Installation of the BAT Mk III Filter Tip

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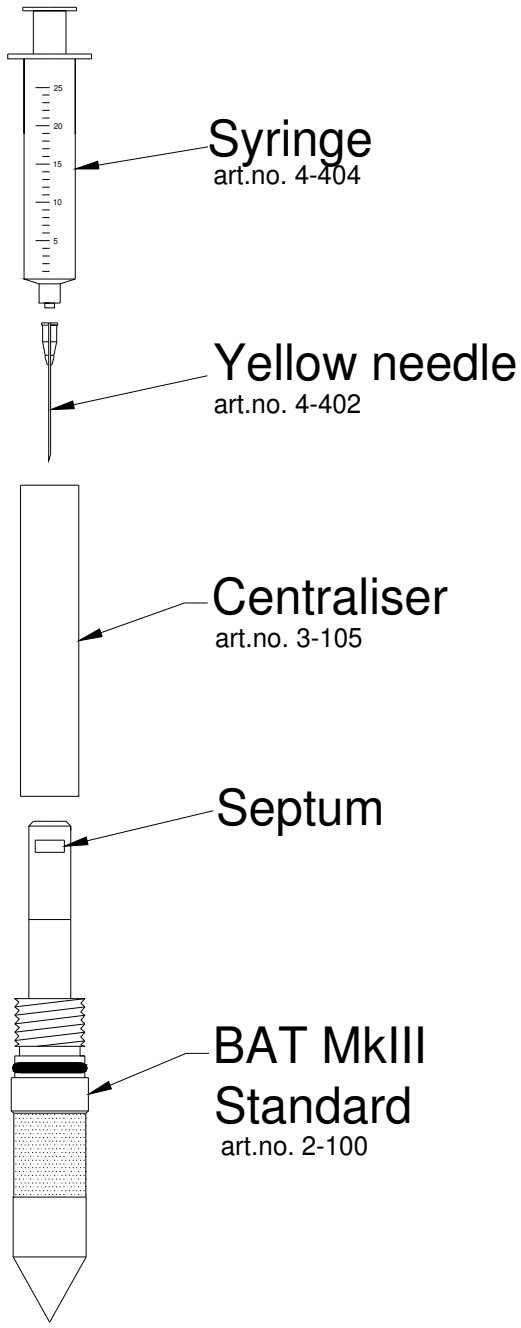
Preparations

!! For instruction on BAT MKIII Vadose, see Appendix 1&2

- Fit a yellow needle to the syringe
- Fit the centraliser to the filter tip
- Lower the filter tip into a bucket containing deaired water until that the filter is below the water surface
- Connect the syringe via the centraliser and penetrate the rubber septa.
- Use the syringe to draw out the air to water saturate the filter tip. Draw a total volume of 40 ml water trough the filter tip, i.e. equal to two syringe volumes.
- Finally, when pulling out the needle, you shall maintain a suction in the syringe to expell any trapped air at the top of the filter tip.
- Let the filter tip remain submerged until time for installation

NOTE! The BAT MKIII filter tip must **not** be boiled to get saturated!



