INSTALLATION AND MAINTENANCE INSTRUCTIONS FOR ASYNCHRONOUS THREE AND SINGLE-PHASE MOTORS: STANDARD HF (HFM), BRAKE HFF, HFZ, HFV (HFVM) AND FLAT EXTRUDED HPE (HPEM), HPEV (HPEVM)

1. General safety instructions

Danger: electric rotating machines present dangerous parts: when operating they have live and rotating components and surfaces with temperatures higher than 50 °C.

Motor should not be put into service before it has been incorporated on a machine which conforms to 98/37/EEC directive.

An incorrect installation, an improper use, the removing or disconnection of protection devices, the lack of inspections and maintenance, the inadequate connections may cause several personal injury or property damage. Therefore motor must be moved, installed, put into service, handled, controlled, serviced and repaired **exclusively by responsible qualified personnel** (definition to IEC 364).

It is recommended to pay attention to following instructions, to the instructions relevant to the system, to all exisiting safety laws and standards concerning correct installation.

May be necessary additional information in case of motor in non-standard design, please consult S.E.I.M.E.C. organization.

Motors of these instructions are suitable for installations in industrial areas; **additional protection measures**, if necessary for other applications, must be adopted and assured by the person responsible for the installation.

When working on electric machine, machine must be stopped and disconnected from the power line (including auxiliary equipment). If there are electric protections, avoid any possibility of unexpected restarting, paying attention to specific recommendations on equipment application. In single-phase motors, running capacitor can remain temporarily charged keeping live relevant terminals even after motor stop.

For motor HPE series: **it is Buyer's responsibility to verify always the suitability of motor (blade holding kit or collet chuck shaft end, if any**, which are not conceived for a specific application) **and relevant correspondence to safety standards, basing on his own application specifications** (machining and material type, tool specifications, machine design, duty cycle, position of the operator, etc.).

Compliance with «Low voltage» 73/23/EEC European Directive (modified by directive 93/68): motors meet the requirements of this directive and are therefore CE marked on name plate.

2. Operating conditions

Motors, foreseen for applications in ambient temperature -15 + 40 °C, maximum altitude 1 000 m according to CEI EN 60034-1 standards, can be used also at ambient temperature with peaks of -20 °C and +50 °C.

Motor operation with independent cooling fan is allowed only when the fan is running.

Not allowed running conditions: application in aggressive environments having explosion danger, etc.

3. Installation: general directions

On receipt verify that motor corresponds to the ordered one and it has not been damaged during the transport; in case of damages, contest them immediately to the courier and avoid to put into service damaged motors.

Eyebolts on motors are suitable only for lifting the motor and no other machines fitted to it.

In case of **storing**, the environment must be clean, dry, free from vibrations (veff ⩽ 0,2 mm/s) and corrosive agents. Always protect motor from humidity.

Insulation resistance control. Before putting into service and after long stillstanding or storing periods it is necessary to measure insulation resistance between the windings and to earth by adequate d.c. instrument (500 V). **Do not touch the terminals during and just after the measurement because of live terminals.**

Insulation resistance, measured at 25 °C, winding temperature, must not be lower than 10 MΩ for new winding, than 1 MΩ for winding run for a long time. Lower values usually denote the presence of humidity in the windings; in this case let them dry.

During the **installation**, position the motor so as to allow a free passage of air (on fan side) for cooling. Avoid: any obstruction to the air-flow; heat sources near the motor that might affect the temperatures both of cooling air and of motor (for radiation); insufficient air recycle or any other factor hindering the steady heat exchange.

Motors should be protected, in case of outdoor installation, from solar radiation and extremes of weather; weather protection **becomes essential** when the motor is installed with vertical shaft and fan upwards.

The surface to which motor is fitted must be correctly dimensioned and flattened in order to allow fastening security and motor alignment with driven machine and to avoid vibrations on the motor.

For use under long overloads or jamming conditions, cut-outs, electronic torque limiters or other similar devices should be fitted.

Where duty cycles involve a high number of on-load starts (or for duty cycle **S6** 60% for motor series HPE), it is advisable to utilize **thermal probes** for motor protection (fitted on the wiring); magnetothermic breaker is unsuitable since its threshold must be set higher than the motor nominal current of rating.

For no-loads starts (or with very reduced load) and whenever it is necessary to have smooth starts, low starting currents and reduced stresses, adopt reduced voltage starting (e.g.: star-delta starting, starting autotransformer, with inverter, etc.).

After making sure that the voltage corresponds to name plate data, wire up to the electrical power supply of motor, of eventual brake and auxiliary equipments,

referring to Fig. 1 ... 11, at ch. 5 for the brake and other additional indications attached to present instructions. Select cables of suitable section in order to avoid overheating and/or excessive voltage drops at motor terminals.

Metallic parts of motors which normally are not under voltage, must be firmly connected to earth through a cable of adequate section and by using the proper terminal inside the terminal box marked for the purpose.

In order not to alter protection class, close the terminal box by positioning correctly the gasket and by tightening all fastening screws. For installations in environments with frequent water sprays, it is advisable to seal the terminal box and the cable gland.

For three-phase motors the direction of rotation is clockwise (drive-end view) if connections are according to Fig. 1. If direction of rotation is not as desired, invert two phases at the terminals; for single-phase motors follow the instructions on Fig. 2.

In case of connection or disconnection of high polarity ($\geq$ 6 poles) motor windings, there can be dangerous voltage peaks. **Pre-arrange the proper protection (e.g. varistors) on the supply line.**

«Blade holding kit» mounting for HPE motor (see ch. Fig. 11): mount the two blade holding flanges **2** (with blade in between), then the tightening nut **1** with circumferencial groove to the inner side (1 groove in case of right hand thread, 2 grooves for left hand thread). Realize the nut tightening by locking the shaft through butt-end slot for setscrew wrench of 10 mm (size 50) and of 12 mm (size 63 ... 80). Be sure that the motor rotation (drive-end view) is counterclockwise for right thread and clockwise for left hand thread.
For not standard design «Collet chuck shaft end» (48) see cat.1.

