

# CREW SWITCH

### 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.

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## CREW SWITCH

## C22CS SERIES CREW SWITCHES FOR RAILWAYS

The crew switch is an electromechanical switch exclusively reserved for the on-board personnel of railway vehicles, which generally allows controlling the opening, closing or locking of one or a set of doors locally. To guarantee this restriction of use, the operating heads are specific and require the use of particular keys, which vary according to the country and the operator. MAFELEC has different configurations adapted to the various constraints of environment and use. All is based on the C22 electric contact block whose robustness and reliability are widely recognized. The C22CS range complies with French, European and international railway standards (EN 60947, EN 45545, EN 61373, EN 60529) and equips the railway vehicles of the largest manufacturers and operators in Europe and worldwide.

- Removable handle or key
- Usually two or three positions (available up to eight), maintained or momentary
- Up to 16 independent contacts NO or NC
- Three different mechanisms, limit torque up to 30 N.m
- IP65/IP66 front option
- IP65/IP67 rear option thanks to special encapsulated cable output
- Wide range of possible adaptations based on customer requirements
- Compliance with railway standards



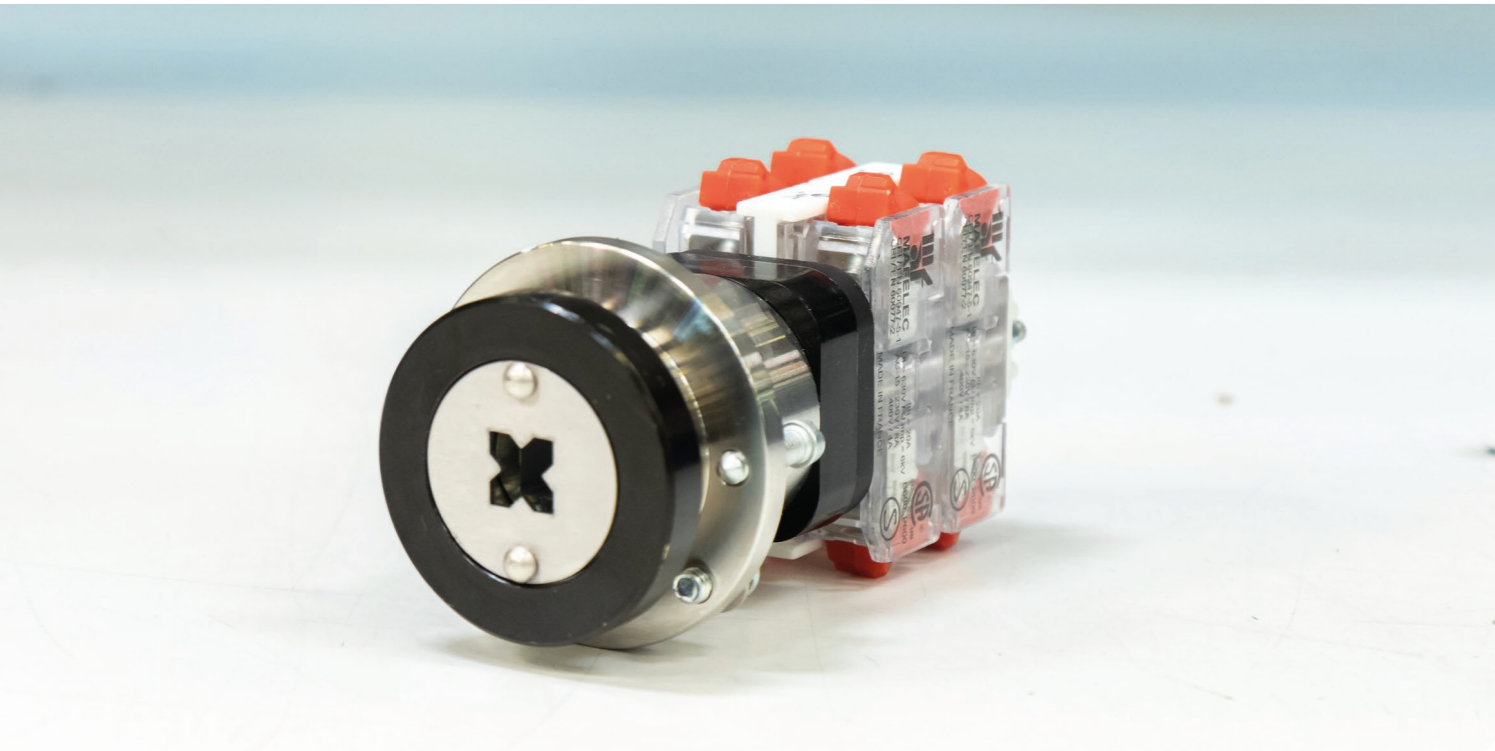
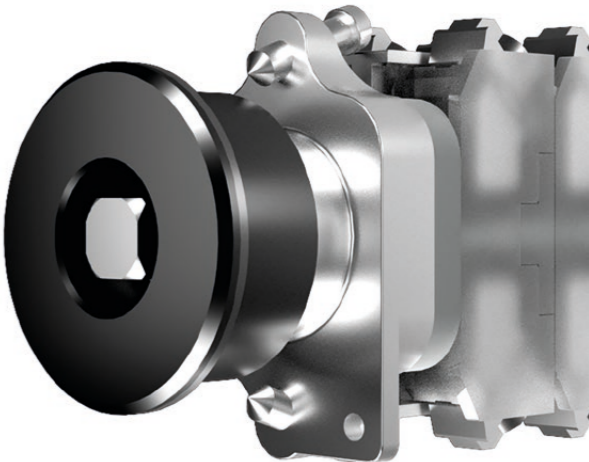
Whatever your need, MAFELEC is able to offer you an adapted crew switch.

