

# Technical Documentation Heating/Cooling Water Filters

## FTK FF 1-16PM, mobile

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Congratulations to your new Heating Water Filter from FTK! Please read this manual prior to installation and initial operation, this will prevent from mistakes during installation and damages to your heating or cooling system.

Depending on the model, type and availability, the configuration and options of your filter machine can vary from the following descriptions, schemes and drawings.

FTK adapts its filter machines to the state of the art technical standards continuously and therefore reserves the right to change the configurations and specifications of its products at any time. For this reason no claims can be held on the following descriptions, schemes and drawings.

For further questions feel free to contact us at any time.

## 1. technical specifications for fine filter type FTK FF 1-6PM, mobile

Automatic mobile heating water filter for heating circuits between approx. 20 kW und 2.500 kW total thermal power output, or climate systems (water circuits) of similar size.

general operating data:

filter medium:	water in heating and cooling circuits
operating temperature:	max. 95°C
filter-flow-through:	max. 8 cm <sup>3</sup> /h
voltage:	1 x 220 V - 250 V 50 HZ
color:	stainless steel, polished
sealings/bearings:	Buna
limits of supply:	a) intake, filter pump = female pipe thread 1". b) exit filter = female pipe thread 1".

the machine is fully assembled and consists of the following main components:

Pos. 1: 1 transport cart, aluminum  
measures: approx. 400 x 970 x 400 mm. Construction in aluminum with solid wheels to support the installation of filter and filter pump.

Pos. 2: 1 filter pump, stainless steel version  
construction as block pump, motor and pump are one unit.  
volume flow: up to 8 m<sup>3</sup>/h  
pressure: up to 1,8 bar  
power consumption: approx. 0,5 kW  
revolutions: 2.900/min  
protection category: IP 54

Pos. 3: pipes and fittings  
diameter DN 1" between pump and filter, stainless steel.

Pos. 4: 1 electric control box  
for automatic control of the machine, signal to shut down the pump at maximum differential pressure, mounted on to the machine and connected electrically. Including 2 m cable for power inlet. Optional model with additional programmable time clock, power failure safeguard and contacts for remote control.



Pos. 5: 1 fine filter type FTK FF 1 – 6E  
Housing and lid constructed of stainless steel, the lid is constructed as a quick release system for easy operation. Manual bleeding valve. Allowed pressure drop in polluted filter: 1,5 bar max..

operating pressure:	16 bar max. (PN 16)
filter surface area:	1,7 m <sup>2</sup> (depending on filter cartridge in use)
filter fineness:	15 µm – different options available (1/5/15/40 µm)
filter cartridges:	1 pc. according to label/process needs

Pos. 6: 1 differential pressure gauge type FTK 03  
with indicator scale 0 - 2,0 bar with membrane technology, electric switch, complete with connection cords mounted on to the filter, reed-contact pre-adjusted to 1,5 bar.

## 2. Installation directions for FTK filter machines

### 2.1. General Instructions:

The micro filter must be set up vertically on even grounds. For stationary machines: the ground plate has to be screwed on to the surface (with decoupling elements if necessary).

The pipe from the heating circuit to the filter pump intake must be installed before the pipe from the filter outlet to the heating circuit - regarding the direction of flow of the heating water. The distance between the two pipes must exceed at least 300 mm. The pipes between filter and heating circuit must not exceed 10m length in total.

Please consider the schematic installation directions on the following pages. Each pipe to or from the filter machine must be equipped with a valve or gate. The pipes must be installed stainless and non-tensioned. Above the filter housing a free space of at least 700 mm from the top of the lid has to be guaranteed for future maintenance works. The filter machine must be installed well accessible. The scheme is valid for stationary filter machines as well as for mobile units. The Pipes/hoses have to be installed free of tension and proper strain relief.

The pipe system of the heating circuit has to be cleaned before installation of the filter machine. Solid pollutions and large particles can lead to damages on the filter pump and the filter cartridges.

Operation and maintenance of the filter itself, the differential pressure gauge, the filter pump and the electric control box can be read in the following chapters.

Important: the installation has to be done in such a manner, that fluid cannot flow through the filter machine in the opposite direction of flow at any time. If not guaranteed by the basic conditions of the water circuit a proper back-pressure valve has to be installed at the filter outlet valve. Otherwise a failure of the filter elements can occur.

**Caution!** Initiation of the filter machine must only be done with a fully vented pressure tank and pump of the filter machine. The filter pump is not self-priming. Running it dry will inevitably result in a pump failure and loss of any warranty!

Used filter elements can be dissolved by regular waste in case the filter medium did not contain any chemistry or toxic substances that have to be treated differently.

