Rowan Elettronica

The Italian Answer to Automation Problems

INVERTER 700 SERIES

BRUSHLESS SYNCHRONOUS VECTOR DRIVES

BRUSHLESS AC SERVOMOTORS

SYNCHRONOUS PM MOTORS

CSQ UNI EN ISO 9001

CERTIFIED IQNet MANAGEMENT SYSTEM

ENGLISH REV.7_01/06/2023

IMPORTANT!

ROWAN ELETTRONICA s.r.l. declines any responsibility for inaccuracies contained in this manual, due to printing errors and/or transcription. It also reserves the right to make at its discretion and without notice the changes it deems necessary for the better functioning of the product.
As for the details and characteristics reported in this manual there is a maximum tolerance of ±10%, unless otherwise stated. The relative diagrams are approximate and are to be perfected by the user.
The warranty on the products is understood as ex-works under the conditions specified in the appropriate document to be requested from the Commercial Department or through the website www.rowan.it

INDICE

ROWAN ELETTRONICA

INVERTER 700 SERIES

BRUSHLESS AC SERVOMOTORS

Rowan Elettronica s.r.l

COMPANY

Rowan Elettronica S.r.l. was established in the Seventies to manufacture variable speed motors and actuators based on proprietory patents. It has progressively developed and consolidated its standing thanks to the quality and reliability of its products and the high professionality and experience of its consultancy and assistence services, growing from its first factory of 200m² in Cresole of Caldogno (VI) to its current 3,000m², which include the manufacturing base and after sales assistance centre. Rowan Elettronica has a highly specialised technical staff who offer their tried and tested experience in the following departments:

- the **Electronics Research Laboratory,** which studies and creates new technological solutions, equipped with anechoic chamber and all necessary instrumentation for measuring and testing electromagnetic compatibility;
- the **Technical Department**, which produces the printed circuit board masters and electrical wiring diagrams using cutting edge IT instruments and a high level of professionalism and know-how;
- the **Quality Management Department**, responsible for the co-ordination of all activities concerning the Rowan Elettronica Quality System and supervision of the quality controls on all products entering and leaving the company;
- the **Mechanical Prototyping Department** studies and creates new mechanical solutions and versions of nonstandard motors;
- the **Production Departments:** ***AC Actuators - Inverters - Instruments/Interfaces/DC actuators - Motors***, which assemble and test all standard products;
- the **Automation Department,** where appliances equipment and switchboards receive a high portion of standard Rowan products and thereby offering the possibility to verify every detail in the application of Rowan components, particularly in their installation and improvement;
- the **Technical Assistance/Consultancy Department,** widely appreciated for its willingness (on average, the staff dedicate approx 8 hours a day on telephone assistance).

In addition to the technical departments, Rowan Elettronica has an efficient support organisation such as **Administration-Accounts**, **Sales Department**, **Commercial Department and Buying Department.**

PRODUCTION

- Single and three phase high speed AC motors and related one or two-way actuators for speed and/or torque control.
- Three-phase AC motors for inverters.
- Vector inverters and related motors with inner functions for positioning, synchronism, winding/unwinding and converters for voltage/frequency.
- Inverters for three-phase asynchronous motors.
- Single axis control instruments for electric axis, loading in motion, cutting in motion and positioner functions.
- Soft starters for three-phase asynchronous motors.
- Speed regulators for three and single phase commercial fan motors both indipendent or multiple.
- Three and single phase voltage regulators for resistive and inductive loads for DC power units.
- Drives for unidirectional/bidirectional DC motors
- Voltmeters/ammeters with displays for readings and set thresholds by on/off or PI outputs.
- Interface boards for signal converting, for setting proportional speeds between several motors, for converting signals from temperature probes, sensors, loading cells.
- Accessories for industrial automation such as safety devices, boards for ramp generating, thermoregulators, photoelectric bars, battery chargers and servo-diameter instruments.

QUALITY

Rowan Elettronica has received certification for its ***Quality System*** *according to UNI-EN ISO9001:2000, keeping in line with the increasing demand to univocally guarantee quality levels in implementing company procedures .*

With regards to Rowan product quality, this is a list of the main company control procedures:

- **Quality control of goods on arrival** carried out by specialist staff who strictly fulfill the procedures and test methods established for each single type of component, a continous thread of information is maintained with suppliers on material conformity and the possibility of improving aspects of performance and reliability.
- **Quality control on products on dispatch:** every product is individually tested according to specific procedures. On completion of the test each article is given a serial number that guarantees its traceability and identification at any time.

For example in **electronic products** sector the test procedure prescribes:

SPECIAL RESIN TREATMENT FOR BOARDS to prevent any malfunctions caused by humidity in the switchboards within the statutory limits.

GENERAL BOARD TEST CYCLE in real operating conditions. As each board enters the production line, it is assigned a test manual containing the procedures that are then rigorously and integrally carried out by the assigned technical staff. The test manual, among other important indications, also specifies the auxiliary equipment required for the test (which also undergo periodical controls and calibrations), the step by step sequence of tests and the standard setup.

For **motors,** the test procedure includes:

VERIFICATION OF RESISTENCE, IMPEDENCE, INSULATION (2000V).

VERIFICATION OF CHARACTERISTICS in no load operating conditions: this step tests characteristics such as absorption and noise levels and functionality of any other related components such as tachymetric dynamo, brake, encoder, fan, etc.

INVERTER 700 SERIES

INTRODUCTION

The **700 series** inverter coupled with their **brushless AC servo-motors** represent the most innovative and compact solution for the motion control needs with high dynamic and torque performance.
The speed and torque control are realized by the **FOC VECTOR** system with encoder feedback.
Their use is suitable when are requested:

> precise speed and torque control
> high dinamic performances
> shortest replay timing
> particularly functions available: positioner, process regulator, winding.

INVERTER 700 SERIES

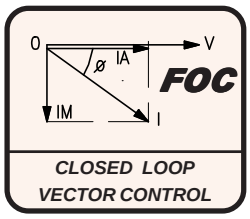
GENERAL FEATURES

> Digit control by DSP microprocessor.
> Semplified start-up menu (**BASIC DATA**) by setting those parameters strictly useful for a quick start.
> Possibility of **copying all parameters** into two internal memories and restoring them onto job memory.
> Possibility of **restoring the default setting of all parameters.**.
> Possibility of **bidirectional transfer** (copy / restore), through a USB port, of all the memories of parameters in an external EEPROM KEY available separately (cod. C411S.A).
> Software "Rowan Key Manager" for saving the EEPROM KEY parameters into a file and vice-versa.
> **Standard INPUT/OUTPUT resources** (digital/analog) fully programmable, including:
6 digital inputs, 3 relay outputs, 4 analog inputs, 4 analog outputs, 2 inputs for 125Khz line driver encoder .
> Possibility of **expanding the I/O resources** by including the optional expansion drive, having:
7 digital inputs, 5 digital static outputs, 1 input for 125Khz line driver encoder.
> **Keypad with remotation and customization possibility** for direct use as terminal on a panel at a side of the machine.
> Network holes managing for limitation of down-times.
> Possibility of **automatic re-start** after fault.
> **Electrical thermic protection** of the inverter, the motor and the braking resistance.
> **RS485 standard serial control** up to 115200 bps by MODBUS RTU. Modbus-RTU

> **Optional serial control:** PROFIBUS DPV1, CAN OPEN, MODBUS TCP/IP, ETHERCAT and PROFINET.

PROFIBUS® CANopen Modbus TCP EtherCAT PROFINET®

> **<u>Vector control (FOC) (SPEED applicative):</u>**
- high precision bidirectional speed control and high dynamic performances.
- speed feedback by line driver encoder.
- motor torque control with two separate rotational directions and precise displaying in Nm.
- speed set can be set by analogic input, keypad, moto-potentiometer, 10 constant speed reference selected by digital input, modbus.
- 3 different speed sets are selected by digital inputs.
- 3 speed limits are selected by digital inputs.
- 3 different acceleration speed ramps can be selected by digital inputs.
- 3 different deceleration speed ramps can be selected by digital inputs.
- 2 thresholds on speed motor can be selected.



CLOSED LOOP VECTOR CONTROL

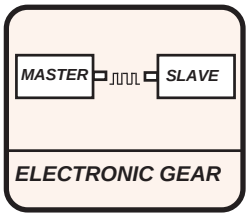
> **Functions available:**
- **AXIS** function implements a position control of the motor.
- **REGULATOR** function implements a closed loop control for compressors, fridges, pomps and cutting application with constant current.
- **DIE CUTTER** function suited for motor position control and PRINT ROLLER or DIE CUTTER motorization.
- **WINDER** function for winding and unwinding application.

> **Available inverter codes relatives to their applicative function:**
- **C700A (SPEED + AXIS)**
- **C700R (SPEED + REGULATOR)**
- **C700F (SPEED + AXIS + DIE CUTTER)**
- **C700W (SPEED + WINDER)**

> **Special function:**
- **Safe Torque off (STO) safety function:** it is a function that allows you to implement an EMERGENCY RESPONSE with safe inhibition of the motor torque; in this case the motor becomes free to rotate in based to its own inertia and that of the load.

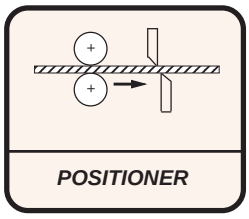
C700A AXIS inverter

ELECTRIC MASTER/SLAVE SHAFT



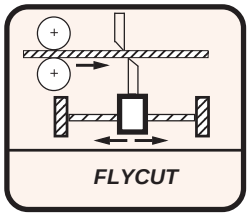
- Encoder master input in LINE DRIVER logic, max 125KHz.
- **Electric shaft** function **without** mechanical master/slave step references (e.g. to sync conveyor belts, neutral material cutting without reference notch, bridge cranes etc.).
- **Electric shaft** function **with** mechanical master/slave step references (e.g. packaging machinery with spot sync, printing machines, to sync chain conveyors with station passage etc.).
- Master/slave ratio selectable from 4.00000 to 0.00466 or directly in product format (mm); the value can be set by:
  > inverter keypad;
  > digital input in binary code, 32 ratios are manually set;
  > modbus serial port.
- Programmable outputs:
  > sync error;
  > anticipated slave;
  > delayed slave.

POSITIONER

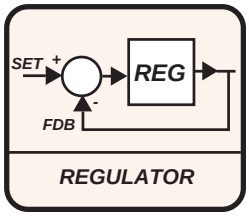


- Positioning: ABSOLUTE, RELATIVE NOT ZEROING, RELATIVE WITH ZEROING.
- Zero search by external sensor or encoder zero notch, with or without pre-slowdown.
- Feedback from motor encoder or external encoder (e.g. metric wheel, optic rule).
- Items-counter function with automatic-stop at program ending.
- Target position set and display of real position with precision from 0 to 3 decimal.
- 32 positioning values, 8 positioning speeds, 8 acc/dec positioning ramps can be selected by digital input or modbus serial port.
- Variable speed during the positioning operation.
- pre-positioning output.
- JOG controls;
- position values memorization at switch-off.
- Software limit switch activation.
- Programmable outputs:
  > positioning tolerance;
  > zero searching completed;
  > sync error;
  > end of items-counter program;
  > 2 thresholds on slave position.

FLYING CUT



- Cutting start from master measurement or from spot reading by shiftable digital input.
- Cutting point run-up and return programmable ramp.
- Return to home position settable by digital input or maximum position value.
- Programmable output:
  > slave/master synchronism.



C700R REGULATOR inverter

STANDARD FEEDBACK REGULATOR (Function 0)

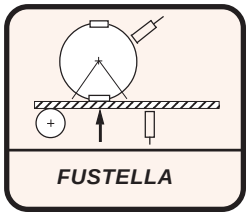
- Feedback from 0 /+10Vdc, +/-10Vdc, 4÷20mA, 0÷20mA signal, by programmable analog input.
- Proportional/Integral regulation.
- Maximum and minimum speed.
- NTC or PTC temperature probe for motor protection.
- Reversible regulation direction.
- Minimum or maximum alarm/fault with delay setting.

SPECIFIC REGULATION FOR COMPRESSORS, PUMPS, FRIDGE CELLS (Function 1)

- Operation level setting by 0÷10Vdc, moto-potentiometer, potentiometer, keypad.
- Feedback from transducer 0 /+10Vdc, +/-10Vdc, 4÷20mA, 0÷20mA.
- Mimimum, maximum speed and delayed stop setting.
- Positive and negative regulation setting.
- Pressure hysteresis and restart temperature setting.
- Proportional and Integral gain setting.
- 3 V/F curves for each different tipe of load (pumps, fans, etc...) has already been set in scalar control.
- Overload start.
- Speed reduce setting in relationship with overload.
- Reading/Display oil temperature by PTC/NTC probe.
- Speed reduce setting in relationship with oil temperature or motor temperature and delayed stop if the temperature stays over the limit (the delay can be set).
- Stand-by operation state if the temperature is too low.
- Memorization of work time.
- Period time setting for oil maintain.
- Customizable keypad.

