Storm water treatment
Waste water technology
Electrical engineering
Urban hydrology

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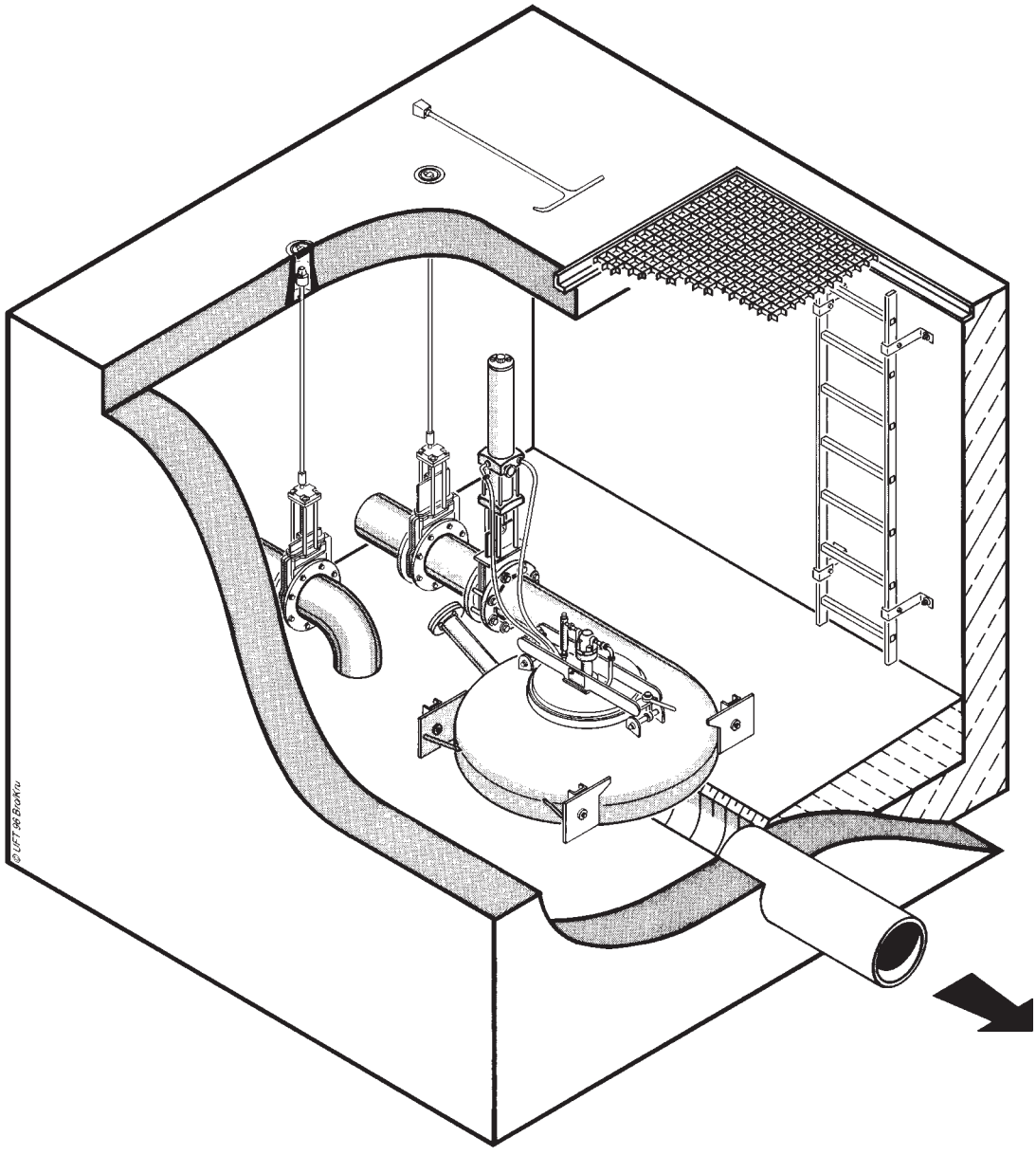
Product Information

Turbo Flow Regulator
UFT-*FluidTurbo*

TUR 0131



1 Application

The Turbo Flow Regulator UFT-*FluidTurbo* is a turbine driven vortex flow regulator. It is a development of the well-known and proven vortex flow regulator technology. It retains all the precision and reliability that made the vortex unit widely popular.

We designed the turbo-regulator to operate in continuous sanitary or combined flow. The Turbo Flow Regulator is particularly well suited for EQ tanks and storm tank outlets with low to average output flow values (see Technical Note Qmin 0098).

