

Uniform and reproducible coils



GRANLUND automatic coiling machines KOC-VE/HD and KOC-T
Reliable and flexible coiling. Simple programming and setting.

Uniform temperature

The manufacture of resistance coils is of the greatest importance for the correct function and a good life of the heating elements. KANTHAL automatic coiling machines, type KOC, have proved to meet the highest demands from the manufacturers of resistance coils for electric-heating appliances. The machines enable the manufacture of uniform and reproducible KANTHAL coils, whereby a uniform temperature can be obtained along the whole element.

Flexible production

The KOC coiling machines can produce coils with resistance wire from 0.15 mm to 1.5 mm in diameter. A suitable mandrel diameter is 4-15 times the wire diameter but also mandrel diameters outside these principle values can be applied in certain cases.

Maximum coil diameter is 9 mm for KOC-VE and -T and 20 mm for KOC-HD.

Tandem wire coils

In many cases it is of advantage to use two wires wound in parallel instead of one single heavy wire. This can be achieved by fitting a second tower containing spool holder, roll labyrinth and wire brake as well as micro switch to the coiling machine.

Fast production

At mandrel speed of 4000 r.p.m. and an effective winding time of 80 % the production is about 600 (D-d) m wire per hour. D and d stand for the outer coil diameter and the wire diameter in mm respectively.

Electrical equipment

All machines are equipped with variable speed motors. Connection is always 220 V single-phase.

Additional equipment

- Device for winding tandem wire coils
- Device for winding coils with one adjustable pitch
- Device for winding coils with double pitch (KOC-T)
- Device for winding fine gauges of wire (< 0.15 mm)
- Cut off device for coil diameters 9-12 mm
- Deereeling device, Type KOA, for large wire spools

Standard models

The coiling machine type KOC is manufactured in the following standard models:

KOC-VE

D.C. motor with variable mandrel speed. Electronic measuring of the wire length. Places on a table.

KOC-HD

D.C. motor with variable mandrel speed. Electronic measuring of the wire length. Places on the floor.

KOC-T

Two D.C. motors with variable mandrel speed. One motor for the mandrel speed and one for the winding width.

- Computerized
- Direct programming of ohmic value
- Oiling of the wire is in the most cases not required
- Simple setting of the cut-off device, near 100 % clean cut
- Simple programming
- Tolerance $\pm 1\%$ on ohmic value

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5. WIRE COILING KOC-VE, KOC-HD, KOC-T, KOA

This chapter presents the GRANLUND coiling machines with accessories:

- KOC-VE, coiling machine
- KOC-HD, heavy duty coiling machine
- KOC-T, computerized coiling machine
- KOA, dereeling devices

A proper manufacture of resistance coils is of greatest importance for a correct function and a good life of heating elements. When coiling by hand, it is difficult to obtain a uniform pitch after cold stretching. Therefore, you often have to hot stretch the resistance coil and thereby eliminate the irregularities. However, hot stretching is an expensive operation.

GRANLUND manufactures a series of automatic coiling machines, type KOC, which have proved to meet the highest demands from the manufacturers of resistance coils for heating elements. The machines enable the manufacture of uniform and reproducible coils, whereby a uniform temperature can be obtained along the entire element.

The principle for all GRANLUND coiling machines is that the wire is coiled around a rotating mandrel. In order to get sufficient friction on the mandrel and improve the coiling, one or two external winding rolls are applied. This technique is well developed and has proven to be the most cost effective when coiling resistance alloys.

The KOC-VE can produce coils with wire from Ø0,20 to 1,0 mm. Also finer wire, down to appr. Ø0,10 mm, can be wound, using special equipment, depending on the ratio of coil to wire diameter. A suitable ratio is:

$$5 _ D/d _ 12$$

where D is outer coil diameter and d is wire diameter

or

$$3 _ D_m/d _ 10$$

where D_m is mandrel diameter and d is wire diameter

(Example: if the wire diameter is 0,5 mm, the coil diameter should be between 2,5 and 6,0 mm.)

The coils are normally close wound. However, if space wound coils are required, it can be obtained by using special equipment. Different pitches along the coils can be obtained on the KOC-TP version.

Wire spools up to 4 kg weight can be applied directly on the machines. If larger spools, or pail pacs are to be used, special dereelers, such as KOA, are recommended.

This information, which may be subject to change, is offered solely for your consideration, and should not be taken as a warranty or representation for which we assume any legal responsibility.

