Mounting + commissioning instructions for steam conditioners baelz 591 MCI 591

Information and notes to install and operate a desuperheater / steam conditioner baelz 591

(herein after called ejector)

and the appropriate control valves

Delivery conditions:

To prevent damages during transport and storage, the control components of the desuperheater (which basically consist of the steam ejector baelz 591 as well as the cooling water control valve) are delivered in a closed position. Pneumatic or electric actuators with fail-safe function previously closed the ejectors in the corresponding position of their operating direction.
The actuators were set in factory to the stroke of the nozzle ejector on which they are mounted.
Any disassembling and re-assembling of the actuator requires a new setting!

For delivery, the openings in the connection flanges have been plugged with cover discs.
Before installing the nozzle ejector, please remove these cover discs.

1. Installation into the pipework and necessary mounting parts

General remarks

Please use flange gaskets according to DIN-EN-standards. When inserting them, make sure that the gaskets are well centred.

Pipelines containing hot water or steam have always to be directed distantly or well insulated past the actuator.

If pipelines are painted, please make sure that neither screws nor bolts nor plastic parts will be painted. In case the nozzle ejectors have already been installed and painters are still working near around, each ejector has to be protected by a plastic cover against dirt and paint splatters.

Mounting into the system

A steam ejector is a **3-way control valve** which can have, as a result of its application and operating functions, very high and *different* temperature- and pressure conditions at its three connections. That is why it is obligatory to install and accordingly connect the steam ejector as **central fixed point** of the system, in due consideration of its mounting position.

The installer has to determine on his own responsibility the pipeline supports by installing the appropriate slide bearings and guide bearings in such a way that no loads, forces and torques will influence our control valve.
The forces and torques that occur as a result of thermal expansion neither may have an influence on the Baelz control valves.

If due to the system lay-out the relevant forces cannot be taken directly by the pipelines, appropriate axial or lateral (hinged) expansion joints have to be used.

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Strainers

Immediately ahead of the primary inlet into the control valve, a strainer (e.g. baelz 70200) has to be installed (see fig. 1 + 2); only then tight closing can be ensured. Before installing the strainer and the nozzle ejector, you have to flush the pipelines, in order to remove dirt and impurity, e.g. welding beads.
In case the strainer cannot be installed immediately ahead of the control valve for lay-out reasons, the impurities (welding residues, etc.) in the pipeline lying in between have to be removed carefully; otherwise they could peel off during operation and could cause damages on the seats.
Oftentimes it is not sufficient simply to rinse the pipeline!

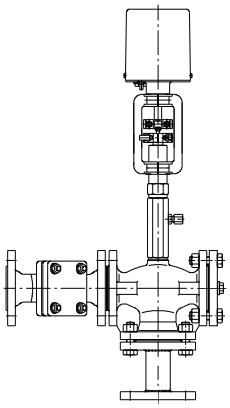


Fig. 1

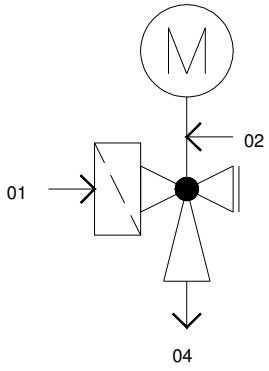


Fig. 2

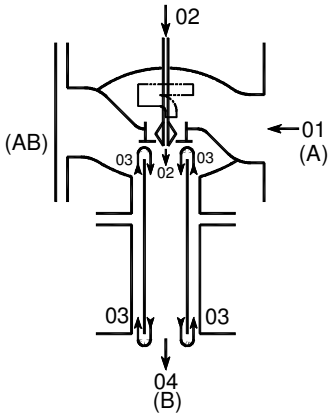


Fig. 3

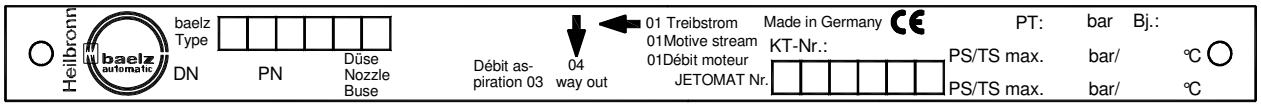


Fig. 4

The inflow side is clearly marked on the nameplate.

