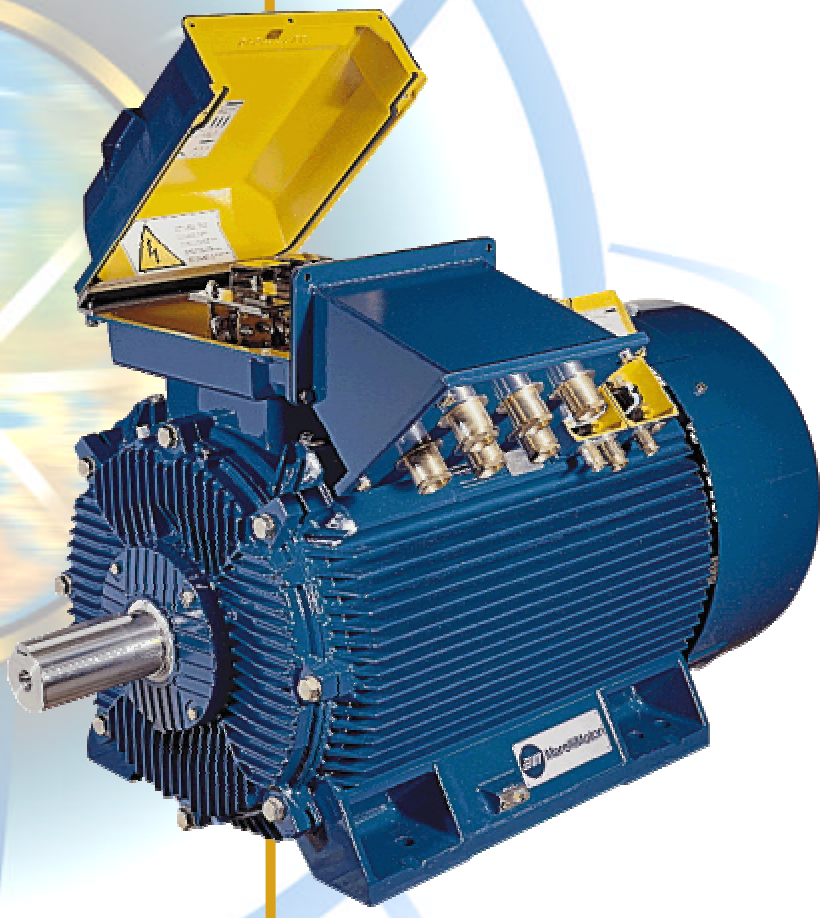
FKI Energy Technology

Three Phase Squirrel Cage Induction Motors

B5_ SERIES
355 - 400 SIZES
SALES MANUAL



MarelliMotori

COMM.MCM.000.1 E

Motor group ed. 12/01

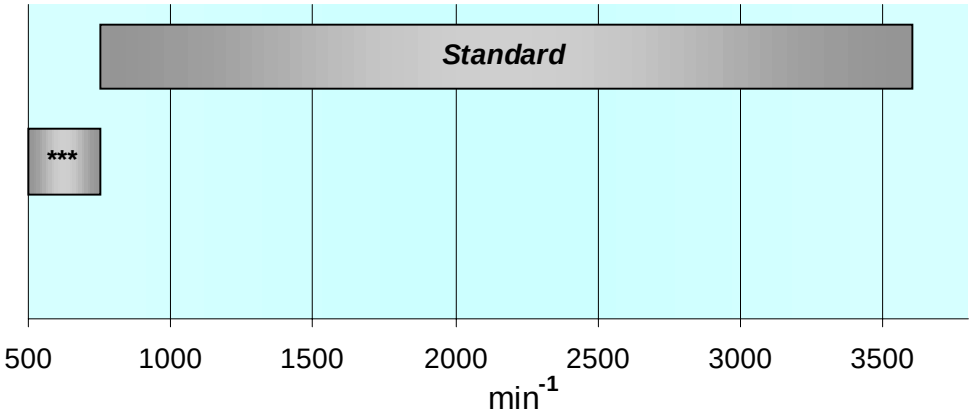
MARCONI PROJECT

Marelli Motori S.p.a.(*MM*) and Laurence, Scott & Electromotors Ltd (*LSE*) have jointly developed a new series of T.E.F.C. motors with high performance and an optimum quality/price ratio. The modular concept design allows a greater degree of flexibility and customer choice.
From the experience gained by the production of the previous series, B4C for MM and R Type for LSE, each single component has been optimised, increasing the standardisation of the products and the flexibility of the basic product. High quality materials make our B5_ motors suitable for use in even the toughest environments world-wide.

Marconi 355-400 series refers to three phase squirrel cage induction motors with external ventilation of 355mm and 400mm shaft height, voltage from 380V to 690V, 50 Hz and 60 Hz, and synchronous speed from 750 to 3600 rpm.
Power outputs range from 160 kW (215 h.p.) to 935 kW (1270 h.p.).Temperature rise class is typically B (≤ 80 K): this allows a large thermal margin and the possibility to use the motors with service factors without the necessity to derate the motor.
The motors can be used for both standard and special applications, and can give the same outputs when fed by frequency converter (execution for frequency converter application) or run as asynchronous generators.
The motors can be supplied either in horizontal or vertical execution. IP55 protection degree is supplied as standard; IP56 is available on request.

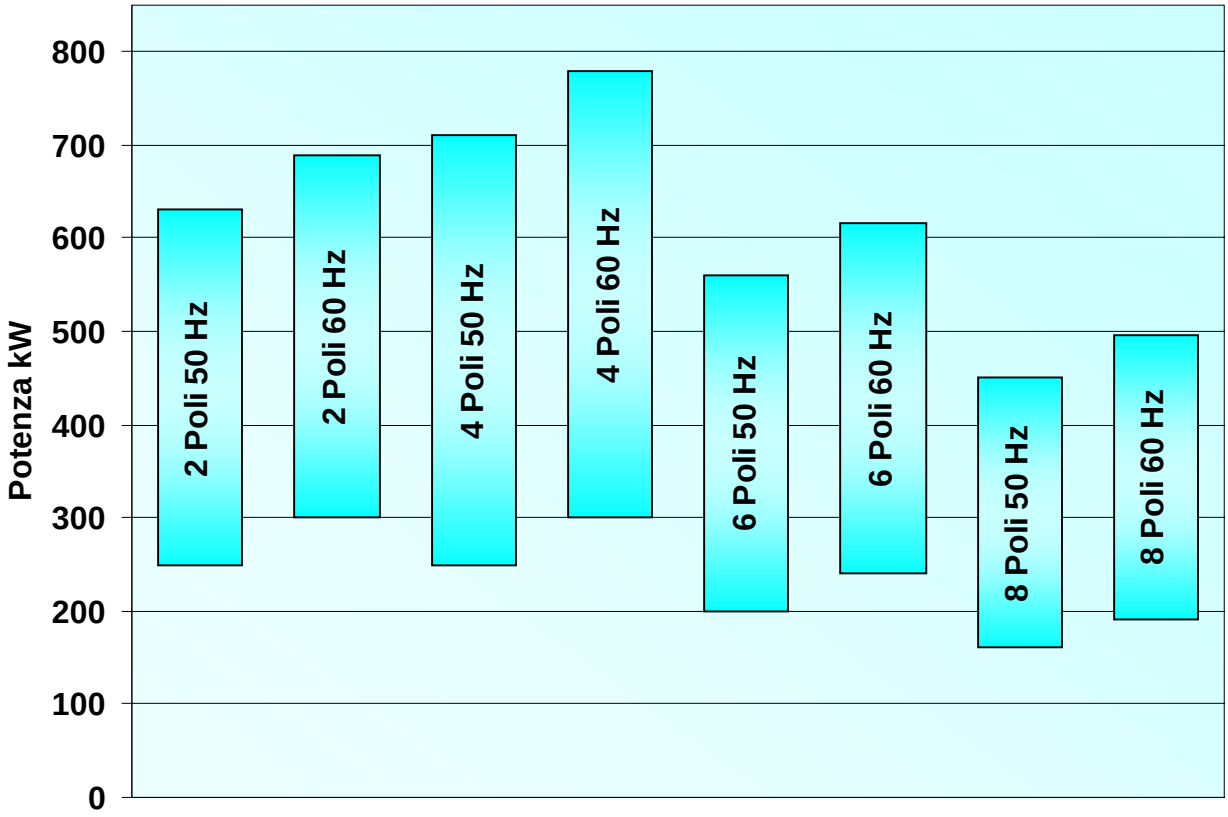
Feeding voltage	Frequency
380 ÷ 690 V	**50** and **60 Hz**

Table 1: *SPEED*



*** *≥ 10 poles available on request*

Table 2: *POWER RANGE MARCONI 355 and 400 for STANDARD POLARITIES*



Power **h.p.** = Power **kW** x **1.36**

The motors are designed and manufactured according to the international standards stated below:

Standard	*Description*
IEC 60034-1	Rating and performance
IEC 60034-2	Methods for determining losses and efficiency
IEC 60034-5	Classification of degree of protection (IP code)
IEC 60034-6	Methods of cooling (IC code)
IEC 60034-7	Types of construction and mounting arrangements
IEC 60034-8	Terminal markings and direction of rotation
IEC 60034-9	Noise limits
IEC 60034-12	Starting performance of rotating electrical machines
IEC 60034-14	Mechanical vibration
IEC 60038	Normalised IEC voltages
IEC 60072-1	Dimensions and outputs for electrical machines
IEC 60085	Classification of insulating materials
ISO 281	Bearings – Basic dynamic loads and nominal lifetime
ISO 1680-1/2	Noise: method of measurement
IEC 60721-2-1	Classification of environmental conditions

and also to the following foreign standards:

- *GERMANY* *VDE 0530*
- *BELGIUM* *NBNC 651-101.1976*
- *FRANCE* *NFC 51*
- *SWITZERLAND* *SEV 3009.1966*
- *UNITED KINGDOM* *BS 5000. BS 4999*
- *HOLLAND* *NEN 3173.1977*
- *SWEDEN* *SEN 260101.1974*
- *SPAIN* *UNE 20106*

Moreover, the motors B5M satisfy the requirement of the major Register of Shipping, such as:

- Registro Italiano Navale	**R.I.Na**
- American Bureau of Shipping	**ABS**
- Bureau Veritas	**BV**
- Det norske Veritas	**DnV**
- Lloyd's Register of Shipping	**LRS**
- Germanischer Lloyd	**GL**
- Russian Maritime Register of Shipping	**RMRS**
- Korean Register of Shipping	**KR**
- Polski Rejester Statkow	**PRS**
- China Classification Society	**CCS**

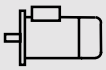
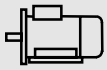
The types of construction referred to the *IEC 60034-7* e *CEI EN 60034-7* standards are displayed with the appropriate code in the following table:

Code I (Simplified): IM __ __

- Number
- *B* for horizontal - *V* for vertical

Code II (Complete): IM __ __ __

- Construction type category (1-9)
- Type of shaft extension (1-9)
- Device Assembly

Construction Type		***Figure***	***Notes***
Cod. I	***Cod. II***		
IM B3	**IM 1001**		
IM B5	**IM 3001**		Std with elastic coupling
IM B6/B7	**IM 1051**		Radial loads: PROG Special drainage system
IM B8	**IM 1071**		Radial loads: PROG Special drainage system
IM B35	**IM 2001**		
IM V1	**IM 3011**		Anti-rain canopy in std execution
IM V3	**IM 3031**		Std with elastic coupling
IM V5	**IM 1011**		Axial loads: PROG Anti-rain canopy in std execution
IM V6	**IM 1031**		Std with elastic coupling
IM V15	**IM 2011**		

where *IM* = International Mounting

Contact MM to check the admissible loads.

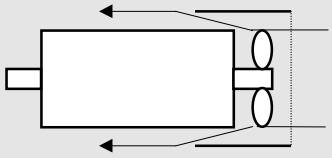
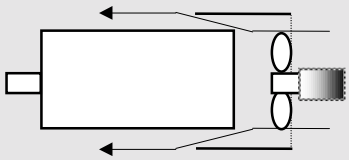
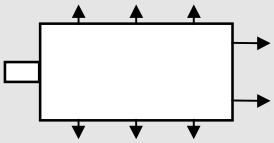
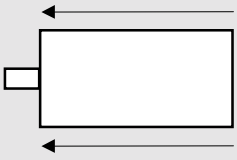
The cooling methods according to the *IEC 60034-6* and CEI EN 60034-6 are mentioned with the codification in the following table:

Code I (Simplified): **IC** _ _ _

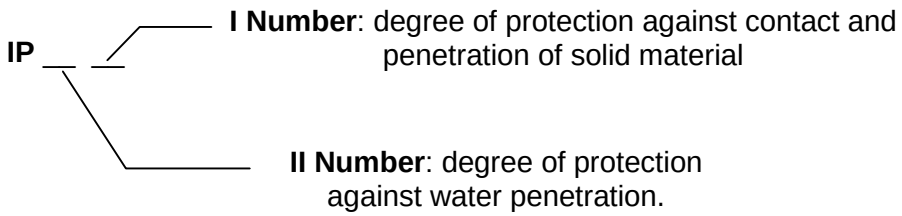
- Primary cooling fluid circulation method
- Secondary cooling fluid circulation method
- Circuit disposition

IC = International Cooling

The motors in standard execution have **IC 411** cooling method.
Motors with **IC 416, IC 410, IC 418** cooling method can be supplied upon request.

IC 411 ***STD***	***Self-ventilated Motor*** Closed machine, with external fins. External fan mounted on the shaft of the motor.	
IC 416 *Upon request*	***Motor with forced ventilation*** Closed machine, externally finned. Independent fan mounted inside fan cowl.	
IC 410 *Upon request*	***Motor without ventilation*** Closed machine, externally finned. Cooling by radiation and natural convention.	
IC 418 *Upon request*	***Motor with external ventilation*** Closed machine, externally finned. Cooling assured by a device not mounted on the motor.	

The coding for degrees of protection according to *IEC 60034-5* are mentioned in the following table:



IP = Index of Protection

The motors in standard execution have **IP 55** protection degree.
Motors with **IP 56** protection can be supplied upon request.

I Number	***Definition***	***II Number***	***Definition***
5 ***STD***	Indoor protection against dust	**5** ***STD***	Machine protected against water nozzle jets from any direction.
		6 *Upon request*	Machine protected against water waves
		7 *Only box* *Upon request*	Machine protected against the effects of immersion

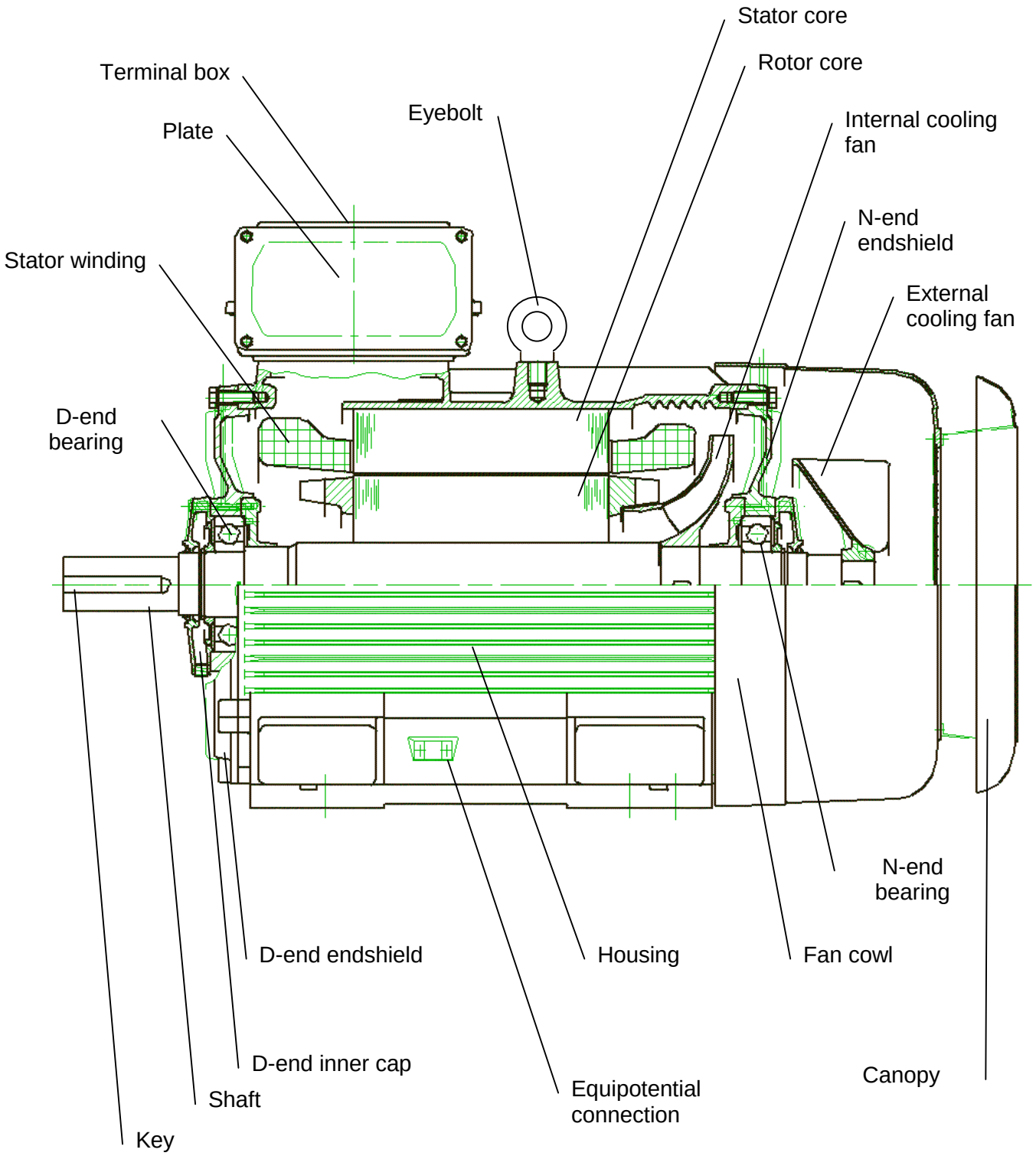
The main terminal box of the motors in standard execution satisfies the degree of protection **IP 55** but it can be supplied with the degree **IP 56** and **IP 57** (self-certification).
Specific protections can be supplied upon request, like:

- Sun shield
- Execution against sand storms

In those cases:

- Protection degree of the terminal box can be supplied upon request with W protection (protection against atmospheric factors). This letter appears after the second number of the protection degree code.
- Test conditions are agreed between the manufacturer and the end-user.

The main components of the motor are described in the drawing shown below. The accurate description of materials and construction principles is included in the specific related sections.



The housing, the endshields and the inner caps are made of cast iron (spherical cast iron on request). The finite element structural analysis produced a robust desing which minimises natural frequency effects and maximises thermal exchange between the active parts and the cooling fluid.

Housing: externally and internally finned with a heavy duty, compact construction. The monocoque feet are designed to uniformly distribute the forces transmitted from the system to the basement. The following features are provided:

- Drilled holes of 28mm diameter (B5_355) and 35mm (B5_400) positioned according to the IEC-60072 for the installation of foot mounted motors;
- Seats for doweling holes;
- Nr. 4 equipotential connections;
- Nr. 8 screws for fixing of the endshield;
- Lifting eyebolts for horizontal and vertical construction;
- Drainage holes fitted with tap.

Endshields: They are internally and externally finned. The configuration allows:

- Standard incorporated regreasing system;
- Arrangement for standard SPM;
- Arrangement for PT100 in the bearing;

Inner caps: large volume to contain the used grease. On the external cap there is an oil seal to assure the IP55 degree of protection: upon request it is possible to mount a sealing ring to increase the degree of protection.

The rotor comprises of the shaft and the rotor pack complete with windings.

Shaft: is manufactured by machining a high resistance steel bar type EN 10083-2 C30 TN. Other materials for special applications (high radial loads etc.) are available on request.

The normalised shaft extension is supplied with key and axial hole according to DIN 332 type DS M20 (2 poles) and DS M24 (4 ÷ 8 poles).

Special customised shaft extensions can be supplied on request.

All motors in standard configuration are equipped with:

- radial or trhust bearings, grease lubricated;
- regreasing system on both ends.

The dimension and construction of the external caps allows a large space for exausted grease (10 –15 re-lubrications) and are equipped with exausted grease drainage hole closed by a tap.

Roller or thrust bearing constructions for heavy radial loads are available on request.

The D-end bearing in the standard foot mounted motors is axially fixed.
The N-end bearing in the standard vertically mounted motors is axially fixed.

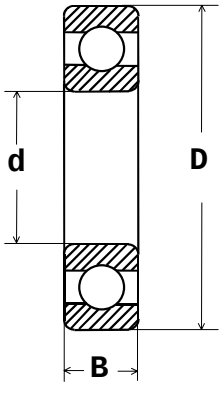
The axially free bearing is pre-loaded axially to:

- allow for thermal expansions;
- reduce vibration and noise level;
- avoid the rotation of the external casing.

All motors in standard configuration have the arrangment for SPM (Shock Pulse Method) on both the two ends.
Pt-100 thermodetectors on bearings are available on request.

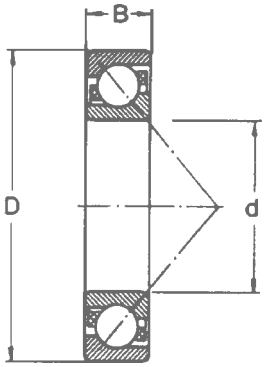
The motors for frequency converter application are supplied with N-end insulated bearing (opt. 175) to avoid circulating shaft currents. Motors with the two insulated bearings are available on request.

The data of the bearings mounted on the motors is shown in the table below. See section *Bearing Tables* for the characteristics of the bearings supplied for different constructions, polarities and loads.



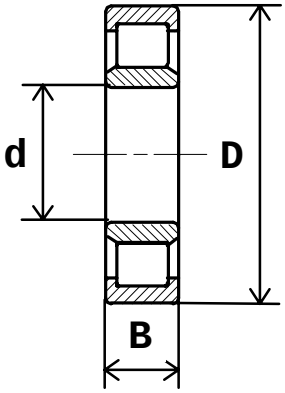
Dimension mm			Type	Mass kg	Motor type
d	D	B			
85	180	41	6317 C3	4,25	B5C 355 2 poles
					B5C 400 2 poles
110	240	50	6322 C3	9,55	B5C 355 4 ÷ 8 poles
					B5C 400 4 ÷ 8 poles

Ball bearings



Dimension mm			Type	Mass kg	Motor type
d	D	B			
85	180	41	7317 BE	4,45	B5C 355 2 poles B5C 400 2 poles
110	240	50	7322 BE	10	B5C 355 4 ÷ 8 poles B5C 400 4 ÷ 8 poles

Thrust bearings



Dimension mm			Type	Mass kg	Motor type
d	D	B			
110	240	50	NU 322-C3	10,5	B5C 355 4 ÷ 8 poles B5C 400 4 ÷ 8 poles

Roller bearings

FANS: standard fans are made of aluminium (with the exception of the external fan for 2 pole motors), bidirectional, designed by using finite element analysis and manufactured with precision casting models to obtain high efficiency values and low noise levels. Unidirectional fans, which further reduce noise levels, can be supplied on request.

FORCED VENTILATION: for variable speed applications an external forced ventilation unit is available on request (opt. 177) A three phase induction motor is mounted on the reinforced fan cowl and the fan mounted on its shaft.

The standard fan cowl is made of auto-extinguishing class 2 VTR (steel glass fibre reinforced polyester resin). The external and internal surfaces are specially treated to guarantee best performance against weather and atmospheric particles. The thickness of the design allow the high mechanical resistance. The metallic grid ensures the protection against external particles according to the IP20 degree of protection at the system input. Rain hood is supplied in the standard vertical configuration.

The following **options** can be supplied on request:

- Air inlet nozzle;
- Sound attenuating material;
- Metallic fan cowl;

The main characteristics are shown in the table below. 6 terminals are available on the low voltage motors to allow the star and delta connections.

Component	***Material***
Terminal box	Cast iron
Terminal box cover	Cast iron
Terminal board	Solid Polyester
Terminals	Nickel-plated copper
Gaskets	Rubber
Screws	Zinc Chromium plated
Earthing plates	Steel
Anti-rotation plates	Nickel-plated copper
Inlet cable plate	Steel
Terminal box adapter	Welded steel

Terminal box adapter
(on request)

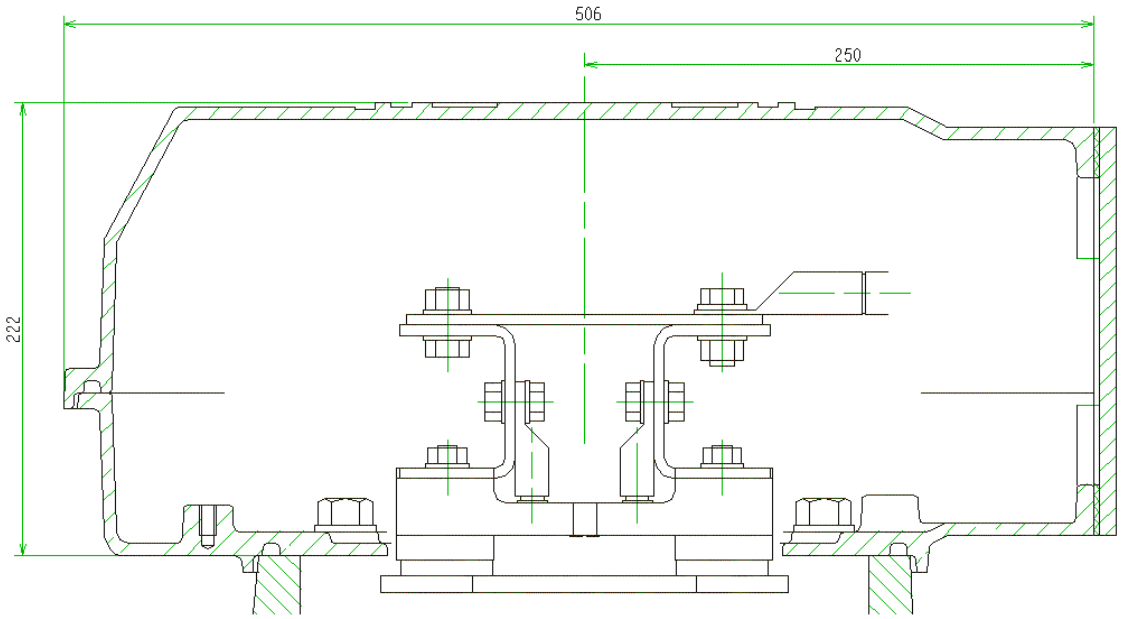
TECHNICAL DATA	*Measurement unit*	*Standard*	*On request / Notes*
Protection degree		IP 55 EEx-n	IP 56 self-certified IP 57 self-certified EEx-e available shortly
Max. voltage	V	750	1000
Mounting position		On top	
Cable inlet		Right when seen from D-End	
Rotation	degree	90° in 90°	
Connection		Cable-ends	Customer's specification
Number of terminals	No.	6	
Maximum current per terminal	A	1350	
Fixing cable-end screws		M 12	
Section of the terminals	mm^2	300 (60 x 5)	
Maximum no. of cables and section	mm^2	2 x 300	
Air gap	mm	14 minimum	
Distance on the surface	mm	20 minimum	
Terminal board material		Polyester	Resistance CTI ≥ 600 (IEC 60112)
Main overall dimensions	mm	525 x 430 x 230	
Terminal box cover weight	Kg	18	
Equipotential connection		1 x M12 with cable-terminal 1 with plate	Inside the terminal box

Supplied with the motor:

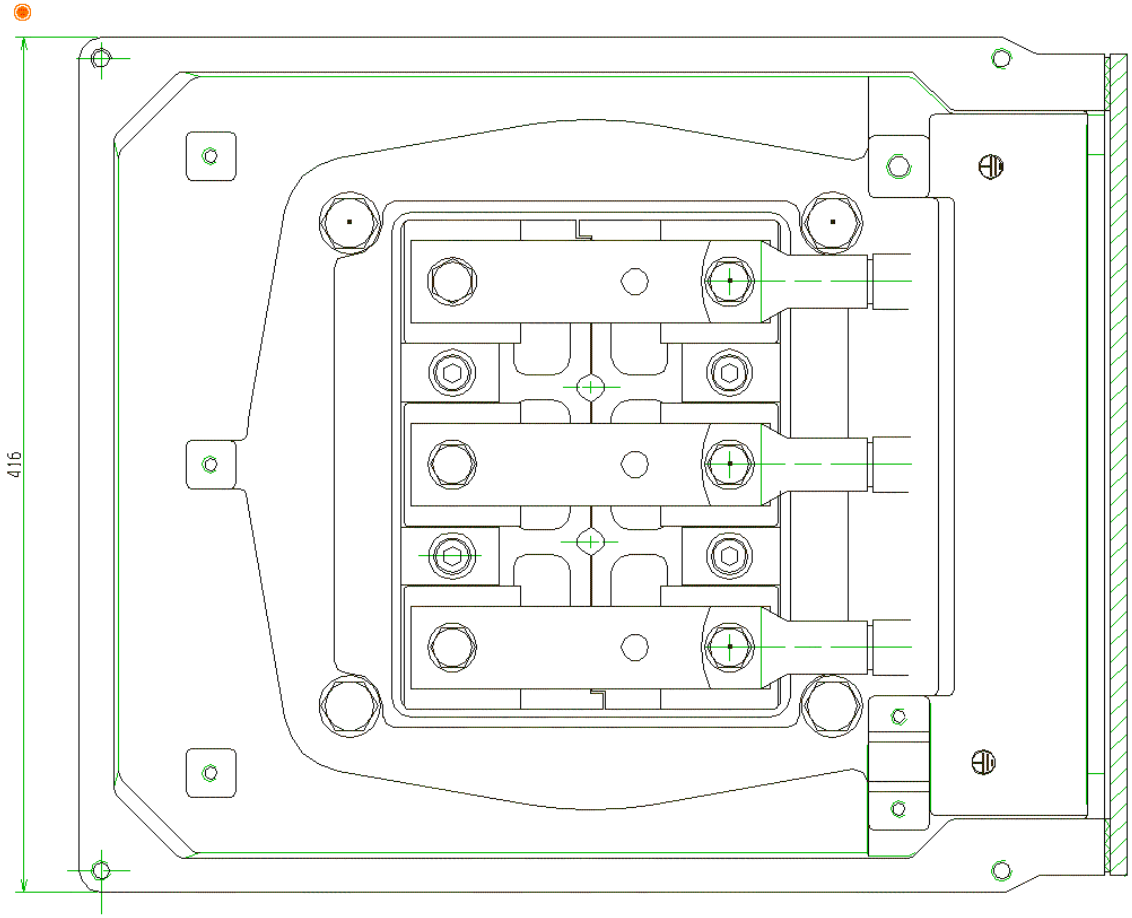
- Bridges for star or delta connection;
- Raised terminals (for Y/ Δ starting);
- 8 mm undrilled cable inlet plate;
- 6 anti-rotation terminals;
- 2 equipotential connections;
- arrangement for auxiliary terminals.

