

Series 09

Rugged. Modular. Reliable.

<https://eao.com/09>



09 Information about the Series

Rugged Keypads

Advantages

- Individual 4-segment and RGB halo ring illumination
- Designed for functional safety: ISO 26262 & ISO 13849
- Intelligent HMIs with CAN bus integration
- Robust, innovative, ergonomic design sealed up to IP67 protection
- Interchangeable ISO 7000 range of symbols or customised symbols

Typical application areas

- Roadmaking vehicles and roller compactors
- Loaders, dozers and excavators
- Cranes, dump trucks and crawler drills
- Fire-fighting and rescue vehicles
- Road sweepers, cleaning vehicles and refuse trucks
- Snow removers and groomers
- Agricultural vehicles and equipment

HMI Functions

- Rugged Keypad
- Rugged Rotary Cursor Controller

Degree of protection

- IP67 protection (front and rear side)
- IP67 protection (panel/screw-in)
- IP54 protection (panel/clip-in)

Operating voltage

- 8-32 VDC

Standards

Information on the availability of the fully validated and certified product according to ASIL B ISO 26262 and PL d ISO 13849 with CANopen Safety can be found at:
www.eao.com/09-status

Joysticks

Advantages

- Mechanical and electrical customisation is possible
- Front protection to IP65 or IP67
- Standard joysticks available from stock
- Low back panel depth for hall effect and conductive plastic sensors

Typical application areas

- Commercial vehicles
- Special vehicles
- Marine, rail and electric vehicles
- Machinery
- Medical technology
- Numerous other applications

Functions

- Joystick
- Koordinatenschalter

Design

- Flush
- Raised

Front protection

- IP40
- IP65
- IP67

Operating voltage

- 5 VDC
- 8 ... 36 VDC
- 30 VDC
- 250 VAC
- 500 VAC

Terminal

- Screw terminal
- Soldering terminal
- Minitec plug
- Dubox plug
- Molex micro
- Cable

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09 Overview of Modules

Rugged Keypads. Optimal for your application.

Series 09 variants




The Series 09 Keypads and Rotary Cursor Controllers are available in a range of different variants. They all have the flexibility of interchangeable legends, but come with a choice of different halo illumination features, communication protocols and connector types for example.

This wide choice allows designers to specify only the HMI features they actually need for their vehicle application, therefore minimising hardware costs and optimising the scope of their software development – optimal for your application.

Variants	Symbol backlight	Halo ring illumination	Communication protocol	Switching element	IP protection	Connector	Switching function/s	Functional safety standard
PREMIUM 	White LED	4-segment RGB, freely configurable	CANopen Safety	Electro-mechanical switching element	IP6K7 frontside and rear-side	Deutsch DT04-6P	Pushbutton	Functional safety ISO 26262 ASIL B and ISO 13849 PL d certified*
SUPER 	White LED	4-segment RGB, freely configurable	CANopen, J1939	Electro-mechanical switching element	IP6K7 frontside and rear-side	Deutsch DT04-6P	Pushbutton	Design for functional safety: ISO 26262 ASIL B and ISO 13849 PL d
PLUS 	White LED	Red LED (other colours on request)	CANopen, J1939	Electro-mechanical switching element	IP6K7 frontside and rear-side	Deutsch DT04-6P	Pushbutton	Fulfil ASIL QM (B) according to ISO 26262
BASIC 	White LED	Red LED (other colours on request)	N.A. (hardwired)	Electro-mechanical switching element	IP6K7 frontside	Würth Elektronik WR-MPC3, 16 pins	Pushbutton	Fulfil ASIL QM (B) according to ISO 26262

* Available at a later date, see: www.eao.com/09-status



Variants	Symbol backlight	Halo ring illumination	Communication protocol	Switching element	IP protection	Connector	Switching function/s	Functional safety standard
PREMIUM 	White LED	4-segment RGB (push-button), freely configurable	CANopen Safety	Electro-mechanical switching element	IP6K7 frontside and rear-side	Deutsch DT04-6P	Pushbuttons: push RCC*: push, rotate, proportional input	Functional safety ISO 26262 ASIL B and ISO 13849 PL d certified*
SUPER 	White LED	4-segment RGB (push-button), freely configurable	CANopen, J1939	Electro-mechanical switching element	IP6K7 frontside and rear-side	Deutsch DT04-6P	Pushbuttons: push RCC*: push, rotate, proportional input	Design for functional safety: ISO 26262 ASIL B and ISO 13849 PL d
PLUS 	White LED	Red LED (push-buttons)	CANopen, J1939	Electro-mechanical switching element	IP6K7 frontside and rear-side	Deutsch DT04-6P	Pushbuttons: push RCC*: push, rotate, proportional input	Switching function with diagnostic capability for ASIL QM (B) acc. to ISO 26262

* Functional safety certification applies to the switching signal of the two keypad pushbuttons.

09 Overview of Modules

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Rugged. Modular. Reliable. *New Series 09 Rugged Keypads.*





Designed for E1 applications with functional safety and CAN bus integration.

- Individual 4-segment and RGB halo ring illumination
- Designed for functional safety: ISO 26262 and ISO 13849
- Intelligent HMIs with CAN bus integration
- Robust design sealed up to IP67 protection
- Interchangeable ISO 7000 or customised symbols

Customer-specific product diversity.

Series 09 In-Cabin Keypads with 6 pushbuttons are available in SUPER, PLUS and BASIC variants. These differ in terms of illumination options and the communication interface. The hard-wired BASIC product variant is available, as an additional option, in a 2-pushbutton version.

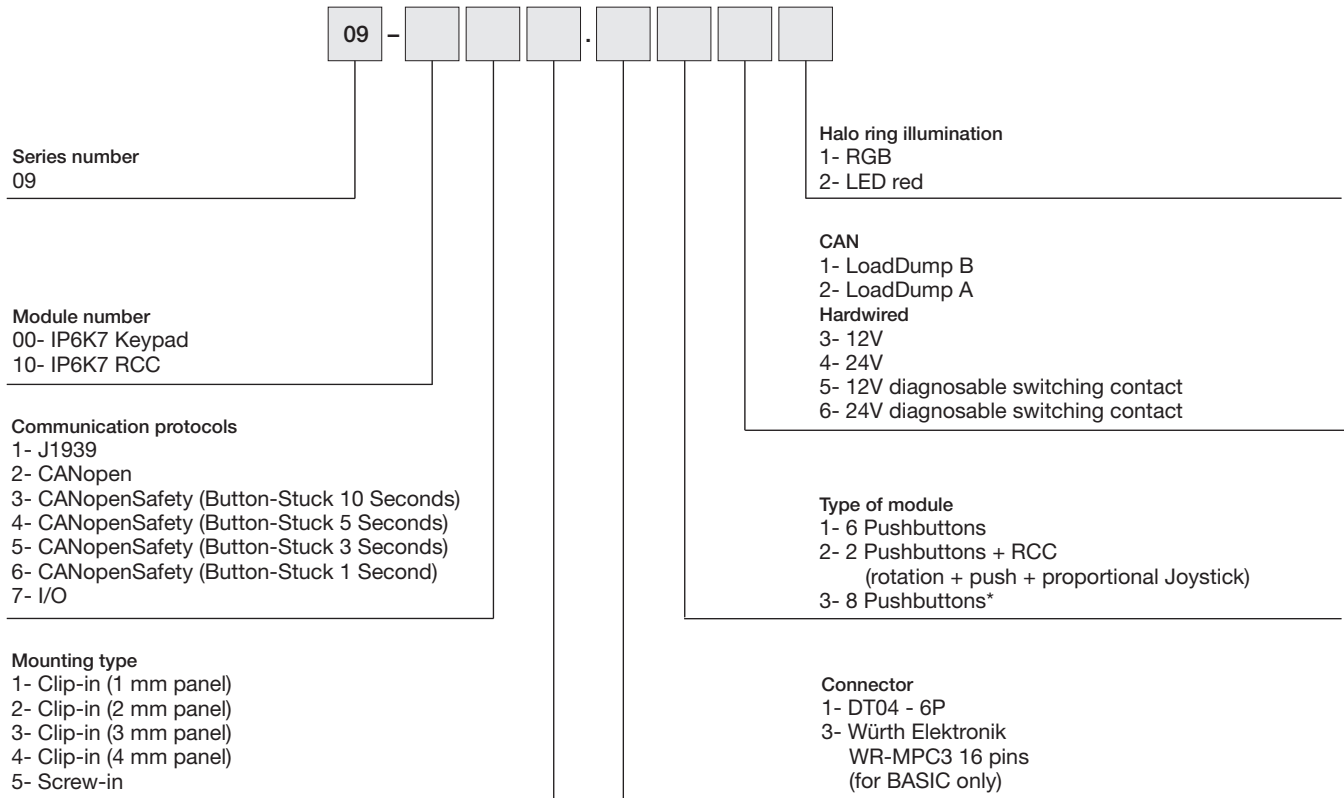
With this wide range of variants, customers can choose between a CAN bus connection or hard-wired version depending on their application, and they can further customise their keypad thanks to a variety of illumination options and interchangeable custom or ISO 7000 symbols – for optimal integration of the HMI in the vehicle interior.

Product	Variant	Symbol illumination	Halo-ring illumination	Communication protocol	IP protection class	Plug	Switching action	Safety
 Keypad 6PB	SUPER	White LED	RGB, freely configurable	CANopen, J1939	IP5K4	TYCO 1745000-3	Pushbutton	Diagnostic switching action for ASIL QM (B) in accordance with ISO 26262
 Keypad 6PB	PLUS	White LED	Red LED (other colours on request)	CANopen, J1939	IP5K4	TYCO 1745000-3	Pushbutton	Diagnostic switching action for ASIL QM (B) in accordance with ISO 26262
 Keypad 6PB	BASIC	White LED	Red LED	n/a (hard-wired)	IP5K4	TYCO 1745000-3/ 1745000-4	Pushbutton	Diagnostic switching action for ASIL QM (B) in accordance with ISO 26262 (with NAMUR)
 Keypad 2PB	BASIC	White LED	Red LED	n/a (hard-wired)	IP5K4	TYCO 1745000-3	Pushbutton	Diagnostic switching action for ASIL QM (B) in accordance with ISO 26262 (with NAMUR)

09 Numbering structure

Part number structure Rugged Keypads Modules

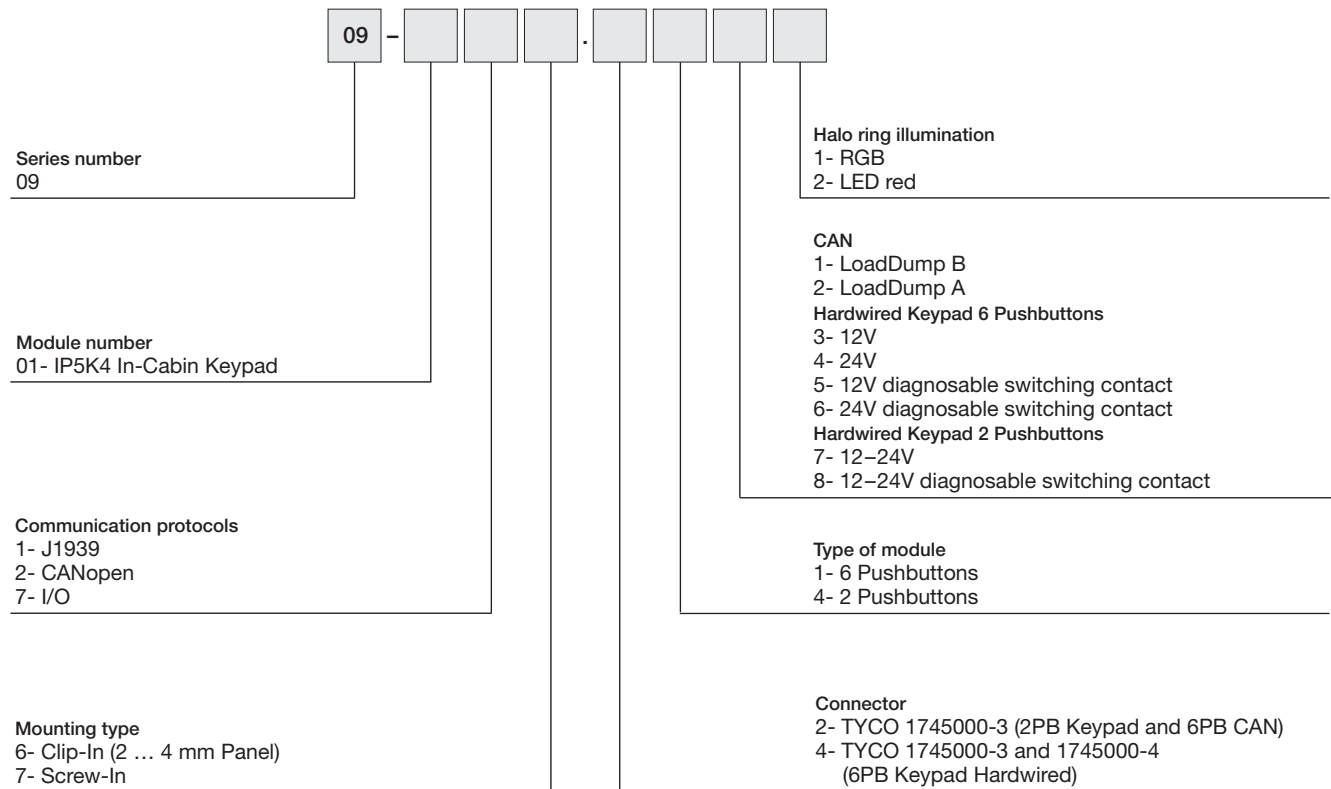
Part No. module (12 digits)