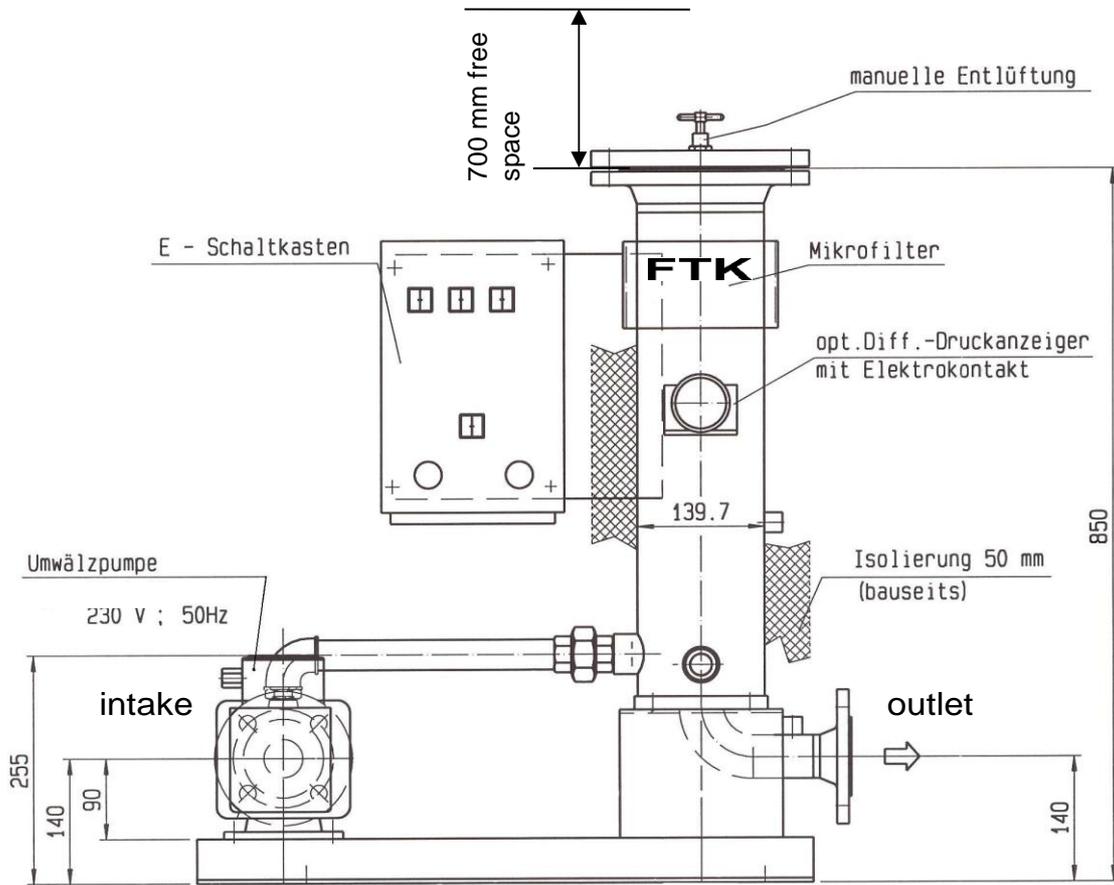
For operation of the filter machine components in detail consult the following chapters.

## 2.2. Special Instructions for connection:

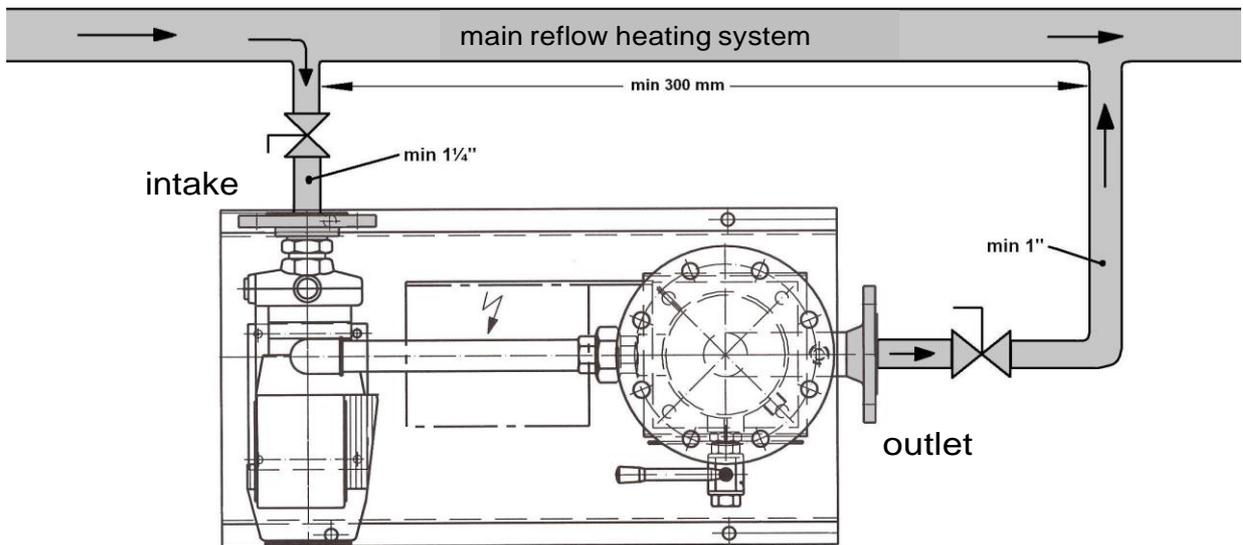
FTK Filter machines are always installed in a bypass. The favorable place for the hydraulic connection is the main return flow pipe to the heat generator. The main circuit must never be disconnected by directly installing a filter machine in-line!

