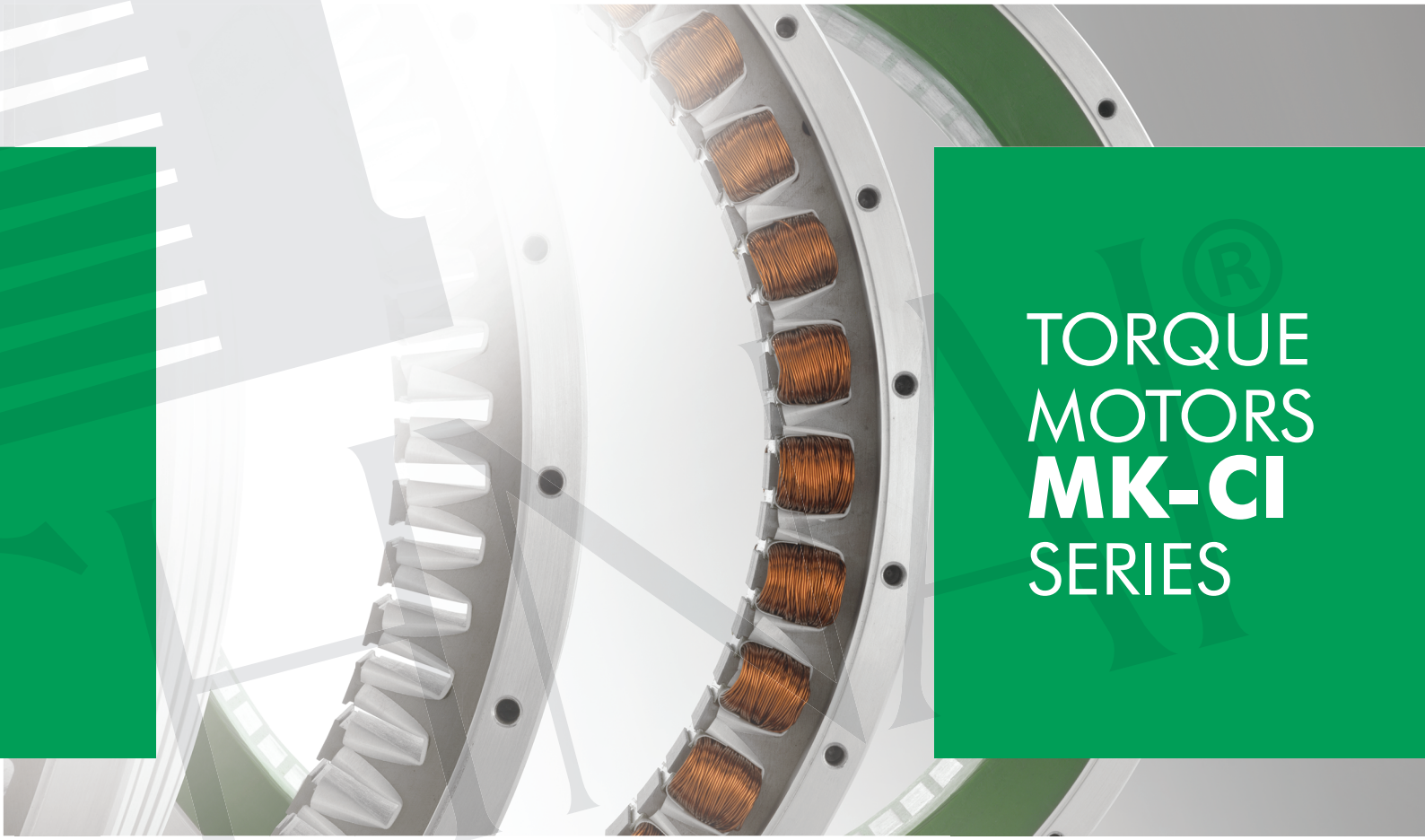


TORQUE MOTORS **MK-CI** SERIES

TECHNAI®
TEAM
DIRECT-DRIVE MOTION TECHNOLOGY

2. INTRODUCTION TO THE DIRECT-DRIVE TECHNOLOGY

"Torque motors" are applied to rotary axes as "Linear motors" are applied to straight axes. Both are the expression of the **technology** named **Direct-Drive**.

The Direct-Drive principle is quite simple: the electric servomotor generates the mechanical energy which is used for driving the payload.

The fundamental difference when compared to conventional systems is the absence of any mechanical means for motion transmission, e.g., gearboxes, couplings or drive belts.

Speed, Torque and Power of the Direct-Drive systems are intrinsic features of the electromagnetic project of the motor which determine its physical size, as well as the quality and the dynamics of the motion depend on the electronic regulation system and the feedback loop quality of the measuring system.

Every Direct-Drive system solution for rotary axes will implement a new form of servomotor, where its electromagnetic component "merges" with the mechanical project of the subgroup on the machine for which the rotary axis is used.

3. ADVENTAGES OF THE DIRECT-DRIVE TECHNOLOGY COMPARED TO CONVENTIONAL SOLUTIONS

Elimination of the mechanical gearboxes:

The system will be considerably simplified in its mechanical structure, obtaining a high reliability and consistency both to the performance and precision.

- The absence of the gearbox will allow to overcome all issues involved such as: friction, wear and motion's cyclic faults
- Better performance and energy efficiency
- The Direct-Drive systems simplify the mechanical complexity by reducing the number of components and assembly costs
- The simplified and symmetric structure of the Direct-Drive systems facilitates the manufacture of the structure of any adjacent machines
- Cost reduction and superior performance will be achieved as a result.

4. THE ELECTRONIC REGULATION PREVAILS AND SETS THE QUALITY OF THE SYSTEM

The Direct-Drive systems implement some functions through the electronic regulation which in the past were linked to the mechanical construction. Herein we highlight some of the basic features of the servo-systems with direct transmission compared to conventional systems using a gearbox.

The field of evaluation for these considerations focuses particularly on the applications for the axes of the machine tools. As a matter of fact, this field requires a very high performance and precision target.

Therefore it constitutes an excellent reference point of evaluation also related to other fields, generally less sophisticated, meaning minor precision requirements.

DIRECT-DRIVE SYSTEMS

GEARBOX SYSTEMS

APPLICATION WITH PREVAILING DYNAMIC CYCLE

Static and dynamic rigidity are functions which are exclusively delegated to the electronic regulation.

The measuring system (feedback encoder) establishes an insurmountable limit of resolution and positioning accuracy.
The electronic regulation "perceives" the mechanic-structural resonance as a limiting border to which it must adequate itself. However, it is quite easy to reach final quality levels decisively higher.

The most sophisticated regulating algorithms of the control electronics are decisive for the determination of final high-level results as to resolution/accuracy. (typical targets: [degrees] resolution 10^{-6} and positioning window: 10^{-5}).

The performance of the dynamic cycle is determined by two fundamental factors:

- Drive torque;
- Inertia moment of the rotary masses.

The only precaution is not to underestimate the residual frictions of the system, such as:

- Friction from rolling bearings
- Any possible friction from rotary hydraulic distributors.

The "calculation model" is simple, linear and without any surprise. The formulas of the dynamics of circular motion are applied with excellent reliability.

In the application field of the prevailing dynamic cycles, the Direct-Drive systems express the maximum quality gap as to conventional systems.

The mechanical qualities of the gearbox prevail, when the dynamic behavior of the servo-system is defined.

Quality and regularity of the motion are bound by the quality of the gearbox. Backlashes, variable frictions and the geometrical quality of the execution prevail over the measuring resolution. The electronic regulation ends here and uniforms itself to what the mechanical transmission is able to offer.

In this case the final result is conditioned by the mechanical system. It is not of great importance to have a very sophisticated electronics.
The goals which can be reached in the best hypothesis are as follows [degrees]: resolutions 10^{-5} and positioning windows 10^{-4}.

The performance of the dynamic cycle is heavily influenced by non-linear physical variables:

- Variable friction and performance depending on speed, type of lubrication, etc.
- Backlashes and elasticity of the gearboxes
- Regulation stability compromised by elastic couplings between different inertias suitable for causing dynamic instability of the system at low frequency.

The "calculation model" is problematic and complex. Very often one must be satisfied with the results obtained by the operative testing of the system.

The applications with very high dynamic cycles put into evidence all the limits of the solution using a gearbox.

DIRECT-DRIVE SYSTEMS | GEARBOX SYSTEMS

APPLICATIONS SUBJECT TO RELEVANT TORQUE DISTURBANCES

A "torque disturbance" is understood as the forces that act by contrasting the programmed axis motion. An example are the cutting forces which are generated on a milling machine. The "torque disturbance" is characterized as to the force value [N] and to the frequency [Hz] - (Rigidity = Force/Flexion)

The performances of dynamic rigidity, as understood as stability to the "torque disturbance" of a Direct-Drive system, are obtained by summing two fundamental quantities:

Active rigidity + Inertial rigidity.

The active rigidity is obtained by regulating the reply of the velocity ring with a through-passing band higher than the frequency of the disturbance coming from the milling.
Therefore, the servo-controlled system will be able to act in real time by opposing the drive torque to the cutting disturbances.

The faster the reaction of the Speed loop is, the lower the flexion (and therefore the higher the active rigidity) will be.

The inertial rigidity is exclusively derived from the intrinsic inertia of the rotary mass:
the higher the inertia is, the lower the value of induced acceleration to the axis will be. Therefore, its motion will be less and such to facilitate the (active) regulated reply of the controlled axis.

The "global dynamic rigidity" of the system will be the sum of these two results, that means:
Active (regulated) rigidity + Inertial rigidity (physical one of the mass).

The quality of the dynamic rigidity is excellent, provided that both elements are well balanced. Any application, which requires a high level of compromise between trajectory precision and low/ medium operation forces, obtains a substantial advantage (for example High Speed Cutting).

The "global dynamic rigidity" of a system using a gearbox have the same factors, however these assume a different weight.

The Inertial rigidity has a predominant importance.

To the intrinsic inertia of the mass of the axis and of the useful load, the reflex inertia of any of the rotary elements is summed up, reconverted by the ratio of the gearbox speed which forms the kinematic chain.

To this factor sometimes the irreversibility of the motion, as a consequence of the low performance and/or of the high reduction ratio, is added.
The positive side of this aspect is as follows:

- Physical containment of the amplitude of the flexion to heavy impulsive loads
- High overloading with mechanical reaction to the force of disturbance.

Normally, the active rigidity due to the regulation of the servomotor has a secondary validity, since it is "screened" both by the low performance and by the irreversibility of the motion.

Very high values of "global dynamic rigidity" can be reached easily. The systems using a gearbox are still valid for heavy-duty jobs.
However, the quality will be much "rougher".

5. OPERATION SAFETY AND QUALITY STANDARDS OF TECHNAI TORQUE MOTORS

All motors manufactured by TECHNAI Team correspond to high standards of execution, where particular care has been given to the electric insulation and the winding protection.
Each single motor is subject to accurate tests and measuring steps during the entire manufacturing process (slot insulation, arrangement of windings, electric connections, impregnation and final encapsulation using epoxy resin). The entire manufacturing process is kept under control in each single step. During each acceptance test a document will be issued to ensure the complete traceability of each motor built by us.

Phase-ground insulation test + Surge test

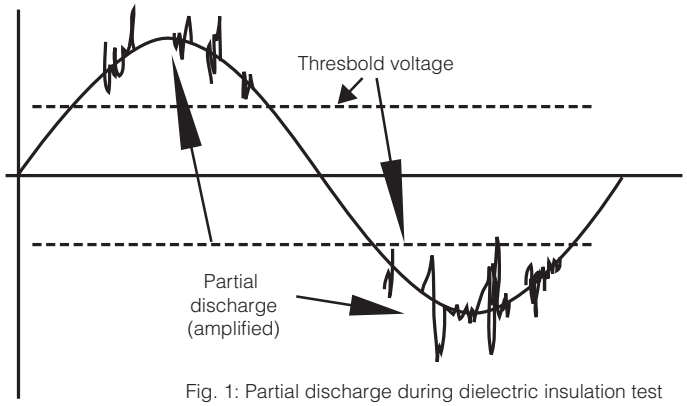


Fig. 1: Partial discharge during dielectric insulation test

Our factory is provided with a sophisticated computerized test-bench, which is well beyond the normal rigidity and insulation tests prescribed by the standards in force. Here in the following, a trace of the advanced testing procedures foreseen by our quality standards is shown:

Microsurges or partial discharge test:
This is used for testing the execution of the motor by putting into evidence any faults, such as winding out of their slots, wires touching metal parts, faults between one spire and another.
Figure 1 shows a motor which presents such faults. Any partial microcharges (microsurge or partial discharge) which deviate from the sinusoidal curve become evident.
The lower the number and the value of the detected microsurges is, the higher the technical quality of the motor will be.

PDIV test (Partial Discharge Inception Voltage):

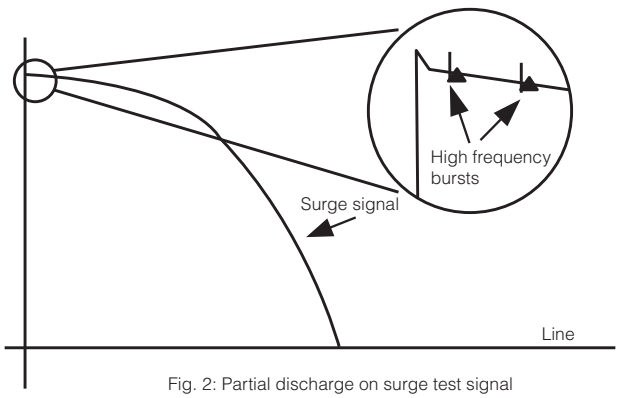


Fig. 2: Partial discharge on surge test signal

This allows to evaluate the quality of the insulating materials between the winding "phases".
The insulating materials may present faults such as different types of micro-cavities caused during the manufacturing process and also metal splinters. These faults may cause local concentrations in the electric field thus exceeding the limit value of the field and causing consequently the phenomenon of Partial Discharges.
The term "Partial Discharge" depends on the fact that this phenomenon occurs on microscopic level thus involving only a part of the existing dielectric between the parts under voltage.
These discharges will damage the dielectric material and are liable for the aging of material and consequently for the reduction of the motor's lifetime. Measuring of partial discharges gives a valid means for checking the state of electric insulation. This allows detecting of faults which sooner or later may cause breakage of the dielectric.
The **PDIV** test allows to program the peak voltage to be applied between the windings and the mass or to the ends of windings. The system checks for each single pulse applied whether in the stator any partial discharges will take place or not. The lower the value of the detected microsurges is, the higher the technical quality of the motor will be.
This TEST (PDIV) is particularly suitable for those motors that for their final application will be powered through a frequency inverter, which is typical for the entire range of servomotors and therefore also for Torque motors.

Phenomenon of creating Voltage spikes

The appearance of high voltage spikes represents a real risk which all servomotors controlled by an inverter are subject to. It can be easily understood that the origin of such phenomenon is external to the motor.
This motor can only be protected as a preventive measure against the appearance of this potentially deleterious phenomenon. The care dedicated by Technai during testing to ensure best conditions of motor protection and testing has already been explained before. However, it has already been placed into evidence that particular operation conditions of the complex drive system may cause voltage spikes which might even exceed 1500-2000 Vpk.
Due to these voltage spikes there might be partial discharges and therefore the risk of a considerable reduction of the motor's lifetime, even causing the clean breakage of the insulation.

The factors which contribute to increase the probability of this deleterious phenomenon are as follows:

- Intrinsic quality of the inverter project (some frequency inverters turn out to be particularly critical)
- Power cables of high length and screened: the difference of impedance between the cable and the statoric winding may cause the appearance of voltage resonance.
- High number of power drive modules using a common supply unit on the DC bus
- High voltage of DC bus having a regenerative circuit.

Prevention and protection of the motor against surges

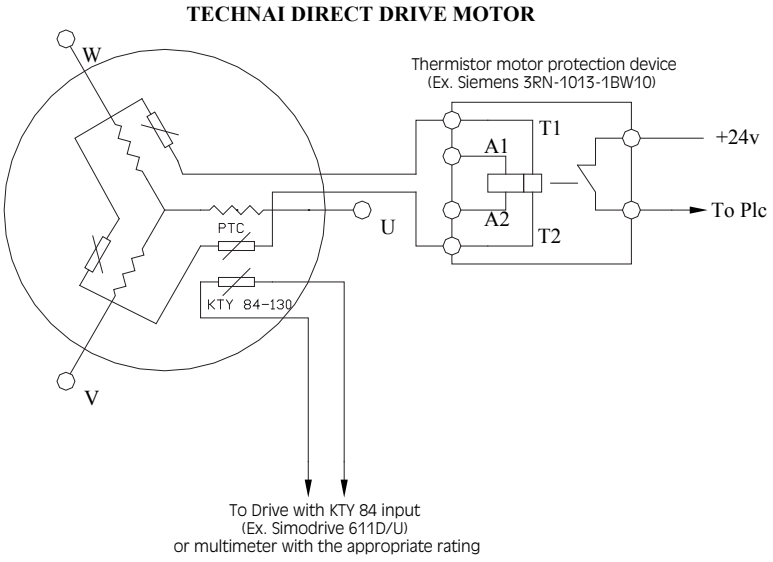
The rule to be respected for safeguarding against such phenomenon will be the execution of a measuring test to be carried out completely under operation conditions so to reduce the values within the following data:
Measuring of peaks of voltage gradient **dV/dt**:

- **Measuring between one phase and another: 900+10% Vpeak max. and dV/dt ≤ 700V/μs**
- **Measuring between one phase and the mass: 900+10% Vpeak max. (Positive peak)**

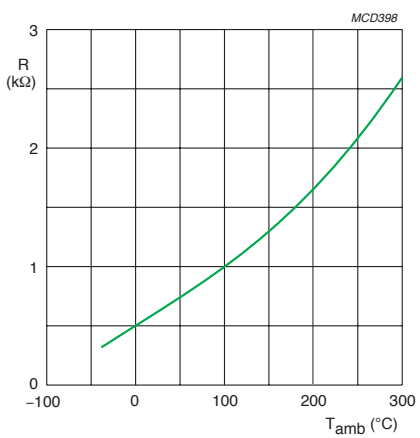
On request, the Technai technical service is able to carry out this acceptance test and to support the customers by choosing the appropriate kits/filters adequately developed for setting the system into the tolerance values foreseen.
A list of such kits/filters combined with each single torque motor of the MK-C series is shown in this catalogue (see page 53).

6. THERMAL PROTECTION AND THERMAL PROBE FITTED INTO THE WINDINGS

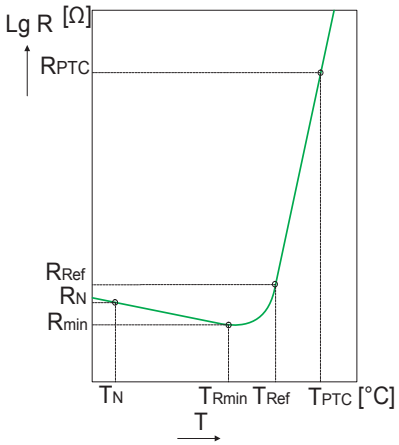
The thermal protection is the only strategy valid for protecting the motor!
The DIRECT DRIVE motor from TECHNAI is provided with two types of thermal probe.
The **PTC** thermal probe is the predominant one to be used for protecting the motor against overtemperatures.
If the PTC temperature probe intervenes, the drive must be rapidly disabled so that the converter of the drive does not continue supplying any current to the stator. This condition of thermal load is caused by electric current required by the closed-circuit control and may damage seriously the stator.
The thermal probe **KTY 84-130** supplies an analog signal proportional to the temperature.
In a system with a symmetric current charge in the three-phase coils it supplies information about the medium temperature value of the motor.
The motor temperature can be displayed if necessary using the signal coming from a **KTY 84-130** sensor. In this particular case, according to the type and application of the machine, an alarm signal may be used when the motor temperature is between 100°C and 110°C. This alarm signal can be used for reducing the power input to the motor.
The temperature probe **KTY 84-130** evaluates only the temperature between **two stator phases**.
However, the phases in a synchronous motor have different load levels according to the operation mode. Therefore, in specific cases there might be phases with a higher temperature than the one indicated.



Characteristic curve of KTY 84-130



Characteristic curve of PTC probe



Torque Motor MK-CI WA/WB | Configuration with the rotor inside of the stator

Code	Stator Outer Diameter	Stator lenght	Rotor lenght	Continuous Torque		Peak Torque	Max speed at Ipk at 600 Vdc	Max speed at Iwc at 600 Vdc	Max speed at Iac at 600 Vdc	pag
				Liq. Cooling Dt100	Natural Conv. Dt 100					
Symbol				**Twc**	**Tac**	**Tpk**	**Npk**	**Nwc**	**Nac**	
Unit	**mm**	**mm**	**mm**	**Nm**	**Nm**	**Nm**	**RPM**	**RPM**	**RPM**	
MK-CI 93-020 WA	110	50	20	5,4	2,2	9	2000	2000	2000	12
MK-CI 93-030 WA	110	60	30	8	3,3	13,3	1000	1800	2000	12
MK-CI 93-040 WA	110	70	40	10,2	4,3	17,8	1300	1400	2000	12
MK-CI 93-050 WA	110	80	50	11,8	5,1	21,1	500	1200	1500	12
MK-CI 93-070 WA	110	100	70	16,5	7,3	30	650	1250	1500	12
MK-CI 93-090 WA	110	120	90	20,5	9	40	420	950	1200	12
MK-CI 93-100 WA	110	130	100	22	10	43	350	900	1100	12
MK-CI 140-030 WA	160	70	30	19,2	8,6	38	700	1000	1000	14
MK-CI 140-050 WA	160	90	50	33,2	14,6	63	370	850	1000	14
MK-CI 140-070 WA	160	110	70	46	19,8	89	450	900	1000	14
MK-CI 140-100 WA	160	140	100	65	27,6	126	240	600	750	14
MK-CI 140-150 WA	160	190	150	98,6	42	190	50	360	490	14
MK-CI 175-030 WA	198	70	30	37	17	72	750	1550	1850	16
MK-CI 175-030 WB	198	70	30	37	17	72	2000	3800	4300	16
MK-CI 175-050 WA	198	90	50	64	29	120	450	850	1100	16
MK-CI 175-050 WB	198	90	50	64	29	120	1200	2100	2600	16
MK-CI 175-070 WA	198	110	70	91	40	168	320	620	750	16
MK-CI 175-070 WB	198	110	70	91	40	168	850	1550	1850	16
MK-CI 175-100 WA	198	140	100	135	57	240	200	400	525	16
MK-CI 175-100 WB	198	140	100	135	58	240	600	1050	1300	16
MK-CI 175-150 WA	198	190	150	209	89	360	130	300	410	16
MK-CI 175-150 WB	198	190	150	205	87	360	360	660	850	16
MK-CI 210-030 WA	230	70	30	68	27	135	350	750	1000	18
MK-CI 210-030 WB	230	70	30	68	26	135	800	1700	2100	18
MK-CI 210-050 WA	230	90	50	118	45	224	175	440	600	18
MK-CI 210-050 WB	230	90	50	118	45	224	520	1000	1250	18
MK-CI 210-070 WA	230	110	70	165	63	310	80	280	400	18
MK-CI 210-070 WB	230	110	70	165	63	310	350	670	900	18
MK-CI 210-100 WA	230	140	100	241	85	442	165	420	560	18
MK-CI 210-100 WB	230	140	100	240	87	442	260	560	760	18
MK-CI 210-150 WA	230	190	150	368	133	660	80	240	360	18
MK-CI 210-150 WB	230	190	150	365	132	660	150	360	475	18
MK-CI 260-030 WA	280	70	30	97	39	173	140	340	480	20
MK-CI 260-030 WB	280	70	30	95	38	173	300	700	800	20
MK-CI 260-050 WA	280	90	50	163	65	288	105	260	360	20
MK-CI 260-050 WB	280	90	50	162	63	288	220	550	750	20
MK-CI 260-070 WA	280	110	70	225	91	402	105	300	400	20
MK-CI 260-070 WB	280	110	70	223	89,5	402	220	550	700	20
MK-CI 260-100 WA	280	140	100	321	128	580	75	195	275	20
MK-CI 260-100 WB	280	140	100	323	126	580	150	400	550	20
MK-CI 260-150 WA	280	190	150	480	194	873	60	165	240	20
MK-CI 260-150 WB	280	190	150	478	192	873	150	370	500	20
MK-CI 290-030 WA	310	70	30	134	59	260	330	660	760	22
MK-CI 290-030 S WA	310	70	30	134	59	260	330	660	760	24
MK-CI 290-030 WB	310	70	30	134	54	260	750	1430	1700	22
MK-CI 290-030 S WB	310	70	30	134	54	260	750	1430	1700	24
MK-CI 290-050 WA	310	90	50	227	96	433	180	370	460	22
MK-CI 290-050 S WA	310	90	50	227	96	433	180	370	460	24
MK-CI 290-050 WB	310	90	50	227	96	433	450	850	960	22
MK-CI 290-050 S WB	310	90	50	227	96	433	450	850	960	24
MK-CI 290-070 WA	310	110	70	322	132	646	130	310	390	22
MK-CI 290-070 S WA	310	110	70	322	132	646	130	310	390	24
MK-CI 290-070 WB	310	110	70	320	132	646	300	575	700	22
MK-CI 290-070 S WB	310	110	70	320	132	646	300	575	700	24
MK-CI 290-100 WA	310	140	100	455	186	868	40	170	230	22

Code	Stator Outer Diameter	Stator lenght	Rotor lenght	Continuous Torque		Peak Torque	Max speed at Ipk at 600 Vdc	Max speed at Iwc at 600 Vdc	Max speed at Iac at 600 Vdc	pag
				Liq. Cooling Dt100	Natural Conv. Dt 100					
Symbol				**Twc**	**Tac**	**Tpk**	**Npk**	**Nwc**	**Nac**	
Unit	**mm**	**mm**	**mm**	**Nm**	**Nm**	**Nm**	**RPM**	**RPM**	**RPM**	
MK-CI 290-100 S WA	310	140	100	455	186	868	40	170	230	24
MK-CI 290-100 WB	310	140	100	460	181	868	200	380	490	22
MK-CI 290-100 S WB	310	140	100	460	181	868	200	380	490	24
MK-CI 290-150 WA	310	190	150	695	275	1290	10	85	130	22
MK-CI 290-150 S WA	310	190	150	695	275	1290	10	85	130	24
MK-CI 290-150 WB	310	190	150	695	272	1290	110	250	310	22
MK-CI 290-150 S WB	310	190	150	695	272	1290	110	250	310	24
MK-CI 360-030 WA	385	90	30	239	112	428	110	250	340	26
MK-CI 360-030 WB	385	90	30	248	112	428	250	520	730	26
MK-CI 360-050 WA	385	110	50	415	175	724	50	140	190	26
MK-CI 360-050 WB	385	110	50	428	178	724	220	480	660	26
MK-CIC 360-050 WA	385	90	50	415	175	724	50	140	190	28
MK-CIC 360-050 WB	385	90	50	428	178	724	220	480	660	28
MK-CI 360-070 WA	385	130	70	587	249	1013	100	200	290	26
MK-CI 360-070 WB	385	130	70	584	247	1013	170	340	460	26
MK-CIC 360-070 WA	385	110	70	587	249	1013	100	200	290	28
MK-CIC 360-070 WB	385	110	70	584	247	1013	170	340	460	28
MK-CI 360-100 WA	385	160	100	821	341	1448	50	140	200	26
MK-CI 360-100 WB	385	160	100	821	335	1448	140	290	390	26
MK-CI 360-150 WA	385	210	150	1240	504	2173	65	145	210	26
MK-CI 360-150 WB	385	210	150	1262	513	2173	120	240	340	26
MK-CI 420-030 WA	455	90	30	283	128,5	430	70	145	220	30
MK-CI 420-030 WB	455	90	30	281	125	430	150	320	450	30
MK-CI 420-050 WA	455	110	50	482	209	725	60	125	185	30
MK-CI 420-050 WB	455	110	50	478	205	725	120	250	390	30
MK-CI 420-070 WA	455	130	70	691	290	980	77	138	200	30
MK-CI 420-070 WB	455	130	70	689	288	980	150	290	400	30
MK-CI 420-100 WA	455	160	100	995	412	1410	44	90	138	30
MK-CI 420-100 WB	455	160	100	991	408	1410	95	200	280	30
MK-CI 420-150 WA	455	210	150	1458	585	2110	44	90	138	30
MK-CI 420-150 WB	455	210	150	1455	583	2110	95	200	280	30
MK-CI 450-030 WA	485	90	30	397	180	731	145	300	400	32
MK-CI 450-030 WB	485	90	30	402	181	731	325	625	800	32
MK-CI 450-050 WA	485	110	50	670	290	1219	70	180	240	32
MK-CI 450-050 WB	485	110	50	679	293	1219	200	380	470	32
MK-CIC 450-050 WA	485	90	50	670	290	1219	70	180	240	34
MK-CIC 450-050 WB	485	90	70	679	293	1219	200	380	470	34
MK-CI 450-070 WA	485	130	70	938	403	1707	55	120	170	32
MK-CI 450-070 WB	485	130	70	950	404	1707	120	260	340	32
MK-CIC 450-070 WA	485	110	70	938	403	1707	55	120	170	34
MK-CIC 450-070 WB	485	110	70	950	404	1707	120	260	340	34
MK-CI 450-100 WA	485	160	100	1355	570	2439	20	80	110	32
MK-CI 450-100 WB	485	140	100	1355	570	2439	85	170	230	32
MK-CI 450-150 WA	485	210	150	2119	831	3647	55	110	160	32
MK-CI 450-150 WB	485	190	150	2109	827	3647	125	230	310	32
MK-CI 500-030 WA	535	90	30	450	220	760	70	170	245	36
MK-CI 500-030 WB	535	90	30	450	219	760	150	300	400	36
MK-CI 500-050 WA	535	110	50	790	340	1460	35	105	164	36
MK-CI 500-050 WB	535	110	50	790	341	1460	100	225	330	36
MK-CI 500-070 WA	535	130	70	1100	435	1750	30	75	118	36
MK-CI 500-070 WB	535	130	70	1100	433	1750	70	160	240	36
MK-CI 500-100 WA	535	160	100	1530	615	2400	25	65	100	36
MK-CI 500-100 WB	535	160	100	1530	615	2400	60	130	200	36
MK-CI 500-150 WA	535	210	150	2390	922	3600	25	60	95	36
MK-CI 500-150 WB	535	210	150	2390	924	3600	60	130	200	36

