

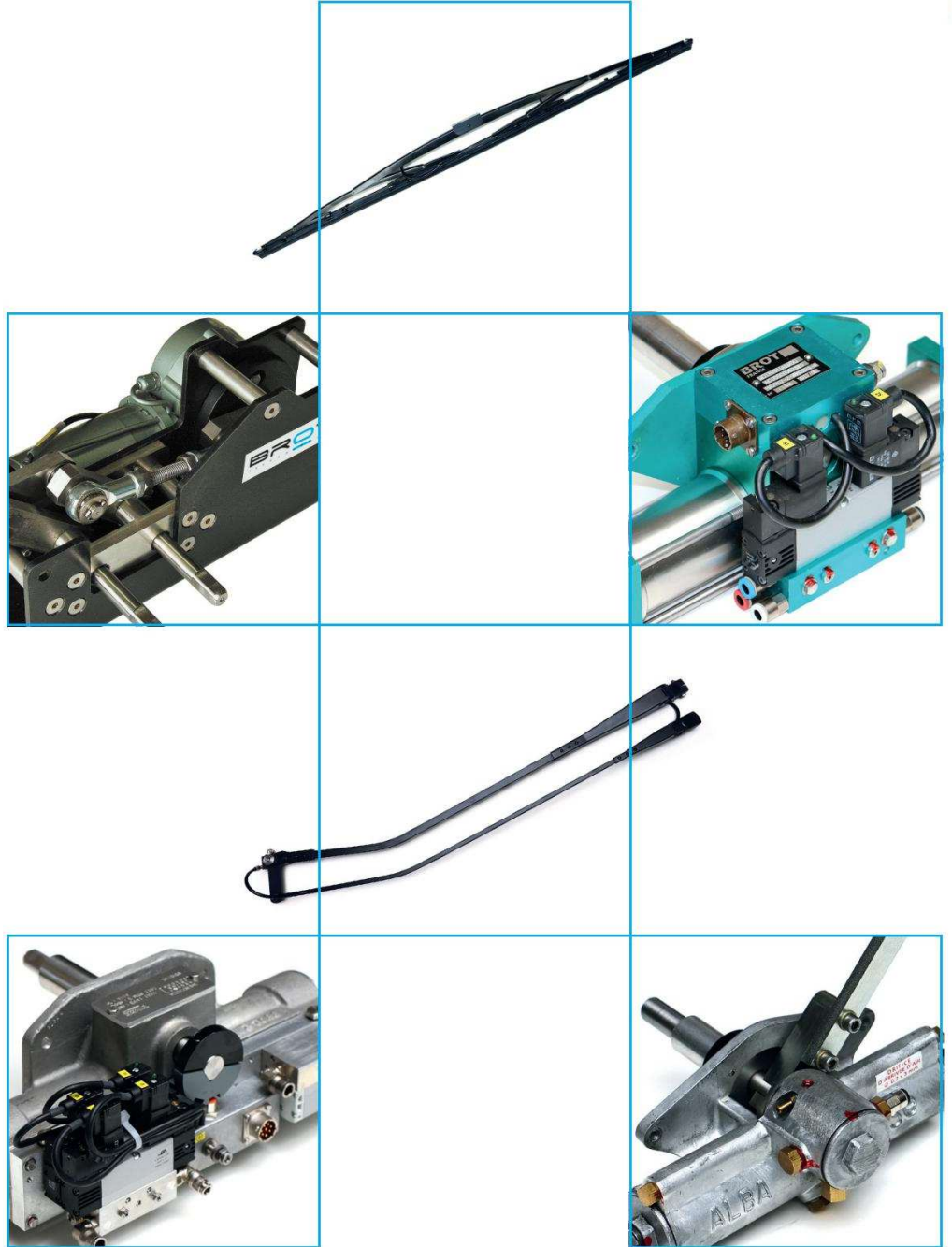
FORB

TECHNOLOGIES



indscreen  
iper systems

FOR THE RAILWAY INDUSTRY



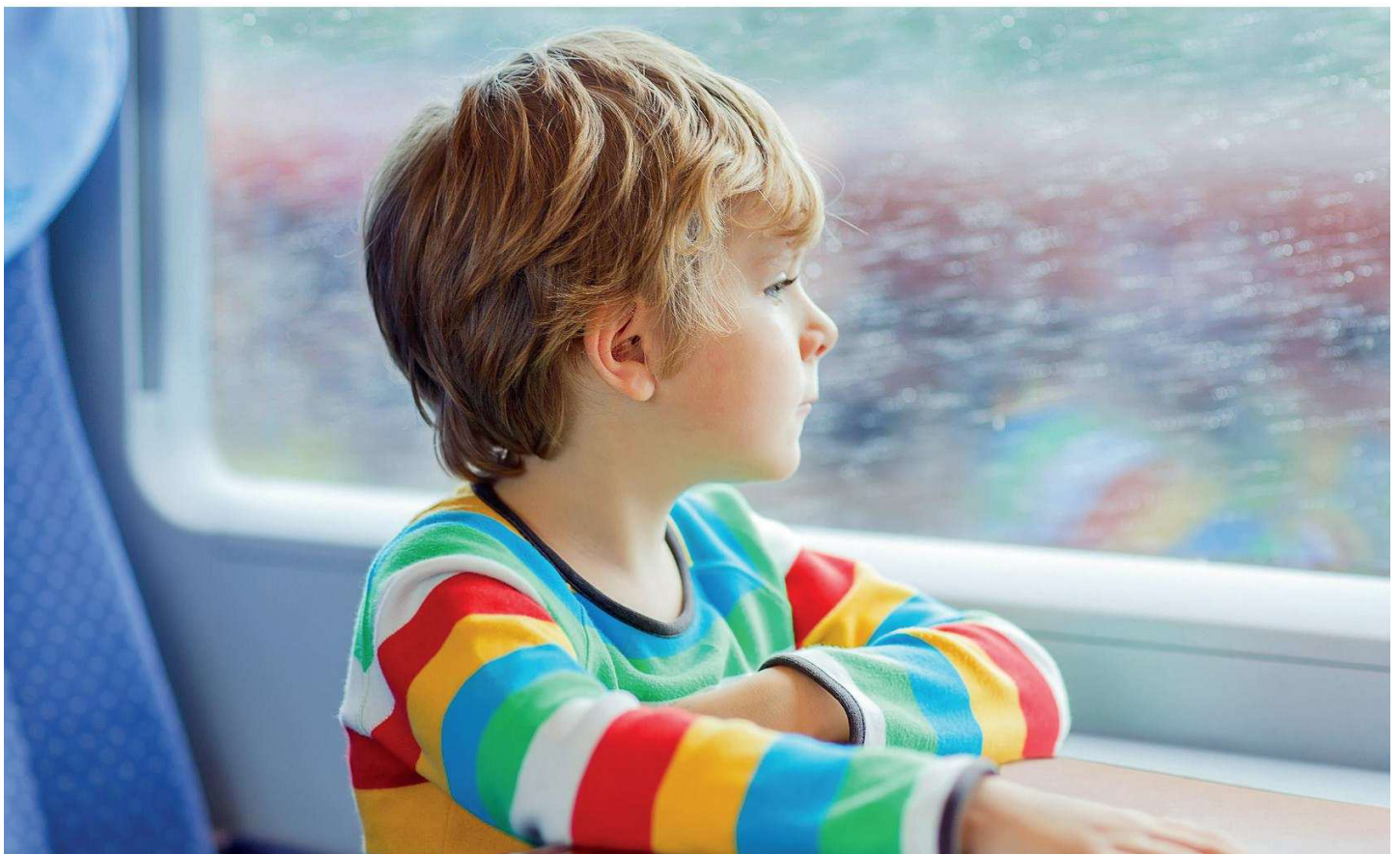
# The Windscreen Wiper, *a safety device*

**T**he windscreen wiper system, long regarded as a secondary feature having little or no impact on punctuality, is now seen as a safety device. Its malfunction reduces the drivers visibility, causing the train to be slowed, which creates delays in service. It is essential that all the components are perfectly adapted to railway conditions and to each cabin configuration. A comparison with motor car fittings can best explain the qualities required for a wiper system intended for railway use:

- ◆ A private car will travel an average of 100,000 Km in 4 to 5 years... ... a locomotive covers this distance in just 3 months, and the average daily journey currently exceeds 1,000 Km per day.
- ◆ In 100,000 Km, a car will have its wiper blades replaced 4 or 5 times, that means a life--span of between 20,000 and 25,000 Km... ... the wiper blades on a locomotive are replaced every 100,000 to 300,000 Km.
- ◆ When it rains, a car travelling at high speed will slow down, and eventually stop if the storm is very violent... whatever the weather, the locomotive will maintain its speed, from 160 to more than 300 Km/hr, while still requiring efficient cleaning of the windscreen. The windscreen wiper system must also clear away the film of insects or even birds, using the mechanism and cleaning fluids specially designed for use on locomotives.

The windscreen wiper system must also clear away the film of insects or even birds, using the mechanism and cleaning fluids specially designed for use on locomotives.

For more than 50 years, BROT Technologies has been designing and manufacturing windscreen wiper systems which meet the stringent requirements of the manufacturers and railway operators for quality and durability.



# A dedicated *supplier*

**F**or more than 60 years BROT Technologies has been designing and manufacturing pneumatic windscreen wiping and washing systems for railways: actuators, arms, blades, command modules, pumps. Pneumatic technology means that our equipment has a very long life cycle in keeping with the most demanding quality standards of manufacturers and rail network operators. BROT Technologies is also a supplier of spare parts to the maintenance departments of rail operators.

*Its wiper arms and blades can be adapted to all existing systems.* In addition to the main components, we supply the accessories for a complete wiping system of the highest quality.

