All miunske® CAN components support the five protocols J1939, CiA447, FireCAN and CANopen. This enables the operation of a wide range of control requirements for commercial vehicles and mobile working machines.

- **J 1939**
  - Trucks / Systems on vehicle chassis

- **CiA 447**
  - Rescue and emergency vehicles / Roof frame and signal lights

- **FIRE CAN**
  - Fire brigade / Roof frame, signal lights, ladders

- **CANOPEN**
  - Construction vehicles / Hydraulics, pneumatics, automation

## REFERENCES FROM THE MIUNSKE CAN WORLD

- **Complex control panel for IHC Fundex Equipment B.V.**
- **Control and display systems for boats and yachts**
- **Impressive sound diversity in the cockpit**

CAN KEYPADS FOR SWITCHING AND DISPLAY FUNCTIONS

Commercial vehicles work with huge forces, move large quantities of critical goods or travel at high speeds - in every weather, during the day and at night. The driver’s cabins are almost the same as the cockpit of an airplane today. A workplace where operating errors are fatal, but often only a hand’s breadth away. miunske® CAN switching and display units provide drivers and operators safety in their harsh everyday work. They meet the highest demands on ergonomics, usability, comprehensibility and design. With their perfect night design, robust design and individual design possibilities, our CAN keypads set the standard in modern commercial vehicles.

Individual design possibilities
Miunske CAN keypads are available with 4, 6 or 12 fields which can be defined as switches, buttons or pulse buttons. The fields are illuminated with multicolour LEDs. In addition, each field can be fitted with vertical or horizontal bar graph display elements. The colour of these unicoloured LEDs is defined through the hardware. The lengths and widths of CAN keypads are based on the dimensions of standard frames. That’s why they fit easily into existing recesses both vertically and horizontally.

Perfect night design
In the dark, miunske CAN keypads reveal their superiority: extremely bright, without glare and homogeneously illuminated panel. This is made possible by placing lighting elements in individual light guides, which are movable for switch elements and stationary for display fields. This spatial separation prevents stray light.

An integrated light sensor ensures the automatic adjustment of the light intensity. This works in a pulse width modulated way so that color fidelity is maintained even at low brightness. Through the use of multicolor LEDs, the individual display elements can be lit in all colors. The fine-grained configurability even allows adaptation to individual color schemes or given product designs. The installation depth of 25mm is significantly lower than conventional rocker switches while improving thermal and optical properties.

Robust construction
Micro switches ensure functional safety even after pressing the Switch 1 million times. The high-quality injection moulding housings are very robust. This protects the electronics inside and allows an easy and faultless installation, even providing (IP67) compliance from the front side.

Keys parametrisable in different fixed states, or full control via CAN information (colour, brightness or flashing)

Absolute colour fidelity during dimming even at the lowest brightness settings

Bar graph LEDs assignable to 60 different positions for bar graph LEDs for switch and display elements

Connection of external encoders for operation of CAN based function parameters

Two inputs to control location lighting, disable the CAN-Bus or as digital input

Flashing frequency freely parametrisable with customisable flashing frequency (range: 0.2 Hz – 50 Hz)

Keys can be updated while installed

CAN speeds of 20 kbit/s up to 1 Mbit/s, adaptable to existing CAN systems

CAN messages bit-by-bit freely configurable in a graphical symbol editor to illustrate the entire network communication

Build your own graphical user interface for your device within minutes using the handy FlexGUI interface, delivered as part of the miunske-toolchain free of charge

Use internal flash memory for your own purposes, fully controllable by CAN, e.g. for redundant data storage or machine parameters

Cyclic sending of a freely configurable, fixed value CAN message for function monitoring and self-diagnosis (heartbeat)

Software can be updated while installed

Timeout monitoring of received messages

Voltage control through cyclic measurement of supply voltage, signal output if voltage drops below a minimum voltage and/or if the keypad is shut off

