

# 3 Gaines Standard Axial 20X40 (600Amp) HST

## EARTHING RETURN CURRENT UNITS (ERCU)

### EARTHING CONTACTS FOR HIGH SPEED TRAINS



The flow of electric current through the axle box roller bearing of railway vehicles is one major problem for the safety and reliability of rolling stock.

The electrification of networks, the increase of power installed on board vehicles and higher speeds lead to an increase of risks of bearings damaged by electric current flow. As a result, the use of Earth Return Current Units, already indispensable on electric locomotives, is being extended to other vehicles by the large European railway companies.

Since 50 years, Mersen devices by virtue of their effectiveness (low contact resistance, permanence of contact), are very well suited for the protection of such bearings.

On all the vehicles of a train, the currents that can flow through the axle box roller bearing have various origins and their magnitude varies from the first to the last vehicles. The origins are:

- The electric locomotive or power car: Traction current in the return current path and current supplied in the return path from trailer vehicles. This latter origin also applies to diesel electric traction.

- The trailer vehicles equipped with generators supplying power to several trailers of a train where the return path is formed by earthing of the vehicles.

- The track: return current of trains running on the same track; signalling currents; stray currents emanating from industrial trackside installations.

In the 3 cases above, train and track are parallel conductors.

- Accidental: faulty insulation on one or more pieces of electrical equipment on board any of the vehicles; overhead line falling onto the train.

The flow of current through roller bearings while the vehicles are

## FEATURES & BENEFITS

- Protected against dust penetration, water splash and shock
- Permanence of contact
- Very Low maintenance cost
- Fast and easy brush replacement
- Low cost and simple fixing on the bogie
- The Axial contact 3 brushes 20 x 40 Earth Return Current Unit is installed at the end of the axle, to provide an effective shunt around the bearings.
- There is a possibility to supply a complete adaptation including the contact disc, the support of the contact, the adapter, etc...
- Possibility to adapt the height dimension

## APPLICATIONS

- Earth Return Current Unit for High Speed trains (> 200 km/h)



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stationary or running, produces damages characterized by craters or scoring (washboarding) respectively and whose development is dangerous. This result in substantial overheating leading to the destruction of the roller bearing or seizure of the axles.

To avoid such damages, it is necessary to use devices shunting the greatest part of the current through the axles and wheels without flowing through the roller bearings.

Some references :

Railway :

SNCF (FR), British Rail (UK), Deutsch Bahn (DE), ONCF (MA), SATS (ZA), AMTRAK (USA), Ferrocarrilios de Bascos (ES), SNCB (BE), NS (NL), China (CN), Japan (JP), Australia (AU) , India (IN)...

