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指针式温度计 / Pointer Thermometer

使用说明书2038 / Operating Instructions 2038

紧凑系列: MT-ST160SK
Compact-Series: MT-ST160SK/TT
MT-ST160W
MT-ST160W/TT
MT-ST160WR
MT-ST160WR/TT

Messko

目录

提示

本说明书中的数据可能会和交货的装置稍有差异。
我方保留进行更改的权利，恕不另行通知。

Contents

HINWEIS

Data contained herein may differ in details from the equipment delivered.
We reserve the right to make alterations without notice.

CE

请保留本说明书以备日后参考!

Please keep this manual for future reference!

Messko MR

1 安全

1.1 安全须知

从事本设备的安装、试运行、运行或维修的人员必须：
- 具有合格的专业资格
- 严格遵守本使用说明书

违章操作或错误使用可能会导致：
- 严重的或致命的伤害
- 损坏本设备或用户的其它财产
- 降低本设备的效能

在安全须知上，本说明书采用如下三种形式强调各种重要事项

警告

这是对生命和健康有一定危险的警示。忽视这种警示会导致严重的或致命的伤害。

注意

这是对本设备或用户其它设备有一定危险的警示。不排除严重的或致命的伤害。

提示

这是对某一事项的重要说明。

1.2 指定用途

指针式温度测量仪表用于测量电源变压器、电抗器或类似设备的温度。
调试仪表前，查阅铭牌上和操作使用说明书上的操作限定值非常重要。

1.3 设备操作的重要提示

用户必须遵守国家健康及安全规章。
特别要强调的是，在进行涉及带电部件（人碰到它们可能会有触电的危险）的工作时，只有在这些部件断电或对它们采取了保护措施，工作人员不会直接接触到时，这些工作才允许进行。
电气安装应遵守相关国家安全规则。为保证无故障运行必须连接地线。

1 Safety

1.1 Safety instructions

All personnel involved in installation, commissioning, operation or maintenance of this equipment must:
- be suitably qualified and
- strictly observe these operating instructions.

Improper operation or misuse can lead to
- serious or fatal injury,
- damage to the equipment and other property of the user
- a reduction in the efficiency of the equipment.

Safety instructions in this manual are presented in three different forms to emphasize important information.

WARNING

This information indicates particular danger to life and health. Disregarding such a warning can lead to serious or fatal injury.

CAUTION

This information indicates particular danger to the equipment or other property of the user. Serious or fatal injury cannot be excluded.

NOTE

These notes give important information on a certain issue.

1.2 Specified application

Pointer thermometers are used to measure temperatures on power transformers, reactors or similar equipment.

It is important to read and observe the limit values for operation indicated on the nameplate and in the operating instructions prior to commissioning the device.

1.3 Important notes on equipment operation

The user is obliged to comply with the national health and safety regulations.

It is especially emphasized that works performed to live, e.g. dangerous-contact components, are permissible only while these components are either de-energized or protected against direct contact.

Electrical installation is subject to the relevant national safety regulations. It is imperative to connect the ground wire in order to ensure trouble-free operation.

注意

本装置的安装、电气接线和投入运行必须由合格的熟练的技术人员按本使用说明书进行。
保证本装置仅用于指定的用途由用户负责。
为安全起见，事先未经MESSKO公司同意，不得在设备的安装、设备改进和更换、电气接线或试运行上擅自进行任何作业。

警告

必须严格遵守相关的各种防火规程。

2 产品规格

指针式温度测量仪表用于显示电源变压器、电抗器或类似设备的温度。
指针式温度测量仪表由温度传感器组成，该温度传感器连接至有毛细管的测量装置上。测量装置配有指针，指针转动显示刻度盘上的温度。测量系统由传感器、毛细管组成，测量装置内装满液体。

注意

测量仪表是敏感装置。因此，所有部件都应该受到良好的保护，避免跌落、碰撞及震动。毛细管不能缩短，否则，测量系统会因为承受较高压力而造成损坏。
测量系统使用的液体有害健康。

2.1 MT-ST160SK

指针式温度计配有可调节微动开关，用于显示油温。所显示的温度是装置的传感器的油温。机械式测量系统是独立运作的，无需输入外部能量。

2.2 MT-ST160W 和MT-ST160WR

配有可调节微动开关的指针式温度表用于显示绕组温度（热像）。冷却介质（油）和绕组之间的温升取决于通过绕组的电流。变换器的二次电流与绕组中电流成正比。该变换器给机械式温度计内加热电阻送电。

CAUTION

Installation, electrical connection, commissioning, and maintenance of the device may only be carried out by qualified, skilled personnel and only in accordance with these operating instructions.

It is the responsibility of the user to make sure that the device is used for the specified application only.

For safety reasons, any unauthorized and improperly executed works, i.e. installation, modification, alteration of the equipment, electrical connection, or commissioning of the equipment, are forbidden without first consulting Messko!

WARNING

All relevant fire protection regulations must be strictly observed.

2 Product specification

Pointer thermometers are used to indicate temperatures on power transformers, reactors or similar equipment.

They always consist of a temperature sensor which is connected to the measuring device with a capillary tube. The measuring device is equipped with a pointer which turns to show the temperature on a scale. The measuring system consisting of sensor, capillary tube and measuring device is filled with a liquid.

CAUTION

Measuring instruments are sensitive. All parts should therefore be protected against falling and against knocks and vibrations.

The capillary tube may not be shortened otherwise the measuring system is subject to increased pressure and will be damaged. The liquid used in the measuring system is hazardous to health

2.1 MT-ST160SK

Pointer thermometers with adjustable microswitches for indicating the oil temperature. The indicated temperature is the oil temperature on the sensor of the device. The mechanical measuring system functions independently and requires no power input.

2.2 MT-ST160W resp. MT-ST160WR

Pointer thermometers with adjustable microswitches are used to indicate the winding temperature (thermal image). The temperature rise between cooling liquid (oil) and winding depends on the current in the winding. The secondary current of the transducer is proportional to the current in the winding. This transducer feeds a heating resistor inside the mechanical

结果，测得油温的梯度曲线呈上升趋势（随变压器负荷的增加）。MT-ST160W型（6.1章）指针式温度表可通过设定加热电流进行调节；MT-ST160WR型(6.2章)则通过设定加热圈的电阻进行调节。

2.3 TT 型号

另外，该装置还装有一传感器，它可将温度值转换为电信号 (4...20mA)。传感器需要通电(12至30V DC).

thermometer. That causes an increasing indication (gradient) of the measured oil temperature according to the transformer load.