* available at a later date

Part number structure In-Cabin Keypads Modules

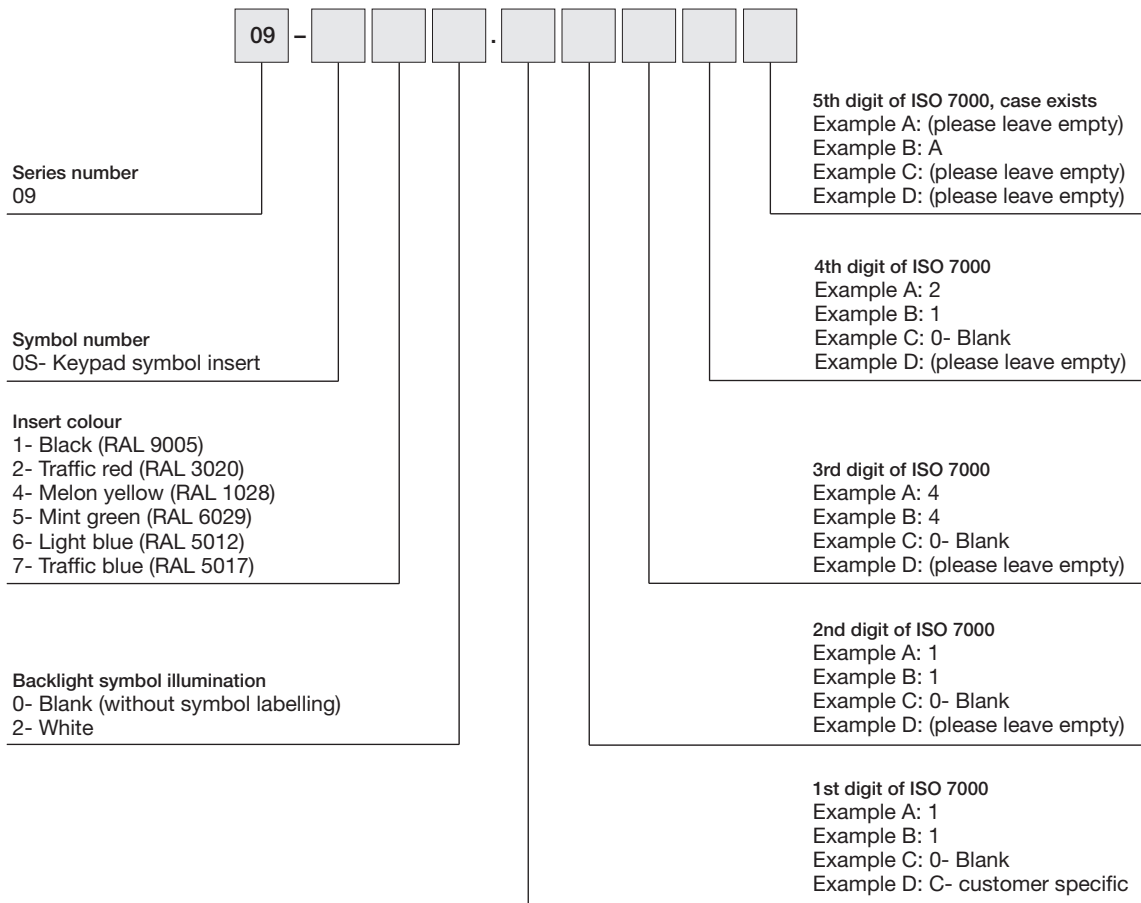
Part No. module (12 digits)



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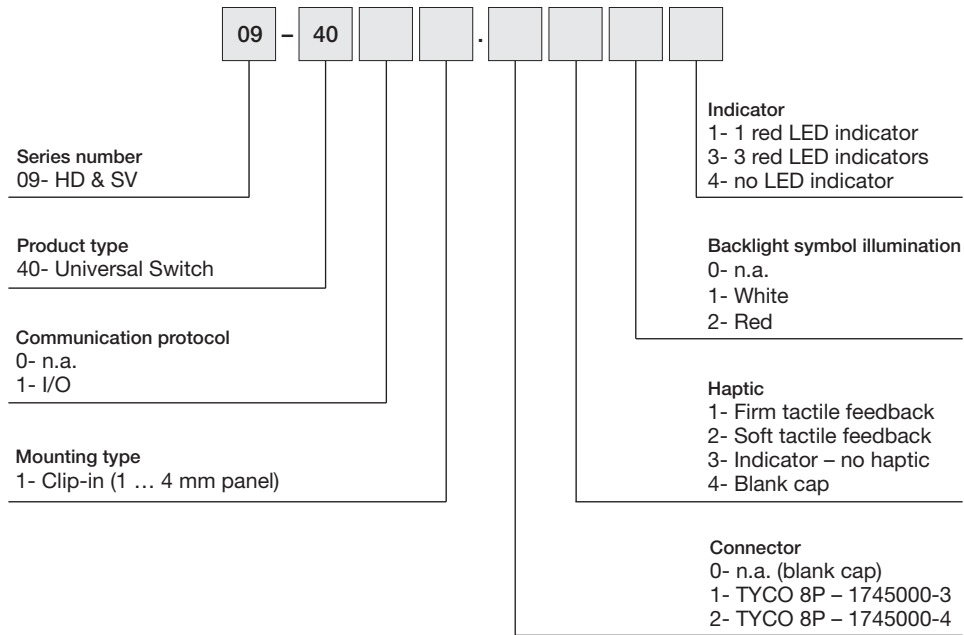
09 Numbering structure

Part No. symbols



Part number structure Universal Switch

Part No. Universal Switch



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09 Numbering structure

Part No. Caps



Series number
09- HD & SV

Symbol number
4S- Symbol caps

Cap colour
1- Black (RAL 9005)

Backlight symbol illumination
0- Blank
1- Red
2- White

5th digit of ISO 7000, case exists
Example A: (please leave empty)
Example B: A
Example C: (please leave empty)
Example D: (please leave empty)

4th digit of ISO 7000
Example A: 2
Example B: 1
Example C: 0- Blank
Example D: (please leave empty)

3rd digit of ISO 7000
Example A: 4
Example B: 4
Example C: 0- Blank
Example D: (please leave empty)

2nd digit of ISO 7000
Example A: 1
Example B: 1
Example C: 0- Blank
Example D: (please leave empty)

1st digit of ISO 7000
Example A: 1
Example B: 1
Example C: 0- Blank
Example D: C- customer specific

Symbol direction
0- Blank
1- 0 degrees
2- 90 degrees
3- 180 degrees
4- 270 degrees

Indicators
0- No LED indicator
1- 1 LED Indicator
3- 3 LED indicators

Keypad PREMIUM*



Mechanical characteristics

- Actuation force: approx. 6.5 N
- Overload: 250 N
- Mechanical lifetime: 250 000 cycles of operation (under specific conditions of functional safety)
- Impact resistance: IK07

Electrical characteristics

- Operating voltage range 8–32 VDC

Illumination

- Halo ring and symbol illumination can be configured independently
- LED symbol illumination
 - Colour: white
 - Luminance: max. approx. 20 cd/m², dimmable
- LED halo ring illumination with four freely configurable segments
 - Multi-colour: RGB
 - Luminance: approx. 1 500 cd/m²
 - Illumination: steady lighting, flashing, pulses, rotations, colour changes

Symbols

- Symbols in accordance with ISO 7000
- Customer-specific symbols on request

Connections/interfaces

- CAN interface (ISO 11898)
- CANopen Safety* (EN 50325-5),
- Baud rate 250 kBd and 500 kBd (software configurable)
- Connector Deutsch DT04-6P

Ambient conditions

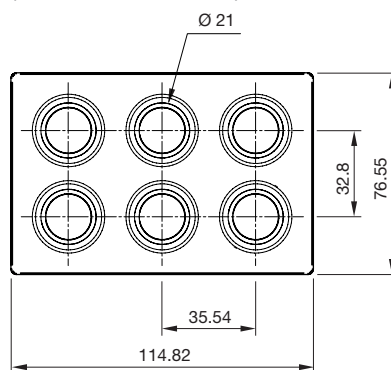
- Operating temperature: –40°C ... +85°C
- Storage temperature: –40°C ... +85°C

Protection degree

- IP6K7 (front and rear side)
- Up to IP6K7 (panel/screw-in)
- Up to IP5K4 (panel/clip-in)

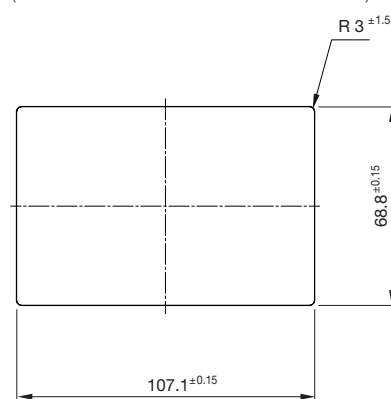
Dimensions

(All dimensions in mm)



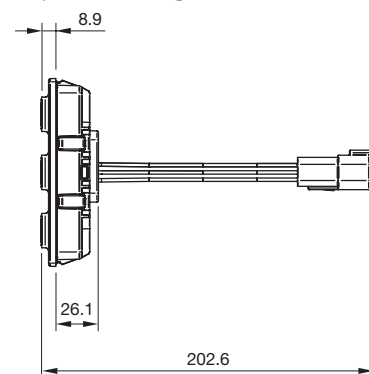
Mounting cut-out

(Panel thickness 1.0 mm ... 4.0 mm)

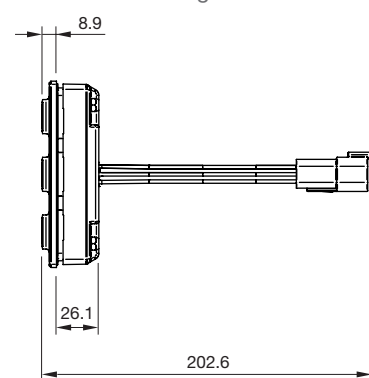


Mounting

Clip-in mounting



Screw-in mounting



* Information on the availability of the fully validated and certified product acc. to ASIL B ISO 26262 and PL d ISO 13849 with CANopen Safety can be found at: www.eao.com/09-status

09 Rugged Keypad Modules

Keypad SUPER



Mechanical characteristics

- Actuation force: approx. 6.5 N
- Overload: 250 N
- Mechanical lifetime: 250 000 cycles of operation (under specific conditions of functional safety)
- Impact resistance: IK07

Electrical characteristics

- Operating voltage range: 8–32 VDC

Illumination

- Halo ring and symbol illumination can be configured independently
- LED symbol illumination
 - Colour: white
 - Luminance: max. approx. 20 cd/m², dimmable
- LED halo ring illumination with four freely configurable segments
 - Multi-colour: RGB
 - Luminance: approx. 1 500 cd/m²
 - Illumination: steady lighting, flashing, pulses, rotations, colour changes

Symbols

- Symbols in accordance with ISO 7000
- Customer-specific symbols on request

Connections/interfaces

- CAN interface (ISO 11898)
- CAN protocols: CANopen (CiA 401), CAN J1939
- Baud rate 250 kBd and 500 kBd (software configurable)
- Connector Deutsch DT04-6P

Ambient conditions

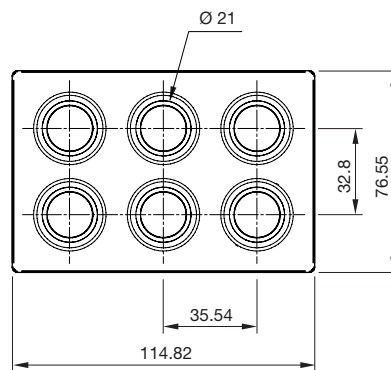
- Operating temperature: –40 °C ... +85 °C
- Storage temperature: –40 °C ... +85 °C

Protection degree

- IP6K7 (front and rear side)
- Up to IP6K7 (panel/screw-in)
- Up to IP5K4 (panel/clip-in)

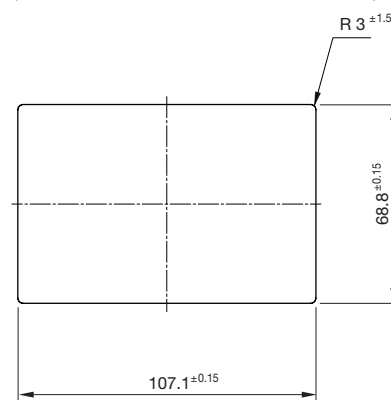
Dimensions

(All dimensions in mm)



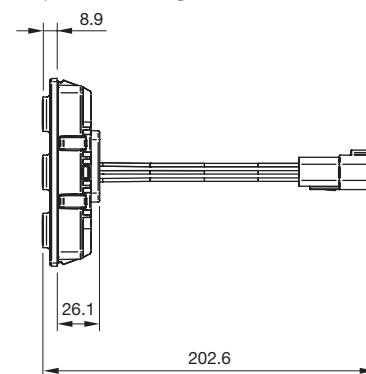
Mounting cut-out

(Panel thickness 1.0 mm ... 4.0 mm)

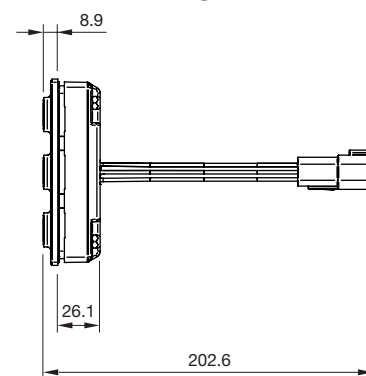


Mounting

Clip-in mounting



Screw-in mounting



Keypad PLUS



Mechanical characteristics

- Actuation force: approx. 6.5 N
- Overload: 250 N
- Mechanical lifetime: 250 000 cycles of operation (under specific conditions of functional safety)
- Impact resistance: IK07

Electrical characteristics

- Operating voltage range: 8–32 VDC

Illumination

- Halo ring and symbol illumination can be configured independently
- LED symbol illumination
 - Colour: white
 - Luminance: max. approx. 20 cd/m², dimmable
- LED halo ring illumination
 - Colour: red
 - (other colours on request)
 - Luminance: approx. 1 500 cd/m²

Symbols

- Symbols in accordance with ISO 7000
- Customer-specific symbols on request

Connections/interfaces

- CAN interface (ISO 11898)
- CAN protocols: CANopen (CiA 401), CAN J1939
- Baud rate 250 kBd and 500 kBd (software configurable)
- Connector Deutsch DT04-6P

Ambient conditions

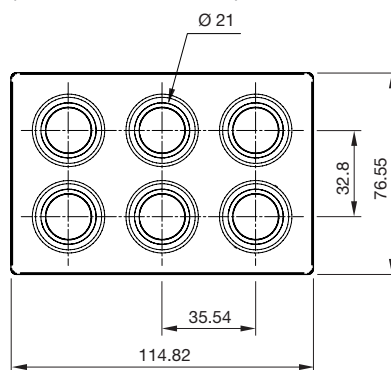
- Operating temperature: –40°C ... +85°C
- Storage temperature: –40°C ... +85°C

Protection degree

- IP6K7 (front and rear side)
- Up to IP6K7 (panel/screw-in)
- Up to IP5K4 (panel/clip-in)

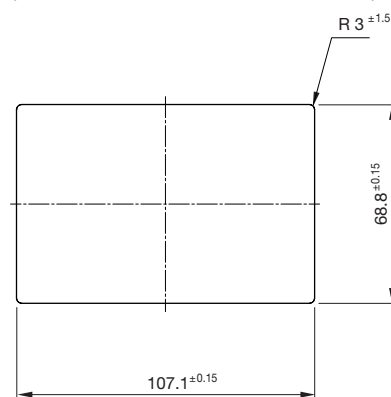
Dimensions

(All dimensions in mm)



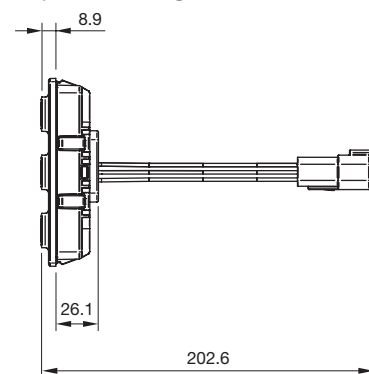
Mounting cut-out

(Panel thickness 1.0 mm ... 4.0 mm)

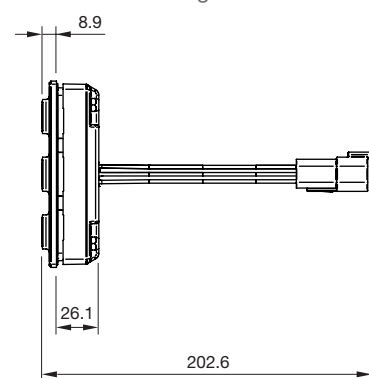


Mounting

Clip-in mounting



Screw-in mounting



09 Rugged Keypad Modules

Keypad BASIC



Mechanical characteristics

- Actuation force: approx. 6.5 N
- Overload: 250 N
- Mechanical lifetime: 250 000 cycles of operation (under specific conditions of functional safety)
- Impact resistance: IK07

