

Grout pumps



Häny low-wear plunger type grout pumps are available as single or double acting units. The unique control of the suction stroke prevents sedimentation of material on the suction valves. This eliminates the need for mechanically controlled valves even when pumping viscous grouts or mortar with particle sizes of up to 8 mm. These pumps therefore, are suitable for all grouting work as well as for the pumping of backfill mortar behind tunnel liners.

GROUTING SYSTEMS



The Plunger Pump System

The difference between the plunger and the piston pump system is that the plunger system does not require any close tolerance parts such as cylinders or precise piston seals, etc. The plunger is sealed by a simple maintenance-free seal. Plungers with various diameters can be mounted on the ZMP 700 series of pumps. This grants the highest possible pressure and output ranges flexibility for each individual model.

Automatic Pressure Control (APC)

The ZMP 700 pumps are equipped with control valves which allow precise pre-setting of the maximum grout pressure. When the pre-set pressure is reached, the pump delivers only as much grout as the injection point will take at the pre-set pressure. If there is no more grout take, the pump automatically stops and maintains the pressure for any time period. Low pressures of only 1 bar can be pre-set on some models. The APC system guarantees safe grouting of delicate formations without risking hazardous overpressure.

Flow control

The built-in flow control permits the setting of a maximum flow rate. With this feature, slow penetration of soft ground can be achieved without risking segregation of the grout or creating new voids. The flow control together with the APC pressure control system allows the use of these pumps for permeability tests.

Valves

The grout valves are made of high grade alloy steel for long life. The valve seats are reversible. The special design of the hydraulic system provides for a high speed suction stroke of the plunger, which creates a relatively high grout velocity in the suction valves. Thus, heavy particles will be flushed away and the valves are kept clear. The design of the valves allows pumping of grouts with low water/cement ratios or sanded grouts with a particle size of up to 8 mm.



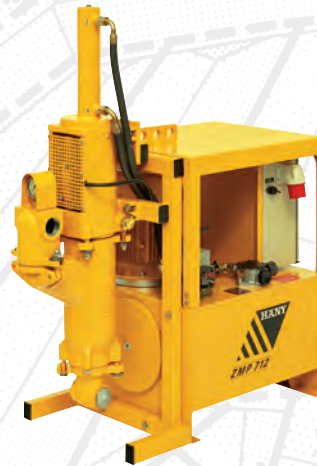
ZMP 610V/611V
Economic single acting,
pump for all applications



ZMP 625V
Double acting pump for all
applications



ZMP 710V
Versatile single acting,
pump for all applications



ZMP 712V
Economic single acting,
pump for all applications



ZMP 725V
Versatile high capacity double acting
pump for all applications

ZMP 726V
Double acting pump with high
pressure/high output
characteristics for long distance
pumping and jet-grouting

Maintenance

In the design of these pumps, Häny has paid great attention to simple maintenance and easy cleaning. The suction and discharge valves can be dismantled quickly. The plunger seal consists of maintenance free, wear resistant seal rings.

Modular Pump System

The pumps of the ZMP 700 series are designed as an interchangeable modular system. The pump modules are identical on both single and double acting units. Thus wear and spare parts are also identical throughout the entire line which simplifies the stocking of spare parts.

ZMP 810V

Single acting high-pressure grout pump

ZMP 812V

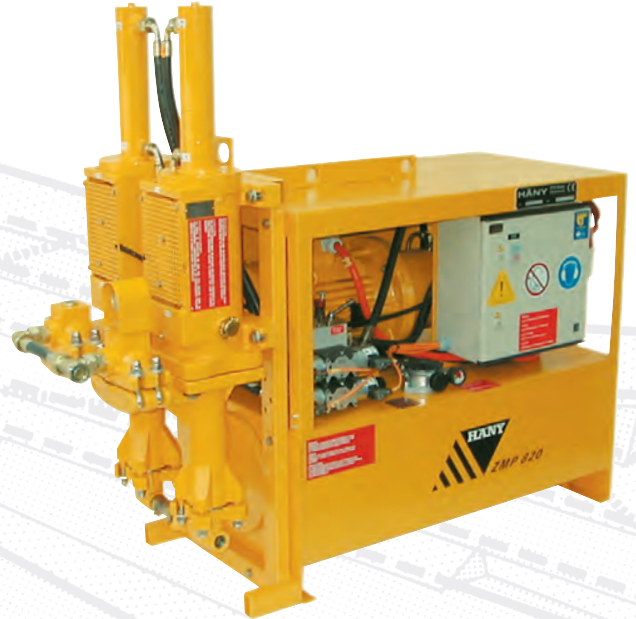
Single acting, economic high-pressure grout pump

ZMP 820V

Double acting, high-pressure grout pump

ZMP 826V

Double acting high-pressure grout pump with high pressure/high output characteristics



Häny single acting grout pumps

Model	ZMP	610V	611V	710V			712V			810V	812V	
Plunger ø	mm	65	65	85	105	120	85	105	120	60	60	
Capacity max. (W/C ratio = 1)	m³/h	1.5	2	3.9	5.5	7.5	2.4	3.8	4.9	1.9	1.3	
Pressure max.	bar	100	75	100	68	50	88	58	44	200	177	
Pressure min.	bar	3	3	2	1.5	1	2.5	2	1.5	12	12	
Particle size max.	mm	5	5	8			8			3	3	
Motor rating	50 Hz	kW	5.5	5.5	5.5			7.5			15	7.5
	60 Hz	kW	6.3	6.3	6.3			8.6			17	8.6

Häny double acting grout pumps

Model	ZMP	625V	725V			726V			820V	826V	
Plunger ø	mm	65	85	105	120	85	105	120	60	60	
Capacity max. (W/C ratio = 1)	m³/h	2	5.9	9	11.7	6.5	9.9	13	3.4	3.2	
Pressure max.	bar	100	100	68	50	100	68	50	200	200	
Pressure min.	bar	3	2	1.5	1	8	5	4	12	15	
Particle size max.	mm	5	8			8			3	3	
Motor rating	50 Hz	kW	5.5	9.2			30			18.5	30
	60 Hz	kW	6.3	10.5			36			21	36



1) Channel Tunnel Rail Link-CTRL Contract 240: PLC controlled backfill plant with ZMP 712 and ZMP 725 grout pumps. London.

