



**DL100F**



## ***Operating manual Data logger***



Version 1.3

TRO-TR-BADL100F-03-GB

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## Foreword

In the **DL 100 F**, you have chosen a measuring instrument that offers you a comprehensive range of possible uses.

The four-channel data logger has two internal sensors to measure air temperature and humidity and two additional external connections.

Due to the possibility of being able to determine and record four different measured variables simultaneously, the data logger can be used for the widest range of applications in industry, craftwork and construction.

Please study all the documentation for this device thoroughly, so that you can exploit this measuring instrument's range of functions to the full in practice.

This operating manual describes the hardware functions.

A separate operating manual for the corresponding software for configuring the data logger, the **software handbook**, is included on the CD-ROM.


### 1. Please read before putting into operation

This measuring instrument has been constructed according to the current state of the art and fulfils the requirements of the applicable European and national guidelines. This conformity has been proven; the manufacturer is in possession of the relevant declarations and documents. You as a user must follow these operating instructions in order to maintain this condition and to ensure safe operation!

- Before using the device, this operating manual must be read carefully and followed in all points.
- Never make measurements on live electrical parts.
- Observe the measurement range of the measured value recorder (inappropriate use can lead to destruction).
- The determination of valid measuring results, conclusions and actions derived from them are exclusively the responsibility of the user! Any liability or guarantee for the correctness of the results obtained is excluded. Under no circumstances will any liability be accepted for damage resulting from the use of the measuring results that were obtained.



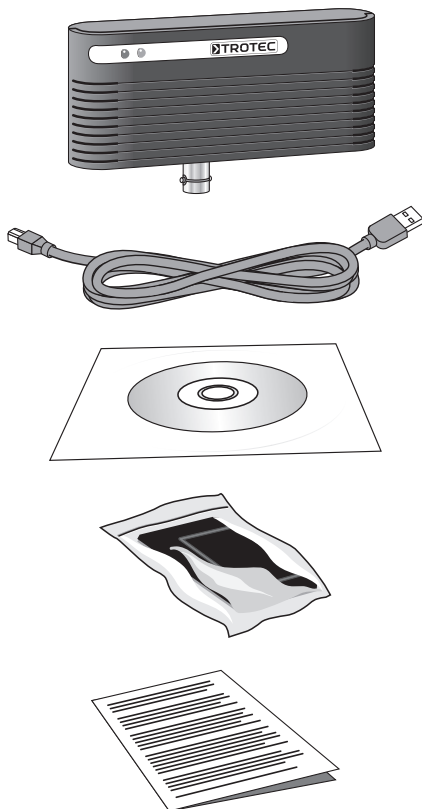
#### Appropriate use:

- The measuring device may only be operated within the specified technical parameters.
- The measuring device may only be used under the conditions and for the purposes for which it was designed.
- Operational safety can no longer be ensured if modifications or conversions have been made.
-  Electronic equipment may not be disposed of in the domestic waste, but must be correctly disposed of in accordance with the European Parliament and European Council Guideline 2002/96/EG of 27th January 2003 regarding used electrical and electronic equipment. Please dispose of this equipment in accordance with the applicable legal stipulations when its service life is ended.

## 2. Package contents

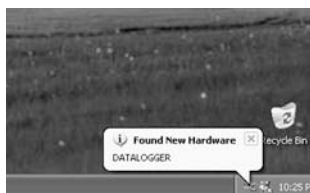
**Your data logger is supplied with the following components:**

- Data logger
- USB cable, length 1 m
- CD-ROM with software and operating manuals
- Fixing kit for wall mounting
- Works certificate



### 3.1.1. Installation of the USB controller driver

1. Place the CD-ROM in the CD-ROM drive of your PC.
2. Connect the data logger to your PC with the USB cable provided.



After communication is established, a message will be displayed on your PC, stating that new hardware has been found.



#### 3. Hardware assistant

The hardware assistant will start automatically. Select "Install the software automatically" and confirm with "Next".



The driver will be searched for.



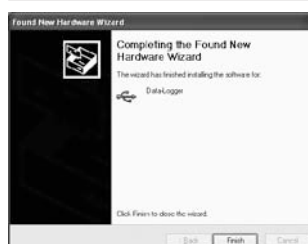
A warning message will appear, stating that the installed software has not passed the Windows logo test.

#### IMPORTANT!

Ignore this warning message and select "Continue Anyway".



The USB driver will be installed.



Select "Finish".

