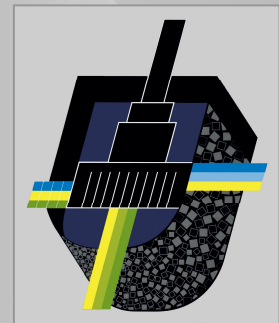
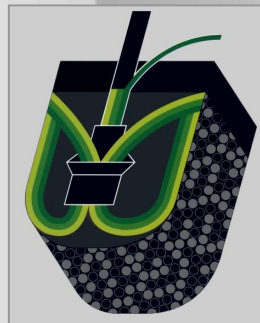


Ystral

Ystral TDS-Technology



TDS – Technology for a clean and agglomerate-free powder treatment

If you have to mix powder into a liquid you are familiar with the following problems:

- ❑ Dust
- ❑ Spillage
- ❑ Unhealthy working conditions
- ❑ Expensive exhaust and filter systems
- ❑ Loss of powder (during filling, in the exhaust system, residues in the bags)
- ❑ Partially wetted powder spots and crusts on the wall of the vessel, mixing shaft and cover
- ❑ Agglomerates in the product
- ❑ For solvent containing liquids:
Powder + Oxygen in Ex-Zone-0

The system that eliminates these problems, became known under the name TDS (Transport- and Dissolving System).

These problems can be avoided by inducting the powder or the granulate with a strong vacuum directly into the liquid and becomes completely wetted and dispersed during the first contact with the liquid.

Neither a vacuum vessel nor an additional vacuum pump air ventilation or filter are required. The induction vacuum is produced in the highly accelerated liquid stream. It inducts the powder, fluidises it and brings it finely distributed into the liquid. During the wetting process the product is already dispersed, no lumps or particle agglomerates can form. Powdery substances can be inducted dust- and loss-free from any type of container.



TDS-machines may be used for all processing steps, from the barrel emptying, powder transportation, wetting and dispersing up to a complete desagglomeration. This offers a very high potential in rationalisation

The main advantages of the TDS-Technology are:

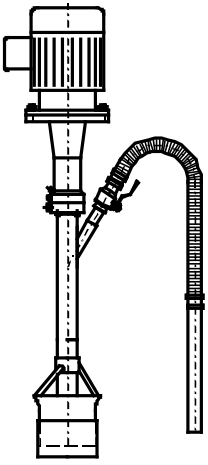
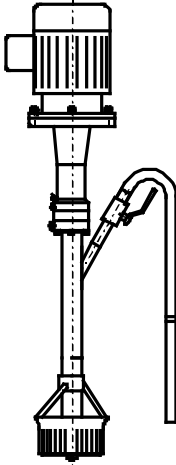
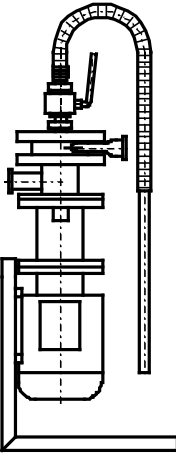
- ❑ Dust- and loss-free operation, no transfuse, no exhaust systems
- ❑ Direct induction from bags, BigBag, silo or any powder container
- ❑ Immediate and complete wetting below liquid level resp. directly into a liquid stream no forming of crusts on the wall of the vessel or on the mixing shaft
- ❑ Higher degree of dispersion compared to conventional mixing principles.
- ❑ After the induction the machine may be used for additional dispersing or as a transfer pump to pump the product to a storage tank.
- ❑ Even liquids and gases can be inducted

General review of TDS machines

TDS-machines are manufactured in three versions, either to be installed in a vessel (TDS-Induction Mixer, TDS-DISPERMIX) or for Inline operation outside of the vessel (Conti-TDS).

The **TDS-Induction Mixer** combines the advantages of a complete and homogeneous mixing effect of a Jetstream Mixer with the possibility to induct powder directly into a liquid. It is mainly used to induct powders into a low viscosity liquid.

