

Ritmo[®] 05 CAT



*The metering of high percentage nitric acid adapted
Metering Pumps with positively controlled valves
with all PTFE construction.*

Metering Pumps tailored
to a specific application

Metal Injection Molding (MIM) is the powder metal Injection casting technique with which complicated geometrical parts are produced in large quantities. Homogeneous molds are produced from fine metal power and a special binder, then subsequently discharged and sintered.

Especially in the Catamold[®] process the BASF SE developed Polyacetal binder is used and then released residue free from the component part by means of a catalytic debinding process. In this process Catamold[®] injection casted 'green' parts are subjected to 110-140°C (230-284°F) N₂ atmospheres with low gaseous nitric acid content in a gas tight oven. The nitric acid reacts on the interfacial debinding of the 'green' parts and intrudes into it at a speed of 1-2mm/h until the part is completely debinded.

The Metering:

For debinding of the molded parts, low quantities of 98 % nitric acid as catalyst are metered into the debinding oven containing an overlaid nitrogen atmosphere.

The gas evaporates in a ceramic basin enabling a very short debinding time when it contacts with the 'green' parts. For laboratory ovens with 50 liter content ca. 40 g/h nitric acid and ca. 500 liter N₂/h is necessary. Such ovens are utilized as production ovens with volumes up to 1 m³ or as continuous processing debinding ovens.

Requirements for a Metering Pump:

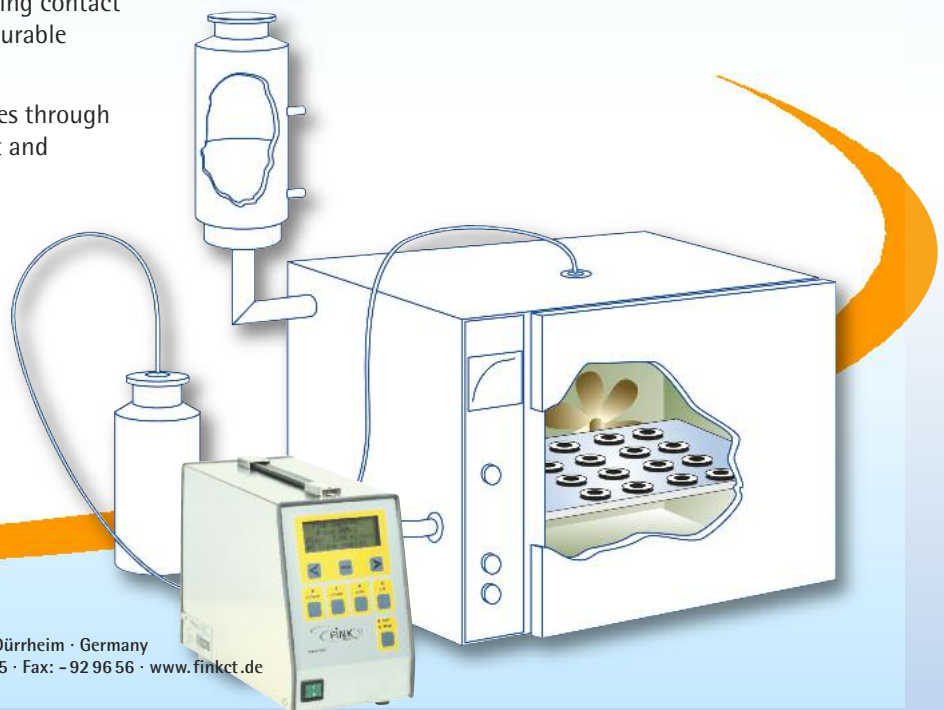
A special Metering Pump tailored for the requirements of a debinding oven handling with high percentage nitric acid must have the following requirements:

- Exact precision metering of smallest nitric acid quantities in order to attain a qualitative high value in a debinding process and achieve accurate parts.
- Highest chemical resistance of parts having contact with nitric acid to enable a robust and durable metering station.
- Prevention of contact to metallic surfaces through nitric acid vapors. Positioning of contact and interfaces within the pump casing.
- Absolute tightness of the valves, connections and tubing to prevent contamination of adjacent working area.

