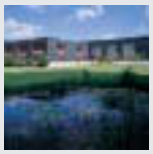










Innovative Dispersion Systems for Laboratory and Pilot Plant

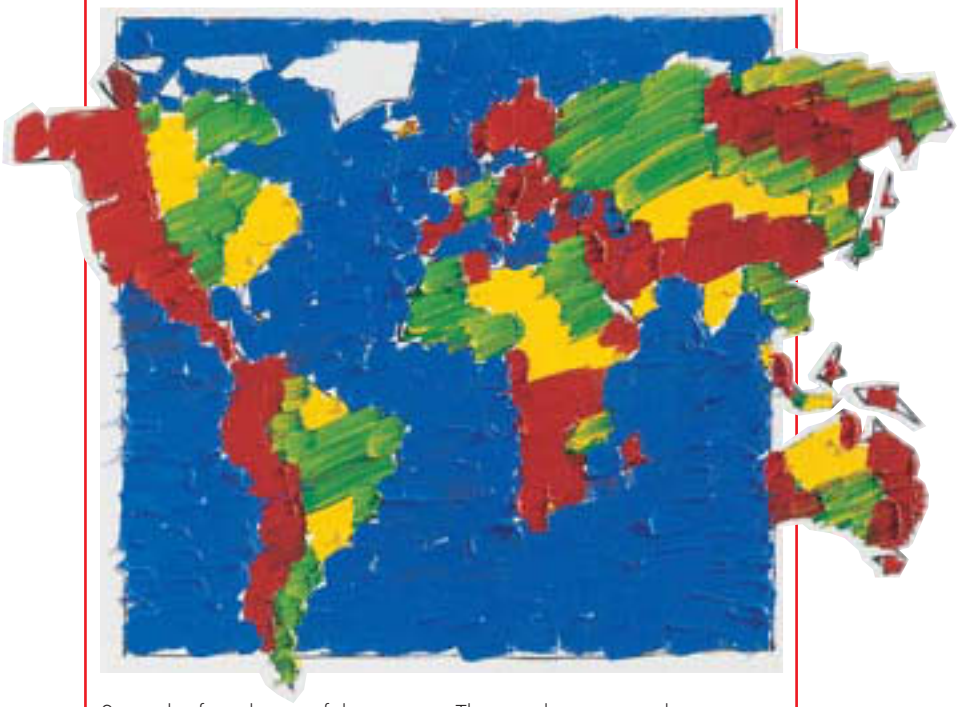
DISPERMAT®
TORUSMILL®

Catalogue 2003

VMA-GETZMANN GMBH
Verfahrenstechnik

The electrical data (voltage, frequency) and the Safety Device described in this catalogue correspond to the normal European Community standards. If your local requirements are different, please contact either ourselves or our local agent.

Dispersion Technology for the World



Since the foundation of the company the name VMA-Getzmann has been synomynous with the production of high-quality and innovative dispersion systems.

The integration of progressive technology with functional design as well as high quality, are characteristic of our products.

This catalogue provides an overview of products and new developments in the field of dispersion technology.

Dispersion Today - World Wide

Dispersion technology can be applied to many different areas.

- Paints and Varnishes
- Pigments and Additives
- Printing Inks
- Chemicals
- Plastics
- Adhesives
- Construction Industry
- Electronics
- Coatings
- Pharmaceuticals
- Cosmetics
- Microbiology
- Agrochemicals
- Food Industry
- Cell Breakage
- Ceramics
- Magnetic Materials

Worldwide operation with VMA-GETZMANN dispersion systems DISPERMAT® and TORUSMILL® requires an international marketing and service organization.

Different Challenges require Intelligent Solutions


















In close cooperation with our clients, we are constantly upgrading our standard programme and developing intelligent solutions to new challenges.

Research, Development and Production at one Factory

VMA-Getzmann process technology develops, produces and markets high-quality dispersion systems.
Many developments have been successively patented.
The innovative combination of technology and design as well as high quality are characteristic of our products.


Dortmund
Düsseldorf
Olpe
Köln
Frankfurt


DISPERMAT


Köln
A4
Reichshof/
Bergneustadt
R.-Denklingen
B 256
Olpe
A4
B 256
Wiehl
Eueler-
hammer
Brüchermühle
Waldbröl
VMA-GETZMANN

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Introduction to Dispersion Technology with the DISPERMAT® Dissolver

The Dispersion Process

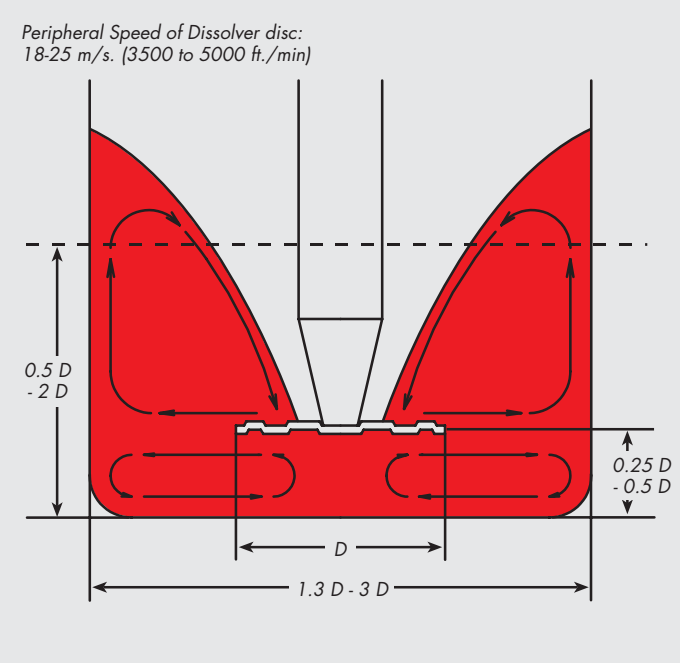
The most frequent application of high speed dispersion is to incorporate extremely fine solid particles into fluids, to produce colloidal suspensions. Colloidal suspensions are characterised by their behaviour that the finely divided small particles do not settle under the force of gravity.

A sequence of related steps take place during the dispersing process. These are:

- the wetting of the surface of the solid particles by the fluid components of the millbase
- the mechanical breakdown of associated particles leading to smaller particles (agglomerates and aggregates)
- the smaller particles generated during the dispersion are stabilised, preventing renewed association (flocculation).

Special interaction between the solid particles and the fluid components of the millbase determine their wetting and resistance to flocculation.

DISPERMAT® CN



Recommended geometrical dimensions and flow pattern with a DISPERMAT® dissolver.

The Doughnut Effect

The best dispersion results with a DISPERMAT® are obtained when the geometry of the dispersion container, the diameter, the peripheral velocity and the height of the dissolver disc above the bottom of the vessel as well as rheological millbase properties are matched to one another.

After adding pigments and fillers to the resin solution, the millbase is brought into a laminar rolling flow pattern by increasing the speed of the shaft until no standing material can be seen at the wall of the container.
At the correct speed, a channel begins to form around the shaft and a part of the dissolver disc becomes visible. At this point, the millbase will form a doughnut-like flow pattern.

The doughnut-like flow pattern is a signal that the maximum mechanical power possible is being transferred into the millbase and furthermore that the millbase is being agitated so that all the agglomerates will eventually reach the dissolver disc.

The doughnut effect develops because the millbase is accelerated outwards from the tip of the dissolver disc. When it hits the wall of the vessel, the stream is divided into two parts. The one going downwards flows back to the middle of the dissolver disc along the bottom of the dispersion vessel and rises up to hit the disc once again.

Optimally formulated Dissolver batch

Poorly formulated Dissolver batch

The second part flowing upwards has the same circular path, which is limited in by the force of gravity and the rheological properties of the millbase.

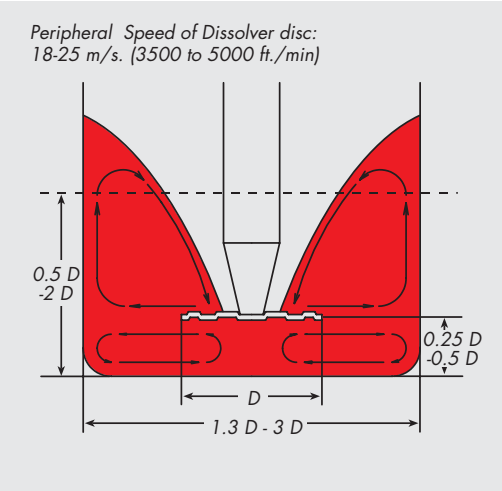
The flow pattern of the doughnut effect is greatly influenced by the amount of pigment and filler in the millbase. When the solids content is not high enough, the viscosity tends to be too low. This leads to splashing and generation of bubbles during dispersion.
In addition, the mechanical power input is limited and the deagglomerating capability of the dissolver disc is diminished. Adversely, if the solids content is too high, then the viscosity will be too high for the doughnut flow pattern to develop.

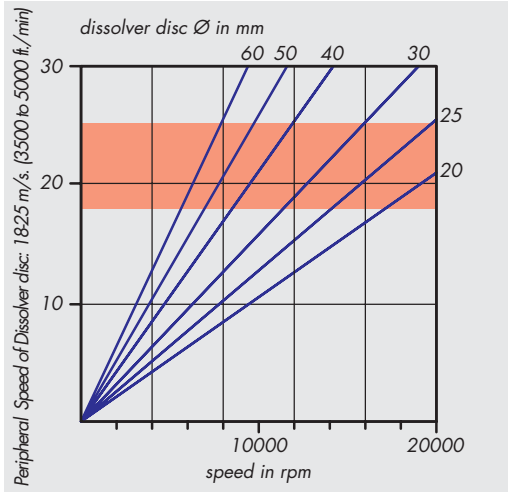
The flow of the millbase may also be hindered by a yield value of viscosity. This will result in a tearing action of the dissolver disc, which may at times even turn without having contact with the millbase.

The Dispersing Effect of the Dissolver Disc on Agglomerates

When the vanes of the disc are moved through the millbase at a high velocity, areas of higher and lower pressure are generated in front of and behind the vane. The alternating stress acting on the agglomerates in these areas facilitate their dispersion. In addition to this, a smashing impact should be considered for larger agglomerates being hit by the edges and the surfaces of the vanes.

However, a considerable share of the total dispersion work takes place at the surface of the dissolver disc. Due to the fast movement of the blade, a gradient of shear builds up on these surfaces in which the dispersion takes place.
The shear stress which acts particularly between the lower disc surface and the bottom of the container largely depends upon the distance between the two. The efficiency of the shear gradient may be enhanced by decreasing this separation since the shear rate within the gap is increased and since a higher rotational speed may be chosen due to the fact, that the change from laminar to turbulent flow takes place at higher rotational speeds.





When higher speeds are used, more mechanical power is introduced into the millbase. The best dispersion results are obtained with the highest possible mechanical power input, as long as the doughnut flow pattern (laminar flow) is maintained. The mechanical power is a product of rotational speed and momentum (torque) of the shaft.

$$P = 2 \pi n M$$

DISPERMAT® CA 40-C

Running the DISPERMAT® and Optimising Millbase Formulations

In practice, a simple procedure has proven to yield satisfactory results.

First the liquid component is put into the dispersion container. Then, under moderate agitation by the dissolver disc, pigments and fillers are added slowly the dissolver disc speed can then be increased until the doughnut effect is detected at a higher rpm (circumference velocities of approximately 18-25 m/s).

After premixing, the walls of the dispersion container and the shaft should be cleaned removed adhering millbase.

Then the dispersion is carried out at high peripheral velocities that guarantee the formation of the doughnut effect.

At this stage, the capability of the DISPERMAT® to transfer high mechanical power into the millbase should be exploited. One must not be afraid to use high rotational speeds. If e.g. an dissolver disc of 25 mm diameter is used, the DISPERMAT® must be run at a rotational speed of 15.000 rpm in order to obtain peripheral velocities of 20 m/s.

The final dispersion result is normally reached after 10 to 15 minutes.

Steps to Take when Dispersion is not Satisfactory

In cases where the quality of dispersion does not meet the required standard, the following parameters should be checked:

- **Duration of the Dispersion Operation**
The quality of formulations dispersed using a DISPERMAT® generally reaches its final value after a short period of time (approximately 10 -15 minutes). Increasing the dispersion time to more than 20 minutes does not normally lead to improved results.

- **Doughnut Effect**
The doughnut flow pattern should be maintained during the course of the whole dispersion.

- **Shaft Speed**
The mechanical power input should be optimised by using the highest possible rotational speed and thereby the greatest peripheral velocity, without destroying the doughnut flow pattern.

- **Geometric Considerations**
The distance between the dissolver disc and the bottom of the vessel can be changed to obtain better results and to make higher rotational speeds possible.

- **Dissolver Disc**
The use of smaller or larger dissolver disc may lead to better results.

- **Amount of Millbase**
Better flow characteristics may be achieved by using more or less millbase in the container.

- **Pigment and Filler Concentration**
A high viscosity millbase of tacky consistency with dilatant flow is recommended this may be obtained by increasing the percentage of solids, but without destroying the doughnut flow pattern.

- **Flocculation**
Does flocculation take place after dispersion? If so, check additives.

- **Temperature**
When dispersing, high energy transfer into the millbase will lead to an increase in temperature. In many cases this destroys the flow characteristics of the formulation. In addition, thermally sensitive paint ingredients may be harmed. Using a water cooled vessel will solve the problem.

- **Raw materials**
Partial re-formulation of the paint using more suitable resins, pigments, fillers or additives:

It should be kept in mind, that the DISPERMAT® is a dispersion device and not a piece of milling machinery. Therefore it is incapable of grinding primary particles down to a smaller size.

Scaling up Laboratory Results to Production

An important fact is that the dispersion results obtained with a DISPERMAT®can be scaled up to a production size dissolver. It was mentioned earlier that the dispersion depends upon the rate with which the agglomerates are transported into the zones of shear and on the mechanical power which is transferred into the millbase. The mechanical power is the parameter that limits the maximum degree of dispersion which can be achieved. The rate at which the transportation of the agglomerates into the vicinity of the dissolver disc takes place, determines the time necessary to reach the optimum dispersion result.

The deagglomeration process mainly takes place within the area of shear which surrounds the dissolver disc. The most effective shearing conditions are found at the tip of the dissolver disc, as this part is moved through the millbase at the highest speed. It is for this reason, that the tip speed (peripheral velocity) is to be considered as the key parameter for scaling of laboratory results to production. This statement refers to the maximum achievable degree of dispersion and not to the time necessary to obtain it. The DISPERMAT® will normally be faster in dispersing than a production scale machine, as the distance of the agglomerates must cover to reach the disc are shorter than in larger equipment.

Exact correlation between the dispersion result with a DISPERMAT® and a larger dissolver will naturally also depend upon comparable temperature conditions. For temperature control, the use of a double wall temperature control container is recommended.

For a laboratory dissolver to reach the peripheral velocities necessary for dispersion, it must be able to run at high speeds with utmost accuracy and reproducibility. When using the dissolver discs of different diameters, the circumference velocities may easily be calculated by the following formula:

$$v = \frac{\pi \cdot d \cdot n}{60}$$

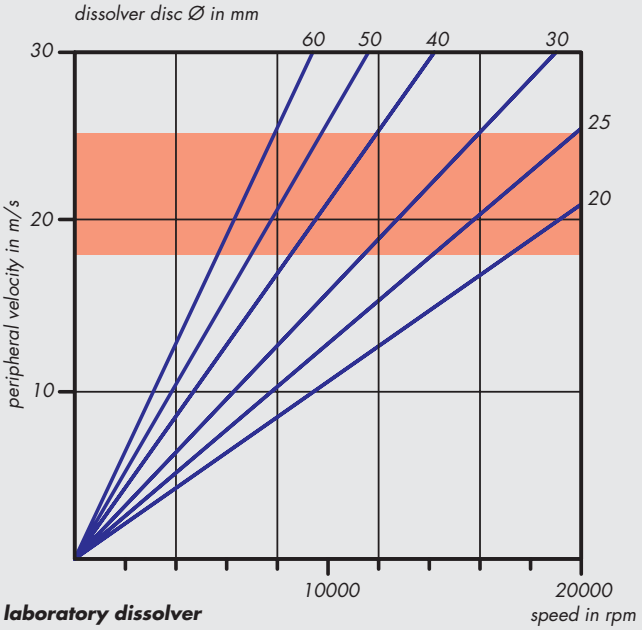
v = circumference velocity

π = 3,141...

d = diameter of the dissolver disc in m

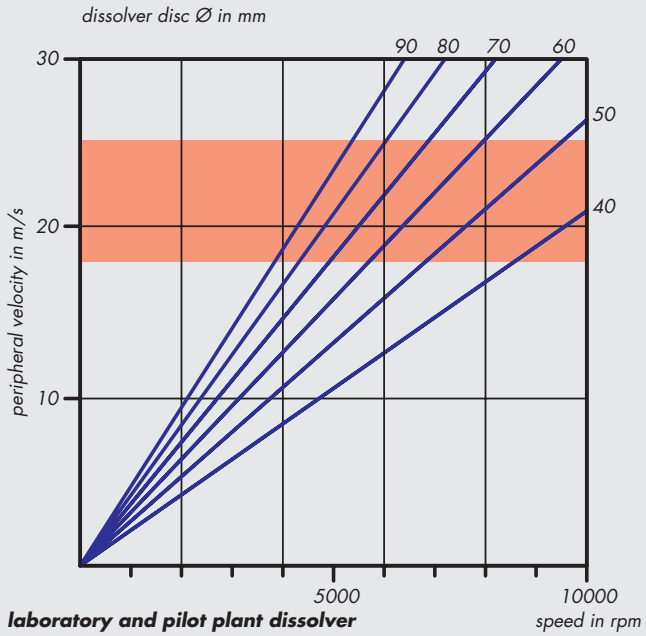
n = revolutions of shaft in rpm

Circumference velocity related to the rotational speed of the shaft for various dissolver disc diameters. The red area indicates the optimum range of circumference velocity between 18 - 25 m/s.

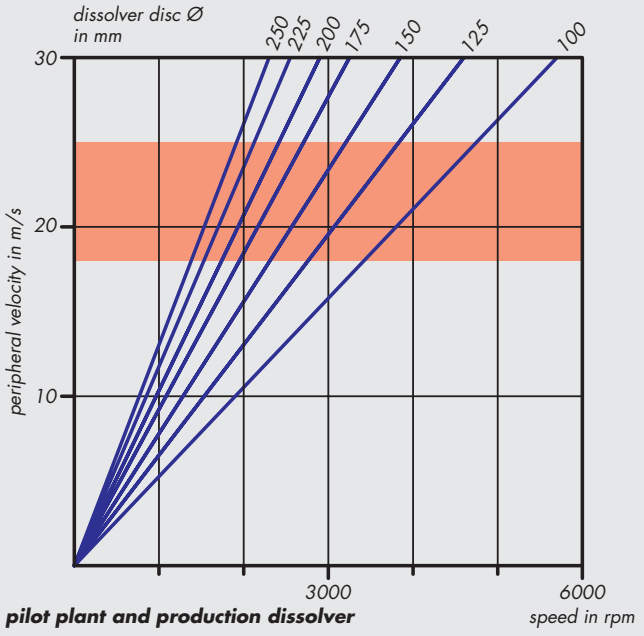


Example for a millbase volume of 100 ml

container capacity:	250	ml
inner diameter of container:	65	mm
container height	85	mm
dissolver disc diameter:	30	mm
revolutions of shaft:	11500 -16000	rpm
peripheral velocity of disc:	18 - 25	m/sec



laboratory and pilot plant dissolver



pilot plant and production dissolver

Example for a larger millbase volume of 2500 ml

container capacity:	5000	ml
inner diameter of container:	180	mm
container height	200	mm
dissolver disc diameter:	80	mm
revolutions of shaft:	4300 - 6000	rpm
peripheral velocity of disc:	18 - 25	m/sec

Example for a larger millbase volume of 30 l

container capacity:	65	l
inner diameter of container:	440	mm
container height	440	mm
dissolver disc diameter:	200	mm
revolutions of shaft:	1700 - 2400	rpm
peripheral velocity of disc:	18 - 25	m/sec

DISPERMAT® CA

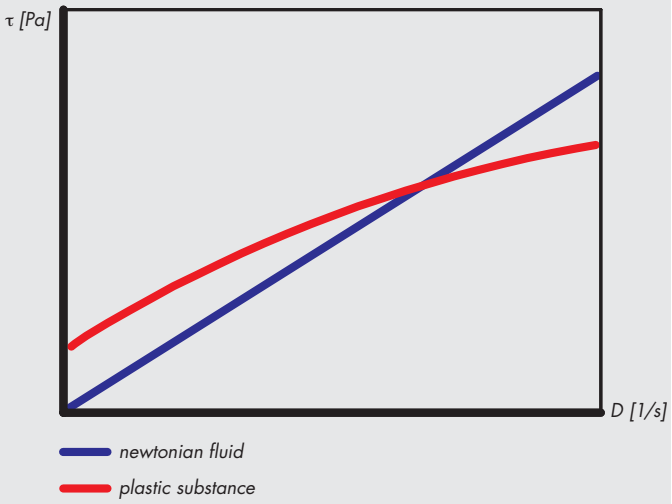
DISPERMAT® VL

The Rheological Behaviour of Millbases

To obtain excellent dispersion results, the millbase must exhibit certain rheological properties. Unfortunately, the flow behaviour of a millbase may not be expressed by one single parameter, such as the apparent viscosity.

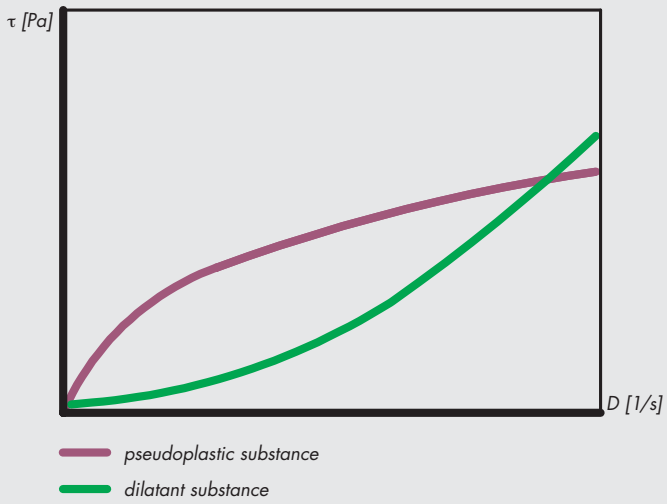
Viscosity is the measure of the internal friction of a fluid, and is a product specific Constant Value which is defined as the quotient of shear stress (τ) and shear rate (D).

Only Newtonian fluids retain a constant viscosity and are independent of variations in shear rate (that is i.e. water, mineral oil, etc.). All other substances which have a viscosity which is dependent on shear rate are classified as Non-Newtonian and are more commonly found than Newtonian liquids.



Newtonian: Is a fluid whose viscoity is independent of the shear rate at which it is measured.

Plastic: Viscositsy decreases when the shear rate velocity gradient in increased.



Pseudoplastic: Viscosity decreases when the shear rate is increased.

Dilatant: Viscosity increases when the shear rate is increased.

$$\textbf{Viscosity } \mu = \frac{\textbf{shear stress } \tau}{\textbf{shear rate D}} \textbf{ [Pa·s]}$$

Millbase formulations are complex rheological systems, for whose characterisation information concerning

- apparent viscosity
- plastic behaviour
- yield stress
- thixotropy
- rheopexy
- dilantancy

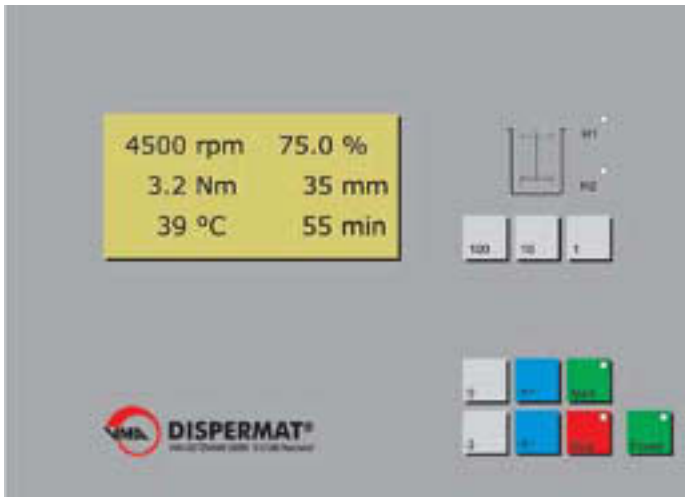
is needed.

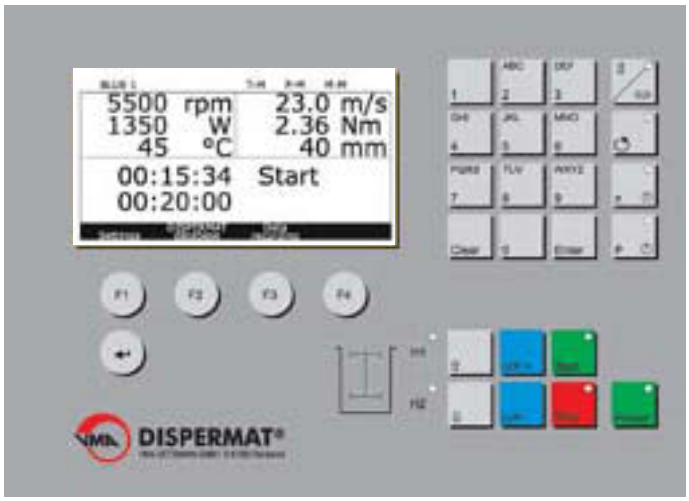
The millbase should exhibit mild dilatancy without having a noticeable yield stress value that may hinder the free circulation of the millbase during dispersion. The rheological properties should not alter too much during the course of the dispersion, although the viscosity does not tend to increase whereas dilatancy decreases in most cases.

The M- and C-Technology

We would like to introduce the second generation of our proven process technology for the control and the data collection with the dispersion systems DISPERMAT. With this the experiences of our customers as well as our own ideas have been realised.

The new M- and C-technology represent the essential innovation for the handling, safety engineering, process control and documentation for dispersion and milling.





M-technology

The M-technology clearly displays all of the essential measurable variables of the dispersion process as well as the current height of the dispersion tool.

Safety engineering: for the adjustment of the operating range within the container no safety limit switches are required; an innovative height measuring system allows the selection, storage and control of the corresponding height adjustments.

C-technology

The C-technology enables an excellent process control as all measurable values as well as the current height of the dispersion tool are indicated on the display.

Safety engineering: for the adjustment of the operating range within the container no safety limit switches are required; an innovative height measuring system allows the selection, storage and control of the corresponding height adjustments.

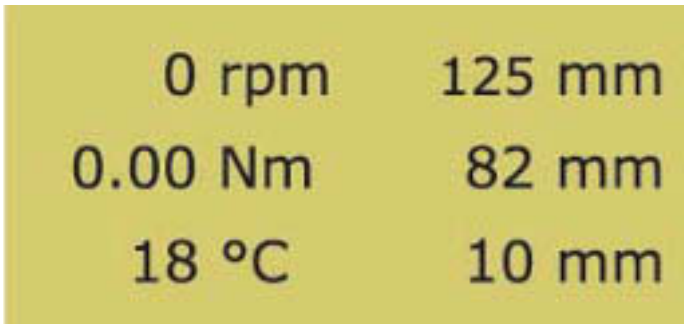
Further High-Lights

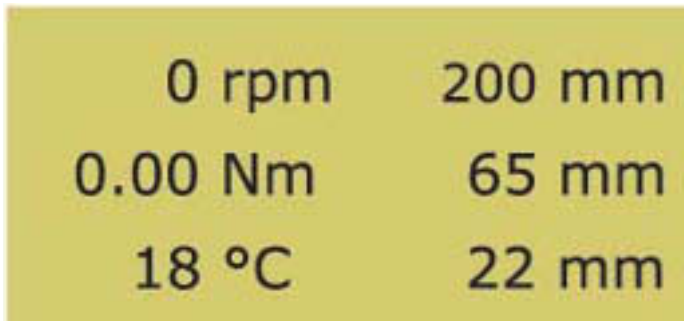
Dispersion process can be automatically switched off at pre adjusted values of:
Product Temperature
Speed
Power output
Torque

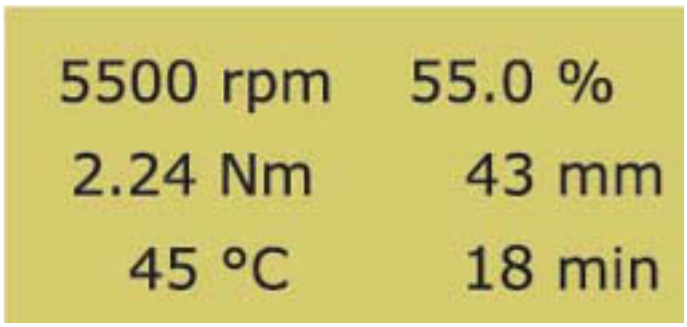
- Automatic equalization of the no-load operation to "0"
- Optimum power regulation by variation of the controlling parameters
- Graphical representation of the measurable values on the display with free scaling of the graphics and marker function
- Data base

The M- and C-Technology safety system with H2L stand

The M-Technology display







In the display the following values appear:

Speed:	5.500	rpm
Percentage speed of the max. speed:	55 %	
of	10.000	rpm
Torque:		
	2,24	Nm
Current height of the dispersion tool:	40	mm
Product temperature:	45	°C
Residual running time of the dispersion process:	18	min

Safety device

Safety directives state that motor cannot operate when the dispersion tool is outside the dispersion container. The innovation of the new M- and C-technology permits operation without safety limit switches and enables the operator to select the required switch points directly via the key pad. This is realized by a height measuring system which is integrated in the H2L stand. This system permanently measures the height of the dissolver disc and the results are indicated on the display. The height measuring system is permanently checked and is adjusted if required.

