



Use and maintenance handbook
Screw jack

HT HR

HT - HR

HT



HR



| | |
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1 GENERAL RULES AND REMARKS

1.1 INTRODUCTION

This handbook is property of MecVel s.r.l. All rights are reserved, hence it is forbidden to copy and transfer to others this document contents.

MecVel s.r.l. has the right to modify this handbook, without any need for preliminary information.

Before using this product(o actuator), we strongly recommend to read this document carefully.

The screwjack is not and must not be considered as a safety device. The final user, or the manufacturer of the machine or system, in which the screwjack is installed, has the responsibility for the safety of the machine or system itself and he must install the screwjack only in accordance to the current rules for safety of the land where the machine is used.

This handbook is about the range of product screwjack HT - HR, described in the next chapters.

1.2 LAW REFERENCES

The safety rules applied by the manufacturer for the design and the realization of this apparatus, in accordance with “CE” mark are described in the technical brochure, section nr. 3, property of MecVel s.r.l.

REMARK: For further explanations and details, please contact MecVel s.r.l.

1.3 CE MARKING

Each screwjack is provided with a label, containing the following details:

- **manufacturer's name**
- **model**
- **year of production**

As an example, here below you can find one of the labels applied by MecVel s.r.l.

| | |
|---|---|
|  | Via Due Portoni, 23 40132 Bologna – I – Tel. +39 051 4143711 |
| CERTIFICATA/CERTIFIED UNI EN ISO9001:2008 | |
| DATA/DATE | COD. |
| O.P. | MOD./MODEL HT - HR |
| CORSA/Stroke | VEL./Speed |
| RAPP./Ratio | Mot. |
| SERVIZIO/Duty cycle | S3 30% |
|  | |

2 DESCRIPTION OF THE SCREWJACK AND TECHNICAL FEATURES

2.1 TECHNICAL FEATURES AND PERFORMANCES

| COMPONENT/ OPTION | FEATURES/ VALUE |
|---------------------------------|---|
| AC motor | Three - phase 400-830 V / 50 Hz 390-830 V / 60 Hz Single - phase 190-400 V / 50 Hz 220-480 V / 60 Hz |
| DC motor | upon request |
| Gearing | Worm screw - Worm wheel |
| Mechanism | Cold-rolled profile lead screw Ballscrew |
| Push rod | CHROMED (standard) STAINLESS STEEL (on request) |
| Ends, joints, fastening devices | Rear, Front |
| Stroke control devices | Microswitch, Encoder, Magnetic external Magnetic internal, Inductiv,Potentiometer |
| Lubrication | grease lubricated |
| Protection level | variable depending on the customer's request (MAX IP65) |
| Weight | Depending on the configuration |

The possible screwjack configurations are listed below, with the following codes:

HT; HTM; HT-VRS; HTM-VRS; HT-FCE; HTM-FCE; HT-FCE-VRS; HTM-FCE-VRS; HT-FCI; HTM-FCI
HT-FCI-VRS; HTM-FCI-VRS; HT-FCM; HTM-FCM; HT-FCM-VRS; HTM-FCM-VRS
HR; HRM; HR-VRS; HRM-VRS; HR-F; HRM-F; HR-F-VRS; HRM-F-VRS

REMARK: *Customized configurations can be carried out. To check if these configurations comply with this handbook, please contact the manufacturer.*

2.1.1 CONFIGURATIONS OF MODEL HT-HR

For the technical features description of the following configurations components and devices, please see section 2 *TECHNICAL FEATURES* of this handbook.

| MODEL | MOTOR | GEARS | LEAD SCREW | END SWITCHES |
|-------|-------|-------|------------|---------------|
| HT | A o B | VR | TR o VRS | F-FCE-FCM-FCI |

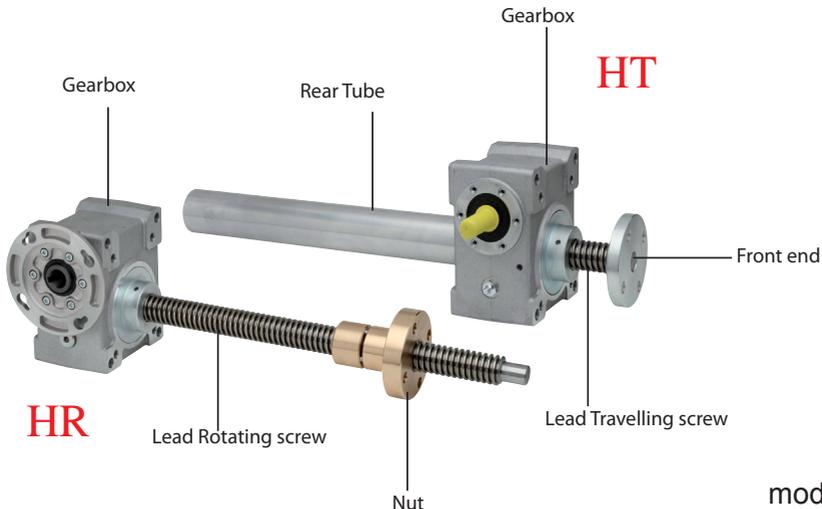
LEGEND:

| | |
|-----|----------------------------|
| VR | WORM SCREW - WORM WHEEL |
| TR | COLD - ROLLED ACME PROFILE |
| VRS | BALLSCREW |
| F | INTEGRATED LIMIT STOP |
| FCE | EXTERNAL LIMIT STOP |
| FCM | MAGNETIC LIMIT STOP |
| FCI | INDUCTIV LIMIT STOP |

| MOTOR TYPE | A | B |
|------------|----|----|
| MOTOR SIZE | CA | CC |

2.2 DESCRIPTION OF THE PARTS AND TOOLS

Concerning technical features and performances, please refer to the catalogue. From the below drawing, you can identify the parts of the screwjack.



2.2.1 Motorizations

The possible motorizations for the screwjack are:

- C.A., with the following configurations:
 - Three - phase;
 - Mono - phase;
 - Three - phase brakemotor, with electromagnetic brake;
 - Mono - phase brakemotor, with electromagnetic brake;
 - Mono - phase with electronic condenser;
 - Mono - phase brakemotor, with electronic condenser and electromagnetic brake.
- Brake on motor allows for a higher precision and repeatability when positioning/stopping, and grants selflocking when screwjack itself isn't.