The pointer thermometer type MT-ST160W (chapter 6.1) has to be adjusted by setting the heating current, type MT-ST160WR (chapter 6.2) by setting the resistor of the heating loop.

2.3 TT version

This devices are additionally equipped with a sensor which converts the temperature value into an electrical signal (4 to 20 mA). The sensor requires power (12 to 30V DC).

3 安装

注意

必须严格遵守本安装和操作说明书中规定的条件。

3.1 仪表的安装

指针式温度表借助固定底板（图1/13）安装到变压器上。安装孔之间距离140毫米，孔直径9毫米。指针式温度表不要安装在有震动或电源电压波动的地方。

指针式温度表要垂直安装。

3.2 毛细管 (图 1/14)

展开毛细管时不得扭绞或成卷。要避免撕裂、强拉、挤压或弯曲毛细管。绝不可用毛细管提携温度计。先确定毛细管的走向，再安装到位。多余的毛细管盘成圆圈，放到不会受热的地方（最高60° C）。最小弯曲半径80毫米（见图1）。

3.3 温度传感器（图1/15）

变压器温度计座（按照DIN42554或类似标准）内充油或导热黏糊到2/3高度，然后用大螺旋密封套（图2/4，扳手尺寸27毫米）扭紧温度传感器（图2/5）。将毛细管转至所需位置并用小螺旋密封套（图2/3，扳手尺寸14毫米）固定。

3.4 防（指针）抖动保护件（图2/1），选择件

如果需要，将防抖元件安装到螺母上（图2/4）并将毛细管在防抖元件内侧走线。将防抖元件固定螺丝（图2/2，扳手尺寸13毫米）拧紧到六角螺母的一个平面上。

3 Installation

CAUTION

The operating and installation conditions demanded by this installation and operating instructions must be strictly complied with.

3.1 Mounting the device

The pointer thermometer is attached to the transformer by its mounting plate (Fig.1/13). The spacing between the fixing holes is 140mm and the diameter of the holes is 9mm. Fix the thermometer in such a position that it will not be subject to vibration or mains voltage fluctuations.

The thermometer should be installed vertically.

3.2 Capillary tube (Fig. 1/14)

Roll out the capillary tube avoiding kinks and loops. Do not rip, pull, squeeze or bend this tube. Never carry the thermometer by the capillary tube. Route the capillary tube and fix it in position. Roll up excess tube and store it in a position not subject to excessive temperatures (max. 60°C). Minimum winding diameter is 80 mm (see fig. 1).

3.3 Temperature sensor (Fig.1/15)

Fill the transformer thermometer pocket (according to DIN 42554 or similar) two thirds with oil or heat-conducting paste and screw in the temperature sensor (Fig. 2/5) via the large screwed gland (Fig. 2/4, wrench size 27mm). Turn the capillary tube to the desired position and secure it with the small screwed gland (Fig. 2/3, wrench size 14mm).

3.4 Kick protection (Fig.2/1) optional

If required, fit the kick protection on the screw (Fig. 2/4) and route the capillary tube inside the kick protection. Tighten the fixing screw (Fig. 2/2, wrench size 13mm) of the kick protection on a flat part of the hex nut.

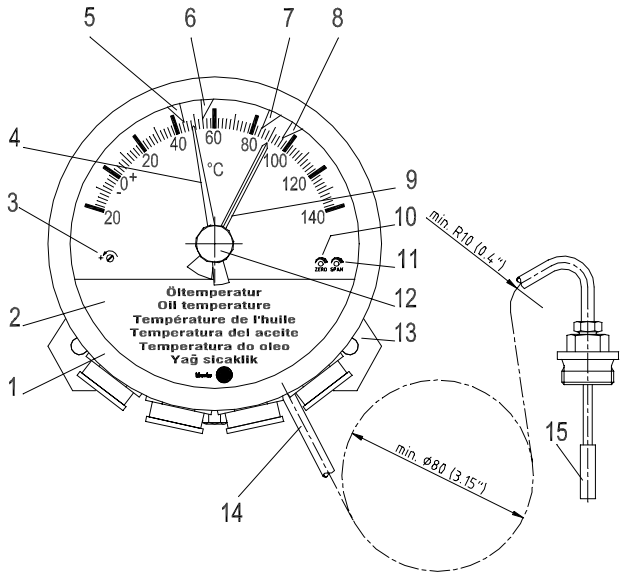


图 1 / Fig. 1

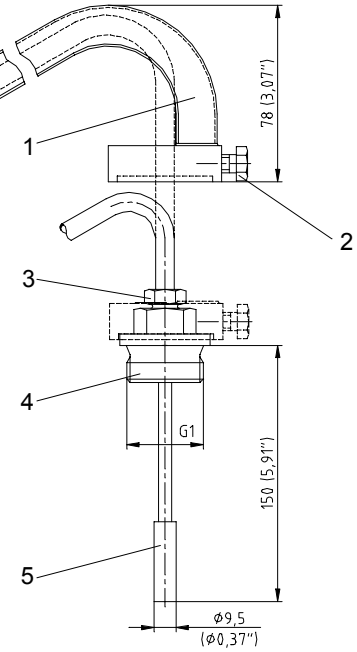


Bild 2 / Fig. 2

3.5 最大读数指针 (图 1/9)

最大读数指针是由指针拖动，记录温度测量当中出现过的最大读数。最大读数指针可以用旋钮调节（图1/12）

3.5 Maximum pointer (Fig.1/9)

The maximum pointer is operated by the pointer and records the maximum reading of a temperature measurement. The maximum pointer can be reset using the knob (Fig. 1/12).

4 电气连接

警告

有电！致命危险！

开启装置前所有连接线路必须不带电。

电气连接前及设定、检查微动开关时，必须拆下卡口压环，。将卡口压环逆时针转动到头，然后向上拉出。
关闭装置时，要确保最大读数指针（图1/4）处于正确位置。将卡圈放回原位，并顺时针转到头。

4.1 微动开关的连接（图3）

连接微动开关时要折起盖板（图1/2）。连接导线削皮约160毫米长，连接导线的绝缘材料削去约6毫米。将有连接线的电缆密封套安装到装置上。然后按照附录中的图（图14）连接。注意电缆密封套的密封圈一定要拧紧以防液体渗漏。

4 Electrical connection

WARNING

Electrical Voltage! Danger to life!