## TECHNICAL DATA

### 600 Amp 3G 20x40

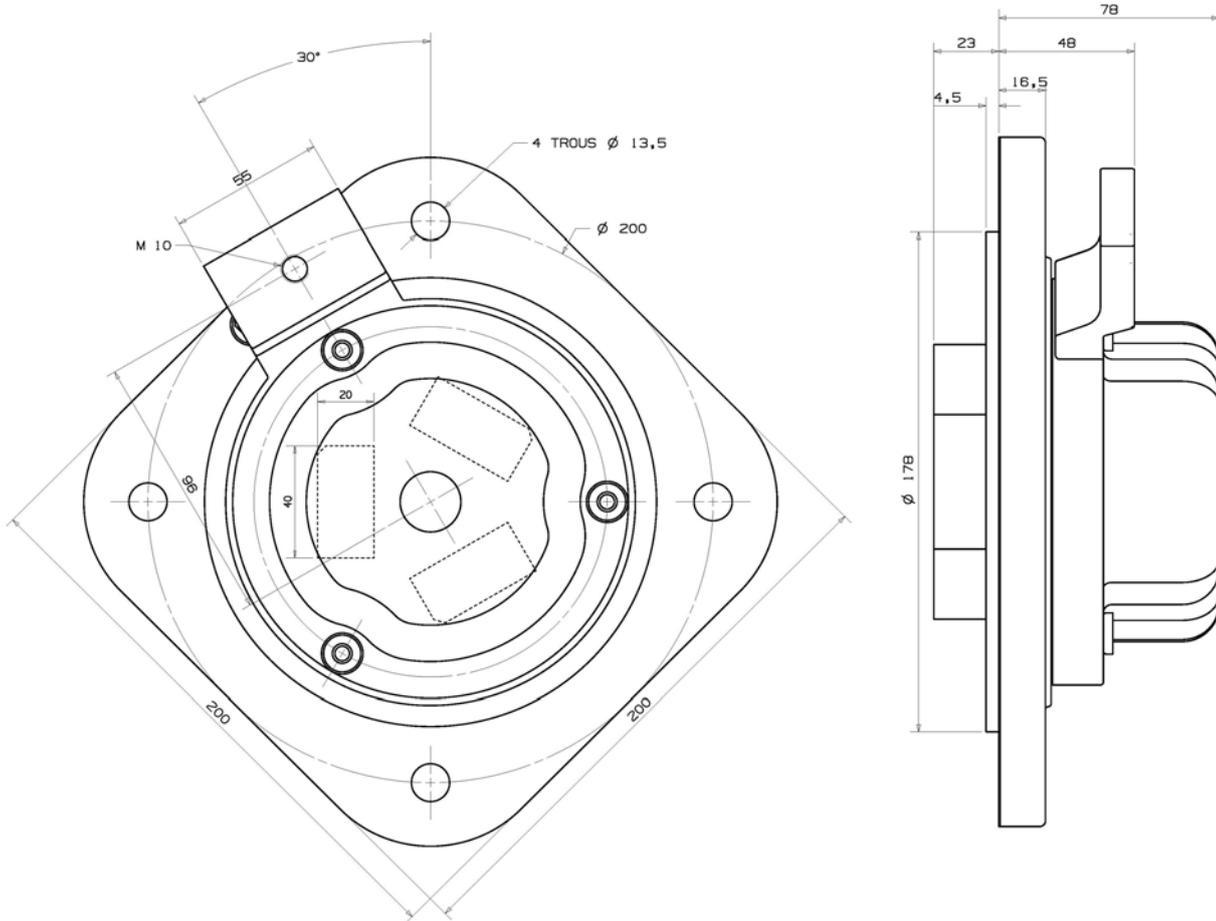
Mounting	Axial
Rated current	600 A
Number of brushes	3
Cross section of the brushes	20 x 40 mm
Short time withstand current 100ms	10 kA
Short time peak withstand current	27 kA
Resistivity	5 mΩms
Constant brush pressure	34 kPa
Material of body	CuPro Aluminium, connection tinned
