THE PF SERIES OF POWDER FEEDERS

The Ideal Solution for Every Application

„All you can feed!“

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The GTV **P**owder **F**eeder type PF is a system that is able to store powder and feed it in a controlled manner. The powder feeder mainly consists of a feeder unit (hopper) and a base unit that carries the hopper. The PLC controller (Siemens S7) and the drive unit for the hopper are located inside the base unit.

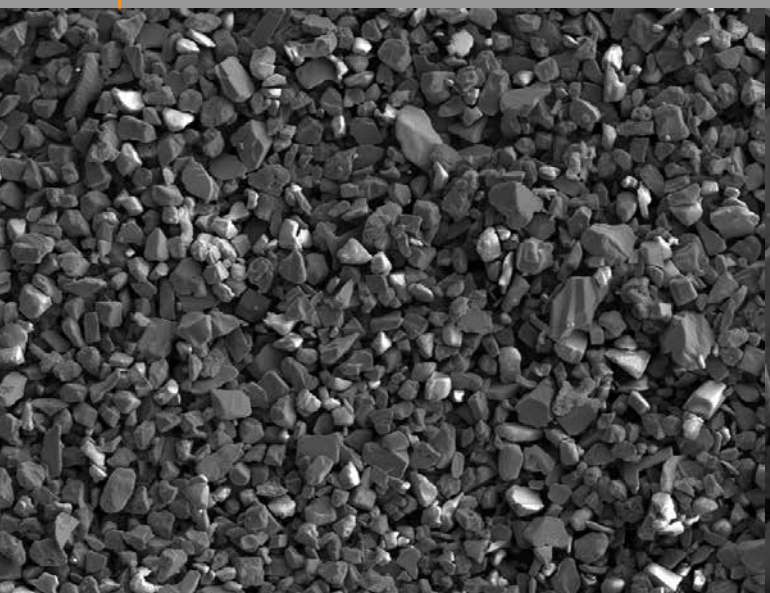
The hopper itself is an independent module that can be adapted using various kinds of base units. These base units enable the standardised control of 1 or parallel of 2, 3 or 4 hoppers. Specially customised cabinets can also be provided in line with customer requests.

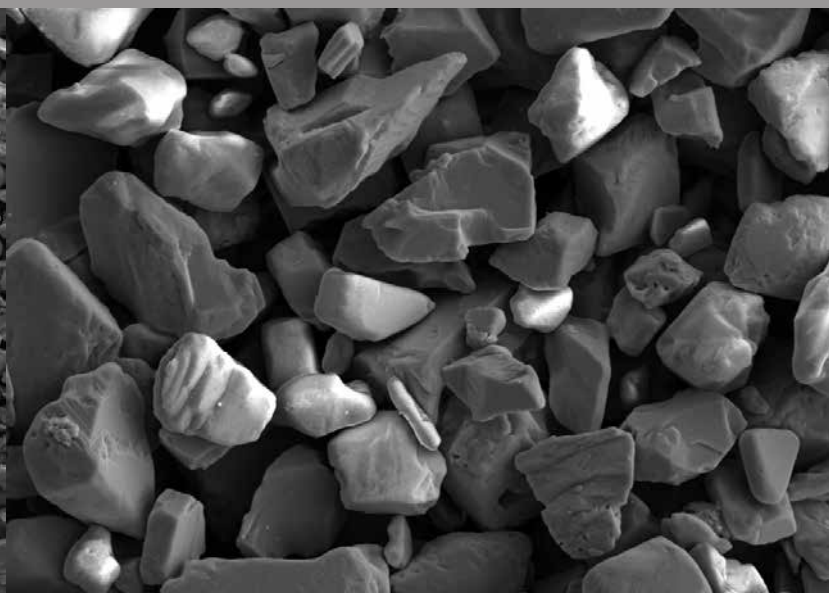
Powder feeder users can additionally choose to equip each hopper with scales for weight loss control (PF 1/1W; PF 2/2W = weight loss control).

Other standard powder feeder options include hopper heater jackets for pre-heated powder and gas mass-flow controllers for the precise closed loop control of carrier gases with high reproducibility. Customers can also choose to purchase low-cost (LC) versions of the powder feeder that use a frequency controller instead of a PLC to control the disc RPM, which can only be viewed as a set value on a simple display in these models.

