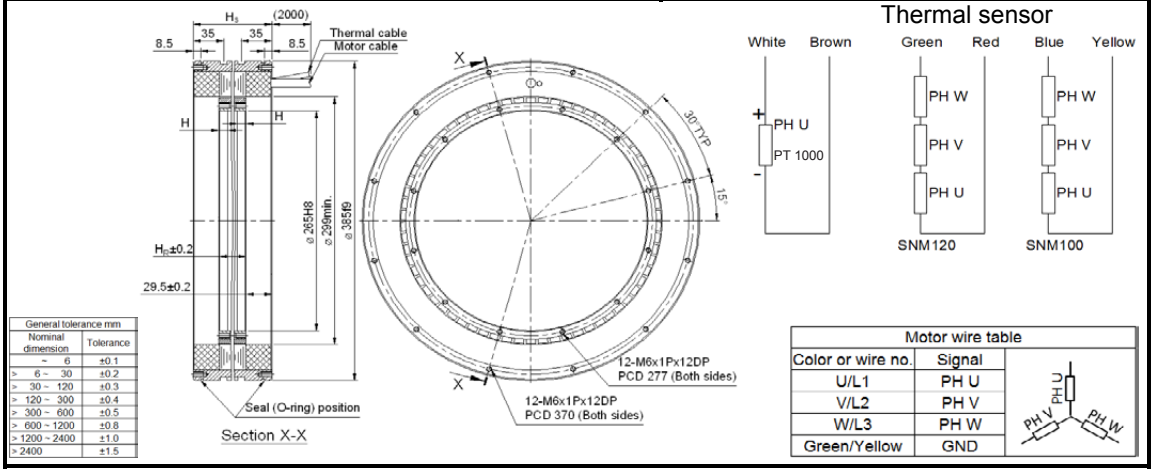
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	5.1	
Mass of stator	M_S	kg	26.8	
Height of stator	H_S	mm	110	
Height of rotor	H_R	mm	51	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	9.5
Max. pressure drop	△p	bar	-	1

T-N curve







General tolerance mm

Nominal dimension	Tolerance
~ 6	±0.1
> 6 ~ 30	±0.2
> 30 ~ 120	±0.3
> 120 ~ 300	±0.4
> 300 ~ 600	±0.5
> 600 ~ 1200	±0.8
> 1200 ~ 2400	±1.0
> 2400	±1.5

Motor wire table

Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.62 **Data sheet TMRWA5**

TMRWA5L Torque Motor DB001043

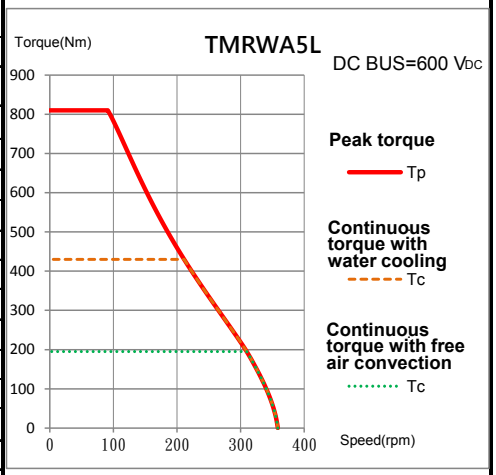
Electrical specifications

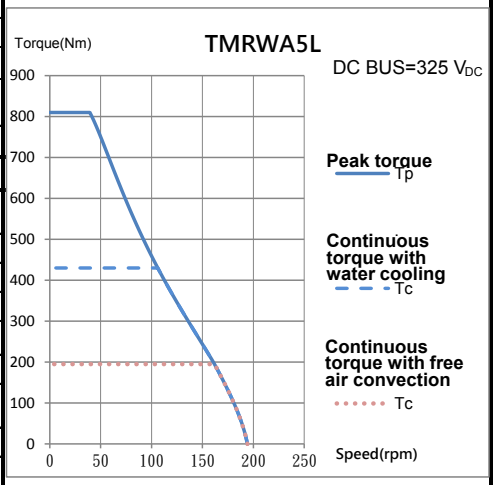
Winding code : SB	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	195	430
Continuous current	I_c	A_{rms}	12	30
Stall torque	T_s	Nm	137	301
Stall current	I_s	A_{rms}	8.4	21
Peak torque(for 1sec.)	T_p	Nm	810	
Peak current(for 1sec.)	I_p	A_{rms}	81	
Torque constant	K_t	Nm/Arms	16.32	
Electrical time constant	T_e	ms	7.5	
Resistance (line to line at 25℃)	R_{25}	Ω	1.78	
Inductance (line to line)	L	mH	13.35	
Number of poles	2p		66	
Back emf constant (line to line)	K_v	Vrms/rad/s	9.42	
Motor constant (at 25℃)	K_m	Nm/√W	9.94	
Thermal resistance	R_{th}	K/W	0.25	0.04
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.1	
Thermal time constant	T_{th}	s	3180	120
Max. continuous power dissipation	P_c	W	527	3294
Rated speed(at 600VDC)		rpm	270	

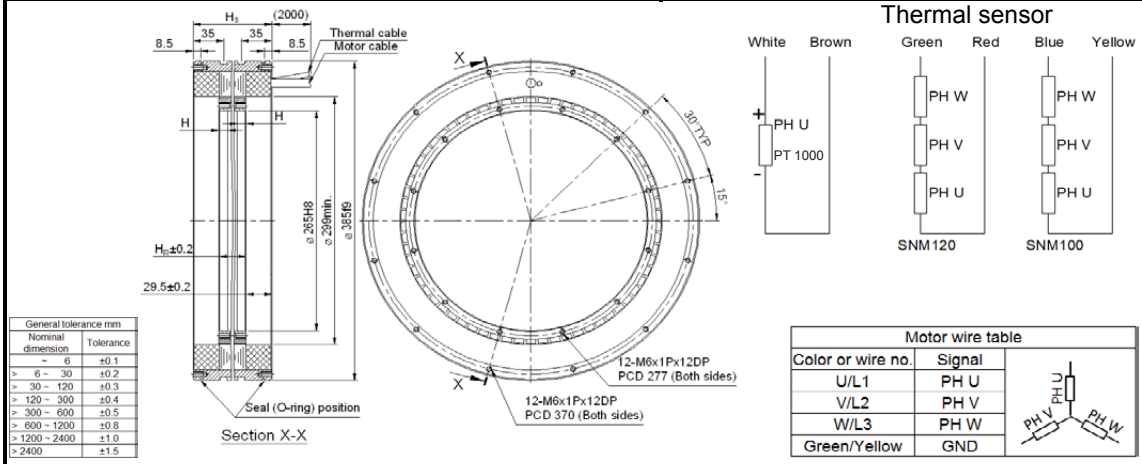
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	5.1	
Mass of stator	M_S	kg	26.8	
Height of stator	H_S	mm	110	
Height of rotor	H_R	mm	51	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	9.5
Max. pressure drop	△p	bar	-	1

T-N curve







Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.63 **Data sheet TMRWA5L**

TMRWA7 Torque Motor

DB001044

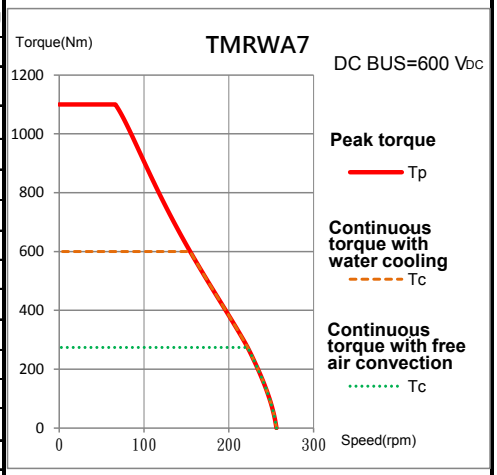
Electrical specifications

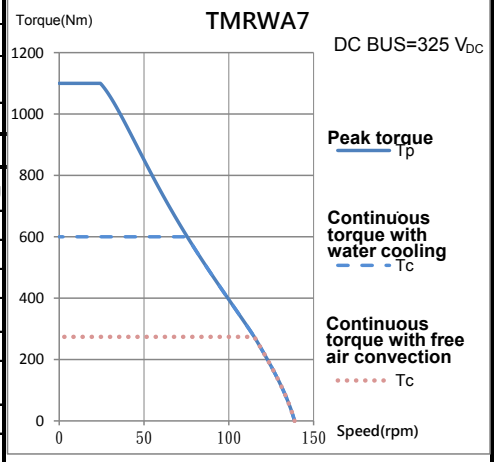
Winding code : SB	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	274	600
Continuous current	I_c	A_{rms}	12	30
Stall torque	T_s	Nm	192	420
Stall current	I_s	A_{rms}	8.4	21
Peak torque(for 1sec.)	T_p	Nm	1100	
Peak current(for 1sec.)	I_p	A_{rms}	81	
Torque constant	K_t	Nm/Arms	22.84	
Electrical time constant	T_e	ms	7.8	
Resistance (line to line at 25℃)	R_{25}	Ω	2.2	
Inductance (line to line)	L	mH	17.21	
Number of poles	2p		66	
Back emf constant (line to line)	K_v	Vrms/rad/s	13.18	
Motor constant (at 25℃)	K_m	Nm/√W	12.57	
Thermal resistance	R_{th}	K/W	0.2	0.032
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.15	
Thermal time constant	T_{th}	s	3620	130
Max. continuous power dissipation	P_c	W	652	4077
Rated speed(at 600VDC)		rpm	220	

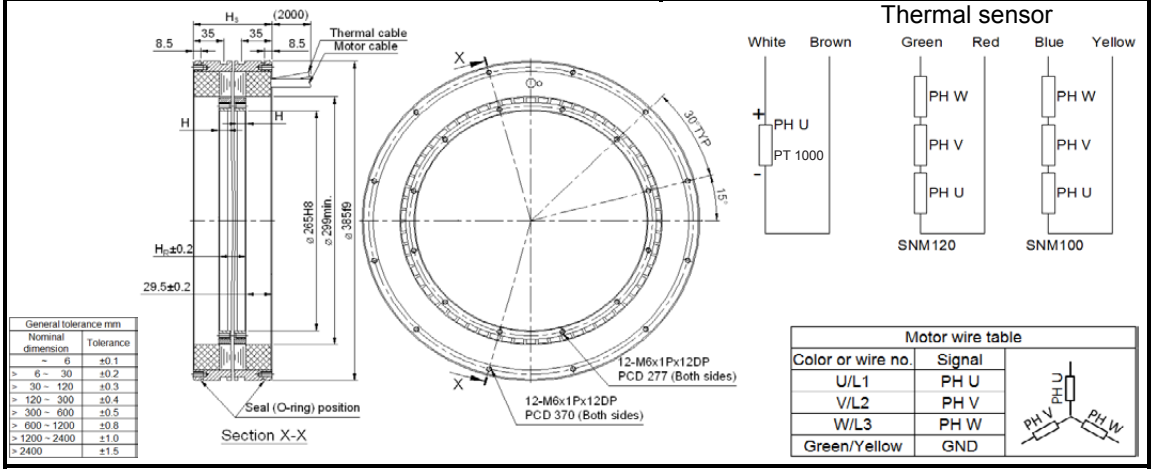
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	7.1	
Mass of stator	M_S	kg	34.5	
Height of stator	H_S	mm	130	
Height of rotor	H_R	mm	71	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	11.7
Max. pressure drop	△p	bar	-	1

T-N curve







General tolerance mm

Nominal dimension	Tolerance
~ 6	±0.1
> 6 ~ 30	±0.2
> 30 ~ 120	±0.3
> 120 ~ 300	±0.4
> 300 ~ 600	±0.5
> 600 ~ 1200	±0.8
> 1200 ~ 2400	±1.0
> 2400	±1.5

Motor wire table

Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.64 **Data sheet TMRWA7**

TMRWA7L Torque Motor DB001045

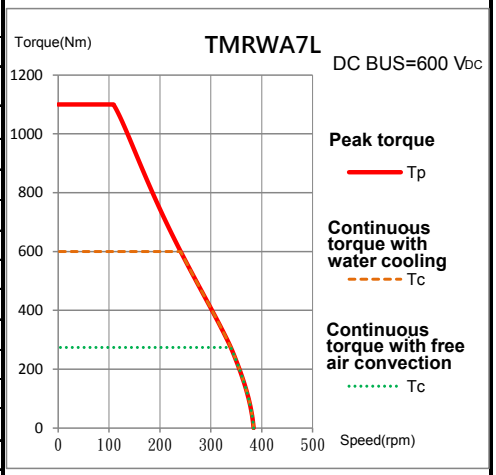
Electrical specifications

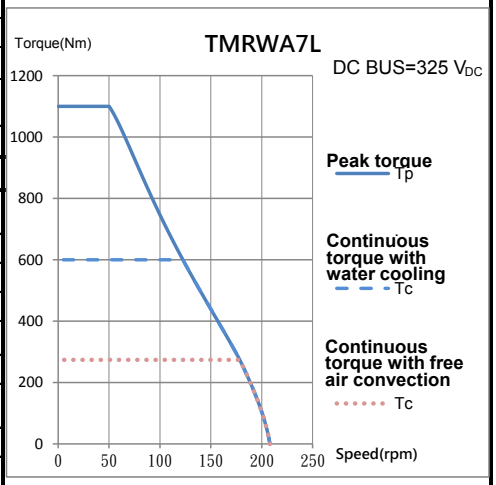
Winding code : SC	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	274	600
Continuous current	I_c	A_{rms}	18	45
Stall torque	T_s	Nm	192	420
Stall current	I_s	A_{rms}	12.6	31.5
Peak torque(for 1sec.)	T_p	Nm	1100	
Peak current(for 1sec.)	I_p	A_{rms}	121.5	
Torque constant	K_t	Nm/Arms	15.23	
Electrical time constant	T_e	ms	7.8	
Resistance (line to line at 25℃)	R_{25}	Ω	0.98	
Inductance (line to line)	L	mH	7.6	
Number of poles	2p		66	
Back emf constant (line to line)	K_v	Vrms/rad/s	8.79	
Motor constant (at 25℃)	K_m	Nm/√W	12.56	
Thermal resistance	R_{th}	K/W	0.2	0.032
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.15	
Thermal time constant	T_{th}	s	3620	130
Max. continuous power dissipation	P_c	W	651	4070
Rated speed(at 600VDC)		rpm	270	

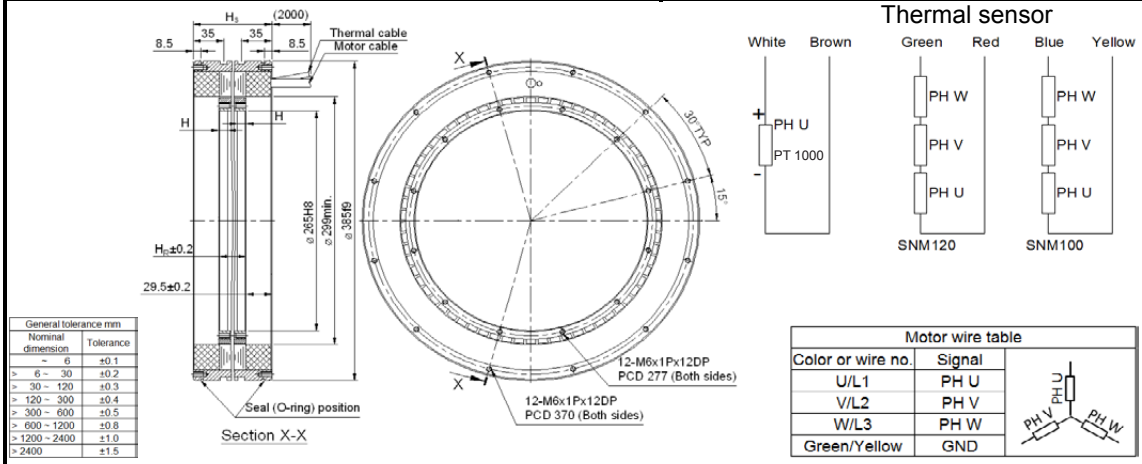
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	7.1	
Mass of stator	M_S	kg	34.5	
Height of stator	H_S	mm	130	
Height of rotor	H_R	mm	71	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	11.7
Max. pressure drop	△p	bar	-	1

T-N curve







General tolerance mm	
Nominal dimension	Tolerance
~ 6	±0.1
> 6 ~ 30	±0.2
> 30 ~ 120	±0.3
> 120 ~ 300	±0.4
> 300 ~ 600	±0.5
> 600 ~ 1200	±0.8
> 1200 ~ 2400	±1.0
> 2400	±1.5

Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.65 **Data sheet TMRWA7L**

TMRWAA Torque Motor

DB001046

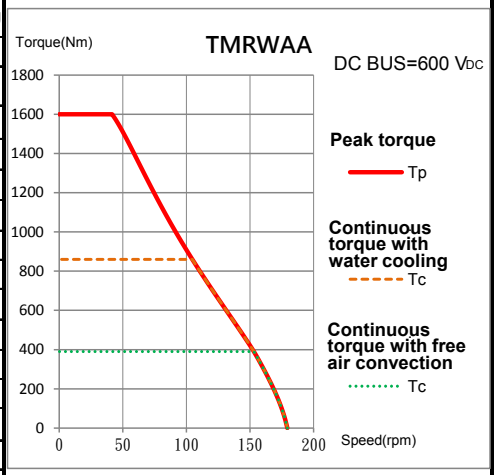
Electrical specifications

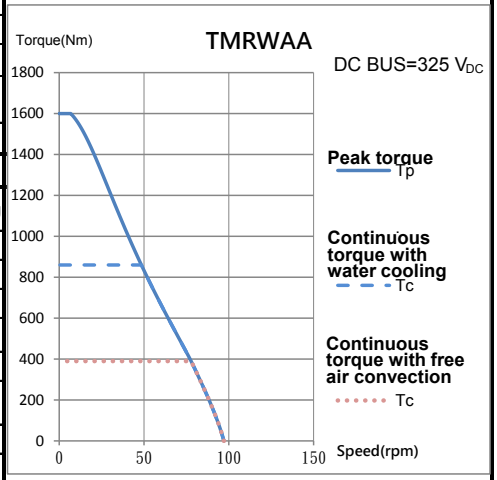
Winding code : SB	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	390	860
Continuous current	I_c	A_{rms}	12	30
Stall torque	T_s	Nm	273	602
Stall current	I_s	A_{rms}	8.4	21
Peak torque(for 1sec.)	T_p	Nm	1600	
Peak current(for 1sec.)	I_p	A_{rms}	81	
Torque constant	K_t	Nm/Arms	32.63	
Electrical time constant	T_e	ms	8.1	
Resistance (line to line at 25℃)	R_{25}	Ω	2.97	
Inductance (line to line)	L	mH	24.2	
Number of poles	2p		66	
Back emf constant (line to line)	K_v	Vrms/rad/s	18.83	
Motor constant (at 25℃)	K_m	Nm/√W	15.4	
Thermal resistance	R_{th}	K/W	0.15	0.024
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.21	
Thermal time constant	T_{th}	s	3670	99
Max. continuous power dissipation	P_c	W	881	5508
Rated speed(at 600VDC)		rpm	150	

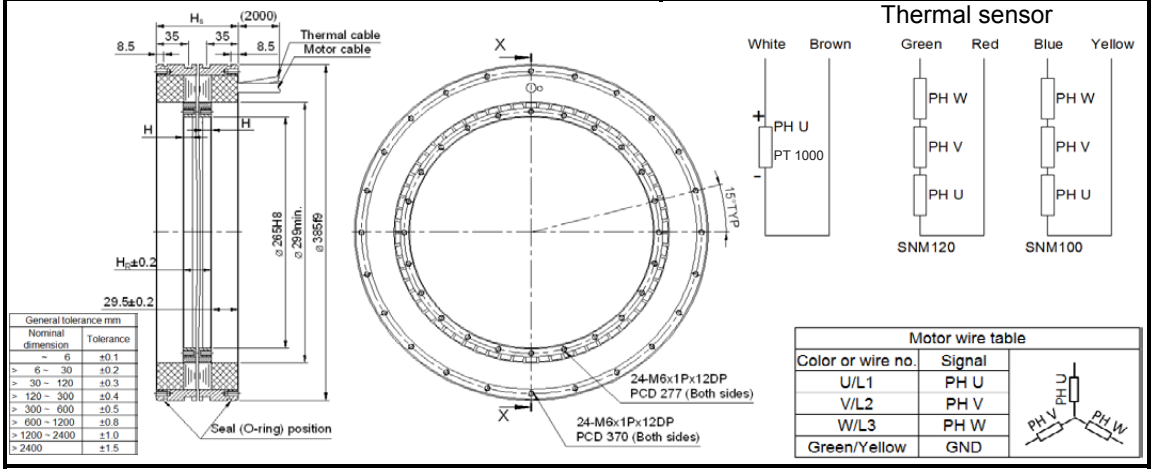
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	10.2	
Mass of stator	M_S	kg	44.9	
Height of stator	H_S	mm	160	
Height of rotor	H_R	mm	101	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	15.8
Max. pressure drop	△p	bar	-	2

T-N curve







Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

General tolerance mm	
Nominal dimension	Tolerance
~ 6	±0.1
> 6 ~ 30	±0.2
> 30 ~ 120	±0.3
> 120 ~ 300	±0.4
> 300 ~ 600	±0.5
> 600 ~ 1200	±0.8
> 1200 ~ 2400	±1.0
> 2400	±1.5

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.66 **Data sheet TMRWAA**

TMRWAAL Torque Motor DB001047

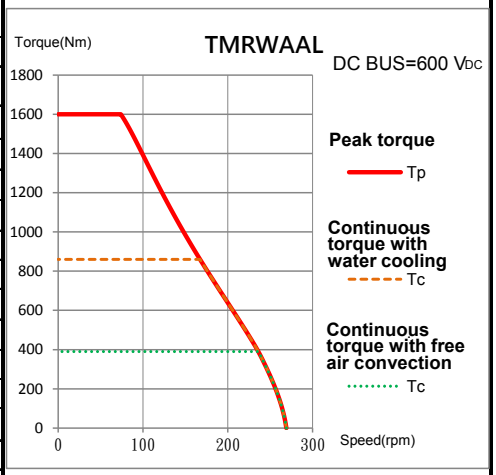
Electrical specifications

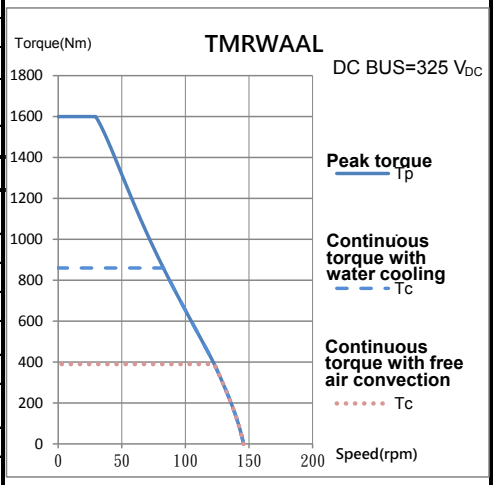
Winding code : SC	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	390	860
Continuous current	I_c	A_{rms}	18	45
Stall torque	T_s	Nm	273	602
Stall current	I_s	A_{rms}	12.6	31.5
Peak torque(for 1sec.)	T_p	Nm	1600	
Peak current(for 1sec.)	I_p	A_{rms}	121.5	
Torque constant	K_t	Nm/Arms	21.75	
Electrical time constant	T_e	ms	8	
Resistance (line to line at 25℃)	R_{25}	Ω	1.32	
Inductance (line to line)	L	mH	10.5	
Number of poles	2p		66	
Back emf constant (line to line)	K_v	Vrms/rad/s	12.55	
Motor constant (at 25℃)	K_m	Nm/√W	15.4	
Thermal resistance	R_{th}	K/W	0.15	0.024
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.21	
Thermal time constant	T_{th}	s	3670	99
Max. continuous power dissipation	P_c	W	879	5497
Rated speed(at 600VDC)		rpm	230	

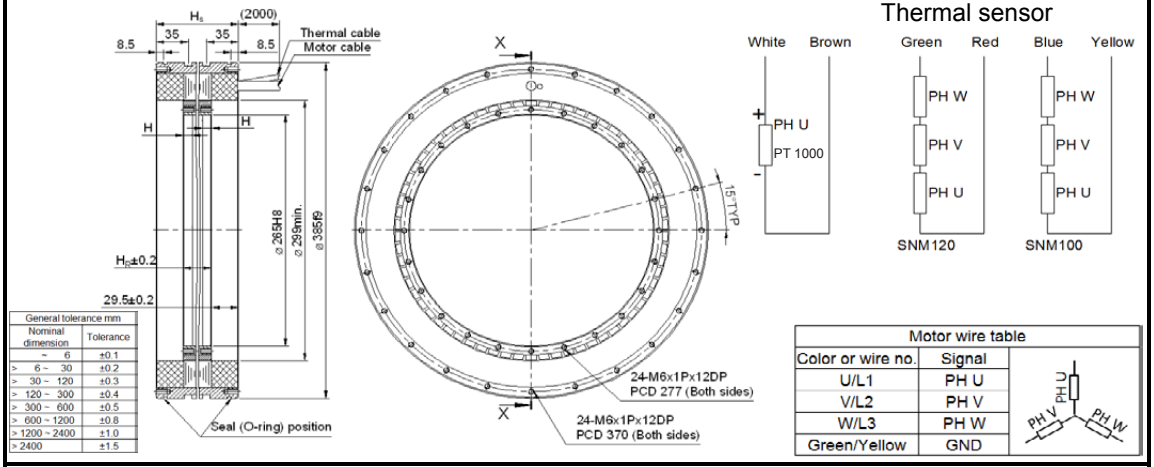
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	10.2	
Mass of stator	M_S	kg	44.9	
Height of stator	H_S	mm	160	
Height of rotor	H_R	mm	101	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	15.8
Max. pressure drop	△p	bar	-	2

T-N curve







Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.67 **Data sheet TMRWAAL**

TMRWAF Torque Motor

DB001048

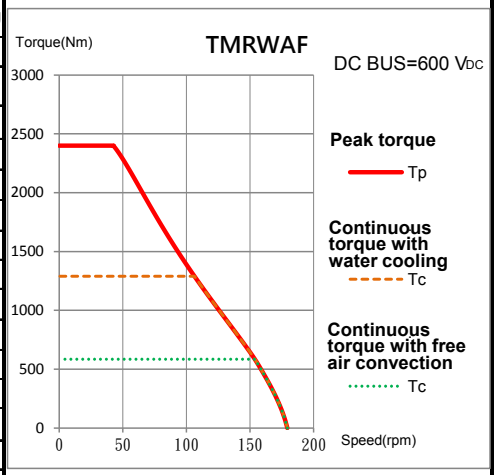
Electrical specifications

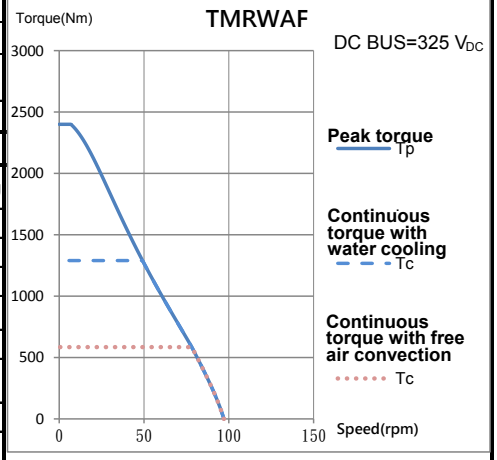
Winding code : SC	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	585	1290
Continuous current	I_c	A_{rms}	18	45
Stall torque	T_s	Nm	410	903
Stall current	I_s	A_{rms}	12.6	31.5
Peak torque(for 1sec.)	T_p	Nm	2400	
Peak current(for 1sec.)	I_p	A_{rms}	121.5	
Torque constant	K_t	Nm/Arms	32.63	
Electrical time constant	T_e	ms	7.9	
Resistance (line to line at 25℃)	R_{25}	Ω	1.98	
Inductance (line to line)	L	mH	15.6	
Number of poles	2p		66	
Back emf constant (line to line)	K_v	Vrms/rad/s	18.83	
Motor constant (at 25℃)	K_m	Nm/√W	18.86	
Thermal resistance	R_{th}	K/W	0.1	0.016
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.32	
Thermal time constant	T_{th}	s	4120	120
Max. continuous power dissipation	P_c	W	1321	8262
Rated speed(at 600VDC)		rpm	150	

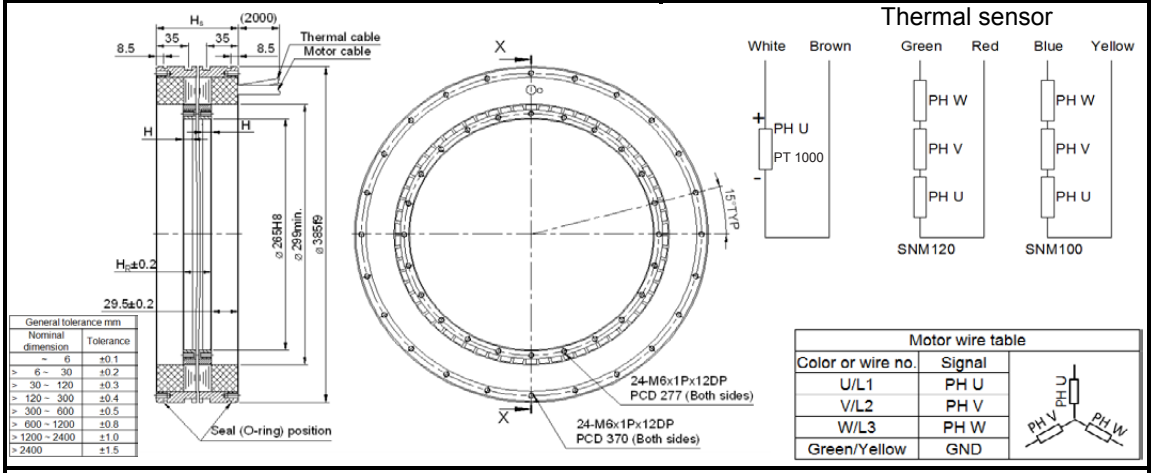
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	15.3	
Mass of stator	M_S	kg	63.1	
Height of stator	H_S	mm	210	
Height of rotor	H_R	mm	151	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	23.7
Max. pressure drop	△p	bar	-	3

T-N curve







General tolerance mm	
Nominal dimension	Tolerance
~ 6	±0.1
> 6 ~ 30	±0.2
> 30 ~ 120	±0.3
> 120 ~ 300	±0.4
> 300 ~ 600	±0.5
> 600 ~ 1200	±0.8
> 1200 ~ 2400	±1.0
> 2400	±1.5

Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.68 **Data sheet TMRWAF**

TMRWAFL Torque Motor

DB001049

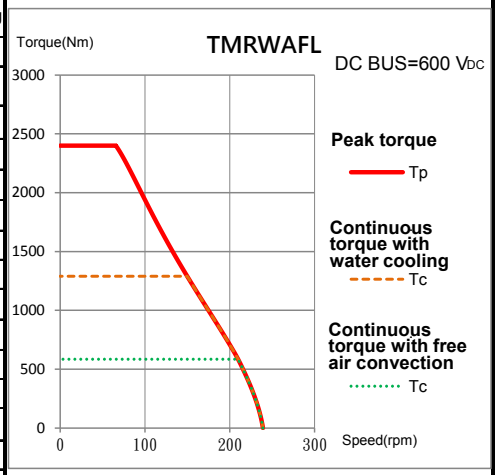
Electrical specifications

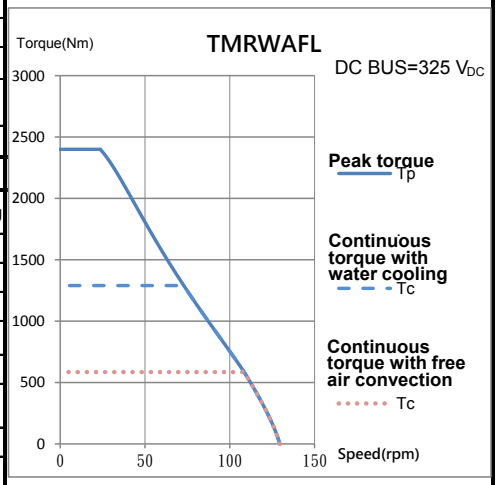
Winding code : PF	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	585	1290
Continuous current	I_c	A_{rms}	24	60
Stall torque	T_s	Nm	410	903
Stall current	I_s	A_{rms}	16.8	42
Peak torque(for 1sec.)	T_p	Nm	2400	
Peak current(for 1sec.)	I_p	A_{rms}	162	
Torque constant	K_t	Nm/Arms	24.45	
Electrical time constant	T_e	ms	7.7	
Resistance (line to line at 25℃)	R_{25}	Ω	1.11	
Inductance (line to line)	L	mH	8.5	
Number of poles	2p		66	
Back emf constant (line to line)	K_v	Vrms/rad/s	14.12	
Motor constant (at 25℃)	K_m	Nm/√W	18.89	
Thermal resistance	R_{th}	K/W	0.1	0.016
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.32	
Thermal time constant	T_{th}	s	4120	120
Max. continuous power dissipation	P_c	W	1313	8208
Rated speed(at 600VDC)		rpm	200	

