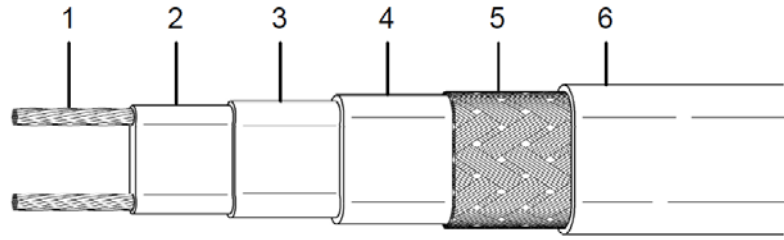


**Heating Tape Structure 伴热带结构**


- 1) Tinned copper bus wire 镀锡铜母线
- 2) Radiation cross-linked self-limiting heating element 加热元件
- 3) Polyurethane inner jacket 聚烯烃内护套
- 4) Flame retardant polyolefin dielectric insulation 改良聚烯烃绝缘层
- 5) Tinned copper braid 镀锡铜编织层
- 6) Fluoropolymer outer jacket (SJ), Modified polyolefin outer jacket (SJP) 含氟聚合物外护套 (SJ), 改良聚烯烃外护套 (SJP)

**Description:**

The Klöpper-Therm heating tape type KTL is a parallel heating cable with self-limiting characteristic. As shown above, the multistranded, tinned copper bus wires (1.31mm<sup>2</sup>) are encased by an extruded, radiation cross-linked semiconductive polymer core material. Induced by temperature changes the heat output of the semi-conductive core material rises or declines.

**产品说明:**

KTL 伴热带符合自限温并行伴热带的特性。如图所示, 1.31 mm<sup>2</sup>镀锡铜母线被辐射半导体聚合物发热元件包裹。温度的变化增加或减少半导体热量的输出。

Moisture resistance, special dielectric strength and protection against impact and abrasion damage is realised by two jackets. An inner Polyurethane jacket is extruded over and bonded to the core material, followed by a flame retardant polyolefin outer jacket which is extruded over the inner jacket. In order to ensure a continuous ground path, a tinned copper braid is installed over the second jacket.

增加了绝缘强度、防潮性保护免受冲击和磨损。内层聚烯烃护套包覆线芯材料。聚烯烃内护套外是改良聚烯烃绝缘层第二层外护套外面覆盖镀锡铜编织层。

For the outer jacket covering the tinned copper braid there are two options available: 1) A fluoropolymer outer jacket (type description: SJ), featuring an excellent chemical resistance. Thus, the heating tape provides an optimal protection against corrosive or chemical impacts.

2) A modified polyolefin outer jacket (type description: SJP). Thus, the heating tape is highly suitable for applications in humid or chemically low aggressive atmosphere. 镀锡铜编织层外层护套有两个选择: 含氟聚合物外护套具有极好的耐火化学性。因此, 伴热带提供了最佳的防腐或提耐化学腐蚀保护。改良聚烯烃外护套适用于潮湿、低化学腐蚀的环境。

**Operation principle:**

Voltage is applied along the complete length of the heating tape by the parallel bus wires. Due to the semiconductive core which provides an infinite number of parallel conductive paths, the heating tape can be cut to any length at site without generating dead or cold zones. The self-limiting characteristic of the heating tape is drawn from the in-built properties of the semiconductive core material.

**工作原理:**

并联母线为整个加热电缆提供电压。半导体线芯提供了无数并联导电路, 因此自调控加热电缆允许进行任意剪切。通过半导体核心材料固有的特性从而实现了伴热的自调控性能。

When the temperature of the core material increases, the number of conductive paths in the core material is reduced, automatically reducing the heat output. When the core material temperature decreases, the number of conductive paths is raised, thus leading to a higher heat output at every point along the length of the heating tape. Hereby the power output of the heating tape is adjusted to the varying conditions along the pipe.

当线芯材料温度升高时, 导电路数量减少, 自动降低热量的输出。随着核心材料温度的下降, 导电路的数量增加, 热输出功率增加。整个加热电缆的任意一点都是一样的, 因此热输出功率伴随管道上的不同温度条件进行调整。

Due to the self-limiting effect the heating tape can be overlapped without creating burnout or hot spots. By regulating its heat output itself, the heating tape provides an efficient use of power. Heat is only produced when and where it is needed and simultaneously the maximum sheath temperature is limited.