Pairings. It is recommended to machine the hole of parts keyed onto shaft ends to **H7** tolerance; for shaft ends having D $\geq$ 55 mm, tolerance G7 is permissible provided that the load is uniform and light.

Before mounting, clean mating surfaces thoroughly and lubricate against seizure.

Assemble and disassemble with the aid of **jacking screws** and **pullers** taking care to avoid impacts and shocks which may **irremediably damage the bearings.**

In case of direct fitting or coupling be sure that the motor has been carefully aligned with the driven machine. If necessary, interpose a flexible or elastic coupling.

In case of V-belt drives make sure that overhang is minimum and that driven shaft is always parallel to machine shaft. V-belts should not be excessively tensioned in order to avoid excessive loads on bearings and motor shaft (for maximum loads on shaft end and relevant bearing lives see points 3.5 and 3.6 of catalogues S.E.I.M.E.C. 1, 2 and 3).

Motor is dynamically balanced; in case of standardized shaft end the balancing is obtained with **half key** inserted into the shaft end and exclusively for the nominal rotation speed; in order to avoid vibrations and unbalances it is necessary that also power transmissions are balanced with half key.
Before executing a possible trial run without output elements, secure the key.

Before putting into service verify the correct tightening of electrical connections, fastening and fitting systems.

Check that eventual condensate drain holes are downwards.

For running at ambient temperature higher than 40 °C or lower than -15 °C consult us.

For **spare parts** order, always point out all name plate data.

In case of brake motor also refer to point 5.

Indications for the installation according to «Electromagnetic Compatibility (EMC)» 89/336/EEC Directive (modified by directives 92/31, 93/68). Asynchronous three-phase motors supplied from the line and running in continuous duty comply with EN 50081 and EN 50082 standards. No particular shieldings are necessary. This is also valid for the motor of independent cooling fan, if any.

In case of jogging operation, any disturbance generated by insertion devices must be limited through adequate wirings (as indicated by device manufacturer).

In case of brake motor with d.c. brake (HFF d.c., HFZ, HFV and HPEV motors) rectifier-brake coil group can comply with standards EN 50081-1 (emission levels for civil environments) and EN 50082-2 (immunity for industrial environments) by connecting in parallel to the rectifier (U $\leq$ 400 V a.c. + 10%) a capacitor, featuring: AC 440, 0,22 µF class X2 to EN 132400.

When brake is supplied separately, brake cables must be kept separate from power cables. It is possible to keep together brake cables with other cables only if they are shielded.

Where motors are supplied by inverters it is necessary to follow the wiring instructions of the manufacturer of inverter.

In case of design with encoder: install the electronic control board as near as possible the encoder (and as far as possible from inverter, if any; if not possible, carefully shield the inverter); always use twisted pairs shielded leads connected to earth on both ends; signal cables of encoder must be separate from the power cables (see specific instructions attached to the motor).

All above mentioned components are designed to be incorporated into equipment or complete systems and **should not be put into service before equipment or system has been made in conformity with 89/336/EEC directive.**

4. Periodical maintenance

Periodically verify (according to environment and duty) and reset, if necessary:

- motor cleaning (absence of oil, dirt and machining residuals) and free passage of cooling air;
- correct tightening of electrical connections (see Tab. 4), of fastening screws and motor mechanical pairing;
- static and live tightening conditions;
- that motor run is free from vibrations (veff $\leq$ 3,5 mm/s for $P_N \leq$ 15 kW; veff $\leq$ 4,5 mm/s for $P_N >$ 15 kW), and anomalous noises; in this case, verify motor fastening, paired machine balancing or bearings should be replaced.

In case of brake motor also see point 5.

5. Brake (for brake motors)

The responsibility of the correct brake running is of the final assembler who, before putting into service, must:

— verify the correct running of brake and make sure that **braking torque satisfies** application needs, taking care to avoid dangers for persons or things;

— adjust braking torque (for HFF motor, only);

— respect connection instructions and any further recommendation contained in present instructions.

5.1 HFF motor brake (Fig. 6)

Brake connection

Standard motors are manufactured with separate brake supply.

For standard applications, in single-speed motors, it is possible to supply the brake directly from motor terminal block.

For **two-speed** motors and for those driven by **inverter** it is necessary to supply the brake separately with proper cables pre-arranged as shown in Fig. 5.

In case of d.c. brake design see Fig. 7 for RN1 rectifier connection scheme.

Braking torque adjustment

Motor is normally supplied with a braking torque set at about 0,71 times the maximum braking torque M_{lmax} (see Tab. 1) with a tolerance of ± 18%. For a correct application it is necessary to adjust the braking torque according to specifications of the driven machine.

For general applications it is normally advisable to set braking torque at about **two times** the nominal braking torque of motor.

Anyway, braking torque must be set between name plate values. If braking torque is set at a value less than the minimum stated on name plate, it is possible to have inconstant brakings strongly affected by temperature, duty cycle and wear conditions. If there is a value set higher than the maximum stated on name plate, it is possible to have missing or partial brake release with consequent vibrations and overheatings of electromagnet and also of motor and mechanical stresses affecting brake and motor life.

Braking torque is directly proportional to preload of braking springs **17** and can be changed by modifying the self-locking nuts **44** making sure to preload uniformly all springs (see Fig. 6).

For the adjustment follow Tab. 1 stating values of springs length according to braking torque percentage ($\%M_{fmax}$) compared to maximum value M_{max}.

Important: values thus obtained can slightly differ from value desired. Therefore, it is advisable to verify effective braking torques achieved through a dynamometric key inserted on drive end motor shaft.

Before putting into service, close motor with brake cover.

Periodical maintenance of brake

Verify, at regular intervals, that air-gap is included between values stated in Tab. 1 (remove the wear dust, if any).

Excessive air-gap value could produce: decrease of braking torque, rise of brake noise level, decrease of start promptness and even miss of electric release.

Adjust the **air-gap** (see Fig. 6) by releasing the nuts **45a** and by screwing the nuts **45b** in order to reach minimum air-gap, measuring the adjustment by a thickness gauge in 3 positions at 120° near the studs **25**. Tighten nuts **45a** and verify again the obtained air-gap.