2) Grout plant with automated mixing of grout with high sand content up to 8 mm particle size and ZMP 726 high performance pump. Birmingham AL, USA.



3) Automated mixing plant MCI 2000/726 with ZMP 726 high performance pump for the transport of grout suspension (W/C ratio 0.7) over a distance of 3,750 m. Boston.

4) Automated mixing plant MCI 2000/725 with 2 grout pumps ZMP 725 to supply 2 drill rigs for soil-mixing. Bangkok.



5) Grout plant with automated weigh-batching and four grout pumps for general grouting work. Bratislava.

6) Grout plant with 2 pumps ZMP 712 for consolidation grouting. Madrid.

Häny AG reserves the right to make improvements and modifications to their equipment without notice.

GROUTING SYSTEMS

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Compact grout plants



IC 650/712

The economic Häny INJECTO-COMPACT (IC) plants are suitable for any grouting work such as tie back anchors, tube à manchette, contact grouting, etc. Due to the outstanding mixing effect of the Häny high shear colloidal mixer, these plants are widely used to mix and pump bentonite and polymer suspensions for pipe jacking and microtunnelling.

GROUTING SYSTEMS

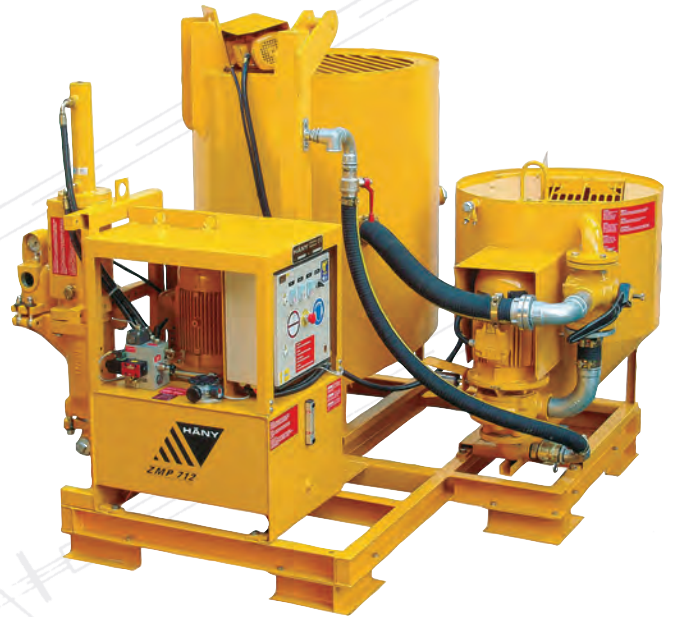


The Häny INJECTO-COMPACT (IC) plants consist of the standard components: HCM mixer, HRW agitator and ZMP grout pump. All components are functionally arranged and easily detachable. A central lifting point makes loading and unloading extremely easy.

Häny designs and builds complete plants to suit the specific requirements of the contractor. These could be conventional plants which are mounted into standard shipping containers or on to special platforms. Automated plants can either be designed with simple volumetric dosing or with sophisticated weigh batching. Besides big savings in labour costs the automated plants offer further advantages. High productivity, quality control and pleasant working conditions make the use of these plants an economic necessity. The plants can be designed for stationary use (e.g. central mixing plants) or for mobile use (e.g. in containers).



IC 325



Special version IC 1100/712

INJECTO-COMPACT	IC	310	311	325	650	650	650	650	650	650	650	1400	1400	1400	1400	
Grout pump	ZMP	610V	611V	625V	710V	712V	725V	810V	812V	820V	826V	710V	712V	725V	726V	
Capacity max. (W/C ratio = 1)	m ³ /h	1.5	2	2	5	4.9	5	1.9	1.3	3.4	3.2	7.5	4.9	8	8	
Pressure max.	bar	100	75	100	100	90	100	200	180	200	200	100	90	100	100	
Motor rating	50 Hz	kW	9	9	9	15.5	17.5	19	25	17.5	28.5	40	15.5	17.5	19	40
	60 Hz	kW	11	11	11	17.5	20	22	28.5	20	32.5	47.5	17.5	20	22	47.5

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Portable mixing plants



Häny's range of portable MCM mixing plants are suitable for mixing bentonite, fly ash, cement, filler, clay and similar suspensions for diaphragm walls, slurry walls, jet grouting and all types of grouting projects.

GROUTING SYSTEMS



The high-shear colloidal mixers are designed to weigh the mixing components and to prepare efficiently a suspension of excellent quality. Besides water, up to three dry components and three liquid additives can be automatically batched, mixed and transferred into a holding tank. Due to well-engineered design, these high performance plants are mounted into standard 10ft or 20ft containers without compromising the accessibility of the individual components. The containerised MCM plants can be re-located very quickly and are protected against the weather and damage from vandalism.

Function

Water is fed to the mixer either by a direct water line or through a special water tank. The dry components are dosed one by one from silos through screw conveyors. Individual components are weighed precisely in the mixer. The control allows a time related dosing of liquid additives.

As soon as the mixing process is over, the mix is transferred automatically into the holding tank, providing there is enough room. If not, the mixing pump is switched off and the suspension is remixed in adjustable time intervals until the holding tank can accommodate the full batch. The holding tank is equipped with a slowly revolving agitator to keep the mix in suspension.

The MCM mixing plants are consumption controlled which means that new batches will be mixed automatically with draw from the holding tank.

Mixing principle

The high shear mixer is first charged with water. The dry components are then added. A high performance mixing pump circulates the entire tank content two to three times per minute. In the mixing tank, the dry components are pre-wetted. Actual mixing takes place in the mixing pump.

The Hány-Vortex impeller creates very high shear forces to separate dry particles from each other, leading to near full hydration. The result is a stable suspension with excellent characteristics.



MCI 1400/625 Grout Plant with automated weigh-batching.



MCI 2000/726 Mixing and grouting plant for soil-mixing.

Control

In addition to the high voltage components, the electric control is equipped with a PLC and touch-screen panel. Through the touch screen, the mixing components can be entered and stored in different recipes. These recipes can be called off as required. The control automatically optimises the dosing procedure. After approx. 3 mixing cycles, the accuracy remains better than 3 %.