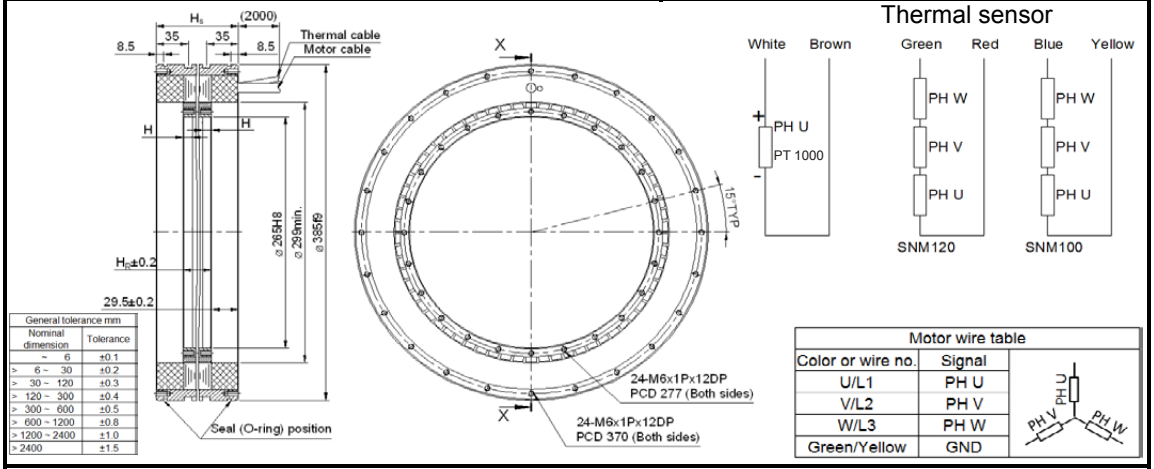
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	15.3	
Mass of stator	M_S	kg	63.1	
Height of stator	H_S	mm	210	
Height of rotor	H_R	mm	151	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	23.5
Max. pressure drop	△p	bar	-	3

T-N curve







Thermal sensor

Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.69 **Data sheet TMRWAFL**

TMRWD3 Torque Motor

DB001050

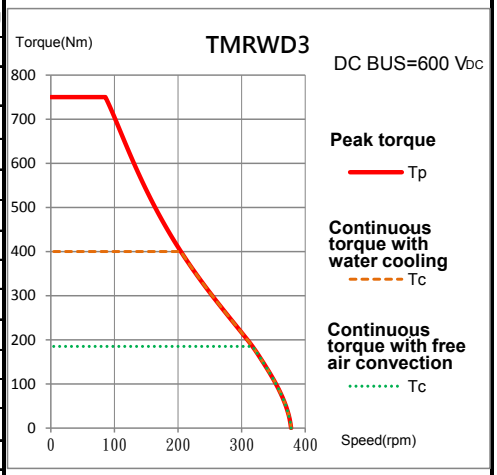
Electrical specifications

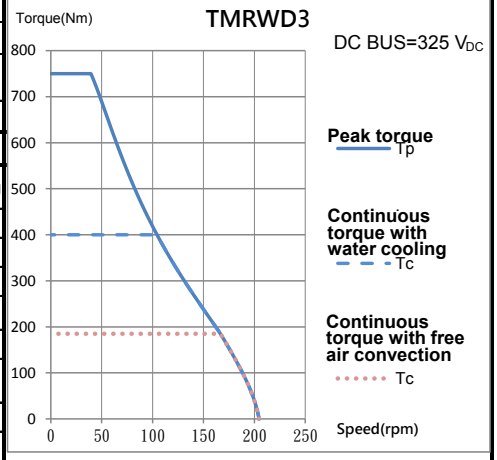
Winding code : SB	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	185	400
Continuous current	I_c	A_{rms}	12	30
Stall torque	T_s	Nm	130	280
Stall current	I_s	A_{rms}	8.4	21
Peak torque(for 1sec.)	T_p	Nm	750	
Peak current(for 1sec.)	I_p	A_{rms}	81	
Torque constant	K_t	Nm/Arms	15.48	
Electrical time constant	T_e	ms	7.1	
Resistance (line to line at 25℃)	R_{25}	Ω	1.57	
Inductance (line to line)	L	mH	11.13	
Number of poles	2p		88	
Back emf constant (line to line)	K_v	Vrms/rad/s	8.94	
Motor constant (at 25℃)	K_m	Nm/√W	10.05	
Thermal resistance	R_{th}	K/W	0.28	0.045
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.16	
Thermal time constant	T_{th}	s	3450	220
Max. continuous power dissipation	P_c	W	464	2902
Rated speed(at 600VDC)		rpm	200	

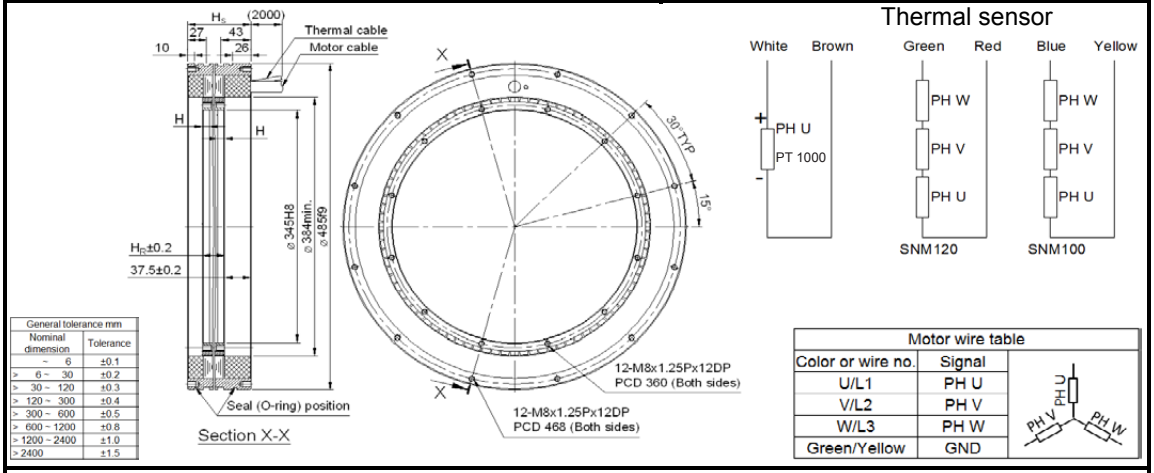
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	5.5	
Mass of stator	M_S	kg	22.8	
Height of stator	H_S	mm	90	
Height of rotor	H_R	mm	31	
Length of rotor centring fit	H	mm	10	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	8.3
Max. pressure drop	△p	bar	-	1

T-N curve







General tolerance mm

Nominal dimension	Tolerance
~ 6	±0.1
> 6 ~ 30	±0.2
> 30 ~ 120	±0.3
> 120 ~ 300	±0.4
> 300 ~ 600	±0.5
> 600 ~ 1200	±0.8
> 1200 ~ 2400	±1.0
> 2400	±1.5

Thermal sensor

Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.70 **Data sheet TMRWD3**

TMRWD3L Torque Motor DB001051

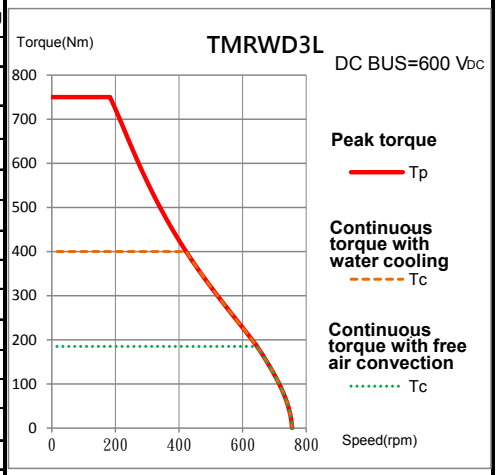
Electrical specifications

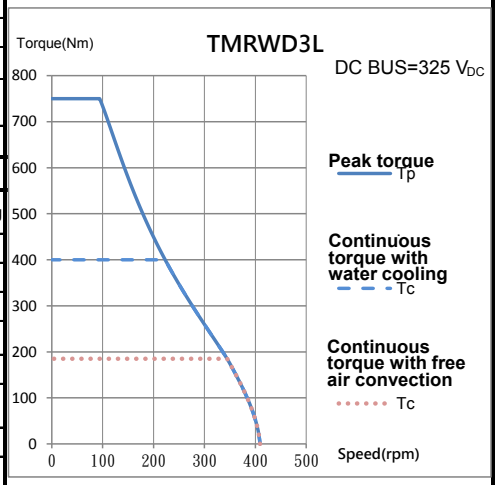
Winding code : SD	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	185	400
Continuous current	I_c	A_{rms}	24	60
Stall torque	T_s	Nm	130	280
Stall current	I_s	A_{rms}	16.8	42
Peak torque(for 1sec.)	T_p	Nm	750	
Peak current(for 1sec.)	I_p	A_{rms}	162	
Torque constant	K_t	Nm/Arms	7.74	
Electrical time constant	T_e	ms	7.1	
Resistance (line to line at 25℃)	R_{25}	Ω	0.39	
Inductance (line to line)	L	mH	2.78	
Number of poles	2p		88	
Back emf constant (line to line)	K_v	Vrms/rad/s	4.47	
Motor constant (at 25℃)	K_m	Nm/√W	10.08	
Thermal resistance	R_{th}	K/W	0.28	0.045
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.16	
Thermal time constant	T_{th}	s	3450	220
Max. continuous power dissipation	P_c	W	466	2916
Rated speed(at 600VDC)		rpm	200	

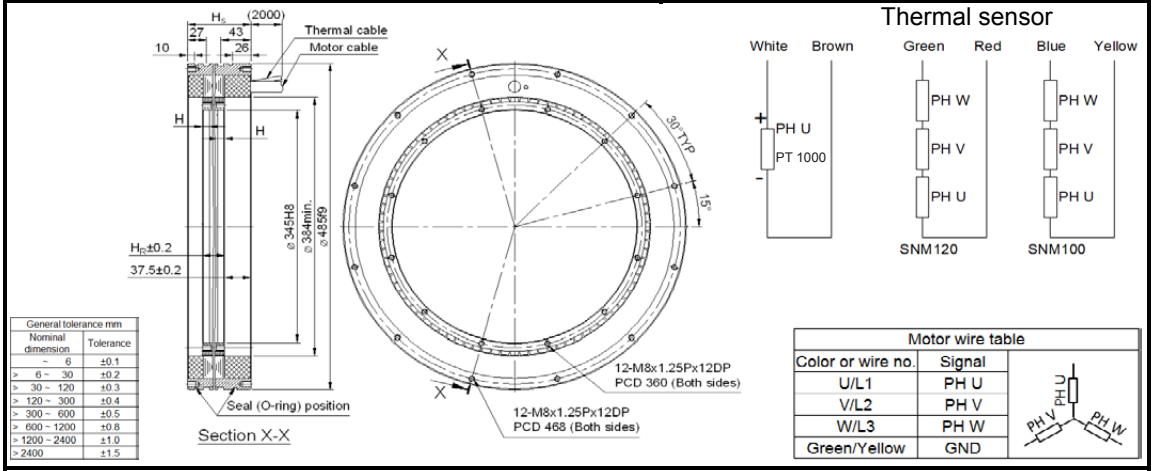
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	5.5	
Mass of stator	M_S	kg	22.8	
Height of stator	H_S	mm	90	
Height of rotor	H_R	mm	31	
Length of rotor centring fit	H	mm	10	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	8.4
Max. pressure drop	△p	bar	-	1

T-N curve







General tolerance mm

Nominal dimension	Tolerance
~ 6	±0.1
> 6 ~ 30	±0.2
> 30 ~ 120	±0.3
> 120 ~ 300	±0.4
> 300 ~ 600	±0.5
> 600 ~ 1200	±0.8
> 1200 ~ 2400	±1.0
> 2400	±1.5

Motor wire table

Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.71 **Data sheet TMRWD3L**

TMRWD5 Torque Motor

DB001052

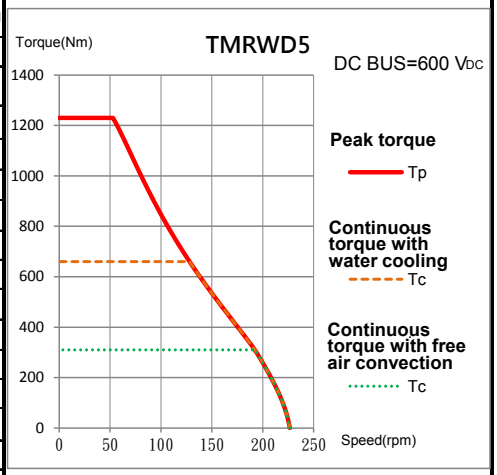
Electrical specifications

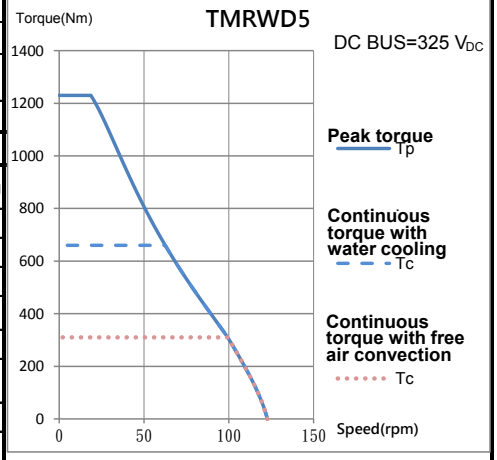
Winding code : SB	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	310	660
Continuous current	I_c	A_{rms}	12	30
Stall torque	T_s	Nm	217	462
Stall current	I_s	A_{rms}	8.4	21
Peak torque(for 1sec.)	T_p	Nm	1230	
Peak current(for 1sec.)	I_p	A_{rms}	81	
Torque constant	K_t	Nm/Arms	25.8	
Electrical time constant	T_e	ms	7.1	
Resistance (line to line at 25℃)	R_{25}	Ω	2.31	
Inductance (line to line)	L	mH	16.3	
Number of poles	2p		88	
Back emf constant (line to line)	K_v	Vrms/rad/s	14.9	
Motor constant (at 25℃)	K_m	Nm/√W	13.88	
Thermal resistance	R_{th}	K/W	0.19	0.03
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.26	
Thermal time constant	T_{th}	s	3570	140
Max. continuous power dissipation	P_c	W	684	4279
Rated speed(at 600VDC)		rpm	190	

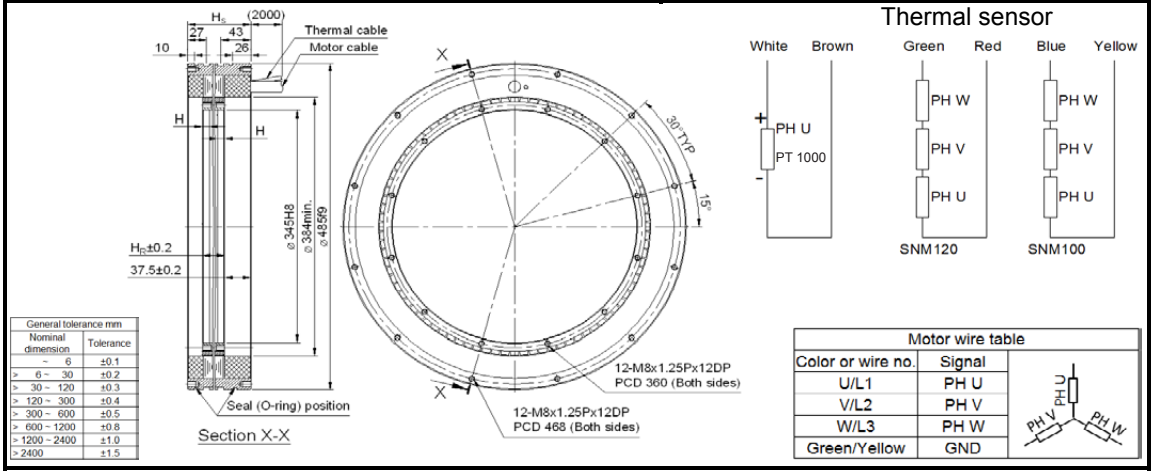
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	9.2	
Mass of stator	M_S	kg	38	
Height of stator	H_S	mm	110	
Height of rotor	H_R	mm	51	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	12.3
Max. pressure drop	△p	bar	-	1