After several adjustments of air-gap verify that brake disk thickness is not lower than **minimum** value S_{min} stated in Tab. 1; if necessary, replace the brake disk (refer to Fig. 6). In case of HFFW design, verify that the thickness of friction surface is at least 1 mm (initial value about 3,5 mm).

Release screw **15** must **not** be left permanently installed (to avoid dangerous or inappropriate use).

5.2 HFZ motor brake (Fig. 8)

Rectifier connection

Single-speed motors are supplied with rectifier already connected to motor terminal block. Therefore, for standard duties, motor is ready to be used without any further connections for brake supply.

For **two-speed** motors and for those driven by **inverter** it is necessary to supply independently the rectifier with proper cables pre-arranged. Refer to Fig. 7.

Verify that rectifier supply voltage is the one stated on motor name plate.

Periodical maintenance of brake

Verify, at regular intervals, that air-gap and backlash **g** (see Fig. 8) of release lever pullers, if any, are included between values stated in Tab. 2 (remove the wear dust of friction surface, if any). It is not necessary to set the backlash **g** if motor is equipped with manual release with automatic clearance taking-up (see ch. 7.(40) cat.1).

Excessive air-gap value makes brake noise level rise and could prevent its electric release.

Important: an air-gap greater than max value can produce a decrease up to 0 of the braking torque due to the **backlash taking up of the release lever pullers; g** dimension in Fig. 8 has always to correspond to the values stated in Tab. 2; too high **g** value makes difficult or inefficacious the use of release lever.

Adjust the **air-gap** (see Fig. 8) by releasing the nuts **32** and by screwing the fastening screws **25** (for motor HFZW it is necessary to act through a hole of the flywheel) in order to reach minimum air-gap (see Tab. 2) measuring by a thickness gauge in 3 positions at 120° near the guiding bushes **28**. Tighten nuts **32** keeping in position fastening screws **25**. Verify the obtained air-gap value.

After several adjustments of air-gap, verify that brake disk thickness is not lower than the **minimum** value stated in Tab. 2; if necessary, replace the brake disk (refer to Fig. 8).

Release lever rod is **not** to be left permanently installed (to avoid dangerous or inappropriate use).

5.3 HFV, HPEV (and HFVM, HPEVM) motor brake (Fig. 10)

Rectifier connection

Single-speed motors are supplied with rectifier already connected to motor terminal block. Therefore, for standard duties, motor is ready to be used without any further connections for brake supply.

For **two-speed** motors and for those driven by **inverter** it is necessary to supply independently the rectifier with proper cables pre-arranged. Follow the instructions of Fig. 9.

Verify that rectifier supply voltage corresponds to the one stated on motor name plate.

It is not allowed to open the electromagnet supply on d.c. side of rectifier (to achieve a rapid braking).

Periodical maintenance of brake

Verify, at regular intervals, that **air-gap** is included between values stated in Tab. 3.

Excessive air-gap value could produce: decrease of braking torque up to zero, rise of brake noise level, and even miss of electric release.

Adjust the **air-gap** (Fig. 10), **with mounted fan cover**, for HFV motor, acting on self-locking nut **45** considering that the pitch is: 1 mm for size 63, 1,25 mm for sizes 71 and 80, 1,5 mm for sizes 90 ... 112, 1,75 mm for sizes 132 and 160S; for motors HPEV, acting on self-locking nut **22** keeping in mind that the pitch is: 1 mm for size 50, 1,25 mm for sizes 63 and 71, 1,5 mm for size 80.

After several adjustments of air-gap, verify that the thickness of friction surface is not lower than the **minimum** value stated in Tab. 3; if necessary, replace the brake anchor (see Fig. 10).

6. Auxiliary equipment connection

Connection of independent cooling fan

Supply wires of independent cooling fan are marked by the letter «V» on cable terminals and are connected to auxiliary terminals of the rectifier or to an other auxiliary terminal block according to Fig. 3, in function of identification code of independent cooling fan.

Independent cooling fan A, B code: connection for single-phase independent cooling fan supply (motor sizes 63 ... 90);

Independent cooling fan D, E, F code: connection for three-phase independent cooling fan supply (motor sizes 100 ... 200); standard supply foresees Y-connection with voltages indicated; for Δ-connection, consult us. Verify that the direction of rotation of three-phase independent cooling fan is correct (air flow must be towards drive end; see arrow on fan cover); on the contrary invert two phases at the terminals.

During the installation verify that the supply data correspond to those of the independent cooling fan; refer to independent cooling fan code as per motor name plate; running of motors with independent cooling fan is allowed only when external fan is running.

Connection of bi-metal type thermal probes, thermistor type thermal probes (PTC) and anti-condensation heater.

The connection wires are inside the terminal box and are marked by the letter «B» (bi-metal type thermal probes), «T» (thermistor type thermal probes PTC) or «S» (anti-condensation heater) on cable terminals; they are connected to auxiliary terminals of rectifier or to a further auxiliary terminal block according to Fig. 4.

Bi-metal or thermistor type thermal probes need an adequate relay or a release device.

Anti-condensation heaters must be supplied separately from motor and never during the operation.

In order to identify the type of design refer to mark on cables connected to auxiliary terminal block and relevant identification code as per motor name plate.

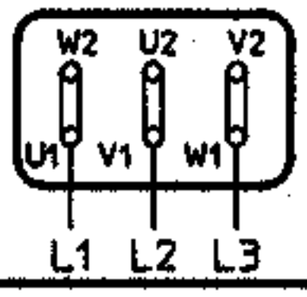
Connection of encoder

See specific instructions inside terminal box, see point 3.

