

# MacroNano

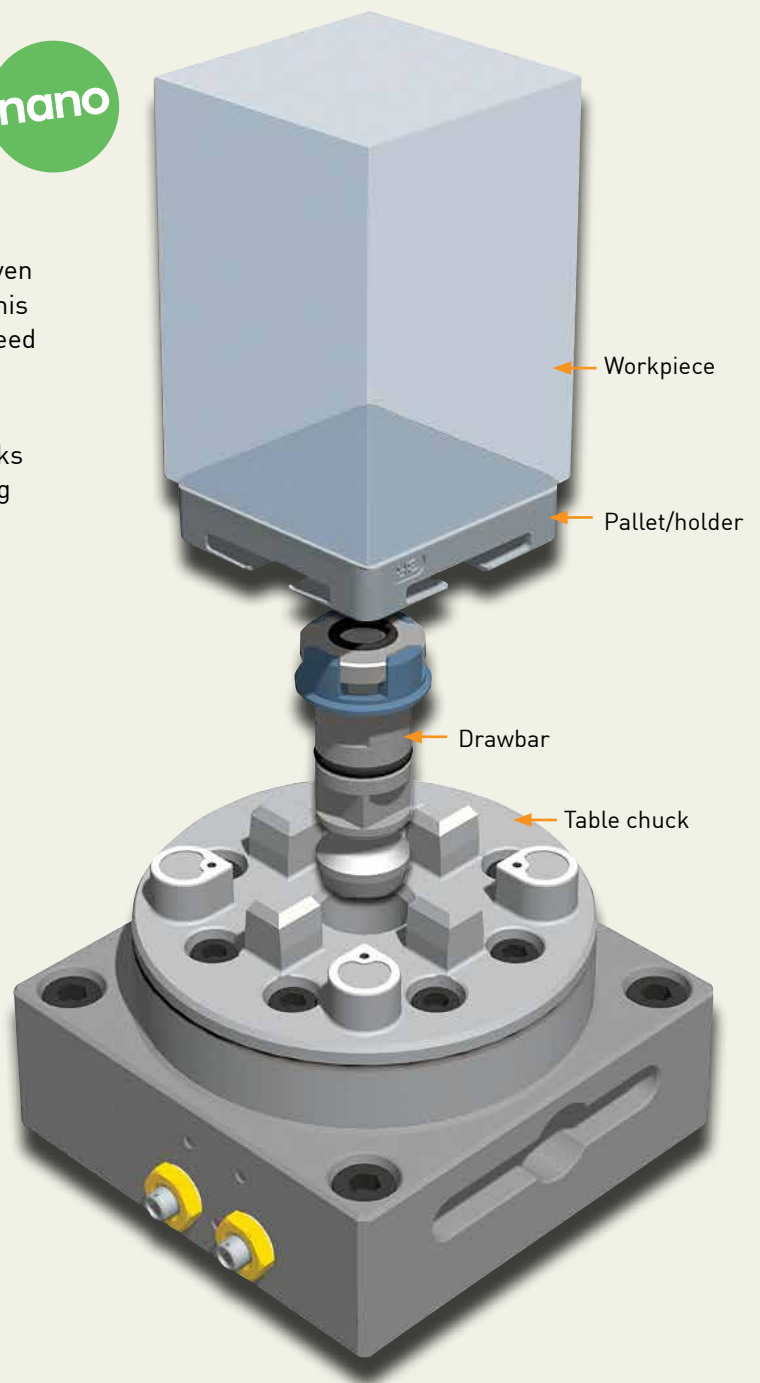
- ... Extremely high accuracy.
- ... High-precision machines are linked together in the production chain, without detracting from the extreme accuracy.
- ... Feedback to the machine for supplementary machining after inspection is possible. This feedback is only meaningful if the pallet system is at least as accurate as the measuring machine.

## Workholding for Nano Precision

Nano-precision machining requires nano-precision referencing of workpieces and tools- a real challenge even with state of the art solutions available in the market. This becomes even more challenging when the references need to be established in the shortest possible time.