T-N curve







General tolerance mm

Nominal dimension	Tolerance
~ 6	±0.1
> 6 ~ 30	±0.2
> 30 ~ 120	±0.3
> 120 ~ 300	±0.4
> 300 ~ 600	±0.5
> 600 ~ 1200	±0.8
> 1200 ~ 2400	±1.0
> 2400	±1.5

Thermal sensor

Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.72 **Data sheet TMRWD5**

TMRWD5L Torque Motor DB001053

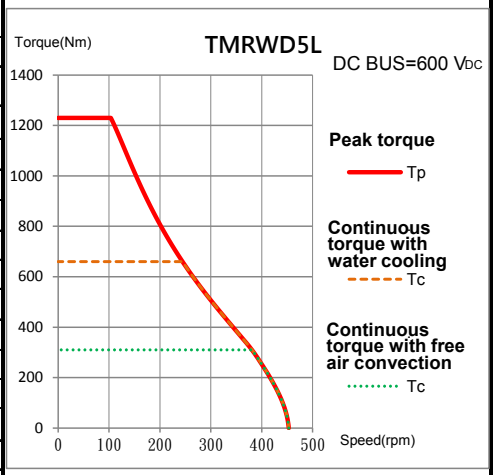
Electrical specifications

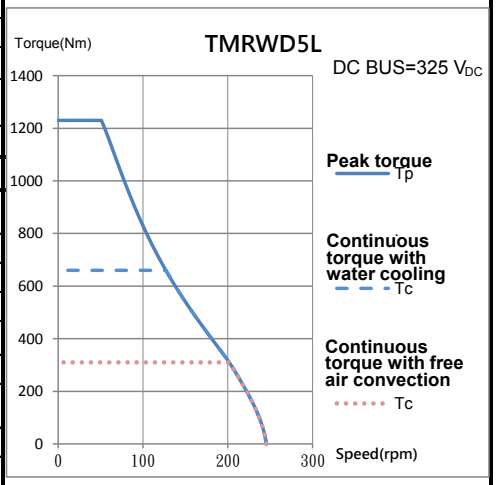
Winding code : SD	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	310	660
Continuous current	I_c	A_{rms}	24	60
Stall torque	T_s	Nm	217	462
Stall current	I_s	A_{rms}	16.8	42
Peak torque(for 1sec.)	T_p	Nm	1230	
Peak current(for 1sec.)	I_p	A_{rms}	162	
Torque constant	K_t	Nm/Arms	12.9	
Electrical time constant	T_e	ms	8.1	
Resistance (line to line at 25℃)	R_{25}	Ω	0.59	
Inductance (line to line)	L	mH	4.78	
Number of poles	2p		88	
Back emf constant (line to line)	K_v	Vrms/rad/s	7.45	
Motor constant (at 25℃)	K_m	Nm/√W	13.73	
Thermal resistance	R_{th}	K/W	0.19	0.03
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.26	
Thermal time constant	T_{th}	s	3570	140
Max. continuous power dissipation	P_c	W	699	4374
Rated speed(at 600VDC)		rpm	200	

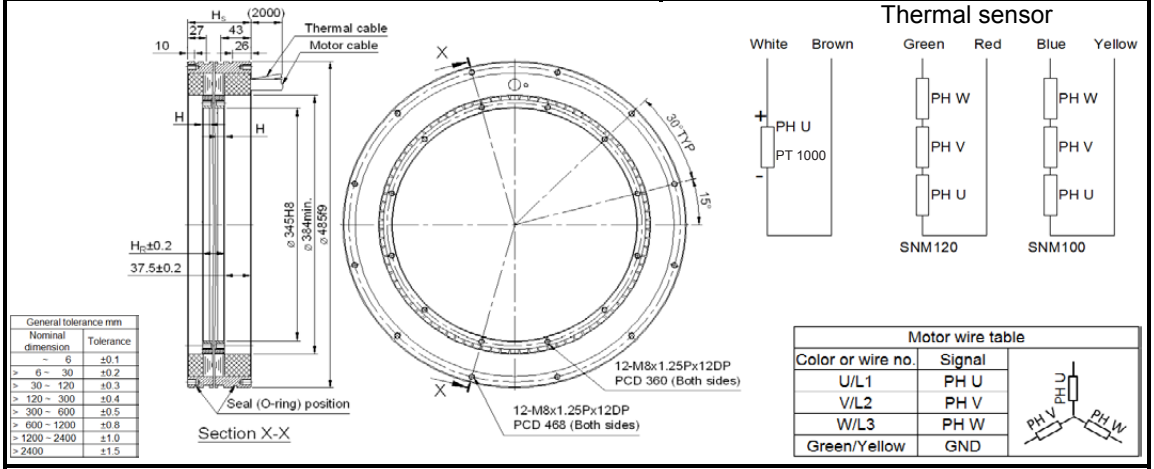
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	9.2	
Mass of stator	M_S	kg	38	
Height of stator	H_S	mm	110	
Height of rotor	H_R	mm	51	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	12.6
Max. pressure drop	△p	bar	-	1

T-N curve







General tolerance mm

Nominal dimension	Tolerance
~ 6	±0.1
> 6 ~ 30	±0.2
> 30 ~ 120	±0.3
> 120 ~ 300	±0.4
> 300 ~ 600	±0.5
> 600 ~ 1200	±0.8
> 1200 ~ 2400	±1.0
> 2400	±1.5

Motor wire table

Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.73 **Data sheet TMRWD5L**

TMRWD7 Torque Motor

DB001054

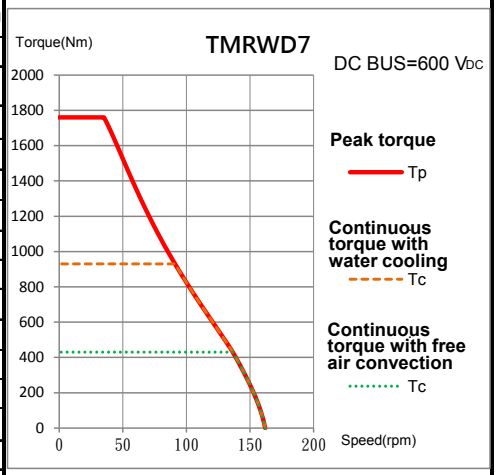
Electrical specifications

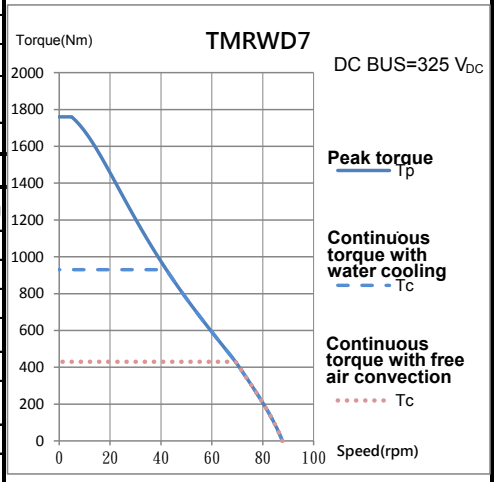
Winding code : SB	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	430	930
Continuous current	I_c	A_{rms}	12	30
Stall torque	T_s	Nm	301	651
Stall current	I_s	A_{rms}	8.4	21
Peak torque(for 1sec.)	T_p	Nm	1760	
Peak current(for 1sec.)	I_p	A_{rms}	81	
Torque constant	K_t	Nm/Arms	36.11	
Electrical time constant	T_e	ms	7.1	
Resistance (line to line at 25℃)	R_{25}	Ω	3.04	
Inductance (line to line)	L	mH	21.5	
Number of poles	2p		88	
Back emf constant (line to line)	K_v	Vrms/rad/s	20.85	
Motor constant (at 25℃)	K_m	Nm/√W	16.78	
Thermal resistance	R_{th}	K/W	0.14	0.023
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.37	
Thermal time constant	T_{th}	s	3940	160
Max. continuous power dissipation	P_c	W	900	5629
Rated speed(at 600VDC)		rpm	130	

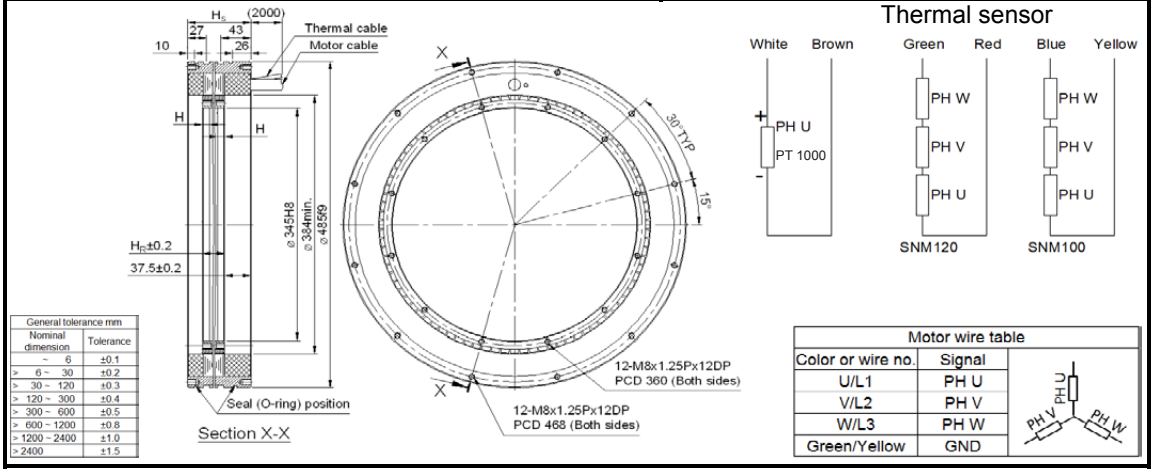
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	12.8	
Mass of stator	M_S	kg	53.2	
Height of stator	H_S	mm	130	
Height of rotor	H_R	mm	71	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	16.1
Max. pressure drop	△p	bar	-	1

T-N curve







General tolerance mm

Nominal dimension	Tolerance
~ 6	±0.1
> 6 ~ 30	±0.2
> 30 ~ 120	±0.3
> 120 ~ 300	±0.4
> 300 ~ 600	±0.5
> 600 ~ 1200	±0.8
> 1200 ~ 2400	±1.0
> 2400	±1.5

Thermal sensor

Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.74 **Data sheet TMRWD7**

TMRWD7L Torque Motor DB001055

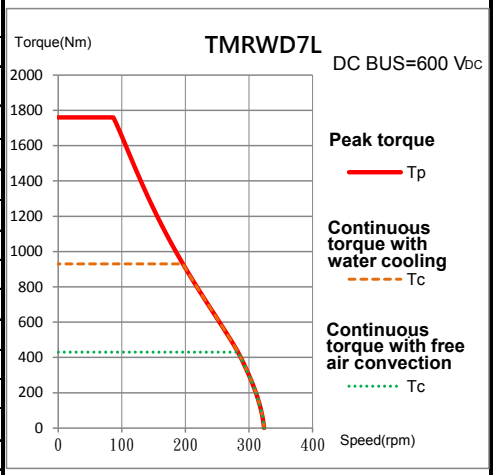
Electrical specifications

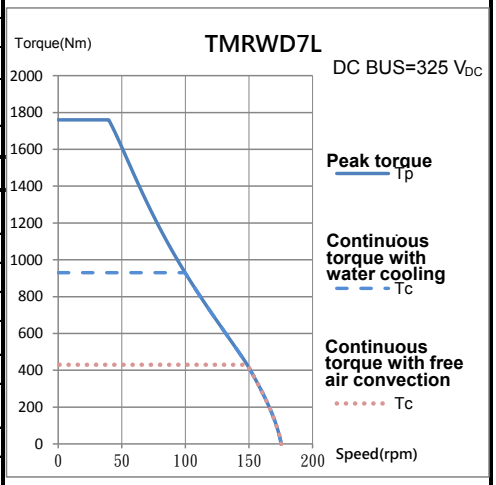
Winding code : SD	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	430	930
Continuous current	I_c	A_{rms}	24	60
Stall torque	T_s	Nm	301	651
Stall current	I_s	A_{rms}	16.8	42
Peak torque(for 1sec.)	T_p	Nm	1760	
Peak current(for 1sec.)	I_p	A_{rms}	162	
Torque constant	K_t	Nm/Arms	18.1	
Electrical time constant	T_e	ms	7.1	
Resistance (line to line at 25℃)	R_{25}	Ω	0.76	
Inductance (line to line)	L	mH	5.38	
Number of poles	2p		88	
Back emf constant (line to line)	K_v	Vrms/rad/s	10.43	
Motor constant (at 25℃)	K_m	Nm/√W	16.78	
Thermal resistance	R_{th}	K/W	0.14	0.023
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.37	
Thermal time constant	T_{th}	s	3940	160
Max. continuous power dissipation	P_c	W	898	5616
Rated speed(at 600VDC)		rpm	200	

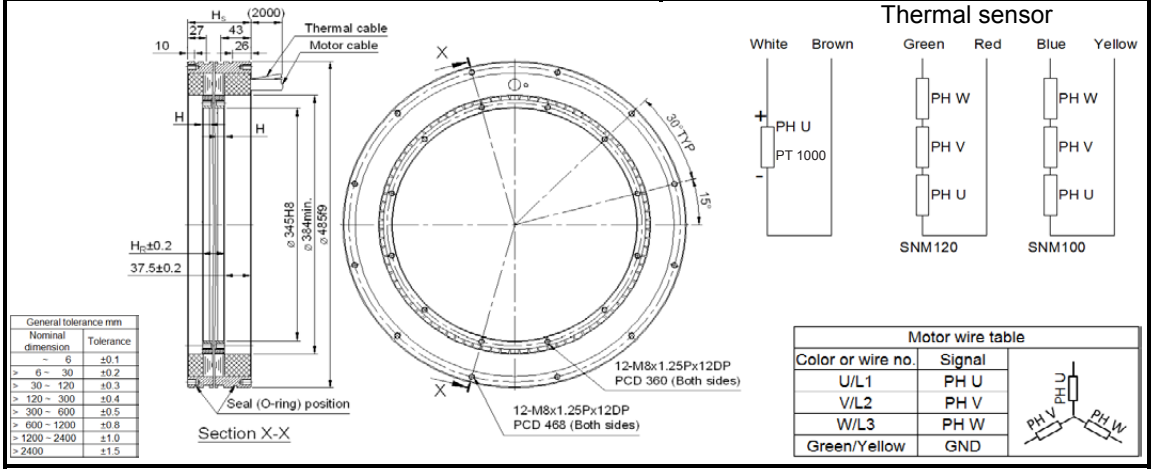
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	12.8	
Mass of stator	M_S	kg	53.2	
Height of stator	H_S	mm	130	
Height of rotor	H_R	mm	71	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	16.1
Max. pressure drop	△p	bar	-	1

T-N curve







General tolerance mm

Nominal dimension	Tolerance
~ 6	±0.1
> 6 ~ 30	±0.2
> 30 ~ 120	±0.3
> 120 ~ 300	±0.4
> 300 ~ 600	±0.5
> 600 ~ 1200	±0.8
> 1200 ~ 2400	±1.0
> 2400	±1.5

Motor wire table

Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.75 **Data sheet TMRWD7L**

TMRWDA Torque Motor

DB001056

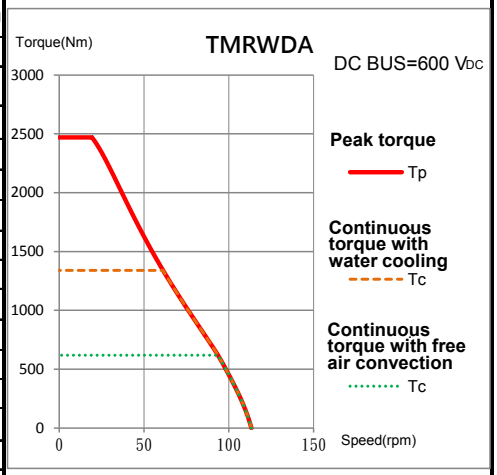
Electrical specifications

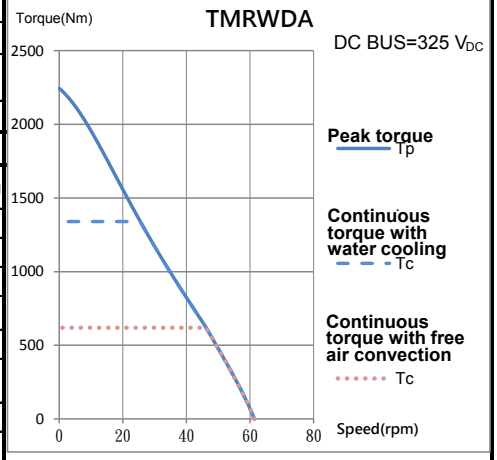
Winding code : SB	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	619	1340
Continuous current	I_c	A_{rms}	12	30
Stall torque	T_s	Nm	433	938
Stall current	I_s	A_{rms}	8.4	21
Peak torque(for 1sec.)	T_p	Nm	2470	
Peak current(for 1sec.)	I_p	A_{rms}	81	
Torque constant	K_t	Nm/Arms	51.6	
Electrical time constant	T_e	ms	7.1	
Resistance (line to line at 25℃)	R_{25}	Ω	4.14	
Inductance (line to line)	L	mH	29.3	
Number of poles	2p		88	
Back emf constant (line to line)	K_v	Vrms/rad/s	29.8	
Motor constant (at 25℃)	K_m	Nm/√W	20.7	
Thermal resistance	R_{th}	K/W	0.11	0.017
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.53	
Thermal time constant	T_{th}	s	3840	110
Max. continuous power dissipation	P_c	W	1226	7668
Rated speed(at 600VDC)		rpm	90	