WHEN IN ON/OFF DUTY WITH STRONG INERTIAS INVOLVED, BRAKE-MOTOR COULD SHORTEN LIFETIME OF SCREWJACK DUE TO MECHANICAL PARTS OVERLOADS.



IF A BRAKEMOTOR IS DRIVEN BY A FREQUENCY CONVERTER, BRAKE SHALL GET A SEPARATE POWER SUPPLY.

Following optional tools are available for the motors:

- Unclamping lever;
- Second shafts;
- Frequency converter.

2.2.2 Gear boxes

Different types are available: wormgear, planetary gears, 1:1 direct drive, belt, cross helix gears ;

2.2.3 Lead Screws

Leadscrews feature cold-rolled steel trapezoid thread; nuts are made in bronze, so to ensure high resistance to load. "VRS" models feature rolled/tempered ballscrews, coupled with ground/tempered nuts.

2.2.4 Screwjack stroke control

Screwjacks can host different devices for stroke control: mechanical switches or proximity sensors, that generate a signal for switching motorsupply (so-called ON/OFF workout).

All wirings and circuitry operations shall be done with unpowered motor, so to avoid any potential harm to operator and damages to screwjack.

Integrated mechanical switches (model HR only)

Single-contact changeover microswitches, integrated into the screwjack gearbox; they get activated with a cam, which gets its own movement from leadscrew revolutions.

A compact and well protected system is then available, even tough it's not fully shitable in case of long strokes.

Proximity sensors (model HT only)

These sensors are mounted on rear-pipe and are not adjustable, therefore position shall be clearly outlined in customer's order.

External mechanical switches (model HT only)

These microswitches are mounted on rear-pipe and are not adjustable, therefore position shall be clearly outlined in customer's order.

Magnetic limit switches (model HT only)

Magnetic sensors are activated by a magnetic field generated by a magnetic ring fixed to the nut.

These switches are mounted on outer tube with brackets; outer tube shall therefore be built with non-magnetic materials.

This kind of stroke control device cannot be used when antirotation system is needed. See pag. 53

Potentiometer (model HR only)

This device is hosted inside limitswitches box that hosts also the integrated limit switches. It allows for absolute feedback reference (in terms of resistance value) for position of nutscrew along the stroke.

Being geared to integrated switches, it does not fully cope with long strokes. Also, gearing does not always permit complete electrical reading, i.e. a 10KOhm device could read only 6KOhm.

Incremental encoder

A device that turns a rotational movement into digital pulses.

It can be hosted into AC or DC motor, or mounted on shaft opposite to motorside.

It does not provide absolute feedback reference, therefore each reset of machine (or mains powersupply failure) will need encoder to be re-setted at "zero".

WARNING: IN CASE NO LIMIT SWITCHES ARE NOT INCLUDED IN THE SCREWJACK OR FRAMEWORK, WE STRONGLY RECOMMEND MOTORPOWER OVERLOAD DETECTORS TO BE INSTALLED.

2.2.5 Ends and fastening devices

Both standard and dedicated ends (according to customer's drawing) are available. Ends shall be carefully chosen, in order to avoid any radial load on screwjack. Please note that front end receives reaction spinning torque when load is acting on screwjack, so when yoke/rod ends (A3/A4) are used, antirotation key is required.

2.2.6 Antirotation device

Antirotation device is needed when the pushtube shall not rotate when travelling. Nut has four keys that lock against rotation.

2.2.7 Safety Nut

In some applications it is necessary to have the jack hold the load even in the event that the main nut fails due to wear.

The safety nut is a device that enables checking the wear of the main nut and that prevents the load from falling down in case the nut thread collapses, due to wear, before being able to do the necessary checking operations.

Three types of safety nuts are available for acme screw jacks, according to the specific needs of each application.

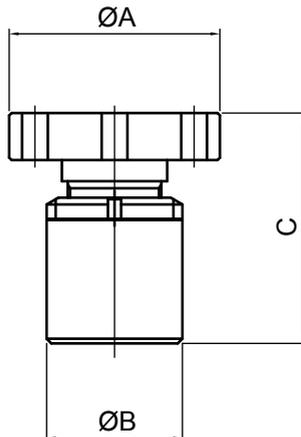
For ball screw jacks we can supply similar solutions but it is necessary to contact our technical department.

Steel Safety Nut (only for travelling nut models HR)

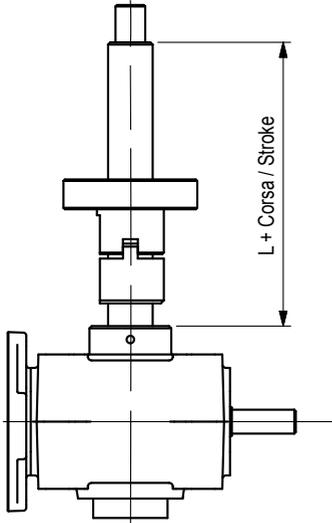
Option GS

The safety nut is in steel and has been designed to start working only in case of main nut maximum wear. This safety nut is connected to the main bronze nut and travels with it along the stroke.

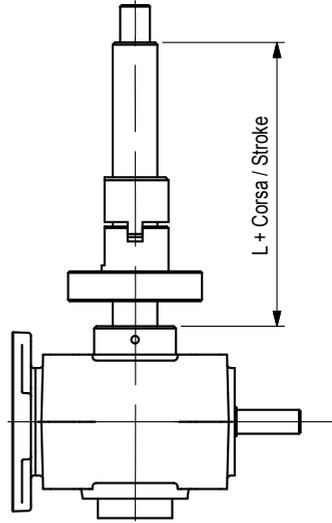
When the bronze nut is completely worn out, the steel nut starts working on acme screw until it comes to a complete grip to acme screw. Screwjack is the completely blocked. This kind of nut can work in both directions, i.e. with compression or traction load (pushing / pulling)