Sales Catalogue

KOC-VE Coiling Machine

Construction

The machine is aimed for placing on a table, suitable 700 mm high. It comprises the following:

- machine stand in welded sheath design
- gear box
- DC motor with variable mandrel speed
- control tower
- cutting device (solenoid)
- coil tray
- set of tools
- tandem winding device (option, second "tower")
- arm with safety switch for taking wire from pail-pacs (option)

Function

The mandrel is rotated by the DC motor, and the mandrel speed can be regulated steplessly between 0 and 6000 rpm. The outer winding rolls are run by the same motor through friction clutches, allowing their speed to be adjusted according to actual coil.

To get the correct resistance of the coil, the wire length is set on the counter. A measuring wheel measures the length and decides when cutting takes place. The cutting device is operated by an electric magnet (solenoid). The number of coils to be made is also programmed.

A special device for making tandem coils is available.

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Sales Catalogue

KOC-VE, cont.

Technical data

total height	1000 mm (excl. table)
height of machine stand	350 mm
length	750 mm
width	550 mm
weight	appr. 100 kg
maximum spool weight	4 kg (for bigger spools or pails, use a separate dereeler, type KOA)
mandrel speed	0 - 6000 rpm
wire diameter	max 1,0 mm min 0,20 (0,10) mm
mandrel diameters	Ø0,7 - 8,5 mm, in steps of 0,1 mm
cut-off bushings	Ø1,0 - 11,5 mm in steps of 0,25 mm
coil diameter	max Ø7 mm with 332A Ø9 mm with 332B Ø12 mm with 332C
electrical connection	single-phase 230 V, 50/60 Hz, 500 W

Required information for ordering

- mandrel size
- coil diameter
- electrical connection

The coiling machine is delivered with a tooling kit, i e ready for production of one specific coil size.

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KOC-HD **Heavy Duty Coiling Machine**

This machine was developed to meet the demands for coiling wires up to $\varnothing 1,6$ mm. The basic design is as KOC-VE, but the gear box is upgraded by 50 percent, and the cutting device is also upgraded. The winding procedure is the same as for KOC-VE and the machine ensures the same good quality of the coils as all our machines do.

The machine is often used for making coils for quartz tubes, which are rather heavy, but of course also other coils of large wire and coil diameter can be produced. We do not recommend smaller wire sizes than $\varnothing 0,3$ mm or larger than $\varnothing 1,6$ mm.

Note: this machine does not solve all problems making coils with large d and small D , i.e. extremely small D/d .

Construction

Due to the larger and more powerful drive motor, the machine is not a table model. It is equipped with four supports and aimed for placing on the floor. It is normally not necessary to fix it to the floor. The wire length is measured electronically.

The machine comprise the following:

- machine stand in welded sheath design
- heavy duty gear box
- DC motor with variable mandrel speed
- control tower (equal as on KOC-VE)
- heavy duty cutting device
- coil tray
- tandem winding device (option)

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Sales Catalogue

KOC-HD, cont.

Technical data

total height	1700 mm
height of machine stand	1000 mm
length	700 mm
depth	700 mm
weight	150 kg
spool weight	max 4 kg (for bigger spools, use a separate dereeler, type KOA-D)
mandrel speed	0-6000 rpm
recomm. wire diameter	max 1,6 mm
	min Ø0,3 mm
mandrel diameters	Ø0,7 - 17,0 mm, in steps of 0,1 mm
cut-off bushings	Ø1,0 - 20 mm (max 25 mm option)
coil diameter	max 20 mm

electrical connection single-phase 230 V, 50/60 Hz, 2200 W

Required information for ordering

- mandrel size
- coil diameter
- electrical connection

The coiling machine is delivered with a tooling kit, i e ready for production of one specific coil size.

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KOC-T (KOC-TT, KOC-TP)

Twin-motor Computerized Coiling Machine

This new type of coiling machine has several advantages over older designs, e.g.

- + improved cutting device, easier to adjust to obtain a clean cut
- + improved possibilities to run without any wire lubricant
- + computer simplifies correction of resistance
- + no oil leakage from gear box

Maximum recommended wire diameter is **0,8 mm**, instead of $\varnothing 1,0$ mm as for KOC-VE.

A version equipped for winding tandem coils, called *KOC-TT*, is available. A version for winding coils with several pitches (stretch ratios) is also available (*KOC-TP*).

