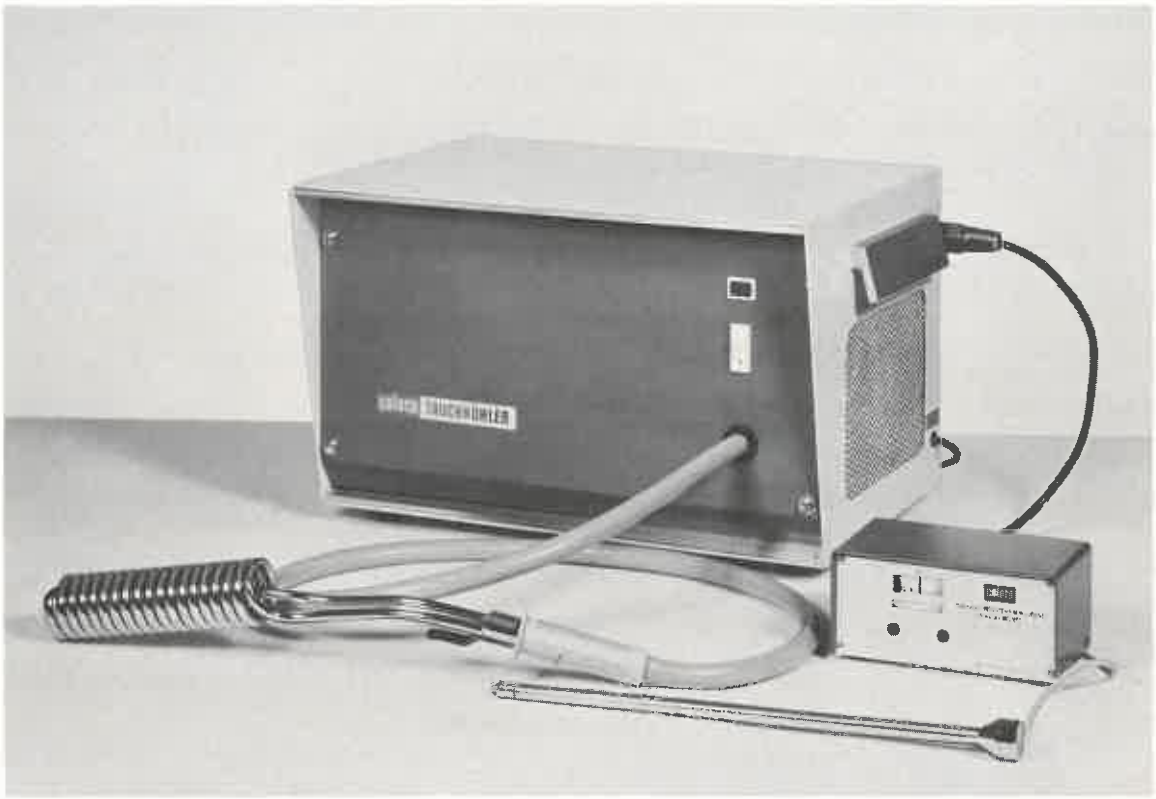
colora



Plongeur Réfrigérant TK 67

appareil de haute précision cryo-thermostatique avec

Régulateur de Température NTC

Plongeur Réfrigérant Colora TK 67

La demande d´un plongeur réfrigérant pouvant assurer une constance de température très exacte, nous a conduit à développer notre nouveau modèle TK 67. Par rapport au modèle éprouvé TK 64 dont la fabrication est continuée sans altération, le TK 67 se distingue par un autre système de montage de la partie frigorifique. Pendant que le motocompresseur du TK 64 s´arrête et redémarre selon la commande du régulateur thermostatique, celui du TK 67 est toujours en marche: alternativement et commandé par un tâteur-régulateur électronique de température par l´intermédiaire de soupapes magnétiques, le fréon alimenté dans l´élément de réfrigération est une fois en état liquide (refroidissement), et alors en by-passant le liquifieur en état gazeux, comprimé, donc chaud (contre-chauffage). Ce système est comparable à celui de nos Ultra-Cryostats.