Compression-Pushing load



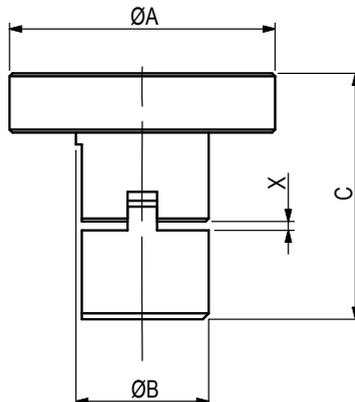
Traction-Pulling load



Bronze safety nut, with eye-sight wear check (only for travelling nut models HR)
Option G

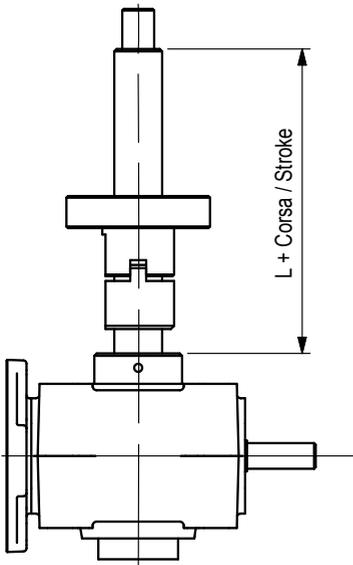
An auxiliary bronze nut travels along with main bronze nut, kept together by a small slot. This connection allows for independent axial movement of one nut to the other. When main nut starts getting too much worn, backlash between this nut and leadscrew grows. This condition causes the auxiliary nut to start working, undertaking part of the load. When this happens, dimension "X" (see table below) lowers; and once it reaches the minimum admitted value shown below, screwjack shall be serviced because wear has reached a critical level, causing a possible collapse of load.

Therefore, we recommend a recurrent check of "X", so to monitor wear of system.

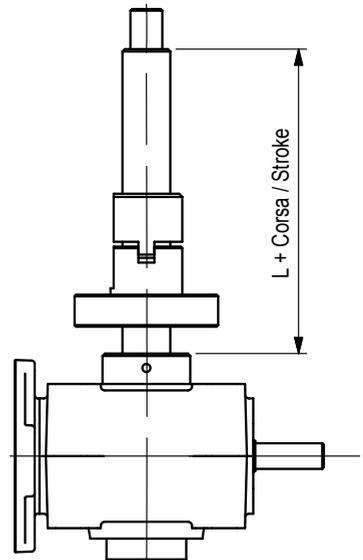


| Tabella dimensioni / Dimensions table | | | | | | |
|---------------------------------------|------|-----|-----|-----|--|---|
| Grandezza Type | A | B | C | L | Valore iniziale Starting valve X | Valore min. minimum admitted x valve X |
| 05 | φ55 | 30 | 55 | 76 | 2 | 1 |
| 10 | φ65 | 35 | 62 | 86 | 2 | 1 |
| 25 | φ90 | 45 | 83 | 125 | 3 | 1.5 |
| 50 | φ99 | 57 | 114 | 165 | 3.5 | 1.75 |
| 100 | φ129 | 72 | 145 | 200 | 4.5 | 2.25 |
| 200 | φ179 | 100 | 170 | 230 | 5 | 2.5 |

Compression-Pushing load

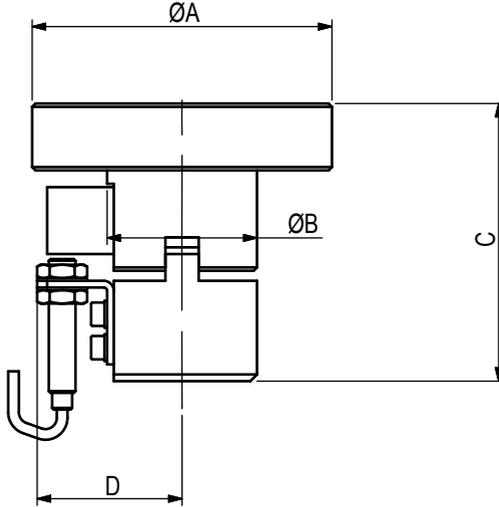


Traction-Pulling load

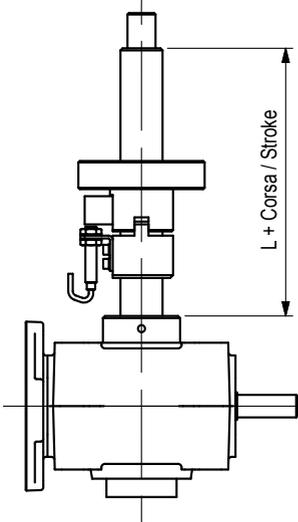


Bronze safety nut, with automatic wear check (only for travelling nut models HR)
Option GU

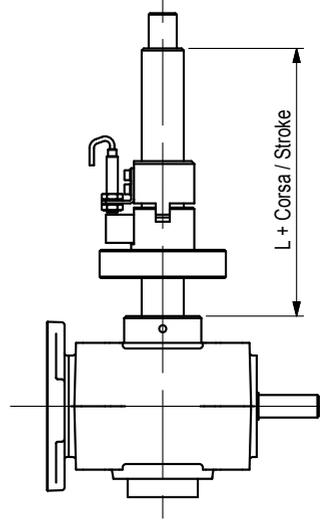
This system works as previous one (Option "G"): it only differs for the proximity sensor installed, which will provide a signal when wear reaches a critical level.



Compression-Pushing load



Traction-Pulling load



2.2.8 Lubrication

Gearstage internal lubrication.

Gearstage, as standard, is lubricated with synthetic long-life grease. See table A.

As an option, oil lubrication is also available.

Contact MecVel offices in case some special lubricants (for special purposes, such as food-friendly grease) are needed.

Gearstage oil-lubrication, option R.

For oil-lubrication, a synthetic oil is used.