Code	Stator Outer Diameter	Stator lenght	Rotor lenght	Continuos Torque		Peak Torque	Max speed at Ipk at 600 Vdc	Max speed at Iwc at 600 Vdc	Max speed at Iac at 600 Vdc	pag
				Liq. Cooling Dt100	Natural Conv. Dt 100					
Symbol				**Twc**	**Tac**	**Tpk**	**Npk**	**Nwc**	**Nac**	
Unit	**mm**	**mm**	**mm**	**Nm**	**Nm**	**Nm**	**RPM**	**RPM**	**RPM**	
MK-CI 530-030 WA	565	90	30	557	251	1080	75	170	235	38
MK-CI 530-030 WB	565	90	30	550	250	1080	150	340	400	38
MK-CI 530-050 WB	565	110	50	924	420	1715	40	100	140	38
MK-CI 530-050 WB	565	110	50	924	420	1715	80	200	280	38
MK-CIC 530-050 WA	565	90	50	924	420	1715	40	100	140	40
MK-CIC 530-050 WB	565	90	50	924	420	1715	80	200	280	40
MK-CI 530-070 WA	565	130	70	1424	580	2455	25	65	95	38
MK-CI 530-070 WB	565	130	70	1425	580	2455	55	145	200	38
MK-CIC 530-070 WA	565	110	70	1424	580	2455	25	65	95	40
MK-CIC 530-070 WB	565	110	70	1425	580	2455	55	145	200	40
MK-CI 530-100 WA	565	160	100	2076	817	3600	45	100	145	38
MK-CI 530-100 WB	565	160	100	2076	814	3600	90	200	280	38
MK-CI 530-150 WA	565	210	150	3050	1200	5400	25	65	95	38
MK-CI 530-150 WB	565	210	150	3050	1197	5400	50	130	180	38
MK-CI 560-030 WA	600	90	30	609	280	1143	75	175	240	42
MK-CI 560-030 WB	600	90	30	610	278	1143	110	300	340	42
MK-CI 560-050 WA	600	110	50	1022	465	1925	34	100	140	42
MK-CI 560-050 WB	600	110	50	1022	468	1925	80	210	290	42
MK-CI 560-070 WA	600	130	70	1459	670	2664	29	87	120	42
MK-CI 560-070 WB	600	130	70	1459	673	2664	60	175	240	42
MK-CI 560-100 WA	600	160	100	2084	897	3800	32	65	100	42
MK-CI 560-100 WB	600	160	100	2084	897	3800	60	140	200	42
MK-CI 560-150 WA	600	210	150	2980	1360	5690	8	52	75	42
MK-CI 560-150 WB	600	210	150	2980	1360	5690	16	120	160	42
MK-CI 660-030 WA	695	90	30	815	400	1600	30	100	140	44
MK-CI 660-030 WB	695	90	30	815	400	1600	80	220	280	44
MK-CI 660-050 WA	695	110	50	1300	523	2400	35	75	105	44
MK-CI 660-050 WB	695	110	50	1300	523	2400	80	170	220	44
MK-CI 660-070 WA	695	130	70	2012	835	3500	25	65	90	44
MK-CI 660-070 WB	695	130	70	2012	835	3500	50	135	180	44
MK-CI 660-100 WA	695	160	100	2900	1200	5000	20	55	78	44
MK-CI 660-100 WB	695	160	100	2900	1200	5000	40	120	158	44
MK-CI 660-150 WA	695	210	150	4000	1800	7200	20	55	75	44
MK-CI 660-150 WB	695	210	150	4000	1800	7200	40	100	130	44
MK-CI 760-030 WA	795	110	30	1272	615	2300	23	62	93	46
MK-CI 760-030 WB	795	110	30	1272	615	2300	55	125	180	46
MK-CI 760-050 WA	795	130	50	2076	995	3770	13	41	63	46
MK-CI 760-050 WB	795	130	50	2076	995	3770	30	80	110	46
MK-CI 760-070 WA	795	150	70	3100	1350	5500	10	33	53	46
MK-CI 760-070 WB	795	150	70	3100	1350	5500	25	80	115	46
MK-CI 760-100 WA	795	180	100	4500	1841	7688	12	35	57	46
MK-CI 760-100 WB	795	180	100	4500	1841	7688	25	55	90	46
MK-CI 760-150 WA	795	230	150	6550	2800	11480	7	26	42	46
MK-CI 760-150 WB	795	230	150	6550	2800	11480	15	65	90	46
MK-CI 990-030 WA	1030	110	30	2124	1068	4023	31	74	105	48
MK-CI 990-050 WA	1030	130	50	3622	1724	6700	17	43	63	48
MK-CI 990-070 WA	1030	150	70	5095	2372	9390	9	29	44	48
MK-CI 990-100 WA	1030	180	100	7490	3290	13400	13	33	49	48
MK-CI 990-150 WA	1030	230	150	11200	4884	20000	5	20	32	48
MK-CI 1220-030 WA	1260	110	30	3377	1680	6280	18	45	67	50
MK-CI 1220-050 WA	1260	130	50	5670	2715	10470	9	26	40	50
MK-CI 1220-070 WA	1260	150	70	7691	3627	14570	7	23	35	50
MK-CI 1220-100 WA	1260	180	100	11811	5228	20850	9	23	36	50
MK-CI 1220-150 WA	1260	230	150	17300	7350	31290	3	14	23	50

Configure your code, for example **MK CI 990 070 WA MP 1**

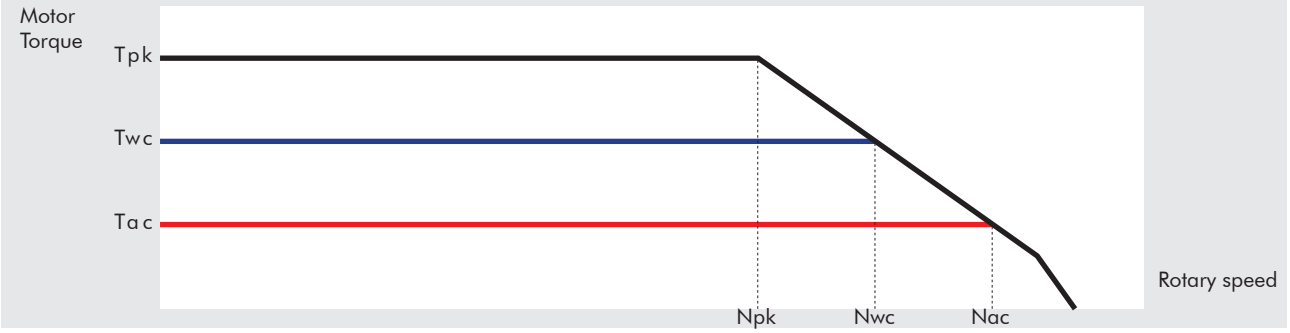
MK [ ] [ ] [ ] [ ] [ ] [ ]

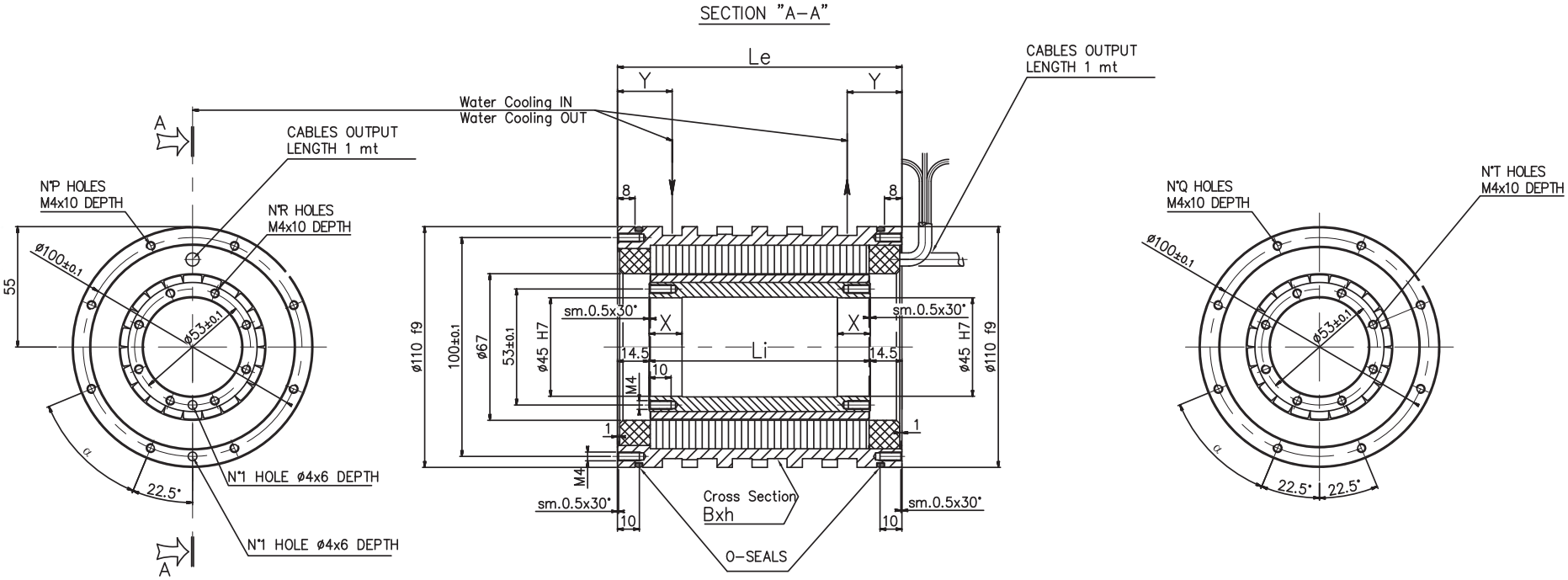
Motor Series	Nominal Motor Size	Stack Height	Winding Configuration	Cable Output Configuration	Output Cable Lenght
				Cable and Length as an option	
CI	93	030	WA	MF	1
CIC	140	050	WB	MP	1
CIS	175	070	WS		2
	210	100			4
	260	150			8
	290	. . .			
	290 S				
	360				
	420				
	450				
	500				
	530				
	560				
	660				
	760				
	990				
	1220				
	...				

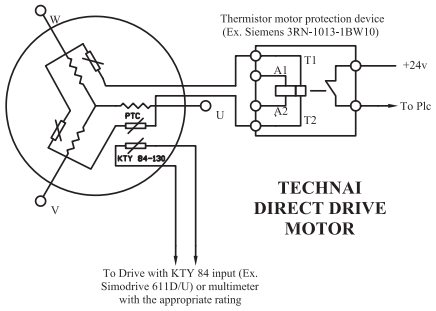
	Integration of new intermediate sizes
CIC	CIC Model – A Technai exclusive
CS	Custom configuration
. . .	Different heights and diameter are available on request
WA	Standard performance winding (Speed)
WB	Best performance winding (Speed)
WS	Special winding configuration according with Technai technical department
MP	Only two cable, one with all power wires and one with signal wires
MF	Every power or signal wire has his cable

Motor Specifications TECHNAI TECHNAI MK-CI 93 WA

Motor Specifications	**Symbol**	**Unit**	**MK-CI 93-020 WA**	**MK-CI 93-030 WA**	**MK-CI 93-040 WA**	**MK-CI 93-050 WA**	**MK-CI 93-070 WA**	**MK-CI 93-090 WA**	**MK-CI 93-100 WA**
Number of pole	P		22	22	22	22	22	22	22
Peak Torque	Tpk	Nm	9	13,3	17,8	21,4	30	40	43
Continuous Torque (Water Cooling Dt100)	Twc	Nm	5,6	8	9,9	11,8	16,5	20,5	22
Continuous Torque (Air Cooling Dt100)	Tac	Nm	2,2	3,3	4,3	5,1	7,3	9	10
Stall Torque (Water Cooling)	Tswc	Nm	4,25	6	7,6	9	12,3	16,2	16,8
Stall Torque (Air Cooling)	Tsac	Nm	1,7	2,55	2,85	3,8	5,6	6,7	7,5
Ripple Torque (Cogging Torque)	Tr	Nm	0,05	0,05	0,05	0,05	0,05	0,1	0,1
Power Loss at Twc	Pwc	KW	0,5	0,55	0,6	0,62	0,65	0,72	0,76
Power Loss at Tac	Pac	KW	0,08	0,087	0,1	0,11	0,12	0,13	0,14
Thermal Resistance Water Cooling	RthWc	K/W	0,211	0,202	0,175	0,164	0,155	0,138	0,132
Thermal Resistance Air Cooling	RthAc	K/W	1,159	1,113	0,961	0,890	0,850	0,762	0,723
Torque Constant	Kt	Nm/A	1,6	2,5	3,3	3,6	3,8	4,9	5,4
Back EMF Constant	Ke	V/1000 Rpm	99,4	149	198,7	220	233	297	327
Maximum Speed at Ipk at 600 Vdc	Npk	RPM	2000	1000	1300	500	650	420	350
Maximum Speed at Iwc at 600 Vdc	Nwc	RPM	2000	1800	1400	1250	1250	950	900
Maximum Speed at Iac at 600 Vdc	Nac	RPM	2000	2000	1800	1500	1500	1200	1100
Winding Resistance (Phase to Phase)	R20	Ω	18,2	21,8	25,5	26,8	14,8	17,8	19,3
Winding Inductance (Phase to Phase)	L	mH	15,5	22,2	28,8	30,2	20,8	26,5	29,3
Peak Current	Ipk	Arms	7,8	7,8	7,8	8,5	11,3	11,6	11,5
Continuous Current (Water Cooling Dt100)	Iwc	Arms	3,5	3,3	3,25	3,3	4,5	4,4	4,35
Continuous Current (Air Cooling Dt100)	Iac	Arms	1,5	1,38	1,35	1,4	1,9	1,8	1,8
Stall Current at 0 Speed (Water Cooling)	Iswc	Arms	2,7	2,5	2,5	2,5	3,5	3,4	3,3
Stall Current at 0 Speed (Air Cooling)	Isac	Arms	1,1	1,05	1	1	1,5	1,4	1,4
Maximum Winding Temperature		°C	130	130	130	130	130	130	130
Height of Rotor		mm	20	30	40	50	70	90	100
Height of Stator		mm	50	60	70	80	100	120	130
Outer Diameter of Stator		mm	110	110	110	110	110	110	110



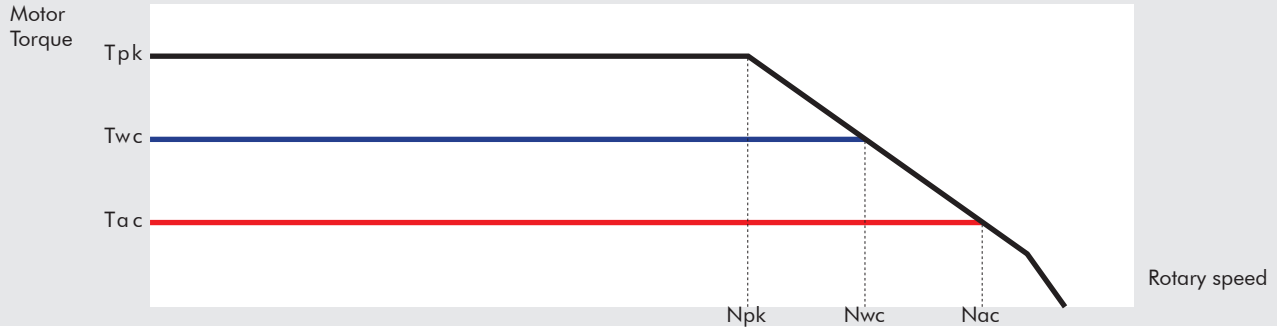


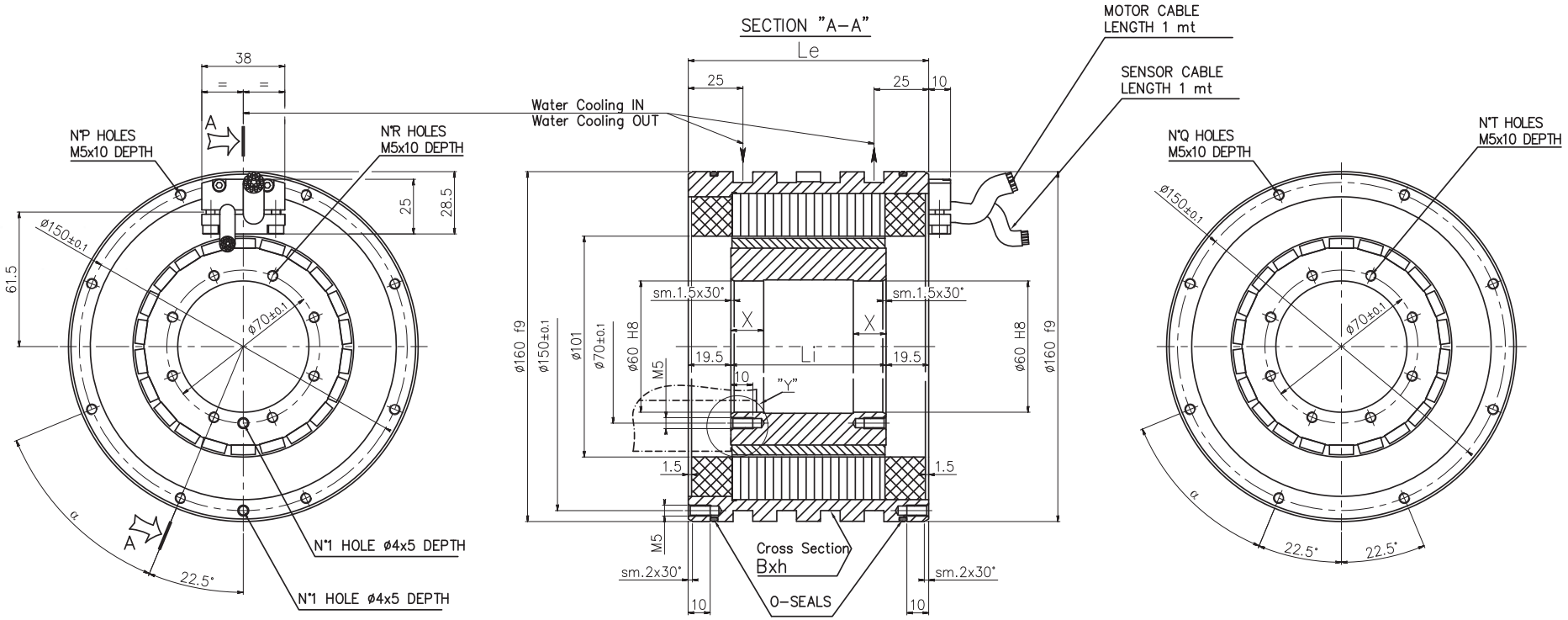


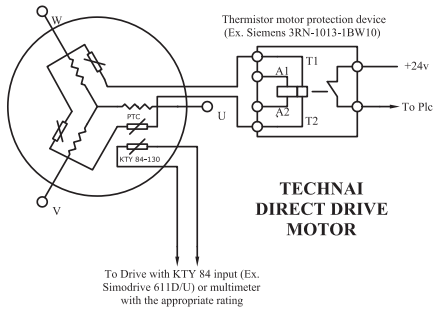
TYPE MK-CI-93		020	030	040	050	070	090	100
STATOR LENGTH	Le	50	60	70	80	100	120	130
ROTOR LENGTH	Li	21	31	41	51	71	91	101
CENTERING LENGTH	X	21	10	10	15	15	15	15
COOLING IN/ OUT	Y	20	22	20	25	25	25	25
COOLING GROOVE WIDTH	B	7	9	7	7	9	9	9
COOLING GROOVE DEPTH	h	4	4	4	4	4	4	4
COOLING GROOVES	No	2	2	4	4	4	6	6
STATOR HOLES	P	8	8	8	8	8	8	8
	Q	8	8	8	8	8	8	8
ROTOR HOLES	R	8	8	8	8	8	8	8
	T	8	8	8	8	8	8	8
HOLES PITCH ANGLE	α	45°	45°	45°	45°	45°	45°	45°

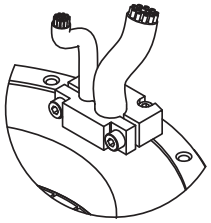
Motor Specifications TECHNAI TECHNAI MK-CI 140 WA

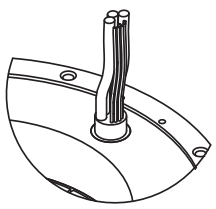
Motor Specifications	**Symbol**	**Unit**	**MK-CI 140-030 WA**	**MK-CI 140-050 WA**	**MK-CI 140-070 WA**	**MK-CI 140-100 WA**	**MK-CI 140-150 WA**
Number of pole	P		22	22	22	22	22
Peak Torque	Tpk	Nm	38	63	89	126	190
Continuous Torque (Water Cooling Dt100)	Twc	Nm	19,2	33,2	46	65	98,6
Continuous Torque (Air Cooling Dt100)	Tac	Nm	8,6	14,6	19,8	27,6	42
Stall Torque (Water Cooling)	Tswc	Nm	14,7	25,4	35,2	49,6	75,3
Stall Torque (Air Cooling)	Tsac	Nm	6,6	11,1	15,2	21	32
Ripple Torque (Cogging Torque)	Tr	Nm	0,2	0,35	0,5	0,6	0,75
Power Loss at Twc	Pwc	KW	0,7	1	1,2	1,45	1,9
Power Loss at Tac	Pac	KW	0,125	0,17	0,2	0,25	0,35
Thermal Resistance Water Cooling	RthWc	K/W	0,153	0,100	0,090	0,070	0,054
Thermal Resistance Air Cooling	RthAc	K/W	0,820	0,617	0,497	0,390	0,300
Torque Constant	Kt	Nm/A	3,3	5,6	5,4	7,8	11,7
Back EMF Constant	Ke	V/1000 Rpm	202	337	329	470	705
Maximum Speed at Ipk at 600 Vdc	Npk	RPM	700	370	450	240	50
Maximum Speed at Iwc at 600 Vdc	Nwc	RPM	1000	850	900	600	360
Maximum Speed at Iac at 600 Vdc	Nac	RPM	1000	1000	1000	750	490
Winding Resistance (Phase to Phase)	R20	Ω	8,7	11,3	7,3	9,4	12,9
Winding Inductance (Phase to Phase)	L	mH	21,7	30	20	27,9	41,2
Peak Current	Ipk	Arms	16,5	16,3	23,5	23,4	23,4
Continuous Current (Water Cooling Dt100)	Iwc	Arms	6,1	6,2	8,6	8,5	8,5
Continuous Current (Air Cooling Dt100)	Iac	Arms	2,6	2,6	3,7	3,6	3,6
Stall Current at 0 Speed (Water Cooling)	Iswc	Arms	4,7	4,7	6,6	6,5	6,5
Stall Current at 0 Speed (Air Cooling)	Isac	Arms	2	2	2,8	2,75	2,75
Maximum Winding Temperature		°C	130	130	130	130	130
Height of Rotor		mm	30	50	70	100	150
Height of Stator		mm	70	90	110	140	190
Outer Diameter of Stator		mm	160	160	160	160	160

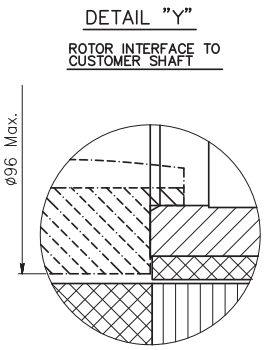








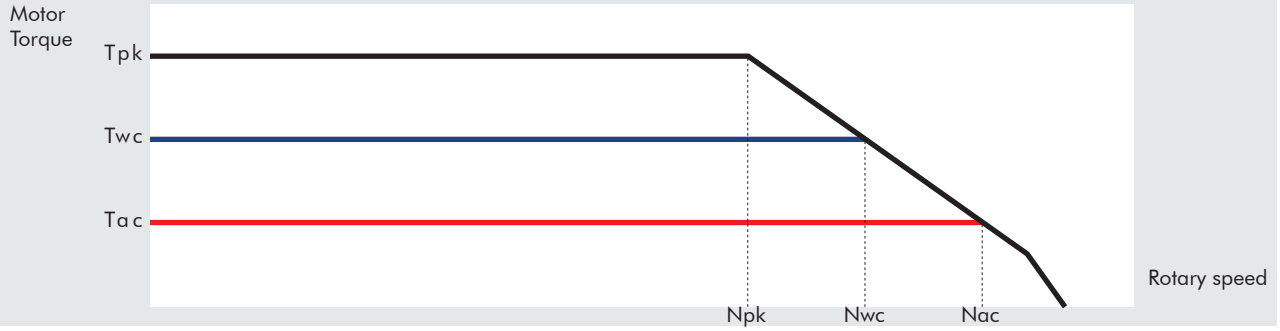


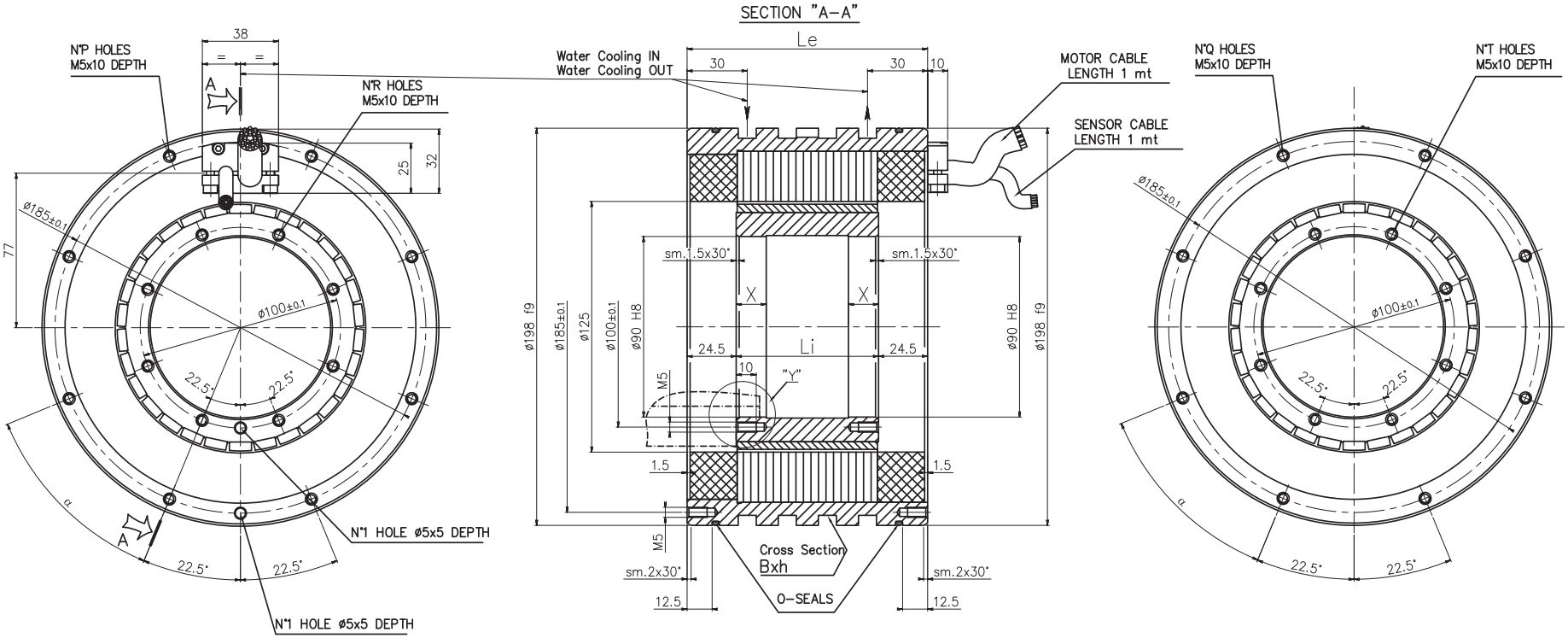


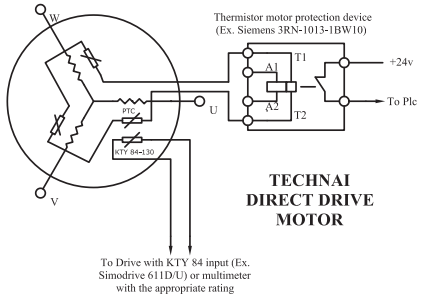
TYPE MK-CI-140		030	050	070	100	150
STATOR LENGTH	Le	70	90	110	140	190
ROTOR LENGTH	Li	31	51	71	101	151
CENTERING LENGTH	X	10	15	15	15	15
COOLING GROOVE WIDTH	B	8	8	9	8	9
COOLING GROOVE DEPTH	h	5	5	5	5	5
COOLING GROOVES	No	2	4	4	8	8
STATOR HOLES	P	8	8	8	14	14
	Q	8	8	8	16	16
ROTOR HOLES	R	8	8	8	15	15
	T	8	8	8	16	16
HOLES PITCH ANGLE	α	45°	45°	45°	22.5°	22.5°

