



HAND RAIL BUTTONS AND DOOR CONTROL UNITS

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

HAND RAIL BUTTON SERIES HST..... 4-9

STOP REQUEST BUTTON SERIES M-360 10-15

STOP REQUEST BUTTON M-DOOR SLIM 16-19

STOP REQUEST BUTTON M-DOOR X-SLIM.....20-21

DOOR CONTROL UNIT SERIES TSG.....22-27

CONTENTS

HAND RAIL BUTTONS AND DOOR CONTROL UNITS

HAND RAIL BUTTONS AND DOOR CONTROL UNITS MULTI-VARIANT AND ROBUST

TSL-ESCHA and MAFELEC offer a variety of hand rail buttons and door control units. These are especially used in buses and trams. From simple stop request buttons up to backlit displays – these product families are very versatile.

- Large selection of colors, texts and pictograms
- Illuminated pictograms possible
- Version with vibration feedback (HSTIV)
- 360° all-round vision with three active buttons (M-360)
- Door control unit with backlit display
- Easy operation for passengers with limited mobility due to beveled surface (TSG108)
- Housing and push buttons in different colors



All current standards for rail vehicles are complied with.

The variants with Braille meet the special requirements of the TSI-PRM to ensure optimum support for persons with reduced mobility.



HAND RAIL BUTTON HST DURABLE AND RESISTANT

HST Series hand rail buttons are particularly durable thanks to their robust housing and compact construction type. Underlying inscriptions and pictograms are protected by scratch-resistant, transparent polyamide. This ensures that the push buttons always look good and prevents the pictograms from fading, thus guaranteeing the durability of the contrast values.

- Hand rail buttons in various designs and mounting shapes
- Elongated design adapted to holding bars
- Large selection of colors, texts and pictograms
- Optional selection of lighting, braille, touch protection or vibration feedback
- Complies with buses and railway standards (ECE R10, ECE R118, ECE R107, EN 45545-2, EN 50155, EN 50121-3-2, EN 61373 and TSI-PRM)
- E1 approval of the Federal Motor Transport Authority
- Raised tactile symbols on the push buttons
- Easy to press thanks to large push buttons



Mounting to the hand rail or the side wall in buses and trams.

OVERVIEW OF SERIES HST

CONSTRUCTION AND MOUNTING FORMS

A new feature of the hand rail buttons is the optional haptic or acoustic feedback by vibration (model HSTIV, HSTIA). When the passenger presses the push button, then a vibration or a sound gives a direct haptic or acoustic feedback. This additional tactile or acoustic feedback is intended to offer visually impaired passengers in particular greater comfort and safety when using buses and trams.

The two-color illuminated HSTI version is particularly popular. The color green stands for better localization of the button. The color red provides visual acknowledgement of the stop request after the button has been pressed. This facilitates visual orientation and provides necessary light/dark and color contrasts. In combination with the vibration feedback, passengers can thus feel and see the actuation of the button.

Nominal voltage	10 ... 24 VDC (HST), 24 VDC (HSTI, HSTIV, HSTIA)
Nominal current	30 mA @ 24 VDC (HSTI), 120 mA @ 24 VDC (HSTIV, HSTIA)
Switching current	max. 200 mA
Operating temperature	-40 ... +85 °C (HST), -30 ... +80 °C (HSTI, HSTIA), -5 ... +60 °C (HSTIV)
Degree of protection	IP40
Icons (W x H)	29 x 45 mm

HST30, HST32 AND HST35



- Mounting on a hand rail with a diameter of 35 mm (standard)
- Mounting on rails with a diameter of 30 or 32 mm using a mounting adapter
- Two variants of touch surfaces: almost flush with the housing and raised (letter E added to the product name)
- Compatible with additional HSTB housing (touch protection)

HST0 AND HST40



- Mounting on the wall panel (HST0)
- Mounting with an adapter on a hand rail with a diameter of 40 mm (HST40)
- Two variants of touch surfaces: almost flush with the housing and raised (letter E added to the product name)

HSTI
(WITH ILLUMINATION)