MacroNano system is best described in two words as precise and quick! The MacroNano clamping system links the production chain through an ultra-precision coupling both for workpiece and tool holding.

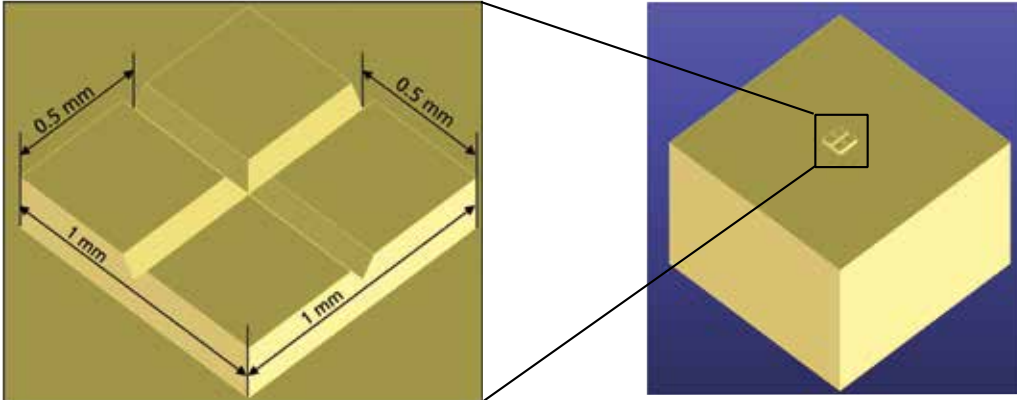
- + Repetition accuracy – within 0.001 mm
- + Locking force – 6000 N
- + Fixed index positions 4x90°
- + Required air pressure, pneumatic chuck – 6±1 bar
- + Recommended max workpiece weight – 50 kg.



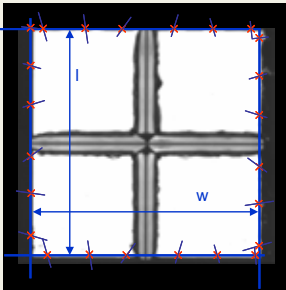
# MacroNano

## Application example: Microstructuring with Diamond Machining

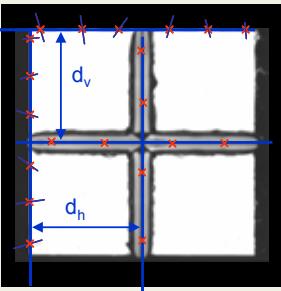
Micro features produced with nano precision



This micro structure is produced by Diamond Flycutting operations on two different machines, each equipped with a MacroNano chuck. The square in the middle of the workpiece (right picture) is produced by plane milling on 1st machine, making use of indexing feature of the MacroNano system. The pallet carrying the workpiece is then transferred to the chuck on 2nd machine to produce the micro-grooves, once again using the indexing feature. The zero reference was determined only once on the 1st machine and then carried through the whole process chain using both the indexing precision and the system precision of the MacroNano system; overall structure deviation is less than 0.5 micron.



Measurement of the cube dimensions

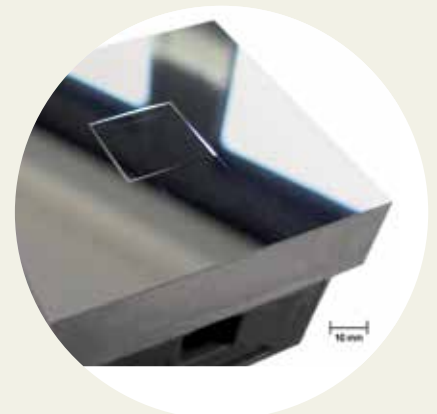
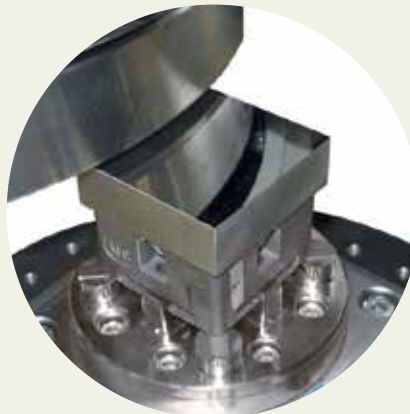