See table B for features and references.

| Tabella A Lubrificazione interna riduttore a grasso Table A Gearstage grease-lubrication | | | | |
|---|-----------|----------------------------|------------|------------|
| Marca Brand | | Tipo Product | Tmin °C | Tmax °C |
| Grasso standard Standard lubricant | Molyguard | VSF 00 | -15 | +150 |
| Grassi equivalenti Alternative lubricants | Klueber | Klubersynth PEG 46-1200 | -50 | +120 |
| | Agip | BLASIA 220 | -20 | +180 |
| | Shell | TVX COMPOUND B GREASE | -45 | +180 |
| | Total | CARTER SY 00 | -20 | +160 |

| Tabella B Lubrificazione interna ad olio Table B Gearstage oil-lubrication | | | | |
|---|-----------|------------------|------------|------------|
| Marca Brand | | Tipo Product | Tmin °C | Tmax °C |
| Olio standard Standard oil | Molyguard | GEARSINT 460 | -30 °C | +220 °C |
| Olio equivalente Alternative oil | Schell | Tivela Oil S 320 | -30 °C | +220 °C |

Leadscrew lubrication.

This lubrication is up to user and is extremely important in order to grant durability and regular workout for screwjack.

Schedule for further re-lubrications shall grant a neat layer of lubricant between parts in contact (leadscrew/nutscrew - leadscrew/wormwheel).

Lack of lubricant, or incorrect type cause abnormal overheating, which leads to a lower durability of screwjack.

Lubricant for this purpose shall provide resistance to very high pressures. (see table C).

| Tabella C Lubrificazione stelo Table C Leadscrew lubrication | | | | |
|---|----------------|-------------------|------------|------------|
| | Marca Brand | Tipo Product | Tmin °C | Tmax °C |
| Grasso standard Standard lubricant | Klueber | Staburags NBU 8EP | -20 | +140 |
| Grassi equivalenti Alternative lubricants | Total | CERAN WR2 | -25 | +180 |
| | Rothen | 2000/P Special | -6 | +287 |
| | Total Carter | EP 2200 standard | -3 | +200 |

In case leadscrews are covered with protections (bellows, for example) or hidden inside other structures, state of lubrication shall be monitored.

A possible solution is fitting an automatic grease-refill system (up to user, because it depends on framework around screwjack).

Mecvel can offer an automatic re-greaser for gearstage

3 TRANSPORT AND DISPOSAL

The product is supplied in carton or wooden boxes with or without pallets, depending on the agreements taken with the customer and on the dimensions/weight of the product itself. After unpacking, we recommend to move the products using adequate systems (such as fork lifts, transpallets, safety belts).

It is important that the operator pay attention to the safety conditions for the product transport. In particular, please remember to wear appropriate safety clothes, such as safety shoes and gloves, to avoid damages or injuries caused by an accidental fall of the product.

We strongly recommend to move the screwjack box with the maximum care, to avoid that accidental collisions damage the screwjack itself.

3.1 DISPOSAL

Hereafter is the list of the products connected with the actuator, that have to be disposed, in accordance with the current rules with the Country in which the product is installed and used:

- Package, during the installation;
- Screwjack components, if replaced or repaired;
- Lubricants, after the cleaning or service of the screwjack;
- Screwjack itself, if replaced or repaired.

Please dispose of all waste carefully.

4 INSTALLATION

4.1 INSTALLATION INSTRUCTIONS

The screwjack shall be installed paying attention to have only axial forces applied to it. It is important to get the mounting points perfectly alligned. They have to be chosen, taking into consideration the loads with which the actuator has to work, in order to avoid misalignements that would cause grease loss and non-regular working.

To guarantee stability of the screwjack, a safe and stable installation, according to the following instructions, is recommended:

1. Front and rear connection points must have parallel axis;
2. Fix the rear connection point so that the actuator is strongly fastened to the structure;
3. connect the load to the front end of the actuator, using suitable fastening devices (tie - rods, screws, pins, etc.);
4. proceed with the electric connection.



OFF - SET LOADS, DUE TO WRONG SELECTION OF SCREWJACK'S FIXING-ENDS OR INSTALLATION MISTAKES, WITH NON ALIGNED ENDS, LEAD TO SIDEFORCES ON ACTUATOR PUSH ROD CAUSING UNEXPECTED WEAR, LUBRICANT LOSS AND NON REGULAR WORKING.

Screwjack shall work within its nominal stroke, avoiding mechanical end stops. Running against mechanical stops cause serious damage of internal screwjack parts, and nulls any kind of guarantee.

When ready to start screwjack, following check-ups shall be performed:

- If screwjack is equipped with electric limit switches, before starting the motor, be sure they have been connected and ensure they work properly, in order to avoid any mechanical end - stop;
- Make sure that push rod is regularly travelling and limit switches are correctly adjusted. Drive the screwjack “step-by-step” to check all this.
- Make sure that there are no interferences between the push rod and other parts of the machine or system on which the screwjack is installed

REMARK: Check catalogue for more explanations about screwjack stroke (contact MecVel s.r.l.).



IN CASE LIMIT SWITCHES ARE ALREADY ADJUSTED BY THE MANUFACTURER, MANUAL ROTATION OF PUSH - ROD WILL CAUSE ADJUSTMENT LOSS!

When installing the screwjack, to avoid accidental overloads, we suggest to install a current overload relay on general control panel. Its function is to cut off the power supply when screwjack current consumption is overriding a chosen limit. In fact, being current proportional to load, this device avoids screwjack to be accidentally overloaded

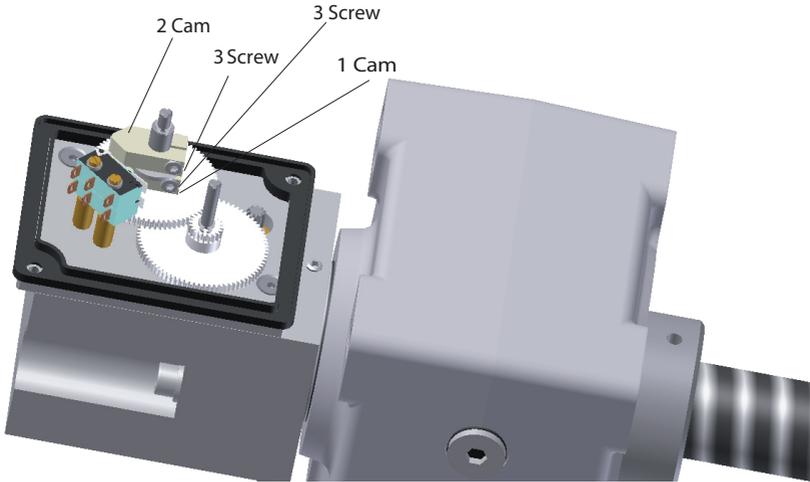
REMARK: Current threshold shall be adjusted not to react towards current spikes on motor startups.



