

## Application

### EF-S the electronic kingpin steering system



#### EF-S Electronic steering system

The TRIDEC electro-hydraulic EF-S steering system is successfully fitted into trailers requiring an extremely low trailer neck, such as e.g. milk- and bulk trailers or trailers with monocoque-constructions. Low loaders also benefit from this system:

- Extremely low neck neck-mounting height required (60mm)
- Weight advantage (provided the truck directly supplies the required steering-energy)
- Minimal trailer chassis modifications necessary
- Easy and swift mounting



In contrast to mechanic and hydraulic steering systems, the EF-S system does not require a fifth wheel unit, but only a kingpin with integrated steering angle sensor. This creates a possible weight advantage, provided the required steering-energy is directly supplied by the truck, e.g. by hydraulic pump or alternator.

Where competitors have a delay in steering reaction, possible leading to trailer chassis damage, the TRIDEC EF-S system directly follows the truck's movement even at the smallest steering motion. At higher speeds and during driving straight, the wheels are locked into the straight position, ensuring a highly stable straight run. The kingpin wedge is equipped with a patented self-centring mechanism preventing damage whilst coupling. The steer cylinder, for twin tire mounting applications, is equipped with an integrated position sensor, eliminating a separate mounted sensor on the steered kingpin axle and offering a mounting advantage.



Only TRIDEC supplies the full range of all possible steering systems: mechanic, hydraulic and electronic for both turntable- and kingpin steered-axes. Allowing to provide the best and most honest steering-advice for your vehicle and application!

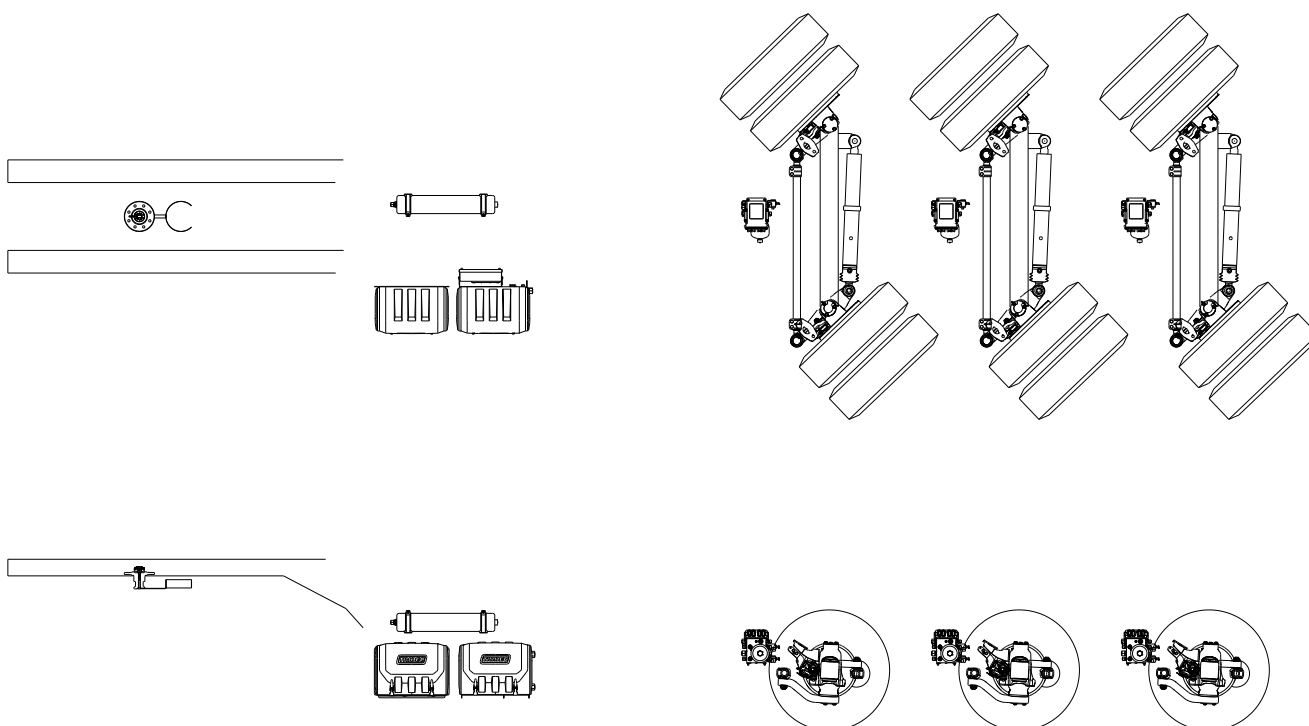
#### Savings on

- Fuel consumption
- Tyre wear
- Time by improved manoeuvrability
- Vehicle maintenance & damage
- Mounting time



### Steering Principle

The kingpin sensor detects the smallest truck steering motion and feeds the steer computer with information to activate the accumulators making the wheels turn by hydraulic steer cylinders. An integrated position sensor in the steer cylinders, or separate sensors on the kingpin axles, inform the computer about the axle steering angles. An intelligent trailer battery charging system, with temperature compensation, ensures the batteries provide the required power level to drive an electro-hydraulic pump. This powerpack provides hydraulic accumulators with sufficient energy, by means of hydraulic pressure. At higher speeds and during driving straight, a second circuit in the steer cylinders lock the wheels into the straight position, ensure a highly stable straight run.