For our customers, we study the best technical and economical solutions, according to their needs and constraints. Over 2000 BROT wiping systems are currently in service on high speed lines. More than 20,000 ALBA series actuators are currently in service on the French rail network.

# They trust *our equipment*

**ALSTOM**

**CAF**

**DB**

**HITACHI**

**ROTEM**

**RATP**

**SBB CFF**

**SIEMENS**

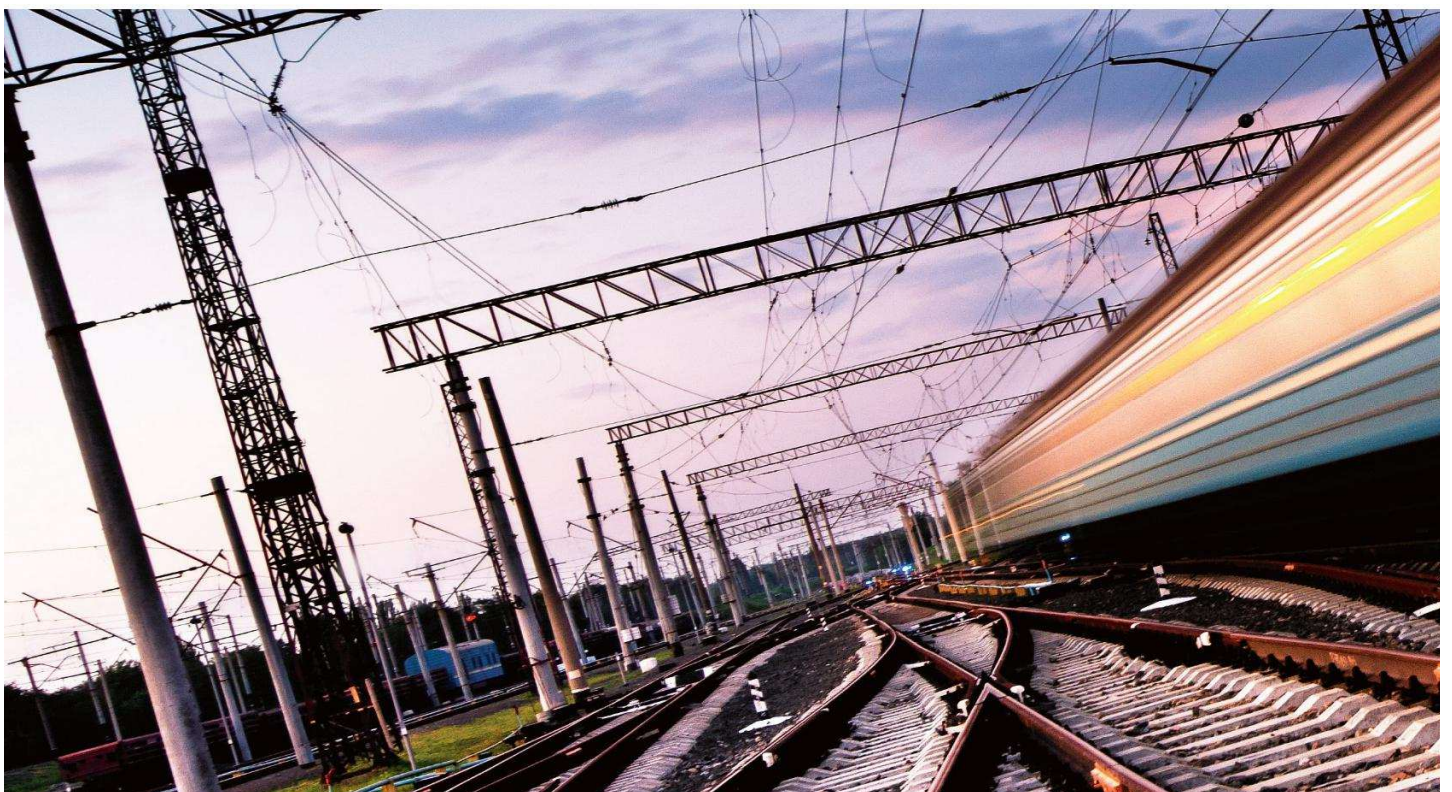
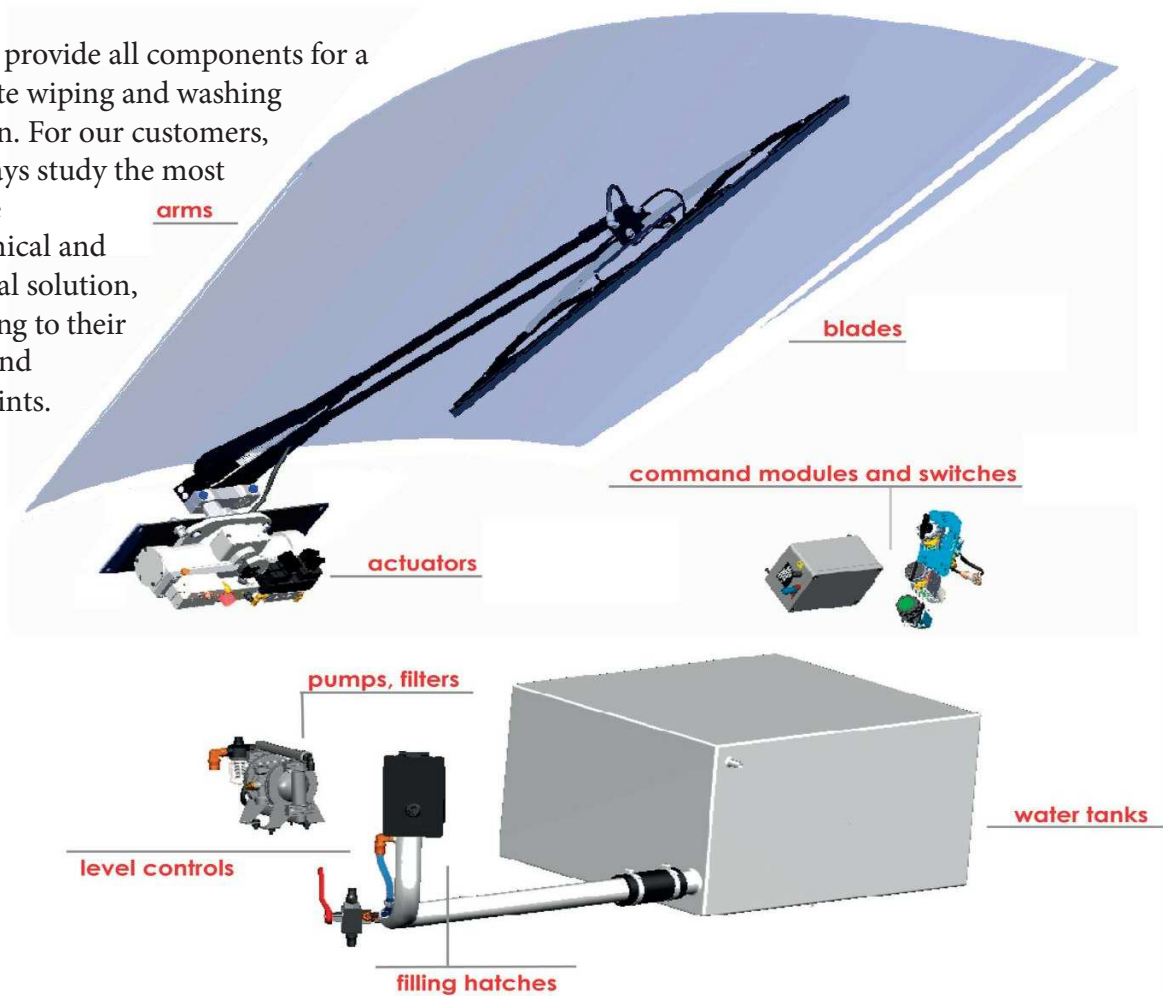
**SNCF**

**STADLER**

**URAL  
LOCOMOTIVES**

# Our *Products*

We can provide all components for a complete wiping and washing function. For our customers, we always study the most suitable economical and technical solution, according to their needs and constraints.



# Our *Trumps*

## **Less maintenance**

The first service of our electro-pneumatic actuators only has to be carried out after ten million cycles, or the equivalent of ten years of use.

## **Unbeatable LCC figures**

The results of Life Cycle Costs calculations indicate that our equipment comes out well ahead thanks to pneumatic technology and the reduced number of moving parts subject to wear and tear.

## **Reported lifetime 5 times greater**

The end users of our products have noticed that the life cycle is multiplied on average by a factor of five once they stop using automobile products and switch over to our equipment.

## **Compliant with the standards**

Our products are compliant with the strongest technical requirements and European standards on inter-operability: UIC 612, NF EN 61373, EN 50121, EN 45 545

## **Guarantee**

All our arms and all our blades come with a two year guarantee for use in normal conditions.

## **Customised solutions**

Every piece of our equipment represents a custom built technical and economic solution, specially adapted to the end user's technical and regulatory needs, as well as to the conditions in which the train is to be used.



