IFOY winner

TORWEGGE

TORsten

MOVE IT FOR TOMORROW

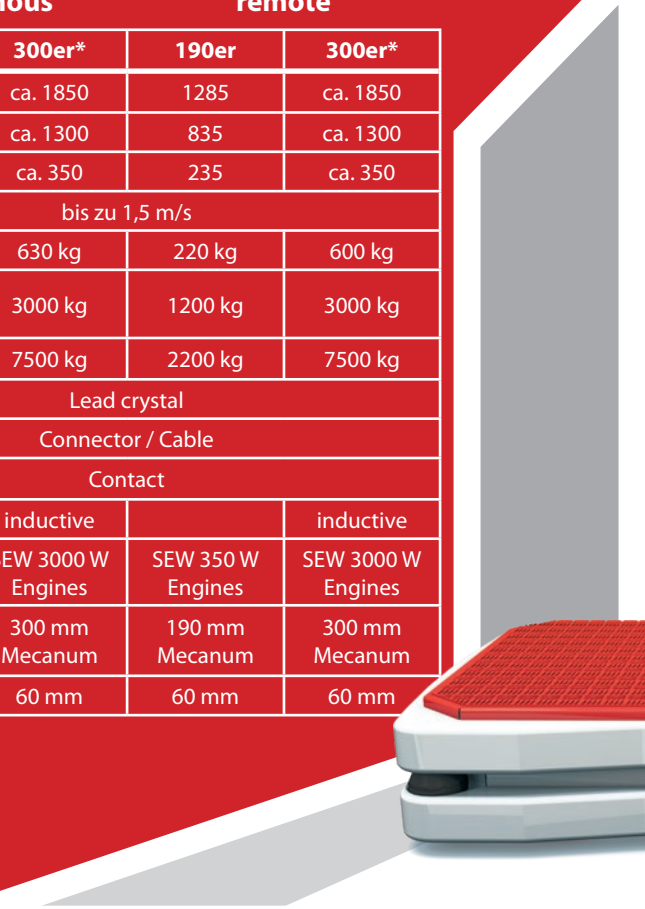
EN

www.torwegge.de

// facts and figures

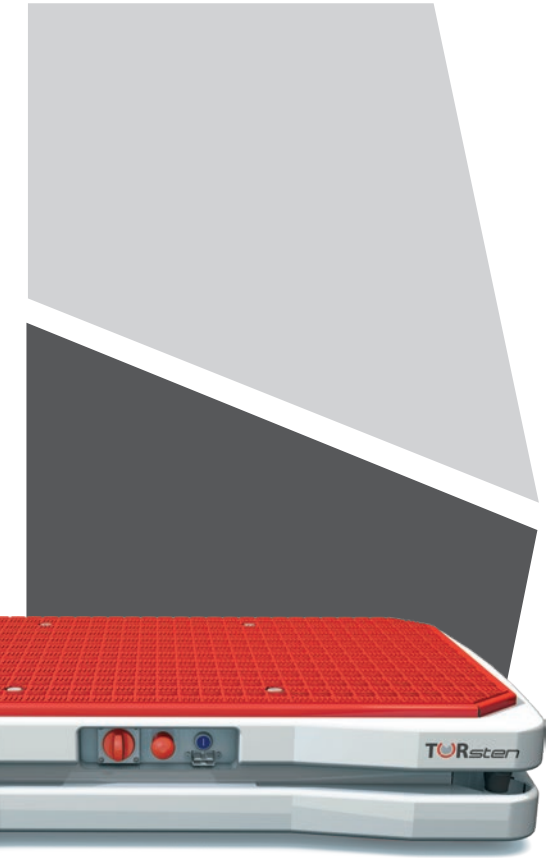
	autonomous		remote	
	190er	**300er***	**190er**	**300er***
Length	1285	ca. 1850	1285	ca. 1850
Width	835	ca. 1300	835	ca. 1300
Height	235	ca. 350	235	ca. 350
Speed	bis zu 1,5 m/s			
own weight	250 kg	630 kg	220 kg	600 kg
Direct Load capacity	1200 kg	3000 kg	1200 kg	3000 kg
Sliding load	2200 kg	7500 kg	2200 kg	7500 kg
Batteries	Lead crystal			
Charging concept I	Connector / Cable			
Charging concept II	Contact			
Charging concept III		inductive		inductive
Drive	SEW 350 W Engines	SEW 3000 W Engines	SEW 350 W Engines	SEW 3000 W Engines
Wheel	190 mm Mecanum	300 mm Mecanum	190 mm Mecanum	300 mm Mecanum
Lifting height	60 mm	60 mm	60 mm	60 mm