自限温效应使加热电缆可以重叠铺设而不会增加过热点或燃烧点。由于加热电缆自行调节其热输出功率, 提供了电力使用效率, 同一时间只在需要的地方产生热量, 同时限制了外护套最高温度。

**Utilization:**

The Klöpper-Therm heating tape type KTL is supremely applicable when it comes to maintaining the fluid flow of a medium under low ambient temperatures.

Characteristically, our product is utilized for frost protection systems and systems with low power density such as process water, product pipelines, fire protection, dust suppression systems, hot water and antiicing (domestic technique).

**应用:**

克鲁博 KT-J 自调控伴热带适合应用于低温环境下维持流体介质。低功率密度的防冻系统, 如产品管道、消防防冻、工艺用水、除尘系统、热水和除冰等, 是该产品的典型应用。

## Rating Data of Heating Tapes: 伴热带技术参数:

Type Designation 型号	Watts/Meter at 10°C 10°C时额定功率	Service Voltage 工作电压 [V AC]	Maximum Length of Heating Tape [m] 加热带最大长度	Maximum Exposure Temperature Continuous [°C] 最高暴露温度 (持续供电)	Maximum Exposure Temperature Intermittent [°C] 最高暴露温度 (间歇式)	Temperature Class (Gas Ex-Area)* 温度等级 (气体防爆区)
KTL23SJ/ KTL23SJP	9	230	207	65	85	T6
KTL25SJ/ KTL25SJP	15	230	165	65	85	T6
KTL28SJ/ KTL28SJP	25	230	127	65	85	T6
KTL210SJ/ KTL210SJP	32	230	74	65	85	T6

\*The temperature classification of electrical equipment is applied in hazardous areas and defines the surface temperature the electrical devices do not exceed during proper operation.

产品可应用于高危区，但环境操作温度不得超过温度等级定义的范围

The heating tapes have been certified for the use in hazardous areas, endangered by gases, of zones 1 and 2 according to EU Type Examination Certificate No. CML 16ATEX3124X and must only be completed by connection and end seal kits delivered by Klöppler-Therm making use of the power termination type HP-A69R and the end seals type HP-A17 plus HP-A30. In addition, Klöppler-Therm delivers a complete range of connection boxes, too.

加热带通过EU检测认证，证书编号CML 16ATEX3124X，适用于1区、2区及气体危险区域。

Dimensions (nominal): width 12.8 mm, thickness 5.5 mm (SJ) 宽度12.8mm,厚度5.5mm (SJ)  
外形尺寸 (标称) width 13.0 mm, thickness 5.7 mm (SJP) 宽度13mm,厚度5.7mm (SJP)

Weight: 130 g/m (SJ), 125 g/m (SJP)  
重量: 130 g/m (SJ), 125 g/m (SJP)

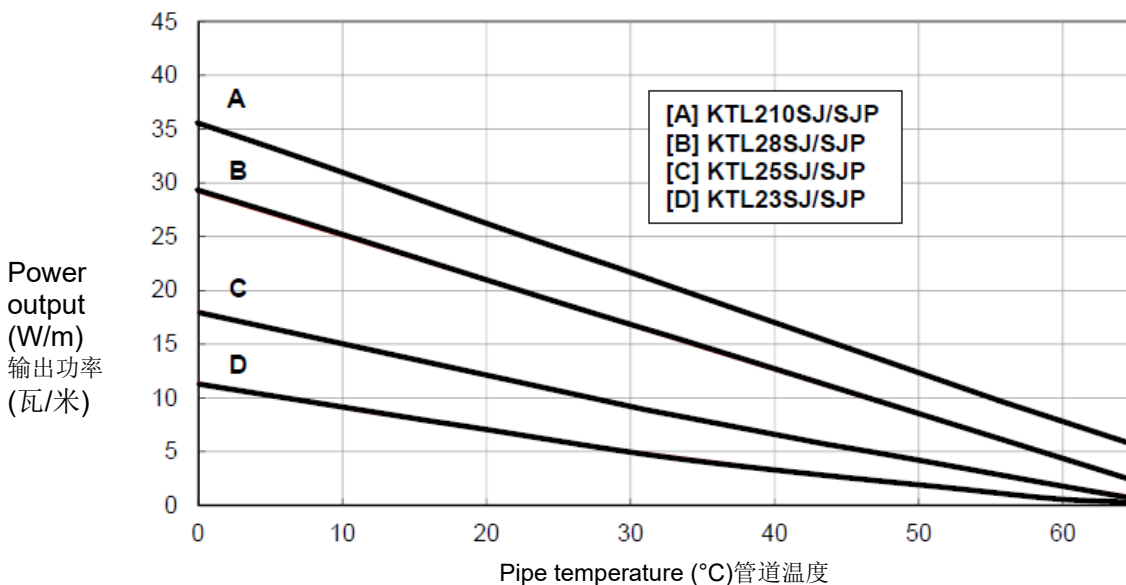
Outer jacket colour: Black (SJ/SJP)  
外护套颜色: 黑色