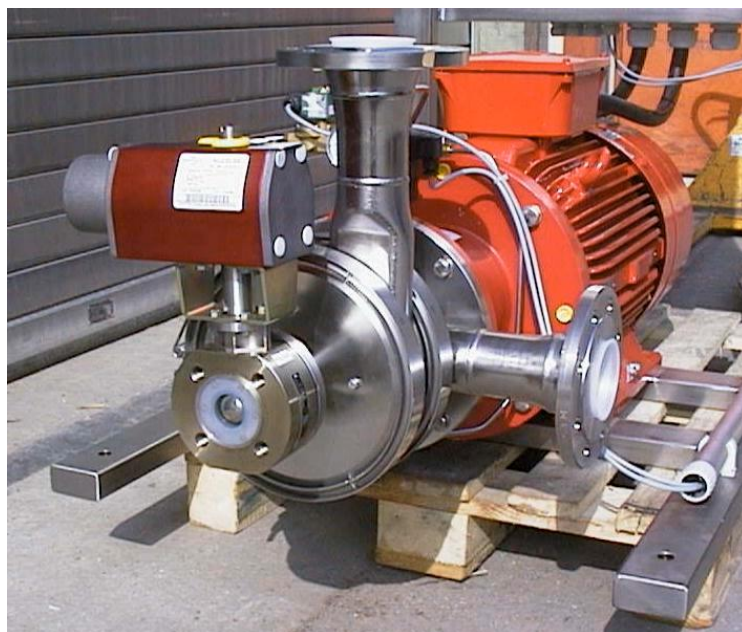
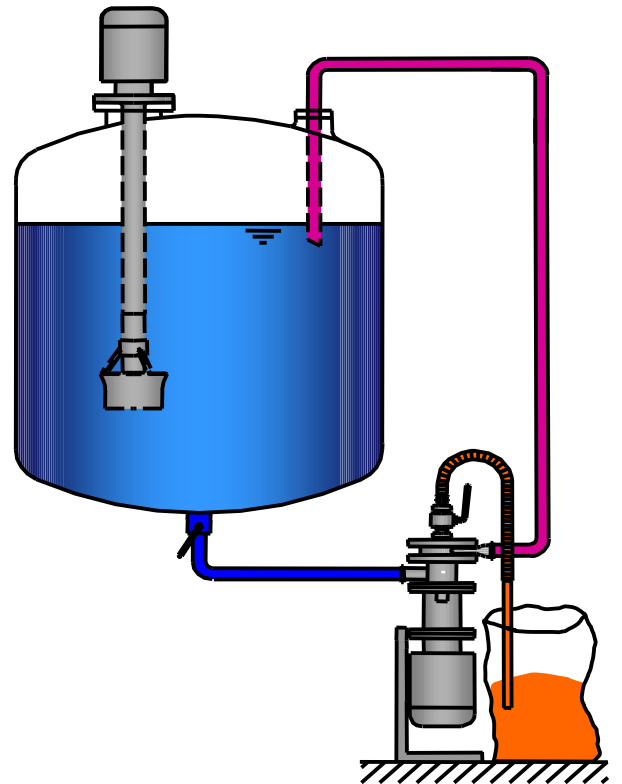
The **TDS-DISPERMIX** disperses the liquid product during the wetting and the following mixing process. This is a big advantage when mixing products that are difficult to wet or which tend to re-agglomerate. The Conti-TDS offers the widest range of applications.. The machine is installed outside the vessel and inducts the powder into the flow of liquid, created by the machine itself..

Machine Type	TDS-Induction mixer	TDS-Dispermix	Conti-TDS
			
Operation	Batch System	Batch System	In-Line-operation Semi-Batch-operation Batch operation
Application	Installed into a vessel Lift system	Installed into a vessel Lift system	outside of vessel piping installation
Power	2,2 to 16 kW	3 to 25 kW	5,5 to 200 kW
additional function	Mixing	Mixing Dispersing	In-Line-Dispersing and Homoqenising