L´emploi de notre régulateur électronique NTC permet d´obtenir avec le plongeur réfrigérant TK 67 une constance de température très favorable. Les valeurs ci-contre sont basées sur 10 litres de méthanol dans un récipient Dewar, dûment couvert et remué.

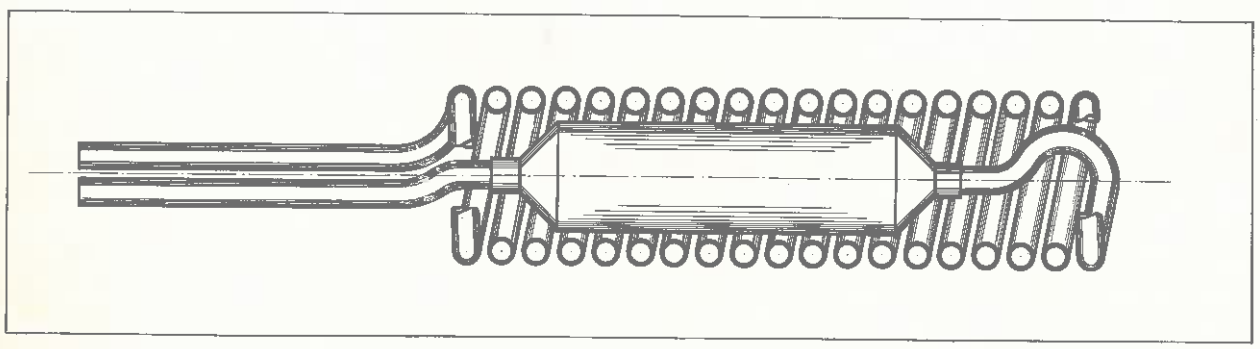


Fig. 1 :
Coupe de l´élément réfrigérant du TK 67 (modèle déposé en République Fédérale d´Allemagne). Dispositions spéciales sur demande.

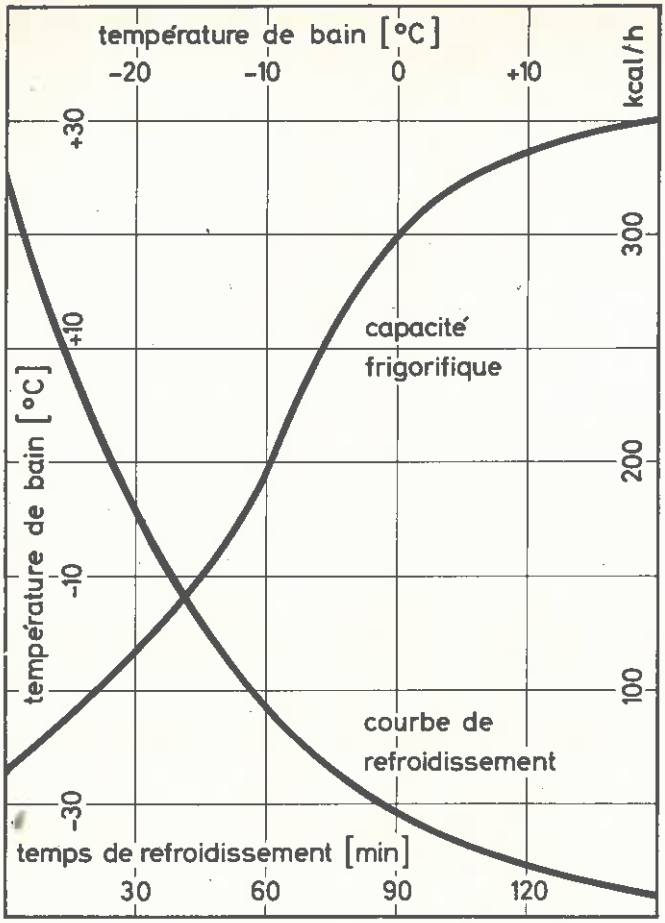


Fig. 2:
Diagramme de la capacité frigorifique et du temps de réfrigération: modèle TK 67

