

Tender specification:

Oventrop heating oil filter with deaerator “Toc-Duo-3” for use in one pipe systems with return flow feed (suction system), for filtering and automatic deaeration of heating oil. A return pipe to the tank is not required.

Deaerator body made of metal, with wall bracket and integrated isolation. Filter cup and deaerator cap made of transparent plastic, for item no. 2152754 made of metal.

Connections for the suction pipe to the tank G $\frac{3}{8}$ female thread for connection of compression fittings 6, 8, 10, or 12 mm (sets of compression fittings to be ordered separately). To the burner G $\frac{1}{4}$ female thread or G $\frac{3}{8}$ male thread with inner taper for hose connection.

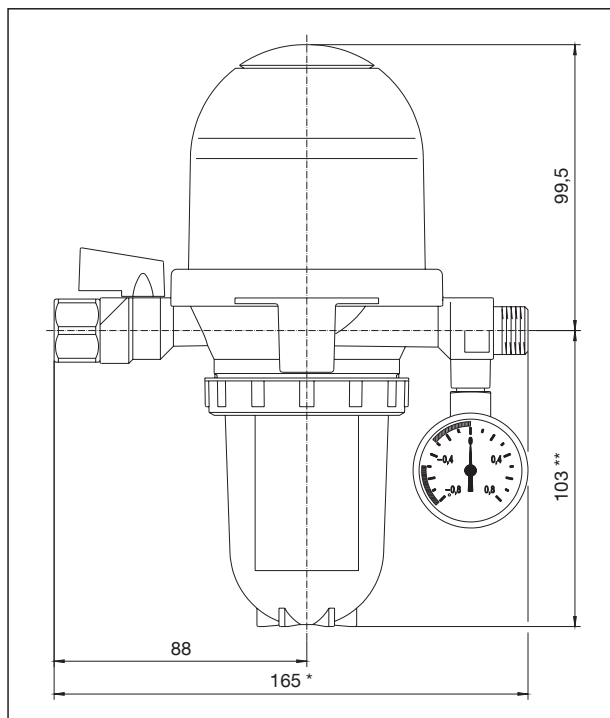
Models:

Filter insert:	Mesh size:	Item no.:
“Toc-Duo-3” without vacuum gauge, burner side G $\frac{3}{8}$ male thread		
Siku	25 – 40 μm	2142732
“opticlean”	5 – 20 μm	2142735
“opticlean” (long)	~ 2 μm	2142737
“Toc-Duo-3” without vacuum gauge, burner side G $\frac{1}{4}$ female thread		
Siku	50 – 75 μm	2142700
“Toc-Duo-3” with vacuum gauge, burner side G $\frac{3}{8}$ male thread		
“opticlean”	5 – 20 μm	2142754
Siku	25 – 40 μm	2142762
“Toc-Duo-3” metal model, with vacuum gauge, burner side G $\frac{3}{8}$ male thread		
“opticlean”	5 – 20 μm	2152754

The “Toc-Duo-3” can be combined with other standard filter inserts for heating oil filters.



“Toc-Duo-3”



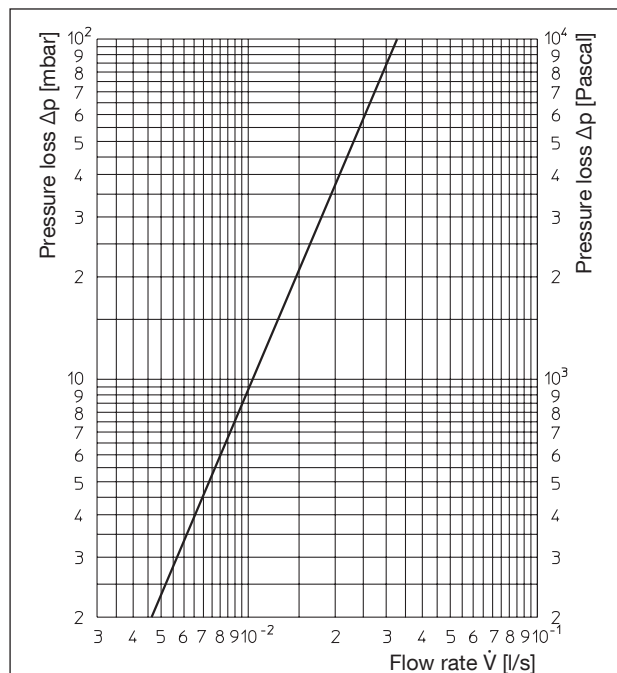
Dimensions

* with female thread 163 mm

** depending on filter insert/filter cup: 98 up to 193 mm

Technical data:

Connections:	
Tank side:	G 3/8 female thread
Burner side:	G 3/8 male thread with taper for burner hoses or G 1/4 female thread
Fluid:	EL type of heating oil according to DIN 51603-1, heating oils with “alternative additives” or with a bio proportion up to 20%, e.g. heating oil EL A Bio 20 according to DIN SPEC 51603-6.
	The metal model “Toc-Duo-B” is recommended for heating oils with higher “alternative additives”, thin vegetable oils as well as FAME.
Max. nozzle capacity:	110 l/h
Max flow of returned heating oil:	120 l/h
Min. deaeration capacity:	6 l/h air or gaseous vapours
Installation position:	vertical, deaerator cap pointing upwards
Max. ambient temperature:	60 °C*
Max. operating temperature:	60 °C* (metal model up to 70 °C)
Max. operating pressure:	0.7 bar corresponding to a static column of oil of 8 m for tanks located at a higher level
Max. suction pressure:	-0.5 bar
Max. test pressure:	6 bar
Dimensions [mm]:	(L x D x H) 165 x 97 x 203 - 337 (depending on the filter cup)
TÜV tested:	TÜV Rheinland, No.: S138 2014 E5
* according to DIN 4755, the max. permissible temperature of heating oil in heating oil installations is 40 °C	



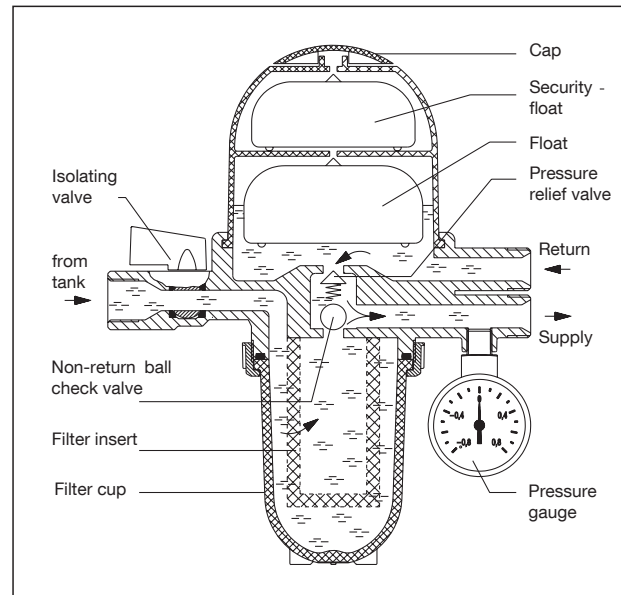
Flow chart (for EL type of heating oil): Pressure loss during suction

Function:

Oventrop heating oil filter with deaerator “Toc-Duo-3” for filtering and automatic deaeration of heating oil.

The burner pump draws oil through the suction pipe via the isolating valve, the filter and the check valve. The filter retains dirt particles. Normally, a small portion of oil is pumped to the nozzle by the burner pump and is burnt (per 10 kW of heat output about 1 litre of oil per hour). The excess is fed into the deaerator via the return pipe. Air and gaseous vapours rise and are expelled into the atmosphere via the float valve. The deaerated oil is fed into the

supply pipe via the pressure relief valve. As a result, only the used quantity is drawn from the tank via the suction pipe and filter. At the same time, the working temperature of the oil pump is used for pre-warming the oil.



Functional scheme

During operation, a relatively constant filling height will be present in the lower part of the deaerator cap. Depending on the working conditions, this part may even fill up completely.

If heating oil enters the upper part with the security float, the “Toc-Duo-3” has to be replaced.

