MICROPLAN®

your partner for metrology since 1976

ENGLISH

# 9

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This symbol accompanying the type of standard packaging of each product. The package may vary according to the quantity and destination, without notice. Any special packaging for export will be calculated at cost.

Technical data, dimensions and tolerances are subject to change without notice.


Catalogue N.9 - V.13/02



**www.microplan-group.com**

## THE USE OF GRANITE IN METROLOGY

Due to its unique properties, black granite in recent years, has been used extensively in the field of measuring instruments, both for traditional ones (surface plates, parallels, set squares, etc...), as well as modern ones: CMM machines, physic-chemical process machine tools. Suitably lapped black granite surfaces are not only extremely precise but also ideal for use in conjunction with air bearings. The reason of the choice of black granite in manufacturing of precision units are the following:

• **DIMENSIONAL STABILITY**: black granite is a natural aged material formed over millions of years and therefore displays great internal stability. • **THERMAL STABILITY**: the linear expansion is much lower than the steel or cast iron ones.• **HARDNESS**: comparable to good-quality tempered steel. • **WEAR RESISTANCE**: instruments last longer. • **ACCURACY**: the flatness of the surfaces is better than the one obtained with traditional materials. • **RESISTANCE TO ACIDS, NON-MAGNETIC ELECTRICAL INSULATION RESISTANCE TO OXIDATION**: no corrosion, no maintenance. • **COST**: working the granite with state-of-the-art technology prices are lower. • **OVERHAUL**: Eventual servicing can be carried out quickly and cheap.

| | AFRICA BLACK | FINE BLACK | BLUE LANHELIN |
|---|---|---|---|
| **Density** | 2.85 kg/dm$^3$ | 3.0 kg/dm$^3$ | 2.7 kg/dm$^3$ |
| **Porosity** | 0.09% | 0.15% | 0.35% |
| **Elasticity Coeff.** | 60 / 95 Gpa | 90 / 103 Gpa | 44 / 58 Gpa |
| **Compression resistance** | 244 MPa | 270 MPa | 188 MPa |
| **Resistance to flexion** | 24 MPa | 25 MPa | 21.5 MPa |
| **Length expansion coeff.** | 6.5 x $10^{-6}$ m/ m° C | 5.9 x $10^{-6}$ m/ m° C | 7.4 x $10^{-6}$ m/ m° C |
| **Knoop Hardness** | 806 HK | 800 HK | 822 HK |
| **Origin** | South Africa | South Africa | France |
| **Colour** | Dark grey | Black | Bleu/Grey |
| **Use** | Standard | On request | For big sizes |

*For big plates of over 5 meters length, we usually use Blue Lanhelin granite, coming from Brittany (France), because big blocks of Black African raw material are very difficult to find.*




## SPECIAL MACHINING ON GRANITE

To offer a complete service, Microplan usually makes special machining according to Customer drawings and specification. Anyway the main special granite workings are:

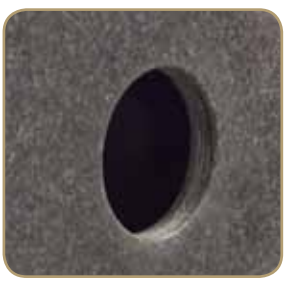
**GLUEING** inserts, clamping or T-slots guide, with epoxy resin according to the technical pecifications;

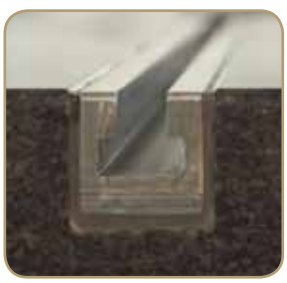
**DRILLING**: granite drilling with diamond tools, of full or through holes (from 3 to 500 mm diameters). Inside these blind holes, threaded inserts can be glued (see table).

**MILLING** with fitted diamond tools (in accordance with the limits of the metal milling). Blind or through milling as per customer drawing.

**SIZE TABLE FOR INSERTS**

| M | D | L | T (N) | S (Nm) |
|---|---|---|---|---|
| **3** | 7.8 | 12 | 5125 | 2 |
| **4** | 9.8 | 16 | 6813 | 3 |
| **5** | 11.8 | 20 | 10204 | 6 |
| **6** | 12.8 | 27 | 14565 | 10 |
| **8** | 14.8 | 34 | 21023 | 25 |
| **10** | 17.8 | 42 | 31154 | 50 |
| **12** | 19.8 | 50 | 40966 | 85 |
| **14** | 21.8 | 60 | 53762 | 135 |
| **16** | 29.7 | 60 | 75455 | 200 |



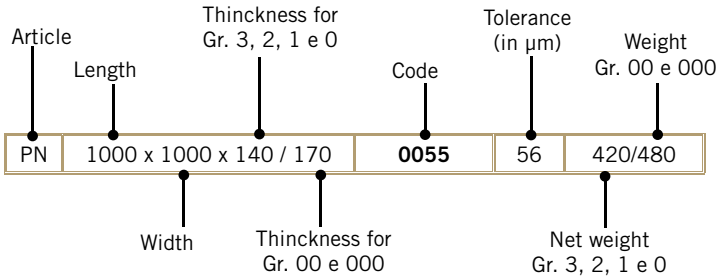
## PN: GRANITE SURFACE PLATES

Black granite surface plates are manufactured in six accuracy grades according to standard ISO 8512-2, with the addiction of high precision grade : “3”, “2”, “1”, “0”, “00” and “000”; in order to satisfy all specific user needs, considered both in a workshop or in a metrological room.
All plates are tested with electronic levels or laser autocollimator in a temperature (20° C) and humidity controlled environment. All plates “Microplan” are supplied with a test report, in which error map and installation instructions are reported. The table hereunder shows the standard sizes, the reference codes and the absolute flatness tolerances (in micrometers). We can supply plates with different sizes according to the customer needs and drawings; with holes, glued threaded inserts, clamping or T-slots guide, clearing grooves and with rubber feet for the smaller sizes.

**ATTENTION:**
For grade “00” and “000” thicknesses are higher!

*The highlighted plates meet the standard **ISO 8512-2**.*

*Box or wooden pallet*




| | SIZE in mm | Grade 3 | Tol. µm | Grade 2 | Tol. µm | Grade 1 | Tol. µm | Grade 0 | Tol. µm | Grade 00 | Tol. µm | Grade 000 | Tol. µm | Net weight KG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PN** | 300 x 200 x 40 / 50 | **0001** | 30 | **0002** | 15 | **0003** | 7 | **0004** | 3.5 | **0005** | 1.9 | **0006** | 1.3 | 08/09 |
| **PN** | 400 x 250 x 50 / 60 | **0007** | 32 | **0008** | 16 | **0009** | 8.0 | **0010** | 4.0 | **0011** | 2.0 | **0012** | 1.5 | 15/18 |
| **PN** | 400 x 400 x 60 / 70 | **0013** | 34 | **0014** | 17 | **0015** | 9.0 | **0016** | 4.5 | **0017** | 2.2 | **0018** | 1.6 | 29/37 |
| **PN** | 500 x 315 x 60 / 70 | **0019** | 34 | **0020** | 19 | **0021** | 9.0 | **0022** | 4.5 | **0023** | 2.2 | **0024** | 1.6 | 28/34 |
| **PN** | 500 x 500 x 70 / 80 | **0025** | 39 | **0026** | 20 | **0027** | 10 | **0028** | 5.0 | **0029** | 2.5 | **0030** | 1.8 | 53/60 |
| **PN** | 630 x 400 x 70 / 80 | **0031** | 39 | **0032** | 20 | **0033** | 10 | **0034** | 5.0 | **0035** | 2.5 | **0036** | 1.8 | 53/60 |
| **PN** | 630 x 630 x 90 / 100 | **0037** | 42 | **0038** | 21 | **0039** | 10 | **0040** | 5.0 | **0041** | 2.6 | **0042** | 1.9 | 107/119 |
| **PN** | 800 x 500 x 90 / 100 | **0043** | 44 | **0044** | 22 | **0045** | 11 | **0046** | 5.5 | **0047** | 2.8 | **0048** | 2.0 | 108/120 |
| **PN** | 1000 x 630 x 110 / 140 | **0049** | 49 | **0050** | 24 | **0051** | 12 | **0052** | 6.0 | **0053** | 3.1 | **0054** | 2.2 | 208/265 |
| **PN** | 1000 x 1000 x 140 / 160 | **0055** | 56 | **0056** | 28 | **0057** | 14 | **0058** | 7.0 | **0059** | 3.5 | **0060** | 2.5 | 420/480 |
| **PN** | 1200 x 800 x 140 / 160 | **0061** | 56 | **0062** | 28 | **0063** | 14 | **0064** | 7.0 | **0065** | 3.5 | **0066** | 2.5 | 403/461 |
| **PN** | 1600 x 1000 x 180 / 210 | **0067** | 66 | **0068** | 33 | **0069** | 16 | **0070** | 8.0 | **0071** | 4.1 | **0072** | 2.9 | 864/1008 |
| **PN** | 2000 x 1000 x 220 / 250 | **0073** | 75 | **0074** | 38 | **0075** | 19 | **0076** | 9.5 | **0077** | 4.7 | **0078** | 3.3 | 1320/1500 |
| **PN** | 2000 x 1500 x 240 / 270 | **0079** | 80 | **0080** | 40 | **0081** | 20 | **0082** | 10 | **0083** | 5.0 | **0084** | 3.5 | 2160/2430 |
| **PN** | 2500 x 1600 x 280 / 330 | **0085** | 92 | **0086** | 46 | **0087** | 23 | **0088** | 11.5 | **0089** | 5.8 | **0090** | 4.0 | 3360/3960 |

## DH/DP: “DHARLA” SERIE - GRANITE SURFACE PLATES

The granite plates of the cheap family named “Dharla”, are supplied in two grades of precision according to the standard DIN 876/0 e DIN 876/00. With all plates is supplied a Test Report with flatness graph, calculated with the grid system.
• Polished sides • 45° Chamfers • Engraved Serial Number

