
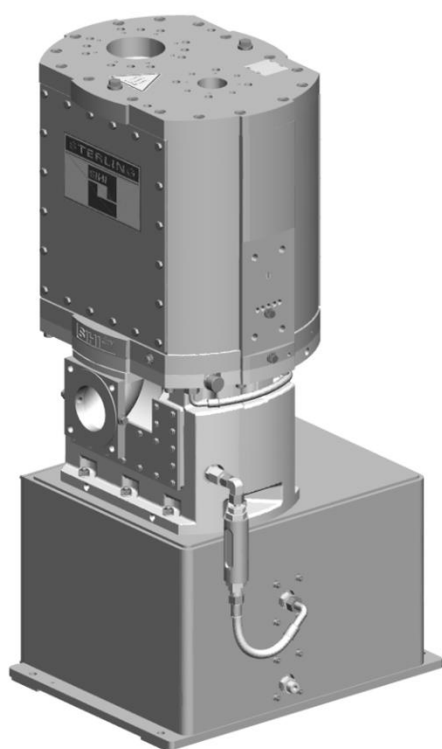




SIHI[®] Dry PD H Sizes H750, H1000

Single Stage Vacuum System P – Design 
Dry Running Screw Vacuum Pump



Pressure range: < 0.001 to 1013 mbar
0.002 to 760 torr

Pumping Speed: 750 to 1000 m³/h
440 to 590 cfm

DESIGN

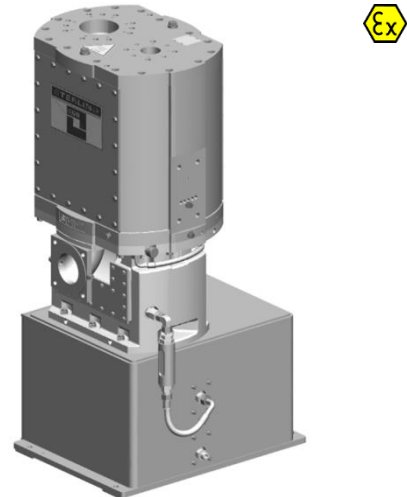
SIHI® Dry vacuum systems in compact design have been especially developed for use in hazardous applications. It is based upon a dry running twin screw principle working as a single stage vacuum pump.

- No wear parts / contact-free shaft sealing
- Low ultimate pressures with only one stage vacuum pump
- Very silent operation
- Lowest vibration level
- Absolutely free of oil / no gear oil
- Plug & Pump for shortest commissioning
- Condition monitoring
- Pre failure detection
- Disassembly and assembly of the pump chamber can be done insitu by own staff members

The **SIHI® Dry H-Version** has been designed to perform maximum pumping speed starting from atmospheric pressure with temperature optimised distribution during compression.

APPLICATION

The **SIHI® Dry** vacuum systems can be used for all chemical applications, where a robust, explosion proof and high reliable dry vacuum pump is required.



The flexibility of the modular system allows to be adapted to any process conditions. Thus the innovative drive concept and its optional additional features, such as the regulation of the speed to meet the requirement of the system, offers the possibility to considerably reduce the power absorption.

NOTE

In contradiction to conventional pumps with mechanical gear box shaft synchronisation, **SIHI® Dry** spindles are electronically synchronized. This well established, innovative concept enables a silent operation of the vacuum system; it also makes all service for maintaining and changing gear oil obsolete.

GENERAL TECHNICAL DATA

SIHI® Dry		H750	H1000
Max. suction capacity	m ³ /h	750	950
Final pressure	mbar g	< 0.1	< 0.05
Prototype test certificate cat 2		Ex 2G IIC T3	
Absorbed power at final pressure	kW	18	
Max. backpressure	mbar g	100	
Gas inlet temperature	°C	0 to + 100	
Gas outlet temperature	°C	≤ 160 (T3)	
Sound pressure level ¹	dB (A)	< 74	
System weight	kg	ca.1000	

