



**TRAXX**

# **TRAXX-M2**

## **BOLT TENSION MEASUREMENT**

Technical data sheet



**TRAXX**

# SPECIFICATIONS OF THE TRAXX-M2 DEVICES

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# I SUMMARY

# TRAXX-M2



25 cm (10 inches)

## 1. Designed for industrial use :

- **Mobile:** weight 3 kg, Battery life 5 hours in continuous operation. **8 hours in option.**
- **Rugged:** IP64, shock resistant
- **User friendly:** Touch screen, icon-driven interface. Sun readable touchscreen in option.

## 2 – Compatible with a vast majority of screw types

- works generally with **non-rectified bolts**

*actual example of a stud measured without any modification*



- Screw length: 5 mm to more than 15 METERS
- Screw diameter: 2 mm to more than 50 cm (unlimited)



## 3 – Up to 1 to 2 % accuracy on tension

- Results displayed directly in kN or  $\mu\text{m}$  or mils
- All measurements are temperature compensated
- **Non-intrusive method:**

The measurements **do not require any modification** to the assembly, and **do not generate any additional cost**, unlike the so-called “*intelligent*” screws

## II QUICK VIEW

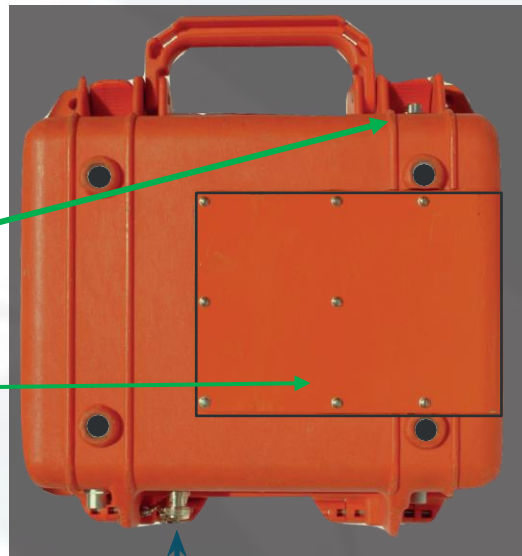
### INPUT / OUTPUT



- Temperature probe socket
- Mains adapter socket
- Accessories adapter (optional mouse & USB key)
- Ultrasound probe coaxial socket

### CASE OPTIONS

- Video output (screen copy to external screen)
- Trap door for end user battery or hard disk replacement
- 0 - 10 V analog output



## ACCESSORIES

**The standard IP67 companion box (same size) includes:**

- › Ultrasonic sensors and cables
- › Temperature probe
- › Mains adapter (all countries)
- › Optical mouse (for optional use in place of the touchscreen)



# TECHNICAL SPECIFICATIONS

## T III CASE

Case type: waterproof suitcase with handle

Material	Polypropylene (resists up to 90°C) (194°F)
Size	<b>Width: 27 cm</b> Length: 24 cm Height: 12 cm (10.6 x 9.4 x 4.7 inches)
Weight	3 kg approx. (6.6 lb)
Volume	7.5 liter approx. (450 cu inch)
Sealing	<b>IP67</b> closed <b>IP 64</b> running
Buoyancy	Yes (closed only)
Strength	100 kg (can be walked on ...)
Acceptable as in-flight hand luggage ?	Yes Internal Li-ion battery <100 Wh is OK for airline companies
Front plate	Mylar and washable polycarbonate

## T IV Ultrasound sender & receiver

Sender amplitude	<b>250 V</b> ou 100 V user selectable
Sender type	Programmable square pulse sender
Sender pulse width	Programmable with a 1 ns ( $10^{-9}$ s) resolution from 25 ns to 500 ns
Allowable UT sensor frequency	From <b>1 to 20 MHz</b> Other values in option
Ultrasound cable length	Up to 10 meters standard (33 feet)
Cable length influence	<b>Automatically zeroed in double echo mode</b>
Receiver amplifier gain	Automatic (AGC) 0 to 60 dB. TWO simultaneous amplifiers in 2-echo mode
Transmission mode	Optional. Driving two sensors, one sending and one receiving (see-through mode)



# V TEMPERATURE COMPENSATION

Temperature sensor type (supplied as standard)	Platinum sensor <b>PT100 4-wire A class</b> Accuracy $\pm 1^{\circ}\text{C}$ Resolution $0.1^{\circ}\text{C}$
Optional temperature sensor	Thermocouple J or K, accuracy $\pm 2^{\circ}\text{C}$ Resolution $0,1^{\circ}\text{C}$
Screw temperature compensation	Automatic by the internal software
Screw Temperature measurement limits	-100 $^{\circ}\text{C}$ to +100 $^{\circ}\text{C}$ (-148 $^{\circ}\text{F}$ to 212 $^{\circ}\text{F}$ ) Optional : -100 $^{\circ}\text{C}$ to +200 $^{\circ}\text{C}$ (-148 $^{\circ}\text{F}$ to 392 $^{\circ}\text{F}$ )