The individual functions are interlocked to eliminate false functions. Transfer of a mixed batch for example is only possible if there is enough room in the holding tank to take the entire batch. Dry ingredients also can only be fed into the mixer after the water has been fed.

All the functions are visualised on the screen. The plant can be operated manually as well as fully automatically. The high voltage part of the control comprises the motor starters and relays for all electrical equipment in the plant as well as the starters for a maximum of three screw conveyors.



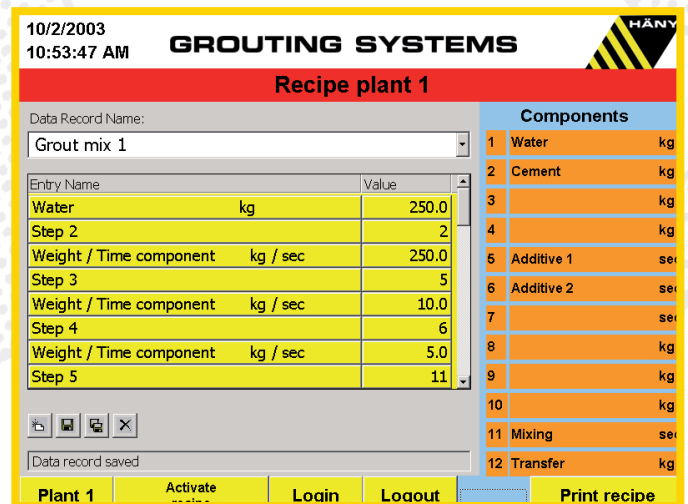
Electric control with touch screen panel.

Record

A batch record of each mixing cycle, as well as a consumption record (total of consumed components) is stored on a memory card. The data from the memory card can be transferred to a PC by a separate memory card drive (optional). A USB printer interface is also provided for direct printing on site.

Water tank

In order to take advantage of the full capacity of the plant, the use of a water tank is recommended. The tank is placed on top of the container and is equipped with all necessary equipment including valves and level probes for a fully automated plant operation.



Configuration of recipes.

MCM 2000

- **Capacity:**
12 – 25 m³/hr depending on the type and composition of the mix
- **Batching accuracy (weighing):**
< ±3%
- **Power rating:**
approx. 25 kW (without screw conveyors)
- **Circulation capacity of mixing pump:**
> 40 l/s
- **Dimensions:**
3000 x 2440 x 2600 mm
- **Weight:**
approx. 3300 kg

MCM 5500

- **Capacity:**
25 – 45 m³/hr depending on the type and composition of the mix
- **Batching accuracy (weighing):**
< ±3%
- **Power rating:**
approx. 50 kW (without screw conveyors)
- **Circulation capacity of mixing pump:**
> 70 l/s
- **Dimensions:**
6000 x 2440 x 2600 mm
- **Weight:**
approx. 8500 kg



1) Two grout plants each with automatic weigh-batching on the two Arrowhead TBMs. San Bernardino CA, USA.

2) MCI 650/625 for tube-à-manchette grout injections. Haltern, Germany.



3) MCM 5500 mixing plant for diaphragm wall construction. Hamburg, Germany.

4) MCM 2500 mixing plant with pump container. Mariaposching/Deggendorf, Germany.



5) MCI 2000/725 for soil-mixing. Bangkok, Thailand.

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FULLY AUTOMATED GROUT PLANTS IC 650A



GROUTING SYSTEMS

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FULLY AUTOMATED GROUT PLANT IC 650A

consisting of:

- 1 Base frame with central lifting point and fork lift sockets
- 1 high-shear mixer HCM 300
- 1 agitator HRW 350
- 1 grout pump ZMP 700V series
- 1 automatic control HWS 080
- 1 Compressor
- 1 water tank (option)
- 1 Pressure and flow recorder (option)

The plants are suitable to mix and inject all common grout, ultra-fine cement, bentonite and mortar mixtures. Due to the outstanding mixing effect of the HÄNY high shear colloidal mixer, these plants are widely used to mix and pump bentonite and polymer suspensions for pipe jacking and microtunnelling.

HIGH-SHEAR MIXER HCM 300

- Usable content 260 L
- Circulation capacity 1100/1400 l/min

The mixer consists of a mixing tank and a high-speed mixing pump. The special mixing effect is achieved by an extremely high turbulence created in the pump casing. This turbulence with its high shear forces separates the cement or bentonite particles which results in a fully hydrated suspension. For the mixing of suspensions with low water/cement ratios or mortar, a high performance mixing pump TMP 22 can be installed. 3 load cells continuously measure the weight of the mixer.

AGITATOR HRW 350

- Usable content 350 L
- Agitator speed 47 min⁻¹

The slow stirring paddle prevents the grout from settling out of suspension and removes any air bubbles from the mix. The slanting paddle together with a special arrangement of the paddle blades ensure complete circulation of the tank content. A safety switch stops the agitator whenever the tank cover is removed.

WEIGH-BATCH CONTROL HWS 080

Through a 7.5" touch screen panel the weight of water, the dry component and liquid additives (optional) can be entered. Different recipes can be entered and called up as required.

The individual mixing components are fed into the mixer in a pre-selected order (recipe) where they are weighed. First the water is fed, followed by the dry component which is fed from a silo by a screw conveyor or similar means. The control continuously optimises the dosing procedure. After approx. 5 mixing cycles, the accuracy is better than 3 %.

The individual functions are interlocked to eliminate false functions such as filling of the holding tank if there is not enough room to take the entire batch. Feeding of the dry component is only possible if there is water in the mixer etc.

All the functions are indicated on the screen. The plant can be operated manually as well as fully automatic. Consumption records (daily and total consumption) can be displayed on the screen and the batch protocols can be downloaded to a PC via USB memory stick.

GROUT PUMP ZMP 700V SERIES

The ZMP 700V are single or double acting vertical plunger pumps powered by a special hydraulic system. Due to the unique design of this system, the back or suction stroke is always carried out at high speed. The advantage of the fast suction stroke is that the grout passes the suction valve of the pump at relatively high velocity. Thus, heavy particles which tend to settle on the suction valve during the working stroke will be flushed away and the valve is always kept clear. Mixes with low water/cement ratios and sand particles of up to 8 mm in size do not create any problems.

