optris

MS

红外测温仪

MS MS Plus MS Pro

操作手册

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简介

感谢您选择 Optris MS 系列红外测温仪。

红外测温仪可以直接测量目标温度而无需接触目标。其工作原理是通过测量目标发射的红外辐射强度计算出物体的表面温度。非接触测温是红外测温仪最大的优点，使用户可以方便地快速测量难以接近或移动中的物体。

请在首次操作之前全面阅读此手册。

供货范围

- 红外测温仪
- 9V 电池
- 操作手册
- 腕带

以下仅适用于 MSPro、MSPlus:

- 软胶保护套
- 仪器套
- 三角架适配器
- USB 连接电缆
- OptrisConnect 软件

以下仅适用于 MSPro:

- TCK 热偶探针

选件:

- 标定证书
- 软件套装，
  包括:OptrisConnect 软件、USB 连接电缆

应用描述

电气设备维护

轴承、电动机热点检测

制造过程产品温度测量

热绝缘体能量泄露检测

车辆关键部件检测

警告

激光 II 级标准

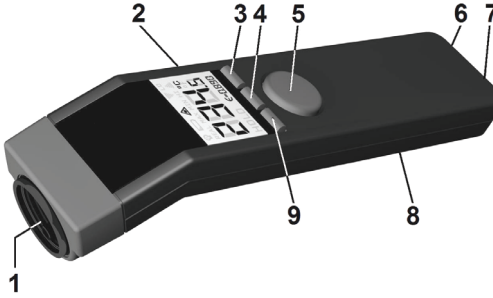
请不要将激光直接对准眼睛或指向高反射物体表面。避免造成伤害。

所有的测温仪均需要避免以下情况：

- 电磁场 (EMF)
- 静电
- 热冲击（由于环境温度变化太大或过快变化引起）

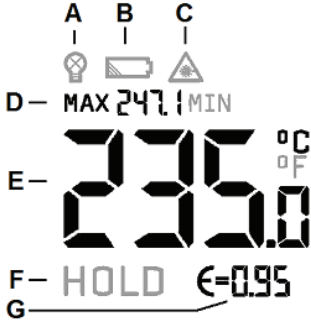
红外测温仪只能测量目标表面的温度。MS 不能穿透透明材料例如玻璃和塑胶进行测量。请保持镜头清洁，远离灰尘，烟雾或者其它微粒，以避免不准确测量。

功能描述



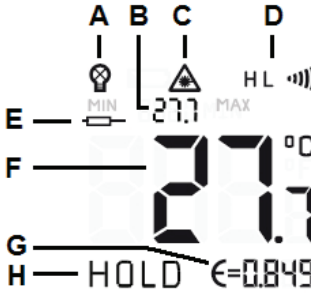
1 精确的光学镜头
2 LCD 显示窗口
3 下行/背光按键
4 模式按键
5 测量按键
6 TCK 接口[仅 MSPro]
7 USB 接口
8 电池室
9 上行/激光按键

显示 [MS]



A 背景光标志
B 低电量报警
C 激光标志
D 最大/最小温度值
E 当前值
F 保持功能
G 发射率

显示 [MSPlus/MSPro]



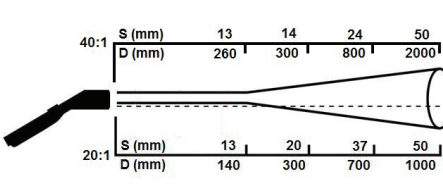
A 背景光标志
B 最大/最小温度值
C 激光标志
D 高低温报警标志
E TCK 测量值[仅 MSPro]
F 当前温度值
G 发射率
H 保持功能

光学性能

距离测量目标 140mm 以内时测温仪的光斑直径为 13mm (MSPro 为 260mm 以内) 。

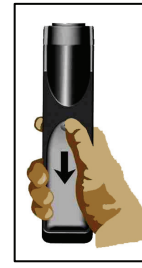
被测目标的尺寸必须大于光斑尺寸。

以下光路图中 D 为仪器与被测目标之间的距离；S 为所测目标的光斑直径。



D:S = 20:1 [MS/ MSPlus]/ 40:1 [MSPro]

更换电池



如需更换电池，电池盖位于仪器下侧，请向下推动电池盖，参见图片示意，取出电池并合上电池盖。

请确定电池放置的方向。

在电池提示低电量的时候请马上更换电池。

仪器套 [MSPlus/MSPro]

请在装仪器前确认正确的方向

软胶保护套 [MSPlus/MSPro]

当使用于污染或恶劣的工作环境中，软胶保护套可起到良好的保护效果。

请将仪器从保护套的前端滑入，注意保护前端的镜头。如下图所示：

装上软胶保护后不会影响按键操作及各种接口的连接。

USB 连接电缆 [MSPlus/MSPro]

标配的 USB 连接电缆为定制的专用电缆，非通用 USB 电缆线。

基本操作

温度测量：

将温度仪对准测量目标，按测量按键。窗口显示当前目标温度。

保持功能：

一旦您松开测量按键，当前温度就会保持 7 秒。

关机:

在保持模式下不进行任何操作，测量数据在保持 7 秒后自动关机。

背景光：

测量或保持模式下按下行按键可以开启或关闭背景光。

激光：

在测量模式下按上行按键可以打开或关闭激光。激光打开时，激光标志会在窗口中显示。

模式设置 [MS]