# Electro-Pneumatic *actuator brot 3*

## Characteristics

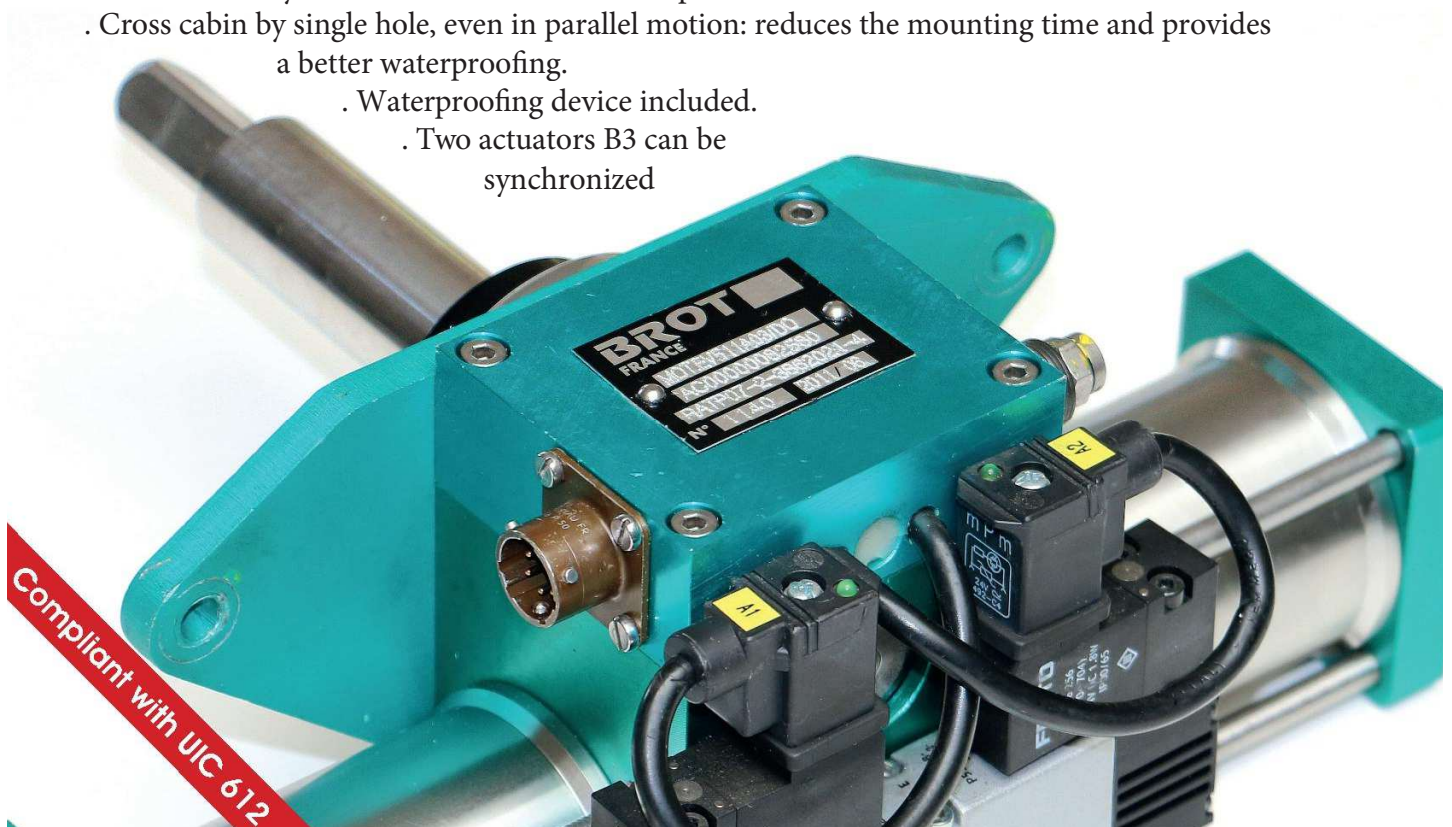
- . Torque: **60 Nm** at 8 bar
- . Sweeping angle: 35 to 90°
- . Sweeping angle precision: +/- 1°
- . Pneumatic input: 7 to 10 bar
- . Electrical input: 24 to 140 V. DC
- . Standard operating temperature: -35°C to +85°C
- . Shaft: grooved Ø 16 mm or 13 x 13 mm
- . Diameter of hole for shaft access: Ø 24 mm
- . Rod and Roller drive system
- . Stainless steel cylinder tubes.
- . Noise level: <70dB.
- . Weight: < 4 Kg

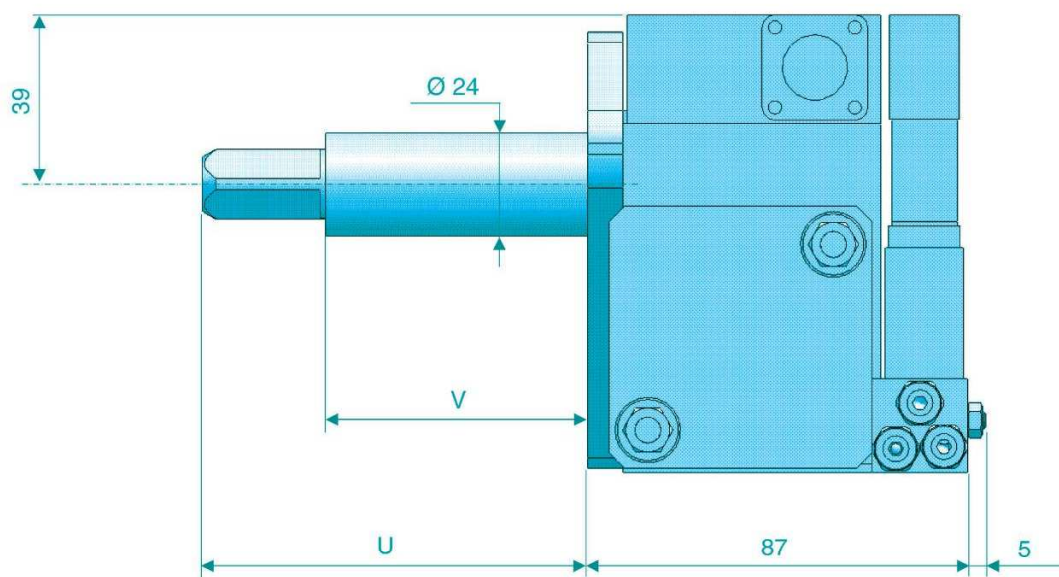
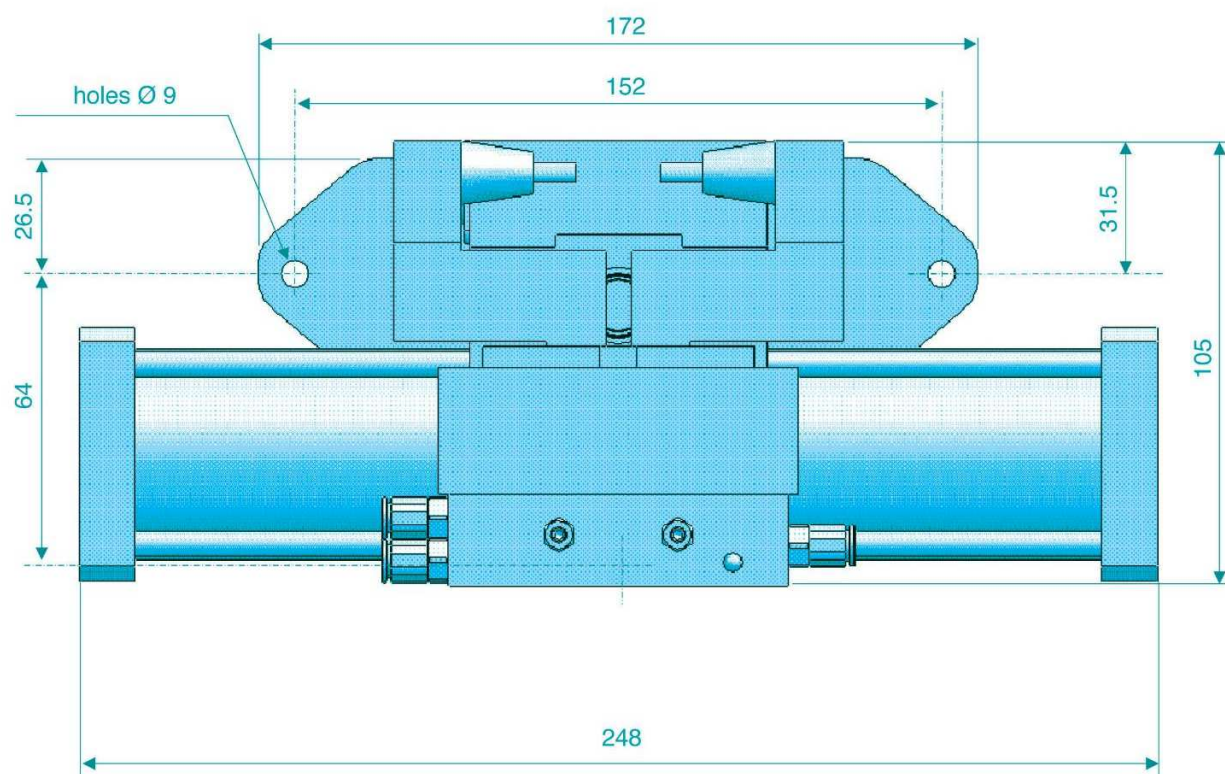
## Use

- . All types of vehicles, except large screens on high speed trains.

## Advantage

- . An exceptional power in a limited space.
- . Combines both the advantages of its electronic control module (space saving, better ergonomics, ease of use) and its pneumatic actuator (power and longevity)
- . **First maintenance at 10 million cycles** for the mechanical parts (i.e. around 3,000 hrs. or ten years of effective use), by the application of new grease and changing only rubber seals.
- . Emergency command by direct injection in the chambers of the actuator. Avoid the use of a manual command or a second wiper system
- . Rod and Roller drive systems with only 2 points of contact: reduces to a minimum the noise and wear created by the more standard «rack and pinion» drive.
- . Cross cabin by single hole, even in parallel motion: reduces the mounting time and provides a better waterproofing.
  - . Waterproofing device included.
  - . Two actuators B3 can be synchronized





Shaft: Smooth or grooved  $\varnothing 16$  mm or square 13 x 13 mm

Dimensions U & V are variable, according to needs.