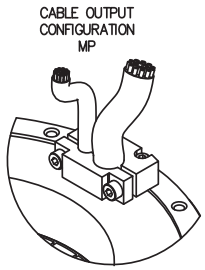
Motor Specifications TECHNAI MK-CI 175 WA/WB

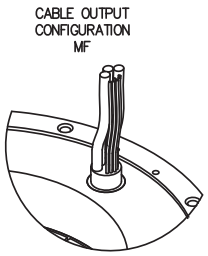
Motor Specifications	Symbol	Unit	MK-CI 175-030		MK-CI 175-050		MK-CI 175-070		MK-CI 175-100		MK-CI 175-150	
			WA	WB	WA	WB	WA	WB	WA	WB	WA	WB
Number of pole	P		30	30	30	30	30	30	30	30	30	30
Peak Torque	Tpk	Nm	72	72	120	120	168	168	240	240	360	362
Continuous Torque (Water Cooling Dt100)	Twc	Nm	37	37	64	64	91	91	135	135	209	205
Continuous Torque (Air Cooling Dt100)	Tac	Nm	17	17	29	29	40	40	57	58	89	87
Stall Torque (Water Cooling)	Tswc	Nm	28	28	49	49	70	70	103	103	160	156
Stall Torque (Air Cooling)	Tsac	Nm	13	13	22	22	31	31	44	44	68	67
Ripple Torque (Cogging Torque)	Tr	Nm	2,5	2,5	4	4	5	5	7	7	10	10
Power Loss at Twc	Pwc	KW	0,75	0,75	1	1	1,35	1,35	1,9	1,9	2,6	2,65
Power Loss at Tac	Pac	KW	0,16	0,16	0,22	0,22	0,27	0,27	0,35	0,35	0,46	0,47
Thermal Resistance Water Cooling	RthWc	K/W	0,133	0,133	0,094	0,0948	0,073	0,073	0,054	0,054	0,039	0,039
Thermal Resistance Air Cooling	RthAc	K/W	0,604	0,604	0,464	0,464	0,377	0,377	0,294	0,294	0,215	0,215
Torque Constant	Kt	Nm/A	3,2	1,5	5,9	2,5	8,3	3,6	11,9	5,1	15,3	7,6
Back EMF Constant	Ke	V/1000 Rpm	214	92	360	154	502	215	717	308	922	461
Maximum Speed at Ipk at 600 Vdc	Npk	RPM	750	2000	450	1200	320	850	200	600	130	360
Maximum Speed at Iwc at 600 Vdc	Nwc	RPM	1550	3800	850	2100	620	1550	400	1050	300	660
Maximum Speed at Iac at 600 Vdc	Nac	RPM	1850	4300	1100	2600	750	1850	525	1300	410	850
Winding Resistance (Phase to Phase)	R20	Ω	3,6	0,6	4,2	0,76	5,2	0,95	6,6	1,21	6,2	1,7
Winding Inductance (Phase to Phase)	L	mH	11,3	2,1	18	3,3	24,7	4,6	35	6,4	38	9,5
Peak Current	Ipk	Arms	29	67,7	29	67,7	29	67,7	29	67,7	33,7	68
Continuous Current (Water Cooling Dt100)	Iwc	Arms	10,6	24,8	11	25,7	11,2	26,2	11,6	27,2	14,2	27,6
Continuous Current (Air Cooling Dt100)	Iac	Arms	5	11,6	5	11,6	5	11,6	5	11,6	6	11,7
Stall Current at 0 Speed (Water Cooling)	Iswc	Arms	8,1	18,9	8,4	19,7	8,5	20	8,9	20,7	10,8	21,1
Stall Current at 0 Speed (Air Cooling)	Isac	Arms	3,8	8,9	3,8	8,9	3,8	8,9	3,8	8,9	4,5	8,9
Maximum Winding Temperature		°C	130	130	130	130	130	130	130	130	130	130
Height of Rotor		mm	30	30	50	50	70	70	100	100	150	150
Height of Stator		mm	70	70	90	90	110	110	140	140	190	190
Outer Diameter of Stator		mm	198	198	198	198	198	198	198	198	198	198

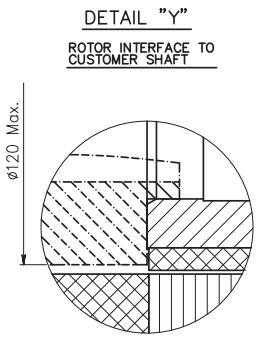








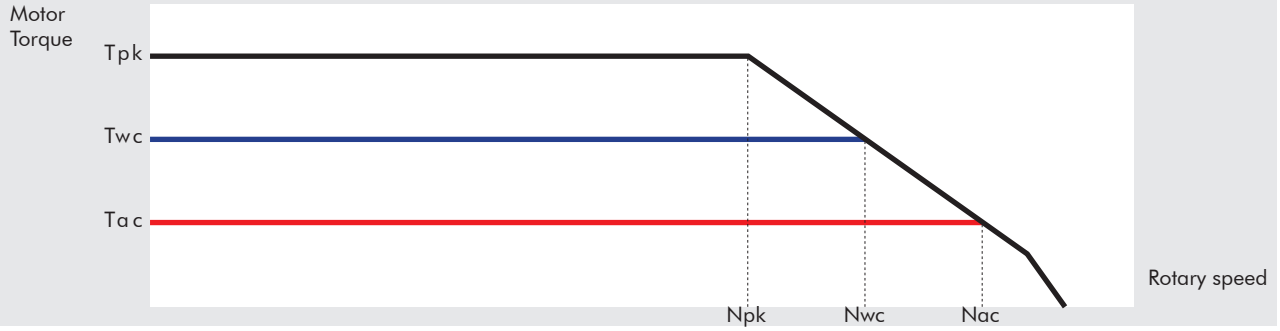


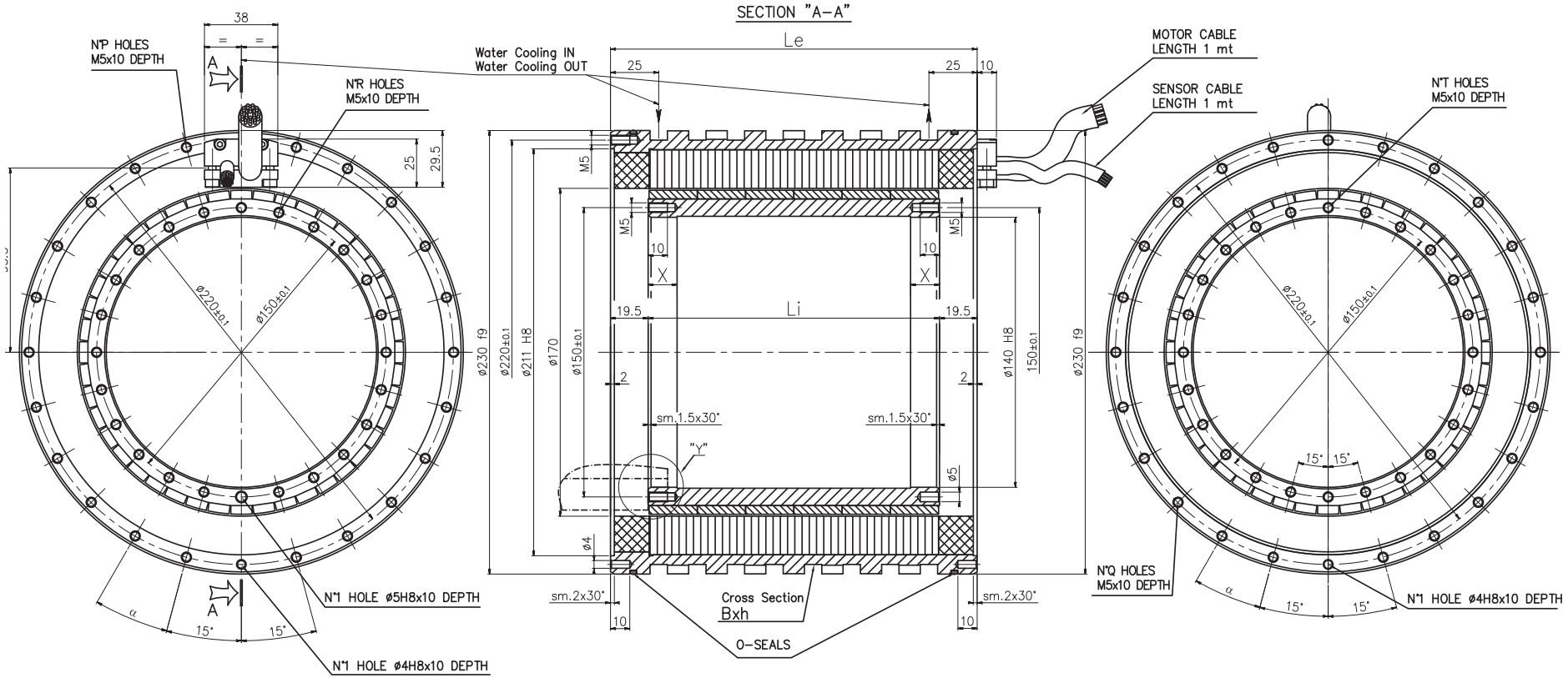


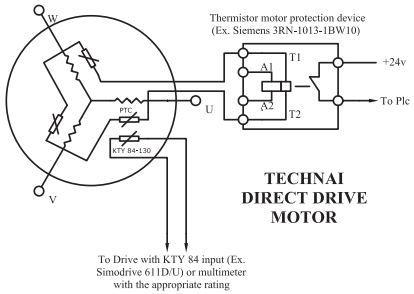
TYPE MK-CI-175		030	050	070	100	150
STATOR LENGTH	Le	80	100	120	150	200
ROTOR LENGTH	Li	31	51	71	101	151
CENTERING LENGTH	X	10	15	15	15	15
COOLING GROOVE WIDTH	B	8	8	9	8	9
COOLING GROOVE DEPTH	h	5	5	5	5	5
COOLING GROOVES	No	2	4	4	8	8
STATOR HOLES	P	8	8	8	14	14
	Q	8	8	8	16	16
ROTOR HOLES	R	8	8	8	15	15
	T	8	8	8	16	16
HOLES PITCH ANGLE	a	45°	45°	45°	22.5°	22.5°

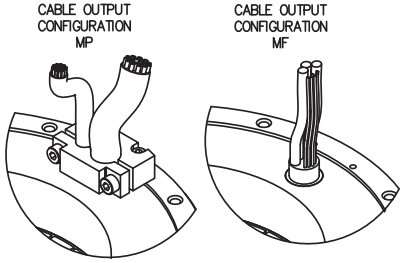
Motor Specifications TECHNAI MK-CI 210 WA/WB

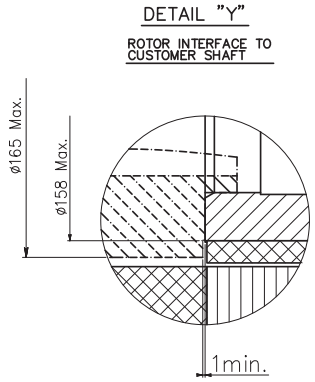
Motor Specifications	Symbol	Unit	MK-CI 210-030		MK-CI 210-050		MK-CI 210-070		MK-CI 210-100		MK-CI 210-150	
			WA	WB	WA	WB	WA	WB	WA	WB	WA	WB
Number of pole	P		44	44	44	44	44	44	44	44	44	44
Peak Torque	Tpk	Nm	135	135	224	224	310	312	442	447	660	670
Continuous Torque (Water Cooling Dt100)	Twc	Nm	68	68	118	118	165	165	241	240	368	365
Continuous Torque (Air Cooling Dt100)	Tac	Nm	27	26	45	45	63	63	85	87	133	132
Stall Torque (Water Cooling)	Tswc	Nm	52	51	90	90	126	126	183	183	281	281
Stall Torque (Air Cooling)	Tsac	Nm	20	20	35	35	48	48	65	66	101	101
Ripple Torque (Cogging Torque)	Tr	Nm	0,4	0,4	0,7	0,7	0,9	0,9	1,4	1,3	2	2
Power Loss at Twc	Pwc	KW	1,4	1,42	2	2	2,5	2,5	3,4	3,4	4,9	4,9
Power Loss at Tac	Pac	KW	0,2	0,22	0,3	0,3	0,38	0,38	0,45	0,45	0,64	0,64
Thermal Resistance Water Cooling	RthWc	K/W	0,085	0,085	0,058	0,058	0,045	0,045	0,033	0,033	0,023	0,023
Thermal Resistance Air Cooling	RthAc	K/W	0,534	0,534	0,398	0,398	0,317	0,317	0,243	0,243	0,175	0,175
Torque Constant	Kt	Nm/A	6,2	3,1	10,4	5,2	14,5	7,3	11,3	8,5	17,0	12,8
Back EMF Constant	Ke	V/1000 Rpm	382	191	637	318	892	446	695	521	1030	787
Maximum Speed at Ipk at 600 Vdc	Npk	RPM	350	800	175	520	80	350	165	260	80	150
Maximum Speed at Iwc at 600 Vdc	Nwc	RPM	750	1700	440	1000	280	670	420	560	240	360
Maximum Speed at Iac at 600 Vdc	Nac	RPM	1000	2100	600	1250	400	900	560	760	360	475
Winding Resistance (Phase to Phase)	R20	Ω	5,74	1,43	7,5	1,88	9,34	2,34	3,6	2,03	4,96	2,8
Winding Inductance (Phase to Phase)	L	mH	13,26	3,11	21,11	5,3	28,8	7,3	12,12	6,82	17,97	12,8
Peak Current	Ipk	Arms	31	62,5	30,8	62	30,6	61,4	56	75,5	56	75
Continuous Current (Water Cooling Dt100)	Iwc	Arms	10,92	22	11,5	23	11,5	22,8	21,4	28,3	22	28,9
Continuous Current (Air Cooling Dt100)	Iac	Arms	4,24	8,5	4,4	8,8	4,4	8,8	7,6	10,3	7,9	10,5
Stall Current at 0 Speed (Water Cooling)	Iswc	Arms	8,5	16,6	8,7	17,5	8,8	17,4	16,3	21,6	16,6	22
Stall Current at 0 Speed (Air Cooling)	Isac	Arms	3,3	6,5	3,3	6,7	3,3	6,7	5,8	7,9	6	8
Maximum Winding Temperature		°C	130	130	130	130	130	130	130	130	130	130
Height of Rotor		mm	30	30	50	50	70	70	100	100	150	150
Height of Stator		mm	70	70	90	90	110	110	140	140	190	190
Outer Diameter of Stator		mm	230	230	230	230	230	230	230	230	230	230







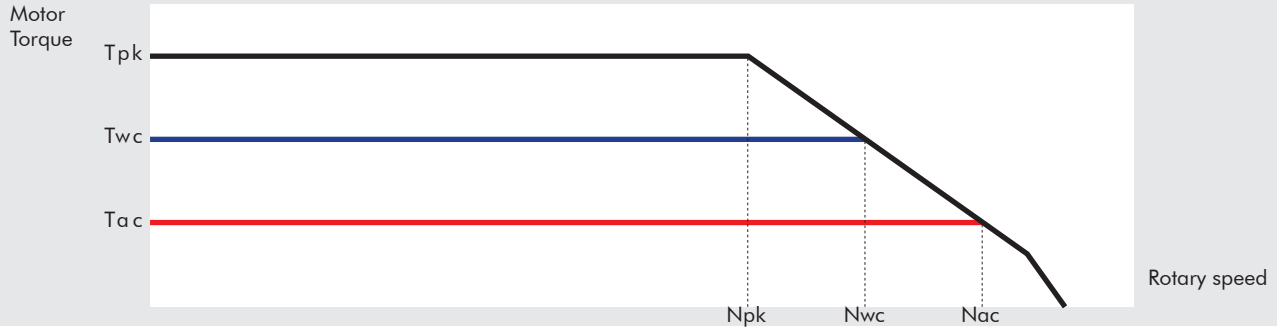


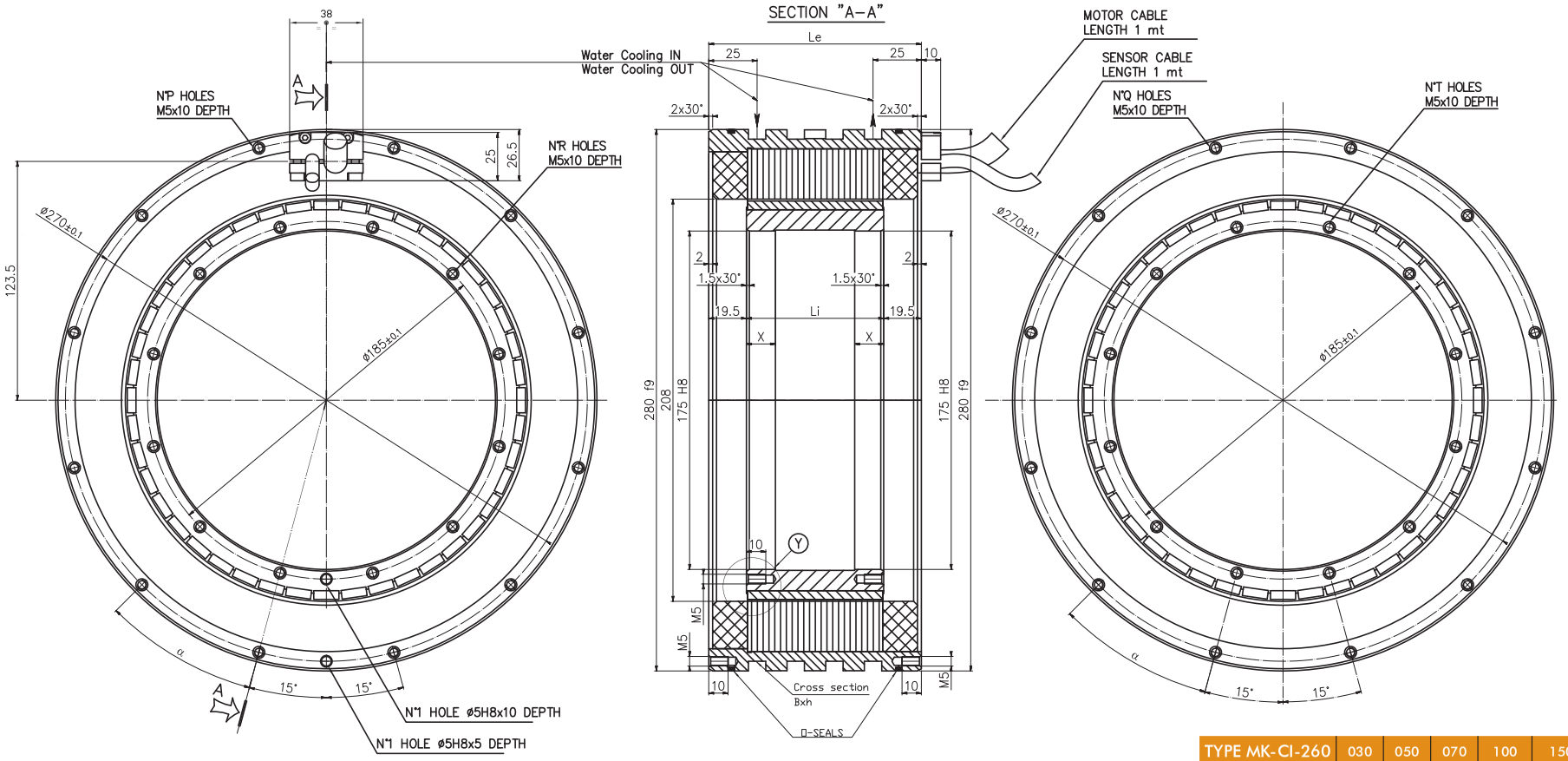


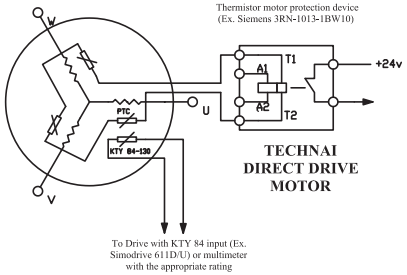
TYPE MK-CI-210		030	050	070	100	150
STATOR LENGTH	Le	70	90	110	140	190
ROTOR LENGTH	Li	31	51	71	101	151
CENTERING LENGTH	X	10	15	15	15	15
COOLING GROOVE WIDTH	B	8	8	9	8	9
COOLING GROOVE DEPTH	h	5	5	5	5	5
COOLING GROOVES	No	2	4	4	8	8
STATOR HOLES	P	22	22	22	22	22
	Q	23	23	23	23	23
ROTOR HOLES	R	23	23	23	23	23
	T	24	24	24	24	24
HOLES PITCH ANGLE	α	15°	15°	15°	15°	15°

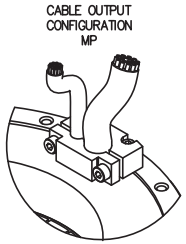
Motor Specifications TECHNAI MK-CI 260 WA/WB

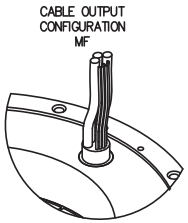
Motor Specifications	Symbol	Unit	MK-CI 260-030		MK-CI 260-050		MK-CI 260-070		MK-CI 260-100		MK-CI 260-150	
			WA	WB	WA	WB	WA	WB	WA	WB	WA	WB
Number of pole	P		44	44	44	44	44	44	44	44	44	44
Peak Torque	Tpk	Nm	173	173	288	288	402	402	580	580	873	873
Continuous Torque (Water Cooling Dt100)	Twc	Nm	97	95	163	162	225	223	321	323	480	478
Continuous Torque (Air Cooling Dt100)	Tac	Nm	39	38	65	63	91	89,5	128	126	194	192
Stall Torque (Water Cooling)	Tswc	Nm	73,7	72,5	124	123	170	169	238	247	371	365
Stall Torque (Air Cooling)	Tsac	Nm	29	29	49,6	48	70	68,3	97,5	96	150	146
Ripple Torque (Cogging Torque)	Tr	Nm	0,4	0,4	0,6	0,6	1	1	1,3	1,3	1,5	1,5
Power Loss at Twc	Pwc	KW	1,5	1,5	1,85	1,85	2,45	2,45	3	3	4,5	4,5
Power Loss at Tac	Pac	KW	0,26	0,26	2	2	0,38	0,38	0,48	0,48	0,75	0,75
Thermal Resistance Water Cooling	RthWc	K/W	0,072	0,072	0,051	0,051	0,039	0,039	0,032	0,032	0,024	0,024
Thermal Resistance Air Cooling	RthAc	K/W	0,419	0,419	0,326	0,326	0,267	0,267	0,210	0,210	0,140	0,140
Torque Constant	Kt	Nm/A	11,7	5,9	15,5	7,8	14,6	7,4	20,8	10,6	23,8	11,8
Back EMF Constant	Ke	V/1000 Rpm	708	357	939	469	882	449	1260	641	1427	713
Maximum Speed at Ipk at 600 Vdc	Npk	RPM	140	300	105	220	105	220	75	150	60	150
Maximum Speed at Iwc at 600 Vdc	Nwc	RPM	340	700	260	550	300	550	195	400	165	370
Maximum Speed at Iac at 600 Vdc	Nac	RPM	480	800	360	750	400	700	275	550	240	500
Winding Resistance (Phase to Phase)	R20	Ω	9,8	2,48	8	2	4,4	1,14	5,65	1,46	4,41	1,1
Winding Inductance (Phase to Phase)	L	mH	35,5	9,05	35,5	8,9	21,9	5,67	30,7	7,96	26,48	6,6
Peak Current	Ipk	Arms	21,5	42	26,2	53,4	39,6	80	39,8	80	53	106
Continuous Current (Water Cooling Dt100)	Iwc	Arms	8,5	17	10,9	21,9	15,9	31,8	15,9	31,8	21,8	43
Continuous Current (Air Cooling Dt100)	Iac	Arms	3,55	7,42	4,3	8,8	6,4	13	6,4	12,7	9	17,5
Stall Current at 0 Speed (Water Cooling)	Iswc	Arms	6,5	13	8,3	16,7	12,1	24,2	12,1	24,3	11,8	32
Stall Current at 0 Speed (Air Cooling)	Isac	Arms	2,7	5,7	3,3	6,7	4,8	10	4,8	9,7	6,7	13,3
Maximum Winding Temperature		°C	130	130	130	130	130	130	130	130	130	130
Height of Rotor		mm	30	30	50	50	70	70	100	100	150	150
Height of Stator		mm	70	70	90	90	110	110	140	140	190	190
Outer Diameter of Stator		mm	280	280	280	280	280	280	280	280	280	280

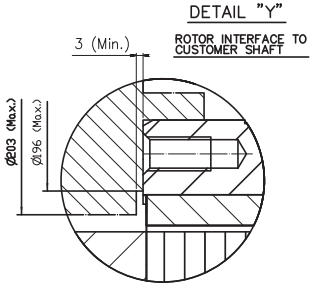








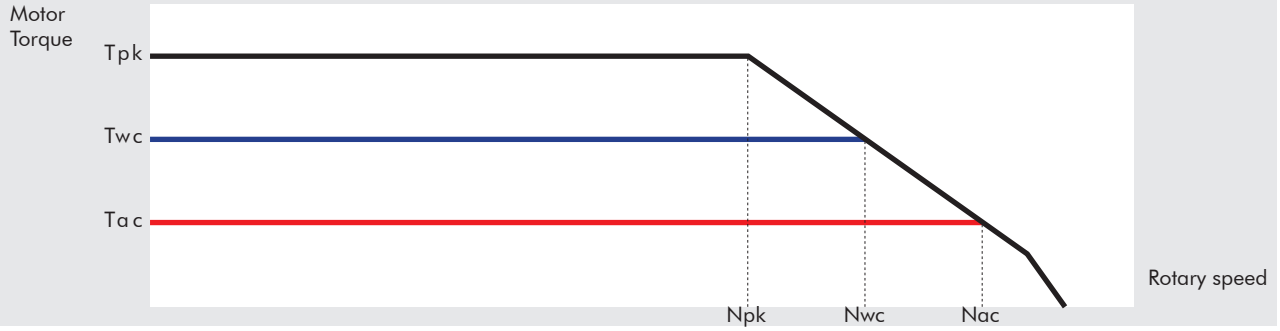


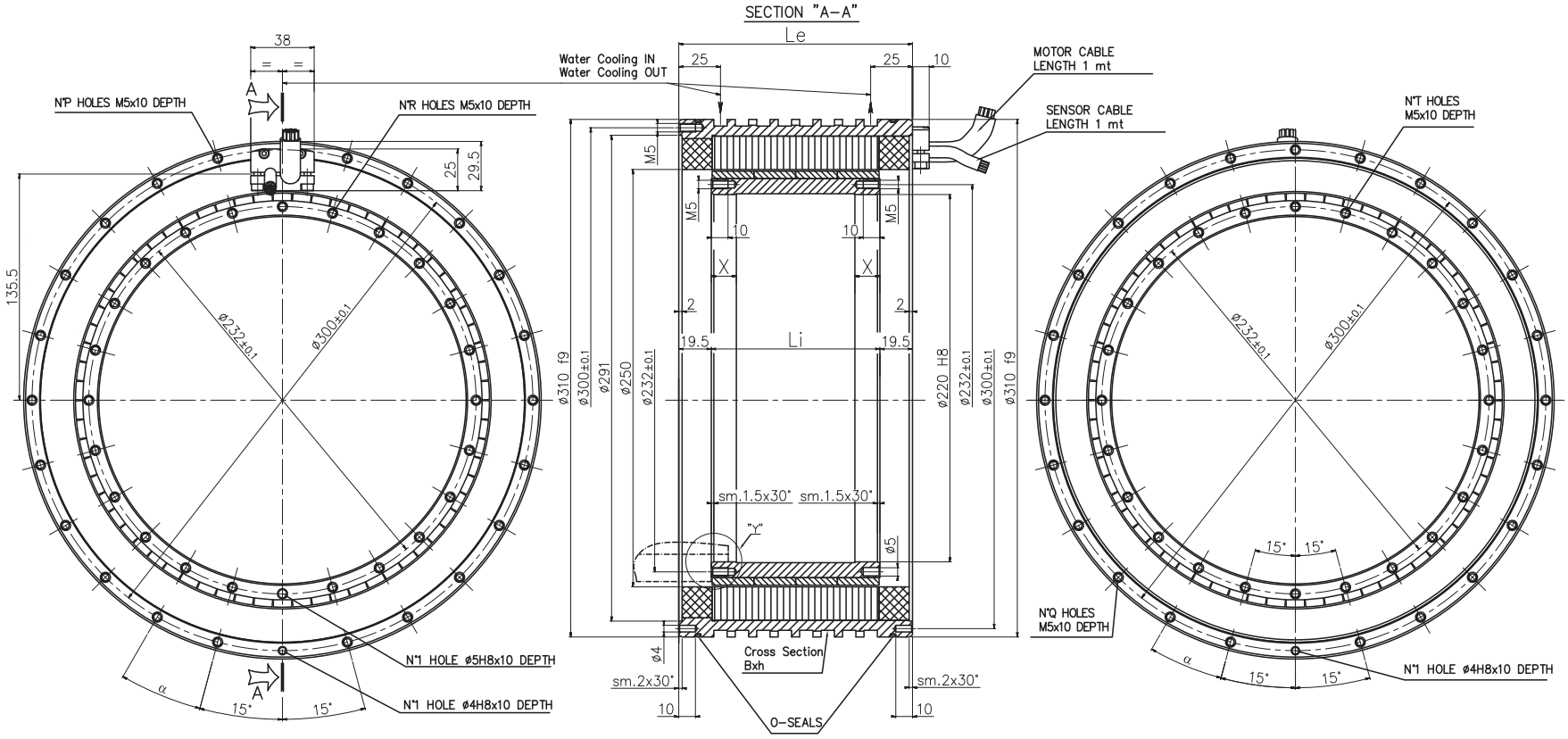


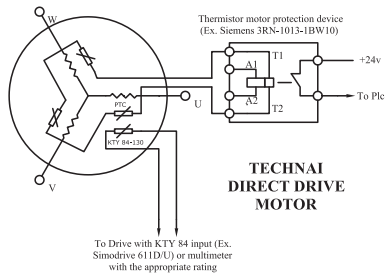
TYPE MK-CI-260		030	050	070	100	150
STATOR LENGTH	Le	70	90	110	140	190
ROTOR LENGTH	Li	31	51	71	101	151
CENTERING LENGTH	X	10	15	15	15	15
COOLING GROOVE WIDTH	B	8	8	9	8	9
COOLING GROOVE DEPTH	h	5	5	5	5	5
COOLING GROOVES	No	2	4	4	8	8
STATOR HOLES	P	12	12	12	22	22
	Q	12	12	12	24	24
ROTOR HOLES	R	12	12	12	22	22
	T	12	12	12	24	24
HOLES PITCH ANGLE	α	30°	30°	30°	15°	15°