Front side, in compliance with IP 67

1. Support bracket with screw fitting (optional) for panel-mounted version IP67
2. Rear housing cover for mechanical protection of electronics
3. 1 freely selectable unicolour – LEDs in horizontal and vertical alignment per element with adjustable brightness
4. 2 individual micro buttons per field for safe switching behaviour and a very good haptic feedback
5. Multicolour high-performance LED, adjustable color and brightness at runtime, to display various status data
6. Clamps in various designs provide for secure hold of the keypad when installed in panels of varying thickness
7. Switch frame in 3 different versions for 4, 6 and 12 switch and display elements complying with installation dimensions of commercially available rocker switches, optionally with IP67 on front
8. Light guides for excellent illumination, optionally with Keypad light chambers for bar graph LEDs for switch and display elements
9. Light guides movable for operating controls and stationary for display fields
10. Diffusion lens for homogeneous symbol illumination
11. Light sensor for automatic brightness control
12. Keypad foil transparent and roughened made of durable polyester, printed on the back in freely-selectable color and design versions, individual symbol choice for small quantities due to laser engraving technology, optionally with logo or application-specific information (optional)
13. Doming elements (optional) for haptic separation of the individual operating fields

TECHNICAL FEATURES AT A GLANCE
MIUNSKE CAN KEYPADS - CUSTOMISED CONFIGURATIONS AND COMBINATIONS

Development of a CAN control unit with application-specific function layout

1. Definition of hardware properties
   Each field is defined either as a mere display field or a combined display/actuation field. Each switching and display field on a miunske CAN keypad can be configured with a vertical or horizontal bar graph display. The maximum number of possible bar graph displays depends on the layout (12 button keypad with max. 4 fully equipped bar graphs, for 4 and 6 button keypads, max. 2 bar graphs). Alternatively, individual bar graph LEDs can be punctually actuated on several fields.

2. Creation of the functional design
   The first step is to define the functions: what function is to be assigned to each individual switching and display field. For the layout of the backlight symbols and status fields, developers can draw from an extensive database of graphics, which is part of the miunske-toolchain software. The database can be complemented with individual symbols anytime. In subsequent production steps, a special laser procedure incorporates these symbols in a transparent surface.

3. Surface design and cover foil
   In addition to the switching and display fields, the keypad foil can also be printed with a functional representation. This way, explanatory hints and pictograms can be integrated. In the simplest case, the manufacturer's logo is placed here.

4. Production of application-specific keypad hardware
   The finished foil layout is manufactured cost-efficiently for small quantities using laser technology. Larger batches are realised by means of printing technology.

TECHNICAL DATA OF CAN KEYPADS

<table>
<thead>
<tr>
<th>Name (number of display fields)</th>
<th>CAN keypad 4</th>
<th>CAN keypad 6</th>
<th>CAN keypad 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Article number</td>
<td>N6-2001-4000</td>
<td>N6-2001-2000</td>
<td>N6-2001-0000</td>
</tr>
<tr>
<td>Size (W×H×D) [mm]</td>
<td>63.4×58.4×28.8</td>
<td>90×58.4×28.8</td>
<td>168×55.8×28.8</td>
</tr>
<tr>
<td>Weight (g)</td>
<td>80</td>
<td>90</td>
<td>110</td>
</tr>
<tr>
<td>Protection class (front)</td>
<td>IP67</td>
<td>IP67</td>
<td>IP67</td>
</tr>
<tr>
<td>Digital input count (pull-down)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>CAN interfaces</td>
<td>1 × ISO11898</td>
<td>CANopen, FireCAN</td>
<td></td>
</tr>
<tr>
<td>Bus protocol</td>
<td>J1939, CANopen, FireCAN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supply voltage [V]</td>
<td>12 and 24 (9–36)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quiescent current consumption at 12 V [mA]</td>
<td>≥2/4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baud rates [kBit/s]</td>
<td>20; 33.3; 50; 83.3; 100; 125; 250; 500; 800; 1000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accessories</td>
<td>CAN USB interface, miunske-toolchain parametrising software</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

THE SOFTWARE FOR CAN SOLUTIONS

Good products need good developers. And good developers need good tools. Otherwise, a lot of time and energy will be lost with unproductive work. This creates frustration and prolongs development times. An efficient development environment is therefore an important building block in the CAN world of miunske.

