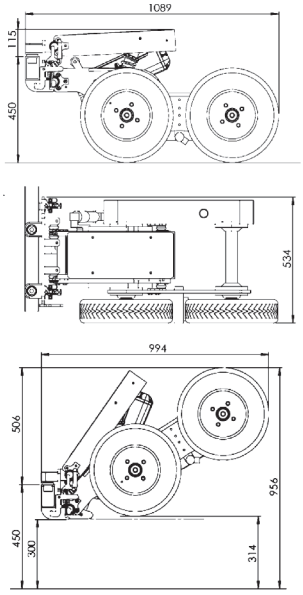
TWO™
Traction Watcher One

TRACTION WATCHER ONE
– FRICTION METER –

Friction meter using precise weight values for definition of friction.
Friction meter additional equipment that provides exact local knowledge.

TWO - FRICTION METER



TWO is a vehicle-mounted gauge for effective measurement of friction on roads and airport runways. When used on the road, TWO is mounted on the left side of the vehicle, to measure the left wheel tracks and for airport the TWO is mounted so that the measuring wheel, detects the friction value between the tire and the runway in the center of the vehicle. The unit is raised and lowered by an actuator and controlled by the TWO software installed on the laptop inside the cockpit of the car.
The friction meter can be moved between multiple vehicles with attached TWO harness and mounting beam. TWO documents the friction on the roadway at speeds of between 5 km / h and 110 km / h

TECHNICAL DATA:

Width	534 mm	Weight:	75 kg
Length	1089 mm	Load on ref wheel:	120 kg
Height	565 mm	Load on frict. Wheel:	60 kg
Ground clearance in transport position:	300 mm	Measuring Principal:	Fixed slip
Wheelbase	450 mm	Slip percentage:	17,8 %

TWO has a simple and robust construction and is attached to the vehicle on a QC standard mounting beam with four attachment points. Coupling plate has two snap locks and an extra safety device.

Connector plate, which is mounted on the girder rear, holding two sub frames (upper and lower). These are holding mounting devices as the electrical cylinder, helical springs and shock absorbers that provides the Friction meter with a smooth ride, and protects the chassis of the TWO unit against bumps and holes in the pavement. Lower support frame keeps the chain case with reference wheel and gauge wheel.

O & M (Operation & Maintenance contracts), there is a requirement for friction to be observed on defined road type. For example, on salted roads, trunk roads, the friction value is set to a minimum requirement ($\mu = 0.4$).
TWO makes it easy to obtain a good overview of friction, or dew-point temperatures, thus defining the need to take action. Moreover defined which measures should be implemented. Adding the measurement results to the other on hand Information, provides the contractor with enough data to ensure a qualified decision on weather You pull out your salting trucks for salting or not. You are on top of the situation, and can yourself decide, which roads should be prioritized for action.

MEASUREMENTS WITH STANDARD TWO

TWO collect detailed measurements of friction for wet, dry or icy road or runway. The values are transferred to the TWO monitoring program, which is installed on a laptop inside the car. In the program, you can immediately analyze and generate reports on road conditions so that specific bank or scatter measures can be taken where necessary. This saves you time and money by performing salt action only where it is necessary, moreover, to document the situation 100 % and ensure the safety of a measured road.
Our device records the weight on wheels (Fn) and the tension in the chain (Fk) simultaneously. Collect frequency is 100 Hz.
The average of these 100 measurements per second, ie friction value ($\mu = Fk / Fn$) is plotted in the friction graph once per 10 m

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TWO Friction Meter can be installed on most types of vehicles. However, we recommend vehicles that do not exceed 1000 mm, from the rear axle and trailer coupling. The car must have some carrying capacity. For example, a VW Caddy be a useful vehicle to mount TWO on.
On some models, we offer fixed prices for installation of the TWO measuring equipment.
Other departments will be responsible for service and annual check on your TWO friction meter.

TWO ON A TRAILER
Since we've had huge demand for trailer mounted TWO meters, Olsense chose before the operating season 2011-2012, to develop a trailer, so that the customer could decide whether he wanted the TWO attached to a car or a trailer.

REQUIREMENTS FOR THE CAR
A trailer hitch must be preinstalled on the vehicle. The car must not have difficult access for TWO brackets, if the fixed price assembly shall apply.

The following TWO equipment covered by the assembly:

Item:	**Description:**	**Comments:**
200 001	Two friction meter	- to be mounted to the QC bar on the rear of the car.
601 801	Computer Hardware Box	- for installation in car
601 001	Cable math	- to be mounted in a car
100 101	Car mounting beam	- to be mounted behind the car
503 403	Friction Test Tire T 520 QC,	- to be mounted on friction meter.
602 701	GPS module, including antenna	- to be mounted on the dashboard in the car
000006	Measuring laptop	- to be mounted at the driver's seat.
602 501	Laptop stand	- to be mounted at the driver's seat.
602 201	Weight Calibration Kit	- Resolved supplied, tripod and carrying case.