MAX/ MIN

通过该功能可选择在显示窗口的上方显示当前测量的最大或最小值。

按测量按键进入测量模式或松开测量按键进入保持模式都可进行该参数设置，按 MODE 键进行设置，当你再次按测量按键或仪器关机，该模式将被保存。

当您松开测量按键进入保持模式，本测量的最大值或最小值将在窗口中显示。

发射率

物体向外发射的辐射强度取决于目标物体的温度和物体表面材料的辐射特性。

该发射率(ε =Epsilon)作为一个稳定的因素，指物体对外辐射红外线能量的能力。假设测量目标温度比环境温度要高，选择发射率过高，红外测温仪所显示的温度值将会低于真正的温度。本仪器为固定发射率 0.95，该发射率适用于大部分物体，特别适合用于有机物、有油漆及氧化物体等表面粗糙的物体。

如测量光亮表面会造成误差，为提高精度，可用胶带或黑漆覆盖测量表面，当被覆盖的表面达到目标表面温度相同时，可开始进行测量。

℃/℉功能设置

可选择摄氏或华氏显示温度。

关机状态，按激光按键，同时按测量按键，仪器设置为℃显示。

关机状态，按背光按键,同时按测量按键,设置为℉显示。

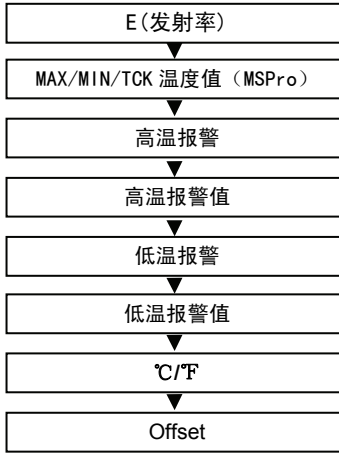
模式设置[MSPlus/MSPro]

在保持模式下按模式按键可选择不同的功能设置菜单，窗口上闪烁图标表明该模式已经被激活并处于可修改状态。通过上行键或下行键进行参数设置。

再一次按功能按键可进行下一个功能菜单或直接按测量按键进入测量模式并会保存设置的参数。

如您 7 秒钟没有任何操作，仪器将自己关机并保存设置的功能参数。

各项目模式设置顺序如下：



发射率：

提示：请参考 MS 的模式设置内容。

如测量金属表面的温度需要认真的修正发射率，可以参考发射率表所提示的发射率值。

设置发射率

在保持模式下按模式按键，然后通过上行键或下行键修改发射率。此时窗口上显示的当前温度值为修改发射率后所得到的数值。

MAX/ MIN/TCK 温度 [MSPro]

使用该功能可选择在窗口的上方显示最大/最小温度值或 TCK 温度值。在保持模式下，按上行键触发该功能，并选择显示的模式。

只有 t/c 探针连接成功后才会显示 TCK 温度值。当仪器进入保持模式时 TCK 温度值也将保持。

报警功能

在屏幕上 H、L 标志闪烁时可进行报警功能设置，通过上行键或上行键进行设置。当屏幕上显示 标志即启动报警功能。

再次按功能按键即进入高、低温报警值设置。可通过上行键或下行键对报警值进行调整。

当测量值大于设置的高温报警值时屏幕背景灯将显示**红色**。

当测量值小于设置的低温报警值时屏幕背景灯将显示**蓝色**。

℃/℉功能设置

可以选择摄氏或者华氏作为显示温度。

OFFSET

通过该功能可进行线性的偏移值设置以修正测量值，在计量时可修改该值以达到与标准源相同的温度读数。

恢复出厂设置

在保持模式下按功能按键同时按上行按键可将仪器恢复出厂默认设置。该功能将不会删除存储的温度值。

数据存储[MSPro]

MSPro 带 20 点的数据存储功能。

数据存储

在保持模式下按下行按键,将会有一行小数字和磁盘的图标在当前的温度结果上面显示。按下模式按键保存当前温度。

显示存储数据

按测量按键同时按下模式按键，使用上行/下行按键选择存储位置，通过模式按键选择非接触测量（红外线）或接触式测量（K 偶探针）。

清空存储器

在保持模式下按下行按键并选择存储位置 0。再按模式按键。三次声音信号确认清除成功。

OptrisConnect 软件

MSPlus 和 MSPro 的包装盒里包含安装光盘。对于 MS 用户，另行选购软件及 USB 电缆套装。

系统要求：

- Windows XP 操作系统
- USB 端口
- 至少 30M 的硬盘空间
- 至少 128M 的内存空间
- CD-ROM 驱动器

软件功能介绍

- 仪器参数设置
- 显示和记录温度值
- 图表显示温度变化曲线
- 下载仪器存储的温度数据

安装

请将安装光盘放入 CD-ROM 驱动器，软件会自动启动安装程序提示安装，如没有自动进行安装请双击光盘文件目录下的 SETUP.EXE 文件启动安装，并按提示完成安装。

