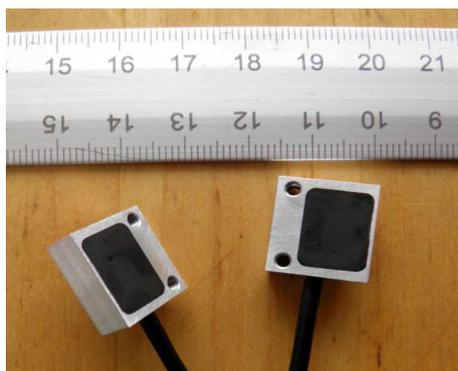


TRAVELMATIC

V1.1



Description

The TM-01 kit for equipping the semi-professional and hobby machine tools (a milling cutter, turning lathe, drill etc.) with a system of digital position measurement (DRO). The system is meant for the precision readout of linear and rotational movements of machine parts and mechanisms along 3 axes. The kit contains 1 to 3 miniature position sensors, a magnetic strip (length depends on the order), a protective steel band and a measuring software. For displaying, a PC, a tablet or a mobile phone with Windows operating system, and minimum screen resolution of 1024 x 600 pixels, can be used. The sensors are manufactured with either UART TTL, RS232, USB or Bluetooth connectivity. The installation is very simple and the sensors are of one of the smallest variety among similar sensors on the market. The set allows you to set up a quality system of digital measurement system, even with such a small tools like the mini milling cutter PROXXONN MF70, or the miniature lathe SM-300E. But even with bigger machine tools this set find its uses, especially when the measurement needs to be carried out in limited spaces, or when the requirement is, for the movement of the parts to be restricted as little as possible. The measurement is carried out either in metric units (mm), or in Anglo-American units (inches). Upon request we can also offer a miniature module for connecting up another sensors to the system, for instance incremental optical sensors with TTL output (max. 5V). Advanced sensor settings in the menu, allows you to set the number of impulses per mm, the type of movement and also the direction of measurement.

Differentiation ability of the system: ~2 um

Accuracy: ~40 um/m (strip AS-KBEE10-1.0-K)

Accuracy: ~20 um/m (strip AS-KBEE10-1-A20K) – to order

Accuracy: ~10 um/m (strip AS-KBEE10-1-A10) – to order

Max. measuring speed: ~20 cm/s

Scale of ABS display in linear measuring mode: 0 - 999,999 mm

Scale of ABS display in angle measuring mode: 0 - 359,999°

Power input: 5V adapter or USB

Power consumption of 1 sensor (UART TTL output): ~20 mA

Power consumption of 1 sensor (with USB module): ~25 mA

Power consumption of 1 sensor (with Bluetooth module): max 50 mA

Dimensions of the sensor itself: 15x16x6 mm

Sensor Protection Marking: IP68

The systemic parts (sensors and the strip) are resistant to water, mineral milling oils and suspensions. Refer to the tab of **Chemical Resistance Of The Magnetic Strip..**

Readout Program Travelmatic

The readout program is designed for use with Windows OS (XP, 7, 8, 10), and requires no performance limits on the machine. At the moment, versions for screen resolution of 1024x600 and 1280x800 pixels are available.

1) Readout program Travelmagic needs no installation, and is launched from an .exe file.

2) As a part of a shipment of DRO **Travelmatic**, is a CD with following files:

TM.exe - the readout program itself

switch-20.wav - a sound of a button pressed (can be replaced with another .wav sound, but name must be the same!!!)

FTDI – a folder with USB drivers for sensors connected by USB (for sensors connected by RS232, UART TTL or Bluetooth, no drivers needed).

3) Files **TM.exe** and **switch-20.wav** must be filed in the same folder. For ease of access, create a shortcut on the desktop, or in the start menu, in the folder for automatic launch on startup (if the PC is only used as a displaying unit for DRO).