# Electro-Pneumatic *actuator brot 4E*

## Characteristics

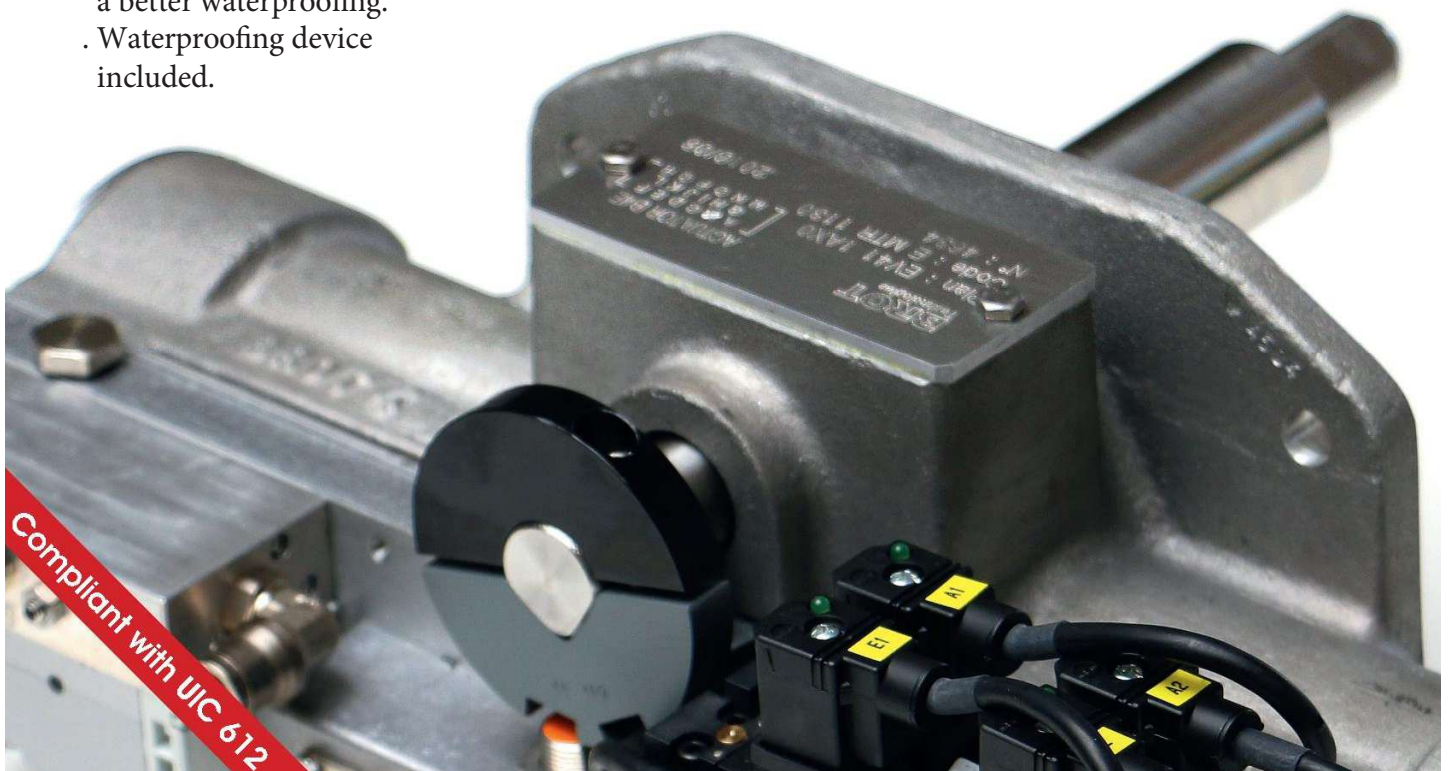
- . Torque: **100 Nm** at 8 bar optional **200 Nm** (twin)
- . Sweeping angle: 50 to 90°
- . Sweeping angle precision: +/- 1°
- . Pneumatic input: 7 to 10 bar
- . Electrical input: 24 to 140 V. DC
- . Standard operating temperature: -35°C to +85°C  
(optional: -50°C to +85°C)
- . Shaft: grooved Ø 16 mm or 16 x 16 mm
- . Diameter of hole for shaft access: Ø 30 mm
- . Rod and Roller drive system
- . Cylinder tubes are stainless steel lined
- . Noise level: <70dB.
- . Weight: 6.5 Kg

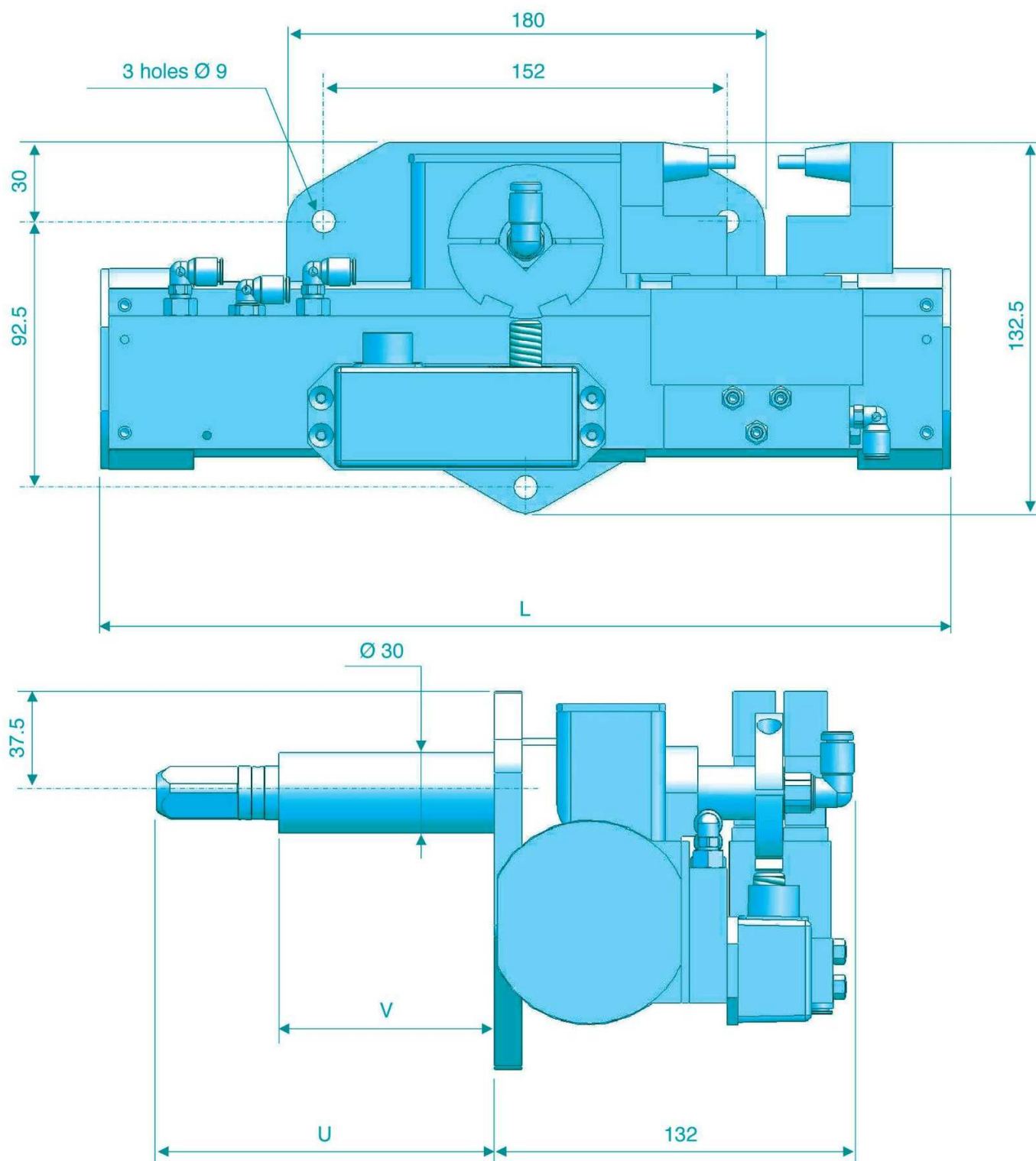
## Use

- . Heavy duty applications and high speed trains (over 200 Km/hr).

## Advantage

- . Combines both the advantages of its electronic control module (space saving, better ergonomics, ease of use) and its pneumatic actuator (power and longevity).
- . **First maintenance at 10 million cycles** for the mechanical parts (i.e. around 3,000 hrs or ten years of effective use), by the application of new grease and changing only rubber seals.
- . **First maintenance at 30 million cycles** for the electro-pneumatic parts.
- . Emergency command by direct injection in the chambers of the actuator. Avoid the use of a manual command or a second wiper system.
- . Rod and Roller drive systems with only 2 points of contact: reduces to a minimum the noise and wear created by the more standard «rack and pinion» drive.
- . Cross cabin by single hole, even in parallel motion: reduces the mounting time and provides a better waterproofing.
- . Waterproofing device included.





Shaft: Grooved  $\varnothing 16$  mm or  $16 \times 16$  mm  
 L = 282 mm for a sweeping angle less than  $70^\circ$   
 L = 320 mm for a sweeping angle of  $70^\circ$  and over

Dimensions U & V are variable, according to needs.