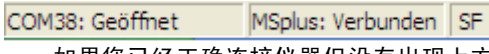
连接电脑

用 USB 电缆线将仪器与电脑连接。电脑将自动找到新硬件并通过 CD-ROM 驱动器找到驱动程序并自动安装。

提示: 驱动安装过程会进行两次 (USB 适配器和 COM 端口)。

软件使用

软件启动后及电脑与仪器成功连接，通讯状态将在状态栏显示（位于时间坐标的下方）。

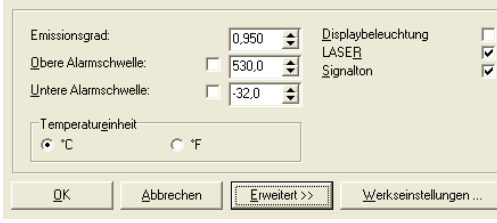


如果您已经正确连接仪器但没有出现上方的信息， 请在软件上选择正确的 COM 端口，打开菜单**[Menu: Setup\ Interface]** 。

如果 USB 适配器已经连接至某端口，将会在该端口号后面显示：**[Infrared Thermometer Adapter]**。

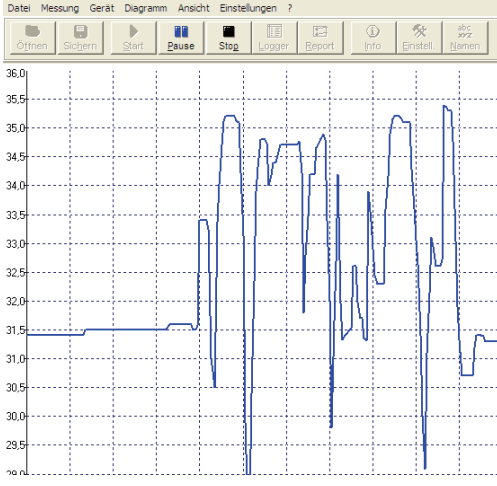
仪器设置

打开菜单**[Menu:Devide \ Setup]** 将弹出对话窗口。可进行以下几个参数的设置：发射率、报警、报警温度、显示背景灯、激光、蜂鸣器。



开始测量

在工具图标点击 **Start** 图标或打开菜单**[Menu: Measurement\ Start]**进行温度测量。



停止测量/保存

点击 **Stop** 图标或打开菜单 **[Menu: Measurement\Stop]** 可停止当前的测量。

点击 **Save** 图标或打开菜单**[Menu: File\ Save as]** 将弹出提示窗口并选择文件和选择保存路径。

打开菜单**[Menu: Setup\ Options]**将弹出窗口定义存储方式以保护数据丢失。

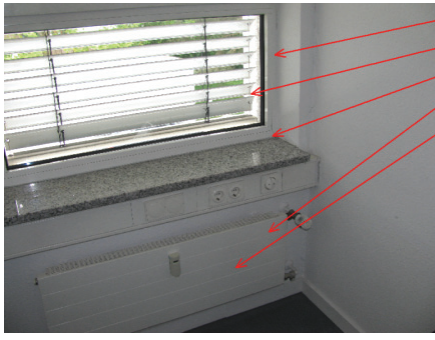
图像报告

该功能可方便在图像上创建带温度测量点指示的报告。

首先需要一张图片作为关联的部件，该图片通常可使用数码相机拍摄（数码相机非标配件）。

建立报告需要通过以下几个步骤：

- 将拍摄的图像保存到您的电脑中。
- 打开 OptrisConnect 软件，然后打开菜单**[Menu: Data\ Report]**启动报告功能。
- 把 MS 仪器与电脑连接。
- 导入关联的图片。
- 光标移到图片上并与 MS 仪器测量时激光点指示的位置相同。
- 在图片上点击鼠标左键，将会在鼠标的当前位置出现一个箭头标识，标识的另外一端显示温度值。



数据存储功能 [MSPRO]

点击 **Logger** 图标或打开菜单栏**[Menu: Measurement\ Download logger data]**，将弹出提示窗口并显示全部被存放的数据。日期和时间及存储温度数据在列表中显示。

	Index	Datum	Uhrzeit	TObj	TExt	Eps
1	1	19.05.2009	13:16:43	27,8°C	28,6°C	0,950
2	2	19.05.2009	13:16:43	33,2°C	28,6°C	0,950
3	3	19.05.2009	13:16:43	39,7°C	28,8°C	0,950
4	4	19.05.2009	13:16:43	23,4°C	33,4°C	0,950
5	5	19.05.2009	13:16:43	27,2°C	30,8°C	0,949
6	6	19.05.2009	13:16:44	24,3°C	30,2°C	0,949
7	7	19.05.2009	13:16:44	45,6°C	30,4°C	0,639

Schließen | Datei Öffnen... | Sichern als ... | Logger Löschen ...

MSpro Daten vom Gerät

如需更多详细信息， 请浏览软件中的帮助功能。可打开菜单栏[Menu: ?\ Help]。

技术参数 [MS]

温度范围	-32~420℃(-20~780℉)
准确度	±1℃ (0℃~100℃)
	±1℃±0.07℃/℃ (-32℃~0℃)
	±1% ×读数 (100 ℃~420℃)
重复精度	±0.7℃ (0℃~100℃)
	±0.7℃±0.05℃/℃(-32℃~0℃)
	±0.5% ×读数(100℃~ 420℃)
光学分辨率(D:S)	20:1
显示分辨率	0.2℃(0.5℉)
响应时间	300ms
环境温度	0~50℃
存储温度	-20~60℃(不含电池)
光谱响应	8~14μm
发射率	0.95
扫描/保持功能	有
最大值/最小值显示	有
背景光	有
℃/℉选择	有
激光瞄准	＜1mW 650nm 激光等级 II 级
低电量报警	有
重量/尺寸	150g/190×38×45mm
电源	9V 碱性电池
电池寿命	20小时,激光与背景光使用占50%；
	40小时,激光和背景光关闭
相对湿度	10~95% RH(不结露，环境温度＜30℃)

技术参数 [MSPlus]

