**AMU Principalli srl**
**ACCESSORI MACCHINE UTENSILI**

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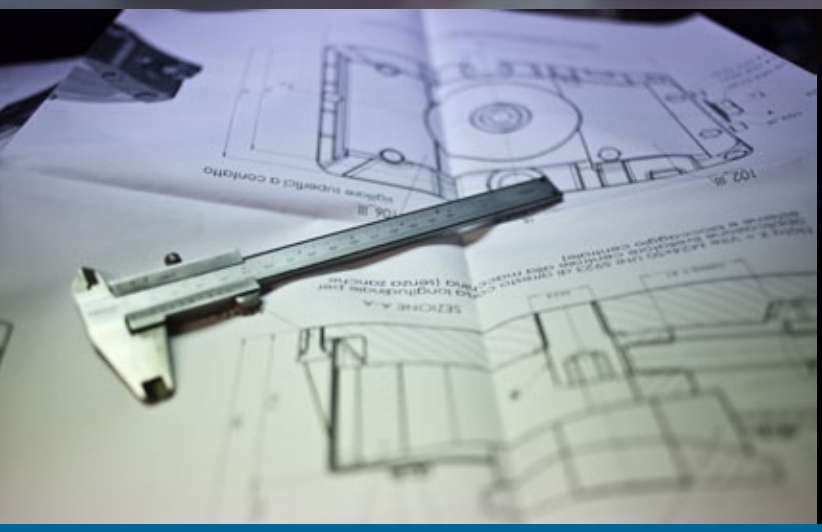
# Fix Level series

## Machine tools anchoring elements



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# Fix Level System

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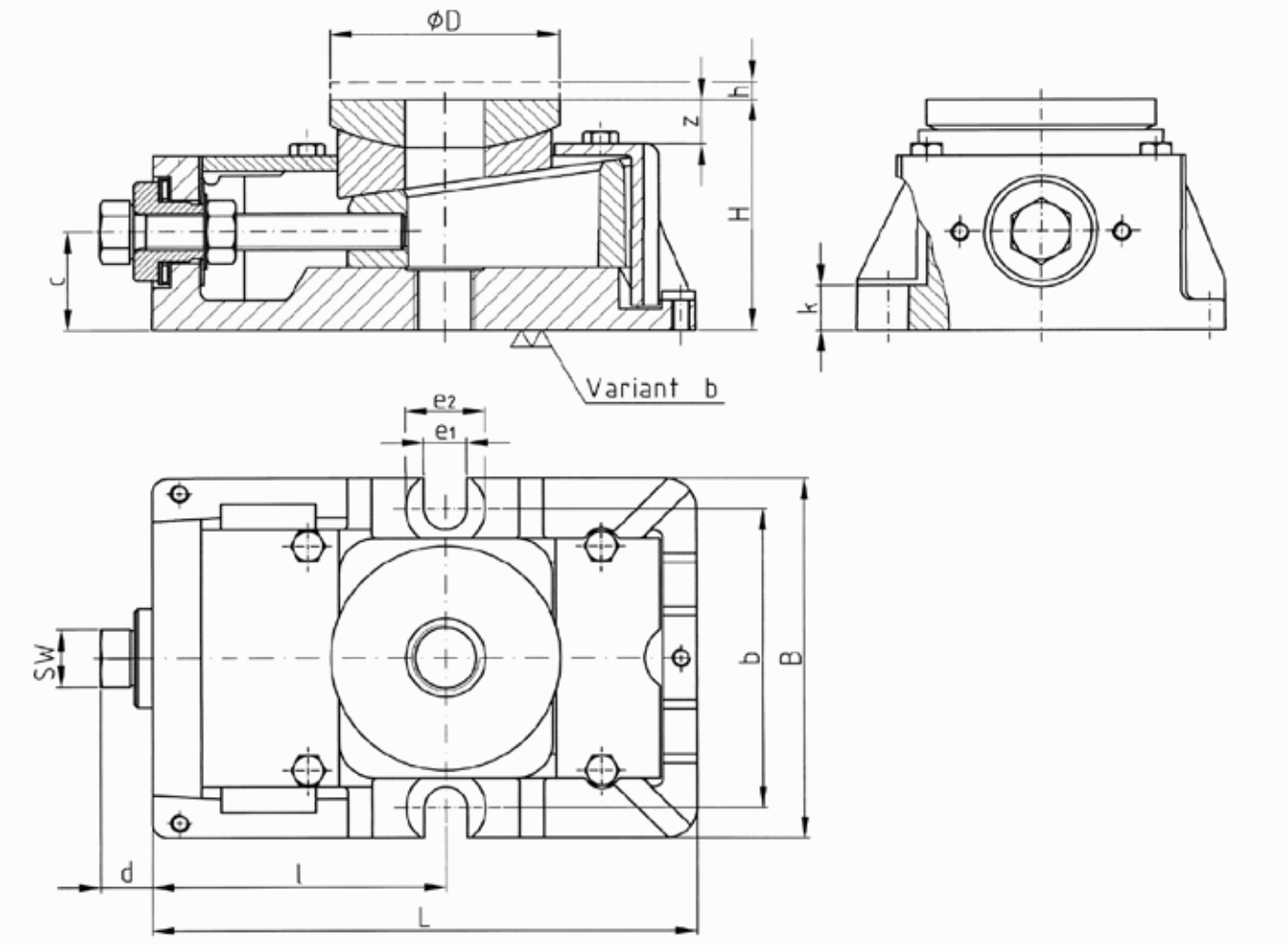
# Fix Level FL

Our anchorage and leveling elements (Fix Level), are universally used for precise positioning of machine tools.