Material of cover	3 mm thick zinc plated (15 microns) steel cover plate or Aluminium Alloy
Material of spring and screws	stainless steel
Material of insulating ring	Compound polyester; Polyester thermoplastic; Polyester glass fibre
IP	547

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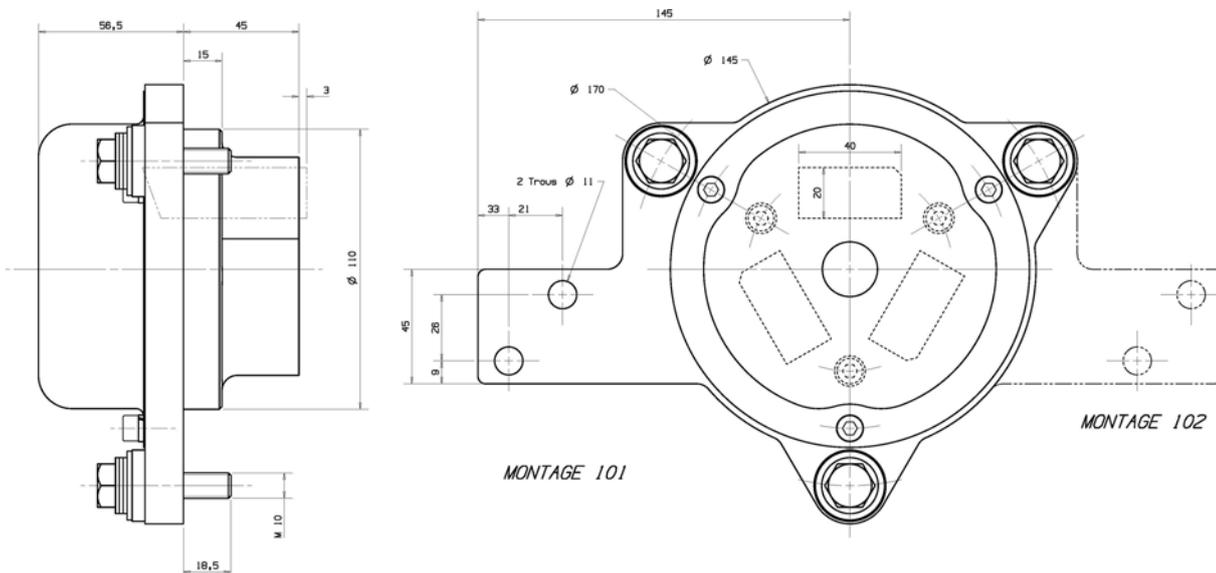
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## DIMENSIONS