- Optional illumination for the HST variants on the left.
- The letter I stands for illumination in the product name
- Two-color illumination: green for better localization of the button; red for optical feedback after the push button has been pressed
- The button illuminates behind the touch surface

HSTIV
(WITH VIBRATION)



- Can optionally be equipped with a small vibration motor for the variants mentioned on the left
- The letter V stands for vibration in the product name
- Passenger briefly receives additional haptic feedback when pressing the touch surface
- More comfort and safety for visually impaired persons

HSTIA



- Can optionally be equipped with a ceramic speaker for the HST-Variants (30, 32,35, 40 and 0)
- Letter A (for acoustic) indicates this in the product name
- Passenger briefly receives additional acoustic feedback when pressing the touch surface
- More comfort and safety for the visually impaired



STOP REQUEST BUTTON M-360

360° ACCESSIBLE AND ELEGANT

The M-360 is a triple push button with an innovative and elegant design that is mounted on the hand rail or interior walls of all transportation vehicles requiring stop request command (buses, trolleys, trams). Accessibility to the stop request function is total for all passengers, whatever their position in the vehicle, thanks to its three large actuation and lighting zones visible at 360 degrees in the pole mounted version. The haptic feedback (click effect) associated with the change of lighting color of all the buttons installed in the vehicle confirms that the request has been taken into account.

Color, marking, relief/braille or lighting are fully configurable. In addition, MAFELEC will soon offer M-Safe options for antimicrobial surface protection or contactless activation. These customization possibilities allow operators to conform the human-machine interface to their identity, while improving passenger comfort, accessibility and safety.

The M-360 obviously complies with all buses and railway standards (ECE R10, ECE R118, ECE R107, ISO 16750, EN 45545-2, EN 50155, EN 50121-3-2, EN 60529, CEI 62262, and EN 61373).

- Contemporary innovative design
- 360° functional: three actuators/backlit areas
- Surrounding ultra slim design: 8.5 mm thickness
- Invisible fixing elements
- Visual feedback detectable for color blind people
- Lit areas visible in daylight
- Fully customizable: colors, marking and lighting
- M-Safe options coming soon



A valuable benefit for the accessibility, safety and comfort of all users.

OVERVIEW OF M-360

MOUNTING FORMS AND VARIANTS

The M-360 is available in two types of mounting: on poles or on walls.

The M-360 is delivered as a kit with its installation instructions, allowing a quick and easy installation. This kit includes three pre-assembled button modules, three bezels and six mounting screws.

With no visible screws thanks to its clip-on bezel, the M-360 is protected against malicious acts. But it can be easily disassembled without special tools by a trained operator using the replacement instructions.

The M-Safe variants of antimicrobial actuator protection and touchless activation will be available in the near future to meet the growing need for enhanced hygienic security.

Nominal voltage	12 or 24 VDC
Nominal current	60 mA @ 24 VDC
Switching current	max. 50 mA
Operating temperature	-30 ... +70 °C
Degree of protection	IP40
Lifespan	4 million cycles

M-360/P



- Pole mounting: $\varnothing 35$, $\varnothing 34$, $\varnothing 32$, $\varnothing 30$ mm
- Vertical or horizontal orientation
- 360° functional: three actuators/backlit areas
- Choice of one or three actuators; haptic feedback

M-360/P M-SAFE (COMING SOON)



- Pole mounting: $\varnothing 35$, $\varnothing 34$, $\varnothing 32$, $\varnothing 30$ mm
- Vertical or horizontal orientation
- 360° functional: Three actuators/backlit areas
- Two mechanical + one touchless actuators
- Optional antimicrobial surface actuator (ISO 22196)

M-360/W



- Wall mounting
- Vertical or horizontal orientation
- Single actuator/backlit area
- Haptic feedback

M-360/W M-SAFE (COMING SOON)



- Wall mounting
- Vertical or horizontal orientation
- Single Touchless actuator/backlit area
- Optional antimicrobial surface actuator (ISO 22196)

M-360 VERY INDIVIDUAL PICTOGRAM AND COLOR SELECTION

The width of our offer will allow you to have a wide choice among different existing configurations or to define according to your needs. The variety of pictograms and colors available allow you to define solutions that meet regulatory requirements such as ECE R107, UFR and PRM needs.