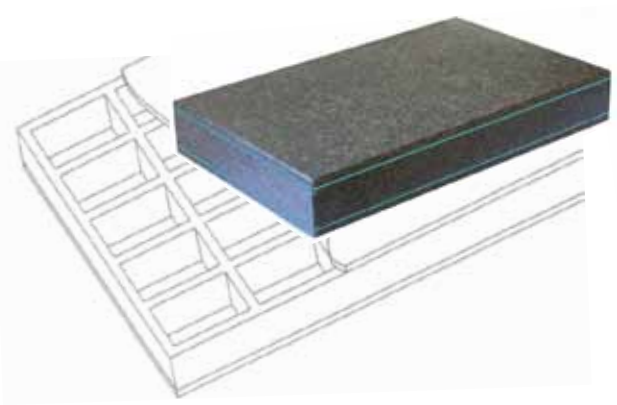
*Polywood Case*

| ART. | SIZE (mm) | DIN GRADE | TOLL. (µm) | NET WEIGHT |
|---|---|---|---|---|
| **DH500** | 500X315X70 | DIN 876/0 | 6.00 | 33 KG |
| **DH630** | 630X400X80 | DIN 876/0 | 6.52 | 60 KG |
| **DH800** | 800X500X100 | DIN 876/0 | 7.20 | 120 KG |
| **DH1000** | 1000X630X140 | DIN 876/0 | 8.00 | 260 KG |
| **DH1200** | 1200X800X160 | DIN 876/0 | 8.80 | 460 KG |
| **DH1600** | 1600X1000X180 | DIN 876/0 | 10.40 | 860 KG |

| ART. | SIZE (mm) | DIN GRADE | TOLL. (µm) | NET WEIGHT |
|---|---|---|---|---|
| **DP500** | 500X315X70 | DIN 876/00 | 3.00 | 33 KG |
| **DP630** | 630X400X80 | DIN 876/00 | 3.26 | 60 KG |
| **DP800** | 800X500X100 | DIN 876/00 | 3.60 | 120 KG |
| **DP1000** | 1000X630X140 | DIN 876/00 | 4.00 | 260 KG |
| **DP1200** | 1200X800X160 | DIN 876/00 | 4.40 | 460 KG |
| **DP1600** | 1600X1000X180 | DIN 876/00 | 5.20 | 860 KG |

## PA: LIGHTENED GRANITE SURFACE PLATES

The inside alveolar structure made of glued crossed granite plates, considerably reduces the weight of the granite surface plate. The advantages with respect of the solid granite plate, are the followings: 40% to 60% of weight reduction; thermal stability, especially in areas subject to temperature changes; better stability since the reduced mass provides a better dissipation of internal tensions due to the low thermal conductivity of granite; lightening simplifies its handling and reduction of the transportation costs.



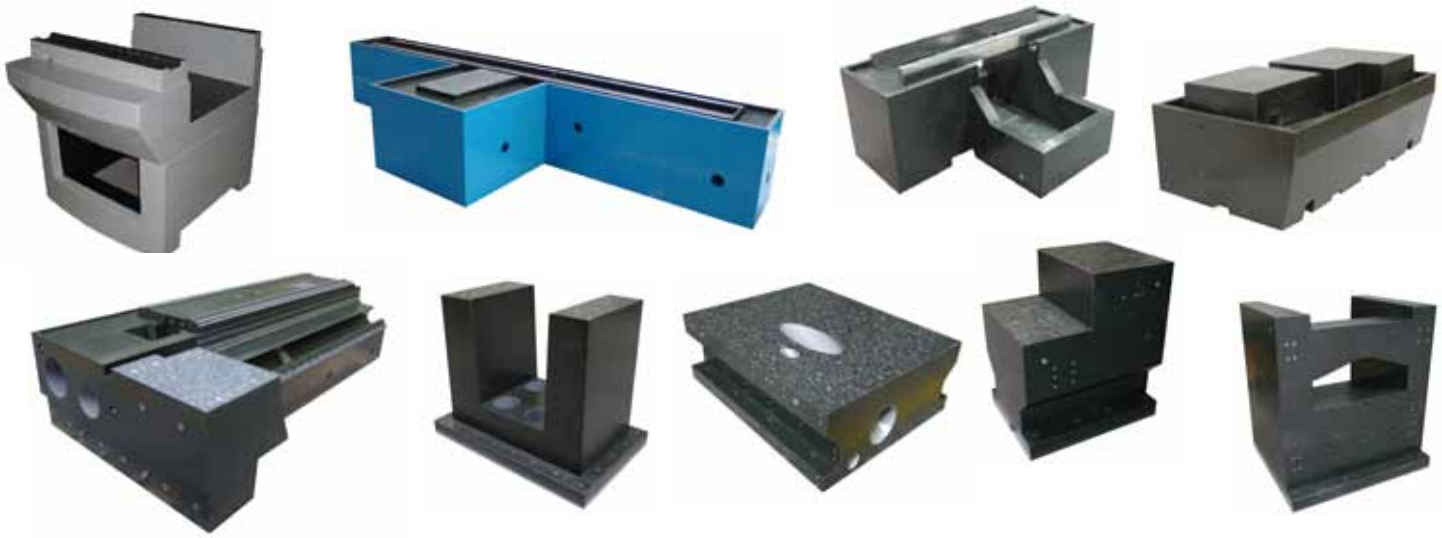
*The second value of thickness indicated in the column "Size" is for grade "00" and "000" (while the first for "1" and "0").*

*Wooden pallet*

| Art. | Size (in mm) | Grade 1 | Toll. µm | Grade 0 | Toll. µm | Grade 00 | Toll. µm | Grade 000 | Toll. µm | Net Weight KG |
|---|---|---|---|---|---|---|---|---|---|---|
| **PA** | 2000 x 1000 x 230 / 260 | **0100** | 19 | **0101** | 9.5 | **0102** | 4.7 | **0700** | 3.3 | 505 / 525 |
| **PA** | 2000 x 1500 x 260 / 290 | **0103** | 20 | **0104** | 10 | **0105** | 5 | **0701** | 3.5 | 763 / 788 |
| **PA** | 2500 x 1000 x 270 / 310 | **0106** | 22 | **0107** | 11 | **0108** | 5.5 | **0702** | 3.7 | 727 / 760 |
| **PA** | 2500 x 1500 x 300 / 340 | **0109** | 23 | **0110** | 11.5 | **0111** | 5.8 | **0703** | 4.0 | 1093 / 1137 |
| **PA** | 3000 x 1000 x 320 / 360 | **0112** | 24 | **0113** | 12 | **0114** | 6 | **0704** | 4.2 | 1052 / 1088 |
| **PA** | 3000 x 1500 x 340 / 390 | **0115** | 25 | **0116** | 12.5 | **0117** | 6.4 | **0705** | 4.4 | 1693 / 1778 |
| **PA** | 3000 x 2000 x 370 / 410 | **0118** | 27 | **0119** | 13.5 | **0120** | 6.8 | **0706** | 4.7 | 2291 / 2377 |
| **PA** | 3500 x 1000 x 370 / 420 | **0121** | 27 | **0122** | 13.5 | **0123** | 6.8 | **0707** | 4.7 | 1459 / 1545 |
| **PA** | 3500 x 1500 x 390 / 440 | **0124** | 28 | **0125** | 14 | **0126** | 7.1 | **0708** | 4.9 | 2153 / 2267 |
| **PA** | 3500 x 2000 x 410 / 460 | **0127** | 30 | **0128** | 15 | **0129** | 7.4 | **0709** | 5.1 | 3225 / 3368 |
| **PA** | 4000 x 1500 x 440 / 490 | **0130** | 31 | **0131** | 15.5 | **0132** | 7.7 | **0710** | 5.3 | 2808 / 2926 |
| **PA** | 4000 x 2000 x 460 / 510 | **0133** | 32 | **0134** | 16 | **0135** | 8 | **0711** | 5.5 | 4142 / 4290 |

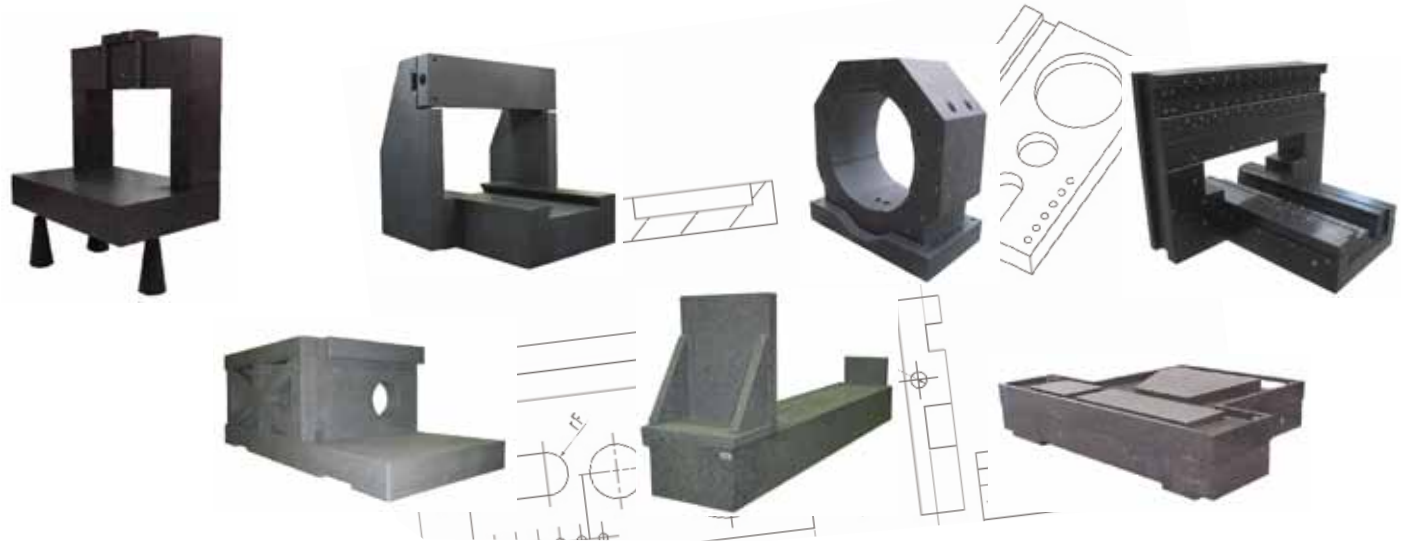
## CELITH: COMPOSITE GRANITE

**CELITH** is a composite granite made up with a mixture of specific granite aggregates of various size grades, bonded with epoxy resin and hardener. This granite is suitable to be poured into moulds, reducing the costs, because the working process is much simpler. Compacted by vibration. Celith stabilizes in a few days. It is poured in wooden moulds (for prototypes or small series) or in steel moulds (for large series); with the possibility to incorporate threaded inserts, "T" slots, etc. It is also possible to add mechanical elements by bonding or remolding. Its low conductivity gives it thermal insulation characteristics. Machine tool benches made in CELITH eliminate the need to stabilize them by running the machine, previously needed for traditional machines after a prolonged storage. In the same way, production cycle breaks during the day have no impact on the machining accuracy. In most applications its high damping properties result in increased performance rates (especially for machine tools) whilst ensuring the quality of machining: • Reduction of mechanical resonance phenomena • Better cutting conditions • Improved tool life and surface finish. In addition, composite granite has a thermal linear expansion coefficient close to the steel one, which allows good integration with mechanical parts that have to be assembled on it.