FUNCTION 2

Regulator for marble, wood, metal, etc... cutting systems
The P/I controller adjusts the speed of the motor for the translation operation then the current of the motor used for the cut operation is maintained constant by one of the following solutions:
A) The inverter implements a direct control of motor speed for the cut operation and the P/I regulator adjusts the external drive for the translation movement by a programmable analog output.
B) The inverter implements the direct control of motor speed for the translation movement by the P/I regulator; the current feedback is read by a programmable analog input (TA signal or 0÷10 V).
Important functions:
- Speed regulation of the motor for cutting operations;
- JOG function for manual translation;
- Manual adjusting of the translation speed;
- Manual adjusting of the motor current for the cutting operation;
- Switch between MANUAL/AUTOMATIC and vice-versa; at the moment the motor current for the cut operation is maintained constant.
- Alarm setting for minimum and maximum current;
- A delay can be set for alarm reaction.

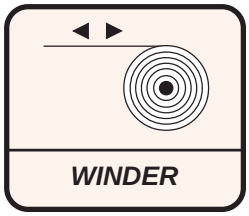


C700F DIE CUTTER inverter

DIE CUTTER

In 700 F series, in addition to 700A applicatives, a DIE CUTTER / PRINT ROLLER functionality is enabled. This function allows a in different sizes, digitally settable, cut or print of a material layed on pulling tape master keeping the same roller diameter. A cutting zone is settable where the cutting/printing roller moves at same materiale speed, in the other turn part a alternate speed profile will be executed depending on the set sizes.
Some example of applicative fields are:
- cut or pre-cut of paper on measure
- packages die cutting
- pad printing
- gluing parts on packages

The die cutter applicative is suitable on neutral material or with master referement notch, in this case an automatic centrature position is also provided through master/slave signal with possible digital shift.
Following resources are available in 700F series:
- master referement notch and slave die cutter position inputs (a fast input module is available as optional, sampling time 10 microseconds, standard 1 microsecond)
- line driver encoder input (max 125 kHz) of pulling tape master
- possibility to manage more than one cutter/printer camme
- function parameters (cutting size, shift, etc...) settable through keypad, I/O or cummunication field bus.



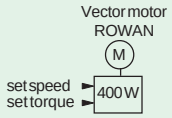
C700W WINDER inverter

BASE FEATURES AVAILABLE IN EACH FUNCTION

- Speed reference is read by a programmable analog input or by encoder.
- The reel diameter can be determined by one of following solutions:
  - > internal operations based on speed reference reading by analog input;
  - > internal operations based on speed reference reading by encoder;
  - > internal operations based on the number of winding (the initial diameter must be set);
  - > a sonar probe connected to a programmable analog input;
  - > an electro-mechanical tracer or analog sensor connected to a programmable analog input;
  - > In steady state, only for the DANCER function, by control of the dandy roll.
- The reel diameter can be memorized on eeprom memory at switch-off.
- The diameter acquisition can be freezed by a programmable input.
- The winding direction can be selected by a programmable input.
- Programmable inputs for JOG controls.
- Minimum and maximum diameter alarm and relative programmable outputs.
- Available winding/unwinding functions: SPEED/TORQUE, STRETCH, CELL, DANCER, MASTER;
- Switching between the different functions is possible by a different combination of programmable digital inputs.

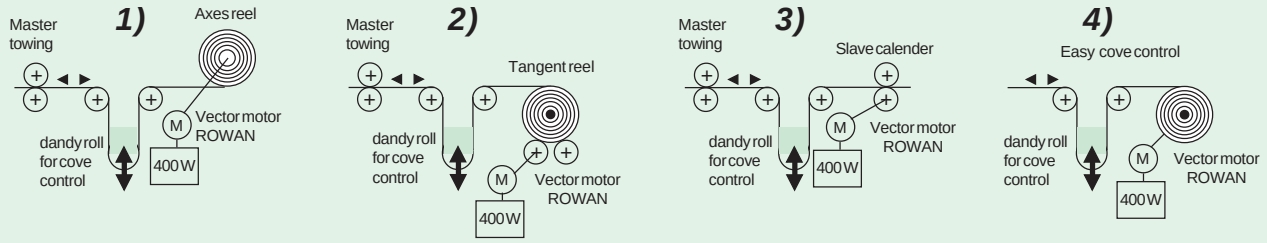
WINDING/UNWINDING FUNCTIONS DESCRIPTION

Function: SPEED/TORQUE



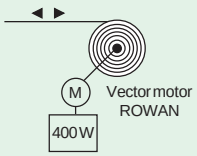
In this function the speed and torque of the motor are separately controlled, the control specs can be selected by the final user.

Function: DANCER - winding/unwinding



This function is suitable for every system where a cove of material is needed, between a master towing and reel or slave calender.
This control is utilized for the following systems:
1) **axes motorized reel,** 2) **tangent motorized reel,** 3) **slave calender.** 4) **easy cove control without speed reference.**
Other important features:
- programmable output for ready tensioning;
- programmable output for dandy roll ready in central position.

Function: MASTER - winding/unwinding



This function is suitable for axes motorized reel systems and where a constant tangential speed is needed indipendently from the diameter variation.
Other important features:
- Two possible controls for the linear speed are available:
  > P/I regulator and closed-loop control with feedback from tacho generator or encoder;
  > reel diameter reading (sonar, potentiometer, winding-counter).

Inverter supply voltage to L1, L2, L3 terminals

Threephase voltage supply:
..... from 320VAC to 490VAC (standard power supply 380/460VAC)
..... from 380VAC to 560VAC (standard power supplies 440/460VAC), only on request

U V W motor output

Types of motor ..... Rowan AC Brushless magnet permanent motor
Motor control ..... FIELD ORIENTED VECTORIAL, FEEDBACKED BY ENCODER
Output voltage ..... from 0 to 100% of the voltage supply
Output frequency ..... 0Hz - 800Hz
Wave type ..... sine wave
Wave type reconstitution ..... PWM (Pulse With Modulation)
PWM frequency ..... To be set from 0.50KHz to 16.00KHz
Overload capacity with PWM at 5KHz ..... <110% of the inverter rated current in continuos service
..... >110% of the inverter rated current for 300sec
..... max 175% of the inverter rated current for 30 sec (variable value basing on inverter size)
..... max 250% of the inverter rated current for 3 sec (variable value basing on inverter size)

Regenerative braking control

With braking module ..... included in all inverters 700-Series
Regenerated energy dissipation system external resistance connected to F+ and F clips

Digital inputs

Nr of digital inputs ..... 6 as standard (I1..I6) + 1 by 702S optional card (I7)
Input insulation ..... optoinsulated in case of external feeding
Connection logic ..... NPN or PNP
Activation voltage ..... 15Vdc min., 30Vdc max.
Programming ..... I1 input with fixed run function. The remaining completely programmable
Input resistance ..... about 3,6Kohm
Enabling/disabling times ..... 10ms, 20ms with pulse control

Digital inputs for Hall Probes

Nr of digital inputs from encoder ..... 3 by 702S optional card (I8, I9, I10)

Pulse digital inputs

Encoder nr. ..... 2 as standard + 1 by 702S optional card
Encoder 0 inputs nr ..... 2 by 702S optional card
Input insulation ..... optoinsulated
Connection logic ..... encoder line driver push/pull output
Encoders voltage supply ..... 5Vdc, short circuit protected
Max. frequency 125Khz
Encoder single channel current load . 10mA
Logic state 1 voltage (5Vdc encoder) . more than 2,7Vdc

Relay outputs

Relay nr 3 (O1, O2, O3)
Programming ..... completely programmable
Contact nr per relay ..... one NO/NC exchange
Contact current-carrying capacity 0.5A 120Vac- 1A 24Vac

Digital outputs

Output nr ..... 2 (O4, O5) just by 702S optional card
Output insulation ..... optoinsulated in case of external feeding
Connection logic ..... NPN or PNP
Programming ..... completely programmable
Job voltage supply ..... max. 100Vdc
Max. current 80mA
Enabling/disabling times 12ms

Analog inputs

AI1 ..... differential +/-10Vdc...12bit (14 bit on request)...sampling time 1ms
AI2 ..... differential +/-10Vdc, 4-20mA, 0-20mA...12 bit...sampling time 5ms
AI3, AI4 ..... +/-10Vdc...12bit...sampling time 5ms
AI5 (just by 702S optional card) ..... +/-10Vdc...10bit...sampling time 16ms
Programming ..... completely programmable

Analog outputs

AO0 ..... 12bit...updating time from 2,6ms (jst for FAST variables) to 6,6ms
AO1 ..... 12bit...updating time 6,6ms
AO2, AO3 ..... 8bit...updating time 20 ms
Output supply voltage ..... +/-10Vdc
Output current ..... max. 10mA
Programming ..... completely programmable

Serial connection

RS485 standard records ..... MODBUS RTU...ROWAN
Baudrate ..... 1200..2400..4800..9600..19200..38400..57600..76800..115200
Insulation..... optoinsulated
Protocols on optional card ..... PROFIBUS DPV1, CANOPEN, MODBUS TCP/IP, ETHERCAT, PROFINET

Available voltage supply

+10Vdc, -10Vdc (for potentiometers) . .max. 10mA
+24Vdc (for inputs or other devices) .. short circuit protected...max.250mA
+5Vdc (on request for encoders or sensors).....insulated...short circuit protected...max.500mA
+5Vdc ..... insulated, short circuit protected...max.200mA
+15Vdc ..... short circuit protected...max.200mA

Protections

Inverter ..... Fault for thermal/electronic protection (I x I x t) on overloading on U, V, W terminals
..... Fault for protection on max. peak current U, V, W
..... Fault for progr. time-threshold protection on output current on U, V, W terminals
..... Fault for short circuit among U, V, W phases and between the phases and ground
..... Fault for BUSDC overvoltage
..... Fault for overheating of IGBT modules
..... Alarm without fault for BUSDC capacitors life
..... Fault for short circuit on F and F+ terminals for braking resistor connection
..... Line voltage dips protection (always enabled) and managing (if enabled)
Motor ..... Fault for thermal/electronic protection (I x I x t) on overloading
..... Fault for overspeed
Braking resistor ..... Fault for threshold thermal/electronic protection on prolonged overloading

Special applications

..... ELECTRIC SHAFT (Code 700A)
..... FLYCUTTER (Code 700A)
..... DIECUTTER (Code 700F)
..... POSITIONER (Code 700A)
..... REGULATOR (Code 700R)
..... WINDING/UNWINDING (code 700W)

Environmental characteristics

Working temperature ..... from -5°C to +40°C
Heatsink temperature ..... rom -5°C to +70°C
Storage temperature ..... from -25°C to +70°C
Altitude ..... max. 1000mt a.s.l. (over this the load must be reduced by 1% every 100mt)
Protection level IP20
Relative humidit ..... from 5% to 95% without condensation

Law conformity and electromagnetic compatibility

The 700-Series drivers have been designed to operate in an industrial environment. They are **EC products** in compliance with the **EMC 2014/30/CE** directive with reference to the **CEI EN 61800-3 (Cat. C2)**, if connected following the wiring system in Chapter 3,4 and 7.
As for the models without internal filter, they are in compliance with the EMC directive only if connected to the relevant filtering devices supplied separately.
Moreover the drives are in compliance with the **Low Voltage directive LVD 2014/35/UE** with reference to the **CEI EN 61439-1/2** and **CEI EN 60204-1** standards.
Caution! This product belongs to the restricted sales distribution class in compliance with **EN61800-3 (Cat. C2)** standard. In a domestic environment this product may cause radio interferences, in which case the user may be required to take adequate safety measures.

