



falma machines

coiling equipment

producing coiled coils for incandescent lamps



montena
falma machines

philosophy

montena
machinery components technology

Turning darkness into light

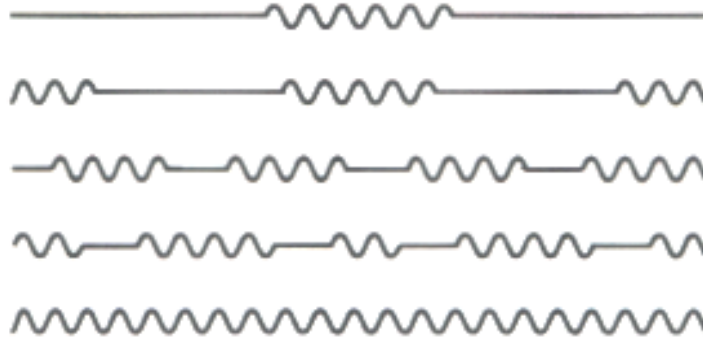
Montena machinery develops, builds and commissions machines and production lines for the manufacture of all kinds of light sources: incandescent or economical, traditional or the latest generation.

Working in close cooperation with and montena lighting, montena machinery has acquired complete mastery over all the phases of lamp production. This synergy effect brings high benefits: for example, it enables montena machinery to make an objective and well-formed assessment of production tool quality.

Montena's foremost aim is to give you comprehensive service, dedicated to your satisfaction and success. Our customer advice focuses on research, development and engineering; we also provide on-site after-sales service, maintenance and monitoring of installations.

Montena summarises its objectives in a single declaration of intent: we can do it!

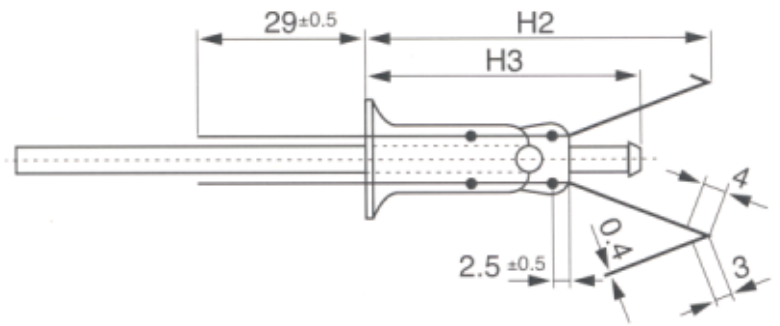
We will be happy to give you further information. Just contact us!



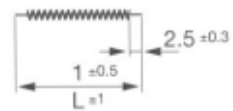
coiling equipment

Highly sophisticated machines for the filament production

- High speed machines
- Easy to operate
- High technology
- Minimum of persons required
- Very short change over time
- Very short pay back time
- Over night work possible
- 3 shift operation possible
- Minimal floor space



Filaments from 25 - 100 W
 110 - 230 Volt
 Cathodes for the CFL lamp



2

technology know-how

With the coiling equipment montena machinery can deliver as well the know-how and the technology how to produce the primary coils, coiled coils and even triple coiled coils for incandescent lamps and compact fluorescent lamps, assuring a high product quality. Every single production step from the beginning to the end is important and that is how we teach your personnel to solve daily problems, how to reduce raw material costs to a minimum and how to increase the overall efficiency. To ensure the quality and the high efficiency of the coiling equipment, the operators of the machines follow a specific training program. Along with our detailed documentation they will soon be able to handle the machines by their own. If later on, during operation of our installation, you have questions and problems to be solved and answered we will help you as well with our support at any time.

3

concept

The filament making machinery, which we propose, is based on the latest technology acquired by the very long experience of - falma - in this field. Over one thousand machines are worldwide working for the filament production. High quality and precision are demanded on the market today. Therefore we are here and can help you.

A good quality primary coiling is absolutely necessary for the manufacture of good coiled coil filaments. In montena's coiled coil machines you can digitally introduce the length of the coil and number of turns. The annealing oven reduces the graphite and stabilises the filament with hydrogen. The wire cutter cuts then each filament with an optical control system. Afterwards the filaments are coming into the dissolving unit where the mandrel wire is dissolved by acids.

For the correct chemical treatment of the acids, one needs different installations as the acid and soda tanks system SL, neutralisation plant NA and recuperation plant RC.

Today we offer high tech machines, with sophisticated control units, to save labour and basic machines, an economical product time for the production of filaments for incandescent lamps, for markets where labour cost are of less importance.