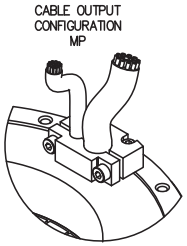
Motor Specifications TECHNAI MK-CI 290 WA/WB

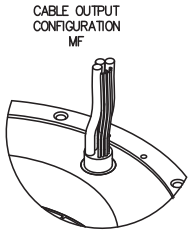
Motor Specifications	Symbol	Unit	MK-CI 290-030		MK-CI 290-050		MK-CI 290-070		MK-CI 290-100		MK-CI 290-150	
			WA	WB	WA	WB	WA	WB	WA	WB	WA	WB
Number of pole	P		66	66	66	66	66	66	66	66	66	66
Peak Torque	Tpk	Nm	260	260	433	432	646	606	868	868	1290	1290
Continuous Torque (Water Cooling Dt100)	Twc	Nm	134	134	227	227	322	320	455	460	695	695
Continuous Torque (Air Cooling Dt100)	Tac	Nm	59	54	96	96	132	132	186	181	275	272
Stall Torque (Water Cooling)	Tswc	Nm	102	102	173	173	246	244	347	351	530	531
Stall Torque (Air Cooling)	Tsac	Nm	45	41	73	73	101	101	141	138	210	207
Ripple Torque (Cogging Torque)	Tr	Nm	1,2	1	2	1,7	2,8	2,8	4	4	6	6,1
Power Loss at Twc	Pwc	KW	1,7	1,7	2,35	2,35	3	3	4,1	4,1	5,7	5,7
Power Loss at Tac	Pac	KW	0,35	0,35	0,45	0,45	0,55	0,55	0,7	0,7	0,95	0,95
Thermal Resistance Water Cooling	RthWc	K/W	0,067	0,067	0,047	0,047	0,037	0,037	0,027	0,027	0,019	0,019
Thermal Resistance Air Cooling	RthAc	K/W	0,314	0,314	0,264	0,264	0,215	0,215	0,169	0,169	0,124	0,124
Torque Constant	Kt	Nm/A	8,1	3,7	13,5	6,8	15,9	9,5	27,1	13,6	40,6	20,3
Back EMF Constant	Ke	V/1000 Rpm	494	227	827	413	975	579	1661	830	2492	1246
Maximum Speed at Ipk at 600 Vdc	Npk	RPM	330	750	180	450	130	300	40	200	10	110
Maximum Speed at Iwc at 600 Vdc	Nwc	RPM	660	1430	370	850	310	575	170	380	85	250
Maximum Speed at Iac at 600 Vdc	Nac	RPM	760	1700	460	960	390	700	230	490	130	310
Winding Resistance (Phase to Phase)	R20	Ω	2,9	0,72	3,9	1	3,44	1,2	6,5	1,62	9,1	2,27
Winding Inductance (Phase to Phase)	L	mH	6,8	1,7	10,8	2,7	10,5	3,7	20,8	5,2	31	7,7
Peak Current	Ipk	Arms	46	92	46	92	58	92	46	92	45,6	91,3
Continuous Current (Water Cooling Dt100)	Iwc	Arms	16,9	33,5	17	34,2	20,5	34,3	17	35	17,3	34,7
Continuous Current (Air Cooling Dt100)	Iac	Arms	7,5	15	7,4	14,5	8,5	14,6	7,1	13,8	7	13,8
Stall Current at 0 Speed (Water Cooling)	Iswc	Arms	12,9	25,5	12,9	26	15,7	26,2	13	26,7	13,22	26,5
Stall Current at 0 Speed (Air Cooling)	Isac	Arms	5,7	11,5	5,6	11,1	6,5	11,1	5,4	10,5	5,4	10,5
Maximum Winding Temperature		°C	130	130	130	130	130	130	130	130	130	130
Height of Rotor		mm	30	30	50	50	70	70	100	100	150	150
Height of Stator		mm	70	70	90	90	110	110	140	140	190	190
Outer Diameter of Stator		mm	310	310	310	310	310	310	310	310	310	310

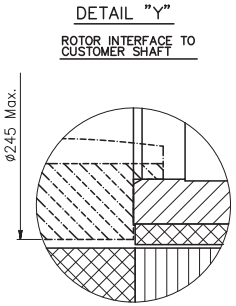








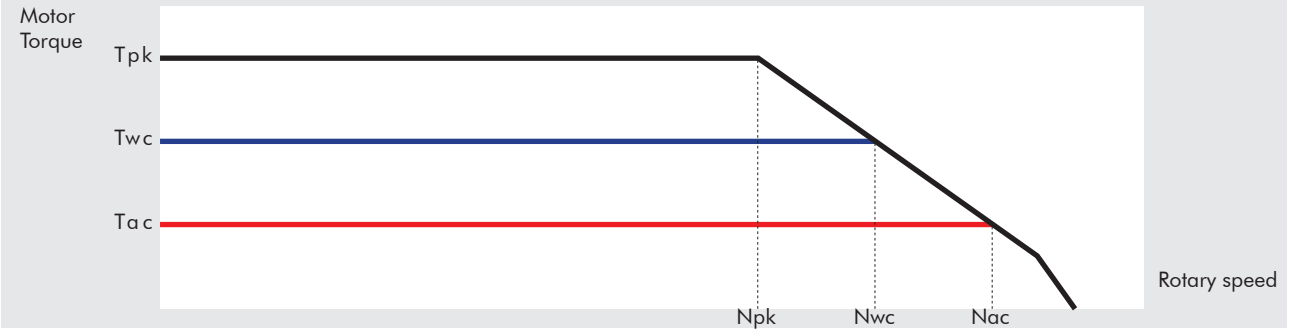


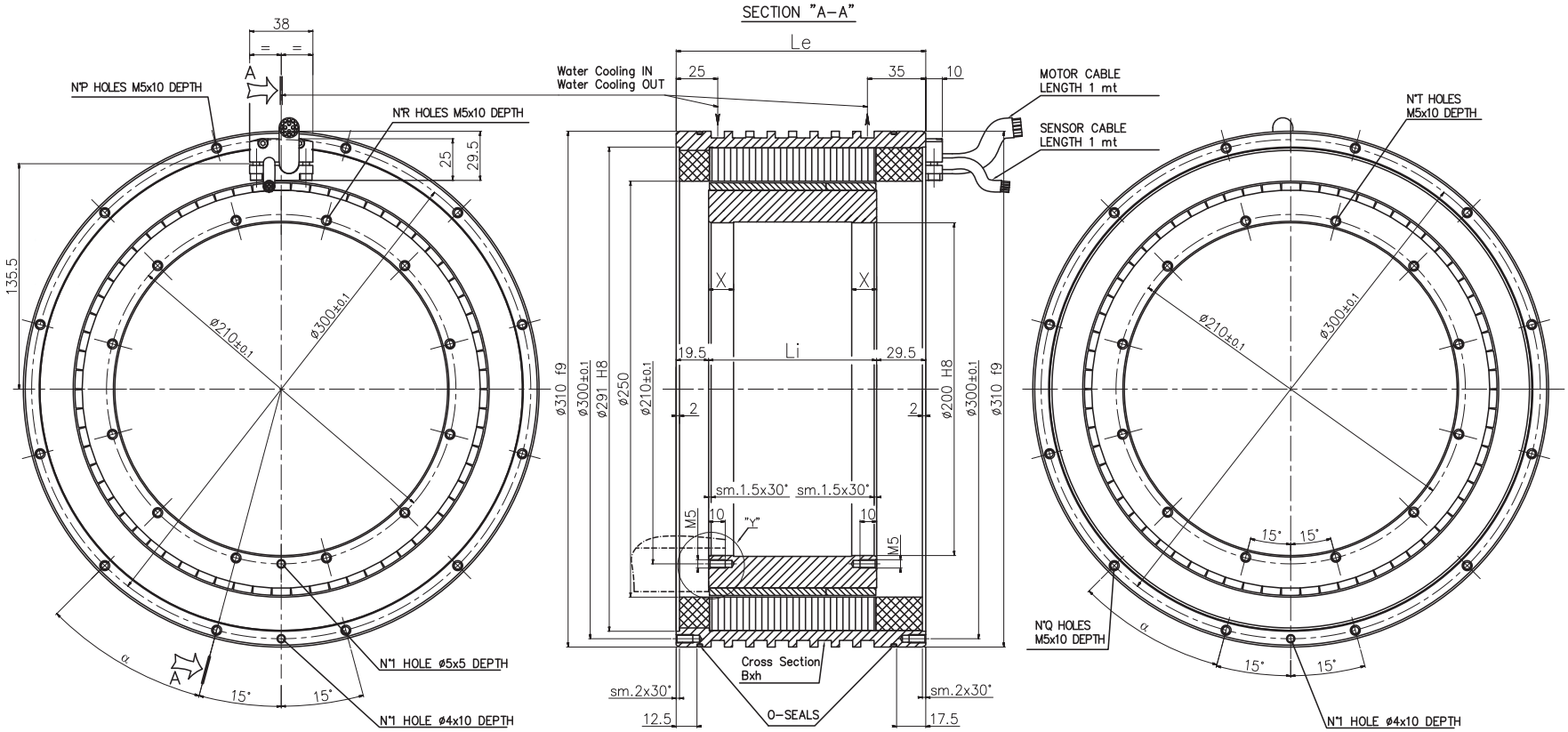


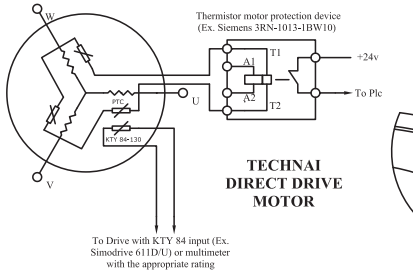
TYPE MK-CI-290		030	050	070	100	150
STATOR LENGTH	Le	70	90	110	140	190
ROTOR LENGTH	Li	31	51	71	101	151
CENTERING LENGTH	X	10	15	15	15	15
COOLING GROOVE WIDTH	B	8	8	9	8	9
COOLING GROOVE DEPTH	h	4	4	4	4	4
COOLING GROOVES	No	2	4	4	8	8
STATOR HOLES	P	22	22	22	22	22
	Q	23	23	23	23	23
ROTOR HOLES	R	23	23	23	23	23
	T	24	24	24	24	24
HOLES PITCH ANGLE	α	15°	15°	15°	15°	15°

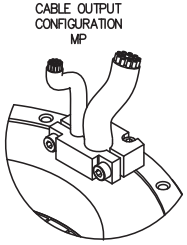
Motor Specifications TECHNAI MK-CI 290S WA/WB

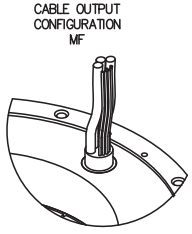
Motor Specifications	Symbol	Unit	MK-CI 290-030		MK-CI 290-050		MK-CI 290-070		MK-CI 290-100		MK-CI 290-150	
			WA	WB	WA	WB	WA	WB	WA	WB	WA	WB
Number of pole	P		66	66	66	66	66	66	66	66	66	66
Peak Torque	Tpk	Nm	260	260	433	432	646	606	868	868	1290	1290
Continuous Torque (Water Cooling Dt100)	Twc	Nm	134	134	227	227	322	320	455	460	695	695
Continuous Torque (Air Cooling Dt100)	Tac	Nm	59	54	96	96	132	132	186	181	275	272
Stall Torque (Water Cooling)	Tswc	Nm	102	102	173	173	246	244	347	351	530	531
Stall Torque (Air Cooling)	Tsac	Nm	45	41	73	73	101	101	141	138	210	207
Ripple Torque (Cogging Torque)	Tr	Nm	1,2	1	2	1,7	2,8	2,8	4	4	6	6,1
Power Loss at Twc	Pwc	KW	1,7	1,7	2,35	2,35	3	3	4,1	4,1	5,7	5,7
Power Loss at Tac	Pac	KW	0,35	0,35	0,45	0,45	0,55	0,55	0,7	0,7	0,95	0,95
Thermal Resistance Water Cooling	RthWc	K/W	0,067	0,067	0,047	0,047	0,037	0,037	0,027	0,027	0,019	0,019
Thermal Resistance Air Cooling	RthAc	K/W	0,314	0,314	0,264	0,264	0,215	0,215	0,169	0,169	0,124	0,124
Torque Constant	Kt	Nm/A	8,1	3,7	13,5	6,8	15,9	9,5	27,1	13,6	40,6	20,3
Back EMF Constant	Ke	V/1000 Rpm	494	227	827	413	975	579	1661	830	2492	1246
Maximum Speed at Ipk at 600 Vdc	Npk	RPM	330	750	180	450	130	300	40	200	10	110
Maximum Speed at Iwc at 600 Vdc	Nwc	RPM	660	1430	370	850	310	575	170	380	85	250
Maximum Speed at Iac at 600 Vdc	Nac	RPM	760	1700	460	960	390	700	230	490	130	310
Winding Resistance (Phase to Phase)	R20	Ω	2,9	0,72	3,9	1	3,44	1,2	6,5	1,62	9,1	2,27
Winding Inductance (Phase to Phase)	L	mH	6,8	1,7	10,8	2,7	10,5	3,7	20,8	5,2	31	7,7
Peak Current	Ipk	Arms	46	92	46	92	58	92	46	92	45,6	91,3
Continuous Current (Water Cooling Dt100)	Iwc	Arms	16,9	33,5	17	34,2	20,5	34,3	17	35	17,3	34,7
Continuous Current (Air Cooling Dt100)	Iac	Arms	7,5	15	7,4	14,5	8,5	14,6	7,1	13,8	7	13,8
Stall Current at 0 Speed (Water Cooling)	Iswc	Arms	12,9	25,5	12,9	26	15,7	26,2	13	26,7	13,22	26,5
Stall Current at 0 Speed (Air Cooling)	Isac	Arms	5,7	11,5	5,6	11,1	6,5	11,1	5,4	10,5	5,4	10,5
Maximum Winding Temperature		°C	130	130	130	130	130	130	130	130	130	130
Height of Rotor		mm	30	30	50	50	70	70	100	100	150	150
Height of Stator		mm	70	70	90	90	110	110	140	140	190	190
Outer Diameter of Stator		mm	310	310	310	310	310	310	310	310	310	310

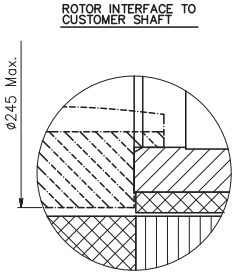








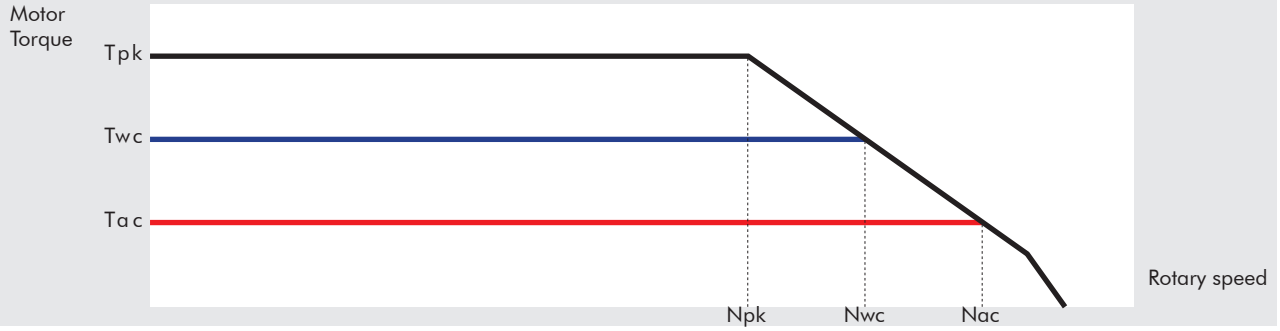


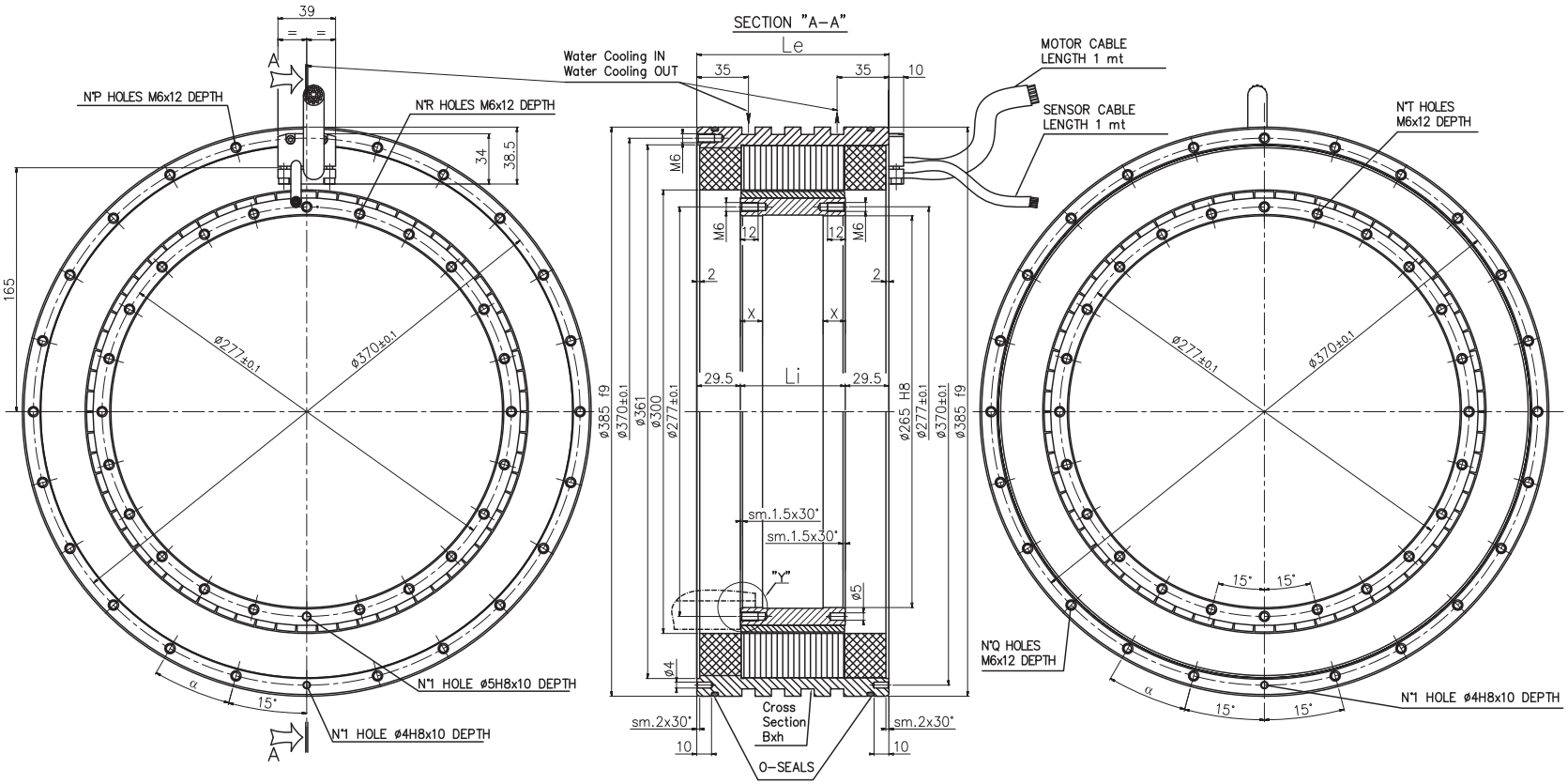


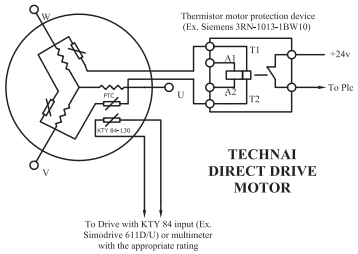
TYPE MK-CI-290S		030	050	070	100	150
STATOR LENGTH	Le	80	100	120	150	200
ROTOR LENGTH	Li	31	51	71	101	151
CENTERING LENGTH	X	10	15	15	15	15
COOLING GROOVE WIDTH	B	8	8	9	8	9
COOLING GROOVE DEPTH	h	4	4	4	4	4
COOLING GROOVES	No	2	4	4	8	8
STATOR HOLES	P	12	12	12	23	23
	Q	12	12	12	24	24
ROTOR HOLES	R	12	12	12	23	23
	T	12	12	12	24	24
HOLES PITCH ANGLE	α	30°	30°	30°	15°	15°

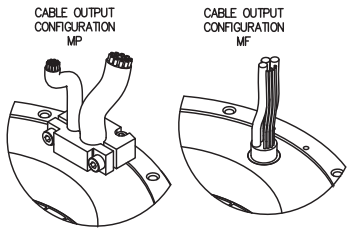
Motor Specifications TECHNAI MK-CI 360 WA/WB

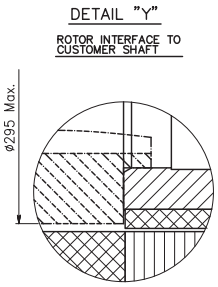
Motor Specifications	Symbol	Unit	MK-CI 360-030		MK-CI 360-050		MK-CI 360-070		MK-CI 360-100		MK-CI 360-150	
			WA	WB	WA	WB	WA	WB	WA	WB	WA	WB
Number of pole	P		66	66	66	66	66	66	66	66	66	66
Peak Torque	Tpk	Nm	428	430	724	724	1013	1013	1448	1447	2173	2120
Continuous Torque (Water Cooling Dt100)	Twc	Nm	239	248	415	428	587	584	821	821	1240	1262
Continuous Torque (Air Cooling Dt100)	Tac	Nm	112	112	175	178	249	247	341	335	504	513
Stall Torque (Water Cooling)	Tswc	Nm	182	189	317	324	472	468	657	657	986	1014
Stall Torque (Air Cooling)	Tsac	Nm	85	85	134	137	190	190	261	257	386	394
Ripple Torque (Cogging Torque)	Tr	Nm	1	1	1,8	1,8	2,5	2,5	3,6	3,6	5,4	5,4
Power Loss at Twc	Pwc	KW	1,9	2,1	2,8	2,75	3,65	3,65	5	5	7	7
Power Loss at Tac	Pac	KW	0,45	0,45	0,5	0,5	0,62	0,62	0,8	0,8	1,1	1,1
Thermal Resistance Water Cooling	RthWc	K/W	0,052	0,052	0,0369	0,036	0,028	0,028	0,020	0,020	0,013	0,013
Thermal Resistance Air Cooling	RthAc	K/W	0,251	0,251	0,196	0,196	0,161	0,161	0,128	0,128	0,0944	0,0944
Torque Constant	Kt	Nm/A	18,0	8,9	30,0	9,8	21,3	13,6	30,5	16,0	29,1	19,0
Back EMF Constant	Ke	V/1000 Rpm	1110	547	1850	599	1313	839	1876	990	1797	1172
Maximum Speed at Ipk at 600 Vdc	Npk	RPM	110	250	50	220	100	170	50	140	65	120
Maximum Speed at Iwc at 600 Vdc	Nwc	RPM	250	520	140	480	200	340	140	290	145	240
Maximum Speed at Iac at 600 Vdc	Nac	RPM	340	730	190	660	290	460	200	390	210	340
Winding Resistance (Phase to Phase)	R20	Ω	5,05	1,24	6,8	0,66	2	0,83	2,9	0,81	1,65	0,67
Winding Inductance (Phase to Phase)	L	mH	26,1	6,3	42	5,05	21,3	6	20,8	5,8	12,6	5,37
Peak Current	Ipk	Arms	36,8	75	35	116	73,5	116	73,5	140	115	173
Continuos Current (Water Cooling Dt100)	Iwc	Arms	13,5	28,3	14	44,5	29,4	45,6	28,6	55	45	71
Continuos Current (Air Cooling Dt100)	Iac	Arms	6,4	13	6	19	12	19	11,6	21,6	18	28
Stall Current at 0 Speed (Water Cooling)	Iswc	Arms	10,3	21,6	10,7	34	22,4	35	21,8	41,5	34,3	54
Stall Current at 0 Speed (Air Cooling)	Isac	Arms	4,9	9,9	4,6	14,5	9,2	14,5	8,9	16,5	13,6	21,5
Maximum Winding Temperature		°C	130	130	130	130	130	130	130	130	130	130
Height of Rotor		mm	30	30	50	50	70	70	100	100	150	150
Height of Stator		mm	90	90	110	110	130	130	160	160	210	210
Outer Diameter of Stator		mm	385	385	385	385	385	385	385	385	385	385







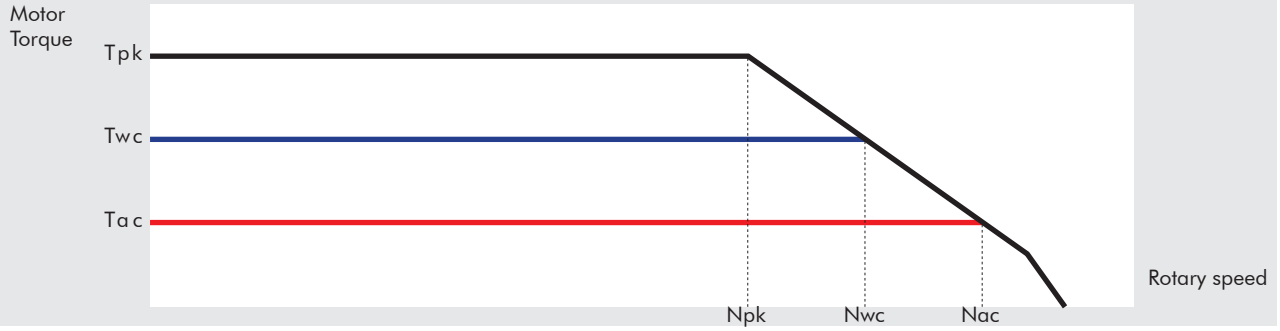


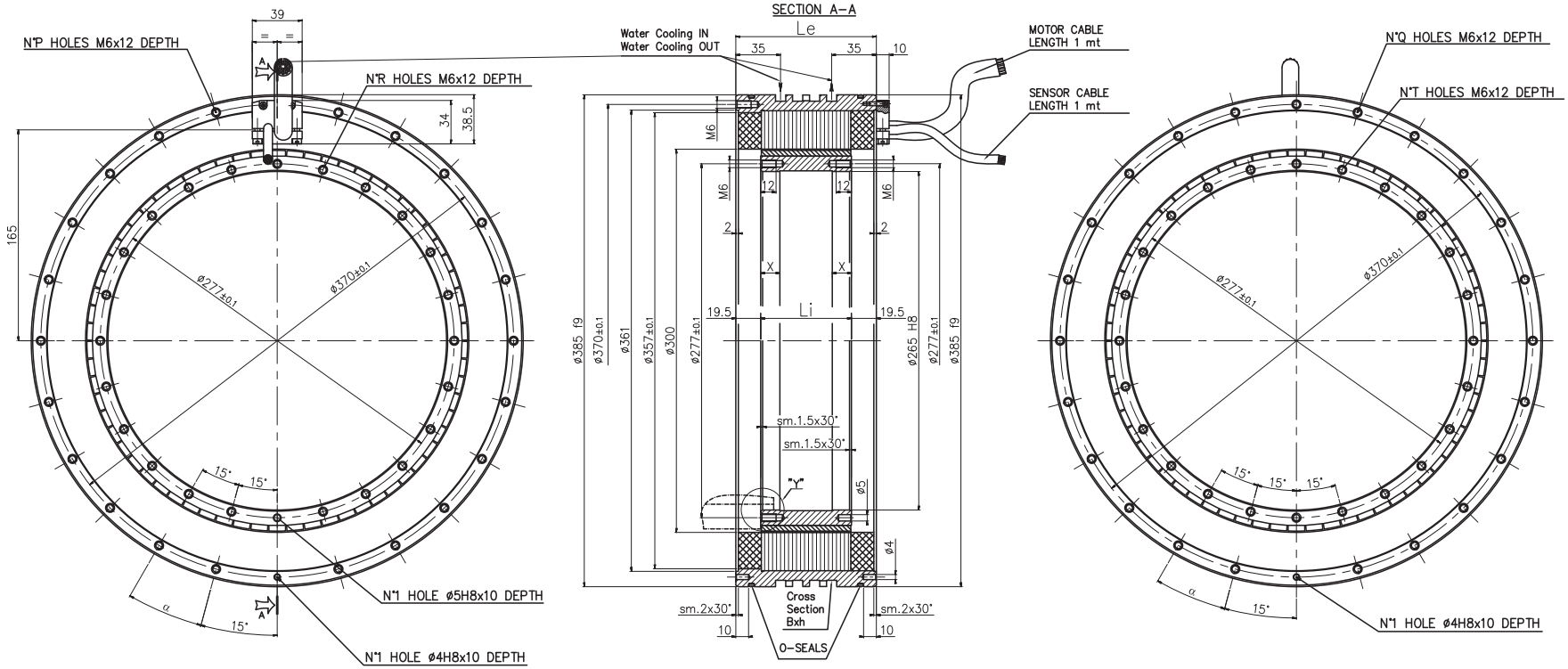


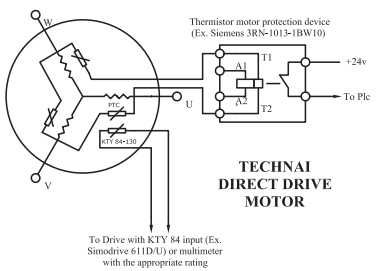
TYPE MK-CI-360		030	050	070	100	150
STATOR LENGTH	Le	90	110	130	160	210
ROTOR LENGTH	Li	31	51	71	101	151
CENTERING LENGTH	X	10	15	15	15	15
COOLING GROOVE WIDTH	B	8	8	9	8	9
COOLING GROOVE DEPTH	h	5	5	5	5	5
COOLING GROOVES	No	2	4	4	8	8
STATOR HOLES	P	22	22	22	22	22
	Q	23	23	23	23	23
ROTOR HOLES	R	23	23	23	23	23
	T	24	24	24	24	24
HOLES PITCH ANGLE	α	15°	15°	15°	15°	15°