All connecting wiring must be free of voltage before opening the device.

The bayonet fixing ring must be removed in order to connect, set and check the microswitches. Turn the ring anti-clockwise as far as possible and then lift it off.

When closing the device, make sure that the maximum pointer (Fig. 1/9) is in the correct position. It must be to the right of the pointer (Fig. 1/4). Replace the ring and turn it clockwise as far as it will go.

4.1 Connecting the microswitches (Fig. 3)

To connect the microswitches fold up the covering plate (Fig. 1/2). Remove the sheaths of the required connection lines to a length of approx. 160 mm and then the insulation of the required leads to a length of approx. 6 mm. Install the cable glands with the connection lines at the device. Therefore see the drawing in the appendix (Fig. 14). Take care that the sealing ring of the cable gland squeezes the cable so that no liquid can escape. Lose the

按照端子（图3/1）盖板上的连接图（图3/4）松开各导线。

individual leads in accordance with the connection diagram (Fig. 3/4) printed on the covering plate on the terminal strip (Fig. 3/1).

4.2 4 至 20 mA传感器信号（仅用于TT型号）

如4.1所述，按照盖板（图3/4）内的连接图连接好感应器的导线。传感器须供给12-30伏电压。因此可以使用一个额外的供电装置（24伏/直流）或一个有内部供电的显示器。传感器使用的是2线连接技术。注意不要弄错极性！

4.2 Sensor signal 4 to 20 mA (only for TT version)

The leads for the sensor are connected as described in 4.1 in accordance with the connection diagram shown on the inside of the covering plate (Fig. 3/4). The sensor has to be supplied with a voltage of 12...30V. Therefore you can use an additional power supply unit (24V/DC) or an indicator with an internal power supply. The senor is performed in 2-wire technique. Take care on the right polarity!

注意

使用调节螺母（图1/3）进行指针校准，模拟输出不会 做相同的调节。这样，指针式温度计和连接至模拟输出的测量仪器之间的读数会出现误差。模拟输出在工厂时已用电位器“ZERO”（图1/10）和“SPAN”（图1/11）校准并设定好。重新调节会造成失去质量保证。

CAUTION

A correction of the pointer using the adjustment screw (Fig. 1/3) does not make the same adjustment to the analogue output. For this reason, a deviation between the readings of the pointer thermometer and a measuring instrument connected to the analogue output can take place.

The analogue outputs are calibrated and set at the factory using the potentiometers „ZERO“ (Fig. 1/10) und „SPAN“ (Fig. 1/11). Readjusting them results in the loss of guarantee.

注意

绝缘试验期间远方批示（4-20 mA）端子必须短路。
试验电压（最大为交流500伏）必须逐步升高。

CAUTION

Terminals for REMOTE INDICATION (4...20mA) must be short-circuited during insulation test.

The test voltage (max. 500VAC) must be raised gradually.

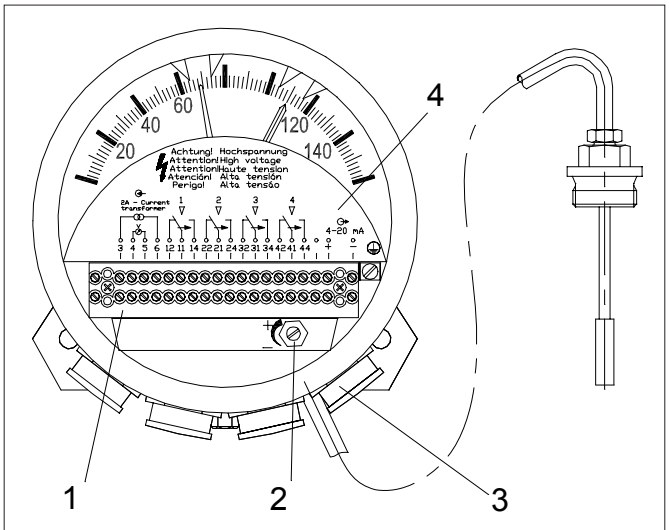


图 3 / Fig. 3

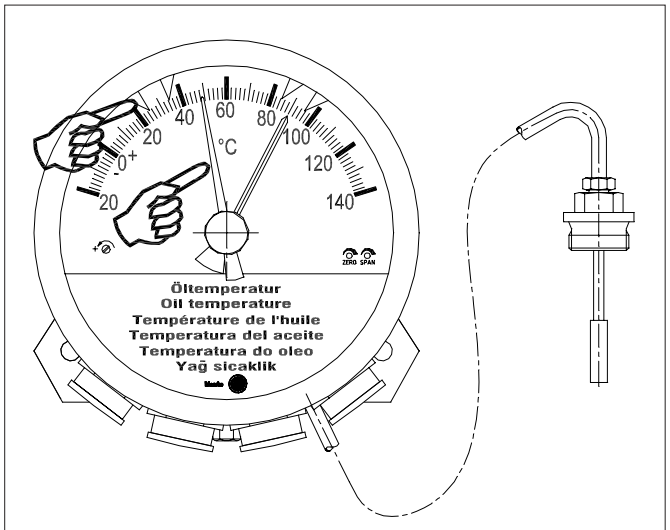


图 4 / Fig. 4

4.3 微动开关的检验及调节（图4）

设定微动开关时，用手将其滑动所需位置即可。

注意

不能在有颜色的显示器指针处滑动微动开关。显示器指针会折断或弯曲。

如检查位于指针左侧的微动开关，则应当用手顺时针推动指针通过微动开关并返回。返回弹簧会将指针拉回至原来位置。（图4）

注意

此处不要松开指针。指针必须慢慢返回至其原来位置。如指针弹回会损坏微动开关。

如检查位于指针左侧的微动开关，则应当顺时针推动指针通过微动开关（设定微动开关时）。检查完后，微动开关必须重置到其原来位置。

注意

指针绝不可逆时针转动至低温度值。否则将损坏测量系统。

5 显示控制及再调整

指针式温度表已在工厂校准。如还要再调整，则显示控制和测量值比较只能在保持温度恒定（大约15分钟）的流动水浴缸内进行。可进行再调整。调节螺丝（图1/3）位于温度计前面。

注意

指针式温度表已在工厂校准并设定好。再调整会造成温度表精确度降低及失去质量保证。

4.3 Checking and adjusting the microswitches (Fig. 4)

To set a microswitch, slide it by hand to the desired position.