Make the system base – block foundations a unique and leveling element
Dampen machine vibrations eliminating imprecisions
Resume planar settling
Maintain initial capabilities conditions over time

## Fix Level FL - Basic unit



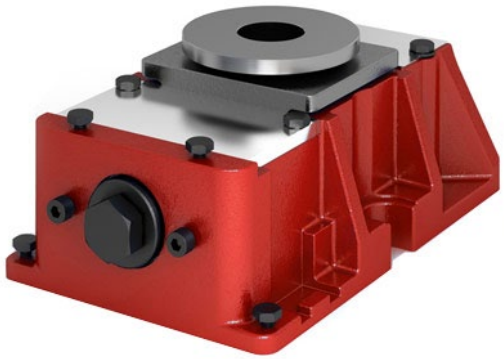

| STATIC LOAD | FL Measure | M | L | B | H | D Ø | $SW_1$ | $SW_2$ | d | c | z | h | l | b | $e_1$ | $e_2$ | k |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10.000 | I | M12 | 175 | 105 | 61 | 60 | 19 | | 14,5 | 23,5 | 16 | 5 | 92 | 90 | 14 | 26 | 10,2 |
| 20.000 | II | M20 | 175 | 120 | 75 | 75 | 19 | | 15 | 33 | 17,5 | 5 | 96 | 100 | 13,5 | 24,5 | 10,3 |
| 40.000 | III | M24 | 220 | 150 | 100 | 88 | 24 | | 19,5 | 41 | 21 | 6 | 117,5 | 130 | 18 | 30 | 13,3 |
| 60.000 | IV | M30 | 275 | 180 | 119 | 106 | 30 | | 23,5 | 53 | 25,5 | 8 | 142,5 | 160 | 26,5 | 39 | 12 |
| 120.000 | V | M36 | 345 | 230 | 144 | 146 | 36 | | 27,5 | 64 | 34 | 10 | 180 | 205 | 27 | 41 | 13,5 |

# Fix Level FL

## Fix Level FL - Technical datas

| Nome | | Dim | FL I | FL II | FL III | FL IV | FL V |
|---|---|---|---|---|---|---|---|
| Max load [1] | | N | 90000 | 120000 | 240000 | 360000 | 700000 |
| Recommended machine dead weight [2] | | N | 10000 | 20000 | 40000 | 60000 | 120000 |
| "C" rigidity index operation field | | N/µm | 2300 | 40000 | 6500 | 8000 | 14000 |
| Torque on adjusting screw | specific | $\frac{N \cdot m}{10^{3Kg}}$ | 3 | 3 | 4 | 4,5 | 5,5 |
| | maximum | N•m | 27 | 36 | 96 | 160 | 385 |
| | safety | N•m | 2,5 - 5 | 2,5 - 5 | 3,5 - 7 | 4 - 8 | 5 - 10 |
| movement in height for each turn adjusting bolt | | mm | 0,25 | 0,25 | 0,29 | 0,35 | 0,423 |
| Basic model weight | | Kg | 4 | 5,5 | 11,5 | 21 | 42 |
| Fondation elements thrust load | CH1 version | N | 53000 | 81000 | 115000 | 182000 | 265000 |
| | BU1 version | N | 53000 | 81000 | 115000 | 182000 | 265000 |
| | ZA version | N | 25000 | 65000 | 120000 | 190000 | 275000 |

[1] Fix Level fixing system are adjustable up to this load.
[2] The standard factor for calculate Fix Level size
[3] Found by appling a changing load equal to the recommended proportionale machine load.
The operating range is achieved when the machine has been levelled and tightened the foundation bolts.



Formula to calculate fixing systems compliance:

$$\Delta f[\mu m] = \frac{\Delta f}{c} = \frac{\text{Load change N}}{\text{Spring costant N/µm}}$$

Total of the force exerted must not exceed maximum load:

[A] Proportional machine load
[B] Tensile force exerted by foundation bolt
[C] Dinamic force
[D] Changing loads (moving machine parts)
[E] Force counteracting moments

**Fix Level size calculation**

"Proportional machine load recommended" is a function of the machine net weight divided by support points number.

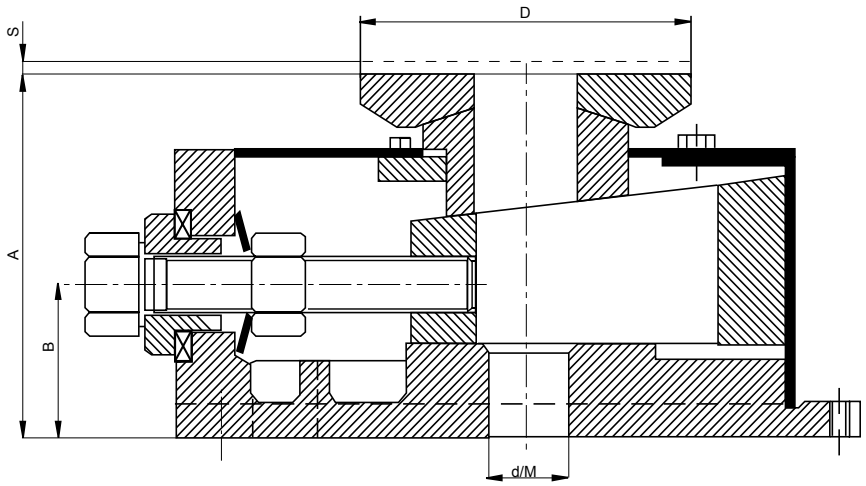
In case of machine with significant difference in partial weight, the haviest machine load has to be divided by the number of support points.
The resulting size has to be used under the machine.