Conti-TDS

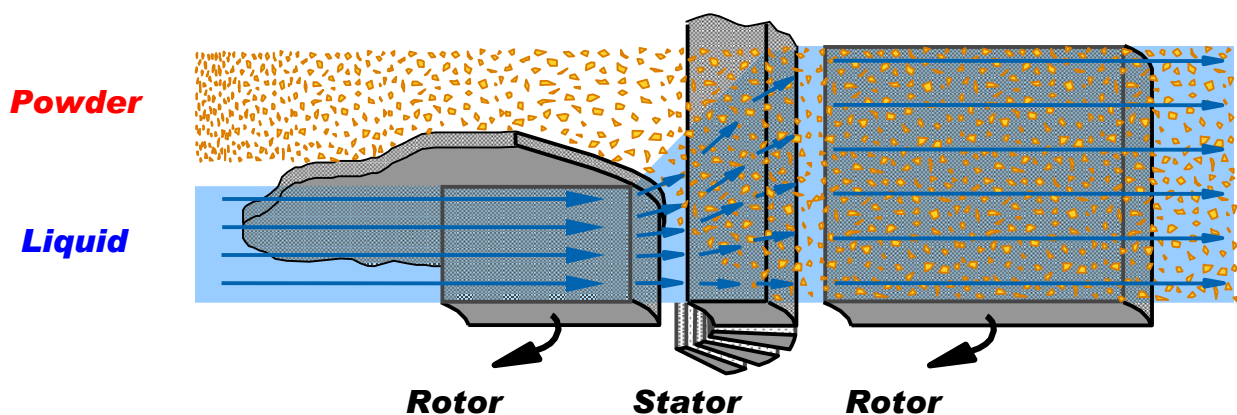
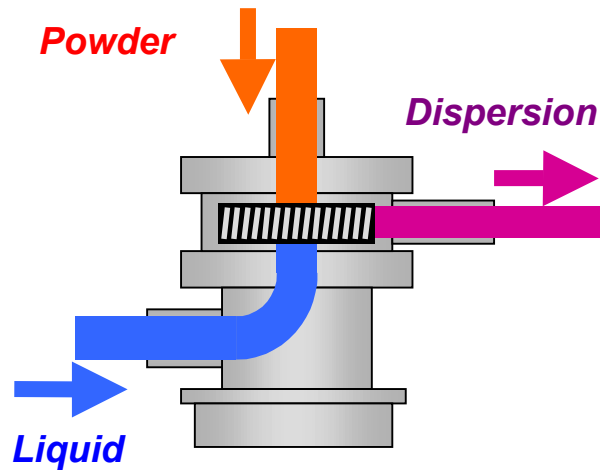
The **ystral Conti-TDS** is a machine to be used for dust-free induction and dispersing of powder into a liquid. The main advantages are:

- ❑ Installation outside of the vessel
- ❑ Connections through pipe or hose
- ❑ Liquid is circulated
- ❑ An induction vacuum is created in a specially designed dispersing zone
- ❑ Dust- and loss-free induction and dispersing of the powders
- ❑ Induction directly from bags, hopper, barrel, container, BigBag or silo possible
- ❑ additional circulation and dispersing until the required particle size, homogeneity or consistence is reached
- ❑ Pumping to a storage vessel with the same machine possible



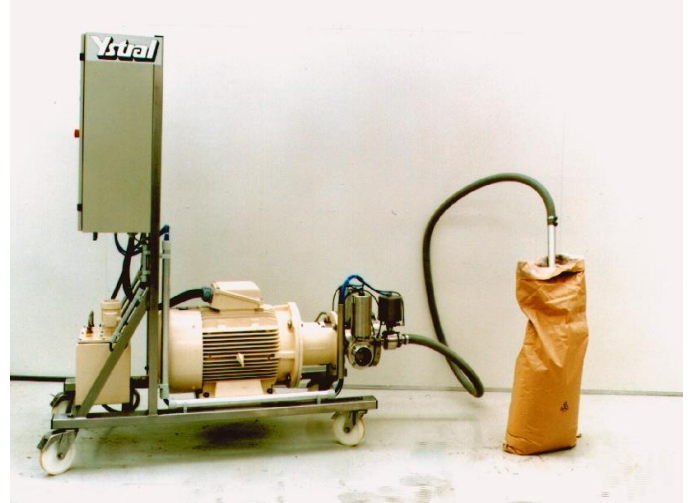
Principle of the Conti-TDS

- ❑ Powder and liquid come into the dispersing and wetting chamber from different sides
- ❑ Only in the dispersing and wetting zone the two components come into contact with each other
- ❑ Through the dispersing energy in the moment of the contact, the surface of the liquid is enormously increased (million times)
- ❑ The vacuum is created in the liquid
- ❑ Under the vacuum, the powder is completely inducted into the dispersed liquid
- ❑ The induction vacuum offers two effects: under vacuum the distance between the particles is enlarged due to the air in the powder and the speed of the particles is increased tremendously
- ❑ This facilitates the penetration of the liquid into the powder and results in an agglomerate-free dispersion

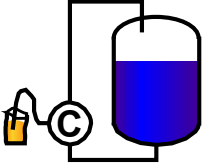
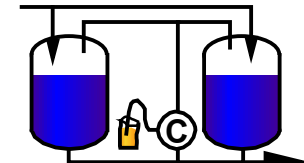
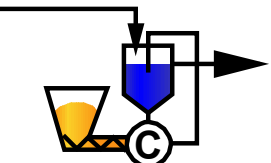
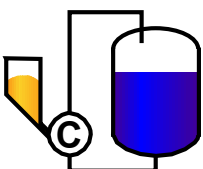
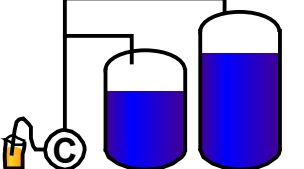
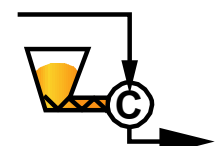
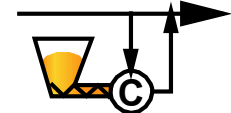