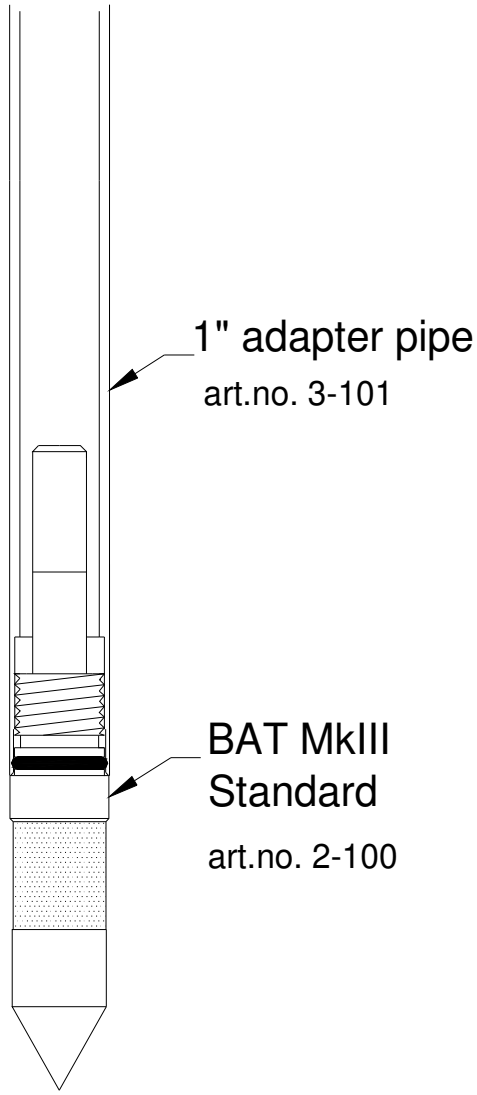
The BAT MKIII Std can tolerate an installation up to 25kN in fine grained soils.

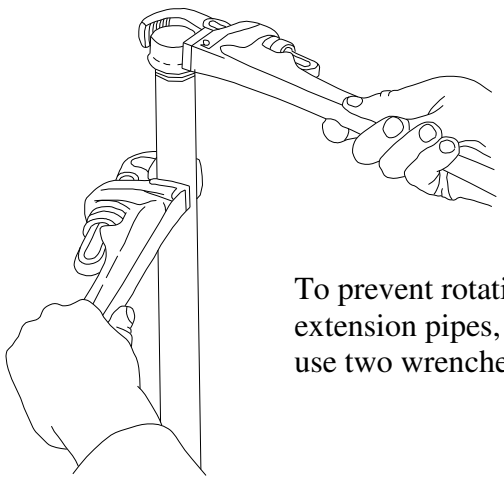
Installation

!! For instruction on BAT MKIII Vadose, see Appendix 1&2 !!

Depending on the soil, you can use several different installation methods. The most common method for the Swedish soil conditions is simply “push in”-installation using an ordinary drill rig. In harder soils predrilling may be required.

- Clean the inside of the adapter pipe and the 1” extension gas pipes. It is recommended to use galvanized pipes.
- Pre-drill the harder top soil layers.
- It is recommended to fill the pre-drilled hole with water.
- Screw the filter tip into the 1”-adapter pipe. Hand tighten, no tools are needed! Let the filter tip remain submerged while doing this.
- If using a rig for the installation, place the bucket under the chuck of the rig. Attach an extension pipe to the chuck and screw it together with the adapter pipe always keeping the filter tip submerged. After this, quickly, remove the bucket and commence the installation. Do not rotate the pipe during installation which may damage the filter.
- Use extension pipes as many as needed and remember to apply some kind of thread sealing agent to prevent leakage of water into the pipe. This may for example cause problem wintertime in colder climates.
- Note date, depth and location of the installation. Add 3cm (1,2”) to the total length of installed pipe (the distance between end of pipe and the filter tips intake). If using the special measure tape (#3-106), no compensation is needed.
- Seal the top end of pipe either by using a cap or the specially designed protective housing (#3-207).





To prevent rotation of the extension pipes, do always use two wrenches.

Installation force & Disturbance effects

Installation Force
In case the BAT Filter Tip is installed using ordinary 1”-gas pipes, the allowable installation force is normally limited by the strength of the pipe couplings.

The BAT MKIII Std Tip can sustain a static installation force of 25 kN in fine grained soils.

The BAT MKIII SS Tip (stainless steel) can tolerate a static installation force of 80 kN in fine grained soils. This filter tip also be installed by using light dynamic equipment.

Dissipation of pore pressures, caused by disturbance during installation
When the BAT Filter Tip is pushed into the soil, excess pore pressures will be generated due to the disturbance of the soil.