# C22CS-5N

## SIMPLE AND EFFICIENT

The C22CS-5N is a crew switch whose design is adapted for use with low-leverage wrenches with an operating torque that does not exceed five Newton meter. Mounted flush to the front of the panel in a diameter cut-out of 30 millimeter, its robust fixing is ensured by a system of two screws at the back. The most common keys are triangular, square and carriage key. The electrical diagrams are made according to the customers' needs, mixing stable and momentary positions. These positions can be at 45 degrees or 90 degrees and therefore, at most eight. However, in the most common cases of use, only two or three positions are necessary.

- 5 N.m limit torque
- Usually two or three positions (available up to eight), momentary or maintained
- Up to 16 independent electrical contacts NO or NC
- Slow make depending action, self-cleaning design for long lifetime
- Electrical schematic designed according to customer specification
- Rear encapsulation for high tightness level available



|                          |                                   |
|--------------------------|-----------------------------------|
| Nominal voltage $U_i$    | 630 V max.                        |
| Thermal current $I_{th}$ | 20 A max.                         |
| Mechanical lifetime      | 300,000 cycles                    |
| Operating temperature    | -25 ... +70 °C; -40 °C on demand  |
| Degree of protection     | IP00 to IP65 according to version |

# C22CS-10N

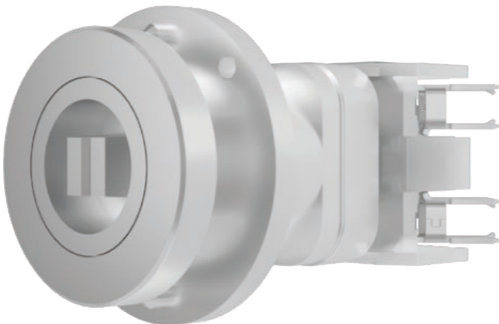
## COMPACT AND REINFORCED

Thanks to a reinforced mechanism, the C22CS-10N is a crew switch capable of withstanding a maximum actuating torque of ten Newton meter. Its robustness combined with its small size are appreciated for installations at access doors, in constrained spaces. Like the basic product C22CS-5N, it is flush and is installed from the front on a panel with a diameter cut-

out of 30 millimeters. Nevertheless, a rear access is needed.

Its depth is a little higher for the same number of electrical blocks. It has the same range of possibilities in terms of electrical configurations or actuating heads, made according to the needs expressed by the customers.