On request:

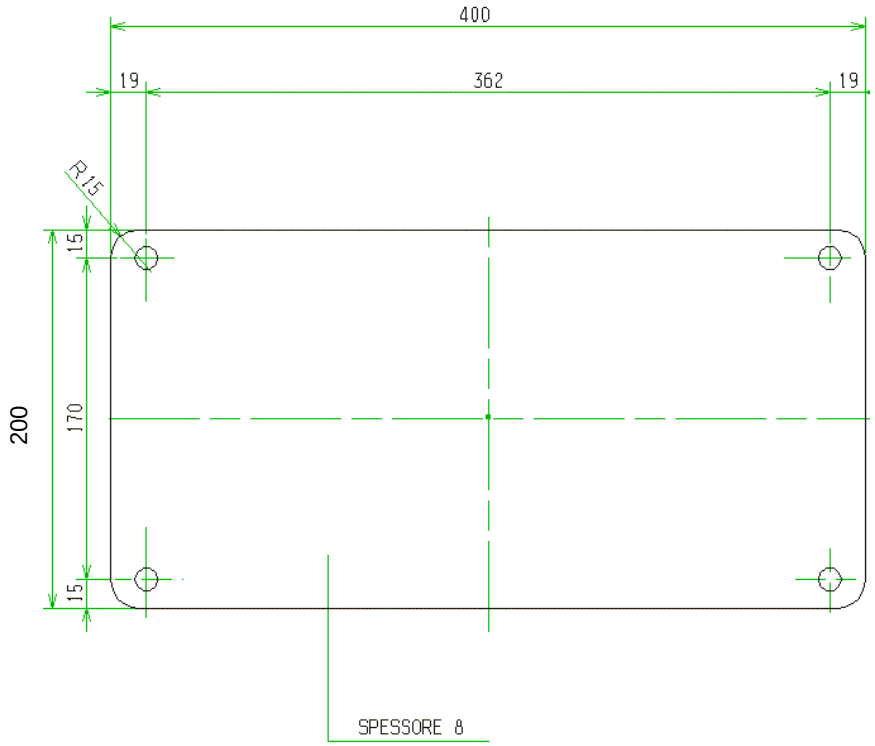
- Drilled cable inlet plate;
- Standard and marine cableglands;
- Terminal box adapter



Main terminal box section view

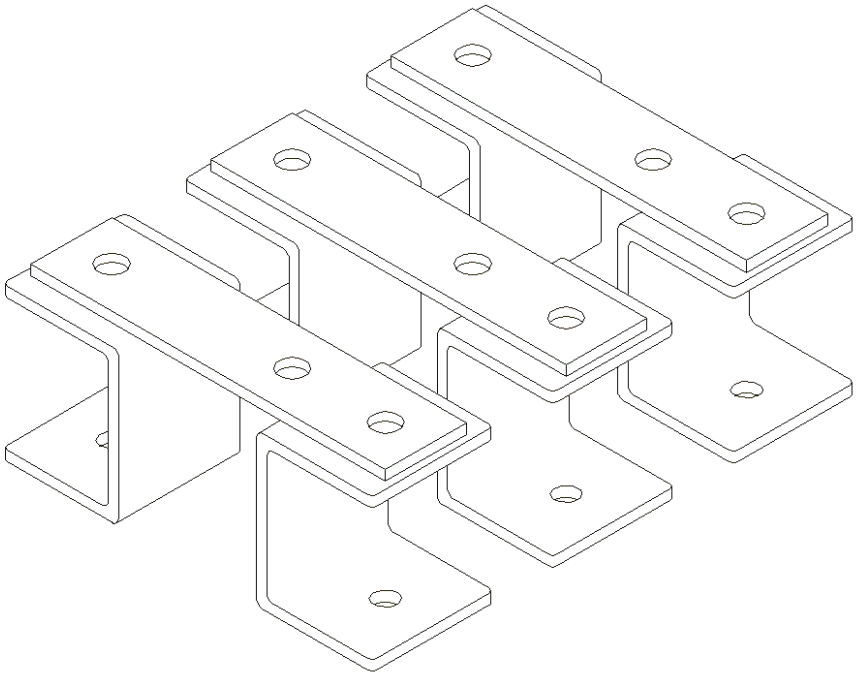


Main terminal box plan view

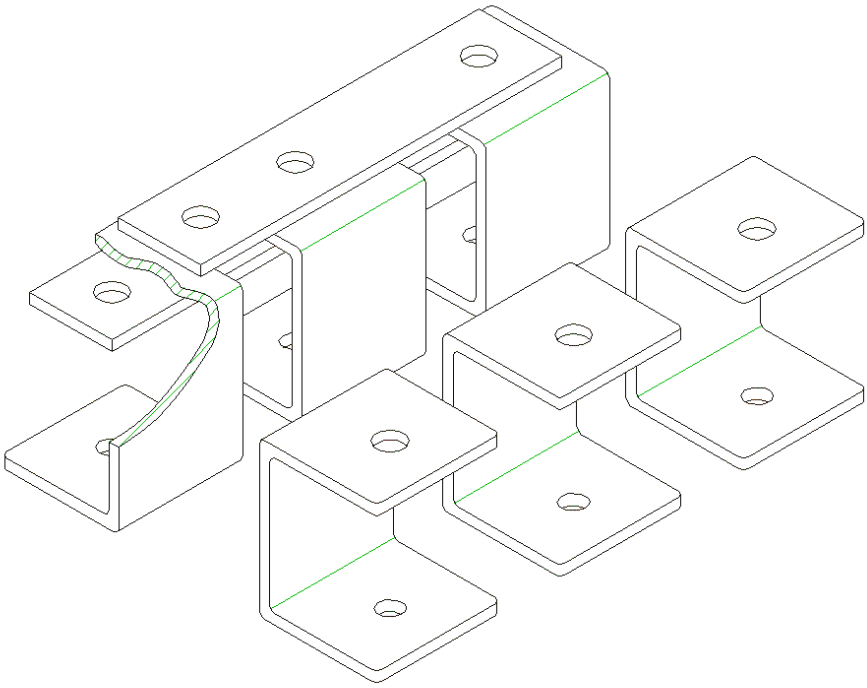


8 mm-thick undrilled cable inlet plate

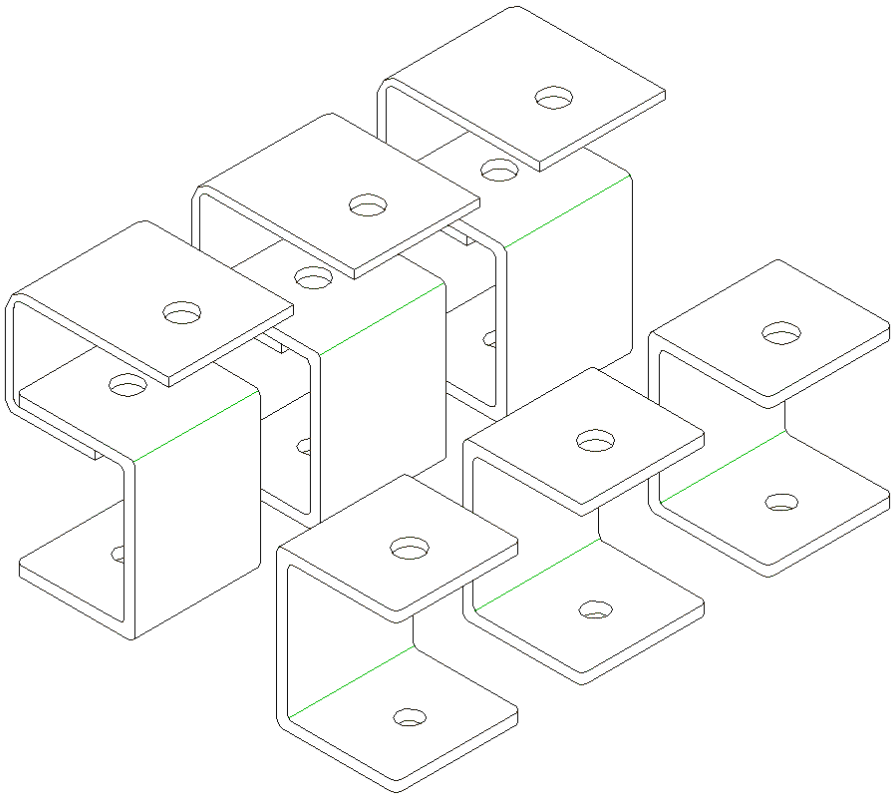
CONNECTIONS



DELTA CONNECTION

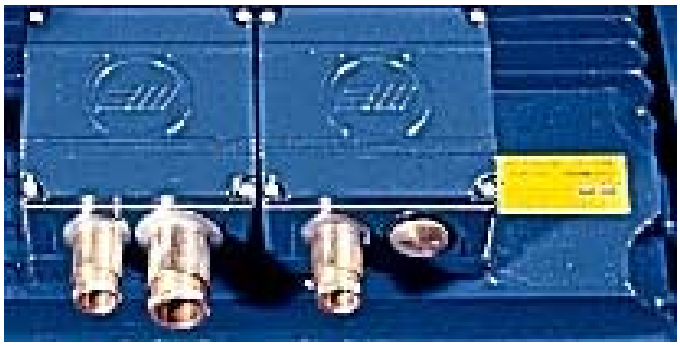


STAR CONNECTION



CONNECTION FOR STAR-DELTA STARTING

The motors are arranged to allow for auxiliary terminal box assembly on both sides of the motor. The standard configuration has an auxiliary terminal box (for PTC 155 °C mounted). The anticondensation heaters supplied as optional are connected to a separate auxiliary terminal box On request the signal and power connections can be isolated with a separator, to allow for use of the same terminal box.
The auxiliary terminals can be mounted inside the main terminal box.



Separate Auxiliary Terminal Boxes

Components	***Materials***
Terminal box	Aluminium Alloy
Terminal box cover	Aluminium Alloy
Sealing	Rubber
Bolts and screws	Zinc Chromium plated steel
Terminal board	Melamine

Auxiliary Terminal box Data	***Unit***	***Standard***	***On request***
Degree of protection		IP 55	IP 56
Position assembly		On the right or left side	
Cable entry and rotation of the box	Grade	90° in 90°	Separate Aux. Boxes
Equipotential connection		1 x M4	
Main external dimension	mm	128 x 128 x 65	
Cableglands		Pg 16	Pg 21

TERMINALS TECHNICAL DATA	*Unit*	*Standard*	*Description*
N° Max of Terminals (for each box)	No.	15	According to auxiliaries
Max Voltage	V	750	
Max terminal current	A	27	
Connection		Flexible and rigid conductors	
Max cable section	mm^2	2,5	
Classification		EEx-e	

UPON REQUEST:

- A maximum of 4 auxiliary terminal boxes;
- Standard and marine cableglands.

EXTERNAL SURFACES

The **standard painting process** uses an epoxy vinyl/polyuretanic paint of a thickness designed for optimum environmental resistance.

For special aggressive environments a **special painting process** is available on request. This comprises a first coat epoxy vinyl paint followed by a second coat of polyacrilic paint. This process is particularly suggested for:

- Environments where of acid or alkaline liquids are present;
- Outdoor installations where salt is present;
- Overdeck and underdeck marine applications;
- Environments where anhydridic gases are present.

The standard finishing paint colour is RAL 5010: Other RAL and Munsell colours are available on request (opt. 919).

Phase		***Characteristics***	***Thickness***
Sand pressured cleaning		Grade Sa $2^{1/2}$	
Antirust coat		Zinch phosphated	≥ 25 μm
Painting	*Std* F96833	Two component paint formulated with solid epoxy resins modified with vinyl polyamide catalyser	≥ 50 μm
	On request F96819	Std + additional polyacrilic coat formulated with an aromatic semiolphatic catalyser	≥ 200 μm
Finishing colour	*Std*	RAL 5010	
	On request	RAL & MUNSELL colours	

INTERNAL SURFACES

All internal surfaces are tropicalised with an insulating enamel to preserve the motors from corrosion due to humidity and corrosive substances.

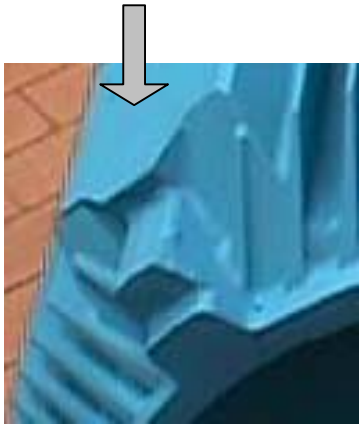
Lifting eyebolts with characteristics shown in the table below are supplied in the standard configuration.

Motor frame	*Mounting*	*Motor type*	*Eyebolt type*	*No. Of eyebolts*	*Eyebolt drilling*
B5_ 355	Horizontal	LA ÷ LB	A	1	M 30
		LC ÷ LF	A	1	M 30
	Vertical	LA ÷ LB	B	2	M 24
		LC ÷ LF	B	2	M 24
B5_ 400	Horizontal	LA ÷ LD	A	2	M 30
	Vertical	LA ÷ LD	B	2	M 24

A type eyebolt

Fixing points on the housing

B type eyebolt



Fixing points on the housing

The nominal characteristics of the motors are shown in the following tables, according to *IEC 60034.1* (with corresponding tolerances):

- In S1 and S2-30' duty;
- At nominal voltage and frequency;
- With maximum ambient temperature of 40°C for industrial application and 45°C for marine;
- With altitude less than 1000m a.s.l.

The data refers to the voltages and frequencies shown in the tables. For specifically wound voltage and frequency values, the values of efficiency and the power factor remain the same. In this case the new value of the current can be obtained by applying the following formula :

$$I_A = \frac{P_W}{\sqrt{3} \cdot V_{\Delta o \lambda} \cdot \cos\varphi_{NOM} \cdot \eta_{NOM}}$$

The motors have a temperature rise according to class B (80K) with the exception of those marked with a star which have a temperature rise of 95K. In the first case it is possible:

- to use the motor in continuous service with an increased output (see tables), and a temperature rise according to class F (105K). Torque and current values in p.u. shown in the graphs change inversely proportional to the ratio of the outputs. The same torque values can be given by manufacturing a specific winding;
- to mention in the nameplate the service factor referred to the nominal output shown in the catalogue (*S.F. Service Factor*) when specifically requested by the customer.

The motors are suitable for the following starting methods:

- D.O.L. (Direct On Line);
- Star-delta;
- Via autotransformer;
- Via soft-starter: in this case it is possible to use the motor in standard construction if the device is by-passed after starting. Otherwise it is necessary to request a special winding with reinforced insulation.
- Via inverter: it is necessary to request a special winding with reinforced insulation (opt. 178).

TABLE LIST

	2 – 8 pole motors – Nominal Data				
	Motor type	*Frequency [Hz]*	*Temperature rise class*	*Service*	*T_{amb} [°C]*
Table 1	B5C 355	50	B - (F*)	S1	40 – (45*)
Table 2	B5C 355	50	F	S1	40
Table 3	B5C 355	60	B - (F*)	S1	40 – (45*)
Table 4	B5C 355	60	F	S1	40
Table 5	B5M 355	60	F*	S2 – 30'	45
Table 6	B5C 400	50	B - (F*)	S1	40 – (45*)
Table 7	B5C 400	50	F	S1	40
Table 8	B5C 400	60	B - (F*)	S1	40 – (45*)
Table 9	B5M 400	60	F*	S2 – 30'	45

***** *F Marine (95 K)*

Table 1 ***400 V - 50 Hz - S1 - F / B (80 K) - IP 55 - IC 411***

Power	Type	Speed	Efficiency	Power factor	Current		Torque			Inertia	Weight	
		Rpm	h %	cos j	In	Is / In	Cn	Cs / Cn	Cmax / Cn	J	IM B3	IM V1
kW		1/min	1 / 1	1 / 1	A	p.u.	Nm	p.u.	p.u.	kgm^2	kg	
2 pole												
250	**B5C 355 LA2**	2980	96	0,9	**418**	7,0	800	2,3	2,3	3,7	1620	1580
315	**B5C 355 LB2**	2980	96,2	0,9	**525**	7,1	1008	2,2	2,2	4,5	1810	1770
355	**B5C 355 LC2**	2980	96,4	0,9	**591**	7,2	1136	2,1	2,2	5,2	2030	1980
400	**B5C 355 LD2**	2980	96,5	0,9	**665**	7,2	1281	2,1	2,1	5,9	2180	2130
450	**B5C 355 LE2** ★	2980	96,5	0,9	**748**	7,2	1441	2,2	2,2	6,5	2310	2260
4 pole												
250	**B5C 355 LA4**	1490	95,5	0,86	**439**	6,2	1601	2,0	2,4	6,1	1690	1650
315	**B5C 355 LB4**	1490	95,6	0,86	**553**	6,2	2017	2,0	2,4	7,4	1880	1840
355	**B5C 355 LC4**	1490	95,6	0,86	**623**	6,2	2273	1,9	2,3	8,3	2100	2150
400	**B5C 355 LD4**	1490	95,8	0,86	**701**	6,2	2561	1,9	2,4	9,4	2250	2200
450	**B5C 355 LE4** ★	1490	96,1	0,87	**777**	6,2	2881	1,9	2,3	10,2	2360	2310
500	**B5C 355 LF4** ★	1490	96,2	0,90	**834**	6,5	3201	1,2	2,8	11,2	2430	2380
6 pole												
200	**B5C 355 LA6**	990	95,3	0,85	**356**	6,0	1927	2,1	2,1	10,5	1700	1660
250	**B5C 355 LB6**	990	95,5	0,85	**445**	6,0	2409	2,1	2,1	13,1	1930	1890
315	**B5C 355 LC6** ★	990	95,7	0,86	**552**	6,3	3035	2,3	2,3	17	2365	2315
355	**B5C 355 LD6** ★	990	96	0,87	**614**	6,5	3421	1,3	2,4	18,6	2440	2390
8 pole												
160	**B5C 355 LA8**	740	95	0,83	**293**	5,8	2063	2,1	2,1	12,7	1750	1710
200	**B5C 355 LB8**	740	95,2	0,83	**365**	5,6	2578	2,0	2,1	15,4	1950	1910
250	**B5C 355 LC8**	740	95,5	0,83	**455**	5,8	3223	2,0	2,0	18,8	2290	2240
315	**B5C 355 LD8** ★	740	95,5	0,83	**574**	6,0	4061	1,5	2,6	21,4	2440	2390

★ 95 K Temperature rise

Table 2 ***400 V - 50 Hz - S1 - F / F (105 K) - IP 55 - IC 411***

Power	Type	Speed	Efficiency	Power factor	Current		Torque			Inertia	Weight	
		Rpm	h %	cos j	In	Is / In	Cn	Cs / Cn	Cmax / Cn	J	IM B3	IM V1
kW		1/min	1 / 1	1 / 1	A	p.u.	Nm	p.u.	p.u.	kgm^2	kg	
2 pole												
275	**B5C 355 LA2**	2978	96	0,9	**459**	6,4	881	2,1	2,1	3,7	1620	1580
345	**B5C 355 LB2**	2978	96,2	0,9	**574**	6,5	1104	2,0	2,0	4,5	1810	1770
390	**B5C 355 LC2**	2978	96,4	0,9	**648**	6,6	1248	1,9	2,0	5,2	2030	1980
430	**B5C 355 LD2**	2979	96,5	0,9	**715**	6,7	1377	2,0	2,0	5,9	2180	2130
465	**B5C 355 LE2**	2979	96,5	0,9	**772**	7,0	1487	2,1	2,1	6,5	2310	2260
4 pole												
275	**B5C 355 LA4**	1489	95,5	0,86	**483**	5,6	1762	1,8	2,2	6,1	1690	1650
345	**B5C 355 LB4**	1489	95,6	0,86	**605**	5,7	2207	1,8	2,2	7,4	1880	1840
390	**B5C 355 LC4**	1489	95,6	0,86	**684**	5,7	2495	1,7	2,1	8,3	2100	2150
440	**B5C 355 LD4**	1489	95,8	0,86	**771**	5,6	2819	1,7	2,2	9,4	2250	2200
465	**B5C 355 LE4**	1490	96,1	0,87	**802**	6,0	2975	1,8	2,2	10,2	2360	2310
515	**B5C 355 LF4**	1490	96,2	0,90	**859**	6,3	3298	1,2	2,7	11,2	2430	2380
6 pole												
220	**B5C 355 LA6**	989	95,3	0,85	**392**	5,5	2122	1,9	1,9	10,5	1700	1660
265	**B5C 355 LB6**	989	95,5	0,85	**470**	5,7	2550	2,0	2,0	13,1	1930	1890
325	**B5C 355 LC6**	990	95,7	0,86	**571**	6,1	3137	2,2	2,2	17	2365	2315
355	**B5C 355 LD6**	990	96	0,87	**614**	6,5	3421	1,3	2,4	18,6	2440	2390
8 pole												
175	**B5C 355 LA8**	739	95	0,83	**320**	5,3	2259	1,9	1,9	12,7	1750	1710
220	**B5C 355 LB8**	739	95,2	0,83	**402**	5,1	2840	1,8	1,9	15,4	1950	1910
275	**B5C 355 LC8**	739	95,5	0,83	**501**	5,3	3550	1,8	1,8	18,8	2290	2240
315	**B5C 355 LD8**	740	95,5	0,83	**574**	6,0	4061	1,5	2,6	21,4	2440	2390

Table 3 ***440 V - 60 Hz - S1 - F / B (80 K) - IP 55 - IC 411***

Power	Type	Speed	Efficiency	Power factor	Current		Torque			Inertia	Weight	
		Rpm	h %	cos j	In	Is / In	Cn	Cs / Cn	Cmax / Cn	J	IM B3	IM V1
kW		1/min	1 / 1	1 / 1	A	p.u.	Nm	p.u.	p.u.	kgm^2	kg	
2 pole												
300	**B5C 355 LA2**	3580	96	0,9	**456**	7,0	799	2,3	2,3	3,7	1620	1580
380	**B5C 355 LB2**	3580	96,2	0,9	**576**	7,1	1013	2,2	2,2	4,5	1810	1770
425	**B5C 355 LC2**	3580	96,4	0,9	**643**	7,2	1133	2,1	2,2	5,2	2030	1980
460	**B5C 355 LD2**	3580	96,5	0,9	**695**	7,5	1226	2,2	2,2	5,9	2180	2130
495	**B5C 355 LE2** ★	3580	96,5	0,9	**748**	7,9	1319	2,4	2,4	6,5	2310	2260
4 pole												
300	**B5C 355 LA4**	1790	95,5	0,86	**479**	6,2	1599	2,0	2,4	6,1	1690	1650
380	**B5C 355 LB4**	1790	95,6	0,86	**606**	6,2	2025	2,0	2,4	7,4	1880	1840
425	**B5C 355 LC4**	1790	95,6	0,86	**678**	6,2	2265	1,9	2,3	8,3	2100	2150
480	**B5C 355 LD4**	1790	95,8	0,86	**764**	6,2	2558	1,9	2,4	9,4	2250	2200
520	**B5C 355 LE4** ★	1790	96,1	0,87	**815**	6,4	2769	2,0	2,4	10,2	2360	2310
575	**B5C 355 LF4** ★	1790	96,2	0,9	**871**	6,8	3065	1,3	2,9	11,2	2430	2380
6 pole												
240	**B5C 355 LA6**	1190	95,3	0,85	**389**	6,0	1924	2,1	2,1	10,5	1700	1660
290	**B5C 355 LB6**	1190	95,5	0,85	**468**	6,2	2321	2,2	2,2	13,1	1930	1890
360	**B5C 355 LC6**	1190	95,7	0,86	**574**	6,6	2888	2,4	2,4	17	2365	2315
390	**B5C 355 LD6** ★	1190	96	0,87	**612**		3123	1,4	2,6	18,6	2440	2390
8 pole												
190	**B5C 355 LA8**	890	95	0,83	**316**	5,9	2037	2,1	2,1	12,7	1750	1710
240	**B5C 355 LB8**	890	95,2	0,83	**399**	5,6	2573	2,0	2,1	15,4	1950	1910
300	**B5C 355 LC8**	890	95,5	0,83	**497**	5,8	3216	2,0	2,0	18,8	2290	2240
345	**B5C 355 LD8** ★	890	95,5	0,83	**570**	6,6	3693	1,6	2,9	21,4	2440	2390

★ 95 K Temperature rise

Table 4 ***440 V - 60 Hz - S1 - F / F (105 K) - IP 55 - IC 411***

Power	Type	Speed	Efficiency	Power factor	Current		Torque			Inertia	Weight	
		Rpm	h %	cos j	In	Is / In	Cn	Cs / Cn	Cmax / Cn	J	IM B3	IM V1
kW		1/min	1 / 1	1 / 1	A	p.u.	Nm	p.u.	p.u.	kgm^2	kg	
2 pole												
330	**B5C 355 LA2**	3578	96	0,9	**501**	6,4	880	2,1	2,1	3,7	1620	1580
416	**B5C 355 LB2**	3578	96,2	0,9	**630**	6,5	1109	2,0	2,0	4,5	1810	1770
470	**B5C 355 LC2**	3578	96,4	0,9	**710**	6,5	1252	1,9	2,0	5,2	2030	1980
495	**B5C 355 LD2**	3578	96,5	0,9	**748**	7,0	1320	2,0	2,0	5,9	2180	2130
510	**B5C 355 LE2**	3579	96,5	0,9	**770**	7,6	1358	2,3	2,3	6,5	2310	2260
4 pole												
330	**B5C 355 LA4**	1789	95,5	0,86	**527**	5,6	1760	1,8	2,2	6,1	1690	1650
415	**B5C 355 LB4**	1789	95,6	0,86	**662**	5,6	2212	1,8	2,2	7,4	1880	1840
470	**B5C 355 LC4**	1789	95,6	0,86	**749**	5,6	2504	1,7	2,1	8,3	2100	2150
500	**B5C 355 LD4**	1790	95,8	0,86	**796**	6,0	2665	1,8	2,3	9,4	2250	2200
530	**B5C 355 LE4**	1790	96,1	0,87	**832**	6,3	2825	1,9	2,3	10,2	2360	2310
590	**B5C 355 LF4**	1790	96,2	0,9	**894**	6,6	3145	1,2	2,9	11,2	2430	2380
6 pole												
265	**B5C 355 LA6**	1189	95,3	0,85	**429**	5,4	2126	1,9	1,9	10,5	1700	1660
300	**B5C 355 LB6**	1190	95,5	0,85	**485**	6,0	2406	2,1	2,1	13,1	1930	1890
370	**B5C 355 LC6**	1190	95,7	0,86	**589**	6,4	2964	2,4	2,4	17	2365	2315
390	**B5C 355 LD6**	1190	96	0,87	**612**	7,1	3123	1,4	2,6	18,6	2440	2390
8 pole												
210	**B5C 355 LA8**	889	95	0,83	**350**	5,3	2256	1,9	1,9	12,7	1750	1710
265	**B5C 355 LB8**	889	95,2	0,83	**440**	5,1	2844	1,8	1,9	15,4	1950	1910
330	**B5C 355 LC8**	889	95,5	0,83	**546**	5,3	3541	1,8	1,8	18,8	2290	2240
350	**B5C 355 LD8**	890	95,5	0,83	**579**	6,5	3747	1,6	2,8	21,4	2440	2390

Table 5 ***440 V - 60 Hz - S2 - 30' - F / F MARINE (95 K) - IP 55 - IC 411***

Power	Type	Speed	Efficiency	Power factor	Current		Torque			Inertia	Weight	
		Rpm	h %	cos j	In	Is / In	Cn	Cs / Cn	Cmax / Cn	J	IM B3	IM V1
kW		1/min	1 / 1	1 / 1	A	p.u.	Nm	p.u.	p.u.	kgm^2	kg	
2 pole												
360	**B5M 355 LA2**	3576	96	0,9	**546**	5,8	959	1,9	1,9	3,7	1620	1580
450	**B5M 355 LB2**	3576	96,2	0,9	**683**	6,0	1202	1,8	1,8	4,5	1810	1770
510	**B5M 355 LC2**	3576	96,4	0,9	**771**	6,0	1360	1,8	1,8	5,2	2030	1980
560	**B5M 355 LD2**	3576	96,5	0,9	**846**	6,2	1494	1,8	1,8	5,9	2180	2130
600	**B5M 355 LE2**	3576	96,5	0,9	**907**	6,5	1601	2,0	2,0	6,5	2310	2260
4 pole												
360	**B5M 355 LA4**	1788	95,5	0,86	**574**	5,2	1918	1,7	2,0	6,1	1690	1650
450	**B5M 355 LB4**	1788	95,6	0,86	**719**	5,2	2403	1,7	2,0	7,4	1880	1840
510	**B5M 355 LC4**	1788	95,6	0,86	**813**	5,2	2719	1,6	1,9	8,3	2100	2150
570	**B5M 355 LD4**	1788	95,8	0,86	**908**	5,2	3041	1,6	2,0	9,4	2250	2200
600	**B5M 355 LE4**	1788	96,1	0,87	**942**	5,6	3201	1,7	2,1	10,2	2360	2310
670	**B5M 355 LF4**	1788	96,2	0,9	**1015**	5,8	3574	1,1	2,5	11,2	2430	2380
6 pole												
285	**B5M 355 LA6**	1188	95,3	0,85	**462**	5,1	2288	1,8	1,8	10,5	1700	1660
340	**B5M 355 LB6**	1188	95,5	0,85	**550**	5,3	2730	1,9	1,9	13,1	1930	1890
420	**B5M 355 LC6**	1188	95,7	0,86	**670**	5,7	3373	2,1	2,1	17	2365	2315
460	**B5M 355 LD6**	1188	96	0,87	**722**	6,0	3689	1,2	2,2	18,6	2440	2390
8 pole												
230	**B5M 355 LA8**	888	95	0,83	**382**	4,8	2469	1,8	1,8	12,7	1750	1710
285	**B5M 355 LB8**	888	95,2	0,83	**473**	4,7	3061	1,7	1,8	15,4	1950	1910
325	**B5M 355 LC8**	889	95,5	0,83	**538**	5,4	3487	1,8	1,8	18,8	2290	2240
410	**B5M 355 LD8**	888	95,5	0,83	**678**	5,5	4399	1,4	2,4	21,4	2440	2390

Table 6 ***400 V - 50 Hz - S1 - F / B (80 K) - IP 55 - IC 411***

Power	Type		Speed	Efficiency	Power factor	Current		Torque			Inertia	Weight	
						In	Is / In	Cn	Cs / Cn	Cmax / Cn	J	IM B3	IM V1
kW			1/min	1 / 1	1 / 1	A	p.u.	Nm	p.u.	p.u.	kgm^2	kg	
2 pole													
500	**B5C 400 LA2**		2981	96,7	0,89	**839**	6,3	1600	1,8	2,0	8,2	2680	2620
560	**B5C 400 LB2**	★	2982	96,8	0,9	**928**	6,8	1792	1,7	2,0	9,1	2850	2790
630	**B5C 400 LC2**	★	2983	97	0,9	**1042**	7,8	2015	2,0	2,2	10	3030	2970
4 pole													
560	**B5C 400 LA4**		1490	96,50	0,87	**963**	6,6	3586	2,0	2,3	11,4	2700	2640
630	**B5C 400 LB4**		1490	96,60	0,87	**1082**	6,6	4034	2,0	2,4	13	2900	2840
710	**B5C 400 LC4**	★	1491	96,70	0,87	**1218**	7,4	4543	0,9	2,5	18	3100	3040
6 pole													
400	**B5C 400 LA6**		992	96	0,84	**716**	6,9	3847	1,5	2,5	17,5	2680	2620
450	**B5C 400 LB6**		992	96,2	0,85	**794**	7,2	4328	1,6	2,5	19,5	2850	2790
500	**B5C 400 LC6**	★	993	96,3	0,84	**892**	7,7	4804	1,7	2,6	22	3070	3010
560	**B5C 400 LD6**	★	994	96,3	0,87	**965**	6,9	5375	1,4	2,6	30	3200	3140
8 pole													
355	**B5C 400 LB8**		743	95,5	0,82	**654**	6,0	4558	1,3	2,3	21	2850	2790
400	**B5C 400 LC8**	★	743	95,7	0,82	**736**	6,2	5136	1,3	2,3	24	3070	3010
450	**B5C 400 LD8**	★	743	95,8	0,81	**837**	5,8	5778	1,2	2,2	27,5	3230	3170

★ 95 K Temperature rise

Table 7 ***400 V - 50 Hz - S1 - F/F (105 K) - IP 55 - IC 411***

Power	Type	Speed	Efficiency	Power factor	Current		Torque			Inertia	Weight	
		Rpm	h %	cos j	In	Is / In	Cn	Cs / Cn	Cmax / Cn	J	IM B3	IM V1
kW		1/min	1 / 1	1 / 1	A	p.u.	Nm	p.u.	p.u.	kgm^2	kg	
2 pole												
550	**B5C 400 LA2**	2983	96,7	0,89	**922**	5,7	1759	1,6	1,8	8,2	2680	2620
605	**B5C 400 LB2**	2983	96,8	0,9	**1002**	6,3	1934	1,6	1,9	9,1	2850	2790
650	**B5C 400 LC2**	2984	97	0,9	**1075**	7,6	2078	1,9	2,1	10	3030	2970
4 pole												
605	**B5C 400 LA4**	1491	96,5	0,87	**1040**	6,1	3870	1,9	2,1	11,4	2700	2640
660	**B5C 400 LB4**	1490	96,6	0,87	**1133**	6,3	4221	1,9	2,3	13	2900	2840
710	**B5C 400 LC4**	1491	96,7	0,87	**1218**	7,4	4543	0,9	2,5	18	3100	3040
6 pole												
440	**B5C 400 LA6**	993	96	0,84	**788**	6,3	4228	1,4	2,3	17,5	2680	2620
475	**B5C 400 LB6**	992	96,2	0,85	**838**	6,8	4566	1,5	2,4	19,5	2850	2790
500	**B5C 400 LC6**	993	96,3	0,84	**892**	7,7	4804	1,7	2,6	22	3070	3010
560	**B5C 400 LD6**	994	96,3	0,87	**965**	6,9	5375	1,4	2,6	30	3200	3140
8 pole												
360	**B5C 400 LB8**	743	95,5	0,82	**664**	5,9	4623	1,3	2,3	21	2850	2790
400	**B5C 400 LC8**	743	95,7	0,82	**736**	6,2	5136	1,3	2,3	24	3070	3010
450	**B5C 400 LD8**	743	95,8	0,81	**837**	5,8	5778	1,2	2,2	27,5	3230	3170

Table 8 ***440 V - 60 Hz - S1 - F/B (80 K) - IP 55 - IC 411***

Power	Type	Speed	Efficiency	Power factor	Current		Torque			Inertia	Weight	
		Rpm	h %	cos j	In	Is / In	Cn	Cs / Cn	Cmax / Cn	J	IM B3	IM V1
kW		1/min	1 / 1	1 / 1	A	p.u.	Nm	p.u.	p.u.	kgm^2	kg	
2 pole												
575	**B5C 400 LA2**	3580	96,7	0,89	**877**	6,6	1532	1,9	2,1	8,2	2680	2620
615	**B5C 400 LB2** ★	3580	96,8	0,9	**926**	7,4	1639	1,9	2,2	9,1	2850	2790
690	**B5C 400 LC2** ★	3581	97	0,9	**1037**	8,5	1838	2,2	2,4	10	3030	2970
4 pole												
625	**B5C 400 LA4**	1789	96,5	0,87	**977**	7,1	3335	2,2	2,5	11,4	2700	2640
725	**B5C 400 LB4**	1790	96,6	0,87	**1131**	6,9	3862	2,1	2,5	13	2900	2840
780	**B5C 400 LC4** ★	1790	96,7	0,87	**1217**	8,1	4157	1,0	2,7	18	3100	3040
6 pole												
460	**B5C 400 LA6**	1192	96	0,84	**749**	7,2	3683	1,6	2,6	17,5	2680	2620
515	**B5C 400 LB6**	1192	96,2	0,85	**826**	7,6	4119	1,7	2,6	19,5	2850	2790
550	**B5C 400 LC6** ★	1192	96,3	0,84	**892**	8,4	4401	1,9	2,8	22	3070	3010
615	**B5C 400 LD6** ★	1193	96,3	0,87	**963**	7,5	4916	1,5	2,8	30	3200	3140
8 pole												
410	**B5C 400 LB8**	893	95,5	0,82	**687**	6,2	4384	1,4	2,4	21	2850	2790
440	**B5C 400 LC8** ★	892	95,7	0,82	**736**	6,8	4704	1,4	2,5	24	3070	3010
495	**B5C 400 LD8** ★	892	95,8	0,81	**837**	6,3	5292	1,3	2,4	27,5	3230	3170

★ 95 K Temperature rise

Table 9 ***440 V - 60 Hz - S2 - 30' - F / F $_{NAVALE}$ (95 K) - IP 55 - IC 411***

Power	Type	Speed	Efficiency	Power factor	Current		Torque			Inertia	Weight	
		Rpm	h %	cos j	In	Is / In	Cn	Cs / Cn	Cmax / Cn	J	IM B3	IM V1
kW		1/min	1 / 1	1 / 1	A	p.u.	Nm	p.u.	p.u.	kgm^2	kg	
2 pole												
660	**B5M 400 LA2**	3583	96,7	0,89	**1007**	5,7	1758	1,6	1,8	8,2	2680	2620
740	**B5M 400 LB2**	3584	96,8	0,9	**1115**	6,2	1970	1,5	1,8	9,1	2850	2790
830	**B5M 400 LC2**	3585	97	0,9	**1247**	7,1	2208	1,8	2,0	10	3030	2970
4 pole												
750	**B5M 400 LA4**	1791	96,5	0,87	**1173**	5,9	3996	1,8	2,1	11,4	2700	2640
835	**B5M 400 LB4**	1791	96,6	0,87	**1304**	6,0	4449	1,8	2,2	13	2900	2840
935	**B5M 400 LC4**	1792	96,7	0,87	**1459**	6,7	4979	0,8	2,3	18	3100	3040
6 pole												
552	**B5M 400 LA6**	1193	96	0,84	**898**	6,0	4414	1,3	2,2	17,5	2680	2620
620	**B5M 400 LB6**	1193	96,2	0,85	**995**	6,3	4958	1,4	2,2	19,5	2850	2790
660	**B5M 400 LC6**	1194	96,3	0,84	**1071**	7,0	5275	1,5	2,4	22	3070	3010
740	**B5M 400 LD6**	1195	96,3	0,87	**1159**	6,3	5911	1,3	2,4	30	3200	3140
8 pole												
490	**B5M 400 LB8**	894	95,5	0,82	**821**	5,2	5228	1,1	2,0	21	2850	2790
528	**B5M 400 LC8**	894	95,7	0,82	**883**	5,6	5637	1,2	2,1	24	3070	3010
595	**B5M 400 LD8**	894	95,8	0,81	**1006**	5,3	6352	1,1	2,0	27,5	3230	3170

1 INDEX OF CONTENTS

2 MOTOR BEARINGS IN STANDARD EXECUTION

Horizontal mounting:
radial ball bearings with D-end bearing which blocks and axially positions the rotor.

Vertical mounting (V1 and V5 mounting):
B5C 355:
2 pole: radial ball bearing on D-end, oblique ball bearing on N-end. The N-end bearing axially positions the rotor;
4-8 pole: radial ball bearing on both ends. The N-end bearing axially positions the rotor.