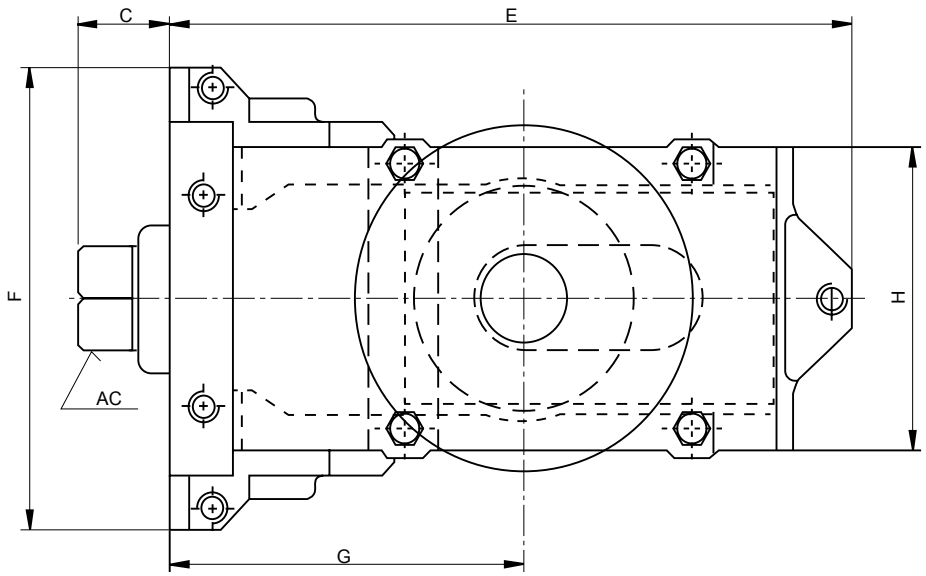
# Fix Level FLS

## FLS are leveling a simplified and lightened the standard model FL

As the solution most widely used is the one with the use of version CHI (bolt cement) positioned at the center of the leveler, we kept the execution of the base with the central hole and **we have eliminated version ZA** which comprises two lateral clamps with all the perimeter edge of the base.
In this way we got a lot lighter without affecting the flow rate values and the elasticity modulus.
**These levelers for machine tools have been tested at the Institute of tests and research OMECO (Monza, Italy).**
2 models available:
M. FLS III for axial static load up to 3.000Kg
M. FLS IV for axial load up to 5.000kg
Both models possess a margin of safety equal to 6 times the static load given in the table.

### Fix Level FLS - Basic unit




| Initial | Dim | FLS III | FLS IV |
|---|---|---|---|
| A | mm | 108 | 117 |
| B | mm | 44,5 | - |
| C | mm | 21 | 22 |
| D | mm | 98 | 120 |
| E | mm | 200 | 260 |
| F | mm | 130 | 149 |
| G | mm | 101 | 143 |
| H | mm | 83 | 100 |
| AC | mm | 24 | 30 |
| d/m | mm | Ø25/M24 | Ø31/M30 |
| S | mm | 3,5 | 5 |

# Fix Level FLS

| Model | | Dim | FLS III | FLS IV |
|---|---|---|---|---|
| Max load [1] | | N | 180000 | 300000 |
| Recommended machine dead weight [2] | | N | 30000 | 50000 |
| Torque on adjusting screw | specific | $\frac{N \cdot m}{10^{3Kg}}$ | 4 | 4,5 |
| | maximum | N•m | 96 | 160 |
| | safety | N•m | 3,5 - 7 | 4 - 8 |
| Vertical adjustament for screew turn | | mm | 0,29 | 0,35 |
| Basic model weight | | Kg | 7,30 | 12 |

# Vibration dampers

Cap and sole vibration dampers

Base material:
Air Loc - SL type

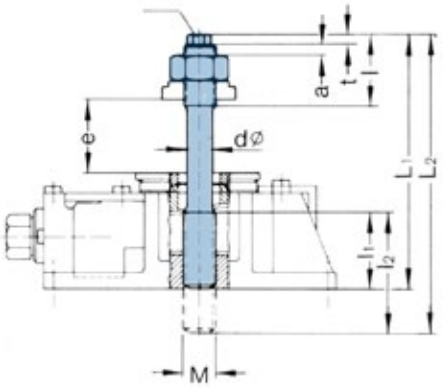
- Profile on 2 sides (double).
- Load: 4daN/cm2 admitted to 12daN/cm2 = (from. approx. 4kg./cm2 to 12kg./cm2)
- Best load: 10daN/cm2 = (ca. 10kg./cm2).
- Thickness: 7mm
- Color: green
- Friction coefficient on concrete: 0.80
- Natural frequency in Hz vertical load average 95 - 30 horizontal.
- Margin of temperature from 0 to 70 ° C.

## Fix Level assembly options - Versions

## BU1

Screw with unloaded shank, normal and long, for machine connection

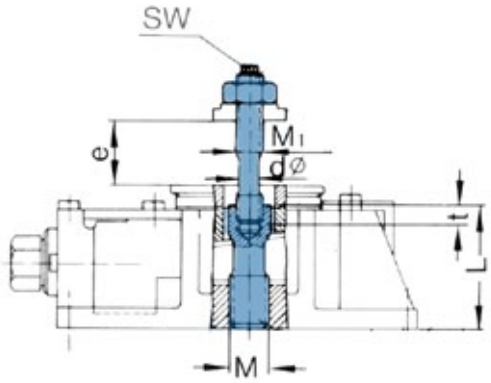
| | | | | | | Fondazione | | e | | lungo | | e | | Forza di serraggio max N |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FL | M | d Ø | SW | t | l | $L_1$ | $l_1$ | da | a | $L_2$ | $l_2$ | da | a | |
| I | M12 | - | 6 | - | - | 130 | - | 20 | 40 | 150 | - | 40 | 60 | 65000 |
| II | M20 | 16 | 13 | 7 | 35 | 175 | 55 | 20 | 55 | 205 | 55 | 50 | 85 | 65000 |
| III | M24 | 19 | 17 | 8 | 50 | 215 | 70 | 20 | 70 | 260 | 70 | 65 | 115 | 120000 |
| IV | M30 | 24 | 19 | 8 | 55 | 260 | 85 | 30 | 85 | 310 | 85 | 80 | 135 | 190000 |
| V | M36 | 29 | 24 | 10 | 65 | 315 | 105 | 40 | 105 | 360 | 105 | 100 | 150 | 275000 |




