ThermoSpot-Vision

Laser
630 nm

2,2" COLOUR TFT	Li-Ion LITHIUM ION BATTERY
50:1 DS-RATIO Distance:Spot	USB 2.0 / optional max. 8GB
Laser DUAL LASER	SOFTWARE INCLUDED
REC RECORDING jpg/avi	K-TYP CONNECTION

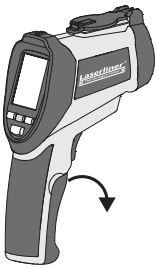
Laserliner®
Innovation in Tools

! Read the operating instructions and the enclosed brochure „Guarantee and additional notices" completely. Follow the instructions they contain. Safely keep these documents for future reference.

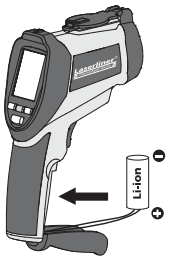
Function/Application

In addition to using non-contact technology to measure surface temperatures, this measuring device is also used to measure relative humidity and ambient temperature. It measures how much electromagnetic energy is emitted in the infrared wavelength range and uses this information to calculate the surface temperature. The dew point temperature is also calculated. A particular application of the device is to effectively locate thermal bridges. The integrated camera makes it possible to record images or video sequences of the specific measuring situation, to evaluate the measured data with the aid of the supplied software and to process the data for documentation purposes.

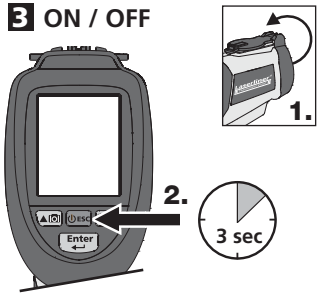
1

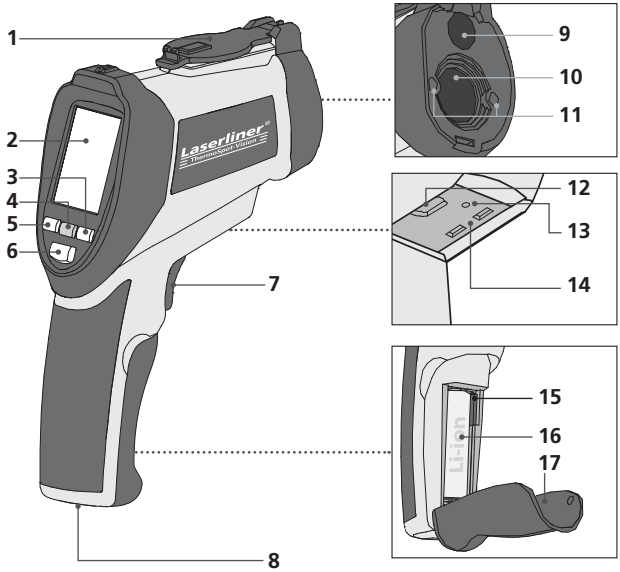


2 **3,7 V Li-Ion-Akku, 18500**



3 **ON / OFF**

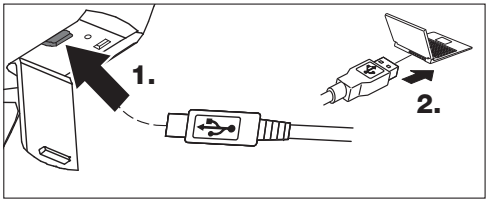




1 Hinged lens guard
2 2.2" TFT colour display
3 Navigation button ▼ / video recording
4 ON/OFF / ESC
5 Navigation button ▲ / image recording
6 Enter / confirm
7 Trigger
8 1/4" tripod connection
9 Camera lens
10 IR sensor
11 Dual laser
12 USB interface
13 Reset
14 Type K thermocouple connection
15 Micro-SD card slot
16 Li-ion rechargeable battery
17 Battery compartment cover

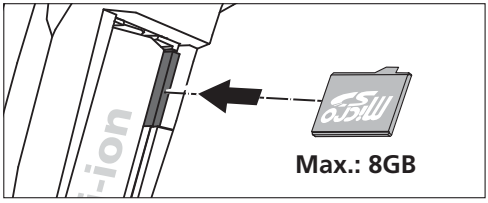
4 Charging li-ion battery

To charge the li-ion battery, connect one end of the supplied USB cable to the mini-USB port on the device and the other end to a free port on your computer. Alternatively, the battery can be charged using a USB-type power supply unit (5 V, 500 mA).