In soft clays, normally high excess pore pressures are generated. On the contrary, in silts and fine sands it can happen that the installation of the filter tip generates a negative pore pressure response, due to dilatancy effects in these types of soil.

The time needed for dissipation of these disturbance effects on the original pore pressure situation varies with the type soil. In soft, high plastic clay it may take up to 5 to 7 days until the original pore pressure situation is restored. In silts and sands, on the other hand, the dissipation of the disturbance effects from the installation of the BAT Filter Tip is much quicker.

The process of dissipation of excess pore pressures can be monitored by the BAT Pore Pressure sensor. In addition this type of monitoring provides valuable information about the character of the soil, surrounding the filter tip.

Accessories

Measure tape to determine installation depth of the BAT Filter Tip.
(art.no. 3-106)

1”-pipe

Protective housing for the cable and battery unit.
(art.no. 3-207)

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BAT MkIII Vadose Filter Tip (2-102).

ASSEMBLY

1) Assemble the Rubber seals and the Ceramic Filter onto the axle of the Tip. Put a few drops of water on the rubber seals to reduce friction.

2) Screw the Tip into the inner inner thread of the. Body. DO NOT use any tools, finger-tight is enough (n.b. fairly strong fingers are needed)! Over-tightening may damage the filter.

WATER SATURATION OF FILTER TIP

1) Lower the Filter Tip into a bucket, containing clean de-aired water.

2) Fit a yellow needle to a 20 ml syringe.

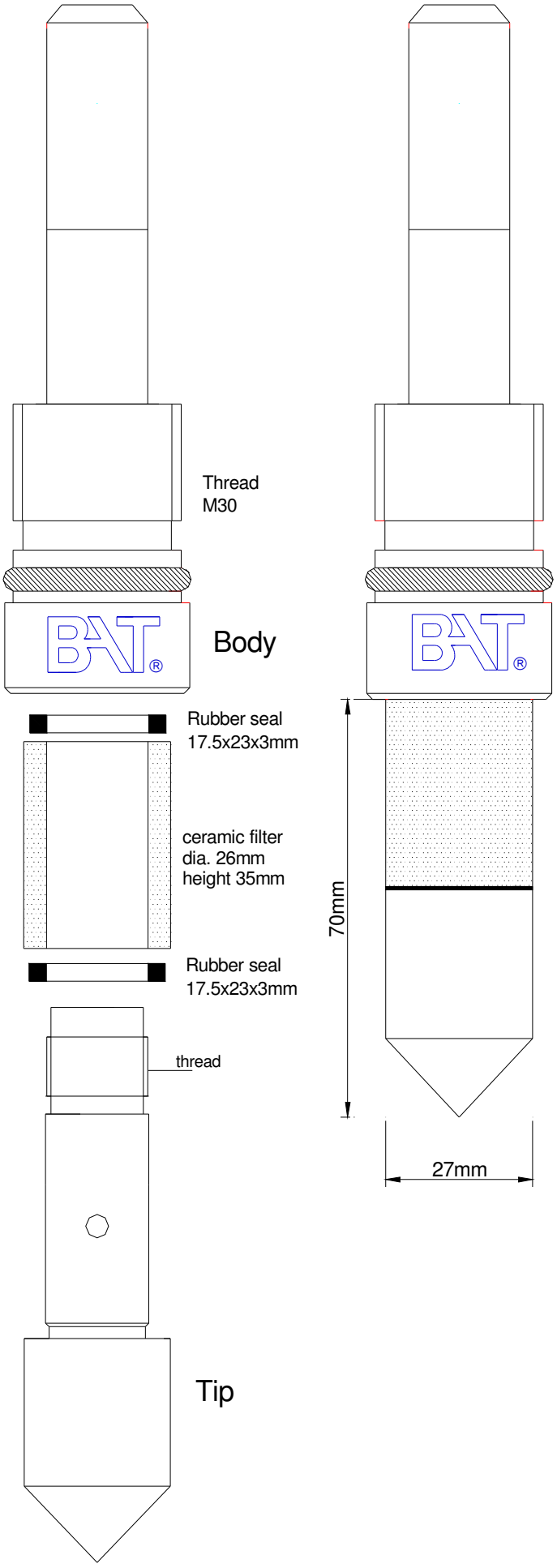
3) Connect the syringe via the centralizer and penetrate the rubber septa (see instruction on Page 1.)

