Constant wattage parallel technology

Constant wattage cable with protective braid

These flat ribbon-shaped cables are composed of two non-heating copper conductors delivering the 230V supply over the entire length of the ribbon.
The thermal effect is provided by the flow of current from one conductor to the other through a parallel mesh composed of resistive nickel-chromium wires alternately welded to one and the other of the two conductors. The electrical insulation is typically PVC, polyolefin, silicone, or FEP. The cables are flat section and may receive a mechanical protection by a metal braid which can itself be coated with a flexible insulator. These cords are connected to the power supply at one end, the other end to receive electrical insulation covering the cut.
They are defined by a watts per meter value. This technology allows the cutting of the heating cable to length, with an output directly proportional to the length.
It is adapted to maintain a medium heat, because its resistance does not vary as a function of temperature like for the self-regulating cables, and it is not restricted in temperature by the characteristics of the semiconductor resistive compound in self-regulating cables.
Cable ends :
The cable ends must be fitted with a non-heating portion, cable or wires, which may be crimped or soldered, then coated with an insulation (silicone sleeve, heat shrink sleeve or molding: see pages 103-104)
Use heat shrink sleeves with caution for wire terminations if they are PVC, Polyolefin or flexible polymer-type TPR coated.
Temperature control :
This technology requires a temperature control system. A fixed setting thermostat, mostly a disc thermostat, can be molded at one end of the cable in the two parallel conductor versions (see pages 93)

Parallel technology, self-regulating type

Self regulating cable with protective metal braid

Limiting power cable with spacer between conductors

These flat ribbon-shaped cables are composed of two non-heating copper conductors (sometimes 3), delivering the power supply over the entire length.
The thermal effect is ensured by an extruded plastic polymer conductor, connecting the two copper conductors.
This polymer main thermal characteristic is the variation in its resistivity and thus its power per linear meter, depending on its temperature. This temperature is the result of its self-heating by Joule effect and its heat exchange outwardly by the wall on which it is placed, as well as the external temperature. The power reduction is in the region of 65% between 0 and 140 ° C (maximum temperature withstood by the polymer semiconductor).
This helps delivering the required power depending on environmental conditions.
This cable is also self-limiting and its power is greatly reduced when approaching the polymer temperature limit, thus avoiding destruction by overheating in the event of improper installation (overlapping or crossing wires, crossing insulation, etc). However, one must ensure that, in any case, the temperature of the fluid flowing in the pipe does not exceed the polymer critical temperature or it would cause its destruction.
The counterpart of this resistivity increase as a function of temperature is a resistivity decrease when the temperature drops. The starting power will be a function of ambient temperature. In the case of very cold environments, this causes large surges until the cable reaches its operating temperature. The startup power will be a function of ambient temperature. In the case of very cold environments, it causes large surges until the cable reaches its operating temperature.
A variant of this technology called power-limiting uses a coiled composite wire around two parallel conductors separated by a spacer of constant width. The characteristics of this wire allow a power limitation as its (.../...) power raises quite strongly with temperature.

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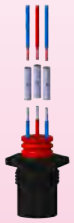
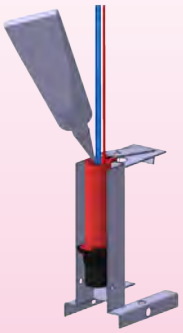
Sensors and accessories to be mounted in ISO M20x1.5 threads (type G sleeves)



Cut the lead wires of the accessory to 13mm, strip the conductors of 6 to 8mm, twist them and insert the stripped portion into each tubular connector.

Crimp the tubular connectors with the hexagonal crimping pliers. The center of each crimp must be at around 4mm from the edge.

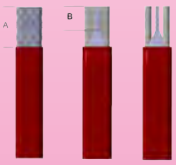
Insert the wires into the silicone sleeve. Make sure that the conductors are in their dedicated holes. Slip the sleeve on the wires to the stop after the locking grooves by using the bottom flap. The conductors are then entirely set in their places.



Position the assembly on the filling support and lock it with the upper flap of the sleeve, which has a flange for this purpose.
Fill with liquid silicone. It is possible to cut the insertion and filling flaps after polymerization.

Heating cables on non heating ends (Sleeves C and D)

Cut the ribbon to the requested length.



- Remove the outer protective jacket of 18mm (if any)
- If the cable has a metal braid, unbraid it (without cutting any wire) with the tip of a pen or a small metal rod with a rounded end, then group it and twist it in a continuous beam
- Remove the second protection jacket of 10 mm. minimum

Strip the two conductors of 6 to 8 mm, twist them and insert the exposed portion in each tubular connector. In the case of cable with metallic braid, insert the twist which is cut to the same length than the drivers in a tubular connector.