5 Inserting micro-SD card

To insert a micro-SD card first open the cover to the battery compartment and then insert the memory card as illustrated. Recorded data are stored to the internal memory (40 MB) when the device is operated without a memory card.



6 Start menu / modes

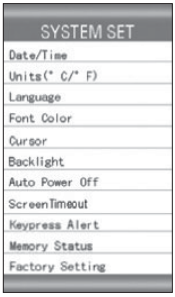
The device features several measuring modes and configuration options. By briefly pressing the "ESC" button after switching on the device, the start menu with 6 options is shown in the display. Move to the required menu item by pressing the corresponding navigation buttons (▲ / ▼) and press "ENTER" to select.

IR CAM	**Camera mode** Infrared measurement with camera image
IR MEASURE	**Infrared mode** Fast infrared measurement (without camera image)
DEWPOINT	**Dew point mode** Locating thermal bridges (without camera image)
DATALOG	**Data recording** For long-term measurements with temperature progression diagram
GALLERY	**Gallery** Stored images, videos and data recordings
SETTINGS	**System settings** Setting and changing device settings

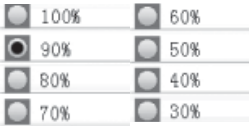
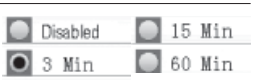
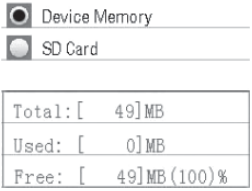
7 SETTINGS Settings

You will need to make a few basic settings in the device before using it for the first time. The navigation buttons (▲ / ▼) are generally used to navigate through the menu items. The chosen menu item is selected by pressing the "ENTER" button. You also use the navigation buttons to change values and selection options. Press the "ESC" button to store a selection and to return to the previous menu.

Please change the settings on the following page as required.



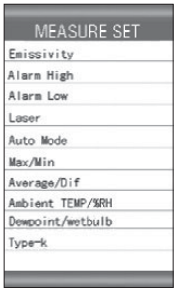
7 SETTINGS Settings

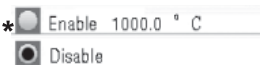
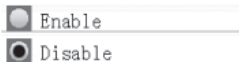
Date/time	**Date/time** Set the date and time with ▲/▼. To save and exit menu press the "ESC" button.	
Units	**Units** Select unit of temperature with ▲/▼. To save and exit menu press the "ESC" button.	
Language	**Menu language** Select menu language with ▲/▼. English, German, French, Dutch, Finish To save and exit menu press the "ESC" button.	
Font colour	**Font colour for on-screen display** Select font colour with ▲/▼. To save and exit menu press the "ESC" button.	
Cursor	**Type of cursor in display** Select type of cursor with ▲/▼: Off, cross, circle To save and exit menu press the "ESC" button.	
Backlight	**Brightness of display backlight** Select brightness level with ▲/▼. To save and exit menu press the "ESC" button.	
Auto Power Off	**Time for automatic power off** Select time with ▲/▼: disabled, 3, 15 or 60 minutes To save and exit menu press the "ESC" button.	
Screen timeout	**Time for automatic screen timeout** Select time with ▲/▼: disabled, 30 seconds, 1 or 2 minutes To save and exit menu press the "ESC" button.	
Keypress alert	**Enable/disable keypress alert** Enable/disable alert sound with ▲/▼. To save and exit menu press the "ESC" button.	
Memory status	**Selection and capacity of storage medium** Select storage medium with ▲/▼. Total capacity (Total), the storage space used (Used) as well as the available space (Free) is shown. Clear memory with ENTER. Confirm clear with ▲, cancel clear with ▼.	
Factory setting	**Reset device to factory setting (stored data are retained)** Select No or Yes with ▲/▼. To save and exit menu press the "ESC" button.	

8 Settings for measuring modes

In addition to the general system settings, other settings are possible specifically for measuring mode. These settings are effective for following modes: IR CAM, IR MEASURE, DEWPOINT, DATALOG. Therefore, check the specific setting before each measuring task.