The miunske-toolchain software package developed in-house offers a uniform interface for parameterization and configuration of processor-controlled electronic components. This software package comes free of charge with hardware components. Thus, miunske® provides a holistic, flexible and cost-effective tool to develop individual control components for commercial vehicles. With every new product development, the miunske-toolchain expands.

5 STEPS TOWARDS YOUR CUSTOMISED KEYPAD

Step 1: Install the Toolchain software on your PC.
Step 2: Connect a CAN interface to the PC’s USB port.
Step 3: Connect the CAN keypad to the connecting adapter and power supply.
Step 4: Start the Toolchain software on the PC. Set the baud rate to 250 kBit/s and let the software locate the device.
Step 5: Done! Now you can start development work. Use miunske toolchain to draft your own keypad configuration.

You can find the software miunske-toolchain for free download at miunske.com/en/service/download
**SYMBOLS & BARGRAPH**

Multicolor LEDs enable to display the field symbols in all colors (RGB).

Up to 5 additional unicolour LEDs per field can be used in horizontal or vertical orientation as a bargraph.

**HAPTICS OF FOILS**

Doming variants haptically support the secure use of the panel keys:

- [a] grid doming black
- [b] grid doming transparent
- [c] doming pads transparent black--imm.
- [d] doming pads transparent

When using the light sensor, please select the grid doming transparent or doming pads.

**DESIGN OF FOILS Colors, Fields, Layout**

The transparent material of the keyboard foils can be printed in all color and design variations (CMYK).

It is possible to apply customized graphics such as vehicle contours or logos.

**KEYPAD FRAME Standard & Deluxe**

In addition to the standard black frames various color variants as well as decorative metallic coatings are available.

The different metallic coatings are available in gloss levels "polished" or "satin-gloss finish".

- chrome + copper
- stainless steel + gold

**PROTECTION CLASS IP67**

The IP67 option on the front side of CAN keypads is realized by frames with sealing in combination with metal holding brackets on the rear. The metal holding bracket pushes the keypad on the surface of the installation location to guarantee IP67 protection, especially on rough surfaces.

**HOLDING CLIPS FOR DIFFERENT MATERIAL THICKNESSES**

Holding clips of different lengths are available for a secure installation of CAN keypads. For installation locations with material thicknesses >5mm (e.g. furniture chipboard) shorter holding clips ensure the proper fit of the keypad.

**LATERAL PLUG CONNECTION**

For installation situations with limited installation depth, a lateral plug connection can be implemented instead of the standard rear-facing plug.

**COMBINATION WITH ENCODER**

It is possible to add external encoders. 6-field keypads can be equipped with one encoder, 12-field keypads with two encoders. The length of the 152 mm connecting cable is customizible on request.

You will find the form „CAN-keypad_form“ for defining individual keyboard configurations in the download area at www.miunske.com.

Equipment, options, accessories Miunske’s CAN keypads can be configured in a variety of ways, but best with our simple configuration sheet. And if there are questions, our consultants are happy to help.
**HARD AND SOFTWARE FOR THE DEVELOPMENT OF CAN SOLUTIONS**

**MIUNSKE CAN-STARTER KIT**

Unpack, plug in, develop - our CAN sample kit is individually assembled and contains exactly the hardware components you need to develop your CAN controller. You can order it for trial or permanent use in your development environment.

**EMAIL ADDRESS FOR PRODUCT INFORMATION**

You can find the software miunske-toolchain for free download at miunske.com/en/service/download

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### TECHNICAL ACCESSORIES FOR CAN KEYPADS

**CAN connecting adapter**

Serves as power supply for miunske CAN devices and adapter for CANfox. CAN connecting adapter serves as power supply for miunske CAN devices and adapter for CANfox.