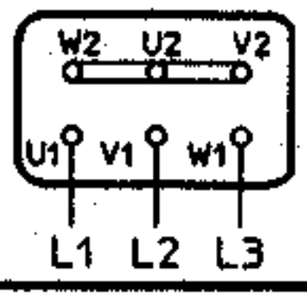
Fig. 1. Collegamento motore trifase / Three-phase motor connection

2, 4, 6, 8 poli - poles

Collegamento Δ
Δ Connection



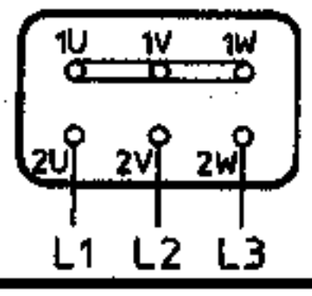
Collegamento Y
Y Connection



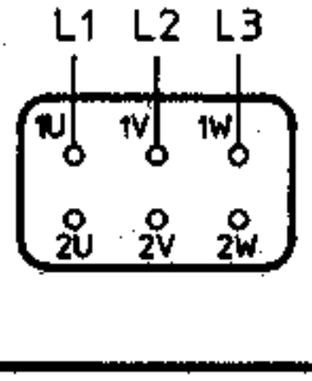
Unico avvolgimento (YY.Δ)
Single winding (YY.Δ)

2.4, 4.6, 4.8, 6.8 poli - poles

Velocità alta
High speed



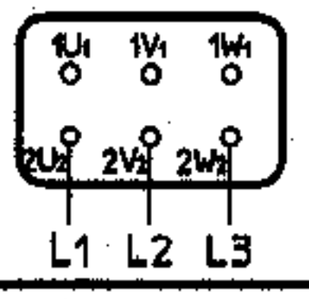
Velocità bassa
Low speed



Avvolgimenti separati (Y.Y)
Separate windings (Y.Y)

2.6, 2.8, 2.12, 4.6, 6.8 poli - poles

Velocità alta
High speed



Velocità bassa
Low speed

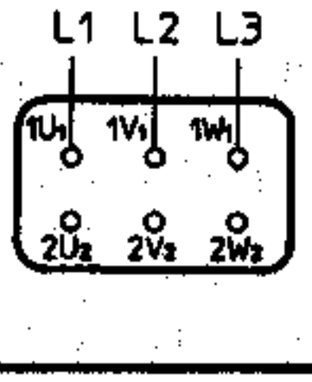


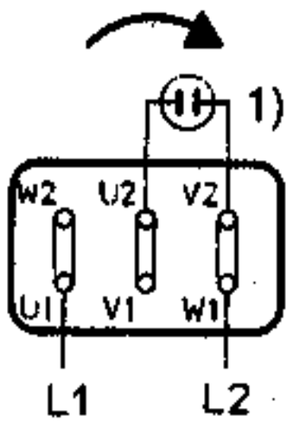
Fig. 2 Collegamento motore monofase e monofase ad avvolgimento bilanciato
Connection of single-phase and balanced winding single-phase motor

Per tensioni di alimentazione ved. targa. For supply voltages see name plate.

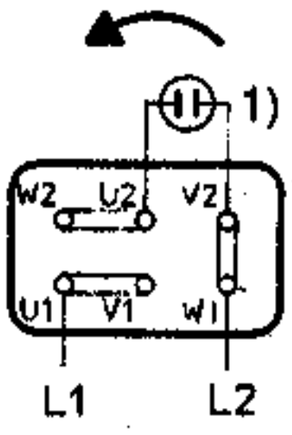
Motori a 2, 4, 6 poli.
Morsettiera a 6 morsetti.
Condensatori sempre inseriti.
Avviamento diretto.

2, 4, 6 poles motor.
Terminal block: 6 terminals.
Permanently connected capacitors.
Direct starting.

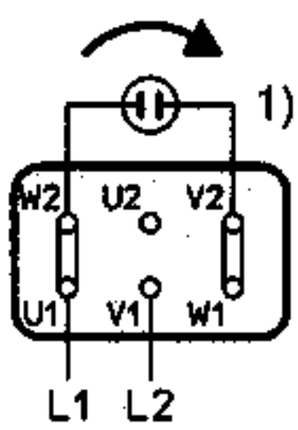
Monofase



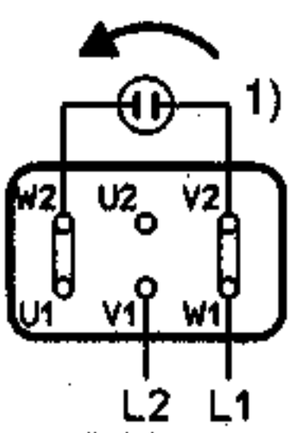
Single-phase



Monofase ad avvolgimento bilanciato



Balanced winding single-phase motor

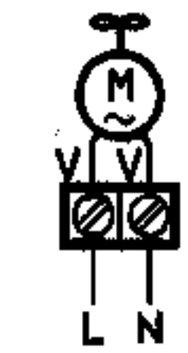


1) L'eventuale condensatore ausiliario viene collegato in parallelo a quello di esercizio.

1) Auxiliary capacitor if any, is to be connected in parallel to the running one.

Fig. 3. Collegamento del servoventilatore / Connection of independent cooling fan

Cod.	Tensione di alim. Supply voltage	Assorbimento [A] - Absorption [A]							
		63	**71**	**80**	**90**	**100, 112**	**132, 160S**	**160, 180M**	**180L, 200**
A	230 V~ ± 10% 50/60 Hz	0,06	0,12	0,12	0,26	—	—	—	—
B	255 V~ ± 5% 50/60 Hz	0,05	0,11	0,11	0,23	—	—	—	—
D	3x400 V~ ± 10% 50/60 Hz	—	—	—	—	0,13	0,15	0,26	0,41
E	3x440 V~ ± 10% 50/60 Hz	—	—	—	—	0,12	0,14	0,24	0,37
F	3x500 V~ ± 10% 50/60 Hz	—	—	—	—	0,11	0,12	0,21	0,33

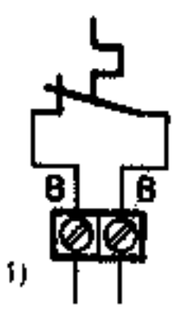


Cod. **A, B**

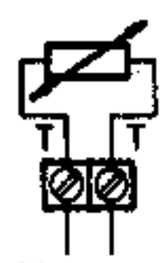
Cod. **D, E, F**

Fig. 4. Collegamento di sonde termiche bimetalliche, sonde termiche a termistori (PTC), scaldiglia anticondensa
Connection of bi-metal type thermal probes, thermistor type thermal probes (PTC), anti-condensation heater