Use the navigation buttons to select a corresponding mode from the start menu and press "ENTER" to confirm. Press the "ENTER" button again to access the settings of the measuring mode:



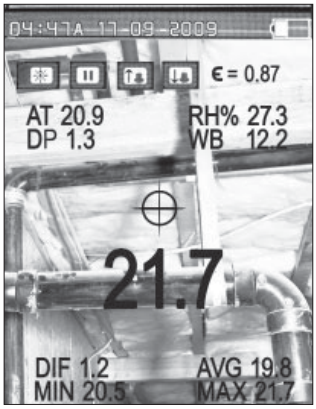
Emissivity (see Point 17)	**Set emissivity coefficient** Select the material type with ▲/▼. Concrete, glass, human skin, ice/water, plastic, Wood. For an individual emissivity coefficient select "E" and confirm with Enter. Set the value with ▲/▼. To save and exit menu press the "ESC" button.	
Alarm High	**Alarm temperature, alert - temperature above threshold** Set temperature or disable function with ▲/▼. To save and exit menu press the "ESC" button.	 *
Alarm Low	**Alarm temperature, alert - temperature below threshold** Set temperature or disable function with ▲/▼. To save and exit menu press the "ESC" button.	 *
Laser	**Dual laser** Enable/disable laser with ▲/▼. To save and exit menu press the "ESC" button.	 *
Auto mode	**Automatic trigger (dual laser)** Enable or disable with ▲/▼. IR measurement takes place continuously when enabled. A lock symbol appears next to the battery indicator. To save and exit menu press the "ESC" button.	 *
Max/Min	**Min/Max display** Enable or disable display with ▲/▼. To save and exit menu press the "ESC" button.	 *
Average/Dif	**Average value/difference display** Enable or disable display with ▲/▼. To save and exit menu press the "ESC" button.	
Ambient TEMP/%RH	**Ambient temperature/relative humidity display** Enable or disable display with ▲/▼. To save and exit menu press the "ESC" button.	 *
Dewpoint/wet-bulb	**Dew point/wet-bulb temperature display** Enable or disable display with ▲/▼. To save and exit menu press the "ESC" button.	 *
Type-K (see Point 14)	**Type-K display (only with Type-K sensor connected)** Enable or disable display with ▲/▼. To save and exit menu press the "ESC" button.	 *

* **Enable/Disable:** Enable/disabled

* **ON/OFF:** ON/OFF

9 IR CAM Camera mode

After selecting camera mode, the live image recorded by the camera is shown on the display. Infrared measurement is started by pressing the trigger. The following measured values and symbols are shown on the display:



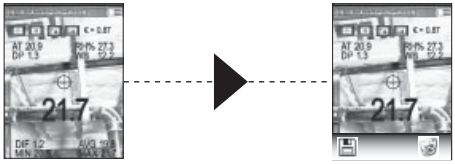
	Camera mode		Alarm High enabled
	IR measurement active		Alarm High exceeded
	IR measurement stopped		Alarm Low enabled
	Laser active		Alarm Low exceeded

AT	Ambient temperature	MIN	Min value
DP	Dew point temperature	MAX	Max value
RH%	Relative humidity	DIF	Differential value (max-min)
WB	Wet-bulb temperature	AVG	Average value
E	Emissivity coefficient	Value in middle	Surface temperature

10 IR CAM Recording images/videos

Images or video sequences of the measuring situation can be recorded during IR measurement.

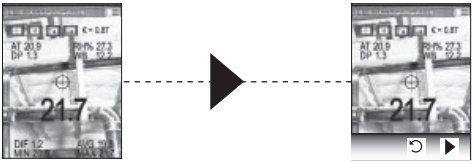
Still image



1.	▲	Record
2a.		Save image: ▲
2b.		Cancel:

You can open, preview and delete recorded images under "Gallery" (see Point 13).

Video



1.		Record
2a.	▶	Start recording: ▲
2b.	↺	Cancel: ESC
3.		Stop recording

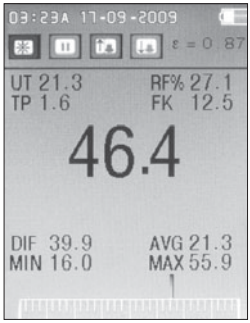
IR measurement and laser are triggered automatically during video recording. The recording status is indicated by the recording symbol at the top left of the display together with the recording time. You can open, preview and delete recorded videos under "Gallery" (see Point 13).