# Pneumatic Actuator

## *Alba 3 / Alba 2*

### Characteristics

- . Torque: **35 Nm** at 8 bars
- . Sweeping angle: 30 to 90°
- . Sweeping angle precision: +3° /- 2°
- . Pneumatic input: 6 to 10 bars
- . Standard operating temperature: -25°C to +70°C
- . For arms and blades up to 700 mm long.
- . Shaft: grooved or smooth Ø 16 mm
- . Diameter of hole for shaft access: Ø 24 mm
- . Rod and Roller drive system
- . Continuous variable speed (40 to 60 cycles / min.) by control of the pneumatic inlet.
- . Weight: 1.9 Kg

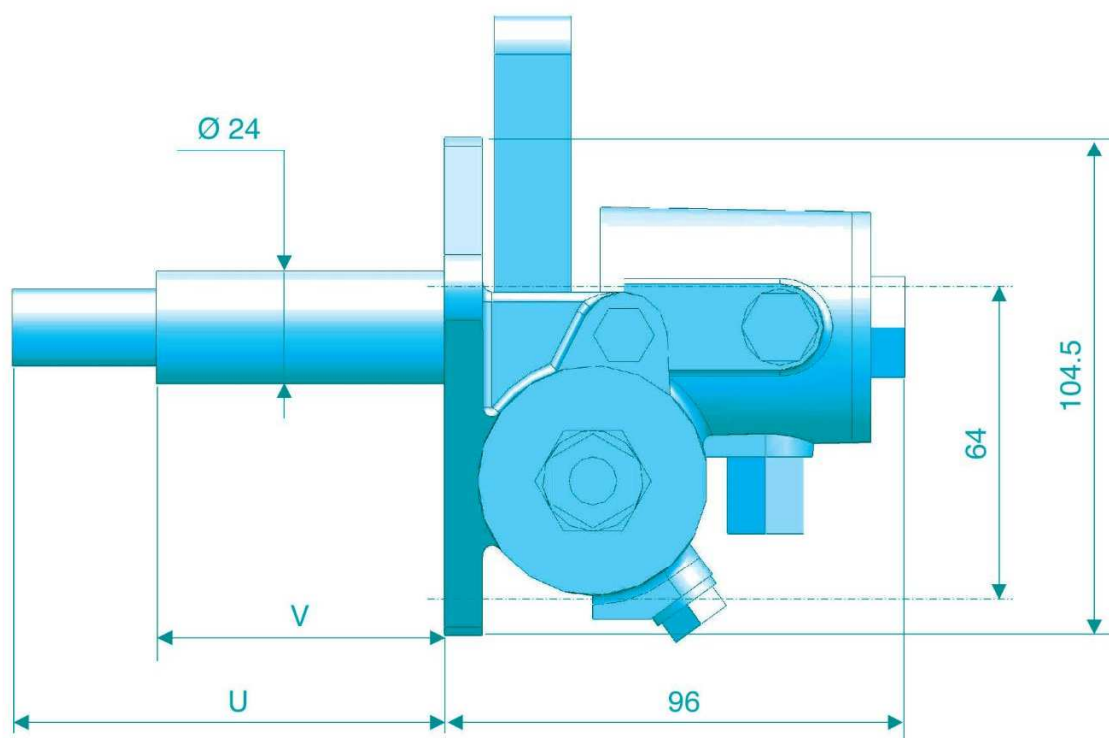
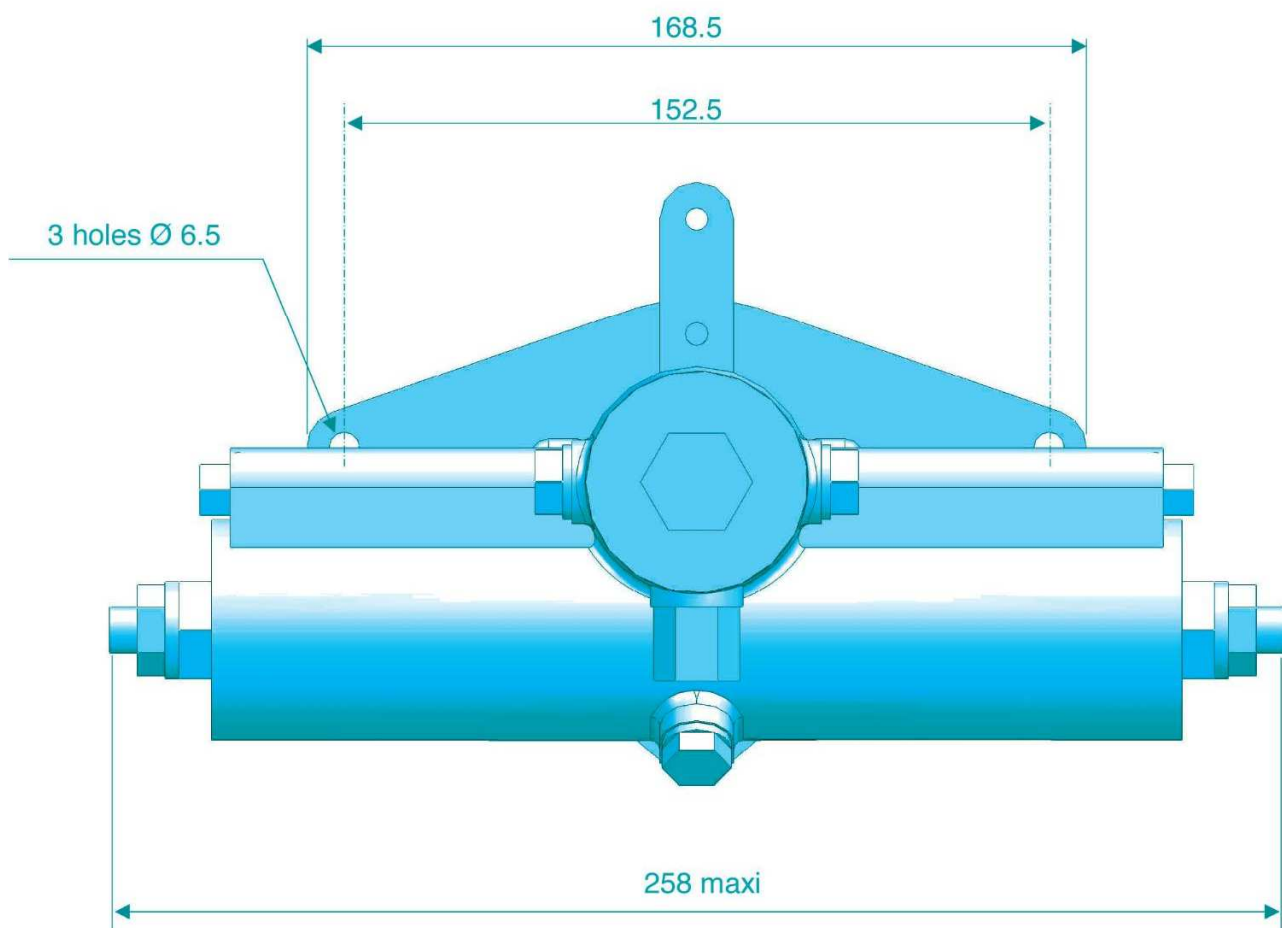
### Use

- . All types of vehicles, except large screens on high-speed trains.

### Advantage

- . 100% pneumatic actuator.
- . Simple and strong design
- . Rod and Roller drive systems with only 2 points of contact: reduces to a minimum the noise and wear created by the more standard «rack and pinion» drive.
- . Waterproofing device included.
- . More than 20,000 ALBA series actuators are currently in use on the French rail network.





Shaft: Grooved or smooth Ø 16 mm

Dimensions U & V are variable, according to needs.

# Electrical *Actuator*

## Characteristics

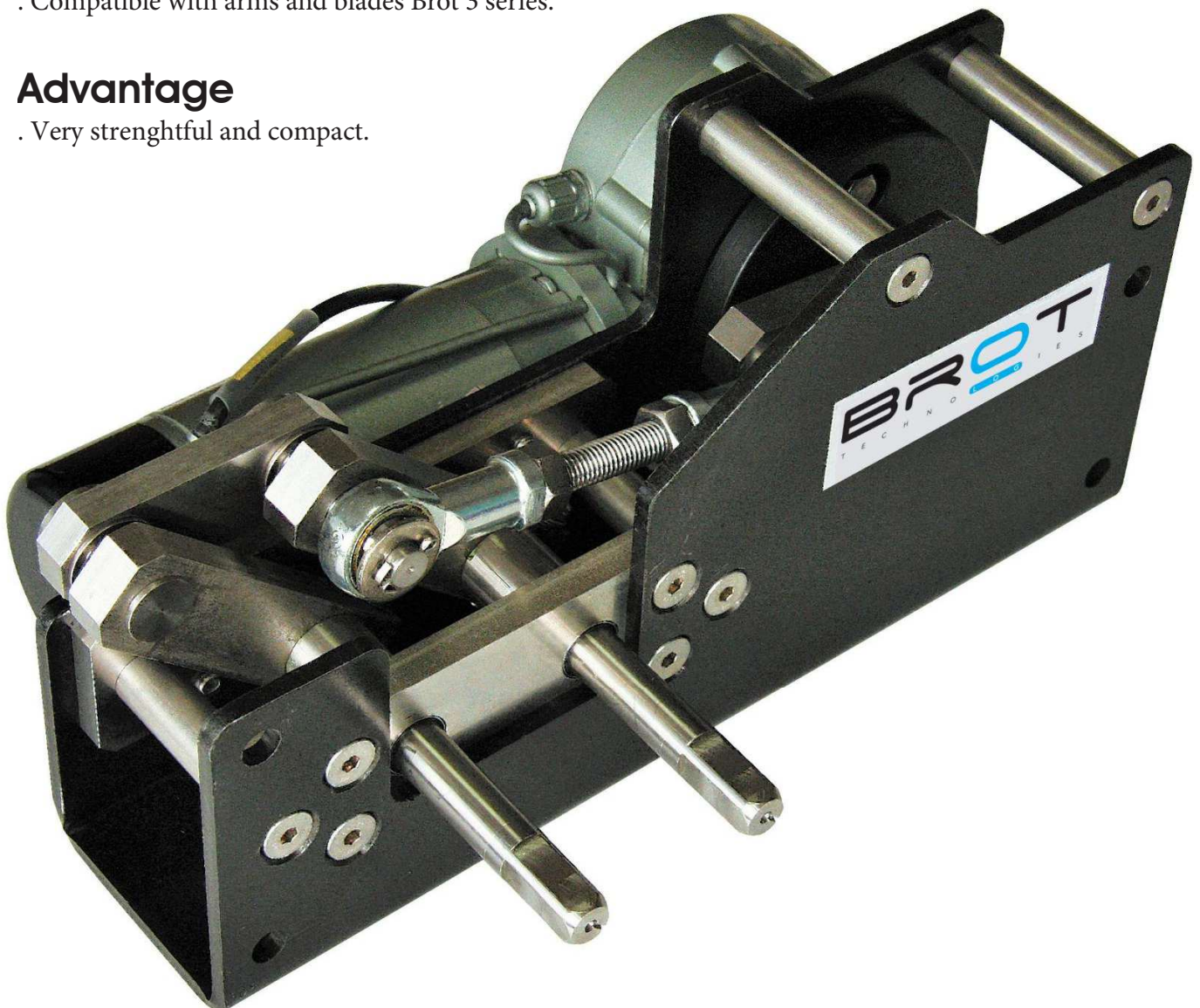
- . Torque 80 to 120 Nm power supply 24V dc
- . Maximum sweeping angle: 100°.
- . Arm fitting square 13mm.
- . Temperature range : -40°C à +70°C IP 54.
- . Torque transmission by two shafts
- . Linkage stainless steel

