



Railway Equipment

Machines for Railway Lines

2013

Catalogue



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Short Introduction

ACIM - Advanced Catenary Installation Method - is the working system for stringing the conductors (ropes - wires) of an overhead contact line for electrification of railway infrastructure.

This method allows to carry out simultaneously and in the shorter time possible all the working phases. It is used both for the electrification of "new railway lines" and for the "renewal of the catenary". The Advanced Catenary Installation Method has been used with success for over 25 years in Europe. During this period the equipment have been designed and manufactured to develop and improve this method, each of them dedicated to a specific working phase. ACIM represents the best available working system for stringing the catenary at the final operating tension force.



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The complete system

A - Multipurpose & Traction Unit: it has the function to tow the Constant Tension Stringing Unit. Tesmec Traction Unit can operate at constant speed controlled by a PLC system. This provides the best working condition to the Constant Tension Stringing Unit and to the operators.

B - Flat vehicle: for goods transport

C - Self drive Vehicle with platform (and crane) for cable droppers installation: it has the function to apply the droppers between the conductor and the contact wire. Tesmec unit can perform these operations easily due a flexible working platform.

D - Constant Tension Stringing Unit (also bidirectional type): it has the function to string with constant tension simultaneously all the cables of the lines at the same time. The conductors should be strung according to the mechanical tensions indicated by the manufacturers and with the maximum accuracy.

The stringing system shall guarantee the same individual stringing force applied to the conductors from the beginning to the end of the operations without stressing the conductors. Tesmec Constant Tension Stringing Unit assures the highest tension accuracy even in case of variation of towing direction, speed, air temperature and slope; world-class in case of computerised automatic models.

E - Self drive Vehicle with MAST and platform (advanced machine for cable positioning): it is a specifically designed self propelled truck, that working in combination with the Stringing Unit, allows the stringing of the catenary on the cantilevers placed on the poles. It has the function to easy positioning of the cable to the posts. Tesmec unit can perform these operations easily due a flexible working platform and high performing MAST system.

F - Multipurpose & Traction Vehicle equipped with developable working platform, hydraulic derricks and line pantograph to perform electrical and dynamic final tests.

Phases of catenary installation

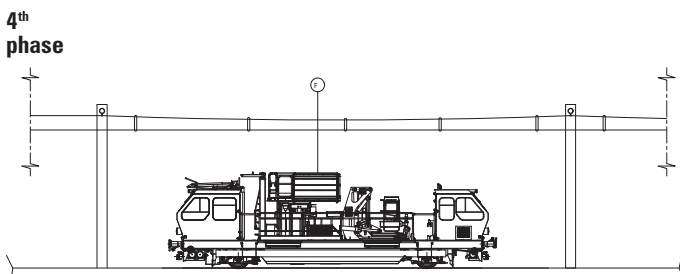
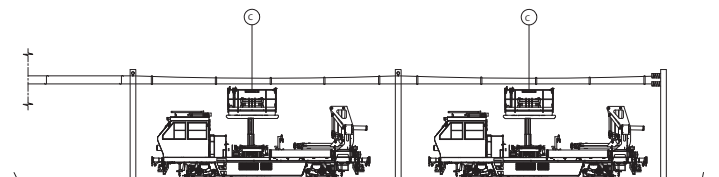
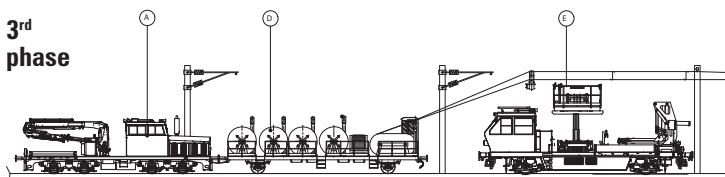
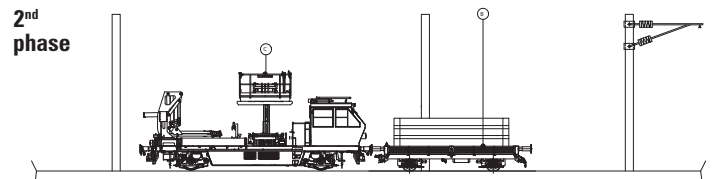
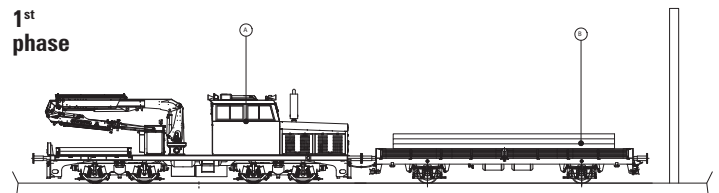
“Catenary installation” consists in a series of operations carried out in sequence, to install the contact line ready to operate. We take into consideration only the technical operations, leaving out the civil works (excavations and foundations); from the poles installation to the catenary final test. The operations can be grouped into 4 different phases which are listed below:

1st phase - poles installation on basements previously built

2nd phase - cantilevers installation on poles

3rd phase - cable(s) stringing (messenger wires - contact wires)

4th phase - catenary final test



The aims of the “ACIM System” (constant tension without stops) is the construction of the Electrified Catenary for Railway Lines without stressing the conductors (stops and restarts) and with relevant advantages in terms of accuracy, performance and timing saving.



Description

The MCRB400 has been designed for the maintenance of railway, tramway and underground railway lines. The unit can be used for rescue service in line for passenger vehicles, by means of an automatic coupler on both headstocks. The unit is equipped with a special crane for maintenance or inspection working under bridge, thanks to the articulated arm. The unit is constituted by the following components: main frame, cabin, bogies, loading bed, crane (with hook and working basket), pneumatic braking system, diesel propulsion group. The MCRB400 can be equipped with a range of optional accessories to complete the equipment and make it suitable to the needs of working teams.

Frame

The main frame is a welded assembly, composed by standard profiles and shaped sheetmetals to house all functional components. Supports on the headstock can accommodate the hook or UIC buffers, in addition to the hammer tow hook for rigid rod and a coupling (type Ringfeder). Moreover the unit can be equipped with an optional automatic coupler (type Voith-Shaku). The frame has been designed to withstand maximum operation and imposed loads without permanent deformity, fracture, cracking or fatigue in any part of frame. The main frame has been predisposed with suitable lifting points under each headstock in case of derailment.

Bogie

The bogie frame is a welded assembly, composed by standard profiles and shaped sheetmetals and designed according to the railway norms. A spherical fifth wheel allows the connection between main frame and bogie, ensuring large angles of yaw and pitch.

Power Pack

The following components of propulsion assembly are positioned within the engine case: diesel engine and engine radiator, hydraulic pumps for vehicle traction and for auxiliary components, pneumatic components for braking equipment. The radiator for oil cooling, fuel and oil tanks are located under the main frame.

Cabin and engine case

The MCRB400 has a driving cabin with driver and co-driver desks oriented so that it is possible to travel in both travel directions, warranting the visibility according to the railway standards. Moreover in the cabin there are two benches and a foldable seat to accommodate up to five operators (in addition to driver and co-pilot). The cabin is equipped with an access door with gallery to avoid the direct access on railway tracks. The material choices of cabin interior have been focused so that to ensure the most high level of safety and occupational health of workers.

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Technical features

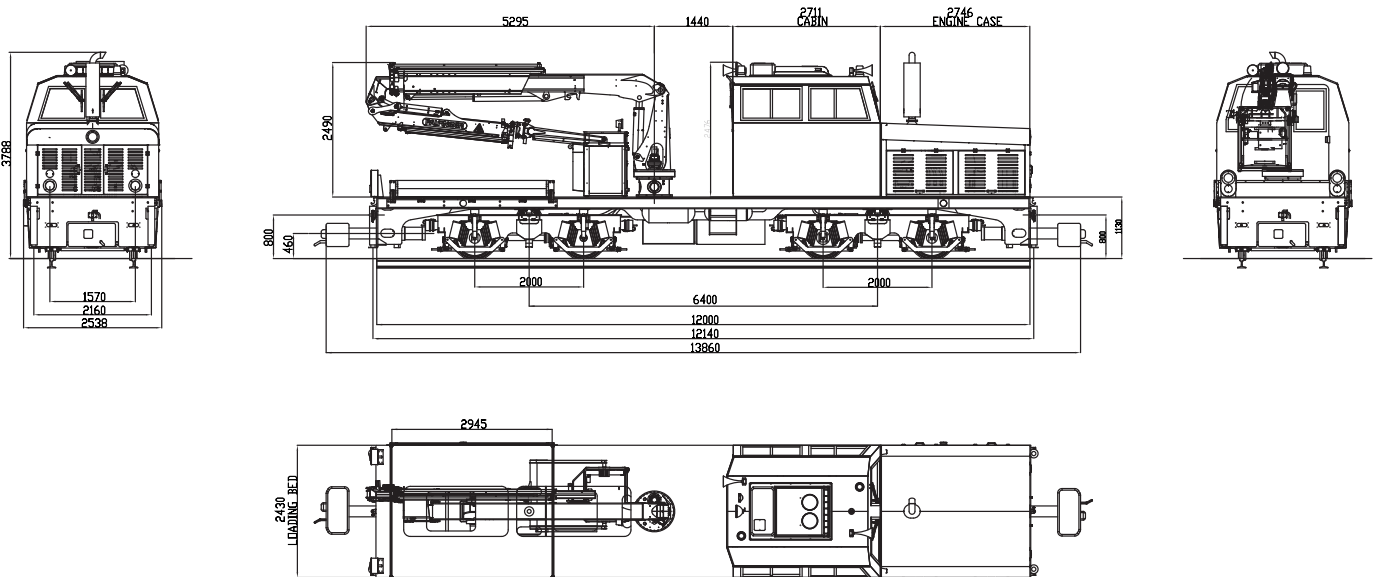
Track gauge	1435 mm	Diesel engine	330 kW @ 2100 rpm
Frame length	12000 mm	Max speed on flat and straight track	50 km/h
Max length including automatic coupler	13860 mm	Max speed in train formation	80 km/h
Main frame height from rail level	1130 mm	Max working speed	16 km/h
Max height above rail level	3788 mm	Distance between bogie pivots	6400 mm
Max width	2540 mm	Motor axles	4
Wheel base	2000 mm	Fuel tank capacity	400 l
Wheel diameter	760 mm	Max traction force at coupler	184 kN
Flange width	135 ± 1 mm	Electric system	24 Vcc
Full load weight	35 t	Minimum curve radius on track	50 m
Max load on axle	16 t	Primary suspension with independent swinging arm	
Speed selector	n. 1 gearbox (2 speeds) per motor axle	Transmission: hydrostatic closed circuit, automatic torque variation, continuous and without traction interruption	

Braking System

The unit is equipped with a compressed air braking system (UIC type); a continuous automatic brake, direct brake, parking brake, emergency brake are located on the driver desk. The system grants the braking of vehicle when full loaded. Pneumatic hoses on both headstocks allow to link trailers. A standard "shoe brake" with four brake shoes for each wheel is mounted.

Hydraulic crane

Opposite to the cabin, the crane is equipped with an hook (max lifting moment: 13.9 ton*m, extended up to 16 m from centerline) and a basket to accommodate n°2 workers and tools (max load on the basket: 280 kg, extended up to 10.2 m from vehicle centerline). This crane model is suitable to operate for maintenance or inspection working under bridge, thanks to the articulated arm.





Description

The unit has been designed for the maintenance of railway, tramway and underground railway lines. It is made up of a main frame with a cabin, a loading bed and a crane; moreover the vehicle has two motor axles, a pneumatic braking system and a diesel propulsion group. This unit can be equipped with a crane that has several optional tools and accessories to complete the equipment and make it suitable to the needs of working teams.

Frame

It is made up of a steel structure with supports on the head to receive hooks and buffers UIC model, in addition to the hammer tow hook for rigid rod and a coupling (type Rockinger).

Axles

The unit is a railway model with amply dimensioned motor axles, keyed one-block wheels with hot interference, bushing with dimensioned roller bearings to guarantee the safety.

Power Pack

The power pack is made up of diesel engine with a gearbox to couple several traction pumps for hydrostatic transmission and auxiliary pumps for the tools.

Cabin

At one end of the unit there is the pilot cabin with a driver and a co-driver desks for both travel directions. The cabin is equipped with an access door with gallery to avoid the direct access on railway tracks. The cabin is equipped with big open able side windows, two on each side and with two front windscreens for each travel directions. At the angels on the cabin top there are four working lights, for lighting all around the vehicle.

The cabin has also an HVAC system (air cooling and heating system) for the comfort of the vehicle.

Technical features

Track gauge	1435 mm	Diesel engine	261 kW @ 2000 rpm or 400 kW @ 2100 rpm
Frame length	12990 mm	Max speed on flat and straight track	80 km/h or 100 km/h
Overall length (buffers included)	14230 mm	Max speed in train formation	120 km/h
Main frame height from rail level	1200 mm	Max working speed	16 km/h
Max height above rail level	3920 mm	Wheelbase	8200 mm
Max width	3192 mm	Fuel tank capacity	400 l
Wheel diameter	950 mm	Buffers and hook	UIC
Running gear type	2 motor axles	Engine displacement	10.8 l @ 261 kW 15.9 l @ 400 kW
Full load weight	35 t	Minimum curve radius on track	130 m
Max load on axle	18 t	Electric system	24 Vcc
Speed selector	n. 1 gearbox (2 speeds) per motor axle	Suspension helicoidal springs and hydraulic damper	
Cabin (length x width x height)	3704x2800x2408 mm	Transmission: hydrostatic closed circuit	

Braking System

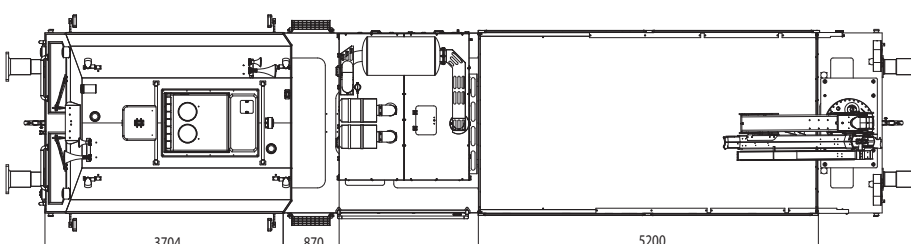
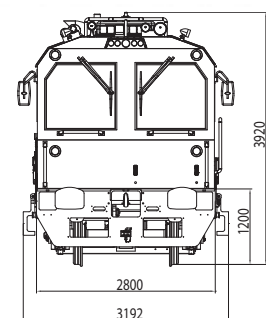
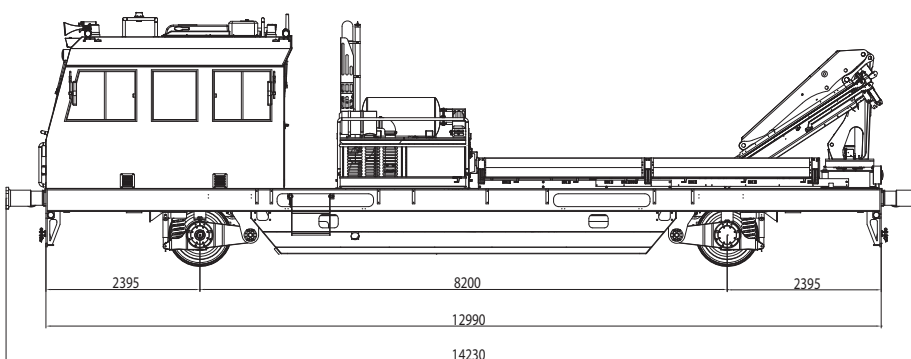
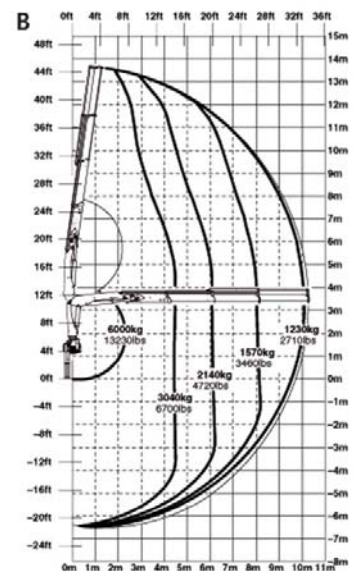
The braking system is made to guarantee the machine braking with complete load. The unit is equipped with flexible couplings on both headstocks to link trailers, pipes with isolated cock. The driver desk is equipped with all the braking commands, gauges and direct/automatic brakes.

