

## Decanting and Dosing Plant Ammonia

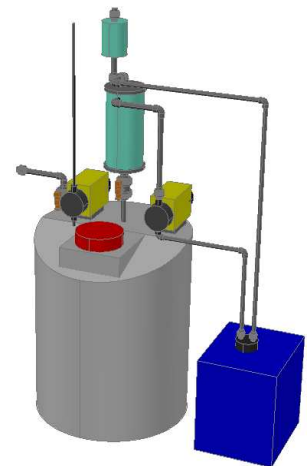
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### 1 Description

The plant described in this operation manual is a decanting and dosing plant for dosing of ammonium hydroxide as conditioning agent to boiler feed water.

The plant is designed gas-tight, and mainly consists of one solenoid diaphragm dosing pump each for decanting and dosing, a measurement vessel and a dosing tank.



Picture: Decanting and dosing plant for ammonia

### 2 Intended Use

The device described here solely serves for decanting and dosing of ammonia, within the limitations listed in this operation manual. Any other kind of use is not permitted.

### 3 Safety Advice

#### 3.1 Operation and Maintenance

The plant may only be operated and serviced by qualified and properly instructed personnel. The operation and maintenance must be conducted according to the operation manual, and in

compliance with the respective safety regulations.



**WARNING: In case of improper operation or maintenance of the plant, there is the danger of injuries, damage to the plant and operation disruptions!**

The operating company has to ensure that the assigned personnel have been instructed properly and are familiar with the operation and maintenance of the plant, as well as with the respective safety regulations.

Hard copies of the operation manual must be made available to the assigned personnel, and furthermore be stored within reach of the workplace.

### 3.2 Pressure

The dosing head of the pumps and the pressure line operate at increased pressure.



**WARNING: When opening or dismantling pressure-loaded plant parts, there is the danger of injuries and damage to the plant**

In case of maintenance or repair works on pressure-loaded plant parts or vessels, a previous pressure relief must be ensured.

### 3.3 Chemicals

Operation of the plant includes the handling of chemicals.



**WARNING: In case of improper handling of chemicals, there is the danger of health hazards. The instructions on the respective safety data sheets must be obeyed!**

Safety data sheets are provided by the respective manufacturer or supplier of the chemicals.

The operator must ensure that operation and maintenance personnel is properly qualified and has been briefed about the handling of chemicals, that copies of the respective safety data sheets are available at the workplace as well as with the responsible persons in the company, and that further safety measures are conducted as far as required.

### 3.4 Electricity

Parts of the plant are powered by electricity.



**WARNING: In case of maintenance or repair works on electric parts, there is the danger of injuries due to electric shock!**

Works on electric parts may only be conducted by qualified specialists. Before maintenance or repair works on live parts, the respective part needs to be de-energised, and to be protected against unintended deactivation.



## 4 Technical Data

### Limitations of Use:

Operation Temperature	5 ... 50	°C
Dosing agent		ammonia dilution
Diluting agent		soft water, permeate, demineralised water

### Decanting Pump:

Solenoid diaphragm dosing pump, mounted on the dosing tank.

Flow rate, max.	17.1	l/h
at counter pressure	4	bar
Capacity range	0...100	%
Stroke frequency	180	1/min
Nominal motor power	17	W
Electric connection	230	V, 50 Hz
Protection type	IP 65	
Material, dosing head/gasket	PP/EPDM	

### Dosing Pump:

Solenoid diaphragm dosing pump, mounted on the dosing tank.

Flow rate, max.	7.1	l/h
at counter pressure	7	bar
Capacity range	0...100	%
Stroke frequency	180	1/min
Nominal motor power	17	W
Electric connection	230	V, 50 Hz
Protection type	IP 65	
Material, dosing head/gasket	PP/EPDM	

### Dosing Tank:

Upright vessel with liter scale and screw cap, gas-tight.