- 10 N.m limit torque
- Two or three positions (available up to eight), momentary or maintained
- Up to 16 independent electrical contacts
- Slow make depending action, self-cleaning design for long lifetime
- Electrical schematic designed according to customer specification
- Rear encapsulation for high tightness level available



|                          |                                   |
|--------------------------|-----------------------------------|
| Nominal voltage $U_i$    | 630 V max.                        |
| Thermal current $I_{th}$ | 20 A max.                         |
| Mechanical lifetime      | 300,000 cycles                    |
| Operating temperature    | -25 ... +70 °C; -40 °C on demand  |
| Degree of protection     | IP00 to IP65 according to version |



# C22CS-30N

## ROBUST AND RELIABLE

The C22CS-30N is the most robust crew switch in the range, with a 30 Newton meter torque limit that allows the use of long lever arm keys.

Its round metal body with a decorative chrome finish, identical to that of our M-Door range of push buttons and light indicators, allows for homogeneous integration on doors. Reliably mounted from the front with three vandal-proof screws, no rear access is required making it really quick to integrate and maintain.

This crew switch is available with different types of axes on request. It exists with two or three positions. Like the other crew switches in the range, it can be configured according to the desired electrical diagram.

- 30 N.m limit torque
- Front mounting
- Two or three positions (available up to eight), momentary or maintained
- Up to 16 independent electrical contacts
- Slow make depending action, self-cleaning design for long lifetime
- Electrical schematic designed according to customer specification
- Rear encapsulation for high tightness level available



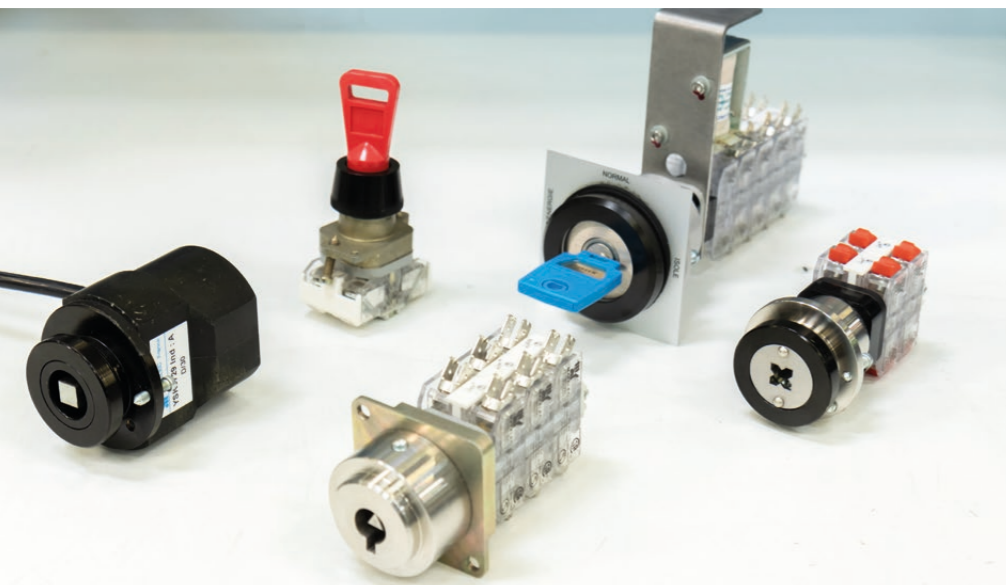
|                          |                                   |
|--------------------------|-----------------------------------|
| Nominal voltage $U_i$    | 630 V max.                        |
| Thermal current $I_{th}$ | 20 A max.                         |
| Mechanical lifetime      | 300,000 cycles                    |
| Operating temperature    | -25 ... +70 °C; -40 °C on demand  |
| Degree of protection     | IP00 to IP65 according to version |

## ELECTRICAL SCHEMATIC ADAPTED TO YOUR NEEDS

The crew switch C22CS is a switch equipped with stackable C22 cam blocks, with a specific safety command. The electrical schematic is fully configurable by choosing the number and type of operating positions as well as the number, type and plating of electrical contacts desired for each position to meet the different control functions to be addressed.