¹ DIN ISO 9614 / 21680

ELECTRICAL DATA

SIHI® Dry		H750	H1000
Power connection	-	L1, L2, L3, PE (without N)	
Voltage	V AC	400 to 500 ± 10%	
Frequency	Hz	47 to 63	
Protection	-	IP54	
Max. power consumption	kW	30	
Pre-fuse (3 pole)	A	63	

PURGE GAS

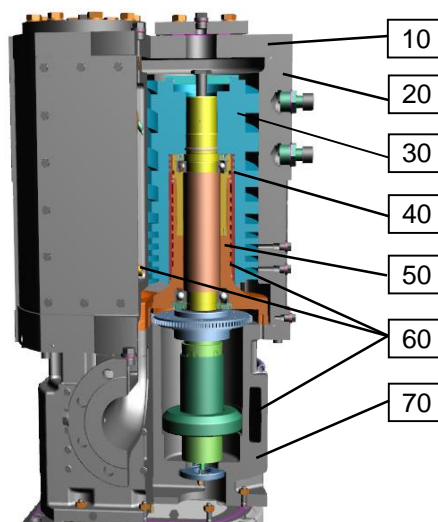
SIHI® Dry		H750	H1000
Medium	-	N ₂	
Gas quality		min class 2.4.1 (according ISO 8573-1:2010)	
Purge gas consumption (In operation)	NI/min	20	
pressure	bar g	3 to 8	

COOLING WATER

SIHI® Dry		H750	H1000
Medium	-	water, conductivity > 50 µS (demineralized water on request)	
Medium temperature	°C	10 - 30	
Max. admissible static medium pressure	bar g	10	
Min. flow rate	l/min	60	

MATERIAL DESIGN

Wetted parts process- and coolant media side



SIHI® Dry		H250	H400	H630
Casing cover	10		1.0553	
Casing	20		EN-GJS-400-18-LT	
Twin screws	30		1.4122	
Labyrinth seal	40		EN-GJL-250	
Bearing cartridge	50		1.4122	
Coolant loop	60		Brass, EPDM / stainless steel, copper / GJS	
Motor casing	70		EN-GJS-400-18-LT	
Inlet strainer (not shown)			Stainless steel / PTFE	

NOT JUST A PUMP! YOUR SOLUTION FOR ...

Engineering / Integration

... LOW EFFORTS IN ENGINEERING & INTEGRATION OF SYSTEM COMPONENTS

Certified explosion protection

- + ATEX certified, even without flame arrester in Category 2 Systems
- + Ex-rated vacuum system control
- + Ex-rated electronic cabinet
- + No source of ignition due to consequential contact free operation

No acoustic cover necessary

- + Contact free principle offers quiet operation and comfortable environmental conditions

Customized vacuum system solutions

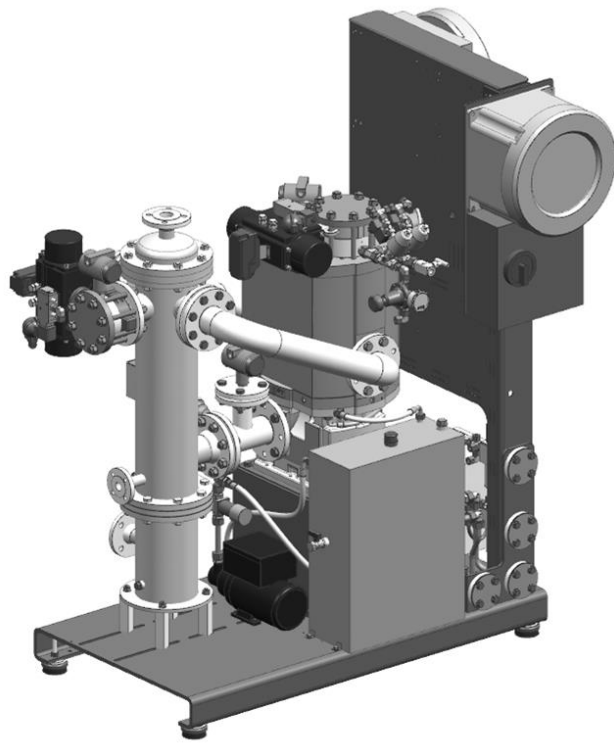
- + Pre-engineered modules matches all individual process needs
- + Small foot print design saves useful space