Electrical characteristics

- 8–18 VDC or 18–32 VDC for operating voltage of the illumination for use in 12 V or 24 V applications. Optionally available with switch contacts with diagnostic capability

Illumination

- Halo ring and symbol illumination can be configured independently
- LED symbol illumination
 - Colour: white
 - Luminance: max. approx. 20 cd/m², dimmable
- LED halo ring illumination
 - Colour: red (other colours on request)
 - Luminance: approx. 750 cd/m²

Symbols

- Symbols in accordance with ISO 7000
- Customer-specific symbols on request

Connections/interfaces

- Connector: Würth Elektronik WR-MPC3, 16 Pins

Ambient conditions

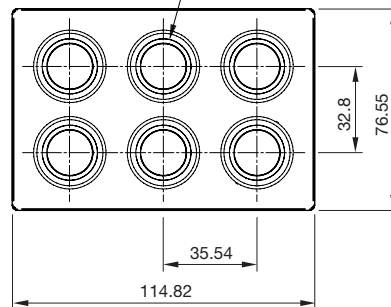
- Operating temperature: –40 °C ... +85 °C
- Storage temperature: –40 °C ... +85 °C

Protection degree

- IP6K7 (front side)
- IP20 (rear side)
- Up to IP6K7 (panel / screw-in)

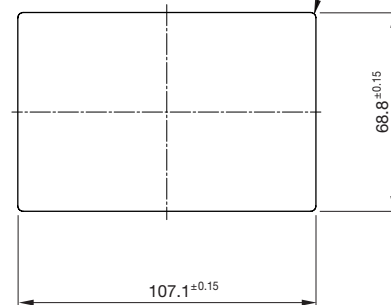
Dimensions

(All dimensions in mm)



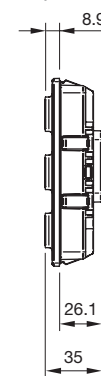
Mounting cut-out

(Panel thickness 1.0 mm ... 4.0 mm)

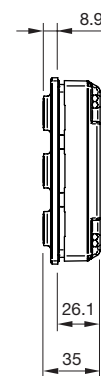


Mounting

Clip-in mounting

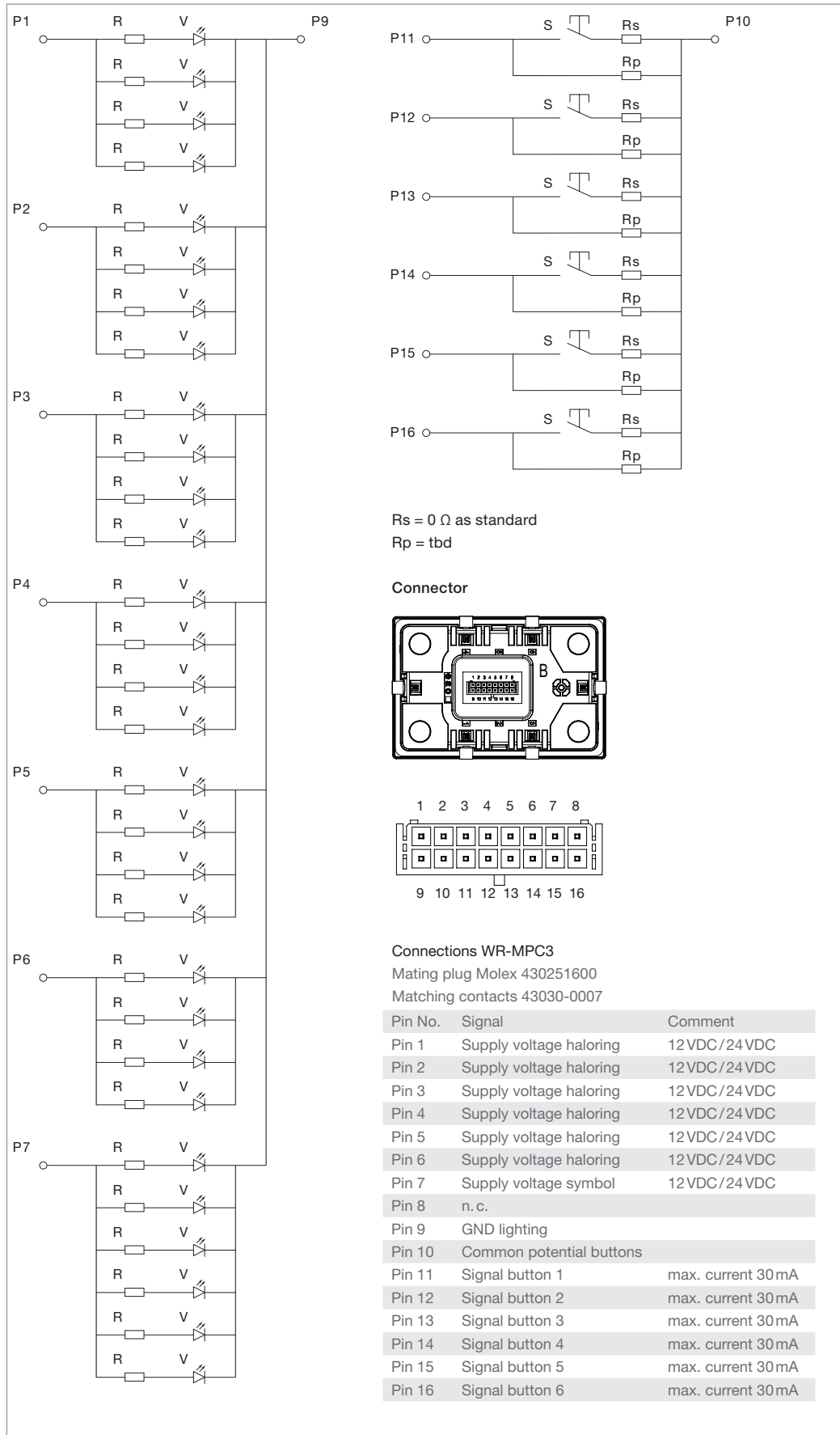


Screw-in mounting



Wiring diagram, connector

Wiring diagram



09 Rugged Keypad Modules

Rotary Cursor Controller PREMIUM*



Rotary Cursor Controller Functions

- Joystick functions
 - With proportional input
 - Digital input can be configured via CAN interface
- Rotary function
 - 20 maintained positions
 - Continuous rotation with no stop position
- Push function
 - Momentary action with click-dome

Mechanical characteristics

- Overload: 250N
- Actuation forces:
 - approx. 6.5 N pushbuttons
 - Turning the rotary cursor controller approx. 3 N
 - Pressing the rotary cursor controller approx. 11 N
- Mechanical lifetime:
 - 250 000 cycles of operation (under specific conditions of functional safety)
 - Joystick Rotary Cursor Controller: up to 3 million rotation cycles (60 million detents)
 - up to 1 million actuations (press)
 - Rotation function: Haptic with precise detent
 - Joystick function: operating angle ~ 5°

Electrical characteristics

- Operating voltage range: 8–32VDC

Illumination

- Halo ring and symbol illumination can be configured independently of each other
- LED symbol illumination
 - Color: white
 - Luminance: max. approx. 20cd/m² (dimnable)
- LED halo ring illumination with four freely configurable segments
 - Multi-color: RGB
 - Luminance: approx. 1500cd/m² (pushbutton)
- Illumination: steady lighting, flashing, pulses, rotations, colour changes

Symbols (on pushbuttons, RCC without symbol)

- Symbols in accordance with ISO 7000
- Customer-specific symbols on request

Connectivity

- CAN interface (ISO 11898)
- CANopen Safety* (EN 50325-5),
- Baud rate 250 kBd and 500 kBd (software configurable)
- Connector Deutsch DT04-6P

Ambient conditions

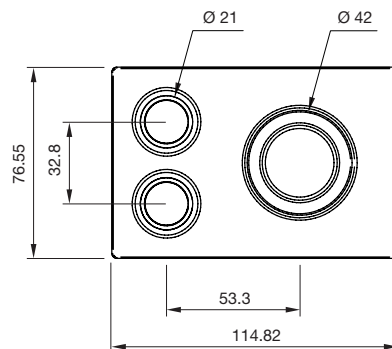
- Operating temperature
 - 40°C ... +85°C
- Storage temperature
 - 40°C ... +85°C

Protection degree

- IP6K7 (front and rear side)
- Up to IP6K7 (panel/screw-in)
- Up to IP5K4 (panel/clip-in)

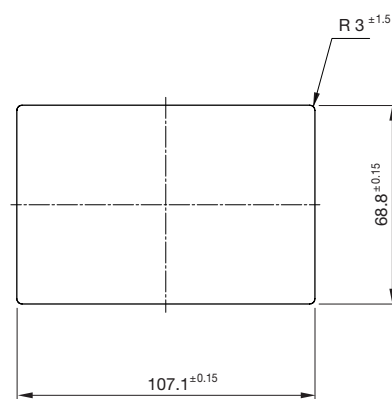
Abmessungen

(Alle Abmessungen in mm)



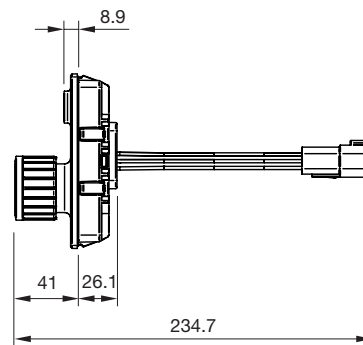
Einbauöffnungen

(Paneldicke 1,0 mm ... 4,0 mm)

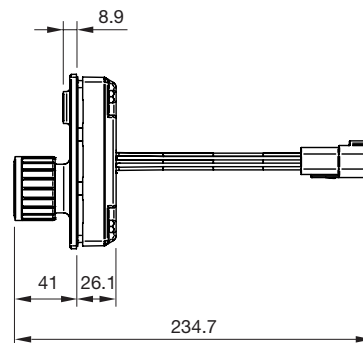


Montage

Einrastbefestigung



Schraubbefestigung



Rotary Cursor Controller SUPER



Rotary Cursor Controller Functions

- Joystick function
 - With proportional input
 - Digital input can be configured via CAN interface
- Rotary function
 - 20 maintained positions
 - Continuous rotation with no stop position
- Push function
 - Momentary action with click-dome

Mechanical characteristics

- Overload: 250N
- Actuation forces:
 - approx. 6.5N pushbuttons
 - Turning the rotary cursor controller approx. 3N
 - Pressing the rotary cursor controller approx. 11N
- Mechanical lifetime:
 - Pushbutton: up to 7 million cycles of operation (under ideal conditions)
 - Joystick Rotary Cursor Controller: up to 3 million rotation cycles (60 million detents)
 - up to 1 million actuations (press)
 - Rotation function: Haptic with precise detent
 - Joystick function: operating angle ~ 5°

Electrical characteristics

- Operating voltage range: 8–32VDC

Illumination

- Halo ring and symbol illumination can be configured independently of each other
- LED symbol illumination
 - Color: white
 - Luminance: max. approx. 20cd/m² (dimnable)
- LED halo ring illumination with four freely configurable segments
 - Multi-color: RGB
 - Luminance: approx. 1500cd/m² (pushbutton)
- Illumination: steady lighting, flashing, pulses, rotations, colour changes

Symbols (on pushbuttons, RCC without symbol)

- Symbols in accordance with ISO 7000
- Customer-specific symbols on request

Connectivity

- CAN interface (ISO 11898)
- CAN protocols: CANopen (CiA 401), CAN J1939
- Baud rate 250kBd and 500kBd (software configurable)
- Connector Deutsch DT04-6P

Ambient conditions

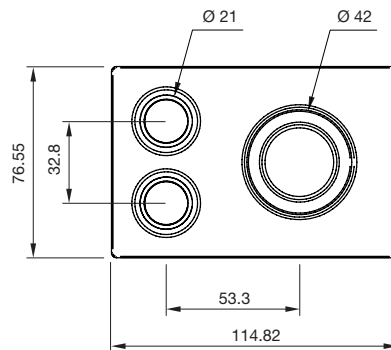
- Operating temperature: -40°C ... +85°C
- Storage temperature: -40°C ... +85°C

Protection degree

- IP6K7 (front and rear side)
- Up to IP6K7 (panel/screw-in)
- Up to IP5K4 (panel/clip-in)

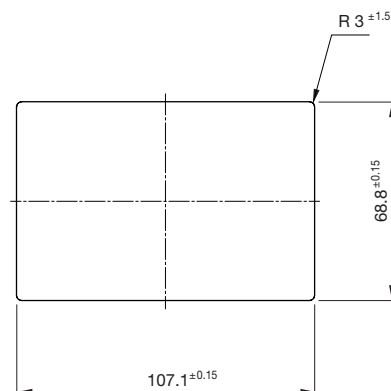
Dimensions

(All dimensions in mm)



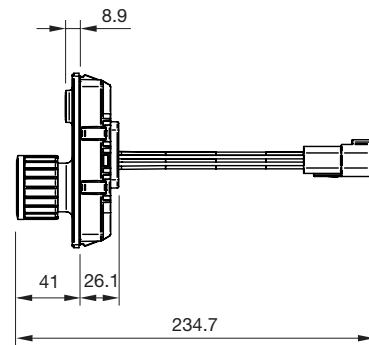
Mounting cut-out

(Panel thickness 1.0 mm ... 4.0 mm)

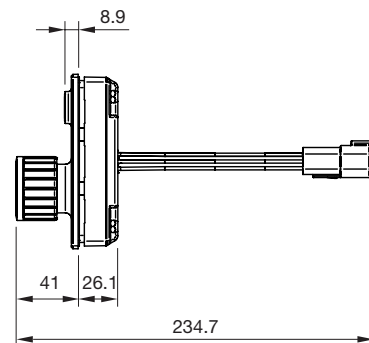


Mounting

Clip-in mounting



Screw-in mounting



09 Rugged Keypad Modules

Rotary Cursor Controller PLUS



Rotary Cursor Controller Functions

- Joystick function
 - With proportional input
 - Digital input can be configured via CAN interface
- Rotary function
 - 20 maintained positions
 - Continuous rotation with no stop position
- Push function
 - Momentary action with click-dome

Mechanical characteristics

- Overload: 250N
- Actuation forces:
 - approx. 6.5N pushbuttons
 - Turning the rotary cursor controller approx. 3N
 - Pressing the rotary cursor controller approx. 11N
- Mechanical lifetime:
 - Pushbutton: up to 7 million cycles of operation (under ideal conditions)
 - Joystick Rotary Cursor Controller: up to 3 million rotation cycles (60 million detents)
 - up to 1 million actuations (press)
 - Rotation function: Haptic with precise detent
 - Joystick function: operating angle $\sim 5^\circ$

