ROAD MARKING SYSTEMS INFORMATION

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For line combinations: Pressure container or metering pump?

The suitability of pressure container and metering pump for double lines (line combinations) will be described in the following:

The disadvantage of pressure container delivery is that the outflow volume is dependent on the changes of the total discharge cross-section of all connected application units. When the total discharge cross-section is changed, the discharged total volume also changes – **however, not always as desired**.

When opening a second application unit – for example when generating the line combinations shown in Picture 1 – it requires double the material volume. This however doesn't happen when using a pressure container as has been shown by the measuring results of a simple test (see Picture 1, drawing + Table). The outflow volumes from only **one** opened SPOTFLEX® spray header, dependent on container pressure, are shown in Column 1 and the values for **two** opened spray headers are shown in Column 2.

With test No. 2 there is a material volume of 10.7 kg/min available for the single line with a container pressure of 3 bar. The double material volume of 21.4 kg/min is necessary in the area of the double line (Picture 1, Table, Column 4). The actual result, however, was a volume of only 15.9 kg/min (Picture 1, Table, Column 2), which represents 25 % less than necessary. A line combination would resemble the appearance shown in the Picture. In the area of the double line, the agglomerates appear visibly leaner, in the area of the single line more voluminous

The explanation is simple: With a higher flow rate, the resistance in the line system rises up to the intersection V, which could only be compensated by increasing the air pressure.

As one can see from the few measuring values, the required double volume would only be reached when the container pressure is 1 bar higher, that is at 4 bar. When opening the spray header for the second line, the container air pressure would have to be increased by 1 bar within milliseconds and when closing it again, it would have to be lowered by 1 bar just as quickly. That this is not possible needs no further explanation.

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Systems with HOFMANN metering pumps behave differently on principle. A pump is not simply a substitute for a pressure container because:

1. The discharge flow is proportional to the speed and this independent of the viscosity and the viscosity changes of the material, as well as independent of pressure and changes of pressure.
2. When the speed is doubled abruptly, the discharge flow also doubles abruptly.

The cause-effect correlation is fundamentally different: While in the case of the pressure container method the discharged volume of material is the result of air pressure, viscosity and resistances in the system, pressure, viscosity and resistance play no role whatsoever in the case of metering pumps. The discharged volume of material solely follows the pump speed and is proportional to it.

HOFMANN takes advantage of this through a so-called accelerating device for the oil metering valves of the hydraulic pump drive. The rpms for the **single** and **double** discharge flow are constantly available here. With the help of a pneumatic coupling, the oil metering valves can be switched over within a few milliseconds from the single to the double speed and vice versa without interfering ramps. This has proven itself since 1985 in various designs.

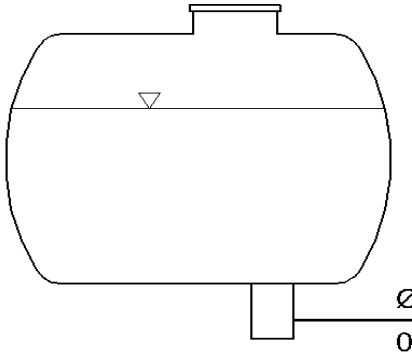
Since 1976 HOFMANN has had a pump principle available which was specially developed for highly-abrasive discharge media, the absolutely wear-free bellow pump principle, which is even suitable for temperatures up to 250° C. Since 2007 these pumps have also been available for medium-sized marking machines and especially for highly-viscous **plastics**. See also our Information No. 384.

As can be seen from Picture 2 there are no parts which are exposed to the discharge medium and slide on top of each other, that are prone to wear and therefore could continuously impair the level of efficiency of the pump.