Données techniques du TK 67

Etendue de température		de +40 à -35°C
Constance de température		±0.02 à 0.07°C
Motocompresseur		Danfoss
Puissance		1/4 CV
Liquifieur refroidi		par air
Agent frigorifique		Fréon R 12
Capacité frigorifique brute		env. 500 kcal/h
Capacité frigorifique effective (fig. 2)		
à une température de bain de	+20°C	env. 350 kcal/h
	0°C	env. 300 kcal/h
	-10°C	env. 195 kcal/h
	-20°C	env. 115 kcal/h
	-30°C	env. 65 kcal/h
Temps de refroidissement de	+25°C à 0°C	23 minutes
	+25°C à -20°C	55 minutes
Puissance absorbée		400 W
Tension standard		220 Volt 50 pér.
Dimensions		
carter		500 x 320 x 360 mm
élément de réfrigération		55 mm ∅ x 220 mm
Poids net		31 kp

Régulateur de Température Colora NTC

Cet appareil électronique (fig. 3) a été conçu par nous comme régulateur à deux points sans dispositif de mesurage, pour commander et maintenir à constant la température de petits cryostats ou bain-maries dans une étendue de +40 à -40°C. Un thermomètre à résistance NTC est prévu comme tâteur de tempé rature.

Le régulateur comprend une unité transistorisée au silicium avec relais de commutation à courrant fort. L´entrée du circuit de mesurage est formée par une connexion de pont transistorisée dont une branche est la résistance de mesurage (tâteur NTC). La température choisie est reglée sur un anneau gradué.

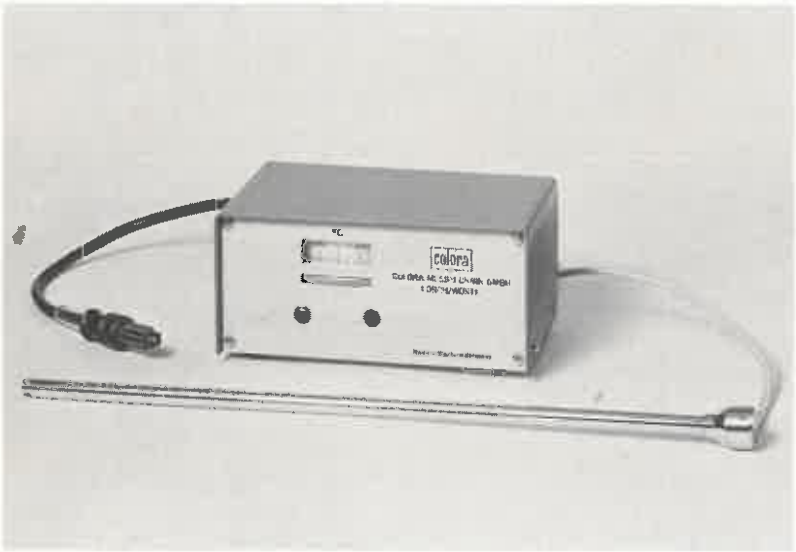


Fig. 3:
Régulateur de Température NTC avec tâteur

Données techniques du Régulateur de Température NTC

Etendue de température	de +40 à -40°C
Exactitude de réglage	± 0.1°C
Circuit de mésurage	connexion de pont transistorisée au potentiel stabilisé
Amplificateur	à courant continu, circuit imprimé
Tension nominale	220 Volt, ± 15%, 50 pér.
Dimensions du carter	179 x 104 x 87 mm
Poids net	1.3 kp

COLORA MESSTECHNIK GMBH
7073 Lorch · B.P. 5 · Allemagne

Operating Instructions

for

COLORA Immersion Coolers TK 64 and TK 67

1. General

The COLORA Immersion Coolers TK 64 and TK 67 are maintenance-free compact bench instruments serving for the rapid cooling and temperature control of liquids and gases. The orperation is extremely simple and requires no technical knowledge of any kind.