1. Two valves have to be used (or need to be placed previously) in the main circuit according to the installation scheme (if not in place already).
2. The two valves should have a distance of approx 400 mm in between. Greater distances are no problem. However, no other components of the heating circuit must be bypassed.
3. Connections of not less than 1" in diameter have to be used.
4. The hose/pipe length to the filter pump intake must not be longer than 2m approx.
6. Mobile units have to be secured against falling over.
7. Free space of at least 700 mm above the filter lid has to be guaranteed for proper maintenance and change of filter elements.
8. The filter machine has to be installed well accessible to guarantee proper operation and maintenance at all times.
9. The filter machine must only be operated, when the main circuit is operated (is in flow) as well.
10. All connections and screws have to be checked for proper fit and leak tightness before putting the filter machine under pressure/operating it. Eventual malfunctions have to be reported immediately to FTK or your FTK dealer.
11. Before operation of the filter pump the whole filter machine has to be de-aerated! The filter pump is not self-priming. Operation in dry state will result in damage to the shaft-sealings and immediate loss of guarantee!

2.3 Installation directions for FTK filter machines, schematically



before and behind the filter valves/gates have to be installed. Reserve free space of at least 700 mm above filter for future maintenance works. The filter must be installed in a well accessible place.



### 3. description and users manual for fine filters type FTK FF 1-6PM, mobile

#### structure:

- 3.1. description
- 3.2. further machine components
- 3.3. operating instructions/maintenance
- 3.4. operating times
- 3.5. filtration results

#### 3.1. description:

The fine filter consists of its main parts housing (pressure chamber), lid and filter cartridge. The housing is constructed with connectors for inlet and outlet of heating water as well as connectors for differential pressure measurement and drainage.

The Lid is a blank flange equipped with an air bleeding valve. The filter inlay consists of a manifold with the respective number of filter cartridge slots. The filter cartridges are pushed into the manifold and sealed with o-ring gaskets. They are held down by the lid. To compensate small differences in length, the cartridges have a rubber knob fixed on their top end. The cartridges are flown through from the outside to the inside.

#### 3.2. further machine components:

- (1.) differential pressure gauge type FTK with magnetic contact, diaphragm and analogue gauge
- (2.) filter pump (see attached manual (Grundfos/Wilo))
- (3.) electric control box for automatic operation and remote signal,  optionally with time clock and power failure safeguard

#### 3.3. operating instructions/maintenance:

On a correctly installed filter machine, open valves on intake and outlet to the heating circuit reflow and running filter pump, the bleeding valve has to be opened until fluid escapes. Then the valve is closed. The heating water filter operates properly.

The differential pressure gauge has to be monitored. When reaching the maximum allowed differential pressure of 1,5 bar the filter pump is automatically shut down and the red alarm light in the control box is switched on. Heating water filters with an installed external contact will additionally send a signal to the control center.

The filter cartridges have to be changed at 1,5 bar differential pressure at the latest - they can be changed earlier. For changing filter cartridges, the lid has to be opened.

#### HOW TO: operate the machine/change a filter cartridge

- Attention!! Before opening the lid the filter pump must be switched off and the valves to the heating circuit have to be fully closed!
- Attention!! Danger of severe burns!! The water temperature in heating water circuits can exceed 90 °C or more! Special precautions have to be taken to prevent from injury. Prior to opening the lid the bleeding valve has to be opened until atmospheric pressure is produced in the housing. Then the bleeding valve has to be closed.
- It is not necessary to fully drain the filter housing for replacing the filter cartridges. When the lid is open, the filter cartridges can be pulled out of the slots carefully in a turn-and-pull movement. In case removing the used cartridges is a problem because of tight sitting, a lever can be carefully applied to the upper plastic cover of the cartridges. As well a lever or a long hook can be used to pull on the lower end of the cartridge; the hook must be placed carefully under the lower plastic cover of the cartridge. Pay attention not to damage the sealing surfaces of the lid or the housing while working on the filter!
- They have to be replaced by new cartridges. Cleaning and reusing the used cartridges is not possible in most cases, they are constructed to be one-way filters. We do not recommend cleaning them, but if you really want to try: cautiously hold it under running water. Do not puncture or penetrate the filter surface, as this will immediately destroy it. Cleaned filter cartridges can never bring the same results as new ones.
- Before inserting a new filter cartridge, make sure it is completely undamaged. Damaged cartridges have little or no filter capability. Before inserting the new cartridges, the o-rings may be lightly greased with common machine grease.
- The gasket between housing and lid must be inspected for damages or bents before remounting the lid. If any damage is visible or if the gasket is older than two years it should be replaced by a new one. Before remounting the lid make sure that no dirt or objects of any kind are on the sealing surfaces and on the gasket itself. The sealing surfaces must be flat and undamaged.
- Mount the lid and lightly tighten the screws crosswise with little power. Only tighten the screws fully when the lid is sitting correctly and parallel to the housing. Tighten the screws crosswise and equally strong to prevent the lid from tilting. If your FTK filter has a central nut as closing system, apply the lid first, then the nut. Look, that it is straight and can easily be screwed on until it is tight. – Then use the hook key from the back side of the machine to fully tighten the lid. Even a light hammer can be used to tighten the nut: apply the hook key, then cautiously strike the hammer on the end of the key.
- After mounting the lid the filter machine is ready for operation again. First of all slowly open the valve from heating circuit to filter pump intake. Then open the valve between the filter outlet and the heating circuit. Wait until system pressure is produced in the housing (no flowing sounds hearable).

- Now open the bleeding valve until fluid escapes from the housing. Close the bleeding valve when all air has escaped from the filter. Make sure that the filter is closed properly without any leakage. The filter pump can now be switched back on and the filter machine is working properly.

The initial differential pressure with a new and clean filter cartridge can be approx. 0,1 bar.