Suction side -03-

Additional need of components in applications with additional vapour compression

When using the steam ejector baelz 591 with additional **vapour compression**, you may have to install a check valve or an automatic control valve on the suction side 03.
This serves to prevent that primary steam enters the suction pipe during start-up, since otherwise the appearing vapour steam pressure may lead to instabilities in the steam ejector. When using an automatic control valve in 03, this may not open before the pressure between control valve and suction side 03 of the baelz 591 is smaller than the steam pressure in the exhaust vapour pipe; usually this is the case with an ejector stroke of approx. 15 - 25%.

Steam pipe and condensate draining

Steam pipes have to be laid with a gradient of approx. 1 - 2% in flow direction. Every 100 m at maximum respectively ahead of changes of direction and ahead of control valves, the appropriate equipment for condensate drain-off has to be installed.

The lay-out of steam installations should always avoid condensation and ensure that any condensate will reliably be removed from the pipework ahead of the control valve. Otherwise there is a risk of water hammering which could cause damages on the installation components, i.e. on the steam ejectors as well.

The pipes have to be drained by float steam traps.
Float steam traps have to be used, in order to ensure drain-off of any condensate without time lag.

The basic rule applies that the pipes have to be kept dry. So please provide for a perfect drain-off. The condensate draining must have a *free drain*, in order to ensure that any condensate will be drained off as well *without pressure*.

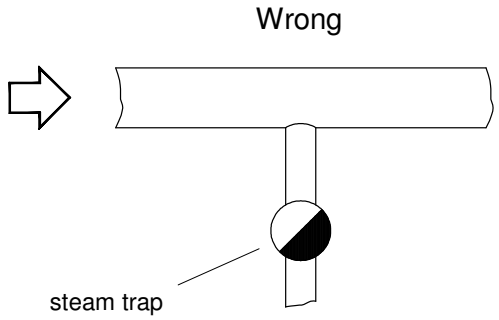


Fig. 5

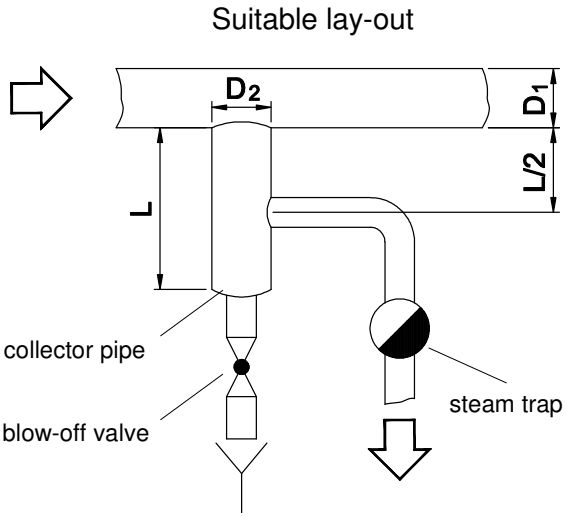


Fig. 6

D_1	DN	50	65	80	100	125	150	200	250	300	350	400	450	500	600
D_2	DN	50	65	80	80	80	100	150	150	200	200	200	250	250	250
L	mm	≥ 250													

Recommendation of practical experiences; changes are possible, depending on the actual volume of condensate in the system.

The given examples how to drain steam pipes (condensate drain-off) are basic recommendations which have to be respected for all steam control valves.

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2. Remarks with regard to noise emission

From experience, the noise level of a steam ejector baelz 591 is not higher than the noise level of a steam valve.

However, the following rules shall apply for the installation of a steam ejector, in order to reduce the noise level:

a) 10 x nominal diameter ahead and after the steam ejector, straight, undisturbed pipe routing
b) 20 x nominal diameter after the steam ejector, no 90° elbows

3. Piping drawings

To prevent possible installation problems and subsequent modifications/replacements, which could result from wrong piping, we ask you to forward us your piping drawings.