温度范围	-32℃~530℃(-20℉~980℉)
准确度	±1%×读数(100 ℃~530 ℃);
	±1℃(0℃~100℃)
	±1℃±0.07℃/℃(-32℃~0℃)
重复精度	±0.5%×读数 (100 ℃~530 ℃)
	±0.7℃ (0℃~100℃)
	±0.7℃±0.05℃/℃ (-32℃~0℃)
光学分辨率(D:S)	20:1
显示分辨率	0.1℃(0.1℉)
响应时间	300ms
环境温度	0~50℃
存储温度	-20~60℃(不含电池)
光谱响应	8~14μm
发射率	0.100~1.000
显示功能	Max/Min/Hold/℃/℉选择
报警功能	高/低温报警功能
电脑联接、软件、热偶输入	---
激光瞄准	＜1mW 650nm 激光等级 II 级
低电量报警	有
重量/尺寸	150g/190×38×45mm
电源	9V 碱性电池
电池寿命	20小时,激光与背景光使用占50%；
	40小时,激光和背景光关闭
相对湿度	10~95% RH(不结露，环境温度＜30℃)

技术参数 [MSPro]

温度范围	-32℃~760℃(-20℉~1440℉)
准确度	±1%×读数 (100 ℃~760 ℃)
	±1℃ (0℃~100℃)
	±1℃±0.07℃/℃(-32℃~0℃)
重复精度	±0.5%×读数 (100 ℃~760 ℃)
	±0.5℃ (0℃~100℃)
	±0.7℃±0.05℃/℃ (-32℃~0℃)
光学分辨率(D:S)	40:1
显示分辨率	0.1℃(0.1℉)
响应时间	300ms
环境温度	0~50℃
存储温度	-20~60℃(不含电池)
光谱响应	8~14μm
发射率	0.100~1.500
显示功能	Max/Min/Hold/℃/℉选择
报警功能	高/低温报警功能
电脑联接、软件、热偶输入	USB 接口、操作软件、K 型热电偶输入
激光瞄准	＜1mW 635nm 激光等级 II 级
低电量报警	有
重量/尺寸	180g/190×38×45mm
电源	9V 碱性电池
电池寿命	40小时,激光与背景光使用占50%；
	80小时,激光和背景光关闭
相对湿度	10~95% RH(不结露，环境温度＜30℃)

故障处理

现 象	问 题	解决方法
HHH	温度超出测量上限	选择在测量范围内的目标
LLL	温度超出测量下限	选择在测量范围内的目标
—	电池电量不足	立刻更换电池
电池电量指示	电量不足	检查 / 更换电池
显示面板无显示	电池没电/无电池	检查 / 更换电池
激光不工作	1. 电量不足或没电	1. 更换电池
	2. 激光关闭	2. 打开激光

金属物体发射率表

材料		发射率
铝	非氧化	0,02-0,1
	光亮	0,02-0,1
	粗糙	0,1-0,3
	氧化	0,2-0,4
黄铜	光亮	0,01-0,05
	粗糙	0,3
	氧化	0,5
铜	光亮	0,03
	粗糙	0,05-0,1
	氧化	0,4-0,8
铬合金		0,02-0,2
金		0,01-0,1
哈氏合金	合金	0,3-0,8
铬镍铁合金	电抛光	0,15
	喷沙	0,3-0,6
	氧化	0,7-0,95
铁	非氧化	0,05-0,2
	生锈	0,5-0,7
	氧化	0,5-0,9
	锻造,生铁	0,9
铸铁	非氧化	0,2
	氧化	0,6-0,95
铅	抛光	0,05-0,1

材料		发射率
铅	粗糙	0,4
	氧化	0,2-0,6
镁		0,02-0,1
汞		0,05-0,15
钼	非氧化	0,1
	氧化	0,2-0,6
铜镍合金		0,1-0,14
镍	电解	0,05-0,15
	氧化	0,2-0,5
铂	黑色	0,9
银		0,02
钢	抛光板	0,1
	不锈钢	0,1-0,8
	厚板	0,4-0,6
	冷轧	0,7-0,9
	氧化	0,7-0,9
锡	非氧化	0,05
钛	光亮	0,05-0,2
	氧化	0,5-0,6
钨	光亮	0,03-0,1
锌	光亮	0,02
	氧化	0,1

非金属物体发射率表

材料		发射率
石棉		0,95
沥青		0,95
黑陶		0,7
碳	非氧化	0,8-0,9
	石墨	0,7-0,8
碳化硅		0,9
陶瓷		0,95
混凝土		0,95
玻璃		0,85
粗沙		0,95
石膏		0,8-0,95
冰		0,98
石灰岩		0,98
油漆	无碱	0,9-0,95
纸	多色	0,95
塑料 >50µm	不透明	0,95
橡胶		0,95
细纱		0,9
雪		0,9
泥土		0,9-0,98
纺织品		0,95
水		0,93
木	本态	0,9-0,95

保修说明

每台仪器都经过质量检验程序，如果发生任何问题，请立刻联系服务部门。仪器从出厂起保质期为 12 个月。过保质期后，生产商对所维修或更换元件部分的保质期为 6 个月。可充电电池生产商提供 3 个月的保质期。如果因使用不当或疏忽造成仪器的电路断路以及原电池损坏不在保修范围。私自拆卸也不在保修之列。生产商不对间接损坏负责。

在保修期内若仪器出现问题，可以免费更换，标定或修理，期间发生的运费由发货人承担。生产商有权选择更换产品部件而不是修理。如果仪器故障是由于用户的使用不当或疏忽造成，用户必须负担维修费用，在这种情况下用户可以事先询问维修费用。

产品符合下列标准：

EMC： EN61326-1:2006
EN61326-2-3:2006
安全标准： EN6101-1:2001
EN60825-1:2007

产品满足 EMC 2004/108/EG 和低电压指示要求 2006/95/EG。
产品遵守欧盟标准。

CE

Introduction

Thank you for choosing the optris MS!

Infrared thermometers measure contactless. They determine the temperature on the basis of the emitted infrared radiation from an object. These thermometers enable the user to detect the temperature of inaccessible or moving objects without difficulties.