Conti-TDS - Set-up and Installation

- ❑ The machine may be set-up either in vertical or horizontal position.
- ❑ It is set-up next to a vessel, recirculating the liquid, but may also be used inline inducting powder during filling of the vessel.
- ❑ The liquid must have a static pressure at the inlet of the machine. This is easy to realise by selecting the place of the installation in such a way that the filling level of the tank is above the mixing head of the dispersing chamber.
- ❑ The angle of product inlet and outlet is variable. The machine can be integrated into any existing system very easily.
- ❑ It may be connected to one or several vessels
- ❑ For the use in different working areas the machine can be delivered on casters and the switchboard assembled to the main frame



Operation of the Conti-TDS

product supply	discontinuous	continuous	
further treatment			
principles			
	 directly from bag	 two vessels	 inline, with deaeration
	 from hopper, BigBag container or Silo	 working- / buffertank min-max-principle	 directly inline
		 bypass	
dosing	no problem, weighing is sufficient	each component gravimetric	
more than only one powder	no problem, together or one after another in optimum sequence, swelling times, mixing times, cooling etc. no problem	powderpremix or dosing of all powders together swelling times impossible	
What about air?	escapes in the vessel	deaeration required	
dispersing	with the same machine after powderinduction	separate machine required	
pumping	with the same machine	separate pompe	
product change	low expense	very complicate	



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Conti-TDS - Technical Data

	<u>Conti-TDS-2</u>	<u>Conti-TDS-3</u>	<u>Conti-TDS-4</u>	<u>Conti-TDS-5</u>	<u>Conti-TDS-6</u>
Power in kW	7 - 9	11 - 30	25 - 45	55 bis 75	110-150
max. speed in rpm	6.000	3.000 (3.600)	3.000 (3.600)	3.000 (3.600)	3.000 (3.600)
Induction rate in kg/min					
- from paper bag	1 - 4	2 bis 20	3 bis 50	4 bis 50	4 bis 50
- from BigBag, container hopper or silo	4 - 12	6 bis 200	10 bis 400	10 bis 500	10 bis 500
maximum concentration non soluble powder	60 %	70 %	75 %	80 %	80 %
maximum viscosity in mPas					
- normaloperation	2.000	4.000	4.000	6.000	8.000
- with additional pump	10.000	50.000	100.000	100.000	100.000
Inlet pressure in bar	0,05 bis 0,2	0,1 bis 0,4	0,1 bis 0,6	0,1 bis 0,9	0,1 bis 0,9
max. counter pressure in bar					
- during powder induction	0,2	0,4	0,6	0,9	
- dispersion, pumping	2,5 (4,0)	3,0 (4,5)	3,5 (5,0)	5 (8,0)	
Pumping rate in m³/h					
- maximum (water)	16	48	84	90	
- during powder induction	6-10	20-30	30-50	30-50	
working temperature	max. 70°C for water as a basic liquid for liquid with higher boiling point please ask the manufacturer				

Conti-TDS - available options

	<u>Basic version</u>	<u>Options</u>
parts in contact with product	1.4571 + 1.4404	14539
Surface quality	electropolished Ra<1,2µm	Ra<0,8µm
Elastomeres	FPM (Viton)	EPDM, PTFE, FFKM (Kalrez)
Type of sealing	Mechanical seal	Double Mechanical seal
Powder inlet	Induction hose or pipe	Funnel, Big-Bag-adapter, Drum-, Silo- or Container connection
Product connections	Milk thread DIN 11851	Flange, Clamp etc.
Accessory	Switch board, pneumatic valves, monitor for seals etc.	

Advantages of the Conti-TDS

- ❑ **Dust- and loss-free operation**
no transfuse, no exhaust systems, no filter
- ❑ **Direct induction from bags, BigBag, barrel, silo or powder container**
- ❑ **Immediate and complete wetting** directly into the liquid stream, no crusts are formed on the wall of the vessel or the mixing shaft
- ❑ **Higher degree of dispersion** compared to conventional mixing principles
- ❑ **Even liquids and gases may be inducted**
- ❑ **CIP-Cleaning** without disassembly
- ❑ **Universal use and adaptation** to existing vessels, also to **several vessels**, also into **existing processing systems**, on casters for **different working areas**
- ❑ **Powder induction without opening the vessel or the system**
- ❑ **When inducting into solvents, powder may be covered with a layer of Nitrogen** into a vessel with a layer of Nitrogen
- ❑ **The function, independent from size of vessel and filling level** in the vessel
- ❑ **The possibility, to induct powder into extremely high concentrated or high viscosity dispersions and wet them completely**
- ❑ **The possibility to induct powder directly into a liquid stream**(e.g. when filling the vessel)
- ❑ **After the induction the same machine disperses the product Inline until the required particle size, homogeneity and consistence.**

