



**NH** N&H Technology GmbH

## PRODUCT RANGE

System supplier for HMI operating units  
ENGINEERING | PRODUCTION | LOGISTICS

COMPLETE SOLUTIONS & ASSEMBLIES

KEYBOARDS & BUTTONS

CABLE ASSEMBLIES & CONNECTORS

MOLDED PARTS & TOOLMAKING



**2001**

Foundation of  
N&H Technology GmbH  
with 4 employees in Krefeld.

**2002**

Certification according to  
DIN ISO 9001.

**2012**

Construction of a new  
company building in Willich  
with its own test laboratory  
and logistics warehouse.

**2013**

Opening of the N&H office in  
Shanghai.

**2016**

Award  
„Manager of the year“  
from Weka Fachmedien for  
Managing Director Yine Zhang.

**2020**

„Best IHK training company“  
award from the IHK Mittlerer  
Niederrhein.

**2021**

New warehouse extension  
with 400 square meters  
of floor space and 470  
additional pallet spaces.

**2023**

Majority shareholding in SNT  
Technology Co., Ltd.  
Own production of input  
solutions.

**2024**

46 employees, including  
13 engineers.





## ABOUT N&H TECHNOLOGY

Since our foundation in 2001, we at N&H Technology GmbH have been a leading full-service provider of electromechanical assemblies and components, specializing in **customer-specific operating units (HMI)**. We offer cost-effective and high-quality manufacturing solutions and rely on our many years of expertise in development, design and production to provide our customers with comprehensive support in the implementation of their projects.

**Our production** is carried out via our extensive supplier network in Asia. We select our long-term manufacturing partners on a project-specific basis using defined technical and economic criteria and review them regularly. Industry-specific quality requirements are naturally taken into account. In addition to DIN ISO 9001 and DIN ISO 14001 certification, we have access to a large number of specialized suppliers who meet IATF 16949 or DIN ISO 13845 standard requirements, for example.

We are supported in this by **our subsidiary** N&H Technology Shanghai Ltd. The regional proximity enables our colleagues in Asia to act quickly and solve technical issues efficiently. Our aim is not only to ensure efficient production processes, but also to guarantee strict compliance with quality standards and delivery reliability in the long term. Our **quality control** is supplemented by an in-house test and inspection laboratory at our site in Willich.

In the course of 2023, we expanded our vertical integration in the area of **membrane switches** by making a majority investment in the highly specialized company FoShan SNT Electronics Technology Co., Ltd. in Guangdong, China. Under our management, we now operate together as a modern unit specializing in the development and production of high-quality membrane switches.

Our customer list includes well-known companies from various industries, including the automotive industry, medical technology, telecommunications, industrial automation, building management systems and many more. We have a successful, long-standing working relationship with many of them.



More about our  
company



### Modernity meets history

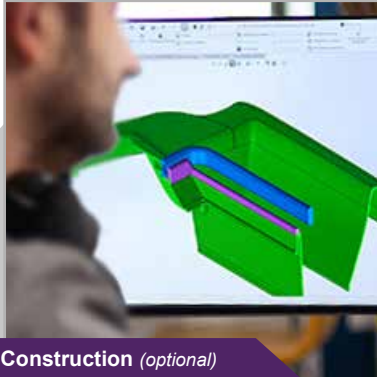
Since the turn of the millennium, the site of the former Becker steelworks has been transformed into a diverse business park where carefully restored monuments alternate with modern architecture.



# WHAT WE DO



Technical engineering support



Construction *(optional)*



Procurement & Production



Assembly



Logistical processing



Buffer storage *(optional)*



End product

We realize customer-specific products for various industries and offer comprehensive support in product development and production. Our services range from electromechanical input units to all components for electronic products, including housing, display, keyboard and cable assembly.

Our services include consultative development, feasibility studies, cost estimates, prototyping, material selection, cost optimization and product design. We also offer the creation of technical drawings and can handle the entire design process.



More about our services

## WHAT WE OFFER



### Technical support

- Support from the concept phase to series development  
Feasibility studies
- Suggestions for improvement
- Advice on material selection and production methods
- Development of cost reduction options

### Development & design



- Development of components, molded parts, assemblies and complete solutions
- Sketching, conception and preliminary design
- Design in 3D / 2D CAD
- Optimization of existing customer templates
- Presentation of product views in the form of realistic 3D renderings
- Creation of production documents such as technical drawings and parts lists
- Prototype construction using 3D printing & silicone casting



### N&H Laboratories

- Project-specific final testing
- Electromechanical tests
- Optical / acoustic tests
- Material tests
- Surface resistance, volume resistance, conductivity measurements
- Technical problem analysis, also for third-party products



### Purchasing

- Outsourcing options for your supply chain
- Procurement of third-party components



### Logistics

- Complete logistics handling
- Buffer storage possible at N&H Technology in Willich / Germany

# YOUR PROJECT



We are your reliable partner for all phases of your project. Regardless of whether you are still in the design phase or are already on the way to series production, our primary goal is to provide you with comprehensive support and ensure that your project is a success

## Your inquiry

We will be happy to provide you with a non-binding offer, tailored to your project. All we need for this are:

- technical drawings, sketches or samples
- technical specifications
- Information on the desired equipment extras
- the required quantity / annual requirement / duration

As soon as we have this information, one of our experienced engineers will contact you immediately. It is obligatory for us to sign a non-disclosure agreement (NDA) to protect your sensitive information.

We are always available for technical advice - either by telephone or in person by appointment.

For complex or new projects in particular, a face-to-face meeting proves to be extremely beneficial. This gives us the opportunity to fully understand your requirements and needs and offer you the optimum solution. During a face-to-face meeting, we can go through the project details together and contribute our extensive expertise and experience.

The choice is yours: you are welcome to visit us at our company location in Willich, or we can come to you. If you prefer the benefits of an online meeting, we are flexible and use various platforms and tools to ensure seamless and efficient communication.

We look forward to supporting you in the implementation of your projects and achieving success together.

## N&H Technology GmbH

Gießerallee 21  
D-47877 Willich

T. +49 (0)2154 - 8125 0  
[info@nh-technology.de](mailto:info@nh-technology.de)



# REFERNCES

Our customer list includes **well-known companies** from various sectors, including the automotive industry, medical technology, telecommunications, industrial automation, building control technology and many more. We have a successful, long-standing working relationship with many of them.



More about our  
references



## COMPLETE SOLUTION

A typical product example is a customer-specific input device which, in addition to the keyboard element, includes a housing, a display and the complete connection technology, including cable assembly.



## Customized components

### KEYPADS

- Silicone Rubber Keypad
- Membrane Switch
- Capacitive Keypads
- Touch-Systems

### BUTTONS & SWITCHES

- Pushbuttons
- Piezo Buttons
- Status/Signal Lamps
- Microswitches

### CABLE ASSEMBLY

- Cable harnesses
- Data cables
- Coaxial cables
- Special cables
- Single cables

### CONNECTORS

- Magnetic connectors
- Spring contact plugs
- Special connectors

### PCB

- Flex & Rigid Circuits
- Single layer, double layer, multilayer

### FURTHER

- Protective bags
- Battery contacts



We also offer a wide range of standard components, which you can select and request directly from our online catalog!

[katalog.nh-technology.de](http://katalog.nh-technology.de)

## Standard Components

- Spring contacts / Pogo pins
- Connectors
- High current connectors
- Stainless steel keyboards
- Hygienic keyboards
- Microswitches
- Pushbuttons, Piezo Buttons
- Status Lamps
- LC-Displays (TFT)
- Buzzer, Transducer
- Speaker, Microphones



# PRODUCT RANGE

|                        |         |
|------------------------|---------|
| KEYPADS / KEYBOARDS    | 10 - 25 |
| BUTTONS / SWITCHES     | 26 - 27 |
| MOULDED PARTS          | 28 - 37 |
| CABLE ASSEMBLY         | 38 - 39 |
| CONNECTORS / POGO PINS | 40 - 43 |
| FURTHER COMPONENTS     | 44      |



More about our product portfolio

## Customized moulded parts

### PLASTICS

- Precision & large parts
- Single and multiple injection molding

### RUBBER

- Protective covers
- O-rings, seals
- Precision parts

### 2K / 3K PARTS

### METAL

- Heat sinks
- Die-cast parts
- Stamped, turned and milled parts
- Deep-drawn parts
- Battery contacts

### GLASS

- Front Glasses
- Molded Glass Panes





## KEYPADS

# MEMBRANE KEYPADS

We manufacture customized membrane keypads for all industries and applications for over 20 years!

Thanks to an enormous variety of design options, the membrane keypad is used in all types of electronic devices. Its ergonomic and design possibilities are virtually unlimited. The membrane keypad is used in areas where dirt and water resistance and easy cleaning are required. It is also very robust and impresses with its compact design.

### IN-HOUSE PRODUCTION

Our membrane switches are manufactured in our own production facilities with modern production equipment and class 1000 clean rooms for particularly demanding processing and assembly methods.

### LOW COSTS

A membrane keyboard is generally less expensive than conventional mechanical keyboards.





#### ■ LOW THICKNESS AND WEIGHT

Membrane keypads are very flat and have a low height.

#### ■ 100% INTEGRATION

Easy integration of LEDs, signal transmitters, sliders, controllers, rotary encoders and viewing windows for combination with displays.

#### ■ INDIVIDUAL TACTILITY

Various technologies are available to achieve the desired tactility.

#### ■ CAPACITY

Realization through capacitive sensor foils

#### ■ DESIGN OPTIONS

Almost unlimited design possibilities. Printing on the back of the film for a durable, individual design.

#### ■ DUSTPROOF & WATER-RESISTANT

The keyboard surface is completely sealed. It is also resistant to chemicals and solvents.

#### ■ DURABILITY

The membrane keypad is very durable due to its design. The service life is at least 1 million operations.

#### ■ LOW NOISE

A membrane keyboard is generally quieter than mechanical keyboards. With pure key embossing, it is completely noiseless.