The apparatus is plugged into mains and after switching on cooling starts immediately. Temperature control is no problem either. When a temperature has been set on the regulator scale it is automatically maintained constant.

2. Applications

There are scarcely any cooling tasks in the laboratory or in the factory that connot be done with the immersion cooler, provided they are within the working range of the immersion coolers.

The cooling element (evaporator) which is connected to the housing by a flexible tubing will be immersed into the medium to be cooled, and as soon as the instrument is switched on cooling begins. If the temperature has to be kept constant at a preset point, it is necessary to connect a temperature regulator (cf. section 5). The standard cooling element is dimensioned in such a way that it can be introduced directly through the filling aperture into the thermostatic bath of the COLORA Ultra Thermostats model N, NB, and NB-DS. This enables these Ultra Thermostats to be operated below ambient temperature. In this case it it not necessary to connect a temperature regulator, as the Ultra Thermostat regulates temperature.

3. Location

The apparatus should be located in such a way that good air circulation for the refrigerator is ensured. Therefore it is important that between the ventilation grills of the TK housing and other objects such as walls or cupboards sufficient space is left. Furthermore please do not place the instruments near radiators etc.

Please pay attention to the electrical data indicated on the label attached to the housing. If not otherwise requested we supply the instruments suitable for 22o V, 5o cy. A.C..

COLORA MESSTECHNIK GMBH, 7073 Lorch/Württ., Postfach 5

Technische Büros (Verkauf und Kundendienst)
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3000 Hannover, An der Tiefenriede 45 (884500)
4000 Düsseldorf, Kronprinzenstr. 62 (17860) FS 08-587253
6000 Frankfurt/M., Röderbergweg 4-6 (446031) FS 04-11216
7073 Lorch/Württ., Barbarossastraße 3 (6041) FS 07-248886
8000 München 2, Dachauer Straße 175 (5169858)

4. Refrigerating set

The refrigerating set is free of maintenance even in continuous use. The air-cooled set is fitted with an almost silently working hermetic compressor. We use a capillary tube as a jet, the simplicity of which ensures trouble-free operation. The evaporator, i.e. the real cooling element is connected to the compressor set by flexible metal tubing. After extensive experiments we have decided to use metal tubing for this connection because we became convinced that only metal tubing will ensure absolute gas-tightness. It is evidently important to treat this tubing carefully. It should not be bent sharply or even at too short radius.

The refrigerating plant is started by switching on the sliding switch on the front of the housing - pilot lamps lights up.

Please note:

The compressor motor is protected against overload by a thermal cut-out (Klixon). This cut-out isolates the motor when its temperature rises too high. When the motor is cooled down to the right temperature, circuit will be closed automatically again so that the motor will restart itself. An overload may occur when ambient temperature is too high or ventilation is insufficient. It may also occur when the operating refrigeration system is stopped and immediately restarted. Please wait 1 - 2 minutes before restarting the refrigerating system again. When the apparatus is brought into operation after a long standstill period it will not produce its full cooling output before 15 - 2o minutes running time, although cooling begins at once. Maximal cooling output can only be attained if

a) the cooling element is entirely immersed in the medium
b) the medium to be cooled is vigorously stirred
c) the thermostatic bath is insulated.

5. Temperature regulation

The Immersion Coolers TK 64 and TK 67 differ essentially by the varying equipment used for the temperature regluation. While the TK 64 can attain a temperature contstancy of ± o,2 to ± 1,o °C in a liquid bath stirred by a propellor and according to the temperature range and the type of regulator used, it is possible with the TK 67 to attain ceteris paribus a constancy of temperature of ± o,o2 to ± o,o7 °C.

On the right side of the housing there is a special socket for the connection of a temperature regulator. The socket differ for the two models. The reasons are the following: If the sockets are not used the instrument will work at full output when switched on.