Sonde termiche bimetalliche
Bi-metal thermal probes



Sonde termiche a termistori
Thermistor thermal probes

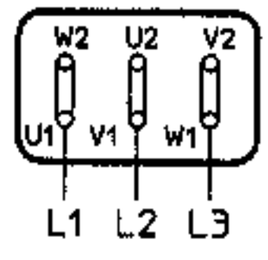
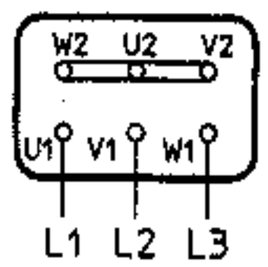


Scaldiglia anticondensa
Anti-condensation heater

1) Al dispositivo di comando: max 290 V, 2,5A.
2) Termistore conforme a DIN 44081/44082.
3) Tensione di alimentazione 230 V ~ ± 10% 50/60 Hz (25 W per 80 ... 112, 40 W per 132 ... 160S, 50 W per 160 ... 180M, 65 W per 180L ... 250).

1) To control device: max 290 V 2,5A.
2) Thermistor conforms to DIN 44081/44082.
3) Supply voltage 230 V ~ ± 10% 50/60 Hz (25 W for 80 ... 112, 40 W for 132 ... 160S, 50 W for 160 ... 180M, 65 W for 180L ... 250).

Fig. 5. Collegamento freno del motore HFF / HFF motor brake connection

Morsettiera freno (quella lato freno) **Brake terminal block** (the one on brake side)	Collegamento freno a Δ Δ brake connection 	Collegamento freno a Y Y brake connection 

Tab. 1. Manutenzione periodica del freno motore HFF
Periodical maintenance of HFF motor brake

Grand. freno Brake size 1)	Grand. motore Motor size	Traferro Air-gap mm	S_{min} mm 2)	M_f [Nm] di targhetta of name plate min	max 3)	L molla per % M_{fmax} [mm] L of spring for % M_{fmax} [mm] 25	35,5	50 3)	71	100
FA 02	63	0,25 ÷ 0,5	4,5	2	5	—	12,2	11,5	10,5	8,5
FA 03	71	0,25 ÷ 0,5	4,5	3	10	—	15,6	15	14,3	13,2
FA 04	80	0,3 ÷ 0,6	5	6	20	—	18,8	18,3	17,7	16,8
FA 05	90	0,3 ÷ 0,6	5	10	40	19,3	19	18,5	17,8	17
FA 06	100, 112	0,35 ÷ 0,7	5	15	75	19,1	18,7	18,1	17,4	16,4
FA 07	132	0,4 ÷ 0,8	11	20	100	27,2	26,5	25,5	24	22
FA 08	132, 160S	0,4 ÷ 0,8	11	30	150	27	26,5	25,8	24,8	23,5

1) La tabella vale anche con freno a c.c. tipo FC. In questo caso M_{fmax} diventa **0,8 volte il valore di tabella** e il traferro max deve essere ridotto di 0,1 ÷ 0,2 mm.
2) Spessore minimo del disco freno.
3) Nel caso di esecuzione HFFW (ved. schema), con le stesse lunghezze molla si ottengono momenti frenanti metà quelli di tabella.

1) Table is also valid with d.c. brake type FC. In this case M_{fmax} is **0,8 times the value of table** and the max air-gap must be reduced by 0,1 ÷ 0,2 mm.
2) Minimum thickness of brake disk.
3) In case of HFFW design (see scheme) with same spring length, halved braking torques will be obtained compared to the table ones.