Model	Number of Driven Units	Number of Reserve Units
PF 2/1	1	1
PF 2/2	2	0
PF 3/3	3	0
PF 4/2	2	2
PF 4/3	3	1
PF 4/4	4	0
PF 1/1W	1	0
PF 2/2W	2	0
PF 3/3W	3	0
PF 2/1LC	1	1
PF 2/2LC	2	0

Available powder feeder models



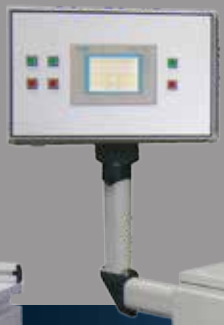


PF 2/2 with
operator control desk

PF 2/2 LC

PF 2/1 LC

PF 3/3 with
weight loss control



PF 3/3

PRINCIPLE OF OPERATION AND FUNCTION

The hopper can be roughly divided into two sections: the container and the feed disc with a rectangular ring groove.

The container itself consists of a double cone structure in which the upper half of the first cone ensures the downward flow of the powder while the lower half prevents the powder from compacting due to its own weight. This structure also prevents a segregation of the powder due to the separation of fine and coarse powder particles or blended powders with different densities.

The second cone is positioned directly under the lower half of the first cone. This second cone ensures the regular filling of the rectangular ring groove within the feed disc using the so-called spreader, which distributes the powder at a consistent level within the rotating groove. The rotation of the feed disc enables the powder-filled groove to be transported to the opposite side of the container, where the carrier gas uses a nozzle-shaped suction mechanism, the so-called suction unit, to pick up the powder by sucking it out of the groove. An anti-static hose is then used to feed the powder into the consumer (coating torch or laser beam).

An accurate parameter setting ensures that the groove is completely empty after it has rotated through the suction unit. The powder feed is linearly proportional to the closed-loop controlled RPM of the feed disc, which can be variably set between 0 and 10 RPM in steps of 0.1 RPM.

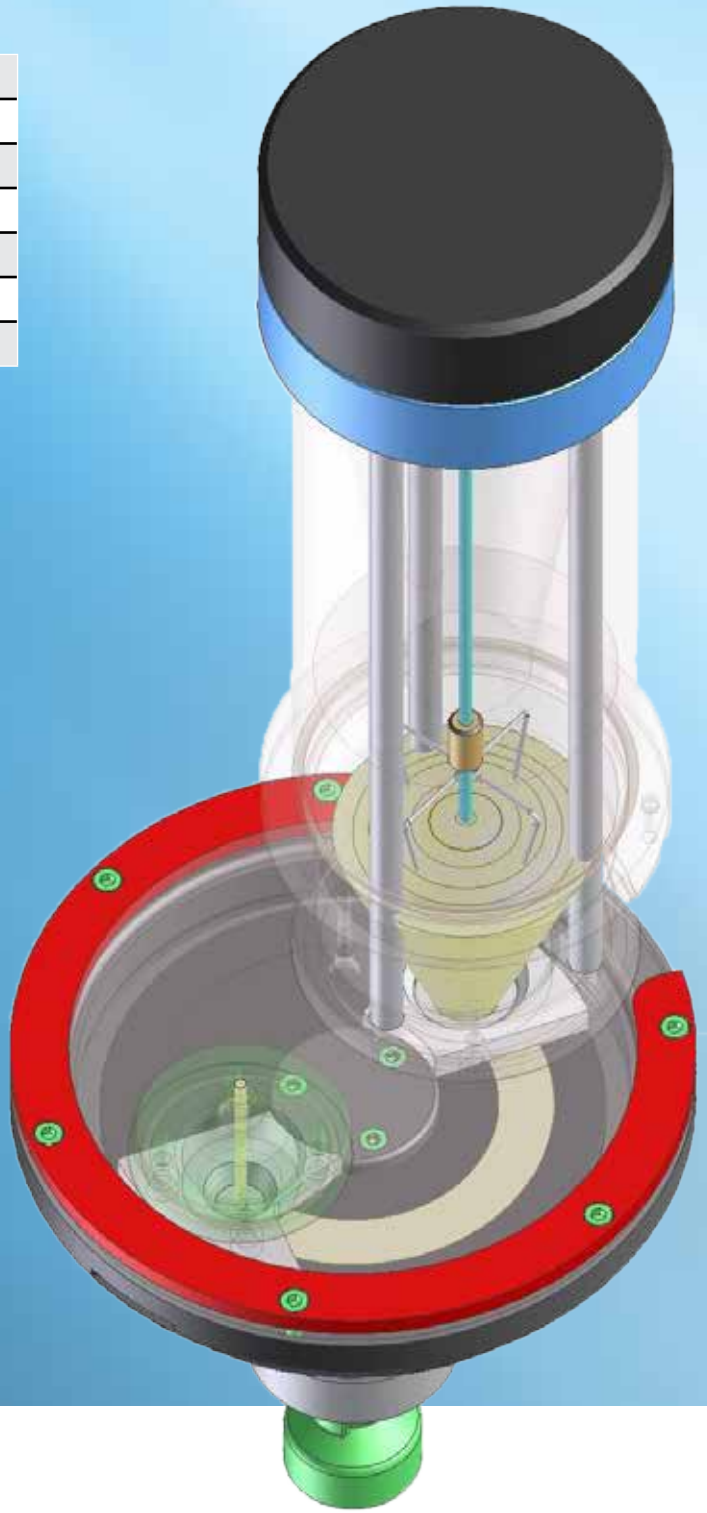
During the operation of the powder feeder, the container is slightly pressurised (at a maximum of 3.5 bar/50 psi or up to 15 bar/214 psi on request). The gas can only exit the hopper from the suction unit and the gas flow amount can be used to adjust the exit velocity of the powder particles. A minimum amount of gas must, however, flow through the hopper in order to ensure a pulsation-free and continuous feed depending on the powder in question.