INVERTER 700 SERIES — TECHNICAL FEATURES

Summary table of power electrical features for inverter series 700 from /P to /2

INVERTER POWER SERIES				/P	/R	/0	/0M	/1	/L	/2
MAX. POWERS APPLICABLE IN U - V - W OUTPUTS	LINE 230Vac	Pmotor* kW		0,6	1,3	1,7	2,3	3,5	4,5	6,5
	LINE 400Vac	Pmotor* kW		1,1	2,25	3	4	6	7,5	11
NOMINAL CURRENT IN L1 - L2 - L3 INPUT	LINE 230-400Vac	A		3	5	7	9	12	15	22
	LINE 230-400Vac with reactance	A		2,25	3,75	5,2	7	9,2	11,5	17,5
NOMINAL CURRENT IN U - V - W OUTPUT	LINE 230-400Vac	A	MAX SETTINGS	3	5	7	9	12	15	22
			ABSOLUTE*	3,3	5,5	7,7	9,9	13,2	16,5	24,2
MAX. CARD BLOCK CURRENT IN U - V - W OUTPUTS		A		8,5	23	20	25	34	42	62
L1- L2- L3 GL INPUT PROTECTION FUSES		A		4	6	10	16	16	20	25
BRAKING CURRENT IN CONTINUOS SERVICE WITH MINIMUM OUTPUT RESISTOR F F+	LINE 230-400Vac	A		5,3	5,3	11	11	11	14	25
MINIMUN BRAKING RESISTOR F F+ OUTPUT	LINE 230Vac	OHM		150	150	73	73	73	57	32
	LINE 400Vac	OHM		150	150	73	73	73	57	32
MAX. DISSIPATED POWER (AT 4KHz PWM)		kW		0,13	0,16	0,17	0,25	0,34	0,43	0,58
COOLING FAN				NO	NO	NO	YES	YES	YES	YES
INTERNAL EMI FILTER		LINE 230-400Vac		YES	YES	YES	YES	YES	YES	YES

* **Pmotor KW =** Maximum power of the motor applicable in output of the inverter based on the data plate of a 4-pole standard asynchronous motor. In case of motors with different poles, check the compatibility with the maximum current in output to the inverter (6 - 8 poli).

* **ABSOLUTE** = Max. limit of the output current U-V-W in S1, without the fault intervention

Inverter derating according to PWM frequencies

Caution !

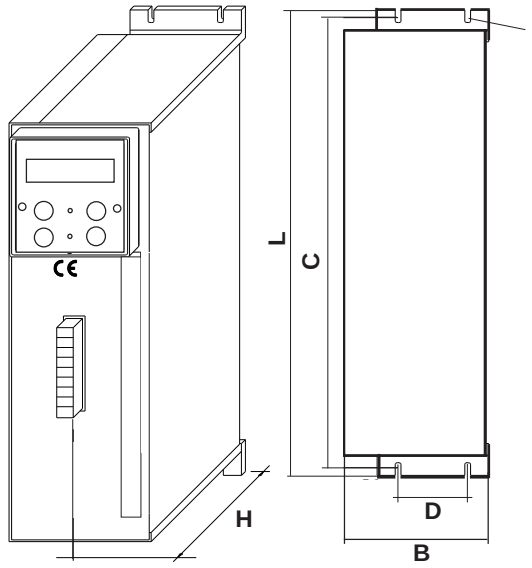
Rated max. powers in the tables are allowed for PWM frequencies up to 5KHz. For higher frequencies the inverter must be derated following the diagrams on the right.

As for PWM frequency setup, see parameter group: 1.12.PWM GENERATOR

INVERTER 700 SERIES

TECHNICAL FEATURES

Dimensions and weights for inverters from 700/P to 700/1

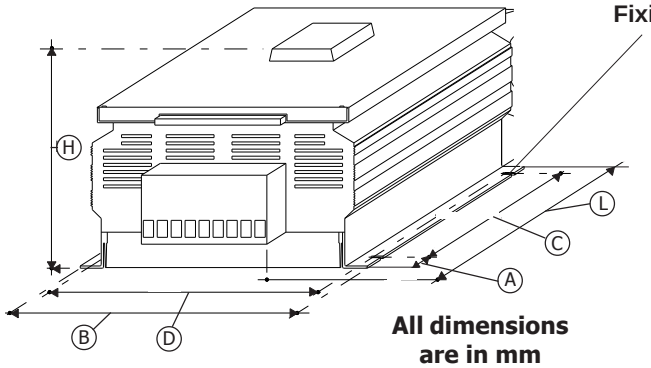


Fixing holes are intended for 4MA screws

INVERTER POWER SIZES	H	B	L	C	D	WEIGHT KG	EMI INTERNAL FILTER
/P	200	90	285	275	60	2,7	YES
/R	200	114	285	275	60	2,8	YES
/0 /0M	200	134	365	353	60	3,5	YES
/1	200	134	365	353	60	3,6	YES
/L	200	134	365	353	60	4	YES

All dimensions are in mm

Dimensions and weight for inverter /2



Fixing holes are intended for 5MA screws

INVERTER POWER SIZE	H	B	L	A	C	D	WEIGHT Kg	EMI INTERNAL FILTER
/2	180	265	385	75	200	253	8	YES

All dimensions are in mm

Table of threephase anti E.M.I. filters and ferrite toroids for different inverters

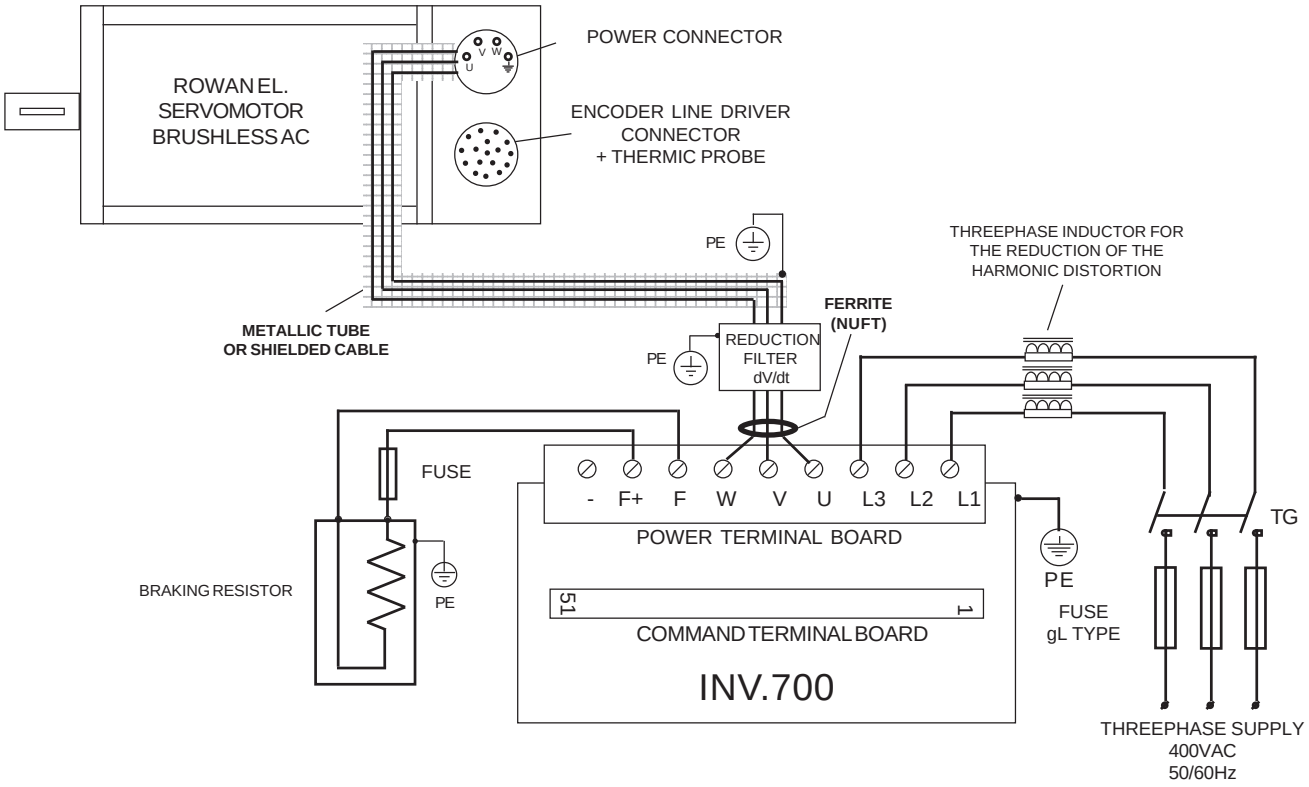
INV.700 POWER SIZE LINE 230VAC-400VAC	CODICE FILTRO EMC	In FILTER (A)	FILTER LEAKAGE CURRENT (1) (mA)	INVERTER OUTPUT WIRES SECTION (mm^2)	PASS NR. THROUGH THE TOROID	TOROID NR	TOROID CODE
/P	INTERNAL FILTER	/	3,5	1	3	1	NUFT19
/0	INTERNAL FILTER	/	3,5	1,5	3	1	NUFT19
/0 /0M	INTERNAL FILTER	/	3,5	1,5	3	1	NUFT19
/1	INTERNAL FILTER	/	3,5	2,5	3	1	NUFT19
/L	INTERNAL FILTER	/	3,5	2,5	3	1	NUFT19
/2	INTERNAL FILTER	/	3,5	4	3	1	NUFT38

(1) This is the EMI filters (inner or external) maximum leakage current to ground in normal and good functioning conditions (460V/50Hz).
ATTENTION: If two phases cut off, the leakage current can reach 6 times the values we have in normal conditions.
* If there are connections with several cables of high section, ROWAN EL. can supply terminals useful to simplify the connection (ask Rowan Elettronica Techn.Dept.).
Filters characteristics for line 690VAC can be supplied by Rowan Elettronica Techn. Dept.

Reducing the harmonic distortion

Inverters cause current harmonic distorsion; the user shall value if the environment or the plant where the inverter is installed needs a reduction of the harmonic distortion as per standards CEI EN 61000-3-2 (In<=16A, directly connected to the public network at low voltage) and CEI EN 61000-3-12 (16A<In<=75A, directly connected to the public network at low voltage); in this case Rowan Elettronica supplies, on request, filters for reduction of the harmonic distorsion as written on the following table.

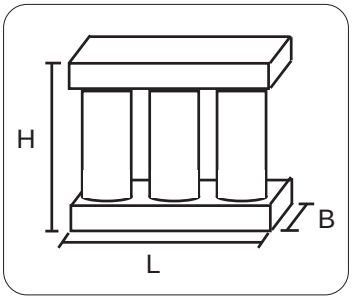
Connection of the filter for the reduction of the harmonic distorsion:



As well as reducing the harmonic distortion, this inductor reduces the effective current absorbed by the inverter and gives also better drive protection against possible power losses and peaks coming from the supply line. In particular, it reduces those current peaks crossing the condensers inside the inverter, which helps them lasting longer.

Table of filters for reducing the harmonic distortion for different inverters

FILTER REACTANCE CODE	In (A)	DISSIPATED POWER at In (W)	DIMENSIONS (mm)			WEIGHT (Kg)	POWER INVERTER SIZE LINE 230-400V
			L	B	H		
RZT.5A.5,6	5	16	120	66	115	3	/P (2,25A) /R (3,75A) /0 (5,2A)
RZT.12A.2,2	12	27	150	90	147	6	/0M (7A) /1 (9,2A) /L (11,5A)
RZT.22A.5,6	22	42	180	89	147	7	/2 (17,5A)



Dimensions of filer for reducing the harmonica distortion (reactance)

Reducing dV/dT transients to the motor

The voltage supplied the motor connected to the inverter is obtained using the PWM (Pulse With Modulation) technique, which means that it is formed by a sequence of variable duration pulses. The high increasing speed of the voltage of these pulses (dV/dt) can cause high dispersion currents through the motor supply cables, as well as between the motor winding themselves, and also between the motor windings and the motor body. A high dV/dt also determines very high voltage paeks on the motor windings, through the intrinsic inductance of the connecting wires.

In order to reduce all problems arising from the presence of dispersion currents and high overvoltage on the windings, a range of filters reducing the dV/dt has been produced. Their related codes, power sizes and dimensions are given in the following table:

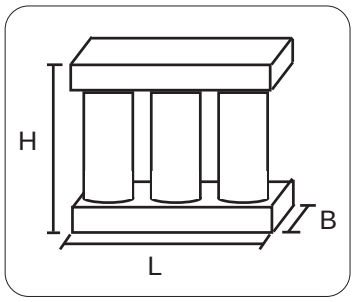
dV/dt reduction filter table for different inverters

FILTER CODE dV/dt	In (A)	POWER DISSIPATED In (W)	DIMENSIONS (mm)			WEIGHT (Kg)	POWER INVERTER SIZE LINE 230-400V
			L	B	H		
FIT.DV/DT.25A	25	27	150	82	147	3,6	/P (3A) /R (5A) /0 (7A) /0M (9A) /1 (12A) /L (15A) /2 (22A)

The filters for dV/dt reducing should always be used if the winding insulation level of the motor is not known, or else with motors that were not purposely manufactured to be connected to an inverter.

These filters should also be used each time wires between the inverter and the motor are longer than 15m.

The dV/dt reducing filter should be positioned between the ferrite toroid and the motor next to this toroid, as shown in the diagram on the previous page.