Fig. 6. Freno del motore HFF / HFF motor brake

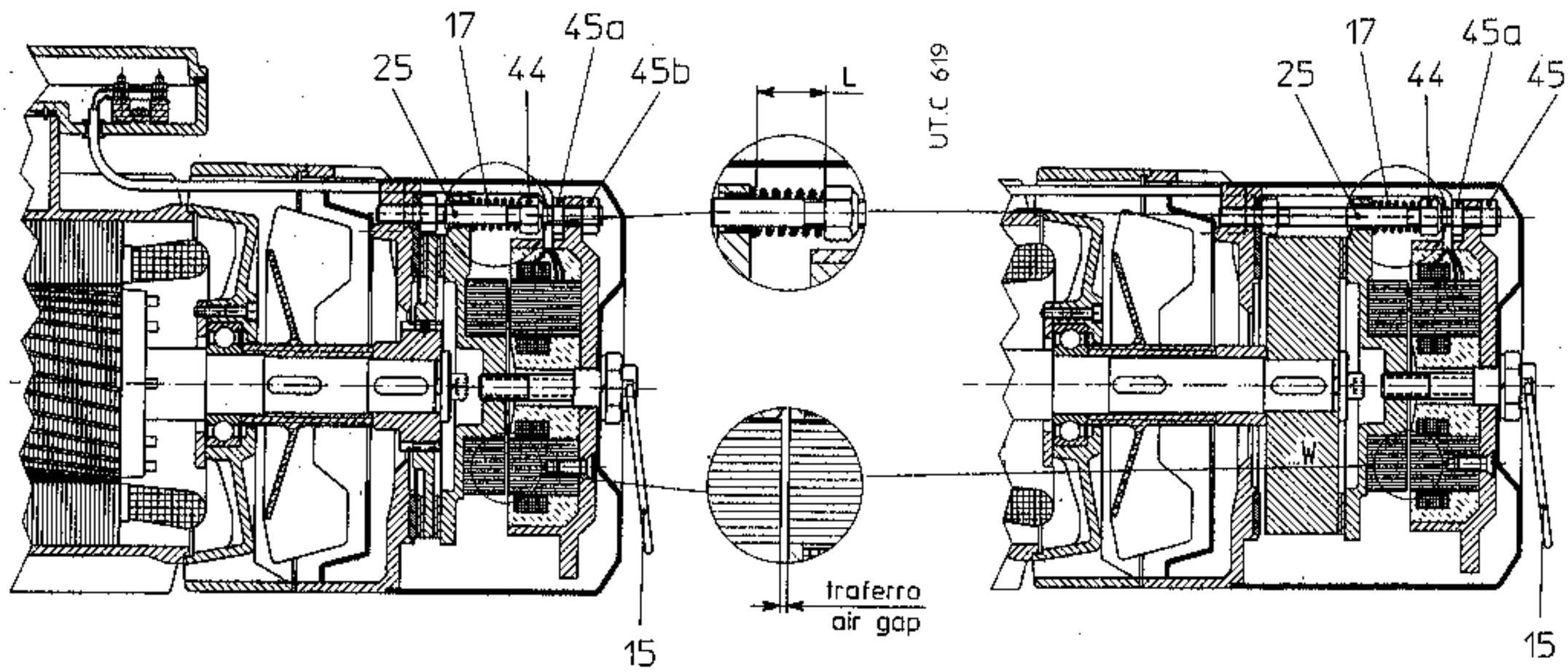
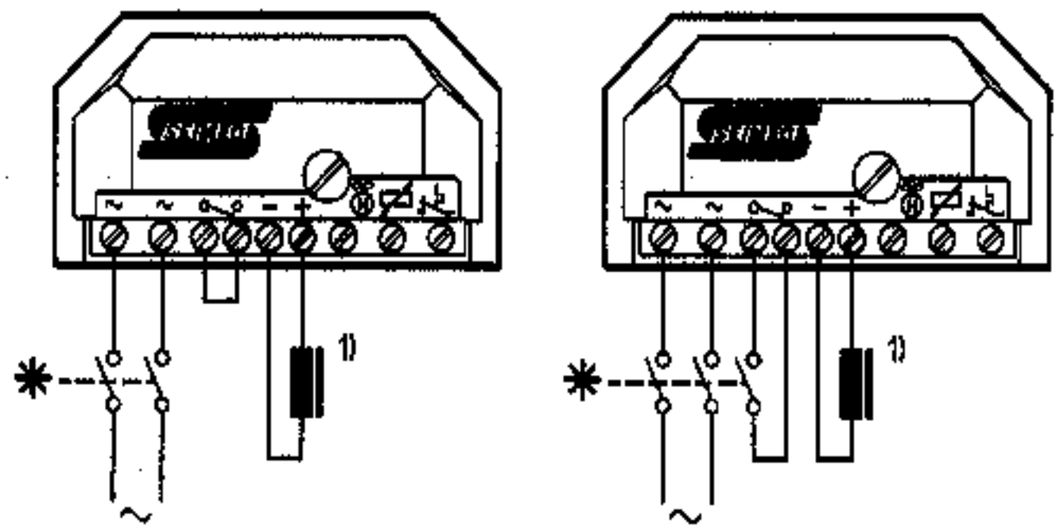


Fig. 7. Collegamento raddrizzatori motore HFZ
Rectifier connection for HFZ motor

Raddrizzatore per sblocco **normale RN1** (colore blu)[2)]
Rectifier for **standard** release **RN1** (blue colour)[2)]

Frenatura normale
Standard braking

Frenatura rapida[3)]
Fast braking[3)]

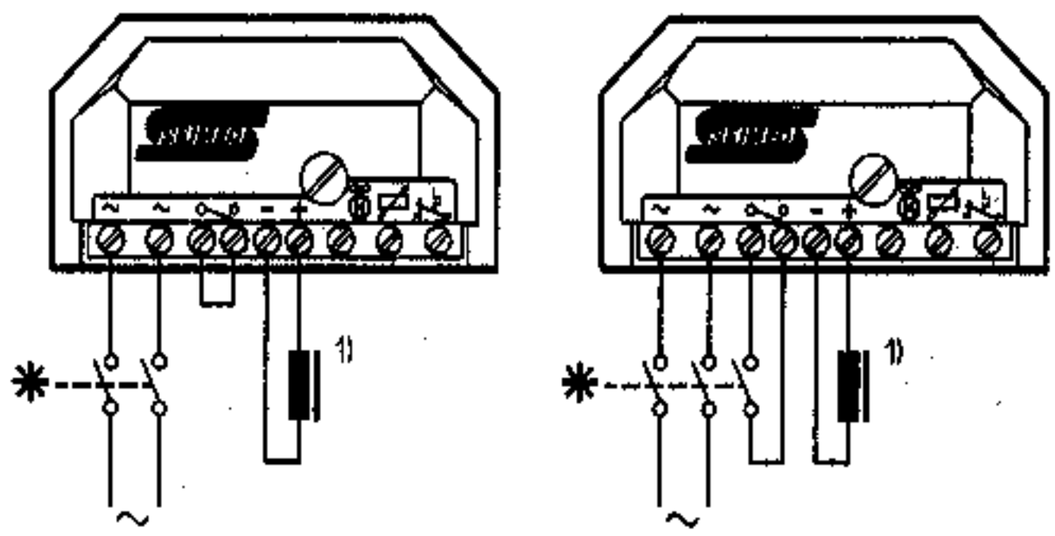


1) Bobina freno, già collegata al raddrizzatore all'atto della fornitura.
2) Schemi validi anche per raddrizzatore **RD1** (doppia semionda, colore grigio) per alimentazione 110 V ~.
3) Per collegamento di raddrizzatore RN1X e RR1X ved. fig. 9.
4) Schemi validi anche per raddrizzatore RR4, RR5 e RR8.
* Il contattore di alimentazione freno deve lavorare in parallelo con il contattore di alimentazione del motore; i contatti debbono essere idonei all'apertura di carichi fortemente induttivi.

Raddrizzatore per sblocco **rapido RR1** (colore rosso)[4)]
Rectifier for **rapid** release **RR1** (red colour)[4)]

Frenatura normale
Standard braking

Frenatura rapida[3)]
Fast braking[3)]



1) Brake coil supplied already connected to rectifier.
2) Schemes valid for rectifier **RD1** (double half-wave, grey colour) for 110 V ~ supply.
3) For RN1X and RR1X rectifier connection see fig. 9.
4) Schemes valid also for rectifiers RR4, RR5 and RR8.
* Brake supply contactor should work in parallel with motor supply contactor; the contacts should be suitable to open very inductive loads.