! Before recording image data or video sequences, check the storage medium to be used to store the data. See Settings under Point 7.

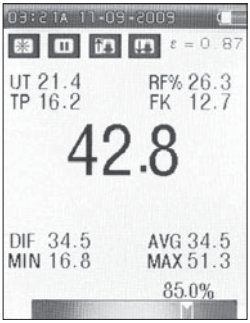
11 IR MEASURE DEWPOINT IR measurement / dew point

The corresponding display view is shown after selecting "IR measurement" or "dew point" mode. The same measurement variables can be determined and displayed as in camera mode but without the live image and recording option. The main difference between "IR measurement" and "dew point" modes is the bargraph function at the bottom of the display.

IR measurement



Dew point



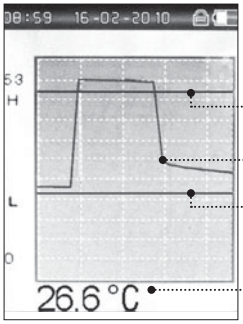
IR measurement bargraph:
shows the measuring range of the current measurement within the Min/Max range.

Dew point bargraph:
shows the percentage probability of condensation on the surface. The condensation probability is 100 % as soon as the surface temperature is equal to or lower than the dew point temperature.

12 DATALOG Datalog

The settings menu is shown in the display after selecting "DATALOG" mode. After setting the corresponding parameters, data recording is started automatically by pressing the trigger. A real-time curve diagram is shown on the display. Stop recording by pressing the "ESC" button and return to the Settings menu. The data recording is saved automatically.

High	Set upper temperature limit
Low	Set lower temperature limit
Time	Set measuring time (1 second to 3600 seconds)
Colour	Set colour of temperature curve
Measure set	Settings for measuring mode (see Point 8)



Set upper temperature limit (red line)

Temperature curve (selectable line colour)

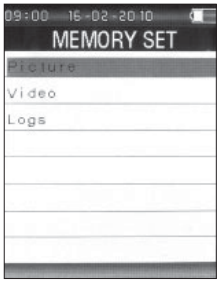
Set lower temperature limit (green line)

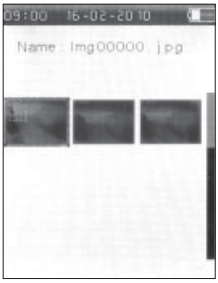
Currently measured temperature

13 GALLERY Gallery

An overview of all recorded data, divided into images, videos and log files is shown after selecting "Gallery" mode. Confirm the required selection with "ENTER" and show a preview of the file on the display.

Images: Preview on display
Videos: Video sequence starts automatically
Logs: Scroll along X-axis with ▲/▼

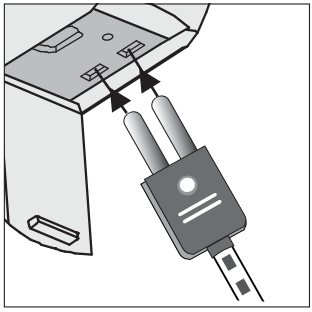




Deleting data

1.	Select file with "ENTER"	
2.	Press "ENTER"	
3a.	Delete image:	▲
3b.	Cancel:	▼

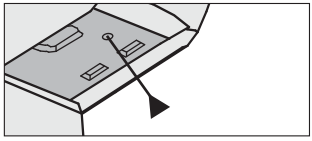
14 Connecting Type-K thermocouple



Connect corresponding Type-K thermocouples at the bottom of the device. To show the temperature of the thermocouple in the display, enable the "Type-K" option in the measurement settings (see Point 8). The temperature is shown with the abbreviation "TK" on the display.

! Pay attention to the polarity information and the correct type class (Type K) on the thermocouple as well as on the device connection.

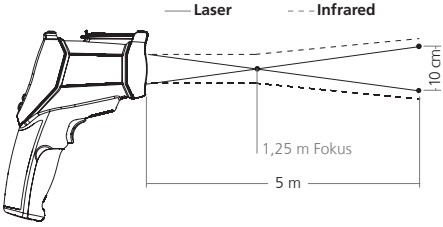
15 Reset



The device can be reset to the factory setting if it no longer responds if a button is pressed or can no longer be switched on or off. Press the pushbutton by inserting a thin, pointed object in the opening at the bottom of the device.

