

CAT

Ingenieurbüro
M. Zipperer GmbH



*From marketing knowledge
to real innovation*

Magnetic Stirrers from CAT

- Microprocessor controlled
- Pt-100 Probe
- Safety Temperature
- Soft Start
- Temperature Ramps
- Timer Function
- Closed Housing

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MCS66



MCS67



- Back-lit, numeric LC-display
- Temperature and motor control via fuzzy-logic
- Self-optimising algorithms grant for a highly accurate temperature stability
- Programmable maximum hotplate temperature
- Programmable safety temperature
- Programmable liquid temperature, if operated via Pt-100
- Selectable shut off function (Timer)
- 4-step programmable multifunction timer
- Over-temperature protection
- Shut off at Pt-100 Error



Dear Madam, dear Sir,

Since the invention of the magnetic stirrer 80 years have passed. What's new in the meantime? In 1967 I introduced the "motorless" magnetic stirrer to a marvellous audience atACHEMA. In 1974 we presented my development, the CERAN® hotplate on magnetic stirrer M21 - M23 as world-wide novelty. And duringACHEMA 1991 we proudly demonstrated our microprocessor controlled magnetic stirrer MCS66, which not only featured a number of active and passive safety elements but also PID controlled temperature curves of an extremely exact heat control with fuzzylogic and temperature ramps could be programmed. At all times there have been manufacturers who adopted our continuative developments. We see that with pride.

Please spare a little time to study our various models and their applications. It might be interesting to learn about our dual circuit safety magnetic stirrer or to have a look at the smallest hotplate stirrer manufactured since 1991 which you will find on page 6. Here we offer in an impressive way a "footprint" hotplate magnetic stirrer, which only uses a 1/3 of heating power to boil 200 ml H2O in approximately 13 minutes. It is beyond comprehension that the usage in laboratories change that slow and it takes a decade until such an idea of an economy unit is duly recognized –only because of increased energy cost and cost of approximately € 10,000.–/sqm lab bench for equipment.

Please enjoy studying this brochure.

Yours,
Manfred Zipperer

Hotplate Magnetic Stirrer MCS66 / MCS67

With modern microprocessor technology self monitoring and programmable magnetic stirrers found their way into today's labs. The RS232 interface provides for networking with other lab equipment and a computer.

The instrument has a rotating easily viewable solvent-proof membrane key pad to access the software which controls all functions.

The fuzzy-logic control of the liquid and hotplate temperatures makes sure for fastest heat up time without overshoot and temperature stability.

A four-step timer system allows for generation of user-defined temperature and stirring profiles. For each timer step the following parameter can be defined: hotplate and sensor temperature (liquid), motor speed, temperature-slope.

The case is made of acid resistant coated aluminium and is protected against liquid penetration. Active and passive safety features protect from risks such as overheating of the hotplate or the medium to be stirred. The unit shuts down if a short circuit or failure of the external Pt-100 probe is sensed, but also if the temperature probe gets out of liquid.

Additional there are extensive „watchdog“-parallel back-up circuits to prevent from failures of the microprocessor or heating.

The motor speed is optoelectronically measured and precisely readjusted, of course with soft-start for smooth acceleration of the stirring bar.

The top of our line for
29 hours and 2 days a week



M26



Safety features of the M26:

- Out-of-liquid alarm when heater breaks
- Monitors for short-circuit and sensor failures
- Internal high-temperature monitor
- Watchdog parallel back-up circuit
- Adjustable safety temperature from RT - 300°C
- Adjustable parallel back-up circuit via 2nd Pt-100-sensor, Adjustable shut off temperature from RT-300°C
- Hotplate temperature limited to 350°C
- Programmable temperature ramps
- RS232
- Programmable Timer

Hotplate Stirring System M26

Modern Microprocessor Technology Provides for Active and Passive Safety within the Hotplate Stirring System M26

The M26 is a compact and totally integrated hotplate stirrer system, featuring PID fuzzy-logic control through a powerful microprocessor.

This grants at plainest operation a maximum of accuracy and safety.

Data is displayed on an easy-to-read, back-lit α -numeric LCD which shows actual values, operating hints and any operating messages.

Data is entered via an encoder-wheel and the acid-proof membrane key-pad, allowing the user access to the powerful EEPROM software. Selected user settings are automatically protected against unintentional changes. The integrated timer enables the M26 to switch off after a programmed time has expired.

The unit has been developed for discerning users who value safety as paramount in their laboratories. A second Pt-100 sensor can be connected to the M26 to switch off the unit if a pre-set safety temperature is reached.

Please find following a description of the safety features:

Differential alarm - the safety power cut-out

Failure of the stirring vessel could create a hazardous situation, so to solve this problem this instrument has a 'differential alarm' feature. The 'differential alarm' switches the unit off if the probe has fallen out of the liquid (e.g. failure of the stirring vessel, breakage of glass).