The multitude of schematics combinations associated with silver/nickel or gold plating contacts to reach high to very low power (few mA up to 20A), make the MAFELEC crew switch range the most complete on the market.

- Two to eight command positions, 45° or 90° angles
- Maintained or momentary positions
- One or two independent contacts NO or NC per block
- Up to eight stackable blocks
- Ag/Ni or Ag/Au contact plating
- Capability to realize complex schematics



## CONNECTION FOR A SAFE INSTALLATION

Like the C22 range of auxiliaries, MAFELEC offers three types of connections for crew switches as shown below. The connection by cable and connector output is associated with an encapsulated version for a perfect protection in dust and humid environments.



### DOUBLE 6,35 TABS

- 0,8 x 6,35 mm
- Two tabs per contact

### SCREWS

- With brackets or washers
- Tightening torque 1,2 Nm
- Usable wire section: up to 2 x 2,5 mm<sup>2</sup>

### CABLE OUTPUT

- Only with encapsulated versions
- Tightness up to IP67
- Connector upon customer request

The most complete range of crew switches on the market.

# KEY FORMS

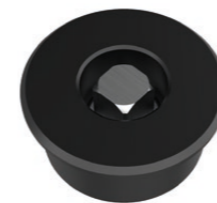
## LARGE VARIETY

The actuating command of the crew switch differs according to the project, the country of operation or the operator. The square or triangular key is common in Europe or Asia, while specific shapes or keys are often required for the North American market.

Thanks to its 40 years of expertise in railway projects, MAFELEC has developed an extensive catalog of keys shapes. The most common examples are shown on the right page.

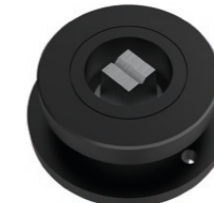
Any other requirement can be studied on request.

SQUARE



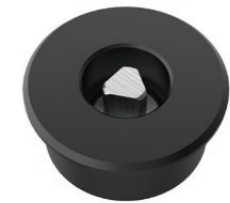
- Standard section 8\*8 mm
- Other sections on demand

BERN SQUARE



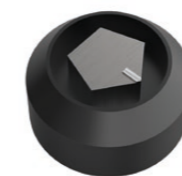
- 9\*9 mm section with 3° angle
- With central slot

TRIANGULAR



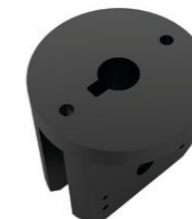
- Standard side length: 9 mm
- Other side lengths on demand

PENTAGON



- Standard outer diameter: 16 mm
- Other diameter on demand

LONG HANDLE



- Actuation through long leverage arm handle
- Shape and size on customer request