No PLC control for pump necessary

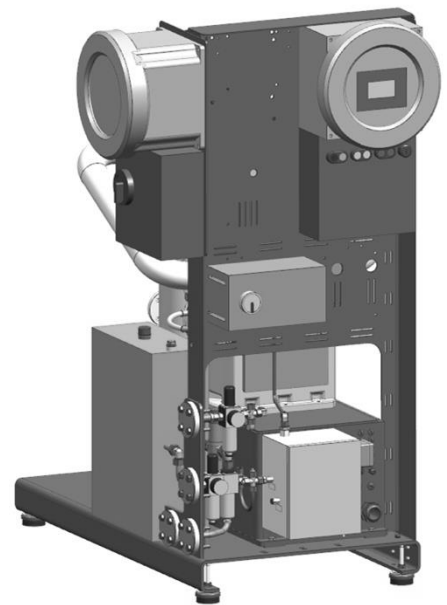
- + Integrated local system control
- + Local control via human machine interface (HMI) panel
- + Data access via Ethernet

Easy communication integration due industrial standards

- + Availability of Bus standards as well as I/O interface



Pump system control with human machine interface (HMI)



Maintenance

... LOWER COST FOR MAINTENANCE & LOWEST DOWN TIME

No oil checks, exchanges and disposals required

- + Free of oil as service liquid
- + No gear oil

No wearing

- + Consequent touch-less principle
- + Long life bearings
- + Contact-free sealings

Continuous condition analysis

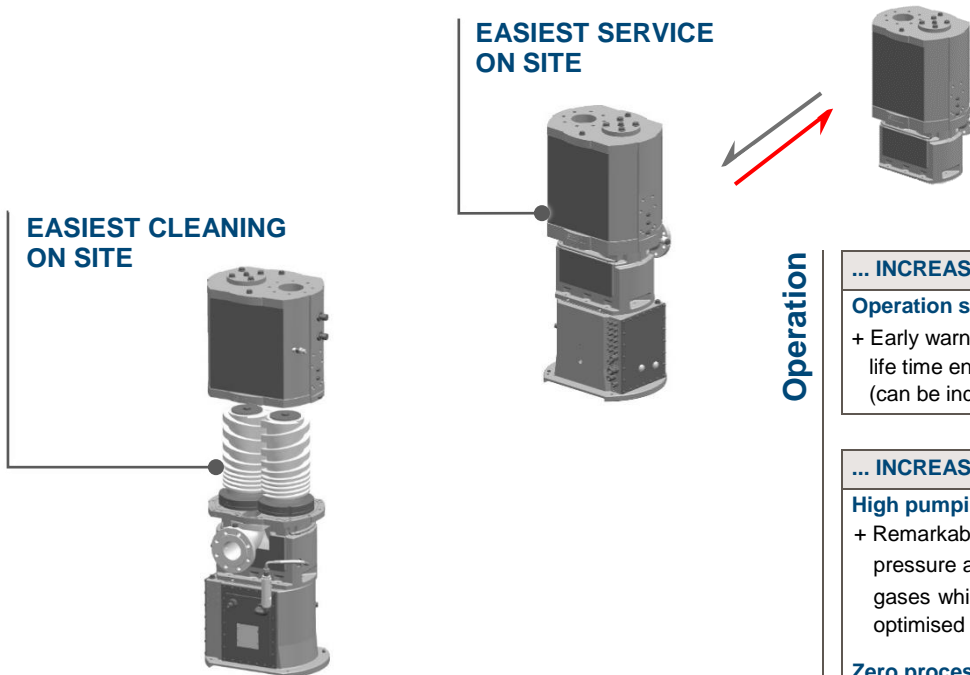
- + Data logging
- + Online monitoring of pump status
- + Simple failure codes