Electrical characteristics

- Operating voltage range: 8–32VDC

Illumination

- Halo ring and symbol illumination can be configured independently
- LED symbol illumination
 - Colour: white
 - Luminance: max. approx. 20cd/m², dimmable
- LED halo ring illumination
 - Colour: red (other colours on request)
 - Luminance: approx. 1500cd/m²

Symbols (on pushbuttons, RCC without symbol)

- Symbols in accordance with ISO 7000
- Customer-specific symbols on request

Connectivity

- CAN interface (ISO 11898)
- CAN protocols: CANopen (CiA 401), CAN J1939
- Baud rate 250 kBd and 500 kBd (software configurable)
- Connector Deutsch DT04-6P

Ambient conditions

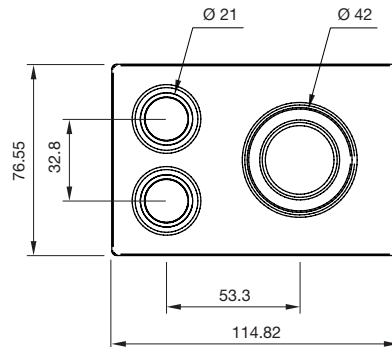
- Operating temperature: $-40^\circ\text{C} \dots +85^\circ\text{C}$
- Storage temperature: $-40^\circ\text{C} \dots +85^\circ\text{C}$

Protection degree

- IP6K7 (front and rear side)
- Up to IP6K7 (panel/screw-in)
- Up to IP5K4 (panel/clip-in)

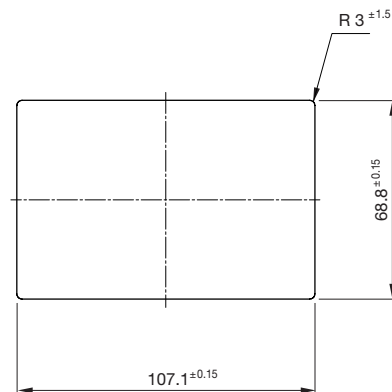
Dimensions

(All dimensions in mm)



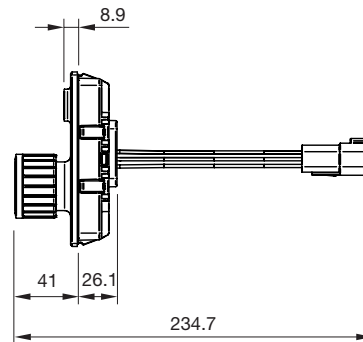
Mounting cut-out

(Panel thickness 1.0 mm ... 4.0 mm)

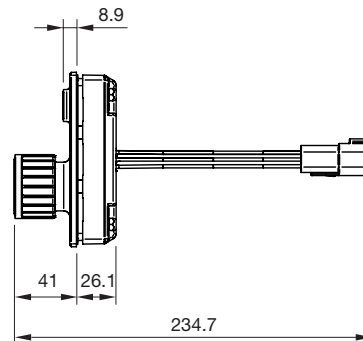


Mounting

Clip-in mounting



Screw-in mounting



09 In-Cabin Keypad Modules

6-pushbutton Keypad PLUS



Mechanical characteristics

- Actuating force: approx. 6 N
- Overload force: 250 N
- Lifecycle: up to 250 000 cycles of operation
- Impact resistance: IEC 62262 IK07

Electrical characteristics

- Operating voltage range 8-32 VDC LoadDump A or B

Illumination

- Halo-ring and symbol illumination can be configured independently of one another
Halo-ring effects: flashing, pulsing, colour change
- LED symbol illumination
 - Colour: white
 - Luminance: approx. 20 cd/m² (dimnable)
- LED halo-ring illumination
 - Colour: red (other colours on request)
 - Luminance: approx. 500 cd/m² (dimnable)

Symbols

- Symbols in accordance with ISO 7000
- Customer-specific symbols on request

Connections/interfaces

- CAN interface (ISO 11898)
- CAN protocols: CANOpen (CiA 401), CAN J1939
- Baud rate 125, 250, 500, 1000 kBit/s (configurable through software)
- Integrated plug recess, compatible with TE 8P-1745000-3

Protection degree

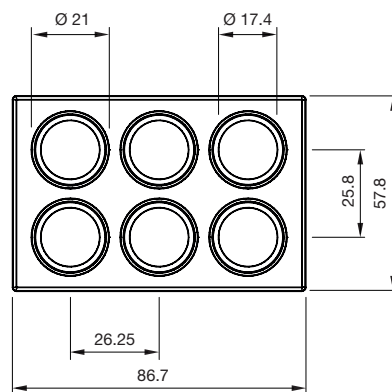
- IP5K4 in accordance with ISO 20653 (front side in installed state)
- IP20 in accordance with ISO 20653 (rear side)

Ambient conditions

- Operating temperature -40°C ... +85°C
- Storage temperature -40°C ... +85°C

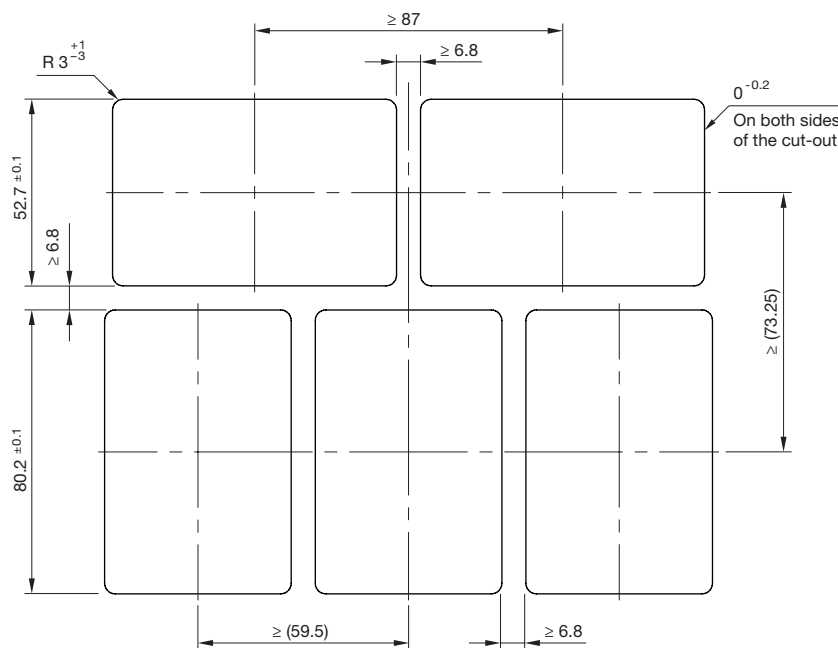
Dimensions

(All dimensions in mm)



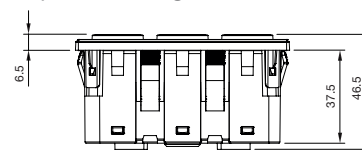
Mounting cut-out

(Panel thickness 1.0 mm ... 4.0 mm)

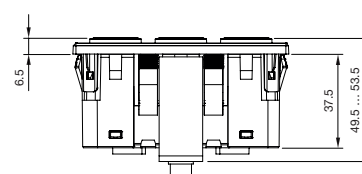


Mounting

Clip-in mounting



Screw-in mounting



The keypad can be mounted into front plate thicknesses between 1 and 4 mm. A front plate of at least 2 mm thickness is recommended. Non-compliance with these specifications may lead to damage to the locking tongue.

6-pushbutton Keypad BASIC



Mechanical characteristics

- Actuating force: approx. 6 N
- Overload force: 250 N
- Lifecycle: up to 250 000 cycles of operation
- Impact resistance: IEC 62262 IK07

Electrical characteristics

- Operating voltage range: 8 – 18VDC or 18 – 32VDC
Operating voltage of illumination for use in 12V or 24V applications. Available with the option of diagnostic switching contacts
- Max. power: 1 W (without NAMUR)
0.25 W (with NAMUR)
- Max. current: 30 mA
- Min. current: 2 mA
- Max. voltage: 32 V
- Contact resistance (unactuated): > 2 M Ω (without NAMUR)
1 k Ω \pm 4 % (with NAMUR)
- Contact resistance (actuated): < 10 Ω (without NAMUR)
110 Ω \pm 10 Ω (with NAMUR)

Illumination

- Halo-ring and symbol illumination can be configured independently of one another
- LED symbol illumination
 - Colour: white
 - Luminance: approx. 20 cd/m² (dimnable)
- LED halo-ring illumination
 - Colour: red (other colours on request)
 - Luminance: approx. 500 cd/m² (dimnable)

Symbols

- Symbols in accordance with ISO 7000
- Customer-specific symbols on request

Connections/interfaces

- Integrated plug recess, compatible with TE 8P-1745000-3/8P-1745000-4, 8-pin

Protection degree

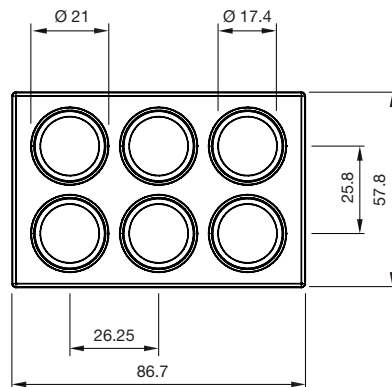
- IP5K4 in accordance with ISO 20653 (front side in installed state)
- IP20 in accordance with ISO 20653 (rear side)

Ambient conditions

- Operating temperature –40°C ... +85°C
- Storage temperature –40°C ... +85°C

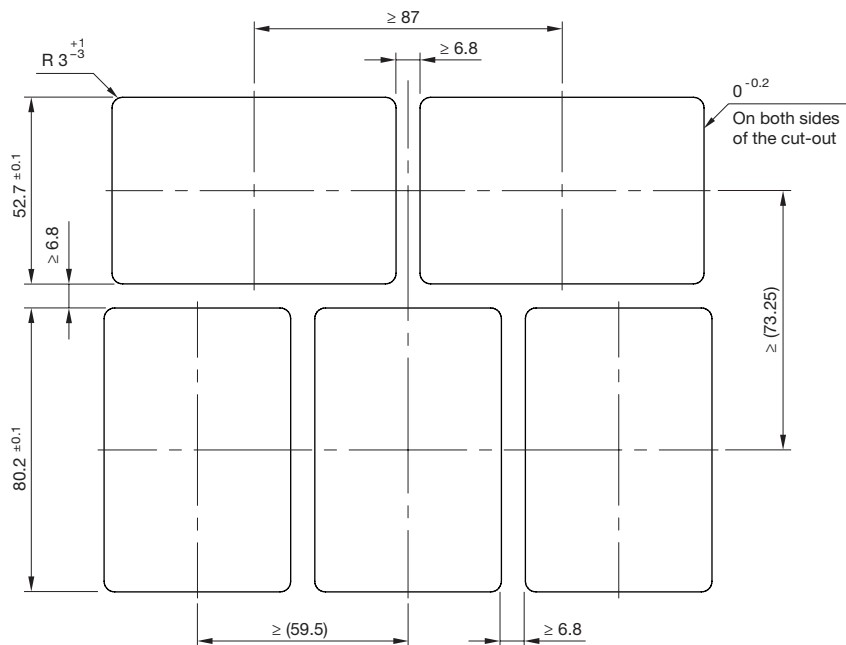
Dimensions

(All dimensions in mm)



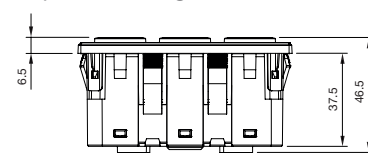
Mounting cut-out

(Panel thickness 1.0 mm ... 4.0 mm)

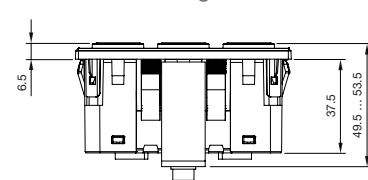


Mounting

Clip-in mounting



Screw-in mounting



The keypad can be mounted into front plate thicknesses between 1 and 4 mm. A front plate of at least 2 mm thickness is recommended. Non-compliance with these specifications may lead to damage to the locking tongue.

09 In-Cabin Keypad Modules

2-pushbutton Keypad BASIC



Mechanical characteristics

- Actuating force: approx. 6 N
- Overload force: 250 N
- Lifecycle: up to 250 000 cycles of operation
- Impact resistance: IEC 62262 IK07

Electrical characteristics

- Operating voltage range 8 – 32 VDC
Available with the option of diagnostic switching contacts (NAMUR)
- Max. power:
1 W (without NAMUR)
0.25 W (with NAMUR)
- Max. current:
30 mA
- Min. current:
2 mA
- Max. voltage:
32 V
- Contact resistance (unactuated):
> 2 M Ω (without NAMUR)
1 k Ω \pm 4 % (with NAMUR)
- Contact resistance (actuated):
< 10 Ω (without NAMUR)
110 Ω \pm 10 Ω (with NAMUR)

Illumination

- Halo-ring and symbol illumination can be configured independently of one another
- LED symbol illumination
 - Colour: white
 - Luminance: approx. 20 cd/m² (dimnable)
- LED halo-ring illumination
 - Colour: red (other colours on request)
 - Luminance: approx. 500 cd/m² (dimnable)

Symbols

- Symbols in accordance with ISO 7000
- Customer-specific symbols on request

Connections/interfaces

- Integrated plug recess, compatible with TE 8P-1745000-3/8P-1745000-4, 8-pin

Protection degree

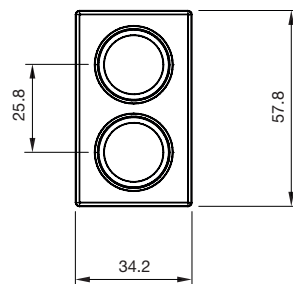
- IP5K4 in accordance with ISO 20653 (front side in installed state)
- IP20 in accordance with ISO 20653 (rear side)

Ambient conditions

- Operating temperature
–40 °C ... +85 °C
- Storage temperature
–40 °C ... +85 °C

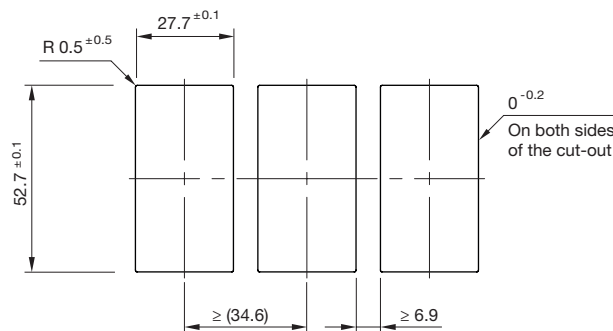
Dimensions

(All dimensions in mm)



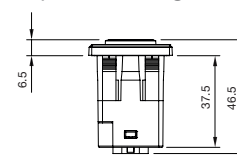
Mounting cut-out

(Panel thickness 1.0 mm ... 4.0 mm)

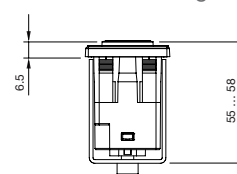


Mounting

Clip-in mounting



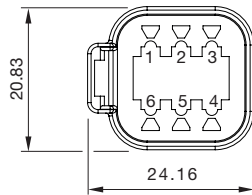
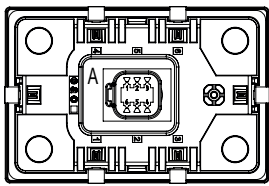
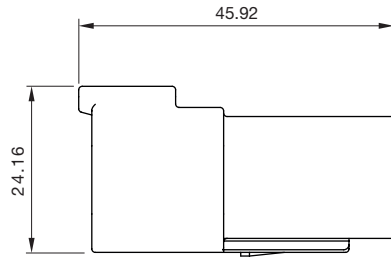
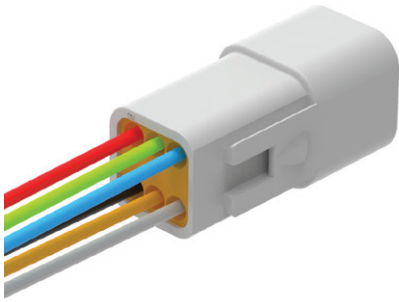
Screw-in mounting



The keypad can be mounted into front plate thicknesses between 1 and 4 mm. A front plate of at least 2 mm thickness is recommended. Non-compliance with these specifications may lead to damage to the locking tongue.