4

different machines

Coiling machines

- PC primary coiling machines
- CC coiled coiling machines
- DW coiled coiling machine machine
- TO annealing oven
- WS coil cutting machines
- Meteor spool winding machine

Dissolving equipment

- WA/WAD dissolving unit
- SL storage plant
- MA acid mixing and storage plant
- NA neutralisation plant
- RC recycling plant

Optional machines

Quality for filaments production

- DS wire cutter
- Mettler micro balance
- WM4 cold resistance measuring bridge
- Projector 4002
- Cadica hot air centrifuge
- Other equipment

5 PC primary coiling machine



General description

The PC machine works on the de-reeling principle, the tungsten bobbin being fixed on the coiling shaft. This coiling principle allows both high speeds and high bobbin loads without special requirements concerning wire quality. The concept of this machine is based on our experience in the design and manufacture of coiling equipment. The machine is easy to operate and maintain.

Advantages

- The machines are designed for the production of primary coils and offer the following facilities:
- High coiling speed (lasso principle only PC and PCX machines).
 - Large bobbin weight load (up to 300 g of wire).
 - No mechanical friction brake.
 - Grease lubricated (no oil contamination possible).
 - Interchangeable coiling head.
 - Low maintenance required.

PC primary coiling machine, basic version

The PC/PCX machines can be supplied as basic versions with a simplified control unit but with the same mechanical execution and performance.

Available types / Technical data		PC	PCX	PCS	PCK
Tungsten wire	mg/200 mm	0.98-9.83	0.19-9.83	10.84-752.79	10.84-752.79
	microns	18-57	8.0-57	60-500	60-500
Molybdenum wire	mg/200 mm	1.43-398.19	0.64-398.19	1.43-1592.8	1.43-1592.8
(Mandrel)	microns	30-500	20-500	30-1000	30-1000
Pitch	microns	25-200	14-100	20-200	200-600
Coiling head speed	rpm	30'000		10'000	
Tungsten bobbin load	grams	300		400	
Voltage/Frequency (Others on request)	V/Hz	3 x 230/400 V 50 or 60 Hz			
Dimensions of the machine	mm	625 x 320 x 630			
	(L x W x H)	(With take up system for 2 mandrels: H = 830)			
Weight of the machine	kg	135			



Technical features

- A newly designed coiling head offers the possibility to use high spool weights and constant wire tension.
- The machine has a frequency controlled maintenance free three phase A.C. motor.
- The core wire drive is realised by a pitch drum and mechanically linked to the coiling head, to practically eliminate the possibility of pitch errors.
- The machine is equipped with a state of the art electronic control unit, based on Siemens Simatic S7/300 components. The inverters are produced by KEB and Schneider.
- The programming of the coiling parameters is done by a simple dialogue via an alphanumeric display. Acceleration and deceleration are carefully surveyed, as well as the other parameters like wire tension, number of turns, length of gap and others
- Up to 99 filament types can be stored in the memory.
- In case of an abnormal condition, the machine stops automatically (wire rupture or others).

Advantages

Its capacity of 500 g per spool (this corresponds to approximately 300 g of tungsten) gives a huge autonomy before reloading. Except for the loading of the spools and the programming of the coiling parameters, the machines works without

General description

The High Performance Coiled Coiling Machine CC has been designed for the production of coiled coils with one or several interruptions.

The machine works with the pulley block system, which offers the possibility to ensure a constant wire tension during the whole work load of a heavy spool.

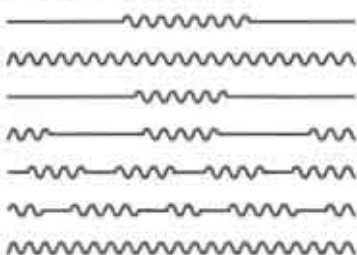
Technical data

Tungsten/primary coil	50-300 μ
Mandrel wire	50-500 μ
Pitch range	100-480 μ
Bobbin load	500 g
Coiling speed	up to 6000 rpm
Effective turns	1-999
Gap turns	1-99
Operating voltage	3 x 400V 50 or 60 Hz
Power	2,2 KVA
Dimensions	570 x 875 x 1270 mm

Production capacity (example)

Coil type	Number of turns	Pcs / hour	Autonomy with 1 spool
230V 25W	201/39	900	65 h
230V 40W	138/30	1100	30 h
230V 60W	141/24	1110	14 h
230V 100W	100/18	1305	5 h

Filament types



CC coiled coiling machine, basic version

The CC machine can be supplied as basic version with a simplified control unit for the manufacture of coiled coil filaments with one gap only, but with the same mechanical execution and performance.