B5C 400:
2 pole: radial ball bearing on D-end, oblique ball bearing on N-end;
4-8 pole: LA - LB radial ball bearing on both ends;
LC - LD radial ball bearing on D-end, oblique ball bearing on N-end. The N-end bearing axially positions the rotor;

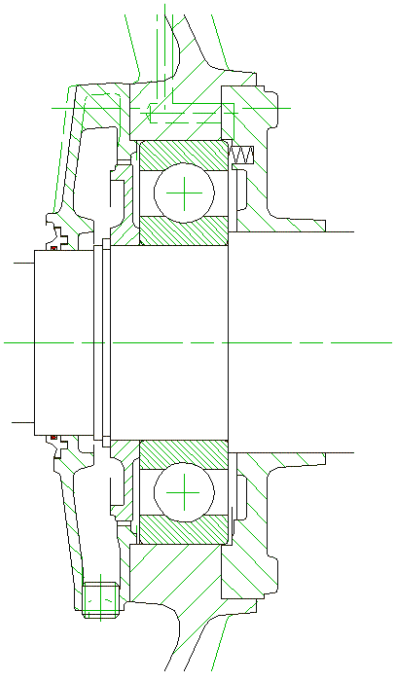
Bearings of standard motors are given in Table 1.

Table 1

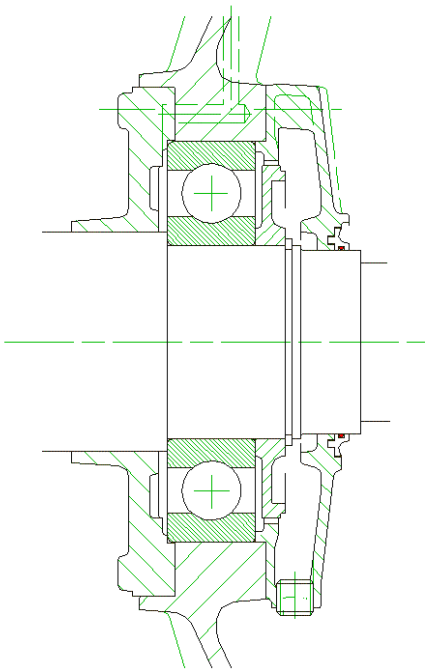
Bearings of standard motors						
Motor frame	**Polarity**	**Type**	**Horizontal**		**Vertical**	
			D-end	**N-end**	**D-end**	**N-end**
B5_ 355	2	LA – LE	6317 C3	6317 C3 (8 springs)	6317 C3 (8 springs)	7317 BE
	4 – 8	LA – LF	6322 C3	6322 C3 (8 springs)	6322 C3 (4 springs)	6322 C3
B5_ 400	2	LA – LC	6317 C3	6317 C3 (8 springs)	6317 C3 (8 springs)	7317 BE
	4 – 8	LA – LB	6322 C3	6322 C3 (8 springs)	6322 C3 (4 springs)	6322 C3
		LC – LD	6322 C3	6322 C3 (8 springs)	6322 C3 (8 springs)	7322 BE

Standard bearing executions are shown in the :

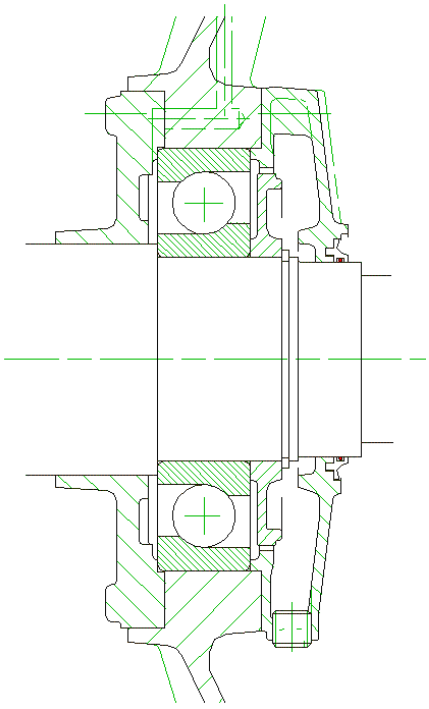
- 6317-C3 and 6322-C3 axially free — Picture 1;
- 6317-C3 and 6322-C3 axially blocked — Picture 2;
- 7317 and 7322 — Picture 3.



Picture 1



Picture 2



Picture 3

The theoretical load bearing life is calculated according to ISO R 281-1, for motors:
- lubricated with standard grease (ref. 532);
- running under normal environmental conditions, without anomalous vibrations, without radial or axial loads additional to those shown in the following tables;
- with bearing operating temperatures between –30 and +70 C°.

The theoretical bearing life of standard bearings are shown in table 2:
- without external loads,
- in horizontal and vertical positions,
- with feeding frequencies of 50 Hz and 60 Hz..

Table 2

Basic life of standard bearings without external loads appiled [hours]

Motor frame	Polarity	Type	50 Hz		60 Hz	
			Horizontal	Vertical	Horizontal	Vertical
B5C 355	2	LA-LB-LC-LD-LE	≥ 100000	≥ 100000	≥ 100000	≥ 100000
	4	LA	≥ 100000	≥ 100000	≥ 100000	≥ 100000
		LB		≥ 100000		84000
		LC		75000		62000
		LD		64000		53000
		LE		58000		48000
		LF		48000		40000
	6	LA	≥ 100000	≥ 100000	≥ 100000	≥ 100000
		LB		88000		73000
		LC		52000		43000
		LD		43000		36000
	8	LA	≥ 100000	≥ 100000	≥ 100000	≥ 100000
		LB		96000		80000
		LC		64000		53000
		LD		48000		40000
B5C 400	2	LA	91000	≥ 100000	76000	≥ 100000
		LB	80000		67000	
		LC	66000		55000	
	4	LA	≥ 100000	40000	≥ 100000	33000
		LB		32000		27000
		LC		≥ 100000		≥ 100000
	6	LA	≥ 100000	40000	≥ 100000	33000
		LB		33000		28000
		LC		≥ 100000		≥ 100000
		LD		≥ 100000		≥ 100000
	8	LB	≥ 100000	41000	≥ 100000	34000
		LC		≥ 100000		≥ 100000
		LD		≥ 100000		≥ 100000

2.1 APPLICABLE RADIAL LOADS – STANDARD CONSTRUCTION – HORIZONTAL MOUNTING

The maximum applicable radial loads at the end of the shaft extension (Fxmax) and at the beginning of the shaft extension (Fxo) referred to a feeding frequency of 50 Hz are shown in table 3/a (B5C 355) and 3/b (B5C 400); for a feeding frequency of 60 Hz the values must be reduced by 10%.

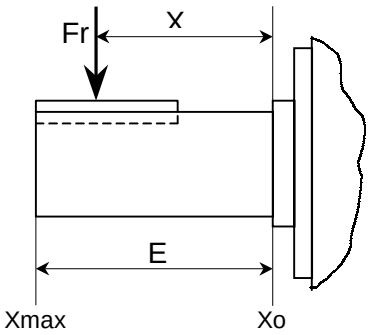
Table 3/a

B5C 355 - Applicable radial loads –Standard construction– IM B3 – f= 50 Hz								
Polarity	Frame	E [mm]	Bearing type		L_{10h} = 40000 h		L_{10h} = 100000 h	
			D-end	N-end	Fxo [N]	Fxmax [N]	Fxo [N]	Fxmax [N]
2	LA	140	6317 C3		4400	3870	1250	1100
	LB	140			3950	3450	750	650
	LC	140			4000	3600	800	700
	LD	140			3600	3200	400	300
	LE	140			3200	2900	-	-
4	LA	210	6322 C3		9100	7550	5950	4930
	LB	210			8350	6950	5200	4300
	LC	210			8500	7300	5300	4500
	LD	210			7900	6700	4650	3950
	LE	210			7400	6300	4150	3550
	LF	210			7000	5900	3700	3150
6	LA	210			10400	8500	6750	5530
	LB	210			9200	7650	5540	4600
	LC	210			8400	7150	4650	3900
	LD	210			7500	6400	3800	3250
8	LA	210			11350	9400	7350	6100
	LB	210			10250	8500	6250	5150
	LC	210			10000	8400	5800	4950
	LD	210			8700	7400	4600	3950

Table 3/b

B5C 400 - Applicable radial loads –Standard construction– IM B3 – f= 50 Hz								
Polarity	Type	E [mm]	Bearing type		L_{10h} = 40000 h		L_{10h} = 100000 h	
			D-end	N-end	Fxo [N]	Fxmax [N]	Fxo [N]	Fxmax [N]
2	LA	140	6317 C3		2950	2700	-	-
	LB	140			2450	2250	-	-
	LC	140			1700	1550	-	-
4	LA	210	6322 C3		7900	6900	4650	4050
	LB	210			6950	6050	3700	3200
	LC	210			5100	4500	1850	1600
6	LA	210			9050	7850	5300	4650
	LB	210			8250	7200	4500	3900
	LC	210			6900	5950	3150	2750
	LD	210			4800	4200	1100	950
8	LB	210			9700	8450	5500	4850
	LC	210			8500	7400	4350	3800
	LD	210			6300	5450	2200	1900

The radial load externally applied between X=0 and X=E, can be obtained by applying the following formula:



$$Fr = F_{xo} - \frac{X}{E} * \left(F_{xo} - F_{x\,\max}\right)$$

Fxo = max radial load at the beginning of the shaft extension [N].
Fxmax = max radial load at the end of the shaft extension [N].
E = standard shaft length [mm].
X = distance between the point of the applied load and the beginning of the shaft extension [mm].

2.2 APPLICABLE AXIAL LOADS – STANDARD CONSTRUCTION – HORIZONTAL MOUNTING

Table 4

Maximum applicable axial load – Standard construciton – IM B3 – f = 50 Hz						
Motor frame	**Polarity**	**Motor type**	**E [mm]**	**Bearing type** D-end / N-end	**L_{10h} = 40000 h Fy [N]**	**L_{10h} = 100000 h Fy [N]**
B5C 355	2	LA	140	6317 C3	1250	350
		LB	140		1250	200
		LC	140		1250	200
		LD	140		1150	100
		LE	140		1100	-
	4	LA	210	6322 C3	4700	2700
		LB	210		4450	2500
		LC	210		4450	2500
		LD	210		4300	2300
		LE	210		4150	2200
		LF	210		4050	2050
	6	LA	210		5650	3350
		LB	210		5300	3000
		LC	210		5000	2750
		LD	210		4800	2500
	8	LA	210		6400	3850
		LB	210		6050	3600
		LC	210		5950	3450
		LD	210		5600	3100
B5C 400	2	LA	140	6317 C3	950	-
		LB	140		800	-
		LC	140		600	-
	4	LA	210	6322 C3	4300	2300
		LB	210		4000	2000
		LC	210		3500	1500
	6	LA	210		5200	2900
		LB	210		4950	2700
		LC	210		4550	2300
		LD	210		4000	3750
	8	LB	210		5800	3350
		LC	210		5500	3000
		LD	210		4900	2400

Notes:

- *The given values must be reduced of 10% for a feeding frequency of 60 Hz.*
- *Loads are assumed bi-directional (from the motor and towards the motor). The axial load created by the pre-loading springs is always considered additional to the external axial applied load.*

2.3 APPLICABLE AXIAL LOADS – STANDARD CONSTRUCTION – VERTICAL MOUNTING

Table 5

Maximum applicable axial load – Standard construction– IM V1 – f = 50 Hz							
Motor frame	Polarity	Motor type	E [mm]	Bearing type D-end	Bearing type N-end	L_{10h} = 40000 h Fy [N]	L_{10h} = 100000 h Fy [N]
B5C 355	2	LA	140	6317 C3	7317	8400	4800
		LB	140			8000	4400
		LC	140			7400	3850
		LD	140			7100	3500
		LE	140			6850	3200
	4	LA	210	6322 C3		3000	450
		LB	210			2500	-
		LC	210			1800	-
		LD	210			1400	-
		LE	210			1100	-
		LF	210			500	-
	6	LA	210			3400	400
		LB	210			2600	-
		LC	210			1000	-
		LD	210			200	-
	8	LA	210			4000	700
		LB	210			3200	-
		LC	210			1800	-
		LD	210			800	-
B5C 400	2	LA	140	6317 C3	7317	5600	2000
		LB	140			5200	1600
		LC	140			4650	1100
	4	LA	210	6322 C3	6322 C3	-	-
		LB	210			-	-
		LC	210		7322	12200	5600
	6	LA	210		6322 C3	-	-
		LB	210			-	-
		LC	210		7322	15800	8000
		LD	210			13000	5400
	8	LB	210		6322 C3	-	-
		LC	210		7322	18500	10000
		LD	210			15700	7100

Notes:

- *The given values must be reduced of 10% for a feeding frequency of 60 Hz.*
- *Loads are assumed to be acting downwards(mono-directional) for B5_ 355 and 400 2 pole motors, for B5_400 LC LD 4-8 pole motors.*
- *Loads are assumed bi-directional (from the motor and towards the motor) for B5_355 4-8 pole motors and B5_400 LA LB 4-8 pole motors.*
- *The axial load created by the pre-loading springs is always considered additional to the external axial applied load.*

3 BEARINGS FOR HIGH LOADS

Both the horizontal and vertical mounting solutions can be supplied with bearings:
- of roller type, suitable for high radial loads (D-end),
- of oblique ball type for high external axial loads (N-end).

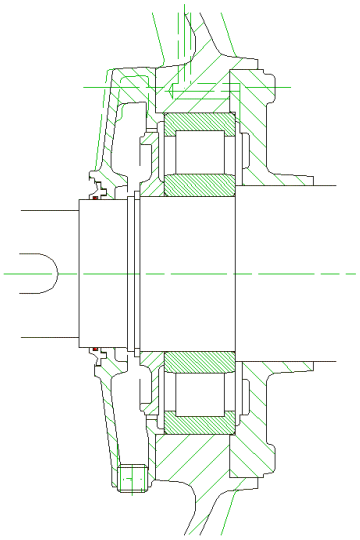
On both cases the N-end bearing axially constrains the rotor.
Roller bearings are not provided for 2 pole motors
Bearings for high loads are shown in table 6.

Table 6

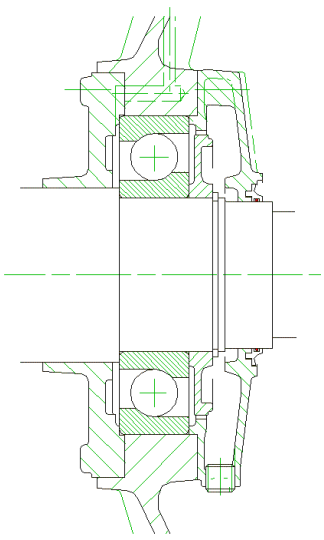
Motor type	Polarity	Type of load	Horizontal		Vertical	
			D-end	N-end	D-end	N-end
B5C 355 B5C 400	4-6-8	High radial	NU322 EC	6322 C3	NU322 EC	6322 C3
	4-6-8	High axial	1		6322 C3	7322 BE[2]
	4-6-8	High radial + high axial	1		NU322 EC	7322 BE[2]

1) Contact M.M.
2) Standard for B5C 400 LC e LD motor types

The following bearing configurations are shown in the pictures below:
- NU322-C3 Picture 4,
- 7322BE Picture 5.



Picture 4



Picture 5

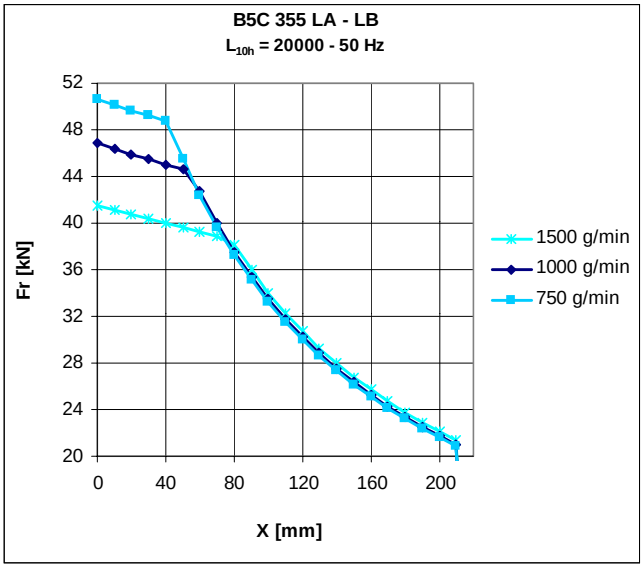
3.1 CONFIGURATION FOR HIGH RADIAL LOADS – HORIZONTAL MOUNTING

The curves indicating the maximum admissible external radial loads for 4-6-8 pole motors, with D-end bearing type NU322 and N-end bearing type 6322/C3, are shown in the graphs 1/a, 1/b, 1/c, 1/d, 2/a, 2/b 2/c, 2/d.
The graphs are referred to a basic bearing life of:

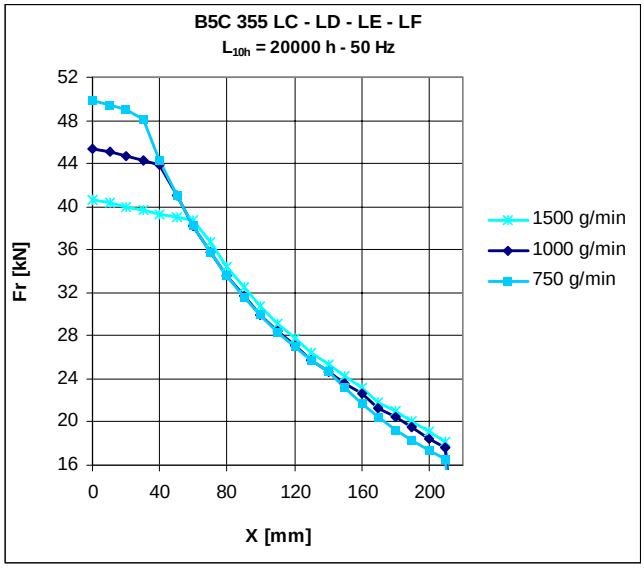
- 20000 hours for 1/a, 1/b, 1/c, 1/d graphs,
- 40000 hours for 2/a, 2/b, 2/c, 2/d graphs,

with a feeding frequency of 50 Hz.
For a feeding frequency of 60 Hz, the given values must be reduced of 10%.

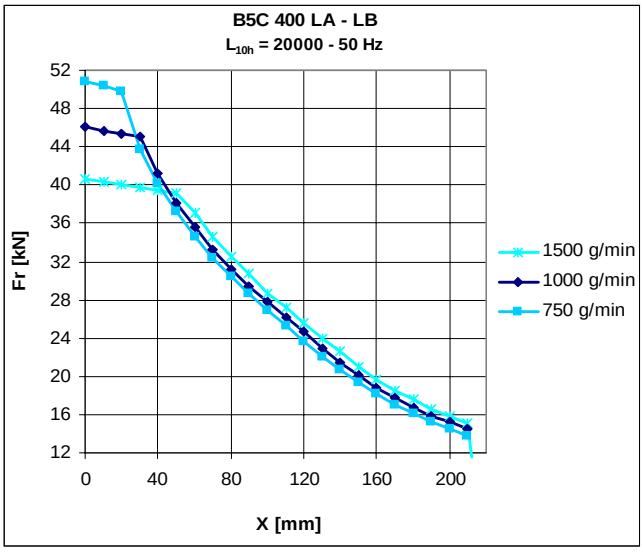
Graph 1/a



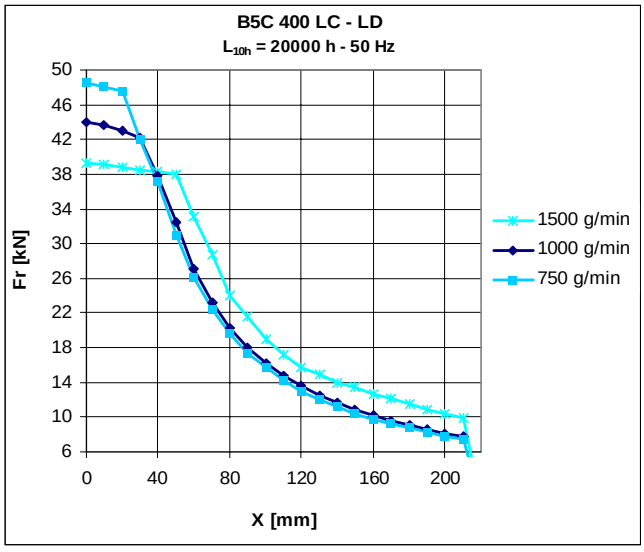
Graph 1/b



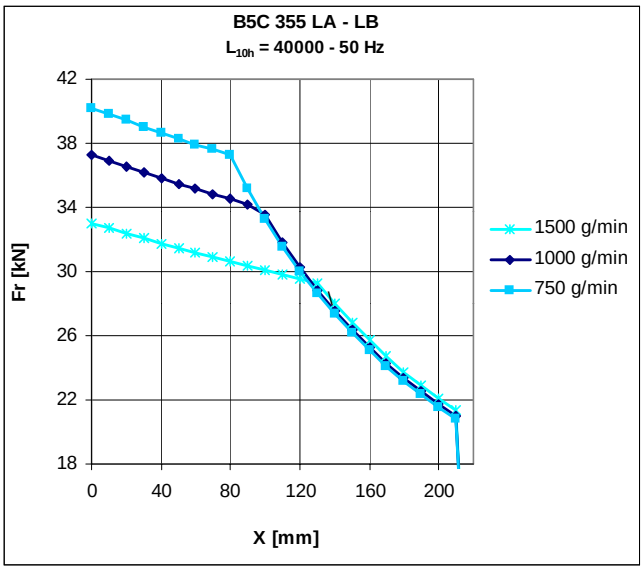
Graph 1/c



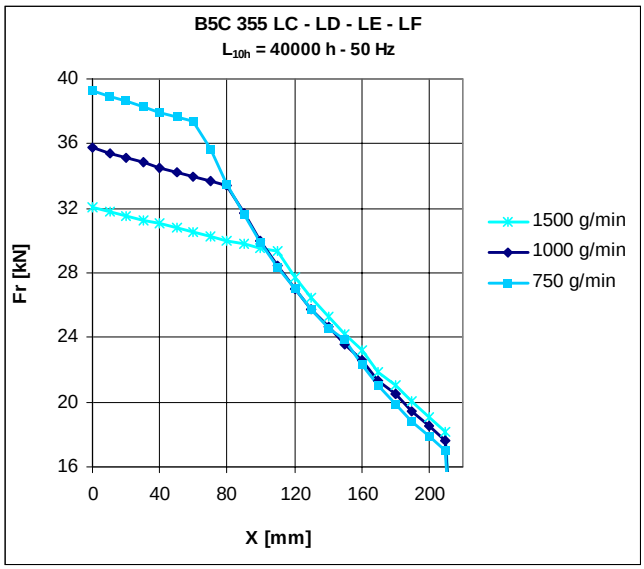
Graph 1/d



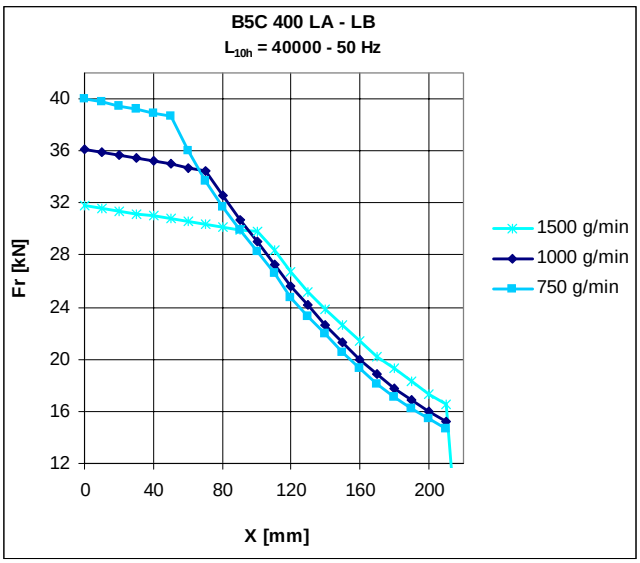
Graph 2/a



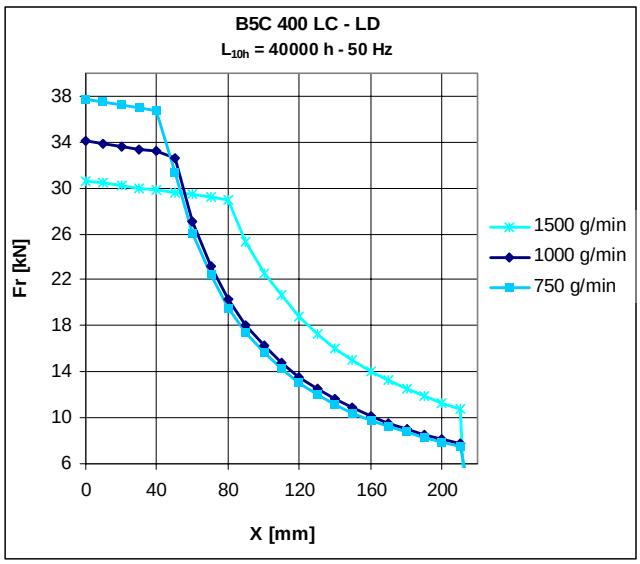
Graph 2/b



Graph 2/c



Graph 2/d



3.2 CONFIGURATION FOR HIGH AXIAL LOADS – VERTICAL MOUNTING.

The maximum externally applicable axial loads to the motors in configuration for high axial loads with respect to vertical mounting with shaft extension down (IMV1/IM3011) and acting downwards directed are shown in table 7. The maximum admissible loads acting upwards are shown in table 8.

Table 7

Configuration for high axial loads – IMV1 – 50 Hz (Loads downward directed)							
Motor frame	Polarity	Motor type	E [mm]	Bearing type D-end	Bearing type N-end	L_{10h} = 40000 h Fy [N]	L_{10h} = 100000 h Fy [N]
B5C 355	4	LA	210	6322 C3	7322	19000	12200
		LB	210			18300	11600
		LC	210			17500	10800
		LD	210			17000	10300
		LE	210			16800	10000
		LF	210			16200	9400
	6	LA	210			21500	13800
		LB	210			20700	12900
		LC	210			18800	11100
		LD	210			18000	10300
	8	LA	210			24000	15400
		LB	210			23100	14500
		LC	210			21400	13000
		LD	210			20500	11900
B5C 400	4	LA	210	6322 C3	7322	15400	8700
		LB	210			14700	7900
	6	LA	210			17500	9800
		LB	210			16700	9100
	8	LB	210			19500	11000

Note: for feeding frequency of 60 Hz, the values must be reduced of 10%.

Table 8

Configuration for high axial loads – IMV1 – f = 50 Hz (Loads upwards directed)						
Motor frame	**Polarity**	**Motor type**	**E [mm]**	**Bearing type**		**Fy [N]**
				D-end	**N-end**	
B5C 355	2	LA	140	6317 C3	7317	-
		LB	140			-
		LC	140			-
		LD	140			100
		LE	140			400
	4	LA	210	6322 C3	7322	1300
		LB	210			1700
		LC	210			2300
		LD	210			2700
		LE	210			2900
		LF	210			3600
	6	LA	210			2700
		LB	210			3300
		LC	210			4700
		LD	210			5500
	8	LA	210			3600
		LB	210			4400
		LC	210			5600
		LD	210			6600
B5C 400	2	LA	140	6317 C3	7317	1600
		LB	140			2000
		LC	140			2400
	4	LA	210	6322 C3	7322	3900
		LB	210			4500
		LC	210			6500
	6	LA	210			5600
		LB	210			6200
		LC	210			7000
		LD	210			9500
	8	LB	210			7200
		LC	210			8100
		LD	210			10500

Note: for a feeding frequency of 60 Hz, the values must be reduced of 10%.

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2 LUBRICATION INTERVALS

The lubrication of the rolling bearing performs several features, mainly:
- Avoid direct contacts between rotating metals (rotating racks and cages),
- Reduce wear,
- Protect surfaces against corrosion,
- Limit noise and vibrations,
- Reduce friction.

All motor bearings are grease lubricated and have a regreasing systems in both ends.
External inner caps have an appropriate design and dimensions in such a way to allow the box to accumulate a high quantity of used grease. External inner caps are designed for 10 –15 re-lubrications, and are fitted with a lubricant discharge.

Interval of re-lubrication and its relative grease quantities are shown in table 1, and refer to bearings:
- Lubricated with standard grease;
- running in normal ambient conditions, without anomalous vibrations, without axial loads or radial loads;
- With bearing operating temperatures between –30 e +70 C° ($f_3 = 1$).

The bearings must be re-lubricated at least once a year.

Table 1

Interval of re-lubrication [h] and grease quantity [g]									
Type of Bearing	**rotation speed [1/min]**								**Quantity of grease [g]**
	3600	**3000**	**1800**	**1500**	**1200**	**1000**	**900**	**750**	
6317	2800	3500	-	-	-	-	-	-	30
6322	-	-	6300	7300	8400	9000	9000	9000	48
7317	1600	2000	-	-	-	-	-	-	30
7322	-	-	3900	4500	5300	7000	7700	9000	48
NU322	-	-	1200	1500	2000	2400	2800	3600	48

3 REDUCTION FACTOR FOR HIGH TEMPERATURE

For bearing temperatures above 70 °C, the intervals shown in table 1 must be multiplied by the following reduction factors f_3:

- f_3 = 0,7 with standard grease and temperature from –30°C to +80°C;
- f_3 = 0,5 with standard grease and temperature from –30°C to +85°C.

4 LUBRICANTS

Standard motors are initially lubricated with grease of mineral saponified oil with Lithium of degree of consistence NLGI3.

Motors for special use are lubricated with a special grease.

In the following are reported the standard suggested grease for the lubrication of the motors:

- Esso: Beacon 3;
- Shell: Alvania 3;
- Mobil: Mobilux 3.

To determine the maximum rotational speed of an electric motor, analysis of the following aspects must be considered::

- the critical characteristic speed of the rotor to limit possible excessive vibrations,
- the maximum speed reached with various types of bearing and with or without loads applied to the shaft extension,
- the maximum speed of the components mounted in the rotor.

The most important condition to comply with is the maximum speed reached by the rolling bearings.

The limited admissible applications are shown in the table according to the three configurations:

- with standard bearings,
- with bearings for external high radial loads,
- with bearings for external high axial loads.

Table 1

Maximum application speed [1/min] without external loads		
N° Poles	**Standard bearings**	
	Horizontal Mounting	**Vertical Mounting**
2	3800	3600
4	2600	2400
6	2600	2300
8	2600	2200

Table 2

Maximum running speed [1/min] with external loads for a duration of $L_{10h} \geq 75000$ h				
N° Poles	**Standard Bearings**		**Bearings for high radial loads**	**Bearings for high axial loads**
	Horizontal Mounting	**Vertical Mounting**		
2	3600	3600	-	3600
4	2600	2200	2000	2200
6	2600	2200	2000	2200
8	2600	2200	2000	2200

The torsional stiffness is a typical characteristic of the rotor of the electric motor allows the avoidance of dangerous resonance, and facilitates the correct functioning of the machine.
Torsional stiffness values relating to this series are shown in table 1:

Table 1

Torsional stiffness [N*m/rad]							
Motor type	**Polarity**	**LA**	**LB**	**LC**	**LD**	**LE**	**LF**
B5C 355	2	1,4E+06	1,5E+06	1,4E+06	1,4E+06	1,5E+06	-
	4	3,0E+06	3,2E+06	2,8E+06	3,0E+06	3,2E+06	2,4E+06
	6	3,0E+06	3,3E+06	3,1E+06	2,3E+06	-	-
	8	3,0E+06	3,3E+06	3,0E+06	2,3E+06	-	-
B5C 400	2	1,4E+06	1,4E+06	1,4E+06	-	-	-
	4	2,7E+06	2,9E+06	2,5E+06	-	-	-
	6	2,8E+06	2,8E+06	3E+06	2,5E+06	-	-
	8	-	2,8E+06	3E+06	2,5E+06	-	-

1 CAUSES OF VIBRATIONS

There are several factors which generate or increase the vibrations in a motor:

- Unbalanced rotating masses,
- Non uniform magnetic field,
- Defective rolling bearings or poor mounting,
- Mechanical movements of the rotating elements,
- Resonance of other machine components or of coupled components,
- Misalignment.

The most frequent major cause is the imbalance of the rotor. The balancing of the rotating parts has the specific task of improving the distribution of the masses so that the spin occurs without generating additional centrifugal forces above the permissible limits. After balancing the rotor unavoidable residual imbalances remain, these however do not affect the normal operating conditions of the motor.

2 BALANCING

Every rotor is dynamically balanced on two axes with a half key.
All motors are balanced to a degree of Q 0.4 according to ISO 1940 standards.
The balancing weights are fixed with appropriate pegs arranged on two distinguished axes (short circuit ring on D-end, inner impeller on N-end).

3 VIBRATIONS

The maximum vibration values of the motors tested:
1 completely assembled,
2 fixed on rigid supports
3 running in no-load conditions
satisfy the most relevant national and international standards. In particular the motors tested meet class of vibration " R " according to the recommendations of ISO 2373-1974 standard as shown in table 1. Machines with class of vibration S can be supplied, on request.
The recommended limits of the intensity of vibration for rotating machines with a range of speed from 10 to 200 rev/s, mounted on rigid supports and with power greater than 75kW, according to ISO 3945 and ISO 2372-1974 standards, are shown in table 2.

Table 1

Recommended limits of vibration intensity for different frames, according to ISO 2373				
Class of vibration	**Rotation speed [Rev./min]**	**Maximum root mean square value of the vibration speed [mm/s]**		
		56 ≤ H ≤ 132	**132 < H ≤ 225**	**225 < H ≤ 400**
N (Normal)	600 ÷ 3600	1,8	2,8	4,5
R (Reduced)	600 ÷ 1800	0,71	1,12	1,8
	1800 ÷ 3600	1,12	1,8	2,8
S (Special)	600 ÷ 1800	0,45	0,71	1,12
	1800 ÷ 3600	0,71	1,12	1,8

Table 2

Recommended limits of the vibration intensity , according to ISO 3945 - ISO 2372	
Speed vibration [mm/s]	**Classification**
0,28	GOOD
0,45	
0,71	
1,12	
1,8	
2,8	USABLE
4,6	
7,1	STILL ADMISSIBLE
11,2	
18	INADMISSIBLE
28	
71	

1 REFERENCE STANDARDS

The acoustic noise level of an electrical machine is measured:
- According to ISO 1680/1 – 1986 standard,
- In an acoustic chamber,
- At no-load conditions,
- At nominal voltage and frequency.

2 NOISE VALUES:

The typical average noise level pressure L_{pf}, expressed in dB, is displayed in table 1.
The noise power L_w is calculated by means of the relation $L_w = L_p + \Delta L_w$.
Both noise pressure and power are expressed in dB, which is a logarithmic value.

Table 1

Noise at 50 Hz Noise Pressure L_{pf} [dB]			
Motor type	**Polarity**	**Noise Pressure L_{pf} [dB]**	**Noise Power L_w [dB]**
B5C 355	2	82	97
	4	79	94
	6	75	90
	8	72	87
B5C 400	2	82	97
	4	80	96
	6	76	92
	8	73	89

Notes:
- When supplying the motors at 60 Hz, the noise increases approximately 4 dB.
- The values are applicable for a feeding frequency of 50 Hz and with a tolerance of +3 dB.

B5C 355 and 400 series has a list of modular standard and optional accessories which make the motor easily customisable and suitable for different applications.