Measurement of groove positions

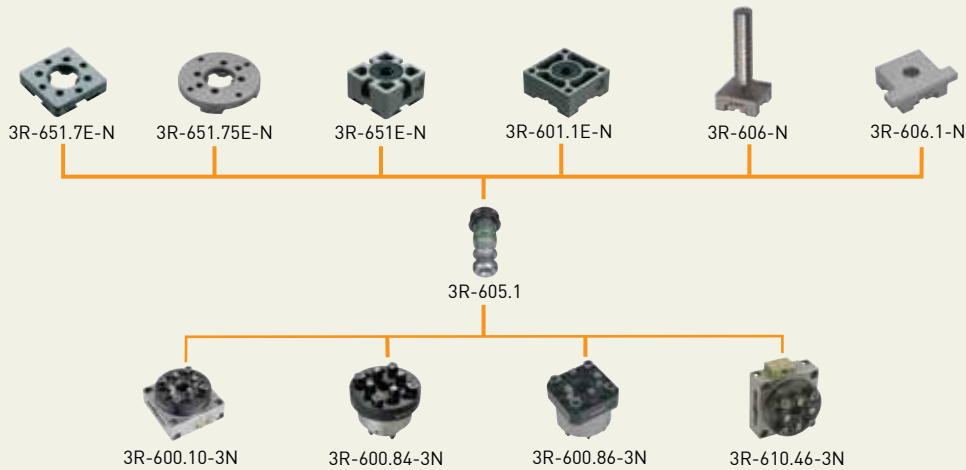
	Width (mm)	Length (mm)	Vertical dist. (mm)	Horizontal dist. (mm)
$W_1$	0.9996	$l_1$ 0.9999	$d_{v1}$ 0.4988	$d_{h1}$ 0.5013
$W_2$	0.9996	$l_2$ 0.9999	$d_{v2}$ 0.4993	$d_{h2}$ 0.4995
$W_3$	0.9996	$l_3$ 0.9999	$d_{v3}$ 0.4996	$d_{h3}$ 0.5001
$W_4$	0.9997	$l_4$ 0.9999	$d_{v4}$ 0.4991	$d_{h4}$ 0.4995
$W_5$	0.9996	$l_5$ 0.9998	$d_{v5}$ 0.5010	$d_{h5}$ 0.5001
$W_6$	0.9996	$l_6$ 0.9998	$d_{v6}$ 0.5007	$d_{h6}$ 0.5002
$W_7$	0.9997	$l_7$ 0.9999	$d_{v7}$ 0.4996	$d_{h7}$ 0.5012
$W_8$	0.9996	$l_8$ 0.9999	$d_{v8}$ 0.4992	$d_{h8}$ 0.5009
$W_9$	0.9997	$l_9$ 0.9999	$d_{v9}$ 0.4996	$d_{h9}$ 0.5009
$W_{10}$	0.9996	$l_{10}$ 0.9998	$d_{v10}$ 0.4998	$d_{h10}$ 0.5008
<b>W</b>	<b>0.9996</b>	<b>l</b> <b>0.9999</b>	<b><math>d_v</math></b> <b>0.4997</b>	<b><math>d_h</math></b> <b>0.5004</b>

Mean values

Overall structure deviation < 0.5  $\mu\text{m}$



# MacroNano – Chucks, pallets, reference elements & accessories



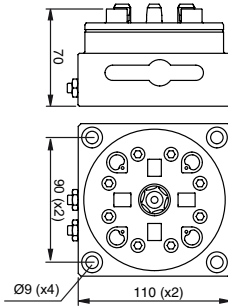
## Pneumatic chuck, MacroNano, 3R-600.10-3N

Chuck for mounting on the machine table.

- Fixed index positions 4x90°
- Required air pressure, pneumatic chuck – 6±1 bar
- References of cemented carbide
- Required drawbar 3R-605.1
- Air-blast cleaning of Z-references
- Turbo locking
- Weight 4.4 kg.