#### ■ EMC SHIELDING

For applications that are exposed to electromagnetic interference or that can generate electromagnetic interference themselves.

#### ■ CONNECTION

The connection is made via a flexible foil cable. Various connector types can be used for direct plugging in or a direct cable connection can be used.

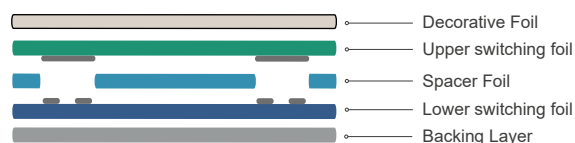
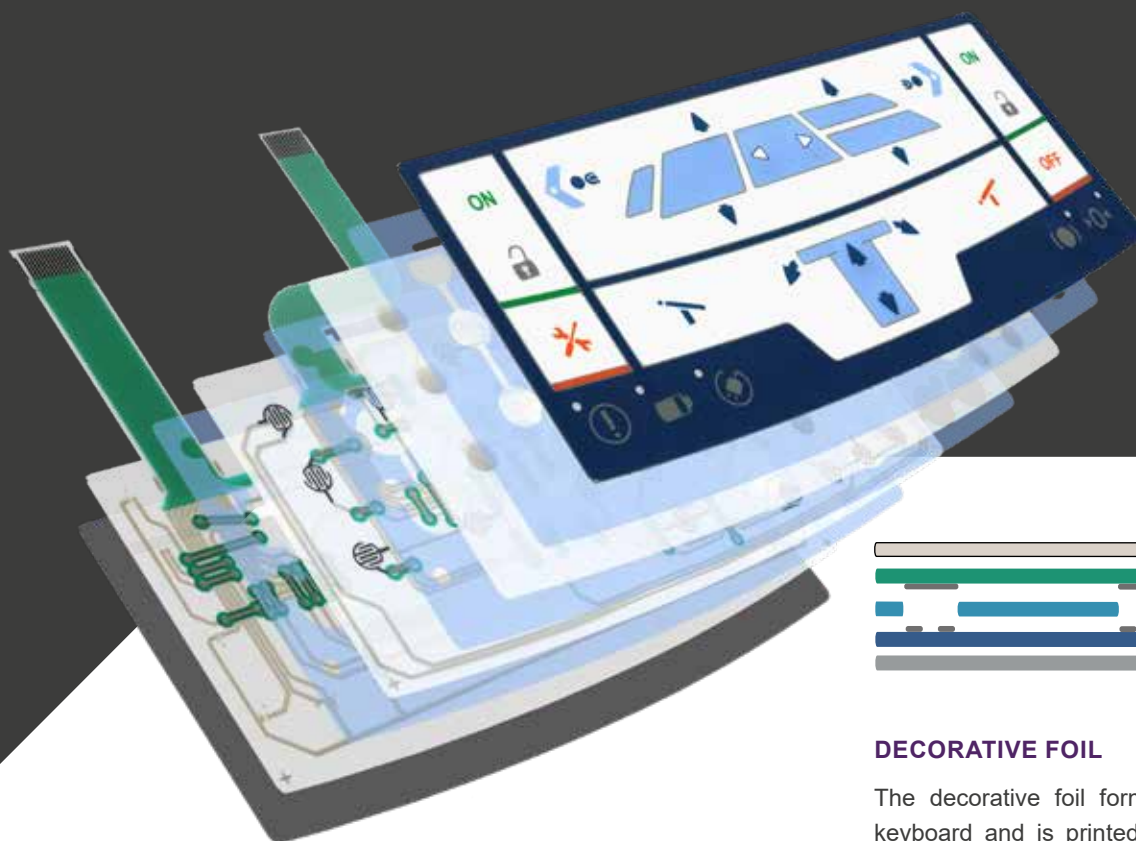




## KEYPADS

# MEMBRANE KEYPAD

The combination of these different layers creates a compact, flexible and reliable membrane keypad.



### SWITCHING FOIL

The functional elements of a membrane keypad are the upper switching membrane with the contact surfaces and the lower switching membrane with the conductor tracks, switching points and connection lug.

Metal snap-on disks or direct printing of the contact surfaces on the decorative foil can replace the upper switching foil. It is also possible to dispense with the upper switching foil completely. Instead of polyester, the material polyimide (Kapton) is also recommended.

In the case of capacitive membrane switches, the conductive layer with the capacitive sensors is located here.

### DECORATIVE FOIL

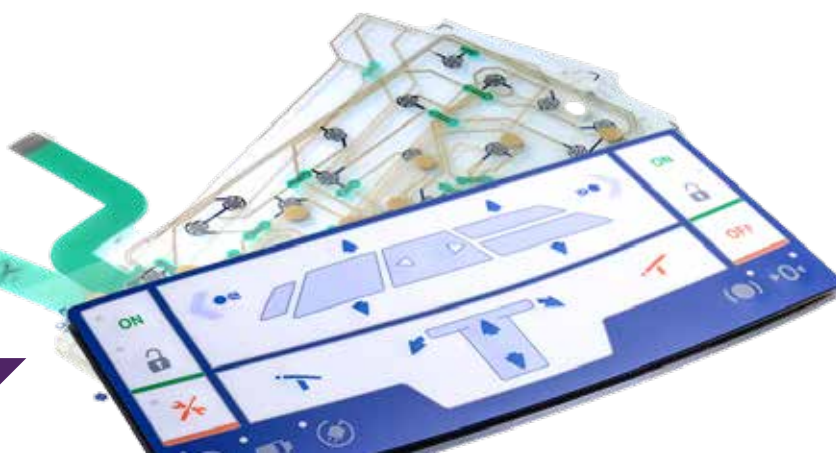
The decorative foil forms the top layer of the keyboard and is printed on the reverse side to ensure maximum protection against abrasion. The foil is optionally embossed for optimum user guidance. A silicone mat or other material is often used instead of a polyester film.

### SPACER FOIL

The insulating foil separates the upper and lower switching foil. Recesses are provided on the contact surfaces. In the versions with metal domes, the spacer foil serves as a spacer and gives the metal domes the necessary space for actuation.

### BACKING LAYER

The bottom layer of the membrane switch is the self-adhesive backing layer, which serves as the base and stabilizes the entire structure. This layer is often made of plastic materials such as polyester or polyimide, which offer high mechanical stability. The reverse side is equipped with a strong adhesive layer.





## TACTILITY

The tactility of membrane keypads plays a decisive role in the interaction between man and machine. By combining different materials and technologies, unique haptic experiences can be created that make the operation of devices intuitive and pleasant.

### METAL DOMES

Metal domes are available in various sizes and shapes to meet different requirements. For illuminated membrane keypads, domes with a central recess for the LEDs are used. Depending on the model, domes offer actuating forces from 40g to 700g and achieve a service life of up to 10 million cycles.



### CAPACITIVE MEMBRANE KEYPADS

Capacitive membrane keyboards replace mechanical keys with a conductive layer with capacitive sensors under the decorative foil. The human body changes the capacitance at the point of contact, which is converted into an electrical signal by the electronics. These keyboards are extremely robust and resistant to environmental influences such as dust, dirt and moisture.



### KEY STAMPING

The embossing on the keys is used for finger guidance and also enables an individual visual design.



#### Frame embossing

A raised edge is formed around the key surface and enables intuitive finger guidance.



#### Dome embossing

The dome embossing enables tactile feedback without metal snap domes and is also suitable for square buttons.



#### Terrace embossing

This terrace embossing is used for small keys. The entire key surface is raised.



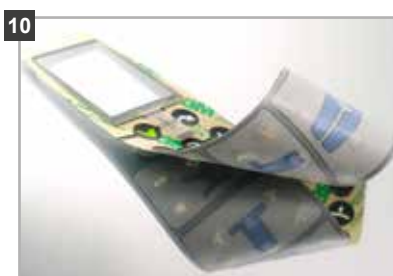


## MEMBRANE KEYPAD

# DESIGN & EQUIPMENT

Membrane keypads offer a wide range of materials and technologies that make it possible to develop customized layouts and designs.

Membrane keypads are **printed** on the back of the decorative film, which ensures durability and protection against abrasion. The most common methods are screen printing and digital printing. **Screen printing** is cost-effective and ensures durable printing by applying ink to the foil through a screen. **Digital printing** allows for color gradients and photorealistic graphics, which makes the design more flexible. It does not require screens, which makes the production of prototypes, one-offs and small batches easier and more cost-effective.







### EPOXY KEYS 1 2

Buttons with epoxy resin enable high-quality, three-dimensional buttons with glossy surfaces.

### SILICONE DESIGN 2 3 4 5 9

The decorative foil can be replaced by a silicone surface. This silicone cover with buttons can either be laminated onto the circuit pack as a pure actuation layer or implemented as an actuation surface with integrated contacts (carbon pills). One advantage of this variant is the ability to achieve very low actuation forces while maintaining good haptics.

The silicone surface also allows three-dimensional designs. Raised buttons with free shapes, guide elements such as offset rings around buttons, Braille lettering or cursor buttons are possible. At the same time, the surface is enhanced both visually and haptically. Alternatively, the conventional decorative foil can also be supplemented with individual silicone buttons.

### KEY POCKETS 7

Customer or country-specific labels can be inserted into optional pockets as individual solutions.

### METAL / CARBON LOOK 8

Durch speziell geprägte Folien können Metalloptik Effekte, wie zum Beispiel gebürsteter Edelstahl, eloxiertes Aluminium und Carbonoptik Effekte erzielt werden.

### DISAPPEARANCE EFFECT 10

This is an inscription that is not visible when not illuminated and only becomes visible when illuminated.

### ROTARY ENCODERS & CO 6

Simple integration of LEDs, signal transmitters, sliders, controllers, rotary encoders and viewing windows for combination with displays.

### LED 1

Membrane keypads can be easily backlit using an additional LED switching foil or a switching foil fitted with LEDs. Special adhesives and sealing materials ensure the function of the LED even in harsh environments with, for example, high levels of vibration.

