



Feeder-Channel and Feeder

APPLICATION

The feeder controls the gobbing rate, the temperature and the quantity of glass which is made available for the production system. The production system is provided with very precise quantities of glass (+/- 1 g) in very accurately controlled time intervals and the glass temperature (viscosity) is precisely regulated. Very high glass quality and consistency is guaranteed by the fact that the stirring plunger increases the glass homogeneity, that the gob-shape may be adapted to the mould and that optimal parameters are accurately reproducible.

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CAPACITY	<ul style="list-style-type: none"> • mini-version: up to 5 t in 24 h • standard-version: up to 10 t in 24 h • XXL-version: up to 20 t in 24 h • high-volume-version: up to 45 t in 24 h • BASIC feeder (all sizes): Füller feeder layout adapted to the functions of standard spout feeders for reduced investment
VISCOSITY	1000 to 10 000 Pa·s (Poise)
TYPES OF GLASS COMPOSITION	lead glass, soda-lime glass, recycling glass, borosilicate glass
FEEDING MODES	<ul style="list-style-type: none"> • continuous casting (without plunger stroke) • forced stream casting (with plunger stroke) • high-quality gob feeding (drawing back the sheared gob into the heated orifice) • high-speed gob feeding (direct gobbing)
GLASS QUANTITY / WEIGHT OF GLASS ITEM	20 g to 10 kg (continuous casting)
GOB-WEIGHT	standard-version: 20 g to 3,5 kg mini-version: 20 g to 500 g XXL-version and high-volume version: 20g to 5 kg
PRODUCTION RATE	<ul style="list-style-type: none"> • low-speed feeding • high speed feeding (allowing short plunger strokes in high speeds and high-speed shearing) 0,2 cut/min. (i.e. 1 gob in 5 min.) up to 120 cuts/min.



MODE OF OPERATION

The horizontal glass flow in the pipe-shaped ceramic segment of the feeder channel is diverted into a vertical glass flow in the T-shaped feeder head (horizontal and vertical tube). This pipe-layout guarantees a laminar glass flow – the round shape providing optimal conditions for a homogenous temperature distribution through infrared radiation within the pipe and eliminating the risk of any inhomogeneities caused by any glass surface. The plunger mechanism is placed onto the vertical tube. The innovative stirring plunger increases the thermal and chemical homogeneity of the glass and eliminates cord. The quantity of glass delivered is controlled by the height to which the plunger is lifted. The feeding speed may be increased by accelerating the downward movement of the plunger – pressing the glass through the heated orifice. The size and shape of the gob are defined through the MMC-software's graphic interface, which allows one to achieve optimal production parameters quickly, and to store the data. A highly efficient heating system – the indirect heating (active insulation) or direct heating – provides extremely homogenous temperature conditions within the pipe. In order to avoid any loss of quality after shearing, the sheared gob is drawn back into the heated orifice by the plunger and is completely re-heated. The shearmark then disappears.

FEATURES

reduced risk of bubbles	<ul style="list-style-type: none"> • because the glass is drawn from beneath the surface of the molten glass, where the furnace provides the best glass quality
homogenous temperature conditions	<ul style="list-style-type: none"> • due to its pipe-shape, the glass has full contact with the channel wall – providing homogenous temperature conditions in the glass, assisted by a homogenous heat distribution due to infrared-radiation within the pipe • delivering the glass in pipe-shaped horizontal tubes eliminates any risk of crystallization or temperature inhomogeneity due to the different glass conditions of glass flow and glass surface (in u-shaped channel systems) • due to a highly efficient indirect or direct heating system based on computer-aided regulation of the heating current – with instant temperature feedback – enabling the glass temperature to be accurately, efficiently and immediately controlled
optimal adjustment to production requirements	<ul style="list-style-type: none"> • due to highly efficient and modular components, which allow target-oriented production conditions based on the standard layout and on proven components • due to a range of heating options which allow one to choose and combine the best glass heating system based on glass characteristics and production target
very high glass quality due to reduced risk of cord	<ul style="list-style-type: none"> • due to an innovative stirring plunger technology which increases the thermal and chemical homogeneity of the glass • due to a range of options which allow one to choose the best glass contact material based on glass characteristics and production target
glass delivery without visible shearmarks	<ul style="list-style-type: none"> • because the sheared glass is drawn back into the heated orifice – re-heating the glass immediately and eliminating the shearmark • due to improved shearing systems and -blades
precise gob-weight	<ul style="list-style-type: none"> • due to a precise regulation of the feeding quantity with the plunger movement (+/- 1 gr) and by using the temperature regulation in the heated orifice to achieve highest gob-weight precision
less scrap (production of more than 2 pieces/min. no waste glass)	<ul style="list-style-type: none"> • because the shearmark is re-heated in the heated orifice and no clear cut is necessary • due to a water-cooled closing device for the orifice (spanker), which stops the glass flow, when no glass is needed

highly flexible production	<ul style="list-style-type: none"> • covering a wide range of gob-weights without changing the size of the orifice • eliminating long job-change times with a quick-change system for the orifice • allowing to react to temperature fluctuations and pull rate changes most efficiently by using a computer-aided regulation of glass temperature
very low energy consumption	<ul style="list-style-type: none"> • because the electrical heating allows a highly efficient insulation to the outside
easily adapted to any existing production surroundings	<ul style="list-style-type: none"> • due to its compact layout which ensures that practically all production systems fit underneath the feeder • due to a mini-version for minimum spaces between the moulds on a roundtable (such as stem presses)
optimal production conditions and extremely user-friendly	<ul style="list-style-type: none"> • due to electronic control system based on MMC-software (please refer to the advantages of the MMC-software on separate data-sheet „electronic control“)