The adjustment of the switch points is very easy: The desired switching points are triggered with keys and are stored by pressing the key H1 and H2. Each time the motor is stopped the dissolver can only be started provided that the operator presses the flashing LED of the keys H1 and H2. This guarantees that if the dispersion container is changed the wrong value for H1 and H2 cannot be used by mistake.

H1 As soon as the dissolver disc reaches position H1 during the lifting the motor stops

H2 As soon as the dissolver disc reaches position H2 during lowering the motor stops. H2 should be adjusted so that contact of the dissolver disc with the bottom of the container is avoided.

Therefore the distance between H1 and H2 is the working area in which the dispersion takes place. This means the dissolver can only be operated when the dissolver disc is situated between H1 and H2.

Ha Furthermore the position of the dissolver disc is permanently indicated on the digital display, so that the distance between bottom of the container and dissolver disc (0,25 D - 0,5 D) can be adjusted exactly and in order to reach the optimum Doughnut-Effect.

Example

The following example shows how to adjust the values H1 and H2.

Instrument:
DISPERMAT AE 4-M and AE 4-C
Container:
Double wall container, 5 l capacity
Dissolver disc: 80 mm ∅

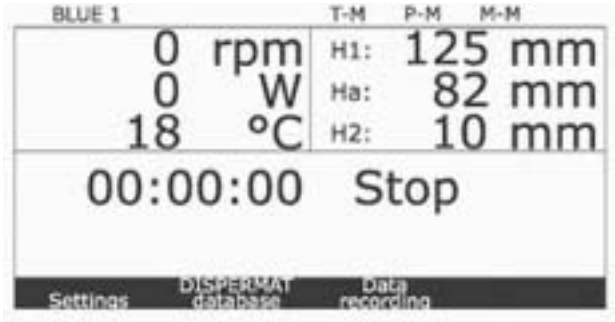
The dissolver disc is first lowered into the container so that it is clearly positioned below the container rim; this height H1 of e.g. 200 mm is memorized with the key H1 (picture 1 shows the height H1 and H2 of the previous adjustment as well as the current height of the dissolver disc). The dissolver disc is then lowered further until it touches the bottom of the container. As contact of the dissolver disc with the container bottom during the operation must be strictly avoided, the dissolver disc is lifted 2 mm and the height H2 is memorized with key H2. Because the double wall container has a double wall bottom of appr. 20 mm, the absolute distance between the table top and the dissolver disc is 22 mm (picture 2).

During programming the distance from the table top to height H2 (22 mm) is adjusted to zero automatically. When using an 80 mm ∅ dissolver disc the distance of the dissolver disc from the bottom of the container bottom (0,5 D) = 40 mm can be adjusted; this value is permanently shown in the display.

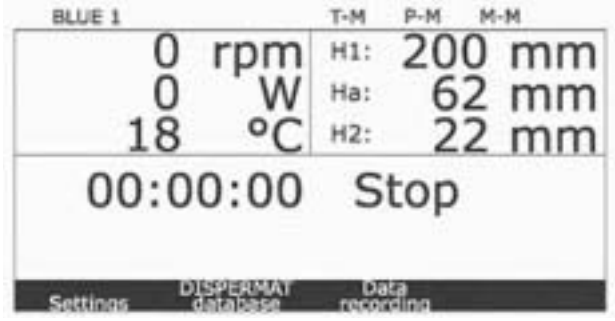
After programming of both heights (H1 and H2) they are faded out and the display indicates the current height of the stirring tool (picture 3).

Every desired change in the distance between the dissolver disc and the bottom of the container which optimizes the flow rate during the dispersion process can now be adjusted exactly and can be logged for future trials.

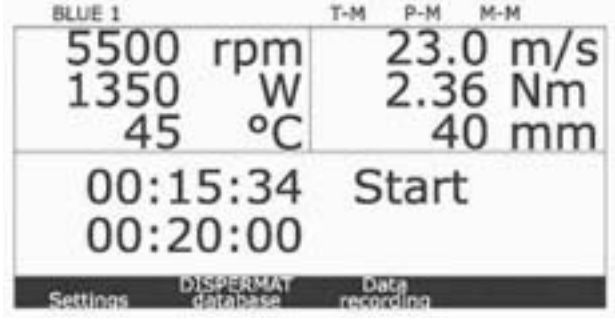
The C-Technology Display



Picture 1



Picture 2



Picture 3

The C-technology displays the following values:

Speed:	5.500	rpm
Peripheral speed of the dispersion tool:	24,1	m/s
Power output:	1.050	W
Torque:	0,92	Nm
Product temperature:	53	°C
Current height of the dissolver disc:	20	mm
Preselection of the timer:	20	min

Power compensation with the C-technology

Relationship between power input and dispersion result

The mechanical power that is transferred into the millbase is closely related to the dispersion result. The mechanical power determines the energy that is transmitted by the dispersion tool or the milling rotor via the grinding beads to the product. The power P is calculated from the speed n of the dispersing tool and the torque M generated on the dispersing tool according to the following equation:
P = 2 P n M

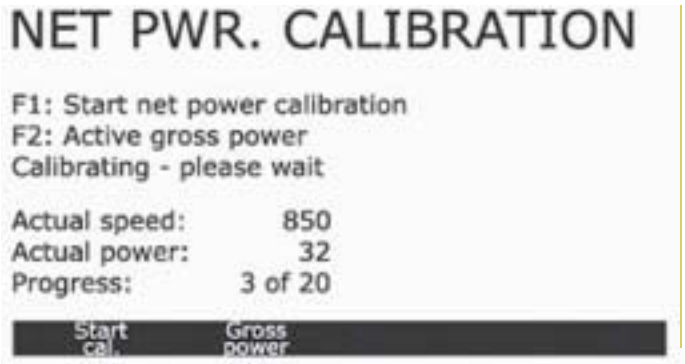
Where:
P power [Nm/s=J/s=W]
P = 3,141…
n speed [rpm]
M torque [Nm]

The higher the energy density, the greater the probability that more agglomerates are also dispersed.

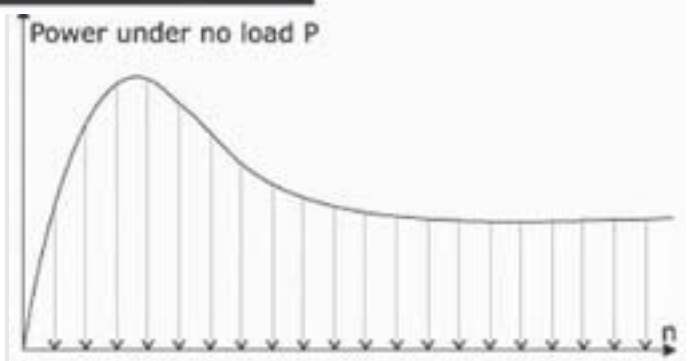
For the exact definition of the power that is transferred into the millbase it is absolutely necessary that all frictional losses which are not generated by the stirring and dispersion process are eliminated and that the calculation is only made with the real net power value.

The power compensation is made as follows:
The motor is ramped up automatically in steps from 0 up to the max. speed. On each speed step it dwells for a moment, measures the power under load and restores the measured value back to 0. The power curve is represented and stored graphically step by step. In the following dispersion process the measured power value is reduced automatically by the stored power under load. As a result of a single power compensation over the complete speed range, operation with the net power is possible.

With the C-technology dispersion with a constant power input is also possible. For this the speed is adjusted during the dispersion in such a way that the product of n and M results exactly in the preset mechanical power transferred into the millbase.



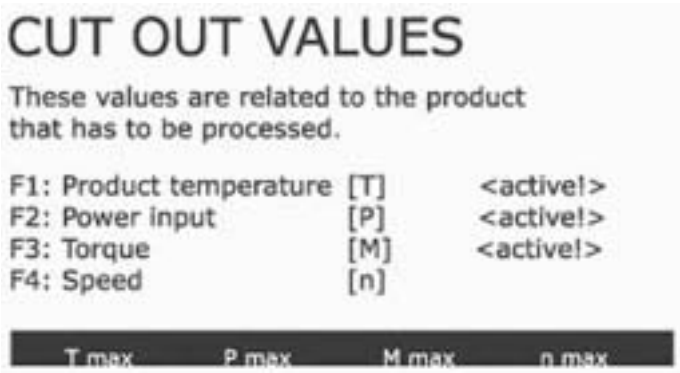
With the new C-technology the power under no load which includes all frictional losses such as ball bearing friction, motor ventilation, mechanical seals etc. as well as the net power (without frictional losses) can be measured.

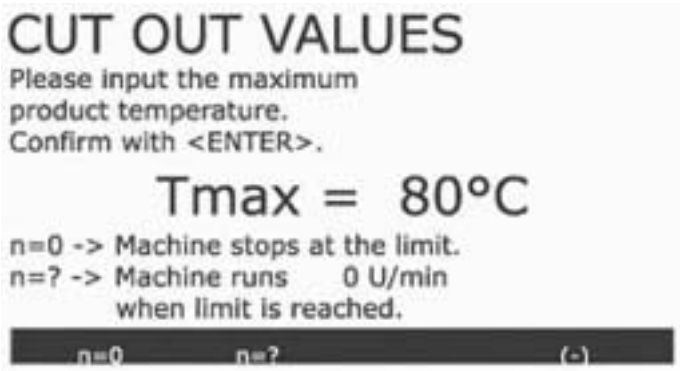


Cut out values with the C-technology

In order to protect from undesirable process variations, up to three cut out values can be defined. The following cut out values are available: product temperature, power input or speed and torque.

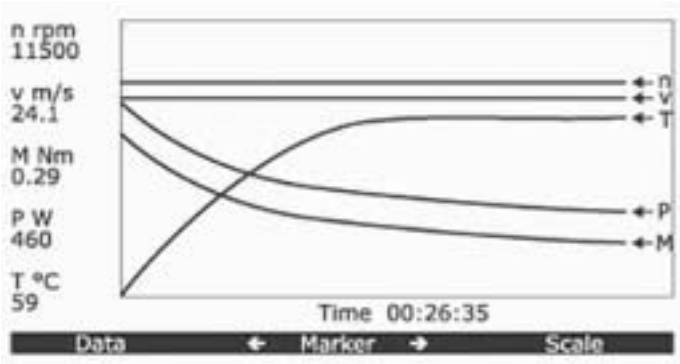
When reaching a cut out value the instrument can either stop or continue to operate further at a pre adjusted constant speed.

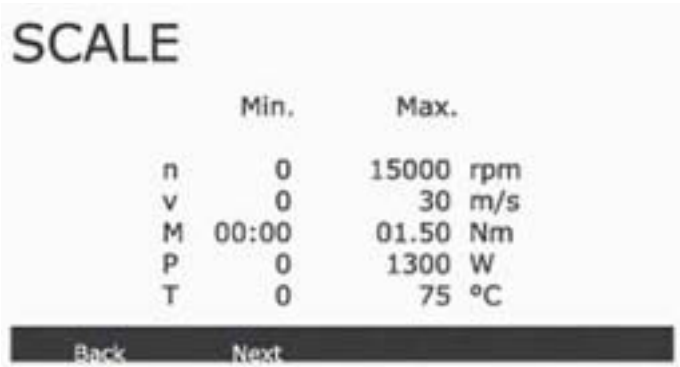


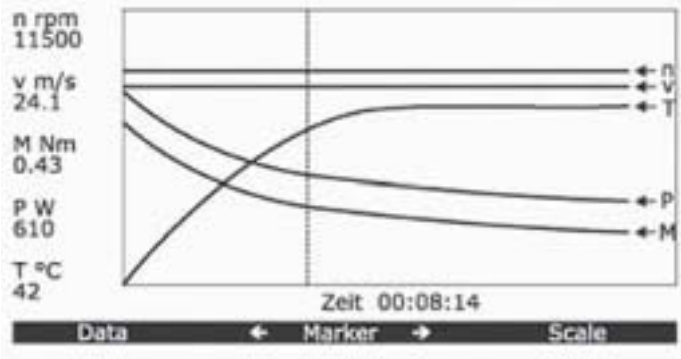


Data recording with the C-technology

The measured values can be recorded as well as presented graphically. The data can also be stored for a later evaluation. Due to the free scaling of the graphics striking results can be presented. The cursor function allows the indication of the numerical values at any point on the graph. In addition simultaneous data transfer to the recording software WIN-DISP is possible.



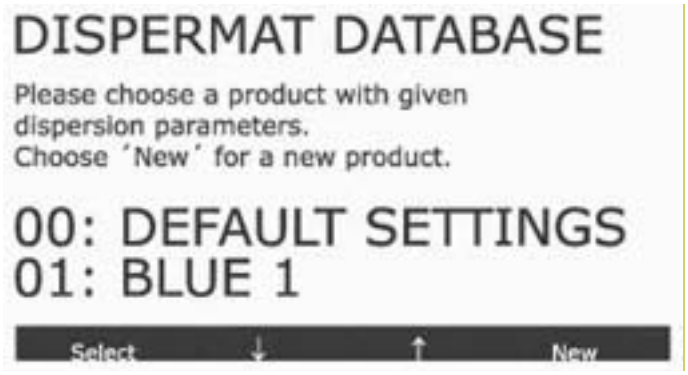


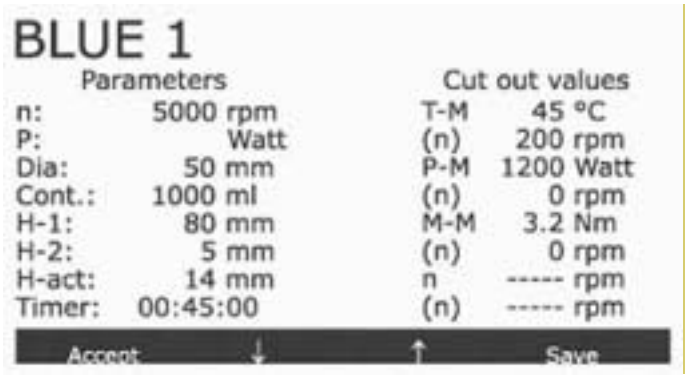


Data base of the C-technology

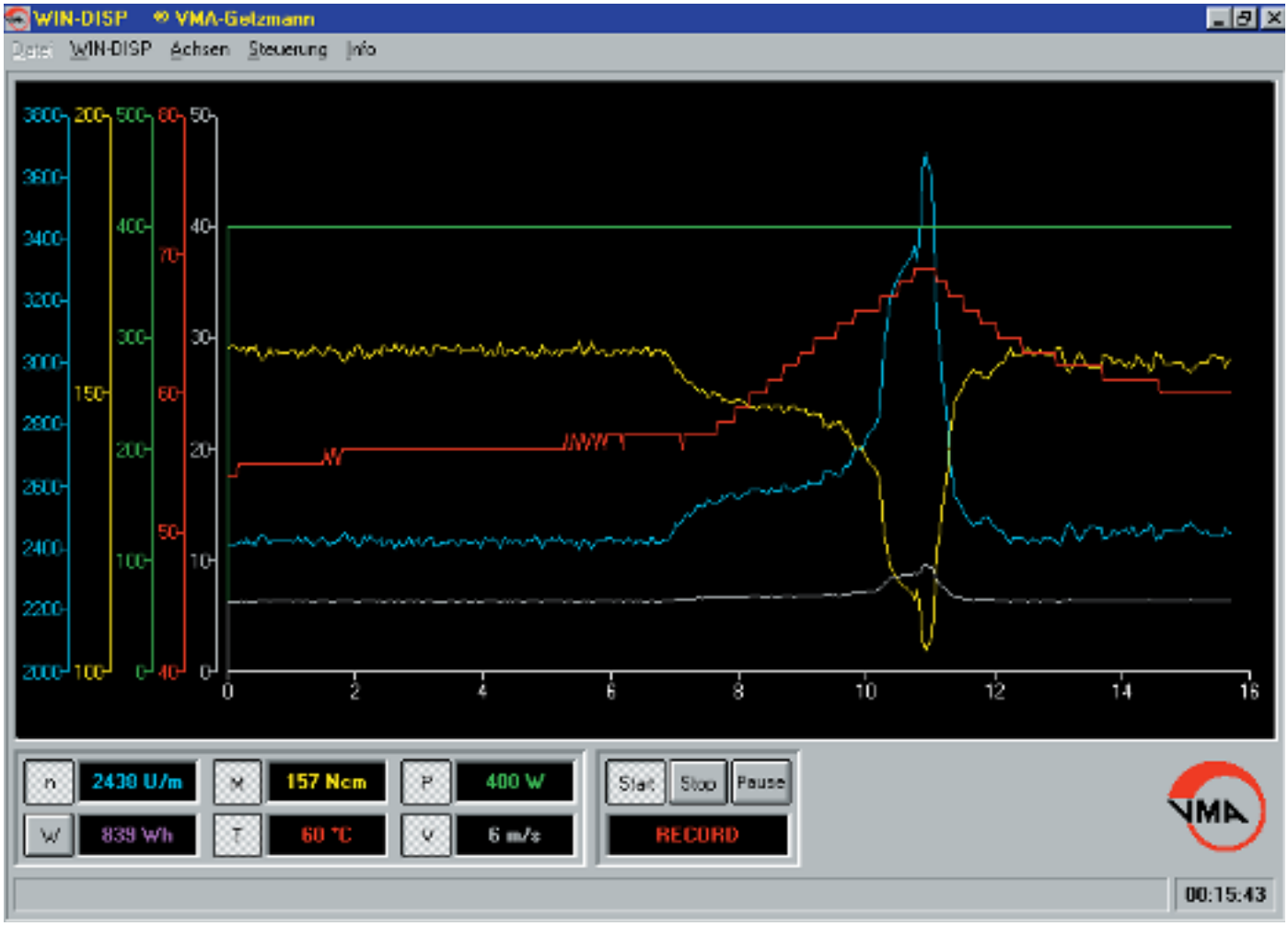
The data base can store up to 100 dispersion parameters sets including the cut out values with a name edit function.

Furthermore the used container or milling bead volume can be memorized. The stored dispersion parameter sets can be easily leaded by the operator to ensure a standard treatment of his products.
As a result operational errors are avoided as the dispersion process is carried out in a secure and repeatable manner.





Scientific Measurement with WIN-DISP



The powerful WIN-DISP software collects measured data generated by all DISPERMAT® dissolvers and bead mills with C-technology.
The measuring software is very simple to operate using the three entry keys START, STOP and PAUSE.
The generation of the measurement curves can be observed during the dispersion. With a mouse click, individual curves can be hidden from the display, during operation.
The measured data is stored and displayed graphically, but can be reproduced in a sophisticated manner.

The WIN-DISP software can print charts as well as in tabular format.
The software,which runs under Microsoft WINDOWS, enables the export of data to other graphic and spreadsheet programs.
The user has a powerful tool with which to process the information gathered and to prepare presentations.

Measurement of data

Very simple use by START, STOP and PAUSE

- individual adjustment of the chart during the dispersion process
- hide measurements that are not required

Data manipulation

- reduction of data
- curve smoothing function
- manipulation of individual parameters

Documentation

- sophisticated chart printout
- print spreadsheet

Presentation

- compatible with WINDOWS software

Laboratory and Pilot Plant Dissolvers

The DISPERMAT® range of laboratory, pilot plant and small scale production equipment includes instruments for applications, including research and development, quality assurance as well as production of larger quantities.

They range from simple laboratory dissolvers to larger computer controlled machines.

All DISPERMAT®s are characterised by their very simple operation.

DISPERMAT® TU
DISPERMAT® CV
DISPERMAT® LC
DISPERMAT® N1
DISPERMAT® F1
DISPERMAT® FE
DISPERMAT® F105
DISPERMAT® FT
DISPERMAT® CN
DISPERMAT® CA
DISPERMAT® AE
DISPERMAT® AE-EX
DISPERMAT® VL

DISPERMAT® VE
DISPERMAT® LH
DISPERMAT® CD

DISPERMAT® CA-40C with safety device and double walled container

Dissolvers

Laboratory and Pilot Plant Dissolvers

DISPERMAT® TU

page 25

DISPERMAT® CV, LC, N1, F1, FE, F105, FT

page 26-29

DISPERMAT® CN

page 30-32

NT Stand

page 33

DISPERMAT® CA

page 34-37

DISPERMAT® AE

page 38-43

DISPERMAT® AE-EX

page 44-47

DISPERMAT® CD-C

page 48-51

safety device

page 52+53

accessories

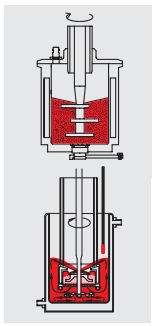
page 54+55

Vacuum-systems DISPERMAT® CDS, VL, VE, LH

page 56-69

single and double wall containers

page 70-73



DISPERMAT® vertical milling systems

page 74-83

grinding beads and milling tools

page 84+85

Laboratory and pilot plant dissolver

Technical Data:

- *Driving power: 0.5 kW*
- *Speed range: 0 – 20.000 rpm*
- *Power supply: 230V, 50 Hz*

Digital indication:

- Speed (rpm)
- Torque (%)
- Dispersion time (min) countdown
- Safety functions

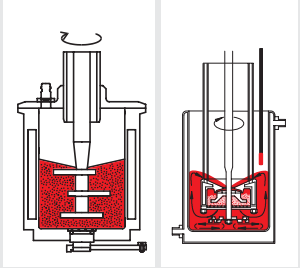
NEW

DISPERMAT® TU

The DISPERMAT TU is a laboratory dissolver that uses innovative technology.
It features a particularly quit three-phase A.C. motor which has separate ventilation.
The speed is infinitely variable adjustable from 0 – 20.000 rpm. The control box contains a digital display which indicates the speed and the torque as well as ERROR and SAFETY functions. The desired dispersion time can be preset up to 99 min; separate indication of the remaining time is also displayed.

How to convert the DISPERMAT® into a vertical bead mill

See page 74-83



Laboratory and Pilot Plant Dissolvers

Additional accessories page 54+55 and 70-85

The central clamping system – part of the safety device – makes it safe and simple to hold the dispersion container securely in position. The container is placed on the laboratory bench between the clamping arms and is automatically centered as the arms are tightened.

DISPERMAT® CV with safety device and double wall container

DISPERMAT® CV

When working with the DISPERMAT® CV the number of revolutions does not change, even if viscosity of the mill base increases; a PID-motor controller guarantees constant speed operation on change of load. The dissolver shaft is super-balanced and made of stainless steel.

The stand base is made of cast iron, acid-resistant coated; the stand shaft is ground hardchrome steel.

The stainless steel set collar prevents accidental contact of the dissolver shaft with the bottom of the container. It is also used to set the height of the dissolver disc.

Motor power: 0,5 kW

Power supply: 230 V, 50 Hz (110V, 60 Hz)

Speed: 0-20.000 rpm

Speed control: electrical, infinitely variable with PID-Motor controller

Speed transmission: non-contacting

Speed indicator: built-in the instrument control case, range 0-20.000 rpm

Safety Device

In order to minimise the risk of injuries with running dissolver discs, it is required by Law that every dissolver must have a suitable safety device.
The safety device consists of:

1 Height adjustable stainless steel telescopic shaft protection pipe

2 Device preventing horizontal movement of the dispersion impeller

3 Height adjustable central container clamping system with two clamping arms operated by a hand wheel with screw adjustment

4 Safety limit switch, incorporated in the container quick clamping system, preventing the motor from operating if the dispersion vessel is not firmly clamped.

5 Safety limit switch, prevents the motor from operating when the dispersion impeller is outside the dispersion container. The switch is easily adjusted for different container heights.

6 The stainless steel set collar prevents accidental contact of the dissolver shaft with the bottom of the container. It is also used to set the height of the dissolver disc.

DISPERMAT® LC with container clamps and double wall container

DISPERMAT® LC

The DISPERMAT® LC is an efficient high speed dissolver which is suitable for various applications including dispersion, homogenisation, emulsification and suspension.

Motor power: 0,3 kW

Power supply: 230 V, 50 Hz (110V, 60 Hz)

Speed: 0-15.000 rpm

Speed regulation: electrical, infinitely variable

Speed measurement: manual tachometer (accessory)

DISPERMAT® N1 with safety device and double wall container

DISPERMAT® N1

The DISPERMAT® N1 is a powerful laboratory dissolver. The speed can be measured on the top of the motor shaft by means of a manual tachometer.

Motor power: 0,5 kW

Power supply: 230 V, 50 Hz (110 V, 60 Hz)

Speed: 0-20.000 rpm

Speed regulation: electrical, infinitely variable

Speed measurement: manual tachometer (accessory)

	Power kW	Speed rpm	Speed indicator	Speed regulation	Speed control	Current indicator	Stand base	Weight kg
DISPERMAT® LC	0,3	0-15000	–	●	–	–	H1	19
DISPERMAT® N1	0,5	0-20000	–	●	–	–	H1	23
DISPERMAT® F1	0,5	0-20000	●	●	–	–	H1	24
DISPERMAT® CV	0,5	0-20000	●	–	●	–	H1	26
DISPERMAT® FE	0,7	0-20000	●	–	●	●	H1	35
DISPERMAT® F105	1,2	0-20000	●	–	●	–	H2G	73
DISPERMAT® FT	1,2	0-20000	●	–	●	●	H2G	84

Laboratory and Pilot Plant dissolvers

Additional accessories page 54+55 and 70-85

DISPERMAT® F1 with safety device and double wall container

DISPERMAT® F1

Reproducible dispersion results can easily be achieved with the DISPERMAT® F1. A speed indicator permanently displays the number of revolutions from which the tip speed of the dissolver disc can easily be calculated.

Motor power: 0,5 kW

Power supply: 230 V, 50 Hz (110 V, 60 Hz)

Speed: 0-20.000 rpm

Speed regulation: electrical, infinitely variable

Speed transmission: non-contacting

Speed indicator: built-in the instrument control case range 0-20.000 rpm

DISPERMAT® FE with safety device and double wall container

DISPERMAT® FE

The DISPERMAT® FE is designed for development tasks where small sample volumes are required.

The speed is controlled by a PID-motor controller for constant speed operation on change of load, while current consumption of the motor is increasing.

Option: a measuring transformer can be built into the instrument control case, allowing the current consumption and the speed to be recorded by a chart recorder.

Motor power: 0,7 kW

Power supply: 230 V, 50 Hz (110 V, 60 Hz)

Speed: 0-20.000 rpm

Speed control: electrical, infinitely variable with PID-motor controller

Speed transmission: non-contacting

Speed indicator: built-in the instrument control case range, 0-20.000 rpm

current indicator: range 0-6 A

digital timer: 0-99 h

Safety Device

In order to minimise the risk of injuries with running dissolver discs, it is required by Law that every dissolver must have a suitable safety device.

The safety device consists of:

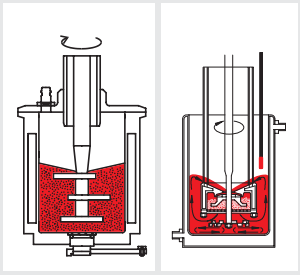
1 Height adjustable stainless steel telescopic shaft protection pipe

2 Height adjustable central container clamping system with two clamping arms operated by a hand wheel with screw adjustment

3 Safety limit switch, incorporated in the container quick clamping system, preventing the motor from operating if the dispersion vessel is not firmly clamped.