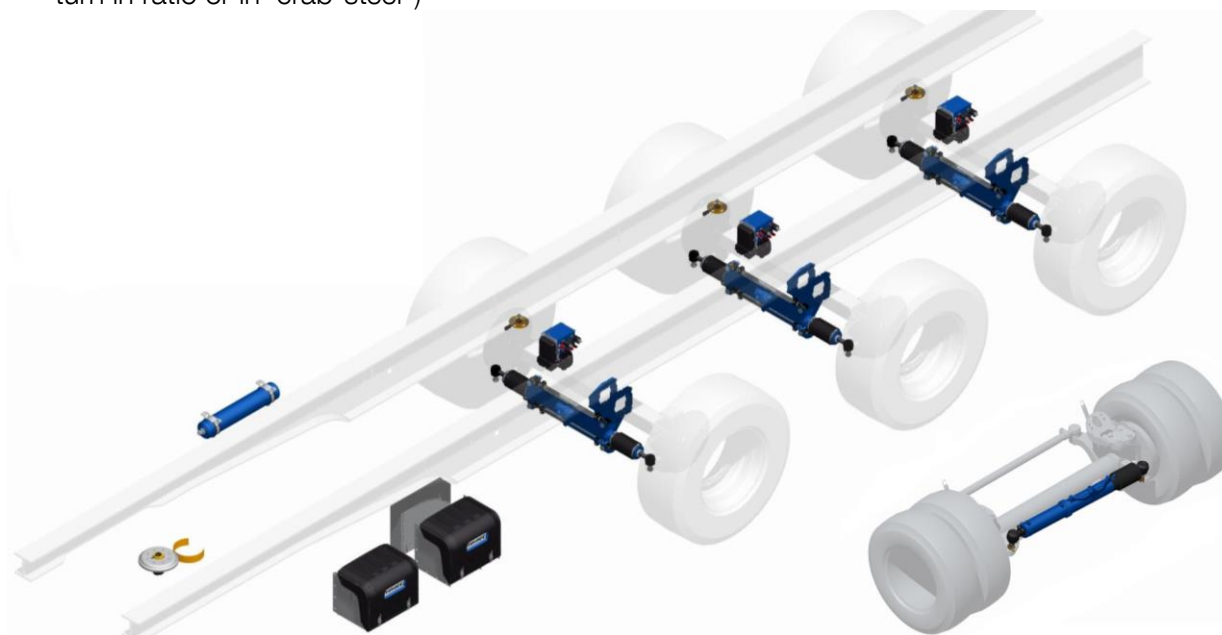


## Technical specification

### EF-S the electronic kingpin steering system

#### General

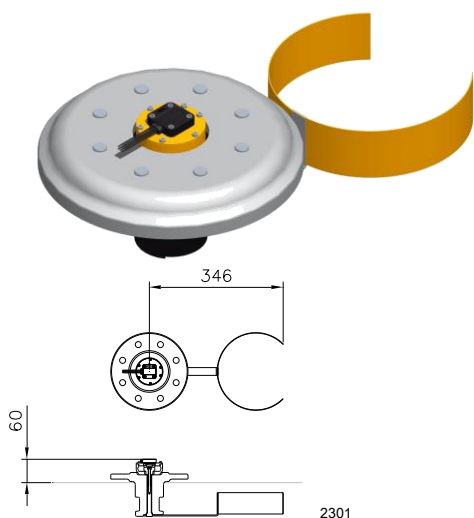
- The EF-S steering system steers one, two or three kingpin steered axles
- Suitable for single- and twin tire mounting, as most kingpin axle types and makes
- The maximum wheel steer angle can easily be adjusted to meet the available space (max 45°)
- RDW test report according EEC R79 and EMC available on request (NL-79R-010002)
- Gross weight: steering system suitable to steer one axle upon 160kg (excluding trailer batteries), each steered axle adds upon 43kg (excluding the additional weight of the kingpin steered axle)
- Components: kingpin with integrated angle sensor and wedge, two control boxes with powerpack and tank, deep cycle batteries with charging system, steer cylinder, sensor and controller
- CAN-bus and Bluetooth communication, minimizing required amount of cables
- Jost 2" kingpin with integrated angle sensor and patented self-centring wedge
- Patented steer cylinder mounting for steered kingpin axles with single tire mounting
- Steer cylinder with integrated sensor for steered kingpin axles with twin tire mounting
- No greasing points on the steering system (only on the kingpin steered axle)
- Manual control possible by wireless remote, for optimal manoeuvrability (making the steered axles turn in ratio or in 'crab-steer')