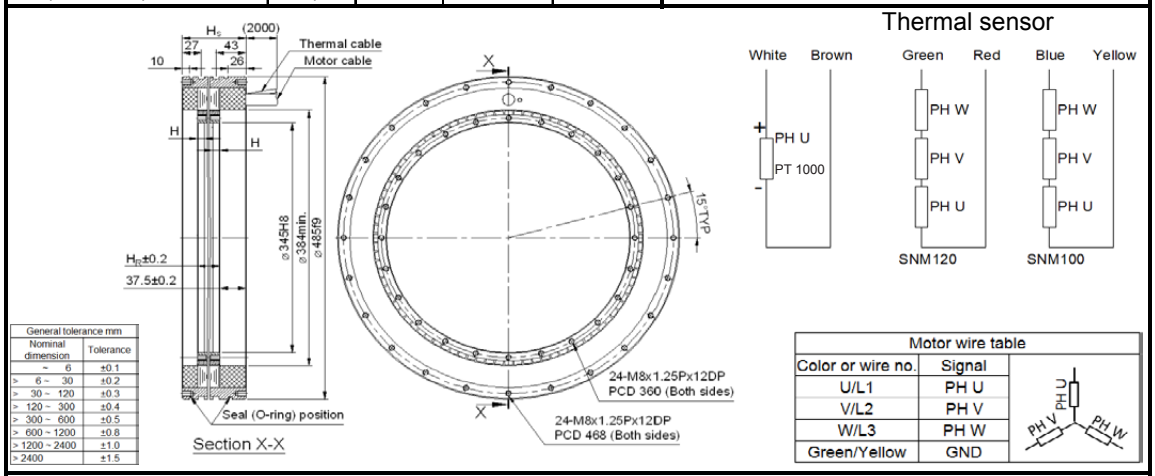
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	18.3	
Mass of stator	M_S	kg	76	
Height of stator	H_S	mm	160	
Height of rotor	H_R	mm	101	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	22
Max. pressure drop	△p	bar	-	1

T-N curve







General tolerance mm

Nominal dimension	Tolerance
~ 6	±0.1
> 6 ~ 30	±0.2
> 30 ~ 120	±0.3
> 120 ~ 300	±0.4
> 300 ~ 600	±0.5
> 600 ~ 1200	±0.8
> 1200 ~ 2400	±1.0
> 2400	±1.5

Motor wire table

Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.76 **Data sheet TMRWDA**

TMRWDAL Torque Motor DB001057

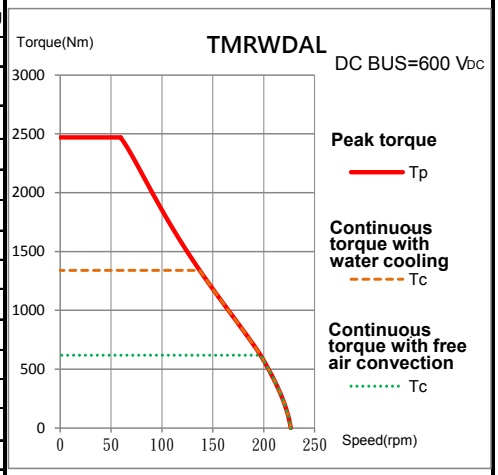
Electrical specifications

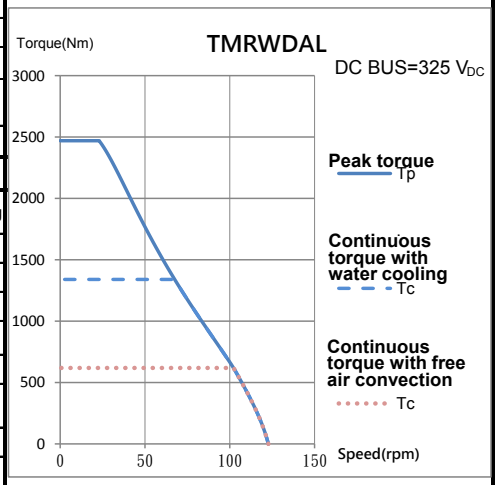
Winding code : SD	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	619	1340
Continuous current	I_c	A_{rms}	24	60
Stall torque	T_s	Nm	433	938
Stall current	I_s	A_{rms}	16.8	42
Peak torque(for 1sec.)	T_p	Nm	2470	
Peak current(for 1sec.)	I_p	A_{rms}	162	
Torque constant	K_t	Nm/Arms	25.8	
Electrical time constant	T_e	ms	7	
Resistance (line to line at 25℃)	R_{25}	Ω	1.04	
Inductance (line to line)	L	mH	7.33	
Number of poles	2p		88	
Back emf constant (line to line)	K_v	Vrms/rad/s	14.9	
Motor constant (at 25℃)	K_m	Nm/√W	20.65	
Thermal resistance	R_{th}	K/W	0.11	0.017
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.53	
Thermal time constant	T_{th}	s	3840	110
Max. continuous power dissipation	P_c	W	1235	7722
Rated speed(at 600VDC)		rpm	190	

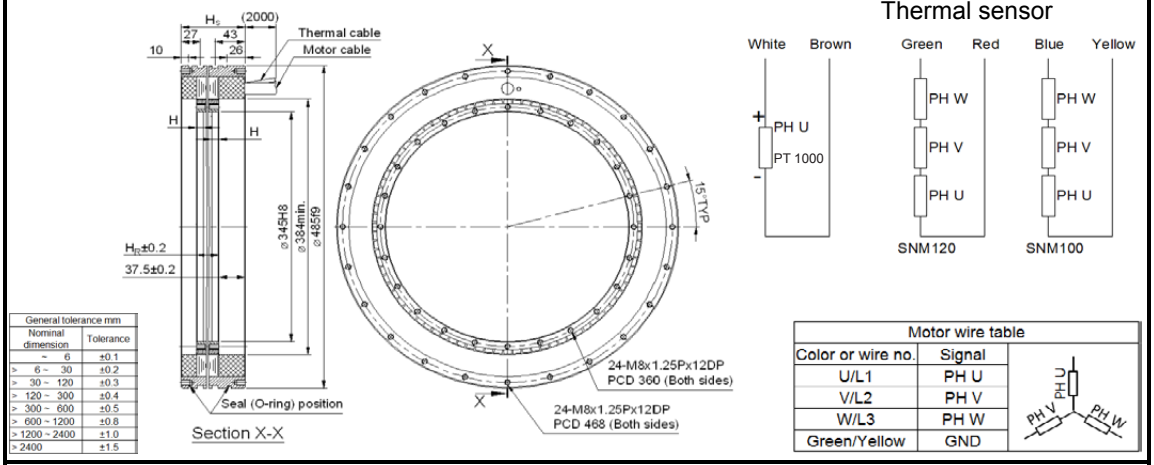
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	18.3	
Mass of stator	M_S	kg	76	
Height of stator	H_S	mm	160	
Height of rotor	H_R	mm	101	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	22.1
Max. pressure drop	△p	bar	-	1

T-N curve







General tolerance mm

Nominal dimension	Tolerance
~ 6	±0.1
> 6 ~ 30	±0.2
> 30 ~ 120	±0.3
> 120 ~ 300	±0.4
> 300 ~ 600	±0.5
> 600 ~ 1200	±0.8
> 1200 ~ 2400	±1.0
> 2400	±1.5

Motor wire table

Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.77 **Data sheet TMRWDAL**

TMRWDF Torque Motor

DB001058

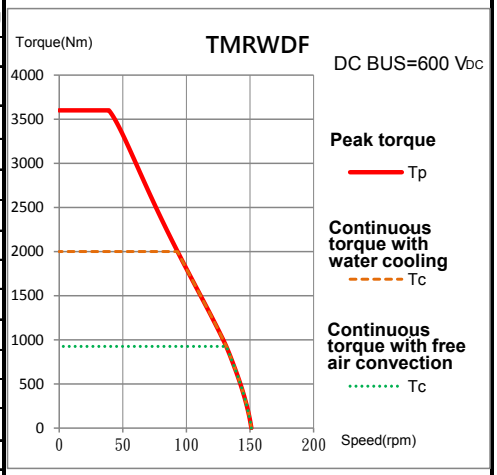
Electrical specifications

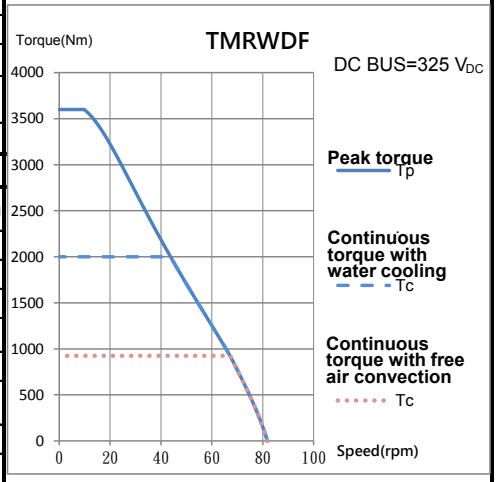
Winding code : SD	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	925	2000
Continuous current	I_c	A_{rms}	24	60
Stall torque	T_s	Nm	648	1400
Stall current	I_s	A_{rms}	16.8	42
Peak torque(for 1sec.)	T_p	Nm	3600	
Peak current(for 1sec.)	I_p	A_{rms}	162	
Torque constant	K_t	Nm/Arms	38.7	
Electrical time constant	T_e	ms	7.3	
Resistance (line to line at 25℃)	R_{25}	Ω	1.35	
Inductance (line to line)	L	mH	9.9	
Number of poles	2p		88	
Back emf constant (line to line)	K_v	Vrms/rad/s	22.35	
Motor constant (at 25℃)	K_m	Nm/√W	27.08	
Thermal resistance	R_{th}	K/W	0.08	0.013
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.8	
Thermal time constant	T_{th}	s	4220	130
Max. continuous power dissipation	P_c	W	1598	9990
Rated speed(at 600VDC)		rpm	130	

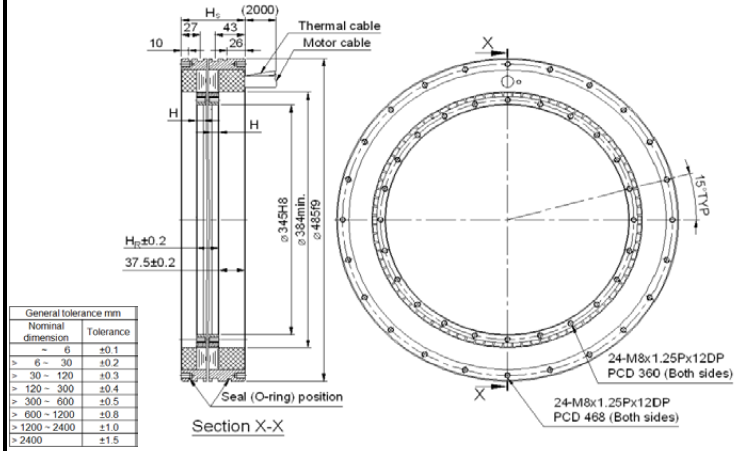
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	22	
Mass of stator	M_S	kg	90	
Height of stator	H_S	mm	210	
Height of rotor	H_R	mm	151	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	28.6
Max. pressure drop	△p	bar	-	1

T-N curve



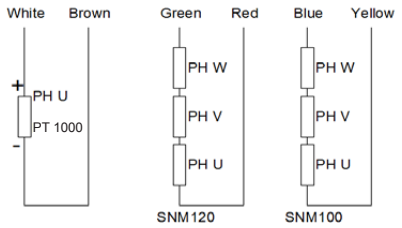




General tolerance mm

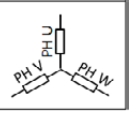
Nominal dimension	Tolerance
~ 6	±0.1
> 6 ~ 30	±0.2
> 30 ~ 120	±0.3
> 120 ~ 300	±0.4
> 300 ~ 600	±0.5
> 600 ~ 1200	±0.8
> 1200 ~ 2400	±1.0
> 2400	±1.5

Thermal sensor



Motor wire table

Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND



Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.78 **Data sheet TMRWDF**

TMRWDFL Torque Motor DB001059

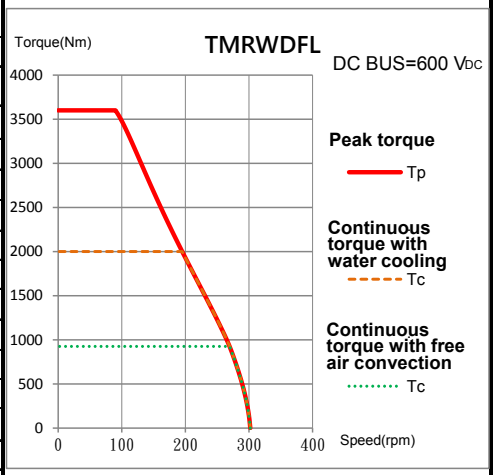
Electrical specifications

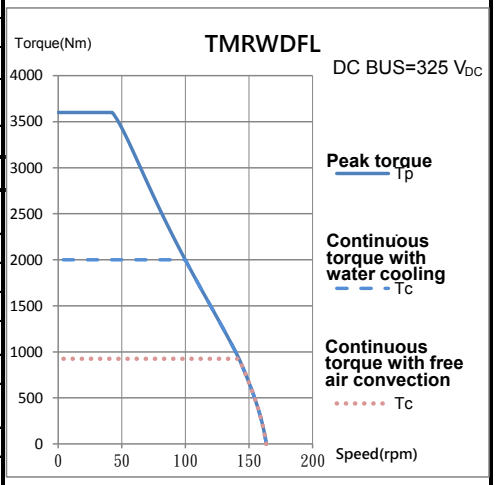
Winding code : SH	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	925	2000
Continuous current	I_c	A_{rms}	48	120
Stall torque	T_s	Nm	648	1400
Stall current	I_s	A_{rms}	33.6	84
Peak torque(for 1sec.)	T_p	Nm	3600	
Peak current(for 1sec.)	I_p	A_{rms}	324	
Torque constant	K_t	Nm/Arms	19.35	
Electrical time constant	T_e	ms	7.9	
Resistance (line to line at 25℃)	R_{25}	Ω	0.33	
Inductance (line to line)	L	mH	2.6	
Number of poles	2p		88	
Back emf constant (line to line)	K_v	Vrms/rad/s	11.18	
Motor constant (at 25℃)	K_m	Nm/√W	27.39	
Thermal resistance	R_{th}	K/W	0.08	0.013
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.8	
Thermal time constant	T_{th}	s	4220	130
Max. continuous power dissipation	P_c	W	1555	9720
Rated speed(at 600VDC)		rpm	200	

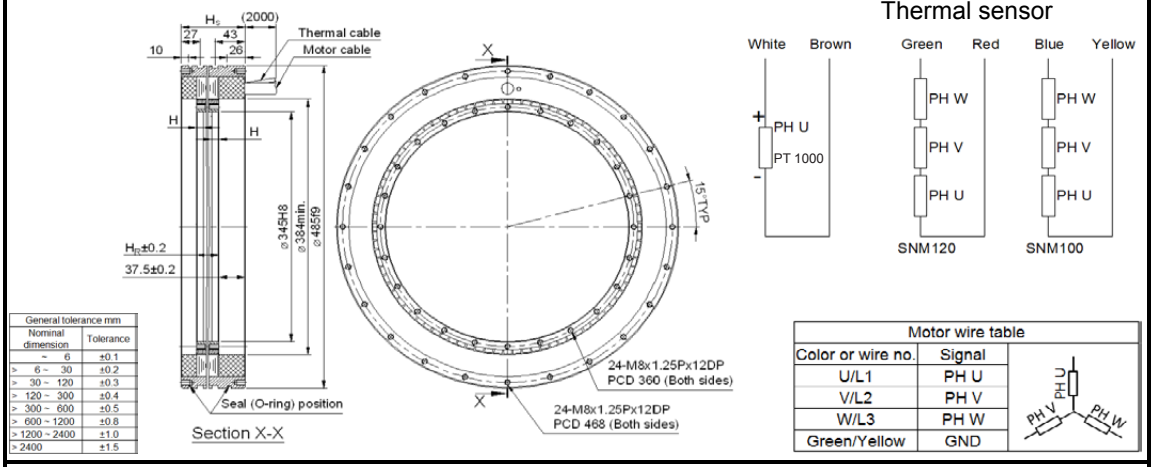
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	22	
Mass of stator	M_S	kg	90	
Height of stator	H_S	mm	210	
Height of rotor	H_R	mm	151	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	27.8
Max. pressure drop	△p	bar	-	1