The standard and optional components are described as shown in table 1:

Table 1

Description	Doc. N°	N° of components	Standard	Optional
Regreasing systems	661	2	X	
PTC thermistors (Alarm temperature = 155°C)	662	3	X	
Arrangment for SPM	663	2	X	
Arrangment for PT100 in the bearings	/	2	X	
SPM nipples	681	2		X
PTC thermistors (Alarm temperature < 155°C)	682	3		X
PT100 on bearings	683	1+1		X
PT100 in stator windings	684	3		X
Anticondensation heaters	685	B5C 355 3 x 100 W B5C 400 4 x 100 W		X
Forced ventilation unit	686	1		X
Encoder	687	1		X
Tropicalisation	/	/	X	

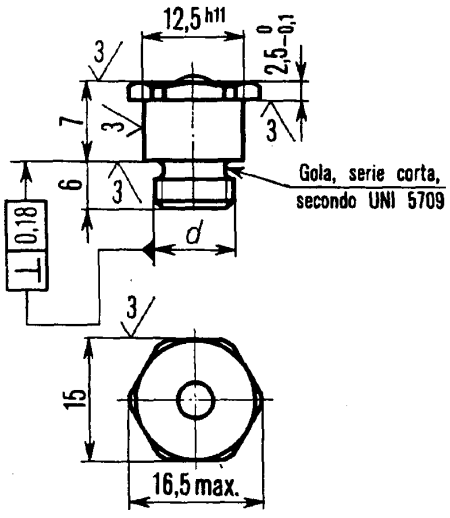
Description: Regreasing nipple closed with a ball for lubrication under pressure.
The regreasing elements are positioned on top of the endshield with 15° angular position to the vertical.

Standard: Forma A UNI 7662 type.

Caracteristics:

Material:	steel
Protective plating:	Zinc process F Zn 12
Tapping:	Cylindrical Gas type G 1/8", and UNI ISO 228/1

Forma A
(a semplice esagono)



Dimensions in mm

Description: Thermal protectors made up of heat conductors to safeguard the electrical machines from thermal overload. The thermistors are fixed on the head of the stator winding. The terminals of connection cables in the auxiliary terminal box.

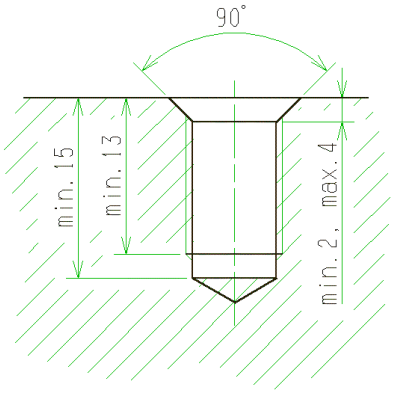
Standard: DIN 44081

Characteristics:

Alarm temperature:	155 °C
Alarm temperature tolerance:	± 5 °C

Description: Threaded holes normal to the surface of installation and suitable for the installation of SPM adapters to monitor the operation state of the bearings. The threaded centres are positioned on the upper part of the D-end and N-end endshields with an inclination of 15° to the vertical, opposite the grease relief.

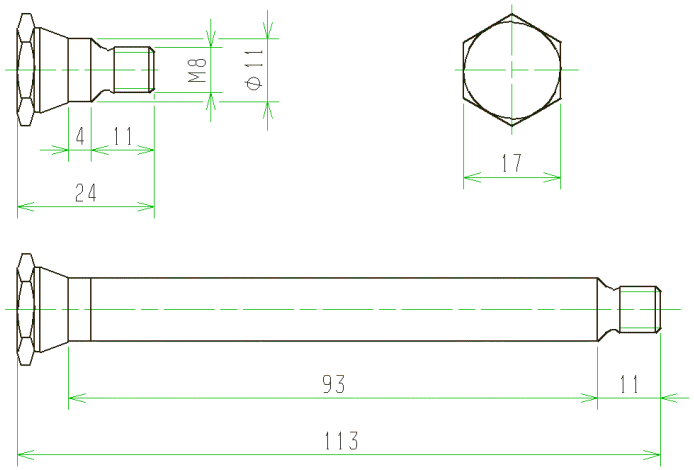
Characteristics: Type and threaded diameter: M8



Dimensions in mm

Description: Steel adapters made of a threaded bulb and hexagonal head for quick connection by an appropriate transducer. SPM adapters are positioned on the upper part of the D-end and N-end endshields with inclination of 15° to the vertical, opposite the grease nipples. The correct transmission of the vibrations from the external ring of the bearings to the SPM adapter is ensured by appropriate ribbings.

Characteristics: Type and threaded diameter: M8



Dimensions in mm.

Description: Thermal protections made up of heat conductors to safeguard of the electrical machines from thermal overload.
The thermistors are fixed on the head of the stator winding.
The terminals of connection cables have inputs in the auxiliary terminal box.

Standard: DIN 44081

Nominal alarm temperature:

Nominal alarm temperature NAT [°C]
80
100
110
120
130
140
145 Alarm*
155 Cut-off*
160
170
150

Characteristics: Alarm temperature tolerance: ± 5 °C.

Description: Platinum resistance thermometers to measure the temperature of the bearings.
The thermometers are positioned in the endshield, near the external ring of the D-end and/or N-end bearing.
The terminals have inputs in the auxiliary terminal box.

Standard: UNI 7937, DIN 43760

Characteristics:

Resistor PT 100 single element ∅ 5x10
Protection Sheath in Teflon
N° 3 flexible cables in silver-plated copper, insulated in Teflon - section: 0,96 mm^2 - length: 1000 mm

Description: Device which measure electrical resistance at the output terminals as a function of the temperature of its sensitive zone. The thermometer is composed of spirals of platinum wound in cylindrical alumina, reinforced with ceramics. The thermometers are positioned in the head of the stator winding. The terminals have input in the auxiliary terminal box.

Standard: UNI 7937, DIN 43760

Characteristics: N° 3 insulation cables in TEFLON®
- minimum section: 0,51 mm^2
- length: 1500 mm

Description: Glass or polyester fabric tape in which electric resistances in Ni-Cr or Ni-Cu are inserted, electrically insulated with silicon and glass fiber: they are normally switched on when the supply to the motor is interrupted, heating the motor to avoid water condensation.
The anticondensation heaters are fixed to the head of the stator winding.
The terminals are in an auxiliary terminal box.

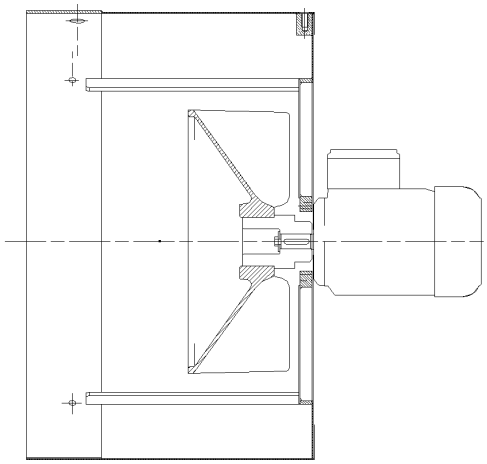
Standard: B.S. 5000/16.

Characteristics:

Power = 100 W
Feeding voltage = 220 V
Resistance = 484 Ω
Operation temperature: -50+180 °C
Resistent to humidity and to resin impregnation
Dielectric rigidity >2000 V in dry conditions

Description: Forced ventilation system composed of a fan (motor, standard fan, hub) with a separate supply from the main, assembled in an appropriate fan cowl. Used to cool the motor with a constant air flow when the motor runs at speed values different from the nominal one.
In order to ensure ventilation during operation, it is suggested to arrange for a device which only allows the starting and operation of the motor when the auxiliary fan is running.

Standard: IEC 60034-6: code IC 416.

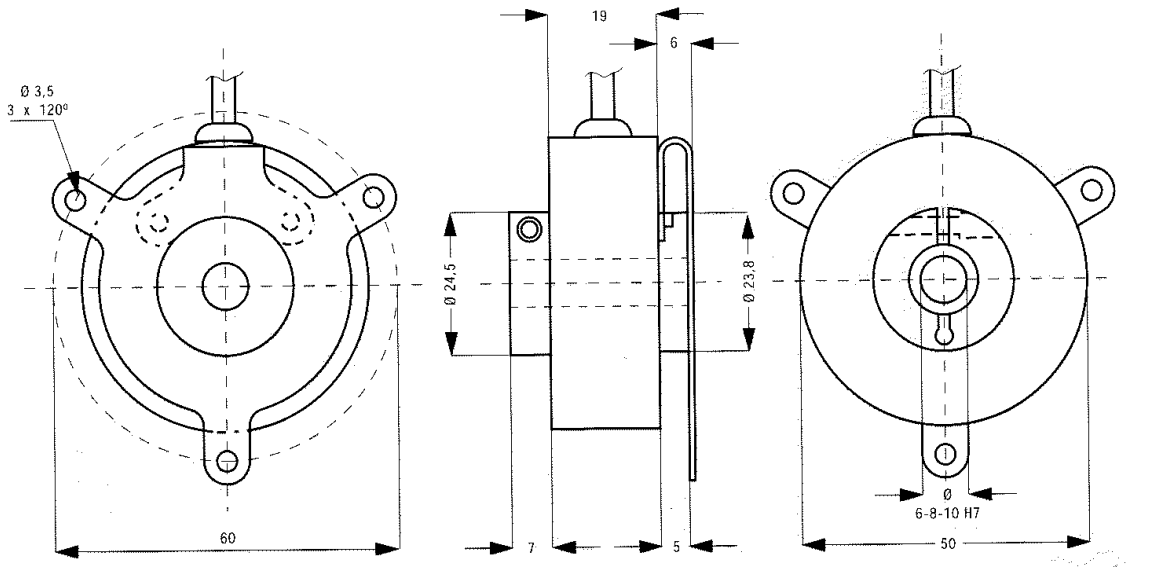


Forced ventilation motor: MA 90 LB4.

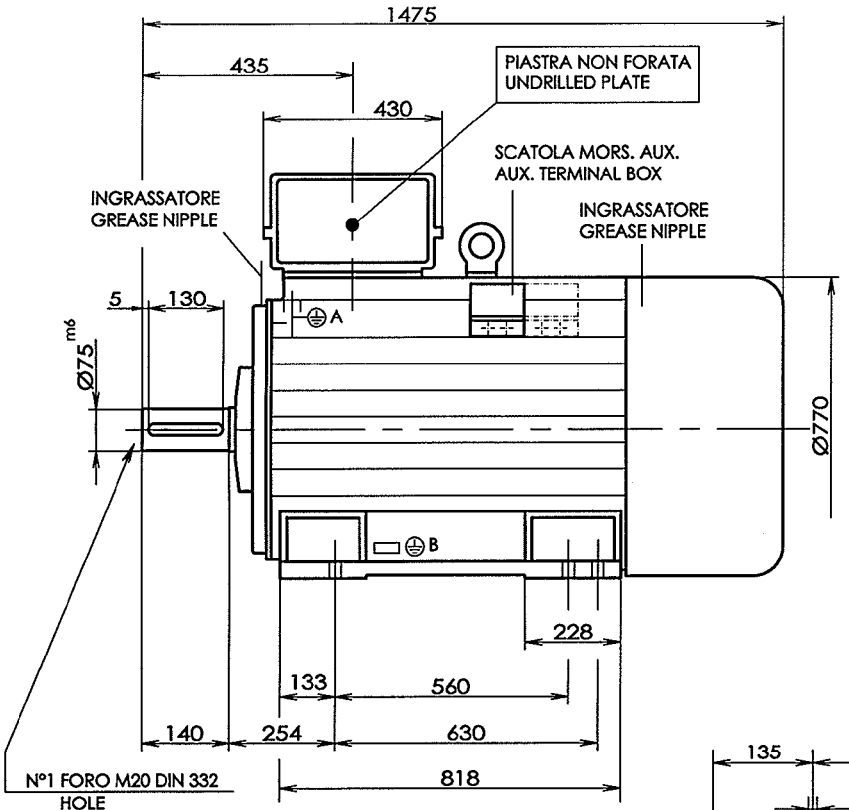
Description: Rotating transducer which transforms an angular movement into digital pulses to check the angular position and the rotor speed of an electric motor. The rotating part of the encoder is fixed to the motor shaft through a support; the steady part is blocked through an appropriate coupling device.
The terminals are inside an auxiliary terminal box.

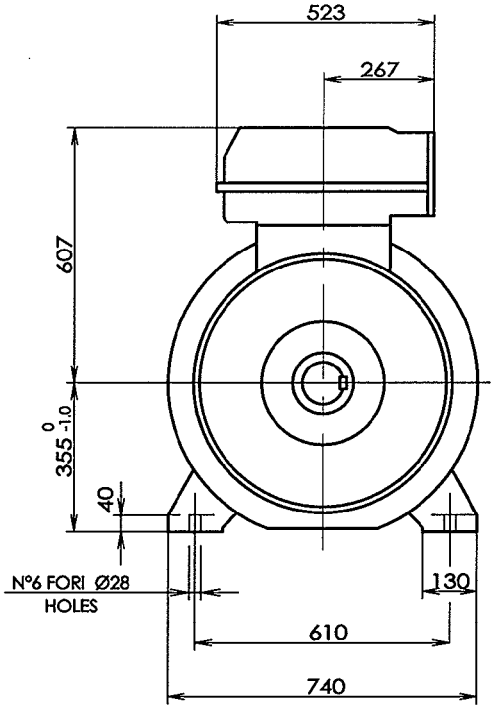
Characteristics:

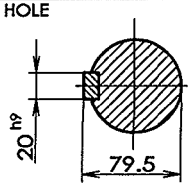
Output:	Push-Pull 5 ÷ 30 V
Pulses per root (PPR):	1024
Signal:	Bi-directional + 0 (zero) mark
Connections:	Additional output 8-wire cable
Supply:	Push-Pull 5÷30 V
Operating temperature:	-40 °C ÷ +100°C
Cable length:	2 m (shielded)
Protection degree:	IP 64
Protection:	Against inlet polarity inversion Against output short circuit
Ingress interface:	NPN e PNP Line driver with inlet 5V o 12 V

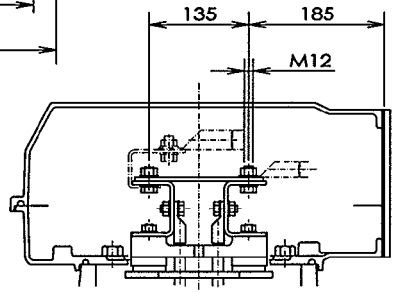


Dimensions in mm

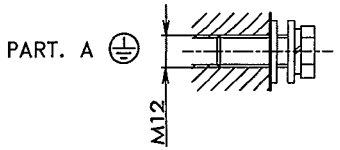


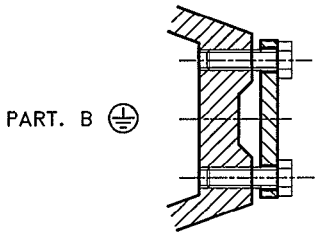


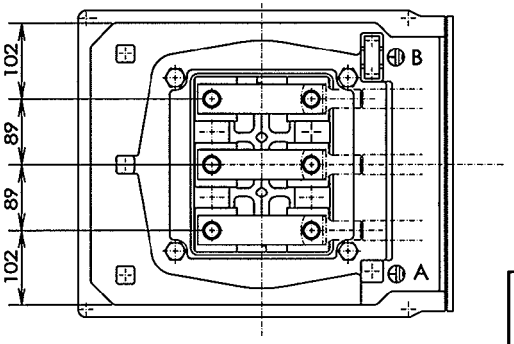




SCATOLA MORSETTI
TERMINAL BOX







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DIMENSIONS IN mm

MarelliMotori	MOTORE MOTOR B5_355 LA–LB 2 POLI FORMA COSTRUTTIVA TYPE OF CONSTRUCTION IM B3	B35AD300B	INFO

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DIS.		26.5.00
CONTR./CUFF.		26.5.00
CONTR.NOR.		30.5.00

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CAD	FIRMA	DATA
DIS.		26.5.00
CONTR./C.UFF.		26.5.00
CONTR.MOR.		30-5-00

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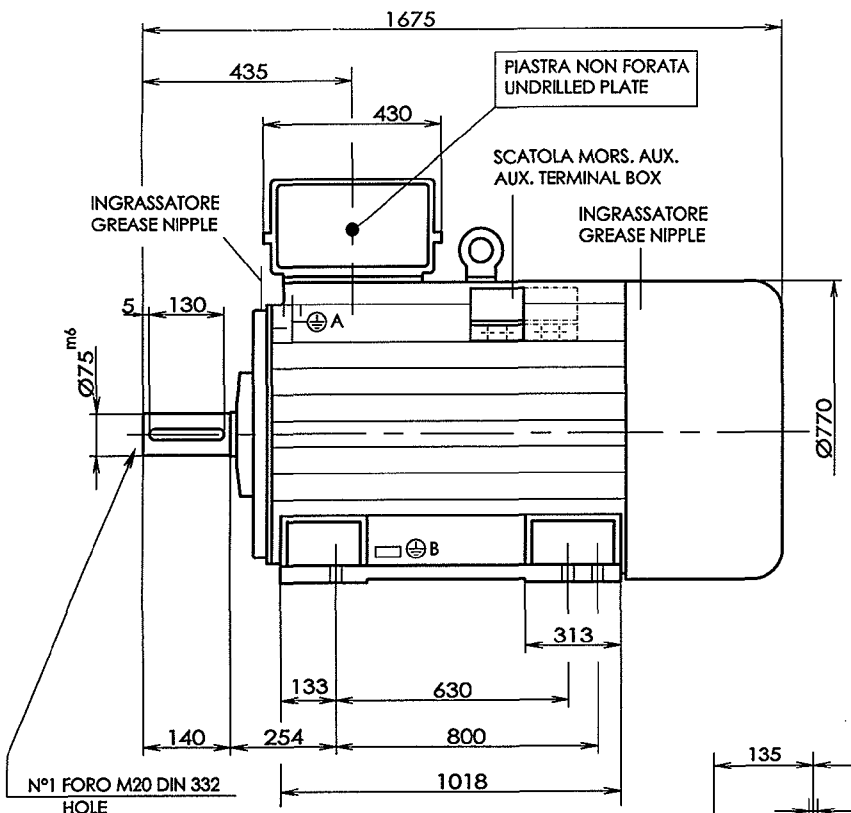

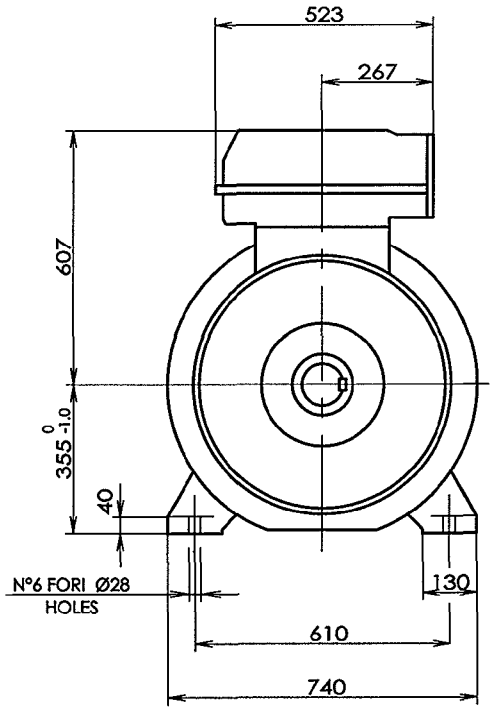

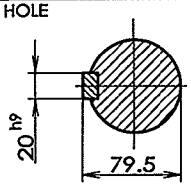

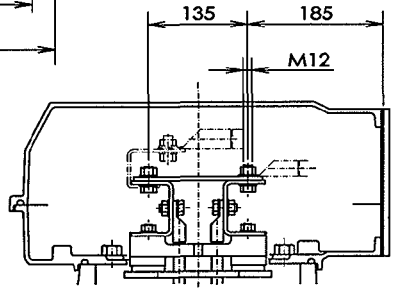

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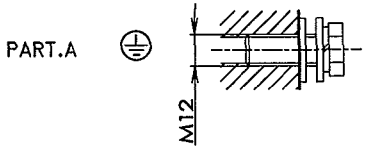

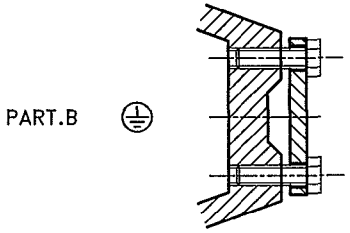

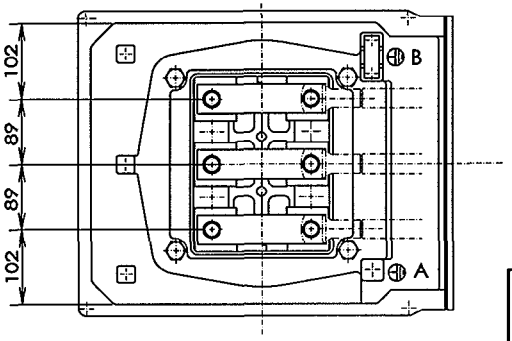

Indice	Modifiche	Firma	Data	CONT./UFF.	CONT.MOR.

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DIMENSIONS IN mm

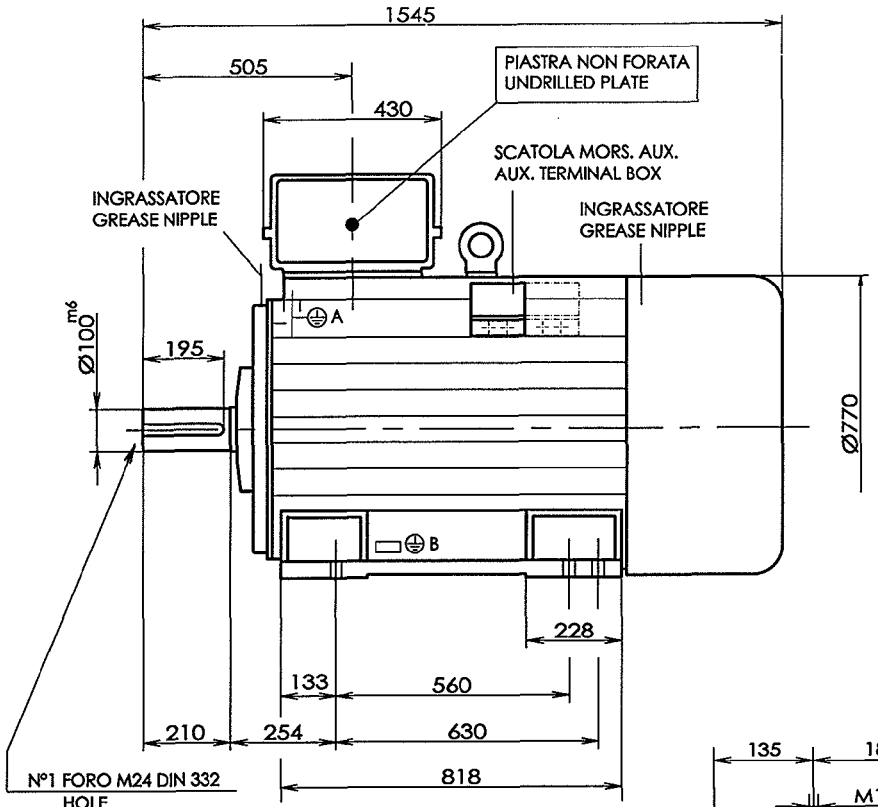
MarelliMotori

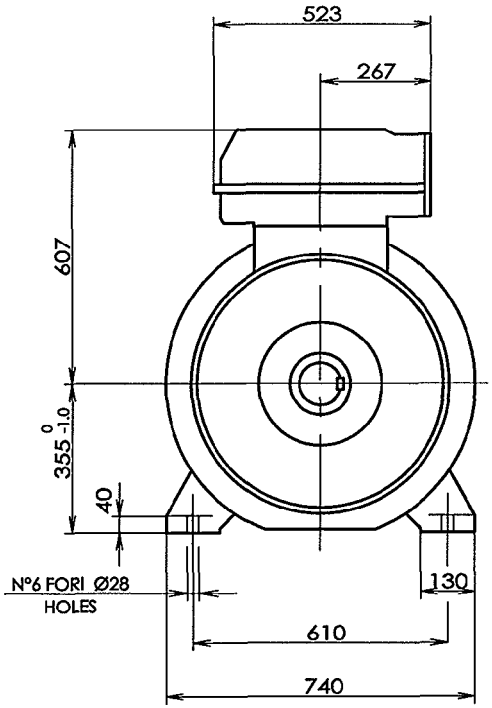
MOTORE
MOTOR B5_355 LC-LE 2 POLI

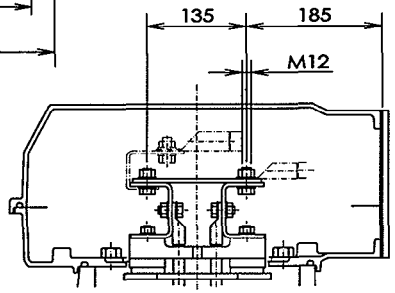
FORMA COSTRUTTIVA
TYPE OF CONSTRUCTION IM B3

B35AD301B

INFO.D







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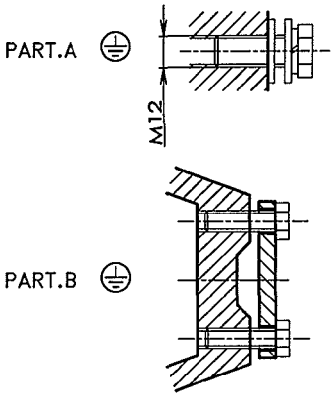

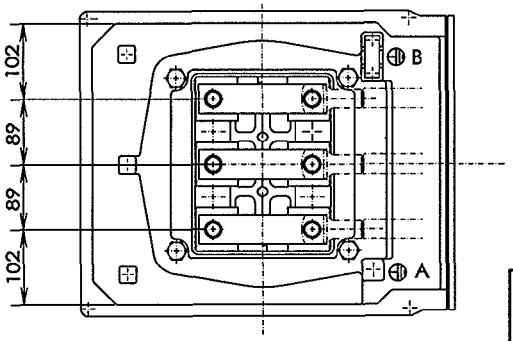

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DIMENSIONS IN mm

MarelliMotori

MOTORE
MOTOR B5_355 LA-LB ≥4 POLI
FORMA COSTRUTTIVA
TYPE OF CONSTRUCTION IM B3

B35AD302B

INFO D

CAD	FIRMA	DATA
DIS.		26.5.00
CONTR./C.UFF.		26.5.00
CONTR.NOR.		30.5.00

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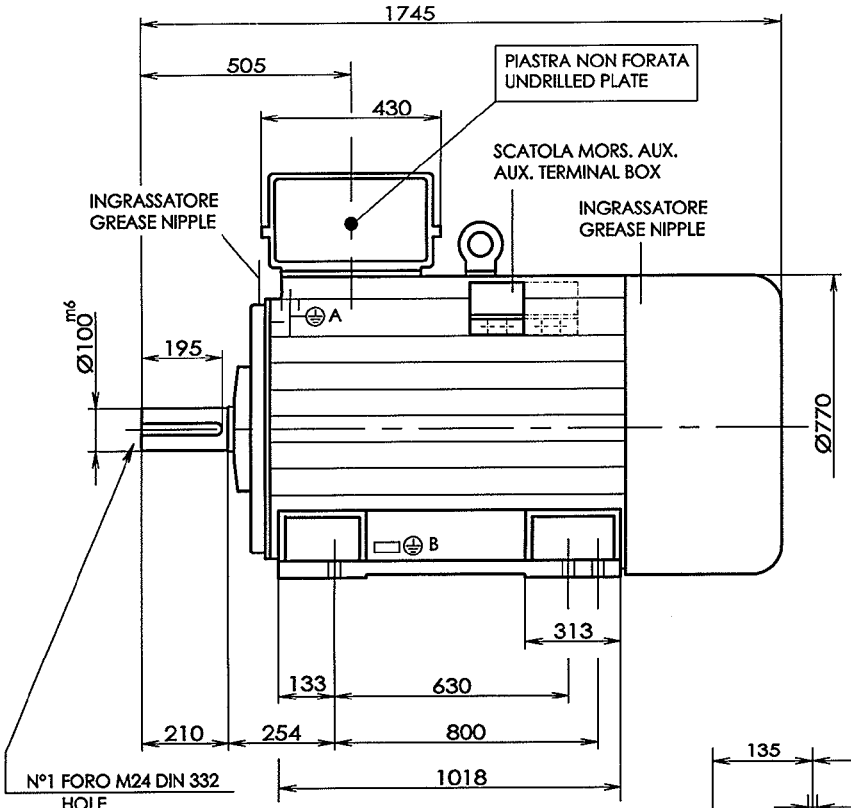
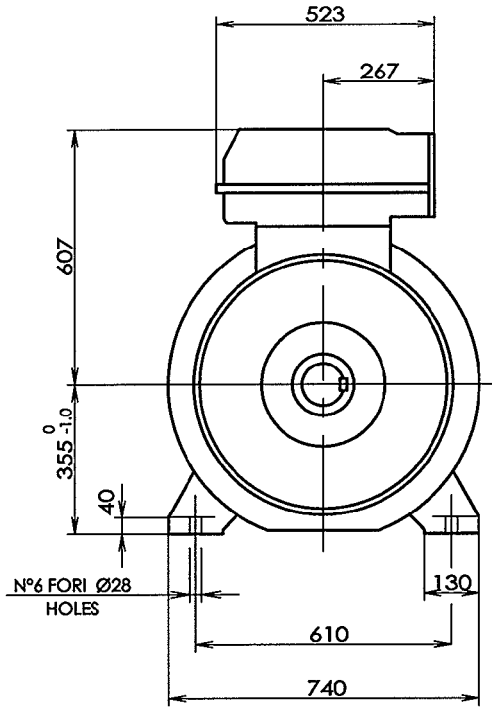
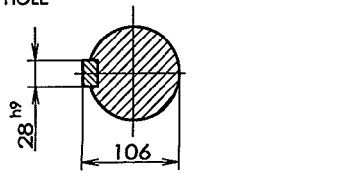
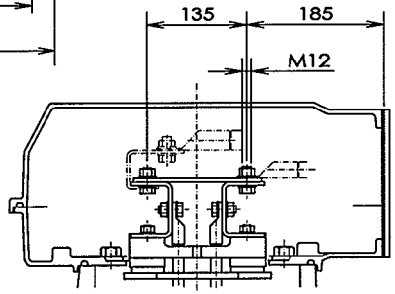
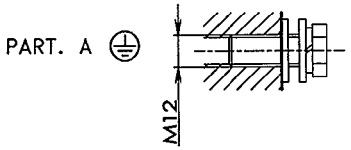


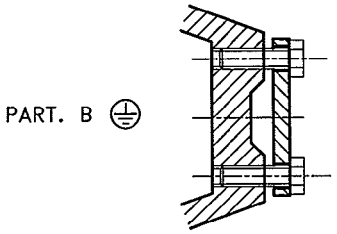


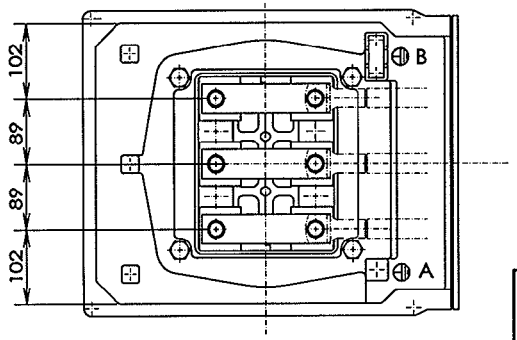




SCATOLA MORSETTI
TERMINAL BOX







DIMENSIONI
DIMENSIONS IN mm

MarelliMotori

MOTORE
MOTOR B5_355 LC-LF ≥4 POLI
FORMA COSTRUTTIVA
TYPE OF CONSTRUCTION IM B3

B35AD303B

INFO D

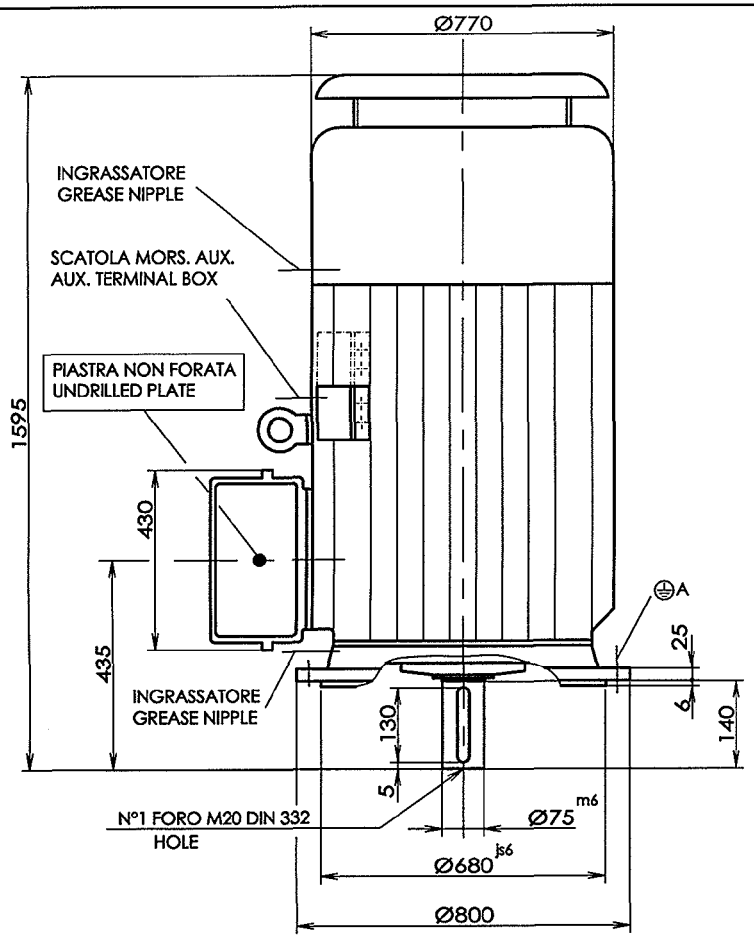
CAD	FIRMA	DATA
DIS.		26.5.00
CONTR./C.UFF.		26.5.00
CONTR.NOR.		30.5.00

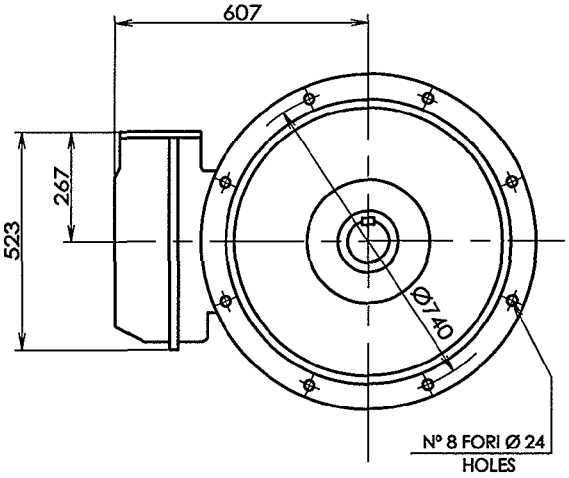
Indice	Modifiche	Firma	Data	CONF./C.UFF.	CONT.NOR.