Please read this manual completely before the initial operation.

Scope of Supply

- Infrared Thermometer
- 9 V alkaline battery
- Operators manual

The models MSPlus and MSPro include in addition:

- Wrist strap
- Pouch
- Protection boot
- Adapter for photo tripod
- USB interface cable
- OptrisConnect Report software

The model MSPro includes in addition:

- Thermocouple insertion probe type K

Optional:

- Certificate of calibration
- Software Kit for MS, containing:
  - OptrisConnect Report software
  - USB interface cable
  - Adapter for photo tripod

Applications

Maintenance of electrical equipment

Hot spot detection on bearings, transmission and motors

Measurement of moving objects in manufacturing processes

Detection of energy losses on heat insulations

Inspection of critical components on vehicles

Important Notes

The MS contains a laser class 2 for marking the measurement spot.

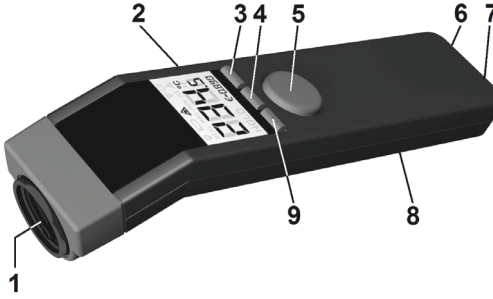
Do not point the laser directly at the eye or indirectly off reflective surfaces as this may cause serious damages!

Please protect the instrument from the following:

- Electromagnetic fields (EMF)
- Static electricity
- Abrupt changes of the ambient temperature

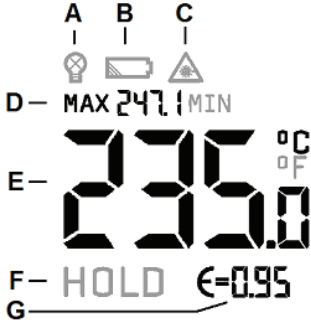
Infrared thermometers measure the surface temperature of objects only. The MS cannot measure through transparent material such as glass or plastic.
Keep the optics clean of dirt (cleaning with a humid tissue or a mild commercial cleaner).

Functional Elements



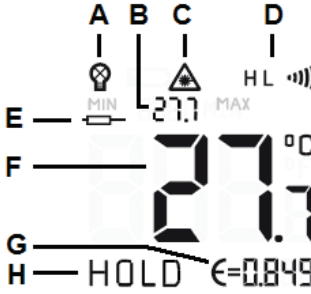
1 Precision glass optics
2 LCD display
3 Down button/ LCD backlight
4 Mode button
5 Trigger
6 Thermocouple input [Pro]
7 USB interface
8 Battery chamber
9 Up button/ Laser

Display [MS]



A Display backlight
B Battery symbol
C Laser symbol
D MAX or MIN value
E Current temperature value
F HOLD function
G Emissivity

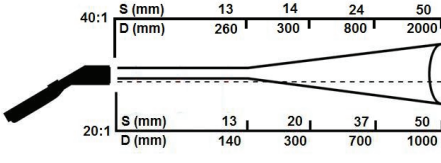
Display [MSPlus/ MSPro]



A Display backlight
B MAX or MIN value
C Laser symbol
D HIGH and LOW alarm indication
E t/c value [Pro]
F Current temperature value
G Emissivity
H HOLD function

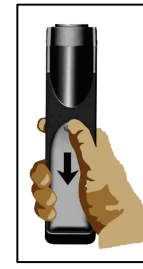
Optics

Due to the precision glass optics the measuring beam of the instrument has a diameter of 13 mm at any distance within the first 140 mm (260 mm at model MSPro).
The object must be at least as large as the spot size.
The diagram shows the distance (D) to spot (S) ratio.



D:S = 20:1 [MS/ MSPlus]/ 40:1 [MSPro]

Insertion of Batteries



In order to exchange the battery just press the cover lid on the bottom side of the unit downwards.
Please make sure to insert the battery in the correct direction.

Please exchange the battery if the low battery symbol is shown in the display.

Usage of the Pouch [MSPlus/ MSPro]

Make sure to insert the unit into the pouch as shown to avoid unintended operation.

Protection Boot [MSPlus/ MSPro]

The rubber protection boot protects your MS efficiently against dirt and contamination in harsh industrial environment.

Slide the MS into the boot as shown in the picture. Then pull the front part of the boot carefully over the optics of the MS.

All operating elements and connections are still accessible if the protection boot is used.

Basic Operation

Temperature Measurement

Please aim with the unit at the target and press the **Trigger**.
HOLD function: After release of the **Trigger** all display values will be shown for 7 seconds.
Shut down: If you do not press any button during the HOLD mode the unit shuts down automatically after 7 seconds.

Display backlight

Please press the **Down** button while the **Trigger** is pressed to switch the display backlight on or off.

Laser

Please press the **Up** button while the **Trigger** is pressed to activate/ deactivate. The current status will be shown in the display.

Unit Settings [MS]

MAX/ MIN

With this function you can select if the maximum or minimum value will be shown permanently in the upper part of the display.
To switch between both please press the **MODE** button, either during the HOLD mode or during a measurement (while the **TRIGGER** is pressed). The made setting will be saved, also after the unit switched off.

If you press the **MODE** button after you made a measurement (during the HOLD mode) the determined maximum and minimum value taken during that measurement will be displayed.

EMISSIVITY

The intensity of infrared radiation, which is emitted by each body, depends on the temperature as well as on the radiation features of the surface of the measuring object.
The emissivity (e= Epsilon) is used as a stable factor of the material, with which to describe the ability of the body to emit infrared energy. If the emissivity chosen is too high, the infrared thermometer may display a temperature value which is much lower than the real temperature. The unit will be delivered with a preset fixed emissivity of 0,95. This emissivity value is very common for most organic materials and painted or oxidized surfaces.