Control system

The unit is manually controlled from the control panel in cabin, equipped with adjustable seat. The control panel has ergonomic controls to facilitate the job of the driver. In the central position, close to the driver, there is a working desk with push buttons and selectors for the crane activation.

Hydraulic Crane

Opposite to the pilot cabin, the hydraulic crane has the following performances: see the graphic beside.





Description

The Constant Tension Stringing Unit is special purpose equipment specifically designed and manufactured for stringing cables in construction and maintenance of railways lines electrification or refurbishment. Particularly indicated for High Speed Lines, the equipment is suitable for laying:

- Single contact and single suspension wires independently and at the same time
- With section area of 50mm²~240mm²
- In one travelling direction only
- The stringing tension can be automatically adjusted and is not related with wagon's travelling speed
- The system grants that the cables are not twisted during stringing



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Technical features

Max number of stringing cables	2
Max force per cable	30 kN + 30 kN
Max stringing speed	6 km/h
Max pulling back speed	1.5 km/h
Capstan diameter	1500 mm
Max reel diameter	1800 mm
Max reel weight	3500 kg
Crane capacity	17.4 t x m - 8 m range
Diesel Engine	82 kW (110 hp)
Control board	Electronic

Main equipment on board

- N. 1 Cabin
- N. 1 Computerized Control System
- N. 1 Power Unit
- N. 1 Puller-Tensioner suitable for independent stringing of two cables
- N. 2 Reel stands (Automatic Lateral movement function)
- N. 1 Guiding Pedestal and set of Guiding Rollers
- N. 1 Foldable articulated crane for reels lifting
- N. 2 Steel Counter Frame Base Assembly

Cabin

The cabin is equipped with door-access suitable to avoid the direct access to rails, with big windows on each side, with windshield wipers, sun shades, controlled emplacement for the driver and armchairs for one operator. A heating system is installed inside the cabin.

Computerised Control system

It is an electronic system to manage and control the main hydraulic parameters; it is designed to maintain a constant pull/tension value(s) on the contact and suspension wires even in case the wagon changes direction and speed.

Power Unit

The power unit is equipped by one diesel engine, coupler and pumps. It supplies the hydraulic power for the puller-tensioner, the reel winders, the pedestals movement, the crane and the other auxiliary units.

Puller-Tensioner

The puller-tensioner operates by means of adherence-wheels (capstans) for adjusting the tension in the cables, by varying the torque applied to them. The system grants that the cables are not strung with twisting torque.

Reel stands

Two reel stands are provided, each one of them composed by four main units: supporting frame in welded steel, reel supporting shaft with steel cones, hydraulically head connected to the shaft and ultrasonic sensor device to measure the working cable layer diameter of the reel.

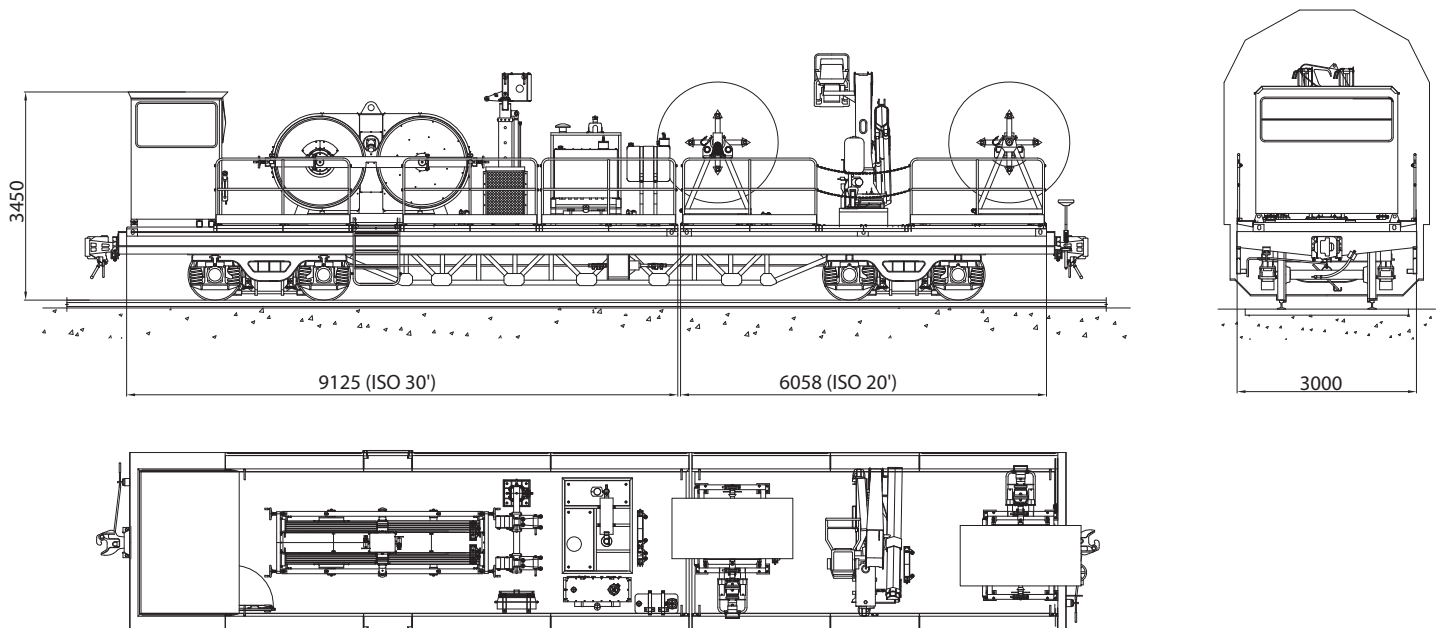
Guiding pedestal

One guiding pedestal is fitted at the puller-tensioner outlet position equipped with suitable rollers adjustable in height, that have to guide from the adherence-wheels outlet towards the MAST wagon therefore towards the stringing line.

Foldable Articulated Hydraulic Crane

In the middle of the reel stands, the hydraulic loading crane is equipped with stabilizers and telescopic boom with different pieces which can be installed.

Available also hydraulic - Mod. CTSU200



UPPERSTRUCTURE ONLY

Chassis not included, available on request



Description

The Constant Tension Stringing Unit is special purpose equipment specifically designed and manufactured for stringing cables in construction and maintenance of railways lines electrification or refurbishment. Particularly indicated for High Speed Lines, the equipment is suitable for laying:

- Single contact and single suspension wires independently and at the same time
- With section area of 50mm²~240mm²
- In one travelling direction only
- The stringing tension can be automatically adjusted and is not related with wagon's travelling speed
- The system grants that the cables are not twisted during stringing



Technical features

Max number of stringing cables	2
Max force per cable	30 kN + 30 kN
Max stringing speed	6 km/h
Max pulling back speed	1.5 km/h
Capstan diameter	1500 mm
Max reel diameter	2000 mm
Max reel weight	4000 kg
Crane capacity	17.4 t x m - 8 m range
MAST Capacity	C1=6.8m, C2=8.2m / 3.0m
Diesel Engine	82 kW (110 hp)
Control board	Electronic

Main equipment on board

- N. 1 Cabin extended version
- N. 1 Computerized Control System
- N. 1 Power Unit
- N. 1 Puller-Tensioner suitable for independent stringing of two cables
- N. 4 Reel stands (Automatic Lateral movement function)
- N. 1 Guiding Pedestal and set of Guiding Rollers
- N. 1 Foldable articulated crane for reels lifting
- N. 2 Tail wire compensation systems
- N. 1 MAST system for independently guiding two cables
- N. 2 Steel Counter Frame Base Assembly

Cabin

The cabin is equipped with door-access suitable to avoid the direct access to rails, with big windows on each side, with windshield wipers, sun shades, controlled emplacement for the driver and armchairs for one operator. A heating system is installed inside the cabin.

Computerised Control system

It is an electronic system to manage and control the main hydraulic parameters; it is designed to maintain a constant pull/tension value(s) on the contact and suspension wires even in case the wagon changes direction and speed.

Power Unit

The power unit is equipped by one diesel engine, coupler and pumps. It supplies the hydraulic power for the puller-tensioner, the reel winders, the pedestals movement, the crane and the other auxiliary units.

Puller-Tensioner

The puller-tensioner operates by means of adherence-wheels (capstans) for adjusting the tension in the cables, by varying the torque applied to them. The system grants that the cables are not strung with twisting torque.

Reel stands

Four reel stands are provided, each one of them composed by four main units: supporting frame in welded steel, reel supporting shaft with steel cones, hydraulically head connected to the shaft and ultrasonic sensor device to measure the working cable layer diameter of the reel.

Guiding pedestal

One guiding pedestal is fitted at the puller-tensioner outlet position equipped with suitable rollers adjustable in height, that have to guide from the adherence-wheels outlet towards the MAST therefore towards the stringing line.

Foldable Articulated Hydraulic Crane

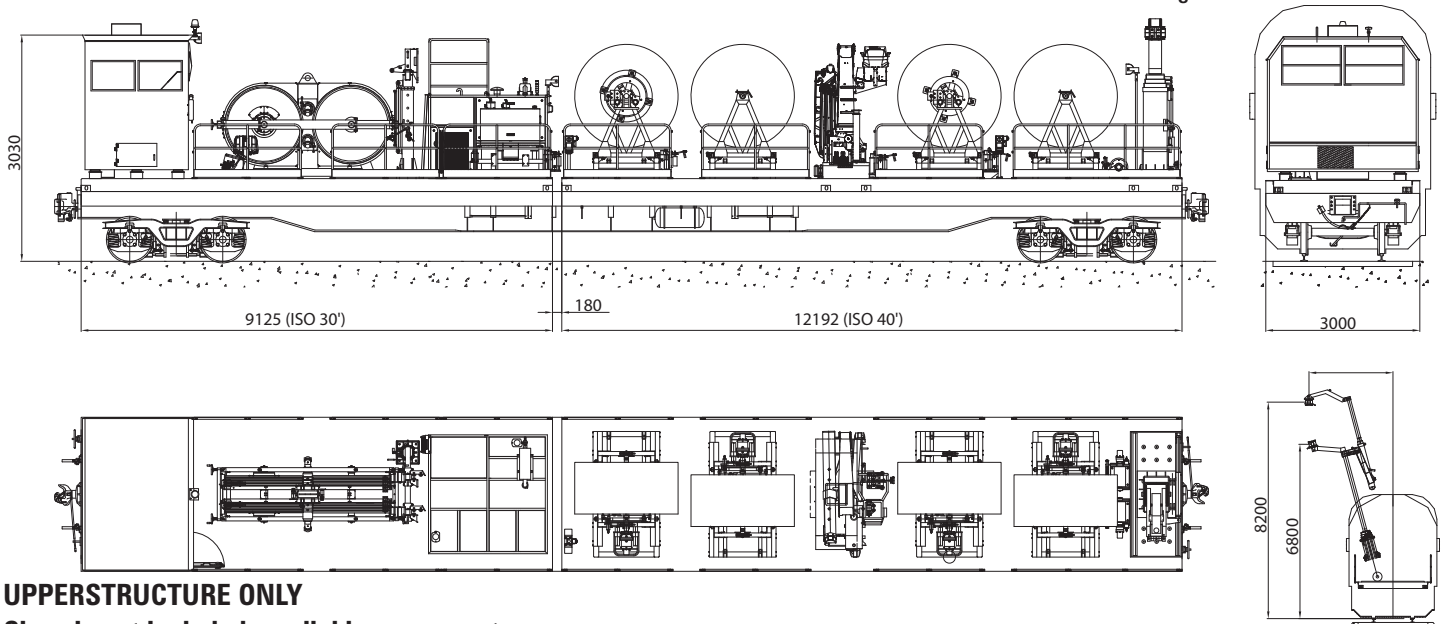
In the middle of the reel stands, the hydraulic loading crane is equipped with stabilizers and telescopic boom with different pieces which can be installed.

Tail wire compensation system

The system is composed by two hydraulic winches for each pair of capstans and reel stands, placed at the end of the reel stands, provided with adequate length of rope, to string almost the total length of contact wire or conductor present on the last wraps of the reel and on the capstan of the tensioner unit.

MAST

The MAST system has the purpose to guide the cables in the proper stringing positions. The MAST is positioned on the extremity of the machine. The base is linked to frame and has an inclinable and moveable telescopic column. On the top there are special roller devices in wearable material suitable to lodge the cables.



UPPERSTRUCTURE ONLY

Chassis not included, available on request



Description

The Constant Tension Stringing Unit is special purpose equipment specifically designed and manufactured for stringing cables in construction and maintenance of railways lines electrification or refurbishment. Particularly indicated for High Speed Lines, the equipment is suitable for laying:

- Single contact and single suspension wires independently and at the same time
- With section area of 50mm²~240mm²
- In one travelling direction only
- The stringing tension can be automatically adjusted and is not related with wagon's travelling speed
- The system grants that the cables are not twisted during stringing



Technical features

Max number of stringing cables	2
Max force per cable	30 kN + 30 kN
Max stringing speed	6 km/h
Max pulling back speed	1.5 km/h
Capstan diameter	1500 mm
Max reel diameter	2000 mm
Max reel weight	4000 kg
MAST Capacity	C1=6.8m, C2=8.2m / 3.0m
Diesel Engine	82 kW (110 hp)
Control board	Electronic

Main equipment on board

- N. 1 Cabin extended version
- N. 1 Computerized Control System
- N. 1 Power Unit
- N. 1 Puller-Tensioner suitable for independent stringing of two cables
- N. 4 Reel stands (Automatic Lateral movement function)
- N. 1 Guiding Pedestal and set of Guiding Rollers
- N. 2 Tail wire compensation systems
- N. 1 MAST system for independently guiding two cables
- N. 2 Steel Counter Frame Base Assembly

Cabin

The cabin is equipped with door-access suitable to avoid the direct access to rails, with big windows on each side, with windshield wipers, sun shades, controlled emplacement for the driver and armchairs for one operator. A heating system is installed inside the cabin.