Crimp the tubular connectors with the hexagonal crimp pliers. The center of each crimp should be around 4 mm from the edge. Crimp one side of the heating cable and the other side on the non-heating conductors. If the cable has a metal braid, this braid is the ground conductor.

Insert the wires into the smallest part of the silicone sleeve. Ensure that the conductors are inserted in their dedicated holes. The central hole is for the ground conductor.

Slide the sleeve over the wires to the stop, using the flat flap located on the heating element side. The tubular conductors are then fully inserted in their places.

Position the assembly on the filling support and lock it with the flap which has a flange.

Fill with liquid silicone in the largest neck (connection wires outlet). It is possible to cut the insertion and filling flaps after polymerization.

Heating cable end (type E sleeves)

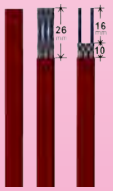
Cut the ribbon to the requested length. Remove 10 to 12 mm of the metal protective braid (if any) in order to ensure a good grip to the silicone. Make sure that none of the wires of this braid exceeds the cut length, which could cause short circuits.

Insert the silicone sleeve on the ribbon end to the stop by pulling the bottom flap.

Position the assembly on the filling support and lock it with the upper flap of the sleeve, which has a flange for this purpose.
Fill with liquid silicone in the upper shell-hole.

It is possible to cut the insertion and filling flaps after polymerization if necessary.

Disc thermostat assembly (anti-freeze ofr other set points) on the end of line (type A sleeves)



Cut the ribbon to the requested length. Remove the first protective jacket. Remove 15 to 16mm of the second protective jacket and the metal braid to (if any).

Position the silicone sleeve on the heating ribbon . Strip 4mm on both conductors.

Solder both wires on the disc thermostat terminals. Then slide the sleeve until the thermostat goes to three stop in its place.

Position the assembly on the filling support and lock it with the upper flap of the sleeve, which has a flange for this purpose.
Fill with liquid silicone in the upper shell-hole. It is possible to cut the insertion and filling flaps after polymerization if necessary.

Connection methods for cables accessories with heat shrinkable sleeve

Strip the conductors of 6 to 8 mm, twist them and insert the stripped portion into each tubular connector. If both parts to connect are multi conductor cables, removing the protective jacket must be done on the appropriate length in order to properly slide a heat shrinkable sleeve. If the cable has a metal braid, unbraid it (without cutting any wire) with the tip of a pen or a small metal rod with a rounded end, then group it and twist it in a continuous beam. The conductors and the twisted braid must be the same lengths.

Crimp the tubular connectors with the hexagonal crimp pliers. If the cable has a metal braid, crimp a braid end in a tubular connector. The center of each crimp should be around 4 mm from the edge. Then slide a insulation sleeve on each conductor having a crimped tubular connector. Insert the other element conductors into the second end of the tubular connectors. Crimp. The center of each crimp should be around 4 mm from the edge.

Slide the shrinkable sleeves to a center position on the tubular connectors. Shrink the sleeves one after another with heat gun or a heat source. Do not exceed the shrinking temperature, as this may destroy the sheath or cause cracks.

After checking the integrity of the shrink sleeves, put a heat shrinkable sheath around the cable, on the sleeves, and shrink the same way. Similarly, it is possible to seal the opposite end as follows:
If the ribbon has a protective metal braid, remove a few millimeters of its outer jacket to improve the shrinkable sleeve grip. Ensure that no wire of this braid could be in contact with the conductors.

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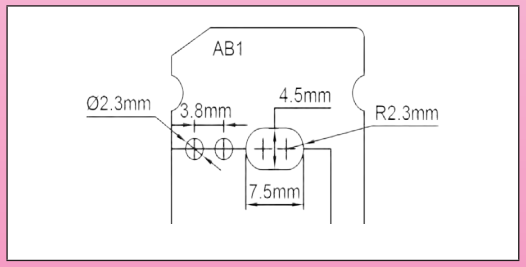
Wire strippers for 2 conductors flat heating cable

Unsheathing and stripping these flat special shape leads is a long and tough work, causing a lot of waste.
We have developed these tools specifically for stripping and unsheathing to reduce these times, and significantly reduce installation times. Each pliers comes with a set of jaws.