Max. dV/dt reduction filters dimensions

Electrostatic discharges (ESD)

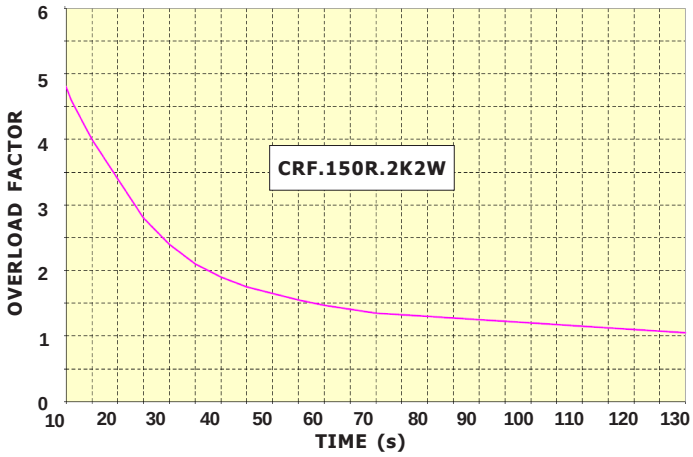
The inverter contains some components that may be harmed by electrostatic discharges (ESD).
For that reason it is important to follow the present advises:

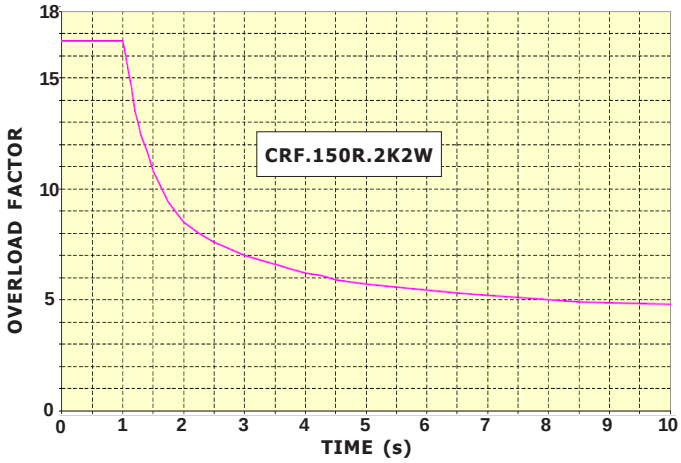
- touch the internal cards only when strictly necessary.
- before handling the cards, provide for discharging yourself electrostatically .
- the cards have not to be touched by very insulating materials (for ex. textile fibers) especially when they are running.

Table of braking resistors for Rowan inverters

DATA	units	RES.180R. 600	CRF.150R. 2K2W
NOMINAL POWER	W	600	2200
RESISTOR	ohm	180	150
NOMINAL CURRENT	A	1.8	3.8
CURRENT MAX x 5 sec	A	2.5 (5s ON- 25s OFF)	9.2 (5s ON- 30min OFF)
PROTECTION FUSE gL	A	2	4

To facilitate the choice of the type of resistance CRF (and any combinations series / parallel) as a function of the working cycle, are depicted below the curves of overload. WARNING! The curves refer to a single overload with a maximum ambient temperature of
40 ° C and a resistor installed in a location where it is ensured proper air circulation. The average time that the resistor employ to move back to the ambient temperature is between 20 and 30 minutes, depending on the cooling conditions.





Installation in a cabinet

This kind of installation is generally used in case of intermittant use of the resistors, with high, but distanced current peaks, in order for cabinet and other devices temperatures not to increase too much over their continuous duty cycle limits. In this case, current and power nominal values must be applied, but with **5% duty cycle**.

- **RES.180R.600** resistor, made of ceramics and protected by an ultra slim covering, must be fixed in close contact with the panel components supporting sheet.
- **RES.CRF.xxR.xKxW** resistors, closed in a IP22 panel without ventilation, must be mounted vertically as shown in the drawings of the page on the right.

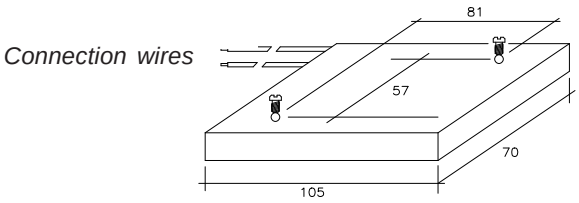
External installation

This kind of installation is used when it is neccessary to dissipate in countinuos duty cycle as much power as possible of the brake resistor, with or without ventilation. The current and power in duty cycle 100% characteristics shown in the table are related to the following mounting conditions:

- **RES.180R.600** resistor must be fixed onto a cooler, which is able to discharge **0,5W/°C**.

Caution! with this features, the flat resisitor external temperature may reach about **300°C**.
Arrange for proper protections against accidental contacts.
Non ventilated resistors in IP22 cabinet **CRF.xxR.xKxW**, and ventilated **CRF.xxR.xKxW.V** must be mounted in vertical position as indicated in diagrams on the facing page.
Caution! with this features, the temperature of the air coming out from the container slits may reach about **400°C**.
Arrange for proper protections against accidental contacts.
Caution! the ohmic value of the braking resistor can't be lower than that estimated in: **"OUTPUT F F+MIN. BRAKING RESISTOR"** tables of Chapter 5: TECHNICAL FEATURES.
In inverter from /3 size up to /F size, the output for connecting the braking resistance (F and F+) is protected against the short circuit (indicated by the inverter blockage with FAULT13). In sizes from /P up to /2 there is no protection, therefore we suggest using a protection fuse on terminal F+.
For safety reasons, insert a protection fuse in series connection with the resistance on F+ terminal, as shown

RES.180R.600 braking resistor dimensions



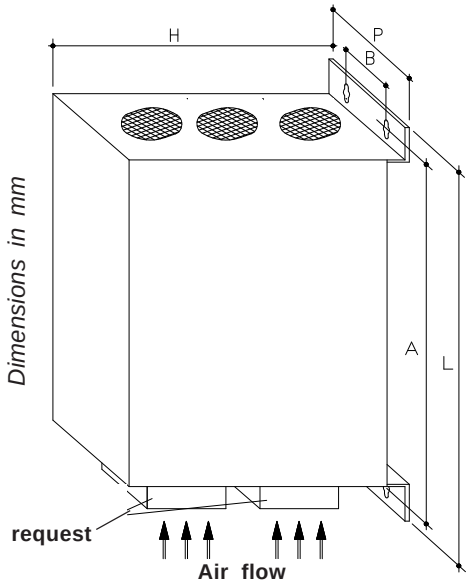
Dimensions in mm

Braking resistors in CRF.xxR.xKxW container dimensions

RESISTOR CODE	H	B	L	A	P	WEIGHT (KG)
CRF.150R.2K2W	322	67	486	458	120	7

Resistance value

Power



Available versions:

C R F. x x R . x K x W: Standard version without ventilation

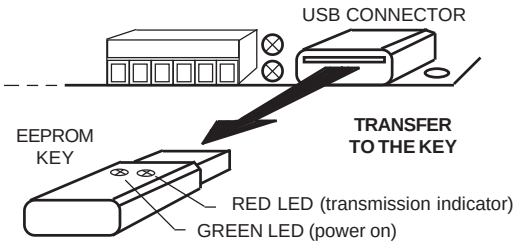
C R F. x x R . x K x W.V: Standard version with ventilation

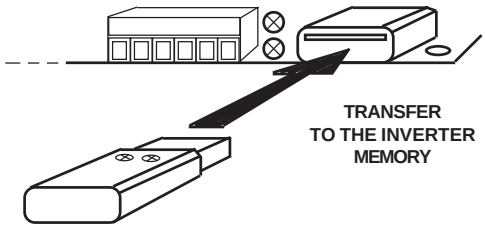
C R F. x x R . x K x W.VL: Standard version with ventilation with fan fault relay

INVERTER 700 SERIES

EEPROM KEY AND PROGRAMMING SOFTWARE

All Rowan Elettronica inverters have an USB port, then it's possible to transfer all the inverter parameters from the inverters memory to the EEPROM key (**cod. C411S**) or vice-versa:



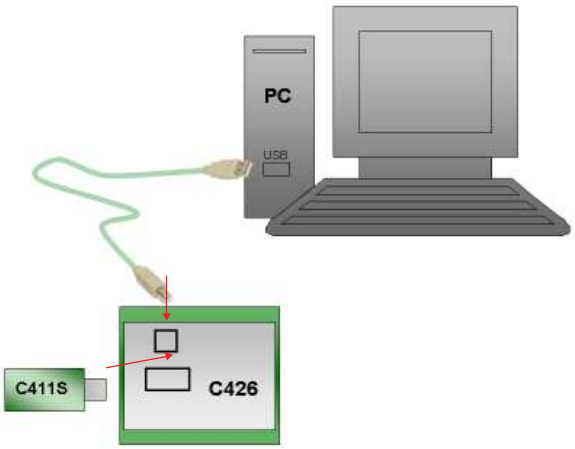


CAUTION! At the moment the normal USB keys can not be utilized for this data transfer and the ROWAN EL. USB key can not be utilized for PCs memory transfer.

Software and accessories for the managing of parameters through PC

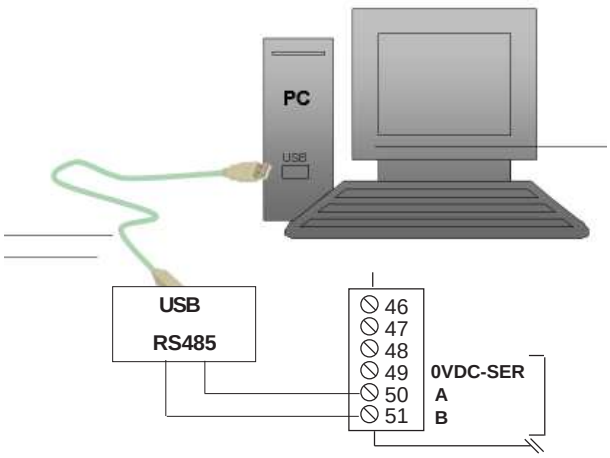
• *Software for eeprom key managing*

On request, Rowan Elettronica provides the "**Rowan Key Manager**"; this software allows, through your PC, to elaborate the inverter parameters in eeprom key **cod. C411S**.
Through "**Rowan Key Manager**" it is allowed to:
> read all parameters contained in EEPROM key, in separated areas and save all datas in a file;
> export all parameters in Excel format;
> save the elaborated data in the EEPROM key;
> read the total picture of the EEPROM key and save that in a file;
> import a total picture file on the key.
For all operations with C411S key an USB cable and an interface board C426 are needed. Rowan Elettronica supplies, on request, the **KIT.426R.A**, that kit contains:
- installation cd with 2 versions of "**Rowan Key Manager**":
  > "**Rowan Key Manager**" for 350S inverter;
  > "**Rowan Key Manager**" for 400S inverter;
- USB cable A-B-M-M type;
- EEPROM key **C411S**;
- interface board **C426**.



• *Software for editing the inverter parameters through PC: ROWAN DATA EDITOR*

Upon request, Rowan Elettronica can supply the "**Rowan Data Editor**", a software for Windows able to manage, through PC and RS 485 serial connection the inverter parameters.
Through "**Rowan Data Editor**" it is possible to:
> read/modify all parameters contained in the inverter and save them on a file.
> export the parameters in PDF or CSV format.
> export the parameters modified from the default setting and save them in
PDF or CSV format.
> by the function "TEST MODE" it is possible to command the inverter function for a
test with a running motor, checking the variables under "oscilloscope" function.
As shown besides, to connect the PC to the inverter, it is necessary to use a
converter (better if insulated) beetween USB and RS485.
With this aim, Rowan Elettronica can supply, on request, the kit **KIT.ROWAN.DATAEDITOR** containing:
- the installation cd for the "**Rowan DataEditor**" software:
- the connection cable to PC and the USB/RS485 interface.