Out of liquid check

The M26 monitors, whether the PT-100 tip is immersed in liquid. The micro-processor checks whether the probe temperature changes in relation to the temperature changes of the hotplate. If the microprocessor detects no increase in the liquid temperature over a certain time, although the hotplate temperature is rising the following happens:

1. Heating function shuts off.
2. Stirring function starts.
3. A warning message is shown on the display,
4. The hotplate is switched off and the M26 shuts down after a preset time.

Failure of temperature probe

Disconnection or failure of a temperature probe (internal or external) will disable the heating of the hotplate. The shut down reason will be shown on the display the next time the unit is switched on.

CAT LabControl for Windows®

CAT LabControl for Windows® enables full control and documentation of parameters such as temperature, motor speed and switch-off time. This powerful package can be used with all CAT units with RS232 interface.



KM16

- 4Digit LED Display
- Display of set and actual values
- Temperature- and motor control via fuzzy-logic
- Self-optimising algorithms grant for a highly accurate temperature stability
- Soft-start of motor
- Programmable maximum hotplate temperature
- Programmable liquid temperature, if operated with Pt-100
- Timer (1 min-999 min)

microprocessor controlled hotplate stirrers for direct use with Pt-100 probes



M17.5



KM16.7



M16.5



M16.6

M16.5 stainless steel hotplate
M16.6 anodised aluminium hotplate (Eloxal)
M17.5 CERAN®

The CAT mid range hotplate stirrers M16.5, M16.6 and the CERAN® hotplate stirrer M17.5 feature direct display and set of plate, probe and safety temperatures on the front panel of the instrument. Set temperatures, safety temperature as well as the programmable switch-off timer can be easily set via an incremental encoder wheel. All parameters can be monitored on a 4-digit LED-display which allows also for monitoring the set motor speed.

These hotplate stirrers all have superb performance such as soft-start for the stirring motor, fuzzy logic control of the liquid and hotplate temperatures for fastest heat up time without overshoot and temperature stability, acid resistant epoxy-finished chassis and grade 304 stainless steel covers, combined with a stainless steel shroud between hotplate and cover to avoid the entrance of spills into the interior.

All three models are also available with RS232-interface which enables easy setting and readout of all relevant parameters.

Magnetic Stirrer with Heating Capability for Round-bottom Flasks

These magnetic stirrers/heaters are developed for heating round-bottom flasks as well as three-neck flasks. The heat transfer is done through radiation and direct surface contact with an aluminium block in the shape of round-bottom flasks. The heating block with the flask is surrounded by a stainless steel container. When breaking of glass occurs, the liquid is collected in this stainless steel container.

The liquid is stirred by an oval stirring bar so that hot spots do not appear. Temperature ramping therefore is going smoothly.

Different covers are delivered with the instrument so that the heat will remain in the stainless steel container. This improves fast heating. The KM16.4D and KM16.7D are equipped with a display for direct reading of the heating block temperature or the liquid temperature through an external Pt-100 sensor.

The following parameters can be adjusted: Temperature of the heating block, external Pt-100 sensor, maximum temperature (for security), timer function, rpm for the stirrer.



for day to day lab routine



Hotplate Stirrers for the daily Lab Routine

This group of compact, robust stirrers has been developed for general stirring tasks in today's busy laboratory. Analogue controlled hotplates, brushless motors with opto-electronic speed control, embedded heater coils, CAT splash-proof construction with stainless steel covers give a long term trouble-free life.

Safety Functions for Connection of Contact Thermometers

Models **M11**, **M12** and **M13** each provide a socket for contact thermometers (CTC) and a safety monitoring circuit which controls the external probe. An error message during operation (e.g. broken CTC) shuts the hotplate down.

Hotplate stirrers **M6**, **M6.1** and **M6.2** are economically priced models without contact thermometer connection.

Note regarding the various hotplates

Types M6, M13, M17.5 und MCS67

These hotplate stirrers are equipped with a CERAN® hotplate with 600 W heating power. CERAN® glass ceramic is mostly chemically resistant. The heating surface stays constantly straight and is easy to clean. The slightly soiled heating surface can be cleaned (when hand-warm or cold) with water and a few drops of washing-up liquid.

Underneath the CERAN® plate there is a closed heating coil which is embedded in a stainless steel tubing filled with quartz sand. The heat is mainly transferred by heat radiation.

Types M6-1, M11 und M16.5

These hotplate stirrers are equipped with a round stainless steel hotplate with 500 W heating power. For easy cleaning the surface of these hotplates are high-gloss finished. It is possible that the hotplate vaults to the inside after some time due to thermal expansion of stainless steel. The heat is transferred by heat conduction.