* in construction



IFOY AWARD
Automated Guided
Vehicle of the year 2017

strong
flexible helpful reliable
powerful



- Variety of platforms to drive under for easy customization
- Autonomous Navigation for reliable and future looking material flow
- Navigation via 2D layout, so no on-site changes in conversion or relocation of production necessary
- 9 axis robot cinematics (3 axis used for driving, 6 axis free to integrate e.g. 6-axis-Lightweight Robot to perform picking tasks)
- Depending on the design, TORsten moves loads of up to 7.5 tonnes and lifts loads of up to 3 tonnes
- Omnidirectional drive concept for movement in the smallest space and 360° assembly
- Exsisting transport routes can be used by TORsten and humans simultaniously (person safe)
- Reduction of driving speed when narrowing roads or approaching an obstacle
- robust construction
- Battery: Hardly self-discharging, resistant to high current, non-toxic, non-flammable, cycle resistant

// Navigation

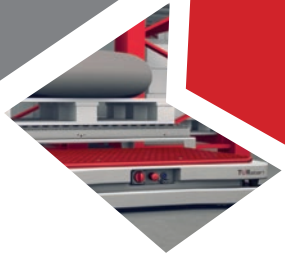
After transmission of the destination, the TORsten automatically finds the best route to that position by autonomous navigation. For this purpose, the following software components are integrated at the core of the control system in the navigation computer:

- **Localisation**
- **Global route planning**
- **Local collision avoidance**

The **localisation** software is based on the widely used, highly reliable Adaptive Monte Carlo Localisation. Through a fuse of sensors, the data from the laser scanners, the integrated inertia measuring device (rotary speed/acceleration) and the wheel encoders is brought together and to determine the actual global position of the platform. The data from the laser scanners (2D light section) is compared with the factory layout, so that operators can track the position of the platform.

The **global route planning** system refers to a virtual route network that can be configured to reflect the actual physical environment. This approach does away with linear guide systems, inductive loops or magnetic track guide systems. The global route is calculated by means of an A* algorithm, based on the travelled track.

Local collision avoidance makes sure that moving obstacles are reliably identified by the lasers. For this purpose, the planners devise what is known as local cost maps. These maps are constantly updated to show all local obstacles so that the shortest obstacle-free route from the current location to the destination can be calculated. The vehicle is therefore permitted to leave the initially chosen global route should this be necessary to prevent a collision.



// drive and control concept

The modular power management and control technology of the TORsten meets the requirements of modern autonomous robot vehicles.

48 V DC power system; control voltage 24 V (industry standard)

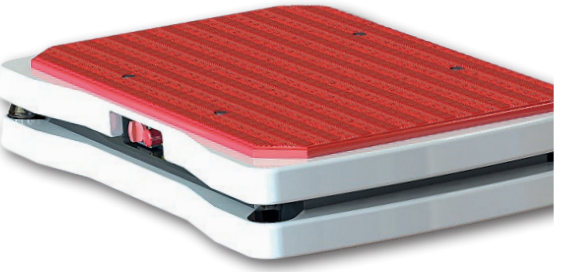
- 48 V DC intermediate circuit with voltage and current monitor
- Energy supply through inductive power transmission or contacts
- Modern power storage system with environmentally friendly lead crystal batteries
- Operating time of minimum one shift without any need for recharging
- Integrated power management system from SEW Eurodrive

Modular control system for manual remote control or autonomous navigation with integrated route mapping processor

- User-friendly remote control with integrated safety technology for manual control
- Movement range in autonomous mode secured by safety scanners
- Automatic adjustment of vehicle speed to suit working area
- Speed-controlled scanned range switching for accurate
  movement in confined spaces
- Display of all vehicle parameters and states on stationary monitor

Distinct and consistent robot layer model for software and vehicle control (doing away with first navigation computer layer in the attached vehicle)

- Route planning system
- Robot kinematics (SEW Eurodrive/ MOVI-PLC)
- Multi motion (SEW Eurodrive/ MOVI-PLC)
- Drive power booster (SEW Eurodrive/ ELVCD)
- Drive units (SEW Eurodrive– CMP servomotors)



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