Computerised Control system

It is an electronic system to manage and control the main hydraulic parameters; it is designed to maintain a constant pull/tension value(s) on the contact and suspension wires even in case the wagon changes direction and speed.

Power Unit

The power unit is equipped by one diesel engine, coupler and pumps. It supplies the hydraulic power for the puller-tensioner, the reel winders, the pedestals movement, the crane and the other auxiliary units.

Puller-Tensioner

The puller-tensioner operates by means of adherence-wheels (capstans) for adjusting the tension in the cables, by varying the torque applied to them. The system grants that the cables are not strung with twisting torque.

Reel stands

Four reel stands are provided, each one of them composed by four main units: supporting frame in welded steel, reel supporting shaft with steel cones, hydraulically head connected to the shaft and ultrasonic sensor device to measure the working cable layer diameter of the reel.

Guiding pedestal

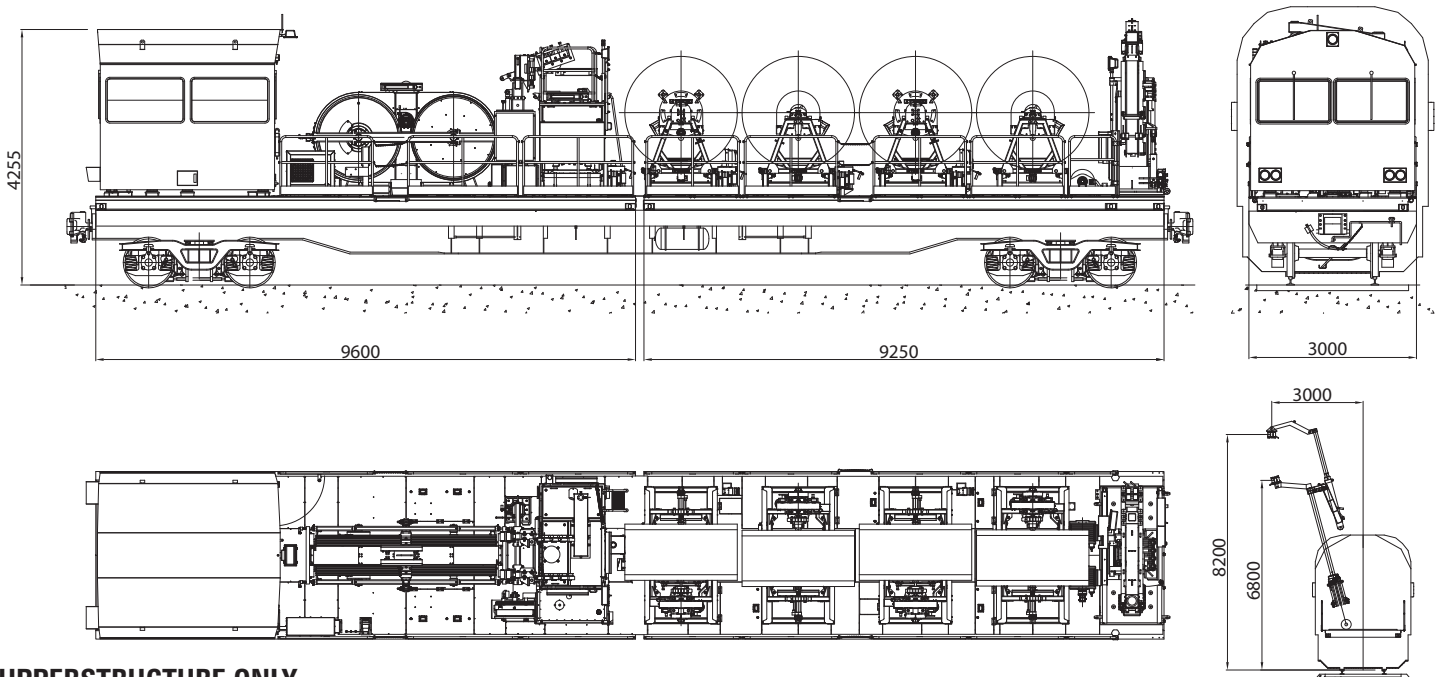
One guiding pedestal is fitted at the puller-tensioner outlet position equipped with suitable rollers adjustable in height, that have to guide from the adherence-wheels outlet towards the MAST therefore towards the stringing line.

Tail wire compensation system

The system is composed by two hydraulic winches for each pair of capstans and reel stands, placed at the end of the reel stands, provided with adequate length of rope, to string almost the total length of contact wire or conductor present on the last wraps of the reel and on the capstan of the tensioner unit.

MAST

The MAST system has the purpose to guide the cables in the proper stringing positions. The MAST is positioned on the extremity of the machine. The base is linked to frame and has an inclinable and moveable telescopic column. On the top there are special roller devices in wearable material suitable to lodge the cables.



UPPERSTRUCTURE ONLY

Chassis not included, available on request



Description

The Constant Tension Stringing Unit is special purpose equipment specifically designed and manufactured for stringing cables in construction and maintenance of railways lines electrification or refurbishment. Particularly indicated for High Speed Lines, the equipment is suitable for laying:

- Double or single contact wires and single suspension, double or single suspension wires and single contact, according to the required configuration, independently and at the same time
- With section area of 50mm²~240mm²
- In two travelling direction
- The stringing tension can be automatically adjusted and is not related with wagon's travelling speed
- The system grants that the cables are not twisted during stringing



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800

Technical features

Max number of stringing cables	3
Max force per cable	25 kN + 25 kN + 25 kN
Max stringing speed	5 km/h
Max pulling back speed	1.5 km/h
Capstan diameter	1500 mm
Max reel diameter	1600 mm
Max reel weight	4000 kg
Crane capacity	18.2 t x m - 8.2 m range
Diesel Engine	82 kW (110 hp)
Control board	Hydraulic

Main equipment on board

- N. 1 Cabin
- N. 1 Manual Control System
- N. 1 Power Unit
- N. 1 Puller-Tensioner suitable for independent stringing of three cables
- N. 3+1 Reel stands
- N. 2 Guiding Pedestal and set of Guiding Rollers
- N. 1 Foldable articulated crane for reels lifting
- N. 2 Steel Counter Frame Base Assembly

Cabin

The cabin is equipped with door-access suitable to avoid the direct access to rails, with big windows on each side, with windshield wipers, sun shades. A heating system is installed inside the cabin.

Manual Control system

The main hydraulic parameters are controlled by the operator; it is designed to maintain a constant pull/tension value(s) on the contact and suspension wires.

Power Unit

The power unit is equipped by one diesel engine, coupler and pumps. It supplies the hydraulic power for the puller-tensioner, the reel winders, the pedestals movement, the crane and the other auxiliary units.

Puller-Tensioner

The puller-tensioner operates by means of adherence-wheels (capstans) for adjusting the tension in the cables, by varying the torque applied to them. The system grants that the cables are not strung with twisting torque.

Reel stands

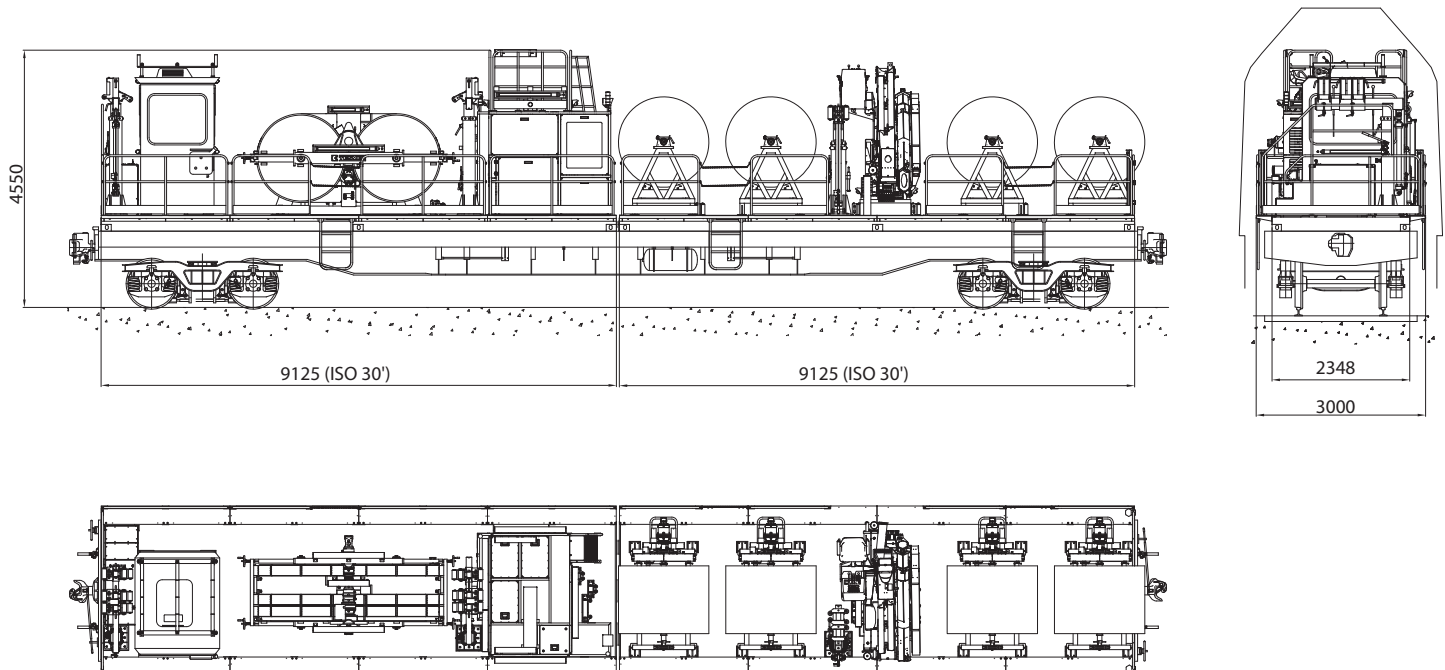
Four reel stands are provided, each one of them composed by four main units: supporting frame in welded steel, reel supporting shaft with steel cones, hydraulically head connected to the shaft.

Guiding pedestal

Two guiding pedestal is fitted at the puller-tensioner outlet position equipped with suitable rollers adjustable in height, that have to guide from the adherence-wheels outlet towards the MAST wagon therefore towards the stringing line.

Foldable Articulated Hydraulic Crane

In the middle of the reel stands, the hydraulic loading crane is equipped with stabilizers and telescopic boom with different pieces which can be installed.



UPPERSTRUCTURE ONLY

Chassis not included, available on request



Description

The Constant Tension Stringing Unit is special purpose equipment specifically designed and manufactured for stringing cables in construction and maintenance of railways lines electrification or refurbishment. The equipment is suitable for laying:

- Double contact and double suspension wires independently and at the same time
- With section area of 50mm²~240mm²
- In one travelling direction only
- The stringing tension can be automatically adjusted and is not related with wagon's travelling speed
- The system grants that the cables are not twisted during stringing



Technical features

Max number of stringing cables	4
Max force per cable	20 kN + 20 kN + 20 kN + 20 kN
Max stringing speed	5 km/h
Max pulling back speed	1.5 km/h
Capstan diameter	1500 mm
Max reel diameter	1800 mm
Max reel weight	4000 kg
Diesel Engine	82 kW (110 hp)
Control board	Hydraulic

Main equipment on board

- N. 1 Cabin
- N. 1 Manual Control System
- N. 1 Power Unit
- N. 1 Puller-Tensioner suitable for independent stringing of 4 cables
- N. 4 Reel stands (Automatic Lateral movement function)
- N. 1 Guiding Pedestal and set of Guiding Rollers
- N. 1 Foldable articulated crane for reels lifting
- N. 2 Steel Counter Frame Base Assembly

Cabin

The cabin is equipped with door-access suitable to avoid the direct access to rails, with big windows on each side, with windshield wipers, sun shades, controlled emplacement for the driver and armchairs for one operator. A heating system is installed inside the cabin.

Manual Control system

The main hydraulic parameters are controlled by the operator; it is designed to maintain a constant pull/tension value(s) on the contact and suspension wires.

Power Unit

The power unit is equipped by one diesel engine, coupler and pumps. It supplies the hydraulic power for the puller-tensioner, the reel winders, the pedestals movement, the crane and the other auxiliary units.

Puller-Tensioner

The puller-tensioner operates by means of adherence-wheels (capstans) for adjusting the tension in the cables, by varying the torque applied to them. The system grants that the cables are not strung with twisting torque.

Reel stands

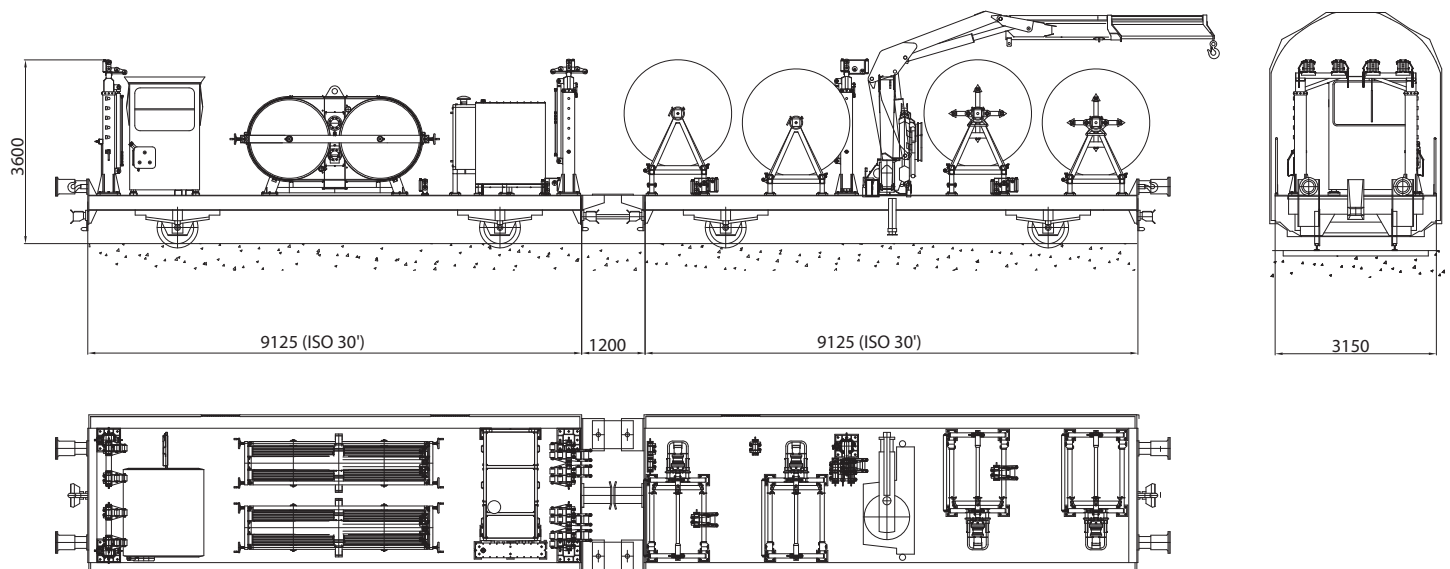
Four reel stands are provided, each one of them composed by four main units: supporting frame in welded steel, reel supporting shaft with steel cones, hydraulically head connected to the shaft and ultrasonic sensor device to measure the working cable layer diameter of the reel.