### LGF - LIGHT GUIDE FILM 11

With LGF (Light Guide Film) technology, LEDs are used at the edge of a highly refractive film that is only 0.1 to 0.2 mm thick. The advantage: the flat design and flexibility of the membrane keypad is retained. Each key can be backlit in different colors. LGF does not require a high-frequency alternating voltage source.

### CARRIER PLATE 12

To ensure additional stability, the membrane keypad can be mounted on different types of carrier plates. As a rule, aluminum plates are used, but circuit boards made of FR4, which take over the function of the circuit foil, can also serve as a carrier plate.

### WINDOWS / TOUCH PANEL 1 9 10 12

Depending on requirements and visual design, viewing windows can be individually specified in versions such as glossy, matt, anti-reflective, scratch-resistant, UV-resistant and colored. We also offer complete solutions with with a matching touch panel.



## KEYPADS

# SILICONE RUBBER KEYPAD

Silicone keypads have always been one of our core competencies and we provide you with detailed support and advice on the equipment and choice of material. We can also take on the complete development and design of a suitable silicone keypad for your application.

The individual, classic silicone keypad is still one of the most widely used switching elements in the electronics and automotive industries. As the central component, it triggers a direct switching function on the underlying circuit board and determines the haptics, the visual and tactile impression and the electrical behavior via the integrated contact elements. In addition, the safety mat often performs a sealing function on the PCB.

### APPLICATION

Silicone keypads are often used in devices and instruments where simple and reliable operation is required. They are used, for example, in remote controls, industrial control systems and electronic measuring devices. In addition, silicone keypads enable noiseless operation, which is an advantage in some areas of application such as medical technology or sound engineering.





#### ■ FLEXIBILITY

Silicone keypads are extremely flexible and can be produced in a variety of shapes and designs. In addition, the keyboards adapt perfectly to the housing construction.

#### ■ RESISTANT

Silicone keypads are highly resistant to wear, scratches and other damage. They are also resistant to moisture, dirt, chemicals and thermal influences.

#### ■ EASY TO CLEAN

Thanks to the water-repellent properties of silicone, silicone safety mats are easy to clean. This is particularly important in environments where hygiene plays a role.

#### ■ DURABILITY

Their long mechanical service life of up to 10 million switching cycles makes them a durable solution with a low maintenance risk.

#### ■ TACTILITY

Silicone keypads offer excellent tactile feedback. The force-displacement behavior can be flexibly selected from 20g - 500g, the button stroke from 0.3 to 5.0 mm. The buttons can also be manufactured with different heights and contours to provide an improved user experience.

#### ■ ELECTRICAL CONTACTING

A wide range of implementation options for electrical contacting - from cost-effective carbon printing to high-quality metal contact pills with a current carrying capacity of up to 2A. The use of metal snap domes or a tact switch is also possible.

#### ■ LIGHTING

Spot or homogeneous backlighting of the keyboard or individual keys is possible without any problems.

#### ■ LOW NOISE

Silicone keypads generally produce little noise when the buttons are pressed. This can be particularly important in environments where quiet operation is required.

#### ■ BUTTON DESIGNS

Individual key colors and shapes can be easily implemented in a mat. Metal and plastic keycaps in various shapes and colors are available for high-quality keyboards.



*Reference of a complete solution  
with silicone switching mat*



## SILICONE RUBBER KEYPAD

# DESIGN & EQUIPMENT

Silicone keypads adapt to your design and are extremely flexible. Different key shapes and individual key colors, as well as multi-colored keyboard lighting can be easily implemented.



### PLASTIC OR METAL CAPS

Plastic or metal caps can be designed in a variety of ways using different paint finishes or chrome plating. The buttons can be given a night design by laser engraving.

### EPOXY COATING

Special surface coatings, such as PU or epoxy coating, make the keys permanently abrasion-resistant and create a high-quality 3D look. In addition to a high-quality and glossy surface, the individual keys impress with optimum finger guidance and a pleasant feel.

### LASER ENGRAVING

Easily recognizable key symbols are essential, especially in diffuse working environments. One option for homogeneous backlighting is laser engraving. The laser makes very intricate lettering possible.

### KEYBOARD ILLUMINATION

Thanks to a very precise 2K injection molding process, a silicone keypad can have multi-colored keypad illumination. The process makes it possible to integrate a light channel into each individual key. This light channel is completely isolated from the rest of the transparent key and achieves precise focusing of the light beam.



### HIGHLY TRANSPARENT

Highly transparent safety mats are characterized by low light scattering, which effectively concentrates the luminous flux on the surface - perfect for bright or daylight environments. Their design enables a continuous surface without light channels. Ideally suited for keypads combined with plastic or metal keycaps and Night Design finishes.

### PHOSPHORESCENT

The phosphorescent silicone is charged by sunlight or artificial light sources and glows in the dark for several hours, depending on the charge.

### FRONT PANEL

The plastic front panel with integrated mounting sockets is overmolded with silicone to create an optimum bond and a sealed surface. This makes the keyboard water- and dust-proof and facilitates cleaning. The multi-component injection molding technology requires only one component, which reduces investment as well as production and quality assurance costs.

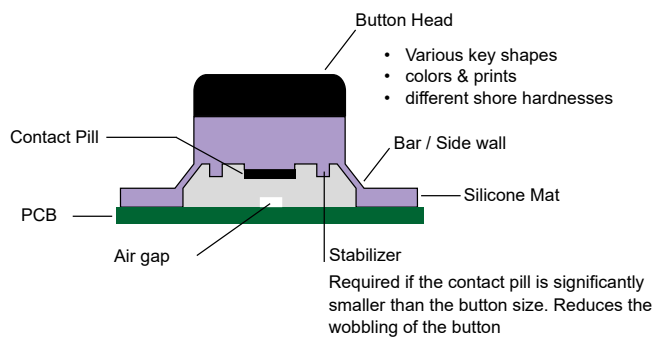
### LIGHT GUIDES

Light guides provide punctual, homogeneous illumination of keys, ideal for precise and uniform lighting in vehicle control panels, industrial controls and high-quality computer keyboards.

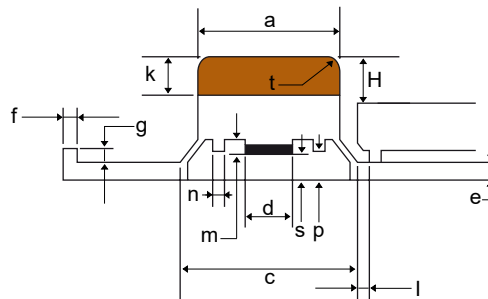
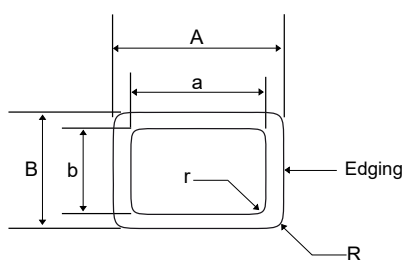
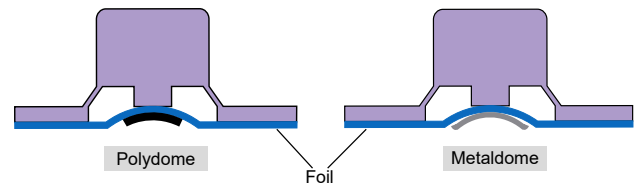
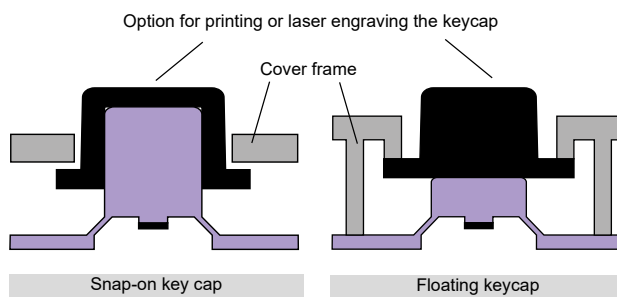
## SILICONE RUBBER KEYPAD

# TECHNOLOGY

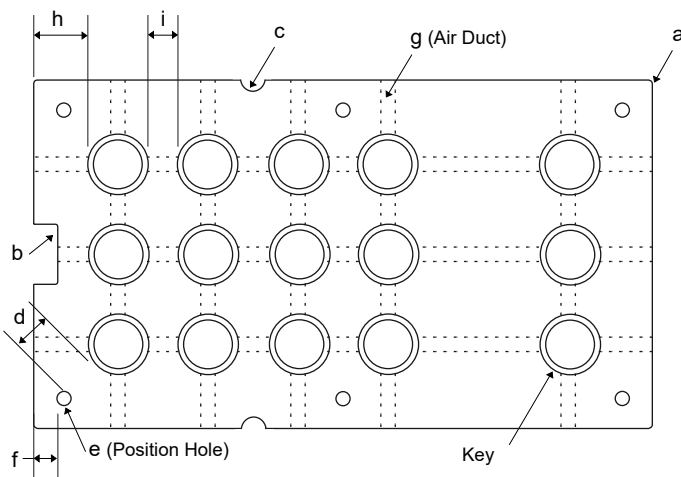
## STRUCTURE & DIMENSION



Silicone rubber keypad with carbon contact pills and gold and stabilizers



|                                |                                  |
|--------------------------------|----------------------------------|
| $A - a \geq 0.4 \text{ mm}$    | $e \approx 0.8 - 1.2 \text{ mm}$ |
| $B - b \geq 0.4 \text{ mm}$    | $f \geq g / 2$                   |
| $a - d \geq 1.5 \text{ mm}$    | $l \geq 1.2 \text{ mm}$          |
| $c - a \approx 2.0 \text{ mm}$ | $k \geq 1.5 \text{ mm}$          |
| $H \geq s + 0.4 \text{ mm}$    | $m \geq 0.6 \text{ mm}$          |
| $p - s \geq 0.15 \text{ mm}$   | $n \geq 1.0 \text{ mm}$          |
| $R > r$                        | $r \geq 0.4 \text{ mm (R)}$      |
|                                | $t \geq 0.3 \text{ mm (R)}$      |



|                             |   |
|-----------------------------|---|
| $a \geq 1.0 \text{ mm (R)}$ | $f \geq 2.0 \text{ mm}$                               |
| $b \geq 0.5 \text{ mm (R)}$ | $g \approx 1.0 \text{ mm wide; } 0.3 \text{ mm deep}$ |
| $c \geq 2.0 \text{ mm}$     | $h \geq 2.0 \text{ mm}$                               |
| $d \geq 1.2 \text{ mm}$     | $i \geq 1.5 \text{ mm}$                               |
| $e \geq 1.5 \text{ mm (Ø)}$ |   |

