



PROFACTOR®
DER DEUTSCHE QUALITÄTSSTANDARD

EN

TECHNICAL DATA SHEET AND USER MANUAL



PRODUCT
CODE

PF RVM 396

**THREE-WAY
MIXING VALVE**

1. PURPOSE AND SCOPE

The mixing three-way valve PF RVM 396 stabilizes the ratio of cold and hot flows in the circuit and maintains the set temperature, according to the set parameters on the actuator controller or on the thermostatic head with a capillary tube.

The direction of the coolant flows is indicated on the valve, where "A" is the supply line of the pipeline, "B" is the return line of the pipeline, and "AB" is the mixed line of the pipeline. Accordingly, the valve is installed before the pump and after the shut-off valves.

In terms of its technical characteristics, the PF RVM 396 valve is suitable for water "underfloor heating" systems, as well as for radiator heating. Liquids that are not aggressive to the materials of the product can be used as a heat carrier: water, glycol-based solutions. Maximum glycol content 40%.

The valve can be controlled using a thermoelectric actuator or a thermostatic head.

2. TECHNICAL SPECIFICATIONS

Nominal size: DN25

Connection thread: internal G1"

Thread for connecting the drive / thermostatic head: M30x1.5

Nominal (conditional) pressure, PN: 16 bar

Permissible medium temperature: -10°C to $+150^{\circ}\text{C}$

Permissible ambient temperature: -5°C to $+60^{\circ}\text{C}$

Full valve travel: 3 mm

Kvs rate of passage AB-A at $\Delta p=1$ bar: $5.17 \text{ m}^3/\text{h}$

Kvs capacity of passage AB-B at $\Delta p=1$ bar: $3.87 \text{ m}^3/\text{h}$

Leakage rate in port AB-A: $\leq 0.05\%$ of Kvs

Leakage rate in port AB-B: 1% of Kvs

Installation length, A: 84 mm

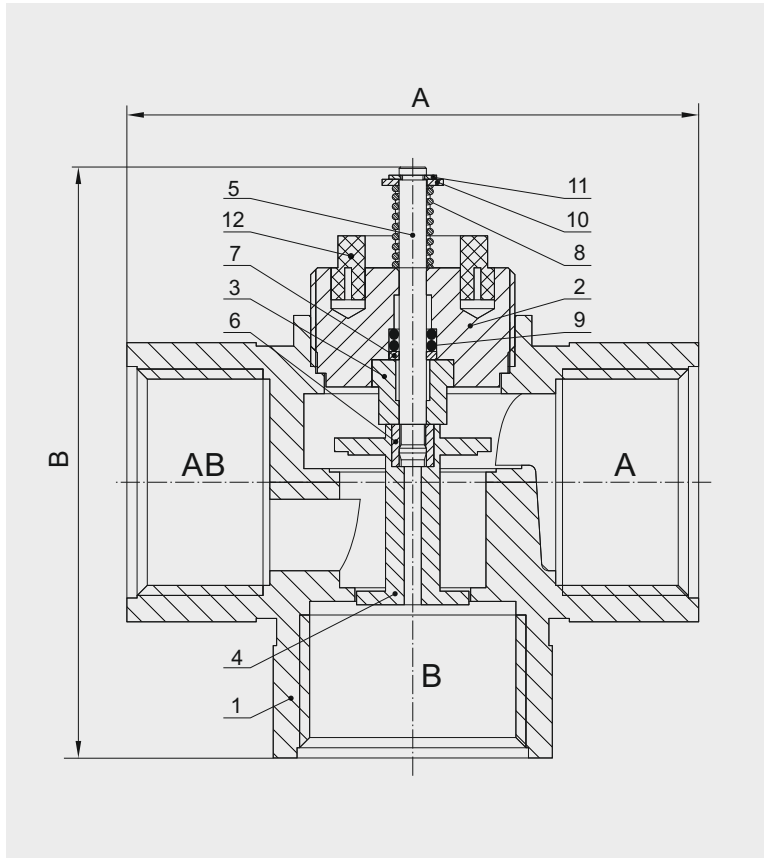
Valve height, B (stem raised): 87 mm

Valve height with manual handwheel, C: 106 mm

Valve weight without handwheel / with handwheel: 690 / 715 g

Average service life: 15 years

3. DESIGN



1 – Valve body

2 – Gland body

3 – Gland bush

4 – Seat

5 – Stem

6 – Seat bush

7 – Packing ring