Advantages of the Turbo Flow Regulator UFT-*FluidTurbo*

The Turbo Flow Regulator operates without external energy or electrical power. The unit acts only in high flow conditions, when the flow inside the vortex portion is enough to activate the hydraulic circuit that will pilot the upstream knife gate valve. The Turbo Flow Regulator UFT-*FluidTurbo* advantages are:

- adjustment of the controlled flow
- constant through flow
- no external energy
- extreme reliability based on the use of a vortex flow regulator
- can handle extremely small flows with large open port area
- adjustment button to modify the flow control set point
- 304 stainless steel construction

2 Operation

Figure 1 shows the simplicity of the hydraulic control circuit. The flow enters the vortex flow control unit tangentially. In the upper portion of the vortex chamber, we have added a plastic turbine, flat and very light. The turbine shaft passes through the removable cover that is air and watertight. The shaft connects to a hydraulic pump. The pump uses colza oil (biodegradable and non-polluting) from a small reservoir, located on top of the regulating knife gate valve.

In dry time conditions, the vortex regulator fills up only partially. The turbine does not feel any water and the knife gate valve remains completely retracted, leaving a full port opening for the flow and debris to go through.

When high flow conditions occur, the turbine activates the hydraulic circuit. It activates the oil through a filter into the hydraulic block control on top of the hydraulic piston, see Fig. 2.

All the piston elements are proprietary equipment of UFT. The oil pressure activates the synchronized low-pressure piston, that drives a free moving knife gate valve with parallel seats. The gate will close until the number of rotations of the turbine, by minute, equals the selected flow to regulate. When the flow recesses to a lesser value, the turbine starves and the spring opens the gate progressively.

The entire unit is a feedback flow control system in terms of the german standard DIN 19226. The combination of the vortex unit with the turbine allows at the same time to measure the flow and generate the flow regulating energy. The dynamic behavior of the hydraulic control circuit is optimized in our laboratory and with the help of a computed simulation model. Facing radical change of conditions, for example passing from no flow to maximum flow instantly, the Turbo Flow Regulator UFT-*FluidTurbo* can stabilize its flow condition in less than a minute. This great dynamic stability is based on the large energy transmission capacity of the hydraulic circuit in case of blockage.

The unit presents an exceptional security potential. If the hydraulic system fails, for instance following a hose breaking or a misconnection of the hoses, the vortex unit portion of the Turbo Flow Regulator UFT-*FluidTurbo* will act as an “emergency brake”. If the knife gate hits a rock during the closing process, the piston includes a pressure release valve that will react and open up the valve for a while, just enough for the rock to go through.

The spring installed inside the piston accumulates enough energy to open up the valve at any position. The oil circulation is independent and never gets into contact with the open air. A leak will generate a pressure loss in the circuit. All the moving parts are in permanent contact with the oil. Blockage and corrosion are very unlikely.