## SPECIAL PROJECTS UPON CUSTOMER DRAWING

Microplan Group provides special granite bases according to the specific needs and drawing of the Customer: granite bases for machine tools, measuring machines, microelectronics, EDM, drilling of printed circuit boards, bases for test benches, mechanical structures for research centers, etc... The maximum sizes that we manufacture are 10.000 mm length and 3.000 mm width. For those big sizes we usually use Blue Lanhelin granite.



## INNOVATIVE SOLUTIONS FOR MEASURE AND TESTING

The standard measuring instruments normally used are not always the best solution for metrological testing of some mechanical parts. The reasons can be many: a minimum time required for the control, the exorbitant cost of some instruments, the environment in which the test is run (workshop instead of laboratory), the specificity of the workpiece to be measured, the difficulty of use and learning of some complex instruments, the unskilled personnel, etc ... In these cases, the best solution is to use a measuring tool built especially for the control of a specific part.

The equipment presented in the document "Custom's Solutions", are just some examples of the achievements since Microplan Group began to pay attention to this particular field.
The knowledge gained in the Metrology field, especially in precision mechanics production as pneumostatic stages, innovative and composite materials, subsequently in electronics systems and software development; allowed us to address several "measuring problems", thanks to a modular design system and with the integration of technology such as linear scales, laser systems, linear motors, etc. ...
Often the design of a special equipment is made with the customer collaboration, who is most familiar with its production details, and knows what he wants to get a specific measuring instrument. It is not rare that these collaborations, as well as technically satisfy the customer requests, represent a significant saving compared to the expected budget, so much so that in many cases the first realization is followed by other ones.

The technologies applied to metrology are sometimes also used to build machine tools, where precision is a critical requirement and where production takes place with non-traditional processes. Microplan Group today provides its experience to all companies wishing to solve specific measurement problems, proposing innovative solutions technologically advanced and
cost-effective.

*"Custom's Solutions" documentation in now available in PDF file on our website www.microplan-group.com, in the download section.*

## SQ: BLACK GRANITE SQUARES

Perfect for squareness testing, set squares are extremely reliable due to their exceptionally limited tolerances and the stability of the base. Holes are made in larger versions to reduce weight and facilitate the transport. The tolerance of the lateral faces is ± 20 µm/m. Supplied in two grades of precision, for **Laboratory and Workshop** use. Original **Test Report** with Primary Instruments Reference included. Wooden case on request.

| Art. | Cod. | Size (mm) | Use | ▱ µm | ⊥ µm | KG |
|---|---|---|---|---|---|---|
| SQ | 0200 | 200 x 150 x 30 | Laboratory | 2.4 | 1.0 | 1.8 |
| SQ | 0201 | 300 x 200 x 40 | Laboratory | 2.6 | 1.5 | 4.7 |
| SQ | 0202 | 400 x 250 x 50 | Laboratory | 2.8 | 2.0 | 10 |
| SQ | 0203 | 500 x 315 x 60 | Laboratory | 3.0 | 2.5 | 17 |
| SQ | 0204 | 630 x 400 x 60 | Laboratory | 3.2 | 3.2 | 28 |
| SQ | 0205 | 800 x 500 x 80 | Laboratory | 3.6 | 4.0 | 63 |
| SQ | 0206 | 1000 x 630 x 100 | Laboratory | 4.0 | 5.0 | 117 |
| SQ | 0207 | 1200 x 800 x 140 | Laboratory | 4.4 | 6.0 | 210 |
| SQ | 0208 | 1500 x 1000 x 160 | Laboratory | 5.0 | 7.5 | 480 |

*Box or wooden pallet*

| Art. | Cod. | Dimensioni (mm) | Use | ▱ µm | ⊥ µm | Peso KG |
|---|---|---|---|---|---|---|
| SQ | 0196 | 300 X 200 X 40 | Workshop | 6.4 | 6.0 | 4.7 |
| SQ | 0197 | 400 X 250 X 50 | Workshop | 7.2 | 8.0 | 10 |
| SQ | 0198 | 500 X 315 X 60 | Workshop | 8.0 | 10.0 | 17 |
| SQ | 0199 | 630 X 400 X 60 | Workshop | 9.0 | 12.6 | 28 |

## PL: BLACK GRANITE ANGLE SQUARE

Particularly suitable for the control of the Squareness test of measuring machines and machine tools, has a square or rectangular shape that ensures a greater dimensional stability compared to the granite squares. Lapped three sides perpendicular to each other and the upper face (where there is a lightening hole centered); in the lower face there are three adjustment feet.

*Wooden pallet*

| Art. | Cod. | Size (mm) | ▱ µm | ⊥ µm | KG |
|---|---|---|---|---|---|
| PL | 0243 | 500 x 250 x 50 | 3.0 | 2.5 | 14 |
| PL | 0244 | 750 x 350 x 60 | 3.5 | 3.8 | 36 |
| PL | 0245 | 250 x 250 x 40 | 2.5 | 1.2 | 7 |
| PL | 0246 | 350 x 350 x 50 | 2.7 | 1.8 | 18 |
| PL | 0247 | 500 x 500 x 50 | 3.0 | 2.5 | 30 |
| PL | 0248 | 750 x 750 x 60 | 3.5 | 3.8 | 70 |
| PL | 0249 | 1000 x 1000 x 80 | 4.0 | 5.0 | 150 |
| PL | 0250 | 1000 x 500 x 80 | 4.0 | 5.0 | 70 |

## PR: PAIR OF GRANITE "V" PRISMS 90°

Ideal for testing cylinders. The tolerances expressed in the table (in micrometers) refer to flatness of the base, and parallelism between the base and the axis of the V-slot. On request, other faces can be lapped.

*Box*

| Art. | Cod. | Size (mm) | ▱ µm | // µm | ø max mm | KG |
|---|---|---|---|---|---|---|
| PR | 0240 | 100 x 70 x 50 | 2 | 4 | 100 | 1 |
| PR | 0241 | 140 x 100 x 60 | 2 | 4 | 140 | 2 |
| PR | 0242 | 200 x 140 x 70 | 3 | 6 | 200 | 6 |

## CU: BLACK GRANITE CUBES

Manufactured with either **two, four or six** lapped, plane and parallel surfaces. See table for dimensions and tolerances. Special sizes, working as a matched pair and threaded holes on all faces, on request.

*Box*

| Art. | Size (mm) | 2 faces | 4 faces | 6 faces | ▱ µm | // µm | KG |
|---|---|---|---|---|---|---|---|
| CU | SIDE 50 | 0225 | 0226 | 0227 | 1.5 | 2.0 | 0.4 |
| CU | SIDE 100 | 0228 | 0229 | 0230 | 2.0 | 2.0 | 3 |
| CU | SIDE 150 | 0231 | 0232 | 0233 | 2.4 | 3.0 | 10 |
| CU | SIDE 200 | 0234 | 0235 | 0236 | 2.8 | 3.0 | 24 |

## RL: BLACK GRANITE LINEAR RULES

For high precision testing of straightness, to compare guides or lapped surfaces. Their shape has been studied to give maximum stability. The lapping on one face is carried out to three levels of precision with tolerances as shown beneath. They can be supplied with handles on the heads and with wooden case. Sides are ground.

*Box or wooden case*

| Art. | Size (mm) | Grado 1 | Toll. □ | Grado 0 | Toll. □ | Grado 00 | Toll. □ | Peso KG |
|---|---|---|---|---|---|---|---|---|
| **RL** | 300 X 30 X 50 | **0150** | 6.4 | **0151** | 3.2 | **0152** | 2.6 | 1.3 |
| **RL** | 400 X 40 X 60 | **0153** | 7.2 | **0154** | 3.6 | **0155** | 2.8 | 2.2 |
| **RL** | 500 X 50 X 80 | **0156** | 8.0 | **0157** | 4.0 | **0158** | 3.0 | 5.0 |
| **RL** | 630 X 50 X 80 | **0159** | 9.0 | **0160** | 4.4 | **0161** | 3.2 | 7.0 |
| **RL** | 800 X 50 X 100 | **0162** | 10.5 | **0163** | 5.2 | **0164** | 3.6 | 10.5 |
| **RL** | 1000 X 60 X 120 | **0165** | 12.0 | **0166** | 6 | **0167** | 4.0 | 15 |
| **RL** | 1400 X 60 X 150 | **0168** | 15.2 | **0169** | 7.6 | **0170** | 4.8 | 35 |
| **RL** | 1600 X 80 X 180 | **0171** | 16.8 | **0172** | 8.4 | **0173** | 5.2 | 53 |
| **RL** | 2000 X 80 X 200 | **0174** | 20.0 | **0175** | 10.0 | **0176** | 6.0 | 89 |

## RP: BLACK GRANITE LEVEL PARALLEL RULES

Manufactured with two H-shaped lapped parallel surfaces to ensure stability and lightness.
The three levels of tolerances are shown in the table. The parallelism tolerance is equal to the flatness. If required, they can be supplied with handles on the heads and wooden case.

| Art. | Size (mm) | Grado 1 | Toll. □ // | Grado 0 | Toll. □ // | Grado 00 | Toll. □ // | Peso KG |
|---|---|---|---|---|---|---|---|---|
| **RP** | 500 X 50 X 80 | **0180** | 8.0 | **0181** | 4.0 | **0182** | 3.0 | 5 |
| **RP** | 750 X 50 X 100 | **0183** | 10.0 | **0184** | 5.0 | **0185** | 3.5 | 10 |
| **RP** | 1000 X 60 X 140 | **0186** | 12.0 | **0187** | 6.0 | **0188** | 4.0 | 23 |
| **RP** | 1500 X 80 X 180 | **0189** | 16.0 | **0190** | 8.0 | **0191** | 5.0 | 40 |
| **RP** | 2000 X 100 X 220 | **0192** | 20.0 | **0193** | 10.0 | **0194** | 6.0 | 80 |

*Box or wooden case*

## SI-SIC SILICON CARBIDE HIGH PRECISION MEASURING INSTRUMENTS

The silicon carbide Si-sic is a ceramic with exceptional mechanical characteristics: it features an hardness just comparable to diamond, and one of the higher elasticity modulus of all materials known. Furthermore, the low thermal expansion coefficient of Si-sic makes it an ideal material to build very high precision measuring instruments, such as the Microplan «NanoLine» family.