In applications where the keypad is completely sealed, positioning holes (e) are not permitted and ventilation can be achieved through air ducts (g) between the keys, i.e. the ventilation openings should not lead to the outer edge of the keypad





# SPECIFICATIONS

Silicone  
PHYSICAL PROPERTIES

|  | Conductor | Insulator                       |
|--|-----------|---------------------------------|
| Density (g/cm³)<br><i>DIN 53479</i>          | 1.2       | 1.1 - 1.4                       |
| Hardness (Shore A)<br><i>DIN 53505</i>       | 65 ± 5    | 30 - 85 ± 5<br>(55 ± 5 typical) |
| Tensile strength (N/mm²)<br><i>DIN 53504</i> | 6.0       | 5.0 - 9.0                       |
| Elongation at break (%)<br><i>DIN 53504</i>  | 170       | 115 - 600                       |
| Compression set (%)<br><i>DIN 53517</i>      | 20        | 11 - 22                         |

Silicone  
ELECTRICAL PROPERTIES

|  |                        |
|--|------------------------|
| Insulation resistance at 250V (MΩ)<br><i>DIN 53482</i> | > 100                  |
| Dielectric strength (kV/mm)<br><i>DIN 53481</i>        | 23 - 27                |
| Contact bounce (ms)                                    | ≤ 12                   |
| Conductor volume resistivity (Ω•cm)                    | 2.5 - 5.0              |
| Insulator volume resistivity (Ω•cm)                    | > 2 x 10 <sup>14</sup> |

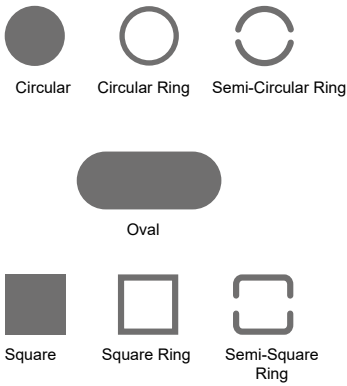
Silicone  
MECHANICAL PROPERTIES

|                         |   |                             |
|-------------------------|---|-----------------------------|
| Actuation force (cN)    | 20 - 500                                  | 180 ± 50 typical            |
| Snap Ratio (%)          | < 80                                      | 50 ± 10 typical             |
| Stroke (mm)             | 0.3 - 5.0                                 | 1.1 ± 0.1 typical           |
| Operating life (cycles) | 1 x 10 <sup>5</sup> - 3 x 10 <sup>7</sup> | 2 x 10 <sup>5</sup> typical |

|                            |              |            |
|----------------------------|--------------|------------|
| Operating temperature (°C) | - 40 ~ + 85  | typical    |
| Storage temperature (°C)   | - 60 ~ + 120 | typical    |
| UL flammability            | HB and 94V-0 | HB typical |

CONTACT PILLS

| Contact Surface of PCB:    |                        | Gold               | Carbon  | Gold                         |             |
|----------------------------|------------------------|--------------------|---------|------------------------------|-------------|
| Type                       | Contact Shape          | Contact Resistance |         | Max. Rating                  | Life Cycles |
| Carbon Dip Printing        | no limit               | 150 - 300 Ω        | < 600 Ω | 30 V <sub>DC</sub> / 3 mA    | 1-3 Mio     |
| Carbon Pill                | circular               | < 100 Ω            | < 200 Ω | 30 V <sub>DC</sub> / 5 mA    | > 5 Mio     |
| Low Resistance Carbon Pill | circular               | < 10 Ω             | < 30 Ω  | 30 V <sub>DC</sub> / 5 mA    | > 5 Mio     |
| Polydome                   | circular               | 1 - 10 Ω           | < 30 Ω  | 42 V <sub>DC</sub> / 20 mA   | > 1 Mio     |
| Metal Powder Pill          | circular               | 10 - 50 Ω          | < 100 Ω | 30 V <sub>DC</sub> / 30 mA   | 1 - 5 Mio   |
| Metal Pill                 | circular               | 1 - 5 Ω            | < 20 Ω  | 100 V <sub>DC</sub> / 100 mA | > 5 Mio     |
| Metaldome                  | circular, square, oval | 1 - 5 Ω            | < 30 Ω  | 42 V <sub>DC</sub> / 30 mA   | > 1 Mio     |



# SILICONE RUBBER KEYPAD TECHNOLOGY

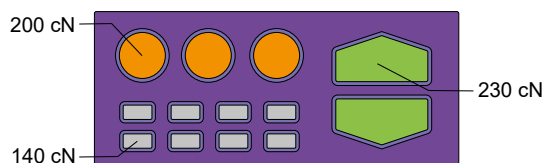
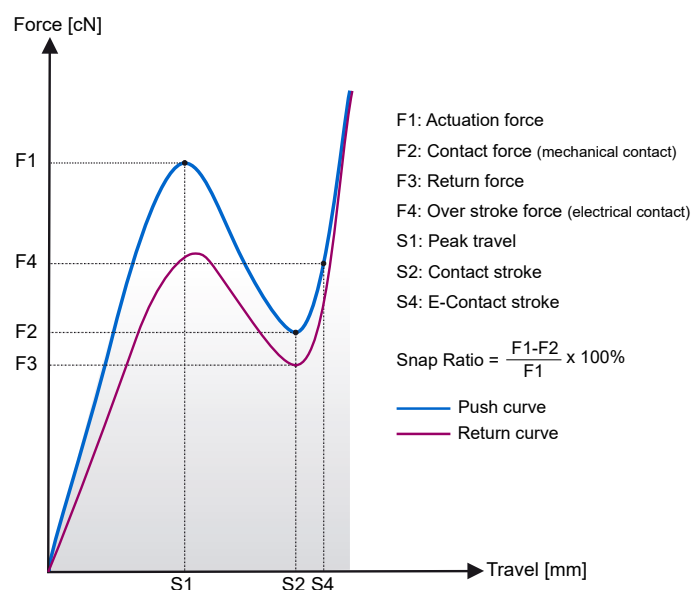
## SPEZIFICATIONS

### FORCE-TRAVEL DIAGRAM

The drop in force from F1 to F2 gives the tactile sensation. The higher this ratio, the stronger the tactile feel. On the other hand, a higher snap ratio means a lower restoring force F3, which can lead to key jamming.

In the case of polydomes or metal domes, the tactile feel is concise and strong even though the snap ratio is nominally low, as the force drop is fast and the force drop curve is steep.

The actuation force should be defined in relation to the size of the keys, especially if the keys are very different in size. In our laboratory we can create force-displacement diagrams.



### TOLERANCE

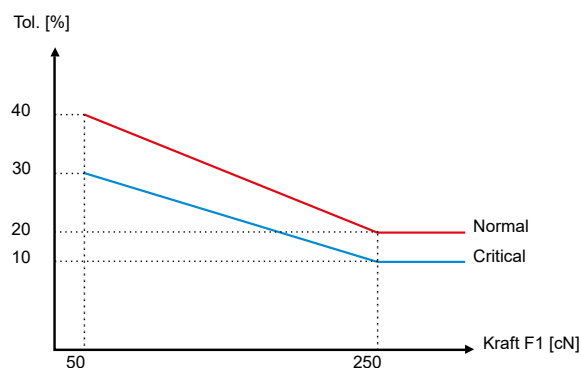
The Normal criterion is the standard tolerance.

The Critical criterion is only available after evaluation of the drawing by our engineers.

$$\text{Tol. [\%]} = 45 - \frac{F1}{10}$$

Note: Force measurement after 10 actuations.

|          | ≤ 50 | ≤ 80 | ≤ 100 | ≤ 120 | ≤ 150 | ≤ 180 | ≤ 210 | ≤ 250 | > 250 |
|----------|------|------|-------|-------|-------|-------|-------|-------|-------|
| Normal   | ± 20 | ± 30 | ± 35  | ± 40  | ± 45  | ± 50  | ± 50  | ± 50  | ± 20  |
| Kritisch | ± 15 | ± 20 | ± 25  | ± 30  | ± 35  | ± 35  | ± 40  | ± 40  | ± 15  |





#### SAMPLE SET

Our sample set contains this silicone keypad with a variety of sample buttons and constructions, as well as a membrane keypad with various equipment options. The set can be ordered from us for a nominal fee.

#### BEHAVIOR BY MEMBRANE SHAPE



| Type                            | Flat Cone    | Single Cone  | Single Bell   | Double Cone    | Double Bell    | Flat Bell      |
|---------------------------------|--------------|--------------|---------------|----------------|----------------|----------------|
| Curve                           |              |              |               |                |                |                |
| Force Range                     | 30 - 350 g   | 30 - 250 g   | 30 - 200 g    | 30 - 90 g      | 30 - 250 g     | 20 - 80 g      |
| Stroke Range                    | 0.5 - 3.0 mm | 0.7 - 2.0 mm | 0.5 - 3.0 mm  | 2.0 - 4.0 mm   | 1.0 - 2.5 mm   | 0.3 - 1.0 mm   |
| Life Cycles (x10 <sup>3</sup> ) | 200 - 2,000  | 200 - 2,000  | 1,000 - 5,000 | 5,000 - 20,000 | 1,000 - 20,000 | 1,000 - 30,000 |







## KEYBOARDS

# STANDARD-KEYBOARDS

We offer a selection of membrane keypads, hygienic keypads with a silicone surface and high-quality stainless steel keypads, which are designed in particular for standard applications. The keypads are characterized by high resistance to external influences such as vandalism, extreme temperatures and dirt. The keyboard layout can be adapted to the specific application.