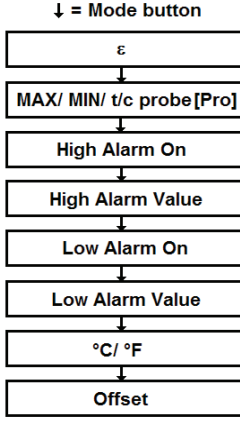
Shiny or metallic surfaces may result in inaccurate reading due to reflexions. To prevent this, cover the measuring surface with either flat black paint or with plastic labels.

°C/ °F SETTING

To setup the temperature unit to °F please press the **DOWN** button (keep pressed) and then the **TRIGGER**.
To setup the temperature unit to °C please press the **UP** button (keep pressed) and then the **TRIGGER**.

Unit Settings [MSPlus/ MSPro]

With the **MODE** button you can select the different setting functions. The unit must be in the HOLD mode. The respective function will be flashing in the display. With the **UP** and **DOWN** buttons you can change parameters or activate/ deactivate functions.
To save the settings you have to press the **MODE** button again (will also switch to the next function) or the **TRIGGER**.
If you have not activated any button for 7 seconds, the instrument will not save the current modification and shut down.



EMISSIVITY
*Definition ► see **Unit Setting MS***
The measurement of metallic surfaces, in particular, requires a careful emissivity adjustment. You will find a material table in chapter ***Emissivity Tables.***

Setting the emissivity: Press the **MODE** button (during HOLD mode) – with **UP** and **DOWN** you can adjust the value. The shown temperature value corresponds to the emissivity adjustment. This allows a correction of ε even after the measurement has been done.

MAX/ MIN/ T/C PROBE [MSPRO]
With this function you can select if the maximum, minimum or t/c probe value [MSPro] will be shown permanently in the upper part of the display. After a measurement (during the HOLD mode) you can also recall the respectively non shown values by pressing the **UP** button.
The t/c probe value will be displayed only if a probe is connected. During the HOLD mode this value will also be frozen.

ALARM FUNCTIONS
To activate/ deactivate please press the **UP** or **DOWN** button if the **H** or **L** is shown in the display. The alarm function is activated as soon as the display shows the sign .
After pressing **MODE** again the alarm values can be adjusted using the **UP** and **DOWN** button.
If the temperature exceeds the selected **High value** an acoustic signal will appear and the display color will change to **RED**.
If the temperature falls below the selected **Low value** an acoustic signal will appear and the display color will change to **BLUE**.

°C/ °F SETTING
Selection of the temperature unit.

OFFSET
With this function you can set a linear offset (+/-) to the temperature reading. It allows a field calibration of several units showing exactly the same values.

Reset Function

The unit can be reset to the factory default values by pressing the **MODE** and **UP** button simultaneously (during HOLD mode). The Data logger [MSPro] will not be deleted by this procedure.

Data Logger [MSPro]

The MSPro has an internal data logger for 20 values.

STORING DATA
Please make your measurement and release the **TRIGGER** – the unit is in the HOLD mode. Pressing the **DOWN** button will show the next free data logger position (flashing) and a disc icon in the display. With **UP** and **DOWN** you can change the data logger position manually. Pressing **MODE** will store the data into the logger (confirmed by a twofold acoustic signal).

RECALL OF DATA
Please press the **TRIGGER** and **MODE** simultaneously. The next free data logger position and a disc icon (flashing) will be shown in the display. With **UP** and **DOWN** you can select any data logger position. To switch between IR temperature value and t/c probe value please press the **MODE** button.

RESET OF THE DATA LOGGER
Please press the **DOWN** button during the HOLD mode. Select logger position **0** and press **MODE** again. A threefold acoustic signal confirms the successful reset.

OptrisConnect Report software

The software is included in the MSPlus and MSPro package. For the basic model MS an upgrade kit is available.

Minimum system requirements

- Windows XP
- USB interface
- Hard disc with at least 30 MByte free space
- At least 128 MByte RAM
- CD-ROM drive

MAIN FUNCTIONS OF THE SOFTWARE

- Setup of unit parameters
- Display and record of temperature trends
- Easy creating of image based temperature reports
- Download of logger data

INSTALLATION

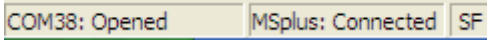
If the auto run option on your computer is activated the installation wizard will start automatically. Otherwise please start **setup.exe** on the CD-ROM. Follow the instructions of the wizard until the installation is finished.

CONNECTION TO THE PC

Please connect the unit via the special USB adapter cable. The installation of the driver software from the CD-ROM will start automatically.
NOTE: The driver installation process will start two times (USB adapter and COM port).

STARTING THE SOFTWARE

After you have started the software and connected the unit the successful communication will be shown in the status line (below the time axis).

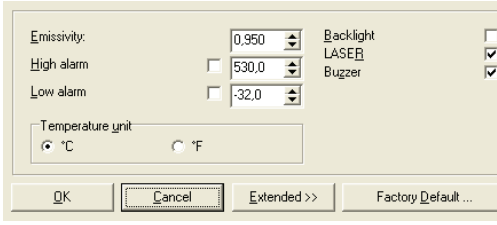


If you cannot establish a communication in spite of correct connection between unit and computer please choose the correct COM port under **[Menu: Setup\ Interface]**.