Installation:

The heating oil filter with deaerator is to be installed at a suitable location with the help of the enclosed fixing plate. To mount the “Toc-Duo-3” on the burner wall, metal screws are included in the delivery. Care must be taken that the max. ambient temperature does not exceed 60 °C, i.e. do not mount the “Toc-Duo-3” near an un-insulated part of the boiler or the exhaust pipe or above flaps of the heating which can be opened.

The heating oil filter with deaerator is to be installed vertically.

It can be installed above or below the oil level.

For maintenance and monitoring, the “Toc-Duo-3” is to be installed in a prominent position which is easily accessible.

When converting two pipe systems to one pipe operation, the pipe dimension has to be reduced if required, see “Sizing of the suction pipe”.

The supply and return connection must not be mixed up as this may cause damage to the “Toc-Duo-3” and the burner pump.

Note:

For technical reasons, deaerators filled with oil must not be inclined too heavily or be laid down. Please drain off the oil first.

If constructional conditions allow, the pipe should be installed in such a way that it acts as “self-monitoring suction pipe”. It has to be installed with an even decline towards the tank and all check valves in front of the “Toc-Duo-3” have to be removed. If a leakage occurs, the column of liquid in the declining pipe breaks off.

Pressure test:

When carrying out a pressure test of the suction pipe, the pressure test device must not be connected to the “Toc-Duo-3” as the integrated check valve will prevent the pressure transmission on the tank side.

Moreover, the float valves of a new, unfilled “Toc-Duo-3” are open so that it should not be included in the pressure test.

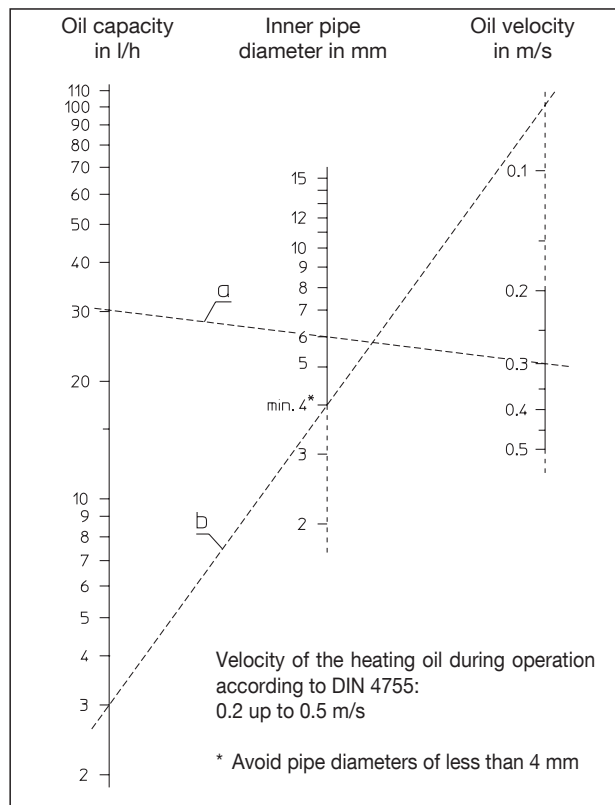
Note:

Do not use detergents containing alcohol or solvents as these may damage the plastic parts.

Sizing of the suction pipe:

The suction pipe towards the tank should be sized in such a way that the velocity of the heating oil during burner operation is between 0.2 and 0.5 m/s (DIN 4755). This is especially valid for pipe sections leading downwards. If the suction pipes are oversized, velocity is reduced in such a way that the gas emissions are not transported constantly and gather as big air bubbles in upper pipe sections. If a big air bubble reaches the burner pump, it may cause a malfunction.

For small burner units in detached and semi-detached houses, the inner pipe dimension of 4 mm (e.g. pipe 6 x 1) is often sufficient. Apart from the velocity, the flow resistance and the suction height have to be taken into consideration.