## BU2

Screw 2 threads for connection of the leveler to the machine (for fixation after placement)

| | | | | | | | | e | Locking force N |
|---|---|---|---|---|---|---|---|---|---|
| FL | M | L | t | $M_1$ | d Ø | SW | da | a | |
| I | - | - | - | - | - | - | - | - | - |
| II | M20 | 55 | 16 | M16 | 13 | 10 | 20 | 100 | 53000 |
| III | M24 | 70 | 20 | M20 | 16 | 13 | 30 | 120 | 81000 |
| IV | M30 | 85 | 24 | M24 | 19 | 17 | 35 | 135 | 115000 |
| V | M36 | 105 | 30 | M30 | 24 | 19 | 40 | 135 | 182000 |

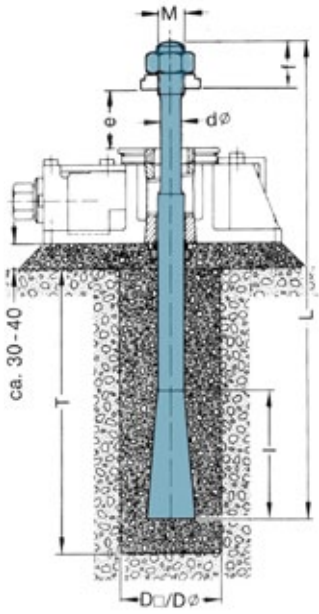


## Fix Level assembly options - Versions

## CH1

Screw with unloaded shank and facetted end bulb for machine direct fixing with the foundation.
Remark: the defnition of f (version of basic model) needs to be indicated in the order: with types II, III, IV the foundation bolt of the next measurement can be used to obtain greater security in the case of extremely high traction loads. When adjusting the iocking force it is important to be careful not to exceed the maximum admissibie load of the FIX LEVEL fixing system.

| | | | | | | from to | | Fondazione | | Forza di serraggio max N |
|---|---|---|---|---|---|---|---|---|---|---|
| FL | M | L | l | f | d Ø | da | a | D | T | |
| I | M16 | 330 | 90 | 30 | 13 | 20 | 60 | 70 | 230 | 53000 |
| II | M20 | 400 | 110 | 40 | 16 | 20 | 100 | 80 | 270 | 81000 |
| III | M24 | 500 | 130 | 50 | 19 | 30 | 120 | 100 | 340 | 115000 |
| IV | M30 | 600 | 150 | 55 | 24 | 35 | 135 | 120 | 410 | 182000 |
| V | M36 | 800 | 180 | 65 | 29 | 40 | 150 | 150 | 570 | 265000 |
| | M42 | 1000 | 260 | 75 | 35 | 40 | 200 | 170 | 760 | 385000 |

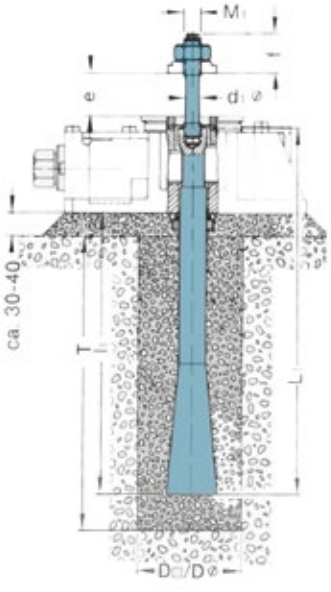



e = altezza della base della macchina

## CH2

Foundation bolt in two parts for fixing machine after its placement.
In the order indicate the height of the machine base (**e**).

| | | | | | | from to | | Fondazione | | Locking force N |
|---|---|---|---|---|---|---|---|---|---|---|
| FL | M | L1 | l1 | f | d Ø | da | a | D | T | |
| I | M16 | 190 | 150 | 30 | 12 | 20 | 60 | 80 | 150 | 32000 |
| II | M20 | 275 | 220 | 40 | 16 | 20 | 100 | 100 | 220 | 81000 |
| III | M24 | 360 | 290 | 50 | 19 | 30 | 120 | 120 | 290 | 115000 |
| IV | M30 | 450 | 360 | 60 | 24 | 35 | 135 | 150 | 360 | 182000 |
| V | M36 | 600 | 500 | 75 | 29 | 40 | 150 | 170 | 500 | 265000 |