The first required USB controller is now available.

**Note: Only the first required USB controller will be installed!**

## 3. What you will require

To configure your data logger and to read out the recorded measured values, you will require a PC with the following minimum performance:

- 450 MHZ Pentium-compatible CPU or better
- CD-ROM drive
- USB connection
- Operating system Windows 98/2000/ME/XP
- Minimum 128 MB RAM
- Adobe Acrobat Reader software
- Approx. 5 MB free hard disk space for installation of the software
- An additional 10 bytes of hard disk space for each measured value to be logged

### 3.1. Installation of the required software

Two prior steps are necessary in order to connect the data logger to the PC and to configure it using the software:

- Installation of the USB controller driver
- Installation of the SmartGraph software



**IMPORTANT :** For the installation of the second required USB controller driver, it is necessary to repeat the entire procedure until the second required USB controller is available, otherwise the SmartGraph software cannot recognise the data logger!

### 3.1.2. Installation of the SmartGraph software

1. Place the CD-ROM in the CD-ROM drive of your PC

2. Install the software on your PC.

Follow the installation assistant's instructions.



3. After successful installation, start the software.

4. In the "device" menu, select the menu item "communication".

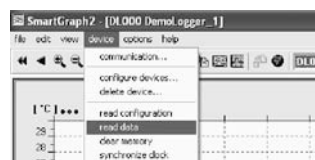


5. Select the interface for your data logger and confirm the selection.

6. Connect the data logger to your PC with the USB cable provided. Make sure that the USB driver has already been installed.



7. The data logger can now be called up via the software. To do this, select the relevant item in the "device" menu.



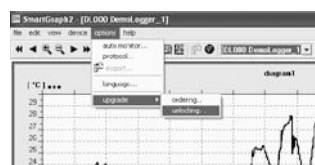
Further and more detailed information on the use of the software can be found in the **software handbook**, which is also included on the CD-ROM.

### Functions of the professional version

In the software handbook you will find information on upgrading your software to the professional version. **The professional version is already included in your data logger's package contents!**

If you wish to use the full range of the professional version's functions, proceed as follows to install it:

1. In the "options" menu, select the menu item "upgrade" and the sub-item "unlocking".



2. Now enter the following key code:  
**0123456789AB**

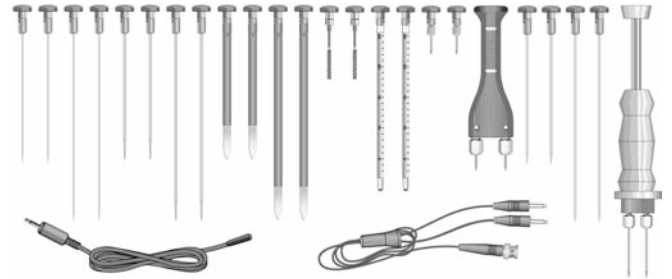


After entering the key code, all the functions of the professional version are activated.

### 3.2. Optionally available sensors and electrodes

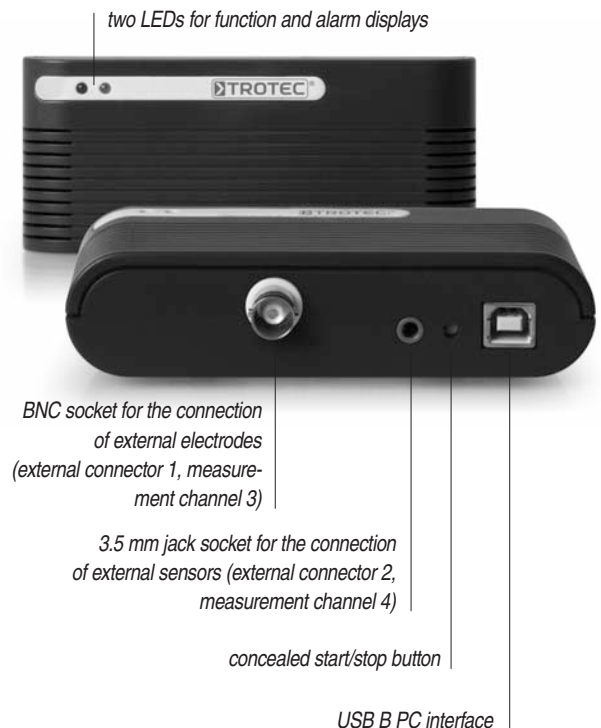
Additional electrodes and sensors will be required for the determination of measured values via the two external measurement channels.