**DIN mounting frame**

For mounting CAN keypads (single and combined) available for 4, 6 or 12 CAN keypads.

**CANfox**

CANfox is the interface between miunske CAN devices and the computer. The connection is made via the computer’s USB interface.

**Programming adapter**

For all miunske CAN devices incl. power supply and all device adapters.

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>Article number/note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Micro MATE-N-LOK 3 mm socket housing, 6-pin, 2x3, black</td>
<td>0-0794617-6</td>
</tr>
<tr>
<td>Micro MATE-N-LOK 3 mm socket housing, 0.2 - 0.6 mm², tin-plated</td>
<td>0-0794610-1</td>
</tr>
<tr>
<td>Micro MATE-N-LOK 3mm with CAN terminating resistor 120 Ohm for Y adapter cable</td>
<td>W3-0000-0130</td>
</tr>
<tr>
<td>Cable set for CAN keypad 4m, 6m with/without terminator</td>
<td>on demand</td>
</tr>
<tr>
<td>Y adapter cable Micro MATE-N-LOK 3 mm for CAN keypads, 20 cm and other lengths, 2x plug, 1x socket</td>
<td>on demand</td>
</tr>
</tbody>
</table>

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Using the miunske-toolchain software for Windows, CAN devices can be parameterized directly on the PC.
As a provider of systems for commercial vehicle electronics, we know that switching high currents is of crucial importance to our customers. All miunske I/O modules with power outputs can permanently switch currents up to 5A per output. This means that the additional power relays required by other modules are not required here. All outputs are protected against overload, short-circuiting and excessive temperatures.

Miunske’s components for commercial vehicle electronics are of robust design. Nevertheless, replacement of parts is day-to-day business in your industry. Therefore, miunske’s CAN modules are easy to exchange. You do not require specialist knowledge in order to exchange hardware. System administrators can program the exchanged assemblies via a service interface (using CAN connection) with the CAN function parameters.

SMALL AND FLEXIBLE WITH I/O NANO

This I/O module can be plugged in a mini relay socket and allows cost-efficient expansion of systems with up to two inputs and outputs. The integrated PLC realises functions such as time-delayed switching, voltage monitoring, pulse-width modulation, A/D conversion etc. The I/O Nano is available in various versions with high-side, low-side or analogue outputs and is freely programmable for specific applications.

FOR RETROFITS OR NEW PROJECTS - I/O1, I/O2, I/O3, I/O4

The miunske I/O modules 1 to 4 were developed and optimised with the focus on “retrofitting” and easy expansion of existing CAN systems and coexistence of conventional wiring and a local CAN system. Therefore, the plug-in connections of these I/O modules are designed to fit two “mini relay sockets”.

Another benefit for use in existing architecture: All inputs can be configured individually – both analogue and digital (pull-up/pull-down/analogue) and programmed to receive the incoming input signal type. This enables component providers to use one system for different CAN architectures in different basic vehicles.

The I/O modules type I/O2 and I/O3 have been developed focusing on functional reliability of contacts, particularly for cold signals. During the switching operation, the input can drive an increased current of 2 to 32 mA. This counteracts contact corrosion. This in turn is cost-efficient and increases your system’s service life.
### BETTER PERFORMANCE WITH I/O 5

Many customers want even more functionality of the components. We responded with the development of the I/O 5 module. With 12 inputs and outputs in all, the I/O 5 provides for an even more comprehensive range of application options. Optionally, the 12 outputs can be separated into 6 high-side and 6 low-side outputs. Up to 6 outputs are galvanically decoupled from the supply voltage, thus enabling control of safety-relevant consumers with separate power supplies.