DW coiled coiling machine, basic version


General description

The DW coiled coiling machine is the economical work horse for the production of coiled coil filaments for incandescent lamps.

Primary coil diameter	50-300 μ
Mandrel wire diameter	50-500 μ
Pitch range	60 - 480 μ
Bobbin load	70 g
Effective turns	1-999
Gap turns	1-99
Operating voltage	1 x 230V 50/60 Hz
Power	280 VA max.
Dimensions	500x250x450 mm
Weight	70 kg

Technical Feature

- ❑ The machine has a drive system with which the drive of the coiling head is mechanically linked to the pitch drum drive, to avoid pitch errors.
- ❑ The main drive is a frequency controlled, maintenance free three phase AC motor.
- ❑ The numbers of turns and gap turns can be programmed.
- ❑ In case of wire rupture of the primary coil the machine stops.

TO annealing oven



General description

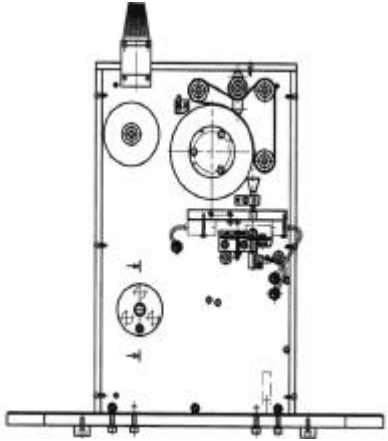
The Annealing Furnace TO was designed for the heat treatment of filaments on mandrels. In the first heating zone the graphite is reduced in humid hydrogen, in the second heating zone the filament is stabilised in dry hydrogen. The design with the two vertical heating zones, closed at the top, guarantees a low consumption of hydrogen. To avoid oxidation of the coils they run through the heating zones first and cool down within the inert atmosphere before leaving the cylinder. The directly heated moly tubes give a good thermal efficiency and a minimal thermal inertia. This new generation of annealer equipped with a microprocessor control unit gives optimum working conditions, easy handling, comprehensive safety and high efficiency. Up to 2 wires are processed simultaneously through the two heating zones with a temperature range of 800 to 1400° C resp. 1300 to 1950° C at a speed of 5 meters per minute.

Advantages

- ❑ The annealer and its control system are one unit.
- ❑ Direct heating of the tubes which allows low energy consumption and a minimum of thermal inertia.
- ❑ The temperature regulation is based on a stabilised and controlled power supply under consideration of the temperature difference of the cooling water.
- ❑ The temperatures can be digitally pre-selected.
- ❑ If one of the cylinders of the heating zones has been lifted up, or the hydrogen supply is interrupted, then the machine automatically starts a rinsing cycle and within minutes the machine is ready for operation again.
- ❑ To avoid safety risks and to avoid damages to the machine all fluids and operating conditions are monitored.
- ❑ A display informs on operating conditions, alarms and certain machine defects.

Technical data	
Coil	∅ - 1 mm
Temperatures:	
1st annealing zone, humid	800-1400 °C
2nd annealing zone, dry	1200-1950°C
Annealing speed:	
Coiled coil	5m/min
Energies:	
Hydrogen	5l/min at 1 bar
Cooling water	3l/min at 1 bar
Operating voltage	3 x 400V 50 or 60 Hz
Power	8 KVA
Dimensions:	1900 x 600 x 1850 mm
Weight	420 kg

(picture not available yet)

**General description**

The WS High Tech coil cutting machine is the high end machine for the cutting of various coil types for incandescent and halogen lamps.

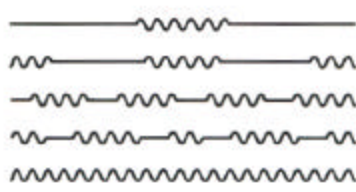
Technical features

- The drive motor is a frequency controlled AC motor which allows to adapt the speed to the coil length.
- The detection of the coil length for gap coils is performed by a laser sensor, the cutting pattern can be programmed.
- The detection for the coil length for continuous coils is linked to the drive system.
- The belt drive guarantees accuracy.
- The cutting is performed by hard metal circular blades.

