



PK2x PUSH BUTTONS

MAFELEC and TSL-ESCHA GmbH

MAFELEC develops control and signaling solutions for harsh environments. From push buttons to switches, from complete control panels to door control solutions, the company offers products that are best suited to the needs of our partners.

TSL stands for Touch, Signal and Light. Door opening push buttons, signal lights, sounders, indicator and display devices as well as LED lighting are part of the product portfolio. TSL-ESCHA develops, manufactures, and distributes individual customer solutions for public transportation.

Members of the MAFELEC TEAM

TSL-ESCHA based in Halver (Germany) and MAFELEC in Chimilin (France) are part of the MAFELEC TEAM. The owner-managed group of companies offers solutions for HMI, lighting and sensors and is active in the markets of bus and railway, industrial vehicle, industry, energy, defense, aerospace, and elevators.

HIGHLIGHTS	3-5
CONSTRUCTION TYPES	6-7
TOUCH SURFACES AND COLORS.....	8-11
LIGHT- AND TONE SIGNALS	12-13
TECHNICAL DETAILS.....	14-15
PUSH BUTTON OVERVIEW.....	16-19

CONTENTS

PK2x PUSH BUTTONS

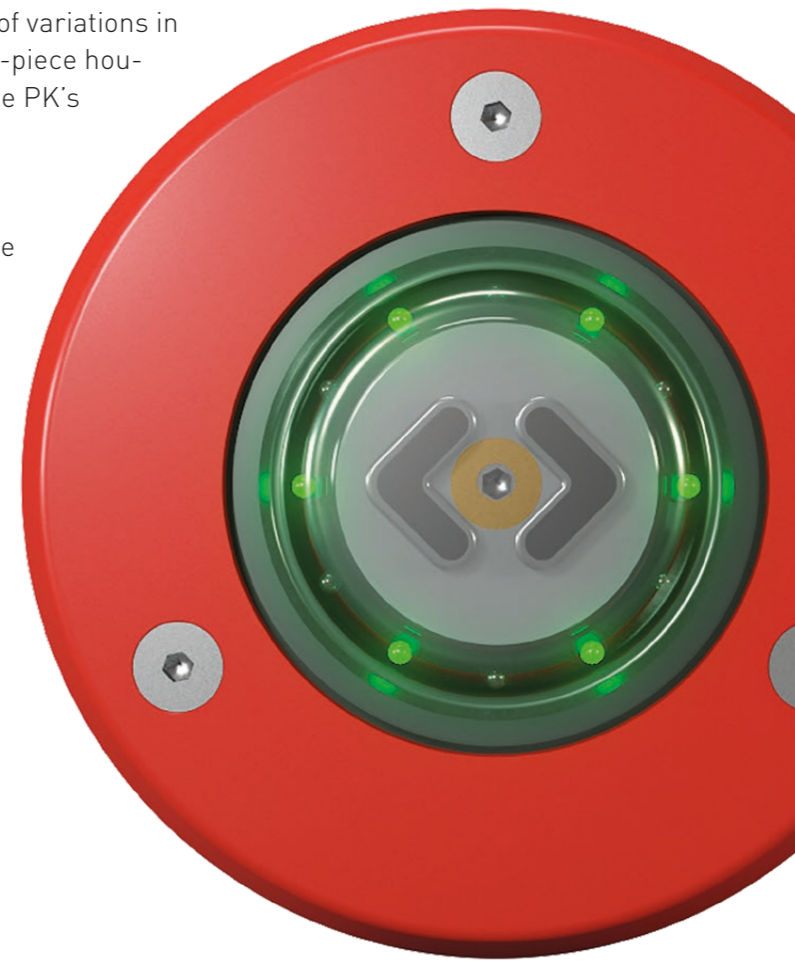
PK2x SERIES

A CUSTOMIZED PRODUCT

The PK2x push button family offers the largest number of variations in the range of TSL push buttons. Its special feature: a one-piece housing design. The great advantage of this design is that the PK's switching chamber is hermetically sealed.

Its self-cleaning contacts and absence of moving parts make the push button wear and maintenance-free. These features are the basis for a long service life while facilitating trouble-free operation. And it keeps your costs down.

- Eight construction types
- Numerous pictograms and buttons
- Several switching functions
- Various mounting rings
- Configurable tone and light signals
- Graffiti protection (additional option)
- Complies with current standards for rail vehicles (TSI-PRM, EN 50155, EN 45545-2 and EN 61373)



The push buttons in the PK2x series offer optimal adaptation to your vehicle and your installation situation.