Tab. 2. Manutenzione periodica del freno motore HFZ
Periodical maintenance of HFZ motor brake

Grand. freno Brake size	Grand. motore Motor size	g mm 1)	Traferro Air-gap mm	S_{min} mm 2)
ZC 02	63	0,5	0,25 ÷ 0,4	5
ZC 03	71	0,5	0,25 ÷ 0,4	8
ZC 04, 14	80, 90	0,6	0,3 ÷ 0,45	8
ZC 05, 15	90, 100, 112	0,6	0,3 ÷ 0,45	11
ZC 06, 16	112, 132	0,7	0,35 ÷ 0,55	9
ZC 07	132, 160S	0,7	0,4 ÷ 0,6	11
ZC 08	160, 180M	0,8	0,4 ÷ 0,6	11
ZC 09	180L, 200	0,8	0,5 ÷ 0,7	13

1) Gioco dei tiranti della leva (eventuale) di sblocco.
2) Spessore minimo del disco freno.

1) Backlash of release lever pullers (if any).
2) Minimum thickness of brake disk.

Fig. 8. Freno del motore HFZ
HFZ motor brake

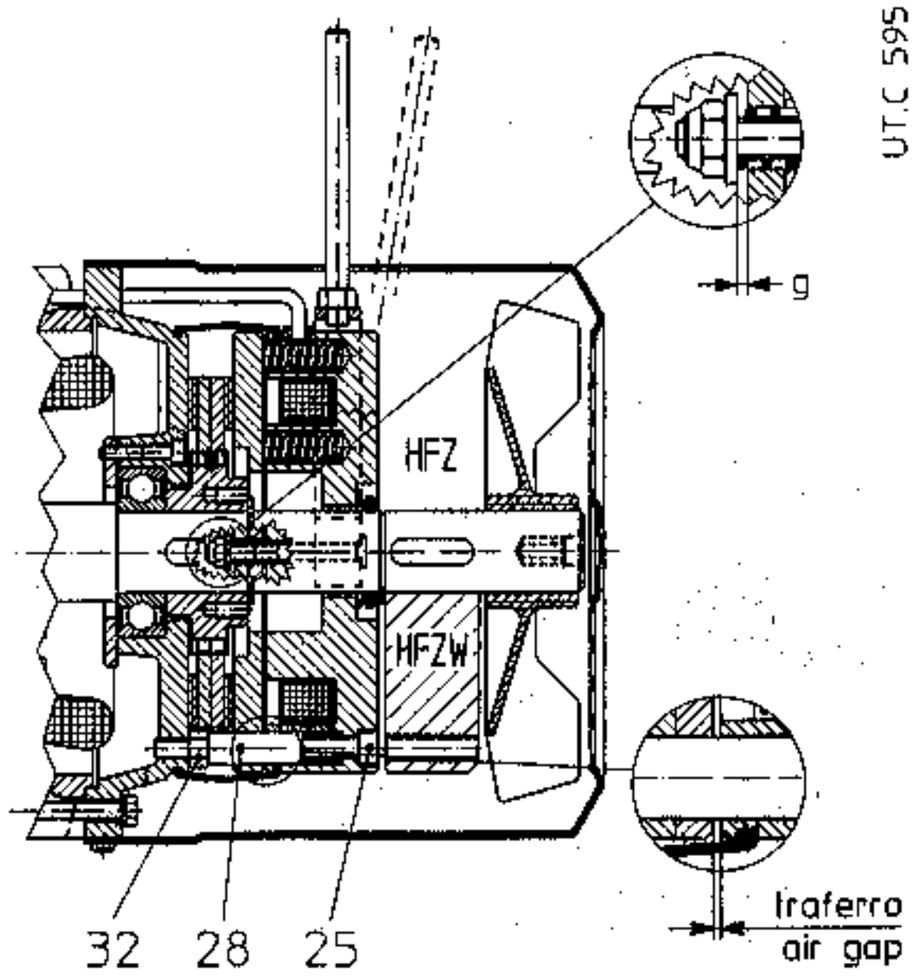
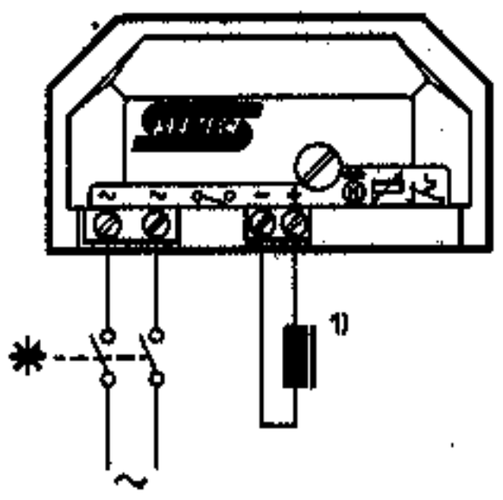


Fig. 9. Collegamento raddrizzatore del motore HFV[3) 4)] e HPEV[3) 4)]
Rectifier connection for HFV[3) 4)] and HPEV[3) 4)] motor

Raddrizzatore RV1 per freno tipo V0, VP (colore blu)[2)] e raddrizzatore RW1 per freno tipo VG, VQ (colore rosso).

Rectifier RV1 (blue colour)[2)] for brake type V0, VP and rectifier RW1 (red colour) for brake type VG, VQ.



1) Bobina freno, già collegata al raddrizzatore all'atto della fornitura.
2) Per raddrizzatore **RD1** (doppia semionda, colore grigio) per aliment. 110 V ~ ved. Fig. 7.
3) Schema di collegamento valido anche per raddrizzatore tipo RN1X o RR1X
4) Per raddrizzatore RR5 e RR8 ved. Fig. 7.
* Il contattore di aliment. freno deve lavorare in parallelo con il contattore di aliment. del motore; i contatti debbono essere idonei alla apertura di carichi fortemente induttivi.

1) Brake coil supplied already connected to rectifier.
2) For rectifier **RD1** (double half-wave, grey colour) for supply 110 V ~, see schemes Fig. 7.
3) Wiring scheme also valid for rectifier type RN1X or RR1X.
4) For RR5 and RR8 rectifier see Fig. 7
* Brake supply contactor should work in parallel with motor supply contactor; the contacts should be suitable to open very inductive loads.