Accessories

Deutsch DT Series connector (DT04-6P)



Connector 6 – DT (DT04-6P)

Mating plug Deutsch DT06-6S
 Matching contacts e.g. 1062-16-0122
 Matching wedge W6-S

Pin Nr.	Signal	Wire colour	Comment
Pin 1	GND	Black	
Pin 2	CAN High	Yellow	
Pin 3	WakeUp_Out	Grey	
Pin 4	WakeUp_In	Blue	
Pin 5	CAN Low	Green	
Pin 6	Vcc		8 – 32VDC

All dimensions in mm.

Symbol inserts



Tool for legends



The new symbol insert tool with trendy design enables user-friendly fitting and removal of symbol inserts from the keypad. The round tip layout without edges prevents from damage of the keypad and symbol inserts. The ergonomically adjusted surface with balance point in the middle offers optimal handling.

09 Universal Switch

Universal Switch*



Typical applications

- Universal switch with white symbol illumination without status indicator
 - Menu button
 - Reset button
 - Tyre failure/malfunction
- Universal switch with white symbol illumination and red single LED status indicator
 - Lock/unlock
 - Headlights On/Off
 - Air conditioning On/Off
- Universal switch with white symbol illumination and three red LED status indicators
 - Seat heating
 - Air conditioning
 - Ventilation fan
 - Blower position
- Universal switch with red symbol illumination for use as a hazard warning light
 - Hazard warning switch
- Indicator without mechanical function with and without functional illumination
 - Driver airbag on, off or not existing
 - Passenger airbag on, off or not existing
 - ESP off
 - Parking brake

Mechanical characteristics

- Actuation force
5–13 N
- Overload
250 N
- Mechanical lifetime
250 000 cycles of operation

Electrical characteristics

- Operating voltage range: designed for 12 VDC and 24 VDC vehicle electrical system
- Maximum power*: 1 VA
- Maximum current*: 50 mA
- Minimum current*: 1 mA
- Contact resistance*: <math> < 10 \Omega </math>
- Additional resistor coding customer specific version on request*

* Refer to S1 (see wiring diagram, page 10)

Illumination

LED symbol illumination

- Colour: white with luminance:
~20 cd/m² at 28 VDC and 23 °C ± 2 °K
- Colour: red (for hazard warning light) with luminance: ~90 cd/m² at 28 VDC and 23 °C ± 2 °K

LED status indicator

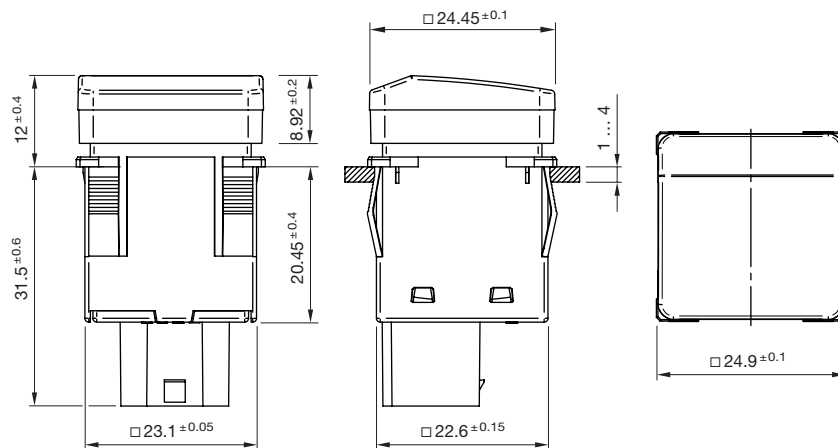
- Colour: Red
- Luminance: ~200 cd/m² at 28 VDC and 23 °C ± 2 °K

Symbols

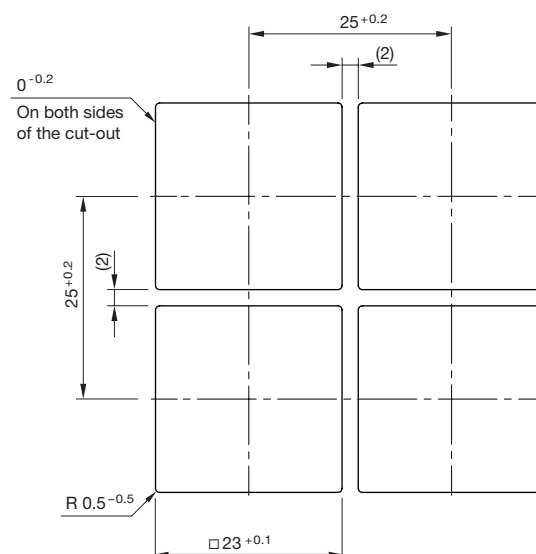
- Symbols in accordance with ISO 7000
- Customer-specific symbols on request

Dimensions

(All dimensions in mm)



Mounting cut-outs

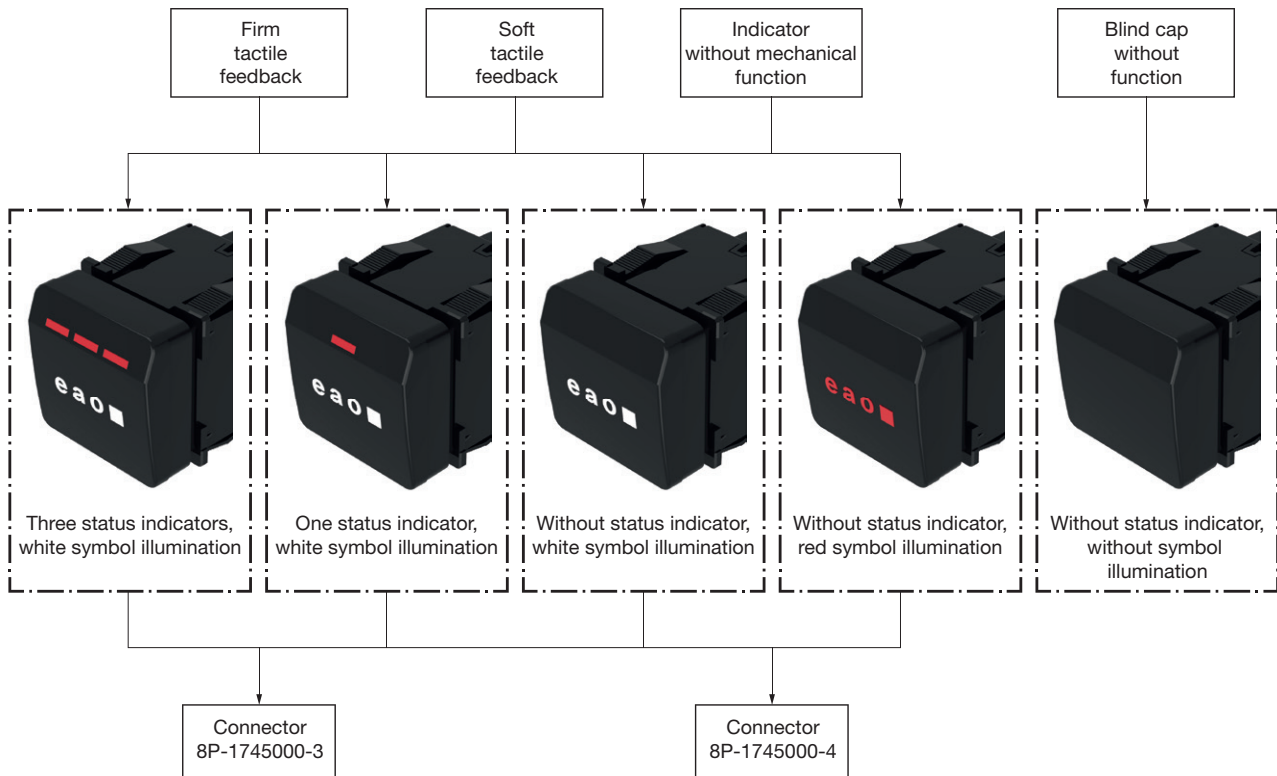


Please note

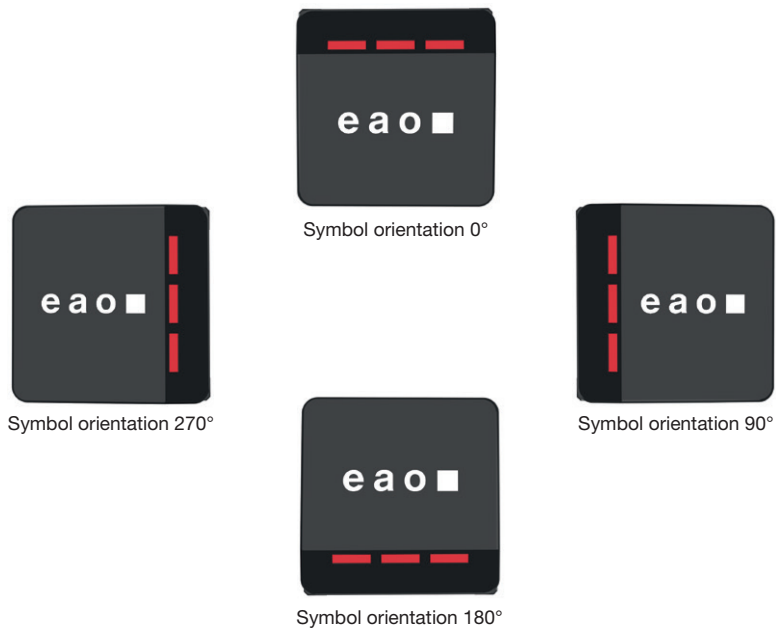
- The view shows the minimum possible distance between the cut-outs for two universal switches
- Another mounting option is using the mounting frame that fits into radio slot according to DIN ISO 7736

Options

Product options



Options of the symbol orientation

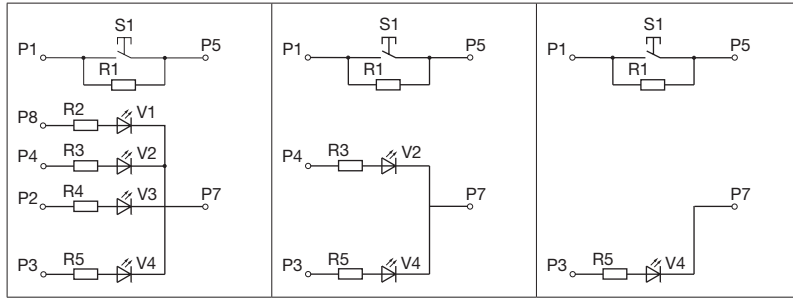


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09 Universal Switch

Wiring diagrams

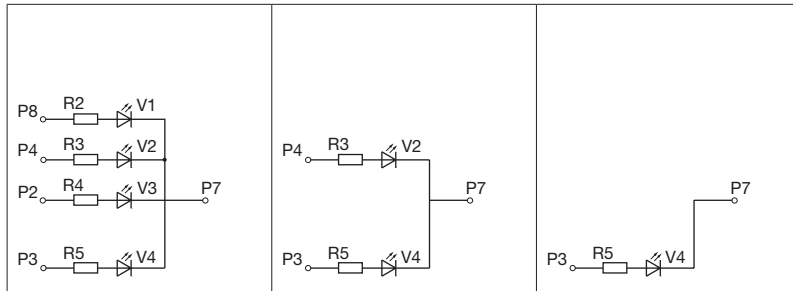
Wiring diagrams



Three status indicators, backlight and switching element

One status indicator, backlight and switching element

Backlight and switching element



Three status indicators and backlight

One status indicator and backlight

Backlight

Please note

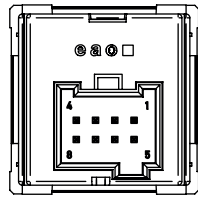
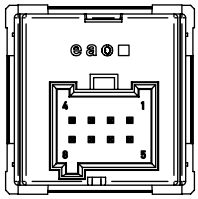
R1 not placed as standard.

TYCO Pin connector

Tyco part-no. locking cover: 1745000-3, 1745000-4

Tyco part-no. housing: 965601-2

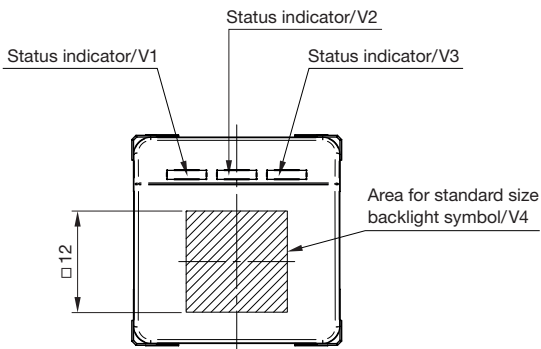
Tyco part-no. receptacle: 963715-1 (0.5 – 0.75 mm²), 928999-1 (0.25 – 0.35 mm²)



Connector
8P-1745000-3

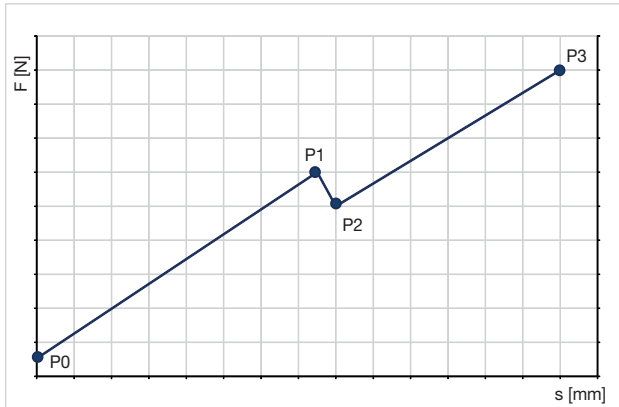
Connector
8P-1745000-4

Illumination specification



Haptic specifications

Universal switch with firm tactile feedback



Parameters

P0: $F_0 \sim 2\text{ N}$

P1: $s_1 \sim 0.65\text{ mm}/F_1 \sim 6\text{ N}$

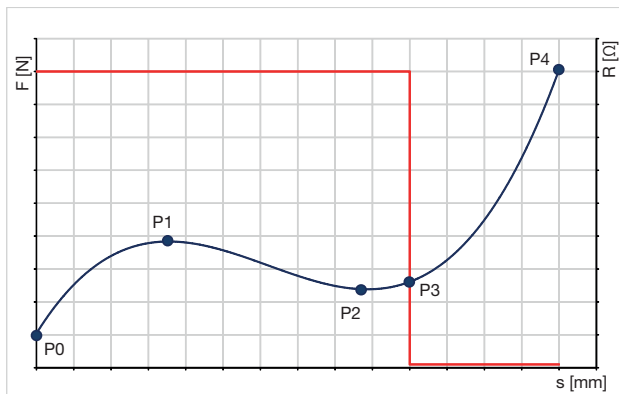
P2: $s_2 \sim 0.775\text{ mm}/F_2 \sim 4\text{ N}$