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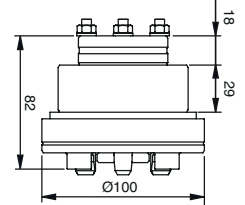
## Pneumatic chuck, MacroNano, 3R-600.84-3N

Chuck for building-in, for example in a fixture, dividing head or B-axis.

- Fixed index positions 4x90°
- Required air pressure, pneumatic chuck – 6±1 bar
- References of cemented carbide
- Required drawbar 3R-605.1
- Air-blast cleaning of Z-references
- Turbo locking
- Weight 2.4 kg.



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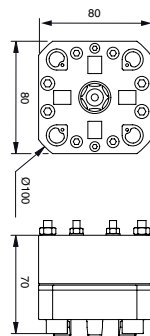
## Pneumatic chuck, MacroNano, 3R-600.86-3N

Chuck for building-in, for example in a fixture.

- Fixed index positions 4x90°
- Required air pressure, pneumatic chuck – 6±1 bar
- References of cemented carbide
- Required drawbar 3R-605.1
- Air-blast cleaning of Z-references
- Turbo locking
- Weight 1.8 kg.



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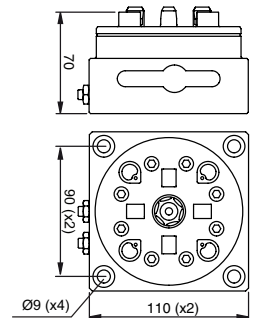
## Pneumatic chuck, MacroNano, 3R-610.46-3N

Chuck for mounting on the machine table with integral air unit. For horizontal and vertical use.

- Fixed index positions 4x90°
- Required air pressure, pneumatic chuck – 6±1 bar
- References of cemented carbide
- Required drawbar 3R-605.1
- Air-blast cleaning of Z-references
- Turbo locking
- Weight 4.4 kg.



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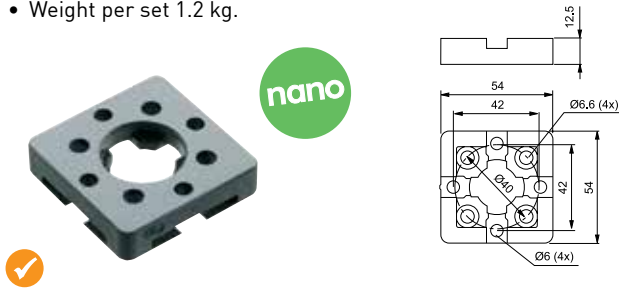
# MacroNano – Pallets, reference elements & accessories

## Reference element 54x54 mm, MacroNano, 3R-651.7E-N

Hardened and precision-cast, with clearance holes for four fixing screws.

Note: Must be mounted on the workpiece/fixture before it is locked in a chuck.

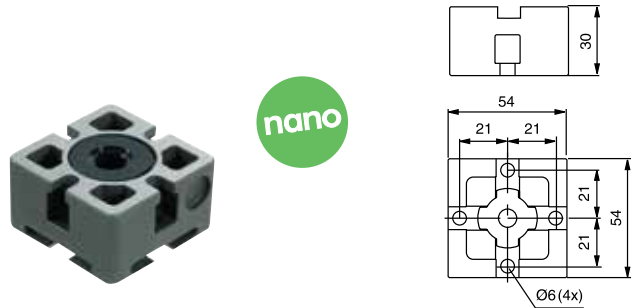
- Fixed index positions 4x90°
- Parallel-ground top and bottom face
- Rust resistant
- Supplied in sets of 8 pcs.
- Weight per set 1.2 kg.



## Pallet 54x54 mm, MacroNano, 3R-651E-N

Hardened with clearance holes for four fixing screws.

- Fixed index positions 4x90°
- Ready for code carrier
- Rust resistant
- Supplied in sets of 8 pcs.
- Weight per set 3.4 kg.



## Pallet 70x70 mm, MacroNano, 3R-601.1E-N

Hardened with clearance holes for four fixing screws.

- Fixed index positions 4x90°
- Ready for code carrier
- Rust resistant
- Supplied in sets of 5 pcs.
- Weight per set 3.6 kg.