How to convert the DISPERMAT® into a vertical bead mill

See page 74-83



DISPERMAT® F105 with safety device and double walled container

DISPERMAT® F105

The DISPERMAT® F105 is a powerful dissolver for use in laboratories and pilot plants. The speed is controlled by a PID-motor controller.
The heavy-duty stand is coated with acid-resistant paint.
The stand shaft is ground hardchrome steel. The motor can easily be moved vertically by means of a counterweight and chain drive.

Motor power: 1,2 kW

Power supply: 230 V, 50 Hz (110 V, 60 Hz)

Speed: 0-20.000 rpm

Speed control: electrical, infinitely variable with PID-motor controller

Speed transmission: non-contacting

Speed indicator: built-in the instrument control case, range 0-20.000 rpm

DISPERMAT® FT with safety device and double wall container

DISPERMAT® FT

The DISPERMAT® FT is a universal dissolver for use in laboratories and pilot plants as well as for research and development purposes and for production of bigger batches. A PID-motor controller ensures a constant speed operation on change of load.

Motor power: 1,2 kW

Power supply: 230 V, 50 Hz (110 V, 60 Hz)

Speed: 0-20.000 rpm

Speed control: electrical, infinitely variable with PID-motor controller

Speed transmission: non-contacting

Speed indicator: built-in instrument control case, range 0-20.000 rpm

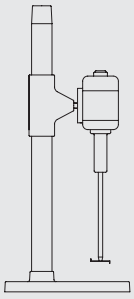
Current indicator: range 0-10 A

Digital timer: 0-99 h

4 Safety limit switch, prevents the motor from operating when the dispersion impeller is outside the dispersion container. The switch is easily adjusted for different container heights.

5 Device preventing horizontal movement of the dispersion impeller.

6 The stainless steel set collar prevents accidental contact of the dissolver shaft with the bottom of the container. It is also used to set the height of the dissolver disc.



	H1	H2G
Stand height	840 mm	1200 mm
Stand depth	420 mm	490 mm
Stand width	420 mm	640 mm
Container diameter	50-250 mm	50-350 mm
Container height	300 mm	360 mm

The laboratory and pilot plant dissolver with power electronics built into the motor

DISPERMAT® CN

NEW

DISPERMAT® CN models are dissolvers for laboratory and pilot plant applications. The compact drive unit not only contains the strong three phase motor and separately driven low noise ventilation, but also has the power electronics built into the motor. The electrical height adjustment is made by using the beautifully designed H2L compact stand.

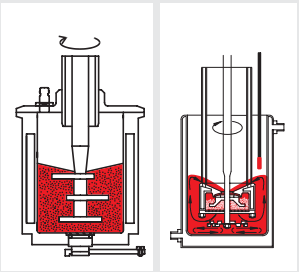
DISPERMAT® CN models are fitted with the safety device as a standard. The central clamping system – part of the safety device – makes it safe and simple to hold the dispersion container securely in position. The container is placed on the laboratory bench between the clamping arms and is automatically centered as the arms are tightened.

The control panel has a digital display which allows the operator to switch between values for speed, torque or time. In addition the dispersion time can be preset. The safety device functions are also indicated on the digital display.

Additional accessories page 54+55 and 70-85

How to convert the DISPERMAT® into a vertical bead mill

See page 74-83



Digital display

- Speed (rpm)
- Torque (%)
- Dispersion time countdown timer
- Safety functions

DISPERMAT® CN 10

Low-noise ventilation

Built-in power electronics

Powerful motor

Safety Device

In order to minimise the risk of injuries with running dissolver discs, it is required by law that every dissolver must have a suitable safety device.
The safety device consists of:

1 Height adjustable stainless steel telescopic shaft protection pipe

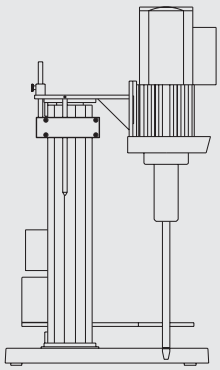
2 Height adjustable central container clamping system with two clamping arms operated by a hand wheel with screw adjustment

3 Safety limit switch, incorporated in the container quick clamping system, preventing the motor from operating if the dispersion vessel is not firmly clamped.

4 Safety limit switch, prevents the motor from operating when the dispersion impeller is outside the dispersion container. The switch is easily adjusted for different container heights.

5 Safety limit switch, adjustable for different container heights. This safety limit switch prevents accidental contact of the dissolver shaft with the bottom of the container.

	H2L
Stand height min.	820 mm
Stand height max.	1290 mm
Stand depth	550 mm
Stand width	490 mm
Container diameter	50 - 350 mm
Container height	450 mm



Tyical performance of the DISPERMAT® CN:

DISPERMAT® CN10	medium viscosity	10 kg
	high viscosity	6 kg
DISPERMAT® CN20	medium viscosity	20 kg
	high viscosity	10 kg

	Type	Power in kW	Voltage/ frequency in V/Hz	Speed in rpm	Torque in Nm	Stand	Approx. weight in kg
DISPERMAT®	CN 10	1,1	230/50	0 - 11000	1,8	H2L	90
DISPERMAT®	CN 20	2,2	400/50	0 - 11000	3,6	H2L	110

DISPERMAT® CN 05

NEW

The DISPERMAT CN 05 is a low priced laboratory dissolver. The compact drive unit contains not only the three-phase A.C. motor and separately driven ventilation but also the built in power electronics.
The On/Off switch as well as the potentiometer for the speed adjustment are conveniently located at the motor.
The adjusted speed can be read directly from the scale.
The height adjustment of the actuation is made by a counter weight within the polished and hard-chrome plated stand pipe.
Of course for an additional price the DISPERMAT CN 05 is also available with complete safety device.

Additional accessories page 54+55 and 70-85

Technical data

Power: 1.1 kW

Speed range: 0 -11000 rpm

Torque: 1,8 Nm

Voltage: 230V/50Hz

Weight: 85 kg

Dimensions:
see page 31 (CN10)

Tyical performance of the DISPERMAT® CN:

DISPERMAT® CN 05	medium viscosity	10 kg
	high viscosity	6 kg

DISPERMAT® CN 05
(photo without safety device)

Stand NT

The new NT stand features a number of technological advances.

The powerful main motor is acoustically insulated to ensure extremely quiet operation even when running at high speeds/rpm.

The electric height adjustment and the central clamping system are integrated into the stand.

The NT stand has an integrated extraction facility so that solvent vapours and dust can be effectively drawn away from the operator. For this, the stand has to be connected to a suitable extraction system.

The NT stand is available for DISPERMAT® CA, AE and VL.

- 2-column stand with a functional design
- Solid cast aluminium construction
- Electric height adjustment
- Central clamping system
- Integrated fume and dust extraction
- Complete safety device according to EC machinery law
- Sound-proofed motor housing for extremely quiet operation

Laboratory and Pilot Plant Dissolvers

DISPERMAT® CA

The DISPERMAT® CA is a compact dissolver. It is easy to handle and has an electrical height adjustment. The motor is convection cooled and is extremely quiet during operation.

The high speed motor develops high torque even when running at low speed.
The DISPERMAT® CA can be used as a dissolver as well as a vertical bead mill.
All DISPERMAT® CA dissolvers are equipped with the complete safety device as standard.

DISPERMAT® CA-40M with safety device and double walled container

Typical Performance of the DISPERMAT® CA

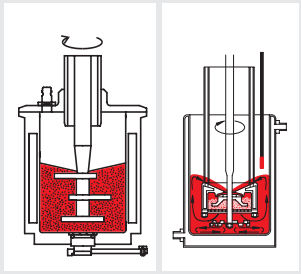
DISPERMAT® CA 20 M/C	
medium viscosity	3 kg
high viscosity	1,5 kg
DISPERMAT® CA 40 M/C	
medium viscosity	8 kg
high viscosity	4 kg
DISPERMAT® CA 60 M/C	
medium viscosity	14 kg
high viscosit	7 kg

Although viscosity ranges are difficult to define, the following information can be used as a guideline:

low viscosity	μ < 500 mPs
medium viscosity	μ 500-5000 mPs
high viscosity	μ > 5000 mPs

How to convert the DISPERMAT® into a vertical bead mill

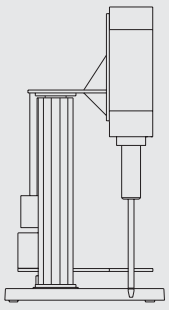
See page 74-83



Additional accessories page 54+55 and 70-85

DISPERMAT® CA-40C with safety device and double walled container

- compact stand with electrical height adjustment
- motor power 0,55, 1,5 or 2,5 kW
- speed 0 - 20000 rpm
- DISPERMAT® CA 20/40/60 C with complete process control
- complete safety device
- use as dissolver and vertical bead mill
- large choice of accessories



H2L

Stand height min.	820 mm
Stand height max.	1290 mm
Stand depth	550 mm
Stand width	490 mm
Container diameter	50 - 350 mm
Container height	450 mm

DISPERMAT® CA

Safety Device

In order to minimise the risk of injuries with running dissolver discs, an obligatory law from the authorities says that every dissolver must have a corresponding safety device.

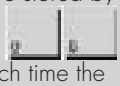
This safety device consists of:

1 Height adjustable stainless steel telescopic shaft protection pipe

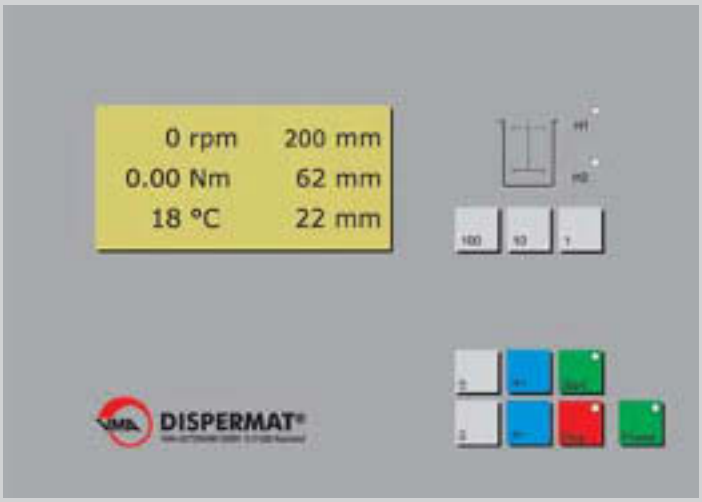
2 Height adjustable central container clamping system with threaded adjustment

3 Safety limit switch, incorporated in the clamping device, switching depends on the clamping pressure. The switch allows starting only when the container is clamped tight.

4 Safety directives state that motor cannot operate when the dispersion tool is outside the dispersion container. The innovation of the new M- and C-technology permits operation without safety limit switches and enables the operator to select the required switch points directly via the key pad. This is realized by a height measuring system which is integrated in the H2L stand. This system permanently measures the height of the dissolver disc and the results are indicated on the display. The height measuring system is permanently checked and is adjusted if required.

The adjustment of the switch points is very easy: The desired switching points are triggered with keys and are stored by pressing the key 
H1 and H2. Each time the motor is stopped the dissolver can only be started provided that the operator presses the flashing LED of the keys H1 and H2. This guarantees that if the dispersion container is changed the wrong value for H1 and H2 cannot be used by mistake.

	Type	Power in kW	Voltage/ frequency in V/Hz	Speed in rpm	Torque in Nm	Stand	Approx. weight in kg
DISPERMAT®	CA-20M	0,55	230/50	0 - 20000	0,5	H2L	70
DISPERMAT®	CA-40M	1,5	230/50	0 - 20000	1,5	H2L	80
DISPERMAT®	CA-60M	2,5	400/50	0 - 20000	2,5	H2L	95
DISPERMAT®	CA-20C	0,55	230/50	0 - 20000	0,5	H2L	70
DISPERMAT®	CA-40C	1,5	230/50	0 - 20000	1,5	H2L	80
DISPERMAT®	CA-60M	2,5	400/50	0 - 20000	2,5	H2L	95

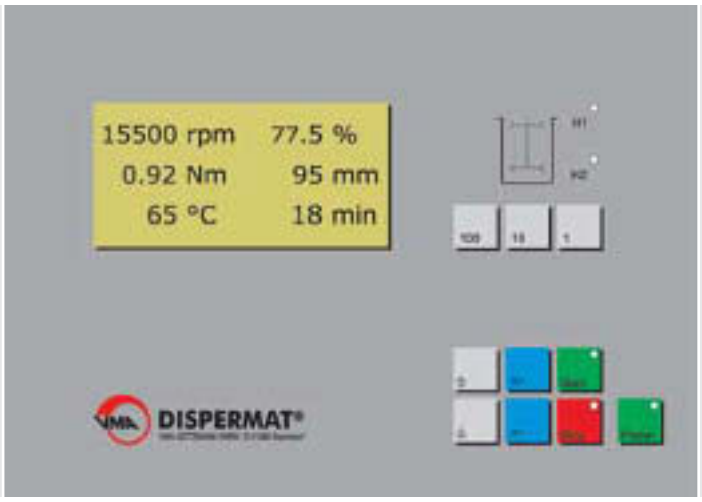


H1 As soon as the dissolver disc reaches position H1 during the lifting the motor stops

H2 As soon as the dissolver disc reaches position H2 during lowering the motor stops. H2 should be adjusted so that contact of the dissolver disc with the bottom of the container is avoided.

Therefore the distance between H1 and H2 is the working area in which the dispersion takes place. This means the dissolver can only be operated when the dissolver disc is situated between H1 and H2.

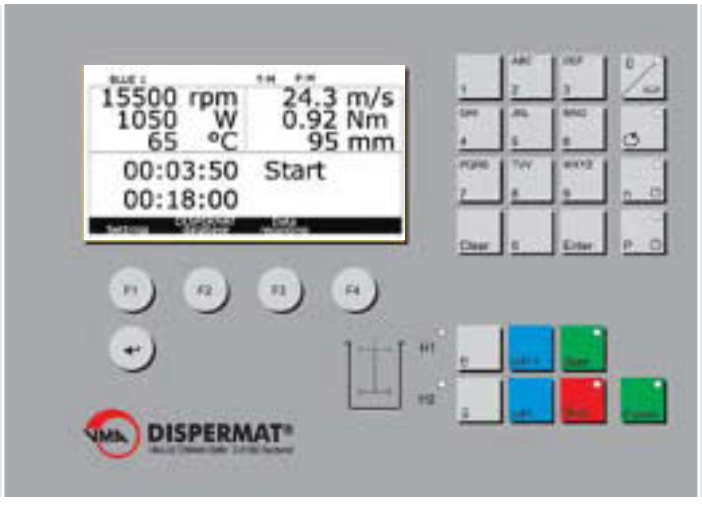
Ha Furthermore the position of the dissolver disc is permanently indicated on the digital display, so that the distance between bottom of the container and dissolver disc (0,25 D - 0,5 D) can be adjusted exactly and in order to reach the optimum Doughnut-Effect.



DISPERMAT® CA-M
Indications in the display:

- Speed of the dissolver shaft
- Speed in % of the final speed (potentiometer function)
- Torque
- Product temperature
- Current height of the dispersion or stirring tool within the container
- Timer, count down
- Height H1 and H2 of the safety device

A detailed description of the innovative M-technology can be found on page 17 to 22.



DISPERMAT® CA-C
Indications in the display:

- Speed of the dissolver shaft
- Peripheral speed of the stirring tool
- Torquet
- Product temperature
- Current height of the dispersion or stirring tool within the container
- Timer
- Height H1 and H2 of the safety device

A detailed description of the innovative C-technology can be found on page 17 to 22.

Laboratory and Pilot Plant Dissolver with Process Control

DISPERMAT® AE

The DISPERMAT® AE-M/ AE-C dissolvers are a new, powerful and innovative generation of laboratory and pilot plant machines for dispersion under maximum process control. With advanced technology from VMA-Getzmann it is possible to make considerable improvements in dispersion techniques. The DISPERMAT® AE-M/ AE-C dissolvers have three-phase motors, which on Models AE 01/02/3/5 only require a single phase power supply. These motors ensure a smooth start, and have infinitely variable speed which is controlled by means of modern frequency converters. The DISPERMAT® AE-M/ AE-C dissolvers are very quiet during operation. Cooling of the main motor is provided by a fan driven by a separate, constant speed motor (separate ventilation). Ventilation turns on automatically when the motor reaches its operating temperature.

The DISPERMAT® AE 01-M/ C to AE 06-M/C have the new stylish and compact H2L stand with electric height adjustment.

The DISPERMAT® AE 07-M/ C to AE 10-M/C have the new heavy and particulary stable H3E stand with electric height adjustment.

The compact instrument control box is conveniently mounted on the stand.

Additional accessories page 54+55 and 70-85

DISPERMAT®AE6-C with compact H2L stand and double walled container

DISPERMAT® AE8-M with H3E stand and double walled container

How to convert the DISPERMAT® into a vertical bead mill

See page 74-83

- Stand with electric height adjustment
- Motor power 0,55 to 4,0 kW
- Speed 0 -10000, 0 - 6000 and 0 - 3000 rpm
- DISPERMAT® AE-C with complete process control
- Central container clamping system
- Safety device
- Easily converted for use as a vertical bead mill (see page 74-83)

Safety Device

In order to minimise the risk of injuries with running dissolver discs, it is required by Law that every dissolver must have a suitable safety device.
The safety device consists of:

1 Height adjustable stainless steel telescopic shaft protection pipe

2 Height adjustable central container clamping system with two clamping arms operated by a hand wheel with screw adjustment

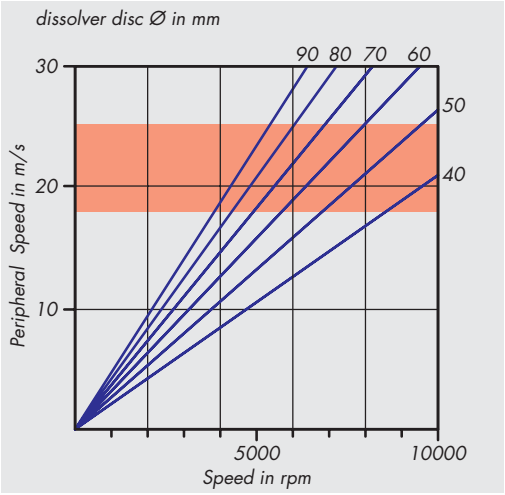
3 Safety limit switch, incorporated in the container quick clamping system, preventing the motor from operating if the dispersion vessel is not firmly clamped.

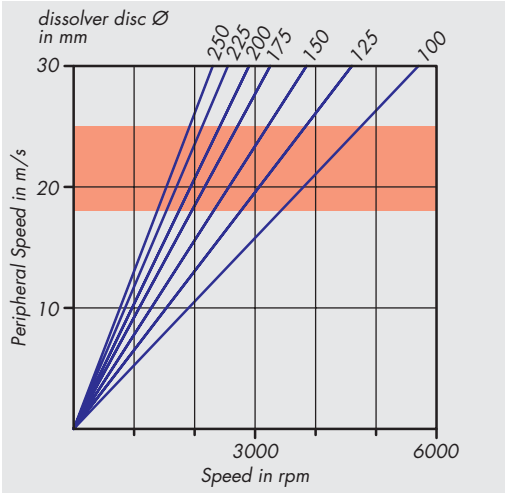
4 Safety limit switch, prevents the motor from operating when the dispersion impeller is outside the dispersion container. The switch is easily adjusted for different container heights.

5 Device preventing horizontal movement of the dispersion impeller

6 The stainless steel set collar prevents accidental contact of the dissolver shaft with the bottom of the container. It is also used to set the height of the dissolver disc.

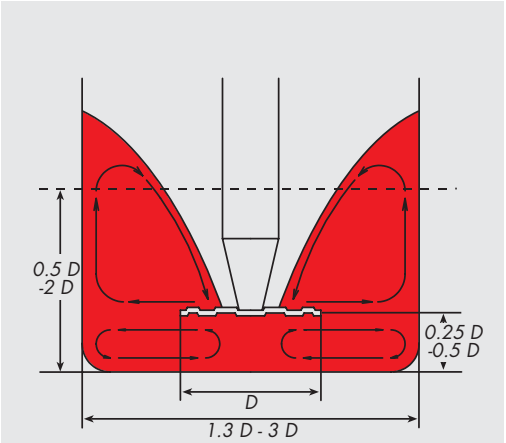
DISPERMAT® AE





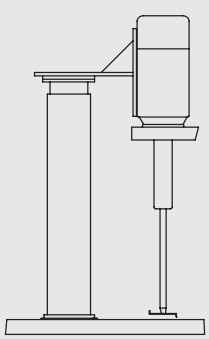
Peripheral speed, is determined by shaft speed and diameter of dissolver disc (recommended range: 18 - 25 m/s).

When the dispersion conditions are optimised the millbase exhibits laminar flow (Doughnut Effect). The results achieved with a DISPERMAT® dissolver can easily be compared to those of production.

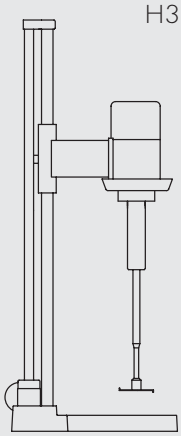


Vessel geometry and flow pattern when dispersing with a DISPERMAT® dissolver.

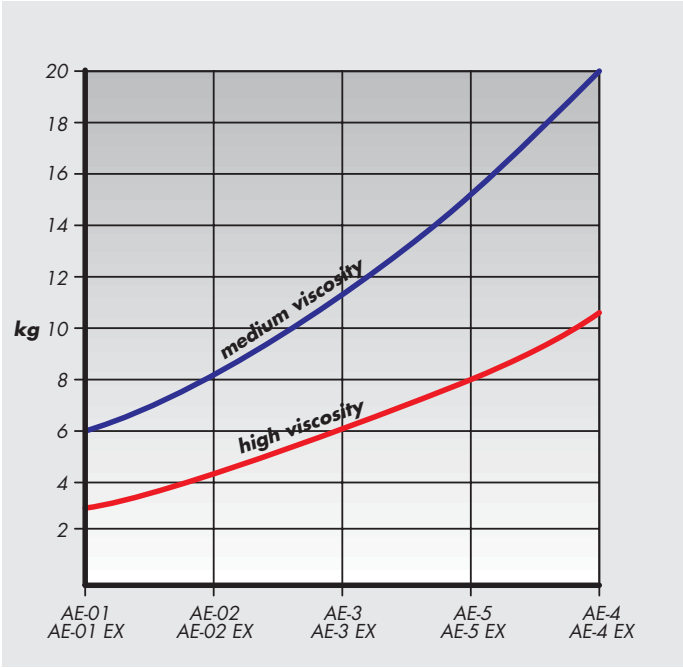
H2L

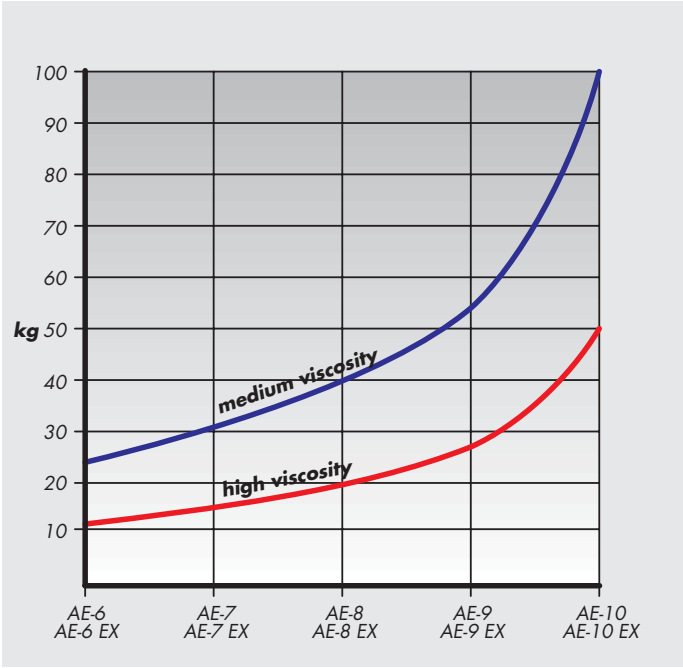


H3E



	H2L	H3E
Stand height min.	945 mm	1800 mm
Stand height max.	1415 mm	1800 mm
Stand depth	550 mm	700 mm
Stand width	490 mm	890 mm
Container diameter	50 - 350 mm	70 - 580 mm
Container height	450 mm	575 mm

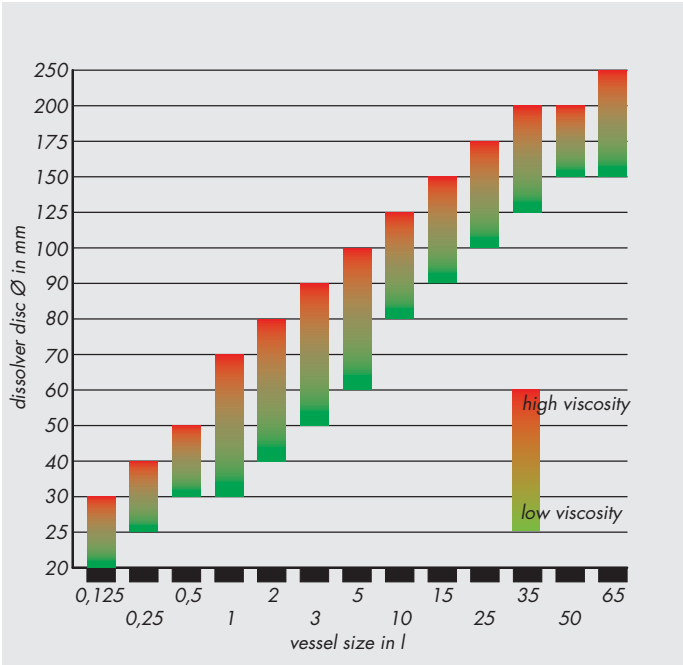




Although viscosity ranges are difficult to define, the following information can be used as a guideline:

low viscosity	μ < 500 mPs
medium viscosity	μ 500-5000 mPs
high viscosity	μ > 5000 mPs

With a dissolver system it is not possible to define a shear velocity gradient nor a shear stress gradient; therefore it is not easy to estimate specific data regarding the capacity of a dissolver when dispersing Non-Newtonian substances. Nevertheless the diagrams will help to select the correct DISPERMAT® dissolvers.



Recommended dissolver disc-Ø in relation to viscosity and vessel size.

DISPERMAT® AE

Safety Device

In order to minimise the risk of injuries with running dissolver discs, an obligatory law from the authorities says that every dissolver must have a corresponding safety device.

This safety device consists of:

1 Height adjustable stainless steel telescopic shaft protection pipe

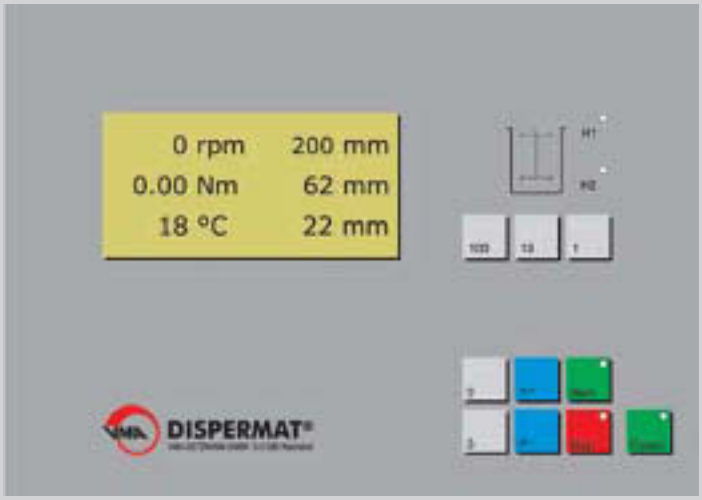
2 Height adjustable central container clamping system with threaded adjustment

3 Safety limit switch, incorporated in the clamping device, switching depends on the clamping pressure.
The switch allows starting only when the container is clamped tight.

4 Safety directives state that motor cannot operate when the dispersion tool is outside the dispersion container. The innovation of the new M- and C-technology permits operation without safety limit switches and enables the operator to select the required switch points directly via the key pad. This is realized by a height measuring system which is integrated in the H2L stand. This system permanently measures the height of the dissolver disc and the results are indicated on the display. The height measuring system is permanently checked and is adjusted if required.

The adjustment of the switch points is very easy: The desired switching points are triggered with keys and are stored by pressing the key 
H1 and H2. Each time the motor is stopped the dissolver can only be started provided that the operator presses the flashing LED of the keys H1 and H2. This guarantees that if the dispersion container is changed the wrong value for H1 and H2 cannot be used by mistake.