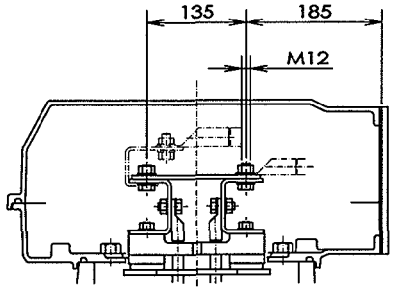
CAD	FIRMA	DATA
DIS.		26.5.00
CONTR./C.UFF.		26.5.00
CONTR.NOR.		30.5.00

Indice	Modifiche	Firma	Data	CONT./UFF.	CONT.NOR.

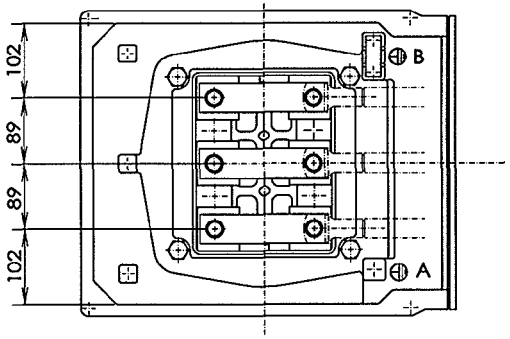
Indice	Modifiche	Firma	Data	CONT./UFF.	CONT.NOR.

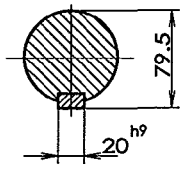


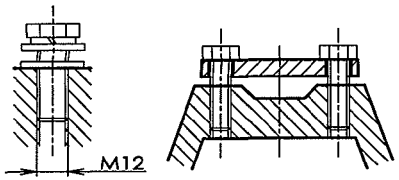




SCATOLA MORSETTI
TERMINAL BOX







PART. A ⊕ PART. B ⊕

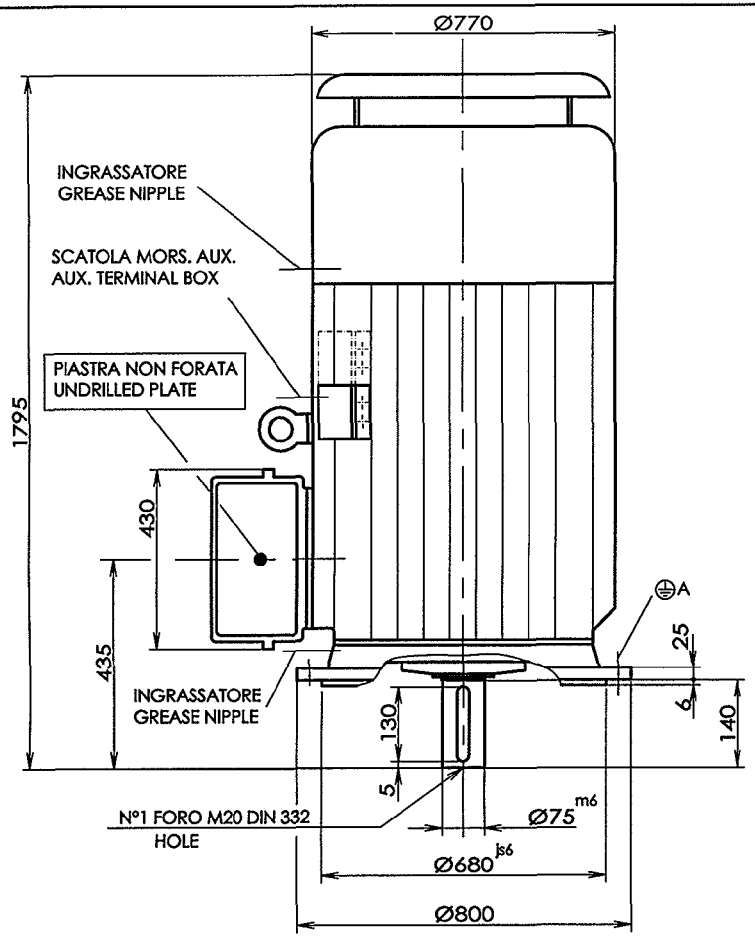
DIMENSIONI
DIMENSIONS IN mm

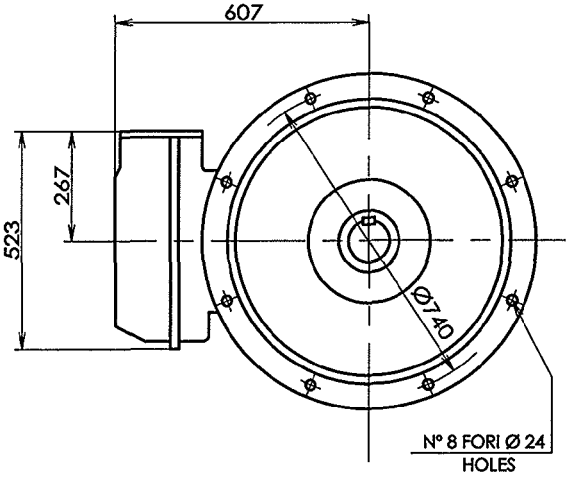
MarelliMotori	MOTORE / MOTOR B5_355 LA–LB 2 POLI FORMA COSTRUTTIVA / TYPE OF CONSTRUCTION IM V1	B35AD304B
		INFO

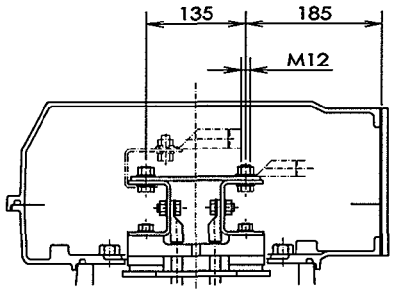
	FIRMA	DATA
CAD		
DIS.		26.5.00
CONTR./C.UFF.		26.5.00
CONTR.MOR.		30.5.00

Indice	Modifiche	Firma	Data	CONT./UFF.	CONT.MOR.

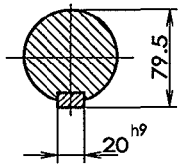
Indice	Modifiche	Firma	Data	CONT./UFF.	CONT.MOR.

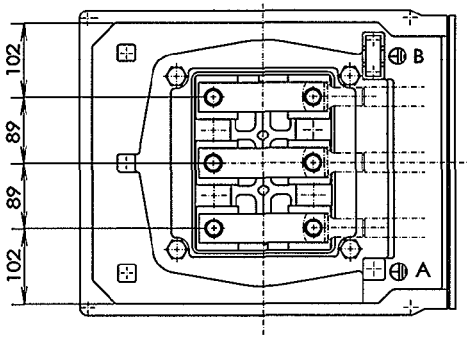


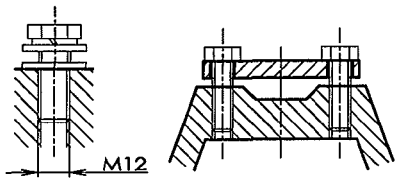




SCATOLA MORSETTI
TERMINAL BOX







PART. A ⏚ PART. B ⏚

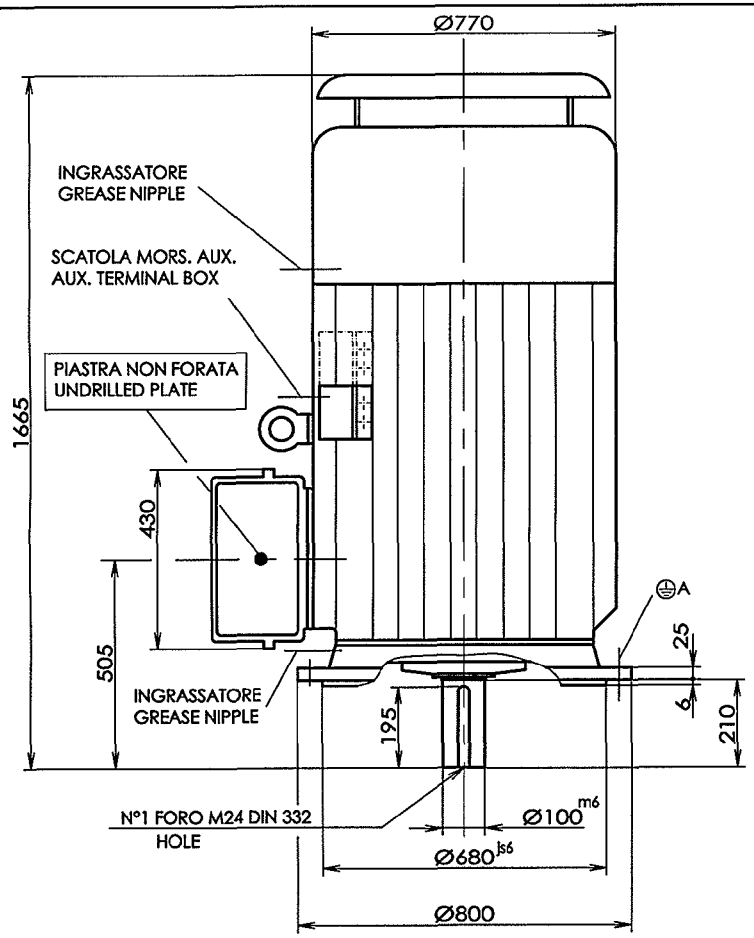
DIMENSIONI
DIMENSIONS IN mm

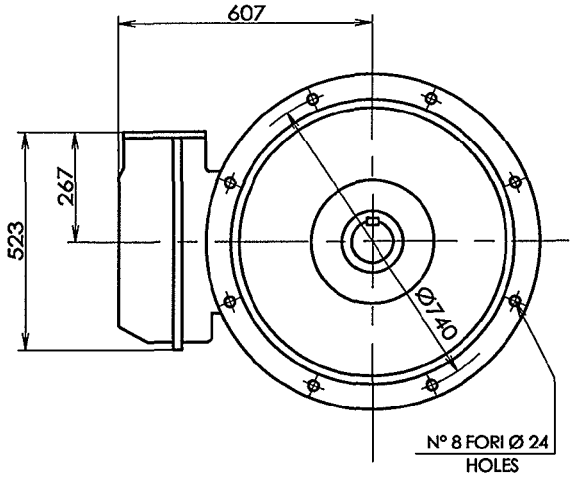
MarelliMotori	MOTORE MOTOR B5_355 LC-LE 2 POLI FORMA COSTRUTTIVA TYPE OF CONSTRUCTION IM V1	B35AD305B INFOD

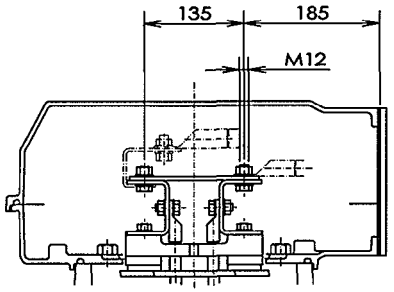
CAD	FIRMA	DATA
DIS.		26.5.00
CONTR./C.UFF.		26.5.00
CONTR.NOR.		30.5.00

Indice	Modifiche	Firma	Data	CONT./UFF.	CONT.NOR.

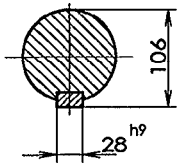
Indice	Modifiche	Firma	Data	CONT./UFF.	CONT.NOR.

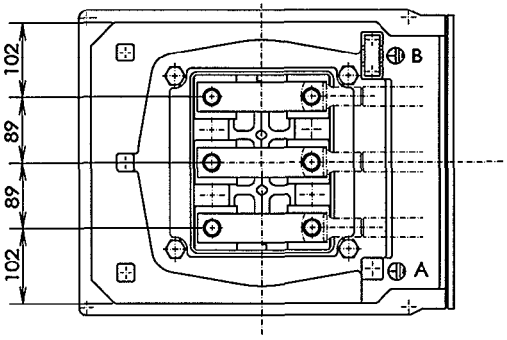


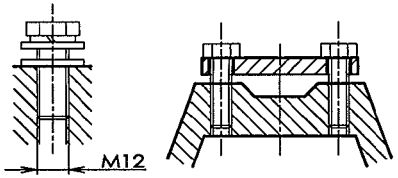




SCATOLA MORSETTI
TERMINAL BOX







PART. A ⏚ PART. B ⏚

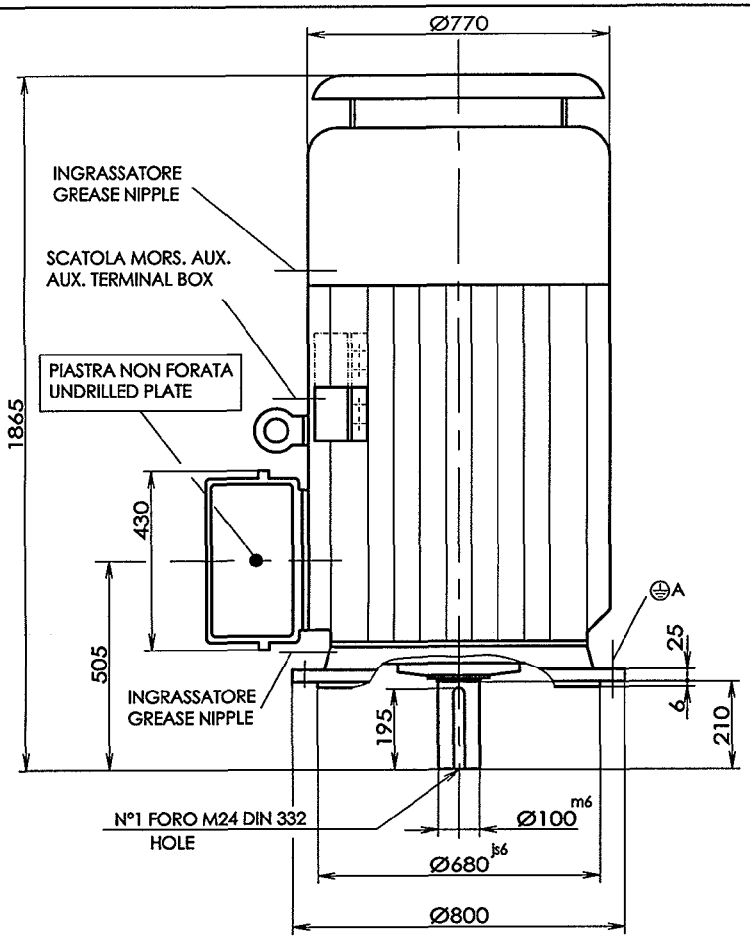
DIMENSIONI
DIMENSIONS IN mm

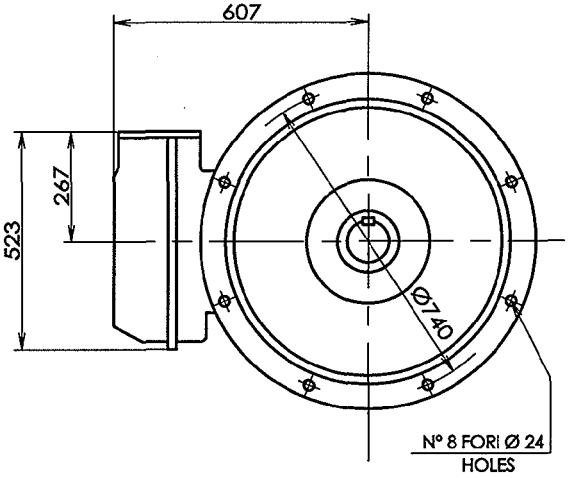
MarelliMotori	MOTORE B5_355 LA–LB ≥4 POLI MOTOR FORMA COSTRUTTIVA IM V1 TYPE OF CONSTRUCTION	B35AD306B INFO D

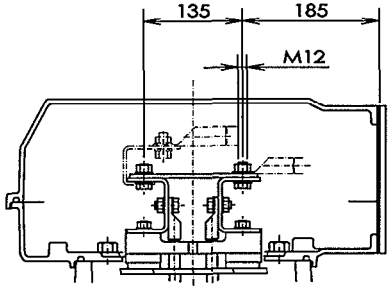
CAD	FIRMA	DATA
DIS.		26.5.00
CONTR./C.UFF.		26.5.00
CONTR.NOR.		30.5.00

Indice	Modifiche	Firma	Data	CONF./UFF.	CONT.NOR.

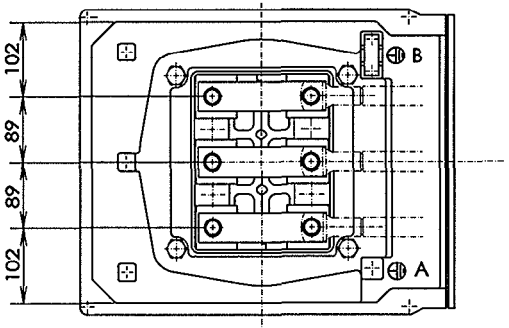
Indice	Modifiche	Firma	Data	CONF./UFF.	CONT.NOR.

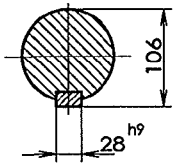


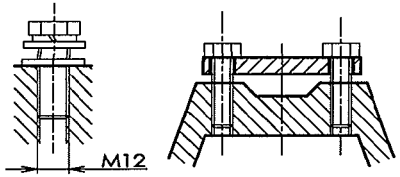




SCATOLA MORSETTI
TERMINAL BOX







PART. A ⏚ PART. B ⏚

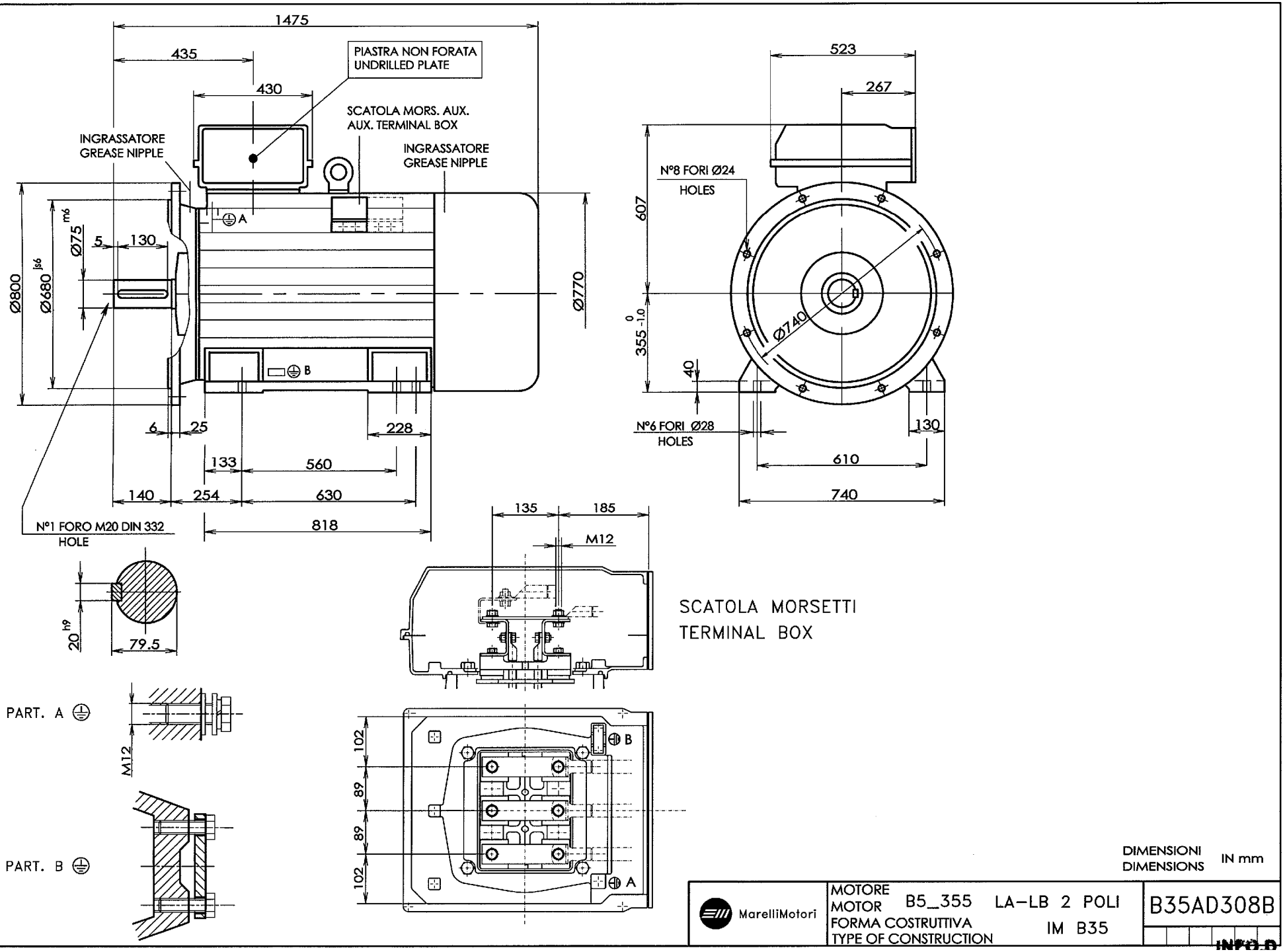
DIMENSIONI
DIMENSIONS IN mm

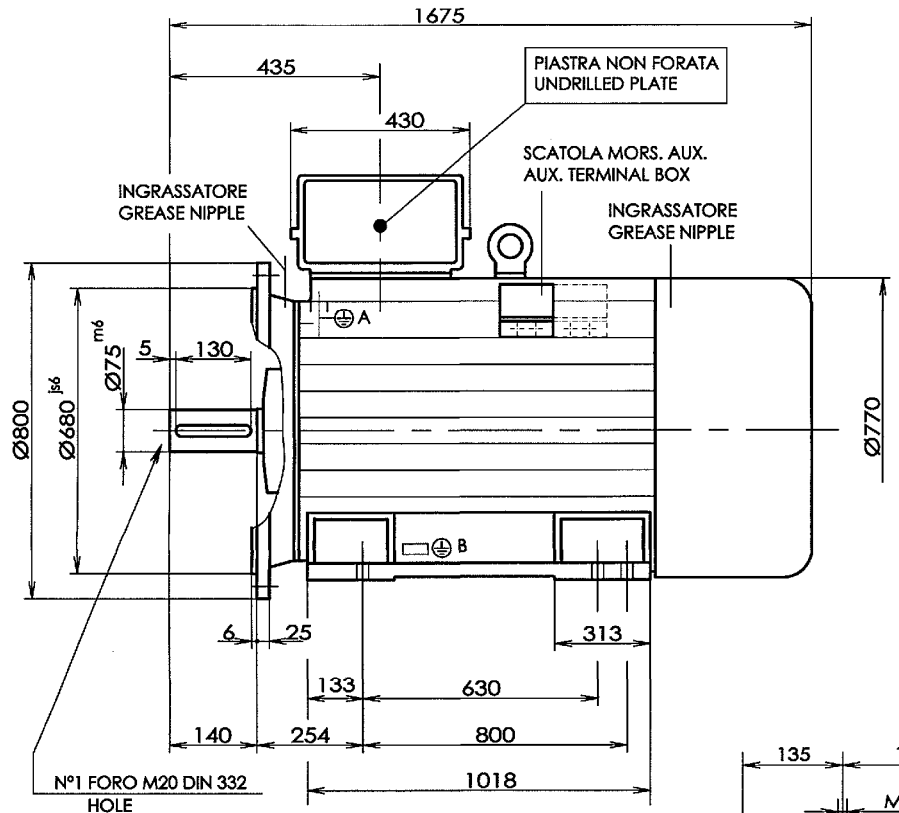
MarelliMotori

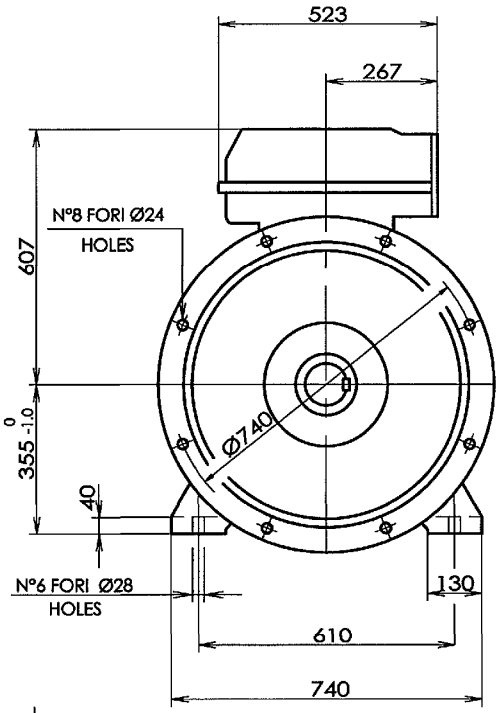
MOTORE
MOTOR B5_355 LC-LF ≥4 POLI
FORMA COSTRUTTIVA
TYPE OF CONSTRUCTION IM V1

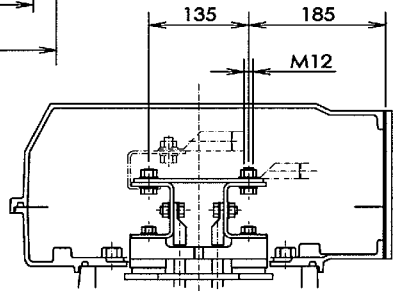
B35AD307B

INFO D

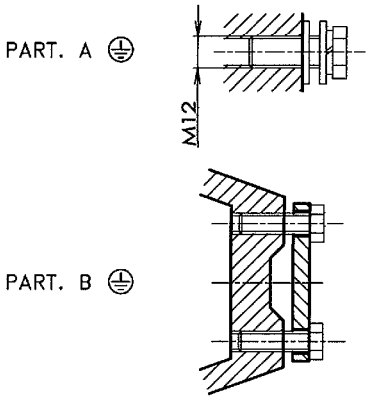

1475
435
430
PIASTRA NON FORATA
UNDRILLED PLATE
SCATOLA MORS. AUX.
AUX. TERMINAL BOX
INGRASSATORE
GREASE NIPPLE
INGRASSATORE
GREASE NIPPLE
Ø800
Ø680 js6
Ø75 m6
5
130
Ø770
6
25
228
133
560
140
254
630
818
N°1 FORO M20 DIN 332
HOLE
20 h9
79.5
523
267
N°8 FORI Ø24
HOLES
607
355 0 -1.0
Ø740
40
N°6 FORI Ø28
HOLES
130
610
740
135
185
M12
SCATOLA MORSETTI
TERMINAL BOX
PART. A
M12
PART. B
102
89
89
102
B
A
DIMENSIONI
DIMENSIONS
IN mm
MarelliMotori
MOTORE
MOTOR
B5_355 LA–LB 2 POLI
FORMA COSTRUTTIVA
TYPE OF CONSTRUCTION
IM B35
B35AD308B
CAD
DIS.
CONTR./C.UFF.
CONTR.NOR.
DATA
FIRMA
14.06.00
16·6·00
Modifiche
Indice
Data
Firma
CONT./C.UFF.
CONT.NOR.

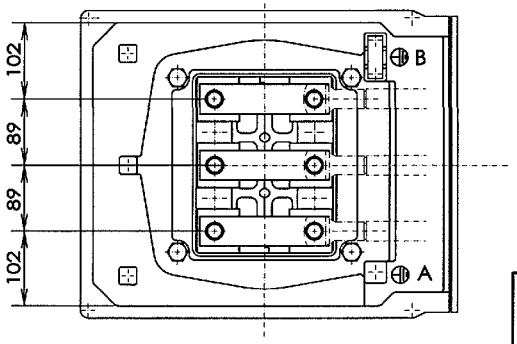






SCATOLA MORSETTI
TERMINAL BOX





DIMENSIONI
DIMENSIONS IN mm

MarelliMotori

MOTORE
MOTOR B5_355 LC-LE 2 POLI
FORMA COSTRUTTIVA
TYPE OF CONSTRUCTION IM B35

B35AD309B

Indice	Modifiche	Firma	Data	CONF./CART.	CONT.NOR.

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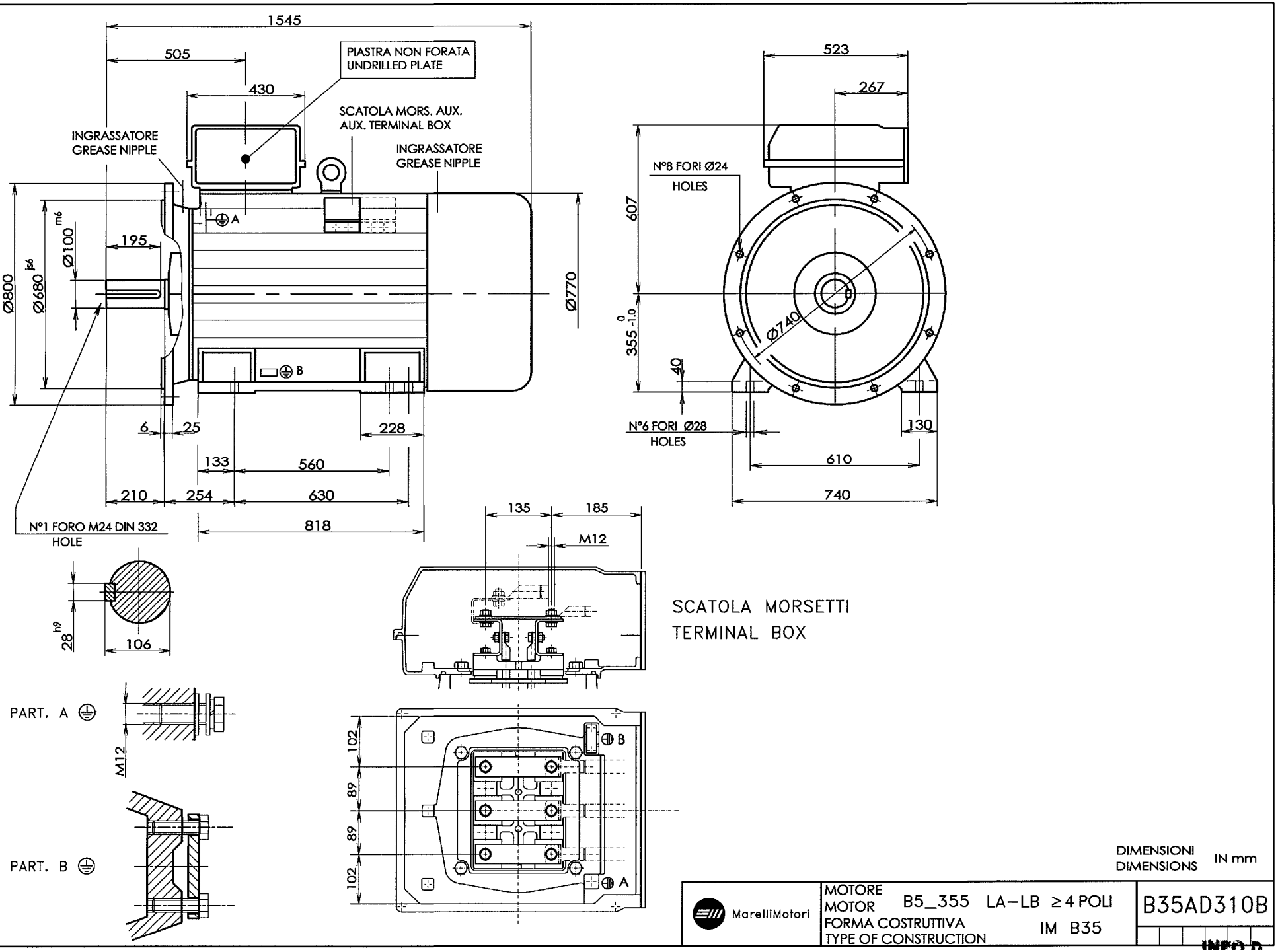
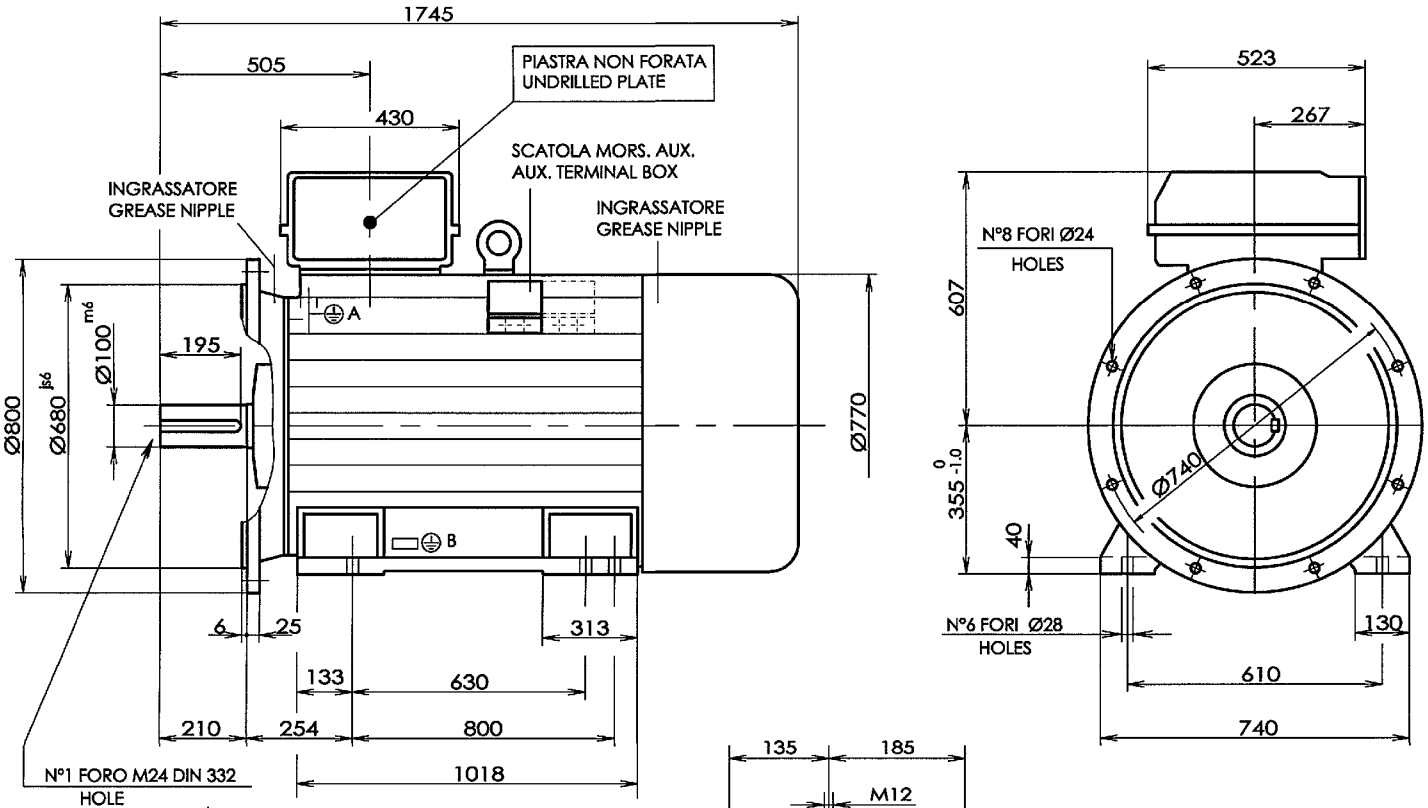
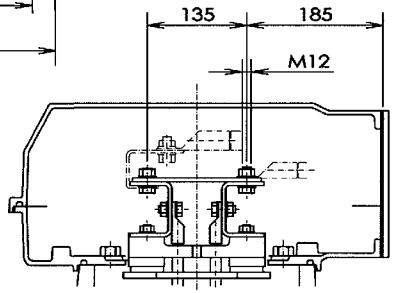
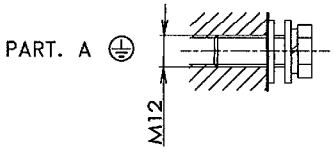
CONTR./C.U.FF.		14.6.00
CONTR.NOR.		16.6.00

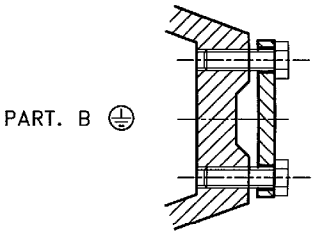

1545
505
430
PIASTRA NON FORATA
UNDRILLED PLATE
SCATOLA MORS. AUX.
AUX. TERMINAL BOX
INGRASSATORE
GREASE NIPPLE
INGRASSATORE
GREASE NIPPLE
195
Ø800
Ø680 js6
Ø100 m6
Ø770
6
25
228
133
560
210
254
630
818
N°1 FORO M24 DIN 332
HOLE
523
267
N°8 FORI Ø24
HOLES
607
355 0 -1.0
Ø740
40
N°6 FORI Ø28
HOLES
130
610
740
135
185
M12
28 h9
106
PART. A
M12
PART. B
102
89
89
102
B
A
SCATOLA MORSETTI
TERMINAL BOX
DIMENSIONI
DIMENSIONS
IN mm
MarelliMotori
MOTORE
MOTOR
B5_355 LA–LB ≥4 POLI
FORMA COSTRUTTIVA
TYPE OF CONSTRUCTION
IM B35
B35AD310B
CAD
DIS.
CONTR./C.UFF.
CONTR.NOR.
DATA
FIRMA
14.6.00
14.6.00
16.6.00
Indice
Modifiche
Firma
Data
CONF./UFF.
CONT.NOR.