PLEASE NEVER SWITCH ON THE SCREWJACK, BEFORE HAVING CORRECTLY COMPLETED ALL THE POSITIONING OPERATIONS.

4.2 STROKE CONTROL SYSTEM SETTING

SETTING INTERNAL LIMIT SWITCHES



To adjust the stroke of the Push Tube to the set value, turn on the Cams 1 and 2 as follows:

- A) Loosen the two cams by loosening the screws No. 3.
- B)* 1) Retract the Push Tube in the desired position
- 2) Rotate the lower cam No. 1 to toggle the corresponding microswitch
- 3) Close the cam in this position, with screw No. 3.
- C)* 1) Move the Push Tube in the desired position.
- 2) Rotate the upper cam No. 2 to toggle the corresponding microswitch
- 3) Retract the Push Tube in the desired position

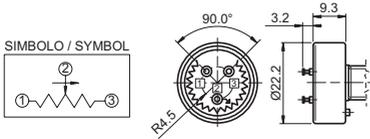
SETTING POTENTIOMETER

For models prepared.

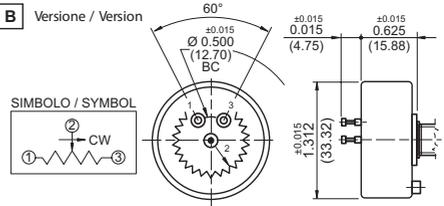
- A) *Move the push-tube in the middle of the mechanics stroke.
- B) Turn the potentiometer in the middle of the stroke.
- C) Take pot'meter teeth-wheel close to gear, taking care not to move the adjustment previously made.
- D) Tighten the screw for locking pot'meter into position

* • This operation has to be done activating the motor, or using handwheel, if available on screwjack purchased.

A Versione / Version



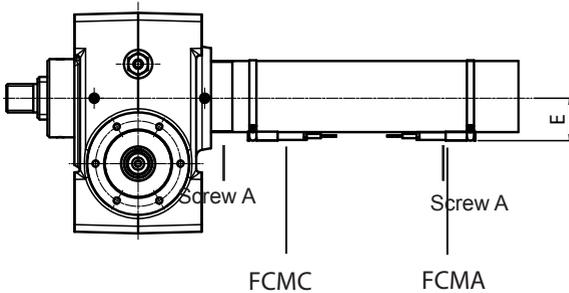
B Versione / Version



Potenziometro rotativo - Spinning potentiometer

| Prestazioni / Performances | Tipo / Type (A) | Tipo / Type (B) |
|---|--------------------------|--------------------------|
| Angolo max. di lavoro / Max. angle | 340° ± 3° | 352° ± 2° |
| Resistenza Ohm / Resistance | 1K / 5K / 10K (standard) | 1K / 5K / 10K (standard) |
| Alimentazione consigliata / Voltage | MAX 10 V | MAX 50 V |
| Linearità indipendente / Independent linearity | ± 2% | ± 1% |
| Tolleranza / Tolerance | ± 20% | ± 3% |
| Coefficiente deriva termica / Temperature coefficient of resistance | 600 ppm / °C | 20 ppm / °C |

SETTING MAGNETIC LIMIT SWITCH



FCMC = All-closed position magnetic switch
 FCMA = opened position magnetic switch

Stroke adjustment shall be done in following steps, acting on switches “FCMA” and “FCMC” as follows:

- A) loose screws “A” to set brackets free.
- B)* 1) Take pushtube up to needed position
 2) take sensor “FCMC” to needed position (led lights up), sliding it from gearbox in direction of front end
- 3) tighten screw “A” to lock the bracket.
- C)* 1) Take pushtube up to needed position.
 2) take sensor “FCMA” to needed position (led lights up), sliding it from tip of pushtube in direction of gearbox
- 3) tighten screw “A” to lock the bracket.

*• This operation has to be done activating the motor, or using handwheel, if available on screwjack purchased

Magnetic Limit Switch FCM

| Performance | Type | | |
|--------------|--------------------|--------------------|--------------------|
| | Reed NC | Reed NO | PNP |
| DC Voltage | 3 / 110 V | 3 / 30 V | 6 / 30 V |
| AC Voltage | 3 / 110 V | 3 / 30 V | / |
| 25°C Current | 0,5 A | 0,1 A | 0,20 A |
| Power | 20 VA | 6 VA | 4 W |
| Supply cable | PVC 2 x 0,14 mm | PVC 2 x 0,14 mm | PVC 3 x 0,14 mm |
| Cablelength | 2500 mm | | |
| Protection | IP67 | | |

Circuit Reed NC

Circuit with normally closed Reed switch protected by a varistor against overvoltages caused when switching off, with LED indicator.

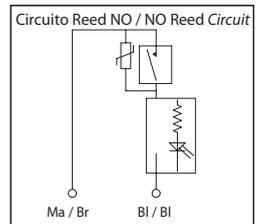
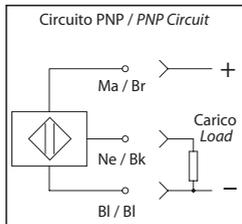
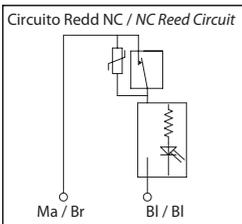
Circuit PNP

Circuit with Hall-effect switch and PNP outlet.

Protected against overvoltage spikes and reverse of polarity.
With LED indicator.

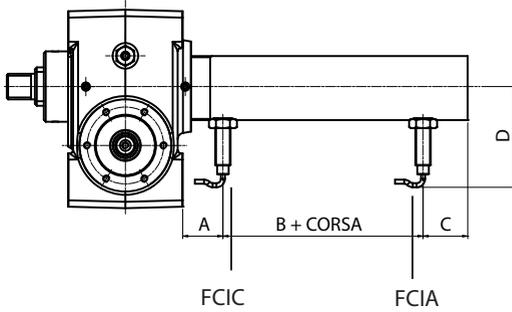
Circuit Reed NO

Circuit with normally open Reed switch protected by a varistor against overvoltages caused when switching off, with LED indicator.