Due to their construction, the push buttons of the PK2x series are wear, and maintenance-free, frost-proof and dust-tight.



PK2x PUSH BUTTONS A PRODUCT FOR EVERY SITUATION

On the front side, the switch housing of the presskey has no gaps where dust or water can penetrate, nothing grates or jams when the push button is pressed. This allows you to use the PK2x series push buttons in very different regions. For example, in regions with very frigid temperatures such as Scandinavia or Siberia, as the door opening push buttons are frost-proof. And thanks to being dust-proof, the PK2x series is also suitable for desert areas.

- Space-saving installation thanks to a mounting cutout of only Ø43 millimeters
- Easy installation, for example due to integrated mounting aid for designs 7 and 8
- Thanks to a modular design, all available pictograms and tactile buttons can be combined
- Modern and optimized design thanks to new spacer ring for installation in glass doors



The push buttons in the PK2x series can be used in a variety of ways in rail vehicles and buses.

VARIETY

EVERY PUSH BUTTON A HIGHLIGHT

The PK2x push button series offers a great variety. Eight construction types alone are available for selection.

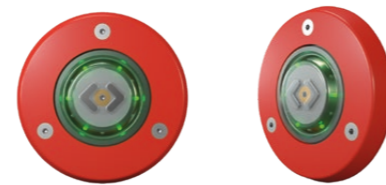
The variant for glass doors (design 7 and 8) have a modern and optimized design. The spacer ring fits perfectly to the door design. The following angles are available for adapting the housing to the door profile slope: 0°/6°/10°/15°/25°.

For designs 2, 7 and 8, an insert ring with text printing and/or Braille embossing is possible.

More detailed information about touch surfaces and LED variants as well as dimensions can be found on our website.



CONSTRUCTION TYPE 1
PK21, PK25, PK28, PK29



- Function: one-sided
- Application area: wall panel or door element
- Installation from front side with standard mounting ring
- Visible screws

CONSTRUCTION TYPE 2
PK21, PK25, PK28, PK29 with insert ring



- Function: one-sided
- Application area: wall panel or door element
- Installation from front side with standard mounting ring
- Screws concealed by additional insert ring

CONSTRUCTION TYPE 3
PK22, PK23, PK26, PK27



- Function: one-sided
- Application area: wall panel or door element
- Installation from front side; stepped mounting ring
- Screws concealed by additional cover caps

CONSTRUCTION TYPE 4
PK41



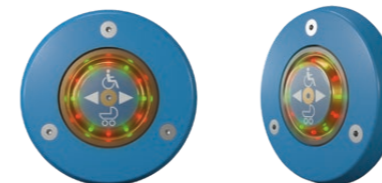
- Function: one-sided
- Application area: wall panel or door element
- Front mounting with pitch circle Ø76 mm, stepped mounting ring
- Visible screws

CONSTRUCTION TYPE 5
PK21-Z, PK28-Z



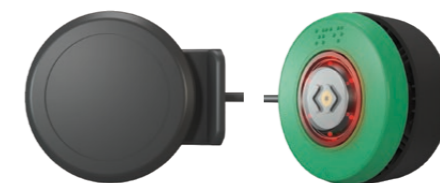
- Function: one-sided
- Ideal for usage in high-speed trains
- Screwless installation from front side with Zentraflex mounting ring
- Flush installation reduces driving resistance and driving noise

CONSTRUCTION TYPE 6
PK21-5, PK25-5, PK28-5, PK29-5



- Function: one-sided
- Application area: wall panel or door element
- Front side installation with a cutout of Ø74 mm, rear wall mounting with mounting claws
- Visible screws

CONSTRUCTION TYPE 7
PK21-3, PK25-3, PK28-3, PK29-3



- Function: one-sided with blind cover
- Application area: glass door
- Mounting of push button in the spacer ring
- Visible screws (Photo: with cover ring)

CONSTRUCTION TYPE 8
PK21-2, PK25-2, PK28-2, PK29-2



- Function: double-sided
- Application area: glass door
- Mounting of push button in the spacer ring
- Visible screws

TACTILE

TOUCH SURFACES WITH TACTILE SYMBOLS

Thanks to the PK2x series' modular structure, all available pictograms and tactile controls can be combined. Due to the special design, also with Braille, the functionality becomes noticeable especially for visually impaired persons.

