



EHK

浸没式加热器
Immersion heaters

4.0



TÜRK+HILLINGER
THERMAL TECHNOLOGY



EHK 型浸没式加热器 IMMERSION HEATERS TYPE EHK

应用领域

T+H 浸没式加热器用于加热液体和气态介质，例如提供热水、锅炉、咖啡机、清洗和注油槽、油加热器、空气加热器、热交换器。

每种应用都有自己的特点。如果应用偏离（高于或低于）通常的要求，今天有3000多种应用可用特定类型的螺栓接头加热器来满足这些要求。它们不能全部在T+H目录中列出。以下简要地介绍了各种变化和不同的设计方向。在选择正确的加热解决方案时，您将得到我们经验丰富的专家的帮助，如果您需要，我们的专家也可以提供现场服务。

- 适合连续运行
- 螺纹从G1 到 G2½"
- 定制的法兰设计和其他法兰种类，特殊的螺纹
- PFA 和PTFE 涂层
- 冷却区可用于高、低介质温度。推荐从110°C开始为连接区的限制，或在加热冷材料以避免在连接区域产生冷凝
- 适合通孔/带优化的盘式流体加热器

Applications

Immersion heaters are used for the heating of liquid and gaseous media e.g. the provision of hot water, boilers, coffee machines, cleaning and degreasing baths, oil heaters, air heaters, heat regenerators.

Each application has its own characteristics. If the application deviates from the usual requirements or goes above and beyond, there are today more than 3,000 application specific types of screw plug heaters available to cover these requirements. They cannot all be listed in the context of a catalog at T+H. The following bullet points give a brief insight into the variety of variants and the different design directions. When selecting the right heating solution, you will be aided by our experienced specialists, and should you desire, also at your site.

- Continuous operation suitability
- Thread sizes from G1 to G2½"
- Custom flange design and other flange types, special thread
- Coatings with PFA and PTFE
- Cooling sections for high or low media temperatures - recommended from 110°C for thermal relief of the connection or, when heating cold materials to avoid condensation in the connection area
- Pass-through suitability / flow heater with optimized flow disks



防护

浸没式加热器可提供以下保护:

- IP 00 无防护
- IP 41 带防护盖- 防尘和防水滴
- IP 64 带防护盖-防尘和防溅水

选项

配备有保护IP41或IP64的保护盖, 该加热器可配备恒温器或温度限制器。这使得加热器可用于更多应用。

Protection

The immersion heaters can be supplied with the following protection:

- IP 00 open
- IP 41 with protective cap dustproof and dripwaterproof
- IP 64 with protective cap dustproof and splashwaterproof

Options

Equipped with a protective cap with protection IP41 or IP64 this heater can additionally be equipped with a thermostat or a temperature limiter. This makes the heater a ready to use heating element which can be used for many applications.

结构 CONSTRUCTION

施工方法

T+H 浸入式加热器由3个U形管状加热元件组成, 这些加热元件被钎焊或焊接在由 铬镍钢1.4301制成G 1 1/2螺纹管短接上(其他材料如黄铜或低碳钢, 可根据要求提供。)对于特殊的应用, 可以提供只有一个或两个加热管安装在短接上。

保护盖由一个附加的电缆压盖组成, 它可以安装在连接电缆安装所需的任何位置。

材料

铬镍钢1.4435具有良好的化学性能和强耐腐蚀性。

质量控制

所有T+H浸没式加热器都是按DIN EN 60335 (VDE0700) 标准100%质量控制。

Construction

The T+H immersion heaters consist of 3 u-shaped tubular heating elements which are brazed or welded onto a threaded nipple G1 1/2" made of CrNi-steel 1.4301 (other materials such as brass or mild steel are available upon request). For special applications it is possible to furnish the heaters with only one or two heaters mounted onto the nipple.

The protective cap consists of an additional cable gland which can be mounted to any position required for the installation of the connection cable.