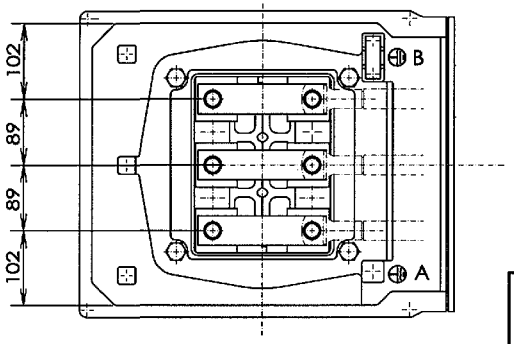




SCATOLA MORSETTI
TERMINAL BOX







DIMENSIONI
DIMENSIONS IN mm

MarelliMotori

MOTORE
MOTOR B5_355 LC-LF ≥4 POLI
FORMA COSTRUTTIVA
TYPE OF CONSTRUCTION IM B35

B35AD311B

Indice	Modifiche	Firma	Data	CONT./C.UFF.	CONT.NOR.

Indice	Modifiche	Firma	Data	CONT./C.UFF.	CONT.NOR.

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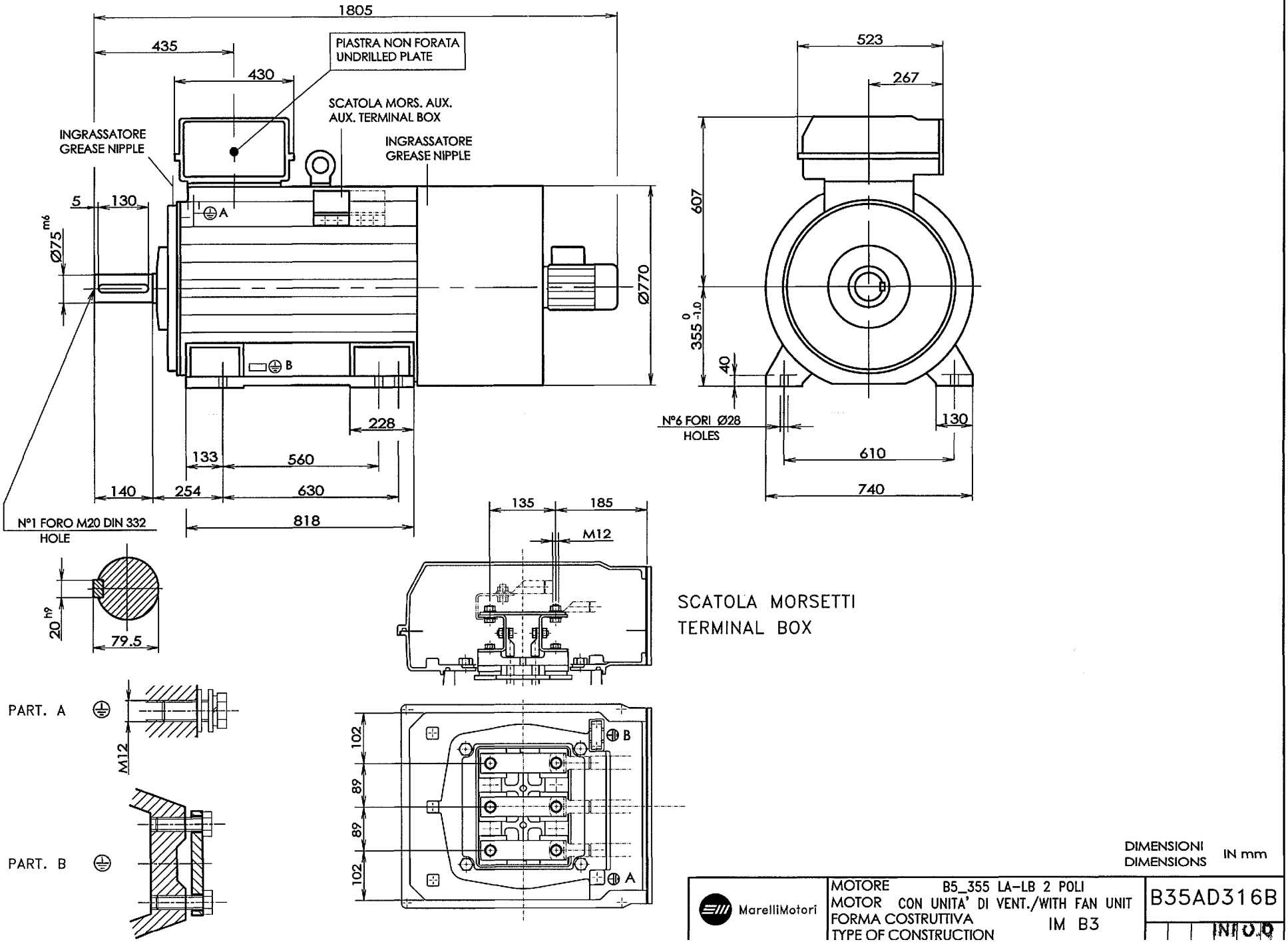
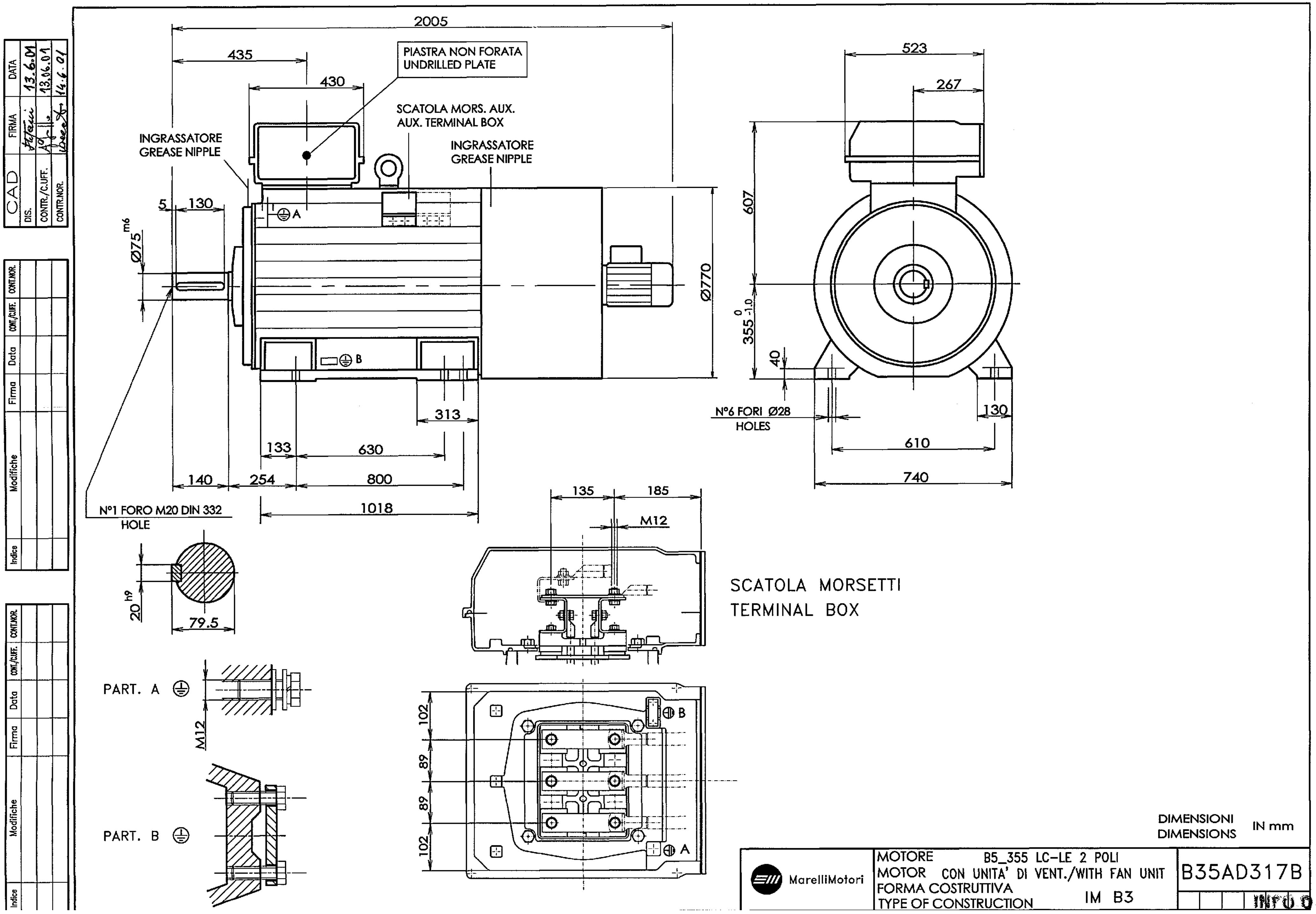
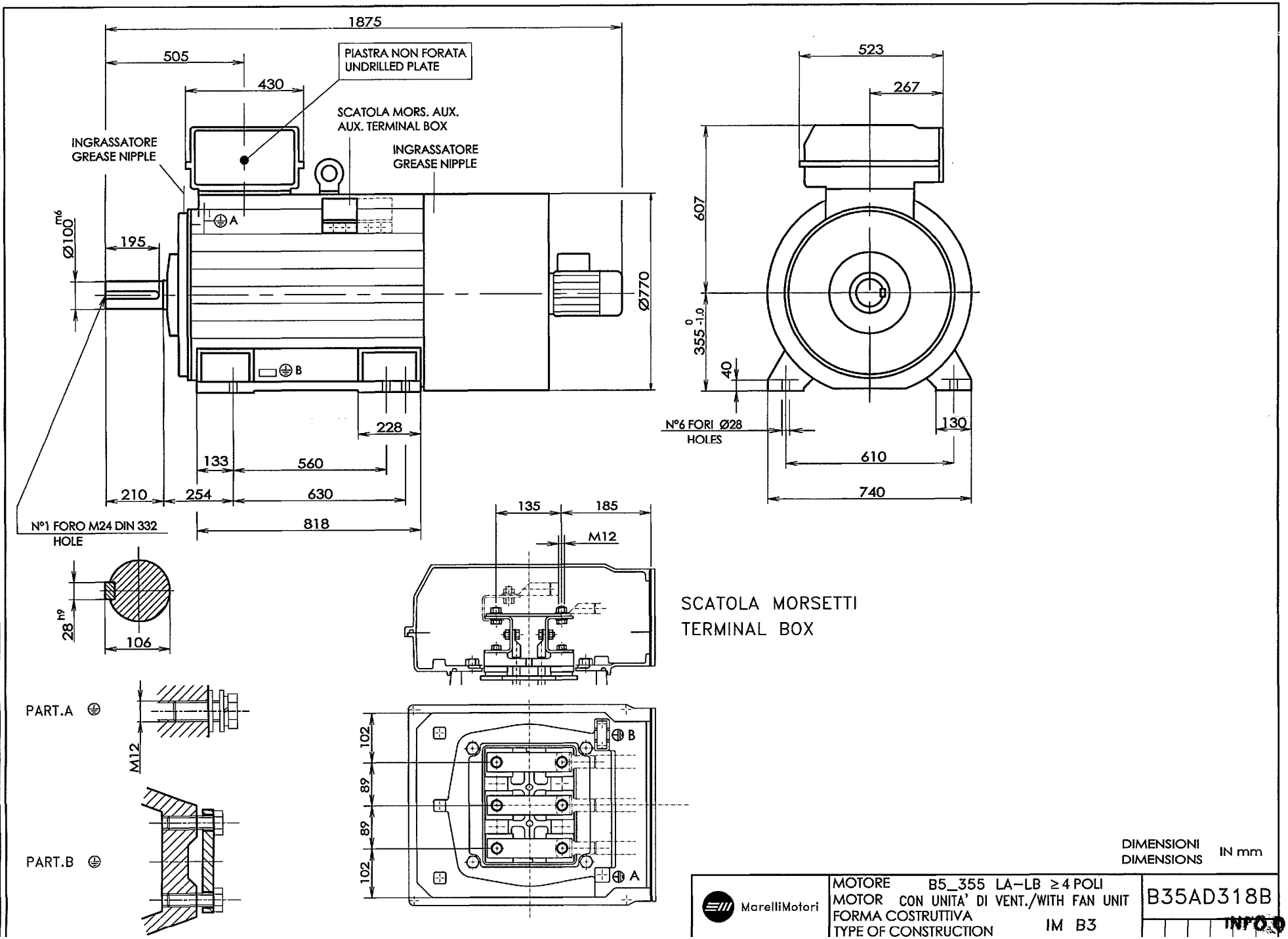
CONTR./C.UFF.	Marco	14.6.00
CONTR.NOR.	Mauro	14.6.00


1805
435
430
PIASTRA NON FORATA
UNDRILLED PLATE
SCATOLA MORS. AUX.
AUX. TERMINAL BOX
INGRASSATORE
GREASE NIPPLE
INGRASSATORE
GREASE NIPPLE
5
130
Ø75 m6
A
B
Ø770
228
133
560
140
254
630
818
N°1 FORO M20 DIN 332
HOLE
20 h9
79.5
523
267
607
355 0 -1.0
40
N°6 FORI Ø28
HOLES
130
610
740
135
185
M12
SCATOLA MORSETTI
TERMINAL BOX
PART. A
M12
PART. B
102
89
89
102
B
A
CAD
DIS.
CONTR./C.UFF.
CONTR.NOR.
FIRMA
DATA
13.6.01
13.06.01
14.6.01
Modifiche
Indice
Data
Firma
CONT./UFF.
CONT.NOR.
DIMENSIONI
DIMENSIONS
IN mm
MarelliMotori
MOTORE B5_355 LA-LB 2 POLI
MOTOR CON UNITA' DI VENT./WITH FAN UNIT
FORMA COSTRUTTIVA IM B3
TYPE OF CONSTRUCTION
B35AD316B
INFO


CAD
DIS.
CONTR./C.UFF.
CONTR.NOR.
FIRMA
DATA
13.6.01
13.06.01
14.6.01
Indice
Modifiche
Firma
Data
CONT./C.UFF.
CONT.NOR.
2005
435
430
PIASTRA NON FORATA
UNDRILLED PLATE
SCATOLA MORS. AUX.
AUX. TERMINAL BOX
INGRASSATORE
GREASE NIPPLE
INGRASSATORE
GREASE NIPPLE
5
130
Ø75 m6
A
B
Ø770
313
133
630
140
254
800
1018
N°1 FORO M20 DIN 332
HOLE
523
267
607
355 0 -1.0
40
N°6 FORI Ø28
HOLES
130
610
740
20 h9
79.5
135
185
M12
SCATOLA MORSETTI
TERMINAL BOX
PART. A
M12
PART. B
102
89
89
102
DIMENSIONI
DIMENSIONS
IN mm
MarelliMotori
MOTORE B5_355 LC-LE 2 POLI
MOTOR CON UNITA' DI VENT./WITH FAN UNIT
FORMA COSTRUTTIVA
TYPE OF CONSTRUCTION IM B3
B35AD317B
INFO 0



DIMENSIONI
DIMENSIONS IN mm

MarelliMotori

MOTORE B5_355 LA–LB ≥4 POLI
MOTOR CON UNITA' DI VENT./WITH FAN UNIT
FORMA COSTRUTTIVA
TYPE OF CONSTRUCTION IM B3

B35AD318B

INFO 0

CAD	DIS.		
	CONTR./C.UFF.	A.M.	13.06.01
	CONTR.NOR.		14.6.01

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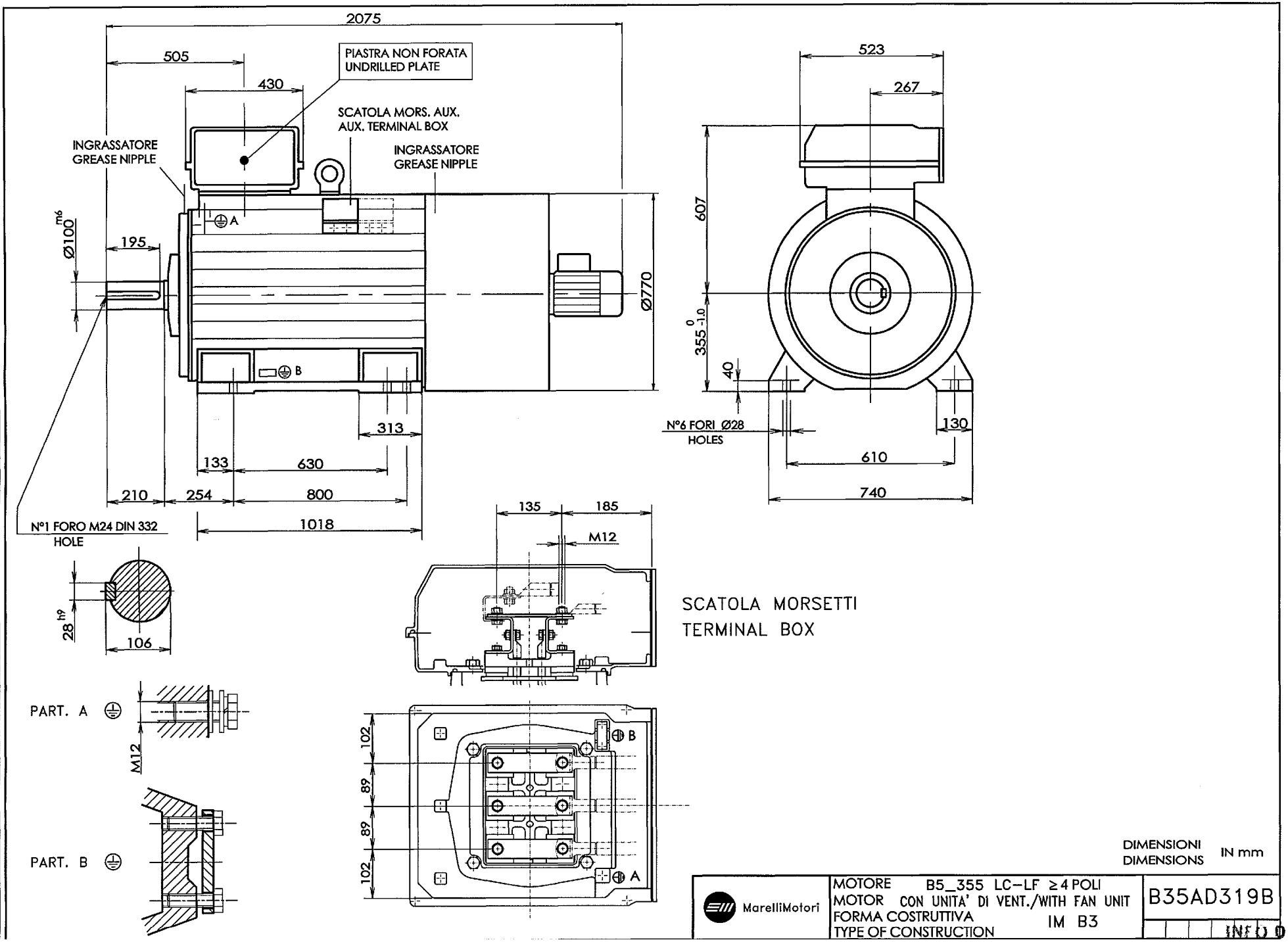

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CONTR./C.UFF.		13.06.01
CONTR.NOR.		14.6.01

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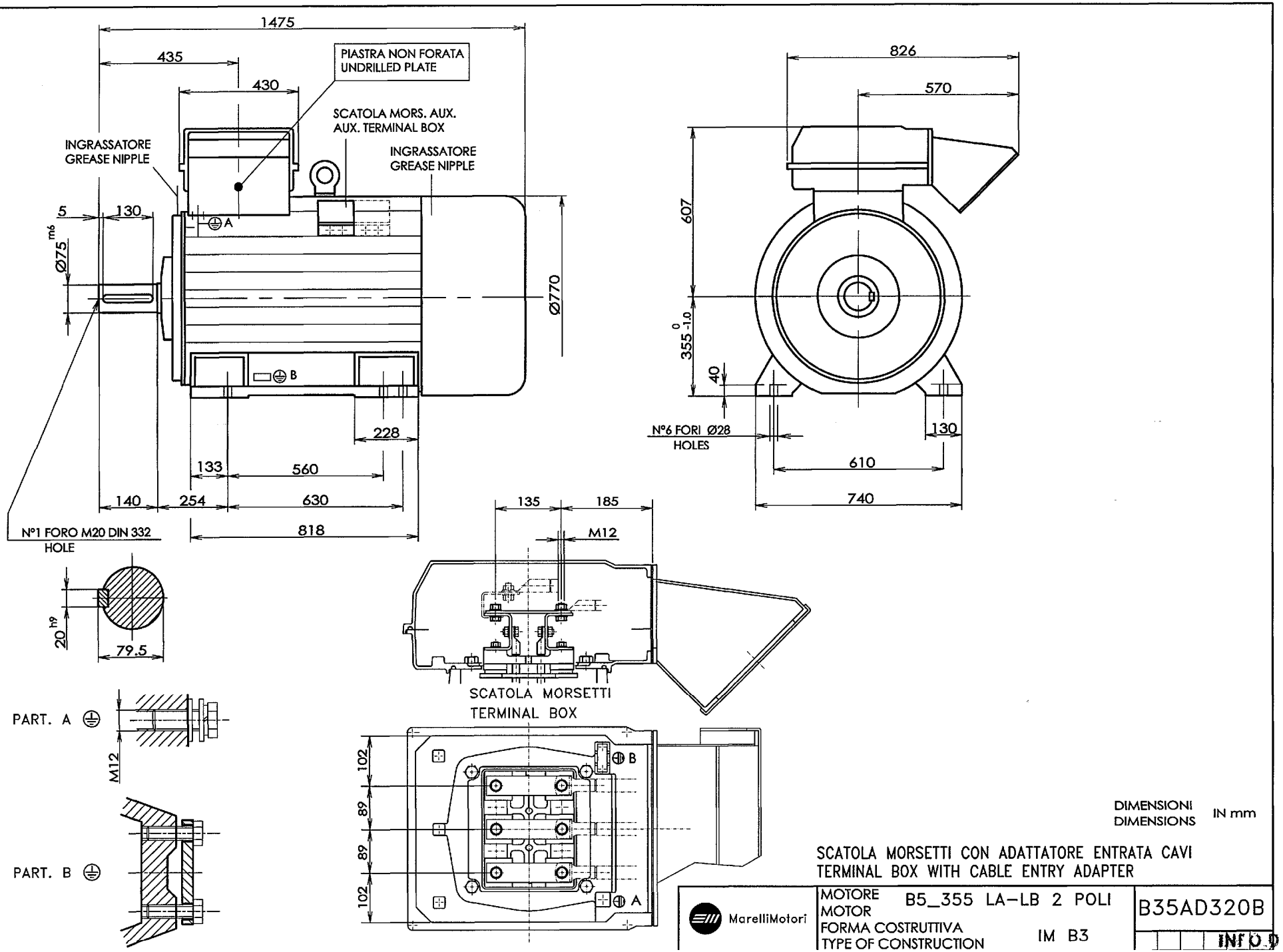

DIMENSIONI
DIMENSIONS IN mm

SCATOLA MORSETTI CON ADATTATORE ENTRATA CAVI
TERMINAL BOX WITH CABLE ENTRY ADAPTER

MarelliMotori

MOTORE
MOTOR B5_355 LA-LB 2 POLI

FORMA COSTRUTTIVA
TYPE OF CONSTRUCTION IM B3

B35AD320B

INFO

CAD	FIRMA	DATA
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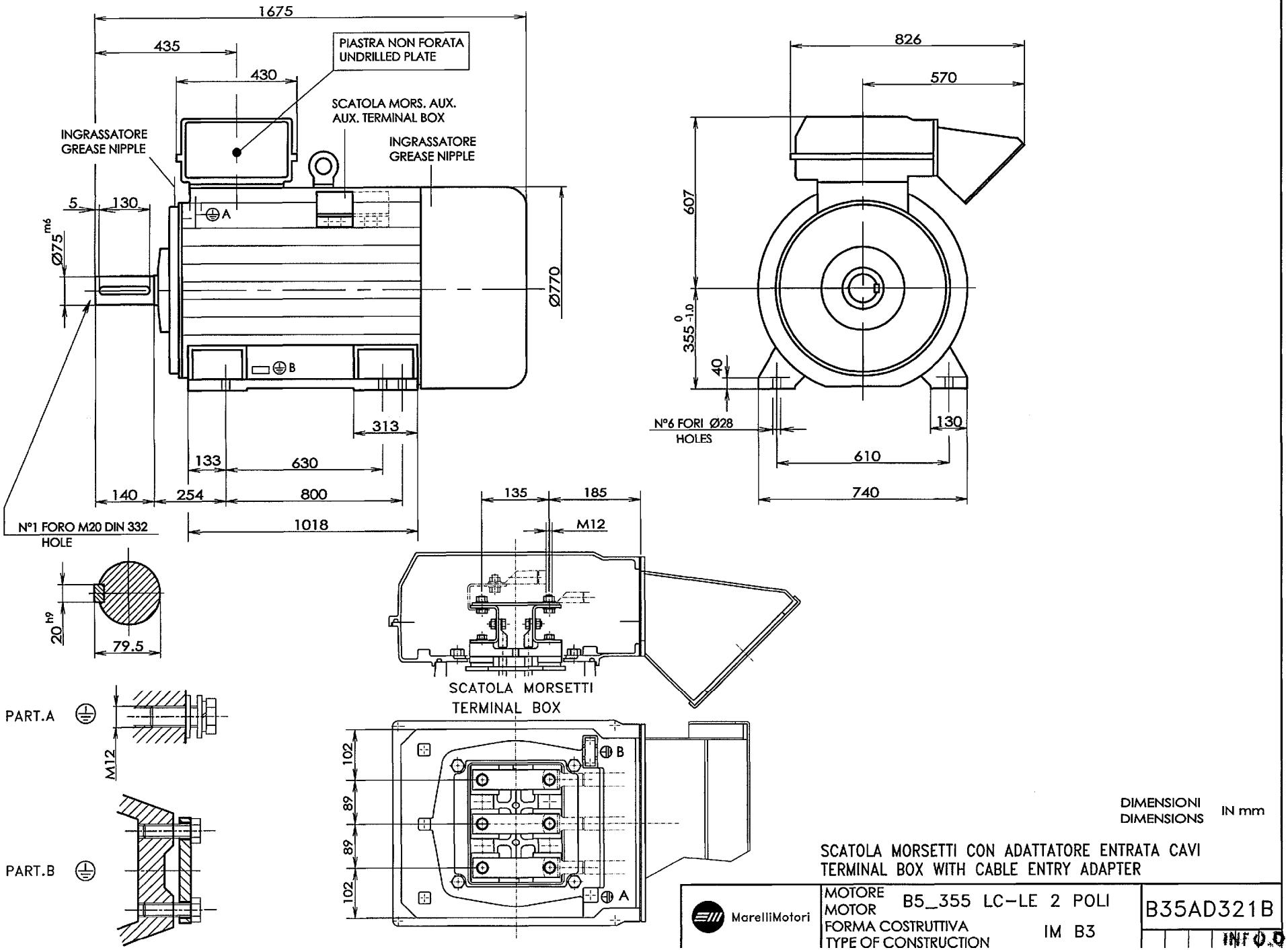
CONTR./C.UFF.	[illegible]	13.06.01
CONTR.NOR.	[illegible]	14.6.01

Indice	Modifiche	Firma	Data	CONT./UFF.	CONT.NOR.



DIMENSIONI
DIMENSIONS IN mm

SCATOLA MORSETTI CON ADATTATORE ENTRATA CAVI
TERMINAL BOX WITH CABLE ENTRY ADAPTER

MarelliMotori

MOTORE
MOTOR B5_355 LC-LE 2 POLI

FORMA COSTRUTTIVA
TYPE OF CONSTRUCTION IM B3

B35AD321B

INF 0.0

CAD	FIRMA	DATA
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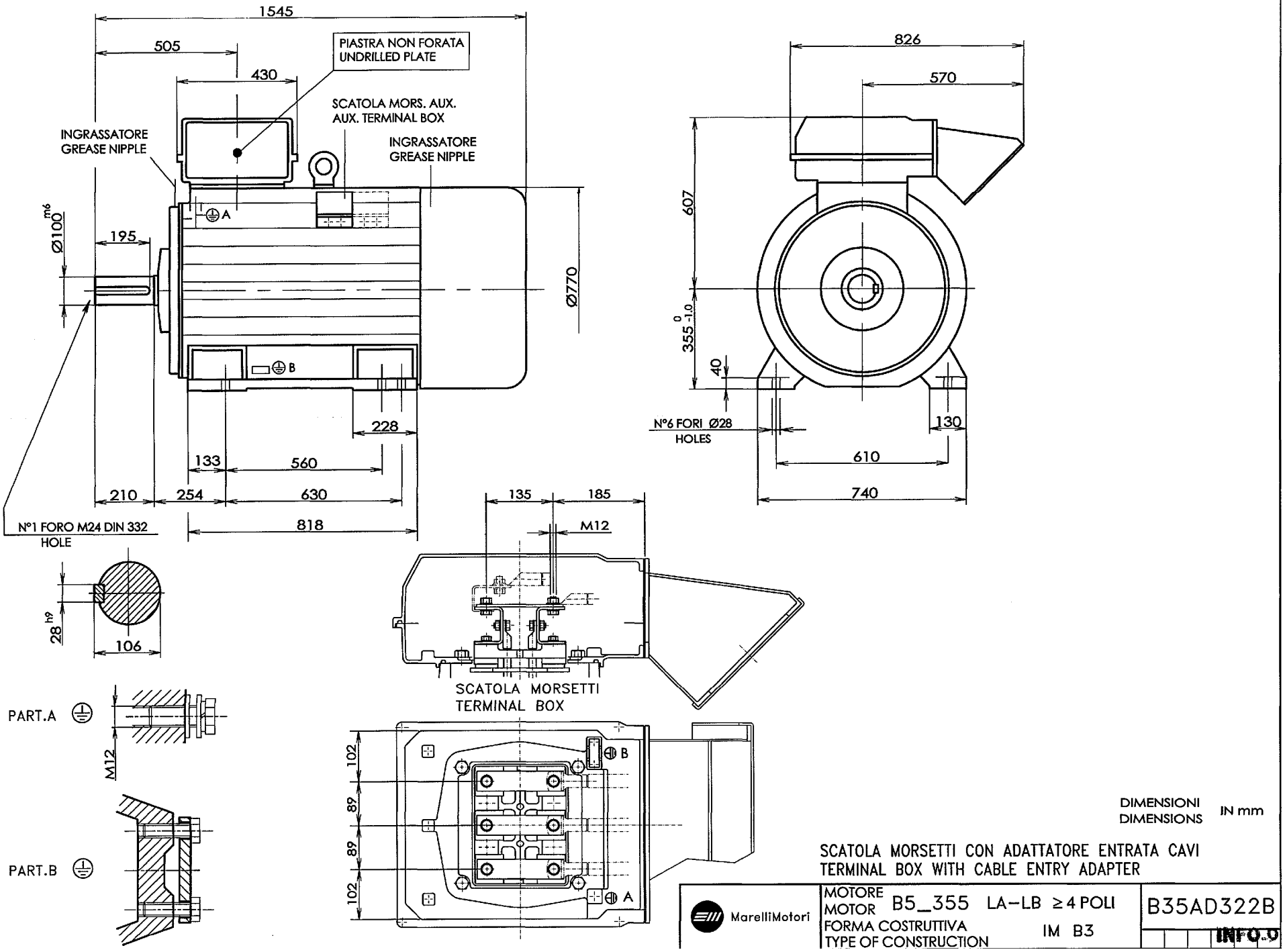
CONTR.MOR.		14.6.01

Indice	Modifiche	Firma	Data	CONF./UFF.	CONT.MOR.



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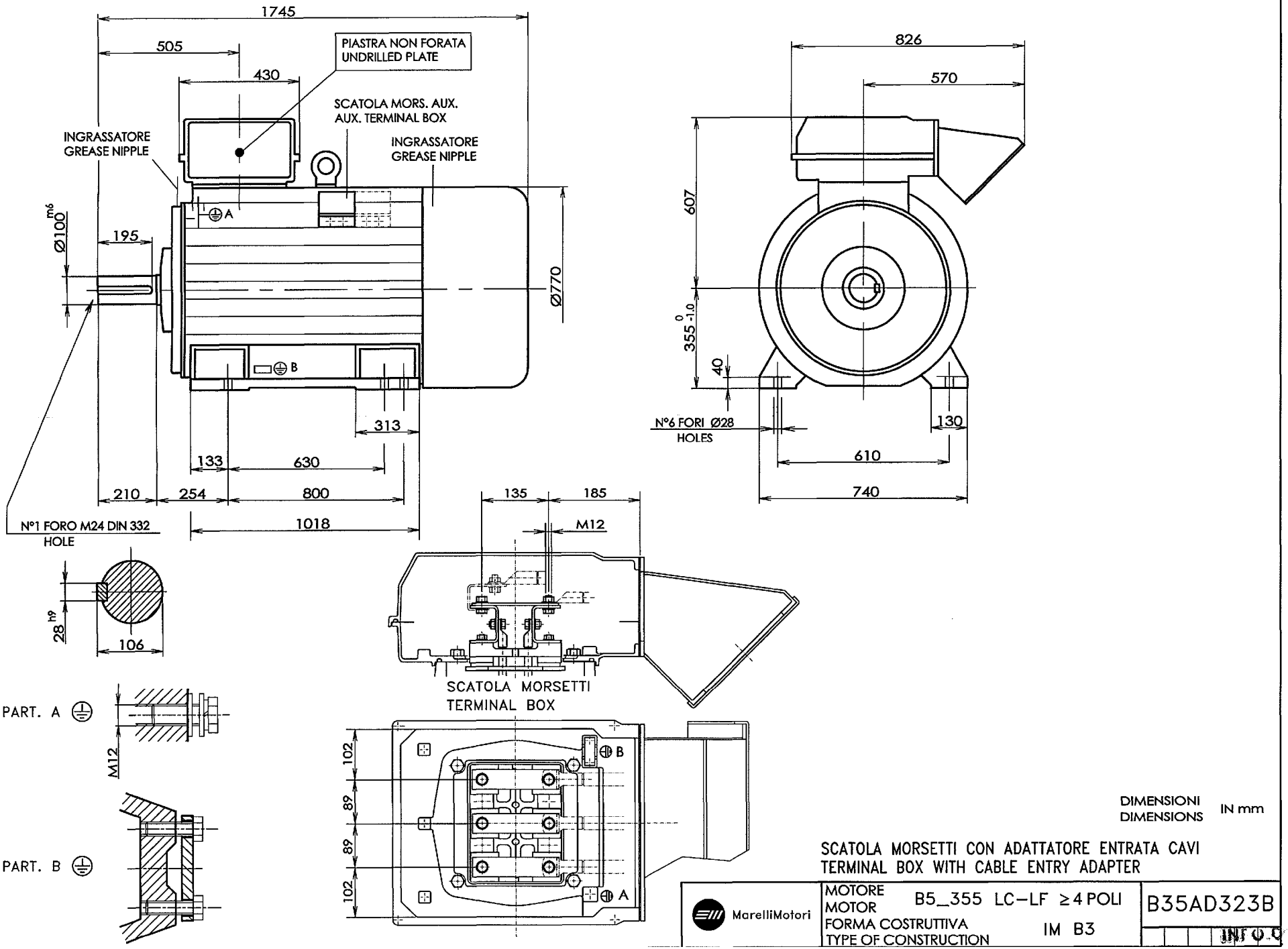
Indice	Modifiche	Firma	Data	CONT./UFF.	CONT.NOR.