SETTING INDUCTIV LIMIT SWITCH

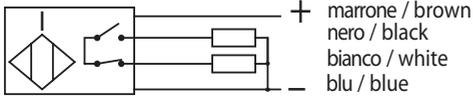
Proxy switches can't be adjusted from user
User shall declare stroke needed in order



FCIC = All-closed position inductive sensor

FCIA = All opened position inductive sensor

NA + NC



Technical data:

Supply voltage (UB): 5 ÷ 40 Vdc

Temperature range: - 25° ÷ + 75°C

Degree of protection: IP67

Switch status indicator: yellow LED

ENCODER

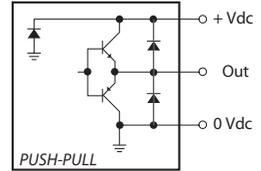
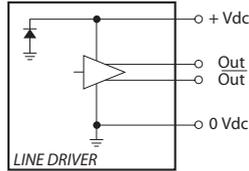
Encoder mounted on AC motors

Bidirectional incremental encoder, with (standard) or without zero-pulse, protection IP54.

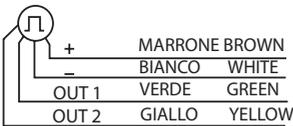
Available ppr: 50 / 100 / 200 / 400 / 500 / 512 / 1000 / **1024 (standard)**

Available output circuits: **Line Drive 5 Vdc (standard)** Push Pull 24 Vdc / Open Collector NPN 10 -30 Vdc / OpenCollector PNP 10 -30 Vdc.

| | |
|--------------------|-----------|
| Rosso / Red | \pm Vdc |
| Nero / Black | 0 Vdc |
| Ver de / Green | A |
| Giallo / Yellow | B |
| Blu / Blue | Z |
| Marrone / Brown | -A |
| Arancione / Orange | -B |
| Bianco / White | -Z |



- Encoder Power Supply 3,8 V - 24 Vdc
- PUSH-PULL
- 2 CH - 4 ppr
- Maximum output current: 100 mA



4.3 CONNECTIONS

4.3.1 Electric connection



THESE OPERATIONS MUST BE DONE BY QUALIFIED AND AUTHORIZED PERSONNEL.

Once installation is completed, following the above described instructions, the stroke control devices (if present) can be activated, by connection of the supply cable to the general control panel.

Connection operations must be done with the maximum attention to safety, using the proper safety tools (such as gloves, glasses, etc.).

Reference drawings for the electric connection are available on the catalogue of the product (contact MecVel s.r.l.)

REMARK: If a brakemotor is driven by a frequency converter, brake shall get a separate power supply.

4.4 DUTIES OF THE END USER

The end user must install the machine in suitable places, equipped with electrical system and lighting, according to the rules in force.

We recommend, moreover, the installation of the electricity in dry and lighted places, with temperature, humidity, etc., comply with the limits indicated by the laws in force.

In particular, the end user shall install on board of the machine the following devices:

- Device for the automatic interruption of the current (magnetothermic switch), controlling the functions of direct and indirect electrical connections, as well as protecting the electrical devices from overloads;
- A locked disconnecter, for maintenance operations, of the suitable size, that gathers all the current supply of the screwjack, before it reaches all the different tools;
- Earthing to control indirect contacts and air discharges.

Remember to use disconnecters of the right dimension for the number and type of screwjacks that they have to disconnect. Please refer to the electric features described on the use and maintenance handbooks.

All these devices shall be installed in a general control panel, adequate to the application.

In case of additional end stroke devices, it is up to the installer to supply them by a current transformer.

The manufacturer cannot be considered as liable in case of loss of performance and/or damages to people or animals, if the installation instructions are not fulfilled as here recommended.

Please contact the manufacturer to verify the compatibility of the work place with the screwjack itself.

REMARK: By laws/rules in force, it is meant the legislation of the Country in which the screwjack is used.

5 WORKING AND USE

5.1 WORKING

This machine is used for loads movement. It is made up by an electrical motor, driving a lead screw directly or with a gearbox. A nut is then allowed to move along lead screw, and its movement drives push rod connected the nut itself.

Load shall be axial only, but it can be tensile or pushing, no matter what push rod direction is. The screwjack can be selflocking or non-selflocking. Anyway, there is not a sharp threshold between selflocking and non-selflocking, because this feature is affected by gears wear, load, vibrations. In case of doubt about screwjack behaviour, it is necessary to do some tests and to contact the manufacturer.

REMARK: We would like to stress that the selflocking of the screwjack limits its accuracy and the repeat of the positioning. In case of doubts, please contact MecVel s.r.l.

5.2 USE AND USAGE CONDITIONS

The screwjack is designed for the use conditions specified by the manufacturer and explained on the catalogue of the product.

The supply is in AC but it is also possible to drive it manually, in case of emergency, through second shafts or stretched wormscrews acting as second shafts. Before starting with manual operation, it is important to disconnect the power supply of the screwjack. About use, it is important to define the screwjack duty cycle and the environment.

These parameters need to be analyzed as linked together. Duty cycle is percentage rate between on-time and idle-time, on a timeframe of 5 mins.

Environment is mainly due to temperature and related elements, which can sometimes create an aggressive environment (humidity, dust...). A bellows protecting push rod is available: pharmaceutical and food industry or aggressive environment are typical examples of applications where this item can be requested; in any case, under such circumstances, please contact the manufacturer.

The duty standards which relate the performance of screwjacks S3 is 30% at a reference ambient temperature of +30 ° C. The operating range of the screwjack is -10 ° C / +60 ° C and a pressure range of 0.8 to 1.1 bar.

Duty cycle can vary depending on the configuration and on the usage of the screwjack. In any case, it is indicated on the label on the product. In case of doubt, please contact the Technical Dept. of MecVel s.r.l.