INVERTER 700 SERIES

INVERTER 700 CODING

INVERTERS order codes

Codice : C700 [X] / [1] . [A] . [P] . [05] . [DN] . [NN] . [N]

ACTIVE APPLICATIONS (to be identified on the inverter by the nr on the right of the full stop, in var.2.1.38 FIRMWARE VERSION)

A	var. 2.1.38 = 2XXX01.XX	Active application: SPEED (speed control, scalar/vectorial) / AXIS (Positioner/electric axis)
R	var. 2.1.38 = 2XXX02.XX	Active application: SPEED (speed control, scalar/vectorial) / REGULATOR (P/I control)
W	var. 2.1.38 = 2XXX05.XX	Active application: SPEED (speed control, scalar/vectorial) / WINDER (Winding-Rewinding system)
F	var. 2.1.38 = 2XXX06.XX	Active application: SPEED (speed control, scalar/vectorial) / AXIS (Positioner/electric axis) + (function of cutting die)

RELEASE HARDWARE

"STO" FUNCTION

S = WITH STO FUNCTION
N = WITHOUT STO FUNCTION

CUSTOMIZATION DIGITS

NN = NO CUSTOMIZATION

Inputs / Outputs	Field bus
C = board with I/O: - 1 encoder line driver - 2 zero encoder input - 1 digital input - 2 digital outputs - 1 analog input - 3 Hall digital inputs (from Encoder) **D** = board with I/O: - 3 Hall digital inputs (from Encoder)	**N** = none **P** = PROFIBUS DPV1 - M30 **C** = CANOPEN - M30 **M** = MODBUS TCP/IP - M30 **E** = ETHERCAT - M40_V.1.0.8 **F** = PROFINET - M30 **G** = MODBUS TCP/IP - M40 **H** = PROFINET - M40

OPTIONAL BOARD with I/O and FIELD BUS

ENCODERS SUPPLY

05 = encoder input 5Vdc, clamps output 40-41 = +5Vdc

POWER SUPPLY VOLTAGE (50/60Hz)

Power supply voltage for inverters

P = 380/460 VAC
N = 500 VAC

DRIVE POWER SIZE

P - R - 0 - 0M - 1 - L - 2

Eeprom key order code

Code : C411S . [A]

RELEASE HARDWARE

BRUSHLESS AC SERVOMOTORS

Introduction

The servo-motors brushless AC designed and realized by Rowan Elettronica includes power sizes with multiple configurations in the aim to satisfy all industrial automation needs.

They are designed from computational and modelling software to the check on the testbench to achieve the maximum power and dynamic performances, keeping the torque ripple at minimum value. The Rowan Elettronica servo-motor are supplied without ventilation or with forced ventilation, the mechanical sizes are in respect of MEC standard, to match with any standard mechanical gear.

BRUSHLESS AC SERVOMOTORS

TECHNICAL FEATURES

Servomotors general features

Power supply ..... three-phase from inverter
Winding max temperature ..... 180°C
Insulation ..... tropicalized to H class with vacuum process
Protection ..... thermic probe with N.C.contact (opening at 150°C)
Rotor ..... brushless surface permanent magnet
Cooling ..... without ventilation or axial forced ventilation with 230 Vac or 24Vdc fan 230Vac / 24Vdc
Material ..... aluminium (housing, shields, brake housing) / copper (windings)
Available shapes B3, B5, B3/B5
Bearings ..... high quality, life lubricated, spherical bearings
Noise ..... less then 70db
Versions ..... without brake, 24Vdc springs brake
Feedback transducer ..... Line driver encoder, 2048ppr, 5Vdc, with zero and Hall signals
Connections ..... metallic connectors

Environment characteristics

Protection levek IP54
Environmental temperature ..... from -20°C to +40°C
Motor max. temperature on the external body ..... 110°C
Altitude ..... 1000mt a.s.l.
Relative humidity ..... 5% to 95% without condensation
Compliance regulations ..... Conformity to CEI EN 60034-5 standard

9 PIN metallic Power Connector Wiring

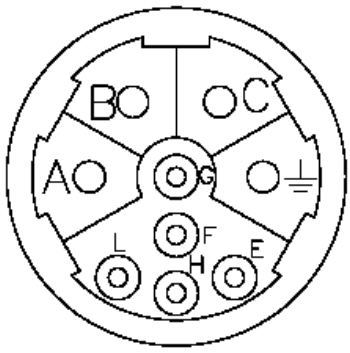
PHASES	COLOR		INVERTER CLAMP
U	BLACK (1)		U
V	BLACK (2)		V
W	BLACK (3)		W
GND	SHIELD + YELLOW-GREAN		FASTON
230 V	WHITE		EXTERNAL POWER SUPPLY
230 V	BLACK		EXTERNAL POWER SUPPLY

FASI	COLORE		MORSETTO INVERTER
U	BLACK (1)		U
V	BLACK (2)		V
W	BLACK (3)		W
GND	SHIELD + YELLOW-GREEN		FASTON
+24 Vdc	WHITE		EXTERNAL POWER SUPPLY
0 Vdc	BLACK		EXTERNAL POWER SUPPLY

Rowan Elettronica supplies inverter, motor and the cable too, complete of 9 PIN metallic connector already assembled.
It is possible to order the length 5 , 10, 15 and 20 mt
The Rowan code are:

CAV.6P.L5.2,5+1,5.SCH.CM for 5mt lenght
CAV.6P.LXX.2,5+1,5.SCH.CM for 10-15-20 mt lenght

Replace XX with the cable lenght.



REAR VIEW

17 PIN metallic Encoder Connector Wiring

CAV.14P.L.....			
SIGNAL	COLOR		INVERTER CLAMPS
S.T.	WHITE		1
S.T.	BROWN		9
A	PINK		34
A -	GREY		35
B	PURPLE		36
B -	BLACK		37
Z	YELLOW		38
Z -	GREEN		39
0 V	BLUE		40
+ 5 Vcc	RED		41
I8	GREY-PINK		58
I9	BLUE-RED		59
I10	YELLOW-WHITE		60
	YELLOW-BROWN		N.C.
GND	SHIELD		FASTON
	WHITE-GREEN		N.C.
	MARRONE-VERDE		N.C.

CAV.14PS.L.....			
SIGNAL	COLOR		INVERTER CLAMPS
S.T.	WHITE		1
S.T.	GREY		9
A	RED		34
A -	ORANGE		35
B	PURPLE		36
B -	BLUE		37
Z	YELLOW		38
Z -	GREEN		39
0 V	BLACK		40
+ 5 Vcc	BROWN		41
I8	WHITE-ORANGE		58
I9	WHITE-RED		59
I10	YELLOW-WHITE		60
	YELLOW-GREEN		N.C.
GND	SHIELD		FASTON
	WHITE-BLACK		N.C.
	WHITE-BROWN		N.C.

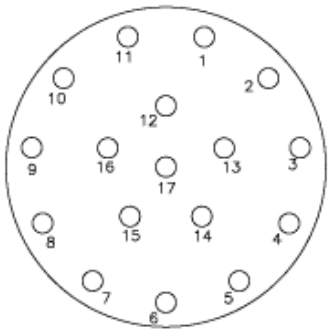
Rowan Elettronica supplies inverter, motor and the cable too, complete of 17 PIN metallic connector already assembled.
It is possible to order the length 5mt or 10mt
The Rowan code are:

CAV.14P.L5.0,25.SCH.CON for 5mt lenght
CAV.14P.LXX.0,25.SCH.CON for 10-15-20mt lenght

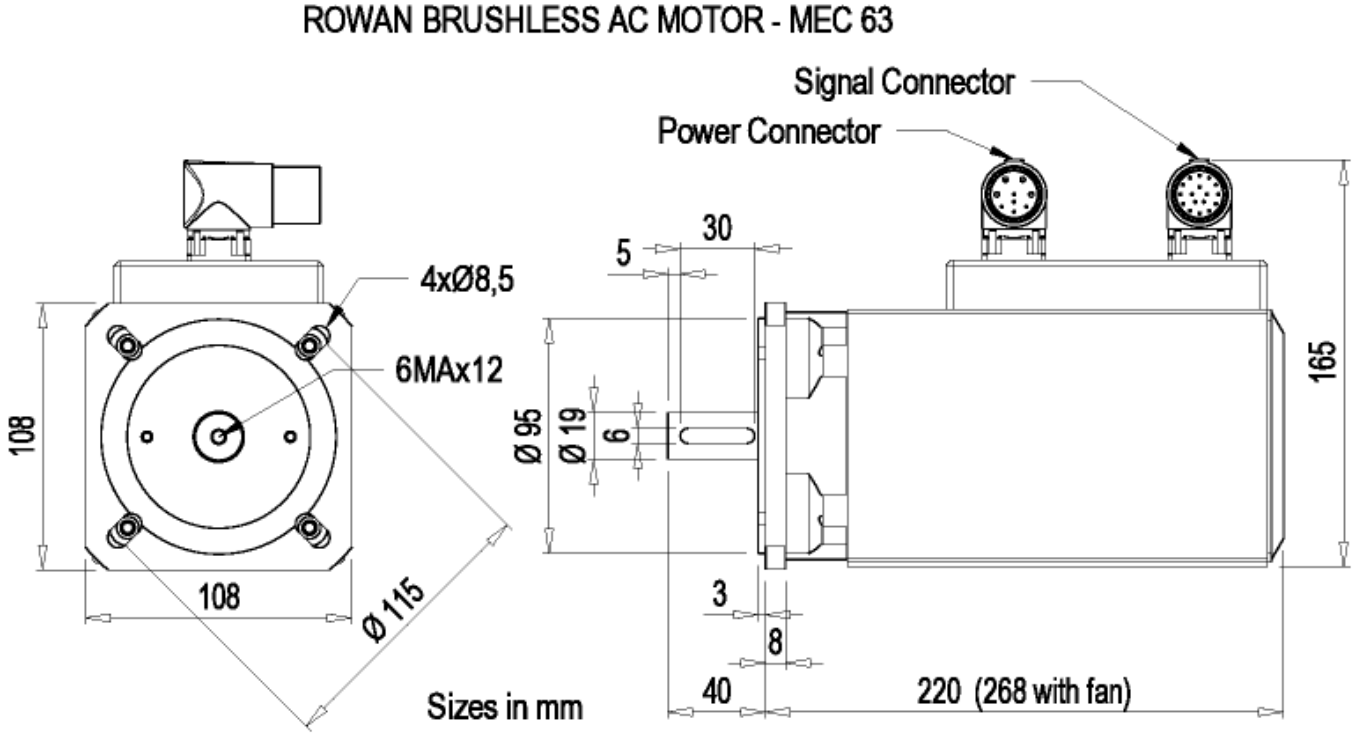
CAV.14PS.L5.0,25.SCH.CON for 5mt lenght
CAV.14PS.LXX.0,25.SCH.CON for 10-15-20mt lenght

Replace XX with the cable lenght.

REAR VIEW



MEC 63 servomotor size drawings



Electrical characteristics table of MEC 63 servomotor

MOTORE Code		MEC 63 TBA4O7B5A....	MEC 63 TBA4O7B5X....
NOMINAL POWER	kW	1,3	1,0
RATED SPEED	rpm	3000	3000
MAX SPEED	rpm	4000	4000
RATED TORQUE*	Nm	4,2	3,2
RATED CURRENT*	A	3,4	2,6
STALL TORQUE**	Nm	4,4	3,4
STALL CURRENT**	A	3,5	2,6
ROTOR INERTIA	Kgm²	0,000248	0,000248
POLES NUMBER	-	4	4
WEIGHT	Kg	5,9	5,3
VENTILATION FAN	-	SI	NO

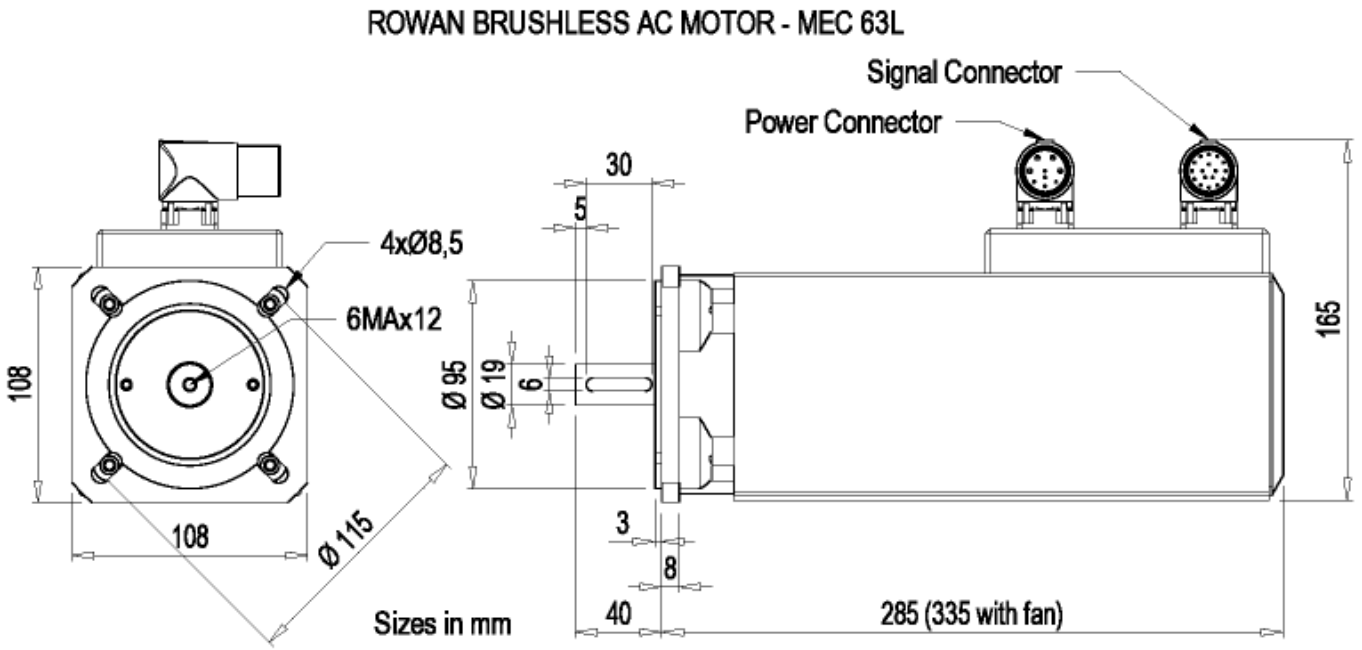
* reported data are measured in continuous duty (S1) at 40 C environment temperature. Considering intermittent duties the motor performances should be higher.
** stall datas are measured in continuous duty (S1) at 20 rpm speed, for lower speed the load should be reduced about 15%.