The pumps are equipped with precise pressure and flow control valves which allow stepless pre-setting of both maximum pressure and flow independently. Whenever the pre-set pressure is reached, the pumps automatically stop and maintain that pressure without fluctuations to ensure complete filling of the grout hole. For continuous operation and warm climatic conditions the hydraulic power pack is provided with a water connection for the cooling of the hydraulic oil.

OPTIONS

WATER TANK

- Usable content 200 L

The water tank is equipped with a level probe which controls the automatic filling if the tank. A pneumatically operated butterfly valve allows quick feeding of the water to the mixer.

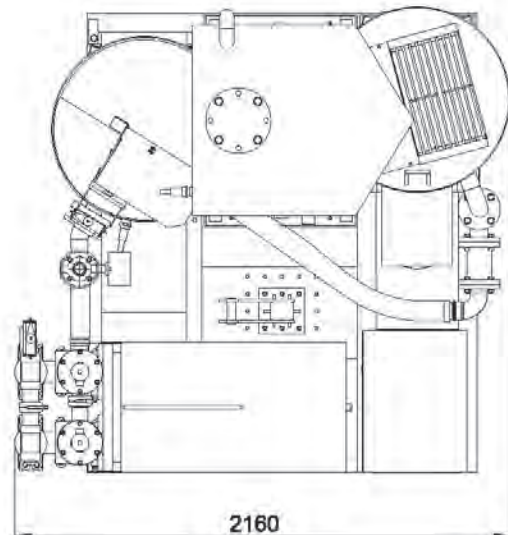
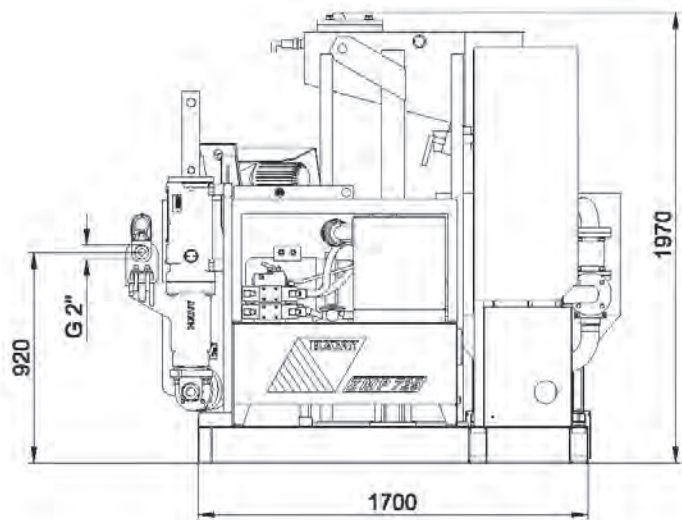
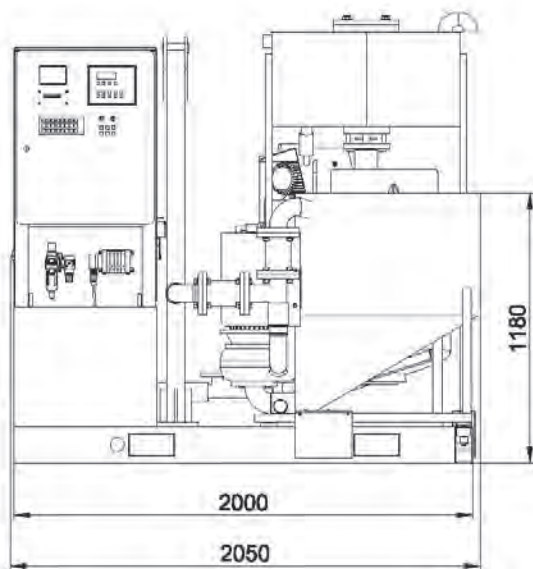
RECORDING

The plant can be equipped with an integral pressure and flow recording system. The data and curves can be displayed on the screen. By a USB memory stick the data are downloaded to a PC where they can be evaluated by our WINMES program. The recording can be initiated from the radio remote control.

REMOTE CONTROL

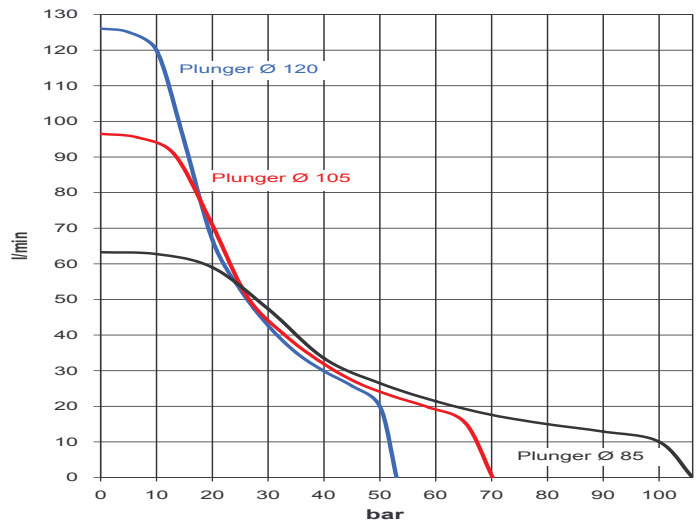
The plants can be equipped with wired or radio remote controls with the following functions:

- Grout Pump ON - OFF
- Output of Grout Pump
- Flush water/grout
- Pressure relief grout line
- Recording Quantity/Pressure