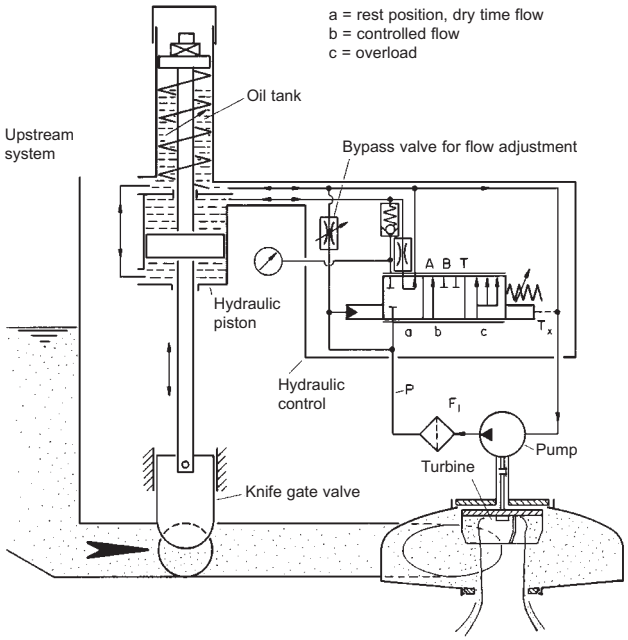


Fig. 1:
Hydraulic power system

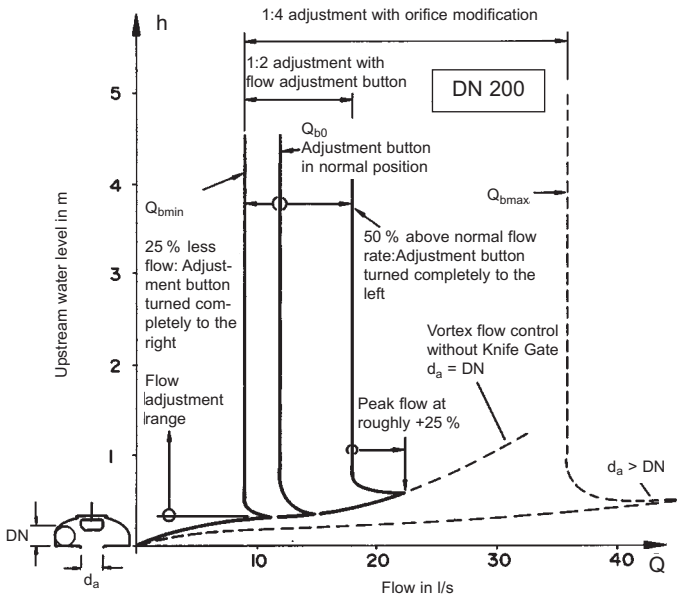
3 Flow Characteristics

The Turbo Flow Regulator UFT-*FluidTurbo* operates in dry time without the help of the hydraulic system and knife gate, whatever the flow setting might be. The “S” shaped curve in the lower portion of the graph is caused by the hydraulic behavior of the vortex regulator.

If the hydraulic circuit is activated, the through flow becomes constant, irrelevant of the upstream head. The flow curve shows a progression from 0 to design flow, typical of vortex flow regulators, then a slight “overshoot”, hard to notice in practice and a vertical progression of the flow once the knife gate valve is throttling the flow. The passage from vortex to knife gate control is very fast.

Figure 3 shows a series of flow curves. In dry time conditions, the turbo-regulator does not create any backwater and the flow passes right through without much headloss.

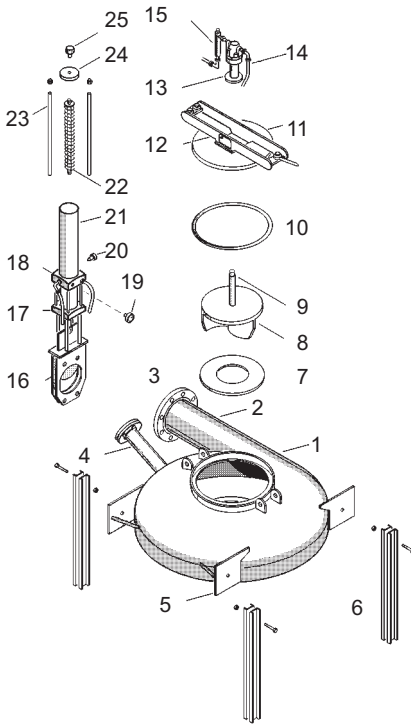
Fig. 3:
UFT-*FluidTurbo*
Flow curves



4 Setting the Flow

The Turbo Flow Regulator UFT-*FluidTurbo* is a real feedback flow control system. Consequently, the design flow value can be pre-set. We can achieve that by one of two approaches.

In the hydraulic control block (18), there is a bypass valve (20, see Figure 1). The more this valve is opened; the more velocity is required from the turbine to close the piston. The bypass valve is gauged and pre-set in our shop before delivery. If you then want to adjust the flow in the field, you must readjust the unit by using the flow adjustment button (see Figure 4).



1 Vortex regulator
2 Inlet pipe
3 Inlet flange
4 Pressure sensor (Option)
5 Support attachments
6 Supports
7 Removable orifice
8 Turbine
9 Turbine driven shaft
10 Cover seal
11 Acrylic glass cover
12 Cover support
13 Oil pump
14 Flexible pipes
15 Oil filter
16 Knife Gate UFT-*FluidKnife*
17 Hydraulic piston
18 Hydraulic Block control
19 Pressure gauge
20 Flow adjustment
21 Colza oil tank
22 Spring
23 Tension rods
24 Tank cover
25 Isolation bolt