	Type	Power in kW	Voltage/ Frequency in V/Hz	Speed in rpm	Torque in Nm	Stand	approx. weight in Kg
DISPERMAT®	AE01-M	0,55	230/50	0 -10000	1,0	H2L	130
DISPERMAT®	AE3-M	1,1	230/50	0 -10000	2,0	H2L	130
DISPERMAT®	AE4-M	2,2	400/50	0 -10000	4,0	H2L	150
DISPERMAT®	AE02-M	0,55	230/50	0 - 6000	1,8	H2L	130
DISPERMAT®	AE5-M	1,1	230/50	0 - 6000	3,7	H2L	130
DISPERMAT®	AE6-M	2,2	400/50	0 - 6000	7,4	H2L	150
DISPERMAT®	AE7-M	3,0	400/50	0 - 6000	10,0	H3E	160
DISPERMAT®	AE8-M	4,0	400/50	0 - 6000	13,7	H3E	170
DISPERMAT®	AE9-M	2,2	400/50	0 - 3000	15	H3E	150
DISPERMAT®	AE10-M	4,0	400/50	0 - 3000	27	H3E	170
DISPERMAT®	AE01-C	0,55	230/50	0 -10000	1,0	H2L	130
DISPERMAT®	AE3-C	1,1	230/50	0 -10000	2,0	H2L	130
DISPERMAT®	AE4-C	2,2	400/50	0 -10000	4,0	H2L	150
DISPERMAT®	AE02-C	0,55	230/50	0 - 6000	1,8	H2L	130
DISPERMAT®	AE5-C	1,1	230/50	0 - 6000	3,7	H2L	130
DISPERMAT®	AE6-C	2,2	400/50	0 - 6000	7,4	H2L	150
DISPERMAT®	AE7-C	3,0	400/50	0 - 6000	10,0	H3E	160
DISPERMAT®	AE8-C	4,0	400/50	0 - 6000	13,7	H3E	170
DISPERMAT®	AE9-C	2,2	400/50	0 - 3000	15	H3E	150
DISPERMAT®	AE10-C	4,0	400/50	0 - 3000	27	H3E	170

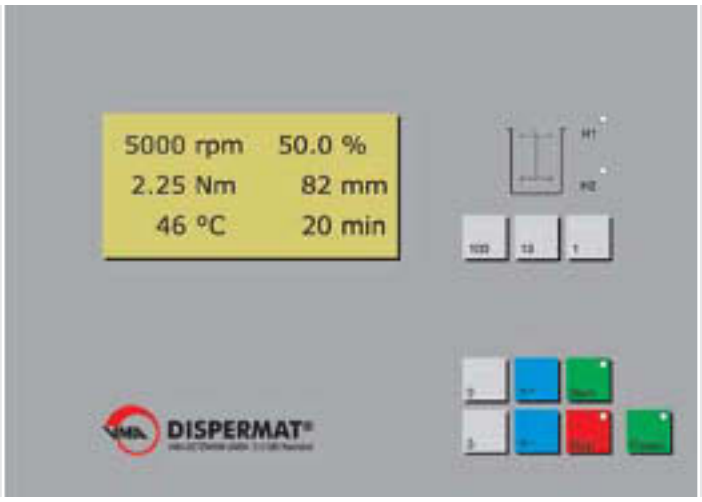


H1 As soon as the dissolver disc reaches position H1 during the lifting the motor stops

H2 As soon as the dissolver disc reaches position H2 during lowering the motor stops. H2 should be adjusted so that contact of the dissolver disc with the bottom of the container is avoided.

Therefore the distance between H1 and H2 is the working area in which the dispersion takes place. This means the dissolver can only be operated when the dissolver disc is situated between H1 and H2.

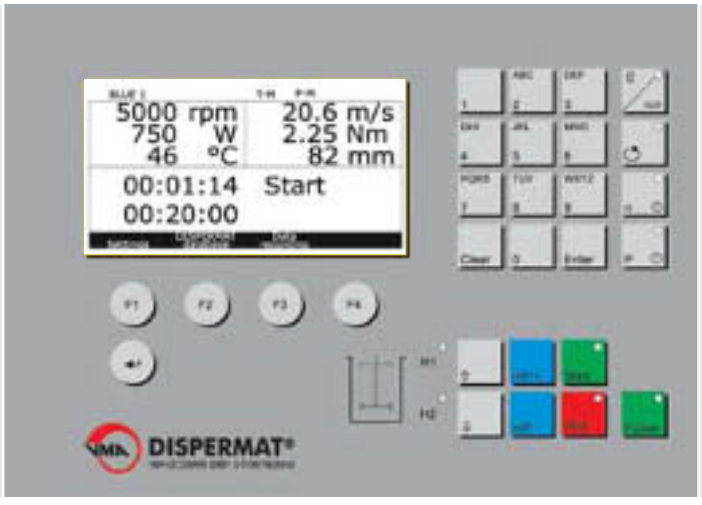
Ha Furthermore the position of the dissolver disc is permanently indicated on the digital display, so that the distance between bottom of the container and dissolver disc (0,25 D - 0,5 D) can be adjusted exactly and in order to reach the optimum Doughnut-Effect.



DISPERMAT® AE-M
Indications in the display:

- Speed of the dissolver shaft
- Speed in % of the final speed (potentiometer function)
- Torque
- Product temperature
- Current height of the dispersion or stirring tool within the container
- Timer, count down
- Height H1 and H2 of the safety device

A detailed description of the innovative M-technology can be found on page 17 to 22.



DISPERMAT® AE-C
Indications in the display:

- Speed of the dissolver shaft
- Peripheral speed of the stirring tool
- Torquet
- Product temperature
- Current height of the dispersion or stirring tool within the container
- Timer
- Height H1 and H2 of the safety device

A detailed description of the innovative C-technology can be found on page 17 to 22.

DISPERMAT® AE-EX

DISPERMAT® AE-EX dissolvers are designed for operation in areas where explosion-proof equipment is required.

The main motor, the control box, the electrical height adjustment motor and the complete safety device are explosion-proof.

Only the enclosure with the built-in power electronics is not explosion-proof and has to be located outside the hazardous area.

The three-phase motors (EEx d II B T3) ensure a smooth start. They have infinitely variable speed which is controlled by means of modern frequency converters.

The DISPERMAT® dissolvers are quiet during operation. Ventilation of the main motor is provided by a separate fan or by convection cooling.

Additional accessories page 54+55 and 70-85

The designation of explosion-proof areas and correct choice of equipment should be carried out by suitably qualified personnel or by the appropriate authorities.

DISPERMAT® AE3-M EX with double walled container

Safety Device

In order to minimise the risk of injuries with running dissolver discs, it is required by Law that every dissolver must have a suitable safety device.
The safety device consists of:

1 Height adjustable stainless steel telescopic shaft protection pipe

2 Device preventing horizontal movement of the dispersion impeller

3 Height adjustable central container clamping system with two clamping arms operated by a hand wheel with screw adjustment

4 Safety limit switch, incorporated in the container quick clamping system, preventing the motor from operating if the dispersion vessel is not firmly clamped.

5 Device preventing horizontal movement of the dispersion impeller

6 The stainless steel set collar prevents accidental contact of the dissolver shaft with the bottom of the container. It is also used to set the height of the dissolver disc.

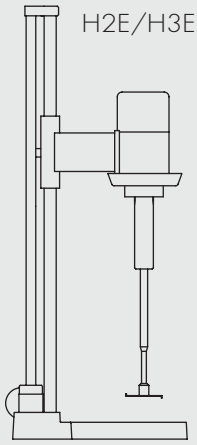
All DISPERMAT® AE-EX dissolvers are equipped with an electrical height adjustment as well as a safety device which is required by EC law (see page 62).

The designation of explosion-proof areas and correct choice of equipment should be carried out suitably qualified personnel or by the appropriate authorities.

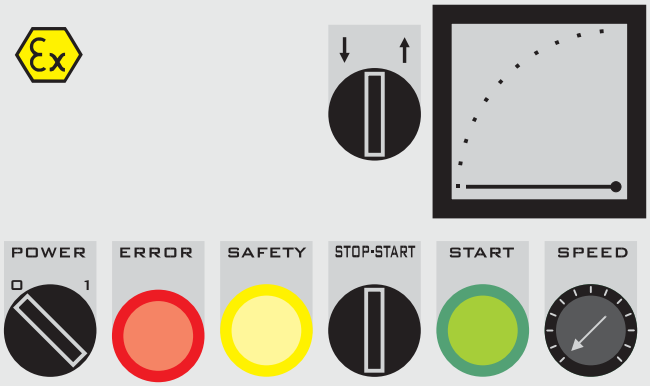
DISPERMAT® AE8-C EX with double walled container

DISPERMAT® AE-EX

	Type	Power in kW	Voltage/ Frequency in V/Hz	Speed in rpm	Torque in Nm	Stand	approx. weight in Kg
DISPERMAT®	AE HS-M EX	0,55	400/50	0 - 18000	0,5	H2E	155
DISPERMAT®	AE01-M EX	0,55	400/50	0 - 10000	1,0	H2E	155
DISPERMAT®	AE3-M EX	1,1	400/50	0 - 10000	2,0	H2E	160
DISPERMAT®	AE4-M EX	2,2	400/50	0 - 10000	4,0	H2E	180
DISPERMAT®	AE02-M EX	0,55	400/50	0 - 6000	1,8	H2E	160
DISPERMAT®	AE5-M EX	1,1	400/50	0 - 6000	3,7	H2E	165
DISPERMAT®	AE6-M EX	2,2	400/50	0 - 6000	7,4	H2E	185
DISPERMAT®	AE7-M EX	3,0	400/50	0 - 6000	10,0	H3E	195
DISPERMAT®	AE8-M EX	4,0	400/50	0 - 6000	13,7	H3E	210
DISPERMAT®	AE9-M EX	2,2	400/50	0 - 3000	15	H3E	190
DISPERMAT®	AE10-M EX	4,0	400/50	0 - 3000	27	H3E	210
DISPERMAT®	AE HS-C EX	0,55	400/50	0 - 18000	0,5	H2E	155
DISPERMAT®	AE01-C EX	0,55	400/50	0 - 10000	1,0	H2E	155
DISPERMAT®	AE3-C EX	1,1	400/50	0 - 10000	2,0	H2E	160
DISPERMAT®	AE4-C EX	2,2	400/50	0 - 10000	4,0	H2E	180
DISPERMAT®	AE02-C EX	0,55	400/50	0 - 6000	1,8	H2E	160
DISPERMAT®	AE5-C EX	1,1	400/50	0 - 6000	3,7	H2E	165
DISPERMAT®	AE6-C EX	2,2	400/50	0 - 6000	7,4	H2E	185
DISPERMAT®	AE7-C EX	3,0	400/50	0 - 6000	10,0	H3E	195
DISPERMAT®	AE8-C EX	4,0	400/50	0 - 6000	13,7	H3E	210
DISPERMAT®	AE9-C EX	2,2	400/50	0 - 3000	15	H3E	190
DISPERMAT®	AE10-C EX	4,0	400/50	0 - 3000	27	H3E	210

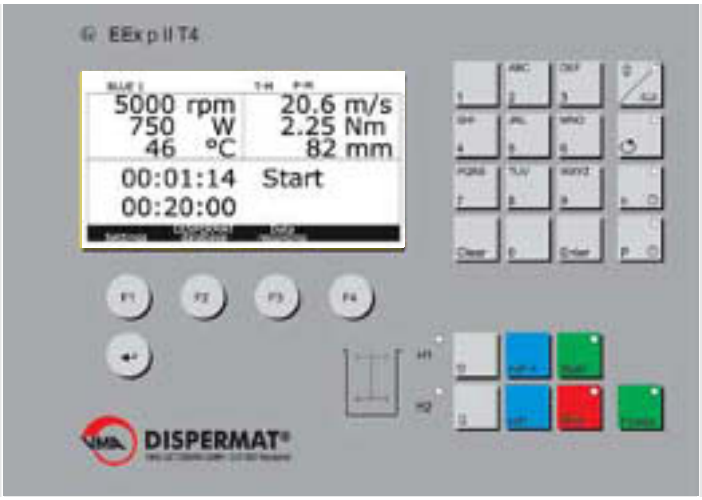


	H2E	H3E
Stand height	1500 mm	1800 mm
Stand depth	550 mm	700 mm
Stand width	730 mm	890 mm
Container diameter	50 - 350 mm	70 - 580 mm
Container height	450 mm	575 mm



DISPERMAT® AE-M EX

The DISPERMAT® AE-M EX dissolvers have an infinitely variable speed control. The compact instrument control box includes speed indication and is conveniently mounted on the stand.



DISPERMAT® AE-C EX

Indications in the display:

- Speed of the dissolver shaft
- Peripheral speed of the stirring tool
- Torquet
- Product temperature
- Current height of the dispersion or stirring tool within the container
- Timer

A detailed description of the innovative C-technology can be found on page 17 to 22.

Dissolver for Extremely High Viscosity and Non-Flowing Products

DISPERMAT® CD-C

The dispersion process with a laboratory dissolver is normally only possible when the product exhibits reasonable flow, making it possible to achieve the Doughnut effect for optimum dispersion results.

The required flow pattern is not always possible with high viscosity or non-flowing substances. Extremely high viscosity can lead to the product in the dispersion zone standstill while the dispersion impeller is running in air.

The DISPERMAT® CD-C has been developed to be able to disperse these problematical high viscosity or non-flowing products.

The DISPERMAT® CD-C dissolvers have powerful three phase motors which ensure a smooth start. They have infinitely variable speed which is controlled by means of modern frequency converters.

The DISPERMAT® CD-C dissolvers are very quiet during operation, cooling of the main motor is provided by a fan driven by a separate constant speed motor.

The machine is equipped with electrical height adjustment as standard.

The DISPERMAT® CD-C is also available explosion-proof on request

Hint:
process control

Use WIN-DISP for complete documentation of valuable measurement with the DISPERMAT® dissolver/ bead mill.
See also page 17-22.

In order to reduce heat generated during dispersion of highly viscous substances, the DISPERMAT® CD is also available with a cooling system for single-walled containers.

Rotary connection for coolant

Double-walled container receptacle is screwed in place

Stainless steel single-walled container located in the double-walled container receptacle

Container with dissolver shaft and scraper system

The DISPERMAT® CD-C achieves excellent dispersion results by means of the intelligent combination of 3 independent motion parameters:

- Infinitely variable speed
- The dispersion container is mounted on a turn-table which rotates, at constant speed, in the opposite direction to the dispersion
- The dispersion impeller oscillates vertically between two selected positions.

The dispersion container can be positioned off centre during the dispersion process. This positions the dissolver shaft centrally or eccentrically.

A spring loaded scraper system moves product away from the container wall, ensuring a complete dispersion with no "dead areas".

The stainless steel dispersion containers are available in the sizes 1, 2, 3, 5 and 10 l. The 1 to 3 l containers are fixed with a quick-clamping system; the larger containers have a bayonet fixing system.

A safety cabinet made of safety glass guarantees safe working conditions.

A safety device on the cabinet door ensures that the instrument will only operate if the door is closed.

The compact control box with solvent resistant keypad and digital display is conveniently mounted on the instrument stand.

With the latest high quality sensor technology all important process data is measured and displayed on the DISPERMAT® CD-C control panel.

The dispersion process with a laboratory dissolver is normally only possible when the product exhibits reasonable flow, making it possible to achieve the Doughnut effect for optimum dispersion results.

The required flow pattern is not always possible with high viscosity or non-flowing substances. Extremely high viscosity can lead to the product in the dispersion zone standstill while the dispersion impeller is running in air.

The DISPERMAT® CD-C has been developed to be able to disperse these problematical high viscosity or non-flowing products.

The DISPERMAT® CD-C dissolvers have powerful three phase motors which ensure a smooth start. They have infinitely variable speed which is controlled by means of modern frequency converters.

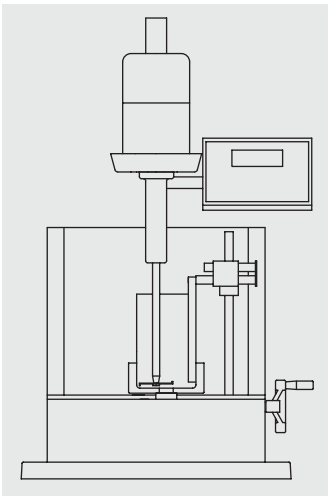
The DISPERMAT® CD-C dissolvers are very quiet during operation, cooling of the main motor is provided by a fan driven by a separate constant speed motor.

The machine is equipped with electrical height adjustment as standard.

DISPERMAT® CD-C

	Type	Power in kW	Speed in rpm	Torque in Nm
DISPERMAT®	CD3-C	1,1	0 - 10000	2,0
DISPERMAT®	CD6-C	2,2	0 - 6000	7,4

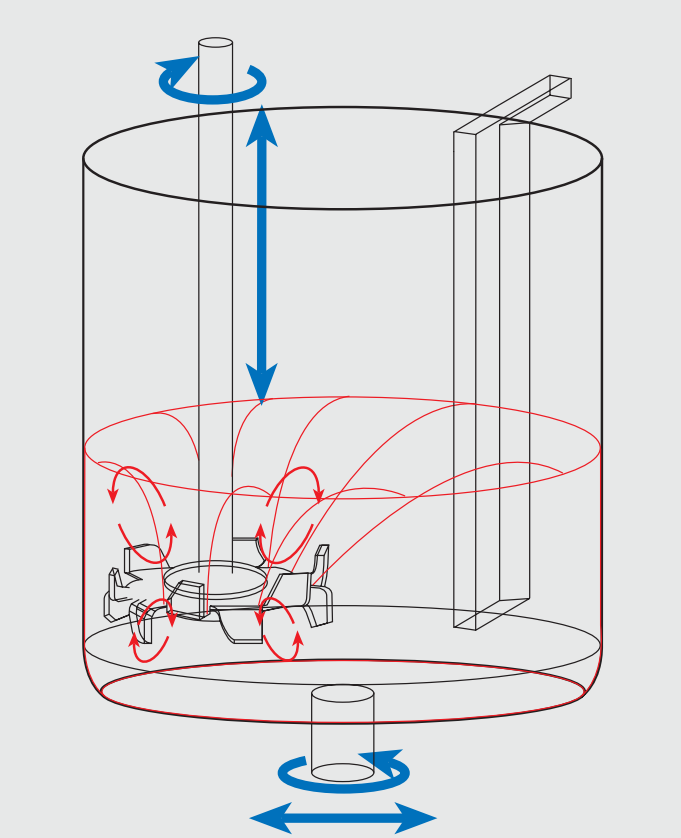
As the DISPERMAT® CD-C can be used with containers of different dimensions, the clamping system, scraper system and dispersion impeller are not included and have to be ordered separately. (see also table below)

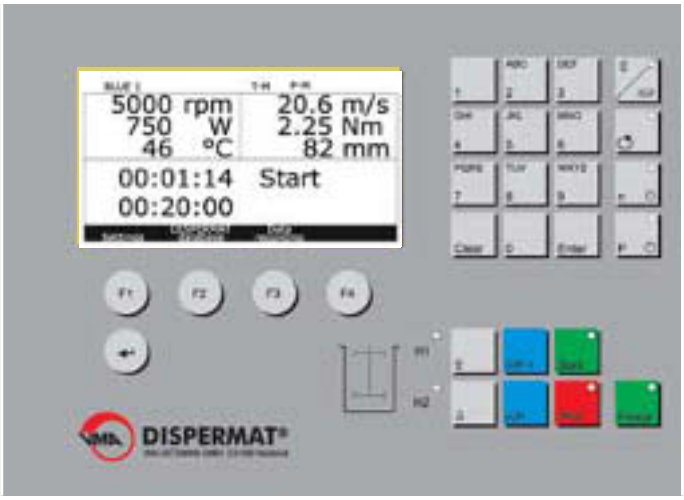


	H2E
Stand height	1500 mm
Stand depth	580 mm
Stand width	700 mm

	Type	Container size in L	Inside diameter x height in mm	Scraper system	Clamping system	Recommended dispersion dissolver disc in mm
DISPERMAT®	CD3-C	1	100 x 130	SCS 1	FS 1	30, 40, 50
		2	120 x 180	SCS 2	FS 2	40, 50, 60
		3	140 x 200	SCS 3	FS 3	50, 60, 70
DISPERMAT®	CD6-C	5	175 x 230	SCS 5	BV 5/10	60, 70, 80
		10	240 x 240	SCS 10	BV 5/10	90, 100, 125

The power supply for all DISPERMAT® CD-C is 400V / 50Hz.





DISPERMAT® CD-C

Indications in the display:

- Speed of the dissolver shaft
- Peripheral speed of the stirring tool
- Torquet
- Product temperature
- Current height of the dispersion or stirring tool within the container
- Timer

A detailed description of the innovative C-technology can be found on page 17 to 22.

Safety Device

With effect from 1st January, 1995, EC law stipulates that no laboratory or industrial dissolver may be bought or commissioned without the appropriate safety features.

The Commission´s Directive 89/392/EWG dated 14th June, 1989, on machines a machinery deals with the harmonisation of the legal requirements for safety equipment relating to laboratory and industrial dissolvers. The manufacturer must confirm the compliance of the fundamental requirements in writing and display the corresponding identification on the machine.

Article 8, Section 1 of the Machine Directive, stipulates that the machine manufacturer issue a formalised EC Declaration of Conformity for every machine manufactured and that they display the CE mark on each machine.

A laboratory or industrial dissolver ordered and supplied by the manufacturer without safety equipment can only be put into operation if the importer or operator installs the safety equipment and has fulfilled the conformity obligation.

In this case the manufacturer must issue a declaration on the incompleteness of the machine, standing that it may not be put into operation.

DISPERMAT® CN

In order to minimise the risk of injuries with running dissolver discs, it is required by Law that every dissolver must have a suitable safety device.
The safety device consists of:

1 Height adjustable stainless steel telescopic shaft protection pipe

2 Height adjustable central container clamping system with two clamping arms operated by a hand wheel with screw adjustment

3 Safety limit switch, incorporated in the container quick clamping system, preventing the motor from operating if the dispersion vessel is not firmly clamped.

4 Safety limit switch, prevents the motor from operating when the dispersion impeller is outside the dispersion container. The switch is easily adjusted for different container heights.

5 Safety limit switch, adjustable for different container heights. This safety limit switch prevents accidental contact of the dissolver shaft with the bottom of the container.

Safety device from M- and C-technology with H2L stand

In order to minimise the risk of injuries with running dissolver discs, it is required by Law that every dissolver must have a suitable safety device.
The safety device consists of:

1 Height adjustable stainless steel telescopic shaft protection pipe

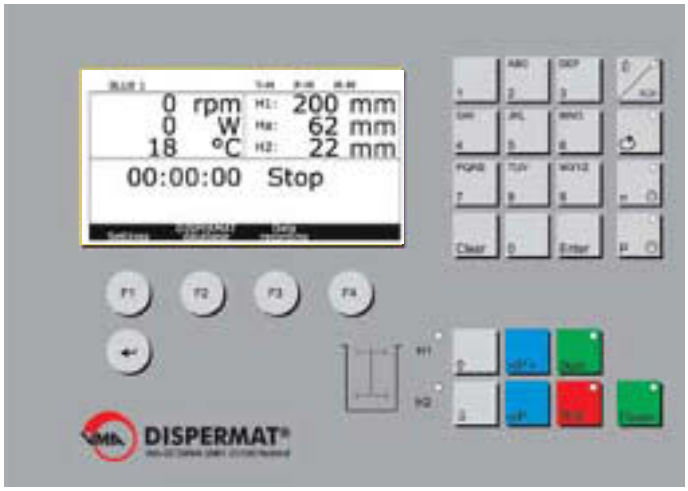
2 Device preventing horizontal movement of the dispersion impeller

3 Height adjustable central container clamping system with two clamping arms operated by a hand wheel with screw adjustment

4 Safety limit switch, incorporated in the container quick clamping system, preventing the motor from operating if the dispersion vessel is not firmly clamped.

This switching-off is normally made by a limit switch which is fixed on the stand. Furthermore a second limit switch makes sure that the rotating dissolver disc cannot touch the container bottom; the motor is switched off in time. Due to the fact that with production machines the operation usually is made with the same container sizes, an adjustment of the limit switches, which are responsible for the switching-off of the motor is rarely necessary. However the situation with laboratory dissolvers is different; container sizes are changed very often.

Now the innovation of the new M- and C-technology permits operation without safety limit switches and enables us to enter the corresponding shift points digitally direct via the key pad. This is realized by a height-finder system which is integrated in the stand H2L. This system permanently measures the height of the dissolver disc and the results are indicated on the display.



The adjustment of the shift points is very easy: The desired switching positions are triggered with the keys  and are memorized by pressing the key H1 respectively H2. After every motor stop the dissolver can only be started provided that the operator presses the flashing LED of the keys H1 and H2. This guarantees that in case of a change of the dipersion container the wrong value for H1 and H2 cannot be mistakenly used.

Safety limit switch, prevents the motor from operating when the dispersion impeller is outside the dispersion container. The switch is easily adjusted for different container heights.

H1 As soon as the dissolver disc reaches position H1 during the lifting the motor stops

H2 As soon as the dissolver disc reaches position H2 during the lowering the motor stops. H2 should be so adjusted in that way that contact by the dissolver disc with the container bottom is narrowly avoided.

Therefore the difference between H1 and H2 is the working area in which the dispersion takes place, which means the dissolver can only be operated when the dissolver disc is situated between H1 and H2.

Ha Furthermore the position of the dissolver disc is permanently indicated on the digital display, so that the distance between bottom of the container and dissolver disc (0,25 D - 0,5 D) can be adjusted exactly and in order to reach the optimum Doughnut-Effect.

Dispersion, Milling and Stirring Impellers

Dissolver Discs

Lightweight stainless steel dispersion impellers
Sizes available:
20, 25, 30, 40, 50 and 60 mm Ø.

Heavy duty stainless steel dispersion impellers, with tooth profile, with 5mm hole, sizes available: 30, 40, 50, 60 mm Ø;
Hub and female thread, sizes available: 70, 80, 90, 100, 125 and 150 mm Ø; with adapter, sizes available 175 und 200 mm Ø.

Lightweight stainless steel propeller blades
Sizes available: 50, 70 and 100 mm Ø.

Heavy duty stainless steel propeller blades
Sizes available: 40, 55, 80, 90, 105 and 125 mm Ø.

Rotor-Stator System

Stainless steel Rotor Stator System for dispersing low viscosity substances (homogenizer).

Grind-Gages

Grind-Gages with scraper
material: stainless steel
path size: 50 x130 mm
range: 0-25µ, 0-50µ, 0-100µ

Full textile cleaning cloth

- Particularly absorbent pore structure
- Quick cleaning possible because liquid is not smeared
- Washable (cloth can be used more often)
- More economic than cloth without pore structure
- Resistant to tearing even when wet
- Ideal for the cleaning of machine components
- Dimension: appr. 38 x 38 cm
- Colour: white
- Lint free cloth
- 75 cloths per package

Clamping devices for thin walled, cylindrical and conical containers

The KB and HS clamping devices enable the safe clamping of thin walled disposable containers. The standard safety device has a pressure switch in the clamping arms. The arms would squash thin walled containers before the switch is properly activated.

KB clamping device

The conical container is pushed into the conical container receptacle.

After dispersion, the container is released with a lever and pressed upwards.

The KB clamping device is suitable for safe clamping of thin-walled conical containers (such as yoghurt cups and similar items).

Both clamping systems are made to customer specifications.

Please send us your sample cup or a drawing and ask for an estimate

HS clamping device

HS container clamps

With the central container clamping system, the cylindrical container is fastened

The HS clamping device consists of two semi circular container clamps for fastening thin walled containers (such as cans and similar items). The HS clamping device can also be double walled for heating or cooling.

Vacuum Dispersion System CDS

Dispersion under vacuum in containers of 250, 500, 1000 and 2000 ml

The CDS dispersion system enables the dispersion process to be carried out in single walled containers in a closed system under vacuum.

The single walled containers are placed into the container receptacle and secured in place. If the dispersion process needs to be cooled a double walled container receptacle is available.

After the liquid and powder components have been added, the glass cover can be lowered into place onto the container receptacle over the vacuum shaft guide tube.

The actual dispersion process can now be carried out and the product set into a turbulence free rolling motion (doughnut effect, see page 10 -11).
If vacuum is required the vacuum pump can be switched on.
The impeller height can easily be raised or lowered during the dispersion process even under vacuum. The dispersion process can clearly be observed through the large glass cover.

DISPERMAT® CA-20 C with CDS vacuum dispersion system

Double walled container receptacle

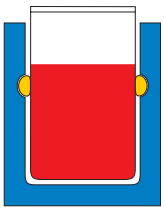
Single wall container within the double walled container receptacle

Container system with dissolver shaft and dissolver disc

Operable vacuum dispersion system CDS

One way container

The vacuum dispersion system CDS also allows the usage of thin walled disposable containers.