### CAN MODULES AT A GLANCE

<table>
<thead>
<tr>
<th>Article number</th>
<th>Size [W x D x H] [mm]</th>
<th>Weight [g]</th>
<th>Supply Voltage [V]</th>
<th>CAN interfaces</th>
<th>Protocol</th>
<th>Mounting</th>
<th>Inputs</th>
<th>Outputs</th>
<th>Safety</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N6-3007-0001 N6-3008-0001</td>
<td>30 x 30 x 50</td>
<td>35</td>
<td>-</td>
<td>12 and 24 (9 – 36)</td>
<td>-</td>
<td>2</td>
<td>2</td>
<td>IP53</td>
</tr>
<tr>
<td></td>
<td>N6-3001-00xx N6-3002-00xx</td>
<td>30 x 60 x 60</td>
<td>60</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>8</td>
<td>IP53</td>
</tr>
<tr>
<td></td>
<td>N6-3003-00xx N6-3004-00xx</td>
<td>150 x 60 x 88</td>
<td>150 700</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>12</td>
<td>IP67</td>
</tr>
<tr>
<td></td>
<td>N6-3005-00xx N6-3006-00xx</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>6</td>
<td>IP67</td>
</tr>
</tbody>
</table>

**Montaging**
- Pluggable mini relay socket
- for DIN rail

**Inputs**
- Quantity: 2 2 2 8 12 2 12
- Constant current source: × × ×
- digital (pull-up/pull-down): O/2 O/2 O/2 ×/+ ×/+× 0/2
- for analog use: 2 2 2 8 12 2 8

**Outputs**
- Power outputs: 2/0 0/2 6/0 4/0 - 6/0 12/0 12/0 0/12 0/12 0/12
- Low-voltage outputs: 6 (1 350 mA)
- PWM outputs: × × ×
- Current-monitored outputs: × × × 6

**Safety**
- Protection class: IP53
- Short-circuit, overload and overtemperature protection: × × ×
The miunske® Gateway allows you to use information from other, already established CAN networks. This product provides manufacturers with the opportunity to provide interfaces for external applications on their machines without allowing access to their own network. Furthermore, remodelers of vehicles and manufacturer of special vehicles have the opportunity to tap into application-specific information from closed CAN networks.

Whenever it comes to adapting existing products in terms of hardware technology or developing a new product entirely according to individual wishes, customers need a special user interface with which they can parameterize their components themselves. However, the effort required to provide such interfaces is often disproportionate to product development.

With FlexGUI, miunske® provides an individual graphical user interface for every programmable product. In addition to setting the software parameter set, FlexGUI also offers the option of storing graphic elements of the corporate design, such as the logo and language-dependent explanations. This can be independently extended and adapted by the customer to translate descriptions and help texts for individual parameters into another language or to explain certain functions with graphics.

The parameterization interface integrated in miunske® toolchain allows access and adaptation to the parameter sets. In particular during test phases or during support, this creates flexibility and shortens development times.

Extended possibilities with CAN Gateway
- Creation of interfaces for external applications on the machine without granting access to the own network
- Access to application-specific information from closed CAN networks such as an Engine-CAN
- Restructure data for other applications/protocols
- State simulation

The miunske® Gateway fits (same as the I/O Nano) all miunske mini relay sockets

Technology at a glance

<table>
<thead>
<tr>
<th>Gateway</th>
<th>Article number</th>
<th>Size W × D × H [mm]</th>
<th>Weight [g]</th>
<th>Supply voltage [V]</th>
<th>CAN interfaces</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N6-3000-2000</td>
<td>30 × 30 × 60</td>
<td>35</td>
<td>9-36</td>
<td>2 × ISO18918</td>
</tr>
</tbody>
</table>

Accessories complementing our modules, can be found in our online catalogue on www.miunske.com.
**MULTI-SOUND-MODULE WITH CAN INTERFACE AND SOUND DATABASE**

With the large number of acoustic signals in the cockpit, it is important that they are quick and safely distinguishable. Miunske’s Multi-Sound-Module helps drivers to immediately recognize every acoustic message in the cabin. There are a variety of signals and voice messages available.

The module equipped with a CAN interface to ISO11898 can be equipped with up to 50 different tones, noises, voice messages or melodies. The miunske-toolchain offers an extensive sound database, which can be extended by own sounds. The audio output can be controlled either via CAN and/or via the 6 digital inputs.