Volume	140	l
Diameter	500	mm
Height tank	860	mm
Total height plant	1650	mm
Material	PE, natural	
Total height	1650	mm
Total weight, empty	23	kg

### Accessories:

- 2 ball valves DN 10 made of PVC
- 1 decanting line  $\varnothing 12 \times \varnothing 9$  made of PE, length 1.5 m
- 1 measurement vessel made of PVC, volume 2 l, with vapour recovery pipeline and air filter
- 1 stirrer made of PP
- 1 suction lance with foot valve made of PP
- 1 dosing line  $\varnothing 8 \times \varnothing 5$  made of PE, length 10 m
- 1 injection point G 1/2" made of stainless steel 1.4404/1.4571, usable up to 200 °C



## 5 Installation

The dosing plant is delivered completely pre-assembled. The plant needs to be set up on a stable and plane surface. Accessibility of the plant for operation and maintenance purposes must be ensured. The dosing plant needs to be installed inside, protected from frost, dirt, dampness and direct solar radiation. The highest permitted environment temperature is 40 °C.

The dosing line needs to be connected to the dosing pump according to the instructions in the respective separate operation manual. The dosing line needs to be run and mounted in a professional manner, avoiding any kind of sharp bends. The injection point needs to be connected with the respective connection at the feed water tank or feed water suction line in a professional manner

The electric connection of the plant must be conducted according to the instructions in the separate operation manuals for the pumps and stirring device.

## 6 Operation

### 6.1 General

The dosing pump is usually operated in parallel with the make-up water valve or the feed water pump, and accordingly shut on and off automatically. For manual operation, the respective "H-0-A"-switch at the control cabinet needs to be set to "H". In order to shut off the dosing pump, the "H-0-A"-switch needs to be set to "0". For automated operation, it needs to be set to "A".

The elements for manual operation are located at the backside of the pump. The pump can be shut on and off with the "start/stop"-switch. The flow capacity can be adjusted directly at the dosing pump via the stroke length adjuster (big turn-switch at the back of the pump). An adjustment within a range of 30...100% is usually expedient.

The decanting pump is operated manually. To this end, the switches at the backside of the pump are to be used. The pump can be shut on and off with the "start/stop"-switch.

Further details can be taken from the separate operation manual of the dosing pump.

The filling of the dosing tank and preparation of the dosing dilution is conducted as follows:

- Shut off the dosing pump.
- Fill the dosing tank about half with water by opening the water inlet valve.
- Connect the decanting line with the connection of the delivery barrel of the dosing agent.
- Fill the measurement vessel with the required amount of dosing agent by using the decanting pump.
- Discharge the dosing agent into the dosing tank by opening the shut-off valve below the measurement tank.
- Use water to fill the dosing tank up to the 140 l mark, as described above.

### 6.2 Dosierung von Ammoniak

Ammonia (NH<sub>3</sub>), or diluted in water Ammonium hydroxide (NH<sub>4</sub>OH), is dosed to boiler feed water for alkalisation as well as binding of free carbonic acid. Since ammonia is volatile, it also serves for conditioning of the condensate. It is delivered as a 25% NH<sub>3</sub> dilution (ammonia water).



The amount of dilution dosed to the boiler feed water needs to be adjusted according to the pH-values of the boiler water and condensate, in order to keep both values within the allowed limits. To this end, the pH-values of both the boiler water and the condensate need to be measured manually. The guideline values for the pH-values are to be taken from the operation instructions of the respective manufacturer. Usually, they lie in the range of pH 10...12 for boiler water, depending upon the type and operation mode of the steam boiler, and pH 7...9 for condensate.

The exactly required amount of the dosing agent depends upon the concentration factor of the boiler water, the condensate return rate, the volatility of ammonia under the present boiler operating conditions, and consumption of ammonia for binding of free carbonic acid. Tentatively, a required amount of 2 g NH<sub>3</sub> for each m<sup>3</sup> of make-up water or of 1 g NH<sub>3</sub> for each m<sup>3</sup> of feed water can be estimated. In case of an adjusted dosing capacity of 5 l/h and a make-up water capacity of 25 m<sup>3</sup>/h or a feed water capacity of 50 m<sup>3</sup>/h, this would for example equal a dosing concentration of about 1%. In that case, 4 l of 25% NH<sub>3</sub> dilution would be required for each 100 l of dosing dilution.

## **7 Maintenance**

The dosing plant should be serviced four times a year. This includes a visual inspection of the dosing tank, the dosing line and the injection point for leaks. Also, the pumps need to be serviced. Instructions for that can be taken from the respective separate operation manual.

## **8 Contact Data of the Manufacturer**

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