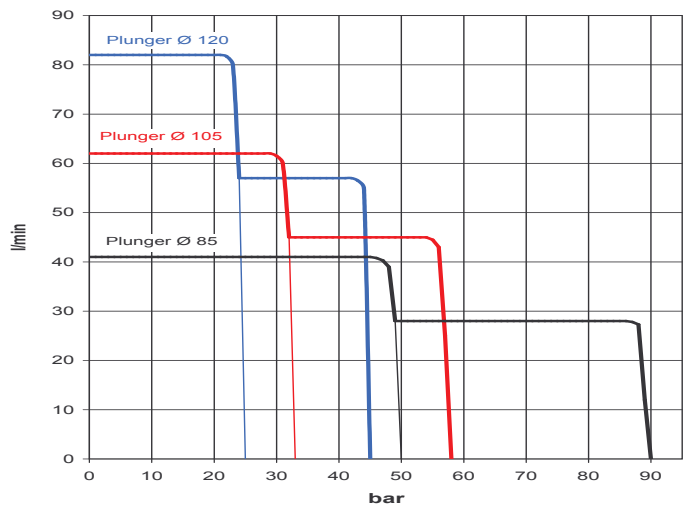
IC 650/710V

Grout pump	ZMP	710V	
Particle size, max.	mm	8	
Oil content	l	140	
Power consumption	50 Hz	kW	16.6
	60 Hz	kW	18.9
Water connection		1 1/2" BSP	
Cooling water connection		1/2" BSP	
Cooling water consumption	l/min	3 - 4	
Discharge		2" BSP	
Weight	kg	1665	



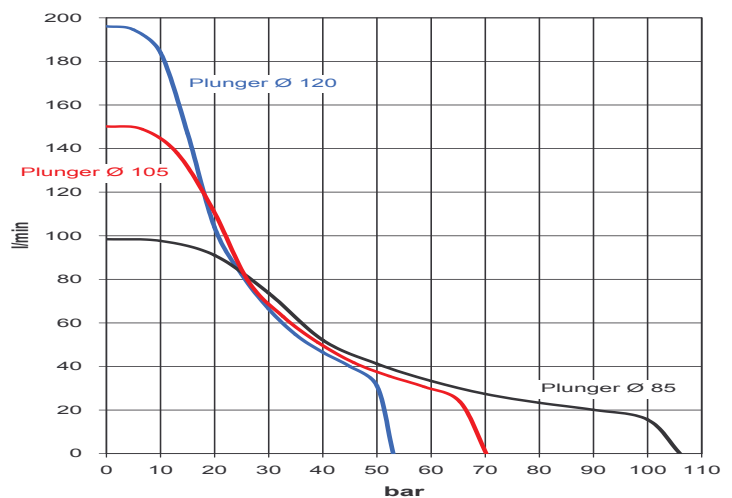
IC 650/712V

Grout pump	ZMP	712V	
Particle size, max.	mm	8	
Oil content	l	110	
Power consumption	50 Hz	kW	18.6
	60 Hz	kW	21.4
Water connection		1 1/2" BSP	
Cooling water connection		1/2" BSP	
Cooling water consumption	l/min	3 - 4	
Discharge		2" BSP	
Weight	kg	1615	