- Attention! The filter cartridges must be changed according to pollution or at least once per year!

#### 3.4. operating times

Operating times generally conform to the conditions of the heating system the machine is installed in, because these conditions vary individually. The filter machine must only be operating when the system it is installed in is running also. Circulation in the system must be running so that fluid is continuously pumped through the pipe the machine is connected to. When the main system is out of order the filter should also be switched off.

#### 3.5. filtration results

FTK filtration machines with the appendant FTK filter cartridges are solely designed to separate solid particles from fluids such as water. The filter cartridges have different filtration properties according to their filter fineness. The number within the name corresponds to the starting filter fineness of the cartridge. For common heating- And cooling water circuits a starting filter fineness of 15µm is recommended.

FTK filter machines are equipped with FTK FF-15 (15µm) filter elements when delivered, if not specified otherwise. That means that the largest solid particle that can pass the filter surface of a new unused filter cartridge has a diameter of 15µm max.

As soon as the filter cartridge is flown through by the circuit water, the contained particles begin to accumulate on the filter surface. Thus less and less free pores are left over on the surface and the flow through area on the cartridge decreases, while the differential pressure increases. This process can be observed on the differential pressure gauge on each filter machine.

It is common that this process takes long – or proceeds quickly, this is solely dependent on the amount of dirt and the character of the particles (size, consistency, etc.) contained in the water. New and clean filter cartridges have a differential pressure of 0 – 0,5 bar.

Over time a filter cake can build up on the surface. This causes the differential pressure to rise as well as the filter fineness to even decrease. Thus dirt particles of a diameter of 1µm or even less can be separated with 15µm cartridges. However, if this fineness has to be guaranteed, filter cartridges with a lower starting fineness can be used (such as FTK FF-1, 1µm cartridges). The cartridge endurance and total amount of dirt separated can then be lower.

Micro-particle-polution such as corrosion products and solid depositions/coagulations of other water ingredients causes the water to be murky or turbid. These particles can be separated with micro filters. Caution! Those particles/substances that dilute fully with water (such as some additives, chemicals, salt, some colors, etc.) cannot be separated!



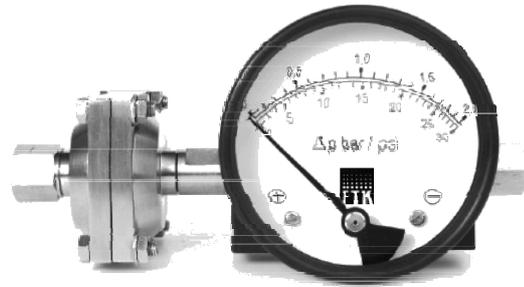
This way those components added to the circuit water deliberately will not be taken out by the filter. On the other hand those ingredients which cause the water to be coloured will also stay in it, because the particles causing the colour are too small to be held back by the filter surface. (Compare to salt which fully dilutes in water as well. The NaCl ions mix with the water, microfiltration is not fine enough to take them back out.) However remaining colour in the water is usually not a problem, as these ultra-fine particles (molecules, atoms, ions) are usually not scaling up on pipe walls, heat exchangers and the like.

If you have any questions to what can be expected from FTK micro filters or to what you experience or observe yourself when using them, just contact us: Filter Technik Kausch under: phone.: +49 (0) 4133 / 3344 or via [info@heizungsfILTER.de](mailto:info@heizungsfILTER.de).

#### 4. Description and Operating Instructions for Differential pressure gauges type FTK (technical alteration reserved)



type FTK 02



type FTK 03

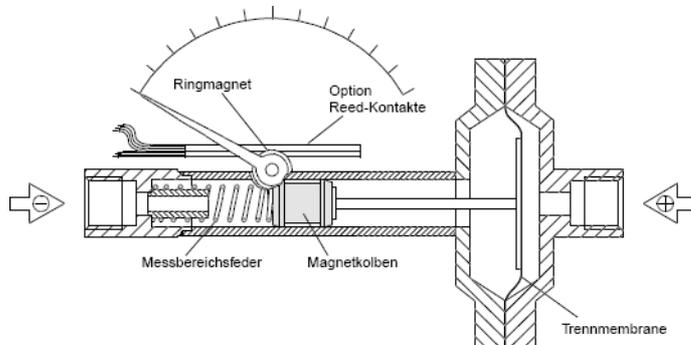
##### Content:

- 4.1. operating principle
- 4.2. installation
- 4.3. commissioning
  - 4.3.1. mounting of pressure connection
  - 4.3.2. wiring details 
  - 4.3.3. setting the switch point
  - 4.3.4. checking the zero point
- 4.4. maintenance
- 4.5. retour / repair
- 4.6. disposal

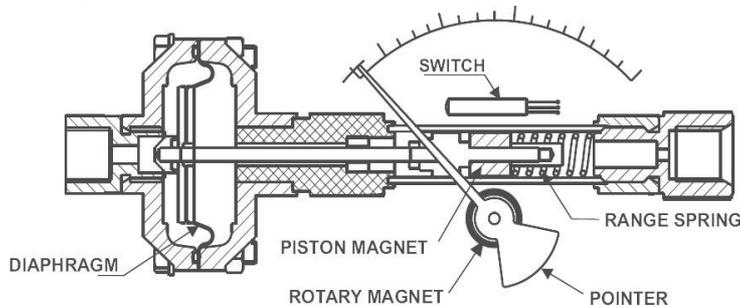
##### 4.1. Operating principle:

Pressures  $p_1$  and  $p_2$  are given in the  $\oplus$  and  $\ominus$  measuring chambers separated by a magnetic piston under pressure (resp. magnetic piston and separation diaphragm for model FTK 02). The difference in pressure causes an axial movement (measuring travel) of the piston supported by the compression spring. The measuring path resulting from this is taken up by a ring magnet found on the instrument pointer and appropriately displayed. This design combines the advantage of a complete separation of the measuring system and the indication and eliminates any leakage to the exterior. For model FTK 01 the stream of volume from the  $\oplus$  measuring chamber to the  $\ominus$  measuring chamber is minimized by the constructive design and will not interfere with the process. These measuring instruments are mainly intended for gas / air supply and preparation applications where no magnetic particles are involved.

drawing: principle of type FTK 02



drawing: principle of type FTK 03



#### 4.2. installation

The installation of the differential pressure gauge is made following the installation recommendations for pressure gauges according to EN 837-2 /7.

- The permissible maximum media / ambient temperature must not be exceeded
- Prior to the installation of the pressure gauge, the pipes should be thoroughly cleaned by tapping blowing or rinsing
- The pressure gauges should be installed and operated such as to avoid exposure to vibrations
- The pressure gauges should be protected against contamination and high temperature fluctuations

To avoid foreign matter in the measuring system and the resulting damage to the system the pressure gauge is to be mounted above the connector. If the line to the pressure gauge is not robust enough for vibrationless mounting it should be fastened by means of an appropriate fastening element for wall fitting or if necessary be made through a capillary.

#### 4.3. commisioning

##### 4.3.1. mounting of the pressure connection

Pressure entries are identified  $\oplus$  and  $\ominus$ .

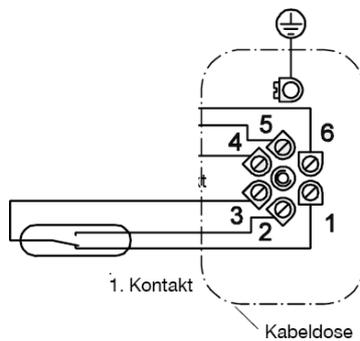
- $\oplus$  high pressure
- $\ominus$  low pressure

Hold against the connection pieces in the case of installation by means of 17 mm screw spanner. (installation by means of the screws without holding against the connection pieces may cause the measuring system to get loose)

#### 4.3.2. Wiring details (for pressure gauges with electrical attachments)

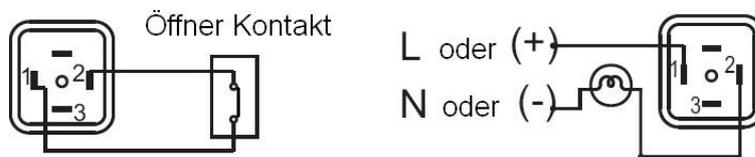
Electric connection of this pressure gauge is by means of terminal box and cable. Precise wiring schemes can be seen in the following drawing. Both the wiring details and the required power supply are stated on the rating plate.

drawing: electric wiring scheme with Reed-contact Typ FTK 02



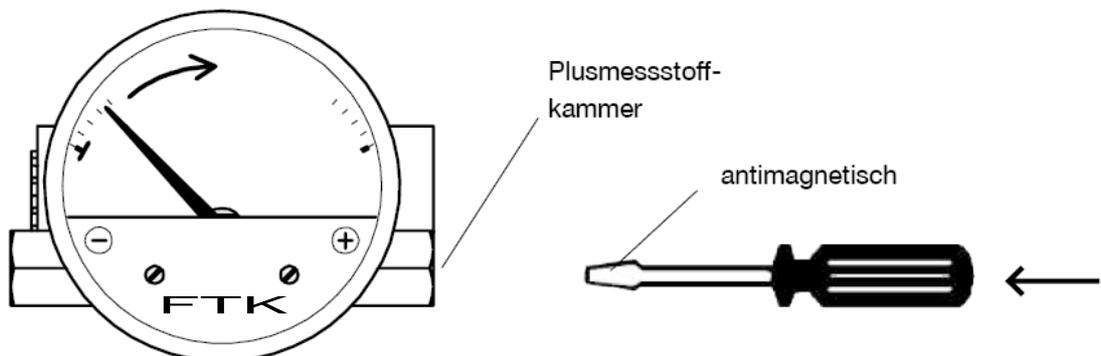
The gauges do not provide for incorporated overcurrent protectors. If overcurrent protectors are requested, these have to be provided for externally.

drawing: electric wiring scheme with Reed-contact Typ FTK 03



#### 4.3.3. setting the switchpoint

Preference should be given to setting the switching point before installing the measuring instrument. The necessary test path is generated by hand (for example, by means of a antimagnetic screw driver).



The switching point can be set after installation even when under pressure. The switching points are set at the factory when the desired values are given. The switching point is set by turning the contact setscrew on the outside of the reed case.

By turning counter-clockwise: switching point can be moved in the direction of the start of the measuring range

By turning clockwise: the switching point is moved towards the end of the measuring range

#### 4.3.4. checking the zero point

In general the zero point is checked and set in pressureless state. The system fastening lug on the back of the case can be easily slackened off for zero point correction of the measuring instrument. Now the zero point can be readjusted by moving the measuring system to the right or left. After this has been done the measuring system is to be secured again by means of the fastening lug (max. tightening torque 2.5 Nm at the screw).