Installation

... FASTEST INSTALLATION & START UP

Self-controlled vacuum system

- + Completely assembled, wired, tested and self-controlled vacuum system allows easiest commissioning



Operation

... INCREASED PRODUCTIVITY
Operation status monitoring
 + Early warning during contamination and bearing life time end due to integrated overload protection (can be individually parameterized)

... INCREASED PRODUCT QUALITY
High pumping performance
 + Remarkably high pump speed at low pressure allows higher flow rate of process gases while at the same time temperature-optimised compression
Zero process contamination
 + Truly dry and touch-less principle with free of any service liquids
 + Absolutely free of gear oil due to electronically synchronised shafts

... LOWER COST FOR OPERATION
Low power consumption
 + High-tech screws design is aimed to run with most energy efficiency
 + Frequency control allows to improve energy efficient operation by operators
Robust & reliable
 + Pump design without any coating on screws

... CAPABILITY FOR USE IN HARSH PROCESSES
Tolerates particle & liquid carry over without any suction side filter
 + Top Down flow avoids particle deposits inside of the pump
 + Carrying particles does not result in wear due to consequential contact free principle
 + Optional integrated liquid cleaning by flushing module
 + Particle carry over & pump drying by optional integrated gas dilution module
Handles condensable & corrosive media
 + Prevention of condensation inside of the pump by optional integrated gas feedback module
 + Optional integrated liquid cleaning by flushing module
 + Reduction of condensation by temperature controlled operation
Trouble free pumping of sensitive media
 + Hermetical tight execution
 + Temperature controlled operation due pump internal secondary cooling loop, decoupled from customer cooling water

Cleaning

... LOWEST DOWN TIME
Only cleaning on demand
 + Condition monitoring by independent data record of both shafts
 + Pre failure detection
 + liquid cleaning by flushing module
Designed for in situ cleaning
 + Easy dismantling without bearing removal
 + No high-tech workshop required
 + Can be done on site by own staff
 + Independency on 3rd party service performance