### HYGIENIC KEYBOARDS (SILICONE)

The hygienic keyboards are available as desktop versions with protection class IP68 / NEMA 6P. Thanks to a special antibacterial coating on the silicone surface, the keyboards are resistant to mechanical and chemical influences and are very easy to clean.

### MEMBRANE KEYBOARDS

The membrane keypads are suitable for indoor and outdoor use and are resistant to windblown dust and rain, splash water and water jets, as well as disinfectants and most chemicals and liquids.

#### Options

- Front mounting with membrane keypad on 2.0 / 3.0 mm aluminum plate - protection class IP67 / NEMA 4X
- Desktop keypad - protection class IP68 / NEMA 6P



### SPECIFICATIONS

Membrane keypads and hygienic keyboards

- Supply voltage: +5V DC +/-5%
- Current: 20mA / 30mA
- Contact technology: Carbon-on-Gold
- Operating temperature: -20°C to +60°C
- „Clean Key“ - for key lock during cleaning
- Optional: Trackball, touchpad
- Optional with LED backlighting
- Service life: > 10 million actuations
- Interface: USB, PS2 with 2m cable





## STAINLESS STEEL KEYBOARDS

The keyboards usually consist of a 1.5 mm thick front plate made of brushed SUS 304 stainless steel and a 3.0 mm aluminum back plate.

The keys are labeled by laser engraving or etching, making the key symbols wear-free. Colored graphics or raised symbols, such as Braille or other customer-specific lettering, are also possible. All common language layouts are also available.



## SPECIFICATIONS

- Installation variants: Desktop, front and rear panel installation
- Key variants: raised (2.0mm) and flat (0.45mm)
- Optionally with trackball or touchpad
- LED backlighting (white, blue, red, green)
- Supply voltage: +5V DC +/-5%
- Current: 20mA or 30mA
- Protection class / impact resistance up to IP67 / IK10
- Service life: ~ 10 million operations
- Connection optionally USB, PS2, or RS232, RS485







# BUTTONS & SWITCHES

We offer an extensive selection of high-quality pushbuttons, which are available both customized and as proven standard solutions. Our portfolio includes pushbuttons, piezo switches, signaling devices and microswitches that perfectly meet your requirements in various applications.

## PUSH BUTTONS

Our 3 basic series offer over 50,000 possible variations. Use our online configurator to design your customized pushbutton. We also have special types, such as 22mm pushbuttons with a high current carrying capacity of 10A. We also produce fully customized pushbuttons, made according to your wishes in terms of size, material, color, engravings and technical specifications.

### Basic Series

- Installation diameter from 12mm - 30mm
- Material: stainless steel, aluminum-zinc alloy
- Protection class IP65 / IP67 / IK08
- Current carrying capacity: 2A / 5A
- LED lighting in various shapes & colors
- Various button shapes & housing colors
- Connection: screw terminal, solder pin, cable, plug connection



## SIGNAL LAMPS

- Installation diameter from 6mm - 25mm
- Front panel mounting
- Protection class IP67 / IK09
- LED lighting in various colors
- Operating temperature -40°C - +85°C







## PIEZO BUTTONS

- Aluminum, anodized
- Protection class IP68
- Installation diameter 16mm, 19mm and 22mm
- Vibration resistance 10-500 Hz / 10g
- Actuating force: 2N to 6N
- LED lighting with multicolor effect
- Service life  $\geq 50$  million cycles



## SWITCHES

Our range includes high-quality tact switches, slide switches, multi-function switches and rotary switches. Visit our homepage for a detailed overview of the standard range. Alternatively, you can send us your individual specifications and we will be happy to develop a customized solution for you.

### EXAMPLE

Our standard tact switches offer an actuating force of 1.6N - 2.6N. For special requirements in the automotive sector, we have developed modified versions that are equipped with an increased actuating force of 4N or 6N for SMD assembly. These switches are designed for switching values of 12VDC 50mA and 16VDC 50mA and guarantee a service life of 100,000 to 200,000 switching cycles, making them particularly durable and reliable.





# MOULDED PARTS

We manufacture customized moulded parts made of plastic, elastomers, metal and glass. Our expertise includes micro-precision parts, functional housings and complex multi-component assemblies.

From the initial concept to series delivery, we are at your side and offer valuable support from a production engineering perspective.



## N&H SERVICES

- Design & development of molded parts
- Tool design & toolmaking
- Feasibility studies & suggestions for improvement
- Development of technical options for cost reduction
- Computer-aided simulation (mold flow analysis)
- Prototyping with 3D printers



Our aim is to work with you to minimize adjustments and avoid costly tool changes right from the start. We accompany you throughout the entire project and organize the tool and sample production as well as the production and optionally also the assembly of the series parts.



*Reference of a complete solution*



*Reference of an assembly consisting of plastic parts and a customized heat sink.*

## PLASTIC

- Individual molds and products made of plastic
- Single and multiple injection molding
- Micro precision parts
- Complex multi-component injection molded parts
- Various surface finishes

## ELASTOMER

- Protective covers for handheld devices
- Protective covers for keyboards
- Individual molds and products made of elastomers
- O-rings and seals
- Grommet rubbers
- Grommets, flanges, bellows Bellows
- PU molded parts (e.g. wheels and rollers)
- Wheels and rollers

## MULTI-COMPONENT

We can combine several components to create 2K and even 3K molded parts. For example, metal elements can be over-molded with plastic and fitted with an elastomer seal at the same time.

## METAL

- Heat sink
- Metal die casting (Zn, Al, Mg alloys)
- Stamped, bent and deep-drawn parts
- Turned and milled parts
- Extruded parts, extruded housings
- Electrical contacts, plug contacts, battery contacts
- Contact springs, tension springs, micro springs, compression springs
- Mounting clips and springs

## GLASS

- Molded glass panes, thermally tempered
- Front glass for input devices, chemically hardened
- Glass panes with optical coating
- Glass panes for household appliances



*Reference of a complete solution*





## MOULDED PARTS

# PLASTIC

Specializing in custom plastic parts and assemblies, we utilize the versatility of plastics to create functional and aesthetically pleasing solutions. Our expertise in material selection and design allows us to integrate several key functions into each product

### PRODUCTION

Depending on the geometry, complexity and intended material of the moulded part, optimized and individual temperature control and injection systems are designed during the design phase of the mould.

Once the tool has been approved for series production, the molded parts are injected. Depending on the quantity, an automatic material feed and the use of insertion and removal devices are used.

### MATERIAL

All common technical thermoplastics and high-performance polymers are processed. Fiber-reinforced and specially adapted compounds are also possible.

### SURFACE FINISHING

#### Printing, labeling

- Pad printing, screen printing
- Laser marking, engraving
- Hot stamping

#### Lacquering

- High gloss, silk matt, matt
- Soft-touch
- Textured lacquers
- Chrome effect lacquers

#### Coatings

- Galvanic surface finishing
- PVD and EMC coatings
- Powder coatings

#### Tool-applied finishing

- IMD technology
- Structuring / texturing





Tool-applied finishing

#### **IMD (IN-MOULD DECORATION)**

IMD technology enables a wide range of decor variants and reduces the production and surface finishing of the molded part to a single work step. A continuous film as a carrier for the decoration is fed fully automatically from the roll between the mold halves, positioned in the mold and fixed in place. When the plastic is injected, the molded part is „welded“ to the decorative layer to form a solid bond. This process ensures high abrasion and scratch resistance of the end product and enables the integration of closed LCD and LED windows.



Tool-applied finishing

#### **HIGH-GLOSS-MATT COMBINATION**

Through the targeted use of structured areas alternating with polished accents, it is possible to create high-contrast design surfaces directly on the tool. The advantage of this surface technology is that further work steps such as painting, milling or foiling are no longer necessary.

It is a cost-effective and reliable method that can be implemented economically for medium quantities and is an alternative to IMD technology.



## MOULDED PARTS

# ELASTOMER

Specializing in custom-made rubber parts, silicones and elastomer composite parts, we offer expert advice on selecting the ideal material to meet your specific requirements in terms of temperature, chemical resistance and load-bearing capacity.



### PORTFOLIO

- Customized shapes and products made of elastomers
- Seals, rings, grommet rubbers
- Grommets, flanges, bellows,
- Rubber dampers, rubberized rollers
- Combined rubber-metal parts
- Combined rubber-plastic parts

### MATERIALS

All common materials in various hardnesses:

- Standard materials such as NR, NBR, BR, EPDM, CR etc.
- Elastomers such as ACM, CSM, FPM, HNBR etc.
- LSR - liquid silicone rubbers
- TPE, TPU molded parts
- Thermoplastics
- Special compounds







## PROTECTIVE CASES

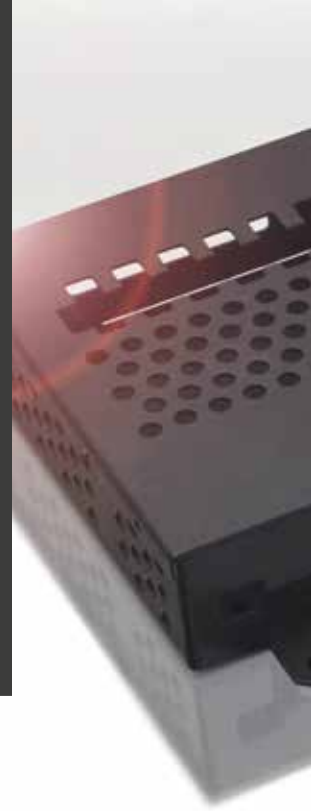
Our custom-made protective covers made of silicone and LSR offer optimum protection for electronic devices. They protect against dirt, scratches and mitigate drop damage while improving grip. Available in various degrees of hardness (Shore A40 - A70), we also offer optional PU coatings. With a variety of colors, individual lettering and specific markings, our silicone sleeves are highly customizable. Our product designers will support you in designing a silicone sleeve. An existing 3D file of the handset or a reference sample is required.