CAUTION

Do not slide the microswitches on the colored indicator points. The indicator points may break off or be bent.

To check the microswitches which are located to the right of the pointer, turn the pointer clockwise by hand past the microswitches and back. A return spring pulls the pointer back to its original position (Fig. 4).

CAUTION

Do not release the pointer here. It must be slowly returned to its original position. If the pointer snaps back, the microswitches may be damaged.

To check the microswitches which are located to the left of the pointer slide them clockwise past the pointer (as when setting the microswitches). After checking, the microswitches must be reset to their original position.

CAUTION

The pointer must never be turned anti-clockwise to lower temperatures. This will damage the measuring system.

5 Indication control and readjustment

The pointer thermometers are calibrated at the factory. If it is necessary to readjust it, indication control and comparison measurements should only be carried out in moving water baths whose temperature remains constant for several minutes (approx.15min.). Readjustments are possible. The adjustment screw (Fig. 1/3) is on the front of the instrument.

CAUTION

The pointer thermometers are calibrated and set at the factory. Readjusting them results in the loss of accuracy as well as the guarantee for the device.

6 梯度曲线调整

绕组温度（热像）与加热电阻（见2.2节）同步，须由变压器的CT（二次电流变压器）供给。
因此，必须知道取决于标定CT电流（额定载荷时绕组和油之间的温差）要求的梯度调节曲线。

注意

2A至5A的标定CT电流，必须使用辅助的镇流变压器V5a。
如标定CT电流低于2A，镇流变压器的型号可使用V1.5a 或 V1a（BA2039）。
按照IEC354S标准，本温度表可在输入电流过载达3A时运行半小时。

工厂制造时的设置:

标定CT电流:	2A
温度梯度调节曲线:	17K
加热电流:	1A ± 5%
加热电阻:	5,6Ω

如需要不同的设置，要由客户自己设定。

6.1 通过加热电流调整 MT-ST160W(TT)

设定温度梯度调节曲线前，应从座标上读取温度值并记录。设定期间应确保感应器温度保持恒定。
将恒定电源接到端子3和6（图5）上，该电源应供给加热器标定CT电流（即2A）。

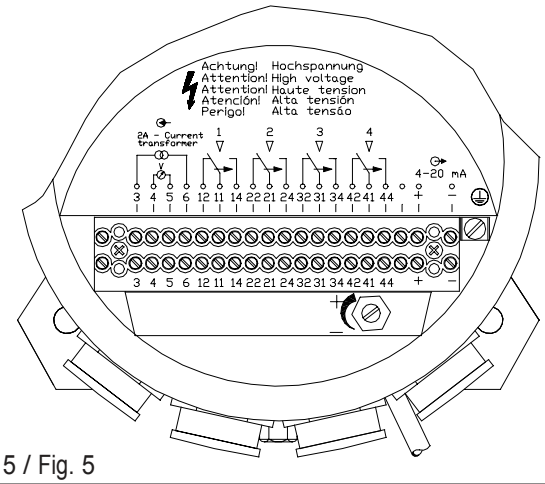


图 5 / Fig. 5

6 Adjustment of the gradient

The winding temperature (thermal image) is simulated with a heating resistor (see chapter 2.2), which has to be fed by the CT (secondary current transformer) of the transformer.

Therefore the required gradient depending on the nominal CT current (temperature difference between winding and oil at nominal load) must be known.

CAUTION

For nominal CT currents from 2A to 5A you have to use the additional ballast transformer V5a.

In cases of nominal CT currents lower than 2A, the ballast transformer type V1.5a or V1a can be used (BA 2039).

According to IEC 354 this thermometer can be operated at an overload of up to 3A input current for the period of 0,5h.

Factory-made setup:

Nominal CT current:	2 A
Temperature gradient:	17K
Heating current (MT-ST160W):	1A ± 5%
Heating resistor (MT-ST160WR):	5,6Ω

If a different setting is required, this must be performed yourself.

6.1 Adjustment via heating current MT-ST160W (TT)

Before the temperature gradient is set, the temperature value should be read from the scale and noted. Make sure that the sensor temperature remains constant during the adjustment.

Connect a constant power source to terminals 3 and 6 (Fig. 5) which supplies the heater with the nominal CT current I_W (e.g., 2 A).