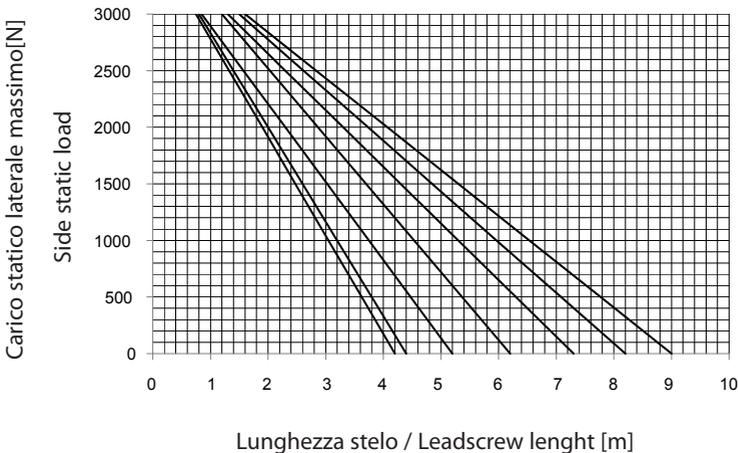
Screwjacks model HR, when featuring long and relatively thin leadscrews, need for an overlook on the a/m parameter.

Max number of revolutions for a certain size of leadscrew is given via these two formulas:

Leadscrew with unbounded top: $rpmst = rst * 0.8 * 0.5$

Leadscrew with bounded top: $rpmst = rst * 0.8$

that reads as: $rpmst =$ Max number of revolutions
 $rst =$ critical number of revolutions [min⁻¹] (see diagram below)



In case rpmst is lower than what's needed, leadscrew will have to be oversized, or if possible used in a 2-starts execution, so to have half-times the number of revolutions. A 2-starts leadscrew can generate backdriving, is possible use screwjacks with oversized leadscrews.(see catalog)

The below table shows how to determine the screwjack actual stroke. It depends on the speed and the weight of the lead screw (in case of assembling on the horizontal axis. Screwjack shall work within stroke settled. During the project of the application, some 50 mm extra stroke (in both directions) are to be considered: lower possibilities of mechanical end - stops will then be involved.

REMARK: Running on block cause serious damage of screwjack! For strokes 20 times larger than lead screw diameter, it is important to consider 150 mm of extra stroke, instead of 10 mm to avoid off set loads and compensate buckling effect.

REMARK: Off set load lead to side-forces on screwjack axis, unexpected wear, lubricant loss and non regular workout.

In order to determine the carrying value refers to the catalog

When screwjack handles a pushing / compression load (even if just by chance), leadscrew size needs to be checked according to Euler diagrams.

In order to determine the limit load refers to the diagram giving the value of the load limit to the length of the stem and its conditions vincolo. Note that the limit load curves vary with the scheme of fixing the jack, shown alongside each curve.

When screwjack handles a pushing / compression load (even if just by chance), leadscrew size needs to be checked according to Euler diagrams.

There are basically two points where screwjack is tied to structure:

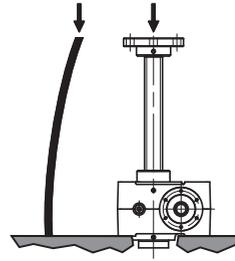
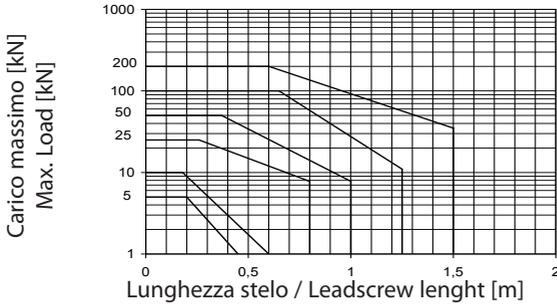
1. the gearbox.
2. the connecting point of leadscrew (model HT), or the nut (model HR)

According to how these two points are set up, a different Euler diagram shall be considered:

Euler I

Gearbox: framed to structure

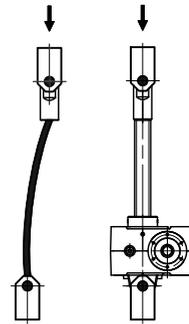
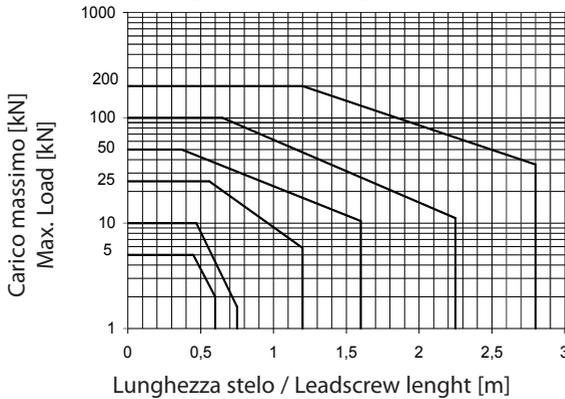
Leadscrew edge / nutscrew: not tied at all



Euler II

Gearbox: hinged

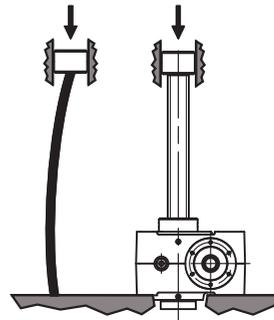
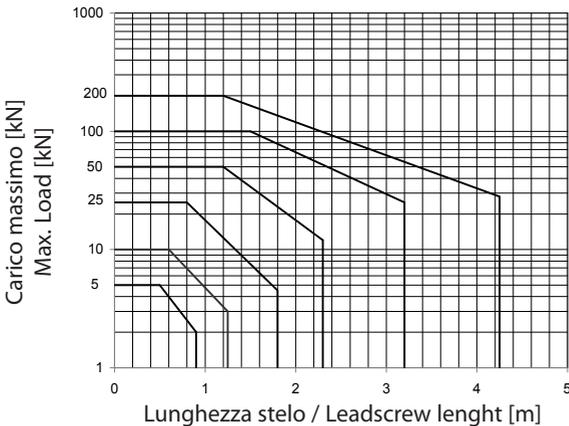
Leadscrew connecting point / nut: hinged



Euler III

Gearbox: framed to structure

Leadscrew connecting point / nut: framed to structure



5.3 PREPARATION OF WORKING AND DUTY CYCLE

Before starting the duty cycle, following checks have to be carried out:

- correct installation of the screwjack;
- correct setting of the stroke control devices, if present;
- correct application of the load, with reference to the guidelines of this handbook.