The disposable containers are fixed in the container receptacle with a pneumatic device.

System	Single-walled container receptacle	Double-walled container receptacle	Container volume in ml	Container dimensions inside Ø x height
CDS E0250	yes	-	250	65 x 85 mm
CDS E0500	yes	-	500	80 x 100 mm
CDS E1000	yes	-	1000	100 x 130 mm
CDS E2000	yes	-	2000	120 x 180 mm
CDS D0250	-	yes	250	65 x 85 mm
CDS D0500	-	yes	500	80 x 100 mm
CDS D1000	-	yes	1000	100 x 130 mm
CDS D2000	-	yes	2000	120 x 180 mm

Vacuum Dissolvers for the Laboratory and Pilot Plant

DISPERMAT® VL

The DISPERMAT® VL is a vacuum dissolver for laboratory and pilot plant operation. It is ideal for R&D work as well as for production of larger batches.

The DISPERMAT® VL is very easy to use. The stand has an electric height adjustment; the vacuum container is securely mounted on the base plate by a quick release fixture. It is also possible to adjust the height of the milling tool during operation.

All DISPERMAT® VL dissolvers come with a safety device as standard.

DISPERMAT® VL dissolvers have three-phase motors, which ensure a smooth start. They have infinitely variable speed which is controlled by means of modern frequency converters.

DISPERMAT® VL dissolvers are very quiet during operation as the ventilation of the main motor is provided by a fan driven by a separate, constant speed motor (separate ventilation). The stainless steel vacuum container is double walled to enable temperature control; the containers are fitted with self-sealing fittings and quick-release couplings.

The stainless steel vacuum cover has an inspection glass, container illumination, vacuum seal and two openings for product inlet and air release.

DISPERMAT® VL02-C, with scraper system

Hint:
process control

Use WIN-DISP for complete documentation of valuable measurement with the DISPERMAT® dissolver/bead mill.
See also page 22.

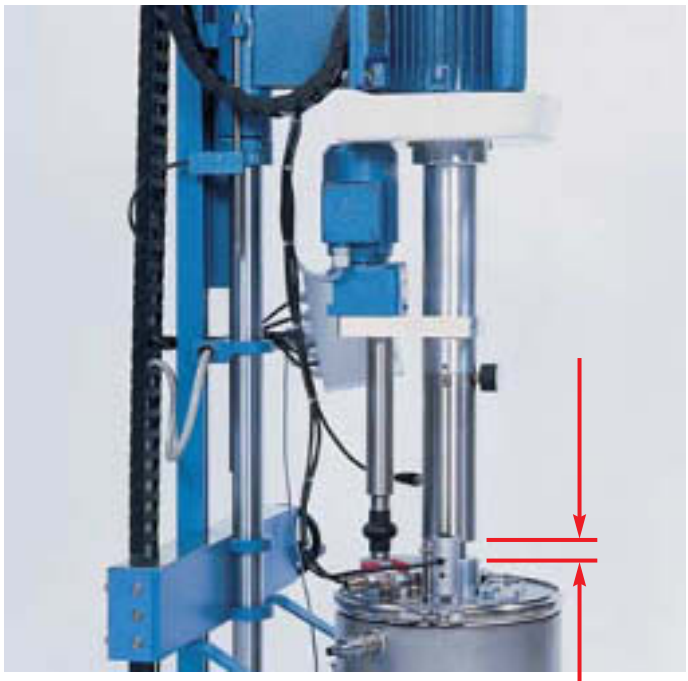
- Option: Scraper systems for highly viscous and non-flowing substances

DISPERMAT® VL15-C with scraper system

DISPERMAT® VL15-C with scraper system

- Very easy and safe operation
- Stand with electric height adjustment
- Simple and easy cleaning allowing a rapid change of material
- Vacuum container fastened with quick release fixture
- Safety device standard
- Height adjustment of dissolver disc even during vacuum operation
- Double wall stainless steel vacuum container
- Stainless steel vacuum cover with inspection glass, halogen light, vacuum seal, two openings for product inlet and air release
- Optimum control over dispersion parameters enables consistent results to be achieved
- Simple operation via key pad

DISPERMAT® VL



The dissolver disc can be adjusted in height during operation under vacuum.

Vacuum cover with vacuum and exhaust connections, halogen light, scraper with cardan and gear unit

The generously sized slewing inspection glass simultaneously serves as an opening for product feed; when the inspection glass is opened, the scraper system automatically shuts off.

Diaphragm pump MZ 2

Mechanical oilfree diaphragm pump with separator system at the suction and pressure side.
Suction speed:
1.7 m3/h
Ultimate vacuum:
9 mbar
Power:
0.18 kW
Power supply:
230 V, 50-60 Hz
Weight:
appr. 12.9 kg
Dimension:
366 x 241 x 326 mm

Particular advantages
- Protection of the pump by particle and liquid protection on the induction side
- Controlled collection of the condensate by condensate separator on the delivery side of the pump
- Low-maintenance oilfree diaphragm pump
- High chemical resistance by PTFE Sandwich diaphragm, PTFE valves, perfluorelastomer (e.g.Kalrez)
- Suitable for the suction of active chemical vapour

Rotary vane pump RE 5

Oil sealed rotary vane pump with separator system on the induction and on the delivery side.
Separation efficiency for mineral oil mist: 99,99 %
Suction speed: 5,6 m3/h
Ultimate vacuum: 1 x 10-1 bar
Power: 0,3 kW
Power supply: 230V, 50-60 Hz
Weight: appr. 15,3 kg
Dimension:
370 x 235 x 230 mm

Particular advantages
- High ultimate vacuum
- Longer intervals between oil changes
- High pumping capacity with a low inlet pressure
- Good vapour compatibility with water and solvents
- Compact construction

Vacuum gauge DVR 2

An alternative to the standard vacuum indicator
- Precise readout due to a digital-analog indication
- IIntegrated pressure transducer (fully electronic)
- Transducer made of alumina ceramics
- User selectable vacuum units (Torr, mbar, hPa)
- Integrated current supply
- Digital calibration
- Ex-proof version available

Dimension:
115 x 115 x 66 mm
Measuring range :
1 – 1080 mbar
Power supply:
9 V lithium round cells
Measuring cycle: 1-9 x/3s

DISPERMAT® VL

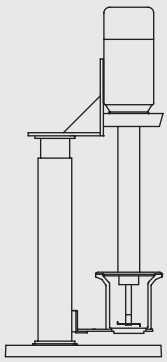
The laboratory vacuum dissolvers (container sizes 1- 5 l) have the compact H2L stand with electric height adjustment. The pilot plant vacuum dissolvers (container sizes 10 - 60 l have the new particularly stable H3E stand with electric height adjustment.

Double-walled vacuum containers

Laboratory

1, 2, 3 and 5 litres

The vacuum container is mounted on the stainless steel base plate and securely locked in place with a quick release fixture.



	H2L
Stand height min.	1160 mm
Stand height max.	1630 mm
Stand depth	550 mm
Stand width	490 mm

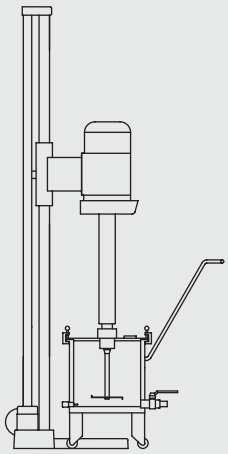
	Type	Power in kW	Voltage/ Frequency in V/Hz	Torque in Nm	Speed in rpm	Container size	Stand
DISPERMAT®	VL01-M	2,2	400/50	0 - 6000	7,4	1	H2L
DISPERMAT®	VL02-M	2,2	400/50	0 - 6000	7,4	2	H2L
DISPERMAT®	VL03-M	2,2	400/50	0 - 6000	7,4	3	H2L
DISPERMAT®	VL05-M	2,2	400/50	0 - 6000	7,4	5	H2L
DISPERMAT®	VL10-M	4,0	400/50	0 - 6000	13,7	10	H3E
DISPERMAT®	VL15-M	4,0	400/50	0 - 6000	13,7	15	H3E
DISPERMAT®	VL25-M	4,0	400/50	0 - 3000	27	25	H3E
DISPERMAT®	VL45-M	4,0	400/50	0 - 3000	27	45	H3E
DISPERMAT®	VL60-M	4,0	400/50	0 - 3000	27	60	H3E
DISPERMAT®	VL01-C	2,2	400/50	0 - 6000	7,4	1	H2L
DISPERMAT®	VL02-C	2,2	400/50	0 - 6000	7,4	2	H2L
DISPERMAT®	VL03-C	2,2	400/50	0 - 6000	7,4	3	H2L
DISPERMAT®	VL05-C	2,2	400/50	0 - 6000	7,4	5	H2L
DISPERMAT®	VL10-C	4,0	400/50	0 - 6000	13,7	10	H3E
DISPERMAT®	VL15-C	4,0	400/50	0 - 6000	13,7	15	H3E
DISPERMAT®	VL25-C	4,0	400/50	0 - 3000	27	25	H3E
DISPERMAT®	VL45-C	4,0	400/50	0 - 3000	27	45	H3E
DISPERMAT®	VL60-C	4,0	400/50	0 - 3000	27	60	H3E

Double walled vacuum containers

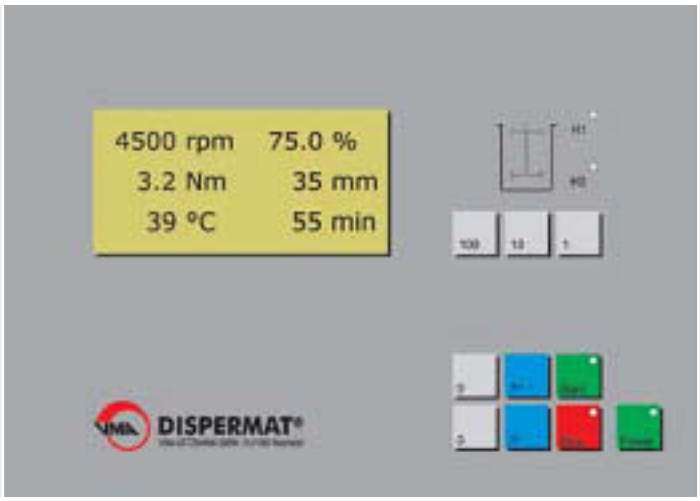
Industrial Scale

10, 15, 25, 45 and 60 litres

The containers have four wheels and a drain valve. They are held securely in place with the central container clamping system.



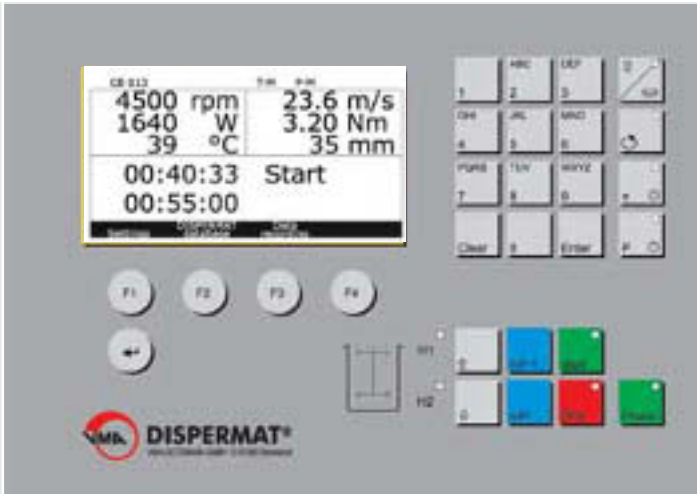
	H3E
Stand height	1800 mm
Stand depth	1060 mm
Stand width	730 mm



DISPERMAT® VL-M
Indications in the display:

- Speed of the dissolver shaft
- Speed in % of the final speed (potentiometer function)
- Torque
- Product temperature
- Current height of the dispersion or stirring tool within the container
- Timer, count down
- Height H1 and H2 of the safety device

A detailed description of the innovative M-technology can be found on page 17 to 22.



DISPERMAT® VL-C
Indications in the display:

- Speed of the dissolver shaft
- Peripheral speed of the stirring tool
- Torque
- Product temperature
- Current height of the dispersion or stirring tool within the container
- Timer
- Height H1 and H2 of the safety device

A detailed description of the innovative C-technology can be found on page 17 to 22.

Vacuum Dissolver DISPERMAT® VE

Dispersion under vacuum using:

- **single walled containers**
- **double walled containers**
- **disposable containers from 250 ml to 10 l**
- Stand with electric height adjustment
- Power 2,2 kW
- Speed 0 - 6000 rpm
- DISPERMAT® VE-C with comprehensive process control
- Complete safety device
- Electric height adjustment of the dispersion impeller even during vacuum operation
- Glass cover with sealable product addition opening
- Halogen lamp for internal illumination of the container

Option:

- Scraper systems for mixing non-flowing or highly viscous materials to ensure complete dispersion with no dead areas

Vacuum dissolver DISPERMAT® VE 3-C, with scraper system

All vacuum dissolvers are also available explosion-proof on request

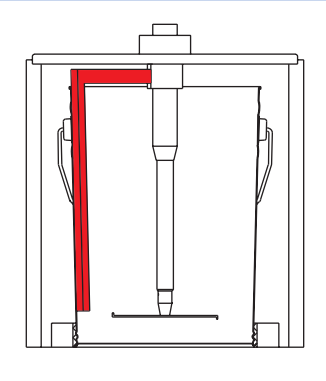
DISPERMAT® VE

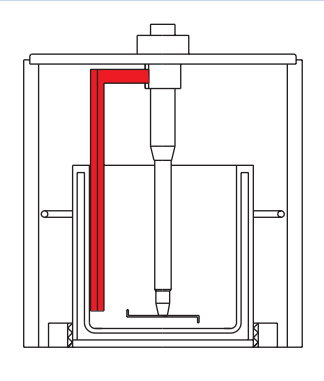
Ease of operation:

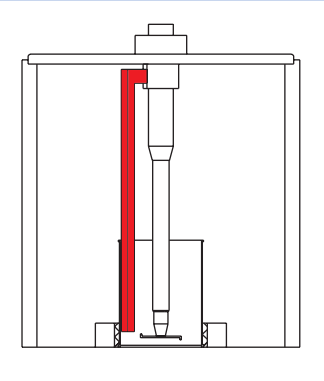
- Clamp the container (for example can, bucket etc.)
- Insert the vacuum tube
- Lower the glass cover
- Switch on the vacuum pump and start the DISPERMAT® VE

Scraper system

For highly viscous and non flowing substances, a scraper system can be added to the DISPERMAT® VE vacuum dissolver. The scraper arm can be changed very simply when the container is changed.

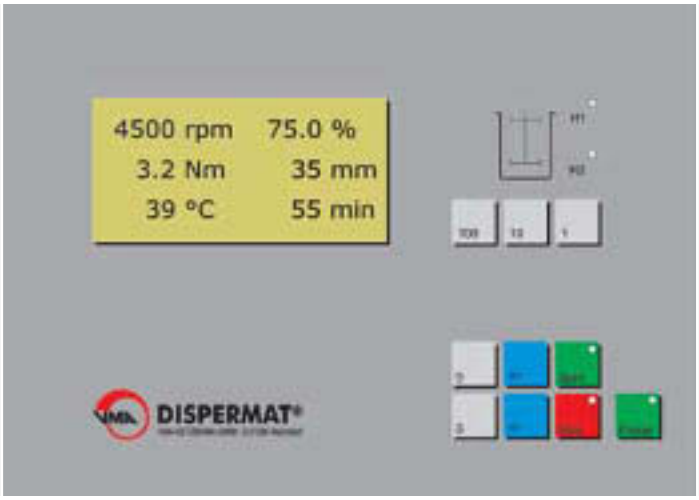






	Type	Power in kW	Voltage/ Frequency in V/Hz	Speed in rpm	Torque in Nm	Container size
DISPERMAT®	VE 3-M	2,2	400/50	0 - 6000	7,4	250 - 3000 ml
DISPERMAT®	VE 10-M	2,2	400/50	0 - 6000	7,4	0,5 -10 l
DISPERMAT®	VE 3-C	2,2	400/50	0 - 6000	7,4	250 - 3000 ml
DISPERMAT®	VE 10-C	2,2	400/50	0 - 6000	7,4	0,5 -10 l

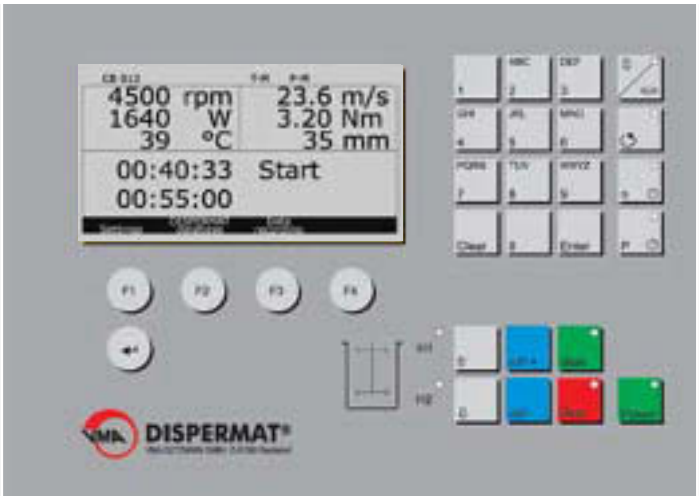
Special design for cotainers up to 50 l on request.



DISPERMAT® VE-M
Indications in the display:

- Speed of the dissolver shaft
- Speed in % of the final speed (potentiometer function)
- Torque
- Product temperature
- Current height of the dispersion or stirring tool within the container
- Timer, count down

A detailed description of the innovative M-technology can be found on page 17 to 22.



DISPERMAT® VE-C
Indications in the display:

- Speed of the dissolver shaft
- Peripheral speed of the stirring tool
- Torque
- Product temperature
- Current height of the dispersion or stirring tool within the container
- Timer

A detailed description of the innovative C-technology can be found on page 17 to 22.

Dispersion under Vacuum with the Dissolver/Butterfly Blade Dispersion System

DISPERMAT® LH

The DISPERMAT® LH dispersion system consists of a high-speed laboratory dissolver and an integrated three-blade butterfly stirrer. Through the interaction of the two dispersion processes, substances with high viscosity and higher yield point can be mixed. Powder products can also be dispersed into highly viscous and non-flowing substances.

Precisely engineered dispersion tools ensure that the entire substance is involved in the dispersion process.

Areas of application:

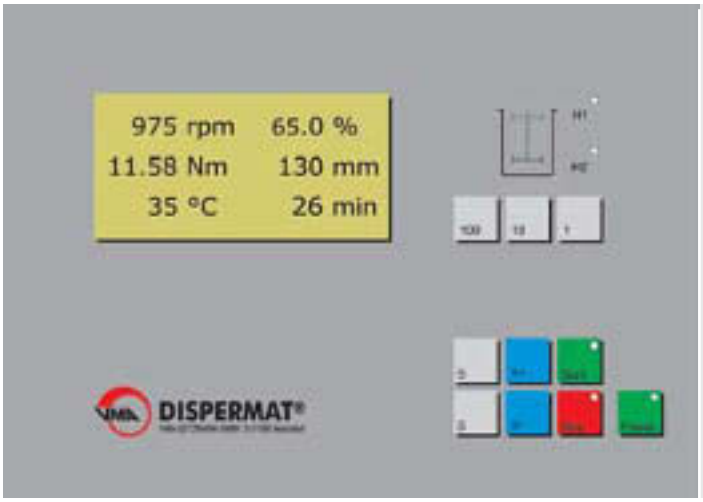
- Printing inks
- Fillers
- Putty
- Sealants
- Glues
- Pastes
- Gels and creams

The DISPERMAT® LH is also available explosion-proof on request

DISPERMAT® LH 5-C

	Type	Power in kW	Voltage/ Frequency in V/Hz	Speed of the butterfly stirrer in rpm	Torque in Nm	Container size
DISPERMAT®	LH 5-M	2,2	400/50	0 - 1500	15	5 l
DISPERMAT®	LH10-M	3,0	400/50	0 - 1500	20	10 l

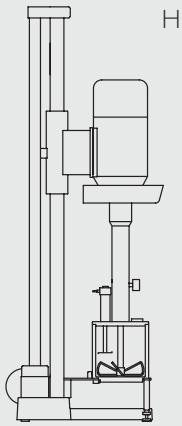
	H2E
Stand height	1500 mm
Stand depth	550 mm
Stand width	730 mm



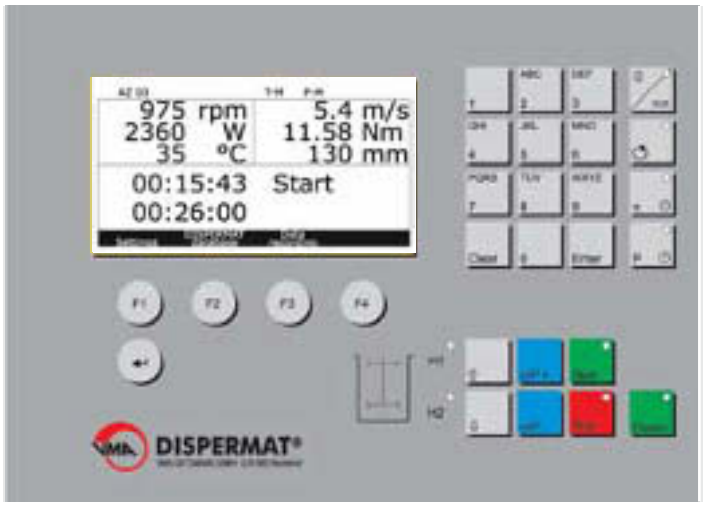
DISPERMAT® LH-M
Indications in the display:

- Speed of the dissolver shaft
- Speed in % of the final speed (potentiometer function)
- Torque
- Product temperature
- Current height of the dispersion or stirring tool within the container
- Timer, down counting
- Height H1 and H2 of the safety device

H2E



	Type	Power in kW	Voltage/ Frequency in V/Hz	Speed of the butterfly stirrer in rpm	Torque in Nm	Container size
DISPERMAT®	LH 5-C	2,2	400/50	0 - 1500	15	5 l
DISPERMAT®	LH10-C	3,0	400/50	0 - 1500	20	10 l



DISPERMAT® LH-C
Indications in the display:

- Speed of the dissolver shaft
- Peripheral speed of the stirring tool
- Torquet
- Product temperature
- Current height of the dispersion or stirring tool within the container
- Timer
- Height H1 and H2 of the safety device

A detailed description of the innovative C-technology can be found on page 17 to 22.

Stainless Steel Single and Double Wall Temperature Control Containers

In the laboratory and pilot plant it is often necessary to process material at defined temperatures; for example during dispersing, stirring and exothermic reactions it is often preferable to remove excess heat. Other applications may require heat to be added.

The high-quality double wall temperature control containers are ideally suited for these and other applications. They are available in many sizes and models. The stainless steel containers can be cleaned very easily due to their polished surface. The containers up to 5000 ml have self-sealing quick connect/disconnect fittings guaranteeing easy handling and time saving cleaning. Self-Sealing valves on the coupling and hose prevent leakage.

The 10 to 65 litres double wall containers are equipped with standard hose fittings to enable heating or cooling.

Stainless steel covers or split covers are available for all containers.

Capacity	Inside Ø x height
30 ml	30 x 40 mm
50 ml	40 x 50 mm
125 ml	50 x 70 mm
250 ml	65 x 85 mm
500 ml	80 x 110 mm
1000 ml	100 x 130 mm
2000 ml	120 x 180 mm
3000 ml	140 x 200 mm
5000 ml	180 x 200 mm

Capacity	Inside Ø x height
10 l	24 x 24 cm
15 l	28 x 28 cm
25 l	32 x 32 cm
35 l	36 x 36 cm
50 l	40 x 40 cm
65 l	44 x 44 cm

Containers with drain valve

Stainless steel double wall temperature control containers, with drain valve.

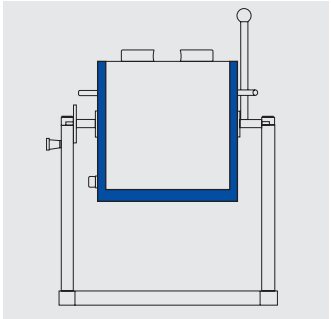
Capacity	Inside Ø x height
5 l	18 x 20 cm
10 l	24 x 24 cm
15 l	28 x 28 cm
25 l	32 x 32 cm
35 l	36 x 36 cm
50 l	40 x 40 cm
65 l	44 x 44 cm

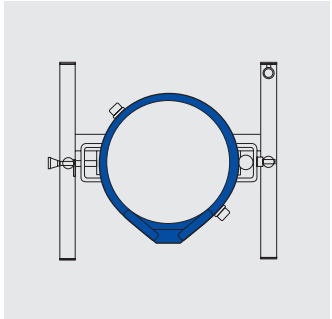
Stainless Steel Dispersion Container with Carrying Handles

Capacity	Inside Ø x height
20 l	27 x 37,5 cm
25 l	30 x 37,5 cm
30 l	30 x 44 cm
50 l	35 x 44 cm
75 l	40 x 60 cm
100 l	45 x 67 cm

Slewable Containers

Stainless steel slewable double wall temperature control containers, with tilting device and pouring lip.
The pouring lip and handle allow easy and safe decanting. The containers can be easily and quickly removed from the stand for mixing or cleaning purposes.





Single Wall Dispersion Containers

Stainless steel single wall dispersion containers, with brushed finish.

Capacity	Inside Ø x height
125 ml	50 x 70 mm
250 ml	65 x 85 mm
500 ml	80 x 110 mm
1000 ml	100 x 130 mm
2000 ml	120 x 180 mm
3000 ml	140 x 200 mm
5000 ml	180 x 200 mm

Stainless Steel Dispersion Containers with Carrying Shackle

Capacity	Inside Ø x height
10 l	24 x 26 cm
15 l	27 x 30 cm

In addition to the standard range of single and double wall containers, stainless steel vessels can be made to individual customer requirements.

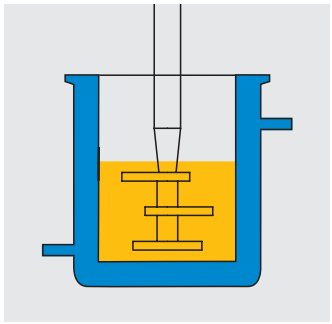
The use of the laboratory and pilot plant dissolver DISPERMAT® as a vertical bead mill

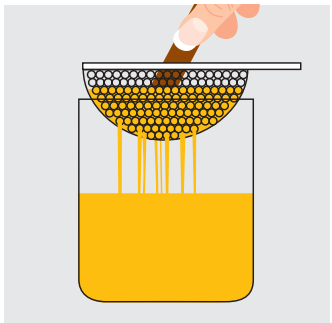
With high demands for particle size reduction or with agglomerates which are difficult to disperse the DISPMERMAT® can be converted into a practical and effective bead mill. For this the dissolver disc is removed and replaced by a milling tool (teflon impeller, double milling impeller or pearl mill impeller according to DIN/ISO).

The milling system of a bead mill consists of a milling tool, a milling container and the milling beads. In the milling container the milling beads together with the mill base are kept moving by the milling tool.

Milling, the easy way

For the easiest and best priced possibility to convert a DISPERMAT® laboratory dissolver into a bead mill only 3 things are necessary: a milling tool, a double wall container and milling beads. The use of a double wall, coolable container is essential otherwise the mill base would heat up to an unacceptable level. For the milling process the mill base and the beads are filled in a corresponding container and stirred with the milling tool. When the milling process is completed the mill base is poured together with the milling beads into a sieve and separated by stirring with a spatula.

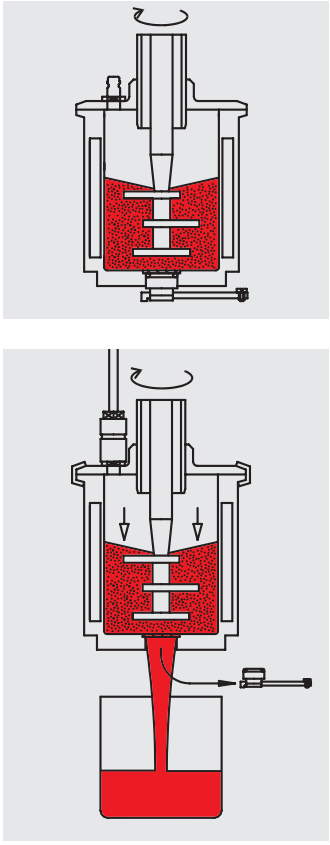




The comfortable way for milling with the APS milling system

For the comfortable way to convert a laboratory dissolver into a bead mill you need three things: a milling tool, an APS system and milling beads. For the milling process the millbase and the beads are filled into a suitable APS system and then the millbase is dispersed. A very high millbase yield is achieved due to the fact that it is pressed out pneumatically after the milling process. Milling beads are retained in the milling container by a sieve.