## RS: SI-SIC RULES

TheSi-Sic parallel bar are provided in the sizes listed in the table, and are lapped to grade 000: they guarantee dimensional stability, wear resistance, low weight compared to the granite ones and are therefore ideal for use in metrology and machine tools fields.

| | Size | □ µm | // µm |
|---|---|---|---|
| RS 0750 | 750 X 56 X 116 mm | 1.6 | 1.6 |
| RS 0751 | 1000 X 56 X 116 mm | 1.8 | 1.8 |
| RS 0752 | 1500 X 56 X 156 mm | 2.2 | 2.2 |
| RS 0753 | 2000 X 76 X 156 mm | 2.6 | 2.6 |

*Side faces grinded.*

## PS: SI-SIC PARALLEL BLOCKS

The silicon carbide Si-sic parallel blocks are very light and have excellent dimensional stability. They are machined and lapped to grade 000 over three sides at 90 ° and grinded over the lateral faces. Their shape allows their positioning in an easy and precise way.

| | Size | □ // µm | ⊥ µm |
|---|---|---|---|
| PS 0760 | 350 x 350 x 46 mm | 1.3 | 1.0 |
| PS 0761 | 500 x 500 x 56 mm | 1.4 | 1.5 |
| PS 0762 | 750 x 350 x 56 mm | 1.6 | 2.3 |
| PS 0763 | 1000 x 350 x 76 mm | 1.8 | 3.0 |

*Side faces grinded, lapped on 3 faces.*

## CC: ADJUSTMENT COLUMNS FOR SURFACE PLATES

Adjustment columns model "**CC**" are made of synthetic granite "CELITH", with tripode section base for an easy positioning under the plate.

| Art. | Cod. | Description | Colour | KG |
|---|---|---|---|---|
| CC | 0741 | Column with adjustable height H. 380/480 mm | Naturale | 15 |
| CC | 0743 | Column with adjustable height H. 480/580 mm | Naturale | 19 |
| CC | 0742 | Column with adjustable height H. 580/680 mm | Naturale | 20 |
| CC | 0744 | Column with adjustable height H. 680/780 mm | Naturale | 24 |

*Wooden pallet*

**SUGGESTED COLUMNS NUMBER**

- Nr. 3/5 for plates 1200x800
- Nr. 5 for plates untill 2000x1000
- Nr. 7 for plates 2000x1500
- Nr. 9 for plates 2500x1500
- Nr. 11 for plates 3000x2000
- Nr. 13 for plates 4000x2000

## TN: SUPPORT FOR SURFACE PLATES - TABLE TYPE

Manufactured with welded and laminated steel sections with 5 adjusting screws and 4/7 vibration damping feet.

Paint color: Pantone 320

*Plastic film wrapped*

| Art. | Cod. | Stand for plate size | Weight |
|---|---|---|---|
| TN | 0260 | 630x400 mm | 25 Kg |
| TN | 0261 | 630x630 mm | 29 Kg |
| TN | 0262 | 800x500 mm | 30 Kg |
| TN | 0263 | 1000x630 mm | 35 Kg |
| TN | 0264 | 1000x1000 mm | 38 Kg |
| TN | 0265 | 1200x800 mm | 38 Kg |
| TN | 0266 | 1600x1000 mm | 44 Kg |
| TN | 0267 | 2000x1000 mm | 48 Kg |

## TC: SUPPORT FOR SURFACE PLATES - TABLE TYPE WITH DRAWERS

Like the previous model but with locking drawers 500x500 mm in welded steel and lock. With 5 adjusting screws and 4/7 vibration damping feet.
Paint color: Pantone 320
Drawers: RAL9010

**1 drawer until 1000x1000**
**2 drawers from 1200x800**

*Plastic film wrapped*

| Art. | Cod. | Stand for plate size | Weight |
|---|---|---|---|
| TC | 0277 | Drawer 500x500 | 5 Kg |
| TC | 0270 | 630x630 mm | 29 Kg |
| TC | 0271 | 800x500 mm | 30 Kg |
| TC | 0272 | 1000x630 mm | 35 Kg |
| TC | 0273 | 1000x1000 mm | 38 Kg |
| TC | 0274 | 1200x800 mm | 38 Kg |
| TC | 0275 | 1600x1000 mm | 44 Kg |
| TC | 0276 | 2000x1000 mm | 48 Kg |

## TA: SUPPORT FOR PLATES - CUPBOARD TYPE

Manufactured with welded steel with two doors laminated cabinet and one shelf inside. With 5 adjusting screws and 4/7 vibration damping feet.

Paint color: Pantone 320

*Plastic film wrapped*

| Art. | Cod. | Stand for plate size | Weight |
|---|---|---|---|
| TA | 0285 | 1000x630 mm | 60 Kg |
| TA | 0286 | 1000x1000 mm | 70 Kg |
| TA | 0287 | 1200x800 mm | 70 Kg |
| TA | 0288 | 1600x1000 mm | 100 Kg |
| TA | 0289 | 2000x1000 mm | 130 Kg |

Welded Steel Support of the economic serie "Dharla". Supplied with adjustment screws, **without vibration dampers**.

Painting color: Ral 4008 (violet)

| Art. | Cod. | Stand for plate size | Weight |
|---|---|---|---|
| DS | 630 | 630X400 mm | 25 Kg |
| DS | 800 | 800x500 mm | 28 Kg |
| DS | 1000 | 1000x630 mm | 30 Kg |
| DS | 1200 | 1200x800 mm | 35 Kg |
| DS | 1600 | 1600x1000 mm | 40 Kg |

## VR: ADJUSTABLE FEET

Support and adjustment feet are made of burnished steel, with threaded bases, sphere head screws and oscillating plates.
Supplied in three sizes as per table.

*Box*

| Art. | Cod. | ø Screw | ø Ext | H min/max |
|---|---|---|---|---|
| **VR** | **0253** | M30X1.0 | 55 mm | 68 ÷ 88 mm |
| **VR** | **0254** | M40X1.5 | 65 mm | 68 ÷ 98 mm |
| **VR** | **0257** | M60X1.5 | 100 mm | 94 ÷ 110 mm |

## RB0700: PRECISION ROLLERS FOR CYLINDER ALIGNMENT AND LEVELLING

Precision rollers system suitable to align large diameter cylinders to be measured. It is made with a granite base fitted with precision slots equipped with a lock on the slot.

| | |
|---|---|
| Minimum/Maximum diameter of cylinders | 30 ÷ 700 mm |
| Maximum load for each couple | 2000 Kg |
| Precision | ± 0.02 mm |
| Weight | 18 Kg / cad. |

*Wooden pallet*

## AR: ARCHIMEDE - LARGE DIAMETERS MEASUREMENT

Archimede is a digital electronic instrument studied for the accurate measuring of large diameters. The value of the diameter is obtained starting from the α angle determined by the three cylindrical contacts (two fixed and one rotating). The precision of the diameter changes in function of the diameter, which itself changes in function of the angle sine. On the digital display appear: the diameter value, the α angle value and the indication of battery charge state. The instrument is provided with a serial output for the transmittion of data to the PC and supplied with battery charger, user's handbook in a practical ABS anti-shock suitcase. The instrument is available with two different accuracies (LA: Low accuracy and HA: High accuracy)

OUTSTANDING FEATURES:
- Digital display
- Resolution: 0.01 mm
- Integrated micro-processor
- Rechargeable batteries
- Weight: 3,8 Kg

- Accuracy for model Archimede **LA** (mm)
± {0.02 + [20 x ($D^2$ /200)]}

- Accuracy for model Archimede **HA** (mm)
± {0.01 + [10 x ($D^2$ /200)]}

*D (m)*

- Outer diameter:
  - min. 500 mm
  - max 6000 mm

- Internal diameter:
  - min. 1100 mm
  - max 6000 mm

| Art. | Cod. | Description |
|---|---|---|
| **AR** | **0725** | Archimede LA - Standard accuracy |
| **AR** | **0726** | Archimede HA - High accuracy |

## CI: BLACK GRANITE CYLINDERS

The control cylinders in granite are manufactured with two support surfaces perpendicular to the cylindrical surface. Particularly suitable for orthogonality control, have reduced tolerances on straightness and roundness on the cylinder generatrices. Wooden case on request.

*Box or wooden case*

| Art. | Cod. | ø mm | H mm | ⊥ µm | ⌭ µm | KG |
|---|---|---|---|---|---|---|
| CI | 0390 | 70 | 200 | 2.0 | 2.0 | 2,3 |
| CI | 0391 | 80 | 300 | 3.0 | 3.0 | 4.5 |
| CI | 0392 | 100 | 400 | 4.0 | 4.0 | 9.5 |
| CI | 0393 | 120 | 500 | 5.0 | 5.0 | 17 |
| CI | 0394 | 160 | 800 | 6.0 | 6.0 | 48 |

## CP: CROSSPOINTS PAIR

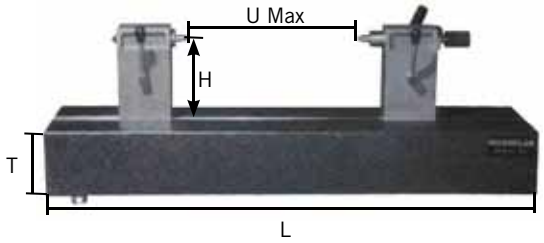
Meehanite WA cast iron structure, standardized anti-wear. Steel tube in cemented Ni-Cr. Points with attachment CM 2. Parallelism between the axis point and the base 0,01 mm. Point alignment ± 0,01 mm. Overall dimension: 350 mm. Key 16 mm.