Material

The standard sheath material of the heaters is stainless steel 1.4435 (AISI 316 L). Upon request higher corrosion resistant steels or copper alloys can be delivered too.

The chrome-nickel-steel 1.4435 has good chemical properties and is highly corrosion resistant.

Quality control

All T+H immersion heaters are individually controlled piece by piece i.a.w. DIN EN 60335 (VDE 0700).

安装 INSTALLATION

安装

加热器的安装可以独立于其位置进行。如果浸没在液体中, 必须确保加热器总是被介质完全覆盖。加热器的安装不能干扰液体的对流, 必须不时检查加热器护套, 以防其功能遭到破坏。最大允许工作压力为6bars。

Installation

The installation of the heaters can be done independant from its position. If immersed in a liquid it is important that the heater is always totally covered by the medium. The convection of the liquid must not be disturbed by the heater and the heater sheath has to be checked from time to time for deposits which might deteriorate its function. The maximum allowable operational pressure is 6 bars.

装配

在壁厚至少为10毫米的容器上使用, 加热器可以通过一个G 1 1/2" 螺纹孔安装。螺纹孔需要在装配侧倒角2.5×45°, 以方便安装。对于装配在壁厚小于10毫米的容器上, 必须使用一个焊接的G 1 1/2"的埋头短接或埋头螺母, 埋头螺母或密封件可单独提供。

Assembly

The assembly of the heater can be made onto a container with a wall thickness of at least 10 mm by a threaded hole G1 1/2". The thread hole needs to be chamfered 2.5 x 45° on the assembly side so that the nipple can easily be mounted. For the assembly onto containers with a wall thickness less than 10 mm it is necessary to use a welded in counter nipple G1 1/2" or a counter nut. Counter nut and/or seal can be supplied separately.

固定元件和密封件 FIXATION ELEMENTS AND SEALS

		零件号 art. no.
六角螺母 hexagonal nut	铜质 made of brass	600 157
G1½" SW 60	铬钢 made of chrome steel	600 158
铜矿物密封 (无石棉) copper-mineral seal (asbestos free)	48 x 54 x 2	600 431

接出 CONNECTION

管式加热器的电压为230 V（也可以使用其他电压）。无恒温器的浸没式加热器通常配备有三相电源400V（星形连接）如下图5.1 它们可以容易地切换到如图5.2的230 V并联连接。

The voltage of the tubular heaters is of 230 V (other voltages upon request). Immersion heaters without thermostat are generally equipped for use with three phase supply 400 V (star connection i.a.w. ill. 5.1). They can easily be switched to 230 V parallel connection as per ill. 5.2.