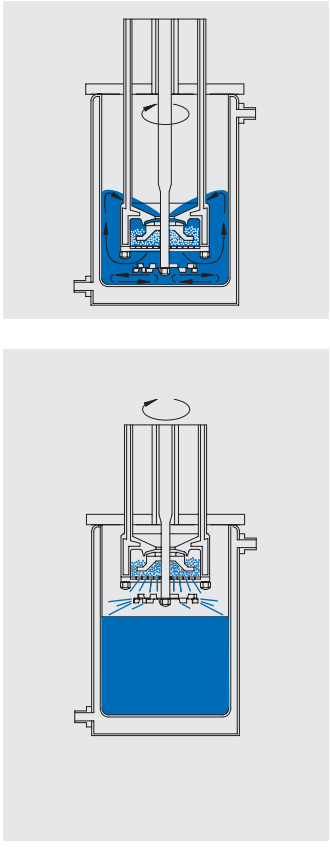
Technical facts:
APS-system: page 76-79
Milling tools: page 85
Milling beads: page 84



The exceptional way for milling with the grinding system TML

A further possibility to convert a DISPERMAT® laboratory dissolver into a bead mill is to use the TORUSMILL®, TML. The grinding system is a basket mill which consists of a double walled, coolable basket with a sieve bottom. During the operation the grinding basket which is filled with beads is lowered into the double walled container with millbase and the millbase is dispersed.
When the milling process is completed the grinding basket is raised and product residue in the grinding basket is centrifuged out by briefly running the milling tool.

Technical facts:
TML-system: page 80-83
Milling beads: page 84



Convert the Laboratory Dissolver into a Closed Vertical Bead Mill

APS Milling System

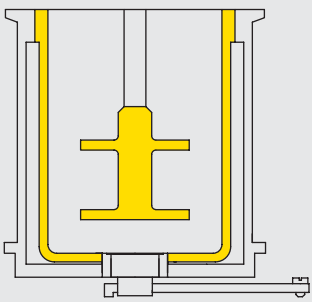
When combined with the APS Milling System and a suitable impeller the DISPERMAT® laboratory dissolver is converted into a closed, batch bead mill.

The APS milling system can be easily fitted to any DISPERMAT®.

DISPERMAT® AE6-C, with APS 1000

Special advantages

- Closed, easy to use milling system
- Simple and secure handling
- Easy cleaning, allowing rapid change of material
- High material yield due to pneumatic press-out-system
- Double walled milling container for cooling or heating
- Cooling liquid is contained by self-sealing quick couplers
- Millbase separation from bead charge by a sieve, integrated in the base of the container
- Sealing of sieve by simple plug system
- Movable cover with compressed air connection
- Cover fastened by quick-clamping ring
- Interchangeable milling tool
- Mounting plate with bayonet fixing for milling container
- Product collecting vessel



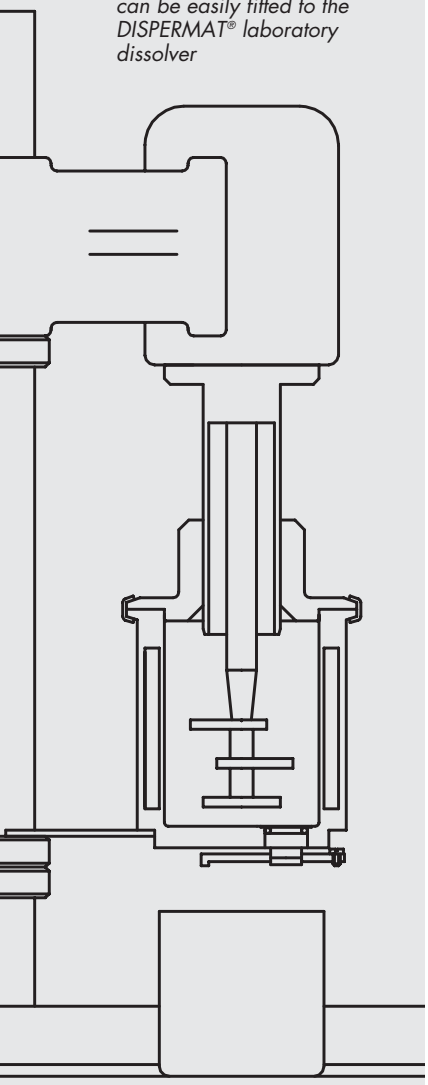
The APS milling system is also available in ceramic

Convert the Dissolver into a Closed Vertical Bead Mill

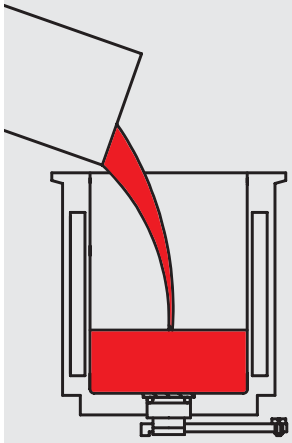
Technical data

APS system	Container capacity ml	Milling tool		Milling beads approx. ml	Millbase quantity approx. ml
APS 30	30		EMS T 20	12	12
APS 50	50		DMS 28	20	20
APS 125	125	MICRO,	DMS 32	50	50
APS 250	250	MINI,	DMS 45	100	110
APS 500	500	MC25,	DMS 60	200	210
APS 1000	1000		DMS 70	400	430
APS 3000	3000		DMS 100	1200	1280
APS 5000	5000		DMS 130	2000	2130

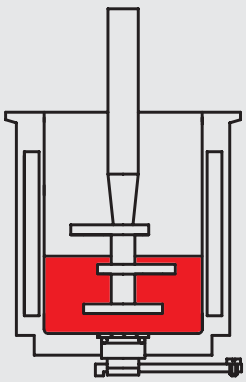
The Milling System APS can be easily fitted to the DISPERMAT® laboratory dissolver



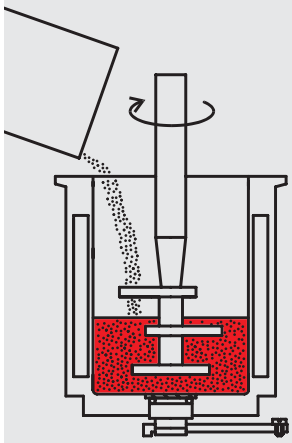
It is filled with the appropriate quantity of millbase



The milling tool is lowered



The milling beads are introduced whilst the milling head is rotated slowly



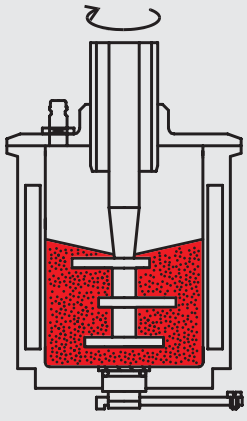
System Recommendation APS/DISPERMAT®

APS system	recommended DISPERMAT® type
APS 30 - APS 500	all DISPERMAT® dissolver
APS 1000	CA 40/60, FT, F105, CN 05/10/20 AE01 bis AE10
APS 3000	AE4 bis AE10, außer AE5
APS 5000	AE6 bis AE10

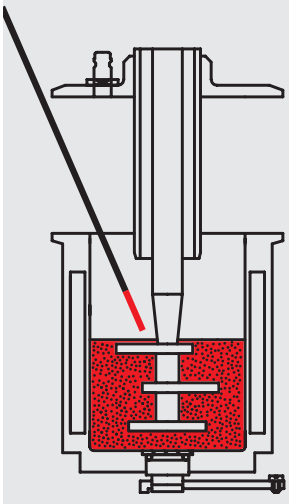
The mechanical power which is transferred into the substance by the motor depends on container size , the speed and the amount of milling beads as well as the viscosity of the millbase.

It is not easy to determine which DISPERMAT®/APS system combination is the most suitable. However, the table can be used to determine right combination of DISPERMAT® (dissolver)/APS-(system).

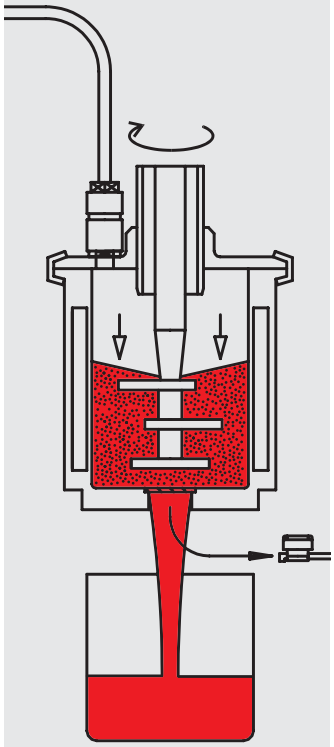
The sliding cover is lowered to seal the milling container. The millbase is then dispersed



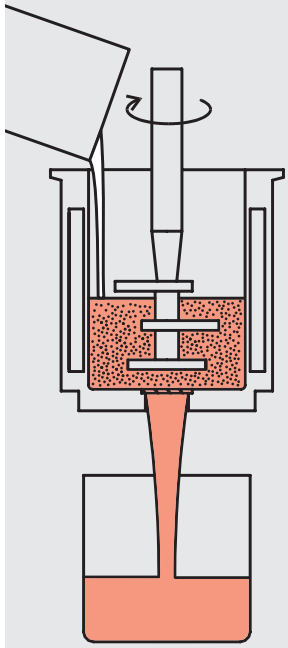
The cover can be easily raised for taking samples during the dispersion process



On completion of the dispersion process, the sieve sealing plug is removed and the milling container is discharged with assistance of compressed air



The milling container is flushed with a suitable cleaning fluid



Convert the DISPERMAT® Laboratory Dissolver into a closed vertical Basket Mill with the patented TORUSMILL® Dispersion System

Basket Milling System TML 1 / TML 5

The addition of the TML 1 converts the DISPERMAT® into a closed double walled basket milling system.
After the pre-dispersion is completed, the dissolver shaft can be replaced by the TML basket mill without the need for any tools.

Basket mills are extremely efficient grinding systems comprising of a grinding basket that is lowered into the millbase for dispersion.

During operation the grinding basket stands still while the milling shaft to which the milling tool, dissolver disc and pump wheel are fastened, rotates. The rotating milling tool agitates the beads inside the basket which disperses the millbase. The dissolver disc at the tip of the shaft and the pumping wheel generate effective circulation of the millbase, helping to provide excellent dispersion results in a short period of time.

The TML 1 basket milling system includes a special adapter flange which enables it to be fitted to a DISPERMAT® without the need for any tools.

If the standard dissolver shaft and the TML 1 basket milling system are frequently interchanged, an additional DL dissolver shaft is recommended (see page 82).

DISPERMAT® AE6-C with TML 1

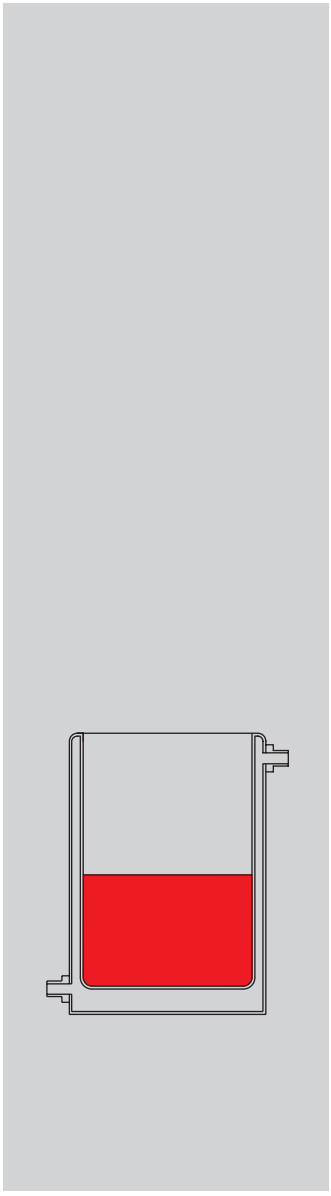
Special advantages

- Milling chamber volume 65 ml
- Bead filling volume 50 - 80 %
- Excellent product circulation via the dissolver disc and pump wheel
- Double walled grinding basket for cooling or heating
- Excellent dispersion results in a short time
- Highly reproducible dispersion results
- Basket mill systems are easy to clean, allowing for quick product changes
- Uniform average residence time
- Narrow particle size distribution
- Environmentally friendly dispersion in a closed system
- Low energy requirement
- No dead areas due to effective millbase circulation

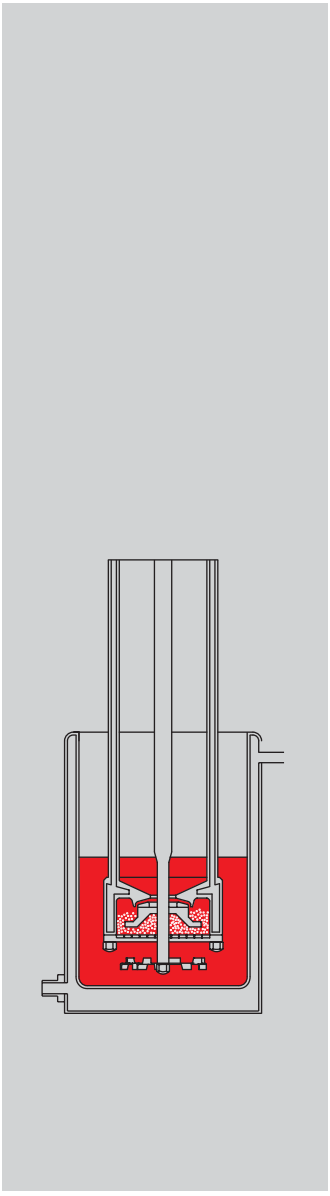
Type	Volume of the milling chamber	Filling ratio of the beads	Recommended container size	Mill base volume
TML 1	65	50 - 80%	1,2,3	50 – 75 % of the container size
TML 5	180	50 - 80%	5,7,10	

TML Basket Milling System

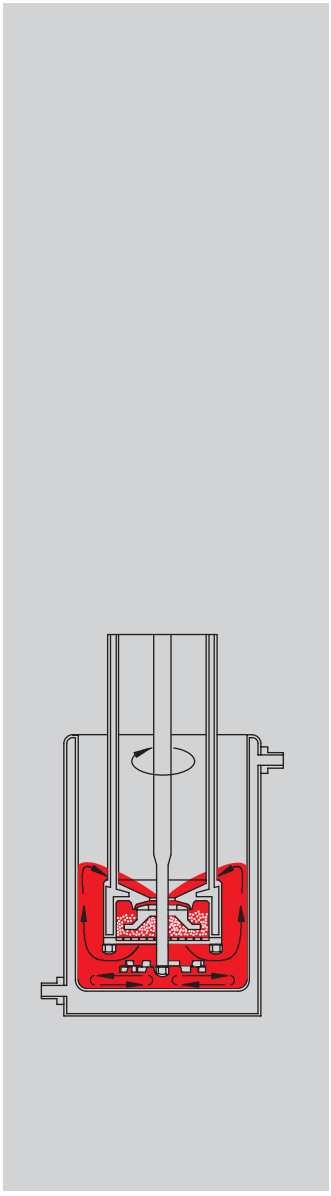
Dissolver shaft DL



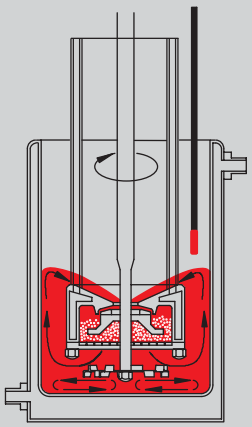
The pre-dispersed millbase.



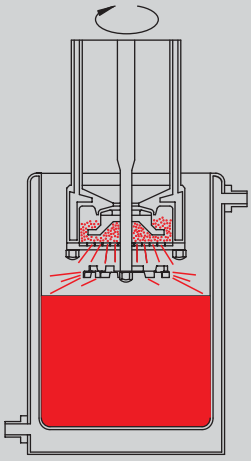
The double walled grinding basket filled with beads is lowered into the millbase.



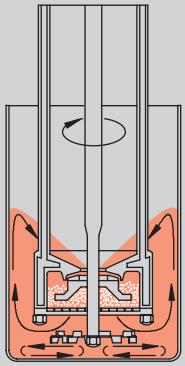
Intense circulation of the product is generated with the dissolver disc and integrated pump wheel.



For assessment of the milling process – during dispersion – a product sample can be taken at any time.



When the milling process is complete, the grinding basket is raised. Product residue in the grinding basket is centrifuged out by briefly running the milling and the dissolver discs.



Cleaning the milling system is carried out with a suitable cleaning fluid in a separate container.

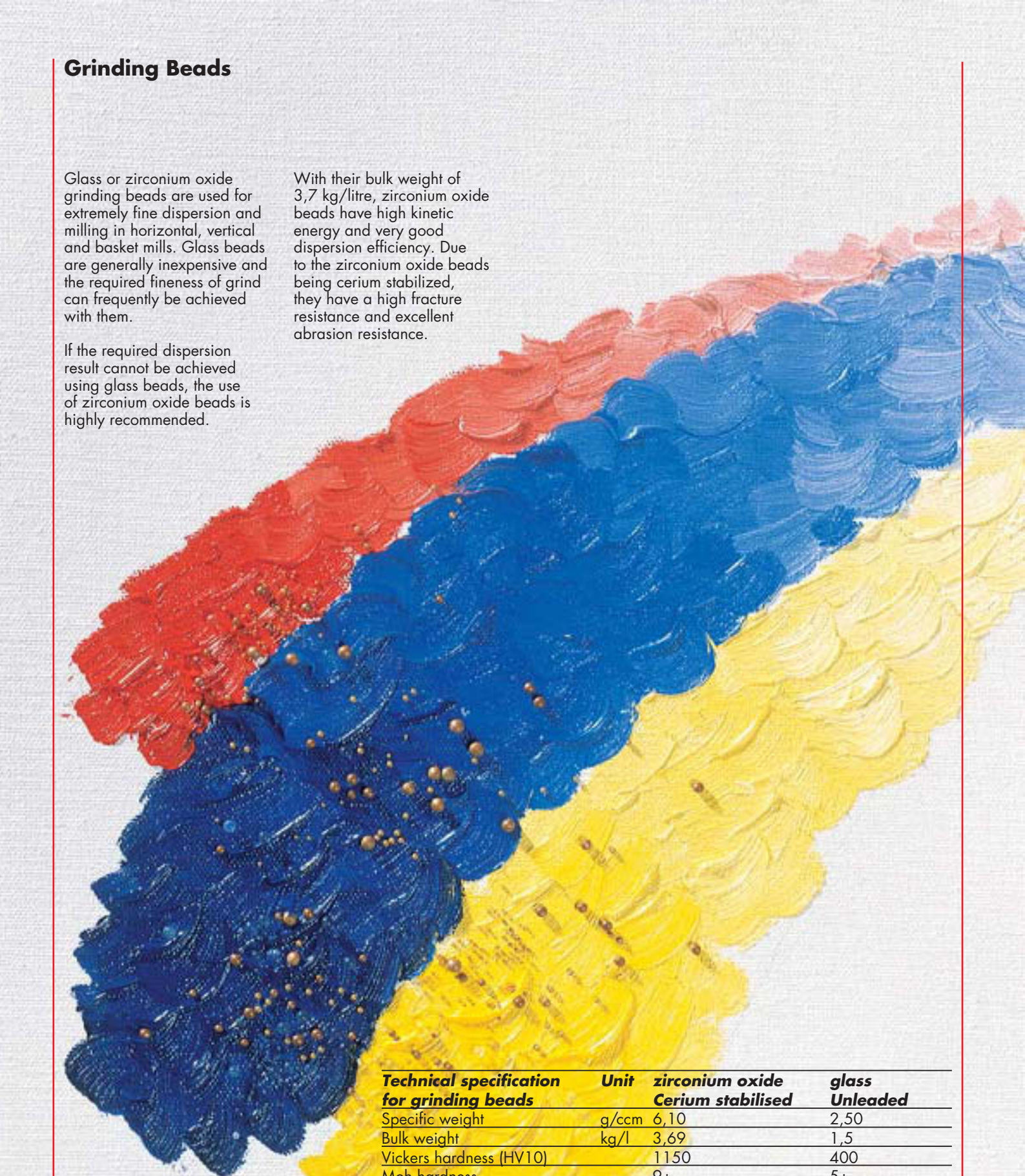
TML
basket milling system

Grinding Beads

Glass or zirconium oxide grinding beads are used for extremely fine dispersion and milling in horizontal, vertical and basket mills. Glass beads are generally inexpensive and the required fineness of grind can frequently be achieved with them.

If the required dispersion result cannot be achieved using glass beads, the use of zirconium oxide beads is highly recommended.

With their bulk weight of 3,7 kg/litre, zirconium oxide beads have high kinetic energy and very good dispersion efficiency. Due to the zirconium oxide beads being cerium stabilized, they have a high fracture resistance and excellent abrasion resistance.



Technical specification for grinding beads	***Unit***	***zirconium oxide Cerium stabilised***	***glass Unleaded***
Specific weight	g/ccm	6,10	2,50
Bulk weight	kg/l	3,69	1,5
Vickers hardness (HV10)		1150	400
Moh hardness		9+	5+
Rupture load on 2 mm grain	kg	>250	40
Abrasion *) by comparison	%	0,065	3,728
Available sizes		0,4 - 0,7 mm	0,5 - 0,75 mm
		0,7 - 1,2 mm	1,0 - 1,25 mm
		1,2 - 1,7 mm	1,55 - 1,85 mm
		1,7 - 2,4 mm	1,7 - 2,0 mm
		2,4 - 2,8 mm	2,0 - 2,3 mm
		2,8 - 3,3 mm	2,3 - 2,6 mm

*) The abrasion quoted refers to comparative experiments and refers to percentage weight loss of the beads.

Other bead sizes, materials or size distributions available on request

Milling tools

Milling tool	Ø x height in mm	Container capacity in ml	Milling beads approx. in ml	Millbase quantity approx. in ml
MICRO	28 x 17	125	50	50

MINI	40 x 30	250	100	100

MC 25	60 x 42	500	200	200

EMS T20	20 x 5	30	12	12
EMS T30	30 x 5	125	50	50
EMS T45	45 x 5	250	100	100
EMS T60	60 x 5	500	200	200
EMS T75	75 x 5	1000	400	400
EMS T90	90 x 5	2000	800	800

DMS 28	28 x 22	50	20	20
DMS 32	32 x 30	125	50	50
DMS 45	45 x 38	250	100	100
DMS 60	60 x 50	500	200	200
DMS 70	70 x 58	1000	400	400
DMS 80	80 x 85	2000	800	800
DMS 100	100 x 95	3000	1200	1200
DMS 130	130 x 95	5000	2000	2000

MICRO, MINI, MC 25 = made of hardened chrome

EMS = teflon single milling impeller

DMS = polyamide double milling impeller

Triple milling tools and alternative materials of construction including ceramics available on request.

Introduction to Dispersion Technology with the Bead Mill DISPERMAT® SL

In many technical processes it is necessary to divide solid material into fine particles and distribute them evenly within a liquid carrier. This process is generally known as "dispersion".
During dispersion, the adhesive forces that act between the extremely fine solid matter powder particles must be overcome. When the requirements on fineness are high or the solid matter is difficult to disperse, a dispersion with the dissolver is often insufficient.

Due to their ability to process a wide variety of solid matters that are difficult to disperse, high speed bead mills have gained particular acceptance.

Function and task of the bead mill

In the dispersion process, three partial steps run in parallel:

1. The wetting of the surface of the solid matter to be processed, by liquid components of the millbase.

2. The mechanical division of agglomerates into smaller agglomerates and primary particles.

3. The stabilisation of primary particles, agglomerates and aggregates against renewed attraction (= flocculation).

While the stabilisation against flocculation is primarily a property of a colloid-chemical system, which depends on the interaction of the liquid components (in varnishes for instance: binders, solvents and additives) with the solid matter parts (e.g. pigments and fillers) or on that of the solid particles with each other, the dispersion machinery used plays a vital part in the mechanical division and more important aids the wetting process.

The actual dispersion system in a bead mill consists of a milling chamber and an agitator; the milling chamber is filled with the grinding beads (material e.g. glass, zircon oxide, steel) and the product to be dispersed. In the milling vessel, the grinding medium is kept moving by the agitator, which itself is driven by a motor. The dispersion process takes place between the grinding beads sliding on each other and between the rotor and/or the vessel sides and the grinding beads.

The Step of Mechanical Division in Dispersion

Just like the dispersion, the mechanical process can be divided into the three steps

- wetting
- mechanical division
- flocculation stabilisation

The step of mechanical division can itself also be separated. To enable the agglomerates to be dispersed, they must

- get into a dispersing situation, e.g. into the shearing zone between two grinding beads (spatial condition) and
- be stressed enough so that they break (energetic condition).

The mechanical division may be illustrated by comparing it with the attempt to crack a nut with a hammer.

In order to break the shell, the nut must be hit in the first place (spatial condition), but it must also be hit hard enough (energetic condition). For a proper understanding it is important to realise that both conditions - spatial and energetic - must be fulfilled at the same time. Although this model may seem rather trivial, it clearly demonstrates the function of a dispersing machine.

In principle the validity of the model can be proved with any dispersing instrument. For reasons of simplicity, one should imagine a batch bead mill, filled with a millbase which with progressing state of dispersion illustrates a measurable change of a technical property. In paints, this may for instance be the colour strength, the gloss, the viscosity or the fineness (to be measured with a Hegman Gauge according to DIN 53203). Our example uses colour strength. When all operating parameters, grinding bead filling quantity, bead type, speed, cooling etc. are kept constant, the measured colour strength reaches a finite value related to the time of dispersion. Longer dispersion will not improve the colour strength. Only by increasing the speed it is possible to further increase the colour strength.

The reason for this behaviour is that in a very long dispersion all agglomerates have the opportunity to get into the zones of the maximum shearing effect. Those that are dispersed under these conditions cause a visible increase in the colour strength. Those that have such a high stability that they are not divided under the conditions of the maximum available shearing effect, are still undispersed. By increasing the speed, zones with stronger shearing effect develop where more stable agglomerates can also be dispersed.Therfore, the colour strength may continue to rise with increased speed.

Only after a sufficiently long dispersion time combined with sufficiently high speeds, can it be expected that all agglomerates are dispersed. Only then the spatial as well as the energetic conditions required for a full dispersion are met. Too low a speed can generally not be compensated by longer dispersion and vice versa.

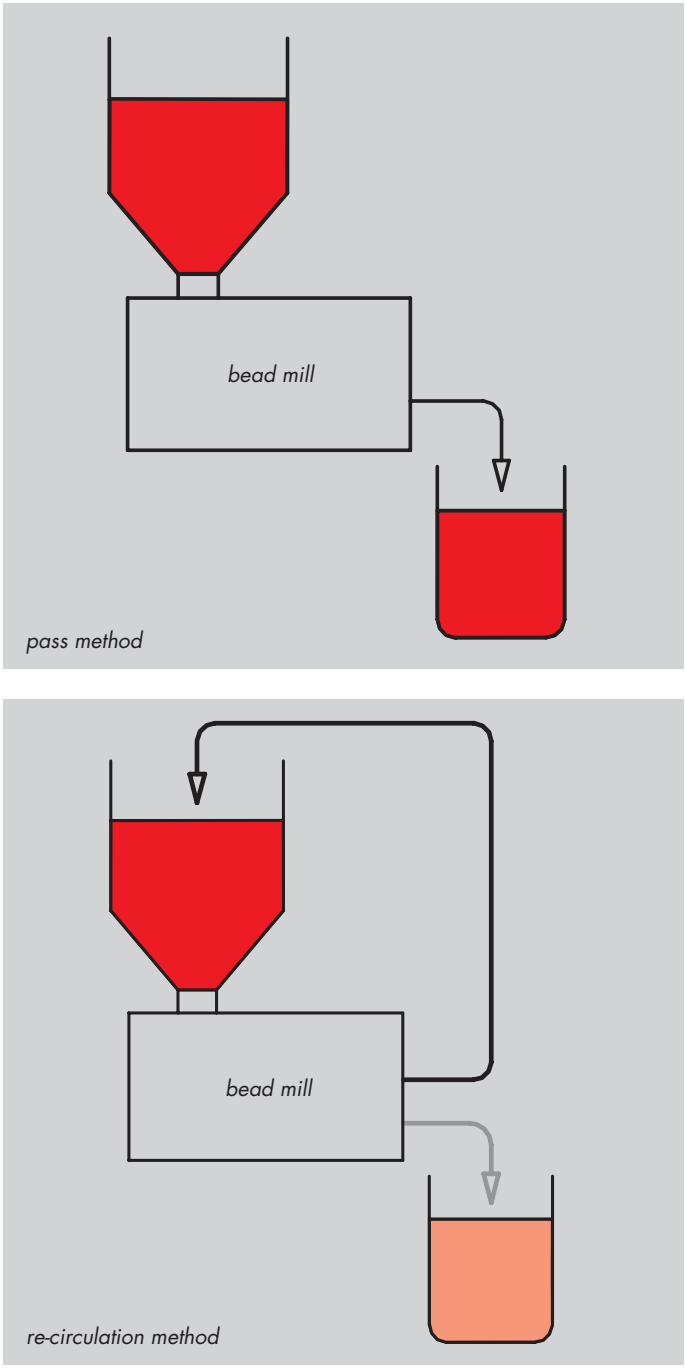
Pass and re-circulation method

In principle, two methods can be distinguished in the operation of the DISPERMAT® SL bead mills.