P3: $s_3 \sim 1.4\text{ mm}/F_3 \sim 10\text{ N}$

S_n : travel at point P_n

F_n : force at point P_n

Universal switch with soft tactile feedback



Parameters

P0: $F_0 \sim 2\text{ N}$

P1: $s_1 \sim 0.3\text{ mm}/F_1 \sim 5\text{ N}$

P2: $s_2 \sim 0.65\text{ mm}/F_2 \sim 2,5\text{ N}$

P3: $s_3 \sim 0.825\text{ mm}/F_3 \sim 3\text{ N}$

P4: $s_4 \sim 1.4\text{ mm}/F_4 \sim 10\text{ N}$

S_n : travel at point P_n

F_n : force at point P_n

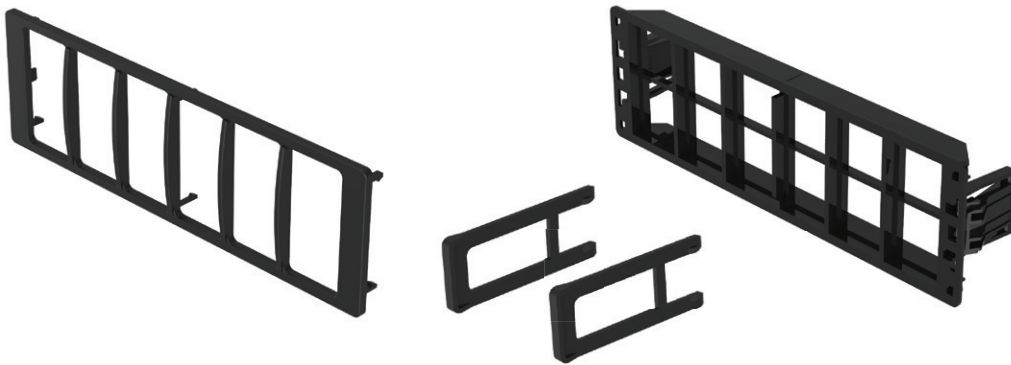
Please note

The customer must ensure the functional and product safety compliance of the integration. The customer must perform all safety activities on the integration level and confirm that no functional safety requirements have been derived from the integration with the HMI.

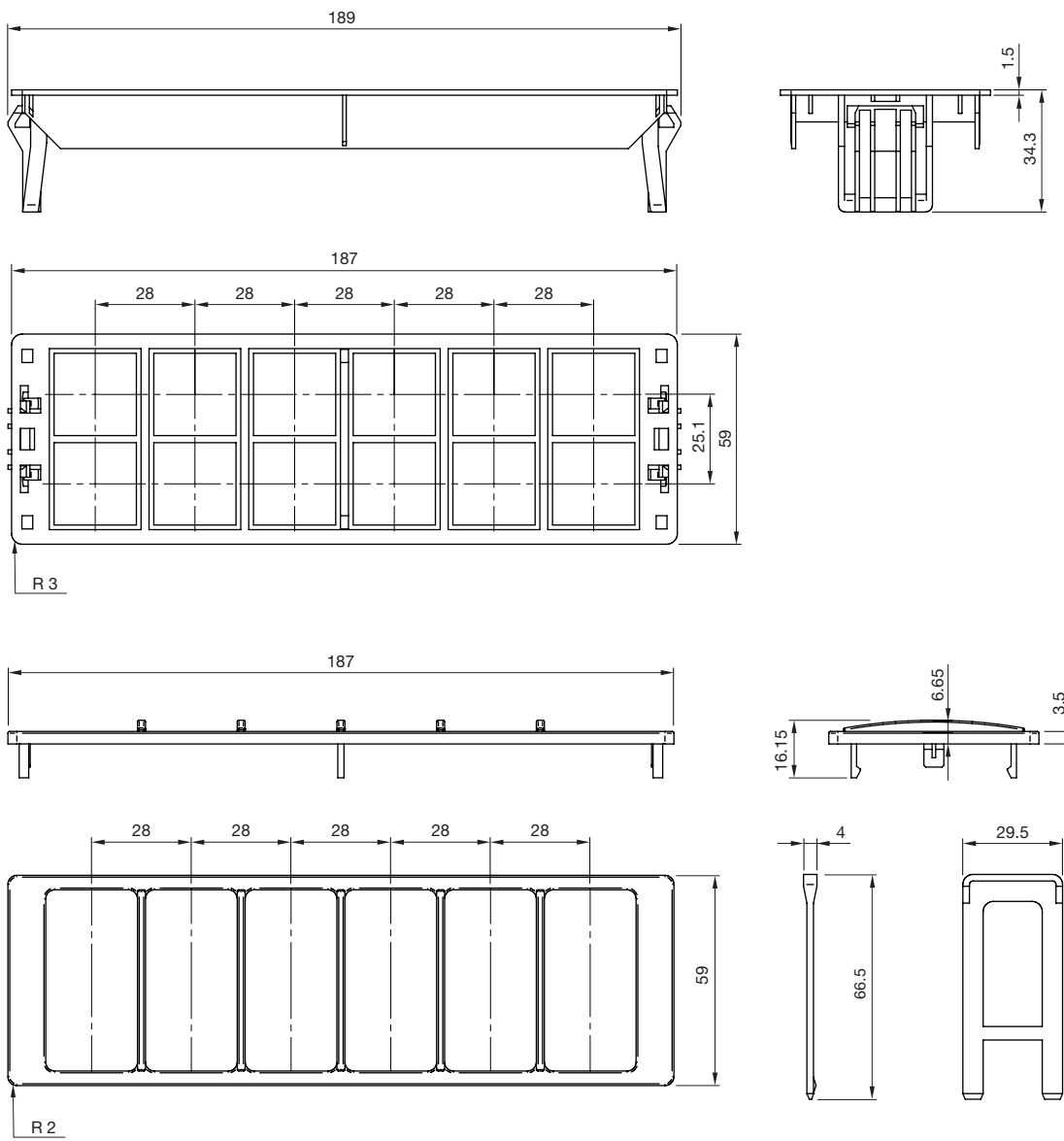
As a consequence, no functional safety requirements have been assigned to the HMI. The customer should be aware that the HMI has been developed according IATF 16949 and fulfils the ISO 26262 classification of a QM level.

09 Universal Switch

Radio slot frame



Dimensions



All dimensions in mm.

The radio slot frame is always customer specific and the above dimensions are an example only.

LIN Switch Panel



Mechanical characteristics

- Actuation force
5–13N
- Overload
250N
- Service life
Up to 50 000 cycles of operation

Electrical characteristics

- Designed for 12VDC operating voltage

Illumination

- LED symbol illumination
- Colour white with luminance
~20cd/m²
 - Colour red with luminance
~90cd/m²

LED status indicator

- Colour
Red
- Luminance
~600cd/m²

Symbols

- Symbols in accordance with ISO 7000
- Customer-specific symbols on request

Connections/interfaces

- LIN interface

Ambient conditions

- Operating temperature
–40 °C ... +85 °C
- Storage temperature
–40 °C ... +85 °C

Protection degree

- IP5K3 protection front side (mounted into panel)
- IP20 protection rear side (mounted into panel)

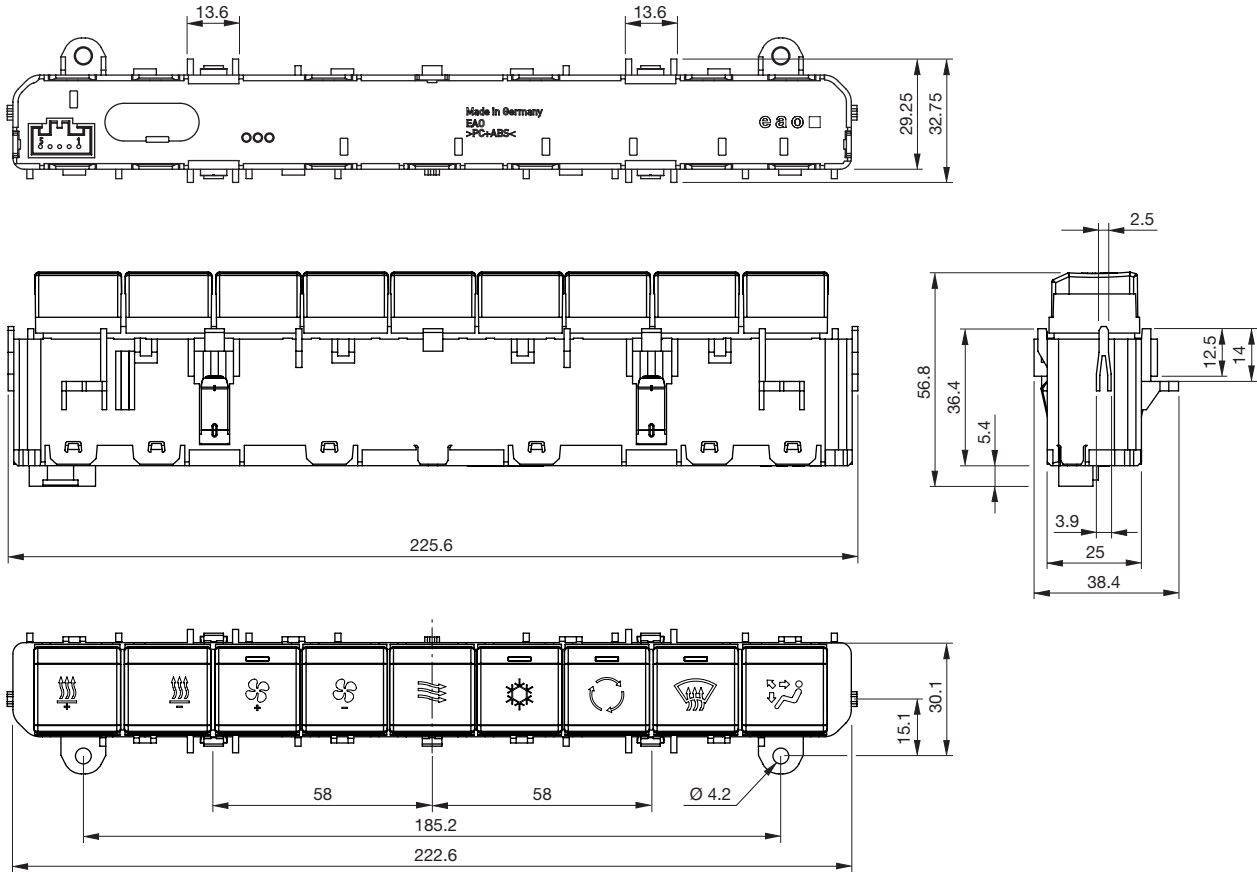
Approvals and conformities

- E1 R10
- E1 R118
- CE

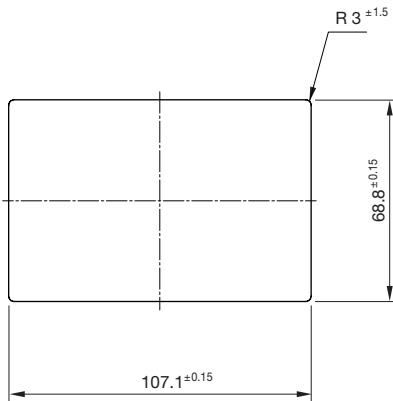
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09 LIN Switch Panel

Dimensions



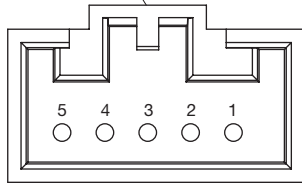
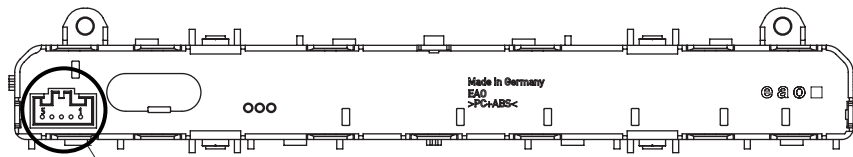
Mounting cut-out (clip-in version)



All dimensions in mm.

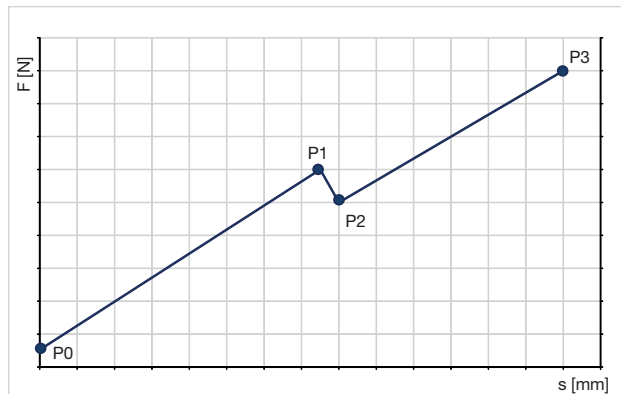
Dimensional tolerance according to DIN 16472 – TGS/2768-mk.

Electrical connections and interfaces



LIN interface pin allocation	
1	nc
2	KL 30
3	LIN
4	KL 31
5	nc

Haptic specifications



Parameters

P0: $F_0 \sim 1 \text{ N}$

P1: $s_1 \sim 0.65 \text{ mm} / F_1 \sim 5 \text{ N}$

P2: $s_2 \sim 0.75 \text{ mm} / F_2 \sim 4 \text{ N}$

P3: $s_3 \sim 1.35 \text{ mm} / F_3 \sim 10 \text{ N}$

S_n : travel at point P_n

F_n : force at point P_n

Please note

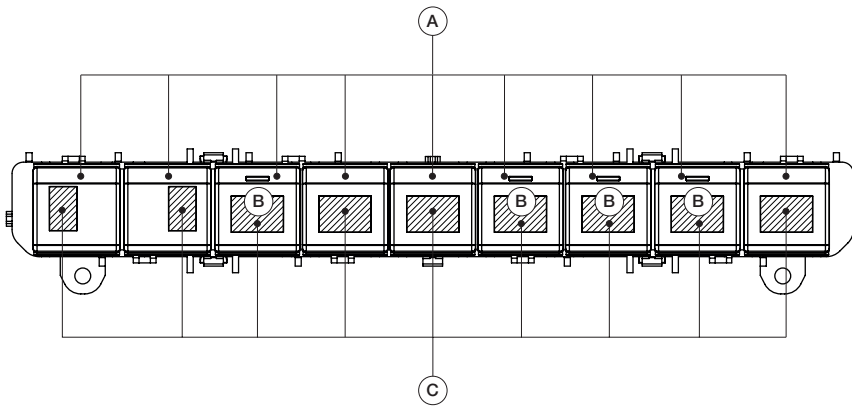
The customer must ensure the functional and product safety compliance of the integration. The customer must perform all safety activities on the integration level and confirm that no functional safety requirements have been derived from the integration with the HMI.