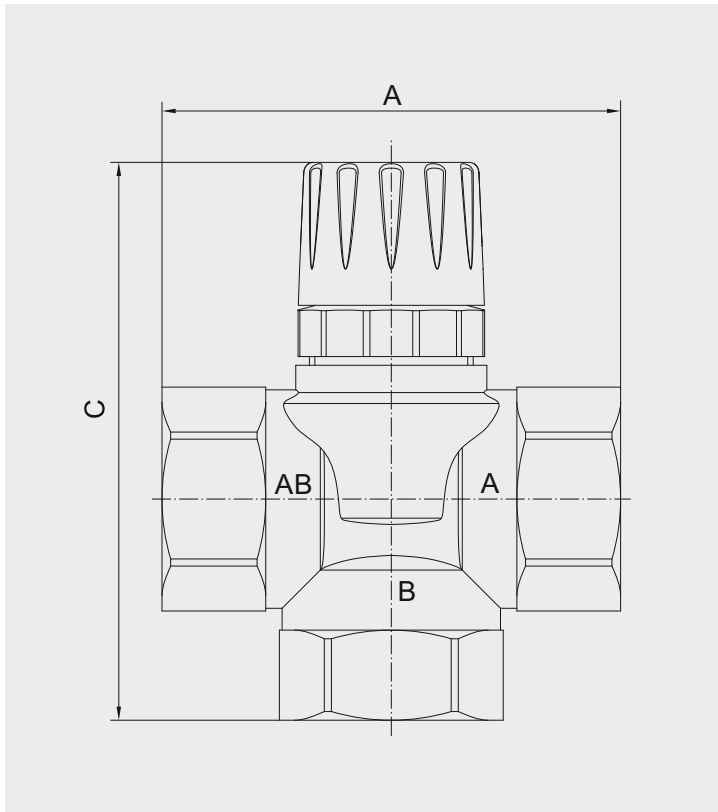
8 – Spring

9 – O-ring

10 – Retaining ring

11 – Spring clip

12 – Actuator support



The valve body (1) is T-shaped and has three marked outlets with a G1" female thread.

The valve packing assembly consists of a packing box (2), a packing sleeve (3), a stem (5), a pressure ring (7) and two packing rings (9). The stuffing box body (2) has an external metric thread M30x1.5 for installing a thermoelectric actuator or thermostatic head.

The upper part of the plug (4) is a poppet, which, when the stem moves down, fits tightly on the seat in the valve body (1), shutting off the flow in the AB-A port. The lower part of the valve is also of the poppet type and has a smaller diameter than the B-port, leaving a guaranteed gap when the AB-B port is closed, which makes it impossible to completely close the AB-B port.

All internal G threads are in an accordance with (ISO 228-1: 2000, DIN 259), and all metric threads are in an accordance with (ISO 261: 1998).

4. MATERIALS

Parts 1, 2, 3, 4, 6, 7, 10 — Brass CW617N (DIN EN 12165-2011).

Stem 5, Spring 8 and Spring clip 11 — Stainless steel AISI 304 (DIN EN 10088-2005).

O-rings 9 — EPDM.

Actuator support 12 — Plastic ABS

5. PRINCIPLE OF OPERATION

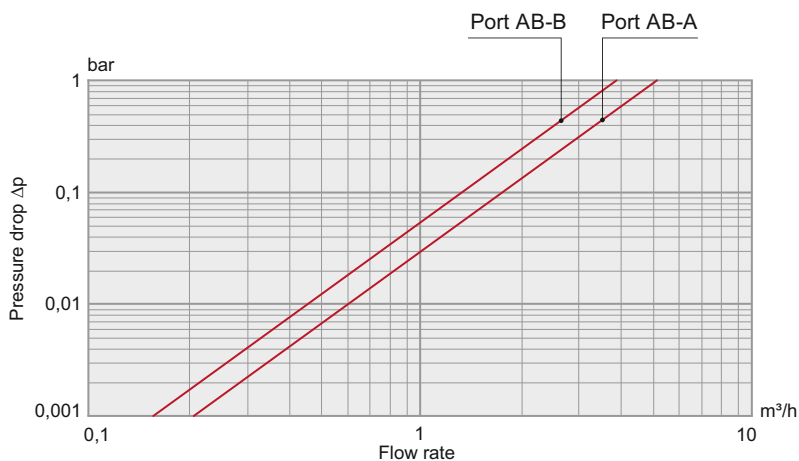
When the valve stem is raised, straight port AB-A is open and port AB-B is closed. Due to the guaranteed clearance between the lower valve disc and the B-port, a complete overlap of port AB-B is not possible.

When the stem moves down, the valve also moves down, while the upper valve plate gradually lowers onto the seat in the valve body, reducing the movement of the coolant through the straight AB-A port, and the lower valve plate simultaneously exits the throughlet B, increasing the flow for the coolant through the orifice AB-B. In the lowest position (stem lowered), port AB-A is closed and port AB-B is open. Conversely, when the stem moves upwards, the AB-A port gradually opens and the AB-B port closes.