## AUTOMOTIVE

We manufacture silicone molded parts for automotive applications that meet the tight tolerances as well as the requirements for high stress and special durability.





## MOULDED PARTS

# METAL

Our expertise lies in the design and manufacture of a wide range of molded metal parts. We cover a broad spectrum, from the smallest precision parts to larger housings, supplemented by customized plastic and rubber injection moulding. Our high-quality molded metal parts are used across a wide range of industries - from the automotive sector and mechanical engineering to electrical engineering and medical technology.



### PORTFOLIO

- Housing made of aluminum and other metals
- Technical shell housing incl. shielding and heat dissipation
- Metal die casting (Zn, AL, MG alloy)
- Stamped parts, deep-drawn parts, turned parts, milled parts
- Precision stamped and bent parts, wire bent parts
- Extruded parts, extruded housings
- Electrical contacts, plug contacts, pin contacts, battery contacts
- Springs: Tension springs, contact springs, torsion springs, compression springs, micro springs
- Combined rubber-metal parts / rubber-plastic parts

Sealing elements, threaded inserts and bearing bushes are integrated to complete the metal parts. We also offer cold pressing processes and enable high-quality surface finishing.



## HEAT SINKS

We also manufacture aluminum heat sinks, which offer excellent thermal and mechanical properties due to their material composition. These heat sinks can be made from various aluminum alloys, and combinations with copper and different surface treatments are also possible on request.

The heat sinks are available in various sizes and shapes, ranging from small SMD heat sinks to larger versions for embedded and LED applications.

The mounting methods of the heat sinks are adapted to the specific requirements of the applications to enable simple and secure mounting.







## MOULDED PARTS

# MULTI-COMPONENT

Our multi-component injection molding combines the best properties of plastic, elastomer and metal in one component, resulting in a wide range of possible applications. Using proven processes, we manufacture 2K and 3K molded parts based on our extensive experience in plastic injection molding and the production of technically sophisticated silicone components.





## MOULDED PARTS

# GLASS

We offer customized glass parts for industrial, electronic and technical applications, complemented by a wide range of optical coatings and custom paint finishes. Our service also includes precision machining steps such as milling, grinding and drilling to ensure the highest quality and functionality.



### GLASS PARTS

We offer glass parts for a wide range of applications in the industrial, electronic and technical sectors. These include, for example, front panels, cover glasses and frames, decorative glasses for electronic products and protective glasses for displays, but also capacitive glasses for modern input units.

The glass generally consists of float glass or white glass and thermally tempered toughened safety glass. We also offer ultra-thin chemically toughened front glass for applications in the field of display protection.

- Thermally tempered molded glass panes in a thickness of 0.55-19mm (also with conductive ITO coating)
- Chemically hardened glass in a thickness of 0.3 -8.0mm. Scratch resistance 9H, compressive strength >600 Mpa

Other types of glass include borosilicate glass, quartz glass, magic mirror glass and touch panel glass. We also offer capacitive operating units with a glass front as an assembly.

### OPTICAL COATINGS

- Anti-reflex (AR)
- Anti-glare (AG)
- PDP-Filter Glass
- ITO coating, EMI / RFI shielded glass
- Filter coatings according to customer specifications

### MACHINING

- Cutting, CNC milling, milling out, cut outs
- Grinding, edge processing
- Drill holes, recesses
- Sandblasting, etching
- Painting, printing
- Lamination, bonding, optical bonding





## CABLE & CONNECTOR

# CABLE ASSEMBLY

With our extensive experience and a highly specialized supplier network, we assemble cables for a wide range of applications and industries. Our wide range of cable assemblies covers all sectors - from automotive to aerospace, medical technology and industrial applications.



### WE ASSEMBLE

#### CABLE HARNESES

- Integration of components
- Sheathing and tying
- Protective braiding and shielding
- Complete, single strands, measuring strands

#### HYBRID CABLE

#### MINIATURE CABLE

#### COAXIAL CABLE

- HF-Cables:  
N, MCX, NMCX, SMA, SMB, F, FME, TNC, BNC
- Antenna cables, measuring cables, sensor cables, monitor RGB cables

#### NETWORK CABLE

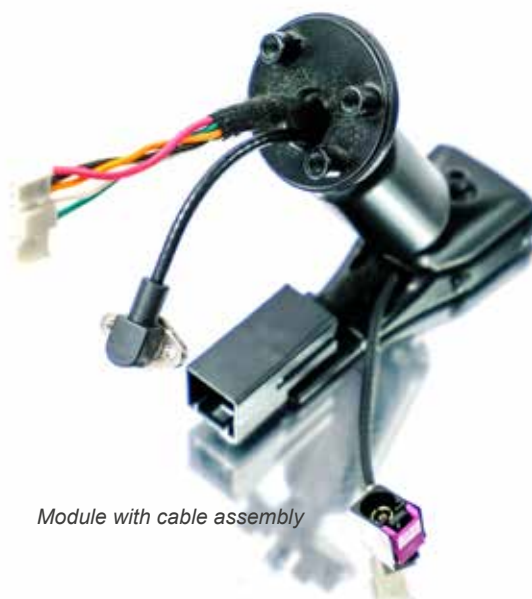
- Slim-SAS HD cable (internal / external)
- Single-pair cables
- with twisted pairs, - also with ferrite and strain relief
- Flat ribbon (FFC)
- D-SUB (9 - 62-pin), HD D-SUB, USB, ATA, S-ATA, IDE, DVI, VGA, DMS-59,
- DisplayPort, CAT (up to CAT. 7) etc.
- EMC shielding

#### LCD CABLE

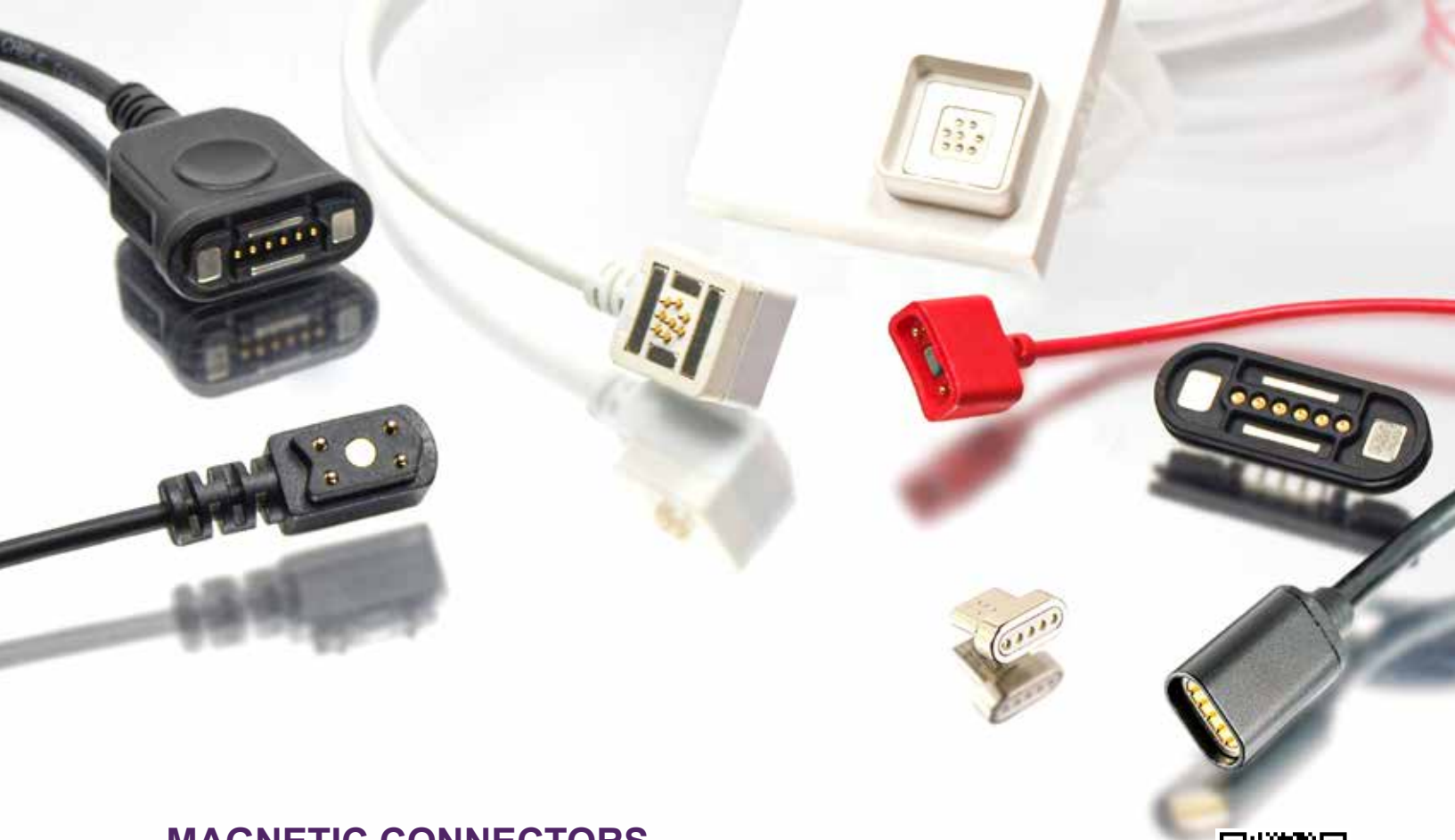
LVDS, HDMI

#### SPIRAL CABLE

#### SPECIAL CABLE







## MAGNETIC CONNECTORS

We produce magnetic connectors including cable assemblies for all sectors and industries. We are happy to take on the design and development.