The mounting positions of the ejector (see fig. 7 + 8 + 9) have implicitly to be respected.

Planning and designing the supports carefully is a decisive factor for a reliable operation of a pipework. The conception should always be worked out by a pipe company having appropriate experiences.

4. Unauthorized conversion and spare parts manufacture

Conversions or alterations to Baelz control valves/ejectors and their actuators are permitted only after consultation with Baelz. Original spare parts and accessories authorized by the manufacturer serve to promote safety. The use of other parts nullifies the liability for resulting consequences.

5. Inadmissible operating modes

Operating safety of the delivered components of the desuperheater is only guaranteed when they are used as intended.

The limiting values stated in the technical data must not be exceeded under any circumstances.

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6. Mounting positions – Baelz recommends fig. 8

Mounting position horizontal with inflow 01 from below.

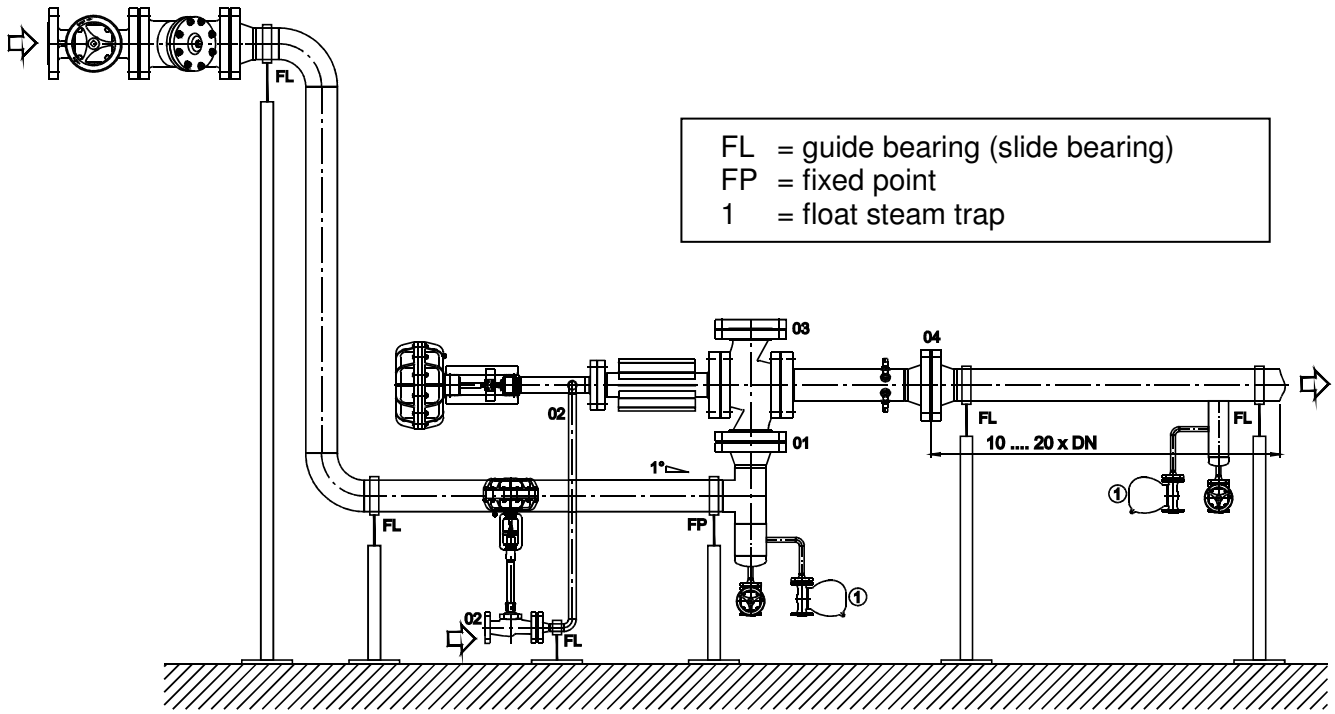


Fig. 7

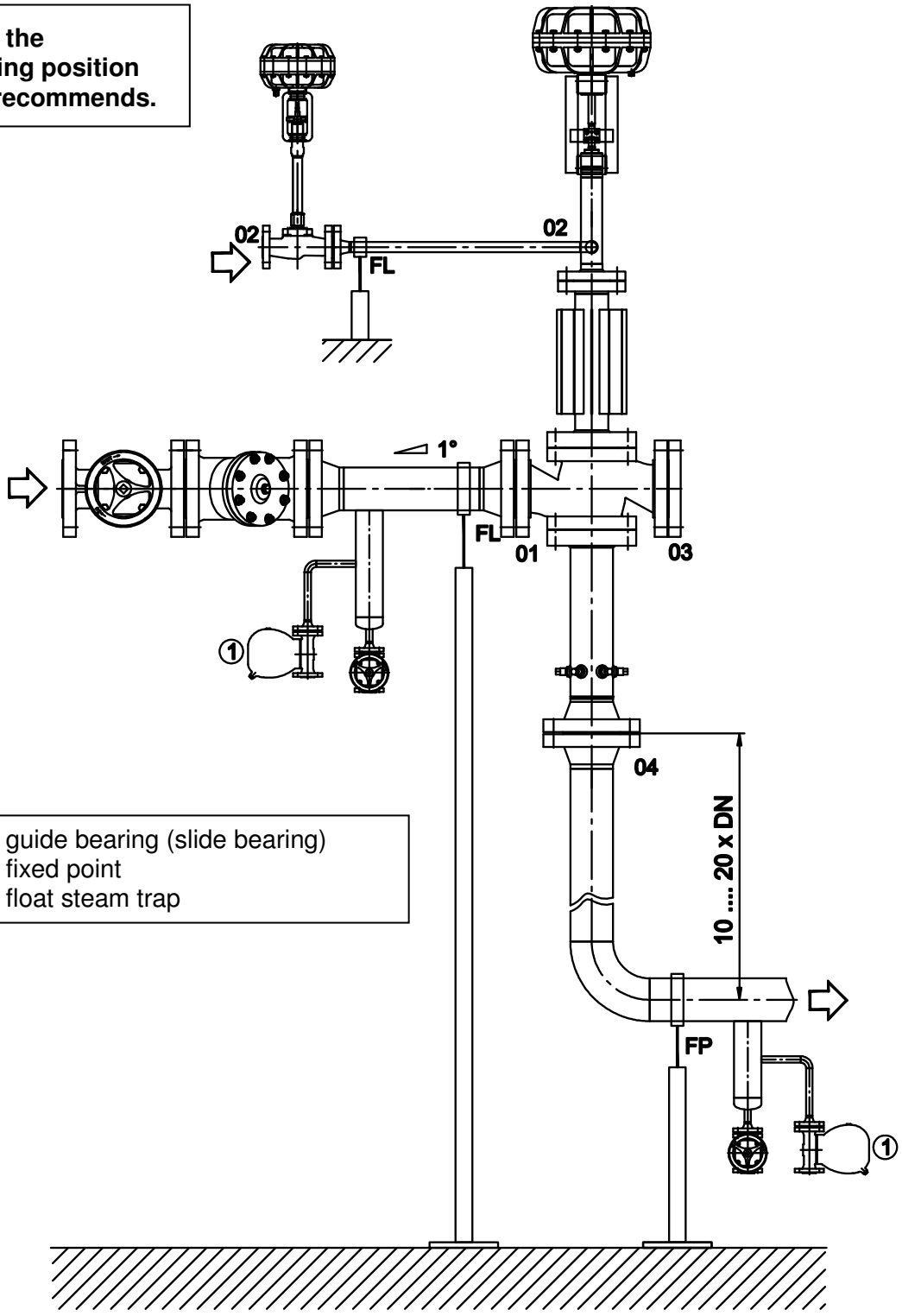
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Mounting position vertical with inflow 01 horizontal and actuator on top.

Please respect: Pipeline 01 slightly sloping against steam flow for the drain condensate.

This is the mounting position Baelz recommends.