## Use

- . Specially adapted for urban rail.
- . Compatible with arms and blades Brot 3 series.

## Advantage

- . Very strengthful and compact.



# Pantograph Arm

## *for large windscreen*

### Characteristics

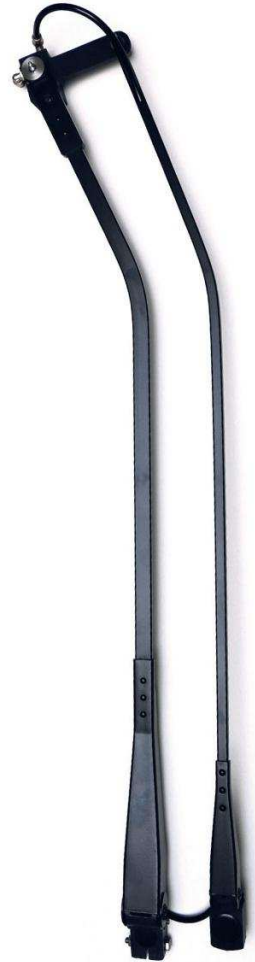
- . Tubular section.
- . Straight or curved.
- . Pantograph system with single cross cabin hole.
- . Length range: 400 to 1,500 mm.
- . Stainless steel.
- . Black coating against reflecting.
- . Maximum wiping angle: 100°.
- . Fixed on the shaft of the motor by fluted (Ø16mm) or squares (13 x 13mm) and (16 x 16mm) drive.
- . Standard operating temperature: -40°C to +70°C.
- . Option : incorporated water jet with nozzles or ramp on blade.

### Use

- . For flat or curved large screens.
- . Compatible with very high speed.
- . Accepts blades of any length.. Accepts blades of any length.

### Advantage

- . The tubular section allows the passage of washing liquid inside the arm.
- . The single cross cabin hole reduces the potential waterproofing problems and saves time for installation.



# Pendulum *Arm*

## Characteristics

- . Rectangular section.
- . Straight or curved.
- . Length range: 400 to 700 mm.
- . Stainless steel.
- . Black coating against reflecting.
- . Maximum wiping angle: 90°.
- . Fixed on the shaft of the motor by fluted or smooth (Ø16mm) drive.
- . Standard operating temperature: -40°C to +70°C.
- . Option : incorporated water jet with nozzles

## Use

- . For flat or curved small screens.
- . Medium and low speed trains (service vehicles, suburb trains).
- . Accepts articulated or rigid blades of length up to 700 mm.

## Advantage

- . Simple and strong design, for the most simple use.



# Articulated *Blade*

## Characteristics

- . Length range: 400 to 1,300 mm.
- . Stainless steel frame.
- . High resistance EPDM or high resistance silicon rubber
- . Black coating against reflecting.
- . Standard operating temperature: -40°C to +70°C.
- . Usual linear pressure: 25 gr / cm.
- . Option: incorporated watering system.

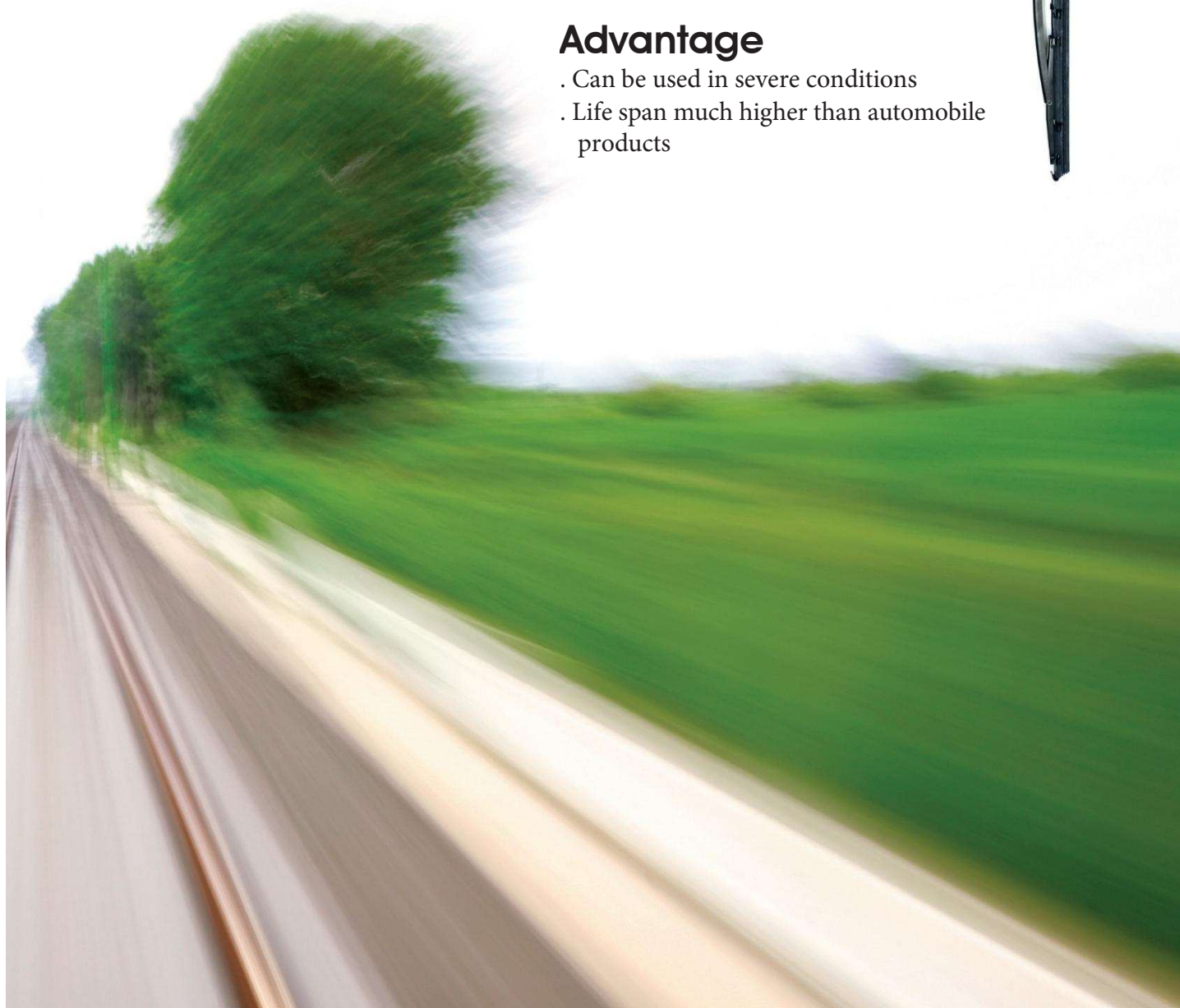
## Use

- . For flat or curved large screens.
- . Medium and high-speed trains (over 200 km/hr).
- . Heavy duty applications

**All  
our blades  
have a  
2-year warranty**

## Advantage

- . Can be used in severe conditions
- . Life span much higher than automobile products



# Rigid *Blade*

## Characteristics

Length range: 250 to 500 mm.

- . Stainless steel frame.
- . High resistance EPDM high resistance rubber
- . Black coating against reflecting.
- . Standard operating temperature: -40°C to +70°C.
- . Usual linear pressure: 55 gr / cm.