The results speak for themselves:

- ❑ **Reduction of the production time for a White Lacquer** down to about 5% of the original time with an increase of product quality
- ❑ **Reduction of the dissolving time for a synthetic resin granulate** to about 19% of the original production time. Induction time approx. 6 sec per bag
- ❑ **Extremely good results when treating starch**, absolutely agglomerate-free product, each particle can be seen under the microscope
- ❑ **Reduction of the grinding time for a pigment** to about 60% of the original time
- ❑ **Increase of the colour brightness and reduction in the grinding time for a wood protection paint**
- ❑ **Controlled and gentle induction of micro balloons into Polyol** without destruction of the balloons
- ❑ **Some user consider the system to be the best for the induction of powder into Polyol**
- ❑ **Saving complete processing steps in the production of foils, fibres and film coating**
- ❑ **Higher solid concentrations in the production of paper coating paint**
- ❑ **Relevant shortening in time for Pectin, Alginate, CMC, Guar, Xanthan a.o.**
- ❑ **Homogeneous induction and dispersing of an extremely high viscosity liquid into a low viscosity liquid**
- ❑ **Controlled induction of a powdery chemical catalyst**
- ❑ **Controlled saponification**
- ❑ **Dust-free handling of high conductive black carbon** with a specific surface of 900 m² per gram
- ❑ **Dust-free treatment of harmful powders** such as herbicides, lead pigments, diatomite earth heavy metals, corrosive powders...

Conti-TDS - Trial machines

ystral offers a range of trial machines from laboratory size to production scale.

With these machines, ystral offers the possibility to test the application with the original product on one side and to learn about the new effects of the ystral-machines on the material treated.

As the Conti-TDS operates inline independent from the volume the trial is always carried out with the original sized machine. The results (induction time and dispersing time) can be directly upgraded to the required production volume, they are 100% reproducible.

Trials in the ystral Pilot Plant

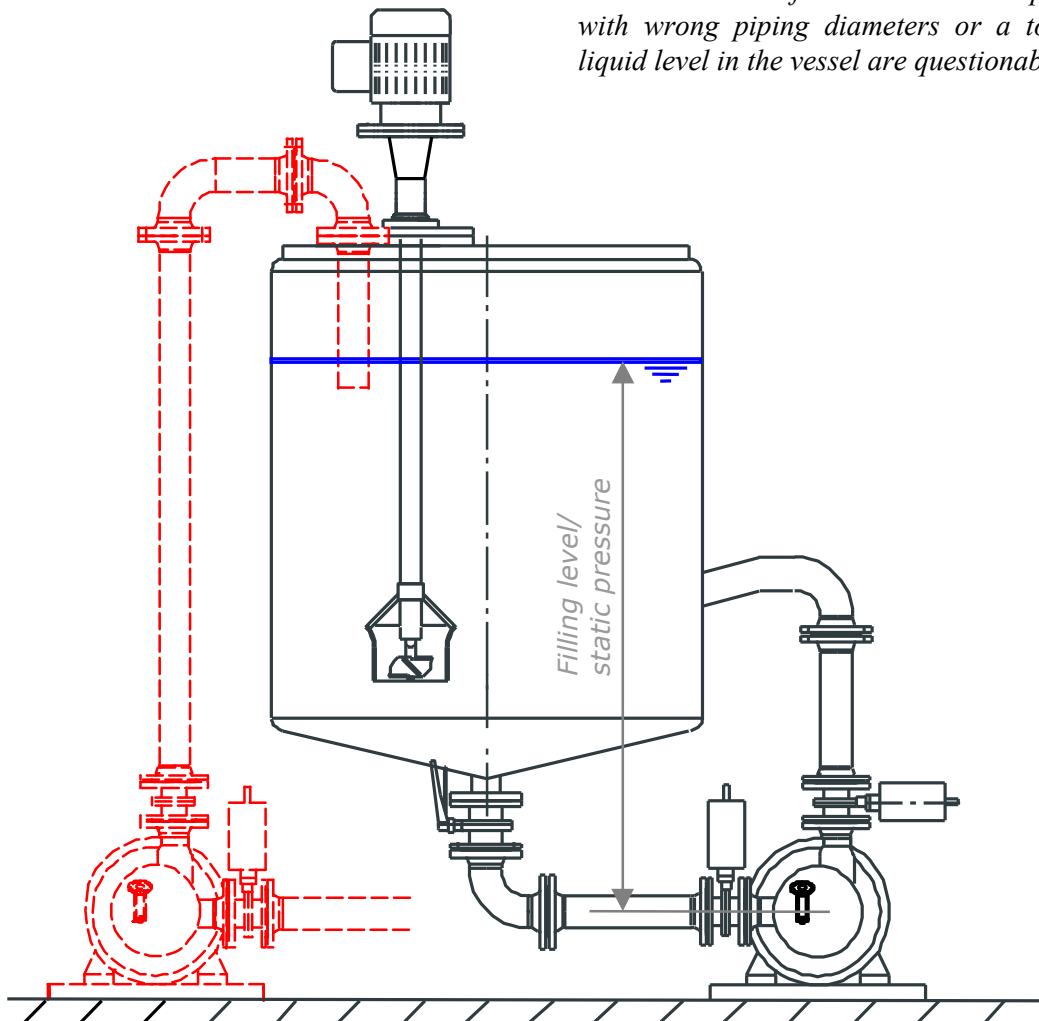
ystral offers a well equipped pilot plant area where all the required tests can be carried out with all ystral trial machines