Guiding pedestal

One guiding pedestal is fitted at the puller-tensioner outlet position equipped with suitable rollers adjustable in height, that have to guide from the adherence-wheels outlet towards the MAST therefore towards the stringing line.

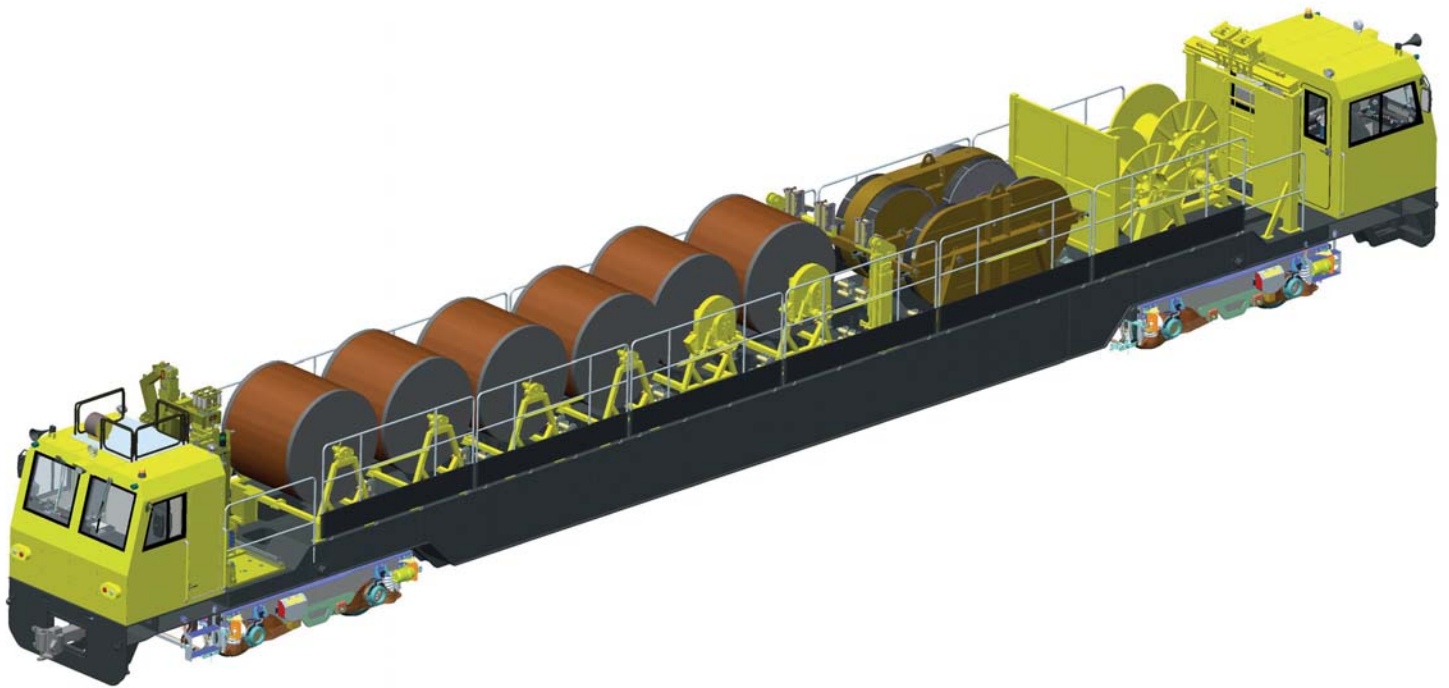
Foldable Articulated Hydraulic Crane

In the middle of the reel stands, the hydraulic loading crane is equipped with stabilizers and telescopic boom with different pieces which can be installed.



UPPERSTRUCTURE ONLY

Chassis not included, available on request



Description

The Self-drive Constant Tension Stringing Unit with Old Cable Removal System "Reel Car" CTSC301 is a special-purpose equipment, self-propelled, specifically designed and manufactured for stringing and recovering wires and cables on the Overhead Catenary System in construction and maintenance of railway lines (electrification or refurbishment).

Frame

The main frame is a welded assembly, composed by standard profiles and shaped sheetmetals to house all functional components. Suitable supports on the headstock can accommodate the draw gear/coupler (US type). The frame has been designed to withstand maximum operation and imposed loads without permanent deformity, fracture, cracking or fatigue in any part of frame. The main frame has been predisposed with suitable lifting points under each headstock in case of derailment.

Bogies

The unit has equipped with n°2 bogies (with axles, wheels, suspensions, sanding, boxes, etc.). It is a welded assembly, composed by standard profiles and shaped sheetmetals and designed according to the railway norms.

Power Pack

The vehicle propulsion is provided by means of n°1 diesel engine, connected to a pump drive by means of a cardan shaft; the traction and auxiliary hydraulic pumps are installed on the pump drive and managed electro-hydraulically.

Cabin

The vehicle has two driving cabins (one on each vehicle end) with a driver and a co-driver desks. The material choices of cabin interior have been focused so that to ensure the most high level of safety and occupational health of workers.

Control system

The driver desk has been designed according to the relevant railway norms. The control panel has ergonomic controls to facilitate the job of the driver. The signal elements and the indicators for the driving of the vehicle are installed in order to ensure immediate view and driving safety.

Technical features

Max number of stringing cables	3
Max force per cable	30 kN
Max stringing speed	8 km/h
Max pulling back speed	1 km/h
Capstan diameter	1500 mm
Max reel diameter	1830 mm
Max reel weight	4000 kg
Max number of recovering cables	2
Max force per cable	13 kN
Control board for tensioning system	Electronic
Control board for recovering system	Hydraulic

Braking System

The unit is equipped with a compressed air braking system (UIC type); a continuous automatic brake, direct brake, parking brake, emergency brake are located on the driver desk. The system grants the braking of vehicle when fully loaded. Pneumatic hoses on both headstocks allow to link trailers. A standard "shoe brake" with four brake shoes for each wheel is mounted.

Computerised Control system

It is an electronic system to manage and control the main hydraulic parameters; it is designed to maintain a constant pull/tension value(s) on the contact and suspension wires even in case the wagon changes direction and speed.

Other technical features

Track gauge	1435 mm	Diesel engine	447 kW @ 2100 rpm
Frame length	27000 mm	Max speed self-propelled	90 km/h
Main frame height from rail level	1390 mm	Max speed in train formation	100 km/h
Max height above rail level	4333 mm	Distance between bogie pivots	18900 mm
Max width	3060 mm	Bogie wheelbase	2500 mm
Height of hook from rail level	863 mm	Fuel tank capacity	1200 l (n°2 tanks of 600 l)
Wheel diameter	915 mm	Max torque	2035 Nm
Wheel width	139.7 ± 1 mm	Engine cooling system	Water
Running gear type	2 motor axles	Engine displacement	15 l
Full load weight	98 t	Tare weight	83 t
Max load on axle	25 t	Max traction force at coupler	151 kN
Speed selector	n. 1 gearbox (2 speeds) per motor axle	Minimum curve radius on track	76 m
Cabin n°1 (length x width x height)	2000x2600x2206 mm	Suspension helicoidal springs and hydraulic damper	
Cabin n°2 (length x width x height)	2000x2600x2206 mm	Transmission: hydrostatic closed circuit	

Puller-Tensioner

The puller-tensioner operates by means of adherence-wheels (capstans) for adjusting the tension in the cables, by varying the torque applied to them. The system grants that the cables are not strung with twisting torque.

Reel stands

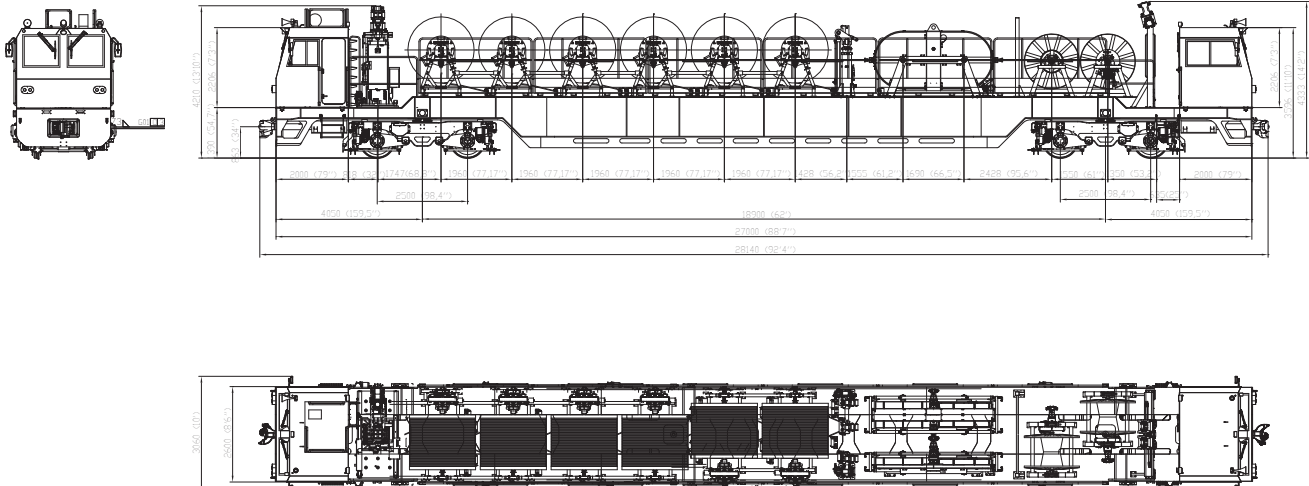
Each reel stand is composed by four main units: supporting frame in welded steel, reel supporting shaft with steel cones, hydraulically head connected to the shaft and ultrasonic sensor device to measure the working cable layer diameter of the reel.

Guiding pedestal

One guiding pedestal is fitted at the puller-tensioner outlet position equipped with suitable rollers adjustable in height, that have to guide from the adherence-wheels outlet towards the MAST therefore towards the stringing line.

MAST

The MAST system has the purpose to guide the cables in the proper stringing positions. The MAST is positioned on the extremity of the machine. The base is linked to frame and has an inclinable and moveable telescopic column. On the top there are special roller devices in wearable material suitable to lodge the cables.



UPGRADED



Description

The OCPC500 is a self-propelled unit designed for catenary maintenance, refurbishment and installation of new catenary lines, by means of the special tools installed on board. The unit is equipped with the following main components: main frame, wheelset (n°2 motor axles) and brake levers, draw gear and buffers (UIC type) on each headstock, power pack under the main frame, a cabin on each headstock (with driver, co-driver desks and a seat for further operators), elevating working platform, crane equipped with hook or working basket, two positioners for new wire installation, pantograph for catenary measuring and inspection.

Frame

The main frame is a welded assembly, composed by standard profiles and shaped sheetmetals to house all functional components. Suitable supports on the headstock can accommodate the draw gear or buffers (UIC type). The frame has been designed to withstand maximum operation and imposed loads without permanent deformity, fracture, cracking or fatigue in any part of frame. The main frame has been predisposed with suitable lifting points under each headstock in case of derailment.

Axles

It is a railway model with amply dimensioned motor axles, keyed one-block wheels with hot interference, bushing with dimensioned roller bearings to guarantee the safety.

Power Pack

The following components of propulsion assembly are positioned within the engine compartment under the main frame: diesel engine and engine radiator, hydraulic pumps for vehicle traction and for auxiliary components, pneumatic components for braking equipment. The radiator for oil cooling, fuel and oil tanks are located on both vehicle sides.

Cabin

The OCPC500 has two driving cabins (one on each vehicle end) with a driver and a co-driver desks. Moreover in the cabin there are other benches/ foldable seat to accommodate other operators. The cabin is equipped with an access door with gallery to avoid the direct access on railway tracks. The material choices of cabin interior have been focused so that to ensure the most high level of safety and occupational health of workers.

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1200

Technical features

Track gauge	1435 mm	Diesel engine	400 kW @ 2300 rpm
Frame length	12990 mm	Max speed on flat and straight track	100 km/h
Max length including buffers	14230 mm	Max speed in train formation	120 km/h
Main frame height from rail level	1200 mm	Motor axles	2
Max height above rail level	4186 mm	Fuel tank capacity	400 l
Max width	3160 mm	Max traction force at coupler	85 kN
Wheelbase	8200 mm	Electric system	24 Vcc
Wheel diameter	950 mm	Minimum curve radius on track	150 m
Flange width	135 mm	Suspension: Helicoidal springs and hydraulic damper	
Full load weight	35 t	Transmission: hydrostatic closed circuit, automatic torque variation, continuous and without traction interruption	
Max load on axle	18 t		
Speed selector	n. 1 gearbox (2 speeds) per motor axle		

Braking system

The unit is equipped with a compressed air braking system (UIC type); a continuous automatic brake, direct brake, parking brake, emergency brake are located on the driver desk. The system grants the braking of vehicle when full loaded. Pneumatic hoses on both headstocks allow to link trailers. A standard "shoe brake" with four brake shoes for each wheel is mounted.

UPGRADED

Automatic Train Control System

The unit is equipped with Automatic Train Control System (SCMT / SCC BL3) designed to provide enhanced levels of rail safety through continuous train control and protection. The SCMT system has the following functions:

- Train control in accordance with signal settings
- Train control in accordance with maximum permitted line speeds and line gradients
- Train control in accordance with slowing and speed reduction rules
- Train control in accordance with the maximum permitted speeds for rolling stock

Emergency braking in the event that operating limits for specific situations are exceeded. The SCMT system is linked to the other systems.

Control System

The driver desk has been designed according to the relevant railway norms. The control panel has ergonomic controls to facilitate the job of the driver. The signal elements and the indicators for the driving of the vehicle are installed in order to ensure immediate view and driving safety.