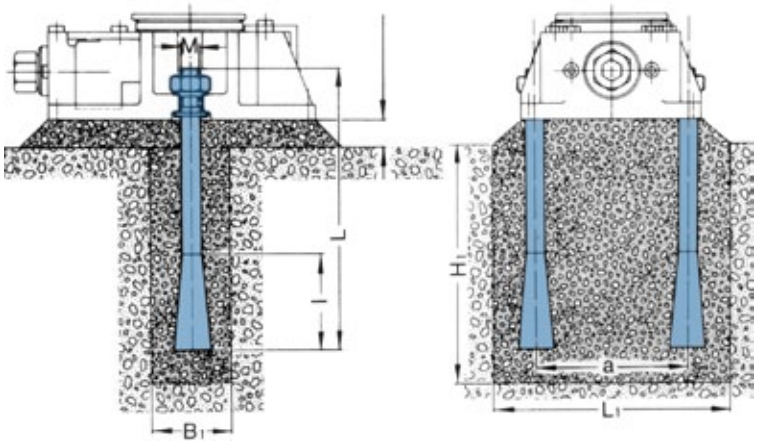

e = altezza della base della macchina

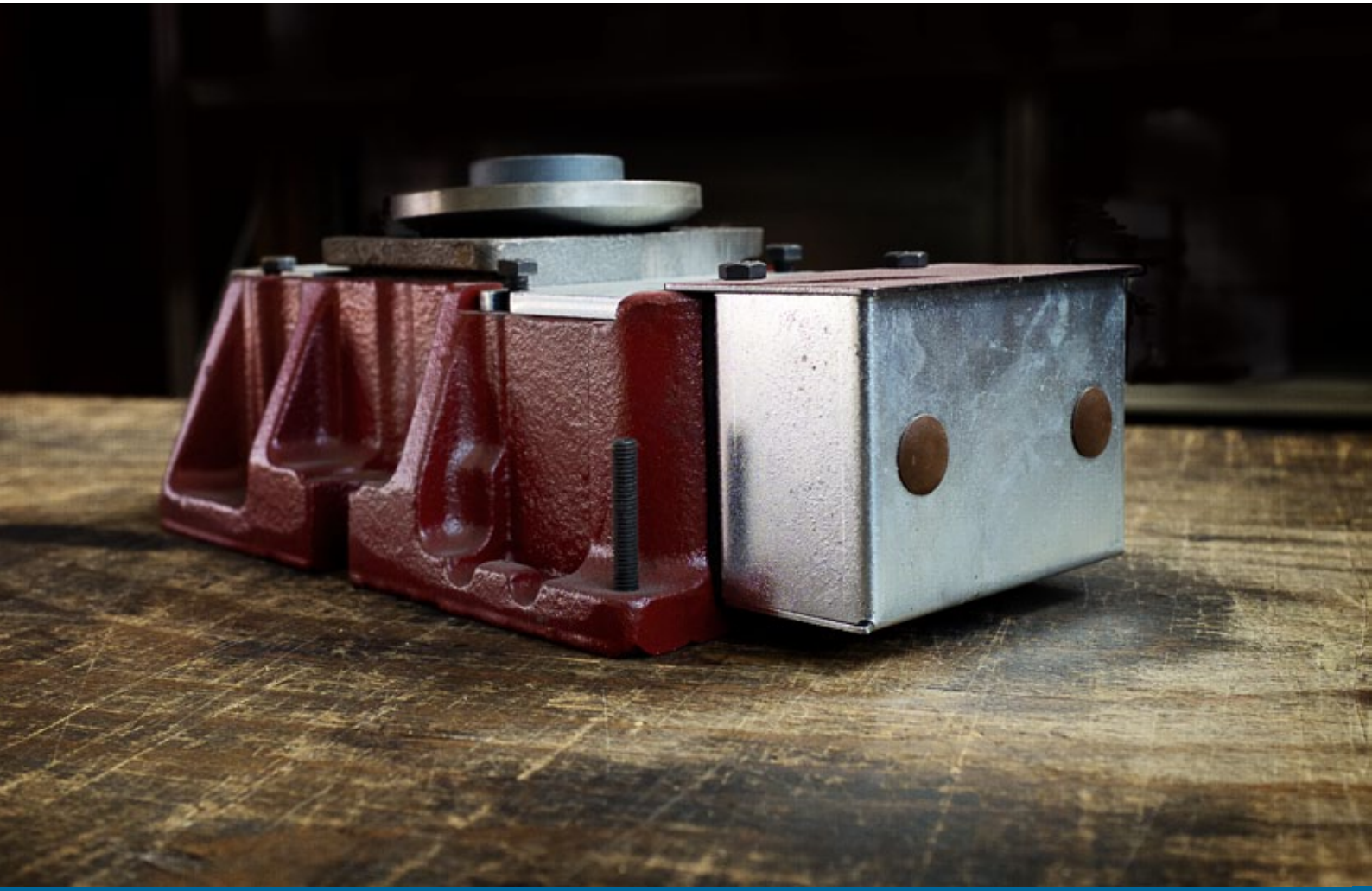
# Fix Level FL

## Fix Level assembly options - Versions

### ZA
Lateral fundation bolts

| FL | Fondazione M | L | l | a | $L_1$ | $B_1$ | $H_1$ | Forza di serraggio max N |
|---|---|---|---|---|---|---|---|---|
| I | M12 | 150 | 70 | 90 | 140 | 60 | 140 | 65000 |
| II | M12 | 150 | 70 | 100 | 160 | 60 | 140 | 65000 |
| III | M16 | 250 | 90 | 130 | 200 | 70 | 240 | 120000 |
| IV | M20 | 300 | 100 | 160 | 240 | 80 | 290 | 190000 |
| V | M24 | 350 | 135 | 205 | 300 | 100 | 350 | 275000 |



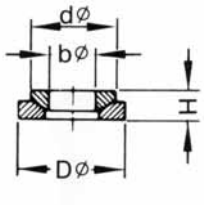



Fix Level accessories

## RO1

Washer with round under nut base for planar adjustment

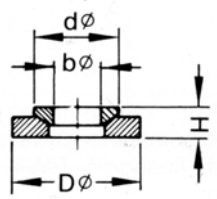
| FL | D Ø | H | d Ø | b Ø |
|---|---|---|---|---|
| I | 36 | 9 | 24 | 13 |
| II | 44 | 10 | 36 | 21 |
| III | 56 | 13 | 44 | 25 |
| IV | 68 | 16 | 56 | 31 |
| V(M36) | 78 | 20 | 68 | 37 |
| V(M42) | 100 | 26 | 90 | 46 |