*Box or wooden case*

| Art. | Cod. | Description | KG |
|---|---|---|---|
| CP | 0385 | Crosspoints H. 150 mm | 23 |
| CP | 0386 | Crosspoints H. 200 mm | 28 |
| CP | 0387 | Crosspoints H. 250 mm | 42 |

## BC: CONCENTRICITY TEST BENCH

Composed by a pair of cross-points (CP) and a black granite base of a reduced width, lapped at grade 1 and a central T-slot mm 16H8; 3 adjustable feet.




| Art. | Cod. | U Max | H (mm) | L (mm) | W (mm) | T (mm) | KG |
|---|---|---|---|---|---|---|---|
| BC | 0140 | 300 mm | 150 | 700 | 250 | 100 | 76 |
| BC | 0141 | 600 mm | 150 | 1000 | 300 | 140 | 149 |
| BC | 0142 | 1100 mm | 150 | 1500 | 350 | 180 | 307 |
| BC | 0143 | 1600 mm | 200 | 2000 | 400 | 220 | 556 |
| BC | 0144 | 2100 mm | 200 | 2500 | 500 | 250 | 928 |

*Wooden pallet + box*

## HV0525: HORIZONTAL & VERTICAL CONCENTRICITY TEST BENCH

Composed by a black granite single block shaped to lodge two stainless steel points aligned with the "V"; the "V" axis is parallel to the base. You can place the bench in horizontal position through the handle fixed on one head, lapped and perpendicular to the axis of the points. On request, other sizes are supplied.

| | |
|---|---|
| Size in mm | 400 x 200 x160 |
| Distance between points | 50 ÷ 200 mm |
| Supplied points | Nr.1 80 x ø30 mm + Nr.2 150 x ø30 mm |
| Flatness on faces | 0.004 mm ( ▱ ) |
| Squareness tol. | 0.004 mm ( ⊥ ) |
| Base/points axe tol. | 0.005 mm ( // ) |
| Weight | 28 Kg |

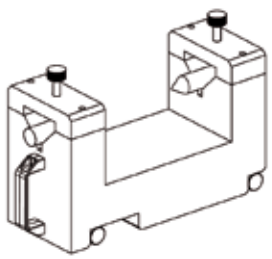
*Box + wooden pallet*

## BB0530: CONCENTRICITY TEST BENCH WITH SINE BAR

Similar to the "HV Bench" for the top part, but with seats for lodging sine bars, placed at 300 mm. For the testing of tapered elements, by using small test blocks, you get some angles between the base and the axis of the points. On request, other sizes are supplied.

| | |
|---|---|
| Size in mm | 400 x 200 x160 |
| Distance between points | 50 ÷ 200 mm |
| Sinebar rollers dist. tol. | 300 mm ± 0.004 mm |
| Supplied points | Nr.1 80 x ø30 mm + Nr.2 150 x ø30 mm |
| Flatness on faces | 0.004 mm ( ▱ ) |
| Squareness tol. | 0.004 mm ( ⊥ ) |
| Base/points axe tol. | 0.005 mm ( // ) |
| Weight | 27 Kg |

*Box + wooden pallet*



## PC: GAUGE STAND SUPPORTS

**PC0317 SMOOTH COLUMN FOR GAUGE STAND SUPPORT** Adjustable arm set composed of stainless steel column Ø 20 mm H 220 mm, stainless steel arm Ø 16 mm, slider with separate screw stops for arm and column, fine adjustment, gauge attachment Ø mm 8H7, screw for attachment to base. (PC 0319 or PC 0320) (*Gauge not included*)

**PC0318 THREADED COLUMN FOR GAUGE STAND SUPPORT**
Adjustable arm set with threaded column composed of: stainless steel threaded column Ø 35 mm H300 mm, nut for vertical movement, stainless steel arm Ø 20 mm, slider with separate screw stops for column and arm, fine adjustment, gauge attachment Ø mm 8H7, screws for attachment to the base PC0319 or 0320. (*Gauge not included*)

**PC0319 BASE FOR A GAUGE STAND 250 X 160 X 40 MM GRADE 1**
Granite base for gauge stand 250 x 160 x 40: upper face lapped grade 1 with hole for M10 screw for threaded or smooth columns and rubber feet.

**PC0320 BASE FOR A GAUGE STAND 300 X 200 X 50 MM GRADE 1** Base for gauge stand 300 x 200 x 50 mm lapped grade 1 on the upper face with hole for M10 screw; available for threaded or smooth columns and rubber feet.

**PC0322 "PLUTO" GAUGE STAND SUPPORT WITH FINE ADJUSTMENT**
Black granite base mm 300 X 200 X 50 lapped grade 0, with column ø 35X300 mm, aluminium slider. Fine adjustment. (*Gauge not included*)

| Gauge stand supports | |
|---|---|
| PC0317 | Smooth column for gauge stand support (without base) |
| PC0318 | Threaded column for gauge stand support (without base) |
| PC0319 | Granite base 250x160x40 gr. 1 with hole for M10 screw |
| PC0320 | Granite base 300x200x50 gr. 1 with hole for M10 screw |
| PC0322 | Gauge stand support with fine adjustment and granite base 300x200x50 Gr. 0 (gauge not included) |

*Box*

## PC0315: "LINO" - VACUUM/PNEUMOSTATIC GAUGE STAND SUPPORT

Suitable for flatness, straightness and squareness measurement. Device composed by an angle base made in aluminium strength anodised alloy. Each unit consists of an air bearing, fixed to the sliding surface plate through a pneumatic vacuum action. On the base is located a flexible arm for gauge stand with 8H7 hole suitable for standard gauges. It is possible to assemble the two elements of the base for a linear guided movement or use the upper unit only for the free sliding on top of the surface plate. You can independently switch on and off pressure and depression by the two valves. Provided with a pneumatic station, the stand support is extensively used on granite surface plates with one or more lapped faces. Adjustable "L"-base according to different sliding surfaces.
Feeding device: COMPRESSED AIR 4 BAR / CONSUMPTION 30 l/min. (*Dial gauge not included*)

*Box*

## PT0340: ROCKO - SQUARENESS TESTING

Rocko is a squareness test instrument with gauge stand (gauge not supplied) composed by: a structure in black granite with the support surface, a vertical sliding lapped faces and a sliding cart on air bearing with stiffness obtained by a Venturi vacuum generator.
The vacuum-pneumatic vertical cart is moved by a valve which works thanks to a pneumatic piston linked to the cart by a wire. Turning the valve knob, the cart will move in two directions, up and down, with progressive speed. The pneumatic movement avoids the direct contact of the cart by the operator, in order to provide repeatability and stability.

*Wooden case*

| Technical properties | |
|---|---|
| Height | 466 mm |
| Width | 140 mm |
| Thickness | 240 mm |
| Run | 300 mm |
| Angle error | 1" |
| Straightness | 0.001 mm |
| Repeatability | 0.001 mm |
| Air power | 3.5 Bar |
| Weight | 29 Kg |

## PT: PERTEST - SQUARENESS TESTING

The perpendicularity test instrument (PERTEST) allows practically, quickly and directly to survey perpendicularity and straightness errors with the lowest tolerance. No tare, squares or cubes are required. Pertest is always ready to be used since the structure in granite and the working precision assure stability and repetition. The sliding of the gauge stand (not supplied) is on air bearings as for the movement on the base in order to avoid all friction and wear causes. The gauge is moved up and down by pushing a button; moreover Pertest is provided with filtering and regulation unit for the compressed air.

*Wooden case*

| | PT0325 | PT0326 | PT0327 | PT0328 | PT0329 |
|---|---|---|---|---|---|
| Height | 500 | 725 | 1000 | 1300 | 1800 |
| Width | 250 | 250 | 300 | 350 | 450 |
| Thickness | 140 | 140 | 140 | 160 | 180 |
| Run | 250 | 500 | 750 | 1000 | 1500 |
| Angle error | 1" | 1" | 1" | 1" | 1" |
| Straightness | 0.001 | 0.002 | 0.003 | 0.004 | 0.005 |
| Repeatability | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 |
| Air power | 4.5 Bar | 4.5 Bar | 4.5 Bar | 4.5 Bar | 4.5 Bar |
| Weight | 22 | 45 | 60 | 100 | 180 |

## DG: AXIAL MEASURING PROBE AND REMO BLUETOOTH INTERFACE

**Remo** is an electronic interface to connect probes (LVDT or half-bridge probes) to a PC through a Bluetooth radio system. This tool is very useful in those cases where the probes are applied to moving parts. As you know, the cable used to plug the probe, during moving measurement can affect the measurement accuracy, especially when the probe is set to its maximum resolution.
Thanks to Remo interface, located on the moving parts and connected to the probe through its special plug, you can send the measurements to the PC via Bluetooth, using a specific software that displays the measurement results both in a numeric and a graphic way. Remo interface houses a power switch, the battery charger plug, the probe connector and a multi-color LED that shows the connection and the battery status.
**ED Axial measuring probe** is based on differential transformer law LVDT, with a body diameter of 8 mm and a shaft sliding through a sleeve bearing. Return motion via a mechanical spring.


| Description | |
|---|---|
| **ED0220** | Remo - Bluetooth Interface and Software for axial probe |

| | Measuring range | Measure force | Resolution mm | Stem ø |
|---|---|---|---|---|
| **ED0217** | ± 0,5 mm | 0,7 N | 0,0001 | 8 mm |
| **ED0219** | ± 1,0 mm | 0,7 N | 0,0002 | 8 mm |
| **ED0221** | ± 5,0 mm | 0,9 N | 0,001 | 8 mm |

*Box*

## TR: ROTARY TABLE ON AIR BEARINGS

The rotary table is composed of granite disks moving on a pressure/vacuum air bearings in a way to obtain the maximum rigidity even changing loads for testing. The bottom disk can translate on the base while the upper disk rotates round the vertical axis, all thanks to the air bearing system. The instrument comes supplied with a compressed-air filtering/regulation unit and controlling device. Other sizes on request.

| | TR0475 | TR0477 | TR0478 |
|---|---|---|---|
| Disc Ø | 290 mm | 390 mm | 490 mm |
| Net weight | 36 Kg | 62 Kg | 106 Kg |
| Pressure | 4.5 Bar | 4.5 Bar | 4.5 Bar |
| Rotary axis precision | 1 µm | 1 µm | 1 µm |
| Horizontal disc precision | 2.0 µm | 2.5 µm | 3.0 µm |
| Max. load | 60 Kg | 100 Kg | 170 Kg |

## TR0476: ADJUSTMENT SYSTEM

It is an accessory for the rotary table, the centering system allows centering a part on the vertical axis of the rotating table; mounting a centering chuck to clamp the workpiece, by acting on the three level adjustments placed at 120° it is possible to adjust the perpendicularity of the vertical axis. With the two 90° regulation knobs it is possible to center the workpiece axis and align it to the rotation axis. Built in hardened steel, it is fixed to the rotary table thanks to the special fixing holes.