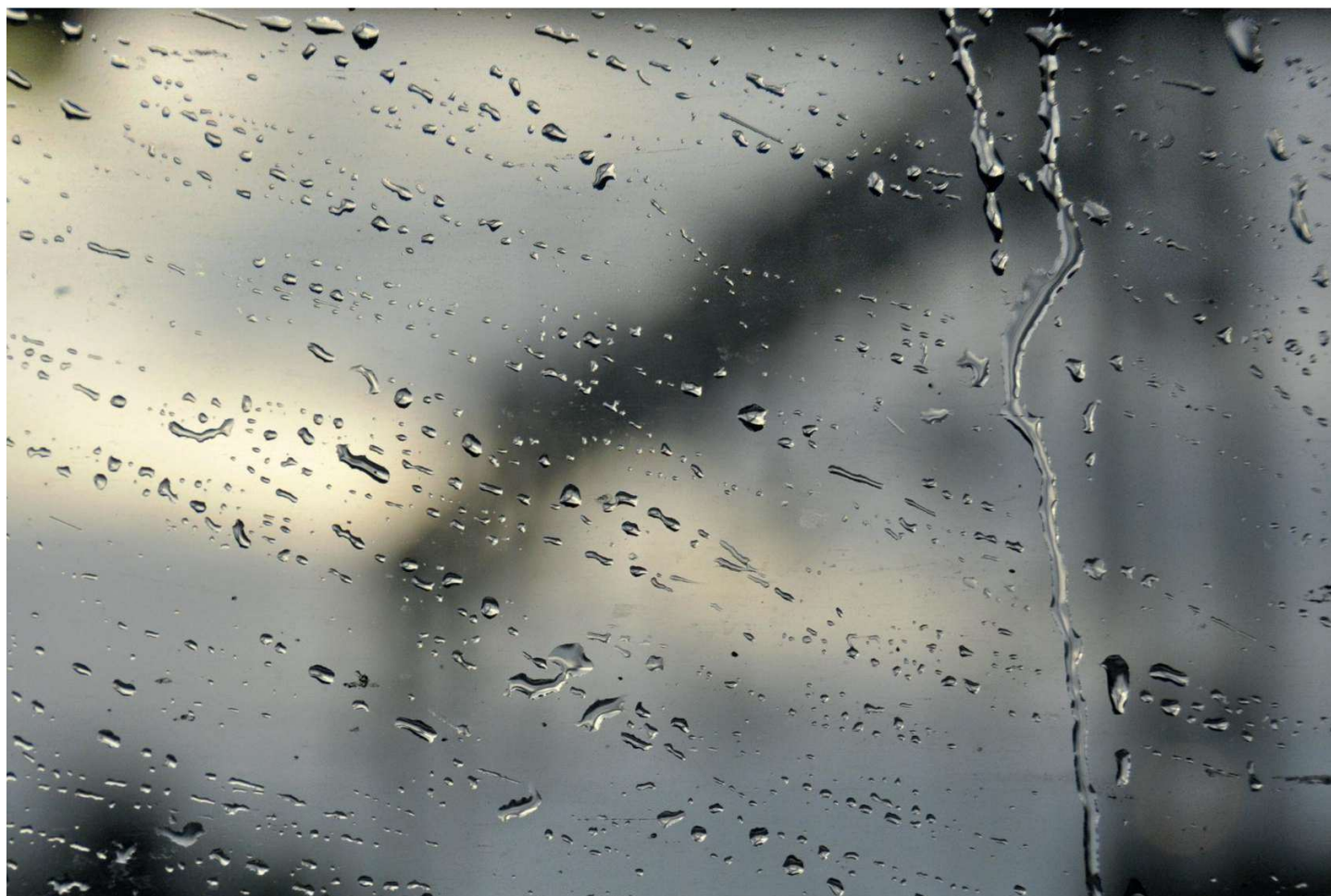
## Use

- . For flat small screens.
- . Low speed trains and service vehicles.

## Advantage

- . Can be used in severe conditions
- . Life span much higher than automobile products

All our blades have a **2-year warranty**



# Command Modules

## Characteristics

- . 5 speeds at customer's choice, from 1 to 60 cycles/min.
- . Positions: On, Off. Optional: Parking position on center of windscreen.
- . Washing push-button: Pushing the button triggers an automatic sequence of three cycles. At the end of the sequence, the system returns automatically to the previous speed.
- . Parking position at customer's choice.
- . Standard operating temperatures : -30°C to +70°C.
- . The safety function is automatic and 100% pneumatic. In case of electric failure, direct injection of air in the chambers of the actuator by setting the selector on Safety position.

## Use

- . For our electro-pneumatic actuators BROT 4E , BROT 3 and two BROT 3 synchronised

## Advantage

- . Can be installed on plate or on cabin desk.
- . The commands for wiping and for washing can be separate or grouped on a single plate.
- . Pictograms can be adapted to each project.
- . The color of the plate can be adapted to each project.
- . The command module can be installed at distance of switches.
- . Compliant with UIC 612
- . Compliant with EN 50121
- . Compliant with NF EN 61373



Compliant with UIC 612

# pneumatic pumps for *washing liquids*

## Characteristics

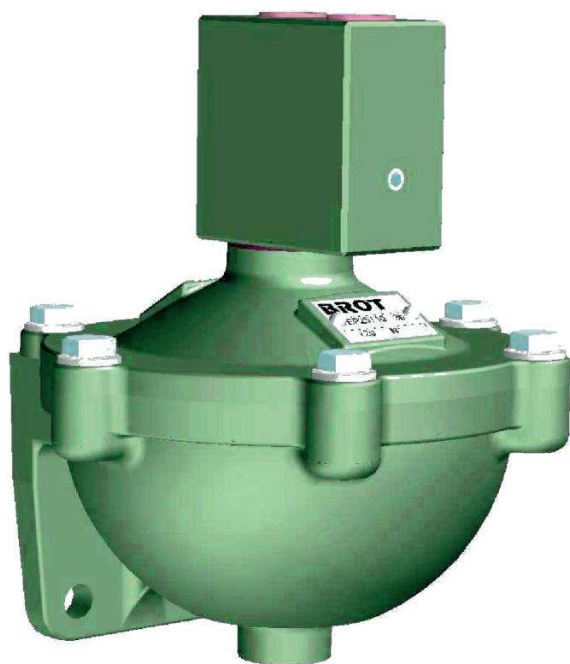
- . Capacity: 250 cm<sup>3</sup>
- . Maximum inlet pressure: 5 bars
- . Integrated non-return valves
- . Separation membrane air / liquid
- . Delivered with instant fittings Ø 6 for ejection and pressure, and Ø 8 for inlet of washing liquid.
- . Dimensions: 170 x 130 x 130 mm
- . Weight: 1 Kg

## use

- . Low and medium speed trains.
- . Suburb trains and service vehicles.

## advantages

- . Simple and strong design
- . Low cost
- . The separation membrane air / liquid avoids any risk of emulsion of the liquid.



## Characteristics

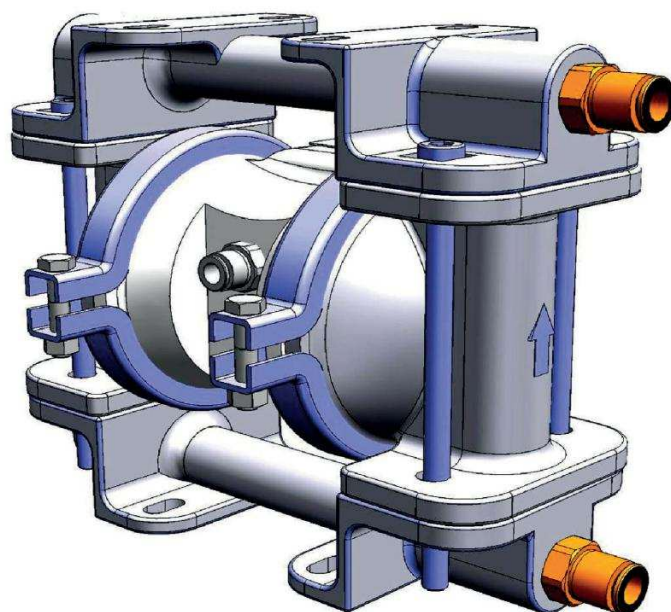
- . Flow rate max.: 18.9 liters / min.
- . Maximum inlet pressure: 10 bars
- . Maximum size of particles: 0.4 mm
- . Maximum suction lift (with liquid): 9.5 m
- . Maximum suction lift (dry): 4.3 m
- . Standard operating temperatures: -40°C +100°C
- . Air inlet: 3 mm
- . Water inlet: 6 mm
- . Water outlet: 6 mm
- . Body material: aluminum or stainless steel
- . Membranes material: elastomer thermoplastic Wil-Flex
- . Dimensions: 148 x 165 x 114 mm
- . Weight: 1.8 Kg

## use

- . Medium and high-speed trains.
- . Long blades

## advantages

- . Continuous ejection
- . Perfectly adapted to important volumes of water.
- . Can be placed at any height.



# The mud *Test*

To meet required standards, our equipment has to undergo a mud test.

The windscreen, covered in mud, must be thoroughly cleaned in no more than **10 cycles**.

The test is carried out in live **at 250 Km/hr**.

## *Efficiency in action...*

The TGV cabin is prepared in the workshop.  
More than 20 layers of mud  
are applied on the screen.

### **Start of the TGV.**

The mud significantly reduces the visibility,  
and therefore the normal safe condition of service.

**As soon as 250 Km/hr** is reached, the test begins.

Cycle 1, left. The combined action of the wiper and the  
washing system has already removed some of the mud.

### **Cycle 2, right.**

A large part of the swept area initially covered,  
is now clear.

### **Cycle 4, left.**

The full swept area that was initially covered, was  
clear at the end of cycle 3.

### **Cycle 10, right.**

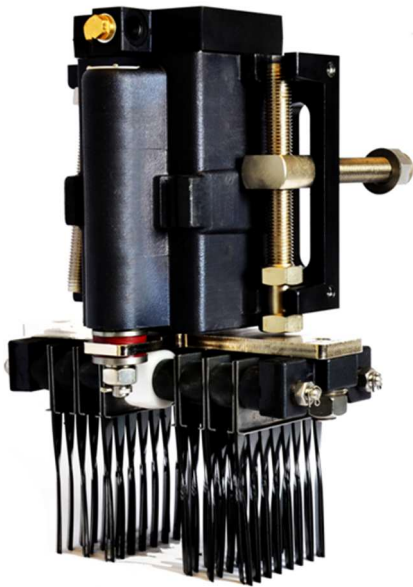
The windscreen is entirely clear of mud, well before  
the end of the 10 cycles.