FL = guide bearing (slide bearing)
FP = fixed point
1 = float steam trap

Fig. 8

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Mounting position horizontal with inflow 01 from above.

This type of installation (steam from above) is only permitted in systems which practically never close; otherwise condensate will pond at 01, thus risking steam/water hammering.

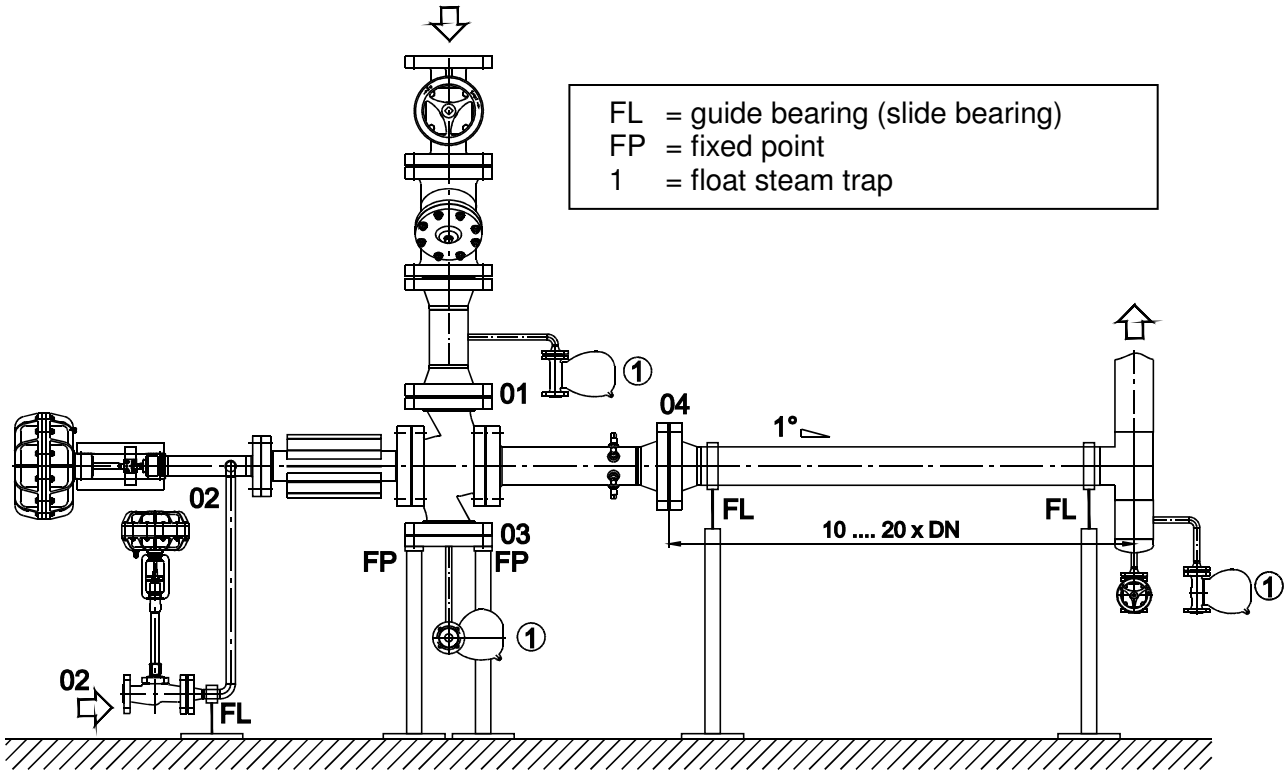


Fig. 9

Remarks in respect of horizontal mounting positions:

Conforming to fig. 7 + 9, please ensure that the yoke S21 or S31 (depending on the nominal diameter) is mounted vertically (as shown in the drawings).
If the nozzle ejectors are of bigger nominal diameters or provided with cooling tubes (types BK, BBK) and if "heavy actuators" such as baelz 373-P31, -E62, -E88 are used, the actuators have to be additionally supported, in order to avoid corresponding bending forces onto the spindle and the spindle guide.