IC 650/725V

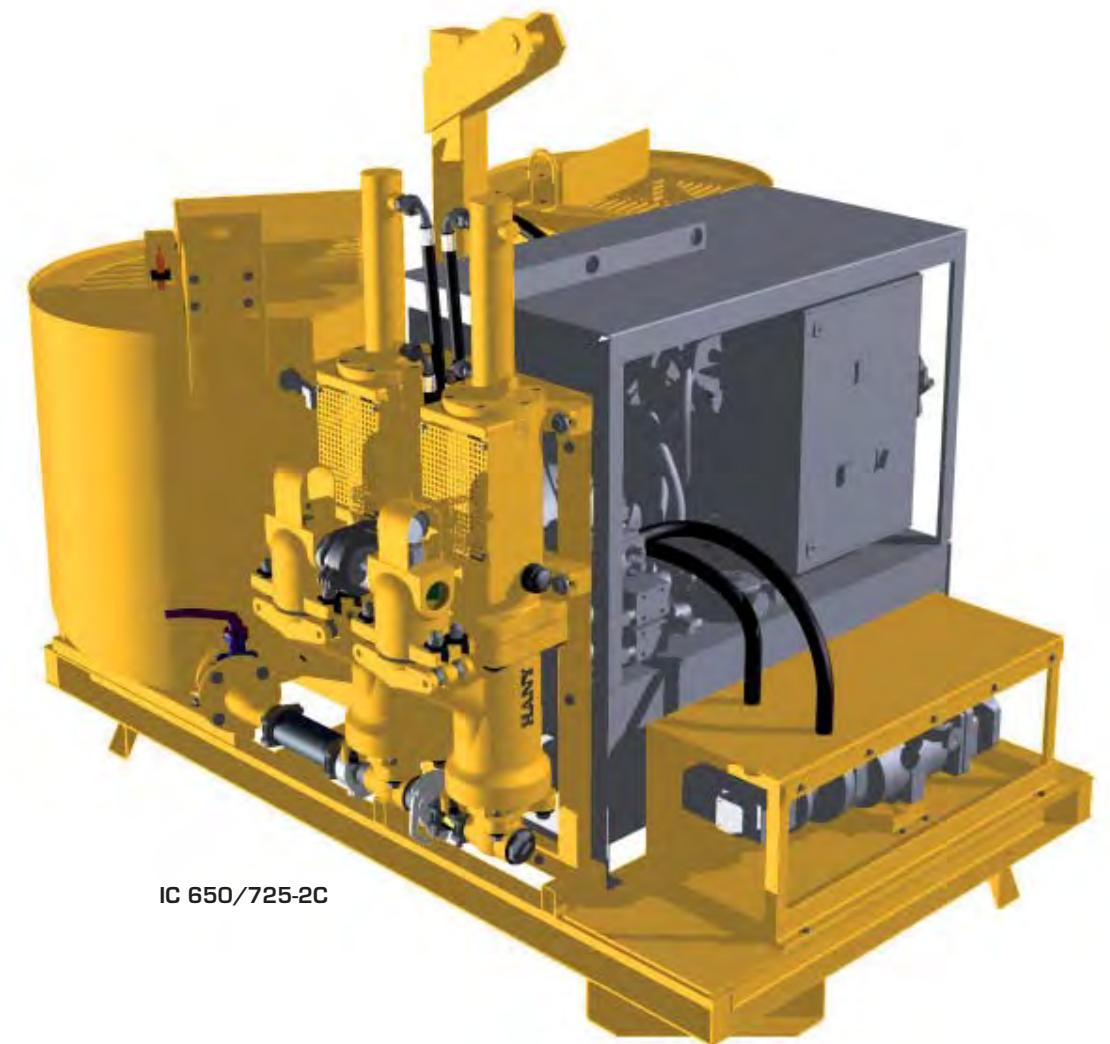
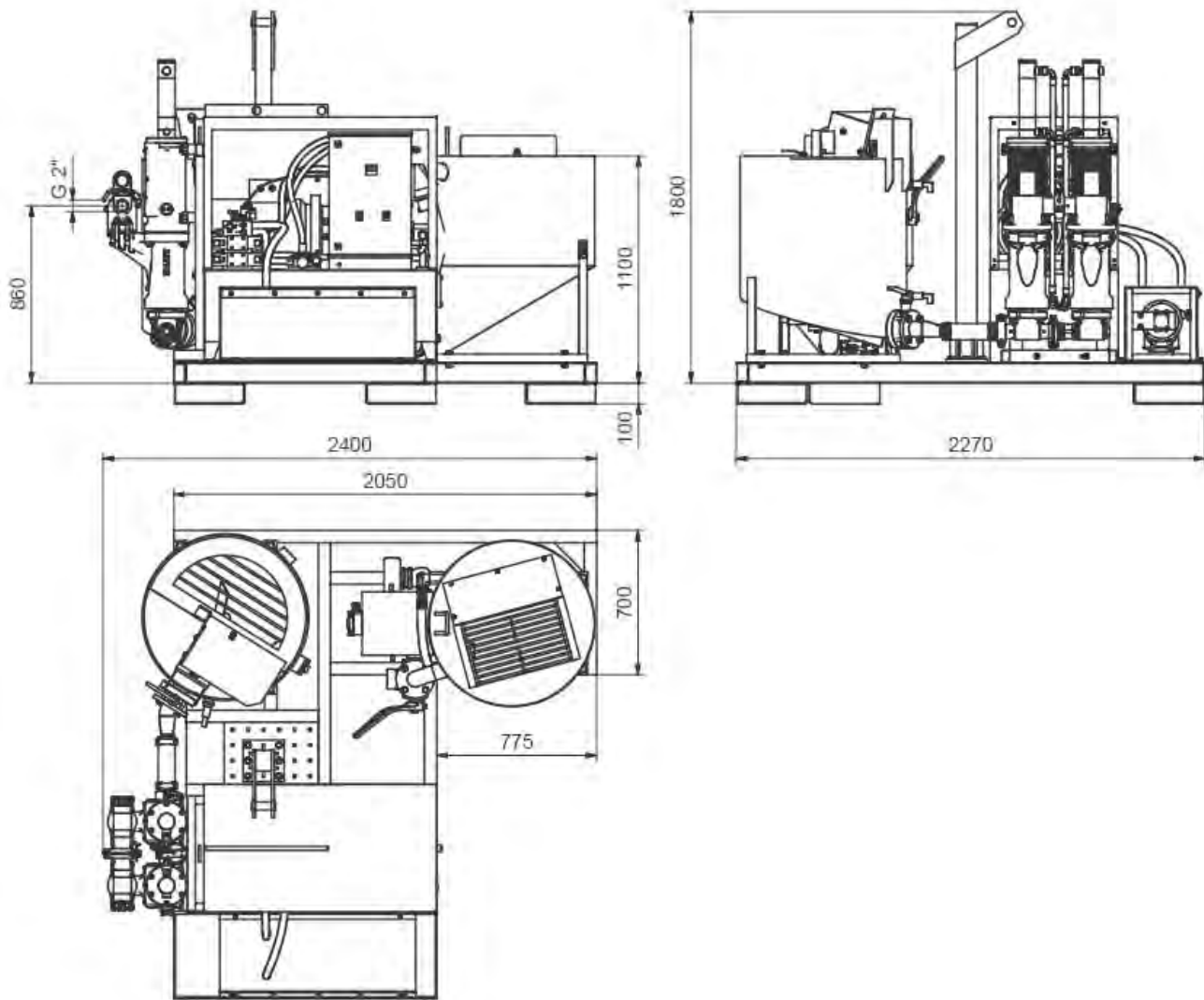
Grout pump	ZMP	725V	
Particle size, max.	mm	8	
Oil Content	l	140	
Power consumption	50 Hz	kW	20.1
	60 Hz	kW	23.4
Water connection		1 1/2" BSP	
Cooling water connection		1/2" BSP	
Cooling water consumption	l/min	5 - 6	
Discharge		2" BSP	
Weight	kg	1950	



GROUTING SYSTEMS

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Two component compact grout plants



IC 650/725-2C

GROUTING SYSTEMS **HÄNY**

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GROUTING SYSTEMS **HÄNY**

TWO COMPONENT COMPACT GROUT PLANT IC 650/725-2C

consisting of high-shear mixer HCM 300, agitator HRW 350, grout pump ZMP 725V.

The plant is suitable to mix and inject all common grout and mortar mixtures. Due to the compact and functional arrangement of the individual components, the equipment can easily be handled by only one operator. A central lifting eye makes the loading and unloading of the unit extremely easy. Simple operation, easy maintenance and cleaning, high quality and safety standards are some of the outstanding features of this unit.

HIGH-SHEAR MIXER HCM 300

The mixer consists of a mixing tank and a high-speed mixing pump. The special mixing effect is achieved by an extremely high turbulence created in the pump casing. This turbulence with its high shear forces separates the cement or bentonite particles which results in a fully hydrated suspension. For the mixing of suspensions with low water/cement ratios or mortar, a high performance mixing pump TMP 22 and/or an additional mixing unit (option) can be installed in the mixing tank to guarantee efficient pre-wetting of the dry admixtures.

AGITATOR HRW 350

The slow stirring paddle prevents the grout from settling out of suspension and removes any air bubbles from the mix. The slanting paddle together with a special arrangement of the paddle blades ensure complete circulation of the tank content. A safety switch stops the agitator whenever the tank cover is removed.