In order to comply with the railway standard EN 14752 (side entry systems for rail vehicles), the push buttons must conform to the following requirements:

- Active actuating surface of the push button with a minimum diameter of 30 millimeters
- Button surface raised by 3 millimeters from the surrounding surface
- Tactile symbols raised by 0.5 millimeters
- Actuating force of the push button < 15 N
- Detectable change of color and position of LED light signals
- Minimum luminance of the light signal 30 cd/m²

The raised types comply in shape and size with the legal and normative requirements of TSI-PRM and EN 14752.





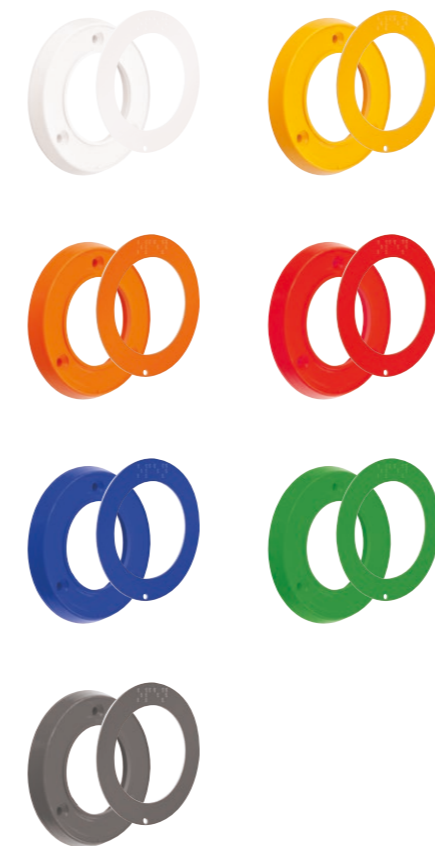
A complete overview of pictograms is available on our website. www.tsl-escha.com

INDIVIDUAL COLOR AND PICTOGRAM SELECTION

The color of the mounting rings and pictograms can be matched to your vehicle design. The insert ring is used to cover the mounting screws (for construction type 2, 7 and 8).

MOUNTING- AND INSERT RING

The mounting ring is made of plastic. Here is a selection of different colors. Braille and printing are also possible.



PICTOGRAM

TSL-ESCHA offers over 90 pictograms. Here we show only a small selection. A complete overview can be found on our website.



SEE AND HEAR

INDIVIDUAL PUSH BUTTON FUNCTIONS

Light and sound signals can be displayed in various ways in the PK2x series. These are triggered by the push button in various operating states. It is possible to trigger functions directly from the push button or by an external control.

For this purpose the PK2x series has up to three inputs (In1, In2 and In3). With this one can control the release of the push button, indicate a door malfunction or switch off the orientation tone during night-time travel.

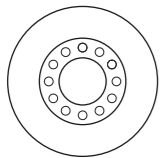
The application options are just as varied as the requirements of the different areas of application.

The connection of light, sound and input signals as well as the desired functionality of the output (Out) are defined individually.