#### Technical specification

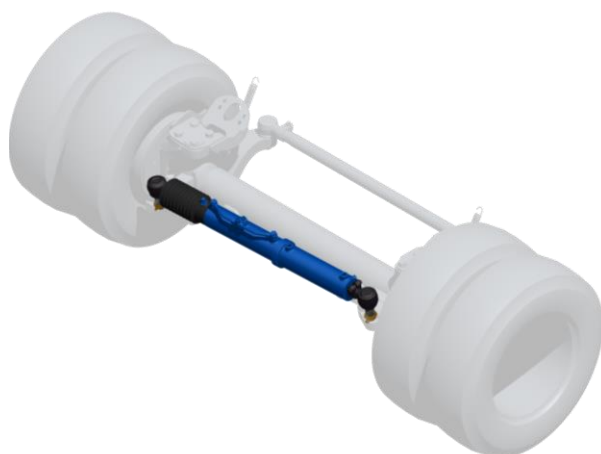
Feature	Value
Number of steered axles	1, 2 or 3
Kingpin	2" pin, 162kN, with integrated sensor and wedge
Steering angle	Max. 45° (depending on applied axle)
Gross weight single tire mounting	Upon 200kg (weight steering system for 1 axle steering, excl. batteries) +86kg (weight steering system for every additional steered axle)
Gross weight twin tire mounting	Upon 160kg (weight steering system for 1 axle steering, excl. batteries) +43kg (weight steering system for every additional steered axle)

## Components



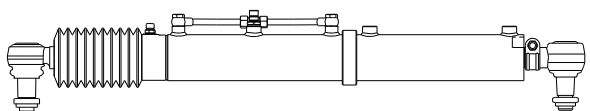
### Kingpin unit

- JOST 2" kingpin with integrated angle sensor and patented self-centring wedge
- Bolted onto the chassis by supplied JOST retention plate
- D-value max. 162kN
- Extremely low trailer-neck possible (60mm)
- Weight 6kg



### Steering cylinder SRE

- Integrated redundant position sensor, eliminating a separate external sensor on the kingpin axle
- Fast and easy mounting on the kingpin axle, by boltable ball-joints
- User friendly alignment by simply turning the cylinder's ball-joint
- Piston rod protected from stone-chipping by flexible bellow
- Color-coded hydraulic connections
- Treatment:
  - Painted steer cylinder, KTL treated ball-joints
  - Nikrom piston rods
- Weight: 37kg

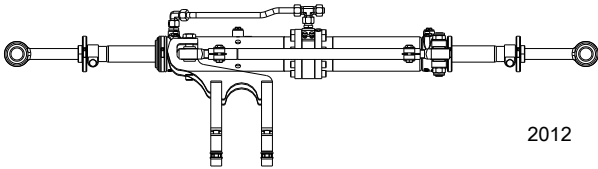


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#### Steering cylinder DRE

- Easy and swift bolttable installation onto axle-body
- Patented cylinder mounting
- Versions for most common available axle-bodies
  - □ 120mm
  - Ø 127 & 146mm
- Easy alignment, length of the track rod and cylinder position easily adjustable
- Cylinder mountings with low-maintenance bearings (ball-joints at piston rods)
- Piston rods protected from stone-chipping by flexible bellows
- Color-coded hydraulic connections
- Treatment:
  - Axle-unit and ball-joints KTL treated
  - Nikrom piston rods
- Contactless redundant angle sensor
- Weight: 80kg



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If your preferred axle is not available with the appropriate steering arms, TRIDEC can modify them.