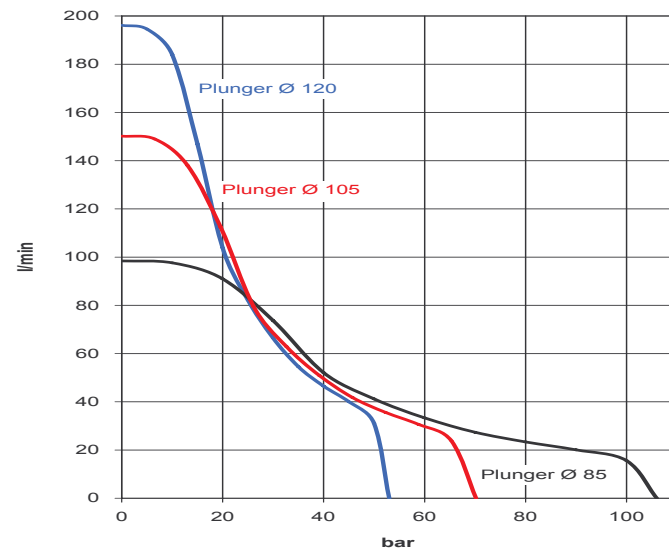
GROUT PUMP ZMP 725V

The ZMP 725V is a vertical double acting plunger pump, consisting of two ZMP 700 pump modules powered by a special hydraulic system. Due to the unique design of this system, the back or suction stroke is always carried out at high speed. The advantage of the fast suction stroke is that the grout passes the suction valve of the pump at relatively high velocity. Thus, heavy particles which tend to settle on the suction valve during the working stroke will be flushed away and the valve is always kept clear. Mixes with low water/cement ratios and sand particles of up to 8 mm in size do not create any problems.

The ZMP 725V is equipped with precise pressure and flow control valves which allow stepless pre-setting of both maximum pressure and flow independently. Whenever the pre-set pressure is reached, the pump automatically stops and maintains that pressure without fluctuations to ensure complete filling of the grout hole. Pressures as low as 1 bar can be pre-set with the low pressure control valve (optional). The automatically controlled variable flow hydraulic pump keeps the power consumption to a minimum, thus preventing the oil from excessive heating. For continuous operation and warm climatic conditions the hydraulic power pack is provided with a water connection for the cooling of the hydraulic oil.

IC 650/725V

INJECTO-COMPACT	IC	650
Grout pump	ZMP	725V
Capacity, max. (W/C = 1)	m ³ /h	5
Pressure, max.	bar	100
Particle size, max.	mm	8
Oil Content	l	140
Power consumption	50 Hz kW 60 Hz kW	15 23
Weight	kg	1465
Water connection		1" BSP
Cooling water connection		½" BSP
Cooling water consumption	l/min	5 - 6
Discharge		2" BSP



DOSINGPUMP

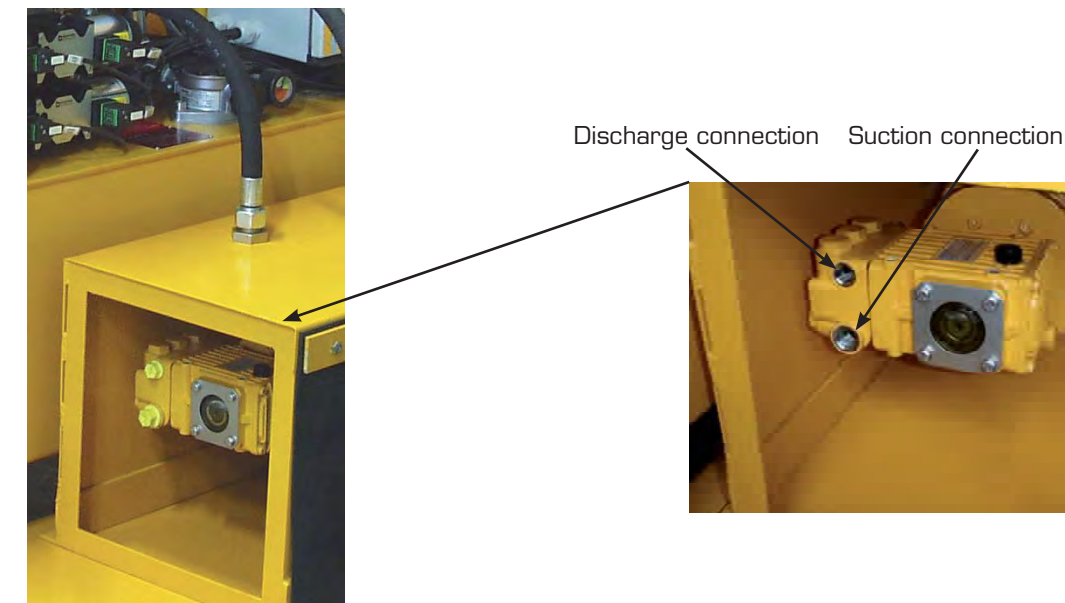
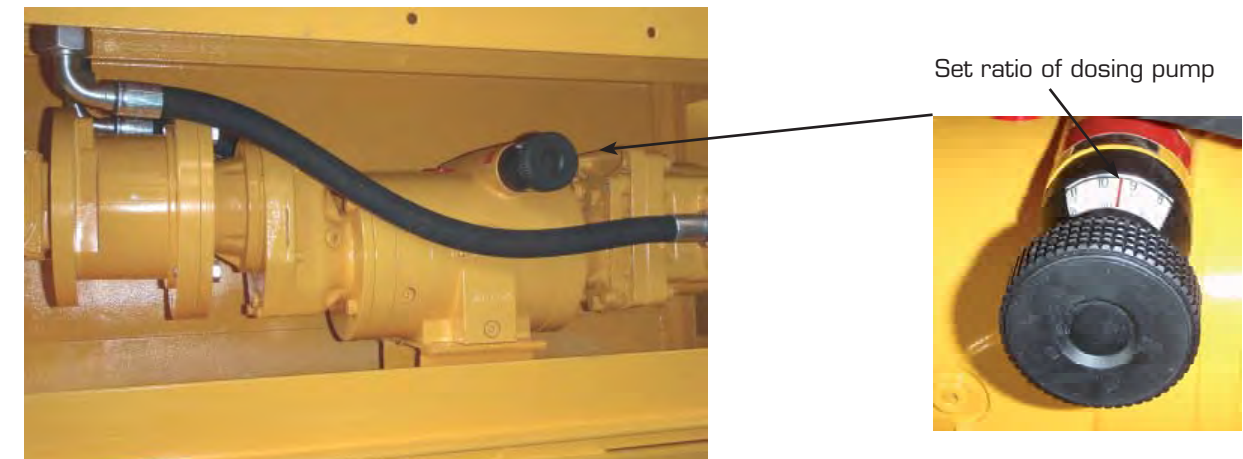
The dosing pump is driven by a hydraulic motor coupled with the hydraulic system of the grout pump in order to always maintain the same ratio between component A (grout) and component B (additive) independent of the output of the grout pump. The exact ratio grout/additive can be adjusted on the variable speed gear box of the dosing pump. The dosing pump can be switched on and off separately. This enables the use of this special grouting unit in conventional mode for cementitious grout without any additive.