Minimum installation temperature: -40°C  
最低安装温度: -40°C

Minimum bending radius: 30 mm at -40°C  
最小弯曲半径: -40°C时为 30 mm

## Heating Tape Power Output Rating at 230 V AC:

交流电源为 230V 时的输出功率:



**Remark: The power rating is valid for applications on insulated steel pipes.**

备注: 保温钢管上的额定功率。

**Circuit Breaker Selection (C-Characteristic) 断路器选型 (C-特性) :**

Type Designation 型号名称	Start-up Temperature [°C] 启动温度	Max. Recommended Heating Tape Length (in Meters) vs. Circuit Breaker Size 不同断路器容量对应的最大加热长度			
		16A	20A	25A	32A
KTL23SJ/ KTL23SJP	+10	207	207	207	207
	0	207	207	207	207
	-10	184	207	207	207
	-20	156	196	207	207
	-30	135	169	207	207
	-40	118	147	184	207
KTL25SJ/ KTL25SJP	+10	163	165	165	165
	0	133	165	165	165
	-10	112	140	165	165
	-20	97	121	151	165
	-30	85	107	133	160
	-40	76	95	119	153
KTL28SJ/ KTL28SJP	+10	88	110	127	127
	0	77	96	120	127
	-10	69	86	107	127
	-20	62	77	96	123
	-30	56	70	88	112
	-40	51	63	79	102
KTL210SJ/ KTL210SJP	+10	37	46	58	74
	0	34	42	53	67
	-10	31	38	48	61
	-20	28	35	44	57
	-30	26	33	41	53
	-40	24	31	38	49

**Remarks:备注:**

- The circuit breaker size must be based on minimum start-up temperature, since the inrush current of the heating tapes increases with decreasing ambient temperature.  
断路器大小必须根据最低启动温度来选型，因为伴热带的回路电流是随环境温度而增减变化的。
- Do not exceed maximum recommended heating tape length, indicated for each type of heating tape.  
不同型号伴热带的分支不要超过其相应的加热长度。
- When connecting two or more different wattage heating tapes in parallel on the same breaker, please use the 16 amps column (16A) and divide 16 amps by the maximum heating tape length indicated with reference to the desired minimum start-up temperature. Thus you get an amps/meter value for each type of heating tape. Multiply the length of each heating tape with the derived amps/meter value. The single amp values calculated have to be added up. The added value must not exceed the amperage rating of the breaker.  
当在同一个断路器下并联连接两个或更多不同功率的伴热带时，要使用16A的断路器。16A除以要求的最低启动温度，就是16A开关所能带的伴热带的最大回路长度。这样就能得到不同型号伴热带每米的启动电流 (A/m)，再乘以长度得到不同伴热带的启动电流。电流值还要考虑增加的系数，增加值不允许超过断路器的额定电流值。
- For electrical heating systems, Klöpfer-Therm stipulates the use of a residual current device with a residual current rating not exceeding 300 mA. Residual current devices with a residual current rating of 30 mA should be used preferably.  
克鲁博规定电加热系统使用漏电保护装置的剩余电流不超过 300 mA 的评级。最好使用额定电流为 30 mA 的漏电保护装置。