These are not included in the package, since each application gives rise to numerous possible combinations. You can supplement your data logger according to your own individual requirements with existing compatible electrodes and sensors or by buying additional ones.



## 4. Features

Your data logger has the following features:



- **Four measurement channels for the recording of various measured variables:**

#### Measurement channel 1:

Internal air temperature sensor

#### Measurement channel 2:

Internal capacitive air humidity sensor

#### Measurement channel 3 (external connector 1):

Measurement of wood, material and building humidity according to the resistance method via the connection of an external electrode

#### Measurement channel 4 (external connector 2):

Measurement of the temperature of air, material surfaces, liquids or bulk materials via the connection of an external sensor

- One memory for 60,000 single measured values per measurement channel
- A separate alarm function for each measurement channel

## 5. Operating

### 5.1. Switching on and off

The data logger is switched on and off via the start/stop button.

#### Switching on

Press and hold down the start/stop button of the switched-off data logger with the aid of a blunt object, such as a ballpoint pen, until the green LED lights up. The device is now ready for operation; the LED flashes every 10 seconds.

#### Switching off

Press and hold down the start/stop button of the switched-on data logger with the aid of a blunt object, such as a ballpoint pen, until the red LED lights up. The device is now switched off; no LED is flashing.

### 5.2. Connecting external sensors:

#### External connector 1 (measurement channel 3)

Various electrodes can be connected to the BNC socket of external connector 1 for humidity measurement according to the resistance method.

All electrodes from the MultiMeasure range are suitable without any restrictions. The optionally available TC 20 connecting cable is required to connect these electrodes to the measuring instrument.

The electrode to be used is connected to the connecting cable by means of the cable's two banana plugs and the cable's BNC plug is then connected to the data logger and disconnected again when not required.

No further steps are necessary.

If you have connected an external electrode, the measured data for this measurement channel will be recorded either automatically or according to the optional configuration additionally set for this measurement channel in the software.

#### External connector 2 (measurement channel 4)

Suitable external sensors can be connected via the 3.5 mm jack socket of the data logger.

The sensor plug is simply plugged into the data logger's 3.5 mm jack socket and unplugged again when not required.

No further steps are necessary.

If you have connected an external sensor, the measured data for this measurement channel will be recorded either automatically or according to the optional configuration additionally set for this measurement channel in the software.

More detailed information on suitable sensors for this connection can be found in the technical data.

### 5.3. Operating modes and data recording options (logging)

After switching on, the device is in logging mode. One of the two LEDs flashes continually at intervals of 10 seconds, indicating that the device is in logging mode. Normally the green LED flashes, but in the case of an alarm the red LED or both LEDs will flash (see "Alarm function").

If the device is in logging mode, the measured data is permanently recorded immediately after switching on. The specifications for the type, duration and scope of the data recording can be individually set via the software.

The following list of the various options serves only as a quick overview; more detailed information on this subject may be found in the **software handbook**.

### Selection possibilities for the logging mode:

The measuring instrument records the measured data continuously. **Two possibilities for the organisation of the memory are available for selection:**

#### Start-stop mode

In start-stop mode, the measured data for each channel is recorded until the memory capacity of 60,000 values per channel is reached. Recording is then ended automatically.

#### Ring mode

Alternatively, ring recording mode may be selected in place of start-stop mode. In this case, the recording does not stop when the memory capacity has been reached, but continues indefinitely. To this end, the respective oldest values are continuously overwritten by the newest measured values.

### Further adjustable parameters for the logging mode:

#### Sampling rates

The measured value to be stored during sampling can be selected via the software for each logging mode. The following measured values can be selected in any combination as desired: average value, minimum value and maximum value.

Additionally, the sampling rate for the sensor and the storage rate for recording the measured values can also be set. Both rates can be set from 1 to 1440 minutes.

#### Preset operating mode

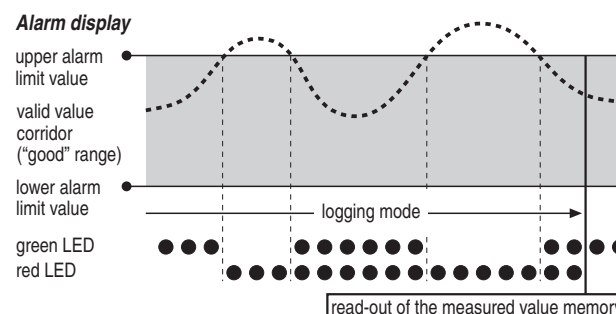
Besides the possibility of starting the recording of measured values immediately, the data logger can also be used in the so-called preset operating mode. The starting date and time for the measurement period are set and the recording of the measured values starts at this time.