#### Control box

Stainless steel control box with robust plastic cover

- Steer computer
- Electro-hydraulic powerpack with brushless motor
- Colour coded hydraulic connections

TRIDEC supplies all required low-current cables, hydraulic tubes and oil

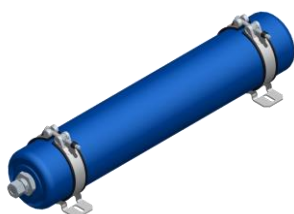


#### Oil tank box

Stainless steel control box with robust plastic cover

- Suction and return filters, with contamination indicator
- Oil level gauge
- Oil level and temperature sensor

The battery charging system can be conveniently mounted on the back or underneath the control box



#### System status light

Three coloured light (green, yellow, red) informing the driver about system status

#### Centring accumulator

High quality piston accumulator with mounting brackets



#### Cylinder-unit controller

Compact controller to activate the axle unit:

- All required hydraulic and electronic components
- CAN-bus communication

#### Trailer-battery-pack with charging system

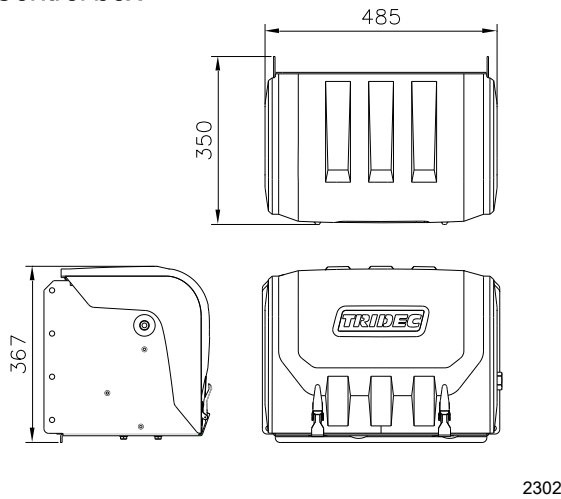
- High quality long-lasting deep-cycle batteries
- Intelligent battery charging system, ensuring optimal performance and protection even in extreme low and high temperatures



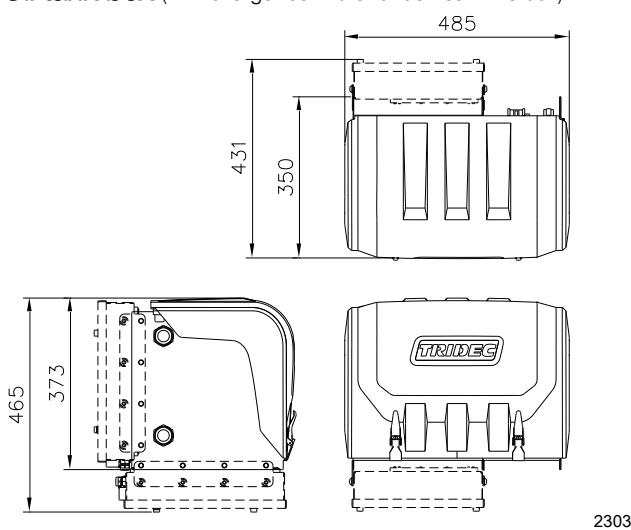
#### Wireless remote

- Manual steering to steer the axles in ratio, or in 'crab steer' (making all axles steer by equal angles)
- Remote with clear menu structure and large colour display and diagnostic functionality
- Programmable in several languages, start-up possible in max. 4 different languages
- Secured Bluetooth communication with computer
- 8 hours continuous operational, 3 weeks standby-time
- Splash-proof according to IP57 classification
- Charger, holder and strap included

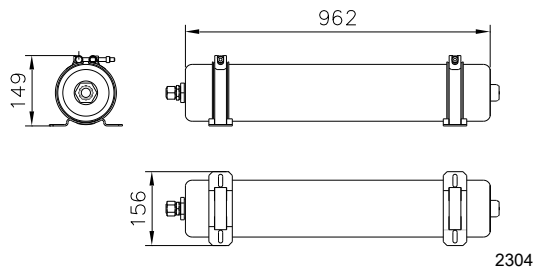
Control box



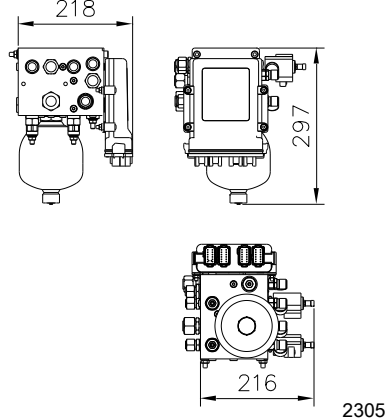
Oil tank box (with charger behind or underneath the box)



Centring accumulator



Cylinder-unit controller



## Order references

### EF-S Electronic steering system

Code	Description
2301	EF-S steering system 1 axle steering
2302	EF-S steering system 2 axles steering
2303	EF-S steering system 3 axles steering

### EF-S Options

Code	Description
2328	Extra remote holder or charge cable
2329	Extra remote
2330	Modify axle to fit steering system
2331	Cylinder mounting axle

The information contained in this document gives an indication of the possibilities. Not all exceptional models are included in this document. Please contact our sales department to determine whether a particular configuration of the system can be used in your trailer or that special solutions are possible.

### Sales contact

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