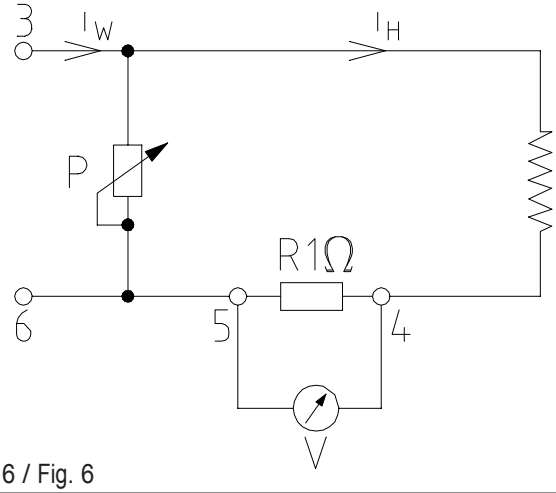
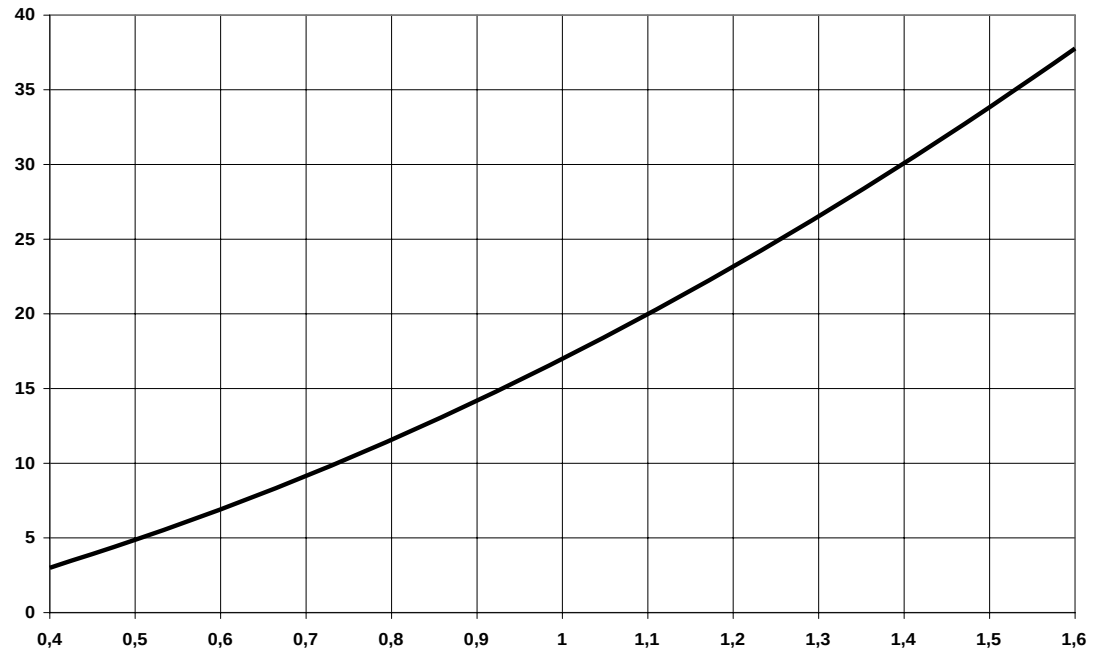


图 6 / Fig. 6

通过加热电流进行梯度曲线调整
Gradient adjustment via heating current



加热电流I_H [A] (测量电压U [V] 大于1W)
Heating current I_H [A] (measured voltage U[V] over 1W)

图 7 / Fig. 7

流过加热电阻的加热电I_H(图6)是要求的梯度曲线的决定因素。从与要求的温度梯度调节曲线的设定曲线(图7) 读取加热电流（待设定）。

加热电流通过内部1Ω电阻的压降确定。1Ω电阻用高阻值电压表（不是电流表）设定“伏特V”的测得端子4和5 (图5)的压降。测得的电压值 伏特“V”等于加热电流“安培A”。

用调节电阻(图3/2)的设定螺丝设定加热电流。将螺丝向右转则升高加热电流。向左转则降低加热电流。

按开始时读到的温度值检验设定温度梯度调节曲线。如果30分钟后仍未达到温度参考值，可以重新调整电位器。此时，记住必须要给出加热和冷却时间（大约15分钟）。调节完成后，拆掉电源和电压表。

The heating current I_H which flows through the heating resistor (Fig. 6) is the determining factor for the required gradient. Read the heating current (to be set) from the setting curve (Fig. 7) corresponding to the required temperature gradient.

The heating current is determined via the voltage drop on an internal 1 Ω resistor. On the 1 Ω resistor measure the dropping voltage on terminals 4 and 5 (Fig. 5) with a high-ohmic voltage meter (not a current meter) set to „V“. The voltage value measured in „V“ corresponds to the value of the heating current in „A“.

Set the value for the heating current on the setting screw for the adjustment resistance (Fig. 3/2). Turn the screw to the right and the heating current rises. Turn the screw to the left and the heating current falls.

Check the set temperature gradient based on the temperature value read at the beginning. If the temperature reference value is not reached after approx. 30 min., a readjustment can be made on the potentiometer. Also here, remember to provide a heat-up or cool-off period (approx. 15 min.). After the adjustment has been made, remove the power source and the voltage meter.

6.2 通过电阻值调节 MT-ST160WR (TT)

根据标定CT电流的要求的梯度调节曲线的决定因素是加热电路（图8）的电阻值。

从与标定CT电流上要求的温度梯度调节曲线相对应的设定曲线上读取电阻（要设定的）值。

例如:

额定CT电流:	1,8A
要求的梯度曲线:	21K
设定曲线上的电阻值:	7,0W

拉出端子4和5之间的电桥，测量两个端子之间的电阻值并用设定螺丝设定电阻值（图9/2）。向右转螺丝电阻升高。向左转电阻降低。

调节完成后，不要忘记重新装好端子4和5之间的电桥。

注意

调节的精确度很大程度上取决于用于测量电阻值的测量仪器的质量和误差。

我们建议使用欧姆表调节梯度曲线。

6.2 Adjustment via resistor value MT-ST160WR

The resistor value of the heating circuit (fig. 8) is the determining factor for the required gradient according to the nominal CT current.

Read out the value of the resistor (to be set) from the setting curve (Fig. 10) corresponding to the required temperature gradient at the nominal CT current.

Example:

nominal CT current:	1,8A
required gradient:	21K
resistor value from setting curve:	7,0W

Pull out the bridge (Fig. 9/1) between terminal 4 and 5, measure the value of the resistor between this 2 terminals and set the value on the setting screw (Fig. 9/2). Turn the screw to the right and the value rises. Turn the screw to the left and it falls.

After the adjustment you must not forget to replace the bridge between terminal 4 and 5.

CAUTION

The accuracy of the adjustment depends significantly on the quality and the error of the measuring instrument with which you measure the value of the resistor.

We recommend to use an ohmmeter for the adjustment of the gradient.