Common diameters of copper leads (mm)

Gauge	Diameter (solid core, multistrand)
0.5 mm²	0.8-0.92
0.75 mm²	0.98-1.14
1 mm²	1.13-1.29
1.5 mm²	1.38-1.59
2.5 mm²	1.78-2.01
AWG22	0.65-0.8
AWG20	0.81-0.95
AWG18	1-1.2
AWG16	1.3-1.5
AWG15	1.45- 1.6
AWG14	1.65-1.9



Parallel lead stripping

Reference	Sapcing between leads	Lead diameter	N°
6YTTL04A1	3,5; 4,8; 5,7	1 to 1.5 mm (multistrand AWG 18 to AWG16 and 0.75 to 1 mm²)	A1
6YTTL04A2	3,5; 4,8; 5,7	1.5 to 1.9 mm (multistrand AWG15 to 14, and 1.5 to 2 mm²)	A2
6YTTL04A3	3,5; 4,8; 5,7	2 to 2.3 mm (multistrand AWG 12 to 2.5 mm²)	A3

Tip: Stripping the self-regulating cable is easier after the semi conductive plastic part has been warmed with a heat gun.

Oblong cables stripping

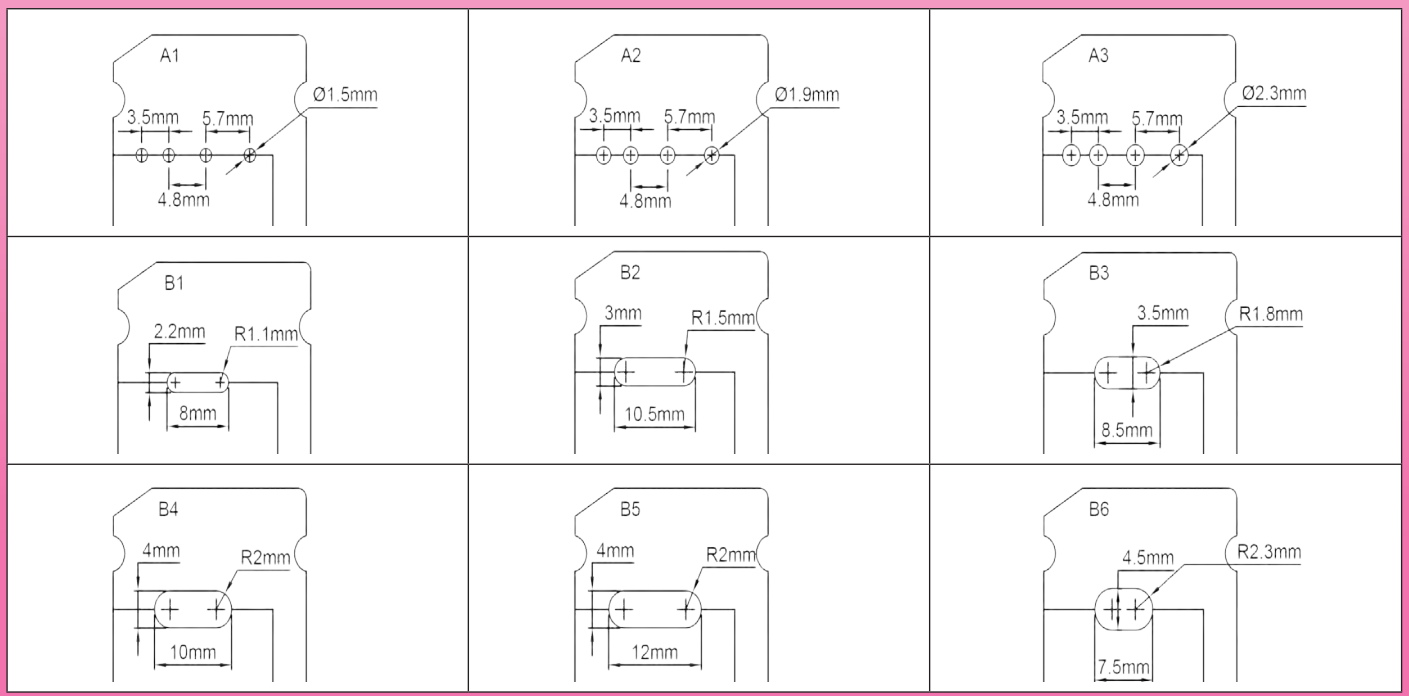
Reference	Dimension	N°
6YTTL04B1	2,2 x 8 mm	B1
6YTTL04B2	3 x 10.5 mm	B2
6YTTL04B3	3,5 x 8,5 mm	B3
6YTTL04B4	4 x 10 mm	B4
6YTTL04B5	4 x 12 mm	B5
6YTTL04B6	4,5 x 7,5mm	B6

Select the pliers sizes according to the dimensions of the part which should not be unsheathed

Combined pliers for flat cable unsheathing and stripping

Reference	Dimension	N°
6YTTL04AB1	2 x dia 2.3 , 3.8 spacing and 7.5 x 4 mm oblong	AB1

Realization of special pliers: Available on request, send us samples of your cables.



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