## VI MEASUREMENT MODE

Sampling clock stability	<b>1 ppm (<math>\pm 1 \cdot 10^{-6}</math>) long term</b> (10 years) = <i>Maximum display error of 1 ns for a 1,000,000 ns measurement displayed</i>
Sampling frequency	2 GHz multipass sampling. Internal resolution 0.5 ns
Sampling depth	1 MB (6 meters flight time at 1 GHz sampling) (Reduced frequency above 6 meters)
<b>Measurement MODE</b>	SM : SIMPLE mode (One echo) <b>DM : DOUBLE echo mode (2 echoes)</b>
Echo rank	1 to 6 in SM (1 to 12 in DM mode)
Signal display	Simultaneous display of <b>two echoes</b> during measurement, with user selectable zoom
Gain control	Automatic, software driven (AGC), 250 times a second. Two independent gains for two echoes in DM (double AGC)
Signal detection	Signal zero-crossing measurement ( 2 Z.C. in DM)
Signal detection gate	One gate in SM, two gates in DM.
Gate delay	Programmable, from 0 to 1200 $\mu$ s (8 m ToF in steel) Optional: 0 to 5000 $\mu$ s ( 18 m ToF in steel)
Gate width	Programmable, from 400 ns to 20 $\mu$ s
Signal detection polarity	Programmable, positive or negative, two independent settings in Double echo mode
Measuring rate	200 to 300 measurements a second, depending on mode and gate width
Screen refresh rate	2 Hz approx.: New signal image displayed every half of a second
Real time statistical computation of 200-300 measurements per second	Automatic cancellation of false measurements Real-time signal stability display (bargraph) Coloured stability flag (Green : Orange / Red)
Maximum screw length	3.5 m (SM) or 1.75 m (DM) Optional 1 : 7 m (SM) or 3.5 m (DM) Optional 2 : 14 m (SM) or 7 m (DM)
Minimum screw length	4 mm approx. (with reduced accuracy)
Minimum screw diameter	2 mm approx. (with special UT sensor) 4 mm approx. with standard sensor
Maximum screw diameter	Unlimited (actually tested up 500 mm)
Materials	Steel, stainless steel, Inconel, titanium, aluminium, bronze, plastics, ...
Unity of result display	TENSION (kN) or ELONGATION ( $\mu$ m or mils)

## T VII SETTINGS Mode

Automatic ultrasound signal settings ? (on a new unknown screw type)	YES. The operator only sets the material, and the <i>approximate</i> length of the screw
New screw type length measurement	Directly on the screen (virtual calliper)
Automatic setting duration	<b>7 seconds</b>
User adjustable settings ?	YES. With a password (configurable)
Signal display	Full scan of the signal . And two windows for zoom of the two echoes at the same time.
Total number of different settings (= different screw types) in permanent memory	<b>10,000 (ten thousand)</b> Exportable to any PC or other Traxx device
Settings labelling (Screw type labelling)	By an ordinary name (20 letters max) Recorded in a 4-level tree <ul style="list-style-type: none"> <li>- 5 "sites"</li> <li>- 5 "services"</li> <li>- 20 "systems"</li> <li>- 20 "screw types"</li> </ul> $5 \times 5 \times 20 \times 20 = 10,000$ screw types <i>The tree level names are user configurable</i> <i>By the administrator</i>

## T VIII Calculation of K us and $\beta$ factors

K us (kN/ns) calculation	Automatic linear regression on N points
Screen display of the linear regression straight line for K us	Automatic display on the color screen Export to the USB key
Correlation coefficient	Automatic calculation and display
$\beta$ factor (temperature) calculation in ns/°C	Same as K
K and $\beta$ memorizing	10,000 values for each (one for every setting)



# T IX Internal data management (data logging)

Measurements recording	Automatic recording of every measurement, with only one click
Recorded measurements arrays	From 1 to 32 columns (1 to 32 screws of the same type) for every array. Automatic new lines creation Configurable labelling of columns
Array maximum number of lines	Unlimited Screen display of the last 50 ones
Number of arrays	10,000 (ten thousand)
Recorded datas for every tension measurement	<ul style="list-style-type: none"> <li>- Time of flight in ns</li> <li>- Screw temperature in °C</li> <li>- Date / Time</li> <li>- Operator's name</li> <li>- Traxx-M2 serial number</li> <li>- Traxx software version</li> <li>- Internal Traxx-M2 temperature</li> </ul>
Measurements storage capacity	Almost "infinite" (more than one million)
Signal shape recording	Automatic, without operator action
Display of a recorded signal shape	Automatic callback of the signal image on one click
Recorded measurement display	On the screen Or on a PC after export on the USB key
Data retention	Infinite, no time limit. Even with a fully discharged battery
Permanent memory type	Industrial SSD memory (Compact Flash card). High temperature compatible(80°C)
Data security	All the user datas are stored in double copy with automatic storage and restauration.  Memory backup on USB key, in 3 minutes