Platform

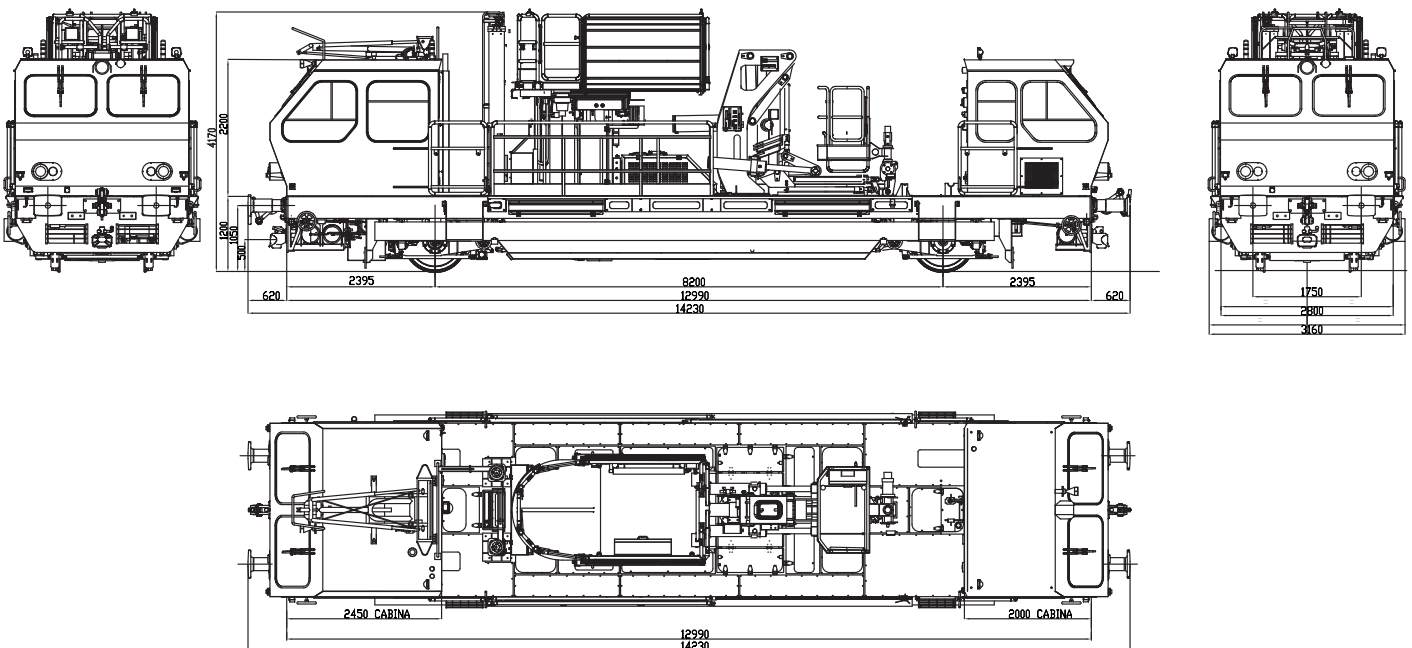
Main Technical Features are:

Platform max height from T.O.R.	7000 mm
Platform transversal displacement	±1200 mm
Platform rotation	±90°
Platform maximum load (n°3 workers + tools)	540 kg

Crane with working basket

Main Technical Features are:

Max height from T.O.R.	10500 mm
Max distance in transversal direction	6000 mm
Crane column rotation	270°
Working basket rotation	±90°
Working basket max load (n°2 workers + tools)	240 kg





Description

The multipurpose vehicle is a self-propelled unit designed for catenary maintenance, refurbishment and installation of new catenary lines, by means of the special tools installed on board. It is made up of a main frame with a cabin, a loading bed, a platform, a crane equipped with a working basket and wire positioner. This unit can be equipped with a range of accessories to complete the equipment and make it suitable to the needs of working teams.

Frame

The main frame is a welded assembly, composed by standard profiles and shaped sheetmetals to house all functional components. Suitable supports on the headstock can accommodate the draw gear/coupler (US type). The frame has been designed to withstand maximum operation and imposed loads without permanent deformity, fracture, cracking or fatigue in any part of frame. The main frame has been predisposed with suitable lifting points under each headstock in case of derailment.

Axles

It is a railway model with amply dimensioned motor axles, keyed one-block wheels with hot interference, bushing with dimensioned roller bearings to guarantee the safety.

Power Pack

The following components of propulsion assembly are positioned within the engine compartment under the main frame: diesel engine and engine radiator, hydraulic pumps for vehicle traction and for auxiliary components, pneumatic components for braking equipment. The radiator for oil cooling, fuel and oil tanks are located on both vehicle sides.

Cabin

The unit has one driving cabins with a driver and a co-driver desks for both travel directions. Moreover in the cabin there is a foldable seat to accommodate other operators. The cabin is equipped with an access door with gallery to avoid the direct access on railway tracks. On the top of the cabin a pantograph to measure the height and the stagger of the contact line is installed. The material choices of cabin interior have been focused so that to ensure an high level of safety and occupational health of workers.

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1210

Technical features

Track gauge	1435 mm	Full load weight	35 t
Frame length	12990 mm	Max load on axle	18 t
Max length including couplers	14200 mm	Diesel engine	400 kW @ 2100 rpm
Main frame height from rail level	1200 mm	Max speed on flat and straight track	100 km/h
Max height above rail level	4330 mm	Max speed in train formation	120 km/h
Max width	3192 mm	Motor axles	2
Wheelbase	8200 mm	Fuel tank capacity	400 l
Wheel diameter	950 mm	Electric system	24 Vcc
Cabin (length x width x height)	2450 x 2800 x 2200 mm	Minimum curve radius on track	80 m
Speed selector	n. 1 gearbox (2 speeds) per motor axle	Suspension: Helicoidal springs and hydraulic damper	
		Transmission: hydrostatic closed circuit	

Control system

The driver desk has been designed according to the relevant railway norms. The control panel has ergonomic controls to facilitate the job of the driver. The signal elements and the indicators for the driving of the vehicle are installed in order to ensure immediate view and driving safety.

Braking System

The vehicle is equipped with a braking system (UIC type): continuous automatic brake, direct brake, parking brake and emergency brake. The system warrants the braking of vehicle when full loaded.

Wire Positioner

The wire positioner has the purpose to operate the initial and final wires connection operations to the balance weight tensioning system and to guide and set-up the wires on the proper position on the cantilever links.

Max horizontal working range from the centre of the wagon:

- 3.05 m (upper rollers)
- 2.5 m (bottom rollers)

Max working height range from the rail surface:

- 8.15 m (upper rollers)
- 6.7 m (bottom rollers)

Platform

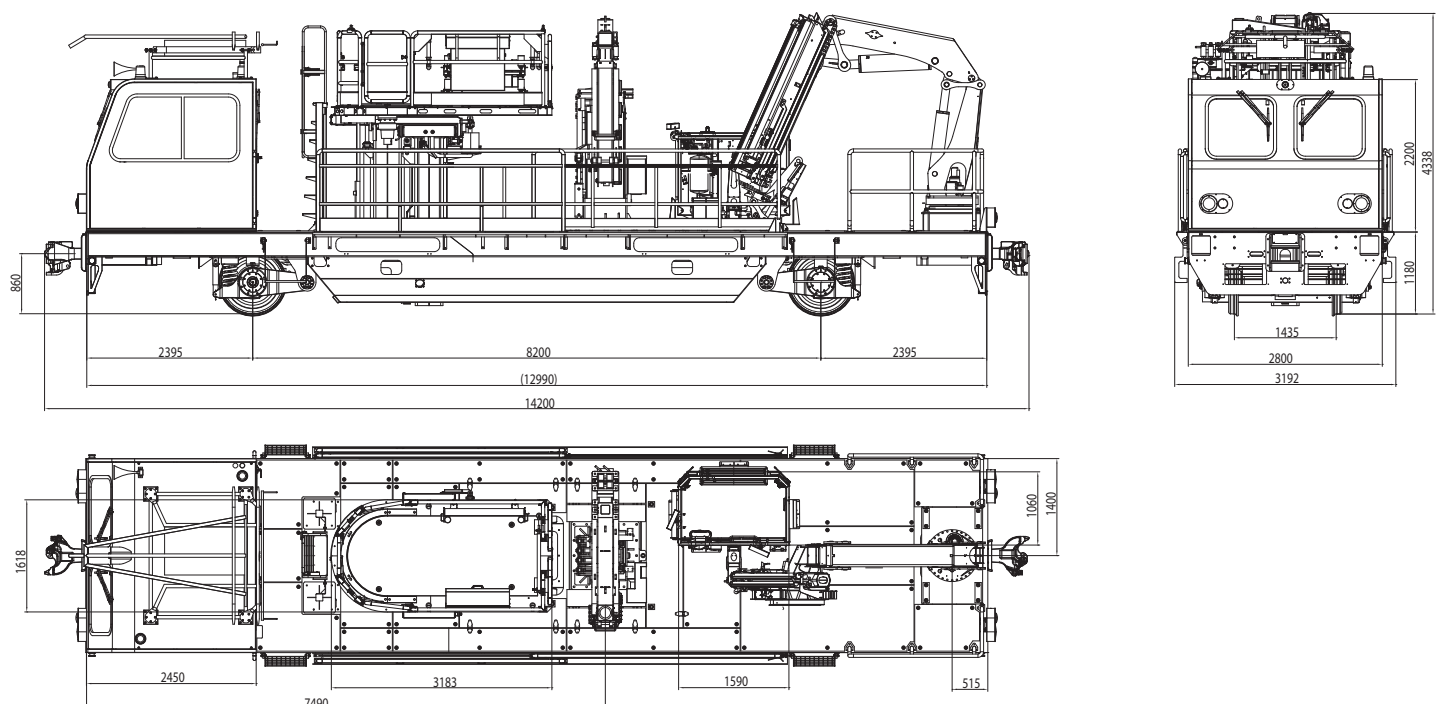
Main Technical Features are:

Platform max height from T.O.R.	7000 mm
Platform transversal displacement	±1200 mm
Platform rotation	±90°
Platform maximum load (n°3 workers + tools)	540 kg

Crane with working basket

Main Technical Features are:

Max lifting moment	146.0 kNm
Max distance in transversal direction	12500 mm
Basket dimensions	1000 mm x 1600 mm
Height of hand rails	1130 mm
Basket hydraulically rotatable	±90°
Working basket max load	350 kg





Description

The vehicle has been designed for the maintenance of railway, tramway and underground railway lines. It is made up of a main frame with a cabin, a loading bed, a platform and a crane equipped with a working basket. This unit can be equipped with a range of accessories to complete the equipment and make it suitable to the needs of working teams.

Frame

It is made up of a steel structure with supports on the head to receive hooks and buffers UIC model, in addition to the hammer tow hook for rigid rod and a coupling (type Rockinger).

Axles

It is a railway model with amply dimensioned motor axles, keyed one-block wheels with hot interference, bushing with dimensioned roller bearings to guarantee the safety.

Power Pack

The following components of propulsion assembly are positioned within the engine compartment under the main frame: diesel engine and engine radiator, hydraulic pumps for vehicle traction and for auxiliary components, pneumatic components for braking equipment.

The radiator for oil cooling, fuel and oil tanks are located on both vehicle sides.

Cabin

At one end of the unit there is the pilot cabin with a driver and a co-driver desks for both travel directions. The cabin is equipped with an access door with gallery to avoid the direct access on railway tracks. On the top of the cabin a pantograph to measure the height and the stagger of the contact line is installed. The cabin is equipped with big open able side windows with control emplacement for the driver and seats for passengers. The cabin has also an HVAC system (air cooling and heating system) for the comfort of the vehicle.

Control System

The driver desk has been designed according to the relevant railway norms. The control panel has ergonomic controls to facilitate the job of the driver. The signal elements and the indicators for the driving of the vehicle are installed in order to ensure immediate view and driving safety.

Technical features

Track gauge	1435 mm	Diesel engine	400 kW @ 2100 rpm
Frame length	12990 mm	Self propelled max speed	100 km/h
Max length including buffers	14230 mm	Max hauled formation	120 km/h
Main frame height from rail level	1200 mm	Motor axles	2
Max height above rail level	4330 mm	Fuel tank capacity	400 l
Max width	3192 mm	Max traction force at coupler	85 kN
Wheelbase	8200 mm	Electric system	24 Vcc
Wheel diameter	950 mm	Minimum curve radius on track	130 m
Cabin (length x width x height)	2450x2800x2200 mm	Suspension: Helicoidal springs and hydraulic damper	
Full load weight	35 t	Transmission: hydrostatic closed circuit	
Max load on axle	18 t		
Speed selector	n. 1 gearbox (2 speeds) per motor axle		

Braking System

It is made to guarantee the machine braking with complete load. The unit is equipped with flexible couplings on both headstocks to link trailers, pipes with isolated cock. The driver desk is equipped with all the braking commands, gauges and direct/automatic brakes.

Platform

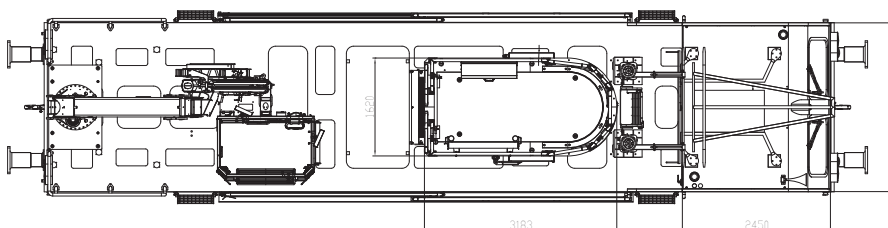
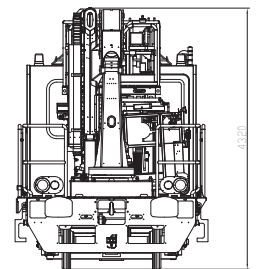
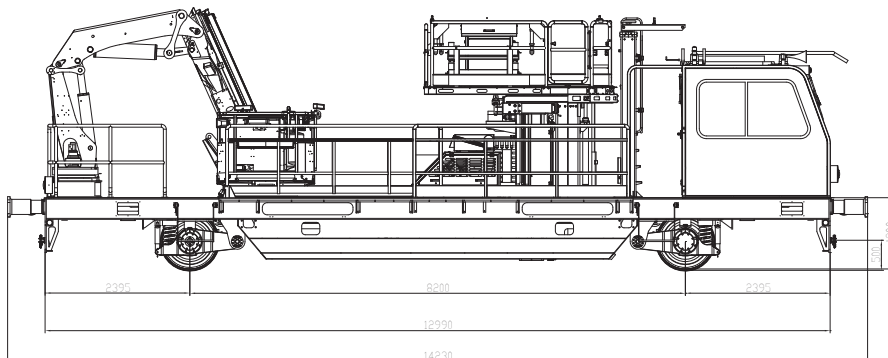
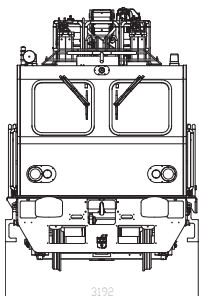
Main Technical Features are:

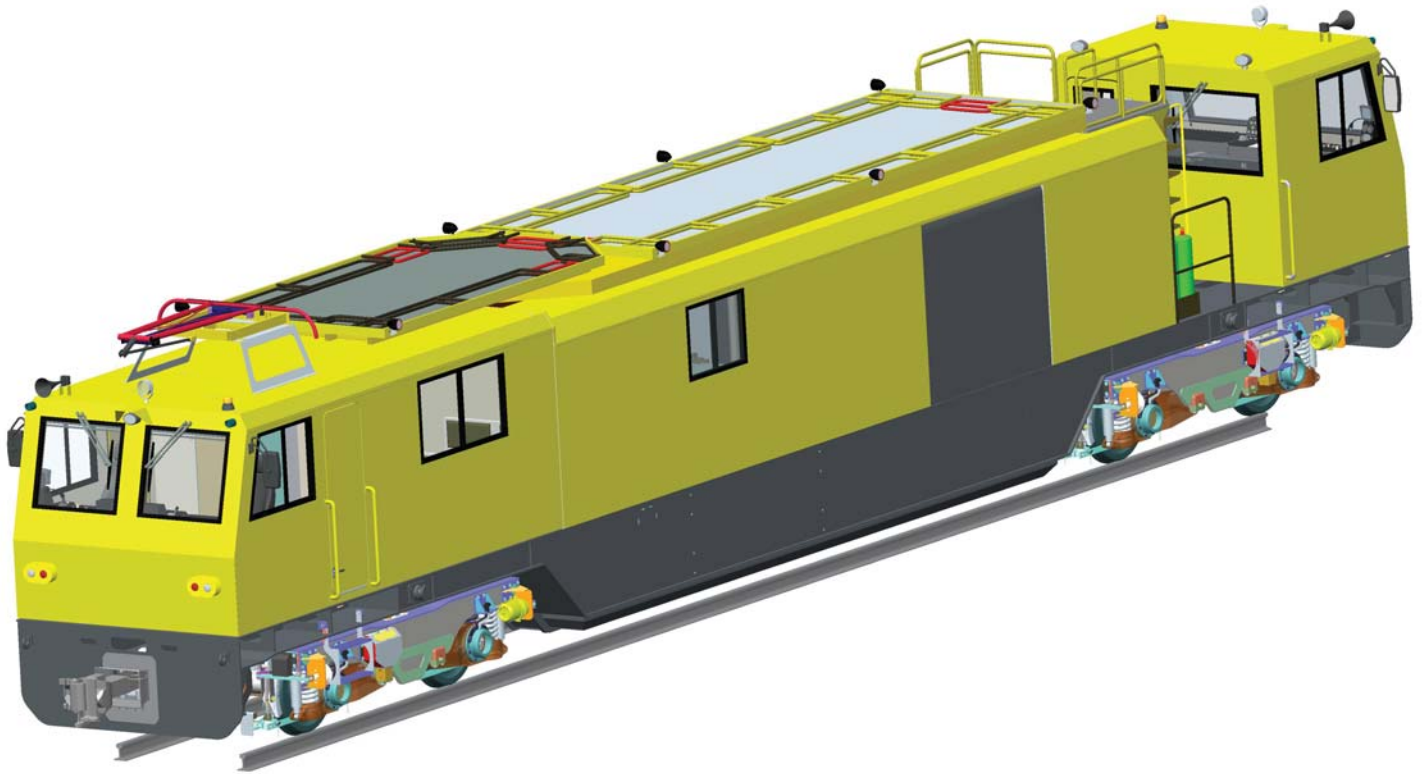
Platform max height from T.O.R.	7000 mm
Platform transversal displacement	± 1200 mm
Platform rotation	± 90°
Platform maximum load (n°3 workers + tools)	540 kg

Crane with working basket

Main Technical Features are:

Max lifting moment	146 kNm
Max distance in transversal direction	12500 mm
Basket dimensions	1000x1600 mm
Height of hand rails	1130 mm
Working basket rotation	± 90°
Working basket max load	350 kg





Description

This Work Car is a self-propelled unit designed for catenary maintenance, refurbishment and installation of new catenary lines. The unit is equipped with the following main components: main frame, two bogies (with axles/wheels, suspensions, sanding boxes, etc), drawbar system and AAR couplers on each end of the vehicle, a cabin at both vehicle ends, an elevating and rotating telescopic working platform in the middle of the vehicle, pantograph for catenary measuring and inspection, workshop area and kitchen area.

Frame

The frame has been designed to withstand maximum operation and imposed loads without permanent deformity, fracture, cracking or fatigue in any part of frame. The main frame has been predisposed with suitable lifting points under each headstock in case of derailment. Moreover on both headstocks an automatic coupler AAR and a drawbar hitch are installed for towing all machines that cannot be promptly removed from the track.

Bogies

The unit has equipped with n°2 bogies (with axles, wheels, suspensions, sanding, boxes, etc.). It is a welded assembly, composed by standard profiles and shaped sheetmetals and

designed according to the railway norms.

Power Pack

The propulsion is provided by means of a diesel engine, connected to a pump drive by means of a cardan shaft; the traction pumps are installed on the engine, while the auxiliary pumps are installed on the pump drive and managed electro-hydraulically.

Cabin, kitchen and workshop area

The Work Car has a driving cabin with driver and co-driver desks on both vehicle ends, complete of all driving commands. The kitchen area has two working/eating tables and benches to accommodate eight persons. Moreover it can be equipped with optional components (i.e. microwave, cook top, refrigerator, cabinets, electrical outlets for cooking equipment and other electronic equipments). The workshop area has a wide space and two work benches with vice, angle grinders and tools for welding operations. The workshop can be customized according to the Customer requests with the following optional components: adjustable storage racks for equipment, material storage bins (clips, insulators, bolts and fittings) with multiple shelves and storage closets, perforated plates for tool storage, electric sockets and lights, pneumatic and hydraulic connections for tools, manual winches for load/discharge components in the workshop, etc.

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Technical features

Track gauge	1435 mm	Diesel engine	447 kW @ 2100 rpm
Frame length	20600 mm	Self propelled max speed	90 km/h
Height of hook from rail level	863 mm	Max speed in train formation	100 km/h
Main frame height from rail level	1390 mm	Max working speed	8 km/h
Distance between bogie pivots	14300 mm	Motor axles	2
Max height above rail level	4419 mm	Bogies	2
Max width	3060 mm	Fuel tank total capacity	1200 l (n°2 tanks of 600 l)
Bogie wheelbase	2500 mm	Max traction force at coupler	151 kN
Wheel diameter	915 mm	Engine cooling system	Water
Wheel width	139.7 ± 1	Engine displacement	15.9 l
Max torque	2035 Nm	Minimum curve radius on track	76 m
Cabin A + Kitchen (length x width x height)	5720x2700x2200 mm	Full load weight	70 t
Cabin B (length x width x height)	2200x2700x2200 mm	Max load on axle	20 t
Tare weight	65 t	Suspension: Primary with independent swinging arms	
Speed selector	n. 1 gearbox (2 speeds) per motor axle	Transmission: Hydrostatic closed circuit, automatic torque variation, continuous and without traction interruption	

Control system

Several types of controls for the different tools and devices are available on the vehicle: i.e. hydraulic traction with electronic regulation of displacement for both pumps and motors, pneumatic levers for the braking system acting, commands for the elevating working platform which act on the electrovalves, etc. The creeping system as well as the braking system are operable from the platform by means of a suitable remote control box.

On each driver desk a SIFA button (dead-man's push button) checks the driver surveillance and it automatically operates the braking system, in case the operator becomes incapacitated, such as through death or loss of consciousness. The vehicle has several emergency shut down and horn buttons on each of the four exterior corners of the main frame, reachable from track level.

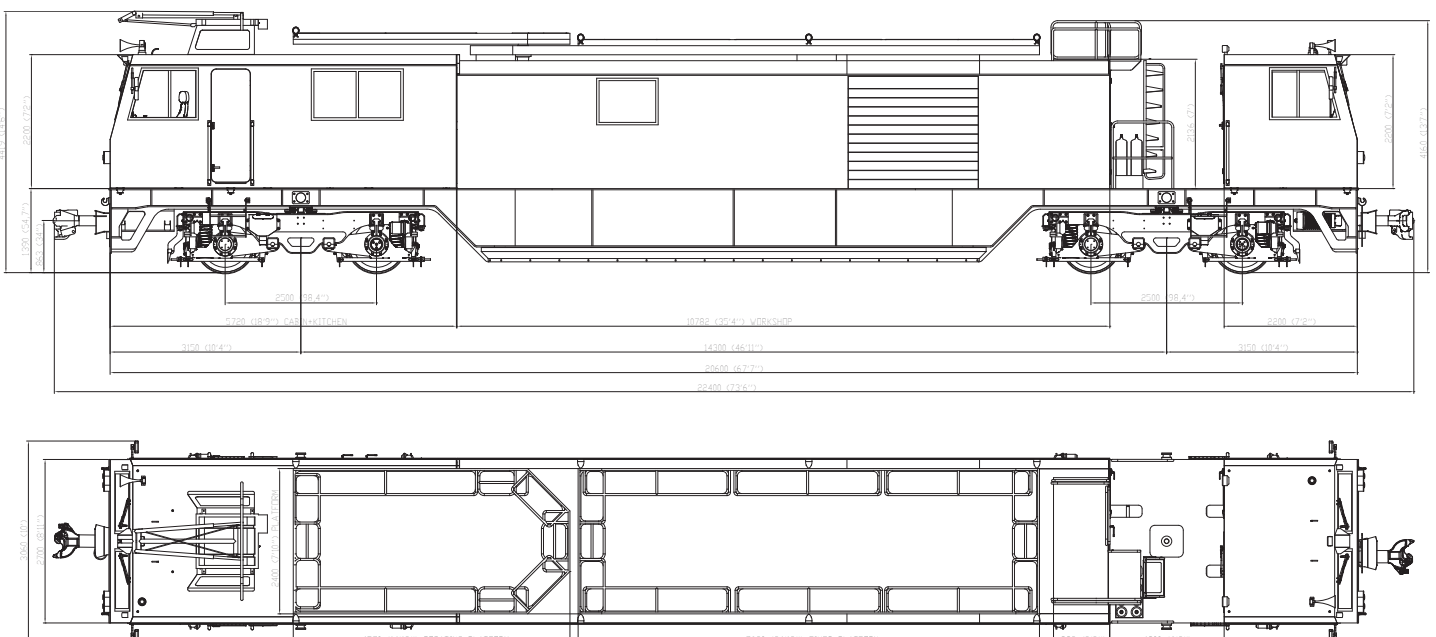
Braking System

The vehicle is equipped with a compressed air braking system that grants the braking of vehicle when full loaded. Pneumatic hoses on both headstocks allow to link trailers. A standard "shoe brake" with four brake shoes for each wheel is mounted.

Working platform

Main Technical Features are:

Dimensions (length x width x height) (Fixed platform)	7620x2400x1100 mm
Max height of platform floor above top of rail (Fixed platform)	7660 mm
Dimensions (length x width x height) (Rotating platform)	4570x2400x1100 mm
Max height of platform floor above top of rail (Rotating platform)	7760 mm
Max horizontal working range from vehicle center line (Rotating platform)	3345 mm
Slewing range of the working platform (Rotating platform)	± 90°
Max payloads on the platform (Fixed + Rotating)	1000 kg (n° 8 persons + tools)





Description

This unit is a "heavy" railcar, designed for the maintenance of railway, tramway and underground railway lines, as well as for shunting and towing of immobilized trains. The unit is suitable for operate also at low temperatures (functioning range: -40°C $-/+35^{\circ}\text{C}$). The unit has been designed to be equipped with optional tools for snow removal (snowblowers, snow plows, etc) or also for the cleaning of railway lines (from light snow, ballast or leaves). It is made up of a main frame with a cabin, a loading bed and a loading crane; moreover the vehicle has two bogies with all four motor axles, a pneumatic braking system and a diesel propulsion group.

Frame

It is made up of a steel structure with supports on the head to receive hooks and buffers UIC model, in addition to the hammer tow hook for rigid rod and a coupling type Rockinger.

Bogies

The unit has equipped with n°2 bogies with all four independent driving axles to prevent slipping.

Power Pack

It is made up of diesel engine with a gearbox to couple several traction pumps for the hydrostatic transmission and other auxiliary pumps for the tools, crane and snowblowers.

Cabin

At one end of the unit there is the pilot cabin with two driver and co-pilot desks for each travel directions. The cabin is equipped with an access door with gallery to avoid the direct access on railway tracks. At the angles on the cabin top there are four working lights, for lighting all around the vehicle. The cabin is equipped with big open able side windows, two on each side and with two front windscreens for each travel directions with electric heating for defrosting. The cabin has also an HVAC system for both air cooling and heating functions.

Control system

The unit is manually controlled from the control panel in the cabin, equipped with adjustable seat. The control panel has ergonomic controls to facilitate the job of the driver. In the central position, close to the driver, there is a working desk with push buttons and selectors for the working tools.

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1300

Technical features

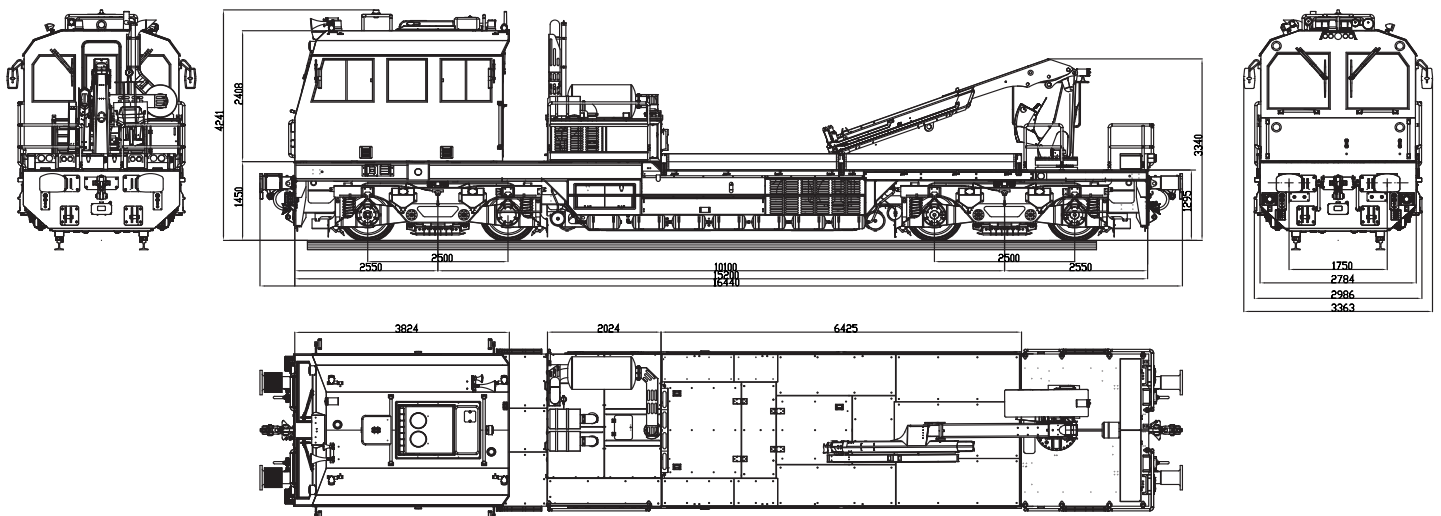
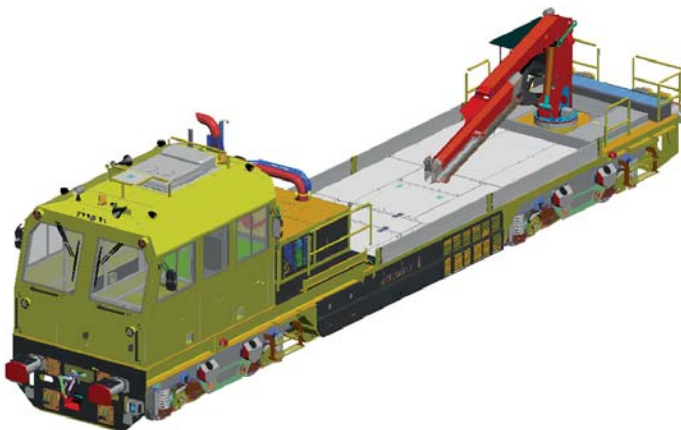
Track gauge	1435 mm	Diesel engine	640 kW @ 1800 rpm
Boogie wheelbase	2500 mm	Max speed when hauled	100 km/h
Frame length	15200 mm	Speed in transfer mode	100 km/h
Wheel diameter	940 mm	Max working speed for operations with snowblower	80 km/h
Max length including buffers	16440 mm	Max working speed for operations with crane	7.2 km/h
Cabin (length × width × height)	3704x2754x2408 mm	Motor axles	4
Max width	3363 mm	Diesel tank capacity	600 l
Max height	4241 mm	Flange width	135±1 mm
Tare	54000 kg	Max extension with crane	10,2 m
Mass at full load	68700 kg	Crane rotation	420°
Max mass on axle	18000 kg	Maximum lifting moment	13900 kg*m

Braking System

It is made to guarantee the machine braking with complete load. The unit is equipped with flexible couplings on both headstocks to link trailers, water pipe with isolated cock. The driver desk has all the braking commands, gauges, direct/automatic brakes, parking brake.