Tab. 3. Manutenzione periodica del freno motore HFV e HPEV
Periodical maintenence of HFV and HPEV motor brake

Grand. freno Brake size		Grand. motore Motor size		Traferro Air-gap mm	A_{min} mm 1)
HFV	**HPEV**	**HFV**	**HPEV**		
V 02	**V P2**	63	50	0,25 + 0,45	1
V 03	**V P3**	71	63	0,25 + 0,45	1
V 04	**V P4**	80	71	0,25 + 0,5	1
V 05, G5	**V P5, V Q5**	90	80	0,25 + 0,5	1
V 06, G6		100, 112		0,3 + 0,55	1, 4,5[2)]
V 07, G7		132, 160S		0,35 + 0,6	1

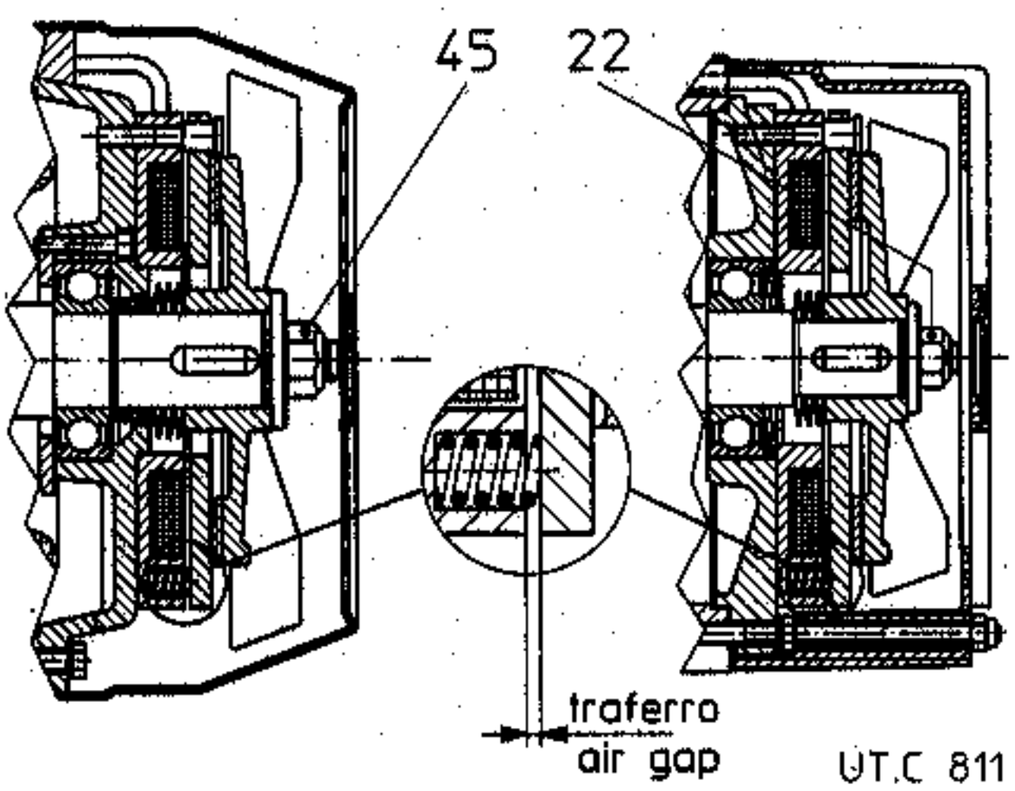
1) Spessore minimo della guarnizione d'attrito.
2) Valore per VG6.

1) Minimum thickness of friction surface.
2) Value for VG6.

Tab. 4. Momenti torcenti di serraggio per collegamenti in morsettiera
Tightening torque for terminal block connections

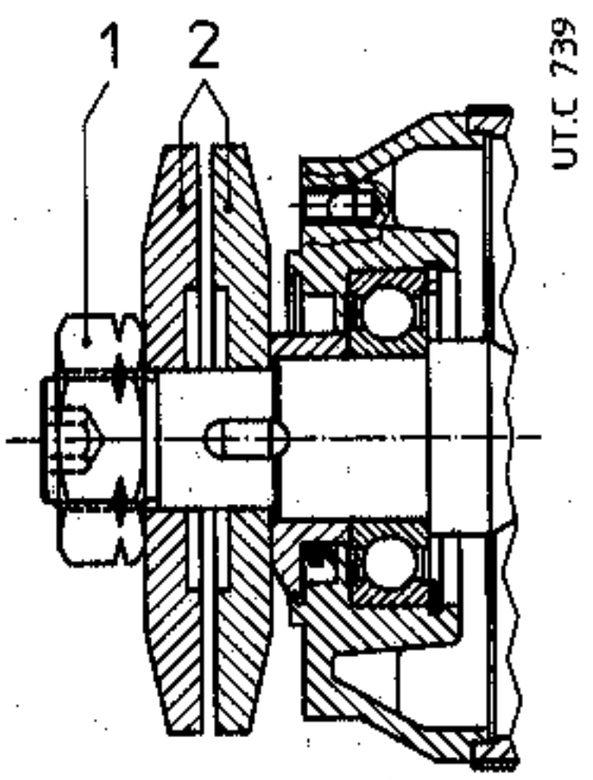
Filetto Thread		M4	M5	M6	M8
Momento torcente di serraggio [Nm]	min	0,8	1,8	2,7	5,5
Tightening torque [Nm]	max	1,2	2,5	4	8

Fig. 10. Freno del motore HFV e HPEV
HFV and HPEV motor brake



Gli schemi delle Fig. 6, 8, 10, 11 rappresentano i motori completi di alcune esecuzioni a richiesta: albero motore bloccato assialmente, V-ring, leva di sblocco manuale con ritorno automatico, guaina antipolvere, kit premilama.

Fig. 11. Montaggio kit premilama HPE, HPEV
Blade holding kit mounting HPE, HPEV



Schemes of Fig. 6, 8, 10, 11 represent motors comprehensive of some designs on request: driving shaft axially fastened, V-ring, hand lever for manual release with automatic return, dust-proof gaiter, blade holding kit.

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