Inverter selection table of MEC 63 servomotor

MOTORE Code		MEC 63 TBA4O7B5A....	MEC 63 TBA4O7B5X....
Nominal Power Nominal Torque		1.3 kW 4.2 Nm	1.0 kW 3.2 Nm
INVERTER 700		/ R	/ P
Parameters	unit		
1.1.1 LINE VOLTAGE	V	400	400
1.1.2 MOTOR NOM CURREN	A	3.5	2.8
1.1.3 MOTOR NOM FREQUE	Hz	100.0	100.0
1.1.5 MOTOR POLES	-	4 POLES	4 POLES
1.3.1 MAX MOTOR SPEED	rpm	3000	3000
1.6.1 E1 ENCODER LINES	ppr	2048	2048
1.6.2 KP GAIN	-	20	20
1.6.3 KI GAIN	-	20	20
1.10.1 MAX TORQUE	%	200	200
1.10.15 ADAPT PERC TORQ.	%	104.0	102.5
1.10.16 ADAPT TORQ. [Nm]	%	46.1	48.9

* at stall condition and continuous duty a drive overload fault could be occur.

MEC 63L servomotor size drawings



Electrical characteristics table of MEC 63L servomotor

MOTORE Code		MEC 63L TBI4O5B5A....	MEC 63L TBI4O5B5X....	MEC 63L TBI4O7B5A....
NOMINAL POWER	kW	1,1	0,8	2,2
RATED SPEED	rpm	1500	1500	3000
MAX SPEED	rpm	2000	2000	4000
RATED TORQUE*	Nm	7,3	4,9	6,9
RATED CURRENT*	A	2,8	1,9	5,2
STALL TORQUE**	Nm	7,4	5,6	7,7
STALL CURRENT**	A	2,8	2,1	5,6
ROTOR INERTIA	Kgm²	0,000496	0,000496	0,000496
POLES NUMBER	-	4	4	4
WEIGHT	Kg	9,3	8,7	9,3
VENTILATION FAN	-	SI	NO	SI

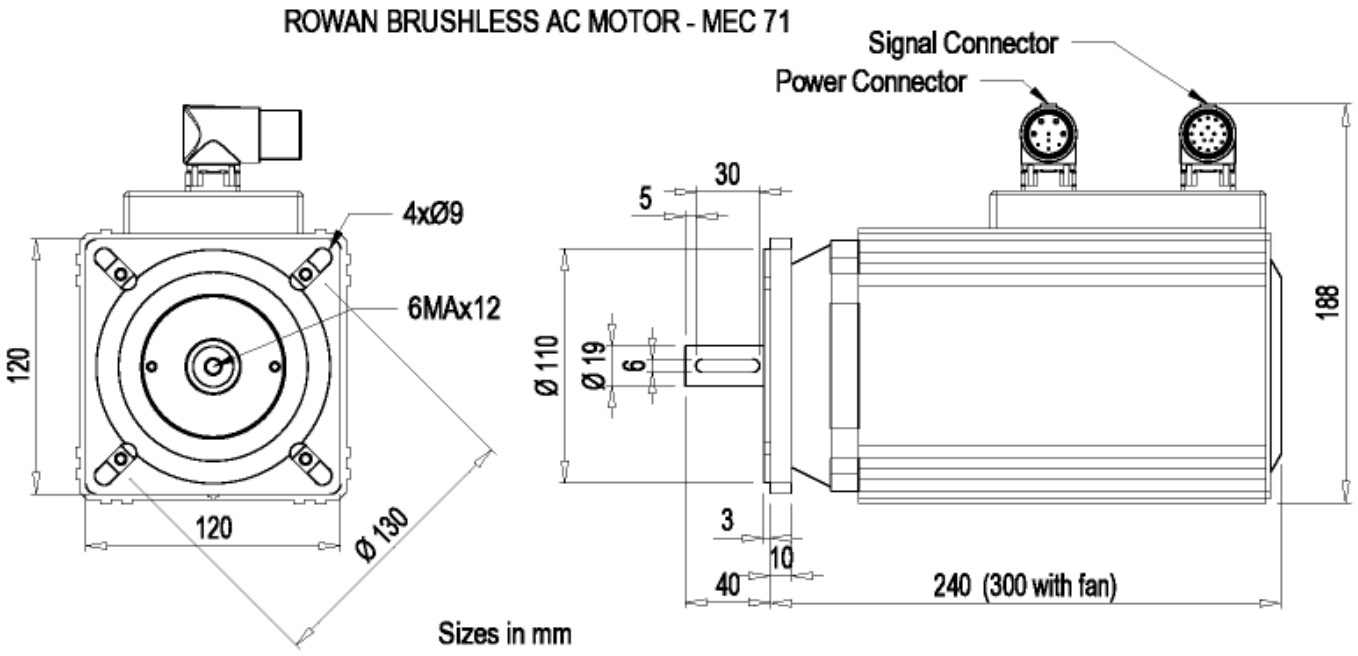
* reported data are measured in continuous duty (S1) at 40 C environment temperature. Considering intermittent duties the motor performances should be higher.
** stall datas are measured in continuous duty (S1) at 20 rpm speed, for lower speed the load should be reduced about 15%.

Inverter selection table of MEC 63L servomotor

MOTORE Code		MEC 63L TBI4O5B5A....	MEC 63L TBI4O5B5X....	MEC 63L TBI4O7B5A....
Nominal Power Nominal Torque		1.1 kW 7.3 Nm	0.8 kW 4.9 Nm	2.2 kW 6.9 Nm
INVERTER 700		/ P	/ P	/ 0
Parameters	unit			
1.1.1 LINE VOLTAGE	V	400	400	400
1.1.2 MOTOR NOM CURREN	A	3.0	2.0	5.4
1.1.3 MOTOR NOM FREQUE	Hz	50.0	50.0	100.0
1.1.5 MOTOR POLES	-	4 POLES	4 POLES	4 POLES
1.3.1 MAX MOTOR SPEED	rpm	1500	1500	3000
1.6.1 E1 ENCODER LINES	ppr	2048	2048	2048
1.6.2 KP GAIN	-	20	20	20
1.6.3 KI GAIN	-	20	20	20
1.10.1 MAX TORQUE	%	200	200	200
1.10.15 ADAPT PERC TORQ.	%	100.0	100.0	99.9
1.10.16 ADAPT TORQ. [Nm]	%	98.9	99.5	44.5

* at stall condition and continuous duty a drive overload fault could be occur.

MEC 71 servomotor size drawings



BRUSHLESS AC SERVOMOTORS — ELECTRICAL FEATURES

Electrical characteristics table of MEC 71 servomotor

MOTORE Code		MEC 71 TBB4O5B5A....	MEC 71 TBB4O5B5X....	MEC 71 TBB4O7B5A....	MEC 71 TBB4O7B5X....
NOMINAL POWER	kW	1,1	0,7	2,3	1,6
RATED SPEED	rpm	1500	1500	3000	3000
MAX SPEED	rpm	2000	2000	4000	4000
RATED TORQUE*	Nm	7	4,7	7,2	5
RATED CURRENT*	A	3	2	6	4,1
STALL TORQUE**	Nm	7,7	5,6	8,4	5,9
STALL CURRENT**	A	3,3	2,3	6,7	4,8
ROTOR INERTIA	Kgm²	0,000745	0,000745	0,000745	0,000745
POLES NUMBER	-	4	4	4	4
WEIGHT	Kg	9,7	9,25	9,7	9,25
VENTILATION FAN	-	SI	NO	SI	NO

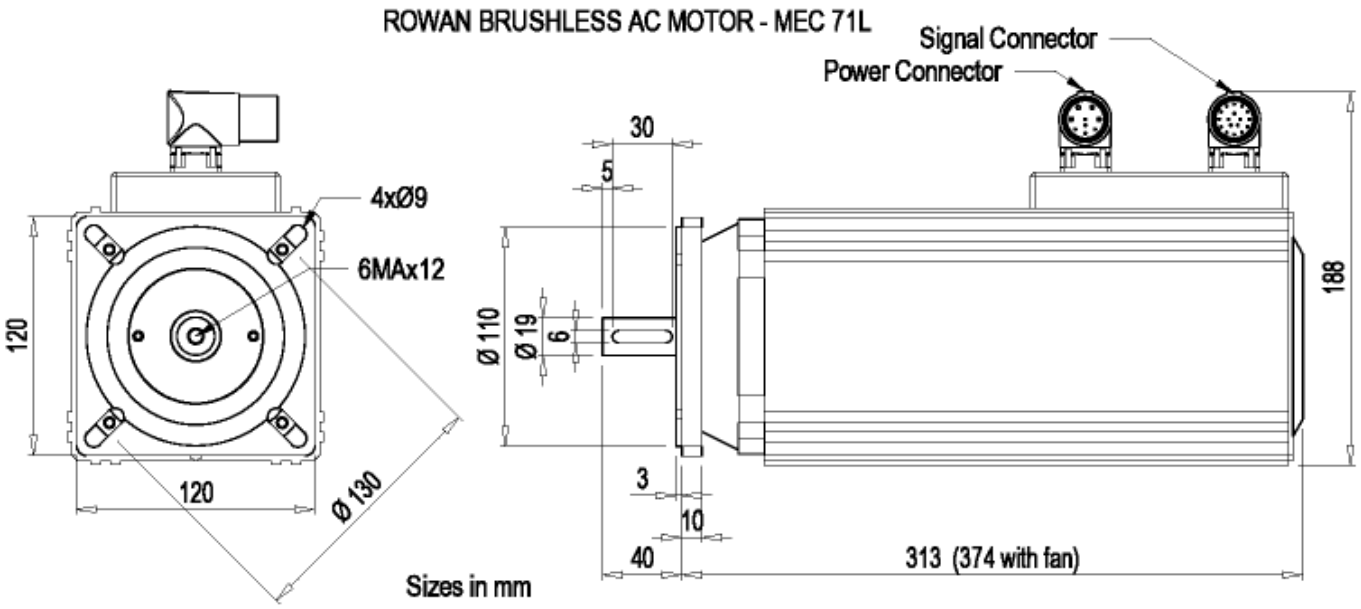
* reported data are measured in continuous duty (S1) at 40 C environment temperature. Considering intermittent duties the motor performances should be higher.
** stall datas are measured in continuous duty (S1) at 20 rpm speed, for lower speed the load should be reduced about 15%.

Inverter selection table of MEC 71 servomotor

MOTORE Code		MEC 71 TBB4O5B5A....	MEC 71 TBB4O5B5X....	MEC 71 TBB4O7B5A....	MEC 71 TBB4O7B5X....
Nominal Power Nominal Torque		1.1 kW 7 Nm	0.7 kW 4.7 Nm	2.3 kW 7.2 Nm	1.6 kW 5 Nm
INVERTER 700		/ P	/ P	/ 0	/ R
Parameters	unit				
1.1.1 LINE VOLTAGE	V	400	400	400	400
1.1.2 MOTOR NOM CURREN *	A	3.0	2.0	6.1	4.1
1.1.3 MOTOR NOM FREQUE	Hz	50.0	50.0	100.0	100.0
1.1.5 MOTOR POLES	-	4 POLES	4 POLES	4 POLES	4 POLES
1.3.1 MAX MOTOR SPEED	rpm	1500	1500	3000	3000
1.6.1 E1 ENCODER LINES	ppr	2048	2048	2048	2048
1.6.2 KP GAIN	-	20	20	20	20
1.6.3 KI GAIN	-	20	20	20	20
1.10.1 MAX TORQUE	%	200	200	200	200
1.10.15 ADAPT PERC TORQ.	%	100.0	100.0	98.0	100.0
1.10.16 ADAPT TORQ. [Nm]	%	94.8	95.5	40.2	46.6

* at stall condition and continuous duty a drive overload fault could be occur.