If the USB adapter cable is connected this port is marked as **[Infrared Thermometer Adapter].**

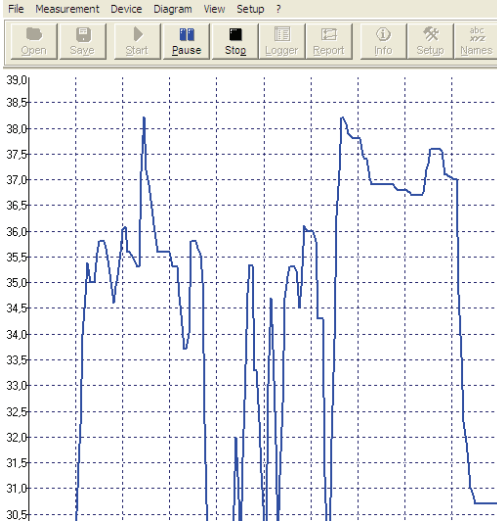
Device Setup

The menu item **[Menu: Device\ Setup]** opens a dialog window for setup of the following parameters: Emissivity, Alarm, Temperature unit, Display backlight, Laser, Buzzer.



Starting a Measurement

You can start a measurement by pressing the **Start** button in the tool bar:
[Menu: Measurement\ Start].



Stop Measurement/ Save

The **Stop** button will finish the current measurement **[Menu: Measurement\ Stop]**.

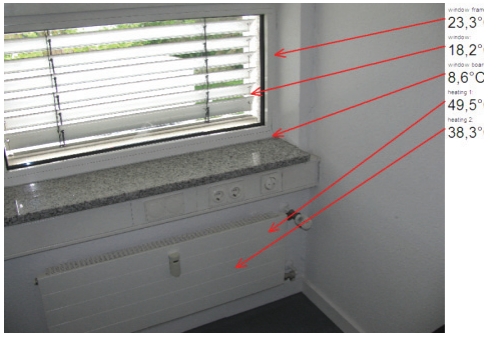
The **SAVE** button **[Menu: File\ Save as]** opens an explorer window for selection of file name and location.
The menu item options **[Menu: Setup\ Options]** enables settings for data protection.

IMAGE BASED REPORTS
This feature allows an easy creating of reports showing temperature points inside a digital picture.
At first you have to make a picture of the desired object/ scenery using a digital photo camera (not included in scope of supply).

To create a report you have to do the following steps:

- Save the picture on your PC
- Open the picture inside the OptrisConnect software using the Report function **[Menu: File\ Report]**.
- Connect the MS unit to the PC
- Point to the desired object
- Align the cursor on the picture to the same location the laser of the MS is showing
- Press the left mouse button

An arrow will now show the location inside the picture and the measured value.



DATA LOGGER FUNCTIONS [MSPRO]
To download the logger data from the unit please press the **LOGGER** button **[Menu: Measurement\ Download logger data]**. All data from the logger will be displayed in an extra window as a table. Date and time correspond to the time of the download.

	Index	Date	Time	TObj	TExt	Eps
1	1	19.05.2009	13:14:39	27,8°C	28,6°C	0,950
2	2	19.05.2009	13:14:39	33,2°C	28,6°C	0,950
3	3	19.05.2009	13:14:39	39,7°C	28,8°C	0,950
4	4	19.05.2009	13:14:39	23,4°C	33,4°C	0,950
5	5	19.05.2009	13:14:39	27,2°C	30,8°C	0,949
6	6	19.05.2009	13:14:39	24,3°C	30,2°C	0,949
7	7	19.05.2009	13:14:39	45,6°C	30,4°C	0,639

Close | Open File... | Save as ... | Clear Logger ...

MSpro Data from device

You will find a detailed software description after start of the program under [Menu: ?\ Help].

Technical Data [MS]

Temperature range	-32...420°C (-20...788°F)
Accuracy (at T_{amb} = 23 ±5°C)	± 1% or ± 1°C (20...420°C) ± 1,5°C (19,9...0°C) ± 2,5°C (-0,1...-20°C) ± 3°C (-20,1...-32°C)
Repeatability	± 0,5% or ± 0,7°C (20...420°C)
Optical resolution	20:1/ 13mm spot size in ≤140mm distance
Resolution (display)	0,2°C (0,5°F)
Response time (95%)	300 ms
Ambient temperature	0...50°C
Storage temperature	-20...60°C (without battery)
Spectral range	8...14µm
Emissivity	0,95
Functions	MIN, MAX, HOLD, °C/°F
Laser	< 1mW laser class IIa, laser beam with 9mm offset
PC interface	USB
Weight/ Dimensions	150g, 190x38x45 mm
Battery	9V alkaline battery
Battery life time	20h (laser and backlight on 50%)/ 40h (laser and backlight off)
Relative humidity	10-95% RH, non condensing at ambient temperature < 30°C

Technical Data [MSPlus]

Temperature range	-32...530°C (-20...980°F)
Accuracy (at T_{amb} = 23 ±5°C)	± 1% or ± 1°C (20...530°C) ± 1,5°C (19,9...0°C) ± 2,5°C (-0,1...-20°C) ± 3°C (-20,1...-32°C)
Repeatability	± 0,5% or ± 0,7°C (20...530°C)
Optical resolution	20:1/ 13mm spot size in ≤140mm
Resolution (display)	0,1°C (0,1°F)
Response time (95%)	300 ms
Ambient temperature	0...50°C
Storage temperature	-20...60°C (without battery)
Spectral range	8...14µm
Emissivity/ Gain	0,100...1,100 adjustable
Functions	MIN, MAX, HOLD, °C/°F, Offset
Alarm functions	Visual and acoustic HIGH- and LOW-alarm
Laser	< 1mW laser class IIa, laser beam with 9mm offset
PC interface	USB
Software	OptrisConnect Report software
Weight/ Dimensions	150g, 190x38x45 mm
Battery	9V alkaline battery
Battery life time	20h (laser and backlight on 50%)/ 40h (laser and backlight off)
Relative humidity	10-95% RH, non condensing at ambient temperature < 30°C