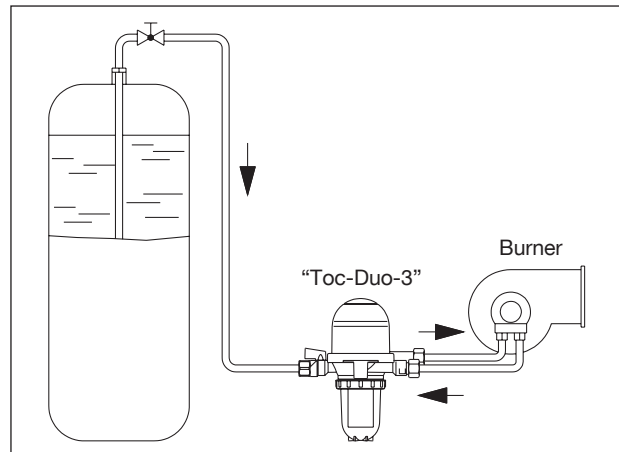
Nomogram

Examples:

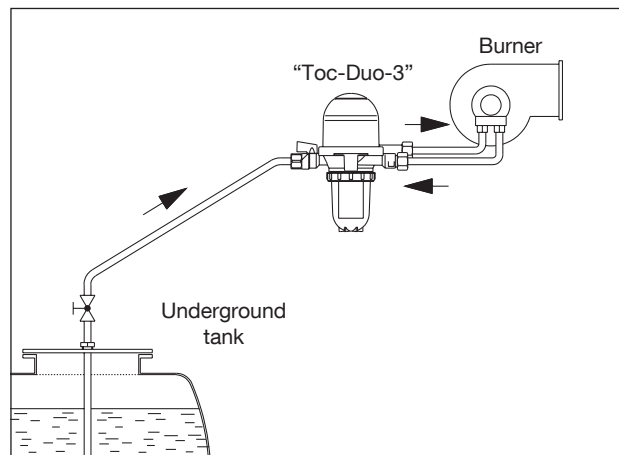
- For a pump output of 30 l/h (about 300 kW), with a medium suction speed of 0.3 m/s, a pipe of 8 x 1 with an inner diameter of 6 mm is required.
- A small installation with a heat output of 30 kW, corresponding to a flow rate of 3 l/h, is equipped with a pipe 6 x 1 with an inner diameter of 4 mm. The velocity is very low then (about 0.07 m/s), but possible airlocks are very small and do not cause malfunctions.

Vacuum gauge (optional):

The optimum depression range is between 0 and -0.3 bar. With the depression lying between -0.3 and -0.5 bar, a replacement of the filter is recommended; with an even higher depression, malfunctions as well as a high pump erosion are to be expected. If the tank is located at a higher level, a positive pressure will be given. The vacuum gauge is not suitable for use behind a feed pump (pressurised system). If the pressure rises in case of a burner stop, pressure compensation has to be provided to avoid damage to the vacuum gauge (install pressure compensation device or remove non-return check valves).



System illustration
Installation of the “Toc-Duo-3” below the oil level



System illustration
Installation of the “Toc-Duo-3” above the oil level

Formation of oil froth and possible malfunctions:

Oil froth may develop if large quantities of air are delivered via the burner pump together with the heating oil. These may lead to malfunctions of the burner.

Possible reasons are:

- Leakage in the suction pipe (seal, re-tighten fittings)
- Initial operation of the suction (if required, fill pipe before)
- Oversized suction pipe (install smaller pipe, see “Sizing of the suction pipe”)
- Storage tank empty (refill heating oil)

Pressure operation:

The “Toc-Duo-3” must not be used under pressure, i.e. behind a feed pump in the supply pipe. This is not sensible as air is only emitted in suction operated systems.

According to DIN 4755 it must be ensured that in closed pipe sections a rise in pressure due to an increase in temperature of the heating oil must be balanced off (for instance by installing a pressure compensation device, e.g. Oventrop pressure compensation device “Olex”, item no. 2107003). Alternatively, closed pipe sections can be avoided by renouncing check valves.

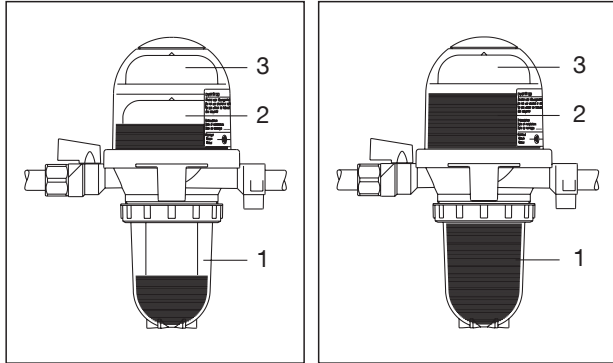
Increased pressure may lead to damage to deaerators and other installed equipment.