Practical hints

If a good temperature constancy is required, the following points should be observed:

a) the medium to be cooled must be vigorously agitated by a stirrer or fan,
b) the sensor of the temperature regulator must be located in such a way that it lies as close as possible to the cooling element (evaporator) and that the stirred medium flows from the cooling element to the temperature sensor.

c) The thermostatic bath should be well insulated whenever the ambient temperatureis subject to wide variations, and also in order to avoid cooling losses.
d) Most temperature regulators have scales with comparatively coarse division and have therefore low setting accuracy. For accurate work the requested temperature must be reset according to a calibrated checking thermometer.

5.1. Special characteristics of the TK 67

The temperature regulation of the TK 67 is effected in a similar way to our Ultra Cryostats according to a procedure for which we hold a patent, wherein the evaporator coil (cooling element) is according to requirements alternatively supplied with expanding refrigerant for cooling or with gaseous warm refrigerant for heating. With this procedure the compressor runs continuously without interruption while the instrument is operating. The temperature regulator controls, by means of magnetic valves, the circulation of the refrigerant. The special applications and advantages of this procedure are:

1. High constancy of temperature by alternating cooling and heating
2. Warming of the medium without additional heaters
3. Quick defrosting of the cooling element
4. Avoidance of stopping and starting strains on the compressor motor, hence long life
5. Applicability of sensitive temperature regulators

5.2. NTC-Temperature regulator for the TK 67

The accuracy of regulation of the TK 67 can evidently not be greater than that of the temperature sensor or contact thermometer in use. For this reason we have constructed a temperature regulator with characteristics matched to the requirements of the TK 67. It is an electronic two-point regulator without a maasuring instrument within a small and nicely designed housing. An NTC resistance thermometer serves as the temperature sensor. A protective covering tube prevents damage to the temperature sensor. The operation of the regulator is simple and free of complications. The plug on the cable coming from the regulator housing is plugged into the socket on the right side of the TK 67 housing. Then the plug on the temperature sensor cable is connected to the socket on the rear side of the regulator housing and the temperature sensor is immersed in the medium to be cooled complete with its protective cover tube. Thereafter it is only be required to set the requested temperature by rotation of the drum scale. The medium will now be automatically cooled to the set temperature and will be kept there constantly. Mounted upon the regulator housing are two pilot lamps. The green one indicates cooling and the red one heating periods. Owing to this compact dimensions the temperature sensor can be accomodated easily even in small containers. Very good temperature constancy can also be obtained by insertion of the temperature sensor within the cooling element.

It is also possible to use other temperature regulators such as contact thermometers, expanding rod regulators, etc. The regulator used should have the following functional characteristics:

a) contact opening with rising temperature
b) quick-make, quick-break contacts. If the regulator in use has slow-moving contacts it is essential to introduce a delay member between the temperature sensor and the relay CK 178-4o1 (cf. circuit scheme ES 415o.25.o1) in order to avoid contact flutter.
c) contact loading: 45 mA at 22o V A.C. (contact connections are at mains potential cf. circuit scheme ES 415o.25.o1)

In cases of uncertainty we should be glad if you would send your inquiries direct to us. We shall be very pleased to advise you on your special problems.

5.3. Special characteristics of the TK 64

The temperature regulation is effected similarly to a domestic refrigerator by switching on or off the compressor. To enable the compressor to start without a load when it is switched on, it is essential for the standstill period to last long enough for equalisation to take place between the high pressure in the compressor and the low pressure in the evaporator. It is therefore essential that in conjunction with the TK 64 only regulators with not too small "on-off" difference are used. Too frequent switching would lead to failure of the compressor motor.

5.4. Temperature regulator for the TK 64

To regulate temperature of the TK 64 we supply the following regulators:

a) NTC temperature regulator (cf. description section 5)
The model intended for use with the TK 64 has a constant switching delay of appr. 1,5 to 2 seconds.

b) Bimetal control device
This model consists of a round housing containing the switch and connections of an expanding rod sensor coming from the rear side. The bi-metal control device should be located in such a way that, if possible, the entire sensor tube is in contact with the medium to be cooled. The bi-metallic control device is fitted with a connecting cable and with a special plug, which is plugged into the socket on the right side of the TK 64. The requested temperature is set by the knob on the top of the bi-metal control device.