Either, the complete millbase is collected after each pass through the bead mill (single or multiple pass), or else the millbase is fed directly back into the supply vessel from the outlet of the milling chamber (re-circulation method).

In the single pass method, the product is filled into a feed vessel and pressed through the milling chamber via continuously adjustable pneumatic transport system or with the feed press.

In the re-circulation method, the product is filled into the feed vessel and repeatedly pumped through the milling chamber with an integrated, continuously adjustable pumping and stirring system.



schematic view of pass and re-circulation method

The method of operation to be chosen depends on the type of task. Easily dispersible pigments can often be processed with the single pass method, whereas with pigments that are more or difficult to disperse the re-circulation method is more efficient.

Over a period of time the re-circulation method ensures , that every agglomerate will get into a dispersion situation. Here, it has spatial and energetic condition and is dispersed. This means that the re-circulation system is more efficient and economic.

Relationship between Power Input and Dispersion Result

Basic scientific research has shown that the mechanical power that is transferred into the millbase is closely related to the dispersion result.
The mechanical power determines the energy that is transmitted by the agitator via the grinding beads to the product.
The power P is calculated from the speed n of the agitator and the torque M generated on the agitator according to the following equation:

$$P = 2 \pi n M$$

Where:
P power [Nm/s = J/s = W]
π = 3,141...
n speed [1/s]
M torque [Nm]

The higher the energy density, the greater the probability that more stable agglomerates are also dispersed.

It does not matter whether the power input which leads to the existing energy density, is applied with a high speed and low torque or vice versa. With a given bead charge and dispersion time, the dispersion result depends only on the amount of the mechanical power.

The torque therefore depends directly on the flow characteristics of the millbase. If the viscosity changes during dispersion at constant speed, the power input changes automatically.

If the viscosity decreases during dispersion, the mechanical power drops, and if it increases, the mechanical power rises. If the formulation is processed with more cooling, the power input is higher, and with less cooling it is lower.

This for example, is the reason why dispersion results may literally depend on the season, because in winter, the cooling water may be much colder than in summer!

The DISPERMAT® SL-C solves this problem by enabling the mechanical power input for dispersion to be pre-set. During dispersion the torque of the rotor is continuously measured and the speed controlled, so that the product of n and M leads to precisely the pre-set mechanical power.
Apart from the agitator geometry and the viscosity of the millbase, the torque transmitted by the shaft onto the millbase also depends on the type, quantity and size of the grinding beads. High bead filling volumes increase the torque on the agitator shaft and also increase the probability that agglomerates come into a spatial dispersion situation.

Steps to Improve Dispersion Results

The relationship between the effects of energy and time enables the dispersion process to be optimised.

If the required dispersion result is not achieved, it must first be determined whether this can be changed by increasing the dispersion time.
The power input can be increased with higher speeds. This will normally improve the dispersion.
Smaller and/or harder beads (e.g. zircon oxide or steel) can also improve the dispersion result. Further, the bead charge can be increased to about 80%.
In order to operate the bead mill economically, dispersion should be made with as much solid matter as possible.
If after the dispersion there is some flocculation, a suitable dispersing aid may help. A partial modification of the millbase formulation by using more suitable raw materials can also be made.

How can the dispersion result be improved ?

- increased dispersion time
- increased speed
- increased mechanical power input
- improved cooling
- smaller or harder beads
- increased bead charge
- modification of the millbase (e.g. by using additives)

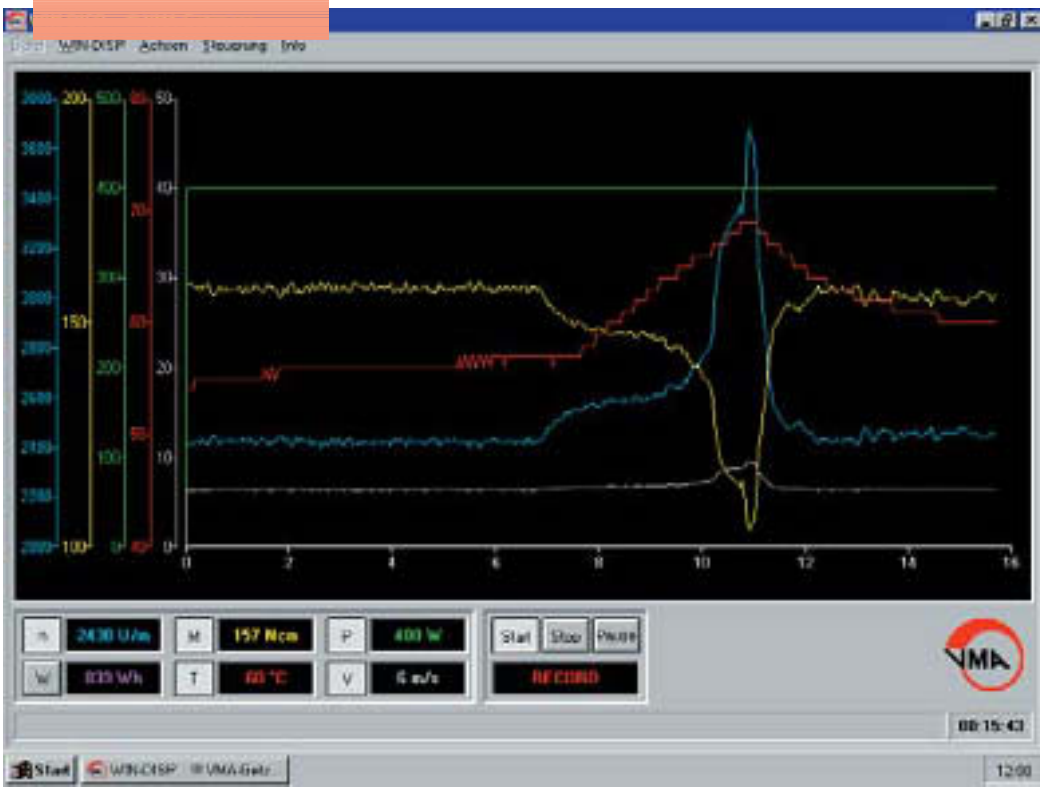
DISPERMAT® SL-C EX,
optional: double walled stainless steel supply vesselhl

Hint
Here is WIN-DISP an excellent tool for the recording and documentation of dispersion results.

Transfer of Laboratory Tests to Industrial Production

Considering the many influences on the spatial and energetic conditions of dispersion and their difference in various bead mills, it is not surprising to learn that the transfer of the results from one machine to another is not automatically possible. Even if the same bead mill is used, but with different disks, the dwell time distribution of the millbase will be changed and, despite the same number of passes (single pass) or same dispersion time (re-circulation mode) the dispersion result will also change.

Nevertheless, if different bead mills are to be compared with each other, it is generally the case that production machines have less adjustment possibilities. First, the typical result has to be determined on a known millbase.



With this typical result (e.g. fineness), a test series should be made with the DISPERMAT® SL-M laboratory bead mill.The impeller speed should be adjusted and the dispersion continued until the result matches that which can be achieved in production.
If a DISPERMAT® SL-C is available, the tests should be made using mechanical power input.

When comparable results have been achieved, the settings on the DISPERMAT® SL can be used to determine results that are possible in production.

When milling with constant power input, not only can complicated dispersion processes be performed in a reproducible manner, but different dispersions can be compared exactly.
The dispersion results from production machinery are easily repeated with the DISPERMAT® SL-C and formulations worked out in the laboratory can be transferred into production.
With the DISPERMAT® SL-C, problematic parameters like product temperature, cooling water temperature or rheological behaviour of the mill base, may be ignored as long as they do not reach limits critical for the product.

Bead Mills

Laboratory and Pilot Plant Bead Mills

DISPERMAT® SL-C

DISPERMAT® SL-C EX

DISPERMAT® SL-M

DISPERMAT® SL-M EX

Feeding Presses and Accessories

Feeding Presses

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Accessories

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DISPERMAT® RS 5 RS 5 EX

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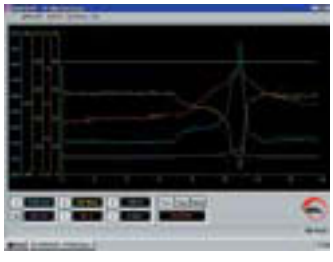


Software WIN-DISP

page 22

Bead Mills

DISPERMAT® SL-C EX,
with double walled supply vessel

DISPERMAT® SL
DISPERMAT® SL EX
DISPERMAT® RS 5
Software WIN-DISP

The DISPERMAT® range of horizontal bead mills includes instruments for applications, including research and development, quality assurance and production of larger quantities.

DISPERMAT® SL

DISPERMAT® SL laboratory and pilot plant bead mills are closed, horizontal bead mills with high output and extremely low dead volumes in the millbase inlet and outlet pipes. During the dispersion process, the product to be dispersed is fed through the horizontal milling chamber and continuously dispersed.
The DISPERMAT® SL bead mills can be used for the pass as well as for the re-circulation process. After the dispersion, the integrated air pressure system presses the remaining millbase out of the milling chamber which allows an almost complete recovery of the dispersed material.
Due to minimised dead volumes, even the smallest quantities can be dispersed with a high yield.

Therefore the DISPERMAT® SL is an ideal tool for Research, Development and Quality Control.
Also, larger quantities can be processed within a very short period of time. In order to minimise the product loss, the mill base is transported directly from the supply vessel into the milling chamber. The dispersed product passes through the millbase separation (dynamic gap) and is recovered either in a vessel (pass method) or flows back into the supply vessel (re-circulation method).

DISPERMAT® SL-C,
optional: Stainless steel supply vessel

- Quick and cost-effective development of new formulations through exact reproducibility of dispersions.
- Quick and reliable transfer of laboratory development into production because of quantitative knowledge of the required mechanical power input.
- Quality control and assurance of production.
- Efficient control of incoming raw materials by measuring product properties relevant for the application.

DISPERMAT® SL-M,
optional: stainless steel double walled supply vessel
and integrated pumping and stirring system

DISPERMAT® SL-C EX,
optional: stainless steel double walled supply vessel

DISPERMAT® SL-M EX,
optional: stainless steel double walled supply vessel
and integrated pumping and stirring system

Milling System

- Milling system (stainless steel milling chamber, nitride steel milling rotor)

Option:

- hard metal
- ceramic (ZrO_2)

- Millbase separation by dynamic gap
- Volume of milling chamber: 50, 125, 250, 500, 1000 and 2000 ml
- Master-batch from 50 ml to 50 l
- Shaft seal by means of mechanical seal, built into easy to install cartridge system integrated, pressurised and cooled lubrication liquid
- Minimised dead volume
- Dispersion of small quantities of millbase is possible due to almost complete product recovery
- Very high millbase yield
- Excellent temperature transfer due to veined cooling water system with extremely large surface area
- Cooling water connections: two self-sealing fittings and two quick couplers
- Milling beads of glass, zirconia etc.

Operation

- Easy to use and secure to handle
- Easy cleaning, allowing rapid change of material

Procedure

- One-pass-procedure and continuous pass procedure
- Circulation procedure with integrated pumping- and stirring system
- Dispersion of flowing and non-flowing products
- High mechanical power input permits processing of difficult to disperse systems

Patented World Wide DISPERMAT® SL-C Process Control

- Excellent process control through measurement and recording of speed, power input, torque, work, product temperature and peripheral speed of the milling rotor.
- Operation with either: constant speed or constant power.

DISPERMAT® SL-M

- infinitely variable speed
- speed and temperature indication

Dispersing with Constant Mechanical Power Input - DISPERMAT® SL-C - Patented

Bead mills are used to disperse (finely divide) solid material into liquid a phase. The actual dispersing system consists of a chamber and a rotor; the chamber is filled with grinding beads and the product to be dispersed.

While in conventional bead mills, the rotational speed is an easily adjustable parameter, the torque strongly depends on the rheology of the mill base. These flow characteristics again strongly depend on the temperature of the mill base. Therefore, during the course of a dispersion at constant rotor speed, the torque and the power input into the product changes in an uncontrolled manner.

With the world wide patented DISPERMAT® SL-C the operating parameters of speed, torque, power input and product temperature are continuously measured and displayed. Operating at constant speed (conventional bead mills) provides information on the changes in the other parameters which affect the milling process.

However, the most valuable insight into the dispersion process is only provided by operation with "constant power input".

Basic scientific research has shown that the mechanical power that is transferred into the millbase is closely related to the dispersion result. The mechanical power determines the energy that is transmitted by the agitator via the grinding beads to the product.

DISPERMAT® SL-C
with stainless steel supply vessel

The power P is calculated from the speed n of the agitator and the torque M generated on the agitator according to the following equation:

$P = 2 \pi n M$

Where:
P power [Nm/s = J/s = W]
π = 3,141…
n speed [1/s]
M torque [Nm]

It does not matter whether the power input which leads to the existing energy density, is applied with a high speed and low torque or vice versa. With a given bead charge and dispersion time, the dispersion result depends only on the amount of the mechanical power.

The torque therefore depends directly on the flow behaviour of the millbase. If the viscosity changes in a dispersion at constant speed, the power input changes automatically. If the viscosity decreases during dispersion, the mechanical power drops, and if it increases, the mechanical power rises. If the formulation is processed with more cooling, the power input is higher, and with less cooling it is lower.

This for example, is the reason why dispersion results may literally depend on the season, because in winter, the cooling water may be much colder than in summer!

The DISPERMAT® SL-C solves this problem by permitting the mechanical power input for dispersion to be pre-set. During dispersion the torque of the rotor is continuously measured and the speed controlled, so that the product of n and M leads to precisely the pre-set mechanical power.

Compared with conventional bead mills, the DISPERMAT® SL-C has many advantages in applications where, exact reproducibility and process control are important, for instance in research and development, for checking incoming raw materials and in quality assurance.

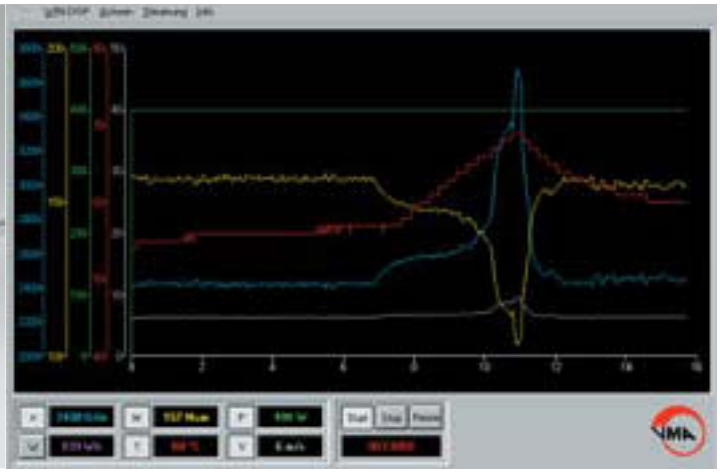
When milling with constant power input, not only can complicated dispersion processes be performed in a reproducible manner, but different dispersions can be compared exactly. The dispersion results from production machinery are easily repeated with the DISPERMAT® SL-C and formulations worked out in the laboratory can be transferred into production. With the DISPERMAT® SL-C , problematic parameters like product temperature, cooling water temperature or rheological behaviour of the mill base, may be ignored as long as they do not reach limits critical for the product.

DISPERMAT® SL

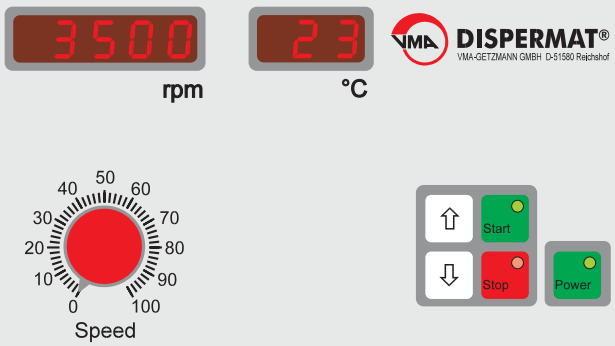
DISPERMAT® SL-M, optional: stainless steel supply vessel, with integrated pumping and stirring system

	Type	Milling chamber volume in ml	Power in kW	Voltage/ frequency in V/Hz	Speed in rpm	Recommended millbase volume
DISPERMAT®	SL-M5	50	1,1	230/50	0 - 6000	50 - 500 ml
DISPERMAT®	SL-M12	125	1,1	230/50	0 - 6000	100 - 750 ml
DISPERMAT®	SL-M25	250	2,2	400/50	0 - 6000	200 - 2500 ml
DISPERMAT®	SL-M50	500	3	400/50	0 - 6000	0,5 - 10 l
DISPERMAT®	SL-M100	1000	3	400/50	0 - 3000	1 - 20 l
DISPERMAT®	SL-M200	2000	4	400/50	0 - 3000	2 - 50 l
DISPERMAT®	SL-C5	50	1,1	230/50	0 - 6000	50 - 500 ml
DISPERMAT®	SL-C12	125	1,1	230/50	0 - 6000	100 - 750 ml
DISPERMAT®	SL-C25	250	2,2	400/50	0 - 6000	200 - 2500 ml
DISPERMAT®	SL-C50	500	3	400/50	0 - 6000	0,5 - 10 l
DISPERMAT®	SL-C100	1000	3	400/50	0 - 3000	1 - 20 l
DISPERMAT®	SL-C200	2000	4	400/50	0 - 3000	2 - 50 l

DISPERMAT® SL-C, optional: stainless steel supply vessel

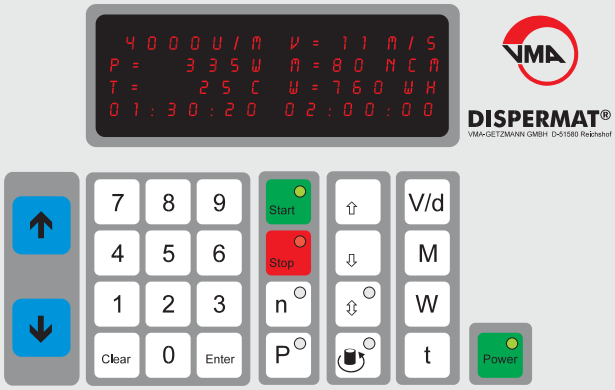


Software WIN-DISP



DISPERMAT® SL-M

The DISPERMAT® SL-M bead mills have an variable speed control. The compact instrument control panel is conveniently located in the stylish housing. Speed and product temperature are shown on a digital display.



DISPERMAT® SL-C

with process control measurement of:

- Speed (rpm)
- Power input (W)
- Torque (Ncm)
- Work (Wh)
- Product temperature (°C/°F)
- Peripheral speed of impeller (m/s, ft/min)

The DISPERMAT® SL-C enables a dispersion at either "constant speed" or "constant power". The measured values are shown on a digital display. A serial port enables the data to be transmitted to a PC for processing with WIN-DISP software (see page 22).

DISPERMAT® SL-EX

The DISPERMAT® SL-EX laboratory and pilot plant bead mills are designed for operation in areas where explosion proof equipment is required.

The main motor, as well as the control panel are explosion-proof.

Only the enclosure with the built-in power electronics is not explosion-proof and has to be located outside the hazardous area.

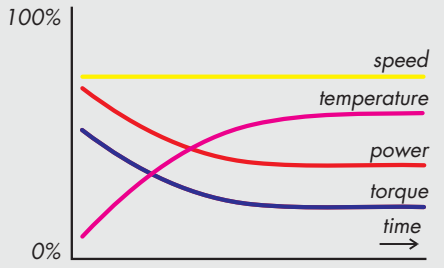
Process technology of the DISPERMAT® SL-EX is the same as the DISPERMAT® SL.
(see page 90-91)

DISPERMAT® SL-C EX,
optional: double walled stainless steel supply vessel

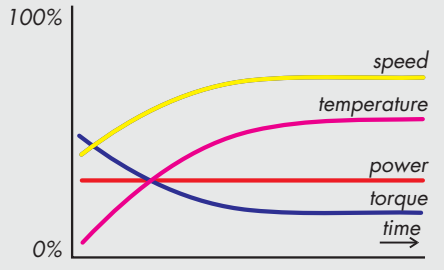
The designation of explosion-proof areas and correct choice of equipment should be carried out by suitably qualified personnel or by the appropriate authorities.

P = 2π n M

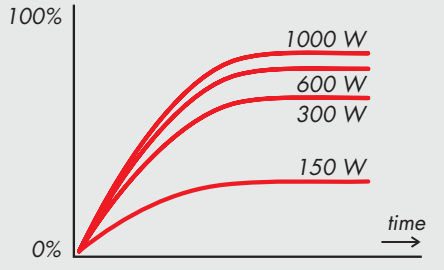
Dispersion with constant speed



Dispersion with constant mechanical power



Dependence of the dispersion result on the power input

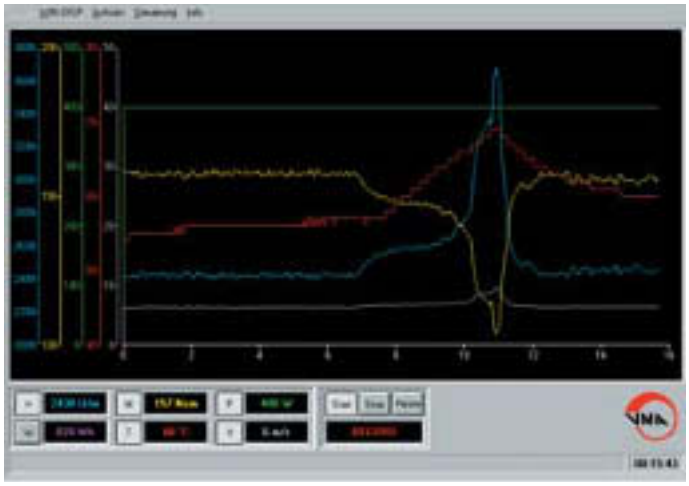


DISPERMAT® SL-EX

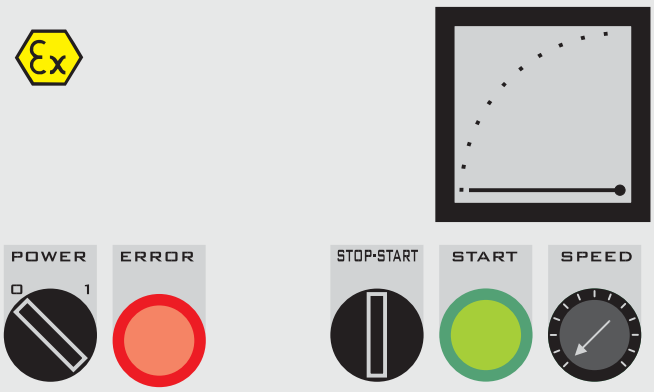
DISPERMAT® SL-M EX, optional: stainless steel double walled supply vessel, with integrated pumping- and stirring system

	Type	Milling chamber volume in ml	Power in kW	Voltage/ frequency in V/Hz	Speed in rpm	Recommended millbase volume
DISPERMAT®	SL-M5 EX	50	1,1	230/50	0 - 6000	50 - 500 ml
DISPERMAT®	SL-M12 EX	125	1,1	230/50	0 - 6000	100 - 750 ml
DISPERMAT®	SL-M25 EX	250	2,2	400/50	0 - 6000	200 - 2500 ml
DISPERMAT®	SL-M50 EX	500	3	400/50	0 - 6000	0,5 - 10 l
DISPERMAT®	SL-M100 EX	1000	3	400/50	0 - 3000	1 - 20 l
DISPERMAT®	SL-M200 EX	2000	4	400/50	0 - 3000	2 - 50 l
DISPERMAT®	SL-C5 EX	50	1,1	230/50	0 - 6000	50 - 500 ml
DISPERMAT®	SL-C12 EX	125	1,1	230/50	0 - 6000	100 - 750 ml
DISPERMAT®	SL-C25 EX	250	2,2	400/50	0 - 6000	200 - 2500 ml
DISPERMAT®	SL-C50 EX	500	3	400/50	0 - 6000	0,5 - 10 l
DISPERMAT®	SL-C100 EX	1000	3	400/50	0 - 3000	1 - 20 l
DISPERMAT®	SL-C200 EX	2000	4	400/50	0 - 3000	2 - 50 l

DISPERMAT® SL-C EX, optional: stainless steel double walled supply vessel



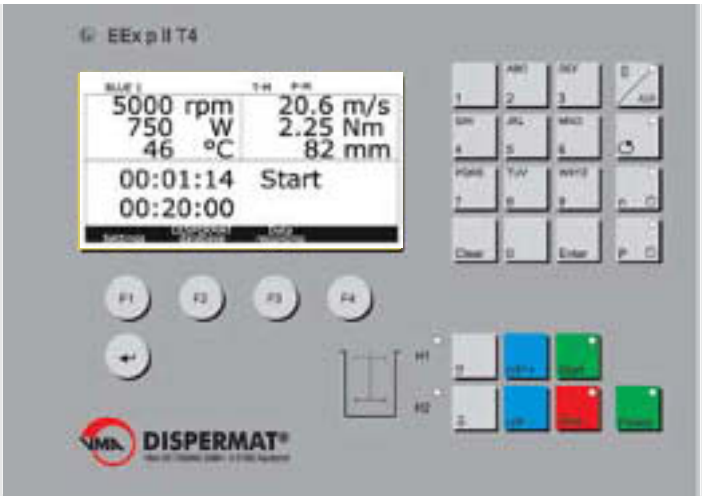
Software WIN-DISP



DISPERMAT® SL-M EX

The DISPERMAT® SL-M EX explosion proof bead mills have variable speed control.

The compact instrument control box is conveniently mounted at the mill. Speed and product temperature are indicated.



DISPERMAT® SL-C EX

with process control measurement of :

- Speed (rpm)
- Power input (W)
- Torque (Ncm)
- Work (Wh)
- Product temperature (°C/°F)
- Peripheral speed of impeller (m/s, ft/min)

The DISPERMAT® SL-C EX enables a dispersion at either "constant speed" or "constant power".
The measured values are shown on a digatal display. An RS 232 serial port enables the data to be transmitted to a PC for processing with WIN-DISP software (see page 17-22).

Accessories for the DISPERMAT® SL Bead Mill

FP and FP-EX Feeding presses

To process high viscosity and non-flowing materials with the bead mill, the feeding press system is required.

The feeding press with integral control panel uses a pressure piston to force the product through the milling chamber.

The DISPERMAT® SL supply vessel is removed and replaced with a solid stainless steel vessel (capacity 500 ml or 1000 ml).

After pouring the material into the vessel (if necessary, with a spatula), the press is attached to the vessel with a quick clamping ring.
The lifting/lowering speed of the pressure piston can be infinitely adjusted so that the flow rate of the material to be processed can be accurately set. When the piston reaches its lowest point, the press switches off automatically.The piston is raised and the press is moved aside after loosening the quick clamping ring. If a foil is placed between the vessel and piston prior to starting, the pressure piston does not require cleaning.

Feeding press FP 80 EX

Type	Supply vessel volume ml	Flow rate ml/s	Voltage/ frequency in V/Hz
FP 80	500	1 - 5	400/50
FP 80 EX	500	1 - 5	400/50
FP 100	1000	2 - 10	400/50
FP 100 EX	1000	2 - 10	400/50

Bead Mill
DISPERMAT® RS 5

The DISPERMAT® RS 5 is a horizontal bead mill for pilot plant and production applications. The compact, functional design ensures an extreme easy and safe handling as well as outstanding dispersing results.