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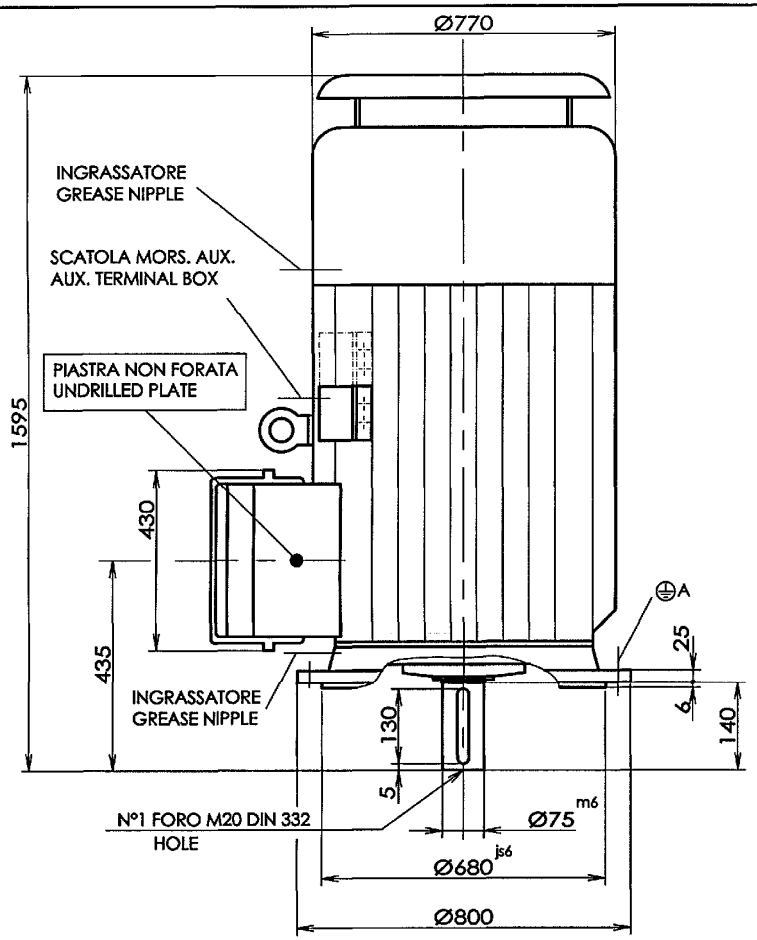
CONTR./C.UFF.		13.06.01
CONTR.NOR.		14.6.01

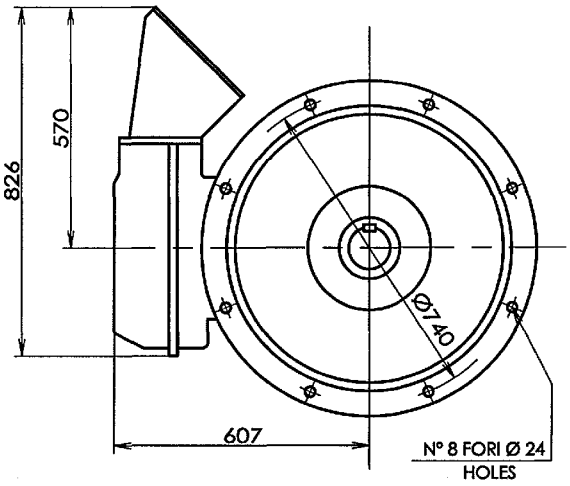
Indice	Modifiche	Firma	Data	CONT./UFF.	CONT.NOR.

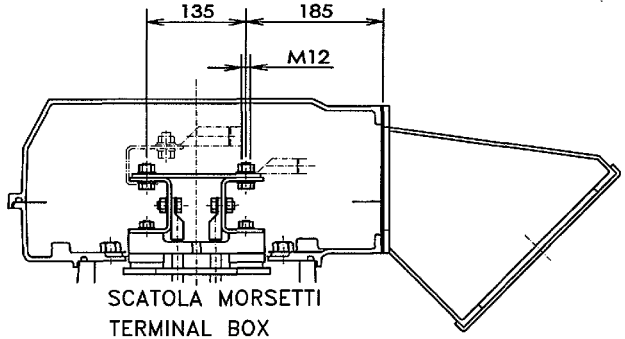
Indice	Modifiche	Firma	Data	CONT./UFF.	CONT.NOR.

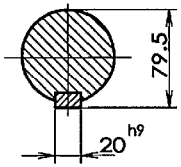
	FIRMA	DATA
CAD		
DIS.		13.06.01
CONTR./C.UFF.		13.06.01
CONTR.NOR.		14.6.01

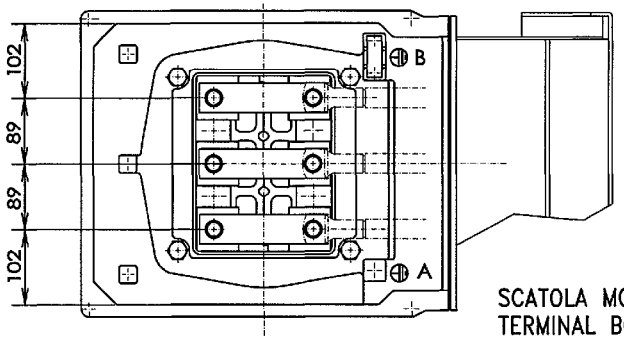
Indice	Modifiche	Firma	Data	CONT./UFF.	CONT.NOR.

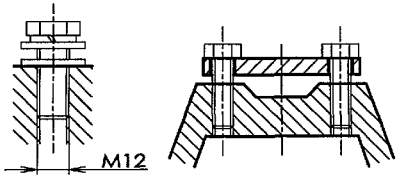










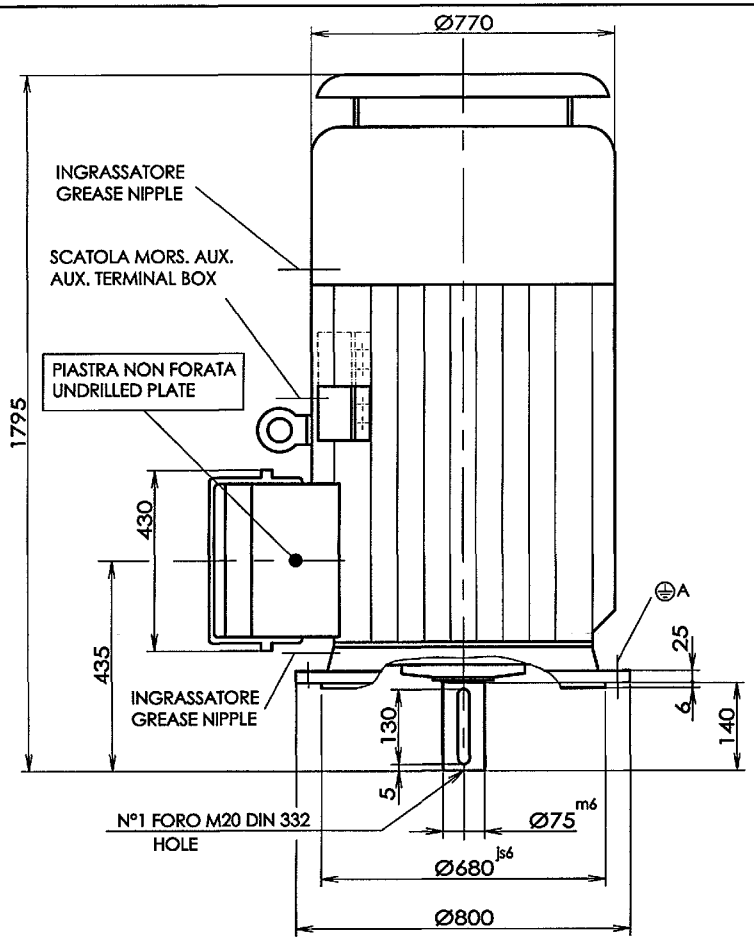


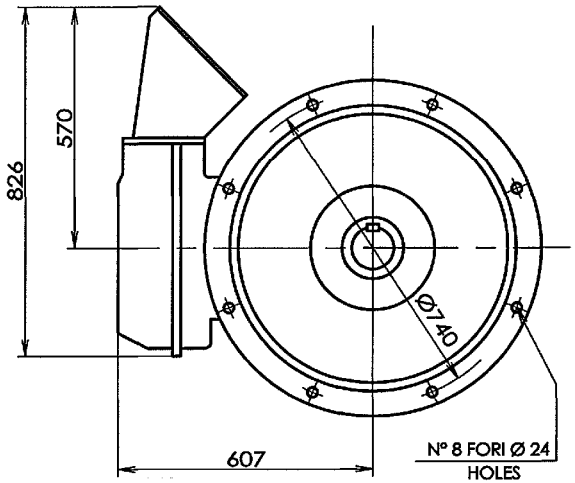
PART. A ⏚ PART. B ⏚

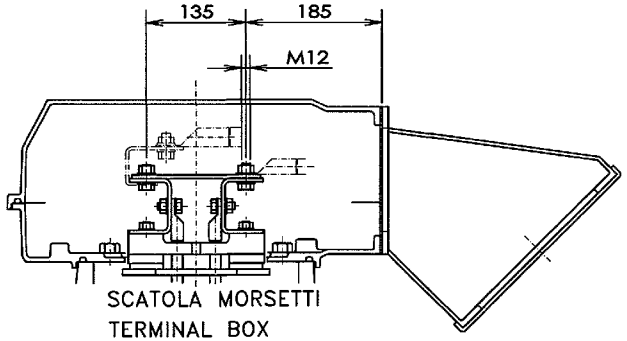
DIMENSIONI
DIMENSIONS IN mm

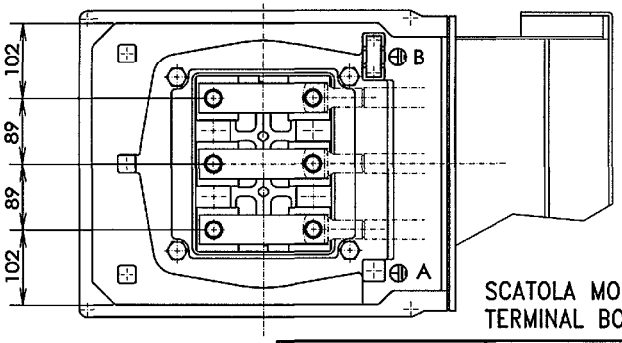
SCATOLA MORSETTI CON ADATTATORE ENTRATA CAVI
TERMINAL BOX WITH CABLE ENTRY ADAPTER

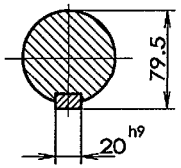
MarelliMotori	MOTORE / MOTOR B5_355 LA-LB 2 POLI FORMA COSTRUTTIVA / TYPE OF CONSTRUCTION IM V1	B35AD324B

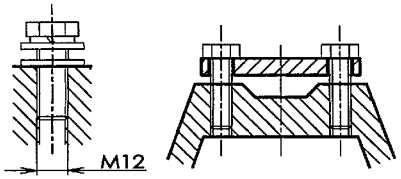












DIMENSIONI
DIMENSIONS
IN mm

SCATOLA MORSETTI CON ADATTATORE ENTRATA CAVI
TERMINAL BOX WITH CABLE ENTRY ADAPTER

MarelliMotori

MOTORE
MOTOR B5_355 LC-LE 2 POLI

FORMA COSTRUTTIVA
TYPE OF CONSTRUCTION IM V1

B35AD325B

INFO

Indice	Modifiche	Firma	Data	CONT./UFF.	CONT.NOR.

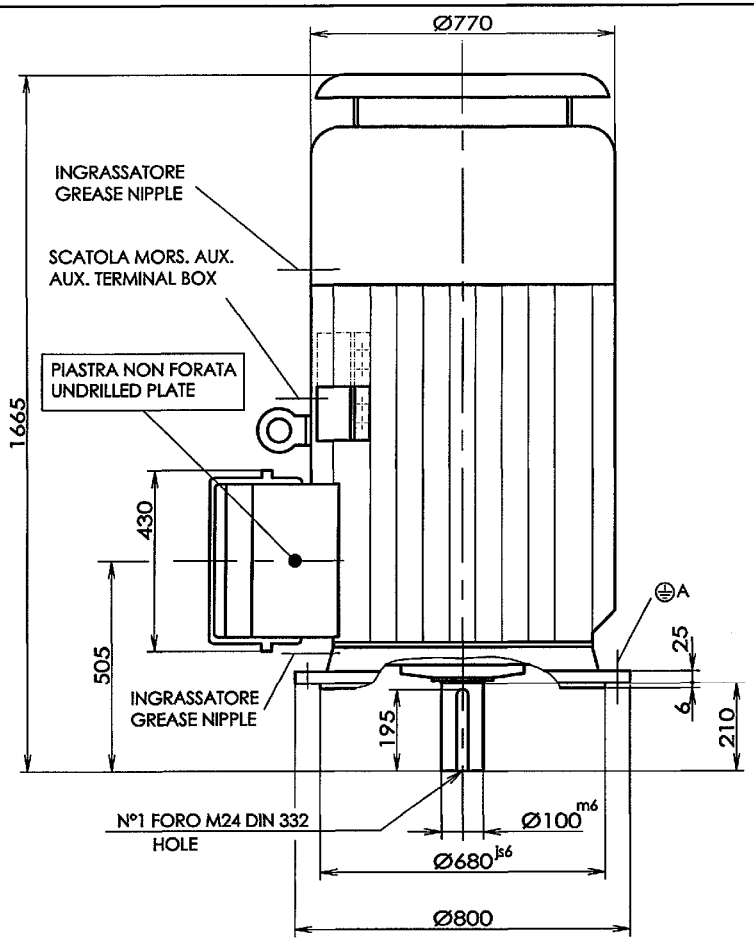
CAD	FIRMA	DATA
DIS.		13.06.01
CONTR./C.UFF.		13.06.01
CONTR.NOR.		14.6.01

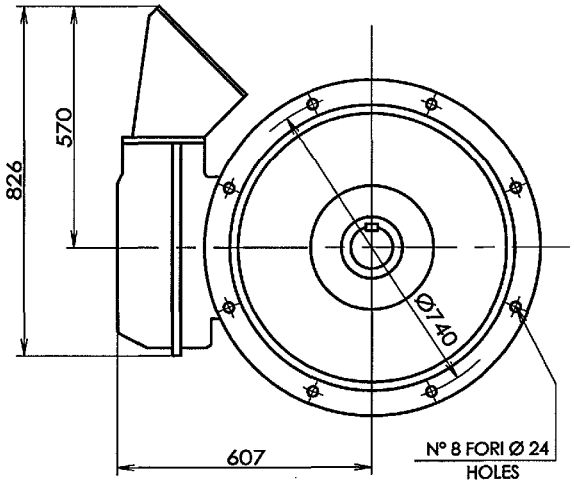
Indice	Modifiche	Firma	Data	CONT./UFF.	CONT.NOR.

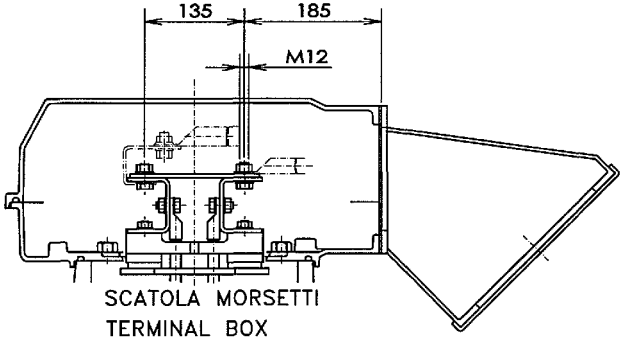
CAD	FIRMA	DATA
DIS.	Stefani	13.06.01
CONTR./C.UFF.	A.V.	13.06.01
CONTR.NOR.	Bosoni	14.6.01

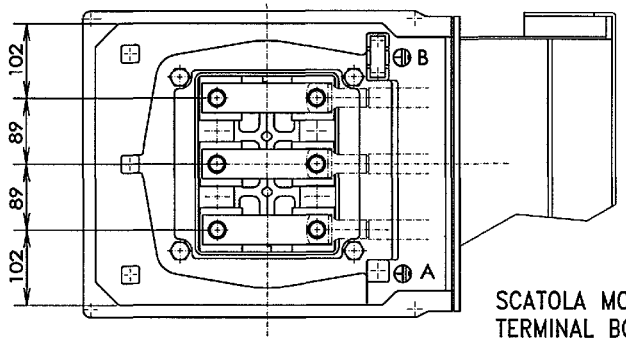
Indice	Modifiche	Firma	Data	CONT./C.UFF.	CONT.NOR.

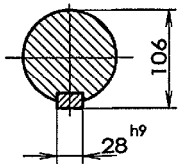
Indice	Modifiche	Firma	Data	CONT./C.UFF.	CONT.NOR.

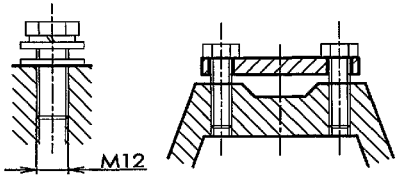












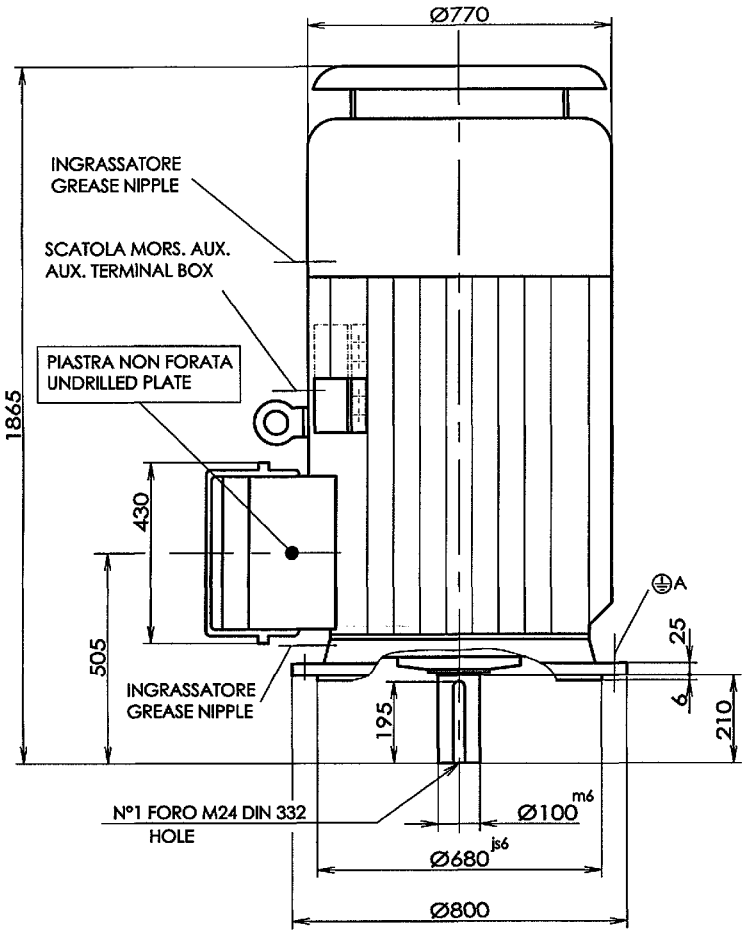
PART. A ⏚ PART. B ⏚

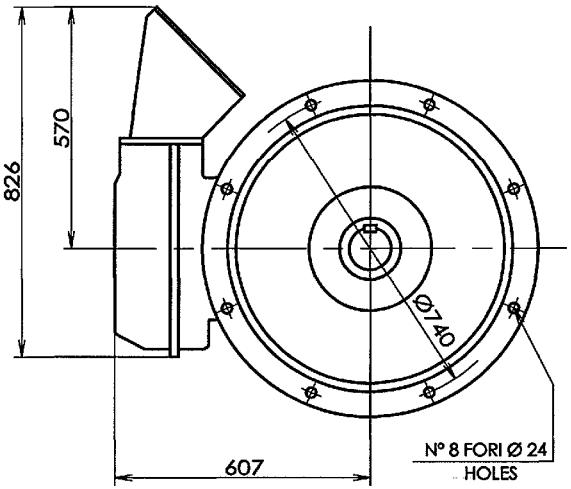
DIMENSIONI
DIMENSIONS IN mm

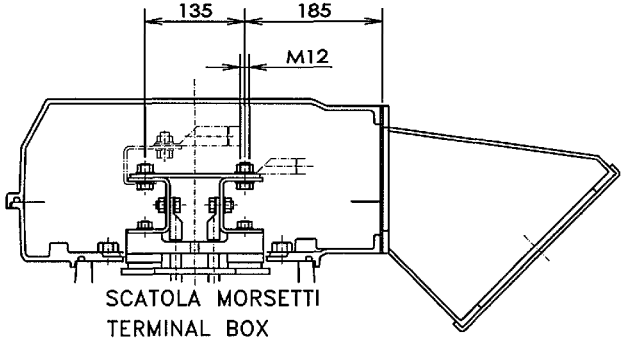
SCATOLA MORSETTI CON ADATTATORE ENTRATA CAVI
TERMINAL BOX WITH CABLE ENTRY ADAPTER

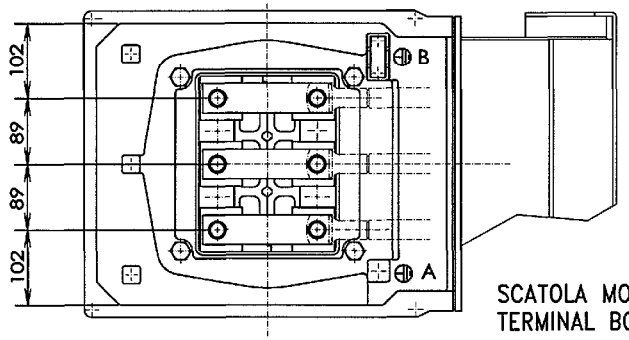
MarelliMotori

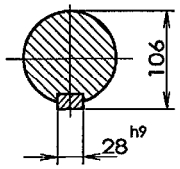
MOTORE MOTOR	B5_355 LA–LB ≥4 POLI	B35AD326B	
FORMA COSTRUTTIVA TYPE OF CONSTRUCTION	IM V1	INFO.D	

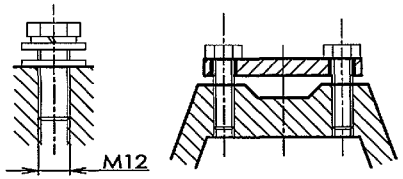












DIMENSIONI
DIMENSIONS
IN mm

SCATOLA MORSETTI CON ADATTATORE ENTRATA CAVI
TERMINAL BOX WITH CABLE ENTRY ADAPTER

MarelliMotori

MOTORE
MOTOR B5_355 LC-LF ≥4 POLI

FORMA COSTRUTTIVA
TYPE OF CONSTRUCTION IM V1

B35AD327B

INFO D

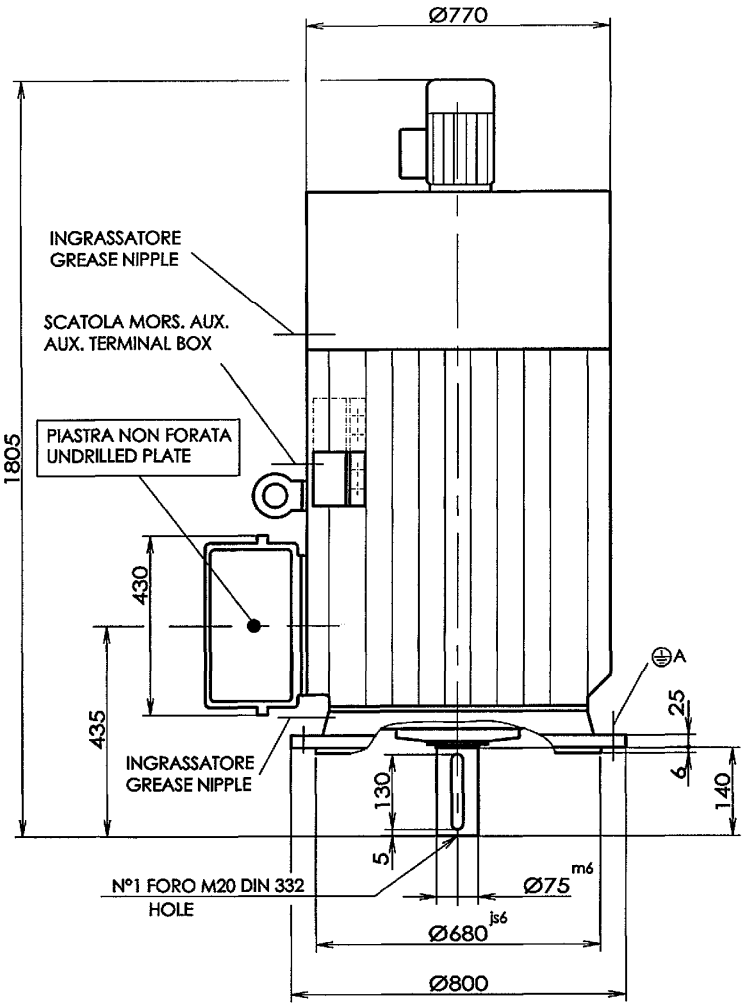
CAD	FIRMA	DATA
DIS.	Stefani	13.06.01
CONTR./C.UFF.	Aprili	13.06.01
CONTR.NOR.	Ubaldi	14.6.01

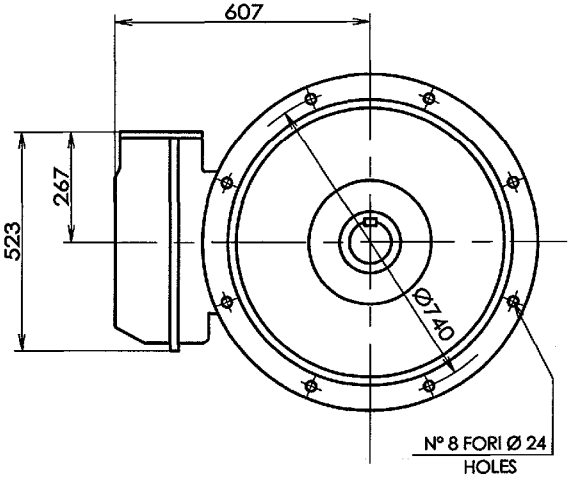
Indice	Modifiche	Firma	Data	CONT./C.UFF.	CONT.NOR.

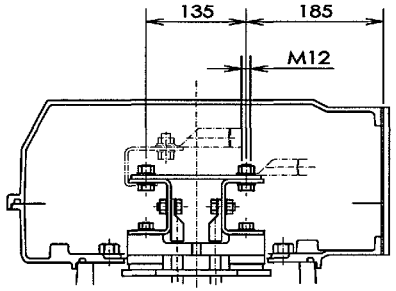
CAD	FIRMA	DATA
DIS.		13.06.01
CONTR./C.UFF.		13.06.01
CONTR.NOR.		14.6.01

Indice	Modifiche	Firma	Data	CONT./C.UFF.	CONT.NOR.

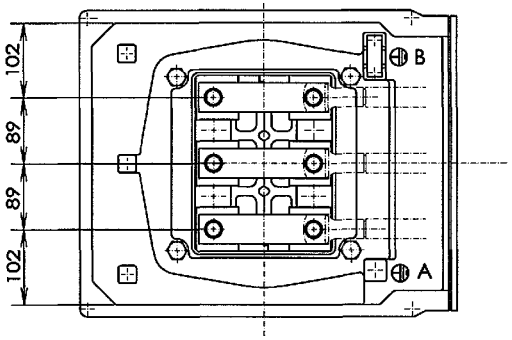
Indice	Modifiche	Firma	Data	CONT./C.UFF.	CONT.NOR.

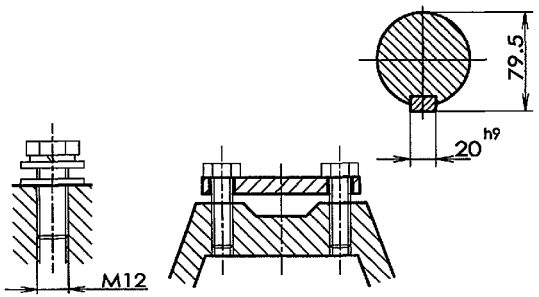






SCATOLA MORSETTI
TERMINAL BOX

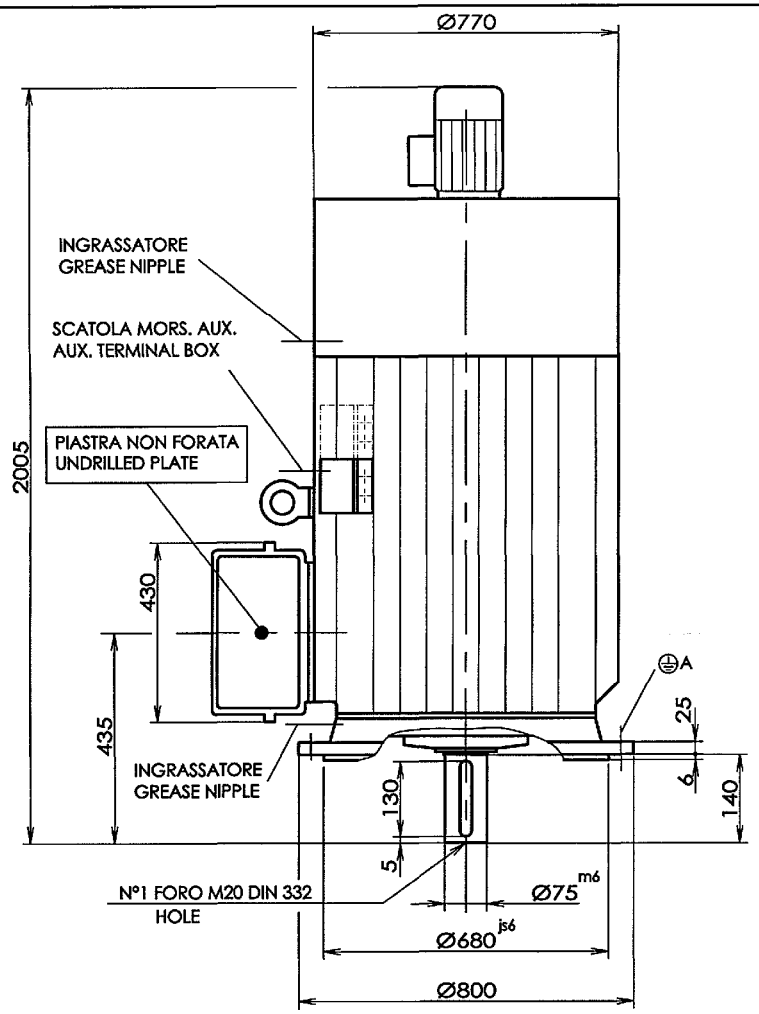


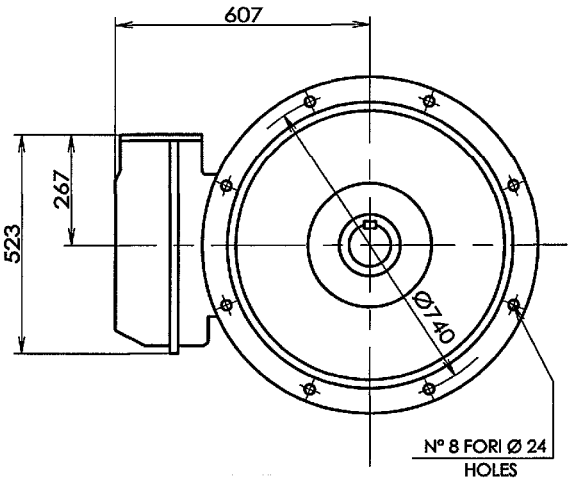


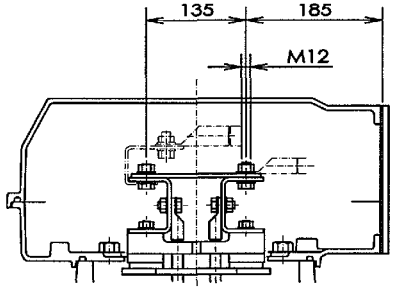
PART. A ⏚ PART. B ⏚

DIMENSIONI
DIMENSIONS IN mm

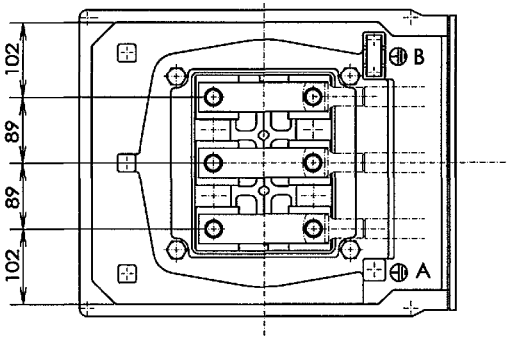
MarelliMotori	MOTORE B5_355 LA-LB 2 POLI MOTOR CON UNITA' DI VENT./WITH FAN UNIT FORMA COSTRUTTIVA IM V1 TYPE OF CONSTRUCTION	B35AD328B INT 0.0

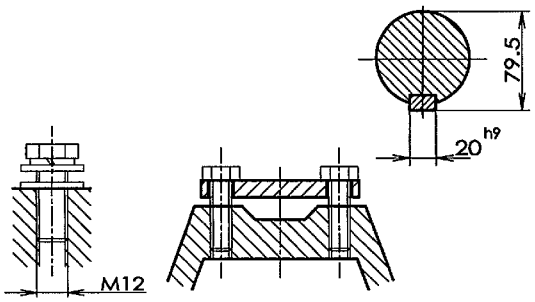






SCATOLA MORSETTI
TERMINAL BOX





PART. A ⏚ PART. B ⏚

DIMENSIONI
DIMENSIONS IN mm

MarelliMotori	MOTORE B5_355 LC-LE 2 POLI MOTOR CON UNITA' DI VENT./WITH FAN UNIT FORMA COSTRUTTIVA IM V1 TYPE OF CONSTRUCTION	B35AD329B

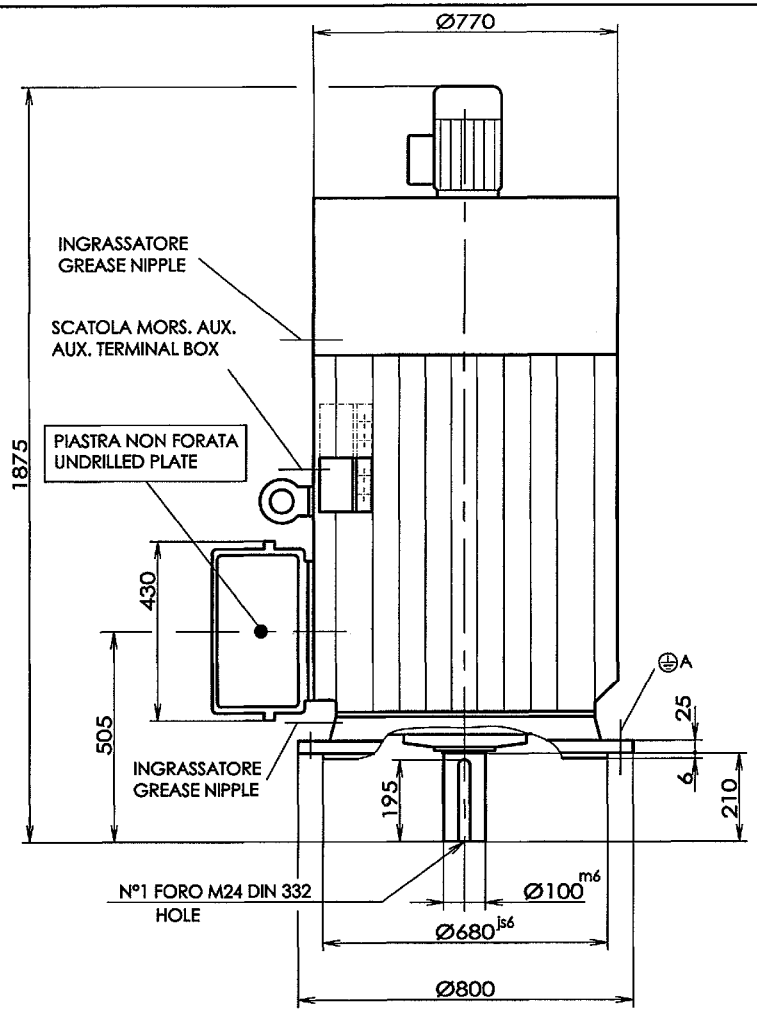
CAD	FIRMA	DATA
DIS.		
CONTR./C.UFF.		
CONTR.NOR.		