## RO2

Washer with round large base

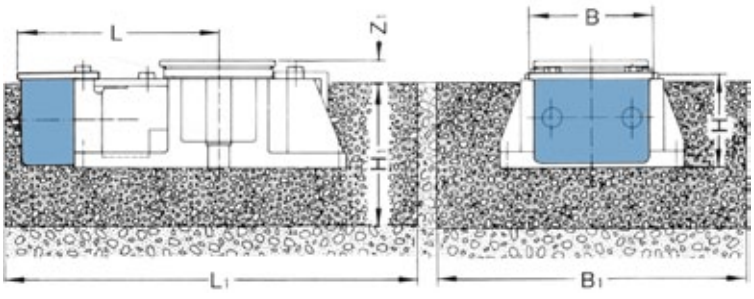
| FL | D Ø | H | d Ø | b Ø |
|---|---|---|---|---|
| I | 44 | 10 | 36 | 17 |
| II | 56 | 13 | 44 | 21 |
| III | 68 | 16 | 56 | 25 |
| IV | 80 | 16 | 56 | 31 |
| V(M36) | 100 | 20 | 68 | 37 |
| V(M42) | 125 | 26 | 90 | 46 |




## CO

Protection box for adjustment screw in FIX LEVEL fixed systems in concrete

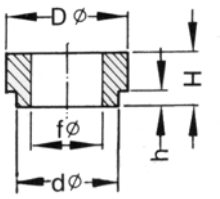
| FL | Foundation | | | | | | |
|---|---|---|---|---|---|---|---|
| | L | B | H | $Z_1$ | $B_1$ | $H_1$ | $L_1$ |
| I | 131 | 82 | 50 | 20 | 160 | 70 | 310 |
| II | 132 | 82 | 62 | 25 | 200 | 80 | 310 |
| III | 164 | 105 | 79 | 30 | 250 | 100 | 380 |
| IV | 198 | 123 | 91 | 35 | 300 | 120 | 450 |
| V | 245 | 150 | 106 | 40 | 330 | 140 | 550 |




## BU

Centering compass for connecting bolts correct positioning

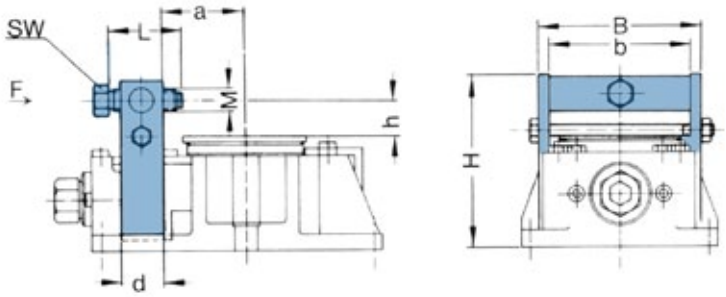
| FL | f Ø | D Ø | H | d Ø | h |
|---|---|---|---|---|---|
| I | 16,2 | 32 | 13 | 22 | 4 |
| II | 20,2 | 40 | 14 | 28 | 4 |
| III | 24,2 | 44 | 18 | 32 | 5 |
| IV | 30,2 | 54 | 21 | 42 | 5 |
| V(M36) | 36,3 | 60 | 26 | 45 | 6 |
| V(M42) | 42,5 | 70 | 32 | 56 | 6 |



## PO1

Thrust and restraint element

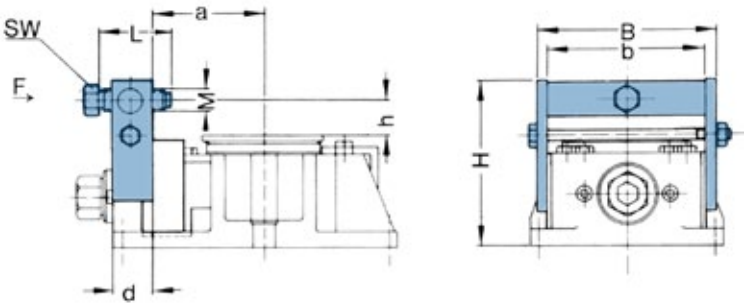
| FL | M | L | AC | H | B | b | d | a | h | F → N |
|---|---|---|---|---|---|---|---|---|---|---|
| I | M12 | 50 | 17 | 75 | 102 | 86 | 25 | 57 | 12 | 20•10³ |
| II | M16 | 60 | 19 | 106 | 118 | 102 | 30 | 65 | 16 | 25•10³ |
| III | M16 | 60 | 19 | 129 | 149 | 129 | 35 | 80 | 16 | 35•10³ |
| IV | M20 | 70 | 24 | 160 | 170 | 150 | 40 | 100 | 20 | 40•10³ |
| V | M24 | 80 | 30 | 192 | 223 | 199 | 45 | 123 | 24 | 60•10³ |




