



## NICOMATIC HEADQUARTERS

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# METAL DOME ARRAY Design Guidelines

This sheet will provide a guideline for designers who require domes and dome array products in electronic devices. The information below is proprietary and specific to NICOMATIC SA and its manufacturing processes. Designers should consult the NICOMATIC engineering department early in the design process to insure a compatible dome array that will yield the desired product functionality.

### **General design guidelines**

The following guidelines are designed to be easily achievable by NICOMATIC's current manufacturing process for standard size dome arrays at the lowest possible product cost and 100 % controlled.

### **Standard Manufacturing Tolerances (MDA process)**

Feature Description	Tolerances for Process Control Dimensions (CpK > 1.33)
Datum Dome to Dome 120mm x 150mm	±0.05mm [0.0019"]
Datum Dome to Tooling Hole	±0.10mm [0.0039"]
Tooling Hole to Position Slot	±0.10mm [0.0039"]
Tooling Hole to Round Internal Cut Centers	±0.10mm [0.0039"]
Part Edge Dimensions	±0.35mm [0.0142"]



#### Notes:

- Dome arrays that require tighter manufacturing tolerances are sometimes possible but need to be communicated with the NICOMATIC engineering team early in the design cycle.

### **Standard Part Size**

- Standard sheet dimensions are 150 mm (5.90") long to 120 mm (4.72") wide. The sheet dimensions can be larger (eg. 10 mm) but will not fit the standard packaging. For greater length, dedicated MDA and control equipment will occur.

- The edges of all adjacent domes should be at least 1.00 mm (0.039 inches) from one another. With dedicated tubes, NICOMATIC can reach a minimal distance of 0.5 mm (0.020 inches) between metal dome edges.

- For P.A.S. type arrays, the spacer hole should be 1.00 mm larger than the dome's dimension.

- If an insulated barrier or double side adhesive is used, the hole in the barrier around the domes should be 1.00 mm larger in diameter than the dome size. Please consult us if a smaller hole size is needed.

- Up to 256 domes can be placed onto a sheet whatever the type (force, plating & shape). Additional metal domes can be placed but this operation will require 2 times process control.

- Any shape of array as well as different types are allowed on the same metal dome sheet.

### **Standard Materials**

- NICOMATIC metal domes are formed from 301 stainless steel and Nickel plated as standard. Bare, silver or gold plating is also available upon request. Multiple dome shapes and sizes are available in many different trip forces and tactile ratios. Consult the Marketing department for information and samples ([marketing@nicomatic.fr](mailto:marketing@nicomatic.fr)).

- Standard dome seal material (top layer or spacer) is 0.05 mm thick PET with 0.03 mm acrylic adhesive. This is available in either clear or white colour. Release liner thickness is 0.08 mm thick. Other thicknesses are also available, please consult us for details but be careful not to damage or strongly reduce the tactile feeling. NICOMATIC has approved top layer thickness between 0.06 mm and 0.10 mm. For P.A.S. spacer it must be between 0.06 and 0.08 mm for 4, 5, 6 mm domes. The release liner should not be greater than 0.15 mm otherwise the control machine may not work properly.



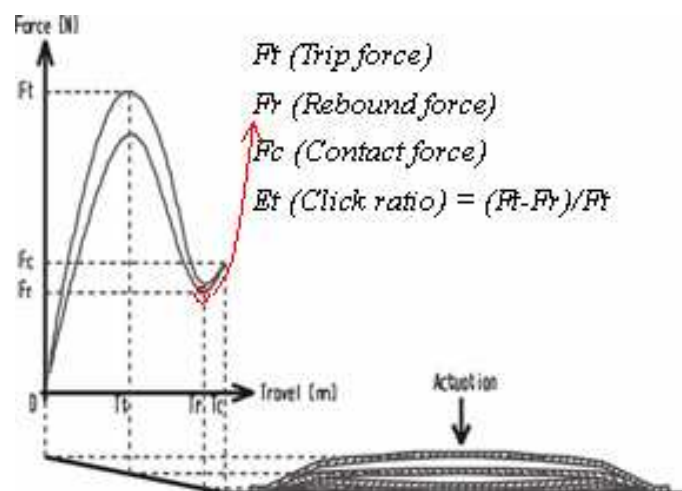
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### Other Design Considerations

- 4 holes of 4mm diameter at (0,0) , (0, 110), (140,0), (110, 140) are required for the NICOMATIC dome placement process.
- NICOMATIC recommends an origin hole and a direction on each individual array to define precisely the position of each dome (is necessary for inspection).
- In standard, no marking is put on the array. Specific marking can be printed at over cost on customer request.
- If useless polyester removal is required, arrays can touch each other. In other more standard cases, a 1.50 mm space should be left between the arrays on the sheet.
- Dome position and dome force reports can be provided upon request.
- Hermetically sealed domes require an air vent to function properly. This can occur by either standard top side venting (kiss cuts), by a through hole in the PCB board or by air tracks, which should be 1.00 mm wide and link at least 2 domes.
- All Internal holes (Positioning, LED) should be a minimum of 1.20 mm in diameter.
- In order to create a sealed switch, all dome edges should be a minimum of 1.00 mm from the edge of the part or any other cut.
- ESD/EMI shielding can be added by printing the top surface of the part with silver ink. The printing needs to be offset from the edges of all cuts and dome vents by 1.00 mm.
- Recommendation: Activators should have a round shape (diameter 1.50 mm to 2.00 mm) or flat shape with 1.50 mm diameter depending on the metal dome type.
- MDA is generally used for high volume production > 50k arrays. Production capability of this tooling is standard 2 500 sheets per shift. It requires high quality & in-house designed and assembled NICOMATIC toolings for placement and control.
- A manual / semi-automatic production & tooling process can be used for less tooling cost and more flexibility but end pricing can be higher than the MDA's.
- NICOMATIC 4-legged square domes are required for single sided PCBs and flex circuits that have a top-side track for the center dome switch contact. Contact NICOMATIC engineering if your design requires this type of PCB design.
- Automated assembly of metal dome arrays to ESD/EMI shieldings, keypads, PCBs, flex circuits or EL lamps is possible. Call your Key Account Manager for specific requirements.





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### Packaging & Shipment

- All sheets parts are delivered in sealed boxes for standard sheet dimensions 120 mm x 150 mm. Each box is labeled with NICOMATIC and customer part numbers. Other packaging are available (reel, individual arrays,...).
- Weight for a metal dome :  $\pm 0.02\text{gr}$
- Weight for a metal dome array (typical 20 domes array) :  $\pm 0.45\text{gr}$

### File transfer to NICOMATIC

For dome arrays approval by our engineering department, the following information is needed:

- Customer drawing mentioning all dimensions in .DXF or .DWG format clearly showing top view and tolerances.
- Type of dome array selected : either top side venting (with kiss-cuts) or with Pre-assembled spacer (P.A.S. extra layer).
- Type and part number of metal dome inside the array : diameters 4 and 5mm circle, diameters 6, 8.4 and 12.2mm square (4-legged), DD type (Please always specify which Trip force, Rebound force, Click ratio and Plating).
- Type of polyester used : white, transparent or other material specified by the customer ?
- All other information useful for the NICOMATIC engineering and or sales team.

NICOMATIC shall provide a sample sheet within 48H after reviewing / confirming all these specifications.

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## CONTACT INFORMATION

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