LIGHT SIGNALS

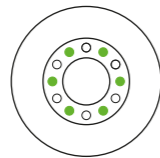
L0

No light signal



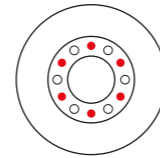
L1

Six green LEDs



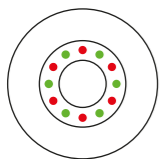
L2

Six red LEDs



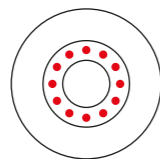
L3

Six green LEDs
Six red LEDs



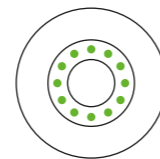
L5

Twelve red LEDs



L6

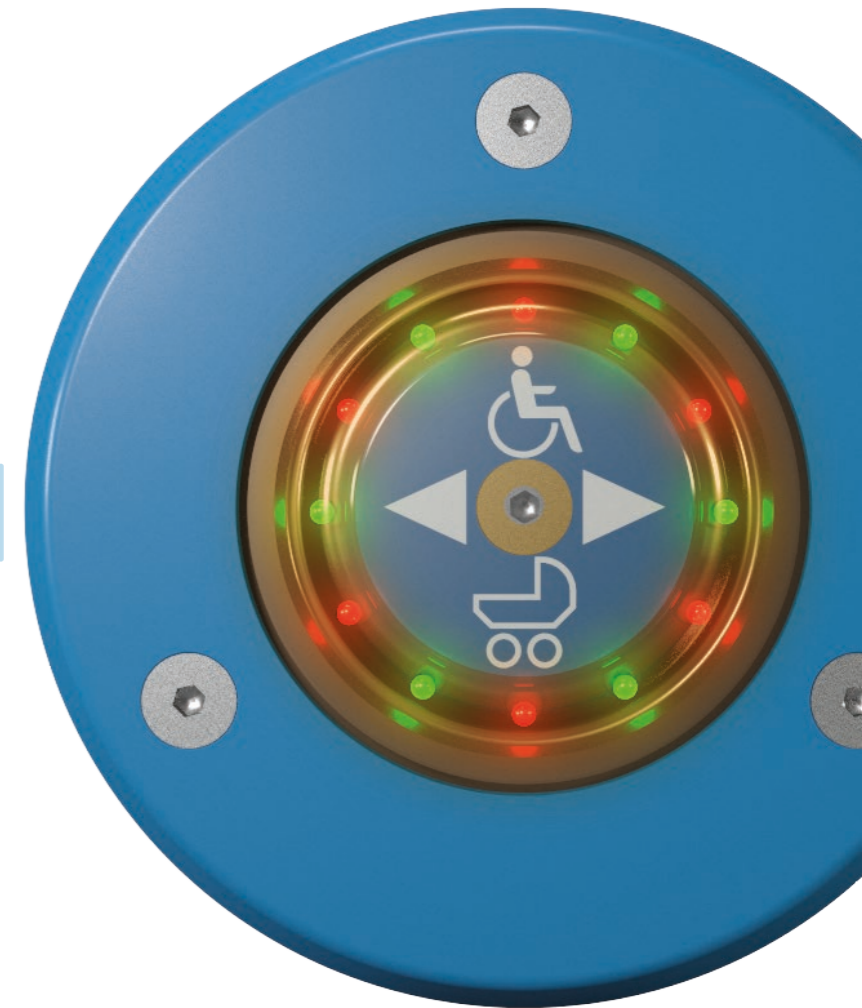
Twelve green LEDs



CONFIRMATION TONE



ORIENTATION TONE



tone signals

Different acoustic variants can be selected for the PK2x push button for the actuated and non-actuated state. Customers can also specify the tone frequency.

Tone signal A	Frequency	Duration	Interval	Functional duration	Description
A0	-	-	-	-	Without tone
A1	3,5 kHz	0,5 Sec.	0,5 Sec.	0,5 Sec.	Confirmation tone
A2	3,8 kHz	0,05 Sec.	2 Sec.	∞	Orientation tone



The PK2x push button series complies with the common standards for rail vehicles (TSI-PRM, EN 50155, EN 45545-2 and EN 61373) and some models also comply with EN 14752.

THE DETAILS TECHNICAL DATA

SWITCHING PRINCIPLE

- 4-point contact
- Self-cleaning contacts
- Integrated air-pressure compensation system (constant switching pressure under all environmental conditions)

SIGNALING

- twelve individually configurable LED displays (high-end version): PK21, PK22, PK23, PK28, PK41 and PK-Z
- four LED displays (economy version): PK25, PK26, PK27 and PK29
- Luminous colors red, green
- Orientation, confirmation or warning tones (individually parameterized)
- Orientation tone and confirmation tone as continuous or intermittent tones, depending on the installation

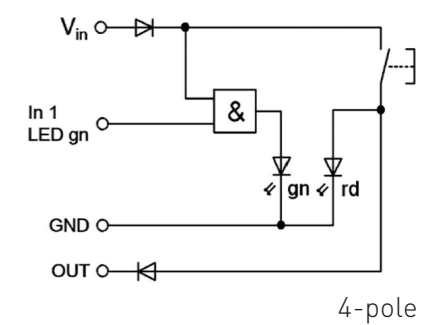
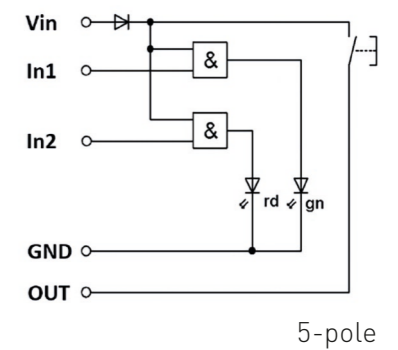
ELECTRICAL DATA

- Nominal voltage 24 VDC, 36 VDC, 72 VDC, 110 VDC
- Nominal current Up to 50 mA @ 24 VDC, depending on the version
- Switching current Up to 200 mA, depending on the version
- Switching function Normally open (NO), PNP or NPN

ENVIRONMENTAL CONDITIONS

- Switching cycles > 7 million
- Operating temperature -40 ... +80 °C
- Degree of protection IP67

CIRCUIT DIAGRAMS OF THE BASIC FUNCTIONS



Further technical details can be found in our checklist at www.tsl-escha.com.