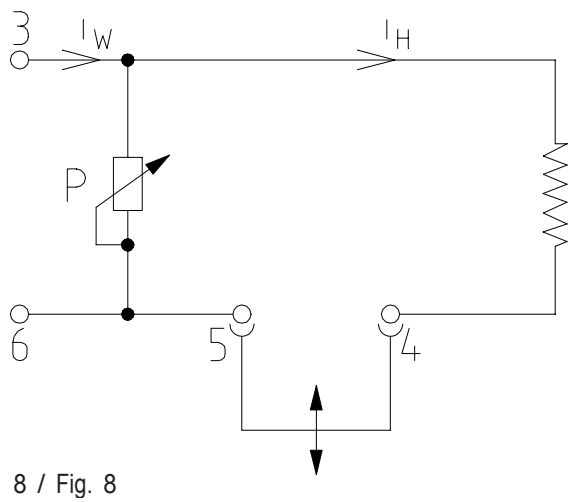


图 8 / Fig. 8

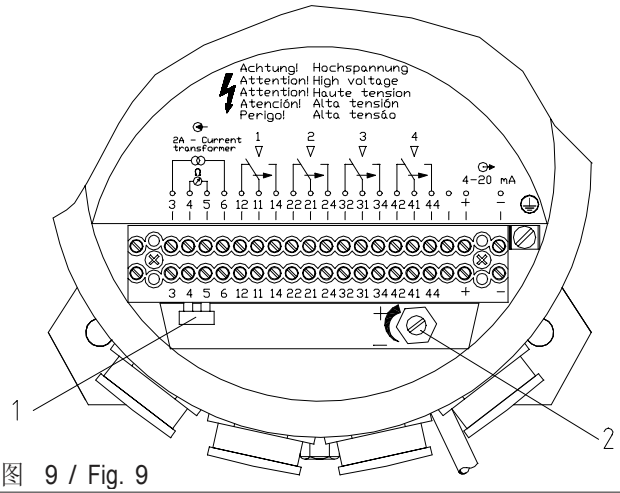
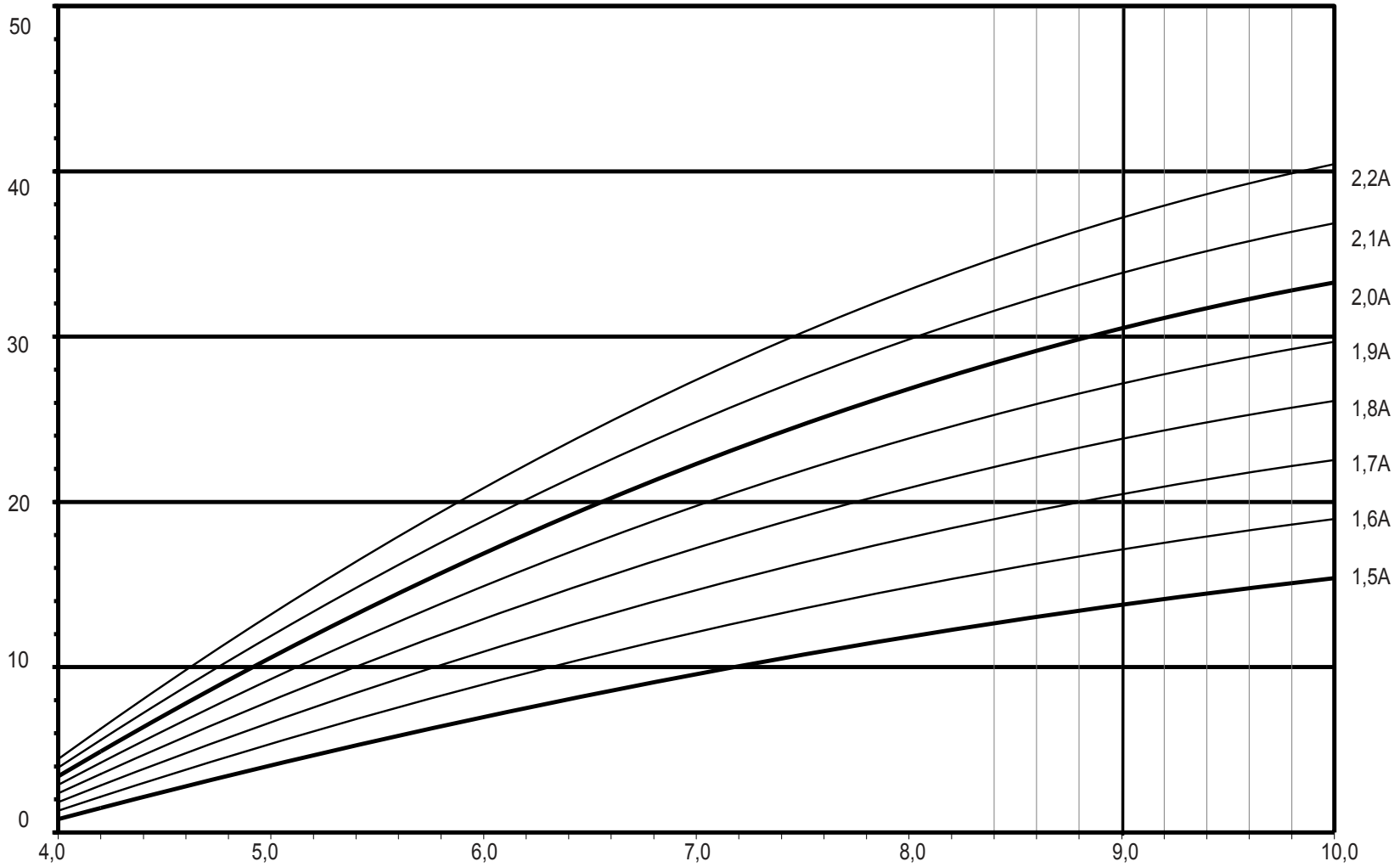


图 9 / Fig. 9

Gradienteneinstellung ü ber Widerstandswert

Adjustment of the gradient via resistor value



6.3 连接二次电流变压器

将二次电流变压器（CT）连接至端子带（图3/1）上的端子3和6上。额定变压器电流不能超过2A。

将二次电流变压器（CT）连接至端子带（图3/1）上的端子3和6上。额定变压器电流不能超过2A。

例如:

梯度(以K值表示):	gr =20K
额定CT电流:	I_w = 2A
加热电流(见图7): (公差 I_H + 10%)	IH = 1,1A 型号MT-ST160W
电阻值（见图10）: (公差R + 10%)	R = 6,0W 型号MT-ST160WR
最大加热温度:	2,0A

1.5A变压器电流会造成1A最大加热电流。

7 维护

无需日常维护。
变压器日常检查时，我们建议做下列检查：
- 检查所装仪器外观是否有损坏。

注意

本使用说明书中所给的技术规范均为标准产品的。对于特殊设计的产品应注意订单中所述的注意事项。

8 技术参数

尺寸	见图 13
材料	
卡口压环及外壳:	镀锌钢板、涂漆 RAL 7033
玻璃:	层压安全玻璃
温度封套:	黄铜、抛光
安装底板:	不锈钢
毛细管:	铜毛细管带护管
电缆密封套:	4x M25x1,5 镀镍,
规格	
测量范围:	-20...140°C 型号为 MT-ST160SK (TT), 0.....160°C型号为 MT-ST160W (TT), 0.....160°C型号为 MT-ST160W
R(TT) 误差:	±3°C（一级，EN 13190和 DIN 16196
安装场所:	户内、户外，热带地区
环境温度:	-50... 80°C
保护等级:	根据 IEC 60 529为IP55
通风:	配有通风装置，相对湿度80%以下表内无雾气
最大读数指针	可复位的最大读数指针

6.3 Connecting the secondary current transformer

Connect the secondary current transformer (CT) to terminals 3 and 6 on the terminal strip (Fig. 3/1). The rated transformer current may not exceed 2 A.