Details of existing customizations are available in our Product Configuration and generic drawings.

ACTUATORS



BEZEL COLOR



Housing colors and actuators are customizable.

M-DOOR SLIM

ROBUST AND VANDAL PROOF

The M-Door Slim push button is a variant of our M-Door range. This offers a large diameter of 40 millimeters with a single or dual color backlit actuator. The actuator can be chosen in flush or raised design. Its particularity is to offer a slim width to be installed in reduced environments.

The M-Door Slim is fixed by two stainless steel anti-vandal screws to facilitate its installation and reinforce its robustness. It is available for wall or pole mounting at a diameter of 30 to 35 millimeters thanks to an adapter.

Designed in compliance with railway and bus standards (ECE R118, ECE R107, TSI PRM, EN 16584-2, EN 45545-2, EN 50155, EN 50121-3-2, EN 60529, CEI 62262, and EN 61373) to comply with technical design rules and PRM accessibility. The M-Door Slim offers a wide range of customization of materials, colors, pictograms, relief/braille and electrical schematics. This allows adaptation to the needs of all applications and customers.

- Slim shape
- Wall or pole mounting
- Ø40 mm single or dual color backlit actuator
- Plastic or metal actuator
- Haptic feedback (click effect)
- Large range of customization



M-Door Slim/W for wall mounting

M-Door Slim/P for pole mounting

Nominal voltage	12, 24, 36, 72 or 110 VDC
Nominal current	15 mA @ 24 VDC
Switching current	max. 200 mA
Operating temperature	-40 ... +85 °C
Degree of protection	IP67/65 front, IP65 rear
Lifespan	3 million cycles

A large selection of colors and pictograms is available for your customization needs.



M-DOOR SLIM

MOUNTING FORMS, COLORS, PICTOGRAMS

Here is a short overview of the unlimited actuator configurability, forms, material, colors, pictograms and relief/braille. For further versions, please ask for our Product Configuration.

COLOR SELECTION FOR HOUSING AND ACTUATOR



PLASTIC ACTUATOR RELIEF/BRAILLE



PLASTIC ACTUATOR PICTOGRAMS



METAL ACTUATOR



Metal actuator can be flush or raised, as well as the symbol on the actuator. Optionally lit hole available.

M-DOOR X-SLIM

EXTRA SLIM AND STREAMLINED DESIGN

The M-Door X-SLIM push button is an extra slim version for bus stop request button. The streamlined overall shape allows it to fit harmoniously on bars from a diameter of 30 to 35 millimeters. It is fixed by two screws embedded in the body of the button.

Based on the M-Door push button range, the plastic actuator can be configured in unlimited ways to comply with customer needs. It can be either not illuminated or backlit with a single or dual color. Moreover, a large choice

of pictograms and relief/braille is offered. The housing color can also be customized for a better vehicle identity signature and contrast requirement for passengers with reduced mobility (PRM).

The addition of a backlighting by a diffuse plastic adapter integrated between the button and the pole gives better visibility and provides a high-end rendering. The M-Door X-Slim is compliant with bus standards (ECE R107, ECE R10, ECE R118).



- Extra slim and streamlined shape
- Pole mounting, Ø30 - Ø35 mm
- Vertical or horizontal orientation
- Single or dual color backlit actuator
- Haptic feedback (click effect)
- Large range of customization
- Optionally backlit between pole and button

ACTUATORS

Some examples of pictograms and relief/braille available to configure your actuator. More versions in our Product Configuration.



HOUSING COLORS



Nominal voltage	24 VDC
Nominal current	20 mA @ 24 VDC
Switching current	max. 50 mA
Operating temperature	-25 ... +70 °C
Degree of protection	IP40
Display window (W x H)	116 x 35 mm

By activating the TSG108 the passenger signals that the door should be opened.