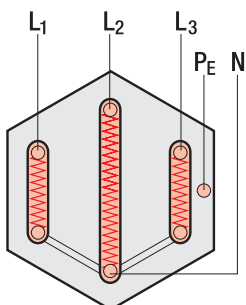


Abb./ ill. 5.1

三相电源 400 V
星形

Three phase supply
400 V
star connection

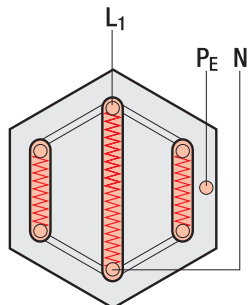


Abb./ ill. 5.2

230 V 并联连接

Parallel connection
230 V

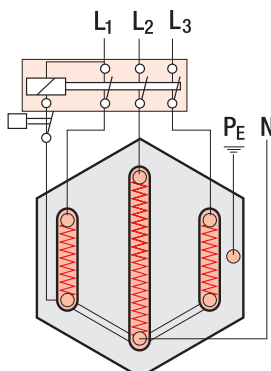


Abb./ ill. 5.3

三线电源 400 V
星形带恒温器和继电器

Three phase supply 400 V
Star connection with
thermostat and relay

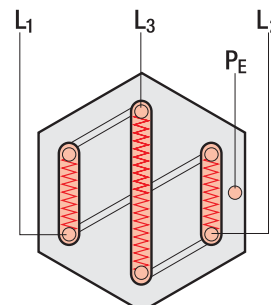


Abb./ ill. 5.4

三项电源230 V
Delta 连接

Three phase supply 230 V
Delta connection

标准类型 STANDARD TYPES

* 仅串联
* series connection only

类型列表 STOCK TYPE HEATERS				
零件号 标准型 art. no. standard type	零件号 焊接短接 art. no. welded nipple	浸没长度 (mm) immersion length (mm)	功率 W 在 230 V performance in W for 230 V	表面荷载 (W/cm ²) surface load (W/cm ²)
105 190 *	103 260 *	170	750	2 - 3
105 191	103 241	240	1000	
105 192	103 227	480	1500	
105 193	103 228	600	2000	
105 194	103 238	880	3000	
105 195	103 234	170	1000	4 - 5
105 196	103 200	240	1500	
105 197	103 203	480	3000	
105 198	103 216	600	4500	
105 199	103 232	880	6000	
105 200	103 202	170	2500	8 - 9
105 201	103 190	240	3000	
105 202	103 222	480	6000	
105 203	103 201	600	7500	
105 204	103 218	880	10000	

库存现货 / available ex-stock

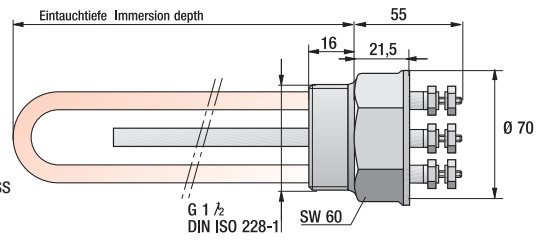
应用 APPLICATION			
护套材料 Sheath material	推荐螺纹短接 Recomm. threaded nipple		应用 Application
	CuZn	CrNi	
Cu 2.0090	x		水, 水稀释液 water, aqueous dilutions
CrNi 1.4435 (AISI 316L)	x	x	水, 水稀释液 water, aqueous dilutions
CrNi 1.4541 (AISI 321)		x	油, 润滑油, 空气 oil, grease, air
CrNi 1.4876		x	空气, 水, 水稀释液, 侵蚀性介质 air, water, aqueous dilutions, aggressive media

基本型号 BASIC TYPES

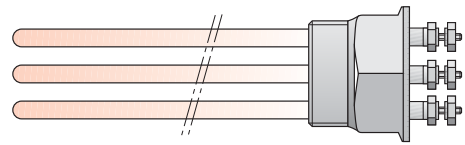


Abb./ill. 7.1

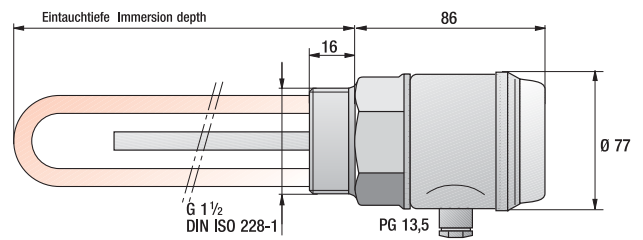
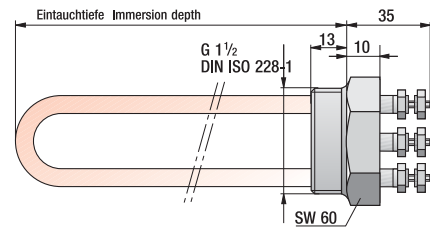
IP 00
不锈钢 1.4301 的短接
Threaded nipple from stainless
steel 1.4301 (AISI 304)