6. Thermostatic bath liquids

For temperatures above +5°C water can be used as thermostatic bath liquid, for temperatures down to about -15°C a mixture of water and glycerol, and for the entire working range technically pure methanol. In case methanol is used please observe the regulations for the use of inflammable liquids.
As non-inflammable, non-poisonous bath liquid particularly suitable for low temperatures we recommend Freon R 11. As the boiling point of Freon R 11 is at +23,6°C it is essential that this liquid is stored in a closed container as soon as the immersion cooler is not operating.

The liquids mentioned above are all proven and most frequently used. In addition there exists a number of liquids which are also suitable. It is important to note that the freezing point of the choosen liquid should be at least 5°C below the working temperature. At a lower difference between the two temperatures ice will form on the cooling element and this will reduce the cooling output and the accuracy of regulation.

7. Starting the apparatus - short directions

7.1. TK 64 and TK 67 without temperature regulators

a) Place apparatus on bench (cf. section 3)
b) connect mains plug to socket
c) suspend cooling element in medium to be cooled or immerse it (cf. section 4)
d) switch on by means of sliding switch. Cooling begins.

7.2. TK 64 and TK 67 with NTC temperature regulator

a) Place apparatus on bench (cf. section 3)
b) connect mains plug to socket
c) suspend or immerse cooling element in medium to be cooled (cf. section 4)
d) immerse temperature sensor in its protective tube into the medium

e) plug temperature sensor cable into socket at rear of regulator housing (cf. section 5.2)

f) connect plug on cable coming from regulator housing to socket on right-hand side of TK housing

g) set temperature desired by means of drum scale on regulator housing

h) switch on by means of sliding switch. The medium is automatically cooled to the temperature set and kept there constantly.

7.3 TK 64 with bimetallic control device

a) place apparatus on bench (cf. section 3)

b) connect mainsplug to socket

c) suspend or immerse the cooling element in the medium to be cooled (sec. 4)

d) immerse the sensor tube of the bimetallic control device in the medium (cf. section 5.3 and 5.4)

e) connect the cable from the bimetallic control device to the socket on the right-hand side of the TK housing.

f) set the desired temperature on the bimetallic control device.

g) switch on by means of the sliding switch. The medium is cooled to the temperature set and kept there constantly.

8. Special modifications and special accessories

Refrigeration plants

The standard models of the TK 64 and TK 67 are equipped with a 0,25 HP compressor. At extra cost the apparatus may also be supplied with a 0,33 HP one.

Specially shaped cooling elements

For special purposes we manufacture cooling elements of widely varying shapes and dimensions made from copper, brass, or stainless steel. Please indicate your requirements and we shall be pleased to submit a suitable quotation.

Mounting clamps

These clamps can be attached to containers, glass vessels etc. They are available with mounts for the cooling element, for the checking thermometer and for a bimetallic control device or temperature sensor, and on application also with a stirring propellor ready mounted.

Technical Data

Model	64	TK 67
Working temperature range (°C)	ambient temp. to -40	+40 to -35
Admissible ambient temperature (°C)	0 to +40	0 to +40
Refrigerating set		
power (HP)	0.25	0.25
condenser cooling medium	air	air
refrigerant	R 12	R 12
gross cooling capacity	abt. 500 kcal/h	abt. 500 kcal/h
Net cooling capacities at bath temperature of		
+20°C	380	350 kcal/h
0°C	320	300
-10°C	210	195
-20°C	140	115
-30°C	70	65
-40°C	10	-
Cooling-down time from		
+25 to 0°C	22 min.	23 min.
+25 to -20°C	48 min.	55 min.
Attainable temperature constancy		
with NTC regulator 4600	± 0,2 to 0,6°C	± 0,02 to 0,07°C
with bimetallic control device	± 0,5 to 1,0	-
Total consumption (W)	375	400
Dimensions		
casing (mm)	500 x 320 x 360	500 x 320 x 360
cooling element (mm)	55 x 200	55 x 200
Net weight (kg)	29,5	31