4) Upon first launch, the screen will automatically show the Settings Menu (See par. **Menu Items**) and in the destination folder, the config. file **TM.CFG** is created (See par. **Items in Config File**). This option is especially interesting in cases, where one PC (or tablet), is used for working with different machines or sets of sensors. If the settings are wrong, so that it could complicate the program launch, you can simply remove this program altogether and after the launch, the settings can be done anew.

The movement sensors keep the data about the current position on the ABS autonomously (while powered). This means, that unless the sensor is unplugged from power, the disconnect of a readout unit will not lead to the loss of measurement data, even in the case, that the measured machine part has been moved. This also applies to USB sensors, but only on the condition, that they are connected to the PC (or tablet) via an active USB switch (an USB hub with its own power supply). This property allows one to switch between different machines, or sets of sensors, without the necessity to reset the current sensor position.

Setting Up of the Sensors

The magnetic strip is to be glued to a clean and degreased surface, after which the protective steel band can be placed over it. The magnetic strip and the sensors must not be exposed to direct mechanical forces, or the magnetic field of electric or permanent magnets. During installation of the magnetic strip and sensors, please uphold the rule of the stiffest possible setup. That means, that the sensor must be fixed so, that there is no unwanted or uncontrollable movement against the magnetic strip. For instance, the sensor mounted on a support made from thin tin, could be exposed to vibrations coming from the motor of the mill, lathe, drill etc. Any movement of the sensor against the magnetic strip is processed as a measured movement. Depending on what's more advantageous, the magnetic strip is installed on the movable machine part, or on the stationary. On the counterpart, the sensor is placed. See the paragraph **Examples of Usage on Machines**.

There must not be any flexure or stress put right next to the sensor's cable. Be careful, not to rip, stress or otherwise damage the cable, when the machine or drill parts move. Protect the cable by a cover, or by an adequate placement. Be careful, not to expose the cable to a possible damage by a splinter from the milled part. Look carefully, so that the cable's cover contains no tears or other signs of mechanical damage, through which a milling emulsion, oil or water could get at the cable, which could result in a dysfunctional, or completely ruined sensor.

Designation of Indicators and Buttons of the Travelmatic Control Panel

1. Display of X axis

Current position of the X axis sensor in mm

2. Display of Y axis

Current position of the Y axis sensor in mm

3. Display of Z axis

Current position of the Z axis sensor in mm

4. Indicator of the current measuring mode

ABS – Absolute position

REL – Relative position

5. Dynamic measuring mode switch button

Sign **ABS** – means that after pressing it, the **ABS** mode will be activated

Sign **REL** – means that after pressing it, the **REL** mode will be activated

6. Button for resetting the display to zero *

In REL, this resets only the display, in ABS mode it annuls the display as well as the sensor itself)

* inactive, unless enabled in menu (this prevents the unwanted loss of coordinates of the absolute position)

7. Button 1/2*

Divides the current relative axial position in half. For centering of the machines in relation to 2 points.

(for instance to ascertain a mid-point between two milled edges of the component).