Depending on the material and internal structure of the spring contact pin, currents of up to 15A per pin are possible. The implementation of magnets ensures a self-guiding, shock- and vibration-resistant connection between the connector and the device. The polarity of the magnets prevents incorrect connection, and the magnetic force can be adjusted to customer specifications using different magnets.

Protection classes up to IPx7 are possible for demanding installation situations. For this purpose, the plugs are supplemented with an O-ring seal or directly overmolded with plastic and/or sealed with elastomer materials.



### PROTOTYPES

With the help of 3D printing and manual processing, we can create individual magnetic connectors as prototypes for customer-specific applications. This „mini-series“ with up to 20 samples enables initial installation trials and tests of the magnetic force. This method allows necessary changes to be identified and implemented as early as the design phase.





## CABLE & CONNECTOR

# POGO PINS

We offer a wide range of high-quality spring contacts and battery charging contacts that guarantee the safe and efficient transmission of power and signal currents.

In addition to standard spring contacts and connectors, we also offer customized developments.

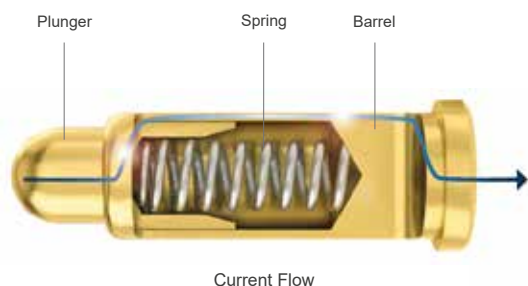


### ADVANTAGES

- Long service life
- Adjustable and measurable spring force
- Space-saving - small pitch possible
- SMD assembly mostly possible
- Good performance for high-frequency applications
- RoHS compliant and halogen-free

### CONSTRUCTION

A spring contact probe consists of three key components: a plunger, a spring and a barrel. The electrical current flows from the plunger via the edge of the pin sleeve to the contact. The contact pressure is largely dependent on the spring.



### ELECTRICAL SPECIFICATIONS

Rated Current:

1A / 2A for the standard version  
up to max.15A due to special design

Contact resistance:

< 100mΩ (depending on the design)

### MATERIAL

As standard, the piston and the pin sleeve are made of high-quality brass, while the springs are made of stainless steel. Of course, we also offer other materials such as beryllium copper or phosphor bronze.

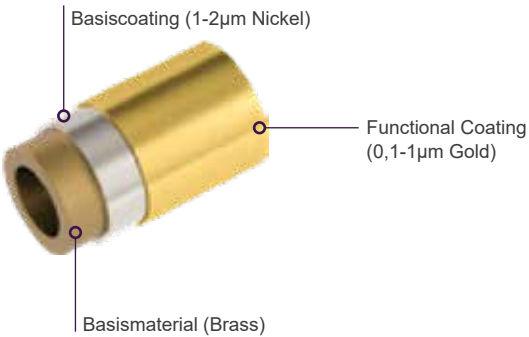
| Part    | Material  |
|---------|---|
| Plunger | <b>Brass (Standard)</b><br>Beryllium Copper<br>Phosphor-Bronze<br>SK4 - Steel   |
| Barrel  | <b>Brass (Standard)</b><br>Beryllium Copper<br>Phosphor-Bronze  |
| Spring  | Stainless Steel   |
| Housing | <b>Polyoxyethylen (Standard)</b><br>HTN Polyphthalamide<br>LCP Liquid-crystal polymers<br>PBT Polybutylene terephthalate<br>PA10T |





### COATING

The gold plating of the spring contacts not only ensures excellent electrical conductivity, but also protects against corrosion and oxidation. The plunger and the pin sleeve are typically coated twice, first with nickel (1-2µm) and then with gold (0.1-1µm). Other coatings are also possible for special applications, as is partial coating of individual components.



| Plating            | Hardness (HV) | Function (Color)   | Farbe  |
|--------------------|---------------|--|--------|
| Gold               | 200           | Low resistance   | gold   |
| Super AP           | 400           | Superior corrosion resistance, low electrical resistance | silver |
| Nickel             | 150 - 200     | Low cost, corrosion resistant                            | silver |
| Palladium-Nickel   | 330 - 380     | Improved signal transmission                             | silver |
| Red Brass (CuSnZn) | 600           | Replace Nickel   | silver |
| Palladium Cobalt   | 450 - 600     | Replace Pd-Ni  | silver |
| Palladium Cobalt   | 600 - 800     | Black color requirement                                  | black  |



In our online catalog you will find over 300 standard spring contacts and connectors, which you can request directly from us with just a few clicks: [katalog.nh-technology.de](http://katalog.nh-technology.de)



POGO PINS

# DESIGN



CONSTRUCTION VARIANTS

1 BACK-DRILL DESIGN

For small spring contacts under 3.5mm in length, where the spring is longer than the hollow plunger to achieve the desired spring force.

2 BIAS-DESIGN

Standard for spring contacts over 3.5 mm in length. The end of the plunger is beveled up to 18° to ensure 100% contact with the pin sleeve.

3 4P-DESIGN / HIGH-CURRENT DESIGN

For demanding applications that require high currents (>3A) and vibrations. The bias design is supplemented here by the 4P design, whereby a **stainless steel ball** is integrated as a fourth component to prevent the compression spring from overheating at high currents. For applications

from 5A up to a maximum of 15A, the **4P design with cap** is used, which offers a reinforced piston shell and a special internal structure to increase the contact area.

DESIGN VARIANTS

2 DOULBE ENDED PIN

Spring contact with two spring-loaded plungers, for contacting two or more PCBs, for example.

5 360° ROLLING PIN DESIGN

An integrated ball in the pin tip ensures continuous contacting, even with 360° rotation. The spring-loaded ball reduces possible transmission interference caused by movements, vibrations or shocks.

6 SCREW-DESIGN

The design with integrated screw thread saves space and significantly reduces assembly time. It can be integrated into all spring contacts with a piston length from 3.5 mm. In addition to its function as a screw, power and signal currents can also be transmitted.

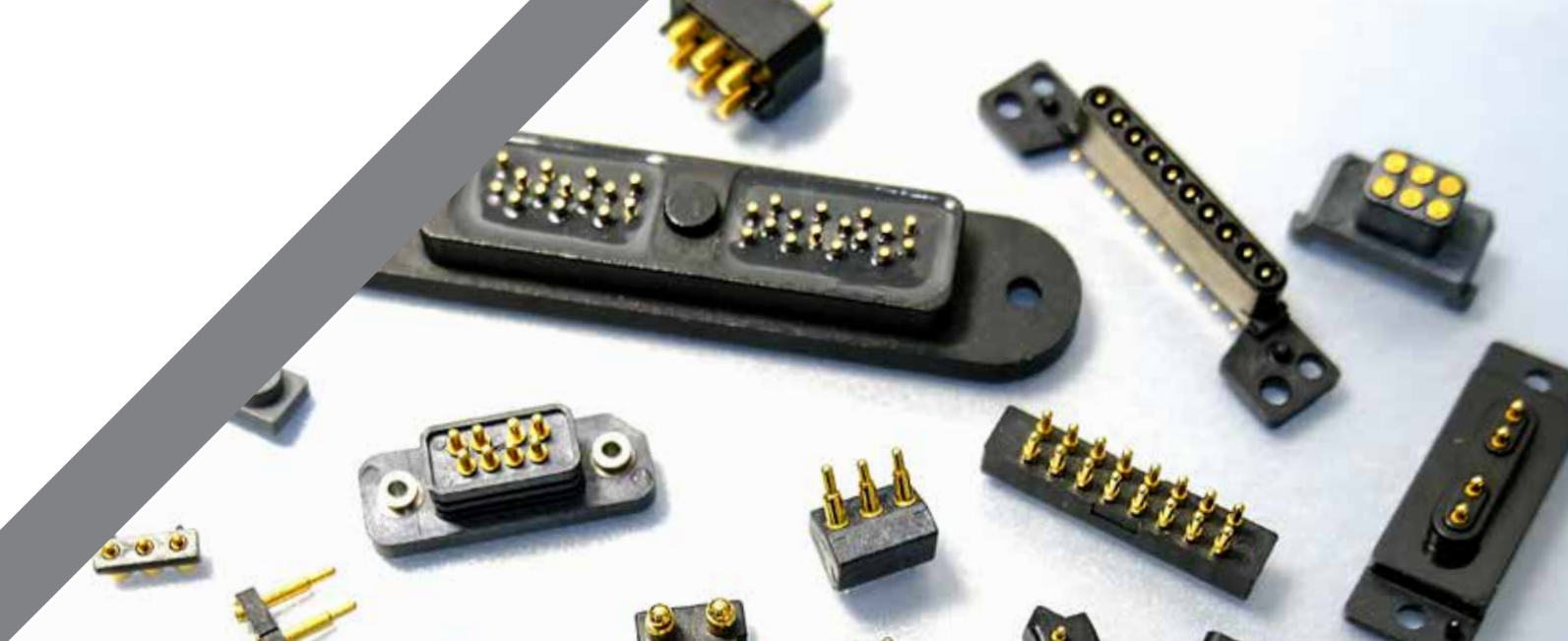
8 BENDING TYPE

The right-angled spring contact with bent end piece offers more space-saving options when mounting on a PCB.

INSTALLATION VARIANTS

|     | Type             | Length (mm) | Spring Force | Installation |
|-----|------------------|-------------|--------------|--------------|
| 3 A | FLAT TYPE        | 1,6 - 21,5  | 25g - 400g   | SMT          |
| 1 B | PLUG-IN TYPE     | 1,39 - 19,5 | 35g - 500g   | THT          |
| 7 C | RIGHT ANGLE TYPE | 4,9 - 5,6   | 80g - 120g   | SMT          |





## CONNECTOR

Several spring contact probes can be joined together in a plastic housing to form a connector. In addition to a number of standard solutions, we also offer the design and manufacture of customized connectors.