Types ECM6, M6-2, M12, M16.6, M26 und MCS66

These hotplate stirrers are equipped with an aluminium hotplate. The hotplates of M6-2 up to MCS66 are heated via a closed stainless steel heating coil with 500 Watt heating power; the heating power of type ECM6 is 160 Watt. The surfaces of these hotplates are anodised and therefore mostly chemically and mechanically resistant. The heat is transferred by heat conduction.



Technical details please see on the reverse side.

A big variety



ECM6



M20

- Why 600 Watt heating power, if 200 Watt are enough?
- Why stir with 40 Watt, if 2-6 Watt are enough?
- Are samples of 500ml really necessary? Are 50 ml or even less not enough?
- Why crowding our lab benches with big-sized standard units, if smaller units also could do the job?
- Small, energy-saving and still powerful.



ECM5



ECM2



M2



M15

Compact, energy and space-saving magnetic stirrers

Early on CAT recognised the need for space-saving stirrers in today's crowded laboratory environment. Also, people are becoming conscious that energy-saving is important.

ECM6

Smallest hotplate stirrer. The Eloxal hotplate is only 90x 90 mm and heats 200 ml water in ca. 13 min to 100°C. The brushless motor enables precise speed control from 10-1200/min

ECM2/5

non-heating version of ECM6

ECM2

Energy and space-saving stirrer 2-200/min

ECM5

Energy and space-saving stirrer 10-1200/min

M2

Low-cost magnetic stirrer for simple stirring tasks. The stirrer comes in a closed polypropylene housing with white cover for titration, brushless motor, 500 rpm.

Magnetic Stirrers without heating

There is a choice of 6 different models. They all have brushless motors with electronic feed-back speed control. This means changes in viscosity of the media or voltage fluctuation do not influence the set speed. A soft-start feature prevents stir-bar de-coupling.

M5

Standard unit, feed-back speed control

M15

Microprocessor controlled

For large volumes:

M20.20

for volumes up to 50 l H₂O, 100-1100/min

M30.30

for volumes up to 100 l H₂O, 100-1100/min



M30

for all kinds of applications

HEATING ONLY



H3.1



H17.5D



H3030



H3030C



H3



H4

Hotplates

Hotplates are mainly used to heat aqueous solutions in glass vessels without flammable contents. Since the hotplates of the units become very hot it has to be determined by the user whether a dangerous situation may arise.

Hotplate Model H3

A laboratory heater made for high demands. The heating platform is made of CERAN® (Schott & Gen.) and is guaranteed to remain a flat surface even after many thermal shocks. The heating consists of a sealed IR-radiant heater covered with stainless steel to insure optimum resistance to acids and alkalis. A thermostatic temperature control unit allows for stepless temperature control.

Hotplate Model H3.1

A laboratory heater made for high demands. The heating platform is made of stainless steel. The heating consists of a sealed IR-radiant heater covered with stainless steel to insure optimum resistance to acids and alkalis. A thermostatic temperature control unit allows for stepless temperature control.

Sandbath, Model H4

A laboratory sandbath for heating sand, oil and other liquids, etc. The heating unit consists of a sealed IR-radiant enclosed in stainless steel. The sandbath itself is made of stainless steel and measures 140 x 140 x 55 mm with a capacity of over 1000ml. The temperature is regulated by a thermostat.

Hotplates H30/30, H30/45, H30/60

The aluminium hotplates of this series feature a precise temperature control. The surfaces of the hotplates will remain a flat even after many thermal shocks this means there is optimum contact between hotplate and vessel to guarantee

for an even heating of the liquid. The heating consists of a sealed IR-radiant heater covered with stainless steel to insure optimum resistance to acids and alkalis. A thermostatic temperature control unit allows for stepless temperature control. The thermostat stops the heat up procedure as soon as the set temperature has been reached.

The desired temperature is set at the temperature control knob (0-300°C). A signal lamp indicates the operation of the hotplate is. The lamp is illuminated as long as energy is supplied to reach the set temperature.

Hotplates H30/30C, H30/45C, H60/30C

Same units as described above but with CERAN® hotplate and a temperature range from 0-400°C.

Hotplate H17.5D

The CAT hotplate H17.5 with CERAN® hotplate features direct display and set of plate, probe and safety temperatures on the front panel of the instrument. Set temperatures, safety temperature as well as the programmable switch-off timer can be easily set via an incremental encoder wheel. All parameters can be monitored on a 4-digit LED-display.

This hotplate has superb performance such as fuzzy logic control of the liquid and hotplate temperatures for fastest heat up time without overshoot and temperature stability, acid resistant epoxy-finished chassis and grade 304 stainless steel covers, combined with a stainless steel shroud between hotplate and cover to avoid the entrance of spills into the interior.

This model is also available with RS232-interface which enables easy setting and readout of all relevant parameters.