侧视图
Side view
Abb./ill. 7.2

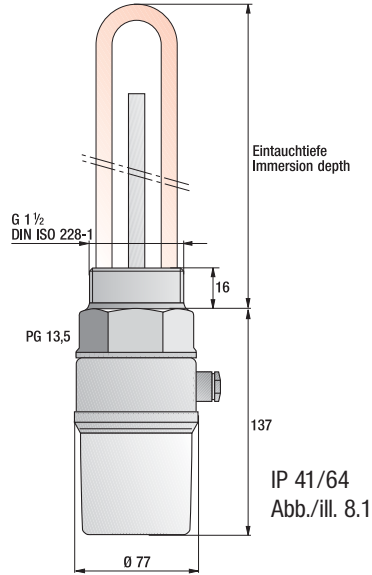


IP 00
黄铜短接 (特殊类型)
Threaded nipple from brass
(special type)
Abb./ill. 7.3



IP 64 oder/or IP 41
不带恒温器和控温器
Without thermostat or limiter
Abb./ill. 7.4

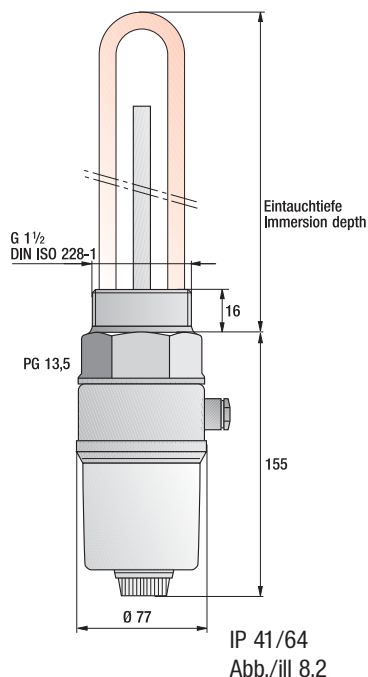
带温控器的加热器 HEATERS WITH LIMITOR



带温控器的T+H浸没式加热器可提供最大允许温度在0°~300°C之间的调节。温控器的传感器定位在保护管，如果温控器因故障被激活，则必须检测故障的原因，并且必须手动复位温控器。电气连接可以与恒温器相同的方式进行。

The T+H immersion heaters with limiter can be supplied with the maximum allowable temperature adjusted between 0° and 300°C. The sensor of the limiter is located in a protective tube. If the limiter is activated the cause of the failure must be detected and the limiter has to be reset manually. The electrical connection can be made in the same way as for the thermostats.

带恒温器的加热器 HEATERS WITH THERMOSTAT



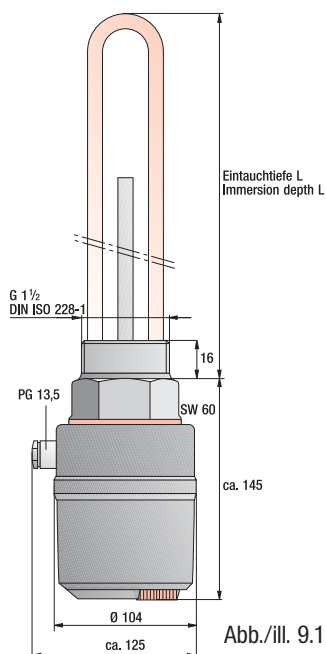
带恒温器的T+H浸没式加热器G 1/2提供电气连接，以备使用。温度可从30°到110°C或从50°到300°C随意调节。恒温器的传感器位于保护管中，该保护管装配在加热器之间以检测液体的温度。单相或三相恒温器在各自的温度范围内从壳体外部使温度无级调节。（根据要求，可以在外壳内提供调整旋钮）。

最高到3000 W功率，加热器可以连接到230 V单相电流（并联如图 5.2）。对于高于3000瓦/ 230 V的功率，加热器通常必须与继电器（最大16A）相连。

T+H immersion heaters G1½" with thermostat are supplied with the electrical connection ready for use. The temperature can be adjusted optionally from 30° to 110°C or from 50° to 300°C. The sensor of the thermostat is located in a protective tube which is assembled in between the heaters and senses the temperature of the liquid. The single-phase or three-phase thermostats are infinitely variable from outside of the housing within the respective temperature range. (Upon request they can be supplied with the adjustment knob inside the housing).