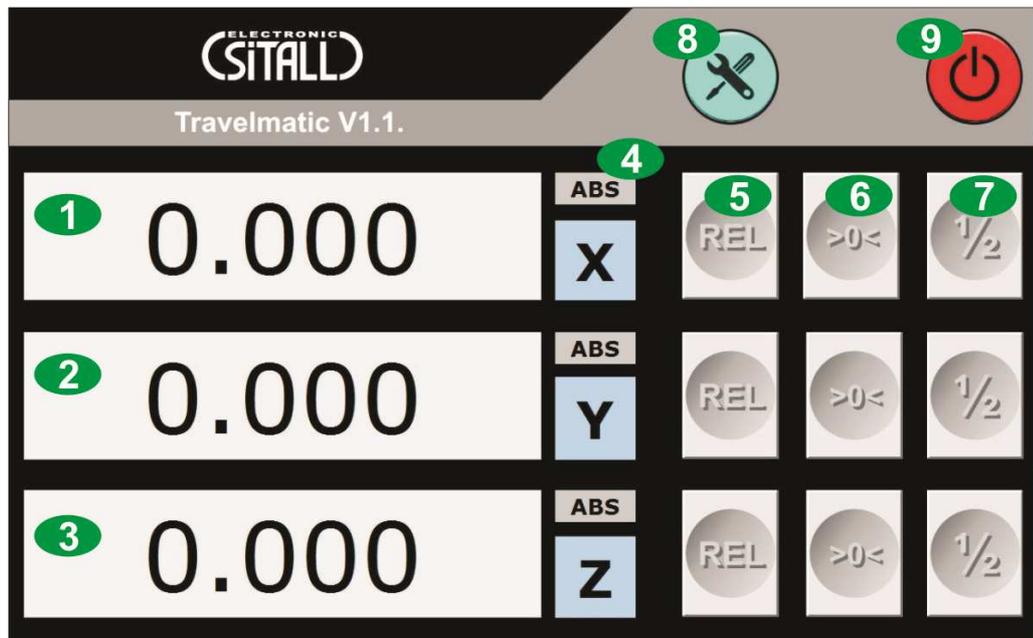
**active only in REL mode*

8. MENU Button

Parameter settings of the measurement program **Travelmatic**

1. OFF Button

Exit from the measurement program **Travelmatic**



Menu Items in Travelmatic Control Panel

Connection – Indicator, whether the sensors are connected up

Port – Switching of the COM port number

Baud Rate - Setting of communication speed with the PC

Color ABS mode – Selecting the display color in Absolute measurement mode (ABS)

Color REL mode - Selecting the display color in Relative measurement mode (REL)

Using - Switching the measuring sensor ON/OFF

ABS zeroing - Setting, whether the display may be reset in the ABS mode

Reverse Travel - Switching the direction of measurement

Angle - Selecting the type of measured movement (linear in mm or angular in degrees)

One impulse = - Measurement constant (the number of mm/degrees, that equals one tick of sensor movement) *

** For instance, by setting the value at 2x the sensor sensitivity, you can for instance adapt the display of the*

lathe's Y axis (where the movement of 1mm means that 2mm will be removed from the component). This can also be used for more precise setup of the measurement set.

The image shows a software configuration window titled "Axes configuration". It contains three vertically stacked panels for "Axis X", "Axis Y", and "Axis Z". Each panel has three sub-sections: "Connection", "Color", and "Parameters".

- Axis X:** Connection: None; Port: COM1; Baud Rate: 9600; Color: ABS mode: clBlack, REL mode: clBlack; Parameters: Using (unchecked), Reverse Travel (unchecked), ABS zeroing (checked), Angle (unchecked), One impulse = 0.001953125 mm.
- Axis Y:** Connection: None; Port: COM1; Baud Rate: 9600; Color: ABS mode: clBlack, REL mode: clBlack; Parameters: Using (unchecked), Reverse Travel (unchecked), ABS zeroing (checked), Angle (unchecked), One impulse = 0.001953125 mm.
- Axis Z:** Connection: None; Port: COM1; Baud Rate: 9600; Color: ABS mode: clBlack, REL mode: clBlack; Parameters: Using (unchecked), Reverse Travel (unchecked), ABS zeroing (checked), Angle (unchecked), One impulse = 0.001953125 mm.

An "Exit" button is located at the bottom right of the dialog.

Items in the Config. File

The **TM.CFG** file contains settings for all 3 axes (3 sets of values). Each axis has the following parameters:

1) **Port Nr.**

Defines the PC or tablet port, to which the sensor is connected (1=COM1, 2=COM2, 3=COM3, etc.)

2) **Comm. Speed**

Defines the communication speed of the port for the given axis (0=1200 Baud, 1=2400 Baud, 2=4800 Baud, 3=9600 Baud, 4=19200 Baud, etc.)

3) **ABS Display Color** (0=Black, 128=Maroon, 255=Red, 32768=Green, 16711680=Blue atd.)

4) **REL Display Color** (0=Black, 128=Maroon, 255=Red, 32768=Green, 16711680=Blue atd.)