**TECHNICAL SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Size (W × D × H mm)</th>
<th>N6-4001-0001</th>
<th>N6-4002-0001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight (g)</td>
<td>120 g</td>
<td></td>
</tr>
<tr>
<td>On-board power supply (V)</td>
<td>9 to 36</td>
<td></td>
</tr>
<tr>
<td>CAN interface</td>
<td>ISO11898</td>
<td></td>
</tr>
<tr>
<td>Bus protocol</td>
<td>application-specific</td>
<td></td>
</tr>
<tr>
<td>Inputs</td>
<td>1 × CAN</td>
<td></td>
</tr>
<tr>
<td>Processing rate</td>
<td>350 CAN messages per second</td>
<td></td>
</tr>
<tr>
<td>Transmission standard</td>
<td>802.11a/b/g</td>
<td></td>
</tr>
<tr>
<td>Sound output</td>
<td>Edge-triggered/CAN, 50 different tones can be parameterized</td>
<td></td>
</tr>
<tr>
<td>max. volume level</td>
<td>95 dB (A)</td>
<td></td>
</tr>
<tr>
<td>Connection</td>
<td>Molex SD-33472-121</td>
<td></td>
</tr>
<tr>
<td>Mounting</td>
<td>with fastening straps</td>
<td></td>
</tr>
<tr>
<td>Protection class</td>
<td>IP 67</td>
<td></td>
</tr>
</tbody>
</table>

**HIGHLIGHTS**

- Parameterizable via CAN
- Usable as active loudspeaker via line in
- Clock signal input for e.g. blinker function with a separate tone for rising and falling edge
- Supply voltage monitoring with separate sound

---

**CAN WLAN INTERFACE**

With this interface, the WLAN technology can be used easily and inexpensively in commercial and special purpose vehicles or mobile working machines. The module not only allows connecting to existing Wi-Fi networks, but also offers the function of a hotspot for your own network. This degree of cross-linking enables a multitude of applications – from vehicle diagnosis and monitoring to fleet management. The CAN WLAN interface is available in 2 different designs.

**TECHNICAL SPECIFICATIONS**

<table>
<thead>
<tr>
<th>N6-4001-0001</th>
<th>N6-4002-0001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size (W × D × H mm)</td>
<td>30 × 30 × 60</td>
</tr>
<tr>
<td>Housing</td>
<td>Standard relay socket</td>
</tr>
<tr>
<td>Weight (g)</td>
<td>31</td>
</tr>
<tr>
<td>Supply voltage (V)</td>
<td>12V, 24V and 48V (9V-60V)</td>
</tr>
<tr>
<td>CAN interfaces</td>
<td>ISO11898</td>
</tr>
<tr>
<td>Bus protocol</td>
<td>application-specific</td>
</tr>
<tr>
<td>Inputs</td>
<td></td>
</tr>
<tr>
<td>Processing rate</td>
<td>350 CAN messages per second</td>
</tr>
<tr>
<td>Transmission standard</td>
<td>802.11a/b/g</td>
</tr>
<tr>
<td>Sound output</td>
<td>Edge-triggered/CAN, 50 different tones can be parameterized</td>
</tr>
<tr>
<td>Range</td>
<td>approx. 30 m bidirectional</td>
</tr>
<tr>
<td>Baud rates</td>
<td>adjustable from 33 kBit/s to 1 MBit/s</td>
</tr>
<tr>
<td>WLAN frequency band</td>
<td>2.4 GHz</td>
</tr>
<tr>
<td>Connection</td>
<td>Standard relay socket</td>
</tr>
<tr>
<td>Protection class</td>
<td>IP 53</td>
</tr>
</tbody>
</table>

**HIGHLIGHTS**

- Cost effective interface for wireless transmission of vehicle data
- Two housing versions for IP 53 and IP 67
- miunske provides the parameterization software free at www.miunske.com/en/service/download