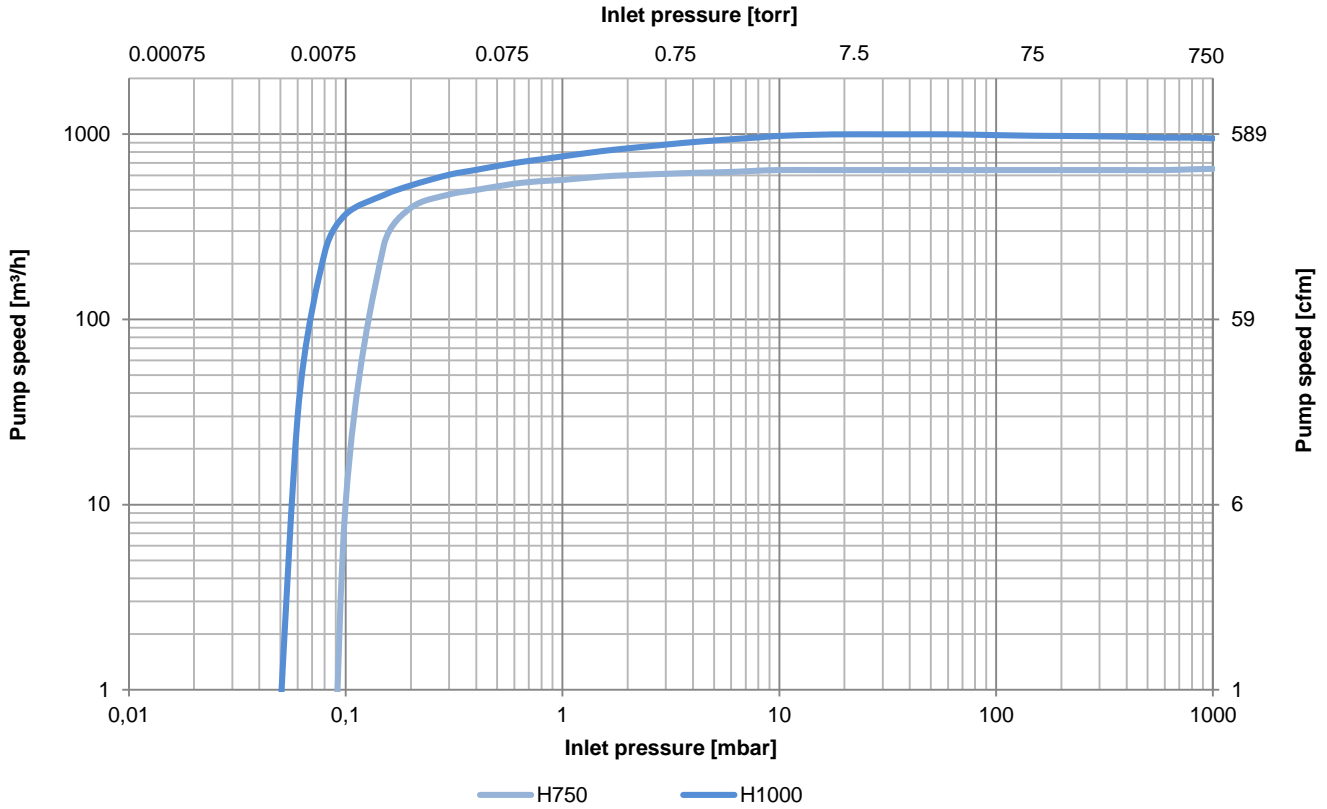
Service

... LOWER COST FOR SERVICE
Avoiding consequential damages
 + Pre failure detection

... LOWEST DOWN TIME
Designed for On-site service
 + Standard spindle exchange modules
 + No high-tech workshop required
 + Can be done on site by own staff
 + Independency on 3rd party service performance
Fastest remote failure analysis
 + Continuous data logging allows comprehensive status of system conditions
 + Prepared for online condition monitoring
 + Simple failure codes

Suction capacity curves – SIHI® Dry H750 – H1000

Operating points below the attached maximum values are achievable by speed variation in dependency of the system execution.





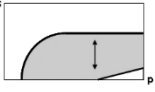
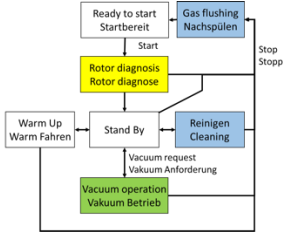

The operating data is valid under following conditions:


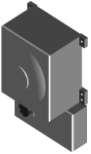
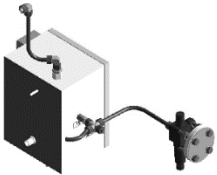
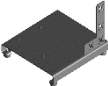
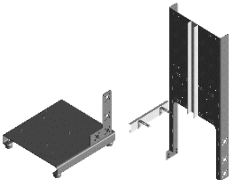
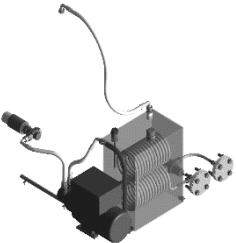

- Process media : dry air 20°C (68°F)
- Cooling media inlet : water 25°C (77°F)
- Discharge pressure : 1013 mbar (760 torr)
- The suction volume is rated to the suction nozzle

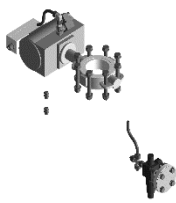
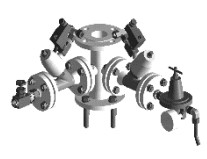



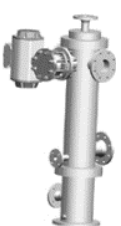
Tolerance on operating data is $\pm 10\%$.

SYSTEM EXECUTION – MODULE KIT

The scope of delivery is compiled according to the application requirements from the following modules.