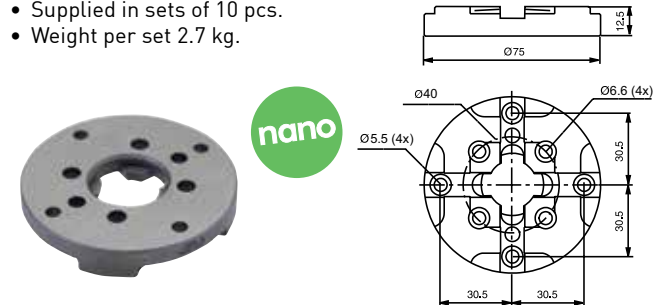


## Reference element Ø 75 mm, MacroNano, 3R-651.75E-N

Hardened and milled with clearance holes for eight fixing screws.

Note: Must be mounted on the workpiece/fixture before it is locked in a chuck.

- Fixed index positions 4x90°
- Parallel-ground top and bottom faces
- Rust resistant
- Supplied in sets of 10 pcs.
- Weight per set 2.7 kg.



## Reference element 70x70 mm, MacroNano, 3R-601.7-N

Hardened and precision-cast, with clearance holes for four fixing screws.

Note: Must be mounted on the workpiece/fixture before it is locked in a chuck.

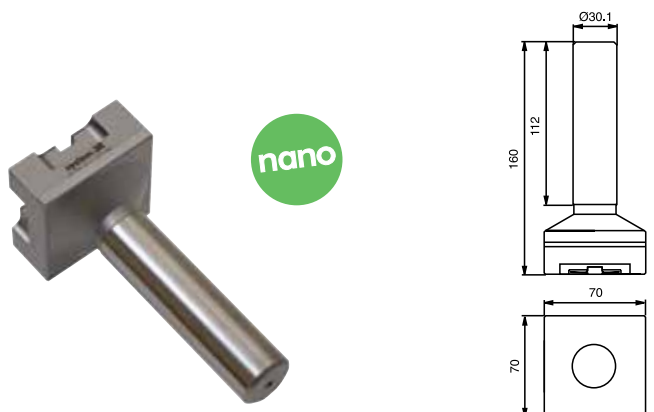
- Parallel-ground top and bottom faces
- Fixed index positions 4x90°
- Rust resistant
- Supplied in sets of 5
- Weight per set 3 kg.



## Check mandrel, MacroNano, 3R-606-N

Check mandrel with ground C-reference for setting Macro chucks.

- Measuring length 110 mm.
- Weight 2.3 kg.

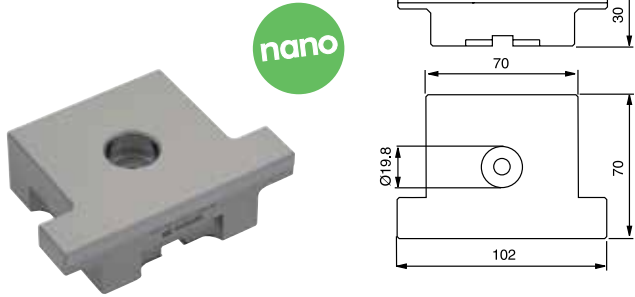


# MacroNano – Accessories

## Check ruler, MacroNano, 3R-606.1-N

For setting angular positions and for centring Macro chucks.

- Measuring length 100 mm.
- Weight 1.4 kg.



## Locking ring key, 3R-605-GE

To lift the locking ring of the drawbars.

- Supplied in sets of 2.



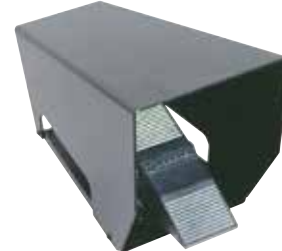
## Drawbar, 3R-605.1E

- Ø20x57.1 mm with flushing holes Ø7 mm.
- Supplied in sets of 10 pcs.



## Air unit, 3R-611.2

Foot operation of pneumatic chucks.



## Air unit, 3R-611.4

Unit for operation of pneumatic chucks. Two functions, opened/closed.