Fig. 2: Exploded view of the Turbo Flow Regulator UFT-*FluidTurbo*

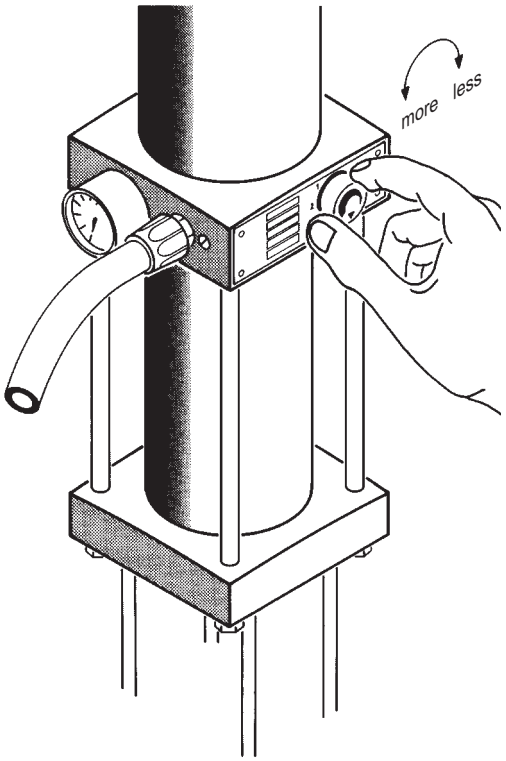


Fig. 4: Flow adjustment

The vortex flow regulator is supplied with a removal outlet orifice. The diameter of the outlet orifice sets the flow capacity of the unit. If the outlet orifice is removed or changed, the flow setting of the unit is automatically changed.

If these two adjustment possibilities are used at the same time, the flow can be adjusted in ratio of 1 to 4. Table 1 shows the operating limits of the Turbo Flow Regulators.

Corresponding to german guidelines (A 111 and A 166 e.g.) the minimum admissable design flow of a feedback flow control system in sanitary flow is 10 l/s. The Turbo Flow Regulator UFT-*FluidTurbo* DN 200 fulfils this condition with a complete free opening of 200 mm.

5 Material and Guaranty

The Turbo Flow Regulator UFT-*FluidTurbo* and the knife gate valve are in 304 stainless steel and PVC. The piston is stainless steel, the hydraulic pump aluminum and the turbine PVC. The equipment, its components and adjustments, are guaranteed for two years.

6 Installation

The Turbo Flow Regulator UFT-*FluidTurbo* is installed in a dry chamber, downstream from the retention portion of the system. The unit is supplied with all components (supports, wall thimbles, knife gates, bypass, etc.). The design flow will be set in our shop and does not require a new adjustment. The culvert and finishing concrete work is performed after the installation of the unit.

Nominal diameter	Vortex regulator type	Q_{bmin} in l/s	Q_{b0} in l/s	Q_{bmax} in l/s
DN 150	TUR 5	4,5	6,0	18,0
DN 200	TUR 5	9,0	12,0	36,0
DN 250	TUR 4	18,0	24,0	72,0

Table 1: Flow capacity of the Turbo Flow Regulator UFT-*FluidTurbo*, see Fig. 3

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Norm DIN 19 226 Teil 1 Feb. 1994. Steuerungstechnik und Regelungstechnik. Allgemeine Grundbegriffe.

Typical Specification Text

Pos.	Number	Article
1	x	Turbo Flow Regulator UFT-*FluidTurbo*

Automatically regulated and without external energy operating feedback flow control system. Extreme reliability based on the use of a vortex flow regulator with high hydraulic resistance combined with a smooth running knife gate valve with low pressure colza oil hydraulic system.
For dry installation in a throttle shaft.
Vortex valve: body construction with inlet pipe, flange and mounting anchors in 304 stainless steel, acrylic glass cover with cover support from stainless steel, Turbine from and outlet orifice PVC, oil pump, filter.
Knife Gate: valve housing, slide plate and spindle from 304 stainless steel und PVC-U, low pressure hydraulic piston with colza oil, hydraulic block control und oil tank from anodized aluminium, mounting parts form stainless steel, seals.

Model UFT-*FluidTurbo*	**type TUR ...**
Design pressure head hb:	... m
Design flow Qb:	... l/s
Dry weather flow Qtx:	... l/s
Orientation:	clockwise / counter-clockwise
Inlet diameter:	DN ...
Max. upstream head:	10 m

Unit ready to be mounted, regulated with required flow rate, includes hydraulic dimensions and technical specifications. The finishing concrete is to be done after assembly of the regulator. The head is measured starting from the invert of the inlet pipe of the regulator.

Further Informationen:

- Technical Note „Flow control devices for low and very low flows from storm water tanks“ Qmin 0098