#### 4.4. maintenance

**FTK** - differential pressure gauges require no maintenance or servicing and will give very long service when handled and operated properly. The instruments should be cleaned with a damp cloth moistened with soap solution. Remainder of the pressure medium in dismantled pressure gauges may be hazardous or toxic. This should be considered when handling and storing the removed pressure gauges.

#### 4.5. repairs

Repairs are to be only carried out by the manufacturer or appropriately trained personnel. If you encounter any problem during operation or maintenance of your differential pressure gauge please contact Filter Technik Kausch.

#### 4.6. disposal

Dispose of instrument components and packaging materials in accordance with the respective waste treatment and disposal regulations of the region or country to which the instrument is supplied.

## 5. Operating Instructions for filter pump type

→ see appendix: manual "operating instructions" from Grundfos or Wilo pumps (German, English and other languages)

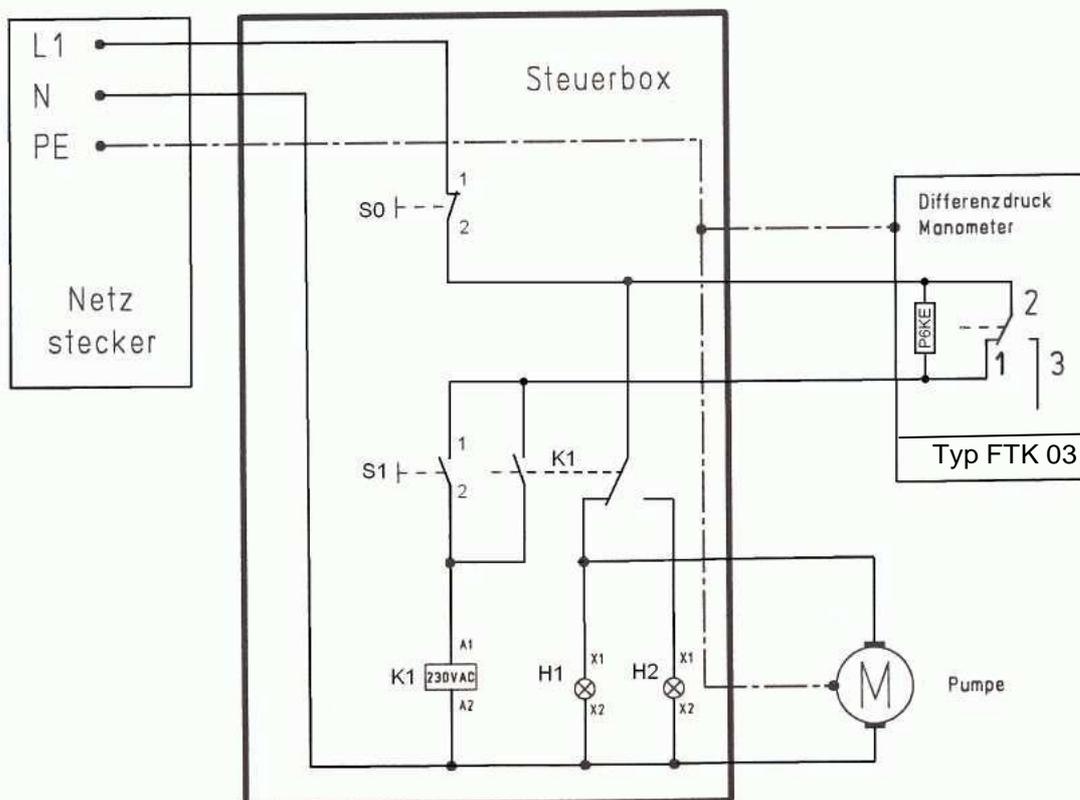
**Caution!** Initiation of the filter machine must only be done with a fully vented pressure tank and pump of the filter machine. The filter pump is not self-priming. Running it dry will inevitably result in a pump failure and loss of any warranty!

6. Wiring of the electric control box for fine filters:  
Type FTK FF 1-16PM, mobile

BESCHREIBUNG		ELEKTRO-ANSCHLÜSSE	
S0	Aus-Taster	Netzstecker	
S1	Ein-Taster	L1	braun
H1	Betriebsleuchte	N	blau
H2	Störungsleuchte	PE	grün-gelb
K1	Relais	Motor	
		L1	schwarz/braun
		N	blau
		PE	grün-gelb
		DD-Manometer FTK 03	
		1	schwarz
		2	blau / grau
		3	(bl./gr. nur Typ FTK 02)

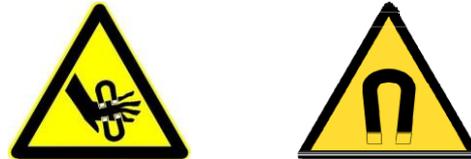


**Caution:** Switch box can only be opened when the machine is de-energized! ZERO-Potential!



## 7. Documentation FTK high-performance Magnetbar for FTK filter elements

**Caution:** Obey safety instructions for FTK magnet-bars!



FTK Magnet-bar type FTK M250-25-40

Technical Data:

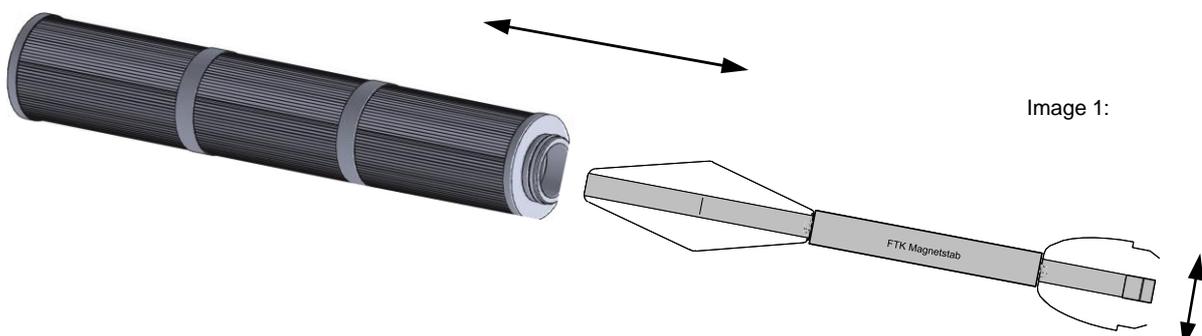
Material Magnet-bar: housing: stainless steel 1.4301, Magnets: NeoDym high temperature magnets  
Magnet-bar measures: length 250mm, Ø 25mm  
Material brooch/clip and screws: stainless steel 1.4301  
Magnetisation/Magnetic remanence: : 10.000 Gs / ca. 1,25 Tesla  
Max. working temperature: 120°C

General conditions / mode of action:

FTK high performance magnet bars are designed to retrieve magnetically reactive particles from circuit waters that are eventually contained in it (especially rust and other ferritic particles). The water which has already been micro-filtrated is streamed alongside the magnet bar, where the very strong magnetic field will draw any ferritic particle to the surface of the magnet bar. The particles will build up a mud cake over time. All materials exposed to the circuit water are made of high grade steel, ensuring a high resistiveness and longevity.

Implementation / filtration results / maintenance:

The fully assembled FTK magnet bar is inserted into the bottom outlet of the filter element, the closed brooches forward. The open brooches on the rear end will clip into the bottom cap of the filter element, ensuring a tight fit, so the magnet bar cannot slide out by itself (see image 1). The filter element can thus be inserted into the filter machine, as usual. The filter machine can then be put in service. If relevant amounts of magnetic reactive particles are contained in the circuit water, several ring-shaped mud cakes will build up on the magnet bar's surface over time. This will happen on those spots where the magnetic field exits the magnet bar. To retrieve the magnet bar from the filter element, the four ends of the lower brooch are pressed towards the middle of the filter element's outlet, so the clips will release from the inside of the filter element's lower cap. For unlatching the clips use the magnet retrieval tool, hold the filter element with the outlet to the bottom and shake cautiously until the magnet bar slides out. Then pull the magnet bar assembly to the bottom slowly. The eventually existing mud cake can be wiped of using a common piece of cloth, paper wipe or towel. This procedure can be done during a regular maintenance of the filter machine / filter element.



## Warning notices

from FTK Filter Technik Kausch e. K. (FTK) for the handling of permanent magnets consisting of neodymium-iron-boron (NdFeB), samarium-cobalt (SmCo), AlNiCo or hard ferrite.

### Disclaimer

FTK is not liable for damages caused by improper handling of magnets and in particular by ignoring the subsequent warnings. With the purchase of magnets, you acknowledge that you took notice of and understood these warnings. For the resale of strong permanent magnets, please make sure that your customers can take notice of these warnings and security advices as well.

### Damage from loosening objects

Make sure that magnets have adequate adhesive force, if they are used to fasten objects, which can lead to personal injury or property damage in case of falling. Especially make sure that the magnetic fixture cannot be loosened by unintended external force.

### Dangers for children

Strong permanent magnets are not toys, especially for young children. They can be fatal if swallowed or inserted into an electric socket. Also keep in mind that larger magnets might cause severe squeezing-injuries and should therefore not be made available to infants and little children.

### Fracture and fragmentation threats

Many magnets are pressed from powdered materials under high pressure (sintered) and provided with a metallic protective layer. Thus, the magnets are brittle and can break. This can happen especially, if larger magnets collide. It can also splinter the magnetic body or make the coating fly off causing eye injury. In case of handling larger magnets the use of protective gloves and goggles is strongly advised.

### Crushing

Neodymium magnets reveal an unexpectedly strong attraction when they are brought together closely or to ferritic steel objects and can very easily cause bruising and contusions. Avoid using on body parts on purpose like nose and ears, etc.

### Abrasion or flaking of the coating

The surface coating of the magnets can wear out with use. Accelerated wear or flaking can occur when magnets collide. Ball magnets are suspended by the point of contact area and should not be stored for long periods of time in direct contact with another magnet or metal surface.

### Machining and fire hazard

Most permanent magnets are hard to machine. They tend to break during drilling or sawing. If you want to machine magnets anyhow, use adequate diamond or corundum tools and apply enough coolant water. The materials NdFeB and SmCo can easily inflame. Moreover, all permanent magnets can lose magnetization, if heated beyond their maximum working temperature. Note also the lack of anti-corrosive protection on the machined areas. If you use magnets without fastening holes, we recommend to glue them on the surface or fit and/or glue them into a recess.