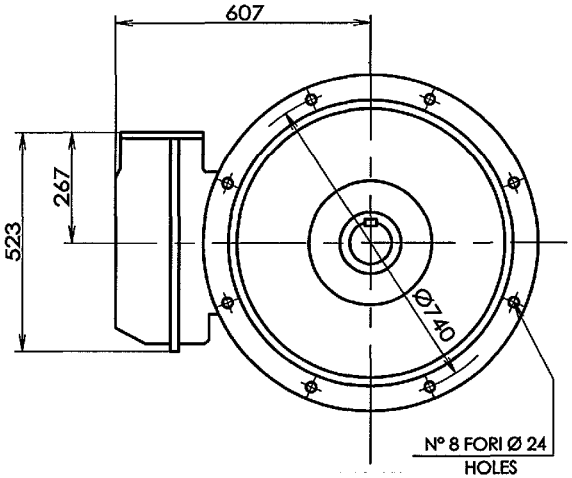
Indice	Modifiche	Firma	Data	CONT./UFF.	CONT.NOR.

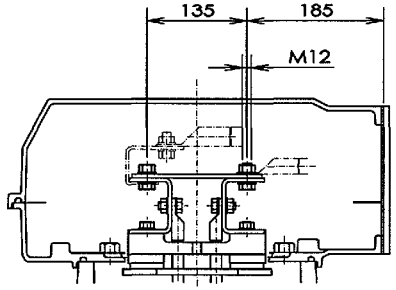
CAD	DIS.	
	CONTR./C.UFF.	
	CONTR.NOR.	

Indice	Modifiche	Firma	Data	CONF./UFF.	CONT.NOR.

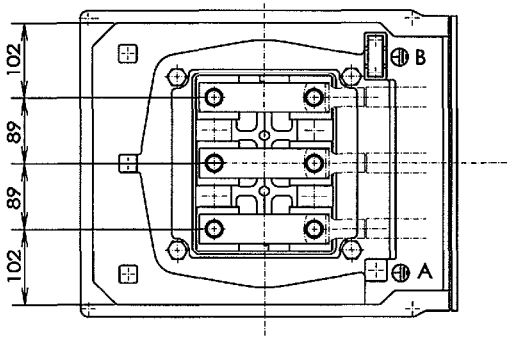
Indice	Modifiche	Firma	Data	CONF./UFF.	CONT.NOR.

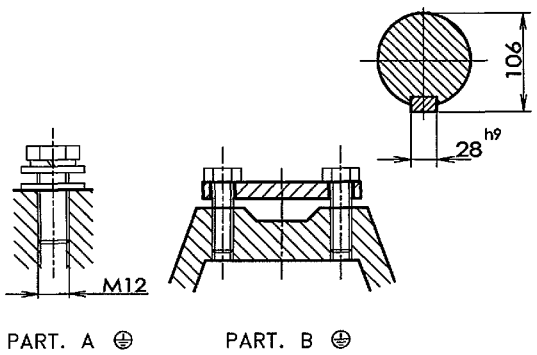






SCATOLA MORSETTI
TERMINAL BOX

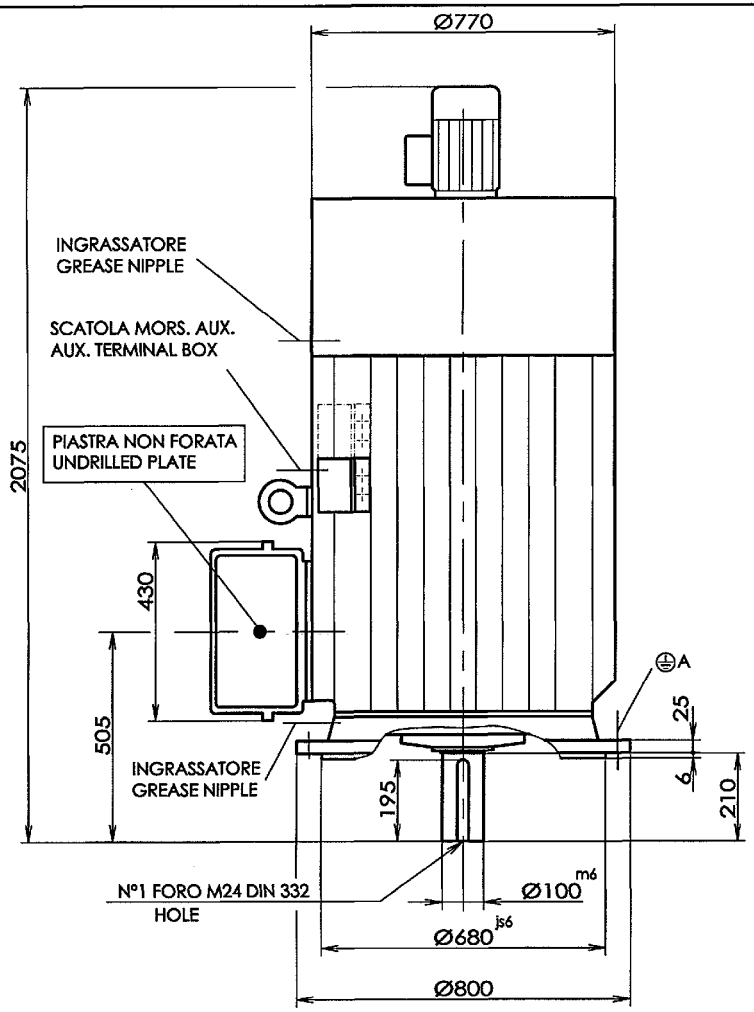


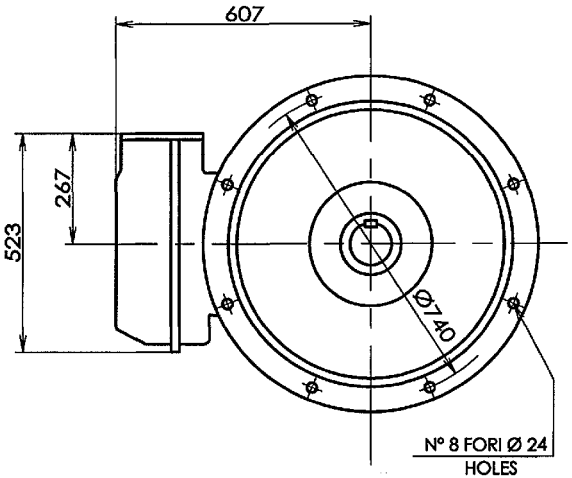


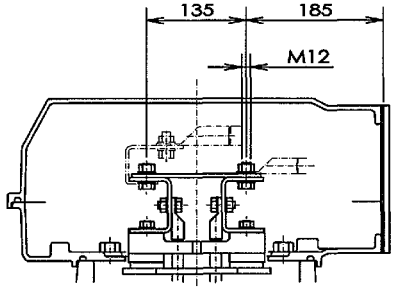
PART. A ⏚ PART. B ⏚

DIMENSIONI
DIMENSIONS IN mm

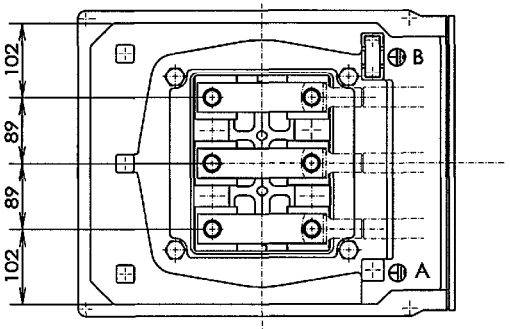
MarelliMotori	MOTORE B5_355 LA–LB ≥4 POLI MOTOR CON UNITA' DI VENT./WITH FAN UNIT FORMA COSTRUTTIVA IM V1 TYPE OF CONSTRUCTION	B35AD330B

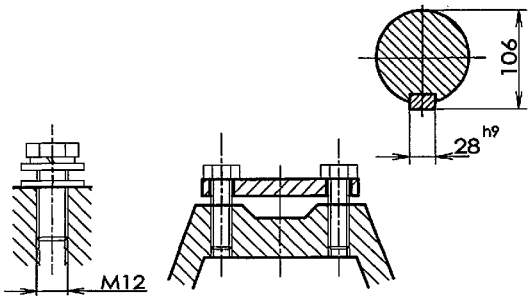






SCATOLA MORSETTI
TERMINAL BOX





PART. A ⏚ PART. B ⏚

DIMENSIONI
DIMENSIONS IN mm

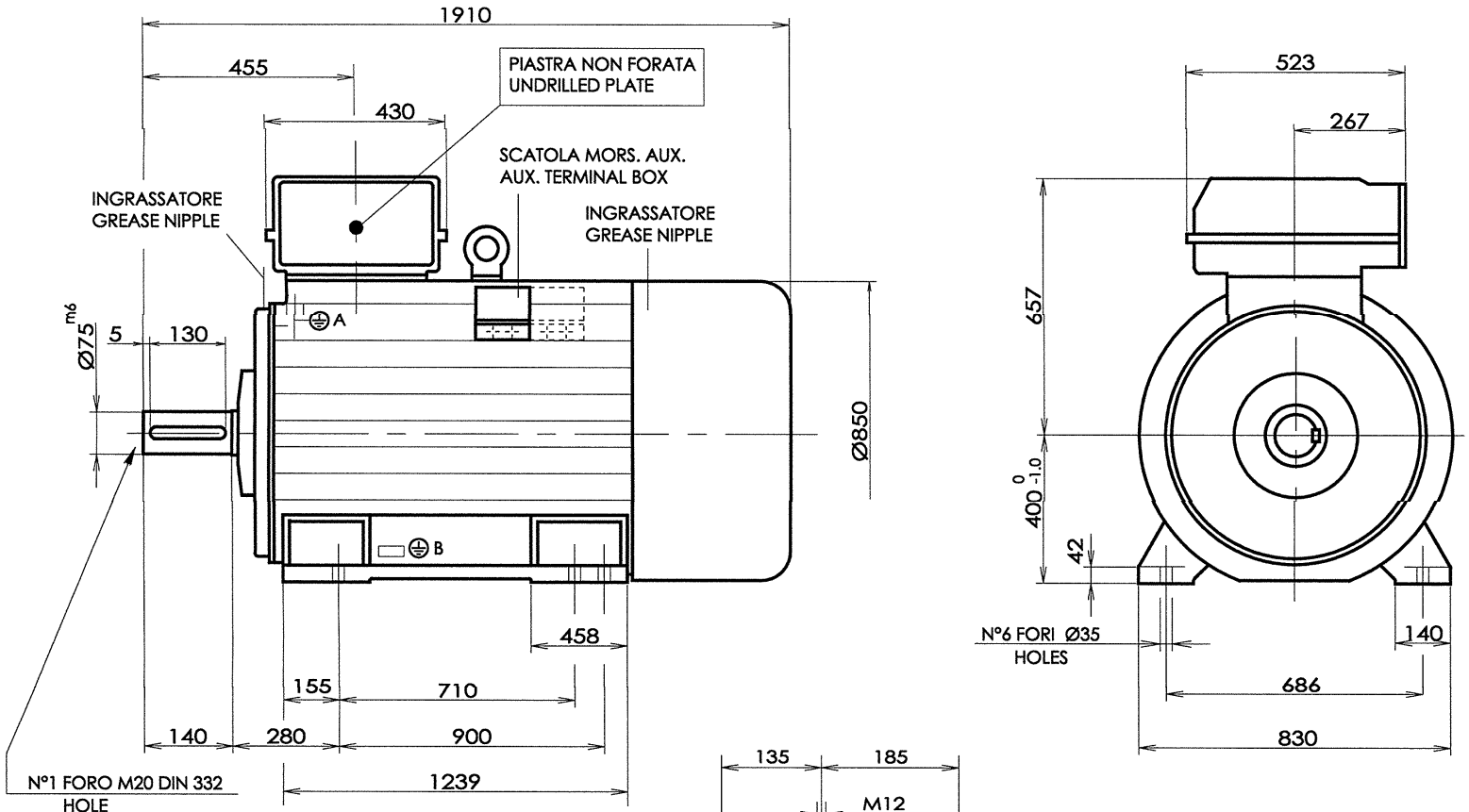
MarelliMotori

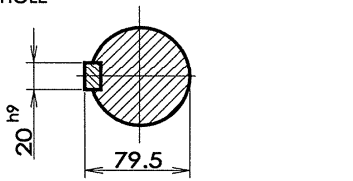
MOTORE B5_355 LC–LF ≥ 4 POLI
MOTOR CON UNITA' DI VENT./WITH FAN UNIT
FORMA COSTRUTTIVA IM V1
TYPE OF CONSTRUCTION

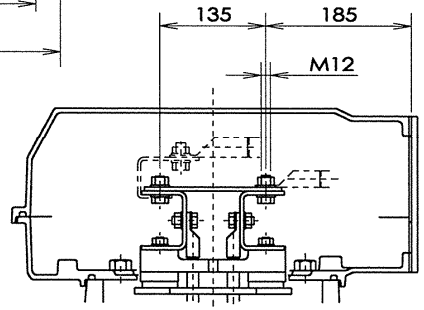
B35AD331B

CAD	FIRMA	DATA
DIS.		13.06.01
CONTR./C.UFF.		13.06.01
CONTR.NOR.		14.6.01

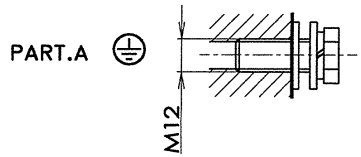
Indice	Modifiche	Firma	Data	CONT./UFF.	CONT.NOR.

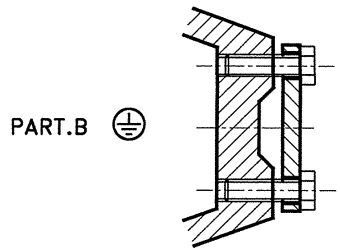


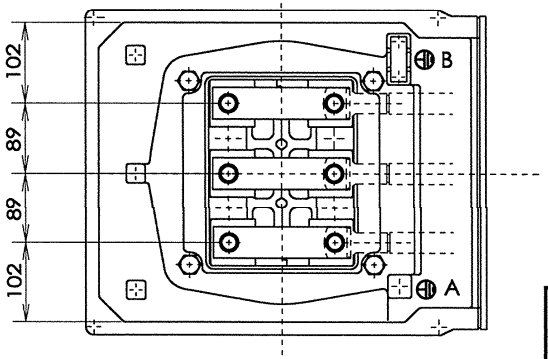




SCATOLA MORSETTI
TERMINAL BOX







DIMENSIONI
DIMENSIONS IN mm

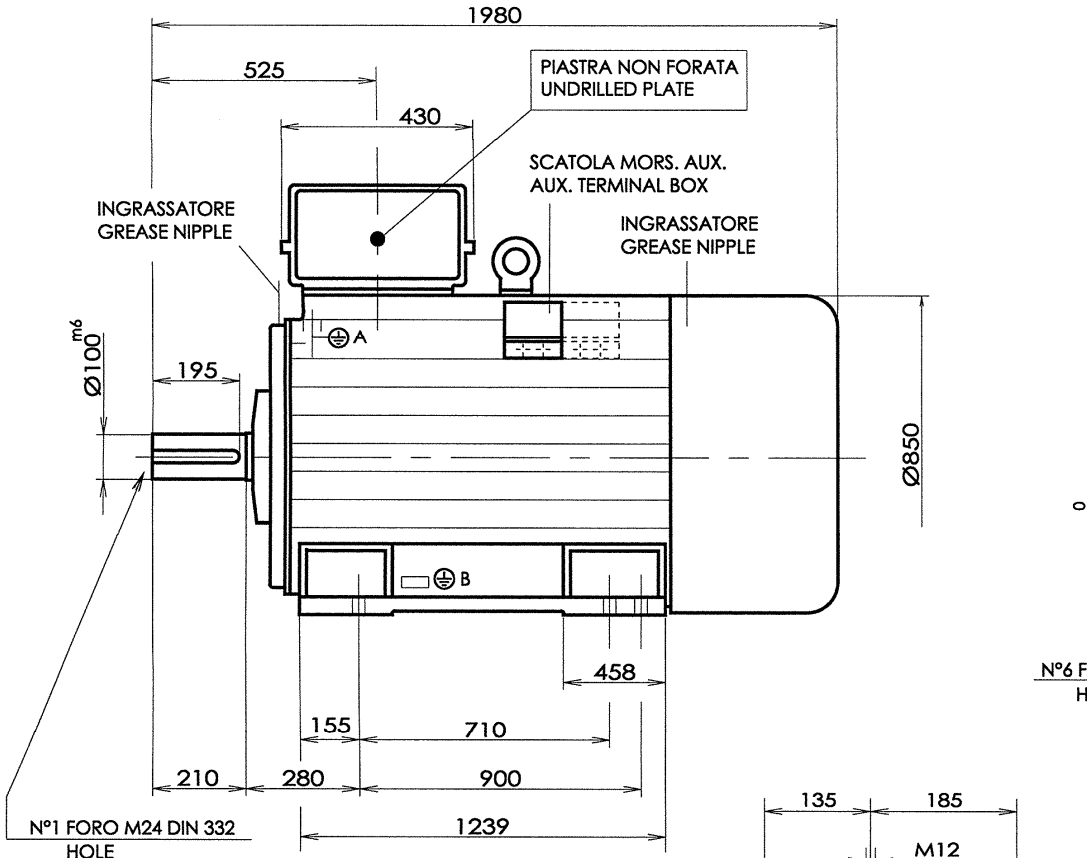
MarelliMotori

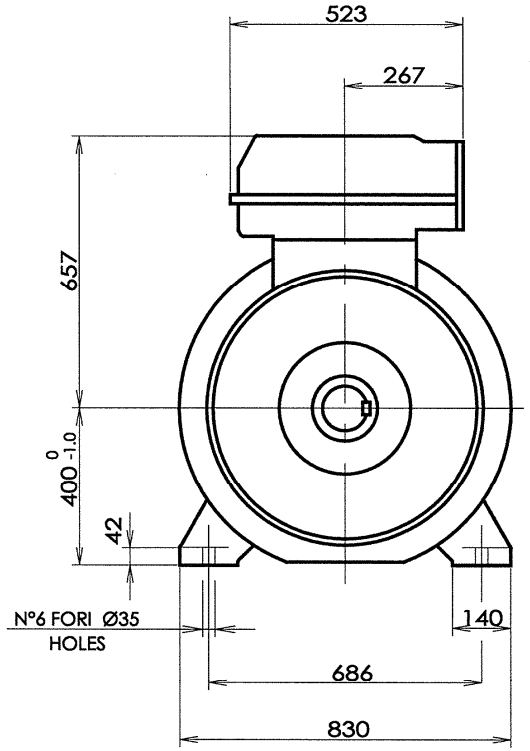
MOTORE B5_400 L 2 POLI
MOTOR
FORMA COSTRUTTIVA IM B3
TYPE OF CONSTRUCTION

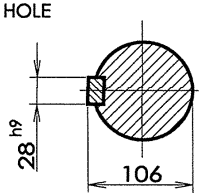
B40AD300B

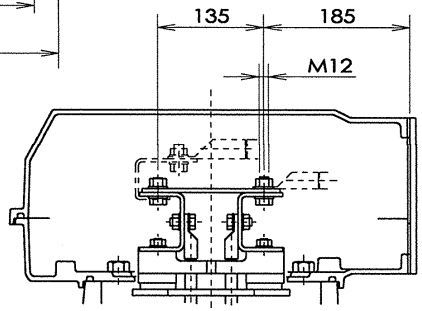
CAD	FIRMA	DATA
DIS.	Gruppaldo	13-9-01
CONTR./C.UFF.		
CONTR.NOR.		

Indice	Modifiche	Firma	Data	CONT./C.UFF.	CONT.NOR.

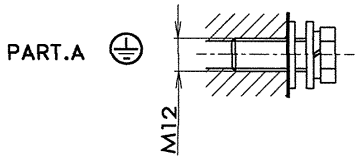


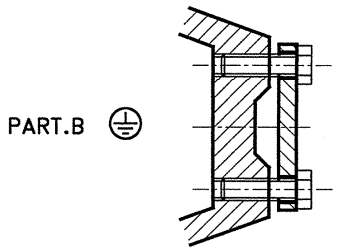


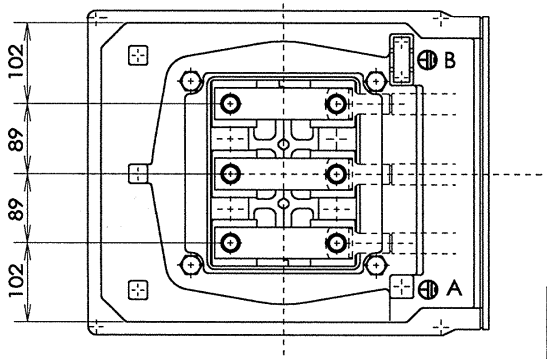




SCATOLA MORSETTI
TERMINAL BOX







DIMENSIONI
DIMENSIONS IN mm

MarelliMotori

MOTORE
MOTOR B5_400 L ≥4 POLI
FORMA COSTRUTTIVA
TYPE OF CONSTRUCTION IM B3

B40AD302B

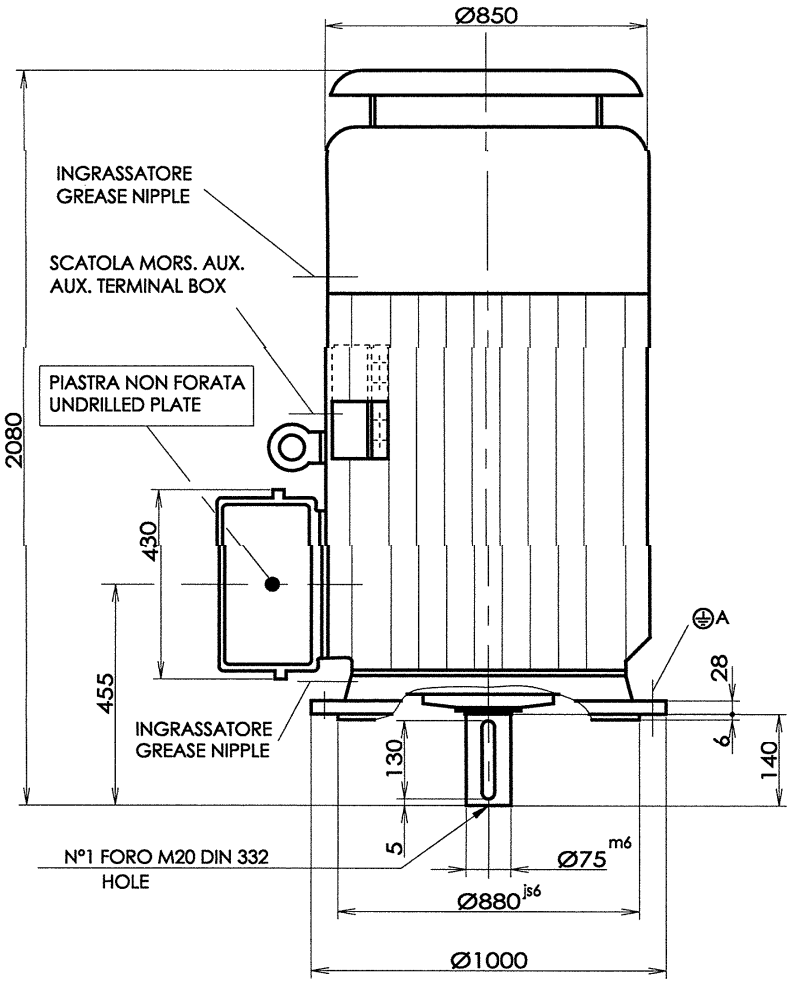
Indice	Modifiche	Firma	Data	CONT./CUFF.	CONT.NOR.

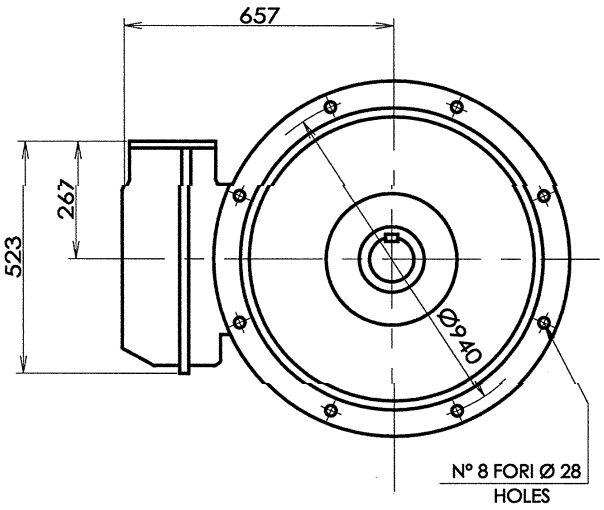
CAD		FIRMA	DATA
DIS.			18.5.01
CONTR./C.UFF.			
CONTR.NOR.			

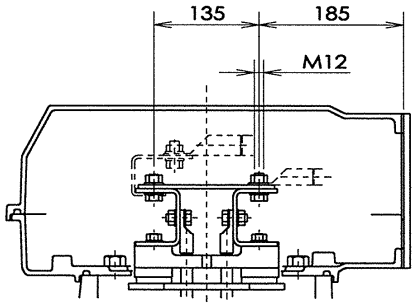
CAD	DATA	FIRMA
DIS.	25-03-09	
CONTR./C.UFF.		
CONTR.NOR.		

Indice	Modifiche	Firma	Data	CONF./C.UFF.	CONT.NOR.

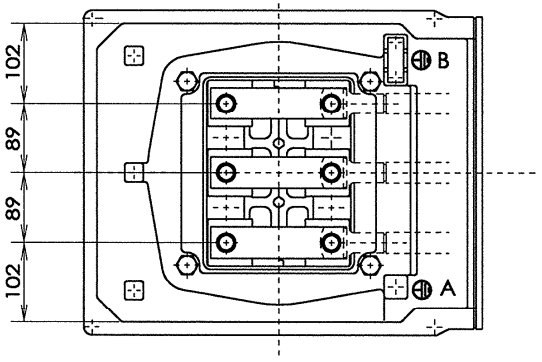
Indice	Modifiche	Firma	Data	CONF./C.UFF.	CONT.NOR.

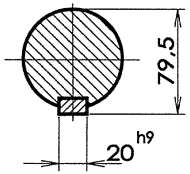


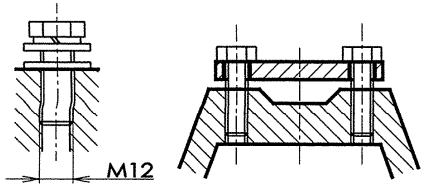




SCATOLA MORSETTI
TERMINAL BOX



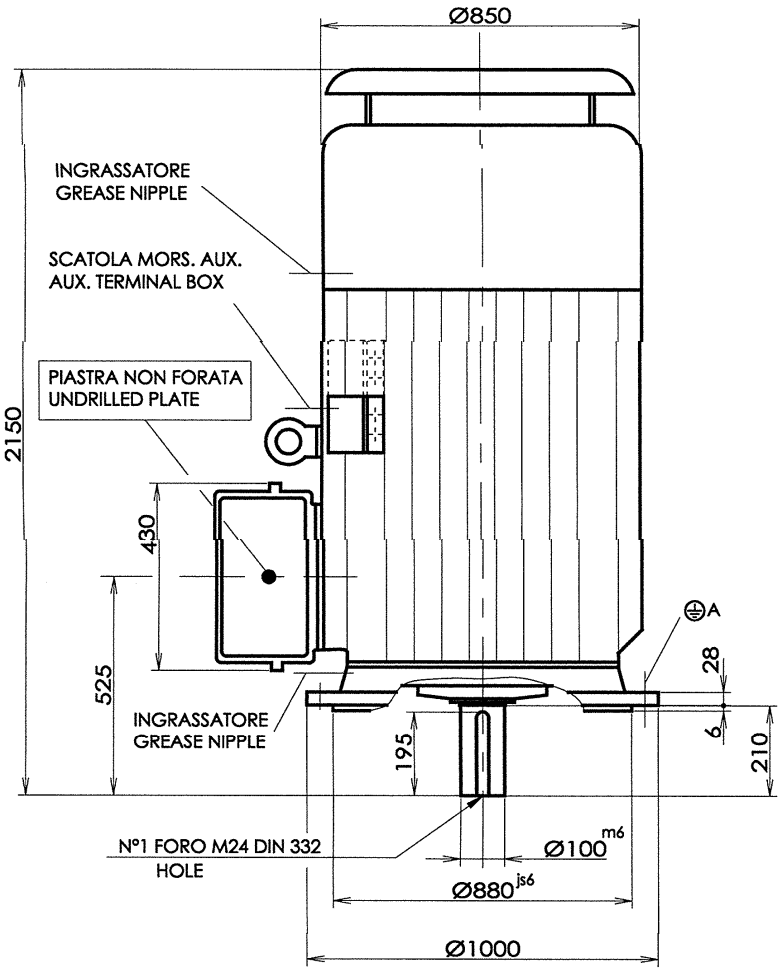


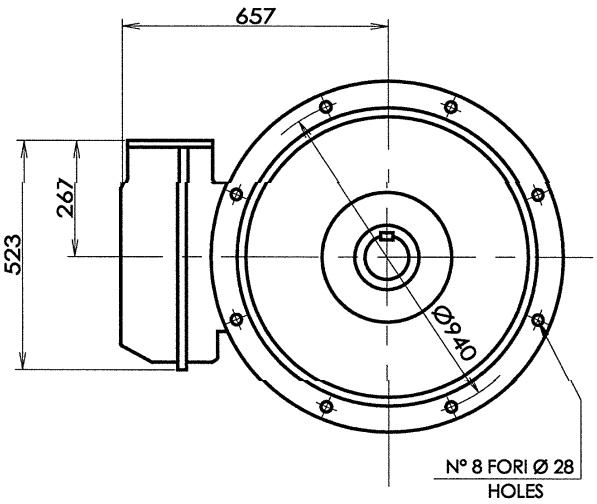


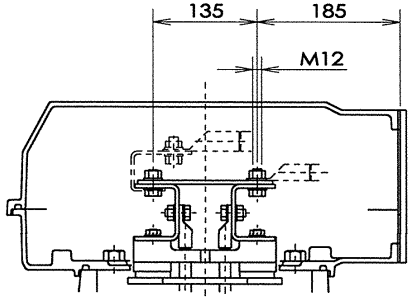
PART. A ⏚ PART. B ⏚

DIMENSIONI
DIMENSIONS IN mm

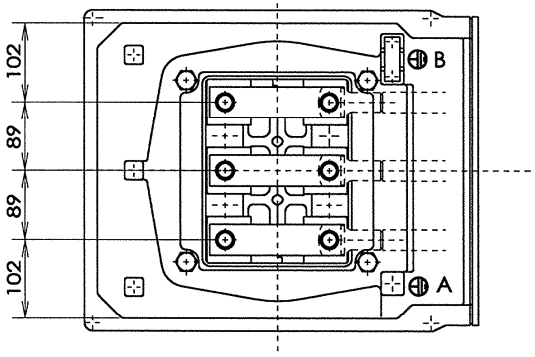
MarelliMotori	MOTORE / MOTOR B5_400 L 2 POLI FORMA COSTRUTTIVA / TYPE OF CONSTRUCTION IM V1	B40AD304B

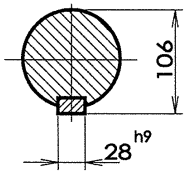


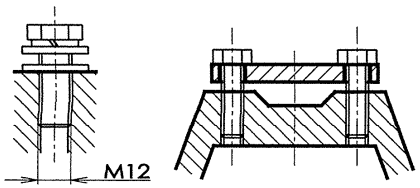




SCATOLA MORSETTI
TERMINAL BOX







PART. A ⏚ PART. B ⏚

DIMENSIONI
DIMENSIONS IN mm

MarelliMotori	MOTORE / MOTOR B5_400 L ≥4 POLI FORMA COSTRUTTIVA / TYPE OF CONSTRUCTION IM V1	B40AD306B

	DATA	FIRMA	
CAD	18-5-01		
Dis.			
CONTR./C.UFF.			
CONTR.NOR.			

Indice	Modifiche	Firma	Data	CONT./C.UFF.	CONT.NOR.

Indice	Modifiche	Firma	Data	CONT./C.UFF.	CONT.NOR.

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