As a consequence, no functional safety requirements have been assigned to the HMI. The customer should be aware that the HMI has been developed according IATF 16949 and fulfils the ISO 26262 classification of a QM level.

09 LIN Switch Panel

Illumination specifications

Variant with maximum number of indicators



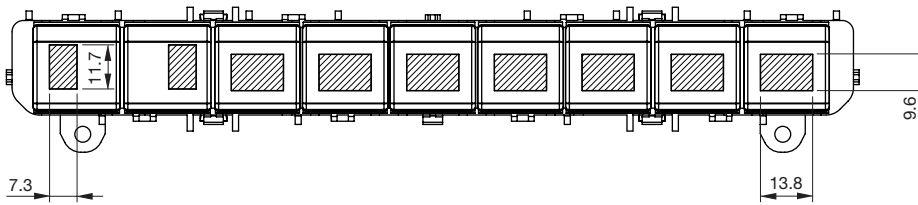
Legend

A = Position

B = Indicator

C = Area for backlight symbol

Variant without indicators



	Pos. 1	Pos. 2	Pos. 3	Pos. 4	Pos. 5	Pos. 6	Pos. 7	Pos. 8	Pos. 9
Backlight colour	white	white	white	white	red	white	white	white	white
Backlight brightness	~ 20 cd/m ²	~ 20 cd/m ²	~ 20 cd/m ²	~ 20 cd/m ²	~ 90 cd/m ²	~ 20 cd/m ²	~ 20 cd/m ²	~ 20 cd/m ²	~ 20 cd/m ²
Indicator colour (optional)	-	-	red	-	-	red	red	red	-
Indicator brightness (optional)	-	-	~ 600 cd/m ²	-	-	~ 600 cd/m ²	~ 600 cd/m ²	~ 600 cd/m ²	-

Symbols according to ISO 7000 or customer-specific symbols on request.

Joystick, 1 axis with square flange

Part No.
09-01.18214.0107

Mechanical characteristics

- Mounting
from front of panel, 4 screws
($\varnothing 3.5\text{mm}$)
- 1 axis
- No cross guidance
- No gate shape
- 20° deflection angle
- Handle "Winter"
- Resetting
self-resetting (medium resetting force)
- Breakout torque
Y-axis 0.18 Nm
- Operating torque
Y-axis 0.42 Nm
- Max. allowable torque
Y-axis 18 Nm

Electrical characteristics

- Operating voltage
5VDC
- Output signal
proportional ($-y = 0.5\text{V}$ /
Mid = 2.5V / $+y = 4.5\text{V}$)
- Redundancy
yes

Technology

- Hall effect sensors

Connections

- Minitek plug (8-pole)

Ambient conditions

- Operating temperature
 -30°C to $+80^\circ\text{C}$
- Storage temperature
 -40°C to $+85^\circ\text{C}$

Degree of protection

- IP65 front protection
- IP40 rear protection



Gate



Dimensions

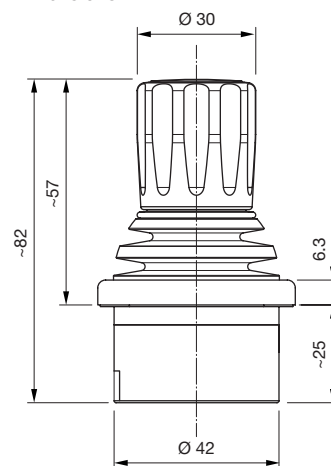
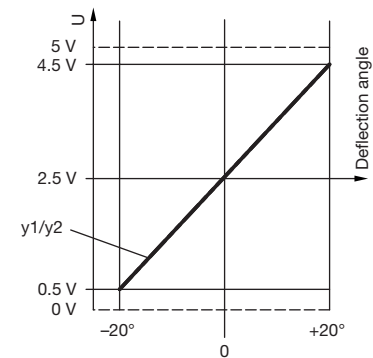
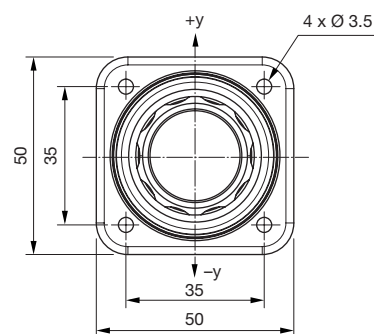


Diagram Y-axis



View from above



09 Joysticks

Joystick, 3 axes with square flange.

Part No.

09-01.32294.0109

Mechanical characteristics

- Mounting from front of panel, four screws ($\varnothing 3.5$ mm)
- 3 axes
- Soft cross guidance
- Gate shape square
- Deflection angle XY: $\pm 20^\circ$ / Z: $\pm 30^\circ$
- Handle "Winter twist"
- Resetting self-resetting (medium resetting force)
- Breakout torque X/Y-axis 0.18 Nm / Z-axis 0.075 Nm
- Operating torque X/Y-axis 0.42 Nm / Z-axis 0.18 Nm
- Max. allowable torque X/Y-axis 18 Nm / Z-axis 10 Nm

Electrical characteristics

- Operating voltage 5 VDC
- Output signal proportional ($-x/y/z = 0.5$ V / Mid = 2.5 V / $+x/y/z = 4.5$ V)
- Redundancy all axes

Technology

- Hall effect sensors

Connections

- Minitek plug (8-pole)

Ambient conditions

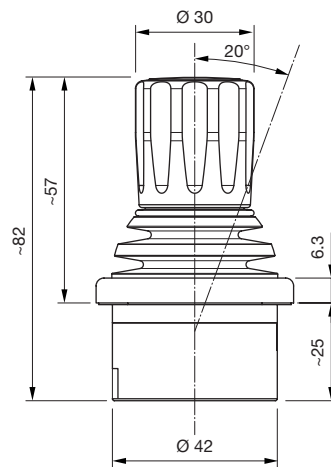
- Operating temperature -30°C to $+80^\circ\text{C}$
- Storage temperature -40°C to $+85^\circ\text{C}$

Degree of protection

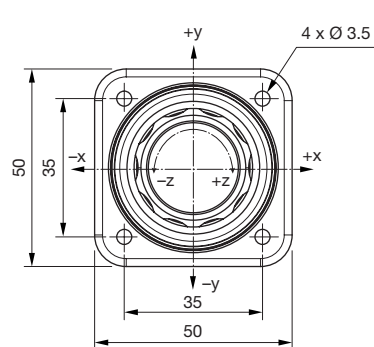
- IP65 front protection
- IP40 rear protection



Dimensions



View from above



Gate

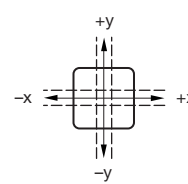


Diagram X-, Y-axis

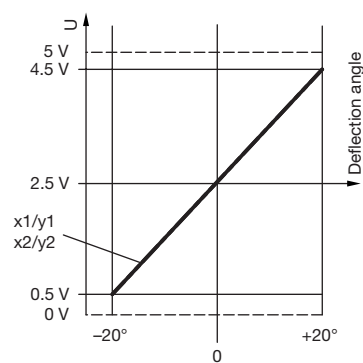
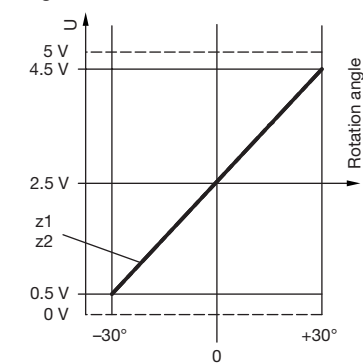


Diagram Z-axis



Joystick, small and beautiful

Part No.

09-01.22224.0128

Mechanical characteristics

- Mounting
from above, four screws (\varnothing 3.5 mm)
- 2 axes
- Light cross guidance
- Gate shape square
- 20° deflection angle
- Handle "Nupsi"
- Resetting
self-resetting (medium resetting force)
- Breakout torque
X/Y-axis 0.18 Nm
- Operating torque
X/Y-axis 0.42 Nm
- Max. allowable torque
X/Y-axis 10 Nm

Electrical characteristics

- Operating voltage
5VDC
- Output signal
proportional ($-x1/y1 = 0.5V$ /average = $2.5V$ / $+x1/y1 = 4.5V$) ($-x2/y2 = 4.5V$ /average = $2.5V$ / $+x2/y2 = 0.5V$)
- Redundancy
all axes

Technology

- Hall effect sensors

Connections

- Minitek plug (8-pole)

Ambient conditions

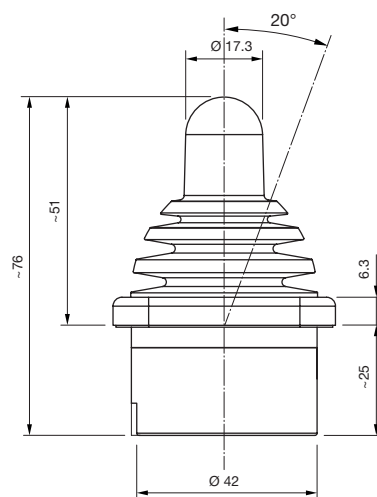
- Operating temperature
 -30°C to $+80^{\circ}\text{C}$
- Storage temperature
 -40°C to $+85^{\circ}\text{C}$

Degree of protection

- IP67 front protection
- IP40 rear protection



Dimensions



Gate

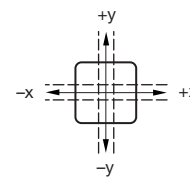
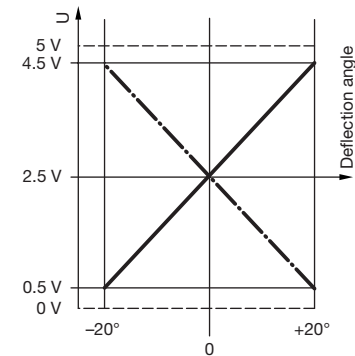
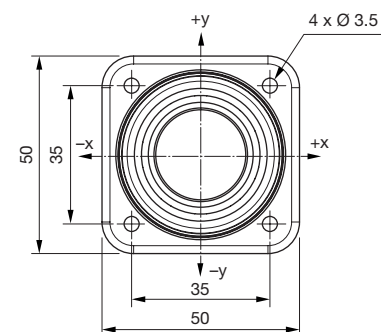


Diagram X-, Y-axis



View from above



09 Joysticks

Joystick, standard with round flange

Part No.

09-02.22244.1052

Mechanical characteristics

- Mounting
from rear of panel, 4 x M3 screws
- 2 axes
- Rigid cross guidance
- Gate shape square
- 20° deflection angle
- Handle "Standard"
- Resetting
self-resetting (medium resetting force)
- Breakout torque
X/Y-axis 0.16 Nm
- Operating torque
X/Y-axis 0.5 Nm
- Max. allowable torque
X/Y-axis 18 Nm

Electrical characteristics

- Operating voltage
max. 30VDC
- Output signal
proportional with centre tab at $\pm 1.75^\circ$,
switch point at $\pm 2.3^\circ$ (see diagram
X-, Y-axis)

Technology

- Conductive plastic with digital steps/
control segment 1-0-1

Connections

- Dubox plug (6- and 8-pole)

Ambient conditions

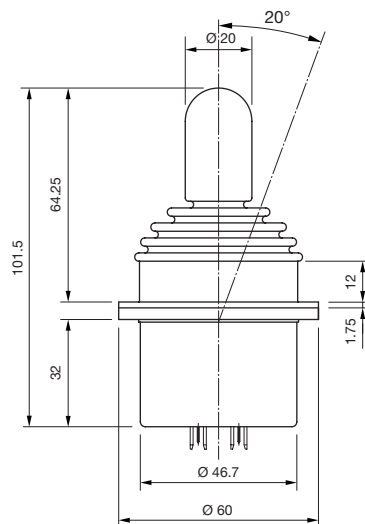
- Operating temperature
 -30°C to $+80^\circ\text{C}$
- Storage temperature
 -40°C to $+85^\circ\text{C}$

Degree of protection

- IP67 front protection
- IP40 rear protection



Dimensions



Gate

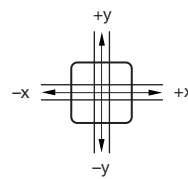
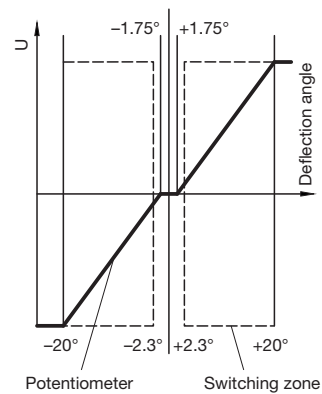
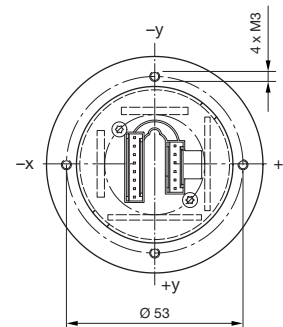


Diagram X-, Y-axis



Bottom view



Joystick, CAN with round flange

Part No.

09-03.23362.1051 (CANopen)

09-03.23363.1051 (J1939)

Mechanical characteristics

- Mounting
from rear of panel, 4 x M3 screws
- 2 axes
- Soft cross guidance
- Gate shape square
- 20° deflection angle
- Handle "Sleek"
with two integrated buttons (red)
- Resetting
self-resetting (strong resetting force)
- Breakout torque
X/Y-axis 0.19 Nm
- Operating torque
X/Y-axis 0.7 Nm
- Max. allowable torque
X/Y-axis 18 Nm

Electrical characteristics

- Operating voltage
8 to 36 VDC

Technology

- Hall effect sensors

Connections

- Dubox plug (4-pole)

Interfaces

- CANopen/J1939 interface

Ambient conditions

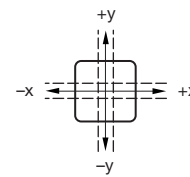
- Operating temperature
-30 °C to +80 °C
- Storage temperature
-40 °C to +85 °C

Degree of protection

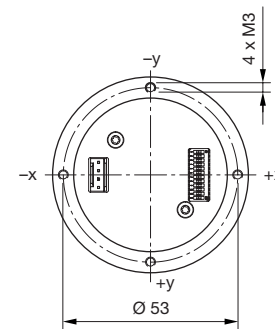
- IP65 front protection
- IP40 rear protection



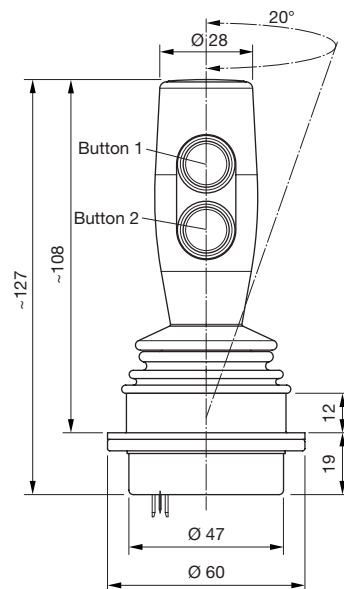
Gate



Bottom view



Dimensions



09 Joysticks

Joystick, CAN with 3 buttons and 1 cable

Applications

Especially well-suited to heavy duty and special vehicles.