T-N curve







General tolerance mm

Nominal dimension	Tolerance
~ 6	±0.1
> 6 ~ 30	±0.2
> 30 ~ 120	±0.3
> 120 ~ 300	±0.4
> 300 ~ 600	±0.5
> 600 ~ 1200	±0.8
> 1200 ~ 2400	±1.0
> 2400	±1.5

Motor wire table

Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.79 **Data sheet TMRWDFL**

TMRWG3 Torque Motor

DB001060

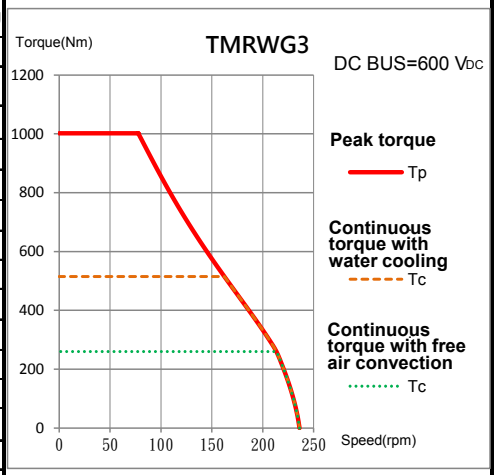
Electrical specifications

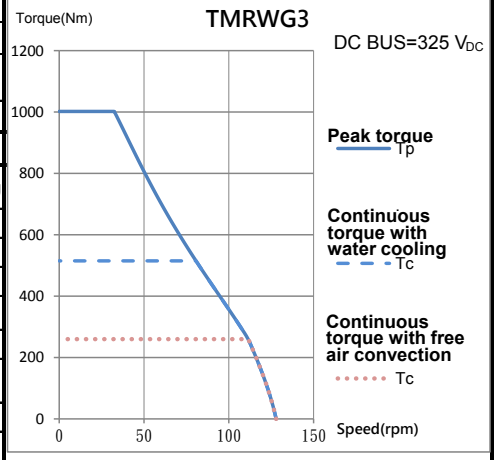
Winding code : SB	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	260	515
Continuous current	I_c	A_{rms}	10.5	26.3
Stall torque	T_s	Nm	182	361
Stall current	I_s	A_{rms}	7.4	18.4
Peak torque(for 1sec.)	T_p	Nm	1002	
Peak current(for 1sec.)	I_p	A_{rms}	71	
Torque constant	K_t	Nm/Arms	24.7	
Electrical time constant	T_e	ms	6.2	
Resistance (line to line at 25℃)	R_{25}	Ω	2.03	
Inductance (line to line)	L	mH	12.55	
Number of poles	2p		88	
Back emf constant (line to line)	K_v	Vrms/rad/s	14.3	
Motor constant (at 25℃)	K_m	Nm/√W	14.19	
Thermal resistance	R_{th}	K/W	0.28	0.045
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.267	
Thermal time constant	T_{th}	s	3520	270
Max. continuous power dissipation	P_c	W	461	2894
Rated speed(at 600VDC)		rpm	200	

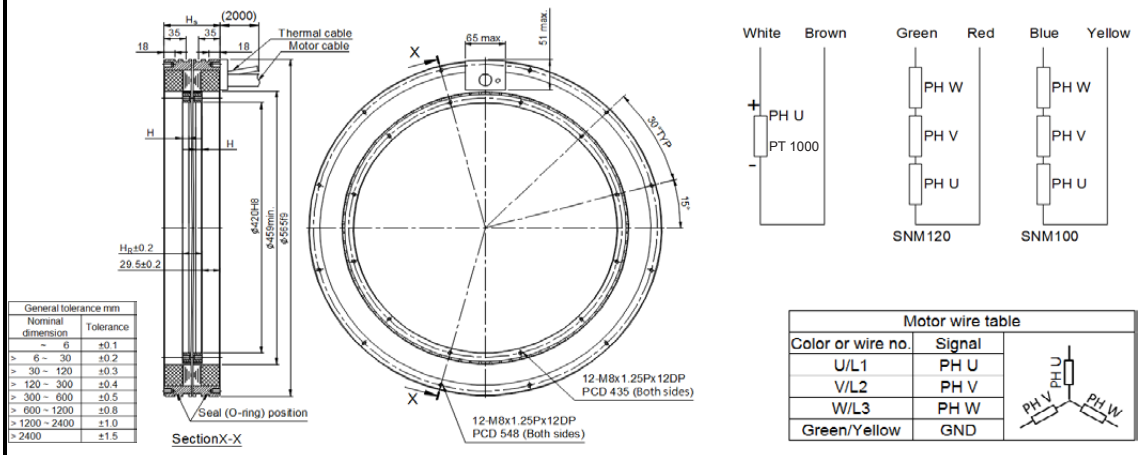
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	5.6	
Mass of stator	M_S	kg	38	
Height of stator	H_S	mm	90	
Height of rotor	H_R	mm	31	
Length of rotor centring fit	H	mm	10	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	8.3
Max. pressure drop	△p	bar	-	1

T-N curve







Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.80 **Data sheet TMRWG3**

TMRWG3L Torque Motor DB001061

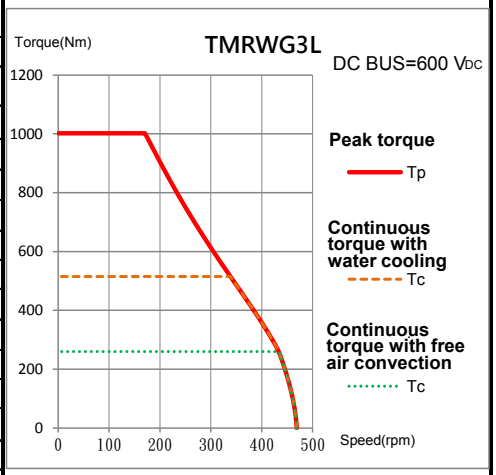
Electrical specifications

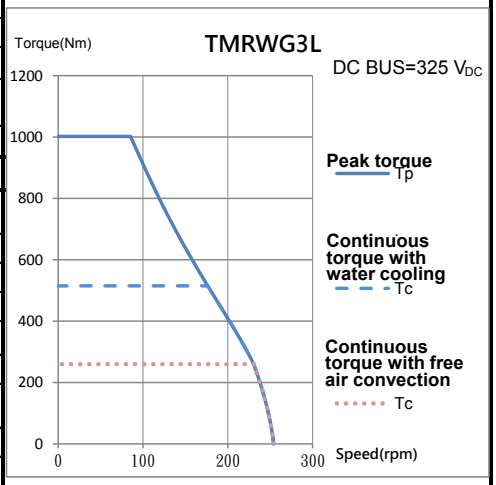
Winding code : SD	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	260	515
Continuous current	I_c	A_{rms}	21	52.5
Stall torque	T_s	Nm	182	361
Stall current	I_s	A_{rms}	14.7	36.8
Peak torque(for 1sec.)	T_p	Nm	1002	
Peak current(for 1sec.)	I_p	A_{rms}	142	
Torque constant	K_t	Nm/Arms	12.4	
Electrical time constant	T_e	ms	6.2	
Resistance (line to line at 25℃)	R_{25}	Ω	0.51	
Inductance (line to line)	L	mH	3.14	
Number of poles	2p		88	
Back emf constant (line to line)	K_v	Vrms/rad/s	7.2	
Motor constant (at 25℃)	K_m	Nm/√W	14.16	
Thermal resistance	R_{th}	K/W	0.28	0.045
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.267	
Thermal time constant	T_{th}	s	3520	270
Max. continuous power dissipation	P_c	W	463	2894
Rated speed(at 600VDC)		rpm	200	

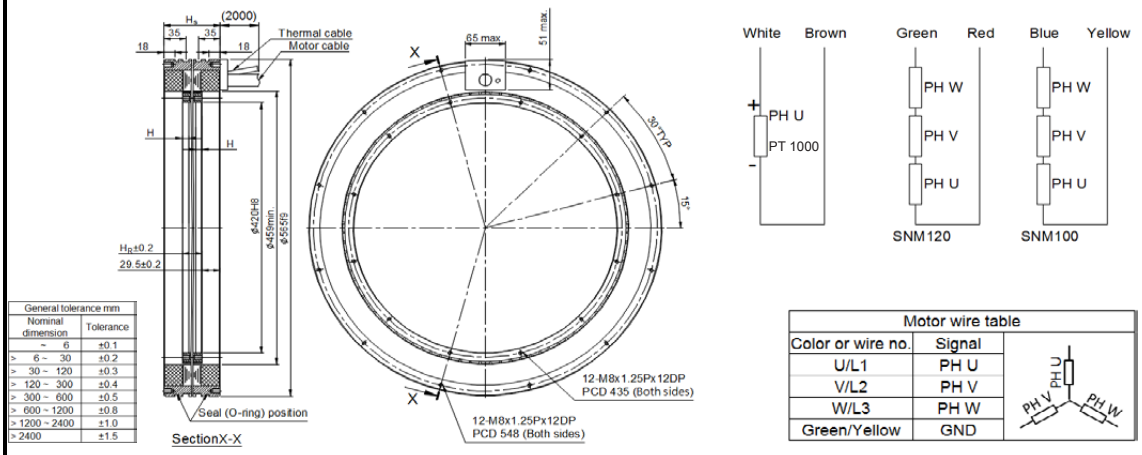
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	5.6	
Mass of stator	M_S	kg	38	
Height of stator	H_S	mm	90	
Height of rotor	H_R	mm	31	
Length of rotor centring fit	H	mm	10	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	8.3
Max. pressure drop	△p	bar	-	1

T-N curve







General tolerance mm	
Nominal dimension	Tolerance
~ 6	±0.1
> 6 ~ 30	±0.2
> 30 ~ 120	±0.3
> 120 ~ 300	±0.4
> 300 ~ 600	±0.5
> 600 ~ 1200	±0.8
> 1200 ~ 2400	±1.0
> 2400	±1.5

Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.81 **Data sheet TMRWG3L**

TMRWG5 Torque Motor

DB001062

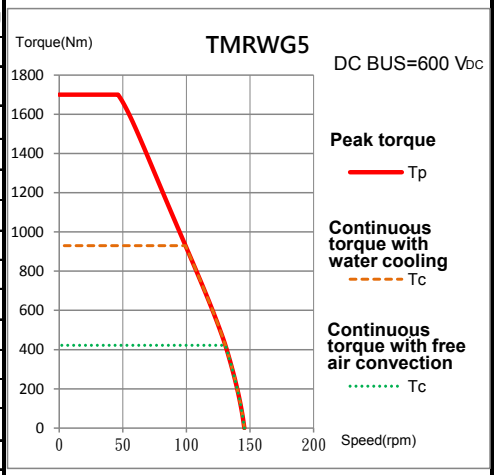
Electrical specifications

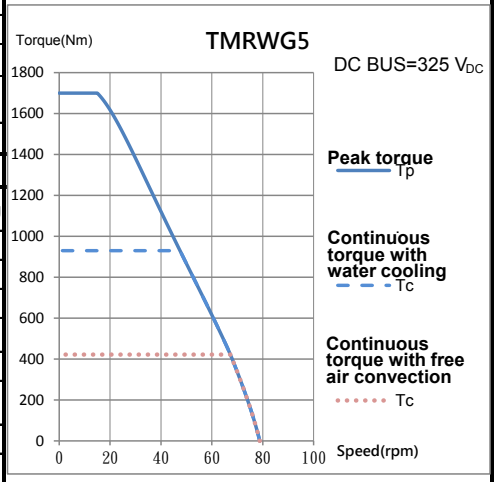
Winding code : SB	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	422	930
Continuous current	I_c	A_{rms}	10.5	26.3
Stall torque	T_s	Nm	295	651
Stall current	I_s	A_{rms}	7.4	18.4
Peak torque(for 1sec.)	T_p	Nm	1700	
Peak current(for 1sec.)	I_p	A_{rms}	71	
Torque constant	K_t	Nm/Arms	40.2	
Electrical time constant	T_e	ms	7.2	
Resistance (line to line at 25℃)	R_{25}	Ω	2.67	
Inductance (line to line)	L	mH	19.13	
Number of poles	2p		88	
Back emf constant (line to line)	K_v	Vrms/rad/s	23.2	
Motor constant (at 25℃)	K_m	Nm/√W	20.08	
Thermal resistance	R_{th}	K/W	0.22	0.034
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.452	
Thermal time constant	T_{th}	s	3560	170
Max. continuous power dissipation	P_c	W	605	3797
Rated speed(at 600VDC)		rpm	130	

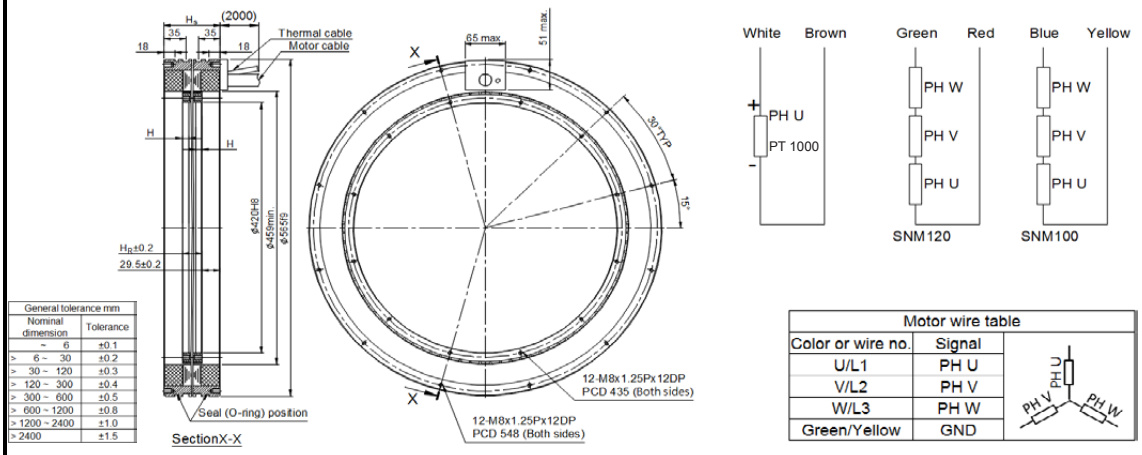
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	9.5	
Mass of stator	M_S	kg	48	
Height of stator	H_S	mm	110	
Height of rotor	H_R	mm	51	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	10.9
Max. pressure drop	△p	bar	-	1

T-N curve







Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.82 **Data sheet TMRWG5**

TMRWG5L Torque Motor DB001063

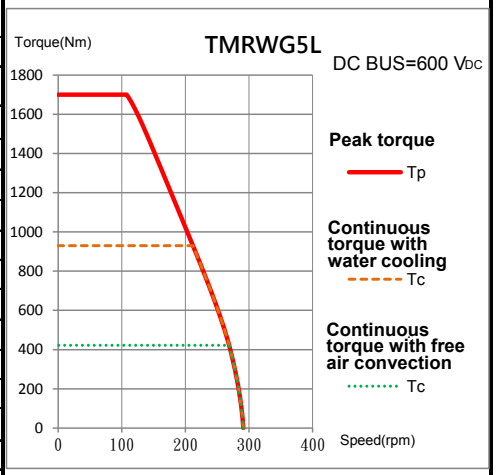
Electrical specifications

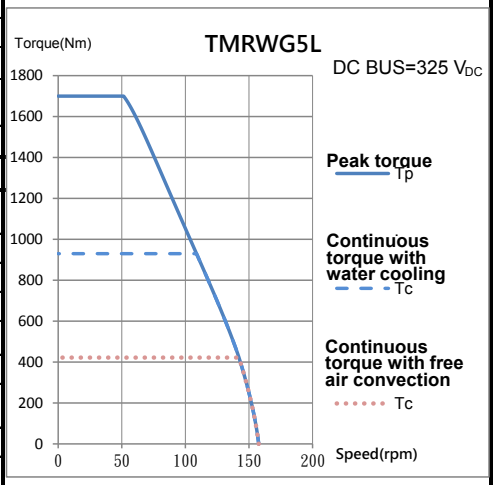
Winding code : SD	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	422	930
Continuous current	I_c	A_{rms}	21	52.5
Stall torque	T_s	Nm	295	651
Stall current	I_s	A_{rms}	14.7	36.8
Peak torque(for 1sec.)	T_p	Nm	1700	
Peak current(for 1sec.)	I_p	A_{rms}	142	
Torque constant	K_t	Nm/Arms	20.1	
Electrical time constant	T_e	ms	7.1	
Resistance (line to line at 25℃)	R_{25}	Ω	0.67	
Inductance (line to line)	L	mH	4.78	
Number of poles	2p		88	
Back emf constant (line to line)	K_v	Vrms/rad/s	11.6	
Motor constant (at 25℃)	K_m	Nm/√W	20.05	
Thermal resistance	R_{th}	K/W	0.21	0.034
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.452	
Thermal time constant	T_{th}	s	3560	170
Max. continuous power dissipation	P_c	W	608	3803
Rated speed(at 600VDC)		rpm	200	