DOOR CONTROL UNITS TSG DURABLE AND LARGE

TSL-ESCHA door control units are particularly popular in buses and trains in North America, where large and robust products are highly valued. Another advantage of the TSL products: the door control units continue to function flawlessly even in cold regions. The reason for this: The TSG Series door control units impress with their robust metal housing and large backlit display area. Their metal housing provides additional protection against vandalism and makes the product durable.

- Robust metal housing with backlit display area
- Large selection of colors, texts and pictograms
- Optional selection of lighting in different colors, tactile push buttons or braille on buttons
- Complies with buses and railway standards (ECE R10, ECE R118, ECE R107, EN 45545-2, EN 50155, EN 50121-3-2, EN 61373 and TSI-PRM)



Mounting on hand rails or by adapter on the wall of the vehicle.

OVERVIEW DOOR CONTROL UNITS

TSG108

- Simple operation for passengers with reduced mobility thanks to the beveled operating surface on hand rails
- Compact and robust construction type
- Display window made of polycarbonate
- Backlighting: red, yellow, green or white
- Icons (W x H): 36 x 75 mm



TSG101

- Robust door control unit for hand rails
- Extremely robust and eye-catching construction type
- Polycarbonate display window with multiple display fields
- Backlighting: red, yellow, green or white
- Icons (W x H): 50 x 120 mm
- Variant TSG100: Mounting on flat surfaces such as a wall panel using a wall adapter



Nominal voltage	24 VDC
Nominal current	150 mA @ 24 VDC
Switching current	Max. 30 mA
Operating temperature	-30 ... +80 °C
Degree of protection	IP40



Touch surfaces with tactile signs and Braille are available for the TSG, as well as different colors for touch surfaces and housing.

BUTTONS, COLORS AND PICTOGRAMS FOR DOOR CONTROL UNITS

Due to the modular design of the door control units, individual combinations of touch surfaces, pictograms and housing colors are possible. The tactile symbols on the touch surfaces are raised and comply with the standards according to EN 14752 and TSI-PRM. Touch surfaces with tactile symbols also offer the possibility of designing both the inner surface of the touch surface and the symbol in different colors. Touch surfaces are also available with and without Braille. The pictograms and texts below are backlit or permanently legible. The color of the housings and the pictograms can be matched to your vehicle design.

TOUCH SURFACE WITH TACTILE SYMBOLS

Touch surface with tactile bell (white or black)



Touch surface with tactile arrows (white or black)



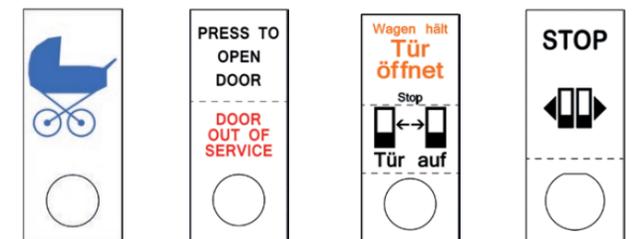
Selection of the inner color for tactile touch surface

X		X
		X
		X
X		X
X		

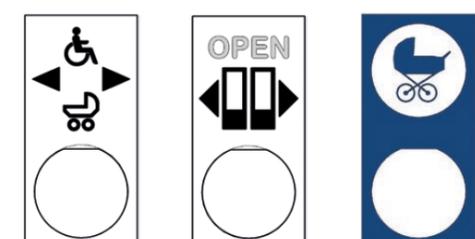
SELECTION OF HOUSINGS AND PICTOGRAMS

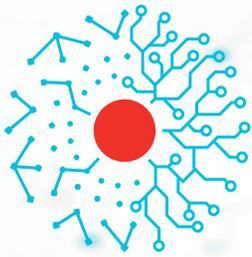


TSG101



TSG108





MAFELEC TEAM

CREATING 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



MAFELEC
471, Route de la Cuisinière | 38490 Chimilin | France
T +33 4 76 32 07 33 | contact@mafelec.com
www.mafelec.com



TSL-ESCHA GmbH
Elberfelder Straße 1 | 58553 Halver | Germany
T +49 2353 66796-0 | info@tsl-escha.com
www.tsl-escha.com

MEMBERS OF THE MAFELEC TEAM