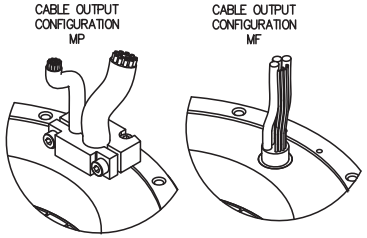
Motor Specifications TECHNAI MK-CIC 360 WA/WB

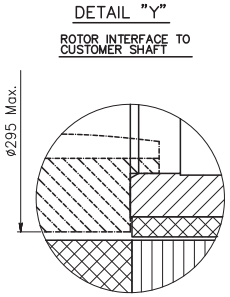
Motor Specifications	**Symbol**	**Unit**	**MK-CIC 360-050**		**MK-CIC 360-070**	
			WA	**WB**	**WA**	**WB**
Number of pole	P		66	66	66	66
Peak Torque	Tpk	Nm	724	724	1013	1013
Continuous Torque (Water Cooling Dt100)	Twc	Nm	415	428	587	584
Continuous Torque (Air Cooling Dt100)	Tac	Nm	175	178	249	247
Stall Torque (Water Cooling)	Tswc	Nm	317	324	472	468
Stall Torque (Air Cooling)	Tsac	Nm	134	137	190	190
Ripple Torque (Cogging Torque)	Tr	Nm	1,8	1,8	2,5	2,5
Power Loss at Twc	Pwc	KW	2,8	2,75	3,65	3,65
Power Loss at Tac	Pac	KW	0,5	0,5	0,62	0,62
Thermal Resistance Water Cooling	RthWc	K/W	0,036	0,036	0,027	0,027
Thermal Resistance Air Cooling	RthAc	K/W	0,196	0,196	0,161	0,161
Torque Constant	Kt	Nm/A	30,0	9,8	21,3	13,6
Back EMF Constant	Ke	V/1000 Rpm	1850	599	1313	839
Maximum Speed at Ipk at 600 Vdc	Npk	RPM	50	220	100	170
Maximum Speed at Iwc at 600 Vdc	Nwc	RPM	140	480	200	340
Maximum Speed at Iac at 600 Vdc	Nac	RPM	190	660	290	460
Winding Resistance (Phase to Phase)	R20	Ω	6,8	0,66	2	0,83
Winding Inductance (Phase to Phase)	L	mH	42	5,05	21,3	6
Peak Current	Ipk	Arms	35	116	73,5	116
Continuous Current (Water Cooling Dt100)	Iwc	Arms	14	44,5	29,4	45,6
Continuous Current (Air Cooling Dt100)	Iac	Arms	6	19	12	19
Stall Current at 0 Speed (Water Cooling)	Iswc	Arms	10,7	34	22,4	35
Stall Current at 0 Speed (Air Cooling)	Isac	Arms	4,6	14,5	9,2	14,5
Maximum Winding Temperature		°C	130	130	130	130
Height of Rotor		mm	50	50	70	70
Height of Stator		mm	90	90	110	110
Outer Diameter of Stator		mm	385	385	385	385







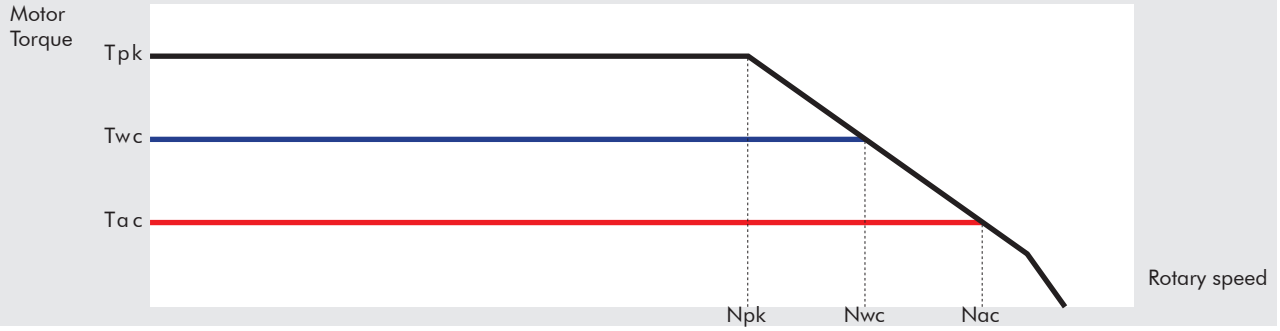


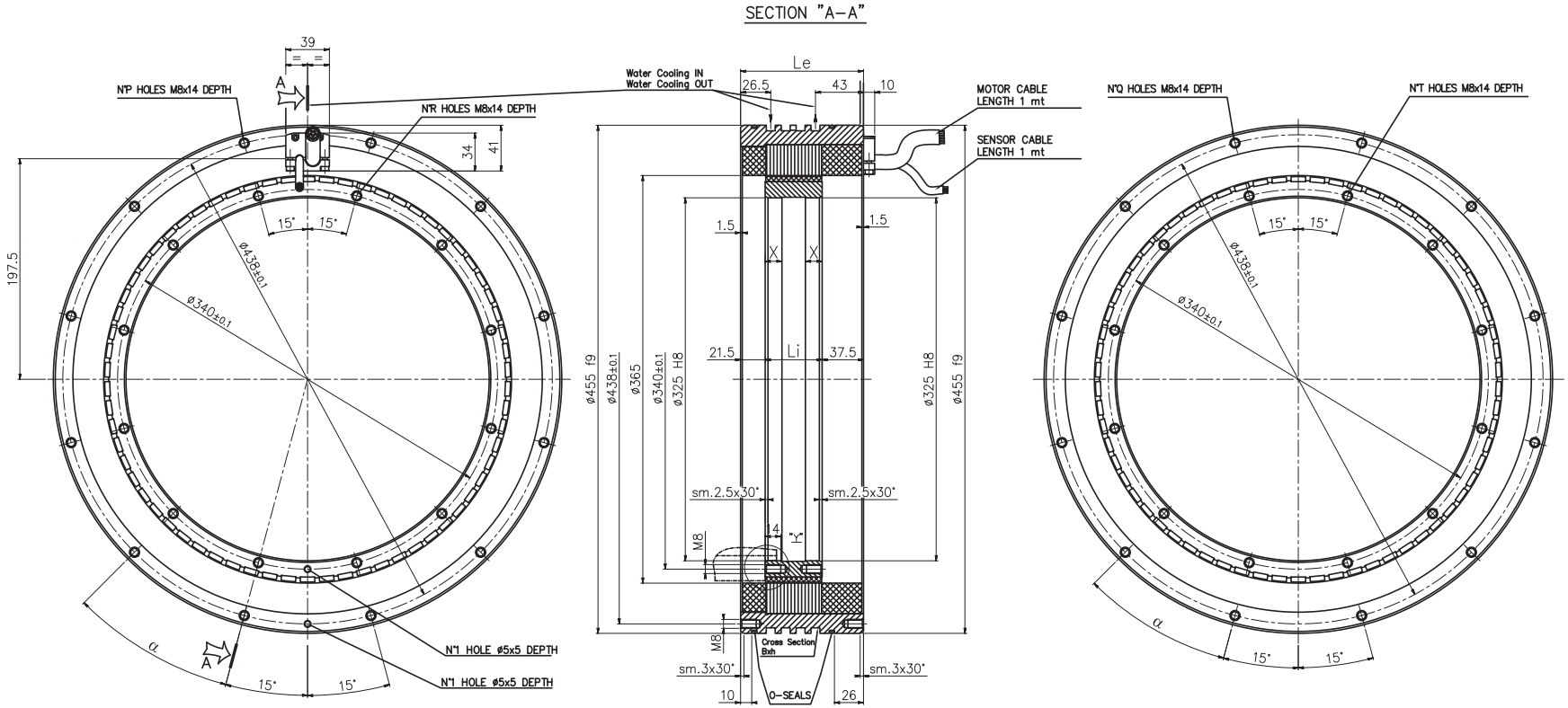


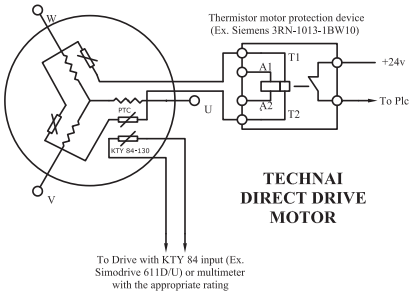
TYPE MK-CIC-360		050	070
STATOR LENGTH	Le	90	110
ROTOR LENGTH	Li	51	71
CENTERING LENGTH	X	15	15
COOLING GROOVE WIDTH	B	8	8
COOLING GROOVE DEPTH	h	5	5
COOLING GROOVES	No	2	4
STATOR HOLES	P	22	22
	Q	23	23
ROTOR HOLES	R	23	23
	T	24	24
HOLES PITCH ANGLE	α	15°	15°

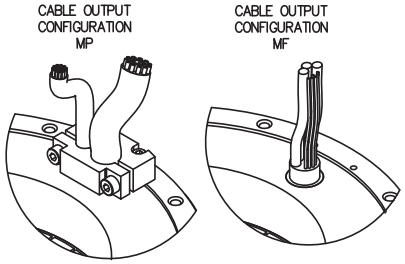
Motor Specifications TECHNAI MK-CI 420 WA/WB

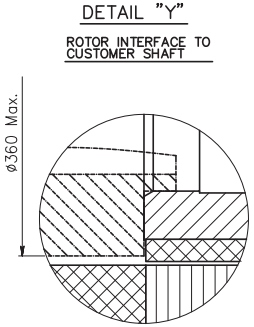
Motor Specifications	Symbol	Unit	MK-CI 420-030		MK-CI 420-050		MK-CI 420-070		MK-CI 420-100		MK-CI 420-150	
			WA	WB	WA	WB	WA	WB	WA	WB	WA	WB
Number of pole	P		66	66	66	66	66	66	66	66	66	66
Peak Torque	Tpk	Nm	430	430	725	725	980	980	1410	1410	2110	2110
Continuous Torque (Water Cooling Dt100)	Twc	Nm	283	281	482	478	691	689	995	991	1458	1455
Continuous Torque (Air Cooling Dt100)	Tac	Nm	128,5	125	209	205	290	288	412	408	585	583
Stall Torque (Water Cooling)	Tswc	Nm	216	214	368	365	527	526	760	757	1113	1111
Stall Torque (Air Cooling)	Tsac	Nm	85	95,6	160	157	223	220	315	311	447	445
Ripple Torque (Cogging Torque)	Tr	Nm	3	3	5	5	7	7	8,7	8,7	13	13
Power Loss at Twc	Pwc	KW	2,7	2,7	3,7	3,7	4,7	4,7	6	6	8,5	8,5
Power Loss at Tac	Pac	KW	0,5	0,5	0,65	0,65	0,75	0,75	0,95	0,95	1,25	1,25
Thermal Resistance Water Cooling	RthWc	K/W	0,036	0,036	0,026	0,026	0,021	0,021	0,017	0,017	0,012	0,012
Thermal Resistance Air Cooling	RthAc	K/W	0,170	0,170	0,150	0,150	0,130	0,130	0,108	0,108	0,080	0,080
Torque Constant	Kt	Nm/A	24,0	11,9	29,5	14,6	28,0	13,6	40,0	19,4	40,0	19,9
Back EMF Constant	Ke	V/1000 Rpm	1450	721	1772	882	1692	822	2417	1175	2417	1202
Maximum Speed at Ipk at 600 Vdc	Npk	RPM	70	150	60	120	77	150	44	95	44	95
Maximum Speed at Iwc at 600 Vdc	Nwc	RPM	145	320	125	250	138	290	90	200	90	200
Maximum Speed at Iac at 600 Vdc	Nac	RPM	220	450	185	390	200	400	138	280	138	280
Winding Resistance (Phase to Phase)	R20	Ω	8,3	2,12	5,8	1,5	3,2	0,8	4,2	1,05	2,7	0,67
Winding Inductance (Phase to Phase)	L	mH	37,9	9,6	32,2	8,16	20,4	4,9	28,7	7	18,8	4,77
Peak Current	Ipk	Arms	26		35,5		50,5	103	50,5	104	75,7	152
Continuous Current (Water Cooling Dt100)	Iwc	Arms	12,6	241	17,6	35,4	26,5	54,5	26,5	54,7	39	78
Continuous Current (Air Cooling Dt100)	Iac	Arms	5,6	10,8	7,5	14,8	10,7	22	10,5	22	14,9	30
Stall Current at 0 Speed (Water Cooling)	Iswc	Arms	9,6	19,2	13,4	27	20,2	41,6	20,2	41,7	29,7	59,6
Stall Current at 0 Speed (Air Cooling)	Isac	Arms	4,3	8,2	5,7	11,4	8,1	16,7	8	16,7	11,4	23
Maximum Winding Temperature		°C	130	130	130	130	130	130	130	130	130	130
Height of Rotor		mm	30	30	50	50	70	70	100	100	150	150
Height of Stator		mm	90	90	110	110	130	130	160	160	210	210
Outer Diameter of Stator		mm	455	455	455	455	455	455	455	455	455	455







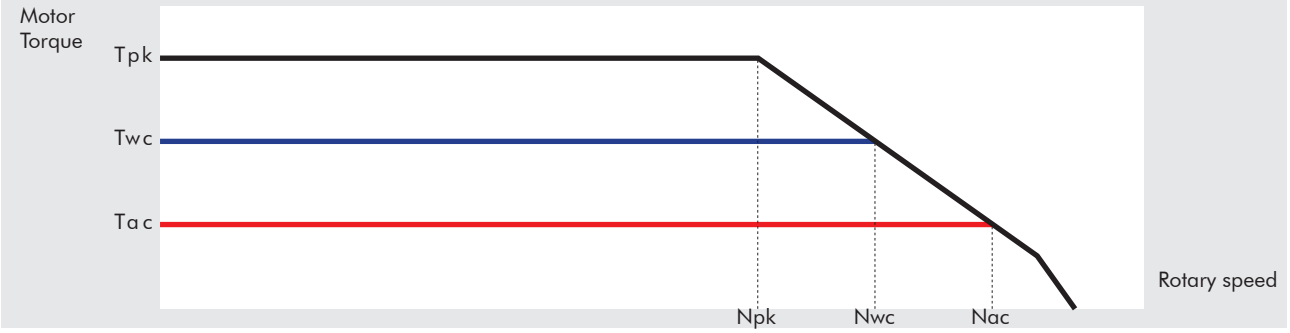


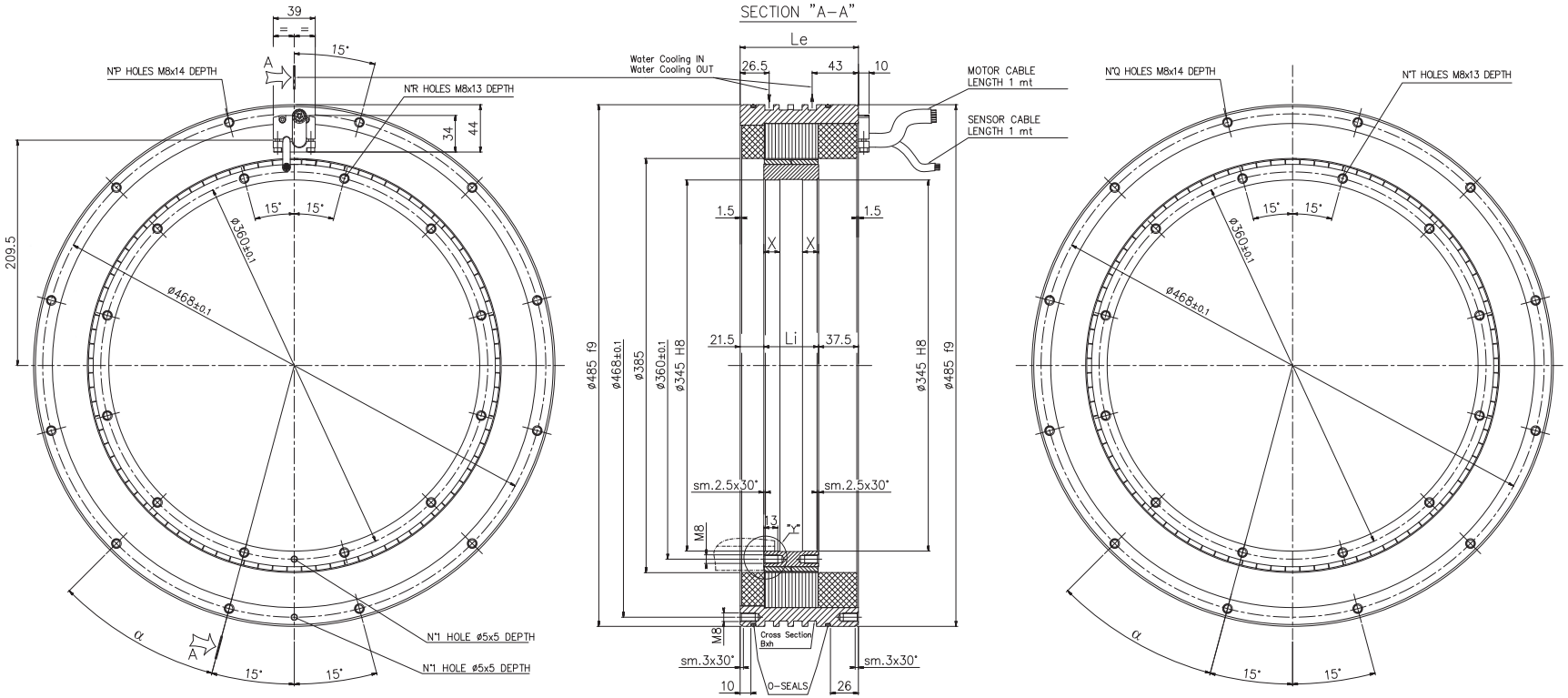


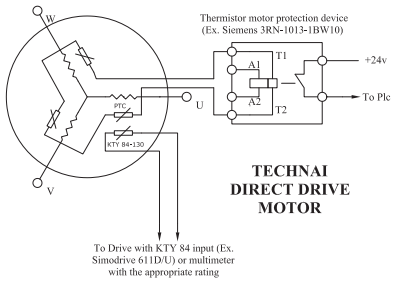
TYPE MK-CI-420		030	050	070	100	150
STATOR LENGTH	Le	90	110	130	160	210
ROTOR LENGTH	Li	31	51	71	101	151
CENTERING LENGTH	X	10	15	15	15	15
COOLING GROOVE WIDTH	B	8	8	9	8	9
COOLING GROOVE DEPTH	h	5	5	5	5	5
COOLING GROOVES	No	2	4	4	8	8
STATOR HOLES	P	12	12	12	22	22
	Q	12	12	12	24	24
ROTOR HOLES	R	12	12	12	23	23
	T	12	12	12	24	24
HOLES PITCH ANGLE	α	30°	30°	30°	15°	15°

Motor Specifications TECHNAI MK-CI 450 WA/WB

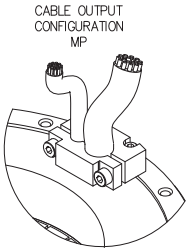
Motor Specifications	Symbol	Unit	MK-CI 450-030		MK-CI 450-050		MK-CI 450-070		MK-CI 450-100		MK-CI 450-150	
			WA	WB	WA	WB	WA	WB	WA	WB	WA	WB
Number of pole	P		88	88	88	88	88	88	88	88	88	88
Peak Torque	Tpk	Nm	731	732	1219	1221	1707	1712	2439	2445	3647	3647
Continuous Torque (Water Cooling Dt100)	Twc	Nm	397	402	670	679	938	950	1355	1355	2119	2109
Continuous Torque (Air Cooling Dt100)	Tac	Nm	180	181	290	293	403	404	570	570	831	827
Stall Torque (Water Cooling)	Tswc	Nm	312	317	528	536	739	749	1070	1070	1682	1673
Stall Torque (Air Cooling)	Tsac	Nm	138	139	222	224	308	309	437	437	636	633
Ripple Torque (Cogging Torque)	Tr	Nm	4,1	4,1	7	7	10	10	14	14	21	21
Power Loss at Twc	Pwc	KW	2,6	2,6	3,6	3,6	4,6	4,6	6,2	6,2	9,1	9,1
Power Loss at Tac	Pac	KW	0,53	0,53	0,7	0,7	0,85	0,85	1,1	1,1	1,4	1,4
Thermal Resistance Water Cooling	RthWc	K/W	0,040	0,040	0,028	0,028	0,022	0,022	0,016	0,016	0,011	0,011
Thermal Resistance Air Cooling	RthAc	K/W	0,196	0,196	0,154	0,154	0,127	0,127	0,101	0,101	0,075	0,075
Torque Constant	Kt	Nm/A	15,6	8,0	26,1	13,4	36,5	18,8	52,1	26,8	38,0	20,1
Back EMF Constant	Ke	V/1000 Rpm	963	495	1606	826	2248	1156	3212	1652	2340	1239
Maximum Speed at Ipk at 600 Vdc	Npk	RPM	145	325	70	200	55	120	20	85	55	125
Maximum Speed at Iwc at 600 Vdc	Nwc	RPM	300	625	180	380	120	260	80	170	110	230
Maximum Speed at Iac at 600 Vdc	Nac	RPM	400	800	240	470	170	340	110	230	160	310
Winding Resistance (Phase to Phase)	R20	Ω	1,77	0,45	2,4	0,61	3	0,8	4	1	1,25	0,36
Winding Inductance (Phase to Phase)	L	mH	15,6	2,26	13,8	3,7	18,91	5,0	26,7	7,0	9,4	2,7
Peak Current	Ipk	Arms	68	131	68	131	68	131	68	131	138	260
Continuous Current (Water Cooling Dt100)	Iwc	Arms	26,5	52,5	27	53	26,8	53	27,3	53	57	110,5
Continuous Current (Air Cooling Dt100)	Iac	Arms	11,9	23,4	11,5	22,6	11,4	22,3	11,3	22	22,8	43
Stall Current at 0 Speed (Water Cooling)	Iswc	Arms	20,3	40	20,5	40,5	20,5	40,5	20,8	40,5	44,8	84,2
Stall Current at 0 Speed (Air Cooling)	Isac	Arms	9	17,8	8,8	17,3	8,7	17,1	8,6	16,8	17,3	32,5
Maximum Winding Temperature		°C	130	130	130	130	130	130	130	130	130	130
Height of Rotor		mm	30	30	50	50	70	70	100	100	150	150
Height of Stator		mm	90	90	110	110	130	130	160	160	210	210
Outer Diameter of Stator		mm	485	485	485	485	485	485	485	485	485	485

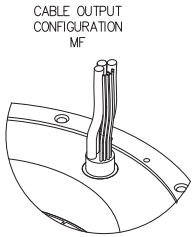


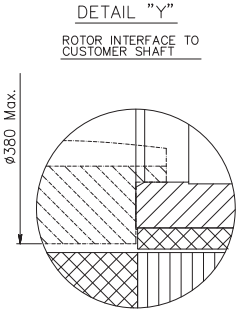




TECHNAI DIRECT DRIVE MOTOR



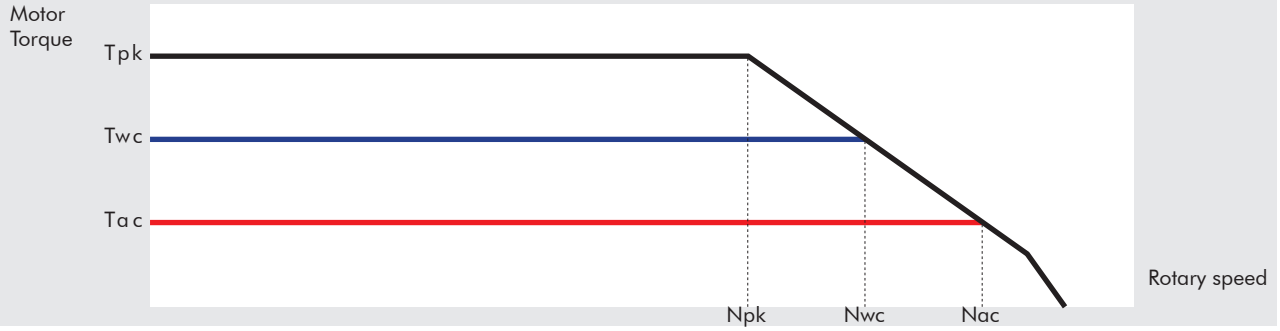


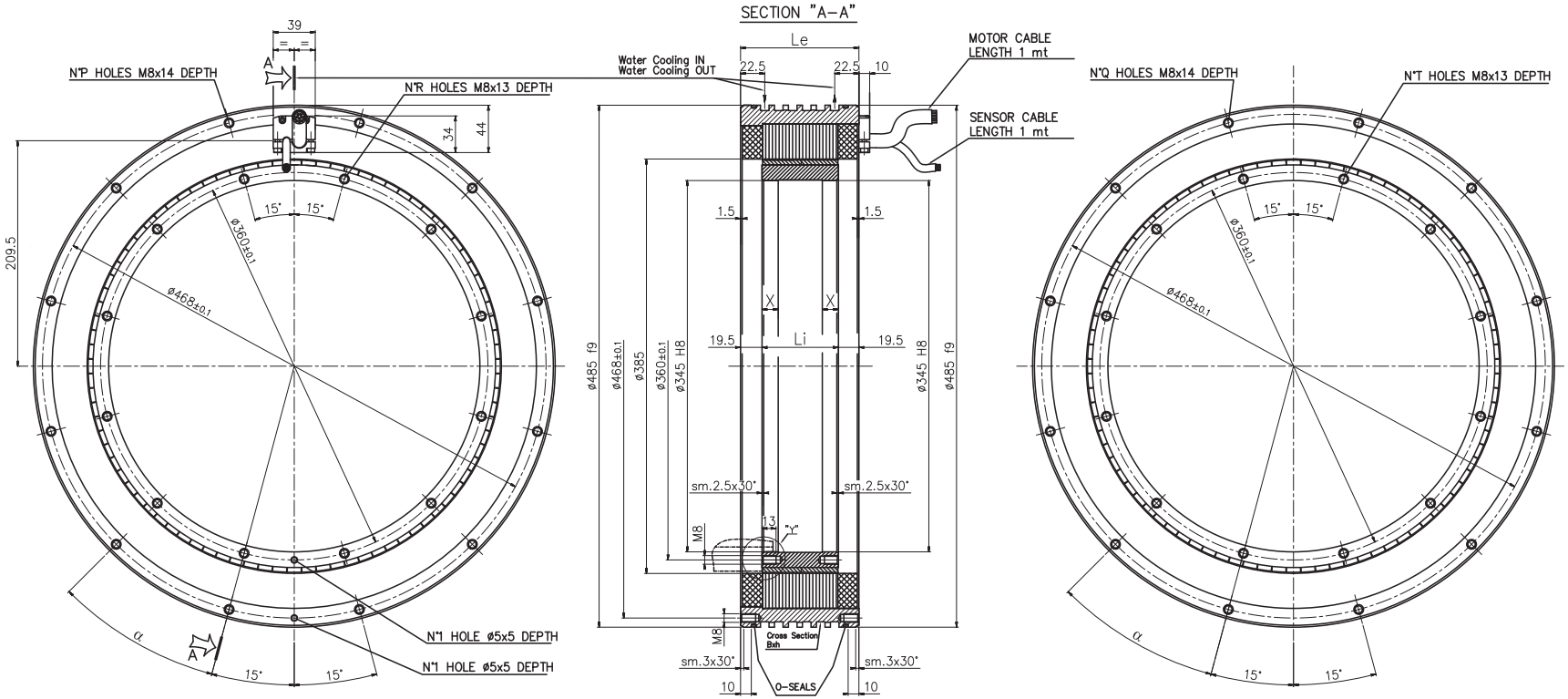


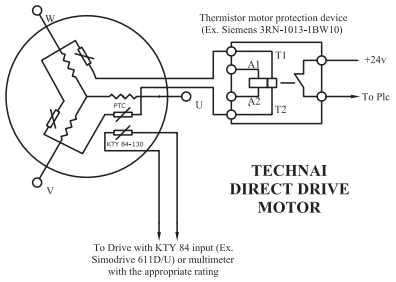
TYPE MK-CI-450		030	050	070	100	150
STATOR LENGTH	Le	90	110	130	160	210
ROTOR LENGTH	Li	31	51	71	101	151
CENTERING LENGTH	X	10	15	15	15	15
COOLING GROOVE WIDTH	B	8	8	9	8	9
COOLING GROOVE DEPTH	h	5	5	5	5	5
COOLING GROOVES	No	2	4	4	8	8
STATOR HOLES	P	12	12	12	22	22
	Q	12	12	12	24	24
ROTOR HOLES	R	12	12	12	23	23
	T	12	12	12	24	24
HOLES PITCH ANGLE	α	30°	30°	30°	15°	15°