- Highest process safety with the interlaced debinding oven and prevention of explosions in the oven. Immediate closing of all pump valves when the system is switched off.
- Fast and safe draining of the metering unit from the oven to the NNO₃-storage tank and least contact with the nitric acid by the operator.
- Safety relevant interlacing and control of the Metering Pump by the debinding oven as well as the allowance of metering after assurance of the overlaid N₂ in the oven.
- Prevention of operation i.e. changing the set parameters on the Metering Pump during oven operation.
- Prevention of over dosage through mechanical damages in the metering process (mechanical or electronic independently switched limiter) or damage to the electronics (self-detecting and automatic reset function)
- Simple recalibration for absolute minimized contact with nitric acid for the operator.

Debinding oven

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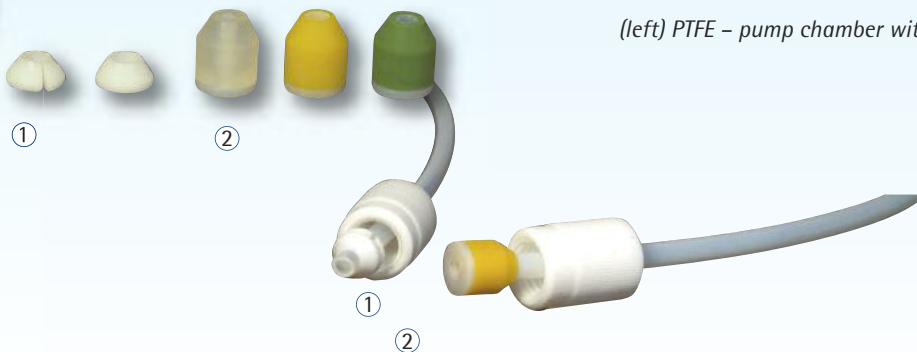
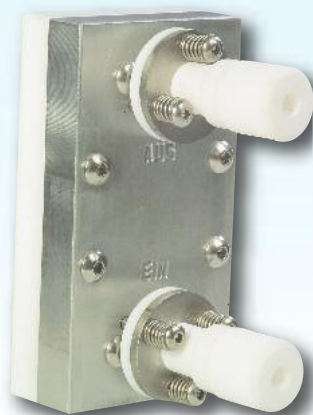
Technical Data

Pump type	R 05/03	R 05/30	R 05/60	R 05/120
max. metering capacity ml/min	3	30	60	120
min. metering capacity µl/min	3	30	60	120
max. stroke frequency strokes/min	ca. 43	ca. 43	ca. 46	ca. 48
max. pressure inlet bar	4	4	3	2
max. pressure outlet bar	4	4	3	2
Stroke volume µl	70	700	1300	2500
min. stroke duration sec.	1,4	1,4	1,3	1,2
max. stroke duration sec.	1400	1400	1300	1500
Repeat accuracy %	< 1	< 1	< 1	< 1
Material, pump head				PTFE
Material, diaphragm				PTFE
Material, valves				PTFE
Input voltage				100-240V, 25W
Control voltage				24 V AC, incl. 1,50 m cable to oven
Safety class				IP 30
Ambient temperature				50 °C; 122 °F
Max. dimensions LxBxT mm				270x130x205

The above rated values have been carefully determined with a reference fluid. If other fluids are metered, the above values may differ minimally.



(top) Metering monitor of the R05 CAT



(left) PTFE - pump chamber with diaphragm

Connection variations

- ① RGL - PTFE- unions with sealing ring and cone
- ② RGL - PTFE - Flex-connector with silicone cover

$\text{CH}_2\text{O} \leftarrow \leftarrow \leftarrow$

$\text{HNO}_3 \rightarrow \rightarrow \rightarrow$