Working range

Diameter of wires 0,1 - 1,2 mm

Filament types

**Options**

- Automatic coil selection system rejecting coils which are not corresponding to the programmed pattern
- Machine table
- Special bobbin holders
- Coil sorting system WS-4-00
- Noise protection WS-5-00

Technical data

Precision of cutting	± 0,1 mm
Cutting speed	8 - 12 cuts/sec
Operating voltage	230 V 50 or 60 Hz
Power	200 VA
Dimensions	800x300x450 mmm
Weight	37 kg

M11 spool winding machine



Technical data

Winding spindle	1
Wire diameter	0.01-2.0 mm
Traverse max.	100 mm
Rotation diameter, max	200 mm
Feed rate, max.	90 mm/sec.
Speed range	50-10'000 rpm
Power supply	230V/50-60 Hz
Current consumption	10A
Main fuse, by customer	16A
Dimensions	480x850x300/500 mm
Spindle height above bench top	190 mm
Weight of machine and control unit	74 kg

General description

The M11 winding machine belongs to a group of newly developed bench-top winding machines. It is based on the well known Meteor M01 of which there are several thousand units worldwide in use today, and it is the result of 50 years in the winding business. Thanks to CNC control, which also allows program storage, the use of this machine is very easy. The precision mechanics guarantee the highest accuracy in dynamic wire positioning at all spindle speeds and wire feeds. The machine runs with virtually no vibrations with both thick wire and heavy bobbins. The M11 can be upgraded at any time using optional accessories to satisfy future requirements.

6

WA/WAD dissolving unit**General description**

Fully automatic, microprocessor controlled dissolving unit for molybdenum mandrel wires. The reaction takes place in a closed vessel with fail safe monitoring system. No nitrogen oxides are released to the atmosphere.

Capacity:

- ❑ 1,5 kg of molybdenum per hour (4 batches).
- ❑ With a double reactor, (WAD) the capacity can be doubled.

Technical features

- ❑ The reaction is monitored through a microprocessor control unit.
- ❑ The different parameters can be changed through a simple man / machine dialogue.
- ❑ The unit is built with resistant materials and components; glass, PVDF pipes and containers for acids, stainless steel tubes for water, high pressure air and oxygen. The pumps and valves were selected according to the same criterias. This guarantees unlimited life and a reasonable amount of maintenance.
- ❑ The monitored reaction, constant initial acid temperature and constant dissolving time give a more constant dissolving quality.
- ❑ This plant allows to dissolve the mandrel wires in a process which corresponds to the requirements of safety, environmental protection and productivity of today's industry.

Options

- ❑ Microprocessor software for moly and iron dissolving process.
- ❑ Duplex unit WAD, equipped with two simultaneous working reactors, double capacity.
- ❑ Unit for connection to a neutralisation plant.
- ❑ Unit equipped for connection to a recovery plant RC for recuperation of acids and MoO₃.
- ❑ Chemical reactor for long filaments.
- ❑ Hot air centrifuge for coil drying.

Technical data

	WA	WAD	
Dissolving capacity	1-1,5 kg	2-3 kg	Mo/h
Mixed acids	16	32	l/h
Oxygen	600, 2 bar	1200, 2 bar	l/h
Water	300, 3 bar	600, 3 bar	l/h
High pressure air	100, 6 bar	200, 6 bar	l/h
Operating voltage	3 x 400V, 50 or 60 Hz		
Power	3 KVA	5 KVA	
Dimensions	1500 x 2800 x 3000 mm	1500 x 3500 x 3000 mm	
Weight	820 kg	1120 kg	


SL storage plant


General description

The Storage Plant SL is used to serve the Dissolving Unit WA. The plant is equipped with pumps to transfer the liquid out of the transport tanks. It is controlled by level detectors with displays and alarms. The plant stands in an overflow basin.

Options

The storage plant SL can be completed with an acid mixing tank and working tank. The name of this acid mixing and storage unit is MA.

Technical features

- The tanks are made of polyethylene, they are located in an overflow basin of glass fiber reinforced polyester, which has a capacity of 100% of the volume of the tanks.
- The levels of the tanks are monitored by means of detectors equipped with float level indicators which produce a voltage proportional to the level of the tank. The level is displayed on the control board.
- Maximum and minimum level are shown through alarms. Self priming pumps made out of resisting materials are provided to transfer the liquids out of the transport tanks.

Technical data

Capacity per tank	800 l
Pumping speed	10-20 l/min
Operating voltage	3 x 400V 50 or 60 Hz
Power	750 VA
Dimensions	3200 x 1900 x 1800 mm

MA acid mixing and storage plant



General description

The Acid Mixing and Storage Plant MA is used to dispense acid to the Dissolving Unit WA. The plant consists of 4 separate tanks. It is equipped with pumps for the transfer of liquid from the transport delivery tanks, to mix the acids in a mixing tank and to serve the Dissolving Unit WA from a working tank. The complete unit stands in an overflow protection basin.