It is necessary to consider the linear speed along stroke together with the load dynamics, in order to avoid inertias or vibrations. In case this situation might happen, we suggest to contact the Technical Department of MecVel s.r.l. to check the correct choice of the screwjack, comparing with its dimensions.

5.4 RESIDUAL RISKS

The risks analysis and evaluation has shown that, even though all the possible measures to avoid dangers from the screwjack use have been adopted, still some residual risks exist. In this section, we will explain all the cares that the operator shall adopt to avoid this residual risks. We will also show the signs used to indicated these risks on the machine.

| RESIDUAL RISK | COMPONENT | PROCEDURE | SIGN |
|----------------------------|---|--|---|
| Parts in tension | Motor and electric parts | Before proceeding with any operation on the screwjack, the operator must switch power off. |  |
| Hot parts | Motor, electric parts, push rod, reduction unit | Wear the necessary clothes. Before proceeding with any operation, the operator must wait until all the hot parts are cooled. |  |
| External parts in movement | Push rod | Before proceeding with any operation, switch power off. Do not wear clothes that can be dragged in the machine. |  |

6 SCREWJACK MAINTENANCE



DURING MAINTENANCE OPERATIONS, PLEASE TAKE ALL THE NECESSARY CARES, TO AVOID ANY DANGER FOR THE OPERATOR. WE RECOMMEND TO CAREFULLY READ THIS CHAPTER OF THE HANDBOOK FOR USE AND MAINTENANCE.

6.1 GENERAL CAUTIONS AND HINTS

All the maintenance operations must be done by qualified and authorized technicians, adequately informed and trained about the dangers, arising from them.

Moreover, it is important to consider the integration and usage of the screwjack into more complicated systems.

If the screwjack is installed in dangerous environment, the operators must behave accordingly, for example, wearing protecting masks, glasses, etc.

All the operations must be fulfilled in safety conditions, with power supply switched off, and after checking the non - possibility of an external switch on of the machine or of the system in which it is integrated, during these operations.

Before starting any operation, operator must wear the following safety clothes:

GLOVES



SUIT



SAFETY
SHOES



HELMET



6.2 SERVICE OPERATIONS OF THE SCREWJACK



BEFORE STARTING WITH ANY SERVICE OPERATION, CHECK THAT THE TEMPERATURE OF THE PARTS IS NOT SO HOT TO CAUSE DAMAGES, INJURIES OR BURNS TO THE OPERATOR. IN THIS CASE, WAIT UNTIL THE PARTS ARE COOLER.

Screwjack needs only few service operations: cleaning and eventually greasing (if necessary, lubricant has to be added by the appropriate lubricator).

REMARK: Lubricants that can be used are listed in chapter 2 TECHNICAL FEATURES of this handbook.

Anyway, MecVel s.r.l. recommends a scheduled inspection on screwjack or screwjacks to detect any problem, especially about movements and in case of noises.

The schedule of the checks should vary according to the application and the use: in case of continuative use or for any doubts, please contact the Technical Department of MecVel s.r.l.

It is necessary to frequently check the nut wear.

To do this, follow this procedure:

1. disconnect load from screwjack;
2. put load on push rod, according to model rating (from nominal load till 0.1 times nominal load, lowering this parameter the more screwjack size is high);
3. with a dial - gauge, putting both compressing and tensile load, check that axial backlash is always lower than 0,3 times the screwpitch.

In case backlash is higher, then screwjack needs to be replaced.

It is necessary to periodically check:

- the isolation and preservation of the cables;
- the cable inlets;
- the preservation of the external surfaces, with particular attention to the parts in movement and their shelters.

6.3 SCREWJACK REPAIR



IF SOMETHING WRONG IS DETECTED, DO NOT TRY TO REPAIR IT BY YOUR OWN, BUT CONTACT AFTER-SALES DEPT. OF MECVEL TO GET THE NECESSARY INSTRUCTIONS.

All the repairs must be done by qualified technicians, adequately informed and trained about the dangers, arising from them. Moreover, it is important to consider the integration and usage of the screwjack into more complicated systems.

Every repair must be fulfilled in safety conditions, with power supply switched off, and after checking the non - possibility of an external switch on of the machine or of the system in which it is integrated.

If the screwjack is installed in dangerous environment, the operator must behave accordingly, for example, wearing protecting clothes and tools.

6.4 SCREWJACK REPLACEMENT

It is necessary to replace the screwjack, in the following cases: if it breaks, if it is not working correctly for its use and if the whole system or application on which it is installed is dismantled. In these cases, the operator must take care to follow the safety instructions about screwjack service, explained in this handbook.

If the screwjack has problem of functioning or control, please get in touch with the Technical Service of MecVel s.r.l. for the instructions and the authorizations about replacement or repair.

REMARK: For the Technical Service MecVel is important the O.P. number written on the label on the motor.



7 EMERGENCY DRIVE

In case of emergency, it is possible to move the actuator manually, as described in section 5, *WORKING AND USE* of this handbook.

Please take the greatest care during these operations and follow carefully the guidelines of this handbook, in particular:

- be sure that load is safely held, braked and/or supported by external tools;
- be sure that the environment is not intrinsically dangerous during the emergency operation (bad lighting, smoke or gases or toxic and burning vapours, etc.);
- use safety tools and wear safety clothes;
- do not proceed with emergency operation without some personnel that can help the operator in case of unexpected danger.

8 INTERACTION WITH THE OPERATOR

This section cannot be applied, because the actuator has no interaction with the operator. External drive is possible only in case of service, repair or emergency. In these cases, remember to switch off power supply of the actuator and be sure that hot surfaces are cool and parts in movement are still.

Please refer to chapter 6, *ACTUATOR MAINTENANCE* for all the necessary hints to safely fulfill these operations.

9 GENERAL WARRANTY CONDITIONS

For general sales conditions consult the catalog or website www.mecvel.com.

10 REMARKS

Particular guidelines for the use and maintenance of customized actuators are available only in case of special configurations.



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