Construction

Table model, table with a height of 700 mm is recommended. The machine comprises the following:

- machine stand in aluminium
- gear box, new design
- coil tray
- two DC motors with variable speed, one for the mandrel and one for the winding rolls
- computer for calculating and programming
- tandem device (option, KOC-TT)
- multi-pitch winding (option, KOC-TP)

Function

On KOC-T, the winding rolls is driven by a separate motor, improving the control over the speed of the rolls. The speed ratio between the mandrel and the rolls is set by a potentiometer to a value depending on the wire and mandrel diameters.

The programming of number of coils to be produced, required resistance etc, is made through a micro computer. The set resistance value is converted to a required length by the computer. Resistance adjustments can be made during production. The cutting is made by a stepping motor instead of a magnet (as in KOC-VE and -HD), which makes it more silent.

The brake is of the powder type, resulting in a constant brake force.

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Sales Catalogue

KOC-T, cont.

Technical data

total height		700 mm (excl table and wire spool)
length		1300 mm (incl hopper for coils)
width		550 mm
weight		appr. 100 kg
max spool weight		4 kg (for bigger spools or pails, use a separate dereeler, type KOA)
mandrel speed		0 - 6000 rpm
winding roll speed		0 - 600 rpm
wire diameter	min	Ø0,20 (Ø0,10) mm
	max	Ø0,8 mm
mandrel diameters		Ø0,7 - 8,5 mm, in steps of 0,1 mm
cut-off bushings		Ø1,0 - 11,5 mm in steps of 0,25 mm
coil diameter	max	Ø7 mm with 332A Ø9 mm with 332B Ø12 mm with 332C
length measuring accuracy		1 pulse/mm
power		500 W
electrical connection		single-phase 230 V, 50/60 Hz, 10 A

Required information for ordering

- mandrel size
- coil diameter
- electrical connection

The coiling machine is delivered with a tooling kit, i e ready for production of one specific coil size.

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KOC-TP

KOC-T with Dual Pitch Function

GRANLUND KOC-T can be equipped for the possibility to wind coils with a secondary pitch, and is then called KOC-TP ("P" for programmable pitch). With this machine, it is possible to make a coil which is close-wound in some parts, and pitch-wound in others. The length of each of the pitch- or close-wound parts can easily be programmed on the computer.

Design and function

As mentioned, KOC-TP is a special version of the KOC-T coiling machine. The additional features of KOC-TP compared with the standard KOC-T, is a pneumatically controlled sintered carbide wedge with holder, and an addition to the computer programme, which makes pitch-winding possible.

The knife is located on the rear shaft of the roll housing, where a winding roll normally is located. This means that coiling can only be made with the front winding roll, which may mean some limitations when coiling "difficult" coils, in particular when winding tandem coils. Enclosed drawing shows the sintered carbide wedge (1) on the wheel (5), which replaces the back winding roll. (2) to (4) shows the part where the wheel and wedge is controlled pneumatically.

The length of the close- and pitch-wound parts are set on the computer. In that way the number of pitch-wound parts, i.e. where the wedge is activated, and the length of each part can be chosen. The result will be a coil which is close-wound in some parts, and pitch-wound in others. The pitch is determined mechanically by how far the wedge penetrates the coil.

Up to 99 steps can be programmed, and the lengths are set directly in ohms on the normal computer keypad and display. If automatic resistance correction is made, it will be made proportionally over the entire coil.

Before starting in automatic mode, the set-off, i.e. the distance between the cutting knife and the wedge, needs to be set. When run in automatic mode, and the control system indicates that a pitch wound part shall be produced, the pneumatic system turns the wedge roll so that the wedge is inserted between the coil turns at the mandrel. When the required ohms of pitch wound part is obtained, the wedge goes out of the coil again.

Comments

GRANLUND KOC-TP replaces the older type of coiling machine with dual pitch, KOC-VEP. If continuous pitch winding is requested, it is better to use a pitch winding roll. A pitch winding roll, which replaces the normal back winding roll, can be used on standard coiling machines (such as KOC-VE or KOC-T).

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KOA **Dereeling Device**

KOA-D

Since the spool holder on the coiling machines is built for spools up to 4 kg, a separate dereeling device should be used for larger spools. Using this device improves productivity in large scale production thanks to less frequent spool changes. The device gets start and stop impulses from the coiling machine.

Max spool weight 20 kg

- improves productivity in large scale production

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