## PO2

Biasing element for lateral adjustment

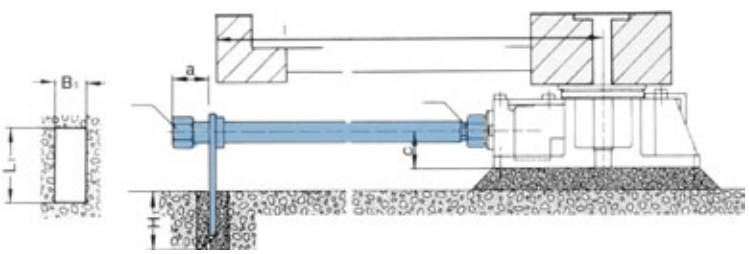
| FL | M | L | AC | H | B | b | d | a | h | F → N |
|---|---|---|---|---|---|---|---|---|---|---|
| I | M12 | 50 | 17 | 75 | 102 | 86 | 25 | 57 | 12 | 20•10³ |
| II | M16 | 60 | 19 | 106 | 118 | 102 | 30 | 65 | 16 | 25•10³ |
| III | M16 | 60 | 19 | 129 | 149 | 129 | 35 | 80 | 16 | 35•10³ |
| IV | M20 | 70 | 24 | 160 | 170 | 150 | 40 | 100 | 20 | 40•10³ |
| V | M24 | 80 | 30 | 192 | 223 | 199 | 45 | 123 | 24 | 60•10³ |




## PR1

Extended adjusting screws in FIX LEVEL fixing systems mounted on the inside

| FL | a | c | $SW_1$ | $SW_2$ | minimum measure | pipe | Foundation $L_1$ | Foundation $B_1$ | Foundation $H_1$ |
|---|---|---|---|---|---|---|---|---|---|
| I | 50 | 23,5 | 22 | 14 | 140 | 24x4 | 80 | 40 | 70 |
| II | 50 | 33 | 22 | 14 | 140 | 24x4 | 80 | 40 | 70 |
| III | 50 | 41 | 24 | 14 | 170 | 24x4 | 80 | 40 | 90 |
| IV | 50 | 53 | 32 | 17 | 200 | 24x4 | 80 | 40 | 100 |
| V | 50 | 64 | 36 | 19 | 250 | 34x6 | 100 | 50 | 110 |



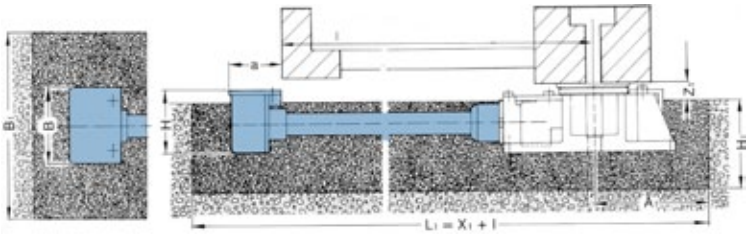
# Fix Level FL

Fix Level accessories

## PR2

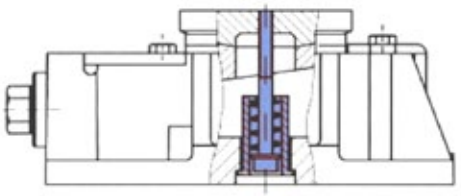
Extended adjusting screws in FIX LEVEL fixing systems in concrete, mounted on the inside

| FL | minimum measure | | | | | | Foundation | | |
|---|---|---|---|---|---|---|---|---|---|
| | a | B | H | I | A1 | Z1 | $B_1$ | $H_1$ | $X_1$ |
| I | 65 | 82 | 50 | 140 | 130 | 20 | 160 | 70 | 230 |
| II | 65 | 82 | 62 | 140 | 140 | 25 | 200 | 80 | 240 |
| III | 70 | 105 | 79 | 170 | 160 | 30 | 250 | 100 | 270 |
| IV | 90 | 123 | 91 | 200 | 200 | 35 | 300 | 120 | 320 |
| V | 100 | 150 | 106 | 250 | 230 | 40 | 330 | 140 | 370 |



## MOM

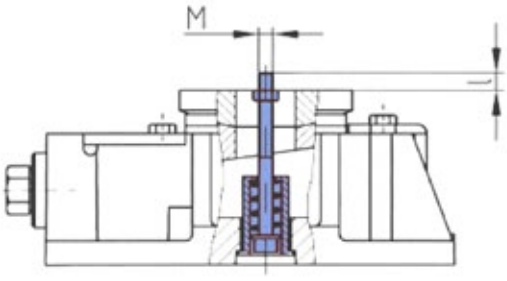
Spherical thickness protection



## FROT

Variables positions fixing

| FL | M | I |
|---|---|---|
| I | 6 | 8 |
| II | 6 | 8 |
| III | 8 | 8 |
| IV | 8 | 12 |
| V | 12 | 12 |



# Fix Level installation

Installation of jacks with measurement reading system from drawing of foundation block piane - coordinate method.

A.M.U. Principalli is able to perform this service with highly qualified tecnicians and instruments.
**Ask us for a quote.**

Commissioning FI - FLS type levelling systems with direct reading of meaurements from foundation blcxk drawing and transposition of the same by precision optical instruments.

## Guaranteed assemby tolerances

on X and Y azis +/- 1mm
on Z azis +/- 0,5 mm
Maximum operable length -50 m

## Obtained adrvantages

- Cernentation of levelling systems in an area (ree (mm encumbrances and wigh pouring of mortali-directly (mm above and without chutes.
- Ability tu nuintain a high pcitioning precision. - Sirnpkr machine assembly times and reducect macine start-up tirries.
- Possibility of treating foundation surface with special treattnents,suchas: sealLng - lead sealing patinting.
- Low installation costs and recovery of own manpoweer.
- Interventins in all European counties.

**Send us your foundation block drawing**

## Fix COA
## Screw leveling with coaxial clamps

The leveler Fix COA is a system made of a slim pitch threaded sleeve,anchor bolts and a reaction plate.

The clamp, in block foundations, crosses the reaction plate, the threaded sleeve and through a containing nut closes in a rigid system.

The fine pitch of the thread of the sleeve, together with a thrust bearing placed between contact surfaces compass - plate allow a controllabe and light recording.

The spherical washer also allows an axial vertical orientation of 360 °.