**Earth Return Current Unit - 3 brushes 20 x 40 - Standard (dwg 115750)**



**Earth Return Current Unit - 3 brushes 20 x 40 - Compact version - Standard - Connexion on the right : version 101 / on the left : version 102 (dwg 119646)**

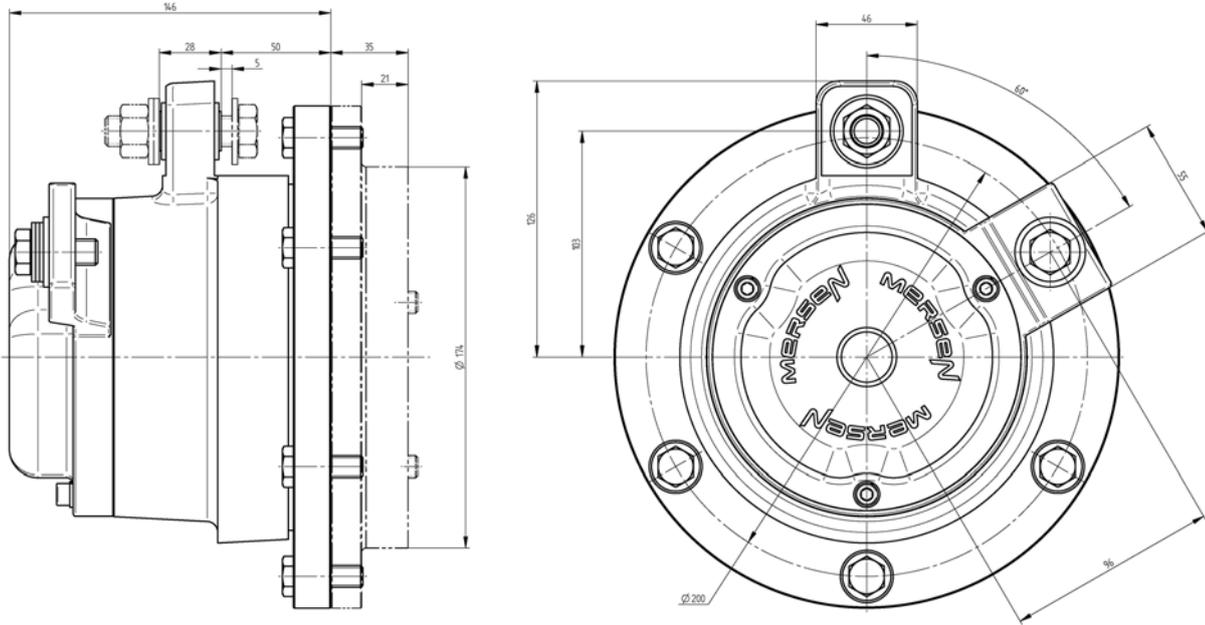


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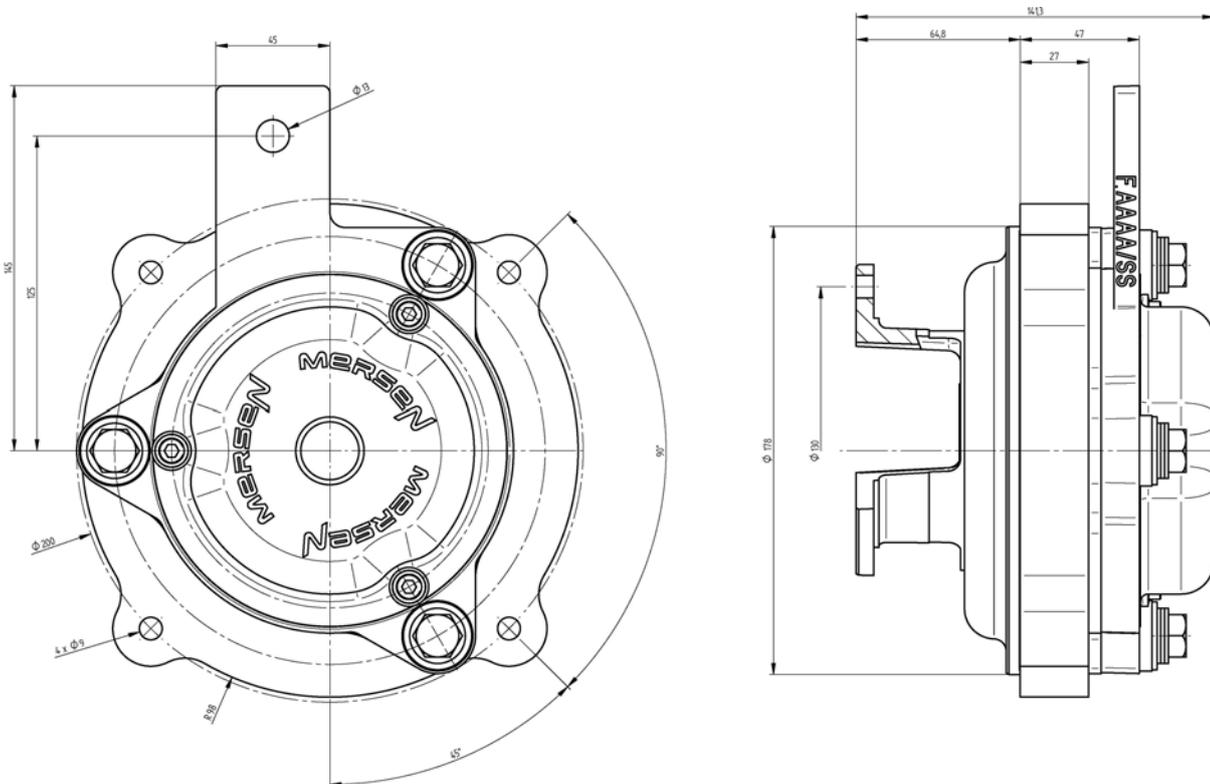
# 3 Gaines Standard Axial 20X40 (600Amp) HST

## DIMENSIONS

Earth Return Current Unit - 3 brushes 20 x 40 - Compact version - Adaptation (including slip disc) wheel mounted (dwg 1044136)