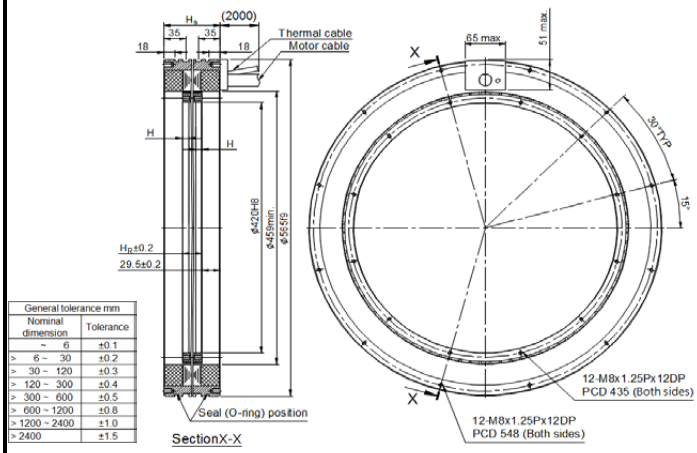
Mechanical specifications

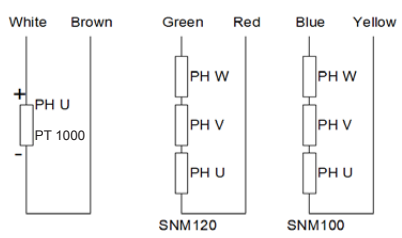
	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	9.5	
Mass of stator	M_S	kg	48	
Height of stator	H_S	mm	110	
Height of rotor	H_R	mm	51	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	10.9
Max. pressure drop	△p	bar	-	1

T-N curve

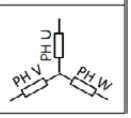








Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND



Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.83 **Data sheet TMRWG5L**

TMRWG7 Torque Motor

DB001064

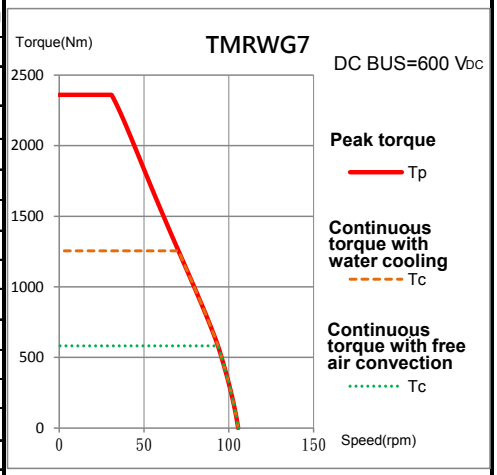
Electrical specifications

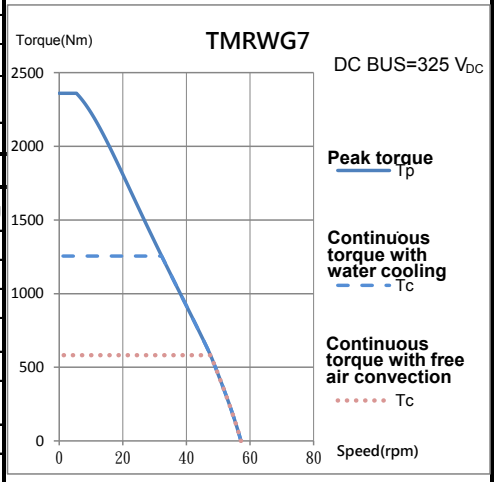
Winding code : SB	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	582	1255
Continuous current	I_c	A_{rms}	10.5	26.3
Stall torque	T_s	Nm	407	879
Stall current	I_s	A_{rms}	7.4	18.4
Peak torque(for 1sec.)	T_p	Nm	2360	
Peak current(for 1sec.)	I_p	A_{rms}	71	
Torque constant	K_t	Nm/Arms	55.4	
Electrical time constant	T_e	ms	7.8	
Resistance (line to line at 25℃)	R_{25}	Ω	3.3	
Inductance (line to line)	L	mH	25.7	
Number of poles	2p		88	
Back emf constant (line to line)	K_v	Vrms/rad/s	32	
Motor constant (at 25℃)	K_m	Nm/√W	24.91	
Thermal resistance	R_{th}	K/W	0.17	0.028
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.619	
Thermal time constant	T_{th}	s	3800	190
Max. continuous power dissipation	P_c	W	749	4700
Rated speed(at 600VDC)		rpm	90	

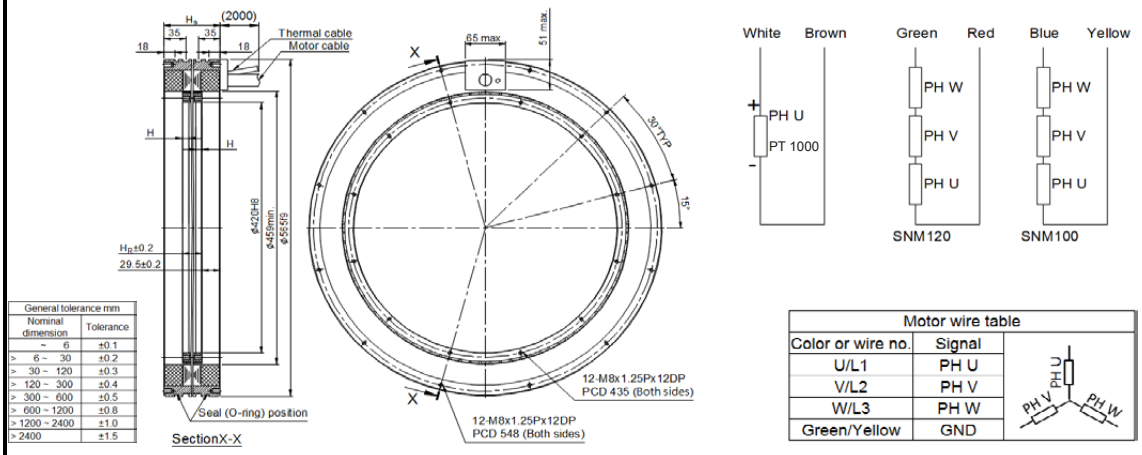
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	13.3	
Mass of stator	M_S	kg	61.1	
Height of stator	H_S	mm	130	
Height of rotor	H_R	mm	71	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	13.5
Max. pressure drop	△p	bar	-	1

T-N curve







Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.84 **Data sheet TMRWG7**

TMRWG7L Torque Motor DB001065

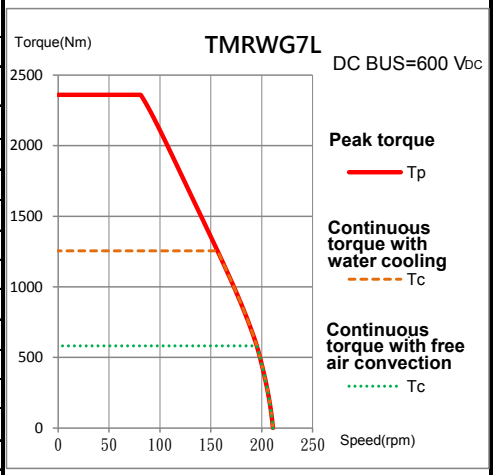
Electrical specifications

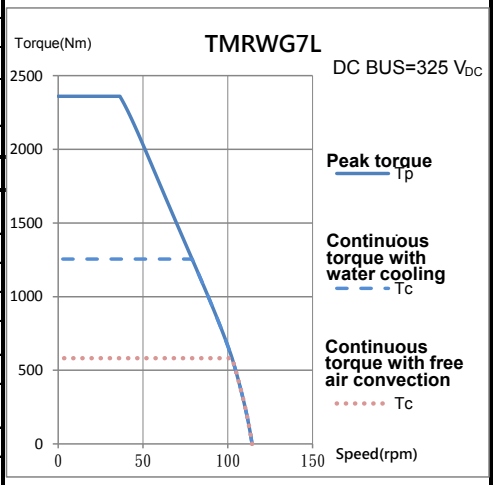
Winding code : SD	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	582	1255
Continuous current	I_c	A_{rms}	21	52.5
Stall torque	T_s	Nm	407	879
Stall current	I_s	A_{rms}	14.7	36.8
Peak torque(for 1sec.)	T_p	Nm	2360	
Peak current(for 1sec.)	I_p	A_{rms}	142	
Torque constant	K_t	Nm/Arms	27.7	
Electrical time constant	T_e	ms	7.2	
Resistance (line to line at 25℃)	R_{25}	Ω	0.83	
Inductance (line to line)	L	mH	6	
Number of poles	2p		88	
Back emf constant (line to line)	K_v	Vrms/rad/s	16	
Motor constant (at 25℃)	K_m	Nm/√W	24.84	
Thermal resistance	R_{th}	K/W	0.17	0.028
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.619	
Thermal time constant	T_{th}	s	3800	190
Max. continuous power dissipation	P_c	W	754	4713
Rated speed(at 600VDC)		rpm	190	

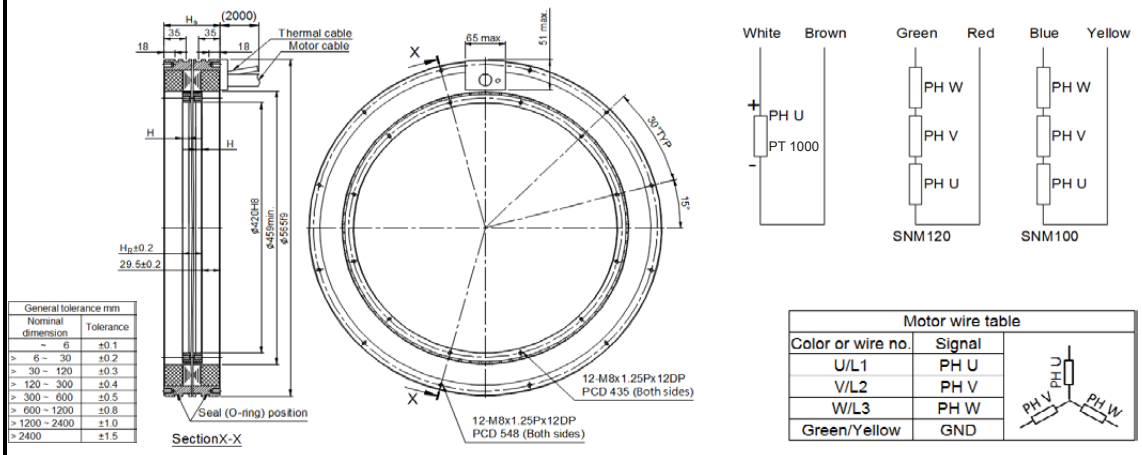
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	13.3	
Mass of stator	M_S	kg	61.1	
Height of stator	H_S	mm	130	
Height of rotor	H_R	mm	71	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	13.5
Max. pressure drop	△p	bar	-	1

T-N curve







General tolerance mm

Nominal dimension	Tolerance
~ 6	±0.1
> 6 ~ 30	±0.2
> 30 ~ 120	±0.3
> 120 ~ 300	±0.4
> 300 ~ 600	±0.5
> 600 ~ 1200	±0.8
> 1200 ~ 2400	±1.0
> 2400	±1.5

Motor wire table

Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.85 **Data sheet TMRWG7L**

TMRWGA Torque Motor

DB001066

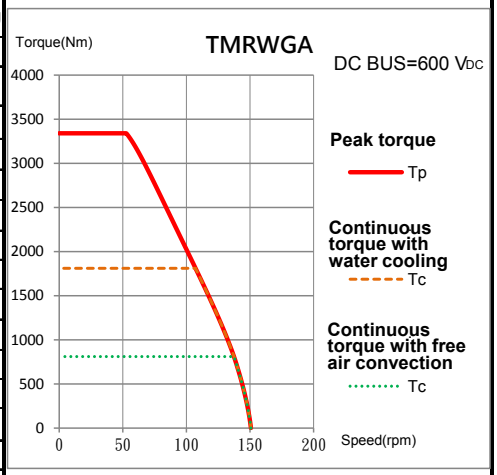
Electrical specifications

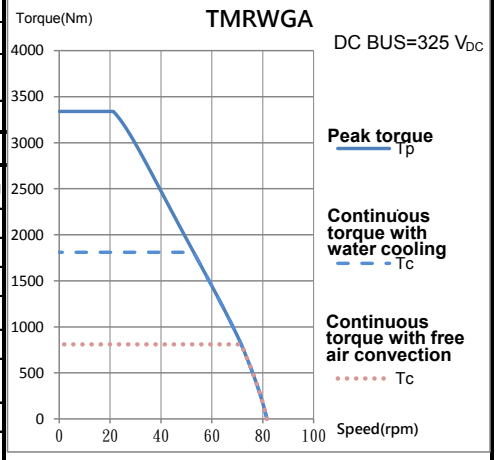
Winding code : SD	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	810	1810
Continuous current	I_c	A_{rms}	21	52.5
Stall torque	T_s	Nm	567	1267
Stall current	I_s	A_{rms}	14.7	36.8
Peak torque(for 1sec.)	T_p	Nm	3340	
Peak current(for 1sec.)	I_p	A_{rms}	142	
Torque constant	K_t	Nm/Arms	38.8	
Electrical time constant	T_e	ms	8.4	
Resistance (line to line at 25℃)	R_{25}	Ω	1.06	
Inductance (line to line)	L	mH	8.9	
Number of poles	2p		88	
Back emf constant (line to line)	K_v	Vrms/rad/s	22.4	
Motor constant (at 25℃)	K_m	Nm/√W	30.59	
Thermal resistance	R_{th}	K/W	0.14	0.022
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.904	
Thermal time constant	T_{th}	s	3520	120
Max. continuous power dissipation	P_c	W	959	5994
Rated speed(at 600VDC)		rpm	130	

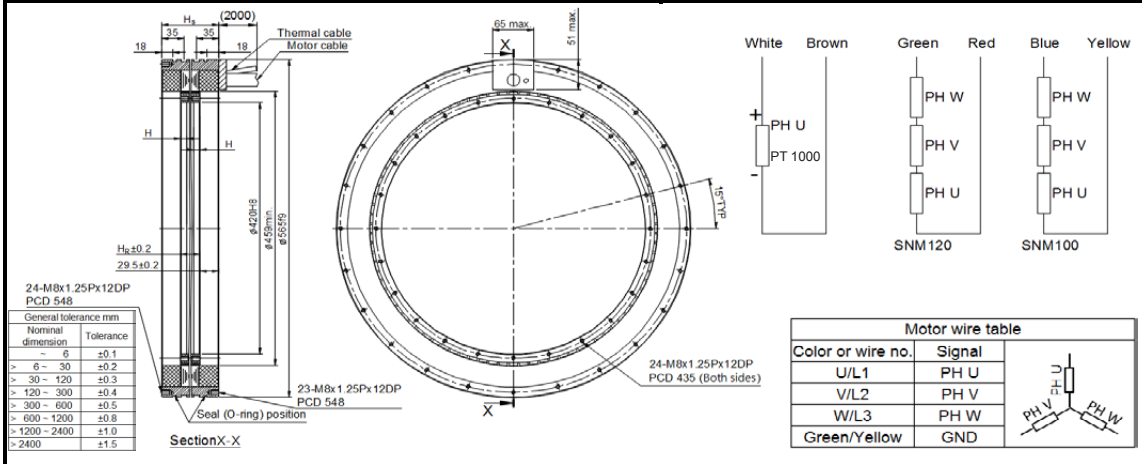
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	19	
Mass of stator	M_S	kg	75	
Height of stator	H_S	mm	160	
Height of rotor	H_R	mm	101	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	17.2
Max. pressure drop	△p	bar	-	3