TSL-ESCHA and MAFELEC offer customers a wide range of different push buttons.

MAFELEC TEAM LARGE VARIETY OF PUSH BUTTONS

The numerous possible combinations within the push button series result in an almost infinite variety of solutions for TSL-ESCHA and MAFELEC customers. Push buttons of the MAFELEC TEAM can be found everywhere on buses, trams, metros or trains. Whether on the exterior, interior or in the lavatories.

- Intuitive operation and clear recognition, even for passengers with restrictions thanks to touch surfaces and acoustic signals
- Designed for railway applications for public transport and accordingly conceived for harsh environments
- Developed to meet the market requirements of transport companies and the expectations of their passengers

TSL-ESCHA AND MAFELEC

OVERVIEW PUSH BUTTON SERIES

PK5x



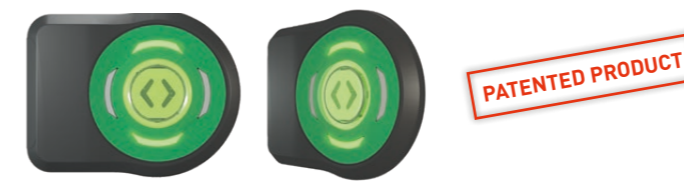
- Large visible plane or tactile touch surface (Ø52 mm); tactile switching feel, with touchless option
- Invisible fastening elements, enhanced protection against manipulation by unauthorized persons
- Solid stainless steel or plastic bezel
- Versatile and individual parameter setting
- One- and double-sided function, suitable for glass doors (4-13 mm glass thickness)

PK2x



- Possibility of different switching functions, touch surfaces, mounting rings, LED colors and pictograms
- Eight construction types
- Hermetically sealed due to one-piece housing design
- Space-saving installation
- One- and double-sided function

M-DOOR GM



- No glass drilling, 3 to 20 mm glass thickness compatible
- Single or double-sided mounting
- No pairing, inside/outside buttons auto-synchronization
- Each LED area individually configurable
- M-Safe Touchless activation option

M-DOOR SINGLE



- Large illuminated area
- Haptic feedback
- Standard panel front or rear mounting
- Large customization, plastic or metal bezel and actuators, several schematics
- Orientation or confirmation tone

CK



- Particularly flat design
- Seven construction types allow versatile use
- Robust stainless steel front panel
- One- and double-sided function
- Optional: CK Touchless with contactless and tactile activation

MP



- Sealed, one-piece push button
- Smallest push button series of TSL-ESCHA
- Switches wear-free and withstands extreme conditions
- Selection of different colors for the inside ring and LED
- Often used in high speed trains

M-DOOR DOUBLE

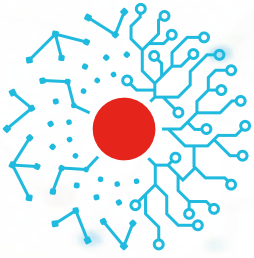


- Large illuminated area
- Single or double sided push buttons
- Easy and fast tool-free mounting
- Automatic glass thickness adaptation from 4 to 6 mm
- Large customization, plastic or metal bezel and actuators, several schematics

M-DOOR SLIM



- Slim ovale shape housing
- Wall or pole mounting Ø30 mm to Ø35 mm with 2 vandalproof screws
- Vertical or horizontal orientation
- Large customization, bezel color, plastic or metal actuator, several schematics
- Orientation and confirmation tone



MAFELEC TEAM

CREATING **TOGETHER** SMART AND SUSTAINABLE INTERFACES

HMI INTERIOR AND EXTERIOR

- DOOR EQUIPMENT
- PASSENGER COMFORT
- SANITARIES
- DRIVER DESK
- SAFETY SOLUTIONS

DETECTION & PROTECTION

- VOLTAGE & CURRENT SENSORS
- CIRCUIT BREAKERS
- INSULATORS AND BUSHINGS
- POWER SWITCHES

LIGHTING INTERIOR AND EXTERIOR

- FRONT LIGHTING
- INTERIOR LIGHTING
- EXTERIOR LIGHT SIGNATURE



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