Upto a performance of 3000 W the heaters can be wired to 230 V single phase current (parallel connection) i. a. w. ill. 5.2. For higher performances than 3000 W/230 V the heaters generally must be connected with a relay.

带恒温器和温控器的EHK加热器 (STB) EHK WITH THERMOSTAT AND LIMITOR (STB)



这种带恒温器和温控器的加热器类型被设计满足更高的安全标准和连续操作。根据要求可提供多种的恒温器和温控器。

它由3个管状加热器和一个安装在G1/2螺纹接头上用于安装传感器的护管的组成。加热器配有外壳和内置的恒温器和温控器。可选配信号灯。所有加热器都具有IP 64保护等级。

This heater type with thermostat and limiter was constructed to meet improved safety standards and continuous operation. A broad range of thermostats and limitors is available on request.

It consists of 3 tubular heaters and a protective tube for the sensors assembled onto a threaded nipple G1½". The heaters are supplied with a housing and a built-in combination of thermostat and limiter. Optional with signal lamp. All heaters are supplied with protection IP 64.

库存型号加热器 STOCK TYPE HEATERS

零件号 art. no.	浸没长度 (mm) immersion length (mm)	功率W 在 230 V/400 V performance in W for 230 V/400 V	不加热长度 (mm) length unheated (mm)	表面荷载 (W/cm²) surface load (W/cm²)
110 5351	260	3000	100	
110 5352	360	4500	100	
110 5353	480	6000	100	4,6 - 10,8
110 5354	550	7500	100	
110 5355	660	9000	100	
搪瓷容器的绝缘版本 Insulated execution for enamelled tanks				
110 5340	310	2000 *	100	
110 5341	260	3000	100	
110 5342	360	4500	100	9,1 - 11,2
110 5343	480	6000	100	
110 5344	550	7500	100	
110 5345	660	9000	100	

* 只用于 230 V
* only for 230 V

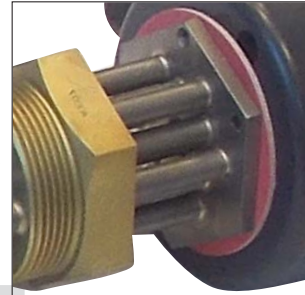
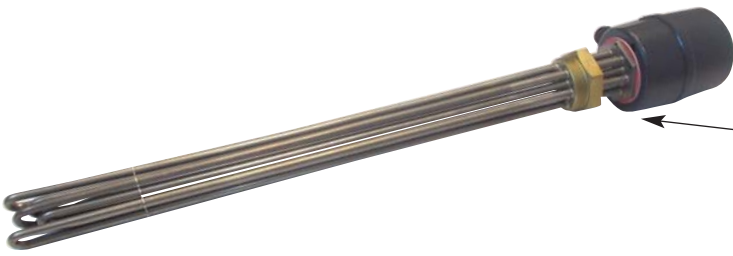
有现货供应 / available ex-stock

技术参数 TECHNICAL DATA

调节 Regulation	5°C bis 85°C 5°C to 85°C
STB 温控器最高允许温度 Max. allowable temp. of limiter STB	110°C
螺纹短接材料 Material of threaded nipple	CrNi 钢 1.4301 CrNi Steel 1.4301 (AISI 304)
护套材料 Sheath material	镍-铁-铬 合金 2.4858 Nickel-Iron-Chromium Alloy 2.4858 (Incoloy 825)
接出 Connection	M 20x1,5 电缆密封套管 cable gland M 20x1,5
装配 Assembly	水平或从上垂直 horizontally or vertically from top