The connectors can be customized in terms of pitch, number of pins and housing dimensions. Different connection types allow a variety of mounting options on SMD mountable PCBs.

Thanks to the large number of spring contacts, particularly small connectors, waterproof solutions and special solutions for high-current applications can be realized, for example.





## FURTHER

# COMPONENTS

To expand our wide range of HMI components, we offer a variety of supplementary products. These include, for example, signal transmitters and optoelectronic components such as high-quality TFT displays and high-performance batteries.



### ACOUSTIC COMPONENTS

- Buzzer & Transducer
  - *Piezoelectric, Magnetic*
  - *for SMD / THT Assembly*
- Loudspeakers and sirens
- Microphones and receivers



### LCD & OPTO-ELECTRONICS

- TFT displays from 0.96" to 10.4"
- with integrated touch panel
- LC displays DSTN, FSTN and STN
- Alphanumeric and graphic
- EL, LED or CCFL backlighting
- Backlights
- LED modules



### CIRCUIT BOARDS & ASSEMBLY

- Flexible, rigid and rigid-flex circuits
- Single and double-sided multilayers
- Hotmelt molding process
- customized assembly



### POWER SUPPLIES & BATTERIES

- Primary batteries - lithium button cells  
also with customized solder connections
- Battery contacts (nickel-plated / gold-plated)







## SPECIAL BAGS

Individual product and protective bags made from high-quality, hard-wearing textiles.

- Matching padding or foamed inlays
- Accessory bags, handles, carrying straps, hooks
- Customized printing and embroidery
- Rain covers, waterproof protective covers

Based on a sample or 3D model of your device, we can offer you a customized case at a reasonable price..



## NO PRODUCT FOUND?

If you cannot find the right product in our product portfolio, please do not hesitate to contact us. Thanks to our extensive supplier network, we are able to offer you a solution that meets your requirements.

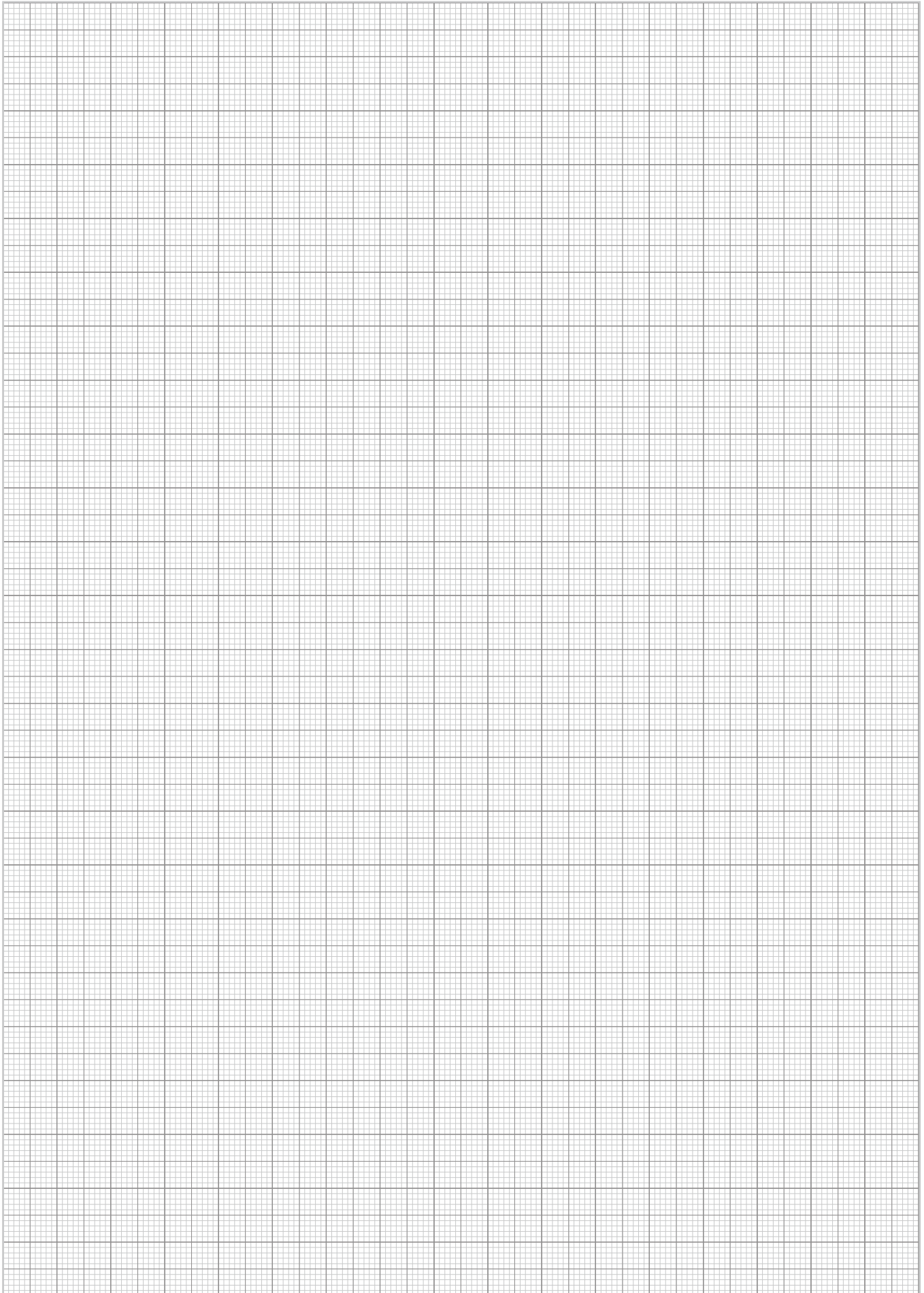
## CONTACT

info@nh-technology.de  
+49 (0)2154-81 25 0

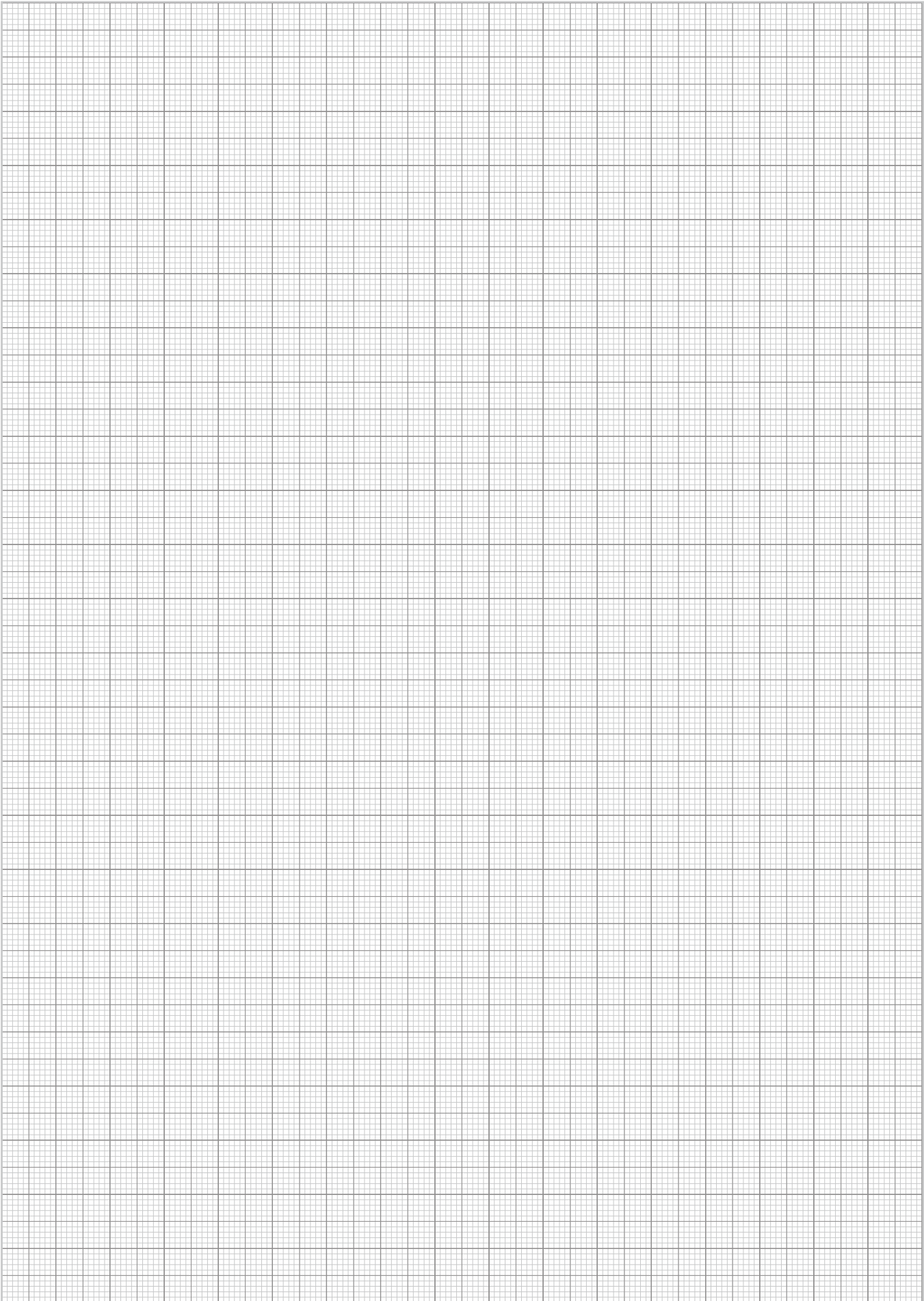
www.nh-technology.de  
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# NOTICE



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N&H Technology GmbH  
Gießerallee 21  
D-47877 Willich / GERMANY

T. +49 (0)2154 - 8125 0  
F. +49 (0)2154 - 8125 22

info@nh-technology.de  
www.nh-technology.de

V-Card



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