We generally recommend a skid station. Such a station can also be designed in a basic lay-out only with standard equipment.
With this solution, the proper support of the control valve(s) as well as the correct type and position of the drainage would definitely be ensured.

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7. Initial commissioning

Please ensure that each mechanic and each electric component is in a proper and good working condition; this is of particular importance with regard to safety equipment.

When using a pneumatic actuator baelz 373-Pxx and an I/P positioner baelz 86, please ensure that the incoming compressed air pressure corresponds to the value specified on the nameplate of the actuator (1.2 bar, 3 bar or 6 bar). Eventually you should install an air set with filter ahead. We generally recommend installing an air set with filter ahead. **The compressed air has to be dry and free of oil and water.** With a wrong compressed air pressure, the pre-set zero point and end point will be inexact.

With all types of actuators, run - before applying the operating fluid - the steam ejector and the injection valve through their complete strokes with the help of a manual control of the controller; you eventually have to re-adjust the stroke.

Pressure- and temperature transmitters have to be checked for their function and plausibility.
It must be ensured that the electric and mechanic control- and safety functions work properly!

All manual isolating valves are closed. All pipes are free of condensate.

01- primary steam inlet
04- secondary steam outlet
03- secondary steam inlet (**only** in applications with additional suction of vapours)

Open manually the steam ejector by approx. 25%.

Open minimally and very slowly 01 manual isolating valve and keep an eye on the pressure increase. Please avoid water hammering under any circumstances; only when the system is steady, continue to open very slowly.
If the steam supply pipes are long and the steam pressures high, it can become necessary to estimate 1h/bar steam pressure for the start-up.

When the secondary set pressure 04 is reached, close the steam ejector.

Then open slowly 04 manual isolating valve.

With vapour compressors, do not open 03 isolating valve before the pressure at the nozzle ejector has obviously fallen below the vapour steam pressure.

Open 02 cooling water / condensate side, control valve closed. Check the incoming pressure. In any case, this pressure must be, depending on the dimensioning, higher than the primary steam pressure.

When all sides are open, you can actually begin to start up the installation.
If the control is tested, this can be done by the control itself; otherwise, i.e. if the control is not tested and set, at first you should start up manually by opening the steam ejector slowly, and the cooling water valve in parallel, depending on 04 pressure and temperature, in order to make yourself familiar with the behaviour of the installation.
Afterwards you can change over to the control to optimize it.

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8. Start-up circuitry

In normal case, the general start-up circuitry has to take place via a setpoint ramp without fail. This allows to start up the installation slowly from its stoppage, e.g. after a production stoppage or after interruptions of operation.

In order to realize the start-up circuitry with a setpoint ramp, the controller / PLC must feature the setpoint ramp function (as the baelz controllers 64XX or 65XX do).
With the setpoint ramp, the setpoint of the controller is increased slowly, starting from the current actual value.

With the baelz controller 64XX or 65XX e.g. the value bar/min is entered into the controller.
Example: When entering 0.6 bar/min, the setpoint of 6 bar will be reached in 10 minutes.

General remarks with regard to the control and the start-up:

1) **As to the adjustment please ensure that the two controlled systems interact. Steam pressure and temperature directly interdepend.**
   wet steam --> saturated steam --> superheated steam

   In order to avoid that unwanted steam conditions are practised by control variations (wet steam zone), we generally recommend setting the setpoint of the cooling water control unit 2 - 5 K above the corresponding temperature of the setpoint steam pressure (in case of saturated steam operation it would be the evaporation temperature).
2) **Set the steam pressure control to approx. 10%, set the water injection to approx. 10%, activate the automatic mode of the steam pressure control. Now adjust the control parameters of the pressure control, switch the water injection control to automatic, identify and adjust the control parameters.**
3) **When the system has stabilized, the start-up ramp will be activated; the more slowly the ramp, the better for the baelz 591 (avoiding steam hammering). However, please respect the general parameters in the installation.**

9. To stop and shut down the installation

For longer interruptions of operation, the steam ejector should be closed via the control, and the appropriate manual isolating valves have to be closed.
The procedure of a re-commissioning is the same as the procedure of the initial commissioning.

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