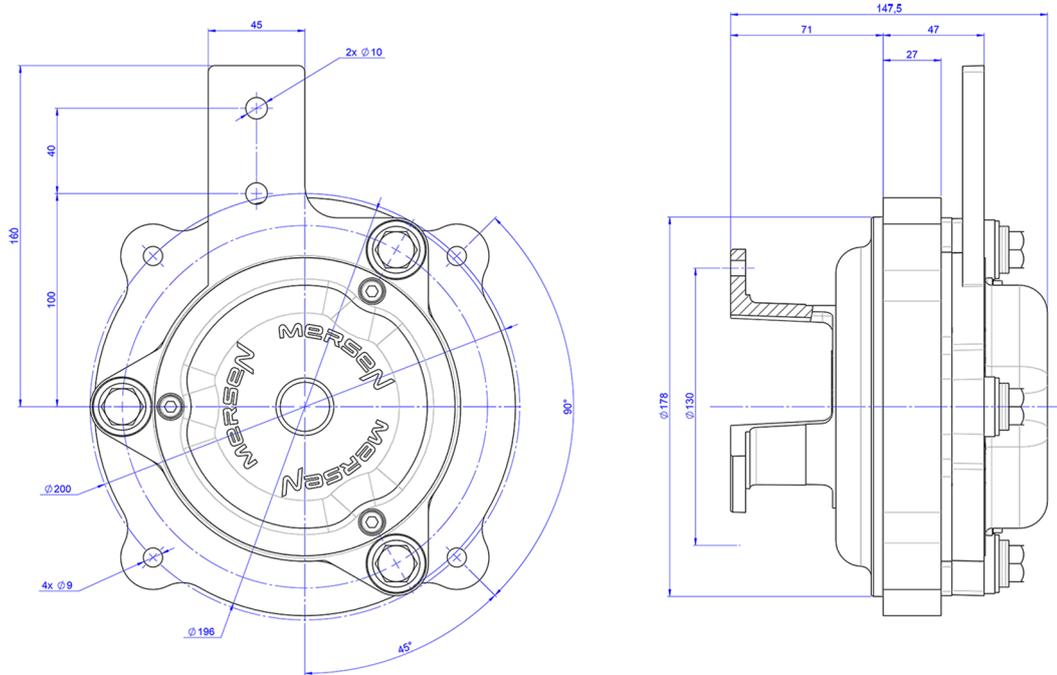
Earth Return Current Unit - 3 brushes 20 x 40 - Compact version - Adaptation (including slip disc) (dwg 1041825)



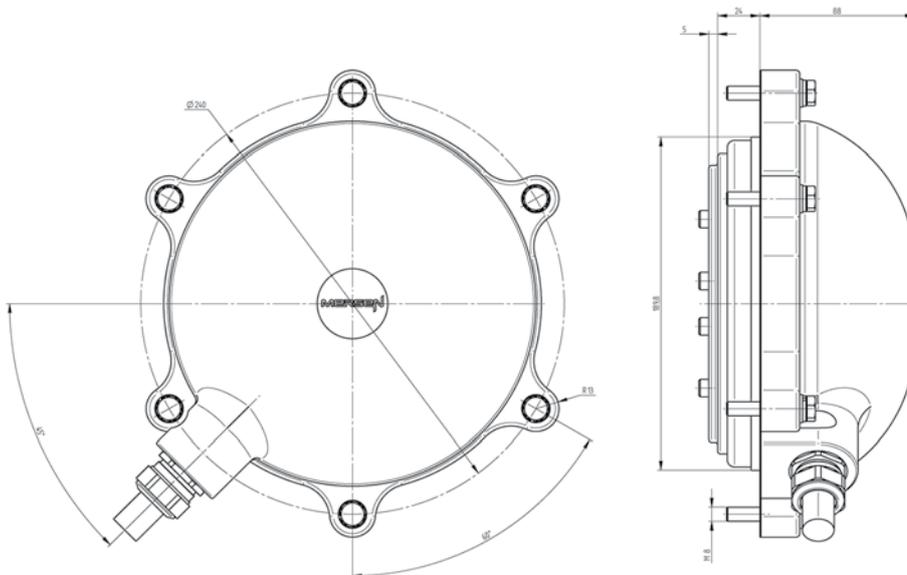
# 3 Gainses Standard Axial 20X40 (600Amp) HST

## DIMENSIONS

**Earth Return Current Unit - 3 brushes 20 x 40 - Compact version - Adaptation (including slip disc)  
(dwg 1024759)**



**Earth Return Current Unit - 3 brushes 20 x 40 - Isolated version - Adaptation (including slip disc)  
Isolated connexion (dwg 1028109)**