The powder feeders are also available with different spreader/suction unit sets: L for liquid (powder that flows well), NL for non-liquid (powder that flows badly or not at all), and some special units. The feed discs are available with different groove depths and widths and corresponding spreader/suction units. These different options enable users to make the most of a wide range of powder feeding rates (from 0.1 g/min to approx. 300 g/min) with an extremely high feed accuracy (+1% in relation to the maximum feed rate). The disks are also available in a variety of different materials and with difference surface finishes.

Designation	Groove Size (depth x width)	Factor
Standard	1.2 mm x 16 mm = 19,2 mm^2	1
Intermediate	0,6 mm x 11 mm = 6,6 mm^2	0,344
Laser	0,6 mm x 5 mm = 3 mm^2	0,156
Micro	0.3 mm x 3,5 mm =1.05 mm^2	0,055
Ultra-Micro	0.3 mm x 2 mm = 0.6 mm^2	0,031
Macro	3.2 mm x 16 mm = 51,2 mm^2	2,66

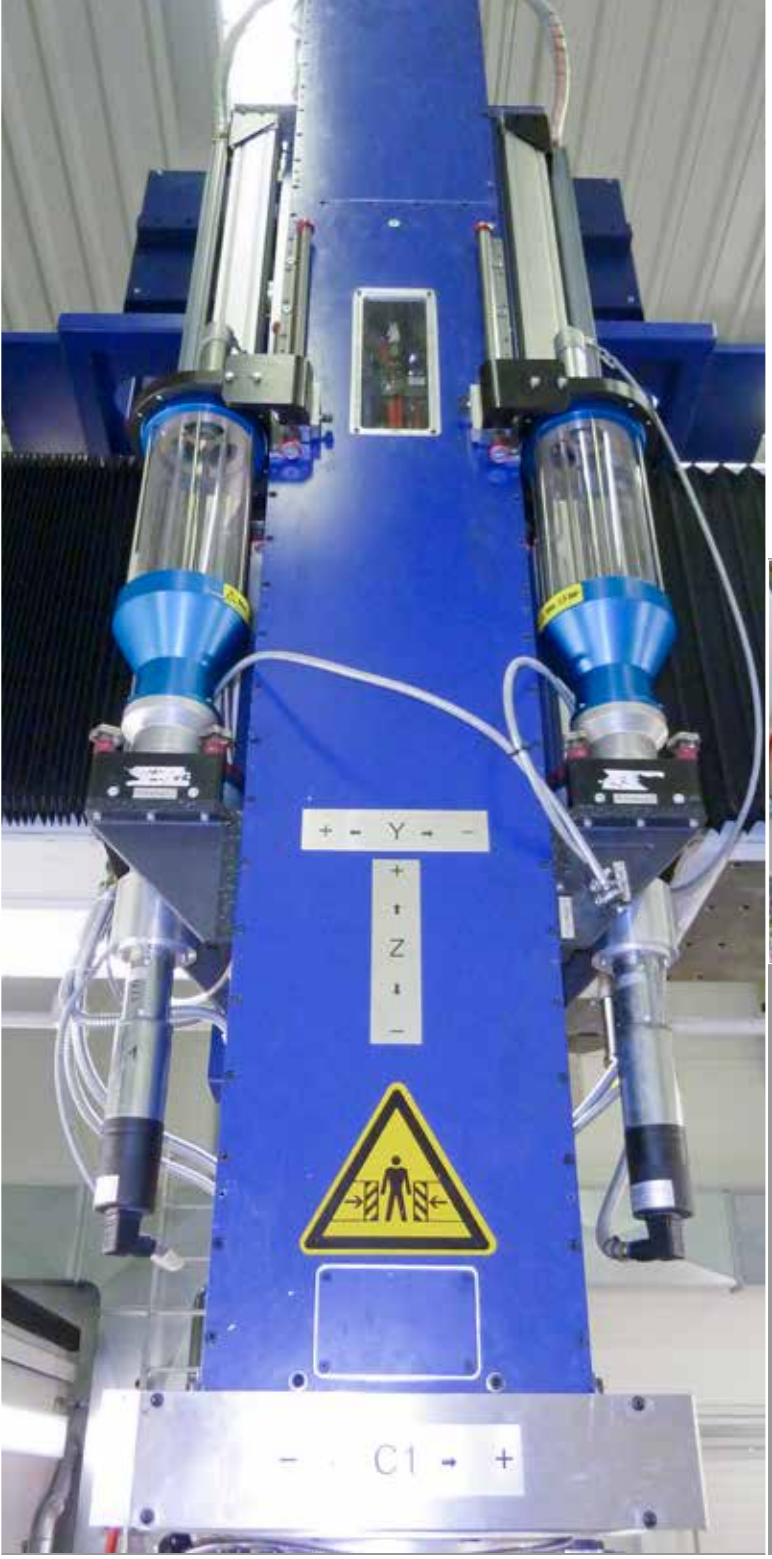
Available disks and groove dimensions

The 1.5l and 5.0l hoppers ultimately feature a stirrer that is integrated into the container and is driven by a controlled motor mounted above the container. The stirrer rotates in the outlet opening of the double cone at a defined distance from the spreader unit and helps to ensure the continuous feeding of powders that do not flow well or tend to trickle poorly. Different types of stirrers (standard or with pins or small plates) are also available for the powder feeders in order to adjust the container unit to suit various flow characteristics.



PROPERTIES AND ADVANTAGES

- Suitable for all types of powders (morphologies)
- The feeders mainly use acrylic glass, which ensures excellent visual control
- The system with weight loss control ensures optimised visualisation and documentation of the powder feeding process (with the powder mass flow displayed in g/min or lbs/min, the container content displayed in 0.1kg/0.1lb and the use of tolerance ranges and process shutting-down limits)