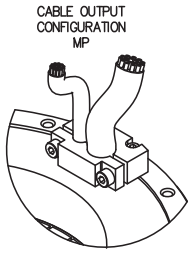
Motor Specifications TECHNAI MK-CIC 450 WA/WB

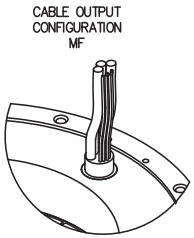
Motor Specifications	**Symbol**	**Unit**	**MK-CIC 450-050**		**MK-CIC 450-070**	
			WA	**WB**	**WA**	**WB**
Number of pole	P		88	88	88	88
Peak Torque	Tpk	Nm	1219	1221	1707	1712
Continuous Torque (Water Cooling Dt100)	Twc	Nm	670	679	938	950
Continuous Torque (Air Cooling Dt100)	Tac	Nm	290	293	403	404
Stall Torque (Water Cooling)	Tswc	Nm	528	536	739	749
Stall Torque (Air Cooling)	Tsac	Nm	222	224	308	309
Ripple Torque (Cogging Torque)	Tr	Nm	7	7	10	10
Power Loss at Twc	Pwc	KW	3,6	3,6	4,6	4,6
Power Loss at Tac	Pac	KW	0,7	0,7	0,85	0,85
Thermal Resistance Water Cooling	RthWc	K/W	0,028	0,028	0,022	0,022
Thermal Resistance Air Cooling	RthAc	K/W	0,154	0,154	0,127	0,127
Torque Constant	Kt	Nm/A	26,1	13,4	36,5	18,8
Back EMF Constant	Ke	V/1000 Rpm	1606	826	2248	1156
Maximum Speed at Ipk at 600 Vdc	Npk	RPM	70	200	55	120
Maximum Speed at Iwc at 600 Vdc	Nwc	RPM	180	380	120	260
Maximum Speed at Iac at 600 Vdc	Nac	RPM	240	470	170	340
Winding Resistance (Phase to Phase)	R20	Ω	2,4	0,61	3	0,8
Winding Inductance (Phase to Phase)	L	mH	13,8	3,7	18,91	5
Peak Current	Ipk	Arms	68	131	68	131
Continuous Current (Water Cooling Dt100)	Iwc	Arms	27	53	26,8	53
Continuous Current (Air Cooling Dt100)	Iac	Arms	11,5	22,6	11,4	22,3
Stall Current at 0 Speed (Water Cooling)	Iswc	Arms	20,5	40,5	20,5	40,5
Stall Current at 0 Speed (Air Cooling)	Isac	Arms	8,8	17,3	8,7	17,1
Maximum Winding Temperature		°C	130	130	130	130
Height of Rotor		mm	50	50	70	70
Height of Stator		mm	90	90	110	110
Outer Diameter of Stator		mm	485	485	485	485

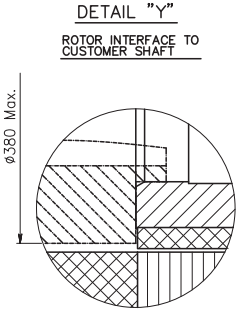








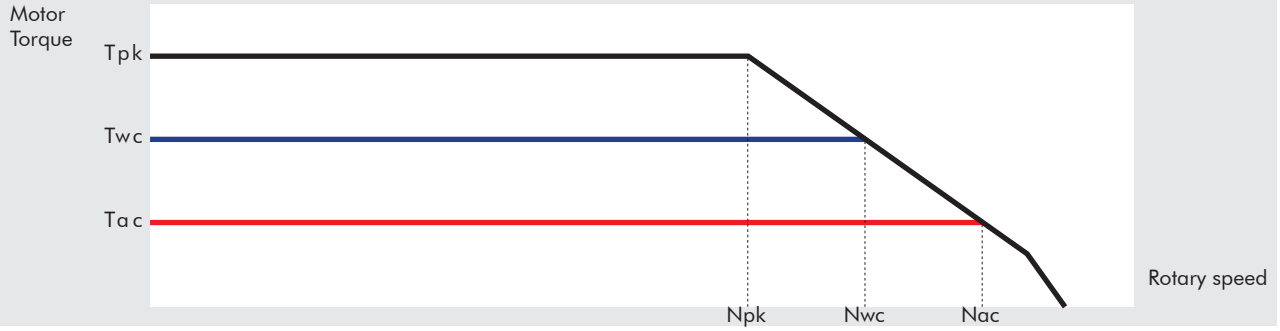


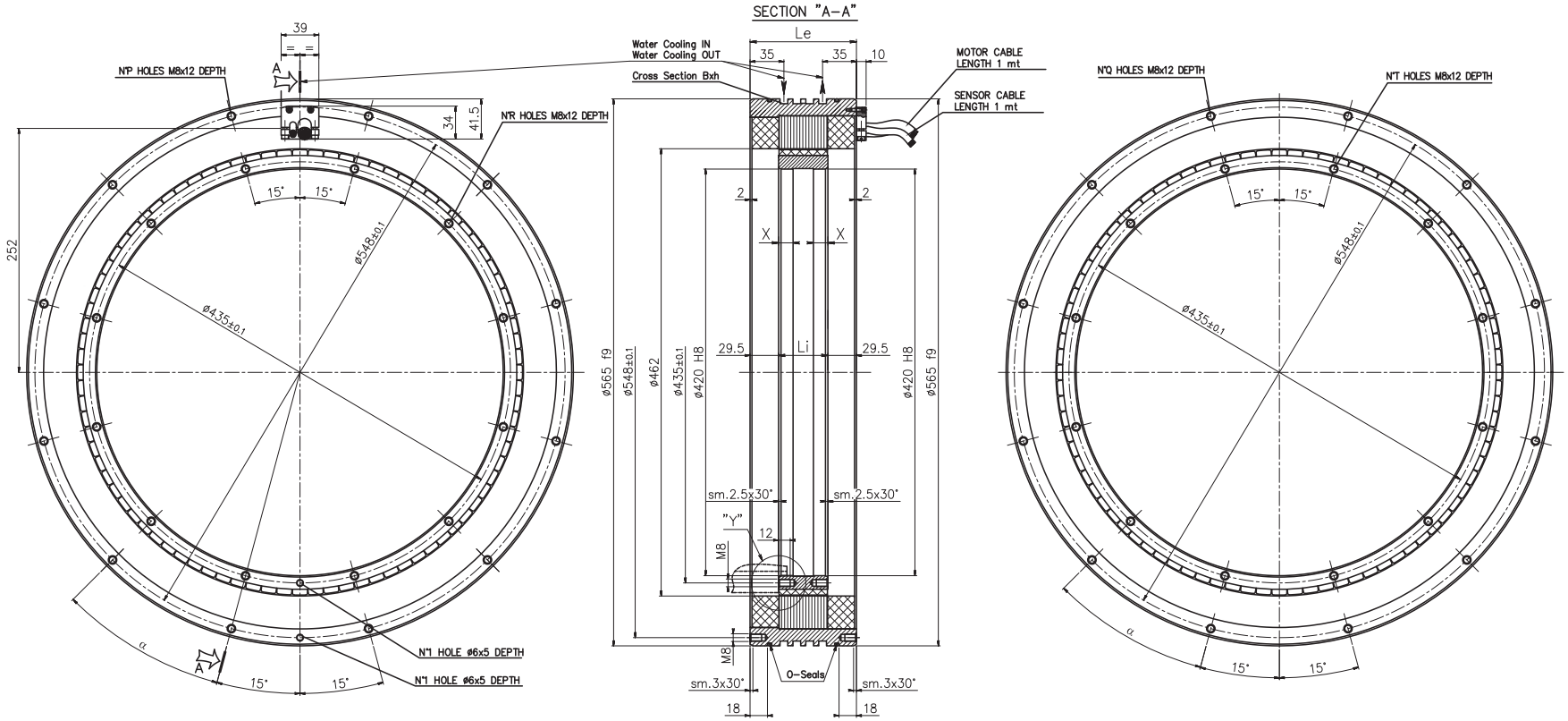


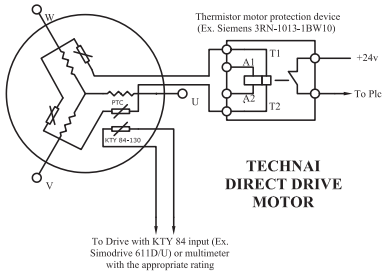
TYPE MK-CIC-450		050	070
STATOR LENGTH	Le	90	110
ROTOR LENGTH	Li	51	71
CENTERING LENGTH	X	15	15
COOLING GROOVE WIDTH	B	8	8
COOLING GROOVE DEPTH	h	5	5
COOLING GROOVES	No	4	6
STATOR HOLES	P	12	12
	Q	12	12
ROTOR HOLES	R	12	12
	T	12	12
HOLES PITCH ANGLE	α	30°	30°

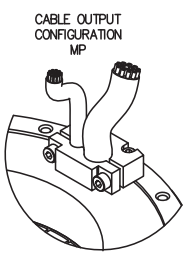
Motor Specifications TECHNAI MK-CI 500 WA/WB

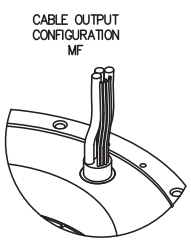
Motor Specifications	Symbol	Unit	MK-CI 500-030		MK-CI 500-050		MK-CI 500-070		MK-CI 500-100		MK-CI 500-150	
			WA	WB	WA	WB	WA	WB	WA	WB	WA	WB
Number of pole	P		88	88	88	88	88	88	88	88	88	8
Peak Torque	Tpk	Nm	760	760	1460	1460	1750	1750	2400	2400	3600	3600
Continuous Torque (Water Cooling Dt100)	Twc	Nm	450	450	790	790	1100	1100	1530	1530	2390	2390
Continuous Torque (Air Cooling Dt100)	Tac	Nm	220	219	340	341	435	433	615	615	922	924
Stall Torque (Water Cooling)	Tswc	Nm	345	345	600	600	844	844	1134	1134	1820	1820
Stall Torque (Air Cooling)	Tsac	Nm	170	167	260	260	331	331	470	470	696	704
Ripple Torque (Cogging Torque)	Tr	Nm	5,1	5,1	8,5	8,5	12	12	17	17	25,5	25,5
Power Loss at Twc	Pwc	KW	3,4	3,4	4,7	4,7	5,2	5,2	7	7	10	10
Power Loss at Tac	Pac	KW	0,7	0,7	0,82	0,82	0,85	0,85	1	1	1,4	1,4
Thermal Resistance Water Cooling	RthWc	K/W	0,037	0,037	0,024	0,024	0,022	0,022	0,016	0,016	0,010	0,010
Thermal Resistance Air Cooling	RthAc	K/W	0,170	0,170	0,140	0,140	0,120	0,120	0,100	0,100	0,062	0,062
Torque Constant	Kt	Nm/A	21,8	12,3	32,6	16,7	45,7	23,4	53,2	27,3	54,6	27,3
Back EMF Constant	Ke	V/1000 Rpm	1321	743	1973	1009	2762	1413	3212	1652	3304	1652
Maximum Speed at Ipk at 600 Vdc	Npk	RPM	70	150	35	100	30	70	25	60	25	60
Maximum Speed at Iwc at 600 Vdc	Nwc	RPM	170	300	105	225	75	160	65	130	60	130
Maximum Speed at Iac at 600 Vdc	Nac	RPM	245	400	164	330	118	240	100	200	95	200
Winding Resistance (Phase to Phase)	R20	Ω	3,2	0,99	3,3	0,86	4	1,05	3,4	0,9	2,2	0,55
Winding Inductance (Phase to Phase)	L	mH	16,5	5	21	5,5	28	7,3	26,8	7,72	19	5
Peak Current	Ipk	Arms	50	89	46	127	55	109	67	134,5	99	190
Continuous Current (Water Cooling Dt100)	Iwc	Arms	22,6	39,6	26,3	51,6	25	50,9	31	61,5	47	94,7
Continuous Current (Air Cooling Dt100)	Iac	Arms	10,2	19,5	11	22,12	9,8	19,8	12	23,7	17,3	34,7
Stall Current at 0 Speed (Water Cooling)	Iswc	Arms	17,3	30,3	20	39,4	19	38,8	23,5	47	36	72,3
Stall Current at 0 Speed (Air Cooling)	Isac	Arms	7,8	14,9	8,4	16,9	7,5	15,1	9,2	18	13,2	26,5
Maximum Winding Temperature		°C	130	130	130	130	130	130	130	130	130	130
Height of Rotor		mm	30	30	50	50	70	70	100	100	150	150
Height of Stator		mm	90	90	110	110	130	130	160	160	210	210
Outer Diameter of Stator		mm	535	535	535	535	535	535	535	535	535	535

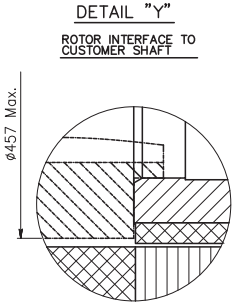








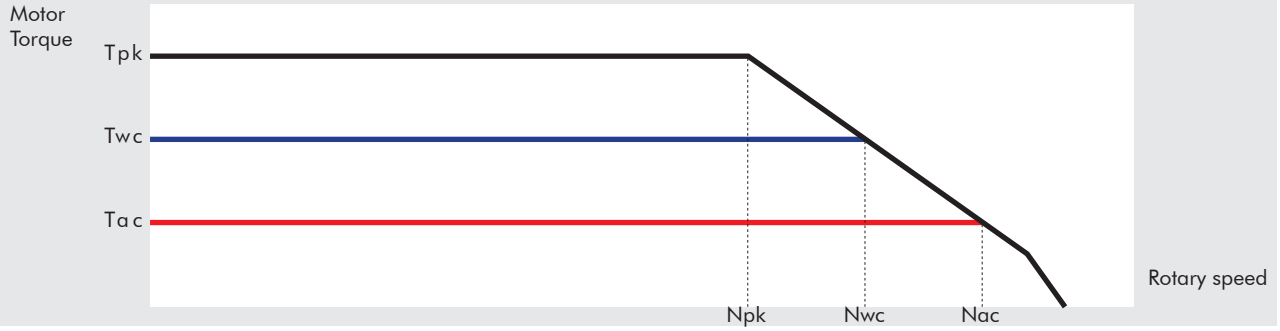


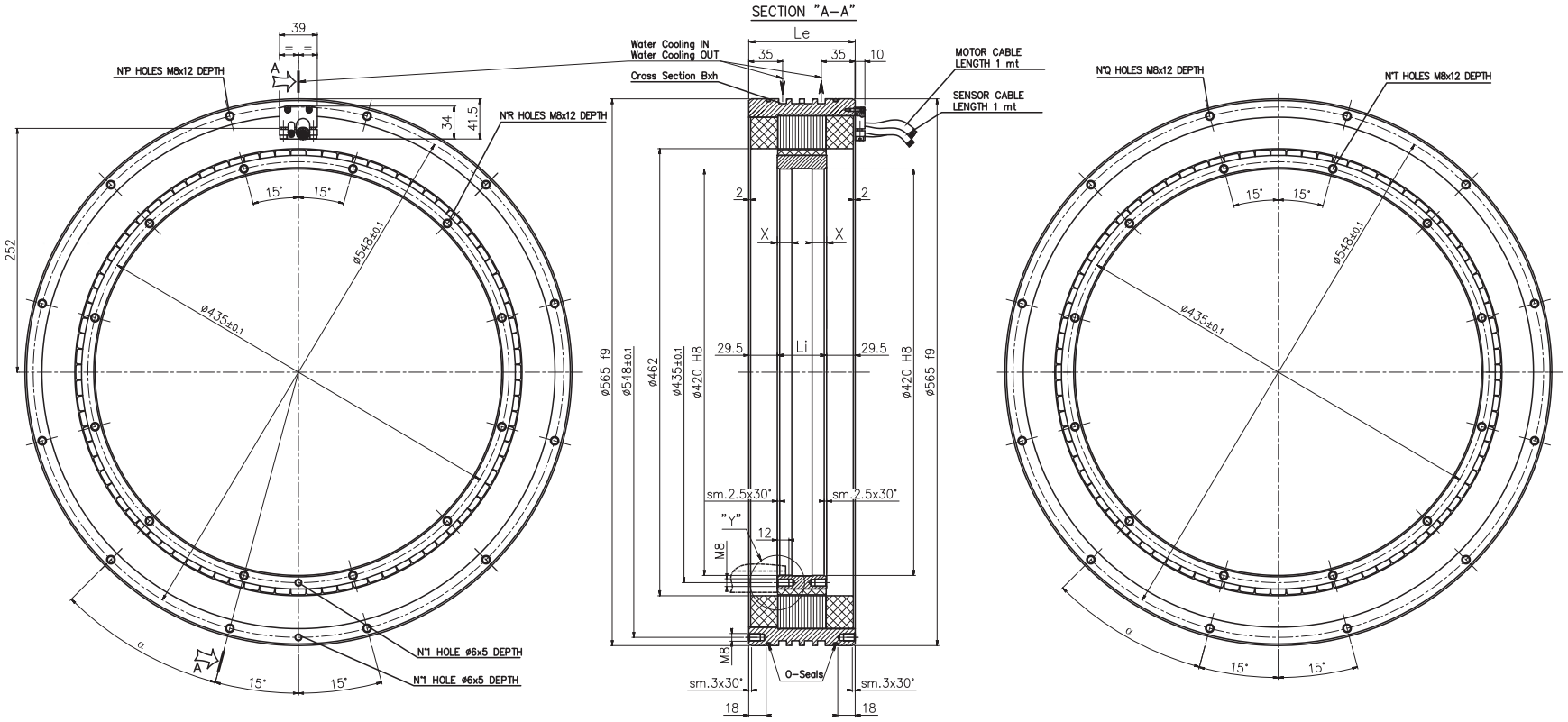


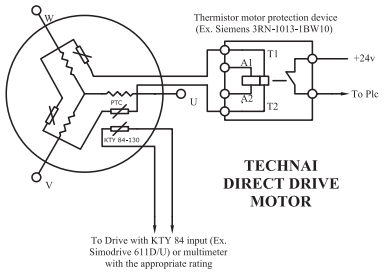
TYPE MK-CI 500		030	050	070	100	150
STATOR LENGTH	Le	90	110	130	160	210
ROTOR LENGTH	Li	31	51	71	101	151
CENTERING LENGTH	X	10	15	15	15	15
COOLING GROOVE WIDTH	B	8	8	9	8	9
COOLING GROOVE DEPTH	h	5	5	5	5	5
COOLING GROOVES	No	2	4	4	8	8
STATOR HOLES	P	22	22	22	22	22
	Q	24	24	24	24	24
ROTOR HOLES	R	23	23	23	23	23
	T	24	24	24	24	24
HOLES PITCH ANGLE	α	15°	15°	15°	15°	15°

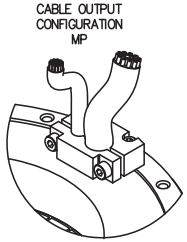
Motor Specifications TECHNAI MK-CI 530 WA/WB

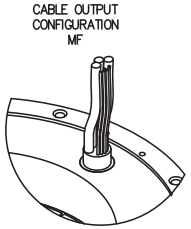
Motor Specifications	Symbol	Unit	MK-CI 530-030		MK-CI 530-050		MK-CI 530-070		MK-CI 530-100		MK-CI 530-150	
			WA	WB	WA	WB	WA	WB	WA	WB	WA	WB
Number of pole	P		88	88	88	88	88	88	88	88	88	88
Peak Torque	Tpk	Nm	1080	1080	1715	1715	2455	2455	3600	3600	5400	5400
Continuous Torque (Water Cooling Dt100)	Twc	Nm	557	550	924	924	1424	1425	2076	2076	3050	3050
Continuous Torque (Air Cooling Dt100)	Tac	Nm	251	250	420	420	580	580	817	814	1200	1197
Stall Torque (Water Cooling)	Tswc	Nm	425	420	705	705	1087	1087	1385	1590	2330	2330
Stall Torque (Air Cooling)	Tsac	Nm	192	191	321	321	443	443	624	621	917	914
Ripple Torque (Cogging Torque)	Tr	Nm	4	4	9	9	12	12	15	15	20	20
Power Loss at Twc	Pwc	KW	2,8	2,8	3,7	3,7	5,3	5,3	7	7	9	9
Power Loss at Tac	Pac	KW	0,6	0,6	0,75	0,75	0,9	0,9	1,1	1,1	1,5	1,5
Thermal Resistance Water Cooling	RthWc	K/W	0,036	0,036	0,025	0,025	0,019	0,019	0,014	0,014	0,011	0,011
Thermal Resistance Air Cooling	RthAc	K/W	0,168	0,168	0,133	0,133	0,110	0,110	0,088	0,088	0,060	0,060
Torque Constant	Kt	Nm/A	23,7	12,2	39,5	20,4	55,2	27,3	39,5	20,4	59,2	30,6
Back EMF Constant	Ke	V/1000 Rpm	1431	741	2386	1235	3340	1651	2386	1235	3579	1853
Maximum Speed at Ipk at 600 Vdc	Npk	RPM	75	150	40	80	25	55	45	90	25	50
Maximum Speed at Iwc at 600 Vdc	Nwc	RPM	170	340	100	200	65	145	100	200	65	130
Maximum Speed at Iac at 600 Vdc	Nac	RPM	235	400	140	280	95	200	145	280	95	180
Winding Resistance (Phase to Phase)	R20	Ω	2,2	0,56	2,8	0,8	3,5	0,9	1,1	0,31	1,5	0,4
Winding Inductance (Phase to Phase)	L	mH	15,6	4,3	25	6,87	34	8,6	12	3,31	17,8	4,9
Peak Current	Ipk	Arms	65	127	63	117	65	125	131	240	131	254
Continuous Current (Water Cooling Dt100)	Iwc	Arms	24,8	46,7	24,5	47	27	54,8	55	106,7	54	104,6
Continuous Current (Air Cooling Dt100)	Iac	Arms	11,5	22,6	11,3	21,2	11	22,2	22	41,4	21,5	41,3
Stall Current at 0 Speed (Water Cooling)	Iswc	Arms	18,9	36,6	18,7	36	20,5	41,8	42	81,5	41	80
Stall Current at 0 Speed (Air Cooling)	Isac	Arms	8,8	17,3	8,6	16,2	8,4	16,9	17	31,6	16	31,6
Maximum Winding Temperature		°C	130	130	130	130	130	130	130	130	130	130
Height of Rotor		mm	30	30	50	50	70	70	100	100	150	150
Height of Stator		mm	90	90	110	110	130	130	160	160	210	210
Outer Diameter of Stator		mm	565	565	565	565	565	565	565	565	565	565

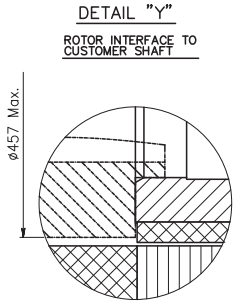








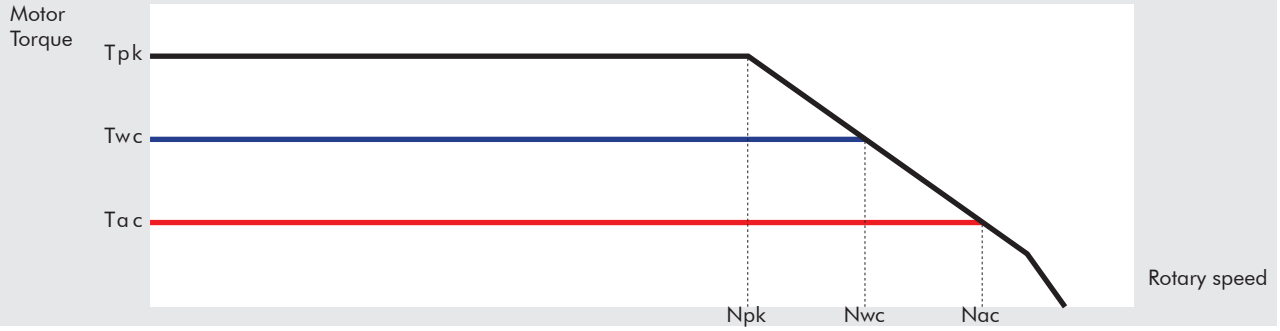


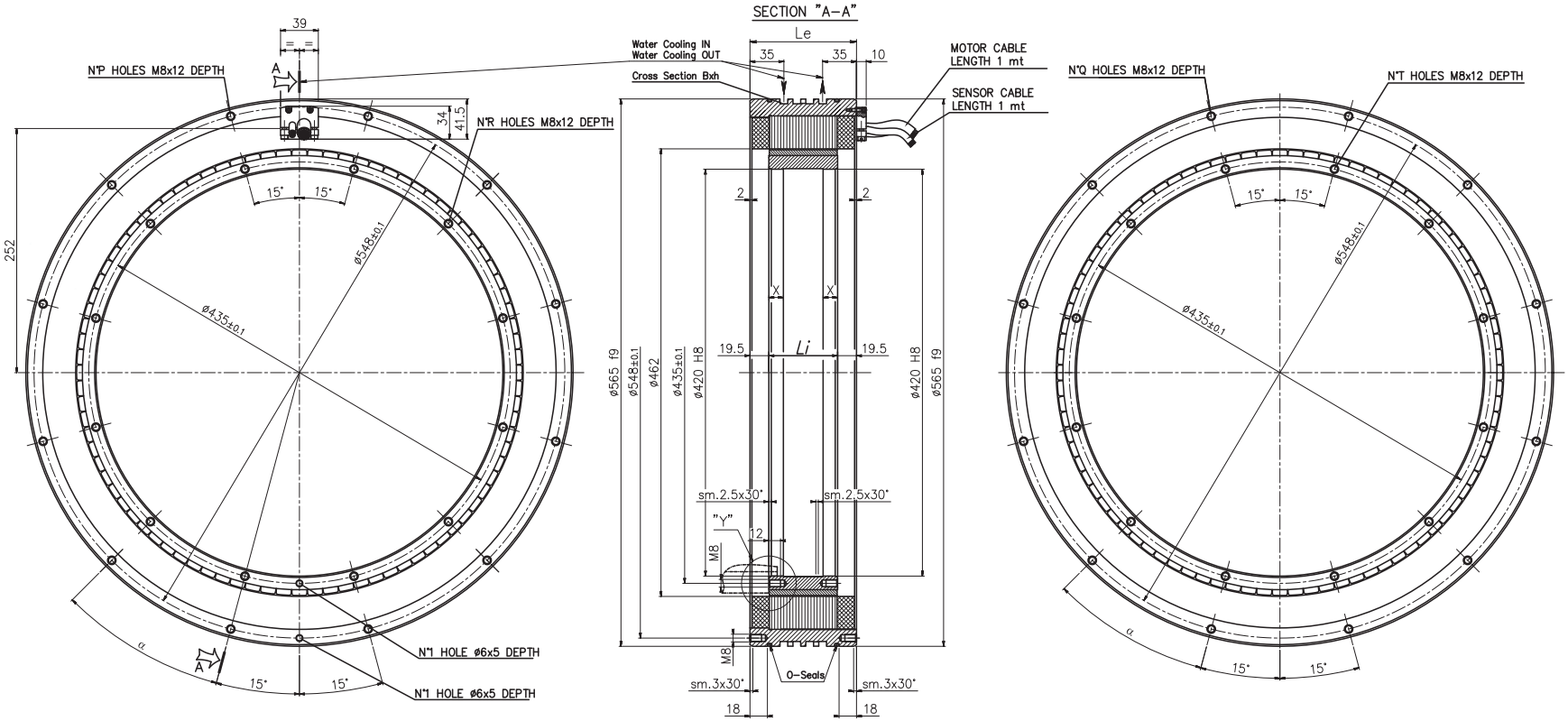


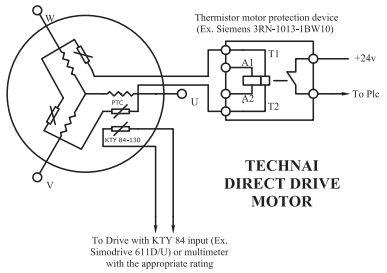
TYPE MK-CI-530		030	050	070	100	150
STATOR LENGTH	Le	90	110	130	160	210
ROTOR LENGTH	Li	31	51	71	101	151
CENTERING LENGTH	X	10	15	15	15	15
COOLING GROOVE WIDTH	B	8	8	9	8	9
COOLING GROOVE DEPTH	h	5	5	5	5	5
COOLING GROOVES	No	2	4	4	8	8
STATOR HOLES	P	12	12	12	22	22
	Q	12	12	12	24	24
ROTOR HOLES	R	12	12	12	23	23
	T	12	12	12	24	24
HOLES PITCH ANGLE	α	30°	30°	30°	15°	15°

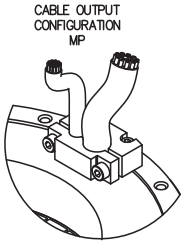
Motor Specifications TECHNAI MK-CIC 530 WA/WB