Air pockets in the filter cup:

The heating oil is filtered before deaeration and during this process it is possible that some of the air in the oil is retained by the oil moistened filter insert so that an air pocket forms in the filter cup (1). As the inside of the filter cup is filled with oil, the installation continues its operation.

This is especially noticeable where a large portion of air is in the oil or only small quantities of oil are consumed (10 kW ~ 1 l oil/h).

A sinking of the oil level is also possible during burner operation.



Filling height in the deaerator cap:

Depending on the working conditions, different filling heights may develop in the lower part of the deaerator cap (2).

This chamber may also be filled completely, for instance if no gas emissions exist in case of a tank located at a higher level. The existing air may then dissolve in the heating oil between the burner pump and the chamber of the deaerator.

If working conditions change, for instance by a sinking oil level in the tank, a new air cushion may grow.

In case of heating oil in the upper part (3) with the security float, the heating oil filter with deaerator has to be replaced.

Parallel installation of several “Toc-Duo-3”:

If higher nozzle capacities than 110 l/h are required, it is possible to install two or several heating oil filters with deaerator in parallel. It must be ensured that the maximum return flow does not exceed 120 l/h per installed heating oil filter with deaerator. The return flow is the pump output minus the volume of burnt oil.

Flooding:

The Oventrop heating oil filter with deaerator “Toc-Duo-3” may also be installed in areas prone to flooding with the height of flooding not exceeding 5 m.

As dirt may block the vent bores which may lead to malfunctions, a replacement of the “Toc-Duo-3” is recommended after a flooding.

Smell of oil:

The deaerator expels gas emissions into the atmosphere which may lead to smell nuisances in badly ventilated boiler-rooms. In this case, a hose may be pushed onto a hose nipple and the air may be expelled (see accessories). Please ensure that the hose is not obturated.

Accessories:

	Item no.:
O-Ring for sealing filter cup/filter head	2126500
Collar nut	2126600
Transparent filter cup - standard model	2126751
Transparent filter cup for “Magnum”	2126755
Transparent filter cup for “opticlean” long	2126774
Metal filter cup	2126754
Bracket with screws	2142892
Hose nipple with 10 m hose	2142990

Filter inserts:

Depending on the requirements, different filter inserts may be chosen.

The sintered plastic insert (Siku) consists of a mass of miniature plastic balls. Its special form offers a larger surface. Possible burner malfunctions caused by erosion of fibre particles are avoided.

These filter inserts are used most frequently. Filter inserts up to 40 µm are recommended for smaller heating systems (up to about 30 kW).

Models:

		Item no.:
Siku	50 - 75 µm	2126300
Siku	25 - 40 µm (red bayonet)	2126354
Siku	50 - 75 µm “Magnum”	2126355
Siku	25 - 40 µm “Magnum” (red bayonet)	2126371

Felt inserts have proven their worth over the years.

Felt	50 - 75 µm	2126200
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The filter cartridges are screwed onto the deaerator body with the help of an adapter. Due to their large surface, they allow for very fine filtering.

Cartridge, PN10	25 µm	2126400
Adapter for connection to the deaerator body		2120691

The filter inserts “opticlean” consist of a special paper allowing for a very fine filtering with a large surface.

“opticlean”	5 - 20 µm	2126454
“opticlean” long	5 - 20 µm	2126474
“opticlean” long	2 µm	2126484

All mentioned filter inserts cannot be cleaned and should be replaced at the beginning of each heating period.

All oil pipes must be installed and operated at a frost-free location as oil expels paraffin at low temperatures which may block the filter. The finer the filter insert, the more this phenomena applies.

“Ofix-Oil” Compression fittings

for the connection of copper pipe to the isolating valve.

Connection set (1-fold)	Item no.:
6 mm	2127650
8 mm	2127651
10 mm	2127652
12 mm	2127653

Brass reinforcing sleeves

for copper pipe with a wall thickness of 1 mm

6 mm	2127650
8 mm	2127651
10 mm	1029651
12 mm	1029652



Reg.-No. 2 Y 111

Subject to technical modifications without notice.

Product range 9
ti 288-EN/10/MW
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