T-N curve







Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.86 **Data sheet TMRWGA**

TMRWGAL Torque Motor DB001067

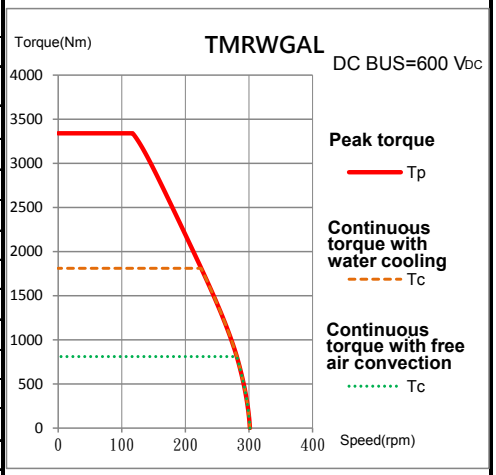
Electrical specifications

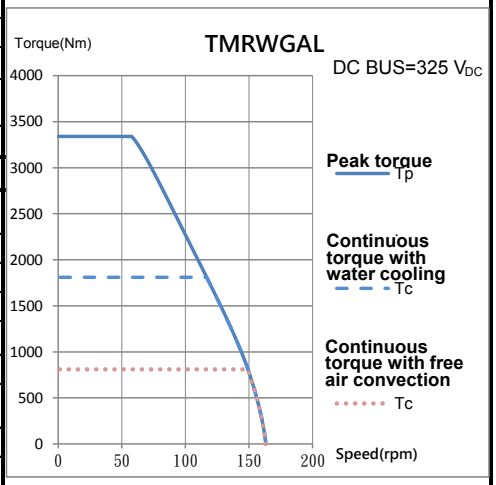
Winding code : SH	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	810	1810
Continuous current	I_c	A_{rms}	42	105
Stall torque	T_s	Nm	567	1267
Stall current	I_s	A_{rms}	29.4	73.5
Peak torque(for 1sec.)	T_p	Nm	3340	
Peak current(for 1sec.)	I_p	A_{rms}	284	
Torque constant	K_t	Nm/Arms	19.4	
Electrical time constant	T_e	ms	8.3	
Resistance (line to line at 25℃)	R_{25}	Ω	0.27	
Inductance (line to line)	L	mH	2.23	
Number of poles	2p		88	
Back emf constant (line to line)	K_v	Vrms/rad/s	11.2	
Motor constant (at 25℃)	K_m	Nm/√W	30.3	
Thermal resistance	R_{th}	K/W	0.13	0.021
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	0.904	
Thermal time constant	T_{th}	s	3520	120
Max. continuous power dissipation	P_c	W	979	6118
Rated speed(at 600VDC)		rpm	200	

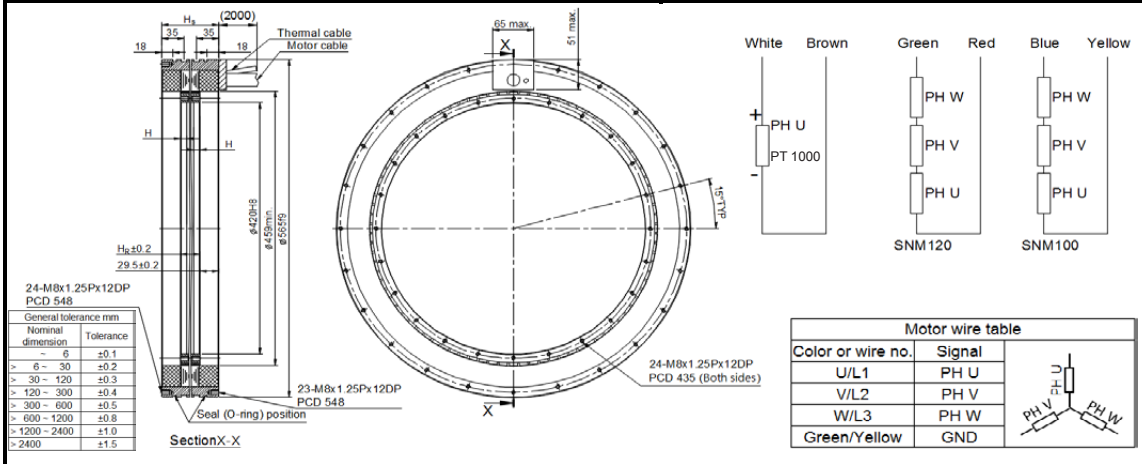
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	19	
Mass of stator	M_S	kg	75	
Height of stator	H_S	mm	160	
Height of rotor	H_R	mm	101	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	17.5
Max. pressure drop	△p	bar	-	3

T-N curve







General tolerance mm	
Nominal dimension	Tolerance
~ 6	±0.1
> 6 ~ 30	±0.2
> 30 ~ 120	±0.3
> 120 ~ 300	±0.4
> 300 ~ 600	±0.5
> 600 ~ 1200	±0.8
> 1200 ~ 2400	±1.0
> 2400	±1.5

Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.87 **Data sheet TMRWGAL**

TMRWGF Torque Motor

DB001068

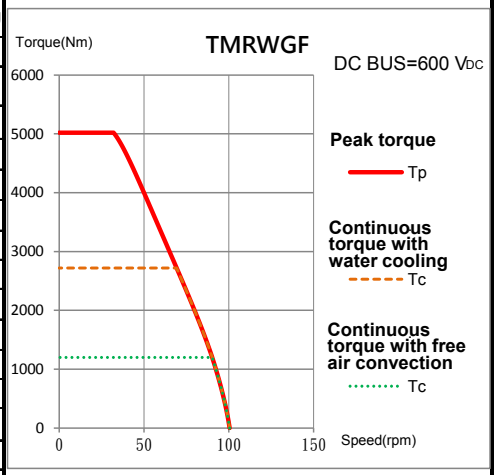
Electrical specifications

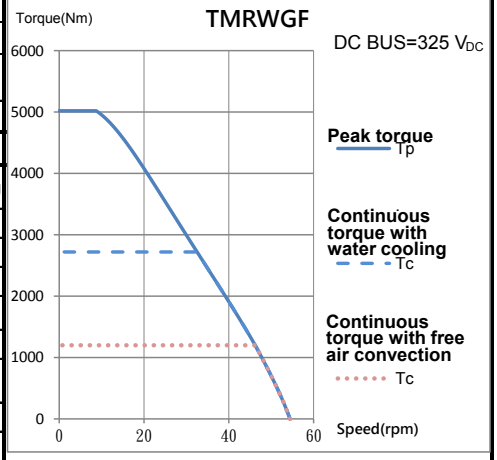
Winding code : SD	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	1200	2720
Continuous current	I_c	A_{rms}	21	52.5
Stall torque	T_s	Nm	840	1904
Stall current	I_s	A_{rms}	14.7	36.8
Peak torque(for 1sec.)	T_p	Nm	5020	
Peak current(for 1sec.)	I_p	A_{rms}	142	
Torque constant	K_t	Nm/Arms	57	
Electrical time constant	T_e	ms	8.9	
Resistance (line to line at 25℃)	R_{25}	Ω	1.46	
Inductance (line to line)	L	mH	13	
Number of poles	2p		88	
Back emf constant (line to line)	K_v	Vrms/rad/s	33.6	
Motor constant (at 25℃)	K_m	Nm/√W	38.61	
Thermal resistance	R_{th}	K/W	0.1	0.016
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	1.38	
Thermal time constant	T_{th}	s	3780	150
Max. continuous power dissipation	P_c	W	1323	8268
Rated speed(at 600VDC)		rpm	90	

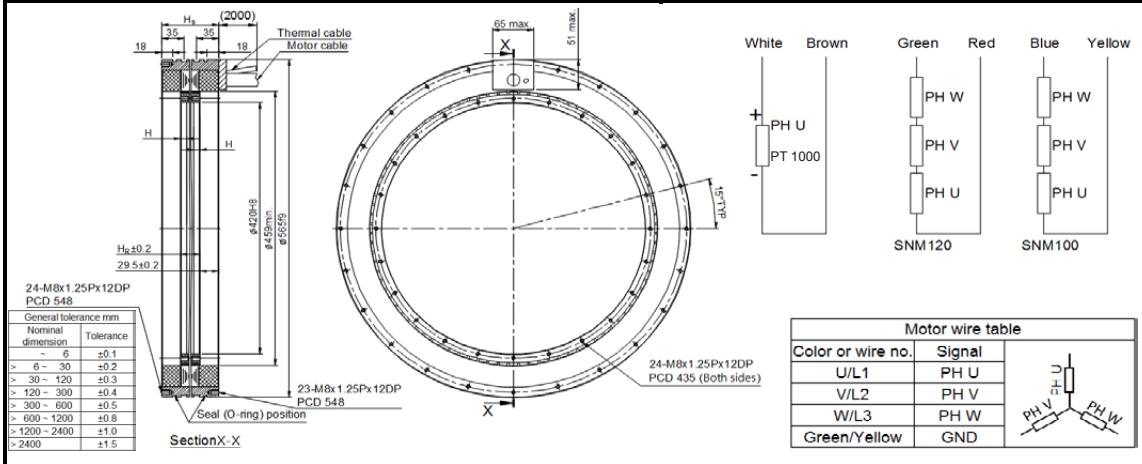
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	28.3	
Mass of stator	M_S	kg	107.5	
Height of stator	H_S	mm	210	
Height of rotor	H_R	mm	151	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	23.7
Max. pressure drop	△p	bar	-	4

T-N curve







Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.88 **Data sheet TMRWGF**

TMRWGFL Torque Motor DB001069

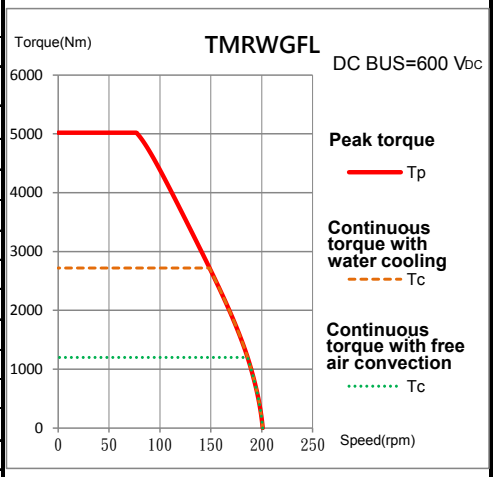
Electrical specifications

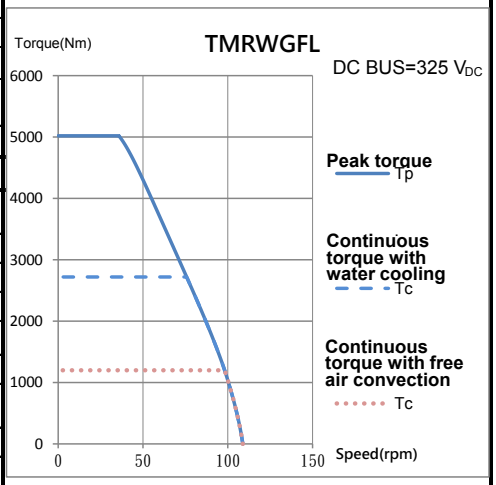
Winding code : SH	Symbol	Unit	Free air convection	Water cooling
Continuous torque	T_c	Nm	1200	2720
Continuous current	I_c	A_{rms}	42	105
Stall torque	T_s	Nm	840	1904
Stall current	I_s	A_{rms}	29.4	73.5
Peak torque(for 1sec.)	T_p	Nm	5020	
Peak current(for 1sec.)	I_p	A_{rms}	284	
Torque constant	K_t	Nm/Arms	28.5	
Electrical time constant	T_e	ms	8.8	
Resistance (line to line at 25℃)	R_{25}	Ω	0.37	
Inductance (line to line)	L	mH	3.25	
Number of poles	2p		88	
Back emf constant (line to line)	K_v	Vrms/rad/s	16.8	
Motor constant (at 25℃)	K_m	Nm/√W	38.35	
Thermal resistance	R_{th}	K/W	0.1	0.016
Thermal sensor			PTC SNM100+SNM120+PT 1000	
Max. DC BUS		V_{DC}	750	
Inertia of rotor	J	kgm^2	1.38	
Thermal time constant	T_{th}	s	3780	150
Max. continuous power dissipation	P_c	W	1349	8434
Rated speed(at 600VDC)		rpm	180	

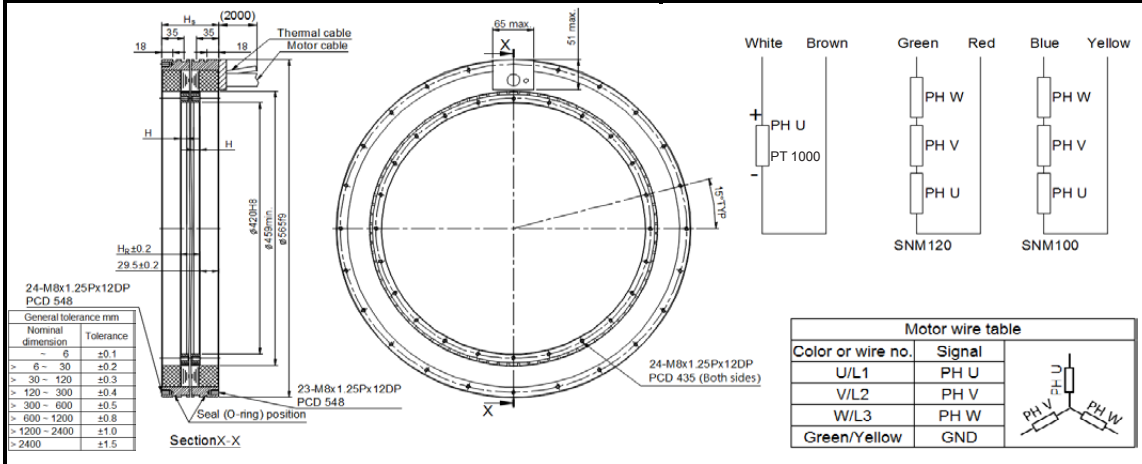
Mechanical specifications

	Symbol	Unit	Free air convection	Water cooling
Mass of rotor	M_r	kg	28.3	
Mass of stator	M_S	kg	107.5	
Height of stator	H_S	mm	210	
Height of rotor	H_R	mm	151	
Length of rotor centring fit	H	mm	15	
Water temperture difference for Pc	△θ	K	-	5
Minimum water flow	q	l/min	-	24.2
Max. pressure drop	△p	bar	-	4

T-N curve







General tolerance mm	
Nominal dimension	Tolerance
~ 6	±0.1
> 6 ~ 30	±0.2
> 30 ~ 120	±0.3
> 120 ~ 300	±0.4
> 300 ~ 600	±0.5
> 600 ~ 1200	±0.8
> 1200 ~ 2400	±1.0
> 2400	±1.5

Motor wire table	
Color or wire no.	Signal
U/L1	PH U
V/L2	PH V
W/L3	PH W
Green/Yellow	GND

Except dimensions, all the specifications in the table are in ±10% of tolerance

Version: 1.13-OG
Date: 2017/1/16

Fig. 12.89 **Data sheet TMRWGFL**

13. Declaration of Conformity

According to EC Directive 2014/35/EU – Low Voltage Directive

Manufacturer
HIWIN GmbH
Brücklesbünd 2
77654 Offenburg,
Germany

This declaration relates exclusively to the following product in the state in which it was placed on the market, and excludes components which are added and/or operations carried out subsequently by the final user. The declaration is no more valid, if the product is modified without agreement.

Product denomination:: Torque motors TMR_, TMRW_
Year of manufacture: from 2016

The manufacturer hereby declares that the product is complying with all essential requirements of the Directive 2014/35/EU (Low Voltage Directive) relating to electrical equipment.

In addition the product is in accordance with the EC Directives:
- EC Directive on electromagnetic compatibility (2014/30/EU)
- EC RoHS Directive on the restriction of hazardous substances (2011/65/EU)

Offenburg, 20.04.2016
Managing Director

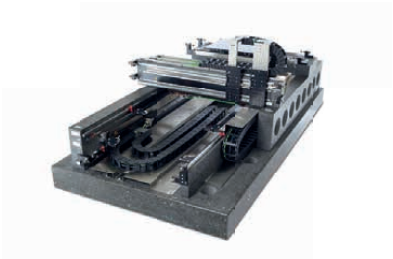
Werner Mäurer

Notes

Notes

Linear Guideways

Ballscrews



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Linear Axes

Linear Actuators

Robots

Linear Motor Components

Rotary Tables

Drives & Servo Motors

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