Magnetic Stirrers

	Stirring Quantity (Hz:O)	Working Area Size (mm)	Material	Speed Range	Heating Power	Temp.-range (C°)	Connection for external Probe	Deviation	Independent Safety Circuits	Dimensions W x D x H	Weights kg	Other Features
Model Part No. Safety Hotplate Stirrers microprocessor controlled												
M26PC	60279-00	10l	Ø140	Eloxal	60-1600	500 W	40-360	2xPt-100/KTA	±0,2°C	2/7	148x209x110	2,6 Timer, Temp.-Ramps, RS232
MCS66	60276-00	10l	Ø135	Eloxal	60-1600	500 W	40-330	Pt-100/KTA	±0,2°C	2/6	180x245x100	2,8 4step Timer, Temp.-Rampen, RS232
MCS67	60277-00	10l	Ø125	Ceran®	60-1600	600 W	40-440	Pt-100/KTA		2/6	180x245x100	3 4step Timer, Temp.-Rampen, RS232
Model Part No. Hotplate Stirrers microprocessor controlled												
M17.5	60263-00	10l	□135	Ceran®	60-1600	600 W	40-500	Pt-100	±1°C	2	150x184x110	2,6 Fuzzy-logic Control
M16.6	60264-00	10l	Ø140	Eloxal	60-1600	500 W	40-380	Pt-100	±1°C	2	150x184x105	2,4 Fuzzy-logic Control
M16.5	60262-00	10l	Ø130	V2A	60-1600	500 W	40-350	Pt-100	±1°C	2	150x184x105	2,4 Fuzzy-logic Control
Model Part No. Standard Hotplate Stirrers												
M13	60272-00	10l	□135	Ceran®	100-1600	600 W	40-400	KTA	±1°C mit KTA	1	150x184x105	2,6
M12	60271-00	10l	Ø140	Eloxal	100-1600	500 W	40-330	KTA	±1°C mit KTA	1	150x184x105	2,4
M11	60270-00	10l	Ø130	V2A	100-1600	500 W	40-330	KTA	±1°C mit KTA	1	150x184x105	2,4
M6	60266-00	10l	□135	Ceran®	80-1600	600 W	40-400				150x157x105	2,4
M6.1	60268-00	10l	Ø130	V2A	80-1600	500 W	40-330				150x157x105	2,2
M6.2	60269-00	10l	Ø140	Eloxal	80-1600	500 W	40-330				150x157x105	2,3
ECM6	60256-00	1l	□90	Eloxal	10-1200	160 W	40-250				100x110x80	1
Model Part No. Hotplate Stirrers for Round-Bottom-Flasks												
KM16.4D	60257-00	100/250/500			60-1600	500 W	40-450	Pt-100				2,6 Fuzzy-logic Control
KM16.7D	60258-00	1000/2000			60-1600	500 W	40-450	Pt-100				2,6 Fuzzy-logic Control
Model Part No. Magnetic Stirrers												
M2	60260-00	1l	75x130	Polypropylen	500						80x150x50	0,28
M5	60265-00	10l	□150	V2A	80-1600						157x157x80	1,8
ECM2	60252-00	1l	□100	V2A	2-200						100x110x57	0,8
ECM5	60255-00	1l	□100	V2A	10-1200						100x110x57	0,8
M15	60261-00	10l	145x160	V2A	60-1600						150x184x80	2
M20.20	60253-00	50l	210x245	V2A	100-1100						210x245x100	4,5
M30.30	60254-00	100l	300x310	V2A	100-1100						300x310x100	6,5

Hotplates

	Volume (H:O)	Plate Size Dimensions (mm)	Material	Heating Power	Temp.-range (C°)	Connection for Probe	Deviation with Probe	Independent Safety Circuits	Overall Dementions W x D x H	Weight kg	Other Features
Model Part No. Safety Unit microprocessor controlled											
H17.5D	60228-00	□125	Ceran®	600 W	RT-500	Pt-100	±1°C	2	150x184x110	2,6	Fuzzy-logic Control
Model Part No. Standard Units											
H3	60223-00	□135	Ceran®	600W	40-400				151x157x110	1,9	
H3.1	60225-00	Ø130	V2A	500W	40-300				151x157x110	1,8	
H4	60224-00	140x140x55	V2A	600W	40-300				151x157x165	1,8	
H30/30	60226-10	300x300	Eloxal	2000W	40-350				311x315x140	7,8	
H30/30C	60226-30	300x300	Ceran®	2000W	40-450				311x315x147	7,9	
H30/45	60226-20	300x450	Eloxal	2000W	40-350				311x315x145	11,6	
H30/45C	60226-40	300x450	Ceran®	2000W	40-400				463x316x147	11,7	
H60/30	60226-60	600x300	Eloxal	4000W	40-350				610x315x145	12	
H60/30C	60227-70	600x300	Ceran®	4000W	40-400				610x315x147	12	