Part No.

09-03.223A2.1114 (CANopen)
09-03.223A3.1114 (J1939)

Mechanical characteristics

- Mounting from below, 4 x M3 screws
- 2 axes
- Light cross guidance
- Gate shape square
- 15° deflection angle
- Handle "Kermit" with 3 integrated buttons (black)
- Resetting self-resetting (strong resetting force)
- Breakout torque X/Y-axis 0.63 Nm
- Operating torque X/Y-axis 1.16 Nm
- Max. allowable torque X/Y-axis 18 Nm

Electrical characteristics

- Operating voltage 8 to 36 VDC

Technology

- Hall effect sensors

Connections

- PVC cable, 4 x 0.34 mm² Molex Micro-Fit (4-pole)

Interfaces

- CANopen/ J1939 interface

Ambient conditions

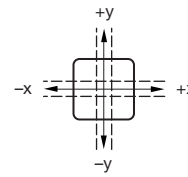
- Operating temperature -30 °C to +80 °C
- Storage temperature -40 °C to +85 °C

Degree of protection

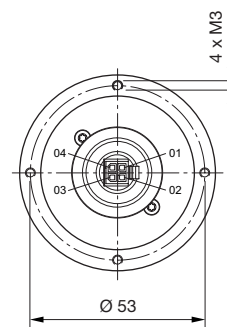
- IP65 front protection
- IP40 rear protection



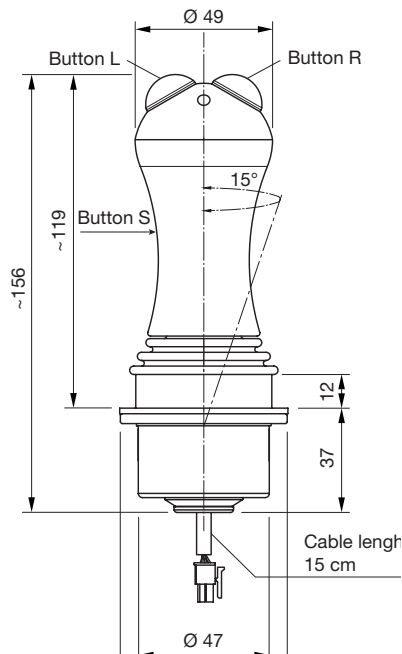
Gate



Bottom view



Dimensions



Joystick, 2 axes with 6 momentary positions each

Applications

Especially well-suited to wireless remote control systems.

Part No.

09-04.223E4.1112

Mechanical characteristics

- Mounting
from below, 4 x M3 screws
- 2 axes
- Soft cross guidance
- Gate shape square
- 20° deflection angle
- 6 momentary positions per axis
- Handle "Goblet Top" with button
- Resetting
self-resetting (strong resetting force)
- Breakout torque
X/Y-axis 0.19 Nm
- Operating torque
X/Y-axis 0.7 Nm
- Max. allowable torque
X/Y-axis 18 Nm

Electrical characteristics

- Operating voltage
max. 5 VDC/5 mA
- Output signal
switching point at $\pm 3.33^\circ$

Technology

- Digital grid/switching segment 3-1-3

Connections

- Dubox plug (2 and 8-pole)

Ambient conditions

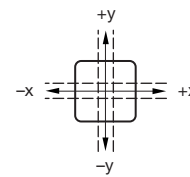
- Operating temperature
-30 °C to +80 °C
- Storage temperature
-40 °C to +85 °C

Degree of protection

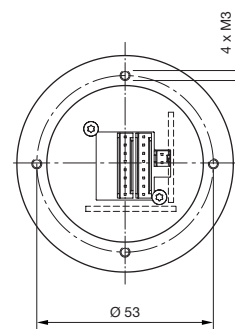
- IP65 front protection
- IP40 rear protection



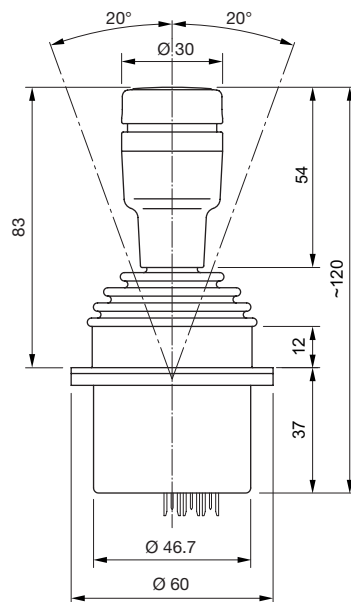
Gate



Bottom view



Dimensions



09 Joysticks

Joystick, drive lever with mechanical interlocking

Part No.
09-02.174C4.1113

Mechanical characteristics

- Mounting
from below, 4 x M3 screws
- 1 axis
- No cross guidance
- No gate shape
- 20° deflection angle
- Handle "Central Lock"
- Resetting
friction brake
- Unlocking force
22 N
- Breakout torque
0.456 Nm
- Operating torque
0.456 Nm
- Max. allowable torque
18 Nm

Electrical characteristics

- Operating voltage
max. 30VDC
- Output signal
proportional without centre tab

Technology

- Conductive plastic

Connection

- Dubox plug (3-pole)

Ambient conditions

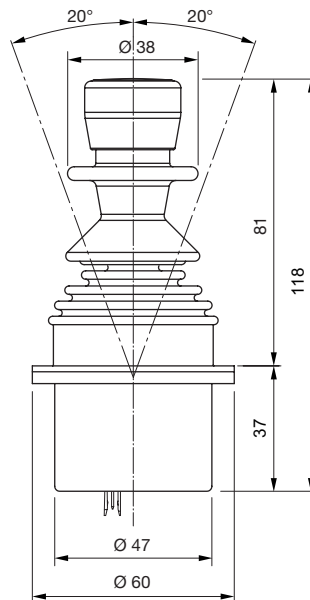
- Operating temperature
-30 °C to +80 °C
- Storage temperature
-40 °C to +85 °C

Degree of protection

- IP65 front protection
- IP40 rear protection



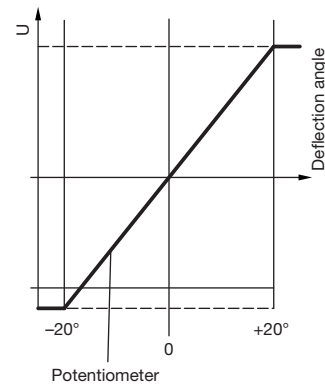
Dimensions



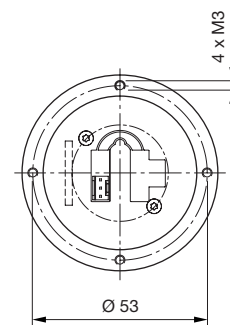
Gate



Diagram Y-axis



Bottom view



Joystick with handle and additional buttons.

Part No.

09-01.222Y2.0009

09-01.222Y3.0009

Mechanical characteristics

- Mounting
from below, 4 x \varnothing 5.5 screws
- 1 or 2 axes
- Soft cross guidance
- Gate shape round
- 24° deflection angle
- Multifunction handle with 3 buttons
- Resetting
self-resetting (strong resetting force)
- Breakout torque
0.5 Nm
- Max. allowable torque
60 Nm

Electrical characteristics

- Operating voltage
8 – 36 V
- Output signal
CANopen/J1939

Technology

- Hall effect sensors

Connections

- Deutsch DTM04-4P (4-pole)

Ambient conditions

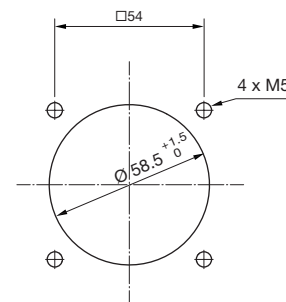
- Operating temperature
-30 °C to +80 °C
- Storage temperature
-40 °C to +85 °C

Protection degree

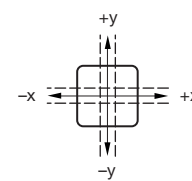
- IP65 front side



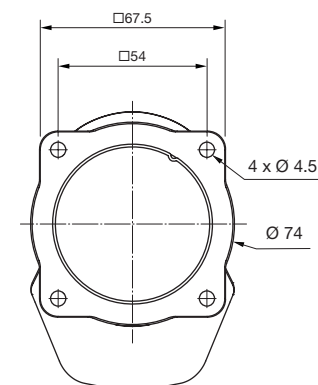
Mounting cut-out



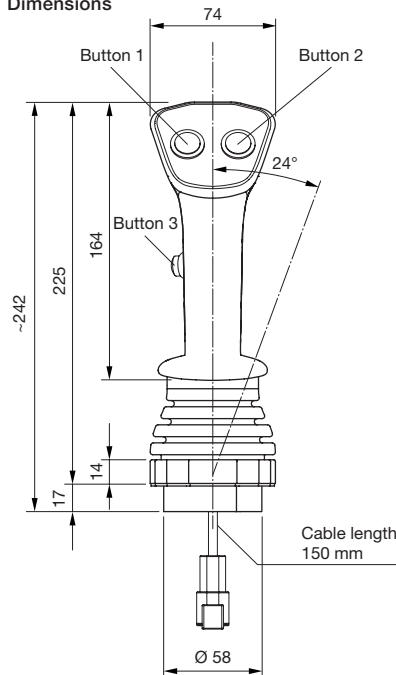
Gate



View from bottom



Dimensions



All dimensions in mm.

Fingertip joystick

Part No.

09-03.22204.0010

Mechanical characteristics

- Mounting
from below, 4 x Ø 2.7 screws
- 1 or 2 axes
- Soft or rigid guidance
- Gate shape round
- 25° deflection angle
- Handle "thumb tower"
- Resetting
self-resetting (medium resetting force)
- Operating torque
0.026 Nm
- Max. allowable torque
4 Nm

Electrical characteristics

- Operating voltage
5 VDC
- Output signal
0.5–4.5 V linear, redundant

Technology

- Hall effect sensors

Connections

- Connector JST EHR (6-Pol)
length 80 mm

Ambient conditions

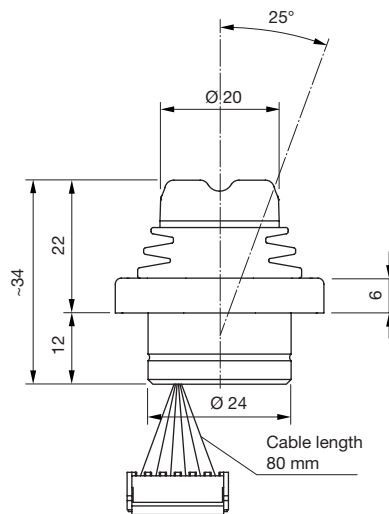
- Operating temperature
–30 °C to +80 °C
- Storage temperature
–40 °C to +85 °C

Protection degree

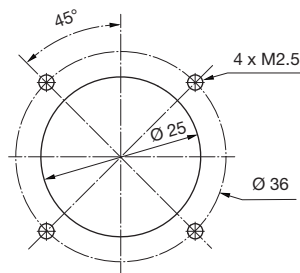
- IP65 front side



Dimensions



Mounting cut-out



Gate

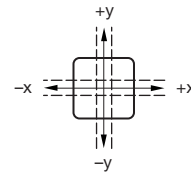
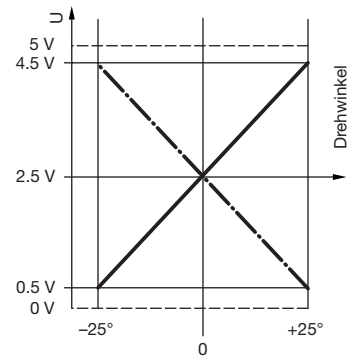
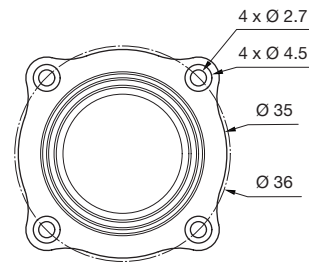


Diagram X-, Y-axis



View from bottom



All dimensions in mm.

Toggle stick, 4 directions with momentary position

Applications

The toggle stick (4 directions with momentary position, lock-able) is suitable for various applications.

Part No.

Please see Series 45

Mechanical characteristics

- Mounting
Ø 22.3 mm, raised
- 2 axes
- Rigid cross guidance
- 35° deflection angle
- Mechanical service life
up to 250 000 switching cycles
- Connection
screw terminal

Electrical characteristics

- Operating voltage
5 to 500 V
- Output signal
AC15: 6A/24 V to 1.4A/500 V
- Contact material
silver

Ambient conditions

- Operating temperature
-25 °C to +70 °C
- Storage temperature
-40 °C to +85 °C

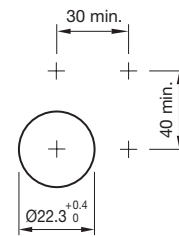
Degree of protection

- IP65, IP67 front protection
- IP20 or IP40 rear protection

Configure your product in a few steps
at eao.com/products.

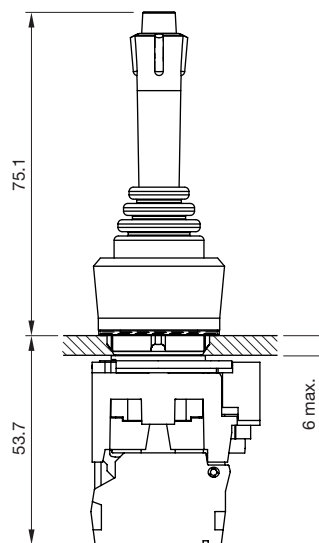


Mounting cut-outs



All dimensions in mm.

Dimensions



09 Joysticks

Lever switch, 8 positions

Applications

The lever switch (2, 4 or 8 positions) is suitable for various applications.

Part No.

44-800.2
44-800.4
44-800.8

Mechanical characteristics

- Mounting
Ø 22.3 mm, raised
- 2 axes
- Soft cross guidance, pulse
- 12° deflection angle
- Mechanical service life
up to 1.2 million switching cycles
- Connection
soldering terminal

Electrical characteristics

- Operating voltage
250 VAC
- Output signal
5A/4 NC + 4 NO
- Contact material
gold-plated silver alloy

Ambient conditions

- Operating temperature
-30 °C to +80 °C
- Storage temperature
-40 °C to +85 °C

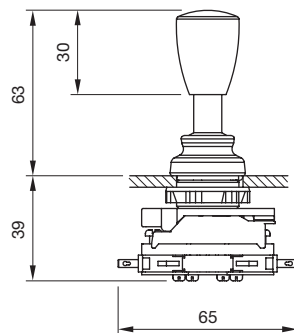
Degree of protection

- IP65 front protection
- IP20, IP40 rear protection

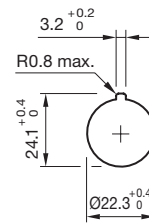
A choice of three lever switches can be found at eao.com/products.



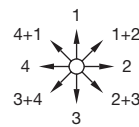
Dimensions



Mounting cut-outs



Wiring diagram



All dimensions in mm.

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