- Several hopper capacities available (1.5 or 5 litre and 0.3 litre on request)
- Fewer maintenance requirements thanks to a small number of wear parts
- Not affected by external influences
- No powder segregation when using blended powder
- No powder particle separation (sedimentation of fine powder particles)
- Easy powder refilling
- A system for thermal spraying (TS), laser cladding and plasma transferred arc welding (PTA) that has proven its worth over many decades
- 50°C heating sleeves for containers with pre-dried powder
- High-pressure containers with pressures of up to 15 bar made of heavy-duty reinforced aluminium
- Split system versions (controller and container with drive motors mounted in separate cabinets, for example in order to adapt to machine support)



Side view

PF 1/1W internal view

PF 2/2 W

An example of a split version in which the powder container and control unit are separate

Limitations

The changing of powder types and the cleaning of the system required alongside this process are relatively laborious compared to other systems. The advantages of a high feeding accuracy and high reproducibility do, however, far outweigh the argument of the easiest possible handling. Additional hoppers are recommended for users who plan to frequently change powder types, e.g. from metal powder to ceramic powder and back to metal powder again.

Ever since the company was established in 1982, the name GTV has stood for top quality and a high level of delivery reliability for all types of thermal spray products.

GTV provides its customers with many years of experience in all aspects of the high-technology field of thermal spray technology, enabling them to make use of the effective and efficient GTV system solutions in order to gain a substantial competitive advantage in the market.

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