- infinitely variable speed via modern frequency converter
- stirring shaft with double bearing is hollow for improved millbase heat transfer
- mechanical seal system with integrated cooled thermo-siphon container for lubrication liquid and safety pressure valve.
- adjustable dynamic gap bead separation system
- complete safety device
- simple central operation and control
- pressure control by manometer with electrical contact
- Non explosion-proof on request

DISPERMAT® RS 5 C-EX

- motor power: 15 kW
- speed: 0 - 2600 min^{-1}
- milling chamber volume: 5 l

The DISPERMAT® RS is also available explosion-proof on request

O-Rings for DISPERMAT® SL

The DISPERMAT SL are supplied with VITON (FKM – caoutchouc) O-rings as standard. Alternatively EPDM (ethylene propylene) O-rings can be fitted at no extra charge.

If VITON or EPDM is not compatible with the products being milled, O-rings made from one of the following perfluoroelastomeres are recommended:

- KALREZ®
- CHEMRAZ®
- PERLAST®

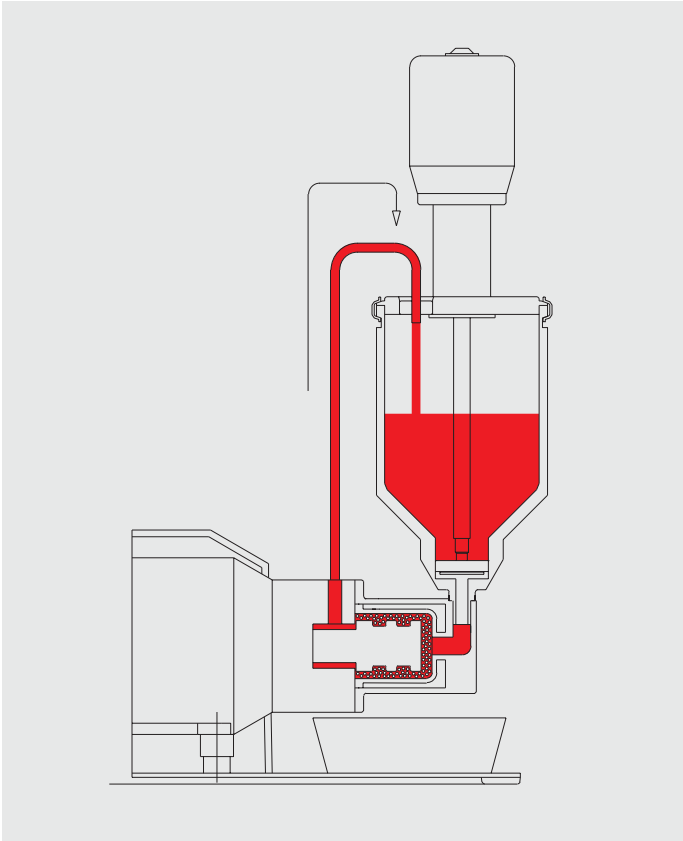
The following compatibility guide should help you to find the right solution.

	KALREZ® CHEMRAZ® PERLAST®	VITON	EPDM
acetaldehyde	2	4	2
acetone	1	4	1
amyl acetate	1	4	2
amyl alcohol	1	2	2
butadiene	1	2	4
butanol	1	4	4
butyl acetate	1	4	2
butanediols	1	1	1
butyl cellusolve	1	4	2
cyclohexanol	1	2	4
cyclohexanone	2	4	3
diethyl ether (ethyl ether)	1	4	4
diethylamine	1	4	3-4
diethylene glycol	1	1	1
dibutyl ether	1	4	3
dibutyl phthalate	1	3	2
dioctyl phthalate	1	2	3
acetic acid ethylester (ethyl acetate)	1	4	2-3
ethanolamine	1	4	1
ethyl acrylate	1	4	3
ethyl alcohol (ethanol)	1	3	1
ethyl benzene	1	2	4
ethyl cellulose	1	4	2
ethylenediamine	2	4	1
ethylene glycol	1	1	1
isobutyl alcohol	1	1	1
isobutyl ether	1	4	4
isopropanol (isopropyl alcohol)	1	1	1
isopropyl acetate	1	4	2
isopropyl ether	1	4	4
linseed oil	1	1	3
methyl metacrylate	1	4	4
metoxy butanol	1	1	1
methyl butyl ketone	1	4	1
methyl ethyl ketone	1	4	2
methyl cellusolve	1	4	2
methyl glycol acetate	1	4	1
methyl isobutyl ketone	1	4	3
methyl tertiary butyl ether	1	3	3
palmitic acid	1	1	4
petroleum ether	1	1	4
phthalic acid anhydride (phthalic anhydride)	1	1	3
propanol (propyl alcohol)	1	2	2
propyl acetate	1	4	2
propylene glycol	1	1	1
silicone oils	1	1	1
stearic acid	1	3	2
styrene	1	2	4
carbon tetrachloride	2	1	4
tetrachloro ethylene	1	2	4
tetrahydro furane	1	4	4
trichloro ethylene	2	2	4
toluene	1	2	4
triethanolamin	2	4	2
water	1	2	1
xylene	1	2	4

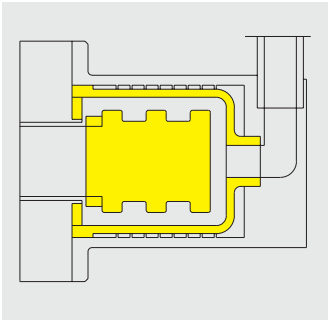
Legend	grade
recommended	1
probably satisfactory	2
marginal	3
unsatisfactory, not recommended	4

Additional Accessories

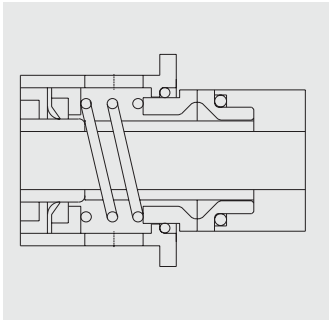
Integrated supply vessels and pumping and stirring systems: millbase volume from 50 ml to 5 l



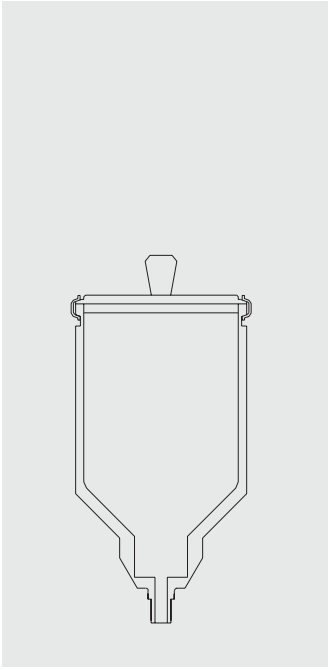
schematic view of DISPERMAT SL using re-circulation method



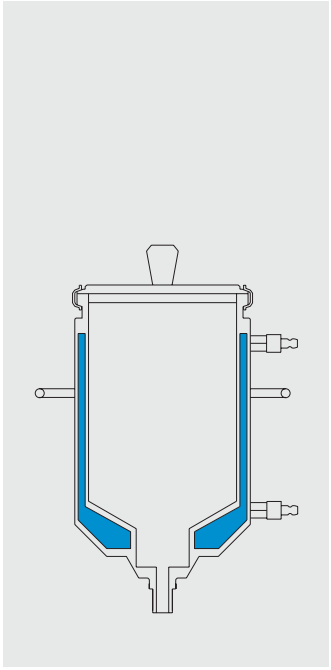
high alloy stainless steel milling system (standard)
optional:
- ceramic (ZrO_2)
- silicon carbide (SiSiC)
- hard metal



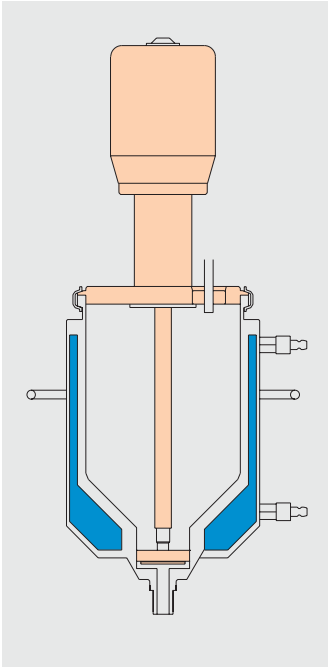
SiC mechanical seal cartridge



polyamide or stainless steel supply vessels
sizes available: 1, 3 and 5 l

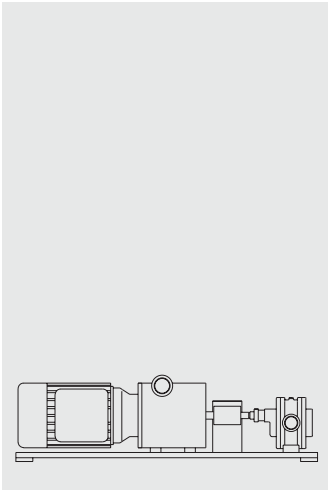


stainless steel double walled temperature control supply vessels, for cooling or heating the product
sizes available: 1 and 3 l

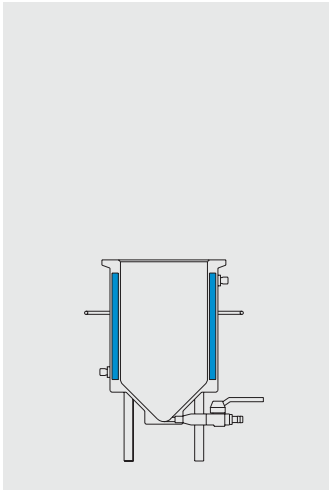


pumping and stirring systems for the closed circulation method
sizes available: for 1, 3 and 5 l supply vessels

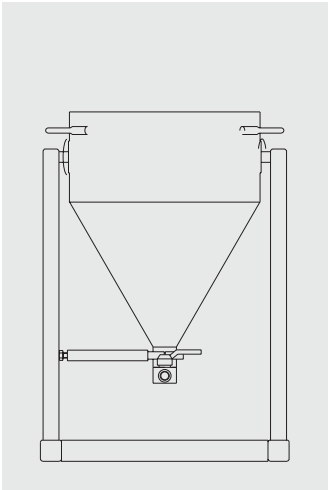
External supply vessels and pumping and stirring systems: millbase volume 5 l to 60 l



pumping systems, gear pumps, hose pumps and accessories on request



stainless steel double walled supply vessel including stand and ball valve



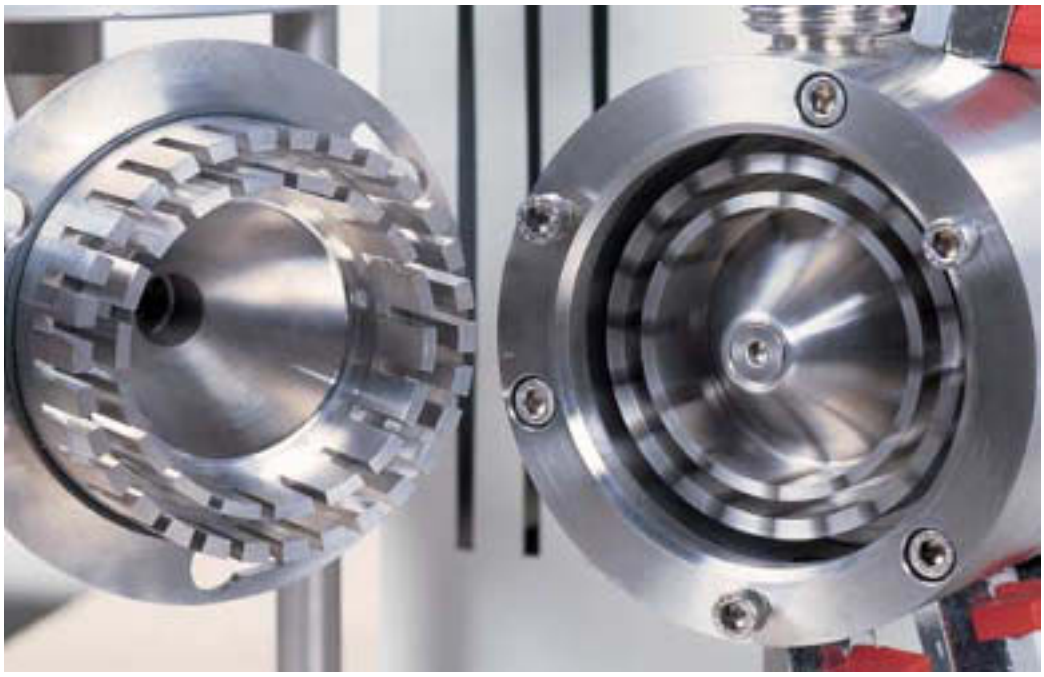
stainless steel supply vessel including stand and ball valve sizes available: 12, 25 and 60 l

Rotor-Stator Dispersion System

DISPERMAT® AS

The process technology in which gases, liquids or solid substances are finely distributed in a continuous liquid phase is referred to as dispersion.

All dispersion systems have in common a dispersed phase gas, liquid or solid and a continuous liquid phase that remains intact.



The DISPERMAT® AS is a rotor-stator dispersion system. The DISPERMAT® AS rotor and stator consist of coaxially intertwined rings designed with narrow radial slots. The rotor runs at high speed across the stator. The substance to be dispersed is fed into the centre of the rotor-stator system and centrifugally accelerated by the motion of the rotor. As it passes through the rotor-stator dispersion head, the substance is dramatically accelerated both tangentially and radially. The high frequency shearing force and turbulent flow conditions ensure optimum dispersion and emulsifying action producing very fine droplets with a large effective surface area (e.g. oil/water or water/oil emulsions).

Emulsification refers to the splitting and fine distribution of a liquid into a second phase in which it is not soluble. Emulsions tend to phase separate, e.g. demixing if they are not stabilised with emulsifying agents. The most important property of an emulsion is its stability.

The dispersion system has a mechanical seal with an integrated pressure system. The DISPERMAT® AS can be operated both in the pass-through as well as the circulation method. All parts that are in contact with the product are made of stainless steel.

Special advantages

- Mechanical seal with integrated pressure system
- Pass-through or circulation methods
- All parts that are in contact with the product are made of stainless steel
- Dispersion under pressure and vacuum
- Simple handling
- Easily changed rotor-stator systems
- Particularly easy cleaning
- Process control by measuring and recording of speed, power input, torque, work, product temperature and circumferential speed of the rotor
- Operating modes: constant speed or constant power
- Documentation of measurement data with WIN-DISP (see page 17-22)

DISPERMAT® AS

DISPERMAT® AS

with process control measurement of:

- Speed (rpm)
- Power input (W)
- Torque (Ncm)
- Work (Wh)
- Product temperature (°C/°F)
- Peripheral speed of rotor (m/s, ft/min)

The DISPERMAT® AS-C enables a dispersion at either "constant speed" or "constant power". The measured values are shown on a digital display. An RS 232 serial port enables the data to be transmitted to a PC for processing with WIN-DISP software (see page 108).

The DISPERMAT® AS is particularly suitable for research and development tasks due to its comprehensive process control.

Depending on the task, there are a variety of easily changed rotor-stator systems are available.

The mechanical power input into the product is closely associated with the dispersion results. The mechanical dispersion power determines the energy transferred to the product from the rotor-stator system. Dispersion power is calculated from rotor RPM n and the resulting torque M

$P = 2 \pi n M$

With the DISPERMAT® AS, the operating parameters dispersion power, speed, torque and product temperature are constantly being measured and displayed on the screen.

In this way, the "constant RPM" operating mode provides a permanent overview of parameter changes during the dispersion process.

Areas of application:

Pharmaceuticals
Cosmetics
Biotechnology
Foodstuffs
Agrochemicals
Beverages
Detergents
Reaction acceleration
Chemicals
etc

Technical data

Motor power: 1.1 kW
Power supply: 230/50 Hz
Peripheral rotor speed:
0 - 25 m/sec

Process technology with DISPERMAT® AS

Emulsion
Suspension
Homogenisation
Dissolving
Chemical reaction techniques

The DISPERMAT® AS is also available explosion-proof on request

Laboratory and pilot plant stirrer with power electronics built in the motor

DISPERMAT® R11

NEW

The DISPERMAT® R11 is a particularly powerful laboratory and pilot plant stirrer. The compact drive unit not only contains the strong three phase motor and separately driven low noise ventilation, but also has the power electronics built into the motor. The electrical height adjustment is made using the beautifully designed compact H2L stand.

Due to its high torque of 12 Nm the DISPERMAT® R11 is most applicable for stirring and mixing of substances with a high viscosity and a high yield point. The speed is infinitely controlled between 0 and 2.000 rpm.
For stirring low to high viscosity liquids there are a lot of classical milling tools available (for example propeller blades, angled turbine blade, disc mixer etc.).

However, the stirring of high viscosity, non flowing substances is not so easy, because there is no ideal mixing system for all ranges of application. For the mixing process of high viscosity media, butterfly stirring tools and the mixing system HM has proved extremely successful.

Sometimes even the most applicable mixing tool is not able to mix the product completely because of static zones between the mixing tool and the inner wall of the container where no circulation of the product takes place.
In such cases the mixing tools can be equipped with a scraper.

However, a scraper that is driven independently from the mixing tool is more efficient. Scraper that are driven from above are ideal as they guarantee complete mixing of non-flowing or highly viscous subtances with no dead areas.

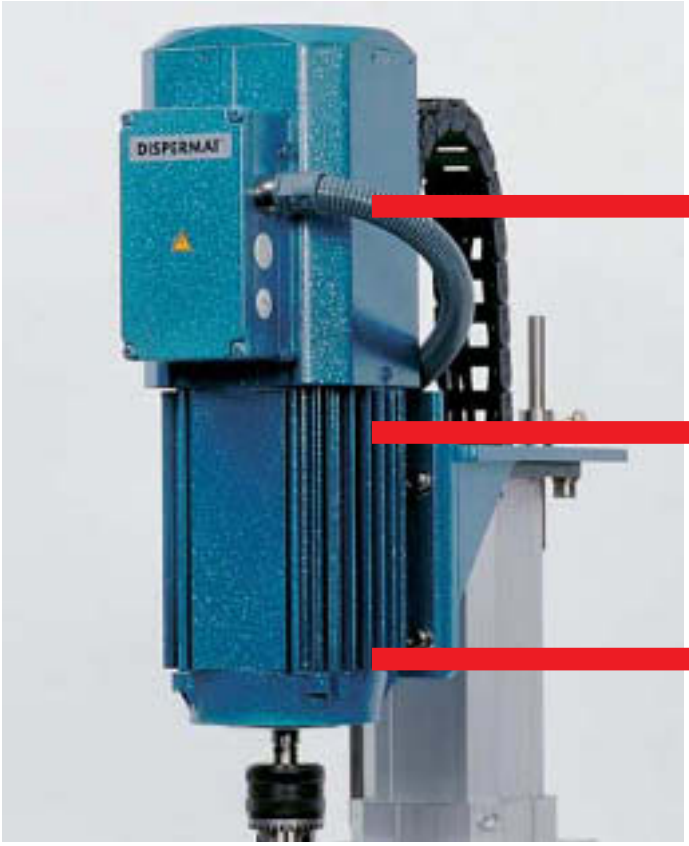
Digital Indications

- Speed (rpm)
- Torque (%)
- Dispersion time (min) reverse counting
- Safety functions

technical data

power: 1,1 kW
speed: 0 - 2000 rpm
torque: max. 12 Nm

DISPERMAT R11 with butterfly stirrer

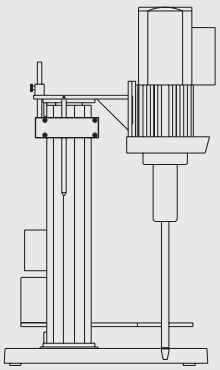


DISPERMAT® R11 models are fitted with the safety device as a standard. The central clamping system – part of the safety device – makes it safe and simple to hold the dispersion container securely in position. The container is placed on the laboratory bench between the clamping arms and is automatically centered as the arms are tightened.

The control panel has a digital display which allows the operator to switch between values for speed, torque or time. In addition the dispersion time can be preset. The safety device functions are also indicated on the digital display.

Vist our application laboratory to find an ideal mixing tool for your application.

	H2L
Stand height min.	820 mm
Stand height max.	1290 mm
Stand depth	550 mm
Stand width	490 mm
Container diameter	50 - 350 mm
Container height	450 mm



Safety Device

In order to minimise the risk of injuries with running dissolver discs, it is required by Law that every dissolver must have a suitable safety device.
The safety device consists of:

1 Height adjustable stainless steel telescopic shaft protection pipe

2 Device preventing horizontal movement of the dispersion impeller

3 Height adjustable central container clamping system with two clamping arms operated by a hand wheel with screw adjustment

4 Safety limit switch, incorporated in the container quick clamping system, preventing the motor from operating if the dispersion vessel is not firmly clamped.

5 Safety limit switch, prevents the motor from operating when the dispersion impeller is outside the dispersion container. The switch is easily adjusted for different container heights.

Mixing tool HM

Mixing tool HM with bottom scraper

Mixing tool HM with bottom and wall scraper

DISPERMAT®
REACTOR

In many sectors of the chemical, biochemical, pharmaceutical and other industries, it is necessary that new developments and formulations are tested on a small scale before a large scale production can be started.

After years of experience in planning and production of vacuum dispersion systems (see page 58-67) VMA-GETZMANN GmbH has extended its range of products to include reactor systems for the observation and documentation of reaction processes.

The reactor systems are modular and contain the following system components.

Stand
All reactor systems have a stand with electrical height adjustment for the motor, sealing system and cover assembly with hardware.

Drive technology
Motor power according to the application from 0.55 kW to 4.0 kW (explosion proof on request), speed according to the application, speed adjustment is controlled by modern frequency converters.

Reactor
To customers specification made of borosilicate glass or stainless steel, single or double walled, made for vacuum or pressure with a volume of 1 – 50 l.

Sealing systems
O-ring sealing, rotary shaft lip seal, mechanical seal, magnetic coupling, standard ground joint stirring seal (only for glass reactors).

Stirring device
Made of stainless steel or PTFE
Dissolver disc
Propeller blade
Anchor agitator
Angled turbine blade
or others

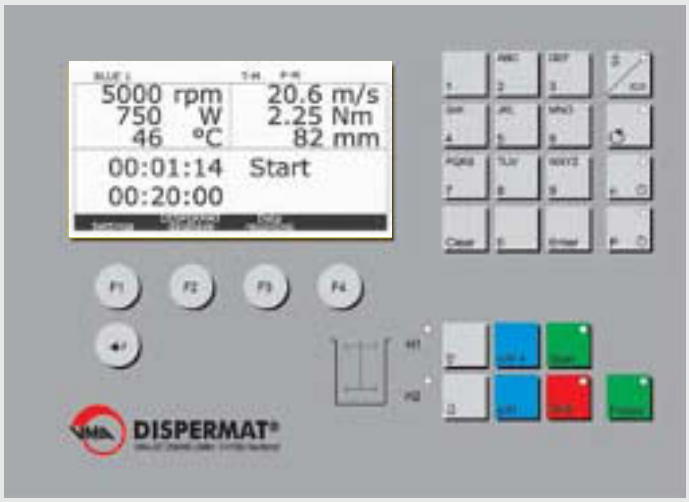
Cover assembly and accessories
Fittings, viewing glasses, illumination, manometer, bursting disc, valves, tubes, drain valves, vacuum and dosing pump systems according to customers specification

Measuring technique
For the process technology the complete new newly developed control system of the C-technology control system is available for measuring the temperature, torque (analog viscosity), power output, speed and peripheral speed of the stirring device.

Furthermore data such as pH value, Redox value, pressure, etc. can be measured and controlled.

Please contact us. Our experienced engineers and specialists can provide general mixing and dispersion advice through to the complete installation and start up of your DISPERMAT®.

DISPERMAT® REACTOR with C-Technology



C-technology

The C-technology enables an excellent process control as all measurable values as well as the current height of the dispersion tool are indicated on the display.

Safety engineering: for the adjustment of the operating range within the container no safety limit switches are required; an innovative height measuring system allows the selection, storage and control of the corresponding height adjustments.

Further High-Lights

Dispersion process can be automatically switched off at pre adjusted values of:

- Product Temperature
- Speed
- Power output
- Torque
- Automatic equalization of the no-load operation to "0"
- Optimum power regulation by variation of the controlling parameters
- Graphical representation of the measurable values on the display with free scaling of the graphics and marker function
- Data base

Power compensation with the C-technology

Relationship between power input and dispersion result

The mechanical power that is transferred into the millbase is closely related to the dispersion result. The mechanical power determines the energy that is transmitted by the dispersion tool or the milling rotor via the grinding beads to the product. The power P is calculated from the speed n of the dispersing tool and the torque M generated on the dispersing tool according to the following equation:
$P = 2\ P\ n\ M$

Where:

P power [Nm/s=J/s=W]
P = 3,141…
n speed [rpm]
M torque [Nm]

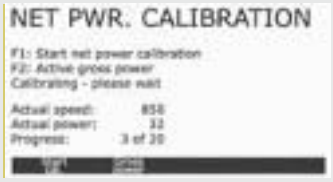
The higher the energy density, the greater the probability that more agglomerates are also dispersed.

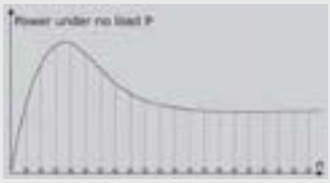
For the exact definition of the power that is transferred into the millbase it is absolutely necessary that all frictional losses which are not generated by the stirring and dispersion process are eliminated and that the calculation is only made with the real net power value.

With the new C-technology the power under no load which includes all frictional losses such as ball bearing friction, motor ventilation, mechanical seals etc. as well as the net power (without frictional losses) can be measured.

The power compensation is made as follows:
The motor is ramped up automatically in steps from 0 up to the max. speed. On each speed step it dwells for a moment, measures the power under load and restores the measured value back to 0. The power curve is represented and stored graphically step by step. In the following dispersion process the measured power value is reduced automatically by the stored power under load. As a result of a single power compensation over the complete speed range, operation with the net power is possible.

With the C-technology dispersion with a constant power input is also possible. For this the speed is adjusted during the dispersion in such a way that the product of n and M results exactly in the preset mechanical power transferred into the millbase.

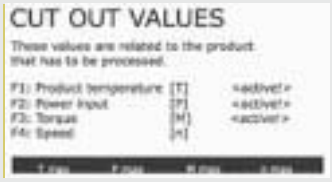


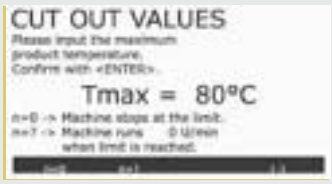


Cut out values with the C-technology

In order to protect from undesirable process variations, up to three cut out values can be defined. The following cut out values are available: product temperature, power input or speed and torque.

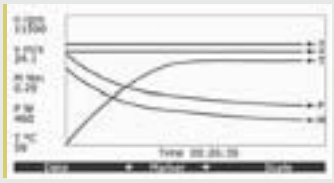
When reaching a cut out value the instrument can either stop or continue to operate further at a pre adjusted constant speed.

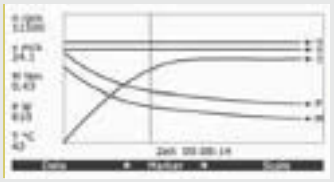




Data recording with the C-technology

The measured values can be recorded as well as presented graphically. The data can also be stored a later evaluation. Due to the free scaling of the graphics striking results can be presented. The cursor function allows the indication of the numerical values at any point on the graph. In addition simultaneous data transfer to the recording software WIN-DISP is possible.





Data base of the C-technology

The data base can store up to 100 dispersion parameters sets including the cut out values with a name edit function.

Furthermore the used container or milling bead volume can be memorized. The stored dispersion parameter sets can be easily leaded by the operator to ensure a standard treatment of his products.
As a result operational errors are avoided as the dispersion process is carried out in a secure and repeatable manner.

DISPERMAT® CC

NEW

Testing device for Coil-Coatings

During the coating of steel or aluminium strips in high speed coil coating machines the liquid coatings (varnishes) are stressed to an extremely high degree. Therefore it is absolutely essential to test the mechanical hardness of these varnishes the laboratory first.

During the test the coating is poured into a small container and subjected to very high shear conditions (up to 64.000 rpm). These conditions are created by the contrarotating high speed propellers.

After the test the coating is applied to a test panel and baked at different temperatures. The subsequent testing of the surface shows whether the coating meets the required quality standards.

Motor power: *135 W*

Power supply: *230 V, 50 Hz*

Speed: *0 – 16.000 rpm*

Two contrarotating shafts

Speed control: *Electric, infinitely variable with PID-motor controller*

Shears: *up to 64.000/min*

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VMA-GETZMANN GMBH
Verfahrenstechnik
Euelerhammerstraße 13
D-51580 Reichshof
Phone +49-2296-803-0
Fax +49-2296-80333
www.vma-getzmann.de
e-mail:info@vma-getzmann.de

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