The main advantage of this possibility is, that vessels, mixers, piping etc. are available in any size. It also enables the user to test his product with different types of machines to find his best solution.

Trials on site

ystral also leases testing machines for tests directly in your production facility. In this case our machines can be tested under production conditions.

The installation of the machine is important. Trials with wrong piping diameters or a too low initial liquid level in the vessel are questionable.



ystral-Systems for Powder Wetting in high viscosity liquids

The data sheets for the ystral Conti-TDS show the range of viscosity in which the machines may be used.

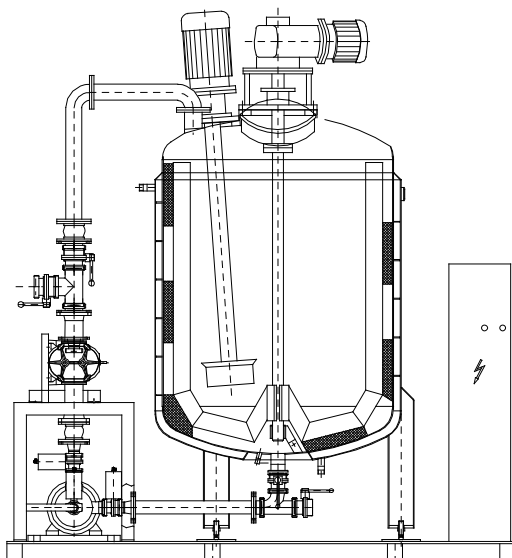
Especially when high viscosity products are treated, a pump is installed to increase the flow rate for the liquid and the induction speed for the powder.

ystral uses only volumetric pumping systems that transport the medium independent from the viscosity. The transportation of the product is completely handled by the pump. The ystral Conti-TDS only inducts and disperses the powder into the liquid stream.

With this set-up, in principle, powder may be inducted and dispersed with the ystral Conti-TDS into any flowing and pumpable product

In case of big variations of the viscosity in the product automatic flow control for the liquid may be installed. After induction the product can be continuously dispersed until it reaches the required particle size.

The powder is inducted with an induction pipe directly from bags or barrels. When larger quantities have to be treated (e.g. Carbon black for newspaper ink) the powder may be inducted from a BigBag or a powder container



Field of applications:

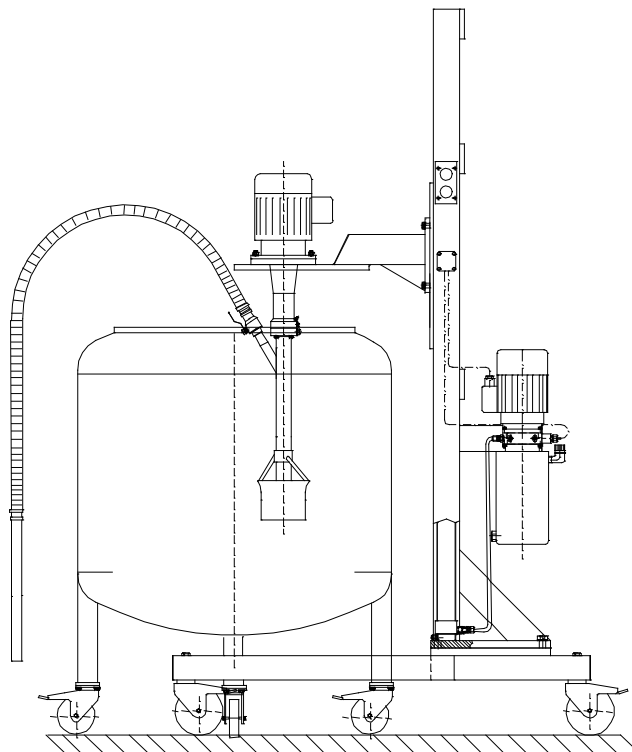
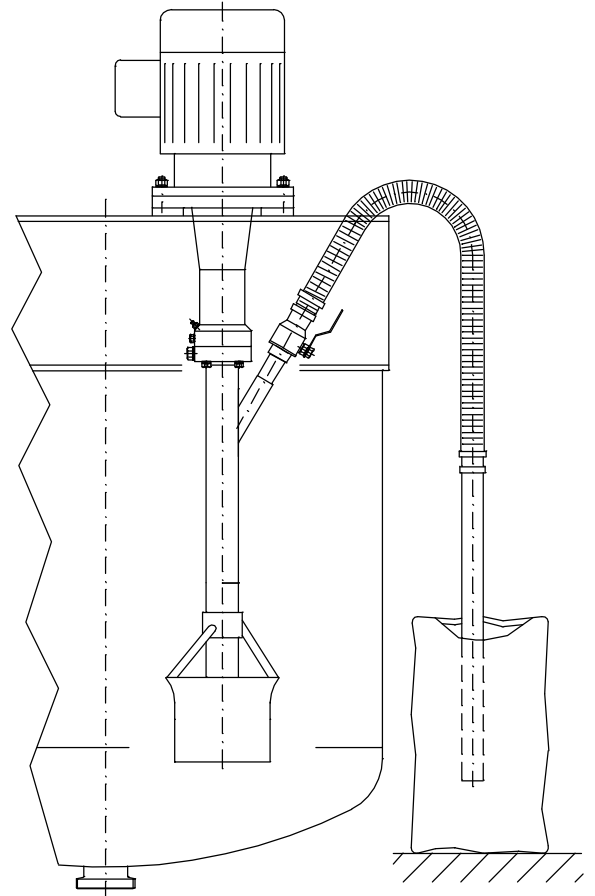
- ❑ Knifing filler
- ❑ Offset printing ink
- ❑ Filler into Polyol
- ❑ Treatment of extremely light fillers
- ❑ high viscosity glue
- ❑ PUR-products
- ❑ soft foam compounds
- ❑ structured pastes
- ❑ Anti-foam for Silicone
- ❑ High-Solids
- ❑ Pigment pastes with highest concentrations

TDS-Induction mixer

*The principle of the **TDS-Induction Mixer** is based on the Jetstream mixer in combination with the Venturi principle to induct powder. A fast rotating rotor is placed into an aerodynamic formed pipe. During mixing a vacuum is created in the centre of the rotor, which is used to induct the powder.*

A special induction fitting is welded to the stator tube to take the induction hose with the induction pipe. This device is used to induct the powder during mixing into the fast rotating rotor.

The combination of inducting and mixing is very effective as sedimentation is avoided and the entire product is homogenised during the operation of the machine.



Samples of application for the TDS Induction Mixer:

Highly dispersed Silica

The treatment of highly dispersed Silica e.g. Aerosil, Cab-O-Sil, HDK, Gasil o.s. is an ideal task for the TDS machines.

The powder is fluidised very easily. It is inducted into the liquid directly from the bag. During induction and wetting, no dust is created. This results in a reasonably short wetting and suspending time..

The degree of dispersion with a **TDS-Induction Mixer** is good enough to avoid additional dispersing with a shear dispersing machine. If the suspension has to be stored for a long time or requires an intensive degree of mixing, our **TDS Dispermix** or the **Conti-TDS** may be used.

Activated Carbon

Activated carbon is used in filter systems in the production of drinking water as well as in sewage plants. This causes a strong pollution of the working environment and a high dust concentration in the air.

Using a ystral **TDS Induction Mixer**, reduces this problem almost down to zero.

Activated carbon does not tend to clog inside of the machine and is therefore ideal for the treatment with the ystral TDS system. After the induction, the speed of the machine is reduced to keep the mixture in suspension during emptying of the vessel.

Diatomite Earth

Diatomite is a filtering aid which is used in the filtration of drinks with a very high contents of turbidity. Diatomite is dangerous. When it gets into the respiratory system, it may result in silicosis or silicosis tuberculosis.