The screw coaxial system compared to leveling systems wedge, allows a practically unlimited vertical registration track in both directions and requires no calibrated leveling. Applicable loads depend on the number of threads in the socket.

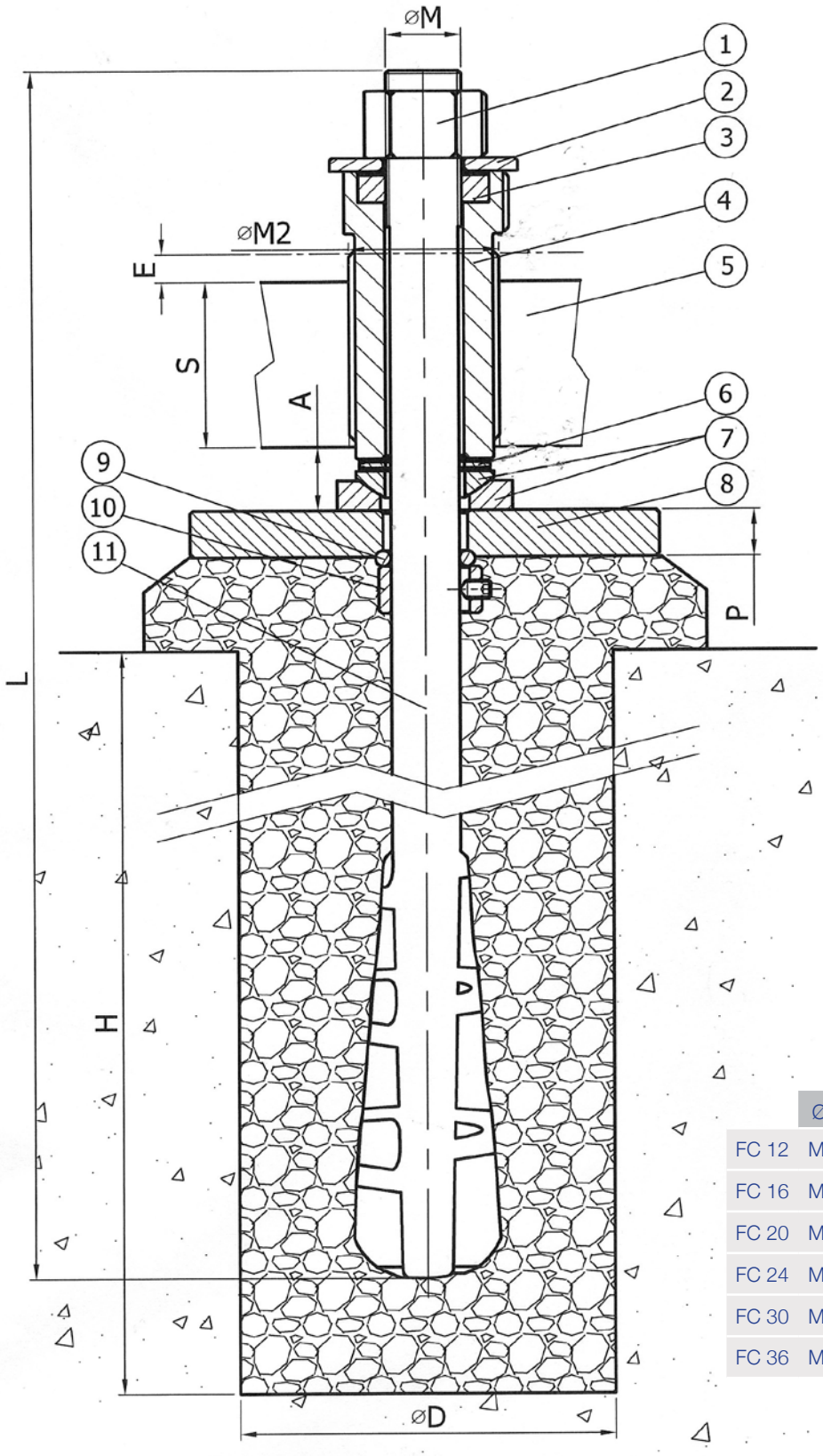
System together with the necessary aggregates makes it impermeable and allow the attack to appropriate seats so suitable for a correct installation.

Affordability and functionality recommend the adoption.

Leveler signed reference

**Fix COA ZC 24**
(coaxial anchor bolt + anchor bolt diameter)

# Fix COA




| | |
|---|---|
| 1 | Clamping nut |
| 2 | Washer |
| 3 | Centering ring |
| 4 | Sleeve adjustment |
| 5 | Machine foot |
| 6 | Thrust bearing |
| 7 | Orientation washers |
| 8 | Reaction plate |
| 9 | O-ring seal |
| 10 | Locking ring |
| 11 | Concrete anchor bolt |

| | ØM | ØM2 | L | D | H | Loads | P | E | A |
|---|---|---|---|---|---|---|---|---|---|
| FC 12 | M12 | M24x2 | 210 | 70 | 140 | 8000 N | 15 | 10 | 25 |
| FC 16 | M16 | M33x2 | 330 | 80 | 230 | 10000 N | 15 | 10 | 25 |
| FC 20 | M20 | M36x2 | 400 | 100 | 270 | 20000 N | 15 | 10 | 28 |
| FC 24 | M24 | M40x2 | 500 | 120 | 340 | 40000 N | 20 | 15 | 30 |
| FC 30 | M30 | M48x2 | 600 | 150 | 410 | 60000 N | 20 | 15 | 33 |
| FC 36 | M36 | M54x2 | 800 | 170 | 570 | 120000 N | 20 | 15 | 38 |

**AMU Principalli srl**
**ACCESSORI MACCHINE UTENSILI**

# Fix Level FL

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