*Box*

## TM0479/0489: MOTORIZED ROTARY TABLE

The pneumostatic precision rotary table is an instrument for concentricity checking. It's made with precision lapped granite discs that move through a vacuum-air bearing support which ensures high stiffness, regardless to any value of load capacity provided. The top granite disc of the table, rotate thanks to an air bearing optimized for this application, that allows a total Runout of 0.1 microns. The lower disc support can move over the board where the rotary stage is placed, thanks to the pneumostatic air bearing. The standard motorization provided has an angular resolution of 0.017° while "high accuracy" version 0.00055°. This rotary stage is designed to integrate a wide range of precision motion applications. Typical applications are: monitoring concentricity, laser reverse engineering, indexing systems for image acquisition, and optical metrology used as a reference axis. The TM is available with Ø 290 mm, like the model TR. Customer requirements for **different sizes and drilling**, are welcome. The Rotary stage is supplied with a filter/air control and a pneumatic control unit.

| | TM0479 | TM0489 |
|---|---|---|
| Diameter | 290 mm | 290 mm |
| Radial / axial error motion | ≤ 0.125µm | ≤ 0.125µm |
| Angular error motion | ≤ 1 µrad | ≤ 1 µrad |
| Axial load capacity | 60 kg | 60 kg |
| Axial stiffness | 10.8kgf/µm | 10.8kgf/µm |
| Air supply | 60psi (4 bar) | 60psi (4 bar) |
| Motor DC (Frameless) | Microstep, Brushless | Microstep, Brushless |
| Encoder resolution | **0.017°** | **0.00055°** |
| Rotational speed | max 360°/sec | max 360°/sec |

## AB: AIR BEARINGS

In recent years air bearings have been used in several fields: for measuring machines, machine tools, control benches, optoelectronic applications, etc. Due to their particular properties they have reached a large diffusion: precision, extremely low friction, good rigidity, endless life, vibration-proof, the possibility of moving considerable weights using minimum power. Moreover we can obtain excellent results by applying air bearings to the granite guides and then reaching linearity precision of about 0.2 µm/mt. In order to facilitate the conception of machines, air bearings are manufactured in standard sizes and circular shapes to obtain their peak efficiency (we can supply right-angled shaped too, but their efficiency shrinks in relation to the area). This article is made from an aluminium alloy that has been anodised for strength. The sliding area is lapped. We produce two versions of air bearings:

**AB 0480/0486: ADJUSTMENT AIR BEARINGS**
fitted and adjusted with thin screws which operate on a steel ball located in the proper seat.

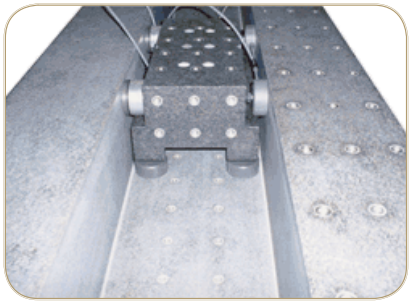
**AB 0487/0493: CONTRAST AIR BEARINGS**
they have to be fitted inside proper seats generally obtained from the cart itself in a way to exercise a regular thrust on the bearing through compressed - feedings of air. They usually have to be placed together with the adjustable bearings.

| Art. | Cod. | Type | P (N) 4.5 Bar | Ø (mm) | Thickness mm |
|---|---|---|---|---|---|
| **AB** | **0480** | Adjustment | 170 | **30** | 14 |
| **AB** | **0481** | Adjustment | 350 | **40** | 16 |
| **AB** | **0482** | Adjustment | 590 | **50** | 20 |
| **AB** | **0483** | Adjustment | 790 | **60** | 24 |
| **AB** | **0484** | Adjustment | 962 | **70** | 28 |
| **AB** | **0485** | Adjustment | 1300 | **80** | 32 |
| **AB** | **0486** | Adjustment | 2000 | **100** | 40 |
| **AB** | **0490** | Contrast | 170 | **30** | 12 |
| **AB** | **0491** | Contrast | 350 | **40** | 14 |
| **AB** | **0492** | Contrast | 590 | **50** | 18 |
| **AB** | **0493** | Contrast | 790 | **60** | 20 |
| **AB** | **0494** | Contrast | 962 | **70** | 23 |
| **AB** | **0495** | Contrast | 1300 | **80** | 27 |
| **AB** | **0496** | Contrast | 2000 | **100** | 31 |

*Box*

*Contrast air bearings*

*Adjustment air bearings*



*Application sample*

## LASER MEASURING MACHINES

As a consequence of the rapid evolution of laser sensors, with the resulting increase in the speed of measurement capture and accuracy down to near micron levels, there is increasing demand for non contact measuring systems capable of controlling different parts with a variety of characteristics. Some applications are limited to 2D profile detection for the determination of measurements of steps, chamfers, joints, heights, widths and radius of curvature. Other applications require the 3D examination of the piece to be controlled, especially for laser applications in Reverse Engineering. Thanks to the **Blues and Swing** system there is the possibility to detect 2D profiles or a series of them, in order to determine measurements of different points of the same piece. It is also possible to create 3D scans and to transmit the relevant file to software for quality control or to software for subsequent CAD CAM data conversion to be sent to the production machine. Laser measuring systems are successfully used in the following sectors: mechanical engineering, plastic moulds, aerospace, packaging. "**SWING R5**" is a 5 axis measuring machine with a laser sensor, largely used in measuring and in Reverse Engineering of turned, milled and moulded plastic parts. The system scans different parts in 2 and 3D, obtaining 2D profiles and point clouds that are combined in a unique 3D file, usable with CAD-CAM. "**BLUES**" is a 2 axis measuring system, for High Definition Reverse Engineering of moulds in the graphic and artistic fields, with a third auxiliary rotary axis, intended for 2D measurement of joints and shafts.
With the "**EMERALD**" periscope it is possible to scan the internal portion of cavities and holes, in order to measure diameters, races, threads and radii, without having to section the piece to be measured. Thanks to **METRACS©**Microplan software, it is possible to detect intuitively measurements on 2D profiles of diameters, step heights, throat depths, radius of curvature, flare angles, threads and race widths, both in Cartesian and in polar coordinates. The surveyed measurements are saved in report form with automatic calculation of the main statistical parameters, which can be used by the customer for production control.

## AF0600: "WILMA" LASER STRAIGHTNESS MEASURING DEVICE

The electronic device "Wilma" is suited for Straightness control of machine tool guides on which it is placed, related to a steel wire stretched at the ends by two adjustable supports with pulleys (not supplied). Any error is indicated by a LED display placed on the top of the instrument, and thanks to a digital micrometer table it's possible to read the straightness deviation. The instrument can store up to 254 measurements: using the appropriate serial cable all the measures can be uploaded to a PC and displayed by the software supplied. The instrument is powered by rechargeable batteries and is supplied in a ABS suitcase, complete with battery charger (220V-50 Hz), one coil spring steel, the "Wilma" Software CD-R and the user manual.


- **Resolution**: 0.001 mm
- **Precision**: ± 0.005

Electronics based on microprocessor
**Auto-calibration** on each switch on
Solid State Laser optic - visible field-Class II
Vertical Adjustment
Optical rule gauge

- **Temperature of use**: 15° / 25° C
- **Wire diameter**: 0.30mm
- **Wire length**: ca. 900 m (500 gr.)

Allowed wire deviation: 35 mm

- **Powering**: NI-MH Rechargeable batteries
- **Recharging time**: 16 ore ca.
- **Autonomy**: about 10 hours

Self extinction when the battery is exhausted

- **Display**: bicolour led panel + LCD Display
- **RS-232** Interface for PC connection
- **Overall dimensions**: 152x227xH217 mm
- **Weight**: 5,1 Kg

*Box*

Wilma
wire laser alignment

## LE101: ELECTRONIC LEVEL WITH ANALOG READOUT

The LE101 electronic level is an high-precision instrument for testing the inclination and the slope relative to the horizontal reference, or any given angle. The reading are expressed in seconds of arc, thanks to a numeric display that allows a rapid readout. The instrument works on a pendulum principle. A pendulum always hangs vertically thus allowing measurement of the variance relative to the horizontal base. For all levels, the mechanic is housed in a oil-filled metallic box with high shock protection. The electronic level is currently employed in the following applications:
• Straightness error detection, flatness and parallelism; • Machinery mounting and leveling; • Testing of inclination, slant and flexion in civil engineering.
The electronic level is composed of the LE101 sensing unit and the VA110 readout unit. The data are transmitted from the sensor to the display by cable. Using this configuration the user can read the inclination values on the display even if the sensor is in an awkward position. A switch allows to select one of the 3 measuring scales. It is possible to connect two LE 101 sensing units to the VA 110 display unit for readings to be collected from different sources. This is particularly useful where floors are not perfectly stable. Rechargeable battery powered, has a warning indicator of low charge. It is supplied in ABS box with User Manual.