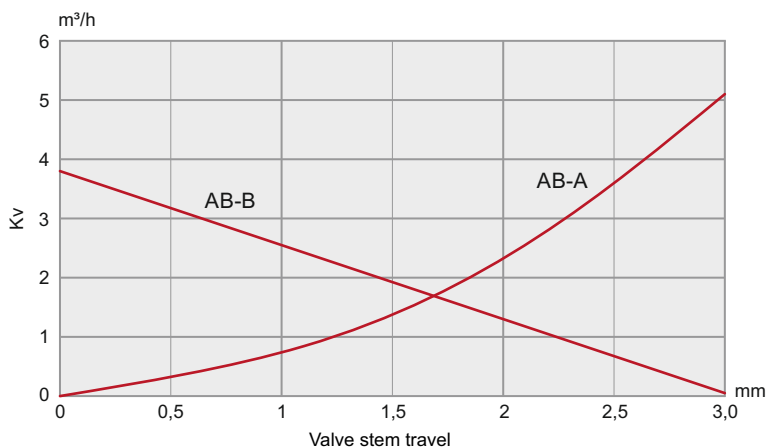
For standard on/off control, it is recommended to use the thermoelectric actuators PROFACTOR® PF TA 633, PF TA 634, PF TA 635 and PF TA 636 normally closed (in the absence of voltage, the stem is down, port AB-A is closed, port AB-B is open). When a duct occurs, vice versa.

For continuous, proportional control, it is recommended to use PROFACTOR® thermostatic heads with immersion (PF RVT 631, PF RVT 661, PF RVT 662) or remote sensor (PF RVT 632, PF RVT 663). Thermostatic heads do not require any energy source and can take intermediate positions. When the temperature around the sensor rises, port AB-A closes and port AB-B opens.

6. HYDRAULIC SPECIFICATIONS



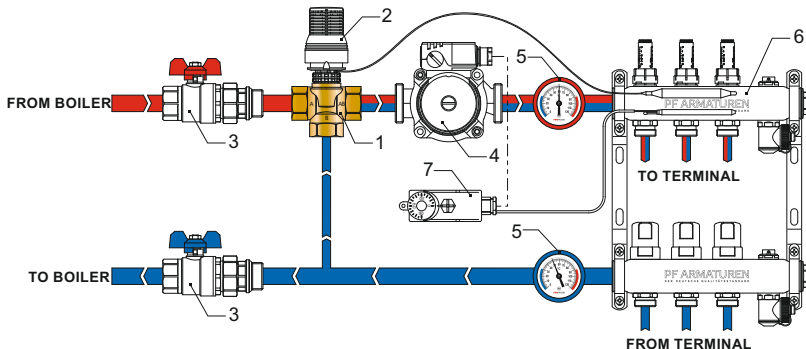
PROFACTOR® PF RVM 396 valve flow characteristic:



In the «0» position, the valve stem is fully lowered, port AB-A is closed, port AB-B is open.

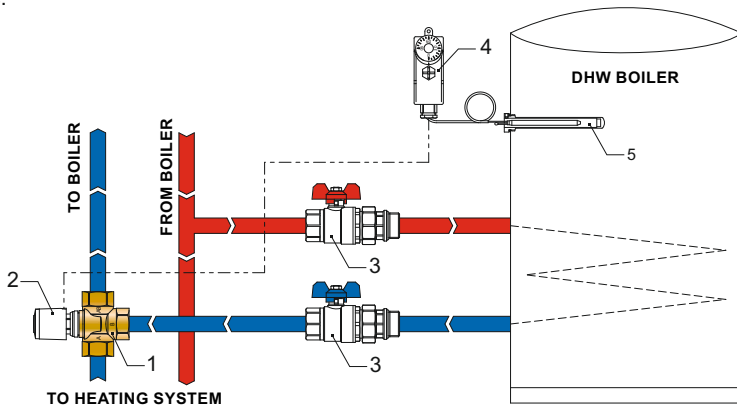
7. EXAMPLES OF CONNECTION

Diagram of a pump mixing unit for a low-temperature heating system using PF RVM 396 valve:



1. Three-way mixing valve PF RVM 396
2. Thermostatic head PF RVT 631 or PF RVT 661 with immersion sensor for the system Underfloor heating or thermostatic head PF RVT 662 for radiator heating with a temperature setting range from 30°C to 70°C
3. Ball valve with semiconductor PF MB 847.25
4. Circulation pump
5. Bimetallic thermometer with immersion sleeve PF SG 868BP
6. Collector group PF MB 806
7. Thermostat with immersion sensor PF TC 641W (optional)