KEY



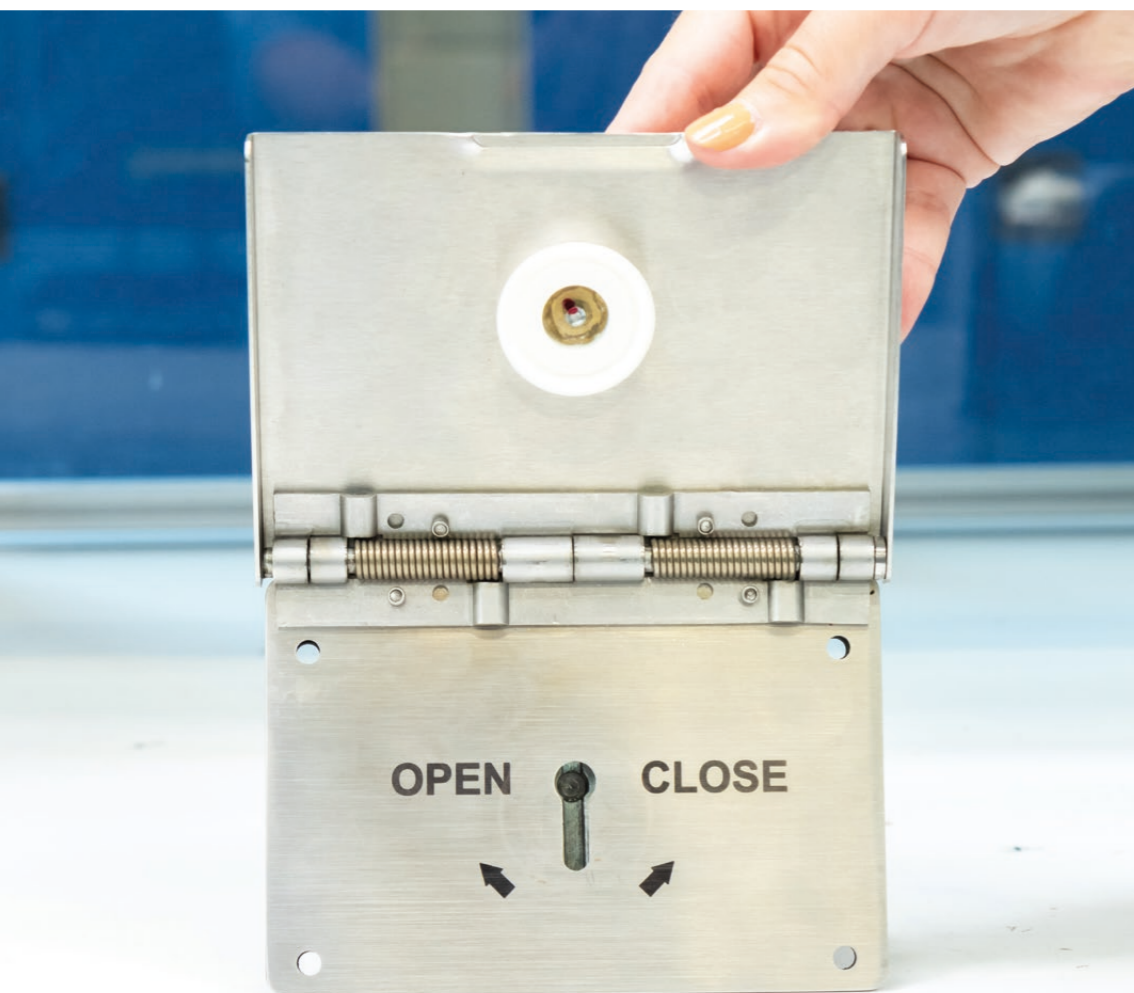
- Standard barrel integrated in special housing
- Standard or specific safety key on customer request

## SPECIAL REQUIREMENTS ADAPTED TO YOUR EXACT NEED

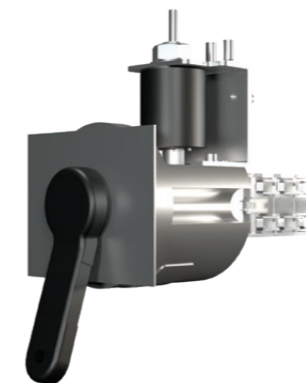
With 50 years of experience in customizing C22 auxiliary solutions, MAFELEC is the ideal partner to design the crew switch adapted to your need for electrical schematics, but also for mechanical integration taking into account your dimensional constraints for each project.

Whether you need a rear mounting that perfectly fits to your installation, or compatible with a reduced rear space, we already have specific solutions that could interest you.

Mechanical or electromagnetic locking systems can also be implemented, we propose equipped plates to facilitate their integration.



- Unique solutions dedicated to customer projects
- Mechanical or electrical adaptations
- 50 years of experience in C22 specific solutions



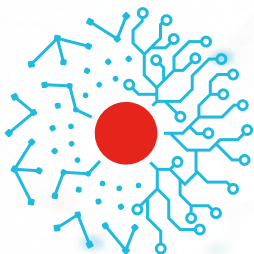
### LOCKING MECHANISM

- Reinforce the safety of command
- Mechanical or electrical locking mechanism
- Existing or specific safety key



### ADAPTED MOUNTING PLATE

- Dimensions upon customer request
- Special plate design
- Encapsulation with cable output



# 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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