SMA 63 for non-speed controlled pumps
SMA 64 for speed controlled pumps

Applications
The Automatic Minimum Flow System SMA 63/64 is a protection device for pump protection. It automatically protects centrifugal pumps from damages, which might occur during operation under low load conditions because of partial evaporation of the pump content. As soon as the main flow falls short of a predetermined value, the valve opens its bypass, so that the bypass flow is passed off, even if the delivery in main flow direction equals zero.

Through actuation of the bypass via a valve control plunger (15) the bypass can be opened resp. closed completely. This "ON/OFF"-Regulation of the Bypass makes it possible to increase the load limit from 200 bar to 400 bar. The prefered duty is in the range of nominal pressure 250 to 400 bar resp. ANSI 2500 lbs.
The Bypass flow can amount up to 35% of the main flow. The valve works without additional auxiliary power.

Maximum flowrate for $Q_{100\%}$ and $Q_{by}$

<table>
<thead>
<tr>
<th>DIN DN1 DN2</th>
<th>ANSI DN1 DN2</th>
<th>$Q_{100%}$ at 10 m/s</th>
<th>$Q_{by\ max.}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>mm</td>
<td>mm</td>
<td>m³/h</td>
<td>l/s</td>
</tr>
<tr>
<td>80</td>
<td>32 40</td>
<td>180</td>
<td>50</td>
</tr>
<tr>
<td>100</td>
<td>40 50</td>
<td>280</td>
<td>78</td>
</tr>
<tr>
<td>125</td>
<td>50 65</td>
<td>440</td>
<td>122</td>
</tr>
<tr>
<td>150</td>
<td>65 80</td>
<td>630</td>
<td>175</td>
</tr>
<tr>
<td>200</td>
<td>80 100</td>
<td>1120</td>
<td>311</td>
</tr>
<tr>
<td>250</td>
<td>100 125</td>
<td>1750</td>
<td>486</td>
</tr>
</tbody>
</table>

Maximum flowrate for $Q_{100\%}$ and $Q_{by}$
Mode of Operation

The main flow lifts the non-return cone (3) up to a defined position. As soon as the main flow equals the value of the pump minimum flow, the cone (3) springs upwards and stops at another predetermined position.

During this procedure the cone actuates both control valves of the pilot unit via the lever (32) and the control plunger (31).

After control valve 2 closes, control valve 1 opens. For the medium the passage to the piston (15) in the bypass becomes free. The piston forces forward against the passing bypass flow and the bypass closes. (Position “OFF”).

With increasing main flow the cone (3) moves further upwards. It reaches the final position at nominated main flow $Q_{100\%}$.

With decreasing main flow the cone moves downwards and switches the two control valves, as soon as it falls below the required pump minimum flow. The bypass opens (Position “ON”) and the pump minimum flow is passed off via the bypass.

The integrated fine throttle (37) in the pilot unit reduces the velocity of the control flow in “OFF” direction. This prevents a too fast closing of the bypass and consequently a hammering valve piston (15).

Through the clear positions of the bypass (“ON” resp. “OFF”) combined with the pilot unit a fitting for pump protection has been developed, which combines a very low wear and tear with very high operational security at highest pressure loads.

Construction

The Autonomous Minimum Flow Systems comprise a split body with non-return cone, bypass and the pilot unit.

In the standard option the casing for valve and bypass are of forged steel 1.0460. Cone seat and actuator control surfaces are stellite-faced. The other parts are made of suitable stainless steels.

The minimum flow $Q_{by}$ is passed off via the Bypass. A piston (15) takes over the closing and opening of the bypass. Double sealing of the piston in the ring seat (14) achieves extreme durability of the internal bypass parts. The following pressure reduction of the minimum flow takes place with a multi-port throttle (13) in the bypass.

The pilot unit utilizes the medium and the pump pressure for actuation of the piston (15). Two control valves control the pump pressure in front of resp. behind the piston and consequently the position of the piston “ON” resp. “OFF” is regulated. The control valves are actuated depending on the main flow through the cone (3) position via the lever (32). With the integrated fine throttle (37) a cushioned move of the piston (15) is achieved.

With a pressure indicator on the bypass the function of the Minimum Flow System can be supervised.
As a special design SMA 64 the system can also be utilized for speed controlled pumps. Special attention has been paid to easy maintenance. So it is not necessary to dismantle the bypass branch resp. the whole fitting for exchange of the wearing parts like piston and ring seat.

The hand-operating branch with multi-port throttle serves for manual control of the minimum flow via a manually actuated valve combination. We recommend the branch for sparing of the internal bypass parts at frequent operation in the range of minimum flow as well as for filling and start-up of the plant. Two positions are possible:

• D1 in the lower part of the casing with junction below the cone;
  · the bypass remains open
• D2 in the upper part of the casing with junction above the cone (larger valve length);
  · the bypass closes at double minimum flow

Warming-up branch, pressure gauge fitting, drainage branch etc. can be provided, if so desired.

Flange design acc. to DIN, ANSI, BS, ISO and related standards are possible.

**Installation**

We recommend installation directly on the pump discharge branch. The flow direction at vertical installation is from bottom to top, when installed vertically.

In order to avoid vibrations in the valve and the pipe lines we recommend to continue the connecting line at the outlet (DN2) and the bypass branch (DN3) for approx. 2-3 m in the chosen nominal bore. A pipe bend directly to the bypass branch should be avoided.

**Design**

The construction is according to specification AD 2000 and particularly to EN 13445. As per Pressure Equipment Directive 97/23 EG the products are provided with the CE marking and the Declaration of Conformity. Certified according to the Module H1 (Pressure Equipment Directive 97/23 EG) all dangerous material classes of category 1 to 4 are covered.
SMA 64 for speed controlled pumps

ANORDNUNG/ARRANGEMENT/DISPOSITION

Manometer
Am Gehäusedeckel
On closing plate
Sur couvercle

Nebenanschluss
Automatic bypass
System du by-pass

F1
Filterleitungen
Impulse lines
Conduite filtre
Conduite motrices

P, A, E
Steuerleitungen
Lines to pressure gauges
Conduite manuel

M1, M2
Anzeigeleitungen
Vorsteueinrichtung
Lines to pressure gauges
Pilot control unit

Manometer
Auf Armaturenleiste
On instrument panel
Sur pupitre

S
DN 3

H