5) **Axis active** (0 = ON, 1 = OFF)

6) **Measurement direction** (0 = regular, 1 = backwards)

7) **Resetting the display in ABS mode** (0 = ON, 1 = OFF)

8) **Type of measurement** (0 = linear, 1 = angular)

1) **Measurement constant** (norm = 0.001953125)

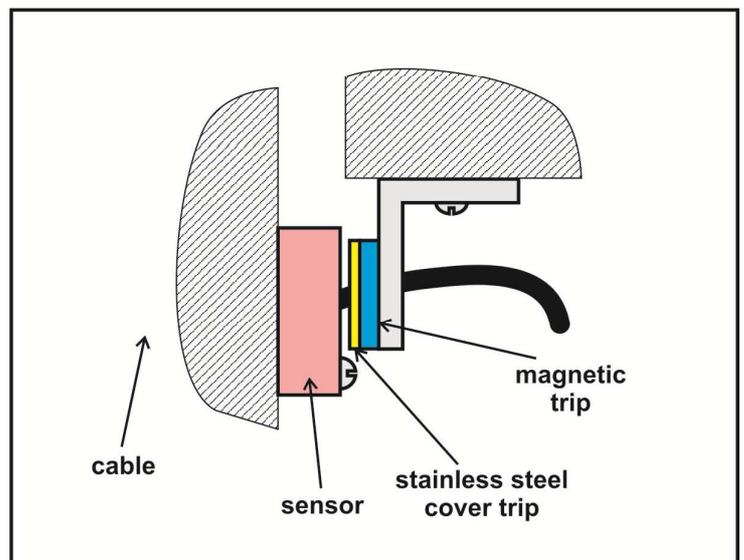
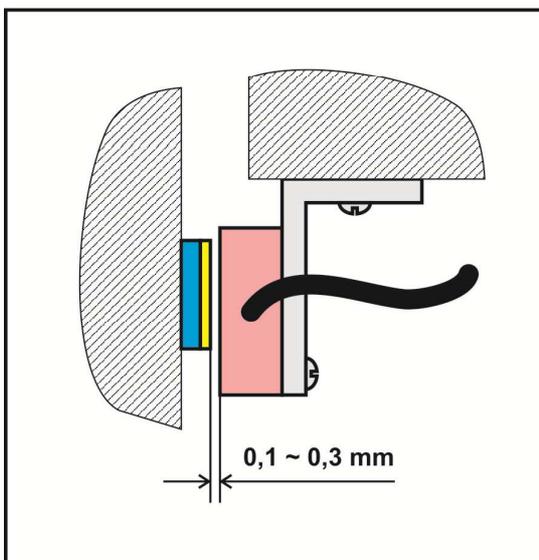
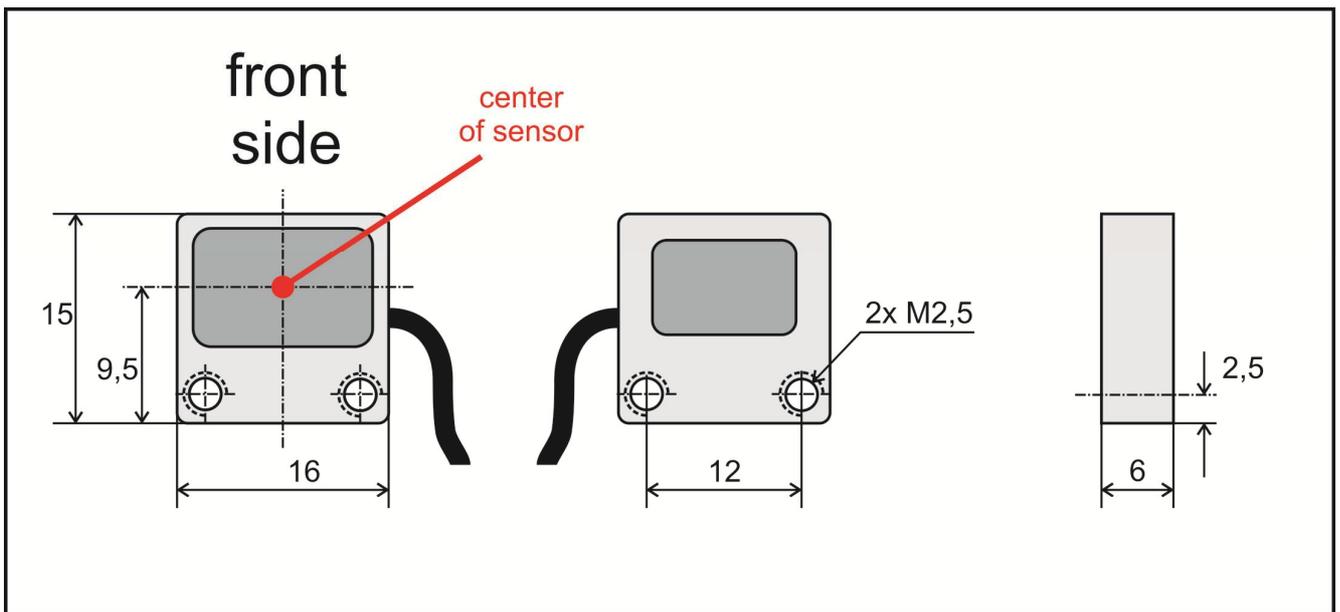
Notes and Suggestions