PRODUCT CODE	MODULE / EXECUTION	FEATURE
Pos. 1 - 8	VACUUM PUMP	
SIHI® Dry 	PDM****S <ul style="list-style-type: none"> - Pump - Suction sieve - Integrated motors - Integrated drive control 	Two screw-shaped displacing bodies counter-rotate without contact.
Pos. 9	CONTROL	
BASIC	B <ul style="list-style-type: none"> - In Pump integrated - Control of internal temperature - Control of torque - Electronically overload protection - On-site operation via Tablet-PC, SIHI® BT-Remote App via Bluetooth® communication 	Operation: Start, Stop Status messages: Failure signal No valve control No sensor evaluation
SIHI CONTROL  Characteristic:  Sequence chart: 	2 <ul style="list-style-type: none"> - Control and supply unit mounted directly on the vacuum system - On site operation via HMI - Variable parameter for process optimising as: Pre Run- Flushing-, Post Run timers - Data logger - Ethernet connection for additional monitoring respectively connection of modem for remote maintenance - Display of operation mode - Input for digital signals - Digital status messages - Control of internal temperature - Control of torque - Electronically overload protection - Integrated pressure control - Programmed valve control (for standard valves) - Input for digital signals - Digital status messages - Cooling pump control (incl. Post Run) - Cooling pump status message via bus available 	Housing : Coated aluminium / polyester resin Protection class : Ex-e Communication : via Profibus DP (IEC 61158) Operation: <ul style="list-style-type: none"> - Start, Stop, Vacuum, Cleaning, post run Speed set value : digital Display of operation mode as: <ul style="list-style-type: none"> - No failure, Operation, Warning, Failure, Failure messages, Valve control: <ul style="list-style-type: none"> - Valve suction side - Valve discharge side - Gas dilution - Cleaning (Liquid flushing) - Gas flushing (N₂-flushing) Sensor evaluation: <ul style="list-style-type: none"> - Limit switch suction side valve - Limit switch discharge side valve - Pressure transmitter - Temperature sensors Digital Inputs: <ul style="list-style-type: none"> - Start, Stop, Vacuum, Cleaning, T_{min} (Warm up), X_{max} (Maximum value evaluation for temperature and pressure) Digital status message: <ul style="list-style-type: none"> - No failure, Operation, Warning, Failure, Failure messages, cleaning
Pos. 10	SUPPLY UNIT / OPERATION	
	A <ul style="list-style-type: none"> - Plug-in solution with integrated transformer for 24 VDC control voltage generation to supply: <ul style="list-style-type: none"> - Display control unit - integrated Ex-p circuit switch for power supply & communication line switch - Cooling pump motor overload switch - Main switch (lockable) - Installation of SIHI® Dry and supply unit in Ex zone 	Housing : Coated aluminium / polyester resin Protection class : Ex-e Electrical connection: Frequency : 50 Hz Voltage : 3 x 400 – 500 VAC, PE

PRODUCT CODE	MODULE / EXECUTION	FEATURE
Pos. 10	SUPPLY UNIT / OPERATION	
	<p>G</p> <ul style="list-style-type: none"> - coolant pump is controlled via control unit (9X) started and stopped - reset-button for motor overload switch. (external accessible) 	<p>Housing : Coated aluminium / polyester resin</p> <p>Protection class : Ex-e</p> <p>Frequency : 50 Hz</p> <p>Voltage : 3 x 400 – 500 VAC, PE</p>
	<p>H</p> <ul style="list-style-type: none"> - Combination of 10 A and 10 G 	
Pos. 14	PURGE GAS	
	<p>E</p> <p>Motor and electronics of SIHI® Dry are held under overpressure with shielding gas. It permits pump installation within a hazardous area. The purge gas system controls the necessary operating conditions.</p>	<p>Housing : stainless steel</p> <p>Connection : DN25/PN40</p>
Pos. 15	BASE FRAME	
	<p>A</p> <p>Pump (and if so the emission condenser or flame arrester) are mounted together on a base frame with four machine feet.</p>	
	<p>C</p> <p>Like A additionally:</p> <p>Frame assembly for supply unit and control unit</p>	
Pos. 16	COOLING	
	<p>D/Q</p> <p>Closed cooling loop for SIHI® Dry</p> <ul style="list-style-type: none"> - the internal secondary cooling loop are decoupled from customer side cooling water - protection against contamination and calcifying - homogeneous tempered SIHI® Dry via temperature controller 	<p>Material execution service side</p> <p>Cooling loop : 1.4571</p> <p>Pipe / fittings : 1.4571</p> <p>Cooling water connections: : 2x DN25 PN40</p> <p>Protection class : Ex-d</p> <p>Electrical connection:</p> <p>Frequency : 50 Hz</p> <p>D: voltage : 3 x 400 V AC, PE</p> <p>Q: voltage : 3 x 500 V AC, PE</p>
	<p>K/R</p> <p>Like D/Q additionally:</p> <p>A temperature controller is installed to adapt the actual demand of customer's coolant.</p>	<p>Like D/Q additionally:</p> <p>Material execution service side thermostatic valve : 1.4581</p> <p>K: voltage : 3 x 400 V AC, PE</p> <p>R: voltage : 3 x 500 V AC, PE</p>