MEC 71L servomotor size drawings



BRUSHLESS AC SERVOMOTORS — ELECTRICAL FEATURES

Electrical characteristics table of MEC 71L servomotor

MOTORE Code		MEC 71L TBQ4O5B5A....	MEC 71L TBQ4O5B5X....	MEC 71L TBQ4O7B5A....
NOMINAL POWER	kW	2,1	1,0	3,9
RATED SPEED	rpm	1500	1500	3000
MAX SPEED	rpm	2000	2000	4000
RATED TORQUE*	Nm	13,2	6,5	12,4
RATED CURRENT*	A	5,5	2,7	10,3
STALL TORQUE**	Nm	15,8	11,4	15,8
STALL CURRENT**	A	6,2	4,4	12,3
ROTOR INERTIA	Kgm²	0,001397	0,001397	0,001397
POLES NUMBER	-	4	4	4
WEIGHT	Kg	16,6	16,2	16,6
VENTILATION FAN	-	SI	NO	SI

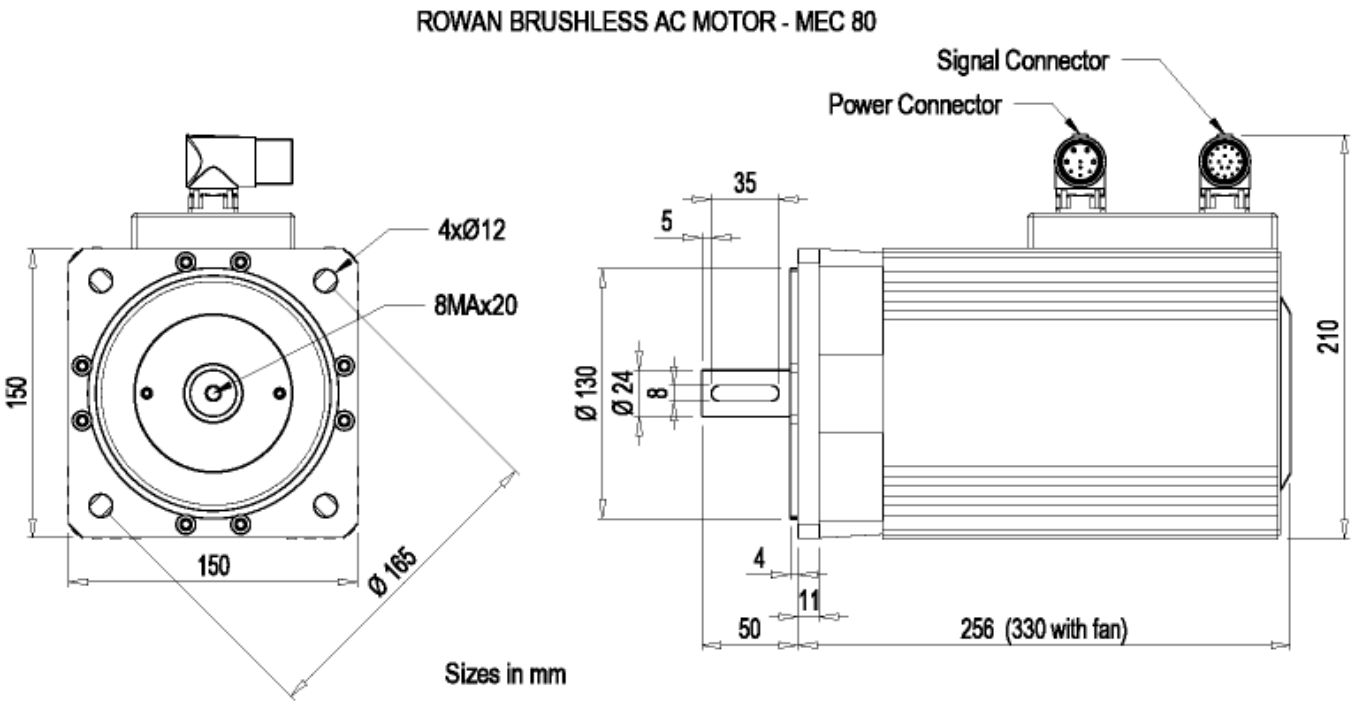
* reported data are measured in continuous duty (S1) at 40 C environment temperature. Considering intermittent duties the motor performances should be higher.
** stall datas are measured in continuous duty (S1) at 20 rpm speed, for lower speed the load should be reduced about 15%.

Inverter selection table of MEC 71L servomotor

MOTORE Code		MEC 71L TBQ4O5B5A....	MEC 71L TBQ4O5B5X....	MEC 71L TBQ4O7B5A....
Nominal Power Nominal Torque		2.1 kW 13.2 Nm	1.0 kW 6.5 Nm	3.9 kW 12.4 Nm
INVERTER 700		/ 0	/ P	/ 1
Parameters	unit			
1.1.1 LINE VOLTAGE	V	400	400	400
1.1.2 MOTOR NOM CURREN *	A	5.7	2.9	10.3
1.1.3 MOTOR NOM FREQUE	Hz	50.0	50.0	100.0
1.1.5 MOTOR POLES	-	4 POLES	4 POLES	4 POLES
1.3.1 MAX MOTOR SPEED	rpm	1500	1500	3000
1.6.1 E1 ENCODER LINES	ppr	2048	2048	2048
1.6.2 KP GAIN	-	20	20	20
1.6.3 KI GAIN	-	20	20	20
1.10.1 MAX TORQUE	%	200	200	200
1.10.15 ADAPT PERC TORQ.	%	99.9	100.0	100.1
1.10.16 ADAPT TORQ. [Nm]	%	80.7	91.1	39.3

* at stall condition and continuous duty a drive overload fault could be occur.

MEC 80 servomotor size drawings



BRUSHLESS AC SERVOMOTORS — ELECTRICAL FEATURES

Electrical characteristics table of MEC 80 servomotor

MOTORE Code		MEC 80 TBC4O5B5A....	MEC 80 TBC4O5B5X....	MEC 80 TBC4O7B5A....	MEC 80 TBC4O7B5X....
NOMINAL POWER	kW	1,8	1,1	3,8	2,2
RATED SPEED	rpm	1500	1500	3000	3000
MAX SPEED	rpm	2000	2000	4000	4000
RATED TORQUE*	Nm	11,4	6,9	12,2	7,1
RATED CURRENT*	A	5	3	10,5	6
STALL TORQUE**	Nm	14,5	9,1	14,5	9,5
STALL CURRENT**	A	5,7	3,6	12	8,4
ROTOR INERTIA	Kgm²	0,00214	0,00214	0,00214	0,00214
POLES NUMBER	-	4	4	4	4
WEIGHT	Kg	14,2	13,2	14,2	13,2
VENTILATION FAN	-	SI	NO	SI	NO

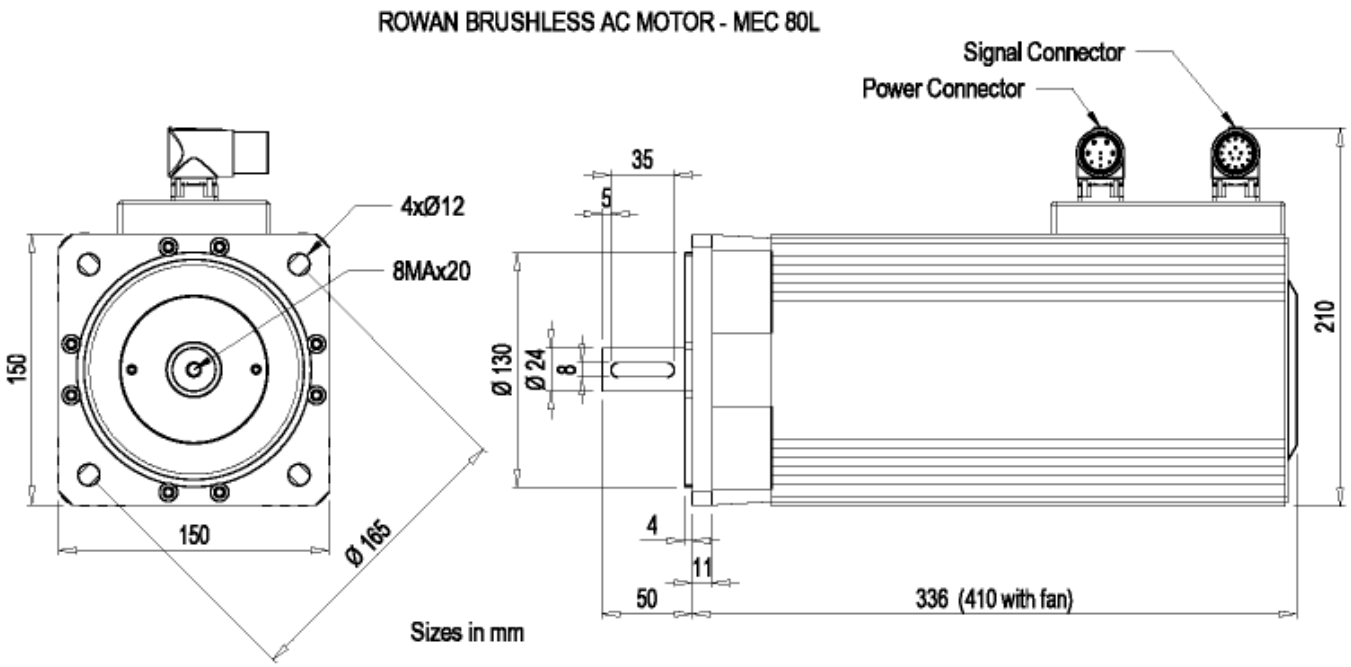
* reported data are measured in continuous duty (S1) at 40 C environment temperature. Considering intermittent duties the motor performances should be higher.
** stall datas are measured in continuous duty (S1) at 20 rpm speed, for lower speed the load should be reduced about 15%.

Inverter selection table of MEC 80 servomotor

MOTORE Code		MEC 80 TBC4O5B5A....	MEC 80 TBC4O5B5X....	MEC 80 TBC4O7B5A....	MEC 80 TBC4O7B5X....
Nominal Power Nominal Torque		1.8 kW 11.4 Nm	1.1 kW 6.9 Nm	3.8 kW 12.2 Nm	2.2 kW 7.1 Nm
INVERTER 700		/ R	/ P	/ 1	/ 0
Parameters	unit				
1.1.1 LINE VOLTAGE	V	400	400	400	400
1.1.2 MOTOR NOM CURREN *	A	5.0	3.0	11.0	6.4
1.1.3 MOTOR NOM FREQUE	Hz	50.0	50.0	100.0	100.0
1.1.5 MOTOR POLES	-	4 POLES	4 POLES	4 POLES	4 POLES
1.3.1 MAX MOTOR SPEED	rpm	1500	1500	3000	3000
1.6.1 E1 ENCODER LINES	ppr	2048	2048	2048	2048
1.6.2 KP GAIN	-	20	20	50	20
1.6.3 KI GAIN	-	20	20	50	20
1.10.1 MAX TORQUE	%	200	200	200	200
1.10.15 ADAPT PERC TORQ.	%	100.0	100.0	99.0	98.9
1.10.16 ADAPT TORQ. [Nm]	%	85.1	93.4	35.8	38.7

* at stall condition and continuous duty a drive overload fault could be occur.