Connection diagram of an indirect heating boiler to a dual circuit boiler using PF RVM 396 valve:



1. Three-way control valve PROFACTOR® PF RVM 396
2. Thermoelectric actuator PF TA 635
3. Union ball valve PF MB 847.25
4. Thermostat with immersion sensor PF TC 641W
5. Immersion temperature sensor well PF MB 850

8. INSTALLATION INSTRUCTIONS

Before the valve installation, the pipe must be clean of rust, dirt, scale, sand, and other foreign matter that affect the product performance. Heating, heat supply and cooling systems must be washed with water after the installation until water comes out with no mechanical impurities.

To prevent damage to regulating parts it is advised to install mechanical filtration systems at the valve inlets.

The valve installation site must be easily accessible and have sufficient space for mounting, dismounting and maintenance of the actuator or thermostatic head.

The valve is installed in any mounting position, except for the position with the actuator downward, with connection on the internal thread G1". During installation, make sure that the requirements of the installation diagram of the piping connections to the marked valve outlets (A, B, AB) are met.

When installing a PROFACOR® thermostatic head with an immersion or remote sensor on the valve, first remove the actuator support (12) from the valve, and set the maximum temperature on the thermostatic head by rotating the hand wheel all the way counterclockwise.

A wrench with rubber jaws should be used when installing an actuator or thermostatic head. Nut tightening torque should not exceed 20 Nm.

The valve should not experience the stress from the pipe (bending, compression, elongation, torsion, skewness, vibration, misalignment of connectors, uneven tightening of the fasteners). If necessary, supports or compensators should be provided to reduce the load on the valve from the pipe. Misalignment of connected pipes should not exceed 3 mm with the length of up to 1 m, plus 1 mm for each subsequent meter.

The valve should be securely attached to the pipe, the leakage of the working fluid through the threaded parts is not allowed. Threaded connections must be completed using sealing material for winding up the threads — PTFE-tape (PTFE — polytetrafluoroethylene, Teflon sealing material), polyamide thread with silicone or flax. It is necessary to ensure that excess sealing material does not reach the regulating parts of the valve. Inspect the accuracy of installation.

9. OPERATING AND MAINTENANCE

To avoid scale formation and damage to the water heating systems, the heat carrier composition must in an accordance with the VDI 2035 directive. Any kind of mineral oil content in the heat carrier or lubricants may damage the O-rings (9).

Installation and dismounting of equipment, as well as any repair operation, must be carried out with no pressure in the system. Allow equipment to cool down to ambient temperature.

Installation and dismounting of the actuator or thermostatic head on the valves in use, i.e. under the influence of pressure and temperature, is prohibited. Once the actuator is installed on the valve, the adjustment is not required. When powered, the actuator automatically adjusts to the valve stem.

10. WARRANTY OBLIGATIONS

The warranty period is 24 months from the date of sale to the end consumer. Throughout the entire warranty period, the manufacturer guarantees the proper functioning of the product and its compliance with safety requirements, provided that the consumer follows the rules for storage, transportation, installation, operation, and maintenance of the product. The warranty covers all defects arising through the manufacturer's fault.

The warranty does not cover defects resulting from:

- Violation of storage, transportation, installation, operation, or maintenance conditions;
- Exposure to substances aggressive to the materials of the product;
- Signs of mechanical damage;
- Damage caused by fire, natural disasters, or other force majeure circumstances;
- Damage caused by improper actions of the user;
- Evidence of unauthorized interference with the product design.

The product described in this technical manual is a technically complex device that must be installed by a qualified specialist with appropriate experience working with this type of equipment.

Installation and commissioning must be carried out by an authorized and certified company.

Profactor Armaturen GmbH reserves the right to make changes to the product design that do not affect its technical characteristics or functional features.



INTERNATIONAL WARRANTY CARD

NAME OF THE PRODUCT

PRODUCT CODE, SIZE

QUANTITY

SELLER NAME AND ADDRESS

DATE OF PURCHASE

SELLER STAMP

SELLER SIGNATURE

For the warranty term refer to the Warranty obligation clause in the technical manual

FOLD LINE

FOLD LINE

In case of any claims to the product quality the following documents should be submitted:

1. Application with customer and product details:

- Name of the customer, actual address and phone number
- Article of the product
- Reason for the claim and photo
- Plumbing system where installed (name, address, phone number)

2. Invoice copy and receipt

3. Warranty card

RETURN/EXCHANGE COMMENTS

DATE

SIGNATURE



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