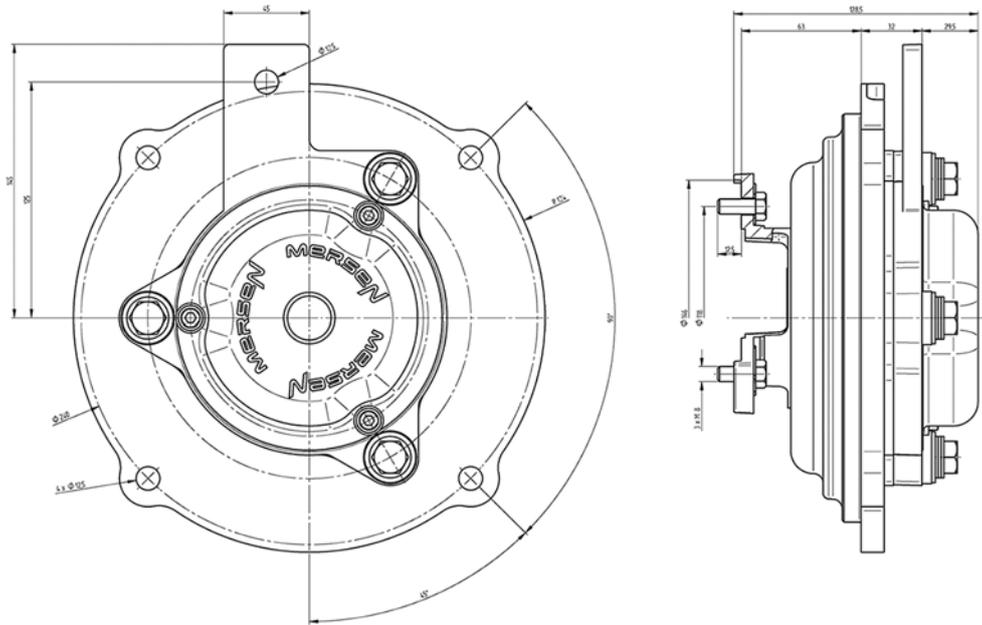


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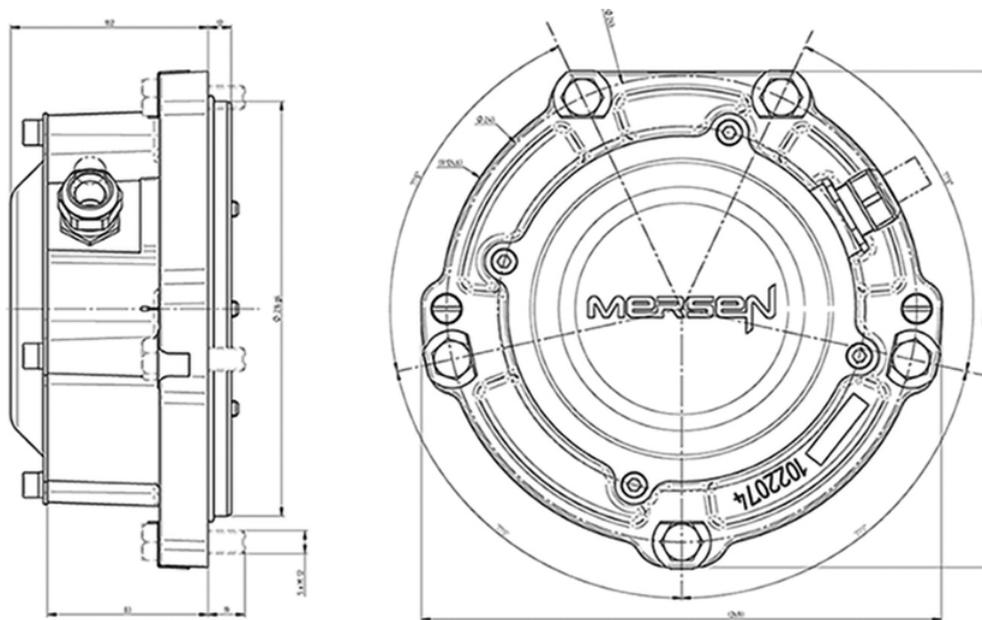
# 3 Gainses Standard Axial 20X40 (600Amp) HST