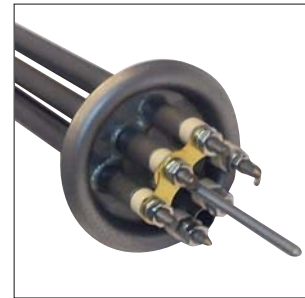
有关要求的更多技术数据 / other technical data upon request

调整和实施方式 ADJUSTMENTS AND EMBODIMENTS



带冷却区的浸入式加热器，其螺纹尺寸为G1 ~ G2，用于连接壳体的热解耦，作为连接壳体的过热保护或在低温下避免冷凝

Immersion heater with cooling section for the thread sizes from G1" to G2½" for thermal decoupling of the connection housing, as overheating protection of the connection housing or at low temperatures to avoid condensation.



各种法兰设计，在这里显示是种定制法兰，其可作为拧入式螺纹的替代。

Various flange designs, shown here as custom flange, as an alternative to screw-in threads.



PFA 和 PTFE 涂层用于苛刻的应用和腐蚀防护。

PFA and PTFE coatings for demanding applications and corrosion protection.

功率计算 POWER CALCULATIONS

计算公式

加热一定质量介质所需的功率计算公式如下

$$P = \frac{m \times c \times \Delta T}{\Delta t}$$

C

P = 功率 Watt
m = 质量 kg
c = 比热 Wh/kg K
 ΔT = 温差 Kelvin
 Δt = 加热时间 h

在高流量的材料应用中，功率应以每小时质量计算，以kg/h代替质量和加热时间。

计算用的具体材料属性见第11页。

Calculation formula

The power required to heat the mass of a medium is calculated as follows:

$$P = \frac{m \times c \times \Delta T}{\Delta t}$$

E

P = power in Watt
m = mass in kg
c = specific heat in Wh/kg K
 ΔT = temperature difference in Kelvin
 Δt = heating up time in hours

In applications with high material flow, the power should be calculated by using the mass per hour, in kg/h instead of the mass and heating up time.

Material properties for the calculation see page 11.

热损失

为了补偿热损失，应相应地增加功率：

敞口式容器的蒸发热损失	
非绝缘容器	20% 到 30%
绝缘容器	10% 到 20%

由于蒸发导致开口容器的热损失

绝缘容器	每 m ² 水单位时间损失 in kWh
40°C	0,6
60°C	2,8
80°C	7,0
95°C	15,0

对于介质的熔化或汽化，熔化或汽化热Wh/kg须使用旁边所示的公式计算。

使用配有恒温器的设备，加热器的功率可以是计算的两倍。

Heat losses

To compensate heat losses, the power should be increased by:

for non-insulated containers	20% bis 30%
for insulated containers	10% bis 20%

Heat losses for open containers by vaporization

Water temperature	Loss per m ² of water surface in kW/h
40°C	0,6
60°C	2,8
80°C	7,0
95°C	15,0

For the melting or the vaporization of a medium the melting or vaporization heat in Wh/kg has to be added to the calculation indicated beside.

By using equipment with a thermostat, the power of the heater may be two times higher than calculated.

重要提示 IMPORTANT INFORMATION

硬水会在加热器护套上形成厚重的氧化皮，从而使加热元件过热。高氯含量的水也会缩短加热元件的寿命。在第6, 9页和第11页上提到的最大允许表面负荷须慎重选择。选择具有低表面负载的加热器，可以减小氧化。

Chalky water causes the formation of heavy scale on the sheath, thus causing the heating element to overheat. Water with high content of chlorine also shortens the life of the heating element. The maximum allowable surface loads mentioned on pages 5, 8 and 11 are to be observed. By choosing heaters with a low surface load the scale can be reduced.