16 Dual laser / 50:1 optics

The dual laser marks the area on the surface where the temperature is measured using the infrared function. The size of the measurement area is in relation to the distance. The greater the distance to the measured object, the greater the measurement area. With this device the ratio between the distance and measurement area is 50:1.



! The target object must be within the measurement area. The determined temperature is the average temperature of the measurement area.

17 Emissivity coefficient / infrared measurement

A built-in sensor head detects the material/surface-specific infrared radiation emitted by all objects. The level of these emissions is determined by the material's emissivity coefficient (0.10 to 1.0). The emissivity coefficient must first be set in order to correctly measure the surface temperature. In addition to the defined emissivity coefficient, it is also possible to set an individual emissivity coefficient (see Point 8).

Metals

Aluminium	
Oxidised	0,2 - 0,4
Polished	0,04 - 0,06
Alloy A3003	
Oxidised	0,3
Roughened	0,1 - 0,3
Brass	
Polished	0,3
Oxidised	0,5
Copper	
Oxidised	0,4 - 0,8
Elect. terminal strips	0,6
Haynes	
Metal alloy	0,3 - 0,8
Inconel	
Oxidised	0,7 - 0,95
Sandblasted	0,3 - 0,6
Electropolished	0,15

Iron	
Oxidised	0,5 - 0,9
With rust	0,5 - 0,7
With red rust	0,61 - 0,85
Iron, cast	
Oxidised	0,6 - 0,95
Non-oxidised	0,2
Molten mass	0,2 - 0,3
Iron, forged	
Matt	0,9
Lead	
Rough	0,4
Oxidised	0,2 - 0,6
Molybdenum	
Oxidised	0,2 - 0,6
Nickel	
Oxidised	0,2 - 0,6
Platinum	
Black	0,9

Steel	
Cold rolled	0,7 - 0,9
Ground plate	0,4 - 0,6
Polished plate	0,1
Alloy (8% nickel, 18% chromium)	0.35
Galvanised	0.28
Oxidised	0.80
Heavily oxidised	0.88
Freshly rolled	0.24
Rough, flat surface	0.95 - 0.98
Rusty, red	0.69
Sheet, nickel plated	0.11
Sheet, rolled	0.56
Zinc	
Oxidised	0,1

Nonmetals

Asbestos	0,93
Asphalt	0,95
Basalt	0,70
Coal	
Non-oxidised	0,8 - 0,9
Graphite	0,7 - 0,8
Carborundum	0,90
Ceramics	0,95
Earthenware, matt	0,93
Clay	0,95
Concrete, plaster, mortar	0,93 - 0,94
Masonry	0,93
Brick, red	0,93
Lime malm brick	0,95
Fabric	0,95
Glass	0,85 - 0,94
Gravel	0,95
Gypsum	0,8 - 0,95

Ice	0,93 - 0,98
Clear	0,97
With heavy frost	0,98
Limestone	0,98
Paper	
All colours	0,95 - 0,97
Wallpaper, light-coloured	0,88 - 0,90
Plastic	0,80 - 0,95
Translucent	0,95
PE, P, PVC	0,94
Soil	0,9 - 0,98
Water	0,93
Wood	
Untreated	0,8 - 0,95
Beech, planed	0,94
China	
Brilliant white	0,7 - 0,75
With glaze	0,92
Paint	
Black, matt	0,96 - 0,98
Heat-resistant	0,92
White	0,85 - 0,95

Transformer paint	0,94
Rubber	
Hard	0,94 - 0,95
Soft, grey	0,89
Cotton	0,77
Lime	0,3 - 0,4
Tar	0,79 - 0,84
Tar paper	0,91 - 0,93
Snow	0,80
Human skin	0,98
Quartz glass	0,93
Heat sink	
Black, anodized	0,98
Marble	
Black, dull finish	0,94
Greyish, polished	0,93

! The table lists several material-specific emissivity coefficients that should be considered as reference values. The shape and structure of the surface can influence the emissivity coefficient.

Unknown emissivity coefficient

Apply masking tape or matt black paint to the surface of the area to be measured. Wait until the tape/paint has assumed the surface temperature. The temperature of the surface can then be measured with an emissivity coefficient of 0.95.