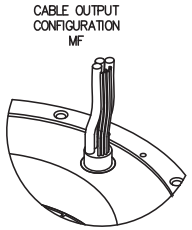
Motor Specifications	**Symbol**	**Unit**	**MK-CIC 530-050**		**MK-CIC 530-070**	
			WA	**WB**	**WA**	**WB**
Number of pole	P		88	88	88	88
Peak Torque	Tpk	Nm	1715	1715	2455	2455
Continuous Torque (Water Cooling Dt100)	Twc	Nm	924	924	1424	1424
Continuous Torque (Air Cooling Dt100)	Tac	Nm	420	420	580	580
Stall Torque (Water Cooling)	Tswc	Nm	705	705	1087	1087
Stall Torque (Air Cooling)	Tsac	Nm	321	321	443	443
Ripple Torque (Cogging Torque)	Tr	Nm	9	9	12	12
Power Loss at Twc	Pwc	KW	3,7	3,7	5,3	5,3
Power Loss at Tac	Pac	KW	0,75	0,75	0,9	0,9
Thermal Resistance Water Cooling	RthWc	K/W	0,025	0,025	0,019	0,019
Thermal Resistance Air Cooling	RthAc	K/W	0,133	0,133	0,110	0,110
Torque Constant	Kt	Nm/A	39,5	20,4	55,2	27,3
Back EMF Constant	Ke	V/1000 Rpm	2386	2354	3340	3340
Maximum Speed at Ipk at 600 Vdc	Npk	RPM	40	80	25	55
Maximum Speed at Iwc at 600 Vdc	Nwc	RPM	100	200	65	145
Maximum Speed at Iac at 600 Vdc	Nac	RPM	140	280	95	200
Winding Resistance (Phase to Phase)	R20	Ω	2,8	0,8	3,5	0,9
Winding Inductance (Phase to Phase)	L	mH	25	6,87	34	8,6
Peak Current	Ipk	Arms	63	117	65	125
Continuous Current (Water Cooling Dt100)	Iwc	Arms	24,5	47	27	54,8
Continuous Current (Air Cooling Dt100)	Iac	Arms	11,3	21,2	11	22,2
Stall Current at 0 Speed (Water Cooling)	Iswc	Arms	18,7	36	20,5	41,8
Stall Current at 0 Speed (Air Cooling)	Isac	Arms	8,6	16,2	8,4	16,9
Maximum Winding Temperature		°C	130	30	130	130
Height of Rotor		mm	50	50	70	70
Height of Stator		mm	90	90	110	110
Outer Diameter of Stator		mm	565	565	565	565

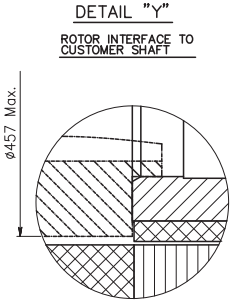








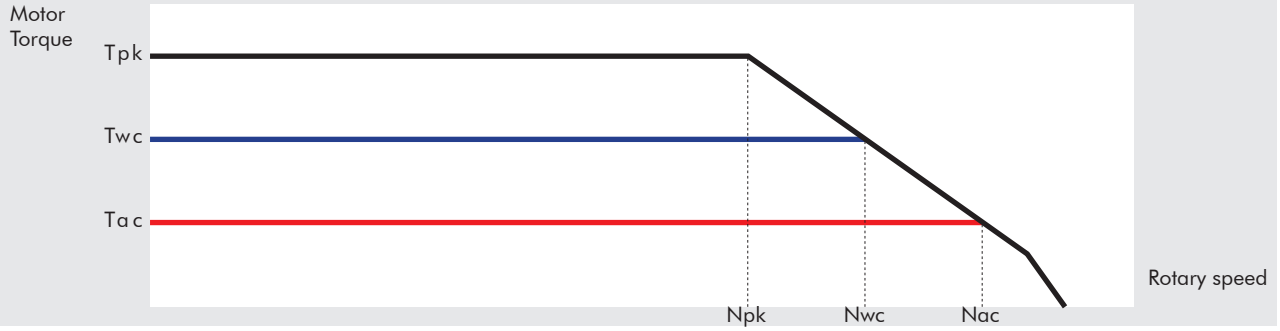


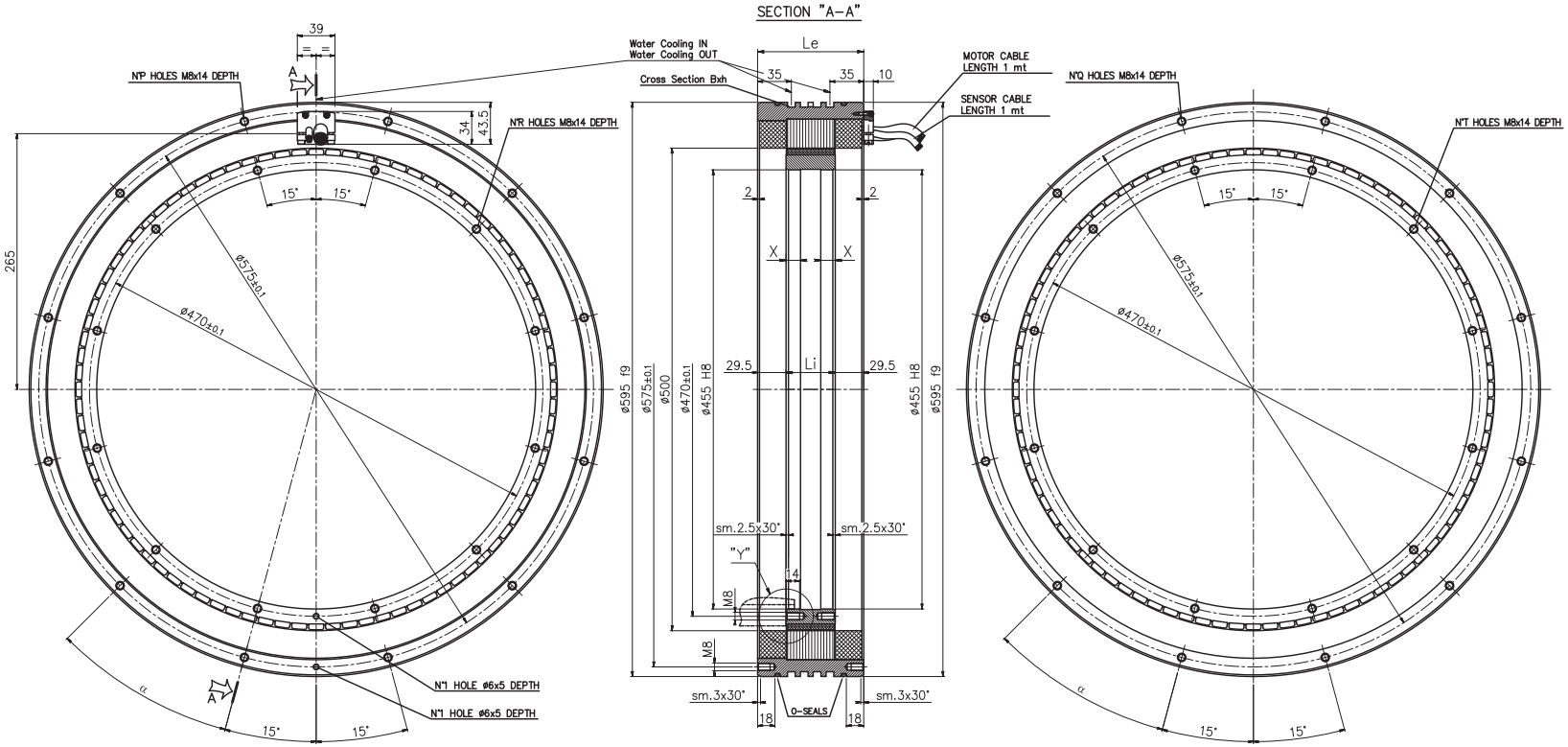


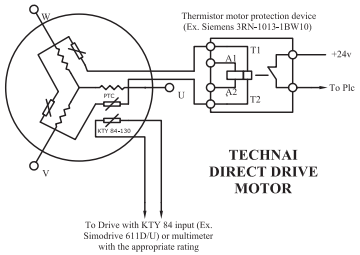
TYPE MK-CIC-530		050	070
STATOR LENGTH	Le	90	110
ROTOR LENGTH	Li	51	71
CENTERING LENGTH	X	15	15
COOLING GROOVE WIDTH	B	8	8
COOLING GROOVE DEPTH	h	5	5
COOLING GROOVES	No	2	4
STATOR HOLES	P	12	12
	Q	12	12
ROTOR HOLES	R	12	12
	T	12	12
HOLES PITCH ANGLE	α	30°	30°

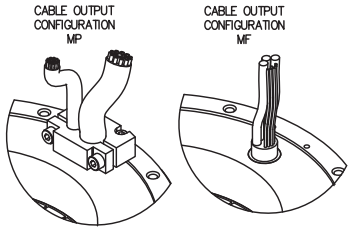
Motor Specifications TECHNAI MK-CI 560 WA/WB

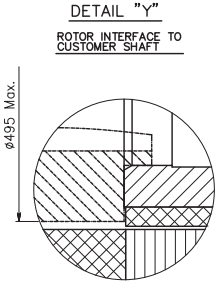
Motor Specifications	Symbol	Unit	MK-CI 560-030		MK-CI 560-050		MK-CI 560-070		MK-CI 560-100		MK-CI 560-150	
			WA	WB	WA	WB	WA	WB	WA	WB	WA	WB
Number of pole	P		88	88	88	88	88	88	88	88	88	88
Peak Torque	Tpk	Nm	1143	1143	1925	1925	2664	2664	3800	3800	5690	5690
Continuous Torque (Water Cooling Dt100)	Twc	Nm	609	610	1022	1022	1459	1454	2084	2084	2980	2980
Continuous Torque (Air Cooling Dt100)	Tac	Nm	280	278	465	468	670	673	897	897	1360	1360
Stall Torque (Water Cooling)	Tswc	Nm	465	465	781	781	1113	1110	1591	1591	2275	2275
Stall Torque (Air Cooling)	Tsac	Nm	214	211	355	357	512	514	685	685	1036	1036
Ripple Torque (Cogging Torque)	Tr	Nm	8	8	12	12	17	17	24	24	35	35
Power Loss at Twc	Pwc	KW	4	4	5	5	6,4	6,4	8,3	8,3	10,5	10,5
Power Loss at Tac	Pac	KW	0,8	0,8	1	1	1,3	1,3	1,7	1,7	2,2	2,2
Thermal Resistance Water Cooling	RthWc	K/W	0,024	0,024	0,019	0,019	0,015	0,015	0,012	0,012	0,010	0,010
Thermal Resistance Air Cooling	RthAc	K/W	0,100	0,100	0,080	0,080	0,073	0,073	0,064	0,064	0,046	0,046
Torque Constant	Kt	Nm/A	23,7	11,4	39,5	19,2	45,8	22,8	55,8	26,6	71,6	34,2
Back EMF Constant	Ke	V/1000 Rpm	1429	694	2382	1157	2765	1377	3370	1608	4327	2067
Maximum Speed at Ipk at 600 Vdc	Npk	RPM	75	110	34	80	29	60	32	60	8	16
Maximum Speed at Iwc at 600 Vdc	Nwc	RPM	175	300	100	210	87	175	65	140	52	120
Maximum Speed at Iac at 600 Vdc	Nac	RPM	240	340	140	290	120	240	100	200	75	160
Winding Resistance (Phase to Phase)	R20	Ω	2,6	0,65	3,4	0,85	2,85	0,75	2,6	0,65	2,7	0,65
Winding Inductance (Phase to Phase)	L	mH	12	2,8	18,7	4,5	17,5	4,4	17,9	4,21	19,6	4,5
Peak Current	Ipk	Arms	70	144	70	148	83,5	167	99	205	114	230
Continuous Current (Water Cooling Dt100)	Iwc	Arms	26,9	55	26,9	56,5	33	66,5	39	81	43	90,5
Continuous Current (Air Cooling Dt100)	Iac	Arms	12	26	12	25,5	14,9	30,4	16,7	34,6	20	40
Stall Current at 0 Speed (Water Cooling)	Iswc	Arms	20,5	42	20,5	43,2	25,1	51	29,7	61	33	69
Stall Current at 0 Speed (Air Cooling)	Isac	Arms	9,2	20	9,2	19,5	11,4	23,21	12,7	26,4	14,9	30
Maximum Winding Temperature		°C	130	130	130	130	130	130	130	130	130	130
Height of Rotor		mm	30	30	50	50	70	70	100	100	150	150
Height of Stator		mm	90	90	110	110	130	130	160	160	210	210
Outer Diameter of Stator		mm	595	595	595	595	595	595	595	595	595	595







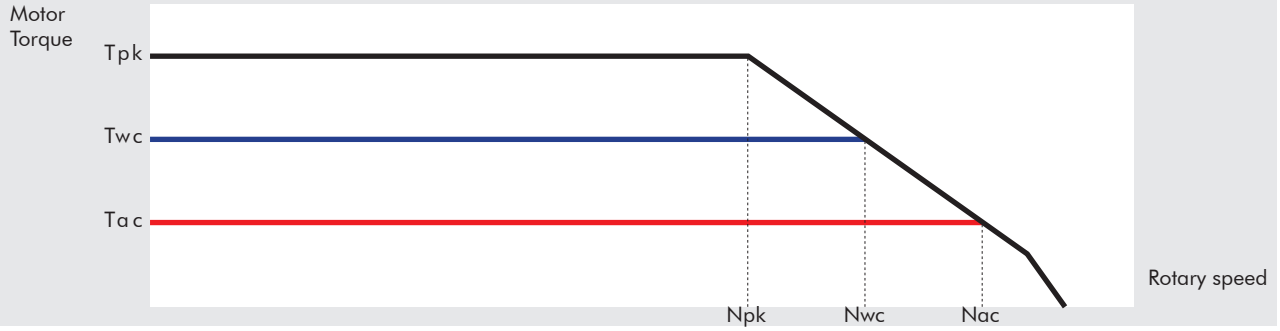


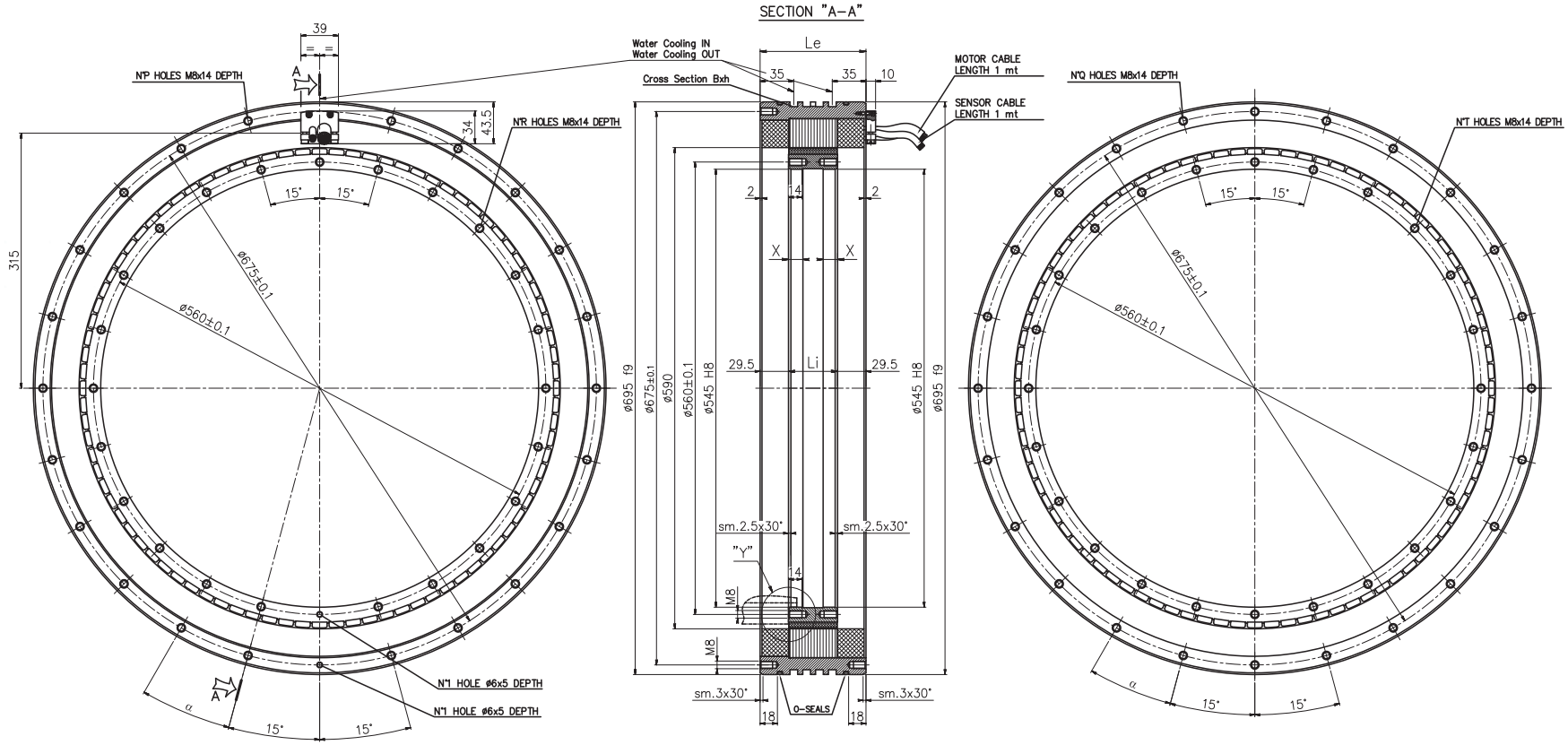


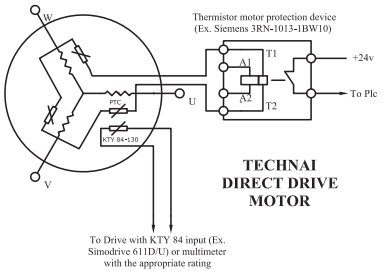
TYPE MK-CI-560		030	050	070	100	150
STATOR LENGTH	Le	90	110	130	160	210
ROTOR LENGTH	Li	31	51	71	101	151
CENTERING LENGTH	X	10	15	15	15	15
COOLING GROOVE WIDTH	B	8	8	9	8	9
COOLING GROOVE DEPTH	h	5	5	5	5	5
COOLING GROOVES	No	2	4	4	8	8
STATOR HOLES	P	12	12	12	22	22
	Q	12	12	12	24	24
ROTOR HOLES	R	12	12	12	23	23
	T	12	12	12	24	24
HOLES PITCH ANGLE	α	30°	30°	30°	15°	15°

Motor Specifications TECHNAI MK-CI 660 WA/WB

Motor Specifications	Symbol	Unit	MK-CI 660-030		MK-CI 660-050		MK-CI 660-070		MK-CI 660-100		MK-CI 660-150	
			WA	WB	WA	WB	WA	WB	WA	WB	WA	WB
Number of pole	P		110	110	110	110	110	110	110	110	110	110
Peak Torque	Tpk	Nm	1600	1600	2400	2400	3500	3500	5000	5000	7200	7200
Continuous Torque (Water Cooling Dt100)	Twc	Nm	815	815	1300	1300	2012	2012	2900	2900	4000	4000
Continuous Torque (Air Cooling Dt100)	Tac	Nm	400	400	523	523	835	835	1200	1200	1800	1800
Stall Torque (Water Cooling)	Tswc	Nm	620	620	1020	1020	1540	1540	2200	2200	3120	3120
Stall Torque (Air Cooling)	Tsac	Nm	304	304	400	400	636	636	910	910	1335	1335
Ripple Torque (Cogging Torque)	Tr	Nm	8,2	8,2	13,5	13,5	19,2	19,2	27,5	27,5	41	41
Power Loss at Twc	Pwc	KW	3,6	3,6	4,3	4,3	6,3	6,3	8	8	9,5	9,5
Power Loss at Tac	Pac	KW	0,82	0,82	0,82	0,82	1,1	1,1	1,2	1,2	1,8	1,8
Thermal Resistance Water Cooling	RthWc	K/W	0,030	0,030	0,024	0,024	0,015	0,015	0,012	0,012	0,010	0,010
Thermal Resistance Air Cooling	RthAc	K/W	0,130	0,130	0,110	0,110	0,085	0,085	0,064	0,064	0,050	0,050
Torque Constant	Kt	Nm/A	39,4	19,3	54,0	26,3	61,0	30,7	70,0	35,0	74,0	44,0
Back EMF Constant	Ke	V/1000 Rpm	2387	1167	3271	1591	3713	1856	4244	2122	4510	2652
Maximum Speed at Ipk at 600 Vdc	Npk	RPM	30	80	35	80	25	50	20	40	20	40
Maximum Speed at Iwc at 600 Vdc	Nwc	RPM	100	220	75	170	65	135	55	120	55	100
Maximum Speed at Iac at 600 Vdc	Nac	RPM	140	280	105	220	90	180	78	158	75	130
Winding Resistance (Phase to Phase)	R20	Ω	3,6	0,85	3,1	0,74	2,5	0,62	2,1	0,5	1,4	0,5
Winding Inductance (Phase to Phase)	L	mH	20,5	4,7	21,5	5,11	20	4,8	17,5	4,4	13,5	4,5
Peak Current	Ipk	Arms	56,5	120	56	134	80	160	101	205	138	240
Continuous Current (Water Cooling Dt100)	Iwc	Arms	21,6	43,8	26	52,3	34	68,5	42	87	57	95
Continuous Current (Air Cooling Dt100)	Iac	Arms	10,5	22,6	11,3	22	14,3	28,2	17,7	36,8	25	44,5
Stall Current at 0 Speed (Water Cooling)	Iswc	Arms	16,2	33,5	19,8	39,9	26	52,4	32,5	66,4	43	73
Stall Current at 0 Speed (Air Cooling)	Isac	Arms	8	17,2	8,6	16,7	10,8	21,5	14	28	19	34
Maximum Winding Temperature		°C	130	130	130	130	130	130	130	130	130	130
Height of Rotor		mm	30	30	50	50	70	70	100	100	150	150
Height of Stator		mm	90	90	110	110	130	130	160	160	210	210
Outer Diameter of Stator		mm	695	695	695	695	695	695	695	695	695	695

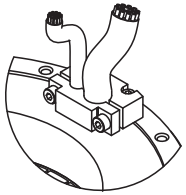




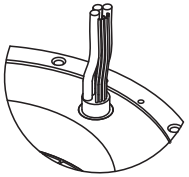


TECHNAI DIRECT DRIVE MOTOR

CABLE OUTPUT CONFIGURATION MP

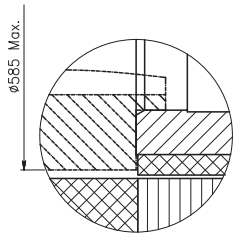


CABLE OUTPUT CONFIGURATION MF



DETAIL "Y"

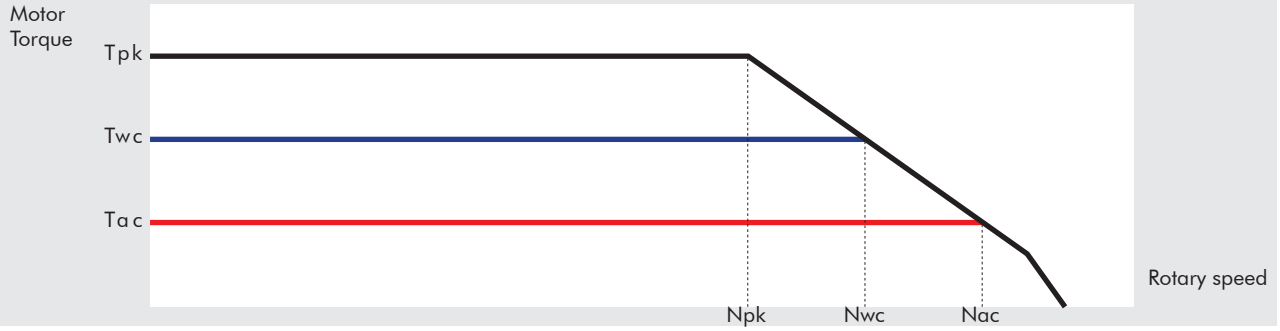
ROTOR INTERFACE TO CUSTOMER SHAFT

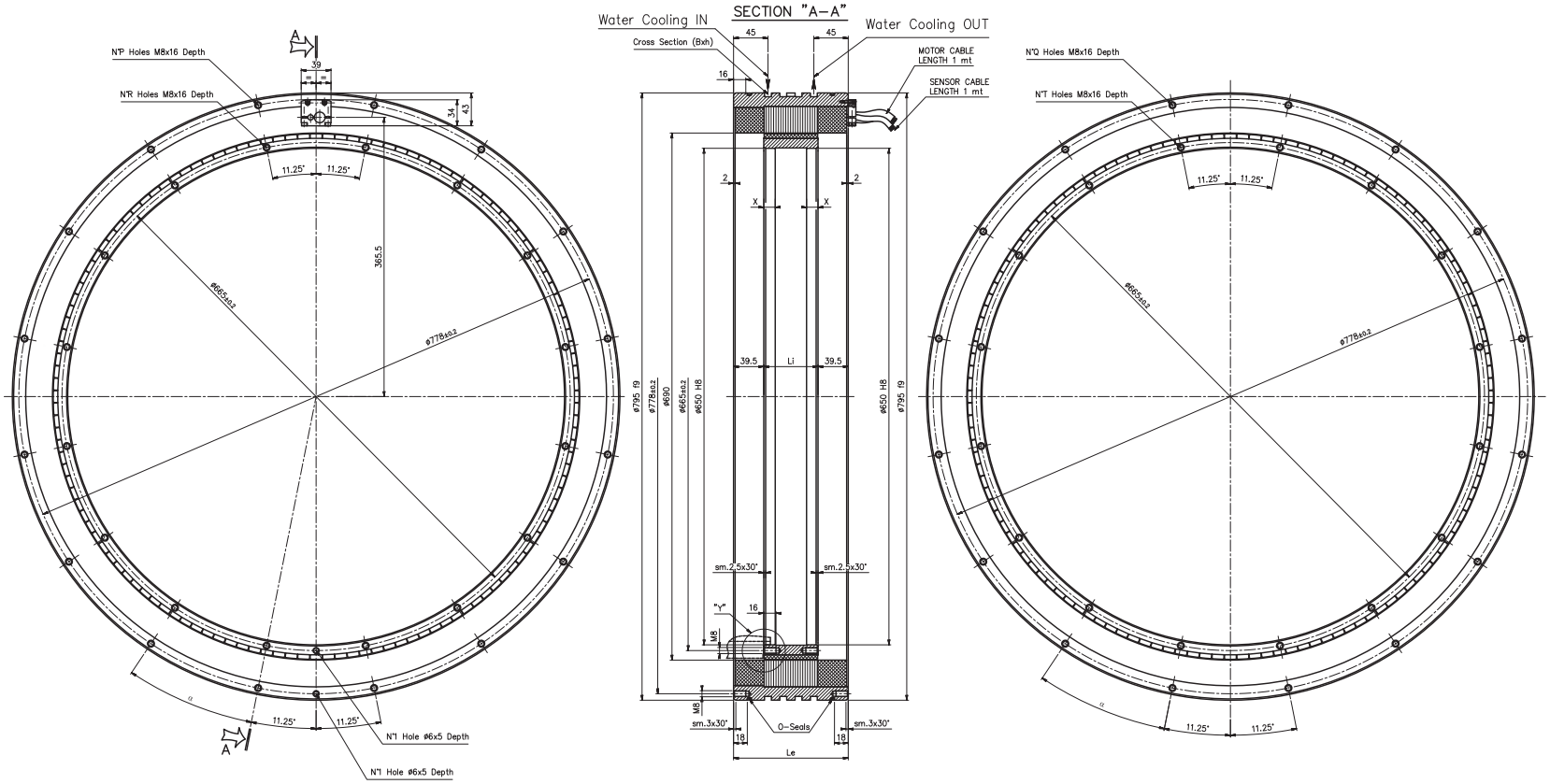


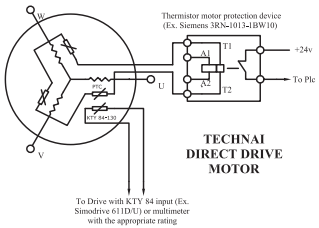
TYPE MK-CI-660		030	050	070	100	150
STATOR LENGTH	Le	90	110	130	160	210
ROTOR LENGTH	Li	31	51	71	101	151
CENTERING LENGTH	X	10	15	15	15	15
COOLING GROOVE WIDTH	B	8	8	9	8	9
COOLING GROOVE DEPTH	h	5	5	5	5	5
COOLING GROOVES	No	2	4	4	8	8
STATOR HOLES	P	22	22	22	22	22
	Q	24	24	24	24	24
ROTOR HOLES	R	23	23	23	23	23
	T	24	24	24	24	24
HOLES PITCH ANGLE	α	15°	15°	15°	15°	15°

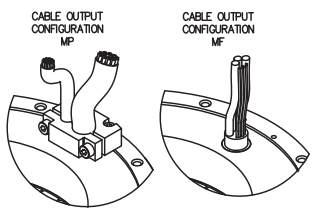
Motor Specifications TECHNAI MK-CI 760 WA/WB