#### It is not necessary to switch on the logger in preset operating mode.

The device switches on automatically at the preset start time for measured value recording. Even if the data logger had already been previously switched on, in preset operating mode it records exclusively the measured data for the defined period, but not the measured data from the time of switching on.

### Alarm function

A separate alarm function for each measurement channel can be configured via the measuring instrument administration. A value corridor is specified, the so-called 'good' range, outside of which an alarm is triggered, via the definition of an upper and lower alarm limit value. If an alarm is triggered on one of the available measurement channels, the flashing logging indicator changes from the green to the red LED. If the measured value re-enters the defined value corridor, i.e. the "good" range, both the green and red LEDs flash. This is intended to indicate that an alarm event has taken place.



The alarm display is extinguished by reading out the measured value memory. Additionally, a hysteresis can be set, by which value the measured value must re-enter the valid range in order to switch off the alarm.

Further information on alarm hysteresis and its practical use can be found in the chapter "Tips and tricks".

## 6. Notes on maintenance and operation

### Positioning for mobile use

The data logger can be positioned as required for the mobile recording of measured values. **Please observe the permitted ambient conditions for operation** (see technical details) Due to its compact dimensions, the data logger can also be placed out of sight for inconspicuous use.

### Wall mounting

The data logger can also be mounted on a wall for the stationary recording of data. A fixing kit for wall mounting is included in the package. Only the holding plate need be mounted on the wall to install the data logger. The data logger can then be slid onto the holding plate by means of the guide rail at the rear.

### Battery replacement

The battery must be replaced if the data logger's LED display indicates the need for a battery change.

The following LED flashing frequency indicates the necessary battery replacement:

Supplementary to the normal indication of logging operation, i.e., the flashing of one or both LEDs at 10 second intervals, an additional 1 second interval is displayed.

Flashing frequency of one or both LEDs in seconds	
Battery capacity OK	10 → 10 → 10 →
Replace the battery	1 → 10 → 1 → 10 → 1 → 10 →

In order to replace the battery, first loosen the two screws on the rear side of the device and then carefully separate the upper and lower parts of the data logger's casing.

Now remove the old battery and replace it with a new one.

Following a battery replacement, it may be necessary to reset the date and time via the SmartGraph software. In this case the LED display indicates condition E (see chapter "overview of LED display intervals").

Be sure to observe the correct polarity when inserting the battery and read the safety instructions on the battery. Use exclusively batteries which comply with the technical data.

Other types of battery are not permitted and can cause faulty operation.  
Do not use rechargeable batteries!

**Do not throw used batteries into the domestic waste, into a fire or water, but dispose of them correctly in accordance with the applicable legal regulations.**

### Care

Clean the device if necessary with a moist, soft, lint-free cloth. Take care that no moisture enters the casing. Do not use sprays, solvents, cleaning agents containing alcohol or scouring agents; use only clean water to moisten the cloth.

### Change of location

In particular when moving from a cold to a warm environment, for example, when bringing the device into a warm room after overnight storage in a car, water may condense on the circuit board, depending on the relative humidity of the air in the room.

This physical effect, which cannot be prevented by structural means for any measuring instrument, leads to false measurement values. In such cases, please wait about 5 minutes until the measuring instrument has "acclimatised" itself before commencing with measurements.

## 7. Tips and tricks

### Battery replacement and lifetime

So that your measuring instrument is always ready for use, the battery should be replaced once per year. Frequent reading out of the measured data reduces the battery lifetime.

### Measurement intervals and recording duration

The type of measured values to be recorded and the respective storage rates should be adapted to the purpose of use.

If you are intending to create particularly detailed documentation and wish to use all the software evaluation options, you can simultaneously record the average, minimum and maximum values for each measurement channel.

Given a specified storage rate of 10 minutes, a maximum recording duration of around 183 days would be possible in this case. For recording at shorter intervals, the storage rate can be reduced to a value of one minute. However, this also reduces the maximum recording duration.

If the main object of your measurement is long-term documentation, you can just record one value, for example, the average value. At a storage rate of 10 minutes, the memory capacity for this configuration allows a recording duration of 416 days!