4) Use the syringe for drawing water through the Ceramic Filter and the Filter Tip.

5) Draw a total volume of approx. 15ml through the ceramic filter and the Filter Tip.

6) IMPORTANT! Finish the water saturation procedure by SLOWLY PULLING OUT the needle, while SIMULTANEOUSLY MAINTAINING THE SUCTION in the syringe.

7) Maintain the Filter Tip submerged in water until installation in soil.



Installation of BAT MkIII Vadose Filter Tip (2-102).

PRE-AUGERING

1) The installation of the BAT Vadose Filter Tip requires pre-augering of a hole to the full installation depth.
The augered hole shall have a diameter sligthly smaller than the diameter (26mm). the BAT Vadose Filter Tip.

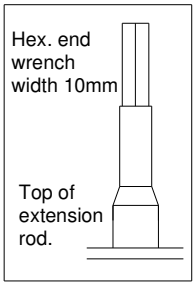
2) The BAT Vadose Filter Tip is supplied together with two augers having the following dimensions:

dia.	22	25	mm
length	300	300	mm

Extension rods (dia. 19mm) to the augers are supplied, having the lengths of 700mm and 1100mm.

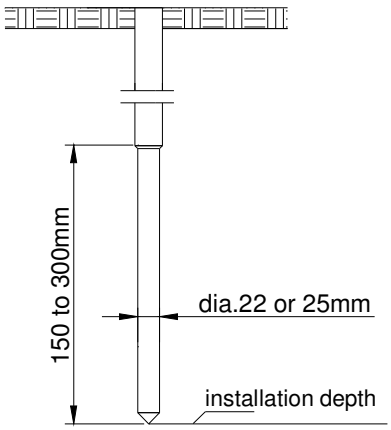
Depending on the soil type, the 22mm auger (soft soil) or the 25mm auger (stiff soil) is used for pre-augering for the BAT Vadose Filter Tip.

The top of the extension rod has a hexagonal fitting with a "wrench-width" of 10 mm. Depending on the the soil type it might be possible to use a strong electric drill for the pre-augering.



Pre-augering.

N.B. Pre-auger successively 0.3m depths in each turn. Measure and note the depth of pre-augering.



INSTALLATION OF BAT FILTER TIP

1) Fill the pre-augered hole with water to reduce the friction along the 1-inch adapter pipe (#3-107)

2) Connect the BAT Vadose Filter Tip to the 1-inch adapter pipe. N.B. Hand tighten only - no tools are needed.

Make sure that the O-ring at the shoulder of the Filter Tip fully seals inside the 1-inch pipe.
Mark the pre-augered depth on the adapter pipe (distance to be measured from the tip of the Filter Tip).

3) Push the 1-inch pipe gently down to the pre-augered depth.

Two pipe wrenches and the weight of two men would normally be enough for pushing down the adapter pipe to the pre-augered depth.

Tamp the soil at the surface around the 1-inch pipe to prevent surface water from . running down around the 1-inch pipe.

4) Connect the BAT IS Sensor to the Filter Tip directly after installation to check the function the Filter Tip.

5) Wait for stabilization of the pore pressure. The stabilization process can be monitored by logging the pore pressure. Depending on the soil type the time needed for stabilization will be in the interval of approx. 2 - 24h.

6) Fill the adapter pipe with clean water. The water will reduce the eventual temperature fluctuations during future permeability testing.

7) Seal the pipe with a cap for preventing vandalism.