Other devices:
TWO Friction meter is also adapted to other uses. Such as when installing on a salting truck, it provides a 0-10V signal. If preferred, the friction value will appear in the salt spreader control console.

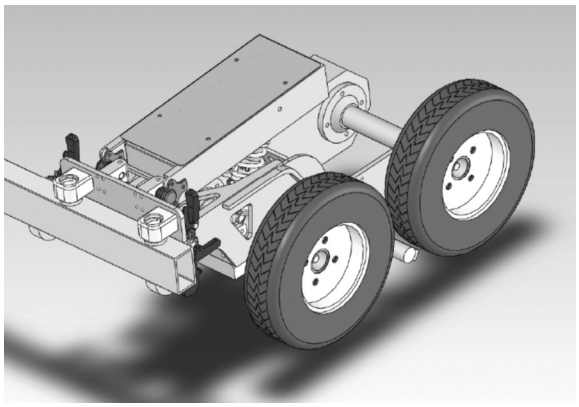
TWO FRICTION METER OPTIONS:
1 Camera used to supplementary document the conditions of the road network. The software includes picture transfer in the measurement file, when transferring data to the storage server (FTP.)
After the data transfer, files are immediately available to other users with access to the FTP address.

2 Temperature and humidity module: An air and infrared camera temperature unit is available. The 3 sensors covers air and track temperatures and humidity meter is provided to supply additional documentation to TWO log. When the dew point temperature exist along the roadway on the friction measured area.
These 3 values is the basis for a qualified assessment of the need for actions taken.

4 Summer measurements of water film. With this module, it will be possible to lay the basis of 0.1 mm to 1.0 mm (airport) water film in front of the wheel. On roads, they typically use 0.5 mm film of water in front of the measurement wheel. The purpose of these measurements is to identify areas in the asphalt roads with no draining capability. For example on the newly laid asphalt, will need this documentation. Or on airports, where rubber buildup, on sections of the runway has to be detected. The TWO friction meter, when used with the ASTM 1551 approved tire will provide You with good and reliable information.

MONITORING / REPORTING

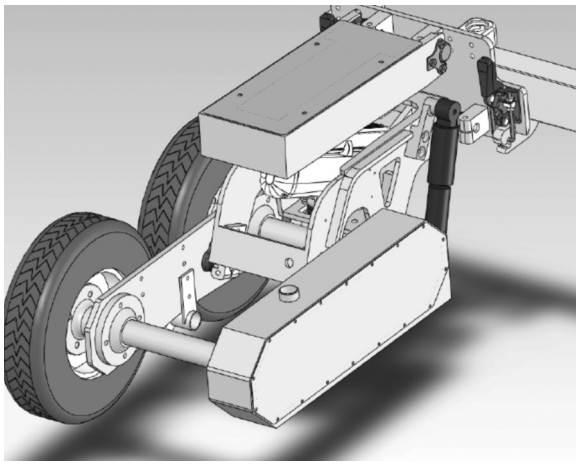
Friction Meter hardware, connected to a laptop which is mounted at the drivers seat, with a USB cable. TWO comes with a software to handle measurement, display and storage of data. The program ensures easy operation, collect, store, and you as the user, able to present and forwarding measurement data. This gives everyone involved (Requires FTP access.) access to measurement data, immediately after the measurement is performed. In order to optimally exploit this functionality, all TWO gauges are supplied with GPS, so you can perform continuous measurements of friction level over a given stretch of road and also be able to see whether your measurement is below, or above target, by adding friction measurement colours on the map. Values below friction requirement on the road emerges in red color (deviation) and values aboveof the requirement for friction will be colored green. Approved.



Variance reporting - we have brought out a new report in the software, which immediately tells your deviation down to 20m lengts.

APPROVALs:

In order to use measuring equipment in different areas, there are requirements for measuring equipment from the authorities.



ROADS:

NPRA by Roads.
- Winter measurements on roads.
- Summer measurements on roads.
- Spense Harmonization approval.
• Measurements on roads in the EU.
- Summer measurements of water film on the road.

AIRPORT:

- Avinor by the CAA. In Norway.
- Approved for use on Norwegian airports.
- FAA (Federal Aviation Authority).

RULES IN NORWAY

Since all friction gauges used to document the level of friction on the road to through a calibration against Roar MK V every year before the winter season starts, we have concluded that we should inspect the unit before TWO calibration against Roar is executed.
The control is performed with TWO friction car, so we get checked the complete car installation. During one such visit we upgrade to the latest TWO software on their TWO software laptop. We issue and / removes a label indicating that the meter is checked and approved. The approval will last for a year at a time, unless the meter is exposed to major unforeseen changes. With this we achieve two things, TWO gauge will definitely be 100% technically optimal, and you can meet season in the knowledge that the meter provides accurate measurement and validation against the Roar Reference meter, will go quickly.

Please contact us for further information.

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