### Dangers for devices

Strong permanent magnets can damage technical equipment and media storage devices and should not be adhered to such objects. A generous safety distance should be allowed. Among others and not exclusively, the following items are at risk: mobile phones, computers, monitors, TV-sets, hard drives, floppy disks, magnetic tapes (including audio and video cassettes), USB sticks, credit and debit cards, clocks, speakers, microphones, power meters, hearing aids, pacemakers and RFID chips (animal chip, transponder), etc..

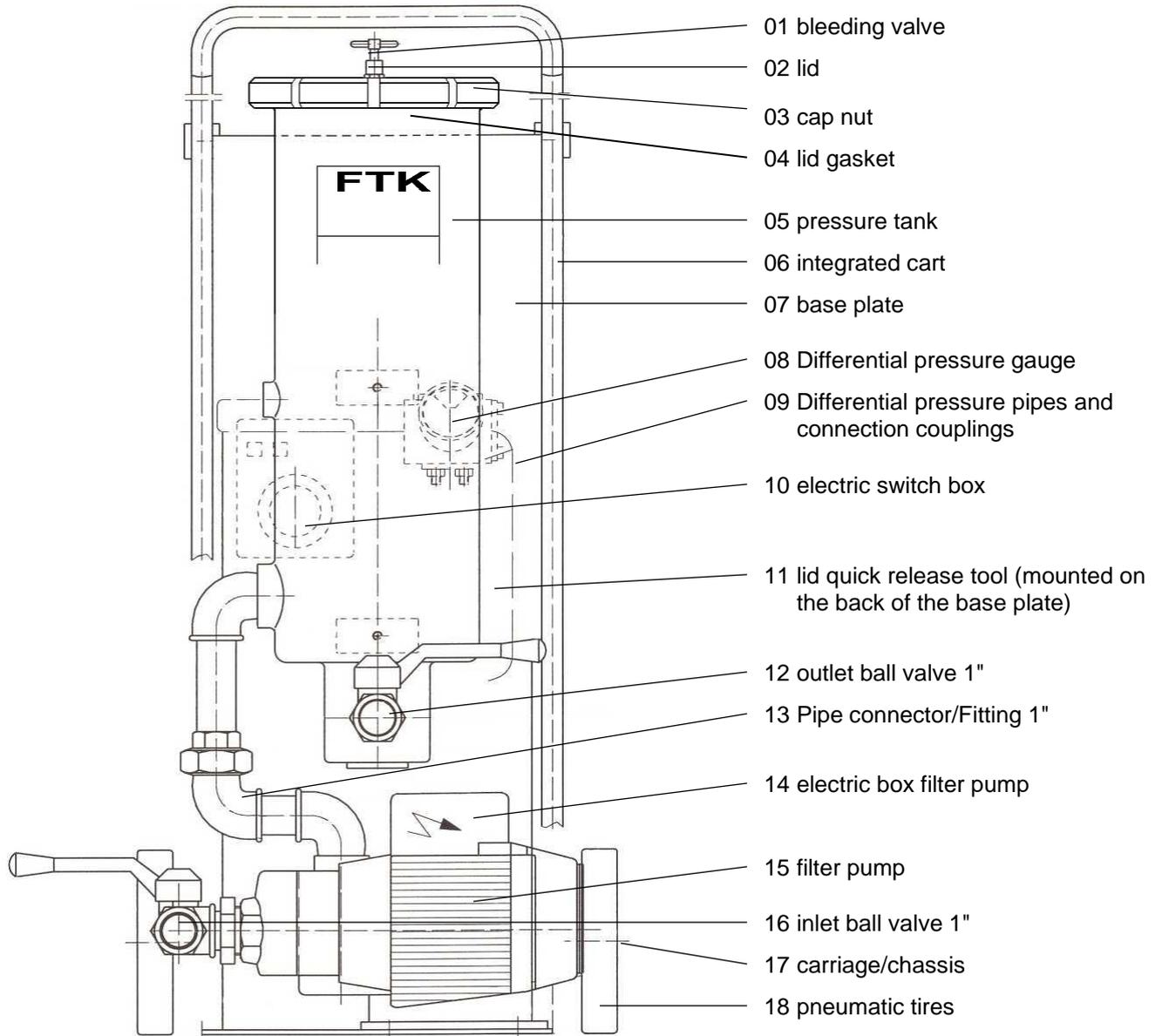
### Health Hazards

Most neodymium magnets are equipped with a nickel coating to which some people react allergic. Prolonged skin contact with nickel may also increase the risk of developing a nickel allergy. The widespread scientific opinion is that static magnetic fields have no harmful effect on the human organism. Moreover there are non-scientific healing methods based on the effect of magnetism. To be safe you should not expose yourself in the long run to strong magnetic fields.

## 8. overview drawing mobile FTK fine filters

Available models:

- PN 6 Standard
- PN 6 + enhanced electrics
- PN 6 + integrated dosing pump
- PN 16 Standard
- PN 16 + enhanced electrics
- PN 6 + enh. el. + dosing pump



19 within pressure tank: e. g. filter cartridge type FTK FF-15 (15 $\mu$ m), FTK FF-1 (1 $\mu$ m), FTK FF-10 (40  $\mu$ m)

! For spare parts inquiries to FTK Filter machines always state the dealers address you got it from, year of manufacture, works number as well as installation point, and/or project. Inquiries can be handed in via phone +49 (0) 4133-3344, fax +49 (0) 4133-3922, or email to [info@heizungsfilter.de](mailto:info@heizungsfilter.de).



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