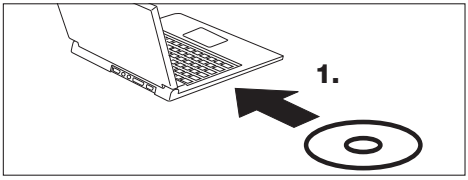
18 Mounting on tripod

For certain measuring tasks it may be of advantage to secure the device on a tripod. To do so, screw the device on to a tripod with a 1/4" connection. Undo the device by turning in anticlockwise direction.

19 ThermoSpot-Vision Reader

With the software provided on the CD it is possible to transfer the recorded data (images, videos, data logs) to a PC and to use the data for further processing and documentation. Load the CD in the drive and follow the installation routine. After successful installation, start the application. Connect one end of the supplied USB cable to the mini-USB port of the device and the other end to a free USB port on your computer. For further information on how to use the software, refer to the Help function that contains a detailed description of the functions.

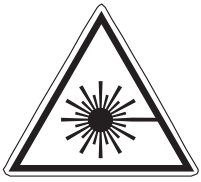
! It is not necessary to install a driver. The software operates under Windows XP and Windows 7.



Technical data	Subject to technical changes. 04.11
Power supply	3.7 V/DC, li-ion rechargeable battery
Screen	2.2" TFT colour display, 320 x 240 pixels
Internal memory	40 MB
Supported memory card	micro SD, max. 8 GB
Connections	USB 2.0
Image format	JPG, 640 x 480 pixels
Video format	3GP, 320 x 240 pixels, 9.5 fps
Optics	50:1
Emissivity coefficient	0.10 … 1.0, adjustable
Laser wavelength	630 … 650 nm

Laser class	2, < 1 mW
Operating temperature	0 °C … 50 °C
Storage temperature	-10 °C … 60 °C
Dimensions (W x H x D)	62 x 205 x 155 mm
Weight	410 g
Infrared	
Measuring range	-50 °C … 1300 °C
Accuracy	±1.0 % ±1 °C (20 °C … 500 °C) ±1.5 % (500 °C … 1000 °C) ±3.5 °C (-50 °C … 20 °C)
Measuring rate	150 ms
Spectral sensitivity	8 … 14 µm
Ambient temperature	
Measuring range	0 °C … 50 °C
Accuracy	±0.5 °C (10 °C … 40 °C) ±1.0 °C (< 10 °C, > 40 °C)
Relative humidity	
Measuring range	0% … 100% rH
Accuracy	±3.0 % rH (40 % … 60 % rH) ±3.5 % rH (0 % … 40 %, 60 % … 80 % rH) ±5.0 % rH (0 % … 20 %, 80 % … 100 % rH)
Dew point temperature	
Measuring range	0 °C … 50 °C
Accuracy	±0.5 °C (10 °C … 40 °C) ±1.0 °C (< 10 °C, > 40 °C)
K-type sensor	
Measuring range	-50 °C … 1,370 °C
Precision	±0.5 % ±1.5 °C (0 °C … 1370 °C) ±2.5 °C (-50 °C … 0 °C)

General safety instructions
Caution: Do not look directly into the beam.
Lasers must be kept out of reach of children.
Never intentionally aim the device at people.

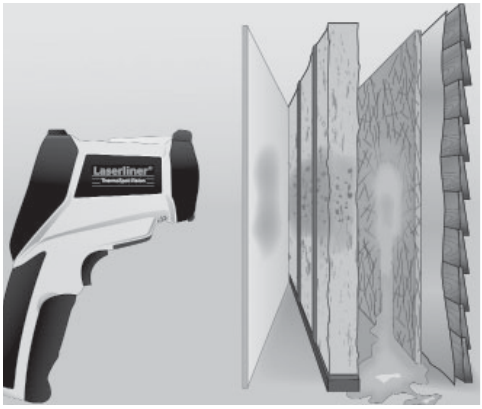


Laser radiation!
Do not stare into the beam!
Class 2 laser
< 1 mw · 635-650 nm
EN 60825-1:2007-10

EU directives and disposal
This device complies with all necessary standards for the free movement of goods within the EU. This product is an electric device and must be collected separately for disposal according to the European Directive on waste electrical and electronic equipment.

Further safety and supplementary notices at: **www.laserliner.com/info**

ThermoSpot-Vision



SERVICE

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