## DIMENSIONS

**Earth Return Current Unit - 3 brushes 20 x 40 - Adaptation (including slip disc)  
(dwg 1021247)**

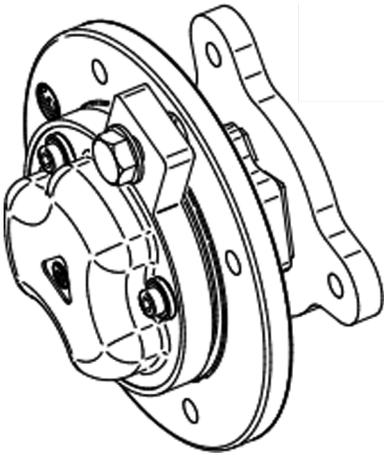


**Earth Return Current Unit - 3 brushes 20 x 40 - Adaptation (including slip disc)  
Isolated connexion (dwg 1021012)**



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## FUNCTIONS



### Operations

In the patented Earth Return Current Unit the contact is made to the axle end by means of 2 independent brushes guided in 2 boxes of rectangular section in the radial direction of the axle. Two independent pressure systems of the close coiled roller spring type without inertia, apply a constant pressure to each of the 2 brushes.

The Earth Return Current unit is fitted to the axle by means of an adaptation part which replaces the axle box end cover, and is therefore easily accessible. For the inspection purposes, it is a simple matter of undoing 3 screws removing the cover/spring assembly for access to the brushes. An insulating support positioned between the Earth Return Current Unit and part ensures the effective shunting of the roller bearing by the unit.

The connection lug for the electrical connection is an integral part of the unit.

The rotating contact face is a disc fitted to the axle end and possibly protected against lubricants emanating from the axle box bearing by a guard.

Due to the simplicity of the device and the very slow rate of brush wear (about 1 to 3mm per 100'000 km or 190'000 miles after patina creation), maintenance required is virtually zero. With the appropriate brush grade the formation of the skin on the surface of the contact disc can be observed and no evidence of hammering nor bevelling appears on the brush contact faces. The brushes are generally a metal graphite mixture grade manufactured by Mersen.

### Contact disc - Slip disc

Mersen can study, design and supply the slip disc adapted to your axel end (material is CuSn8Ni3P)



### Brushes

For the maintenance, the replacement brushes designed and dedicated to your Ground Brush can be provided by Mersen



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## FUNCTIONS



### Connexion cables + Braided cable

Mersen can supply and guarantee the Connexion cables or braided cables which studied for your application.

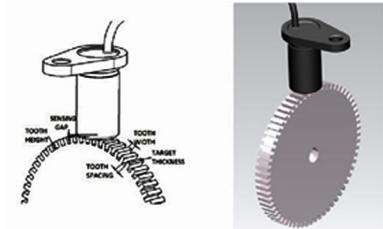
They are delivered with the possibility to customize the total length plus the adapted hardware for bolted connection.



### Electrical isolation

ERCU are sealed to offer electrical isolation and a perfect protection from outside aggression and dirty environments.

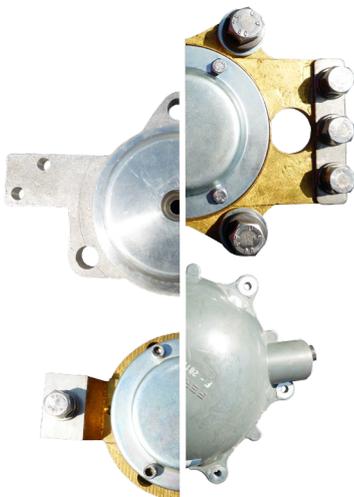
On a regular basis, they offer IP547 but they can be modified to offer IP65



### Speed sensor - Pulse generator

An angular speed sensor is mounted on the ERCU and transmits the pulses generated by the dented wheel inside the ERCU to an electronic system which can:

- Detect when a wheel slips to control traction or engine speed, or to trigger an anti-skid system.
- Detect whether the train is running or stopped, in order to trip or release safety systems such as door locks.
- Detect which way the train is traveling.



### Connexion plate

Connection plate can be designed for “external” or “internal” connections to meet your requirements.

Also the cover of the ERCU can be electrically isolated.

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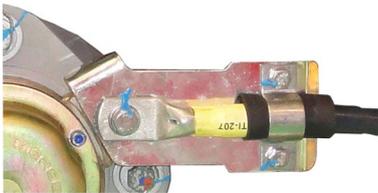
## Salt mist protection

Standard version of ERCU offer 96 hours protection against salt mist but Mersen can propose higher protection with Zinc Nickel coating on the cover for 500 hours protection and a cataphoresis coating on the cover for a protection up to 1000h against salty mist.