Technical data

Capacity per tank	800 l
Pumping speed	10-20 l/min
Operating voltage	3 x 400V 50 or 60 Hz
Power	5 kW
Dimensions	6000 x 2000 x 1900 mm

Technical features

- The tanks are made of polyethylene. They are located in an overflow basin of glass fiber reinforced polyester, which has a capacity of 100% of the tank volume.
- The mixing tank is equipped with a stainless steel cooling system. The acid temperature is monitored, if required the cooling water is passed through the cooling system.
- The acids are mixed based on volumetric measurements performed with inductive flow meters. The acid quantities can be digitally preselected.
- The levels of the tanks are monitored by means of detectors equipped with float level indicators. The level is displayed at the control board.
- Maximum and minimum levels are shown through alarms.
- Pumps made of acid resisting materials are provided to transfer the liquid out of the transport tanks.
- The plant is completely closed and connected over a gas washing system.

NA neutralisation plant



General description

This unit has been built to neutralise wash waters and acids resulting from the dissolving of mandrel wires. It is a completely equipped compact plant standing in an overflow basin.

Technical data

Working volume	1,2 m ³
Water	4-5 bar
Compressed air	6 bar
Operating voltage	3 x 400V 50 or 60 Hz
Power	600 VA
Dimensions	1600 x 1000 x 1600 mm

Technical features

- ❑ The continuous flow neutralising basin has a functional volume of 1,2 m³.
- ❑ The heavy duty stirrer mixes the liquid with the neutralising chemicals.
- ❑ The dosage of the caustic soda is performed through an injector, monitored through a pH-regulator.
- ❑ The neutralising unit is equipped with a time control system; if within a pre-selectable time limit the required pH value is not reached, an optical and acoustical alarm is started.
- ❑ The neutralised water flows through a pH end control to the sewer. The pH end control is connected to a recorder which records the pH values of the effluent. If the pH values are not within determined limits, an alarm is started.

Technical features

Bulk liquid storages tanks

- For storing the used acids and the products in process.
- For storing the bases used for neutralisation.

The storage equipment consists of 800 liters tanks which stand in an overflow basin. The tanks are fitted with level indicators, alarm systems and pumps.

HNO₃ column

- For concentrating the nitric acid.

Steam heated still.

Analysis and acid-mixing apparatus

- For analysis of the recovered acids and the acid mixes.
- To determine proportions of the acids for a new mixture.

The analysis is done by a recording potentiograph. The components quantities are preselected on the mixing apparatus. The new mixture is then prepared automatically.



Reactor

- For recovery of the acids.
 - For precipitation of MoO₃.
- The reactor consists of a steam heated, enamelled steel vessel with stirrer, distillation column and temperature sensors. The capacity of the reactor is 400 liters.

Filter

- For separating the MoO₃ sludge from the acid.
- For washing the MoO₃ sludge.

The filter press of stainless steel has a stirrer to suspend or compress the filter cake. It is equipped with a pressure dependent safety system.

Bioreactor

- To eliminate the nitrates in the neutralised wash waters

7 DS wire cutter



General description

Designed to cut accurately 200 mm wires for weight control

Technical Data

Accuracy of cutting	±0,02 mm
Dimensions	350 x 200 x 300 mm
Weight	5 kg

Mettler Micro Balance

Technical data

Readability	1 microgram
Range	0 - 150 mg
Max. weight	3050 mg

WM4 cold resistance measuring bridge



Cold resistance measuring bridge

For measuring the cold resistance of filaments with a length between 4 to 60 mm.

Technical data

Filaments	4-60 mm
Accuracy (20-30° C)	$\pm 0,035\%$ +1 digit.
Temperature coefficient	$(\pm 0,003\% + 0,1 \text{ d})/^{\circ}\text{C}$
Operating voltage	220 V 50 or 60 Hz
Dimensions	550 x 210 x 170 mm
Weight	6,600 kg

Projector 4002

This micro macro projector is used to visually examine coils and to determine pitch errors.

Cadica hot air centrifuge, goes with the WA dissolving unit

General description

Centrifuge for the rapid drying of filaments after mandrel dissolving.

Other equipment

- Laboratory microscope
- Stereo microscope
- Coil calculator
- Spot welder PECO