- **Resolution:**

Range A: 250 µm/m / Range B: 50 µm/m / Range C: 5 µm/m for division
***High Sensibility on request***
Range A: 20 µm/m / Range B: 10 µm/m / Range C: 1 µm/m for division

- **Measure field:**

Range A: 5000 µm/m / Range B: 1000 µm/m / Range C: 100 µm/m
*High Sensibility* on request
Range A: 400 µm/m / Range B: 200 µm/m / Range C: 20 µm/m

- **Reaction time**: 3 sec typical
- **Zero setting**: ± 1500 µm/m
- **Straightness**: ± 2%
- **Reference temperature**: 20°C - 50% U.R.
- **Power**: rechargeable batteries
- **Autonomy**: 20 h standard mode, 15 h in differential mode
- **Recharge time**: about 15 hours
- **Battery charger power**: 220 V a.c. 20 mA.
- **Level weight**: with 100 mm base: 1,2 Kg / 200 mm base: 1,8 Kg / with squared base: 3,9 Kg
- **VA110 Unit weight**: 1 Kg
- **Level dimension**: 106 x 50 x 87 mm (senza base)
- **VA 110 dimension**: 205 x 160 x 115 mm
- **Cable length**: 3 m
- **Input**: 2 external differentiable

| | | |
|---|---|---|
| **LE** | **0412** | LE101 level with 100 or 200 mm base + battery charger |
| **LE** | **0420** | LE101 level with squared base + battery charger |
| **LE** | **0435** | VA110/PC connection cable (optional) |
| **LE** | **0440** | VA110 Readout unit |
| **LE** | **0439** | WPLAN©Microplan software for Windows (optional) |

*Box*

## LE201: DIGITAL ELECTRONIC LEVEL

**LE201** electronic level is an high precision instrument for very small angle measurement, with the following specifications:

• MICROPROCESSOR-BASED LOGIC • STRAIGHTNESS AND FLATNESS MEASUREMENTS • USER-SELECTABLE MEASURE UNIT: µm/m, sec, mrad • ONLY THREE KEYS KEYBOARD: UP, DOWN E ON/OFF • OPTIONAL WINDOWS SOFTWARE FOR DATA PROCESSING • DIFFERENTIAL MODE (with "LE 301" level)

This electronic level is based on a high performance microprocessor. The microprocessor is in charge of every operation within the instrument, starting from the position transducer (a very sensitive LVDT- Linear Variable Differential Transformer), trough the AD converter, ending with the system calculations and data display. Measures are continuously taken and processed, to average out electronic noise and high-frequency mechanical vibrations. Sensitivity is as high as 0.5 µm/m (0.1 second of arc). The internal firmware manages the whole acquisition process, the measures averaging and the data display on a 16-characters LCD. Thanks by two buttons on the front panel, the measuring reference can be moved up and down, to set the zero and simplify the process. The digital electronic level may be supplied with an optional Windows based software, especially designed for an easy and straightforward data processing, archiving and printing, as well as graphic rendering of the surface or line under test. This software allows the operator to produce a complete and accurate report of the measured surfaces. Supplied in ABS box with User Manual.

**Resolution**: 0.1 sec / 0.5 µrad / 0.0005 mm/m
**Measure field**: ± 655 sec / ± 3275 µm/m
**reaction time**: 3 sec typical
**Straightness**: ± 2%
**Reference temperature**: 20°C - 50% U.R.
**Power**: NI-MH rechargeable batteries
**Battery charger power**: 220 V – 50 Hz
**Autonomy**: 10 ore
**Recharge time**: about 15 hours
**Weight**: 100/200/S base: 1.4 Kg /2.0 Kg / 4.2 Kg
**Dimensions:** 106 x 126 x 54 mm (without base)
**Interface:** RS-232 per connessione a PC


*Box*

| | | |
|---|---|---|
| **LE** | **0425** | LE201 with 100/200 mm base + battery charger |
| **LE** | **0426** | LE201 with squared base + battery charger |
| **LE** | **0439** | WPLAN©Microplan software for Windows (optional) |
| **LE** | **0435** | Level / PC connection cable (optional) |

## LE301: DIGITAL ELECTRONIC LEVEL

The LE 301 electronic level is part of our range of precision instruments for straightness and flatness measurements. Here its main characteristics listed: • MEASURING SYSTEM OPERATING THROUGH MENUS • STRAIGHTNESS AND FLATNESS MEASUREMENTS • SELECTABLE MEASURE UNIT: µm/m, sec, µrad • STORAGE OF INPUT DATA FOR DEFERRED TRANSMISSION TO PC • RS-232 INTERFACE • PC-RESIDENT SOFTWARE UNDER WINDOWS • DIFFERENTIAL MODE MEASUREMENTS.
This electronic system is based on a high performance microprocessor that drives the A-D converter of a very sensitive LVDT (Linear Variable Differential Transformer). Sensitivity as high as 0.5 micron/meter (0.1 arc seconds). The instrument's internal software guides the operator with an easy menu-based interface, implemented on a 16-characters alphanumeric display and a 6 keys simplified keyboard. A remote control is a valid aid for simple commands and functions. The serial RS 232 link allows data stored in the instrument to be uploaded to a PC for either on-line or off-line processing. In the PC, WPLAN software treats data to yield a complete representation of the measured object, offering also the possibility to produce reports of both numeric and graphic outputs. Supplied in ABS box with User Manual.

**Resolution**: 0.1 sec / 0.5 µrad / 0.0005 mm/m
**Measure field**: ± 655 sec / ± 3275 µm/m
**Reaction time**: 3 sec typical
**Straightness**: ± 2%
**Reference temperature**: 20°C - 50% U.R.
**Power**: NI-MH rechargeable batteries
**Autonomy**: 10 ore (spegnimento temporizzato)
**Recharge time**: about 15 hours (battery test)
**Weight**: base 200: 2 Kg / base quadra: Kg 4
**Dimensions**: 106 x 126 x 54 mm (without base)
**Battery charger power**: 220 V a.c. 50 Hz.
**Internal Software**:
*Measure menu (free measure, straightness, flatness)*
*Zero menu ( relative zero, absolute zero)*
*Setup menu (measure unit, serial no., stanby time)*
**Remote control**
**RS-232 Interface** for PC connection


*Box*

| | | |
|---|---|---|
| **LE** | **0445** | LE301 with 100/200 mm base + battery charger |
| **LE** | **0446** | LE301 with squared base + battery charger |
| **LE** | **0439** | WPLAN©Microplan software for Windows (optional) |
| **LE** | **0435** | Level / PC connection cable (optional) |

## LE401: DIGITAL RADIO TRANSMISSION ELECTRONIC LEVEL

The evolution of the electronic level has been concentrated in this new instrument, LE401 where inclination values are transmitted through a radio connection. The instrument is composed by a digital readout unit VD410 and the pendulum unit LE401. The pendulum unit, as for the other models of electronic level provided by Microplan Group, uses the oil-filled system for shock damping, while the digital readout unit is used for wireless data transmission/reception from the pendulum unit. In the same unit, are placed the ON/OFF button, the PC and battery charger connection and a command keyboard unit. The two units can communicate with 100 meters maximum distance: the VD410 unit can read the signals from 1 up to 4 pendulum units in the same time. The digital and graphic display gives you the exact inclination value, with the inclination direction; a complete range of values can be stored by the VD410 unit and can be uploaded later to a PC through an appropriate cable and with the aim of the WPLAN©MICROPLAN Software (Ver. 5) The data analysis allows to get 4 different results:
• Straightness • Easy-grid flatness • Complete-grid flatness • Parallelism. The operator can also select or change the following parameters:
• Measuring Unit (µm/m; arc seconds; microrad); • Zero Setting (Absolute or differential); • Time-out.
Resolution is 0,5 µm/m. Rechargeable batteries with status indication. The complete instrument set is provided in an ABS suitcase with accessories, battery charger and User Manual.

| | |
|---|---|
| **Resolution**: | 0.1 sec / 0.5 µrad / 0.0005 mm/m |
| **Measure field**: | ± 400 sec / ± 2000 µm/m |
| **Reaction time**: | 3 sec typical |
| **Straightness**: | ± 2% |
| **Reference Temperature**: | 20°C - 50% U.R. |
| **Power**: | NI-MH rechargeable batteries |
| **Autonomy**: | 10 hours (automatic switch-off) |
| **Recharge time**: | about 15 hours (battery test) |
| **Readout unit weight**: | 550 gr. |
| **Overall dimension**: | 115x225x70 mm |
| **Level weight:** | 100/200/S base: 1.2 Kg/ 1.8 Kg/ 3.9 Kg |
| **Overall dimensions**: | 120 x 145 x 50 mm |
| **Battery charger power**: | 220 V a.c. 50 Hz. |
| **Internal Software**: | Measure, function, parameters |
| **Interface** | RS-232 for PC connection |

*Box*


| | | |
|---|---|---|
| **LE** | **0441** | LE401 with 100/200 mm base + battery charger |
| **LE** | **0442** | LE401 with squared base + battery charger |
| **LE** | **0435** | LEVEL/PC connection cable (optional) |
| **LE** | **0443** | VD410 readout unit |
| **LE** | **0439** | WPLAN©Microplan software for Windows (optional) |

## LE051: ANALOG/DIGITAL ELECTRONIC LEVEL

This electronic level is composed by a stabilized cast iron structure with two right-angled sides, useful for testing the orthogonality; two mounted displays, an analogue one and a digital one; a wooden handle (in order to prevent thermal influences on the level structure with the heat of the hands); the pendulum mechanic is mounted in an oil-filled box which ensures protection against accidental shocks. A switch allows the selection between the **five measure scales** available, while a potentiometer allows the "zero" setting. The LE051 is rechargeable battery-powered, with battery status button. The instrument is supplied in ABS suitcase with accessories, battery charger and User Manual.

| | |
|---|---|
| **Resolution**: | A: 250 µm/m, B: 50 µm/m, C: 10 µm/m,<br>D: 5 µm/m, E: 1 µm/m per divisione |
| **Measure field**: | A: 5000 µm/m, B: 1000 µm/m, C: 200 µm/m,<br>D: 100 µm/m / E: 20 µm/m |
| **Reaction time**: | 3 sec typical |
| **Zero setting**: | ± 1500 µm/m |
| **Straightness**: | ± 2% |
| **Ref. temperature**: | 20°C - 50% U.R. |
| **Power**: | rechargeable batteries |
| **Charger power**: | 220 V a.c. 20 mA |
| **Autonomy**: | about 15 hours |
| **Weight**: | Kg. 4,4 |
| **Overall dimensions**: | 220 x 220 x 50 mm |

*Box*


| | | |
|---|---|---|
| **LE** | **0433** | LE051 electronic level + battery charger |
| **LE** | **0435** | LEVEL/PC connection cable (optional) |
| **LE** | **0439** | WPLAN©Microplan software for Windows (optional) |

## LE050: ANALOG ELECTRONIC LEVEL

LE050 electronic level is composed by a granite base 200 mm long, and is provided with one analog display; this model is manufactured with the same features of the model LE051; the mechanic pendulum is mounted in an oil-filled box which ensures protection against accidental shocks. A switch allows the selection between the **five measure scales** available, while a potentiometer allows the "zero" setting. The LE050 is rechargeable battery-powered, with battery status button.
The instrument is supplied in ABS suitcase with accessories, battery charger and User Manual.