Example:

Gradient (in K):	gr = 20K
Nominal CT current:	I_w = 2A
Heating current (see Fig. 7): (Tolerance I_H + 10%)	IH = 1,1A forMT-ST160W
Resistor value (see Fig. 10): (Tolerance R + 10%)	R = 6,0W für MT-ST160WR
Max. heating current	2,0A

1,5A transformer current causes max. 1A heating current.

7 Maintenance

Regular maintenance is not required.

During the regular check of the transformer, we recommend checking the following.

- Check the exterior of the installed device for damage.

CAUTION

The specifications given in this operating instructions are for standard products. For special designs you have to take care about the notes given in the order.

8 Technical data

Dimensions	see Fig. 13
Materials	
Ring and casing:	Sheet steel, galvanised, paint RAL 7033
Glass:	Laminated safety glass
Temperature bulb:	Brass, bright
Mounting plate:	Stainless steel
Capillary tube:	Copper capillary tube with sheath
Cable glands:	4x M25x1,5, nickel-plated
Specifications	
Measuring ranges.:	–20...140°C Typ MT-ST160SK (TT), 0.....160°C Typ MT-ST160W (TT), 0.....160°C Typ MT-ST160W R(TT)
Tolerances:	± 3°C according to EN 13190 class 1 and DIN16196
Location:	indoor and outdoor, tropics
Ambient temperature:	-50 to 80 °C
Degree of protection:	IP55 in accordance with IEC 60 529
Ventilation:	Ventilation unit, no condensation up to 80% humidity
Drag hand:	Resetable maximum pointer

微动开关

数量: 1到6个可调节微动开关

额定电流: 在 250VAC (110VAC) cosφ=1时为5A
在 250VDC时为0,4A
在110VDC时为0,6A

开关位置: 见图 11, 其它的按要求

开关间隔: 测量范围的6%

开关磁滞: 约 5°C (温度下降时)

触头材料: 银镉氧化物

额定绝缘电压: AC: 2500V / 1min

Microswitches

Number: 1 to 6 adjustable microswitches

Rated current: 5A at 250VAC (110VAC) cosφ=1
0,4A at 250VDC
0,6A at 110VDC

Switch position: See Fig. 11, others on request

Switching distance: 6% of measuring range

Switching hysteresis: appr. 5°C (at decreasing temperatures)

Contact materials: Silver-Cadmium-Oxide

Rated insulation voltage: AC: 2500V / 1min

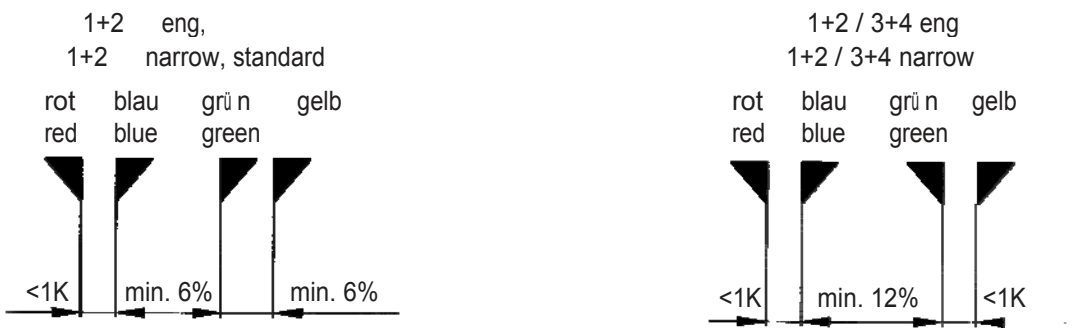


图 11 / Fig. 11

电流输出

传感器: 测压元件

电源: DC: 12..30V 未稳压，最大残余波纹系数10%，具有极性颠倒保护

输出信号: 4...20 mA; 2线连接

最大负载: 见图 12
即 U_b=24V DC时750Ω

重复精确度: 最大值时≤ ± 0,1%

Current output

Sensor: Load cell

Supply: DC: 12...30V unregulated, maximum 10% residual ripple, protected against reverse polarity