End of the test. Wiper in parking position.

**Test successfully completed**



# Pneumatic Brush for *rails and wheels*



## Characteristics

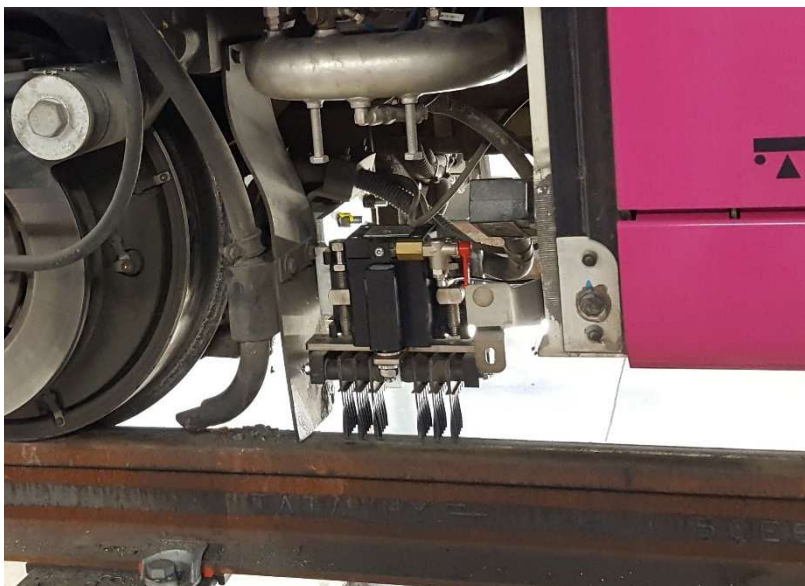
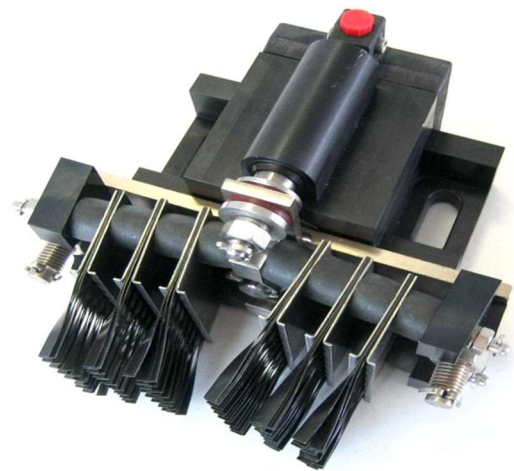
Air pressure 2 bars  
Single acting cylinder  
Tines in hard steel

## Use

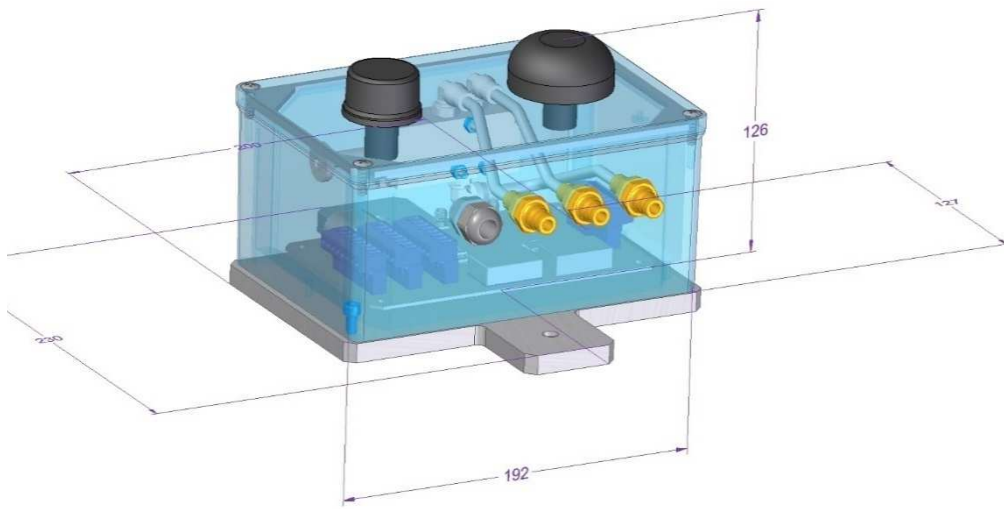
Tramways  
EMU and locomotives  
Maintenance train

## Advantage

Very effective during leaves fall  
Reduces sand consumption  
Prevents calamine formation  
Preserve rail/wheel shunting



# GPS control box for *pneumatic brush*

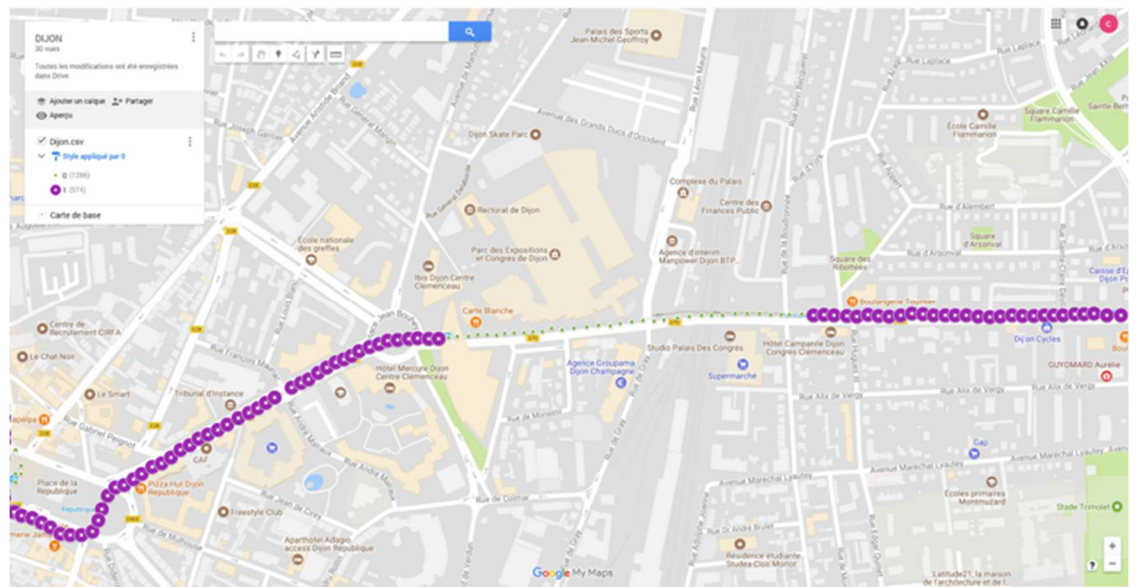


## Characteristics

Power supply 24 Vdc or 36/140 V  
Maps learning by Wi-Fi  
No additional software needed

## Advantage

Allows precise control of brushing area

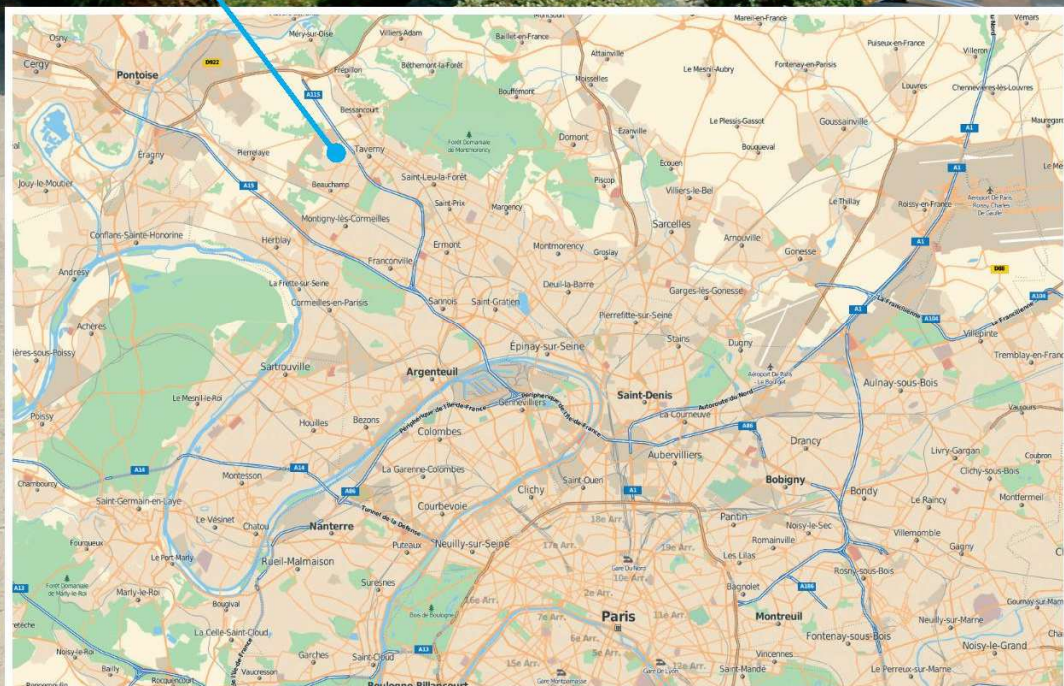


# French head office & production site



**BROT**  
TECHNOLOGIES

Close to Paris and at 30 min from  
Roissy Charles de Gaulle (CDG) airport





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