### Use of alarm hysteresis

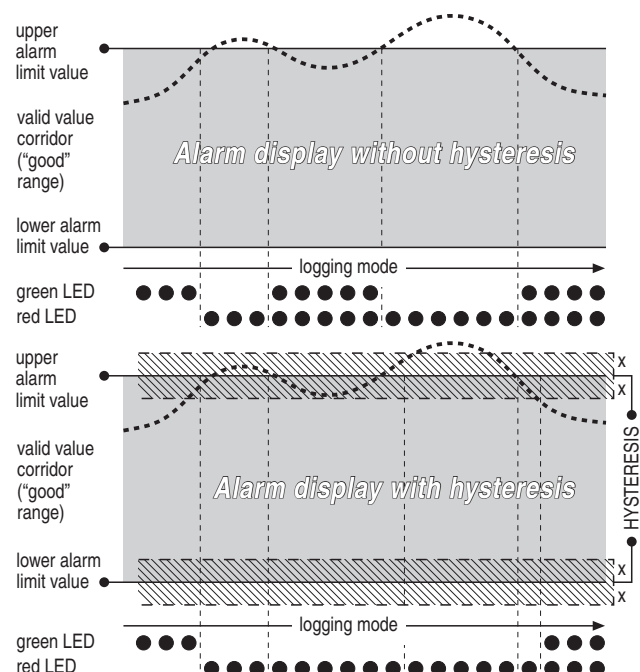
If the alarm function without hysteresis is used, an alarm will be triggered and recorded each time the specified limit value is exceeded.

If your limit values are very tightly selected, this leads to a very frequent occurrence of alarm situations.

For example, if a room temperature of 24 °C is entered as the upper alarm limit value and a room temperature of 10 °C is entered as the lower alarm limit value and the room temperature settles permanently in the range between 23.5 and 25 °C during the measurement period, the result will be that numerous individual alarm signals will be generated and recorded during the entire measurement period.

In order to avoid this, an alarm hysteresis can be defined. With this setting, you can define a value by which the measurement value must re-enter the valid value corridor in order to switch off the alarm.

With a set value for the alarm hysteresis of 1 °C, the alarm in the above example would only be triggered once when 24 °C was exceeded and would only be switched off again when the value fell below 23 °C.



## 8. Overview of LED indicator intervals

Flashing codes depending on status		Continuously repeated displayed intervals:			
		Interval 1	Interval 2	Interval 3	Interval 4
Status	Explanation	Short flash	Duration of pause	Short flash	Duration of pause
A	Normal logging operation	green	10 s.	green	10 s.
B	Current alarm event	red	10 s.	red	10 s.
C	Prior alarm event	red and green	10 s.	red and green	10 s.
D	Flat battery	as for condition A, B or C	1 s.	as for condition A, B or C	10 s.
E	Time and date not set following battery replacement	red	0,5 s.	green	0,5 s.
F	Device switched off	No LED is lit			

## 9. Technical data

### MultiMeasure Data Logger

### DL 100 F

Function and alarm indication	LED
Measurement channels	4
Measured value memory (60,000 per channel)	240,000 measured values
Start/stop button	yes
Operating mode button	no
Sensor elements	Measurement channel 1 Measurement channel 2 Measurement channel 3 Measurement channel 4
PC interface	USB B
Storage conditions	Permissible ambient temperature Permissible relative humidity
Operating conditions	Permissible operating temperature Permissible relative humidity
Temperature (internal sensors)	Measurement range Resolution Accuracy
Temperature (external sensors)	Measurement range, resolution, accuracy
Relative humidity (internal sensors)	Measurement range R.H. Resolution R.H. Accuracy R.H.
Wood and building humidity <sup>1)</sup> (external electrodes)	Measurement range Resolution* Accuracy*
Electrical data	Power supply / battery Battery lifetime
Features	Standard package contents Optional accessories

\* in the range 20 to 80 digits

<sup>1)</sup> external connector 1: BNC socket for the connection of an external measuring electrode with BNC plug for the resistance measurement of wood and building humidity; connection cable TC 20 is additionally required for the connection of the electrode

<sup>2)</sup> external connector 2: 3.5 mm jack socket for the connection of external surface temperature sensor TD910

### External temperature sensor

### TS 910

Temperature measurement	Measurement principle Measurement range Resolution Accuracy
Operating conditions	Permissible operating temperature Permissible relative humidity
Additional key technical data	Dimensions Protection class Connection