Output signal 4...20mA; two wire-technique

Maximum load see Fig. 12
e.g. 750Ω for U_b=24V DC

Repeat accuracy: ≤±0,1% at the maximum value

$$R_{L\ max.}\ [\Omega] = \frac{U_B - 9\ [V]}{20\ [mA]}$$

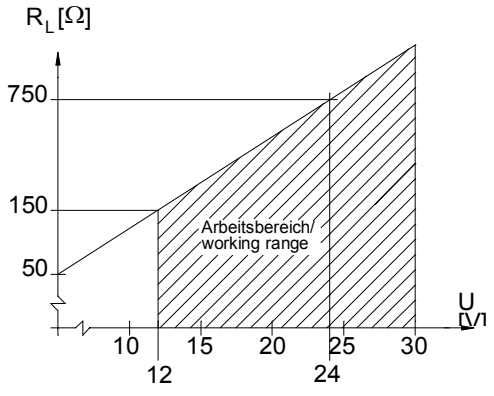


图 12 / Fig. 12

9.1 安装图

9.1 Installation diagram

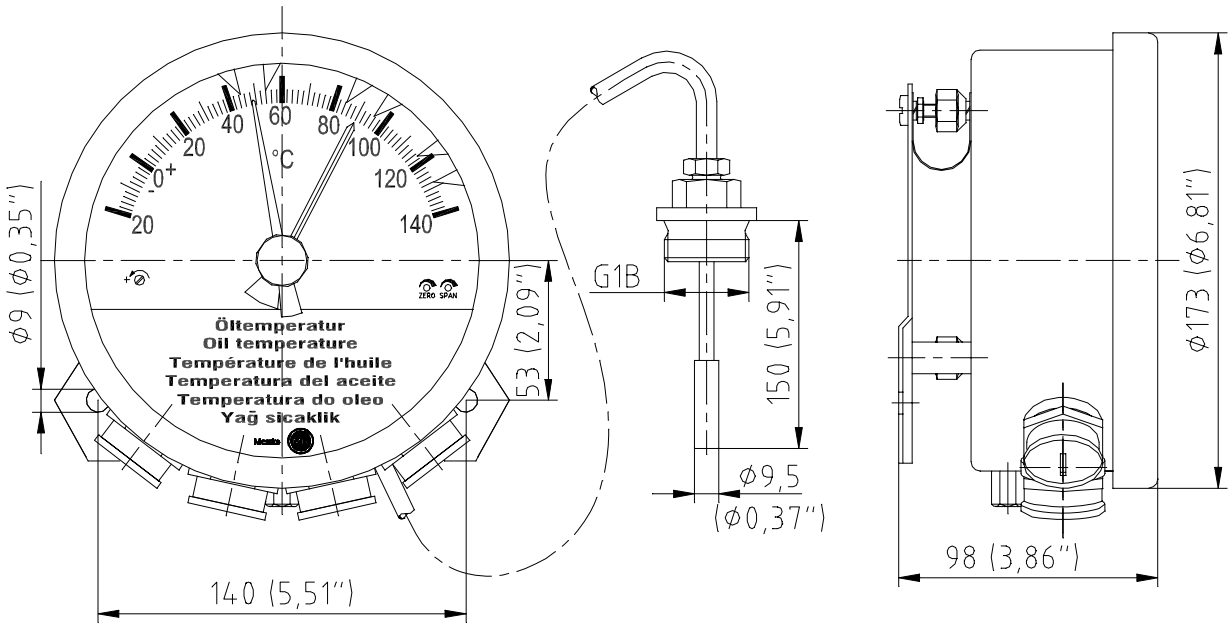


图 13 / Fig. 13

9.2 电缆密封套

9.2 Cable gland

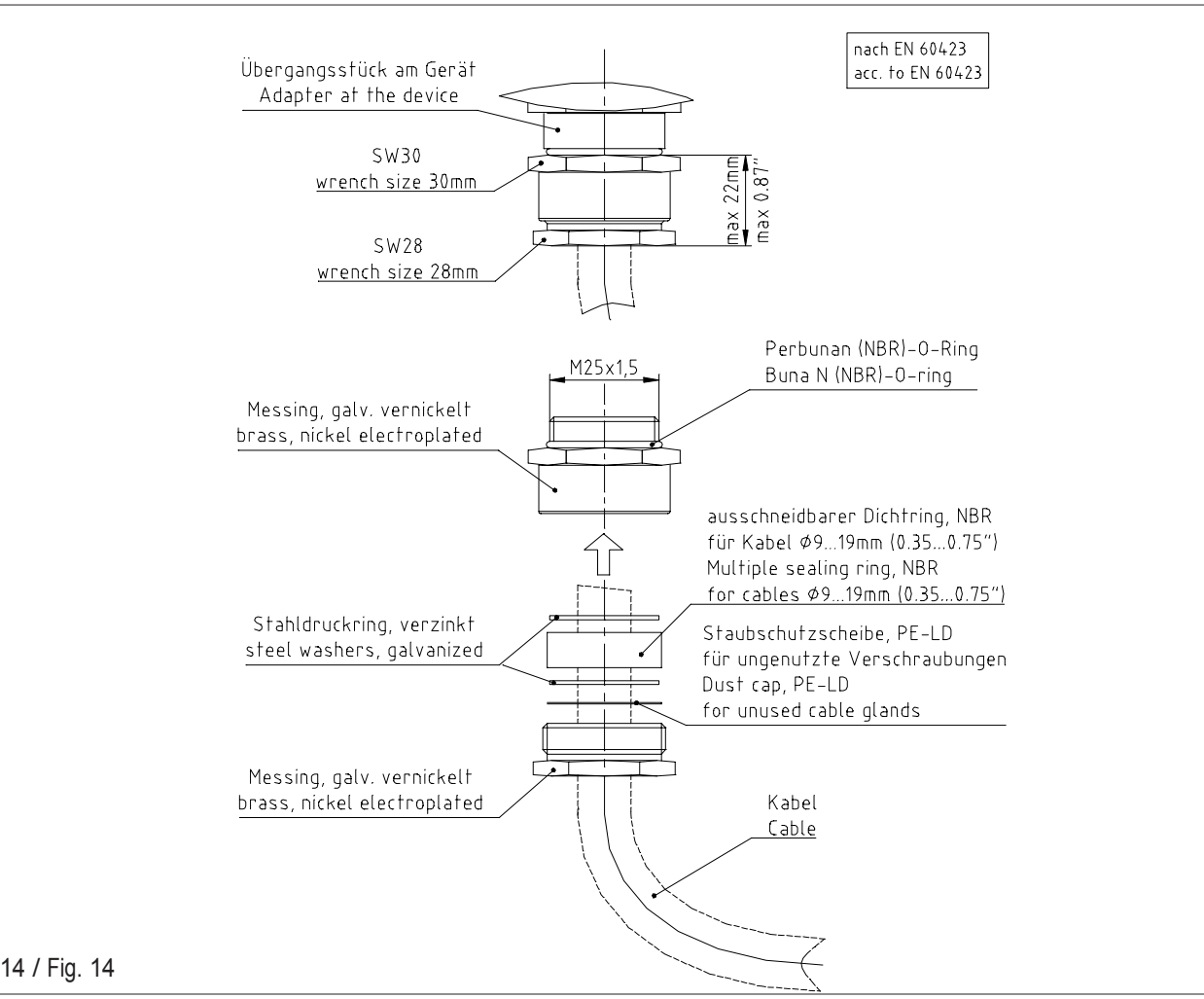


图 14 / Fig. 14

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