PRODUCT CODE	MODULE / EXECUTION	FEATURE
Pos. 17	CONNECTION SUCTION SIDE	
	<p>A Isolation of the vacuum pump from the reactor:</p> <ul style="list-style-type: none"> - entry of medium into the working chamber after process is prevented - backflow through the pump, ventilation of the reactor, is disabled. 	<p>Scope of supply:</p> <ul style="list-style-type: none"> - valve, PFA/PTFE- conductive lined - drive, designed for control pressure of 3...6 bar g, closed by spring energy - solenoid valve (Ex-e) - limit switch (Ex-d)
Pos. 18	FLUSHING	
	<p>2 The purge gas flushing purging allows drying or the discharge of residual gases from the work chamber. In addition, a liquid flush can remove particles or deposits. The flushing can be activated by a cleaning request, post run or injection flushing</p>	<p>Scope of supply:</p> <ul style="list-style-type: none"> - 2/2-ways-valve, DN25, stainless steel / PTFE with drive, designed for control pressure of 3...6 bar g, closed by spring energy - solenoid valve (Ex-e) - pressure reducer - needle valve
	<p>3 Like 3, but: threaded connections instead of flange connections</p>	<p>Scope of supply:</p> <ul style="list-style-type: none"> - 2/2-ways-valve, DN25, stainless steel / PTFE with drive, designed for control pressure of 3...6 bar g, closed by spring energy - solenoid valve (Ex-e) - pressure reducer - needle valve
Pos. 20	GAS DILUTION	
	<p>H In order to minimize deposits and corrosion, cooled exhaust gas from the emission condenser (see item 21 P / Q) is returned to the SIHI® Dry working chamber</p>	<p>Material execution: Stainless steel 1.4571</p>
Pos. 21	CONNECTION DISCHARGE SIDE	
	<p>P Emission condenser</p> <ul style="list-style-type: none"> - condensation of vapours - In order to minimize deposits and corrosion, cooled exhaust gas from the emission condenser is returned to the SIHI® Dry working chamber 	<p>Type:</p> <ul style="list-style-type: none"> - Tube & shell – Condenser - Exchange area 1,7 m² <p>Material execution (Product-/ Service side):</p> <ul style="list-style-type: none"> - Stainless steel / Stainless steel <p>Connection:</p> <ul style="list-style-type: none"> - Process side : DN50/PN16 - Service side : DN25/PN16 - Gas feedback : DN80/PN16 - Ventilation : G 1/8" - Drain service port : G 1/2" - Measuring port : G 1/2"
	<p>Q Like P additionally: shut of valve</p>	<p>Like P additionally:</p> <p>Scope of supply:</p> <ul style="list-style-type: none"> - valve, PFA/PTFE- conductive lined - drive, designed for control pressure of 3...6 bar g, closed by spring energy - solenoid valve (Ex-e) - limit switch (Ex-d)



Cat SIHI Dry PD H750 H1000 EN 2017 03 133.76145.50.01

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