- 1) During the installation of the magnetic strip on rounded machine parts (i.e. on rotational dividing table), it is not allowed to bend the strip in a circle with radius <5 cm. In any similar installation, the current axis must be re-calibrated by altering the Measurement constant. Carry out the calibration with a gauge with an adequate precision.
- 2) When taking measurement on revolving parts of the machine (i.e. on rotational dividing table), the magnetic strip does not allow for measurement in the entire 360° range (unfortunately it's impossible to connect the strip ends so accurately, that there are no impulses lost in the gap). In this case, it's better to replace the magnetic strip with a rotational magnetic disc (supplied on demand), or to entirely replace the measurement system by an optical incremental sensor of an adequate type. For this purpose a special measuring module for external sensors is used (supplied on demand). The sensor must have a TTL output, compatible with 3 or 5V logic. Sensor with the output signal of more than 5V could destroy the module. Measurement module for sensors with different output may be manufactured upon prior consultation.
- 3) We do not suggest to use other cooling liquids than water, mineral oil or the standard milling emulsions. A corrosion of a part of measurement setup may occur, or the PC cables may get damaged.
- 4) The magnetic strip and the sensors must not be exposed to direct mechanical forces, or the magnetic field of electric or permanent magnets. The result may be inaccuracy of measurement, malfunction or a completely ruined sensor.
- 5) There must not be any flexure or stress put right next to the sensor's cable. Be careful, not to rip, stress or otherwise damage the cable, when the machine or drill parts move.
- 6) Protect the cable by a cover, or by an adequate placement. Be careful, not to expose the cable to a possible damage by a splinter from the milled part.
- 1) Look carefully, so that the cable's PVC cover contains no tears or other signs of mechanical damage, through which a milling emulsion, oil or water could get at the cable, which could result in a malfunction, or completely ruined sensor.

Chemical Resistance Tab Of The Magnetic Strip

None/very small effect	Medium effect	Strong effect
Engine oil Transmission oil ATF Hydraulic oil Kerosene Antifreeze Clorox, Detergents Turpentine Water Saline aerosol	JP-4 fuel Petrol Heptane Alcohols	Aromatic or chlorinated carbohydrates (Benzene, Toluene, Xylene, Trichloroethylene, Carbon Tetrachloride) Ketones Inorganic acids (HCL, H2SO4)

Sensor proportions, Set Installation



* NOTE:

Depicted on the diagram is the **MSP-01R** sensor with cable pointing right.

The sensor with the cable going left has the marking **MSP-01L**.

The sensor with the cable going down has the marking **MSP-01D**.

Examples



Mini lathe SM-300 E (X axis)



Mini lathe SM-300 E (Y axis)



Mini lathe SM-300 E (Z axis)



Cross table for mini mill PROXXONN MF-70