MEC 80L servomotor size drawings



Electrical characteristics table of MEC 80L servomotor

MOTORE Code		MEC 80L TBW4O5B5A....	MEC 80L TBW4O5B5X....	MEC 80L TBW4O7B5A....
NOMINAL POWER	kW	3,3	1,4	5,9
RATED SPEED	rpm	1500	1500	3000
MAX SPEED	rpm	2000	2000	4000
RATED TORQUE*	Nm	21	9,2	18,7
RATED CURRENT*	A	8,5	3,7	15
STALL TORQUE**	Nm	24,6	17,8	24,5
STALL CURRENT**	A	9,3	6,7	18,7
ROTOR INERTIA	Kgm²	0,004281	0,004281	0,004281
POLES NUMBER	-	4	4	4
WEIGHT	Kg	22	21	22
VENTILATION FAN	-	SI	NO	SI

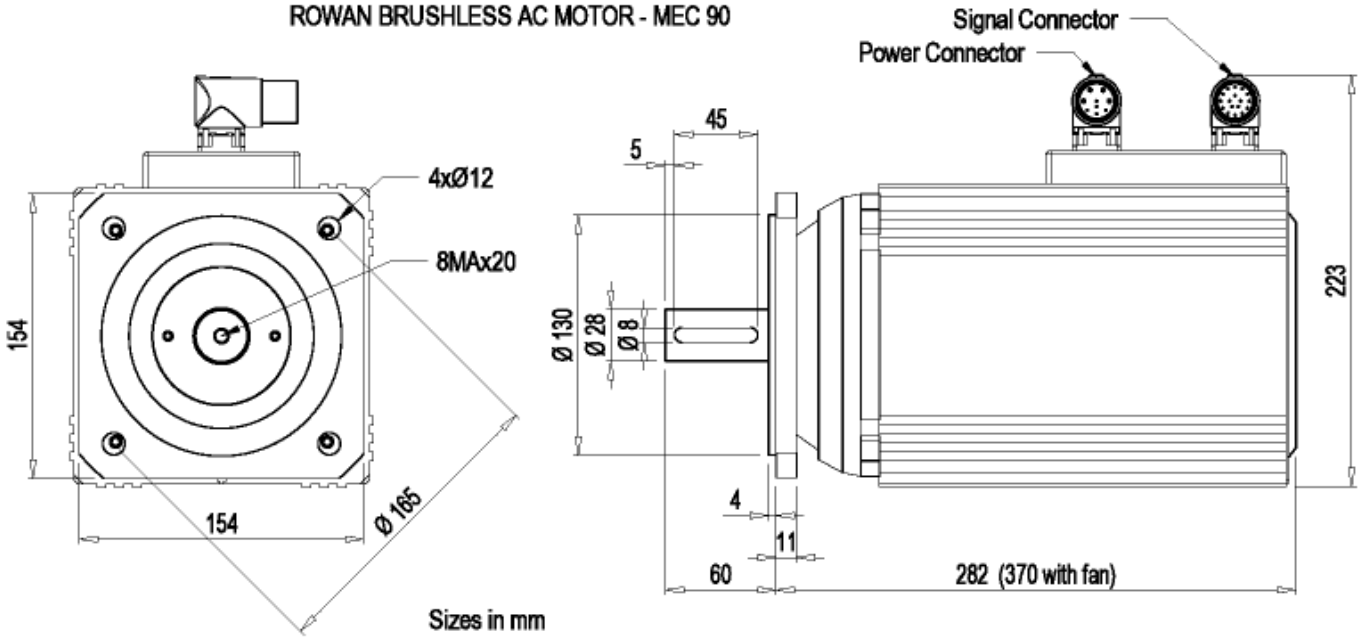
* reported data are measured in continuous duty (S1) at 40 C environment temperature. Considering intermittent duties the motor performances should be higher.
** stall datas are measured in continuous duty (S1) at 20 rpm speed, for lower speed the load should be reduced about 15%.

Inverter selection table of MEC 80L servomotor

MOTORE Code		MEC 80L TBW4O5B5A....	MEC 80L TBW4O5B5X....	MEC 80L TBW4O7B5A....
Nominal Power Nominal Torque		3.3 kW 21 Nm	1.4 kW 9.2 Nm	5.9 kW 18.7 Nm
INVERTER 700		/ 0M	/ R	/ L
Parameters	unit			
1.1.1 LINE VOLTAGE	V	400	400	400
1.1.2 MOTOR NOM CURREN *	A	8.7	3.9	15.0
1.1.3 MOTOR NOM FREQUE	Hz	50.0	50.0	100.0
1.1.5 MOTOR POLES	-	4 POLES	4 POLES	4 POLES
1.3.1 MAX MOTOR SPEED	rpm	1500	1500	3000
1.6.1 E1 ENCODER LINES	ppr	2048	2048	2048
1.6.2 KP GAIN	-	20	20	20
1.6.3 KI GAIN	-	20	20	20
1.10.1 MAX TORQUE	%	200	200	200
1.10.15 ADAPT PERC TORQ.	%	100.3	100.0	100.3
1.10.16 ADAPT TORQ. [Nm]	%	89.6	88.0	37.3

* at stall condition and continuous duty a drive overload fault could be occur.

MEC 90 servomotor size drawings



BRUSHLESS AC SERVOMOTORS — ELECTRICAL FEATURES

Electrical characteristics table of MEC 90 servomotor

MOTORE Code		MEC 90 TBD4O5B5A....	MEC 90 TBD4O5B5X....	MEC 90 TBD4O7B5A....	MEC 90 TBD4O7B5X....
NOMINAL POWER	kW	2,7	1,6	5,8	3,3
RATED SPEED	rpm	1500	1500	3000	3000
MAX SPEED	rpm	2000	2000	4000	4000
RATED TORQUE*	Nm	17,1	10,5	18,4	10,5
RATED CURRENT*	A	7	4,4	15,1	8,7
STALL TORQUE**	Nm	21,5	13,7	22	15
STALL CURRENT**	A	8,3	5,3	17,1	11,7
ROTOR INERTIA	Kgm²	0,002674	0,002674	0,002674	0,002674
POLES NUMBER	-	4	4	4	4
WEIGHT	Kg	19,1	17,4	19,1	17,4
VENTILATION FAN	-	SI	NO	SI	NO

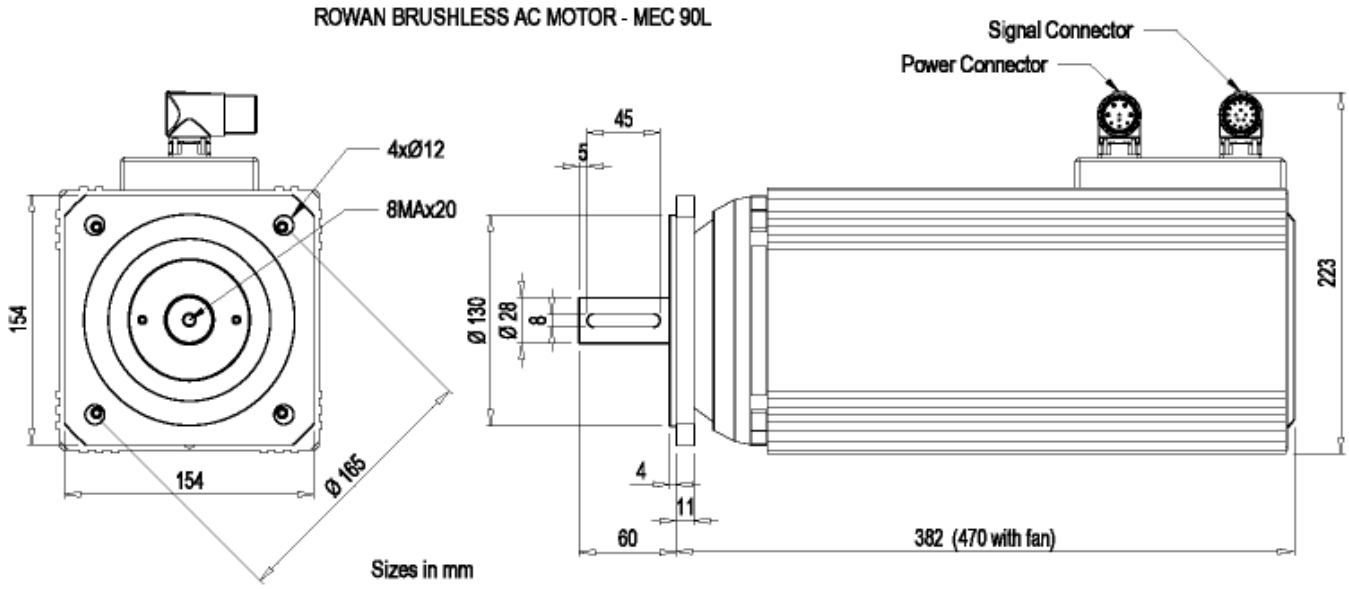
* reported data are measured in continuous duty (S1) at 40 C environment temperature. Considering intermittent duties the motor performances should be higher.
** stall datas are measured in continuous duty (S1) at 20 rpm speed, for lower speed the load should be reduced about 15%.

Inverter selection table of MEC 90 servomotor

MOTORE Code		MEC 90 TBD4O5B5A....	MEC 90 TBD4O5B5X....	MEC 90 TBD4O7B5A....	MEC 90 TBD4O7B5X....
Nominal Power Nominal Torque		2.7 kW 17.1 Nm	1.6 kW 10.5 Nm	5.8 kW 18.4 Nm	3.3 kW 10.5 Nm
INVERTER 700		/ 0	/ R	/ L	/ 1
Parameters	unit				
1.1.1 LINE VOLTAGE	V	400	400	400	400
1.1.2 MOTOR NOM CURREN *	A	7.0	4.6	15.0	8.7
1.1.3 MOTOR NOM FREQUE	Hz	50.0	50.0	100.0	100.0
1.1.5 MOTOR POLES	-	4 POLES	4 POLES	4 POLES	4 POLES
1.3.1 MAX MOTOR SPEED	rpm	1500	1500	3000	3000
1.6.1 E1 ENCODER LINES	ppr	2048	2048	2048	2048
1.6.2 KP GAIN	-	20	20	20	25
1.6.3 KI GAIN	-	20	20	20	25
1.10.1 MAX TORQUE	%	200	200	200	200
1.10.15 ADAPT PERC TORQ.	%	99.9	100.0	101.0	100.1
1.10.16 ADAPT TORQ. [Nm]	%	85.1	82.2	36.7	39.4

* at stall condition and continuous duty a drive overload fault could be occur.

MEC 90L servomotor size drawings



BRUSHLESS AC SERVOMOTORS — ELECTRICAL FEATURES

Electrical characteristics table of MEC 90L servomotor

MOTORE Code		MEC 90L TBE4O5B5A....	MEC 90L TBE4O5B5X....	MEC 90L TBE4O7B5A....
NOMINAL POWER	kW	4,8	2,4	8,4
RATED SPEED	rpm	1500	1500	3000
MAX SPEED	rpm	2000	2000	4000
RATED TORQUE*	Nm	30,7	15,3	26,8
RATED CURRENT*	A	12	6	21
STALL TORQUE**	Nm	37,8	27,2	37,8
STALL CURRENT**	A	13,8	9,9	27,6
ROTOR INERTIA	Kgm²	0,005348	0,005348	0,005348
POLES NUMBER	-	4	4	4
WEIGHT	Kg	30,1	28,4	30,1
VENTILATION FAN	-	SI	NO	SI

* reported data are measured in continuous duty (S1) at 40 C environment temperature. Considering intermittent duties the motor performances should be higher.
** stall datas are measured in continuous duty (S1) at 20 rpm speed, for lower speed the load should be reduced about 15%.

Inverter selection table of MEC 90L servomotor

MOTORE Code		MEC 90L TBE4O5B5A....	MEC 90L TBE4O5B5X....	MEC 90L TBE4O7B5A....
Nominal Power Nominal Torque		4.8 kW 30.7 Nm	2.4 kW 15.3 Nm	8.4 kW 26.8 Nm
INVERTER 700		/ L	/ 0	/ 2
Parameters	unit			
1.1.1 LINE VOLTAGE	V	400	400	400
1.1.2 MOTOR NOM CURREN *	A	12.0	6.2	21.0
1.1.3 MOTOR NOM FREQUE	Hz	50.0	50.0	100.0
1.1.5 MOTOR POLES	-	4 POLES	4 POLES	4 POLES
1.3.1 MAX MOTOR SPEED	rpm	1500	1500	3000
1.6.1 E1 ENCODER LINES	ppr	2048	2048	2048
1.6.2 KP GAIN	-	20	20	20
1.6.3 KI GAIN	-	20	20	20
1.10.1 MAX TORQUE	%	200	200	200
1.10.15 ADAPT PERC TORQ.	%	100.3	99.9	100.0
1.10.16 ADAPT TORQ. [Nm]	%	76.7	86.0	38.1

* at stall condition and continuous duty a drive overload fault could be occur.

BRUSHLESS AC SERVOMOTORS

SERVOMOTORS CODING

Example:
THREE-PHASE BRUSHLESS SERVOMOTOR, 71 SERIES, 4 POLES, 50 Hz, 2048 ppr ENCODER 5 Vdc with ZERO and HALL SIGNALS, AXIAL FAN, WITHOUT BRAKE, STANDARD B5, PROTEZIONE IP54 PROTECTION.

1	2	3	4	5	6	7	8	9	10	11	12	13
T	B	B	4	O	5	B5	A	X	F	O	5	X

1 – Power supply
T = three-phase

2 – Motor series
B = brushless

3 – MEC
A = 63
I = 63L
B = 71
Q = 71L
C = 80
W = 80L
D = 90
E = 90L

4 – Poles number
4 = 4 poles

5 – Motor voltage
O = 400 from inverter

6 – Hertz
5 = 50Hz (1500rpm)
7 = 100Hz (3000rpm)

7 – Tranducer
B5 = encoder 2048 ppr 5Vdc with zero and Hall signals

8 – Fan type and accessories
A = 230Vac single-phase axial
M = 24Vdc axial
X = without ventilation fan

9 – Brake type and accessories
C = 230V spring brake
M = 24Vdc spring brake
X = without brake

10 – Motor shape
F = standard B5
S = standard B3/B5
Z = standard B3

11 – Shape peculiarity
A = various details
X = none
O = metallic connectors

12 – Motor protection degree
5 = IP 54 without filter
6 = IP 54 without ventilation fan

13 – Free position for furher informantions
X = no further informations

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