The ZMP 725 with a plunger of 85mm can achieve the following dosing rates for a specified water/cement ratio:

Technical Data

Flow rate at 160 rpm	0.38 l/min
Flow rate at 1450 rpm	3.45 l/min
Flow rate at 1800 rpm	4.28 l/min
Maximum pumping pressure	140 bar

Ratio of admixture to cement slurry			
Scale setting	w/c ratio		
	0.8	0.9	1
1	0.7%	0.7%	0.8%
4	2.8%	3.0%	3.1%
8	5.6%	5.9%	6.2%
12	8.4%	8.9%	9.3%



Häny Mixing and Injection Technology

Product Portfolio



Mixing and grouting equipment for ground improvement, anchorages, reinforcing, sealing, pipe jacking, micro-tunneling, and directional drilling.



HÄNY

Mixing and Injection Technology

Product Portfolio

Mixers

Häny high-shear colloidal mixers are recognized worldwide for their excellent mixing performance, efficiency, and wear resistance. The vortex impeller generates high shear forces, separating the particles very efficiently. This ensures that the mix is thoroughly hydrated. Additional mixing units are available for mixing of microfine cements. Optional weight-batching systems enable automated mixing of dry products, chemical additives, and water.



Model HCM		100	300	600	800	2500
Max. mixing capacity ¹	m ³ /h	2.0	5.0	8.0	20.0	40.0
Circulation capacity	l/min	540	1400	1400	2400	4800
Holding capacity	l	100	260	550	800	2500
Max. aggregate size	mm	5	8	8	3	no sand
Nominal power	kW	3.0	9.2	9.2	22.0	45.0

Agitators

Agitators ensure continuous operation by holding and homogenizing the mixed suspension and removing any air bubbles by means of a slowly rotating paddle. Optional level sensors enable fully automatic operation.



Model HRW		150	350	800	1200	2000	3000
Holding capacity	l	150	350	800	1050	2000	3000
Nominal power	kW	0.55	0.55 / 1.10	0.55 / 1.10	1.5	3.0	3.0

Compact grout plants

This solution arranges a mixer, agitator, and grout pump in a functional configuration on a frame, forming a compact grout plant that is suitable for any kind of grouting work. The central lifting point makes transport extremely easy. Various levels of automation are available, from manual to fully automated - resulting in an economical solution that delivers excellent productivity, enables quality control and reduces labor costs.²



Model IC		310	311	325	650			1100				1400			
Configuration	HCM/HRW	100/150	100/150	100/150	300/350			300/800				600/800			
Grout pump	ZMP	610	611	625	710	712	725	710	712	725	726	710	712	725	726
Max. capacity ¹	m ³ /h	1.5	2.0	2.0	5.0	4.9	5.0	5.0	4.9	5.0	5.0	7.5	4.9	8.0	8.0
Max. pressure	bar	100	75	100	100	88	100	100	88	100	100	100	88	100	100
Nominal power	kW	9.1	9.1	9.1	17.5	17.5	19.0	17.5	17.5	19.0	39.8	17.5	17.5	19.0	39.8



Grout pumps

Häny grout pumps set the standard for low-wear, easy-to-maintain plunger-type injection and transfer pumps. With delivery pressure levels from 1 to 100 bars and flow rates up to 1000 l/min, they cover a broad range of applications. The standard gravity ball valves allow aggregates up to 8 mm to pass and are at the same time easy to clean. All models include pressure and flow control valves, which make it possible to limit the maximum pumping pressure and flow in the case of delicate formations.²

SINGLE-ACTING GROUT PUMPS

Model ZMP		610	611	710			712		
Max. capacity ¹	m ³ /h	1.5	2.0	3.9	5.5	7.5	2.4	3.8	4.9
Max. pressure	bar	100	75	100	68	50	88	58	44
Max. aggregate size	mm	5	5	8			8		
Nominal power	kW	5.5	5.5	7.5			7.5		

DOUBLE AND TRIPLE-ACTING GROUT PUMPS

Model ZMP		625		725			726		
Max. capacity ¹	m ³ /h	2.0	5.9	9.0	11.7	6.5	9.9	13.0	
Max. pressure	bar	100	100	68	50	100	68	50	
Max. aggregate size	mm	5	8			8			
Nominal power	kW	5.5	9.2			30.0			

Container grout plants

Mixers, agitators, and grout pumps are installed in a standard sea container, providing a solution that is not only highly portable, but also delivers protection against harsh environments and vandalism. PLC controls featuring a touch-screen panel and data logging ensure a consistently high level of quality at maximum throughput. The components are arranged in an intelligent way, allowing easy access for operation and maintenance. External connections to silos and integration into higher control levels enable complete system supervision and remote control of the plant.²



Model MCM		2000		5500		30000	
Configuration	HCM/HRW	800 / 1200		2500 / 3000		2x 2500 / 25000	
Mixing capacity	m ³ /h	12 - 25		25 - 45		50 - 90	
Circulation capacity	l/min	2400		4800		9600	
Holding capacity HCM	l	800		2500		2x 2500	
Max. aggregate size	mm	3		no sand		no sand	
Nominal power	kW	25.0		50.0		140.0	

1: Water to cement ratio = 1

2: Data recording system available



1



2



3



4



5



6

- 1 **Tunnelling** Equipment for backfilling, contact, and consolidation grouting
- 3 **Anchoring** Mixing and injection equipment for cement suspensions and mortars
- 5 **Diaphragm walls / slurry walls** Fully automated mixing plants for bentonite, cement, and slurry wall suspensions

- 2 **Microtunnelling / pipe jacking / directional drilling** Mixing and injection plants for bentonite and cement suspensions
- 4 **Dam construction** Compact grouting units, fully automated mixing and grouting plants
- 6 **Soil mixing** High-volume mixing and pumping

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