## **X Communications (Import / Export)**

Data media	USB key (provided as standard)
Exchange of screw types names between Traxx-M2 devices	YES
Exchange of the settings between Traxx-M2 devices	YES
Exchange of measurements between Traxx-M2 devices	YES
Import/Export of screw type names on PC/MAC	YES
Import/Export of screw type settings on PC/MAC	YES
Import/Export of measurements on PC/MAC	YES
Export files types	CSV Ascii text files Easily imported by Excel, Word ...
Full internal memory backup	YES, on USB key



## XI Mains adapter (world wide)

Mains voltage	100 to 240 Volts AC, automatic switching
Mains frequency	47 to 63 Hz, automatic switching
Mains power	90 Watt 19 Volts 4.7 Amps
DC input on M2 case	19 Volts DC (polarity inversion protected)
Power consumption	4 A maximum
Fuse	Internal, automatic resetting
Mains cord	2 m, no earth connection (double isolation)
Mains / Battery switching	Automatic, even in the course of a measurement, without any disturbing effect.
Battery charger	Internal, automatic
Full charge duration	4 hours approx
Stand-by charge	Automatic, no time limit
Autonomy on battery	5 hours approx., in constant use
Battery charge display	On screen bargraph and duration display
Battery replacable by end user	Yes, with the trapdoor option
Full M2 fonctionality when battery is fully discharged?	Yes, normal use on mains. But not recommended (no security if mains fails)
Influence of battery charge state on measurements	No effect, even if battery is fully discharged
Influence of mains voltage on measurements	No effect



## XII Man-Machine Interface (MMI)

### Screen

Resolution	<b>VGA color</b> 640 x 480 pixels (Big pixels, very easy to read)
Technology	LCD TFT color with CCFC or LED backlight
Touch screen	Yes (usable even with gloves) Resolution 0.2 mm
Number of colors	16 millions
Image size	17 x 13 cm ( <b>8.5 inches</b> )
Brightness	<b>400 cd/m<sup>2</sup> standard</b> <b>Optional : 1.200 cd/m<sup>2</sup> sun readable</b>

### Keyboard

Type	Virtual keyboard on touch screen
Alphanumeric keyboard	Complete virtual keyboard User configurable : AZERTY / QWERTY / ABCDE Lowercase / Uppercase
Number of physical keys	4 physical keys (Yes / No / Exit / Stop)

### Mouse

Type	Optical mouse (provided as standard). Optional use.
Number of buttons	2

### Screen hardcopy

Type	<b>Software:</b> Screen shot in one click, exported as jpeg file to the USB key <b>Hardware:</b> Live hardcopy with video output option
Number of buttons	2

### Language

Standard languages	French + English
Optional languages	<b>German, Italian, Portugese, Spanish, ...</b>
Other languages (special option)	Any language on special order

## Operator identification

Identification	By one click on the virtual keyboard (by name of 20 characters maximum)
Number of recorded users	25
Security	Configurable password (4 digits) To block settings modification by unauthorized operator Configurable by the administrator

## Optional analog output

TYPE	Programmable 0-10 Volts analog output Representing the currently displayed bolt tension value
Resolution	10 bits ( $\pm 10$ mV)
Output socket	Coaxial BNC 50 $\Omega$ short circuit protected



## XIII Environnemental

Use temperature	+5°C to +35 °C ambient temperature
Internal fan	Automatic, software driven Used for internal temperature equalization No outside air circulation (IP64)
Internal temperature	Software regulated, internal temperature displayed on-screen by a colored flag (green/yellow/red)
IP protection	IP 64 in use IP 67 closed IP 54 in use with optional trapdoor
Ok for air travel?	YES (automatic pressure valve included) Internal Li-ion battery less than 100 W.hour



## XIV CE certification

Laboratory	HAZTEC 4 avenue de la Baltique, Bat B, BP725 91962 COURTABOEUF Cedex FRANCE
Reference	R99167 -1 et -2
Electrical safety	According to NF EN 61010-1 "Directive basse tension"
Electromagnetic compatibility (EMC)	See next lines
Emission (industrial area)	According to NF EN50081-2
Conducted emissions	According to NF EN55011 class A
Radio frequency disturbances	According to NF EN55011 class A
Immunity (industrial area)	According to NF EN50082-2
Rapid transients	According to NF EN61000-4-4
Electric field	According to NF EN61000-4-3 & ENV50204
Conducted disturbances immunity	According to NF EN61000-4-6
Electrostatic discharges	According to NF EN61000-4-2



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