Hydraulic crane

Opposite to the pilot cabin, the hydraulic crane is equipped with a hook for the operations on the loading bed. The crane can be equipped with a range of accessories to complete the equipment and make it suitable to the needs of working teams (grab, digging bucket, etc).





Description

The TSNF300 is a trailer unit designed and equipped with a frontal snowblower to remove snow from railway tracks and with some special devices to remove ice from railway switches or from overhead contact wire. The unit is equipped with a traction hook and buffers (UIC type) or Rockinger drawbar coupling to be connected to a motorized vehicle. The TSNF300 vehicle consists of the following main components: main frame, engine case, toolbox to storage all the equipments, axles and brake levers, frontal snowblower, pantograph (allows to remove ice from catenary wire), device for ice defrost from railway switches.

Frame

The frame is a welded assembly, composed by standard profiles and shaped sheetmetals to house all functional components. The frame has been designed to withstand maximum operation and imposed loads without permanent deformity, fracture, cracking or fatigue in any part of frame. The main frame has been predisposed with suitable lifting points under each headstock in case of derailment.

Axles

It is a railway model with amply dimensioned motor axles, keyed one-block wheels with hot interference, bushing with dimensioned roller bearings to guarantee the safety.

Power Pack

The following components of propulsion assembly are positioned within the engine case on the upper frame: diesel engine and engine radiator, hydraulic pump for the snowblower, pumps of auxiliary components, oil tank, radiator for oil cooling and other components of the hydraulic circuit.

Control system

The TSNF300 has been designed to work in tandem with the vehicle for catenary maintenance OCPC500, suitably predisposed. In the cabin of the motorized vehicle, the working desk contains all the commands/levers for the snow removal unit.

The motorized vehicle modulates automatically the working speed as function of the resistant load acting on the snowblower of TSNF300 vehicle, thanks to the electronic management of the traction pumps. The electronic control unit operates the control signals of the two vehicles and the interaction between the displacements of hydraulic circuits by means of a CAN-bus connection. The snowblower is controlled by means of a remote control box.

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1350

Technical features

Track gauge	1435 mm	Diesel engine	209 kW @ 2200 rpm
Maximum height (snowblower excluded)	2670 mm	Max Engine Torque	1356 Nm @ 1500 rpm
Maximum length (between the headstocks)	5500 mm	Engine Displacement	8.3 l
Maximum width (snowblower excluded)	2450 mm	Fuel tank capacity	200 l
Maximum width (with snowblower)	2900 mm	Max Working Speed	60 km/h
Wheelbase	3800 mm	Max Speed in train formation	80 km/h
Wheel diameter	760 mm	Snow plough hydraulic circuit	Hydrostatic closed circuit
Full load weight	16 ton	Minimum curve radius on track	90 m
Max load on axle	18 ton	Electric System	24 Vcc

Braking system

The unit is equipped with a compressed air braking system (distributor and pneumatic tank) that grants the braking when connected to a motorized vehicle by means of pneumatic hoses on both headstocks. A standard "shoe brake" with four brake shoes for each wheel is mounted.

SPECIAL DEVICES

Snowblower, pantograph* and ice defroster

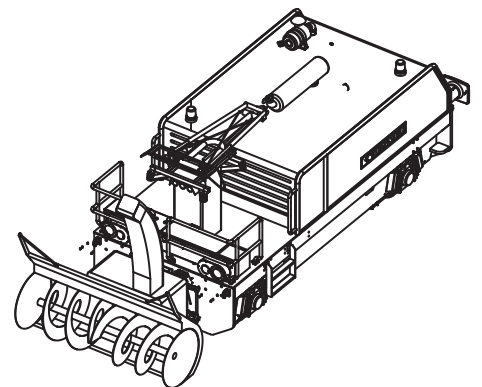
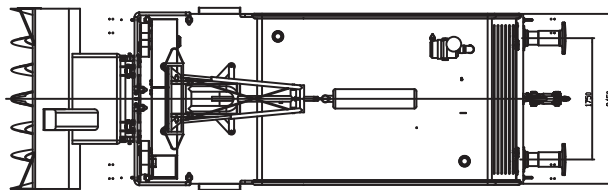
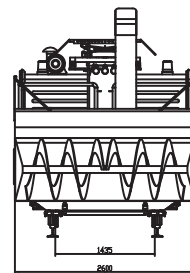
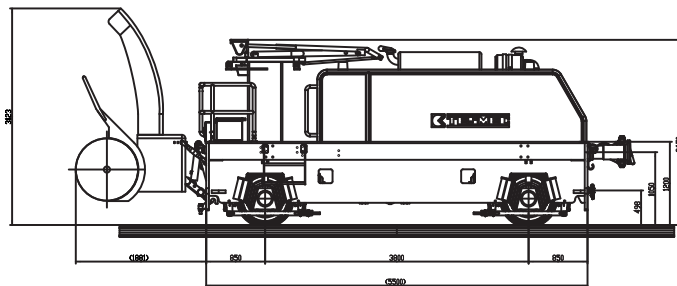
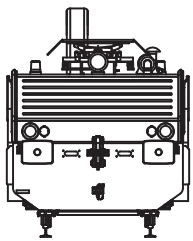
The frontal snowblower is suitable to handle all types of snow, from heavy and wet to light and dry. Its serrated cutting drums easily deal with old and hardened, icy snow. The snow is ejected over long distances through the hydraulically pivoting chute (rotation of 240°), removing snow walls along railway lines.

The snowblower is hydraulically managed (up/down lifting, lateral translation, rotation) and controlled by means of a remote control box from the cabin of self-propelled vehicle.

An insulated pantograph installed on a suitable elevating support on the rear side of unit allows to remove ice from the catenary wire. Under the main frame on both unit sides, a long flexible pipe with warm air blower is used to defrost ice from railway switches.

Snowblower - Main technical features

Max clearing width	2900 mm
Cutter drum diameter	900 mm
Frontal height	1200 mm
Max height with heavy snow	850 mm
Central turbine diameter	850 mm
Max snow removal capacity	4800 m ³ /h
Max rotation of central pivoting chute	240°
Max ejection distance	30 m
Weight	1680 kg



* PATENT PENDING



Description

The vehicle LHTB200 is a shunting locomotive designed for rescue service in line for trains of short and medium haul.

Frame

The frame is a welded assembly, composed by standard profiles and shaped sheetmetals to house all functional components. The frame has been designed to withstand maximum operation and imposed loads without permanent deformity, fracture, cracking or fatigue in any part of frame. The main frame has been predisposed with suitable lifting points under each headstock in case of derailment.

Axles

It is a railway model with amply dimensioned motor axles, keyed one-block wheels with hot interference, bushing with dimensioned roller bearings to guarantee the safety.

Power Pack

The following components of propulsion assembly are positioned within the engine case: diesel engine and engine radiator, hydraulic pumps for vehicle traction and for auxiliary components, oil tank and pneumatic components for braking equipment. The radiator for oil cooling and fuel tank are positioned under the main frame.

Cabin

The LHTB200 has a driving cabin with driver and co-driver desks oriented so that it is possible to travel in both travel directions, warranting the visibility according to the railway standards. Moreover in the cabin there is a bench to accommodate two operators. The cabin is equipped with an access door with gallery to avoid the direct access on railway tracks. The material choices of cabin interior have been focused so that to ensure the most high level of safety and occupational health of workers.

Braking System

The vehicle is equipped with a compressed air braking system (UIC type); in the cabin a continuous automatic brake, direct brake, parking brake, emergency brake are located. The system grants the braking of vehicle when full loaded. Pneumatic hoses on both headstocks allow to link trailers. A standard "shoe brake" with four brake shoes for each wheel is mounted.

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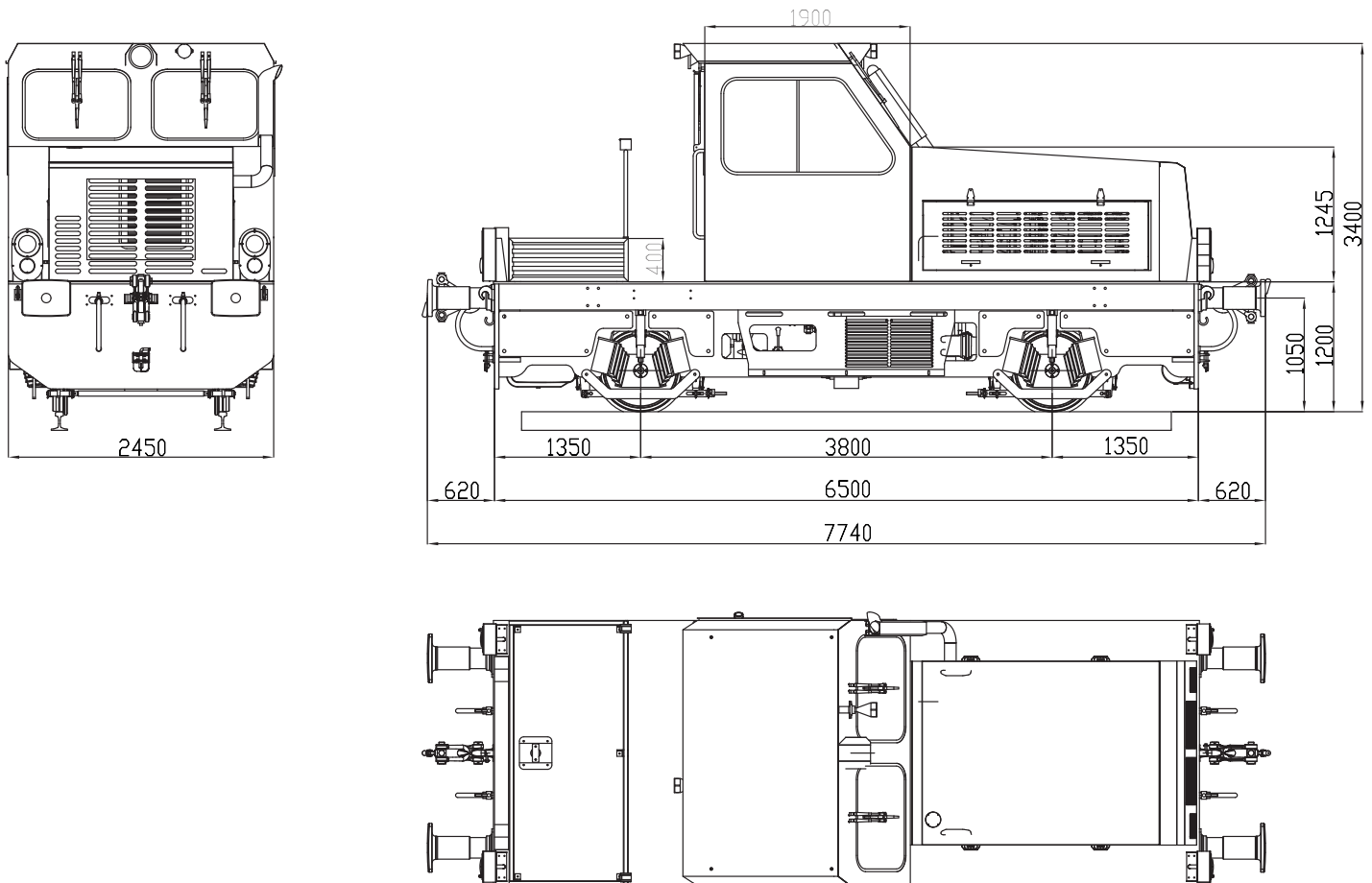
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1400

Technical features

Track gauge	1435 mm	Diesel engine	175 kW @ 2300 rpm
Frame length	6500 mm	Max speed on flat and straight track	55 km/h
Max length including buffers	7740 mm	Max speed in train formation	80 km/h
Main frame height from rail level	1200 mm	Motor axles	2
Max height above rail level	3400 mm	Fuel tank capacity	250 l
Max width	2450 mm	Max traction force at coupler	55 kN
Wheelbase	3800 mm	Electric system	24 Vcc
Wheel diameter	760 mm	Minimum curve radius on track	90 m
Flange width	135 mm	Transmission: hydrostatic closed circuit, automatic torque variation, continuous and without traction interruption	
Full load weight	24 t		
Max load on axle	12 t		
Speed selector	n. 1 gearbox (2 speeds) per motor axle		





Description

The LHTC400 is a locomotive designed and equipped with a frontal snowblower to remove snow from railway tracks, a rear snowplough and some special devices to remove ice from railway switches or from overhead contact wire.

Frame

The frame is a welded assembly, composed by standard profiles and shaped sheetmetals to house all functional components. On both the heads of the frame are mounted coupling devices.

Axles

It is a railway model with amply dimensioned motor axles, keyed one-block wheels with hot interference, bushing with dimensioned roller bearings to guarantee the safety.

Power Pack

The following components of propulsion assembly are positioned within the engine case: diesel engine and engine radiator, hydraulic pumps for vehicle traction, for the snowblowers and for auxiliary components, oil tank, radiator for oil cooling and other components of the hydraulic circuit.

Cabin

The LHTC400 has a driving cabin with driver desk oriented so that it is possible to travel in both travel directions, warranting the visibility according to the railway standards. The cabin can also accommodate up to five operators and contains control panels of the vehicle.

Control System

The locomotive has been designed to work, modulating automatically the working speed as function of the resistant load acting on the snowblower (depending from the type of snow to remove), thanks to the electronic management of the traction pumps. The electronic control unit operates the control signals and the interaction between the displacements of hydraulic circuits by means of a CAN-bus connection. The snowblower is controlled from the cabin by means of suitable control box.