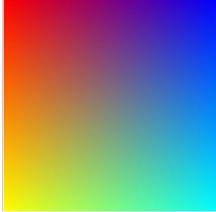
## Personal identification

Mersen can add identification like data Matrix or QR code on each product



## Cable support

Cable supports system can be studied to hold the cable and enlarge its life.



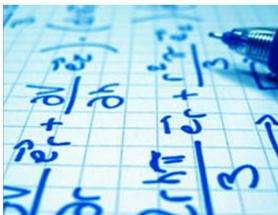
## Painting of Steel covers

We can paint the metal covers on your ERCUs to the color specified as per the RAL chart, for purely cosmetic reasons.



## Training and technical support

All around the world, Mersen technical team can help you for technical support and can offer you customized training sessions for your Maintenance team.



## LCC; RAMS; Type tests

Mersen teams can supply Life Cycle Costs "LCC" and Reliability Availability Maintainability Safety "RAMS" and Faillure Mode and Effect Analysis "FMEA" studies. They can operate Qualification type tests.

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## ACCESSORIES



ERCU Cover

### Covers/cover caps

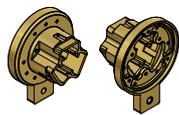
Catalog number	Package	Weight
ERCU COVER	1 piece	2 kg
ISOLATED ERCU COVER	1 piece	1.5 kg



20 X 40 mm Brush

### Brushes

Catalog number	Package	Weight
Brushes 20 X 40	24	30 g



3G 20 X 40 Axial Brush Holder

### Brush Holder

Catalog number	Package	Weight
Brush Holder 3G 20 X 40 Axial	1 piece	1.25 kg



O Ring and Gaskets

### Seal

Catalog number	Package	Weight
Gasket	1 piece	10 g
O-Ring seal	1 piece	5 g



Insulating Spacer

### Insulating spacer

Catalog number	Package
Insulating Spacer	1 piece



Clamping plate

### Clamping plate

Catalog number	Package	Weight
Clamping Plate	1 piece	0.2 kg



Slip Disc

### Slip disc

Catalog number	Package	Weight
Slip Disc	1 piece	0.3 kg

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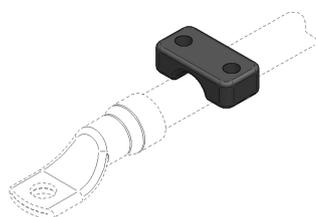
## ACCESSORIES



Insulating bushing

### Insulating bushing

Catalog number	Item number	Package	Weight
ISOLATING SPACER DIAM 17	Q109471	1 piece	25 g
ISOLATING SPACER DIAM 7	D116383	1 piece	20 g
ISOLATING SPACER DIAM 8,5	Y116861	1 piece	20 g
ISOLATING SPACER DIAM 9	T118559	1 piece	20 g
ISOLATING SPACER TGV DIAM 11	G041314A	1 piece	25 g



Cable Clamp Strain Relief

### Cable clamp strain relief

Catalog number	Package	Weight
Cable Clamp Strain Relief	1 piece	0.1 kg



Silohm resistances

### Silohm resistances

Catalog number	Item number	Package	Weight
COVER 8x53	Y1048430	-	10 g
INSULATING BUSHING 16X19	W1048428	10 pieces	25 g
INSULATING BUSHING 30X18	G154014	-	25 g
PAPYEX WASHER EP:0,4 48MM	Z202445A	-	5 g
RD6 R0,010/10 EPAIS.11	P1048422A	-	40 g
RD6 R0,04/10 EPAIS.11	N1048421A	-	40 g
RD6 R0,04/20 EPAIS10	X202443A	-	40 g
RD6 R0,05/20 EPAIS.11	Y202444A	-	40 g
STAINLESS STEEL WASHER 17X50	A154008	-	50 g
STAINLESS STEEL WASHER DIAM 50	X1048429	-	60 g

### Cables

Braided cables
Braided cables



Connexion cables