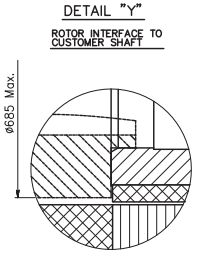
Motor Specifications	Symbol	Unit	MK-CI 760-030		MK-CI 760-050		MK-CI 760-070		MK-CI 760-100		MK-CI 760-150	
			WA	WB	WA	WB	WA	WB	WA	WB	WA	WB
Number of pole	P		132	132	132	132	132	132	132		132	132
Peak Torque	Tpk	Nm	2300	2300	3770	3770	5500	5500	7688	7688	11480	11480
Continuous Torque (Water Cooling Dt100)	Twc	Nm	1272	1272	2076	2076	3100	3100	4500	4500	6550	6550
Continuous Torque (Air Cooling Dt100)	Tac	Nm	615	615	995	995	1350	1350	1841	1841	2800	2800
Stall Torque (Water Cooling)	Tswc	Nm	970	970	1585	1585	2370	2364	3435	3435	5000	5000
Stall Torque (Air Cooling)	Tsac	Nm	470	470	760	760	1030	1030	1405	1405	2140	2140
Ripple Torque (Cogging Torque)	Tr	Nm	11	11	18	18	25	25	35	35	53	53
Power Loss at Twc	Pwc	KW	4,4	4,4	5,6	5,6	7,5	7,5	11	11	13,5	13,5
Power Loss at Tac	Pac	KW	1	1	1,2	1,2	1,4	1,4	1,8	1,8	2,4	2,4
Thermal Resistance Water Cooling	RthWc	K/W	0,023	0,023	0,017	0,017	0,013	0,013	0,009	0,009	0,007	0,007
Thermal Resistance Air Cooling	RthAc	K/W	0,104	0,104	0,084	0,084	0,070	0,070	0,057	0,057	0,043	0,043
Torque Constant	Kt	Nm/A	55,1	28,1	81,6	44,8	97,2	45,6	94,0	61,1	122,5	61,1
Back EMF Constant	Ke	V/1000 Rpm	3331	1677	4935	2709	5872	2759	5675	3695	7401	3695
Maximum Speed at Ipk at 600 Vdc	Npk	RPM	23	55	13	30	10	25	12	25	7	15
Maximum Speed at Iwc at 600 Vdc	Nwc	RPM	62	125	41	80	33	80	35	55	26	65
Maximum Speed at Iac at 600 Vdc	Nac	RPM	93	180	63	110	53	115	57	90	42	90
Winding Resistance (Phase to Phase)	R20	Ω	3,5	1,01	3,6	1,2	3,1	0,8	1,95	0,9	1,96	0,48
Winding Inductance (Phase to Phase)	L	mH	29,2	7,7	37,1	11,3	36,8	8,2	23,8	10,2	26,8	5,2
Peak Current	Ipk	Arms	60	119	67	123	81,5	161	118	177	135	268
Continuous Current (Water Cooling Dt100)	Iwc	Arms	24,5	49	27	49,5	34	72	51	79	56,6	113,8
Continuous Current (Air Cooling Dt100)	Iac	Arms	11,5	22,6	12,5	23	14,5	31,1	20,5	31,1	23,5	47,4
Stall Current at 0 Speed (Water Cooling)	Iswc	Arms	18,8	37,5	20,5	37,8	25,9	55	38,9	60	43,2	87
Stall Current at 0 Speed (Air Cooling)	Isac	Arms	8,8	17,3	9,6	17,5	11	23,75	15,7	23,7	17,9	36
Maximum Winding Temperature		°C	130	130	130	130	130	130	130	130	130	130
Height of Rotor		mm	30	30	50	50	70	70	100	100	150	150
Height of Stator		mm	110	110	130	130	150	150	180	180	230	230
Outer Diameter of Stator		mm	795	795	795	795	795	795	795	795	795	795







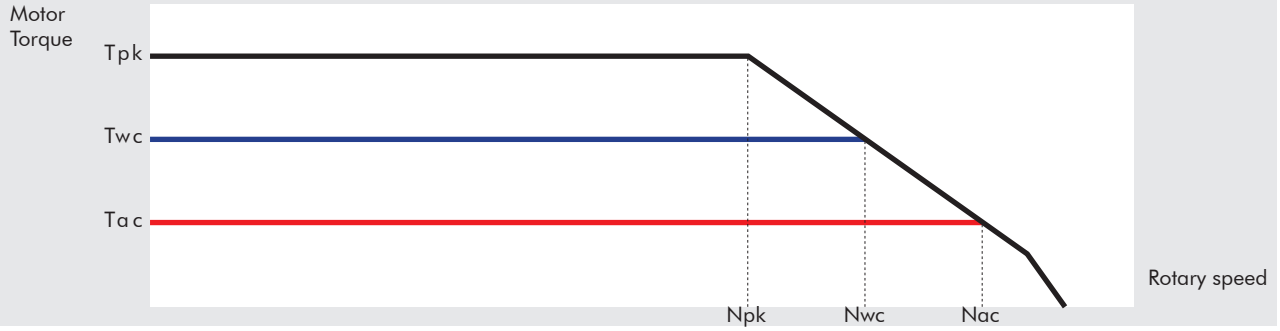


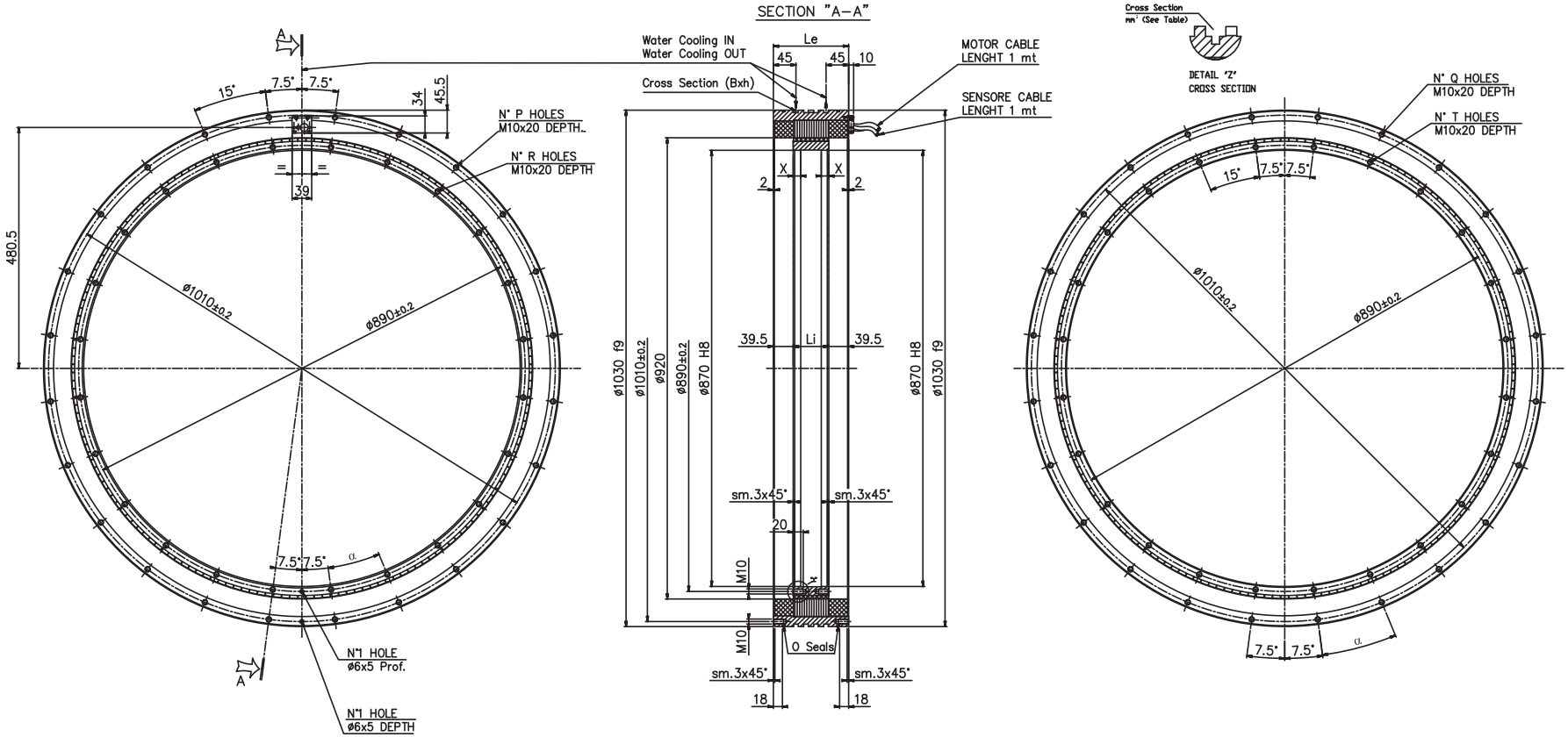


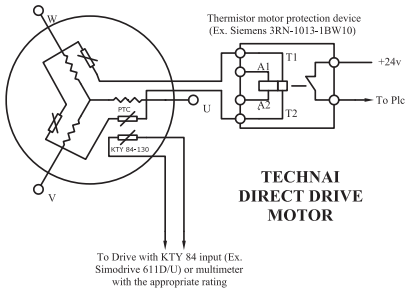
TYPE MK-CI-760		030	050	070	100	150
STATOR LENGTH	Le	110	130	150	180	230
ROTOR LENGTH	Li	31	51	71	101	151
CENTERING LENGTH	X	10	15	15	15	15
COOLING GROOVE WIDTH	B	8	8	9	8	9
COOLING GROOVE DEPTH	h	5	5	5	5	5
COOLING GROOVES	No	2	4	4	8	8
STATOR HOLES	P	16	16	16	30	30
	Q	16	16	16	32	32
ROTOR HOLES	R	16	16	16	31	31
	T	16	16	16	32	32
HOLES PITCH ANGLE	a	22.5°	22.5°	22.5°	11.25°	11.25°

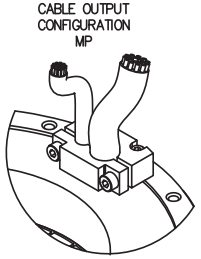
Motor Specifications TECHNAI MK-CI 990 WA

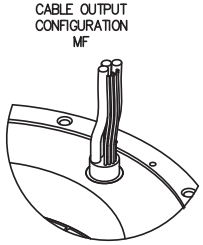
Motor Specifications	**Symbol**	**Unit**	**MK-CI 990-030 WA**	**MK-CI 990-050 WA**	**MK-CI 990-070 WA**	**MK-CI 990-100 WA**	**MK-CI 990-150 WA**
Number of pole	P		176	176	176	176	176
Peak Torque	Tpk	Nm	4023	6700	9390	13400	20000
Continuous Torque (Water Cooling Dt100)	Twc	Nm	2124	3622	5095	7490	11200
Continuous Torque (Air Cooling Dt100)	Tac	Nm	1068	1724	2372	3290	4884
Stall Torque (Water Cooling)	Tswc	Nm	1622	2764	3890	5718	8521
Stall Torque (Air Cooling)	Tsac	Nm	815	1316	1777	2514	3728
Ripple Torque (Cogging Torque)	Tr	Nm	13	21	30	43	63
Power Loss at Twc	Pwc	KW	5,6	7,7	9,1	13	17
Power Loss at Tac	Pac	KW	1,4	1,6	1,9	2,3	3,1
Thermal Resistance Water Cooling	RthWc	K/W	0,018	0,013	0,010	0,007	0,005
Thermal Resistance Air Cooling	RthAc	K/W	0,078	0,064	0,053	0,043	0,032
Torque Constant	Kt	Nm/A	50,0	83,4	116,8	109,0	163,0
Back EMF Constant	Ke	V/1000 Rpm	3025	5041	7058	6576	9863
Maximum Speed at Ipk at 600 Vdc	Npk	RPM	31	17	9	13	5
Maximum Speed at Iwc at 600 Vdc	Nwc	RPM	74	43	29	33	20
Maximum Speed at Iac at 600 Vdc	Nac	RPM	105	63	44	49	32
Winding Resistance (Phase to Phase)	R20	Ω	1,28	1,66	2,04	1,1	1,5
Winding Inductance (Phase to Phase)	L	mH	10,25	16,5	22,7	13,6	20,2
Peak Current	Ipk	Arms	116	115,3	115,3	177	176
Continuous Current (Water Cooling Dt100)	Iwc	Arms	45,3	45,9	46	73	72,8
Continuous Current (Air Cooling Dt100)	Iac	Arms	21,9	21,2	20,9	31,2	31,2
Stall Current at 0 Speed (Water Cooling)	Iswc	Arms	34,6	35	35,1	56	55,6
Stall Current at 0 Speed (Air Cooling)	Isac	Arms	16,7	16,2	15,9	23,8	23,8
Maximum Winding Temperature		°C	130	130	130	130	130
Height of Rotor		mm	30	50	70	100	150
Height of Stator		mm	110	130	150	180	230
Outer Diameter of Stator		mm	1030	1030	1030	1030	1030

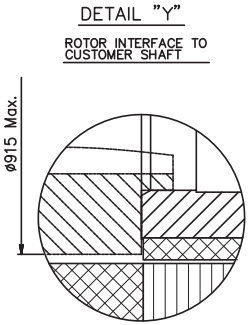










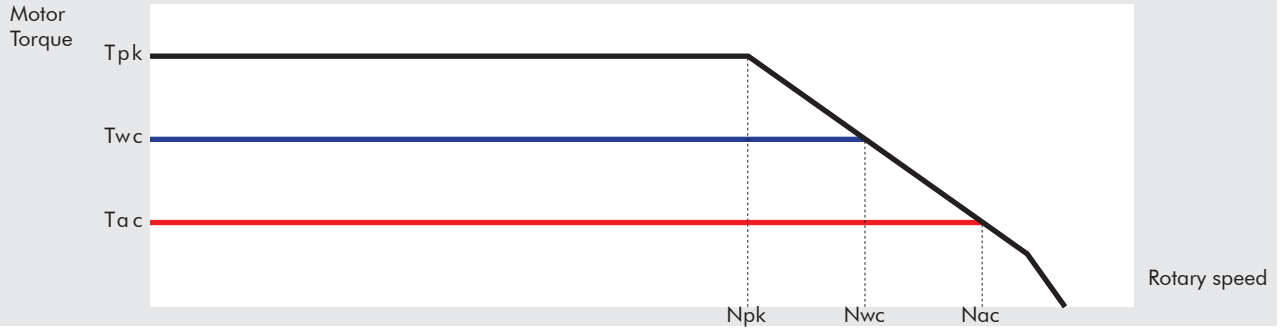


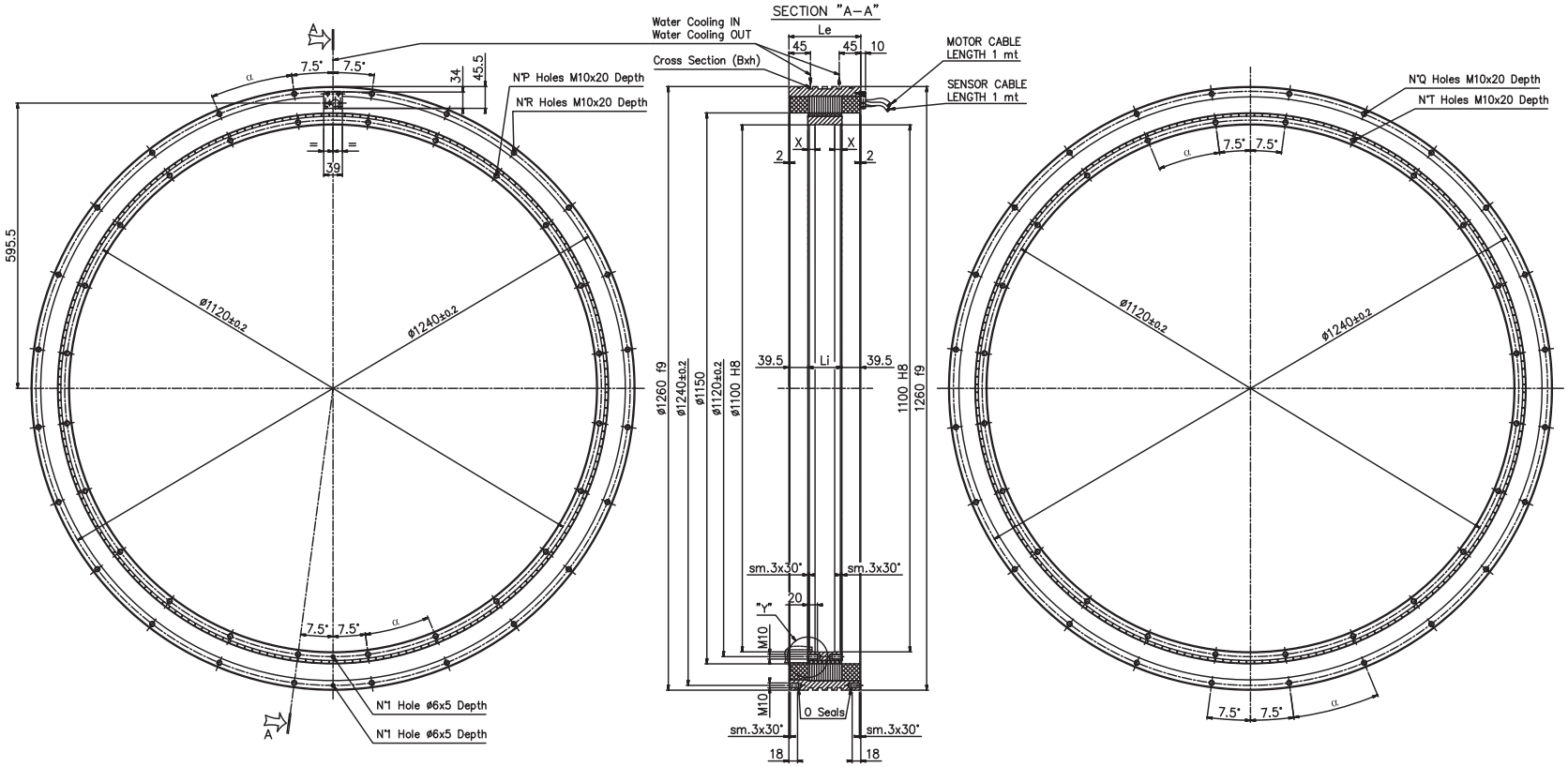
FOR TORQUE MOTOR TYPE MK-CI-990-150
ONLY CABLE OUTPUT CONFIGURATION MF

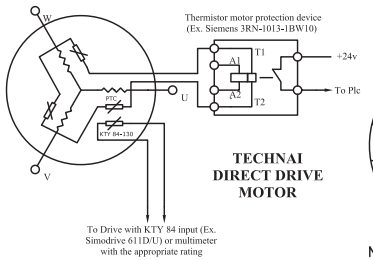
TYPE MK-CI-990		030	050	070	100	150
STATOR LENGTH	Le	110	130	150	180	230
ROTOR LENGTH	Li	31	51	71	101	151
CENTERING LENGTH	X	10	15	15	15	15
COOLING GROOVE WIDTH	B	8	8	9	8	9
COOLING GROOVE DEPTH	h	5	5	5	5	5
COOLING GROOVES	No	2	4	4	8	8
STATOR HOLES	P	24	24	24	24	46
	Q	24	24	24	24	48
ROTOR HOLES	R	24	24	24	24	47
	T	24	24	24	24	48
HOLES PITCH ANGLE	α	15°	15°	15°	15°	7.5°

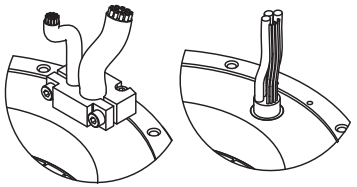
Motor Specifications TECHNAI MK-CI 1220 WA

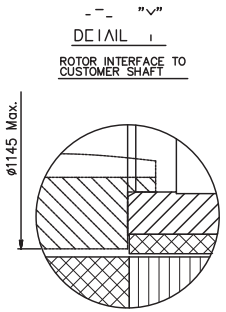
Motor Specifications	**Symbol**	**Unit**	**MK-CI 1220-030 WA**	**MK-CI 1220-050 WA**	**MK-CI 1220-070 WA**	**MK-CI 1220-100 WA**	**MK-CI 1220-150 WA**
Number of pole	P		220	220	220	220	220
Peak Torque	Tpk	Nm	6280	10470	14570	20850	31290
Continuous Torque (Water Cooling Dt100)	Twc	Nm	3377	5670	7691	11811	17300
Continuous Torque (Air Cooling Dt100)	Tac	Nm	1680	2715	3627	5228	7350
Stall Torque (Water Cooling)	Tswc	Nm	2578	4328	5871	9016	13240
Stall Torque (Air Cooling)	Tsac	Nm	1280	2073	2769	3991	5608
Ripple Torque (Cogging Torque)	Tr	Nm	25	40	56	80	120
Power Loss at Twc	Pwc	KW	7	9	10,5	16	21
Power Loss at Tac	Pac	KW	1,6	2	2,3	3	3,7
Thermal Resistance Water Cooling	RthWc	K/W	0,015	0,010	0,008	0,006	0,004
Thermal Resistance Air Cooling	RthAc	K/W	0,064	0,052	0,044	0,035	0,027
Torque Constant	Kt	Nm/A	78,0	130,3	150,5	147,3	220,9
Back EMF Constant	Ke	V/1000 Rpm	4721	7874	9107	8902	13353
Maximum Speed at Ipk at 600 Vdc	Npk	RPM	18	9	7	9	3
Maximum Speed at Iwc at 600 Vdc	Nwc	RPM	45	26	23	23	14
Maximum Speed at Iac at 600 Vdc	Nac	RPM	67	40	35	36	23
Winding Resistance (Phase to Phase)	R20	Ω	1,5	2	1,72	1	1,4
Winding Inductance (Phase to Phase)	L	mH	13	20,7	19,43	12,8	19
Peak Current	Ipk	Arms	115	115	139	203	203
Continuous Current (Water Cooling Dt100)	Iwc	Arms	46	46	53,8	84,9	82,8
Continuous Current (Air Cooling Dt100)	Iac	Arms	22	21,4	24,8	36,5	34,3
Stall Current at 0 Speed (Water Cooling)	Iswc	Arms	35	35	41	64,8	63,2
Stall Current at 0 Speed (Air Cooling)	Isac	Arms	16,8	16,4	18,9	27,8	26,2
Maximum Winding Temperature		°C	130	130	130	130	130
Height of Rotor		mm	30	50	70	100	150
Height of Stator		mm	110	130	150	180	230
Outer Diameter of Stator		mm	1260	1260	1260	1260	1260







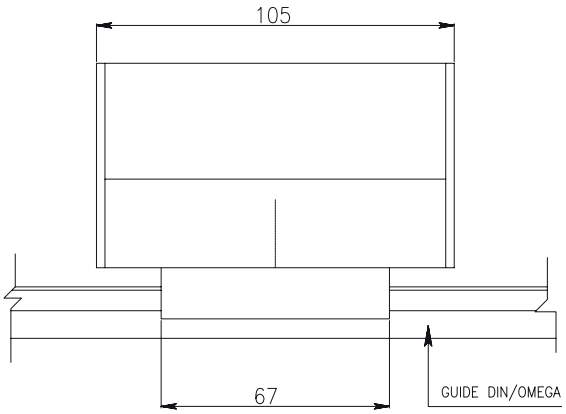


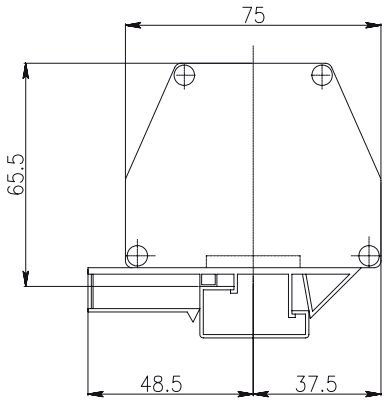


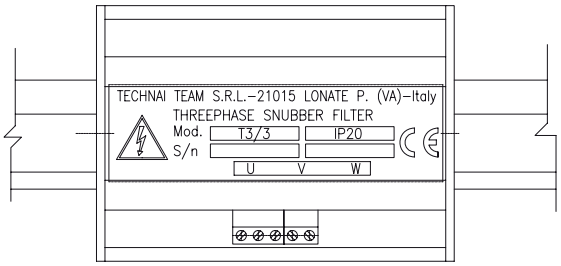
NOTE:
FOR TORQUE MOTOR TYPE
MK–CI 1220–100 AND MK–CI 1220–150
ONLY CABLE OUTPUT CONFIGURATION MF

TYPE MK-CI-1220		030	050	070	100	150
STATOR LENGTH	Le	110	130	150	180	230
ROTOR LENGTH	Li	31	51	71	101	151
CENTERING LENGTH	X	10	15	15	15	15
COOLING GROOVE WIDTH	B	8	8	9	8	9
COOLING GROOVE DEPTH	h	5	5	5	5	5
COOLING GROOVES	No	2	4	4	8	8
STATOR HOLES	P	24	24	24	24	46
	Q	24	24	24	24	48
ROTOR HOLES	R	24	24	24	24	47
	T	24	24	24	24	48
HOLES PITCH ANGLE	α	15°	15°	15°	15°	7.5°

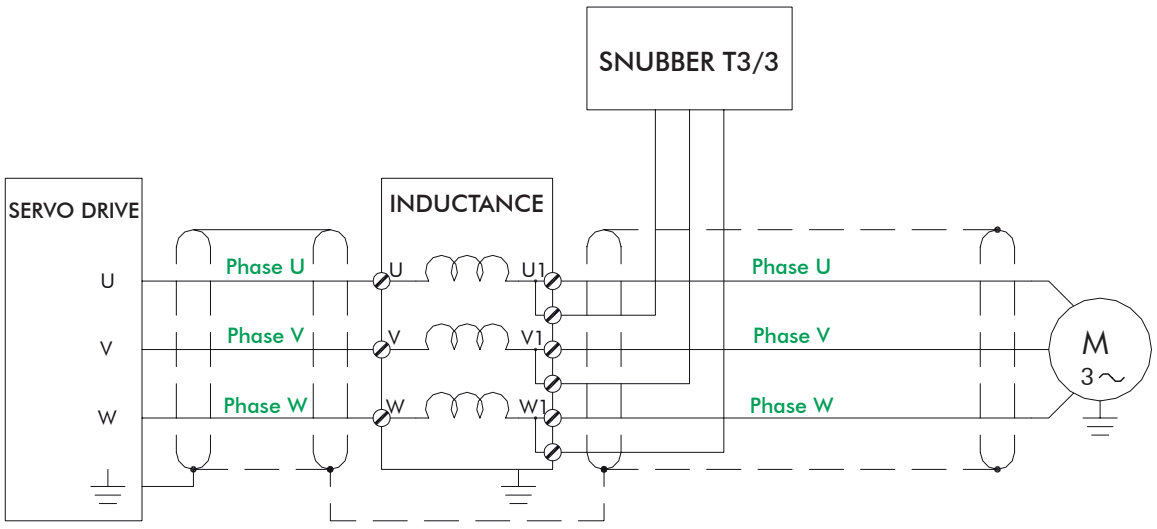
Overvoltage PWM filter suppressor



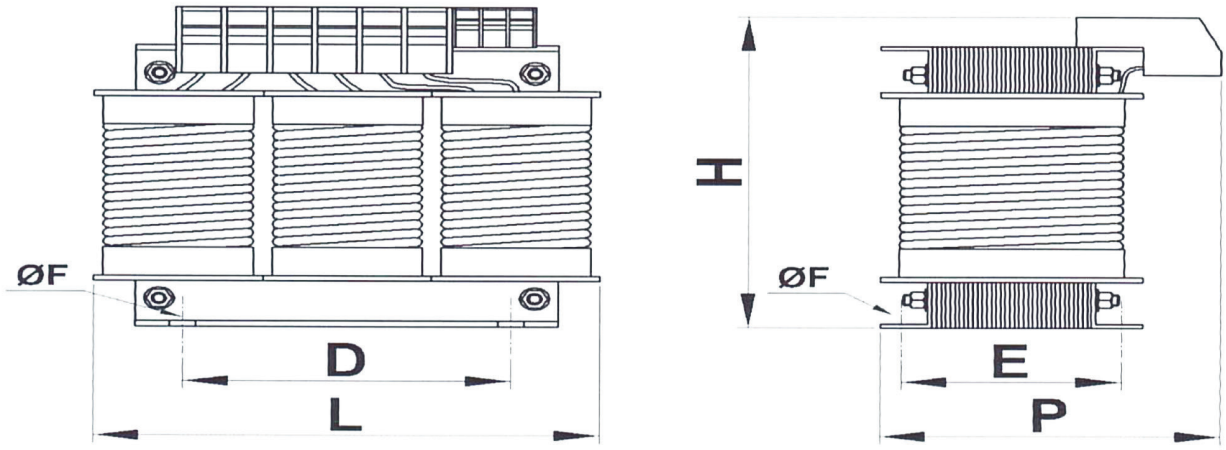




Connection Diagram SNUBBER T3/3



Dimensional features of three-phase chokes



COD	Ampere	Mh	Hz	dimensione / mm			Fixing / mm			Weight Kg
				L	P	H	D	E	F	
CEIN0034-0	10	0,7	50	120	95	125	78	60	5,5	2,4
CEIN0035-0	20	0,7	50	165	115	165	115	80	6,5	5
CEIN0032-0	30	0,7	50	165	115	180	115	80	6,5	5
CEIN0033-0	40	0,7	50	180	135	200	115	105	6,5	10,5
CEIN0027-0	40	0,1	50	120	100	140	78	60	5,5	2,8
CEIN0058-0	50	0,7	50	240	165	230	200	100	9	19,5
CEIN0025-0	60	0,7	50	240	155	230	200	100	9	19
CEIN0060-0	100	0,7	50	240	220	220	200	135	9	38
CEIN0074-0	150	0,7	50	360	200	320	225	130	9	73,5
CEIN0076-0	200	0,3	50	240	230	220	200	115	9	32

Technical Specification

- V=400/600 Hz =50/60
- CEI EN 61558
- Tropicalized Resin Impregnation
- Isolation class H
- Isolation KV 3
- Double Isolation windingcopper cl.H
- Vertical Execution

Your notes and other product information

YOUR PARTNER IN **DEVELOPMENT AND PRODUCTION** OF DIRECT DRIVE SOLUTIONS

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