The driver desk has been designed according to the relevant railway norms. The control panel has ergonomic controls to facilitate the job of the driver.

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1450

Technical features

Track gauge	1435 mm	Diesel engine	400 kW @ 2100 rpm
Max length (between the headstocks)	6700 mm	Max speed	60 km/h
Max length (with snowplough)	10550 mm	Max speed in train formation	80 km/h
Max height above rail level	4116 mm	Fuel tank capacity	400 l
Max width (with snowlower)	2940 mm	Electric system	24 Vcc
Bogie Wheelbase	3800 mm	Minimum curve radius on track	90 m
Wheel diameter	760 mm	Transmission: hydrostatic closed circuit	
Cabin (length x width x height)	1900x2450x2195 mm		
Full load weight	22.8 t		
Max load on axle	16 t		

Braking System

It is made to guarantee the machine braking with complete load. The vehicle is equipped with a brake direct, indirect brake and parking brake (type UIC).

SPECIAL DEVICES

Snowblower and snowplough

The frontal snowblower is suitable to handle all types of snow, from heavy and wet to light and dry. Its serrated cutting drums easily deal with old and hardened, icy snow. The snow is ejected over long distances through the hydraulically pivoting chute. The snowplough on the other side of vehicle is used during medium or high snow.

The snowblower is hydraulically managed from the cabin by means of suitable control box (up/down lifting, lateral translation, rotation).

Main technical features

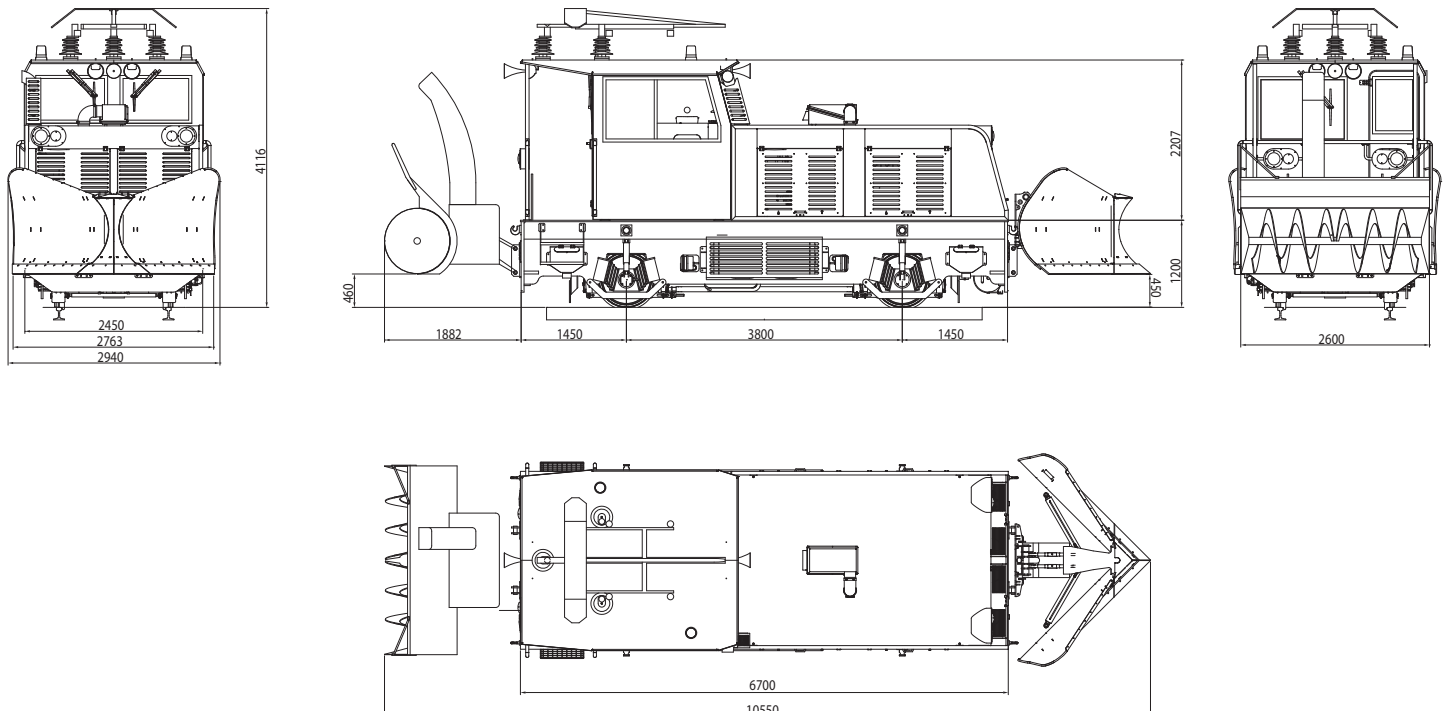
Max clearing width	2600 mm
Max height with heavy snow	850 mm
Max clearing width snowplough in trim wedge	2630 mm
Minimum width	2580 mm
Max snow removal capacity	4800 m ³ /h
Max rotation of central pivoting chute	240°
Max ejection distance	30 m

Ice defroster

The vehicle is equipped with a device for the removal of ice from the railroad switches (switches), and boxes of turnouts, by the flow of hot air from the engine case of the vehicle.

Pantograph*

The locomotive is equipped with an insulated pantograph installed on the cabin allows removing ice from the catenary wire.



* PATENT PENDING



Description

The vehicle LHTC401 is a shunting locomotive designed for rescue service in line for trains of short and medium haul.

Frame

The frame is a welded assembly, composed by standard profiles and shaped sheetmetals to house all functional components. The frame has been designed to withstand maximum operation and imposed loads without permanent deformity, fracture, cracking or fatigue in any part of frame. The main frame has been predisposed with suitable lifting points under each headstock in case of derailment.

Bogies

The bogie frame is a welded assembly, composed by standard profiles and shaped sheetmetals and designed according to the railway norms.

Power Pack

The LHTC401 has an engine compartment in which the following components are installed: diesel engine and engine radiator, hydraulic pumps for vehicle traction and for auxiliary components, oil tank, pneumatic components for braking equipment, radiator for oil cooling and fuel tank.

Cabin

The LHTC401 has two driving cabins (one on each headstock) with a driver and a co-driver desks. The control panel has ergonomic controls and pneumatic components as prescribed from the railway normatives. The material choices of cabin interior have been focused so that to ensure the most high level of safety and occupational health of workers.

Braking System

The vehicle is equipped with a compressed air braking system (UIC type); in each cabin a continuous automatic brake, direct brake, parking brake, emergency brake are located. The system grants the braking of vehicle when full loaded. Pneumatic hoses on both headstocks allow to link trailers. A standard "shoe brake" with four brake shoes for each wheel is mounted.

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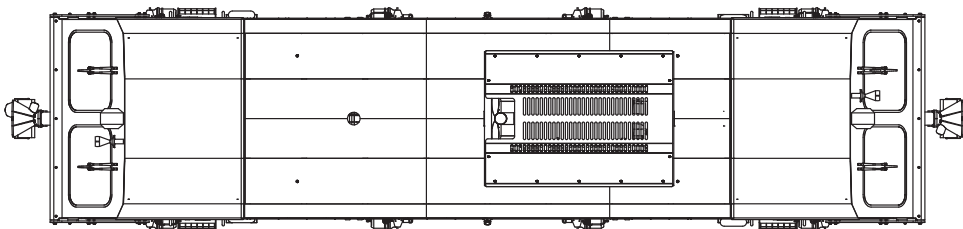
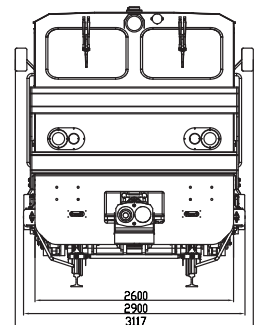
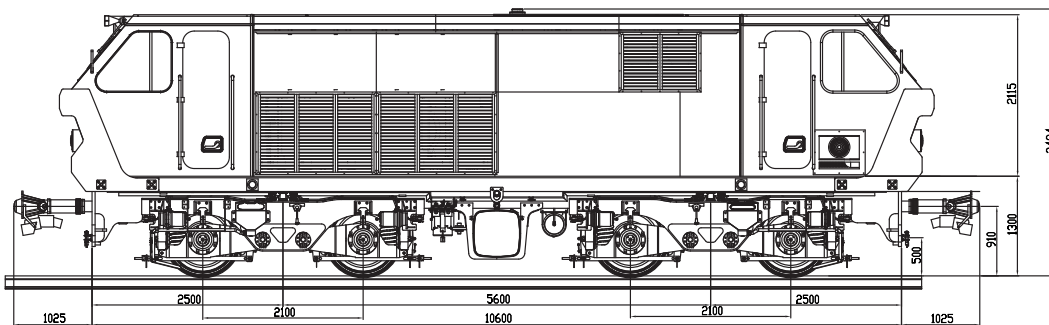
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1500

Technical features

Track gauge	1435 mm	Diesel engine	400 kW @ 2100 rpm
Frame length	10600 mm	Max speed on flat and straight track	60 km/h
Max length including buffers	12650 mm	Max speed in train formation	100 km/h
Main frame height from rail level	1300 mm	Motor axles	4
Max height above rail level	3494 mm	Fuel tank capacity	600 l
Max width	2900 mm	Max traction force at coupler	135 kN
Wheelbase	2100 mm	Electric system	24 Vcc
Wheel diameter	940 mm	Minimum curve radius on track	60 m
Flange width	135 mm	Suspension: Primary with independent swinging arm	
Full load weight	65 t	Transmission: hydrostatic closed circuit, automatic torque variation, continuous and without traction interruption	
Max load on axle	18 t		
Speed selector	n. 1 gearbox (2 speeds) per motor axle		





BASIC - ZPAD100

The BASIC instrumentation version allows the user to read the stagger on a ruler mounted on the pantograph. The catenary height is measured by means of a mechanical/electronic transducer.

The system is composed by:

- Pantograph, equipped with a ruler to read the stagger
- Thermometer, for ambient temperature measurement
- Transducer for measuring the pantograph height
- Camera
- Acquisition system
- Video monitor, displaying the temperature, the height and the pantograph with ruler
- Lamp for night operations

More technical characteristics

- Temperature range: -15 °C to +40 °C (extended range upon request)
- Metric or imperial measurement units (user selectable)



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1600

ADVANCED - ZPAD200

The ADVANCED version is based on an ultrasonic system, to measure the wire position without contact. A couple of sonar devices measure the wires distance. By triangulation (the standard telemetry algorithms) the wires position is computed. Data sampling is fixed in space. The odometer on the axlebox (which is a standard fitting on this version) triggers the measurements at constant space intervals.

This solution is very well suited for low speed applications, compared to optical systems, for a number of reasons:

- No need to keep the windows clean
- No moving parts (not all, but many optical system have moving mirrors)
- Insensitive to sun
- Rugged, light and very simple to install

The system delivers: Stagger, Height, Gradient (referred to the track), km position, Speed and Ambient temperature.

For every measured figure the user can set alarm thresholds. Values exceeding the alarm are highlighted in a different colour. The measurements are recorded in a text file, easy to import in any spreadsheet application. The user can record header data, including track identification, initial km, km increasing or decreasing km direction.

The system is composed by:

- Ultrasonic sensor
- Thermometer, for ambient temperature measurement
- Encoder on the axlebox
- Computer, screen, keyboard and relevant software
- Playback software

More technical characteristics

- Temperature range: -10°C to +40°C (extended range upon request)
- Number of measured wires: 2
- Accuracy respect to the roof of the vehicle: ± 2 mm
- Stagger range: ± 500 mm
- Samples/sec: 20
- Max speed: 60 km/h

COMPLETE - ZPAD300

This version is composed adding the video monitor to the ADVANCED version. The images are recorded in digital files, allowing an easy "jump" to the required position, synchronized with the strip chart display.

Additional Devices

Body tilt compensation for BASIC and ADVANCED version

The vehicle body tilt can create an important error in the stagger reading (the stagger must be referred to the orthogonal to the running plan, passing through the track axis). This is very likely to happen when running at very low speed in superelevated curves. The error can be 100 mm in extreme cases. To compensate this error, a couple of transducers measure the vehicle body tilt. The measurements are then processed taking also the catenary height into account. This additional device reduces the measurement error of the wires respect to the rail center positioning reference within:

- Stagger Accuracy ± 20 mm;
- Height Accuracy ± 10 mm;

BASIC: The resulting error compensation is shown on the same screen showing the height.

ADVANCED: The stagger values delivered by the ultrasonic measurement system are automatically compensated. The body tilt is also recorded.

Odometer and data recorder for BASIC version

An encoder is mounted on an axlebox, to measure the vehicle position, referred to an initial km set by the user via a keyboard. The user can input a number of file header parameters, including track identification, initial km, km increasing or decreasing km direction. The system superposes the actual km to the image.

Two files are created:

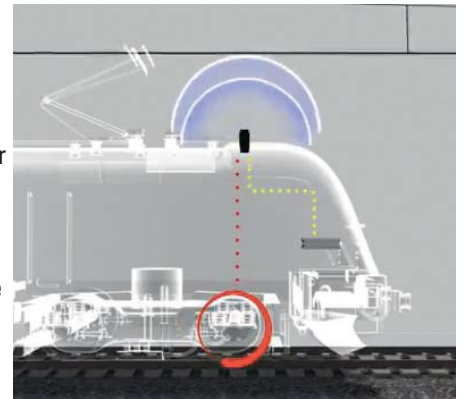
- A video file, where the measured values are superposed to the image
- A text file, where the columns are: km, temperature, height, tilt compensation (if the relevant optional equipment exists)

Pantograph for ADVANCED version

The catenary positions in static conditions (no pantograph) and in dynamic conditions are different (uplift generated by the pantograph force). It is often useful to measure the height in both conditions. The height difference divided by the pantograph force gives the catenary elasticity. The pantograph force can be regulated via the air pressure. A pressure meter allows the indirect measurement of the force. The force is a function of the air pressure and of the height; the parameters of this function can be calibrated using the tools supplied with the equipment.

The additional device is composed by:

- Pantograph
- Pressure regulator
- Pressure transducer and acquisition system
- Software for computing and displaying the force (it also displays the air pressure)
- Calibration toolset



Printer for ADVANCED version

The printer allows printing a stripchart showing the line km on the horizontal axis and the catenary parameters (height, stagger, ...) on the vertical axis. The alarm thresholds are shown and highlighted. The printer can also print text pages showing the spots where one or more parameters exceed the thresholds.

The additional device is composed by:

- Printer
- Software

Events markers (for each version)

A keyboard allows the operators to add auxiliary information to the records. Most typical events are pre-coded, and can be added just with a pushbutton or a mouse click, but the operator can also add free comments.

Among the pre-coded events: road crossings, bridge, tunnel, turn out, new km position (the user adds the km), mast id.

The events can be printed in the relevant horizontal axis position in the strip-chart.

The language can be selected by the user.

The additional devices available for the COMPLETE version are the same as for the ADVANCED version.



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Watch the video
of the machines
in action on your
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