Technical Data [MSPro]

Temperature range	-32...760°C (-20...1440 °F)
Accuracy (at T_{amb} = 23 ±5°C)	± 1% or ± 1°C (20...760°C) ± 1,5°C (19,9...0°C) ± 2,5°C (-0,1...-20°C) ± 3°C (-20,1...-32°C)
Repeatability	± 0,75% or ± 0,75°C (20...760°C)
Optical resolution	40:1/ 13mm spot size in ≤260mm
Resolution (display)	0,1°C (0,1°F)
Response time (95%)	300 ms
Ambient temperature	0...50°C
Storage temperature	-20...60°C (without battery)
Spectral range	8...14µm
Emissivity/ Gain	0,100...1,100 adjustable
Functions	MIN, MAX, HOLD, °C/°F, Offset
Alarm functions	Visual and acoustic HIGH- and LOW-alarm
Laser	< 1mW laser class IIa, laser beam with 9mm offset
PC interface	USB
Software	OptrisConnect Report software
Data logger	for 20 values
Input	for t/c probe type K
Weight/ Dimensions	180g, 190x38x45 mm
Battery	9V alkaline battery
Battery life time	20h (laser and backlight on 50%)/ 40h (laser and backlight off)
Relative humidity	10-95% RH, non condensing at ambient temperature < 30°C

Troubleshooting

Error/ Code	Problem	Action
HHH	object temperature above range limit	choose object within measuring range
LLL	object temperature below range limit	choose object within measuring range
battery indicator	low battery	replace battery
no display	low battery	replace battery
laser does not work	low battery	replace battery
	laser deactivated	activate laser

Emissivity Table Metals

Material		typical Emissivity
Aluminium	non oxidized	0,02-0,1
	polished	0,02-0,1
	roughened	0,1-0,3
	oxidized	0,2-0,4
Brass	polished	0,01-0,05
	roughened	0,3
	oxidized	0,5
Copper	polished	0,03
	roughened	0,05-0,1
	oxidized	0,4-0,8
Chrome		0,02-0,2
Gold		0,01-0,1
Haynes	alloy	0,3-0,8
Inconel	electro polished	0,15
	sandblast	0,3-0,6
	oxidized	0,7-0,95
Iron	non oxidized	0,05-0,2
	rusted	0,5-0,7
	oxidized	0,5-0,9
	forged, blunt	0,9
Iron, casted	non oxidized	0,2
	oxidized	0,6-0,95
Lead	polished	0,05-0,1

Material		typical Emissivity
Lead	roughened	0,4
	oxidized	0,2-0,6
Magnesium		0,02-0,1
Mercury		0,05-0,15
Molybdenum	non oxidized	0,1
	oxidized	0,2-0,6
Monel (Ni-Cu)		0,1-0,14
Nickel	electrolytic	0,05-0,15
	oxidized	0,2-0,5
Platinum	black	0,9
Silver		0,02
Steel	polished plate	0,1
	rustless	0,1-0,8
	heavy plate	0,4-0,6
	cold-rolled	0,7-0,9
	oxidized	0,7-0,9
Tin	non oxidized	0,05
Titanium	polished	0,05-0,2
	oxidized	0,5-0,6
Wolfram	polished	0,03-0,1
Zinc	polished	0,02
	oxidized	0,1

Emissivity Table Non-Metals

Material		typical Emissivity
Asbestos		0,95
Asphalt		0,95
Basalt		0,7
Carbon	non oxidized	0,8-0,9
	graphite	0,7-0,8
Carborundum		0,9
Ceramic		0,95
Concrete		0,95
Glass		0,85
Grit		0,95
Gypsum		0,8-0,95
Ice		0,98
Limestone		0,98
Paint	non alkaline	0,9-0,95
Paper	any color	0,95
Plastic >50µm	non transparent	0,95
Rubber		0,95
Sand		0,9
Snow		0,9
Soil		0,9-0,98
Textiles		0,95
Water		0,93
Wood	natural	0,9-0,95

Warranty

Each single product passes through a quality process. Nevertheless, if failures occur please contact the customer service at once. The warranty period covers 12 months starting on the delivery date. After the warranty is expired the manufacturer guarantees additional 6 months warranty for all repaired or substituted product components. Warranty does not apply to electrical circuit breakers, primary batteries and damages, which result from misuse or neglect. The warranty also expires if you open the product. The manufacturer offers a 3 months warranty for rechargeable batteries. The manufacturer is not liable for consequential damage. If a failure occurs during the warranty period the product will be replaced, calibrated or repaired without further charges. The freight costs will be paid by the sender. The manufacturer reserves the right to exchange components of the product instead of repairing it. If the failure results from misuse or neglect the user has to pay for the repair. In that case you may ask for a cost estimate beforehand.

The product complies with the following standards:

EMC:	EN 61326-1:2006 (Basic requirements) EN 61326-2-3:2006
Device safety:	EN 61010-1:2001
Laser safety:	EN 60825-1:2007

The product accomplishes the requirements of the EMC Directive 2004/108/EG and of the Low-Voltage Directive 2006/95/EG.

CE

Disposal of old electrical and electronic equipment

This symbol on the unit indicates that this product shall not be treated as household waste. Instead it should be handed over to the applicable collection point for the recycling of electrical and electronic equipment. For more information please contact your distributor.

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