Dangerous concentrations are possible when the diatomite is brought into a dosing system or a vessel manually..

With the **ystral-TDS-machines** the diatomite is inducted dust-free directly from a bag into the liquid and wetted completely. There is no dust coming out of the surface of the liquid.

Tests in the laboratories of **Forschungs- und Materialprüfanstalt Baden-Württemberg in Stuttgart** showed that no particle reduction occurs while inducting it with a ystral **TDS Induction Mixer**.

Some employer's liability insurance companies recommend the use of the ystral **TDS Induction Mixer**.

Reduction of the Oxygen Contents of Filtering Aid Suspension

The contents of oxygen of filtering aid suspensions is close to its saturation.

The reason for this is the high contents of oxygen in the water and the additional air in the powder. Depending on the temperature of the water, this value may be in the range of 20.4 to 10.8 mg oxygen per litre.

This quantity of oxygen may be reduced by dosing CO₂ through an additional fitting in the inlet of the **TDS Induction Mixer**.

The achievable concentration in this case varies within a range of 4 and 5 mg per litre of suspension. This equals in a reduction of more than 50%

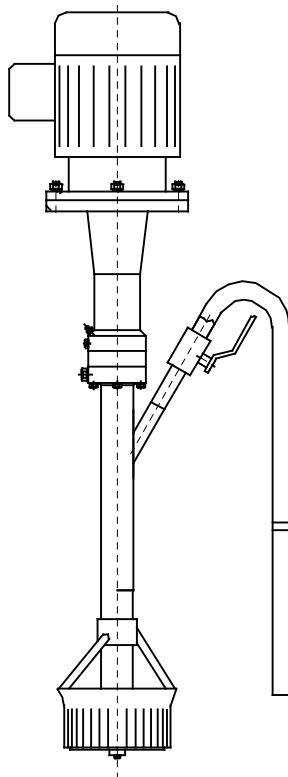
TDS - Dispermix

The **TDS-Dispermix** is also a machine for the dust-free induction of powder into a liquid.

Similar to the TDS Induction Mixer, the powder is inducted through the concentric stator tube into the liquid and wetted and dispersed immediately.

Different to the **TDS-Induction-Mixer** the **TDS-Dispermix** offers a combination of a mixing and a dispersing head.

The liquid that streams through the mixing head is - same as for the Jetstream Mixer - accelerated and takes up the inducted powder. The liquid that passes through the area of the wall of the mixing head is forced by the patented Dispermix construction to leave the head through the dispersing slots in the mixing head.. The liquid is very intensively dispersed. Beside the wetting and homogeneous mixing a partial stream is always dispersed..



With this machine products may be treated that

- ❑ tend to re-agglomerate after wetting
- ❑ need a higher degree of dispersing energy to disintegrate the powder
- ❑ have to be dispersed very intensive during the induction or after the induction process to reach the required particle size
- ❑ are very difficult to wet

Besides the general advantages of the TDS principle the following additional effects are achieved with the TDS Dispermix:

- ❑ no need for additional rotor-stator dispersing process
- ❑ reducing the working time for powders that are difficult to wet during the process
- ❑ agglomerate-free dispersion when treating powders that tend to re-agglomerate or which are difficult to disagglomerate
- ❑ lump free solutions within shortest processing time

As the Dispermix (ystral-machine without additional induction feature) may also be used to produce emulsions, it is obvious that the TDS Dispermix may be used for any other process where liquids have to be emulsified and powdery materials to be dispersed.

As the Dispermix as a mixer and a dispersing system mixes the total contents of the vessel it may be used for:

- ❑ fast and homogeneous distribution of stabilisators and emulsifying agents
- ❑ narrow droplet spectrum of the emulsion in the whole vessel
- ❑ Rarely the possibility is being used to induct liquids and gases besides powders and to disperse them



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*Are you interested in a concrete quotation for your application?
Please fill in this form and send it back to ystral.*

Questionnaire Conti-TDS

Request No.:
Customer:
.....

Application: *Induction, Wetting and Dispersing of*
.....
in

End Product:
Total Volume l or kg
Viscosity: mPas
Density: kg/dm³

Basic liquid:
Quantity: kg or l
Viscosity: mPas
Density: kg/dm³

Powder:
Quantity: kg
Bulk density: kg/dm³
Particle size: µm

Inlet pressure: bar
Working temperature: °C
Required lifting height: max. m
Voltage / Frequency:/..... V/Hz
Protection class:

Further Information:

(How does the powder flow? Is it sticky? Does it swell? Is it hazardous?)