物理特性 PHYSICAL PROPERTIES

物理特性 Medium	密度 Density kg/dm ³	比能量 spec. Heat Wh/kg K	熔化温度 Melting temp. °K	融化热 Melting Heat Wh/kg	沸点 boiling Point °K	汽化热 Vaporization Heat Wh/kg
酒精 Alcohol	0,8	0,675	159	29,07	351	238,33
氨 Ammonia	0,77	1,163	195	27,90	240	380,17
非纯苯 Benzol	0,88	0,472	278	35,34	353	109,40
狄菲尔换热剂 Diphyl	1,06	0,418	285	-	-	-
甘油 Glycerine	1,26	0,658	291	48,83	563	229,53
民用燃料油 Heating oil	0,83	0,58	263	-	~450	~160
石蜡 Parafin	0,9	0,908	325	-	573	-
汞 Mercury	13,55	0,038	234	-	630	79,16
水 Water	1,0	1,162	273	92,66	373	626,66
空气 Air	0,0013	0,279	53	-	82	-

浸没式加热器应用

参考库存列表，将会注意到有不同的表面荷载。表面荷载地选择取决于具体应用。

表面荷载 2-3

W/cm²: 加热油、稀油或轻质油脂，例如液压润滑油。

表面荷载 4-5 W/cm²: 加热水，最小速度为4米/秒的空气，清洗或脱脂浴槽。

表面荷载 8-9 W/cm²: 为加热锅炉或蓄热器中的淡水，压力最高为6 bar的流动水。

Applications of Immersions Heaters

With reference to the stock list, it will be noticed that there are different surface loadings. Depending upon the application these should be observed.

Surface loading 2-3 W/cm²: to heat oil, thin oil or light grease, for example hydraulic aggregate oil.

Surface loading 4-5 W/cm²: for heating water, air with a minimum velocity of min. 4 m/sec., cleaning or degreasing bath.

Surface loading 8-9 W/cm²: for heating fresh water in boilers or regenerators, flowing water with pressures upto 6 bar.

附件 ACCESSORIES

订货举例

浸没式加热器 4.5 kW, 浸没深度 600 mm, 保护等级 IP 64 带50°-300°C恒温器:
零件号: 105 198 + 120 804 + 120 813

Order example

Immersion heater 4.5 kW, immersion length 600 mm
protection IP 64 with thermostat 50°-300°C:
art. no. 105 198 + 120 804 + 120 813

附件 ACCESSORIES	描述 Description	零件号. Art. no.
保护等级 IP 41 Protection IP 41	不带恒温器 without thermostat	120 800
	带恒温器 with thermostat	120 801
	带温控器 with limiter	120 802
保护等级 IP 64 Protection IP 64	ohne Regler without thermostat	120 803
	mit Regler with thermostat	120 804
	mit Begrenzer with limiter	120 805
恒温器/Thermostat	单相/single-phase 30 - 110°C	120 810
	单相/single-phase 50 - 300°C	120 811
	三相/three-phase 30 - 110°C	120 812
	三相/three-phase 50 - 300°C	120 813
	单相/single-phase 0 - 100°C	120 815
	内调节/inside adjustment 单相/single-phase 50 - 320°C	120 816
	内调节/inside adjustment 单相/single-phase 50 - 300°C	120 817
	内调节/inside adjustment	
温控器/单相 0 - 100°C	120 819	
温控器/单相 70 - 300°C	120 814	
温控器/单相 Limiter/single-phase		



特殊型号 SPECIAL TYPES

特殊型号

除了上述在第6页上标准的类型, 我们还可提供特殊类型, 特殊类型的最小起订量为8件。特殊型号的加热器可以定制浸没深度, 螺纹短接 (1 1/4", 2"), 电压, 功率或加热器和短接之间的材料, 采用不同组合。为提高地运行压力和更好的抗化学磨损, 我们可以提供焊入式加热器。

Special types

Apart from the standard types mentioned in the table on page 5 we can supply special types at a minimum order quantity of 8 pieces. These heaters may vary with the immersion depth, the threaded nipples (1 1/4", 2"), voltage, wattage or material combinations between heaters and nipple. For higher operational pressures and a better resistance against chemical wear we can supply them with welded-in heaters.

公司

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