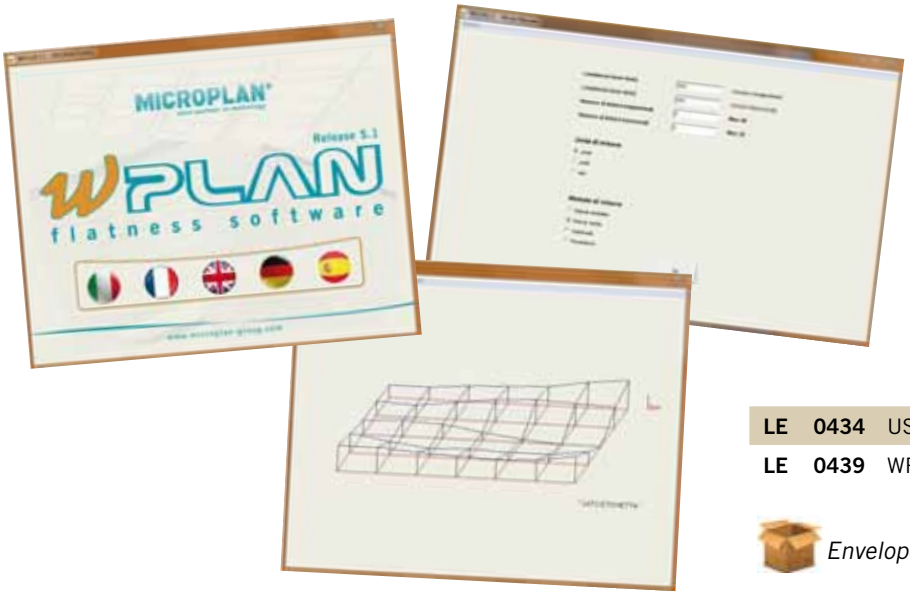
| | |
|---|---|
| **Resolution**: | A: 250 µm/m,<br>B: 50 µm/m,<br>C: 10 µm/m,<br>D: 5 µm/m,<br>E: 1 µm/m for division |
| **Measure field**: | A: 5000 µm/m,<br>B: 1000 µm/m,<br>C: 200 µm/m,<br>D: 100 µm/m / E: 20 µm/m |
| **Reaction time**: | 3 sec typical |
| **Zero setting**: | ± 1500 µm/m |
| **Straightness**: | ± 2% |
| **Ref. temperature**: | 20°C - 50% U.R. |
| **Power**: | rechargeable batteries |
| **Charger power**: | 220 V a.c. 20 mA |
| **Autonomy**: | about 15 hours |
| **Weight**: | Kg. 3,5 |
| **Overall dimensions**: | 220 x 50 x 250 mm |

| | | |
|---|---|---|
| **LE** | **0432** | LE050 electronic level + battery charger |
| **LE** | **0434** | USB cable for LE050/PC connection (optional) |
| **LE** | **0439** | WPLAN©Microplan Software for Windows (optional) |

*Box*

## LE0439: W-PLAN SOFTWARE

The WPLAN©Microplan Software allows the calculation of Flatness, Straightness and Parallelism with the measures acquired by the electronic levels models LE 101, LE201, LE301, LE401, LE050 and LE051 in the way to find the quote elevations and the graphic representation of the flatness or straightness of a measured surfaces. The new release "Ver. 5 International" run under all Windows platforms 95/98/ME, 2000/NT/XP/ VISTA and WIN7, translated in five languages (Italian, French, English, German and Spanish). The Software comes supplied with its installation CD-R, User Manual and one USB/RS232 Hardware Sentinel Adapter.




| | | |
|---|---|---|
| **LE** | **0434** | USB cable for LE050/PC connection (optional) |
| **LE** | **0439** | WPLAN©Microplan software for Windows |

*Envelope*

## CLEANING AND MAINTENANCE PRODUCTS

**TZ0510: CLEANING AND MAINTENANCE PASTE FOR GRANITE**
The paste TZ0510, with its special formula, ensures not only a thorough cleaning, but also the protection of wear surfaces, a better sliding of the measuring accessories on the granite and protect them from oxidation. A small amount is good to better prepare the working surface of granite. Supplied in 300 cc plastic jar with screw cap.
**Minimum order: 3 boxes**

**DT0520: LIQUIDE DETERGENT FOR GRANITE**
Liquid detergent for daily cleaning of granite parts and artifacts. Supplied with 1 liter spray dispenser.
**Minimum order: 5 boxes**


***Safety data Sheet*** *on www.microplan-group.com*

*Box / Pallet*

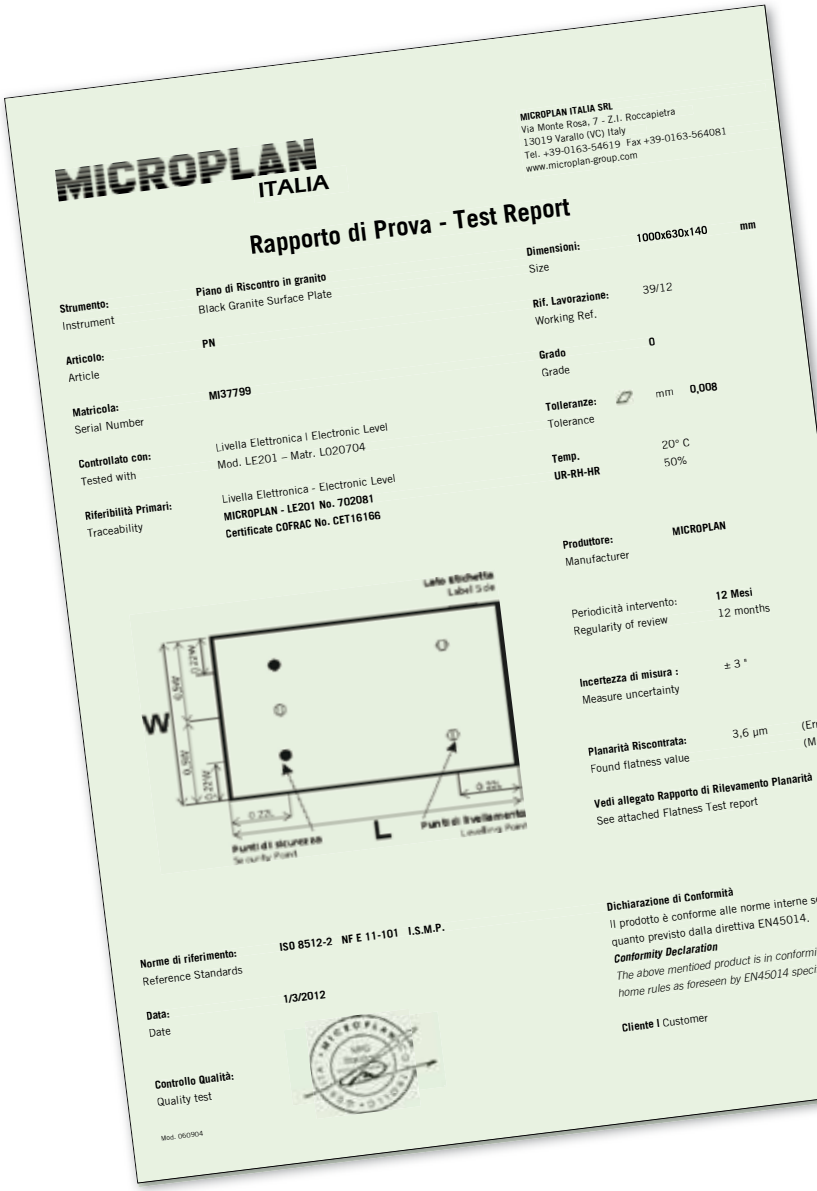
## RV: CALIBRATION, OVERHAUL AND PERIODIC TESTINGS

The term overhaul refers to the restoration of the original geometry of the granite artefact. This process, which can be performed on any type of granite artefact independently from its size, requires the intervention of Microplan personnel and upon Customer request can be done on the Customer location. In the overhaul process are not fixed any cracks or holes (that will not be repaired in the overhaul process), in case of a seriously damaged artefact it is strongly suggested to be ground (ie removal of a layer of the granite surface to be restored) and subsequent lapped, operations to be carried out in Microplan.

In case of intervention at the customer facility Microplan personnel will be provided with everything needed to perform the job. The customer will be asked only 220 V-AC power supply and water. With each overhauled artefacts, a "Microplan" test report will be provided, that shows dimensions, tolerances and serial number, environmental characteristics at testing time, the technical characteristics of the primary reference artifact used, the measured values and those implemented with W-Plan software related to a theoretical flat surface, the Maximum Permissible Error and the Closing Error, the indication of the support points set used while testing the surface plate.

**Repairs and calibration of electronic levels** is a Microplan activity, with the supply of the test report with the traceability declaration related on the reference electronic level used to check the Calibration process.

May be carried out precision machining of ceramic material, also of large size pieces.


MICROPLAN ITALIA

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Rapporto di Prova - Test Report

Strumento / Instrument: Piano di Riscontro in granito / Black Granite Surface Plate
Articolo / Article: PN
Matricola / Serial Number: MI37799
Controllato con / Tested with: Livella Elettronica I Electronic Level Mod. LE201 – Matr. L020704
Riferibilità Primari / Traceability: Livella Elettronica - Electronic Level MICROPLAN - LE201 No. 702081 Certificate COFRAC No. CET16166

Dimensioni / Size: 1000x630x140 mm
Rif. Lavorazione / Working Ref.: 39/12
Grado / Grade: 0
Tolleranze / Tolerance: ⌀ mm 0,008
Temp. UR-RH-HR: 20° C 50%
Produttore / Manufacturer: MICROPLAN
Periodicità intervento / Regularity of review: 12 Mesi / 12 months
Incertezza di misura / Measure uncertainty: ± 3 °
Planarità Riscontrata / Found flatness value: 3,6 µm
Vedi allegato Rapporto di Rilevamento Planarità / See attached Flatness Test report

Lato Etichetta / Label Side
W
L
Punti di Riscontro / Leveling Point
Punti di sicurezza / Security Point

Norme di riferimento / Reference Standards: ISO 8512-2 NF E 11-101 I.S.M.P.
Data / Date: 1/3/2012
Controllo Qualità / Quality test
Mod. 060904

Dichiarazione di Conformità
Il prodotto è conforme alle norme interne s
quanto previsto dalla direttiva EN45014.
Conformity Declaration
The above mentioed product is in conformi
home rules as foreseen by EN45014 speci
Cliente / Customer

www.microplan-group.com