FEATURES (HEATING SYSTEMS)

indirect heating	<ul style="list-style-type: none"> • to be applied in combination with ceramic, platinum coated ceramic and a platinum sheet cladded into the ceramic • electrical resistance heating which allows a computer-aided regulation of the glass temperature with instant temperature feedback • the heating elements entirely cover the outside of the ceramic tube, which allows instant and consistent transfer of heat to the ceramics and on to the glass, providing optimal temperature conditions within the pipe-shaped ceramic segments • the infrared radiation within the tube further enhances a homogenous heat distribution within the ceramic pipe
microwave heating	<ul style="list-style-type: none"> • to be applied in combination with ceramic • extremely energy efficient heating system for the temperature regulating cell, where the glass is conditioned immediately prior to entering the feeder • improved temperature homogeneity and heating efficiency due to a volume heating of the glass • accurate, efficient and immediate control of the glass temperature due to a computer-aided regulation of the microwave intensity with instant temperature feedback • reduced response times to temperature fluctuations and improved temperature stability • improved production conditions, because the glass temperature provided by the furnace may be maintained at a constant level (compensation of heat-loss) and allows controlled cooling and heating
direct heating <ul style="list-style-type: none"> • inductive heating • directly heated platinum and power-coating 	<ul style="list-style-type: none"> • to be applied in combination with ceramic, platinum coated ceramic and a platinum sheet cladded into the ceramic • improved temperature homogeneity and heating efficiency due to a volume heating of the glass (inductive heating) • extremely fast and responsive glass temperature control due to a computer-aided regulation of the heating current with instant temperature feedback • reduced response times to temperature fluctuations and improved temperature stability • long service life since the heating system is based on highly wear-resistant components • improved production conditions, because the glass temperature provided by the furnace may be maintained at a constant level (compensation of heat-loss) and allows controlled cooling and heating

THE PACKAGE INCLUDES

FEEDER CHANNEL

- pipe-shaped ceramic segment supported by a steel casing and frame, including heating elements for indirect heating

FEEDER CHAMBER

- T-shaped feeder chamber, supported by a steel casing and frame, including heating elements for indirect heating

HEATED ORIFICE

- ceramic ring and platinum tube
- holder for the orifice with quick-change system
- indirect heating for the orifice

PLUNGER EQUIPMENT

PLUNGER MECHANISM

- plunger and plunger holder
- feeder mechanism, based on servo-motor system for the plunger-stroke and three-phase-motor system for the plunger-rotation
- water-cooling for the feeder mechanism with an electronically controlled flow monitor

HEATING SYSTEM (INDIRECT HEATING)

- heating elements
- heating control panel for the heating circuits (including alarm system)

ELECTRONIC CONTROL SYSTEM

- PC-based real time system with MMC-software and Windows 2000 operating system, incl. cooling system



OPTIONS

CAPACITY

- mini (up to 5 t pull rate in 24 h)
- standard (up to 10 t pull rate in 24 h)
- XXL-version (up to 20 t pull rate in 24 h)
- high-volume version (up to 45 t pull rate in 24 h)

GLASS CONTACT MATERIAL

- refractory/ceramic
- platinum coated ceramic for improved glass quality, reduction of wear and extension of service life
- platinum sheet cladded onto the ceramic segments for corrosion protection and direct heating

GLASS-CONTACT MATERIAL (PLUNGER)

- refractory/ceramic
- platinum coating
- fabricated platinum plunger (for mini-feeder and for improved glass quality, reduction of wear and extension of life service of standard, XXL and high-volume plunger)

LENGTH OF CHANNEL SEGMENTS

- 950 mm (standard)
- 450 mm

HEATING

- indirect heating (active insulation)
- microwave heating for temperature regulating cell
- direct heating (inductive heating and directly heated platinum/power-coating)

ADDITIONAL EQUIPMENT FOR CHANNEL

- colouring cells
- stirring cells
- temperature regulating cells
- cooling zones

ORIFICE

- standard orifice rings for unheated orifice
- ceramic orifice tube (for indirect heating)
- platinum orifice tube with quick-change system
- different diameters for varying gob-weights and glass quantities
- different lengths for varying heights of moulds (short: 100 mm; long: 200–300 mm)
- different heating systems: unheated, indirect heating, inductive heating, direct heating

ELECTRONIC CONTROL

- external control panel, when there is insufficient space to install the control panel close to the feeder

ADDITIONAL EQUIPMENT

SHEAR UNIT

- linear shear (based on servo-motor)
- linear shear (based on linear servo-motor) (please refer to separate data sheet)

SPANKER

- watercooled closing device for the orifice (reducing waste glass for low-speed feeding and long-feeding intervals), based on two movement axis: servo-motor system for the vertical movement and pneumatic cylinder for the horizontal movement

GOB TRANSFER

- feeding reservoir for large glass weights allowing to feed large injection reservoirs on a roundtable

FEEDING STATION

- feeding station which may be intergrated into any production system – allowing to move the mould directly under the orifice of the feeder (vertical and horizontal movement of the mould) for continuous feeding