HOFMANN GmbH

Annexes

		1	2	3	4
Ver-such Nr. *Test No.*	Behälter-druck *Pressure*	Ausfließende Materialmenge **Einzellinie** *Outflow single line* kg/min	Ausfließende Materialmenge **Doppellinie** *Outflow double line* kg/min	Verhältnis *Relation*	Tatsächl. benötigte Menge Doppellinie *Actual necessary quantity double line* kg/min
1	2 bar	6,6	8,7	1,3	13,2
2	3 bar	**10,7**	15,9	1,48	**21,4**
3	4 bar	14,3	**21,8**	1,53	28,6



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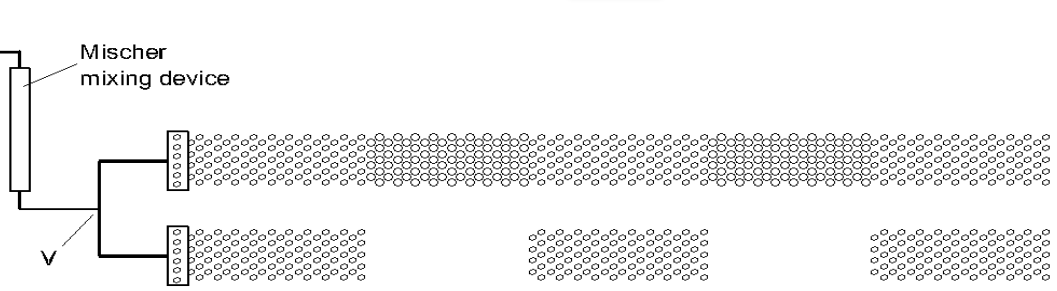

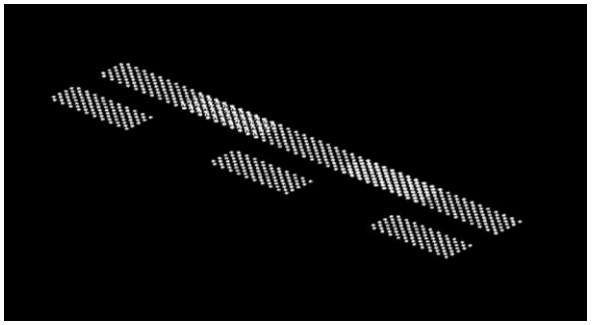

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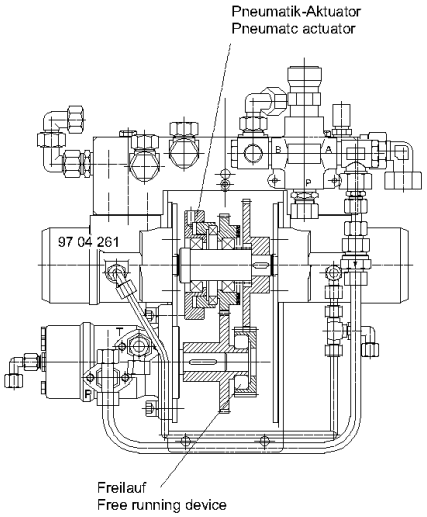

Verdoppelungsgetriebe
Accelerating device

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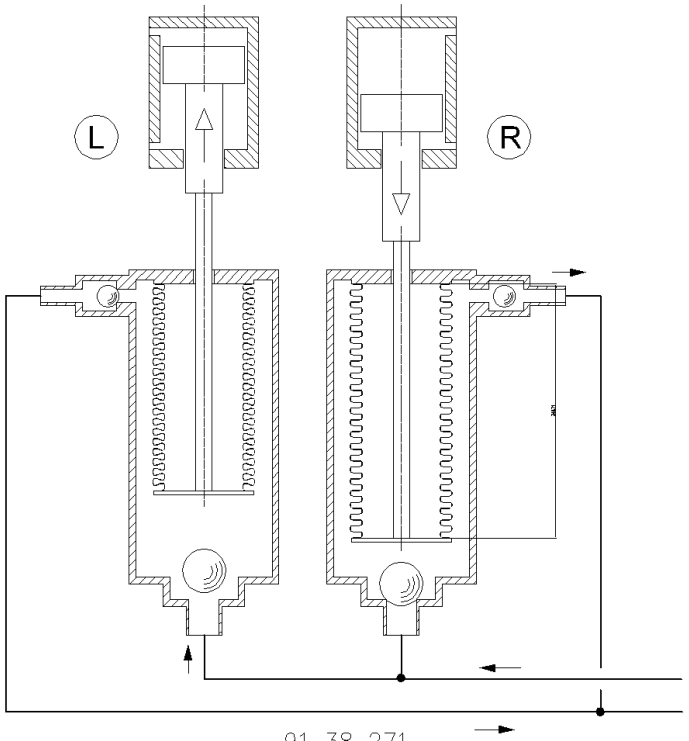

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