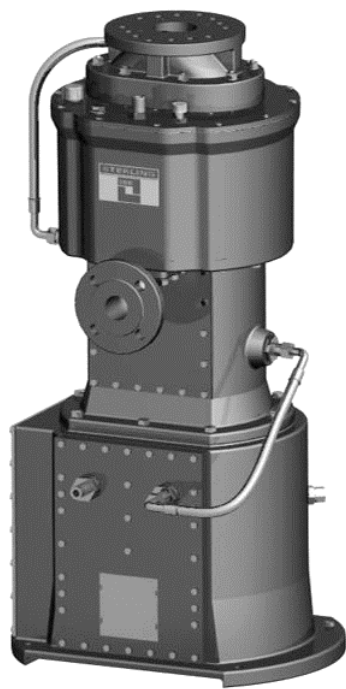




# SIHI<sup>®</sup> Dry PD M

## Sizes M100, M160, M250, M400

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:** 100 to 400 m<sup>3</sup>/h  
59 to 235 cfm

## DESIGN

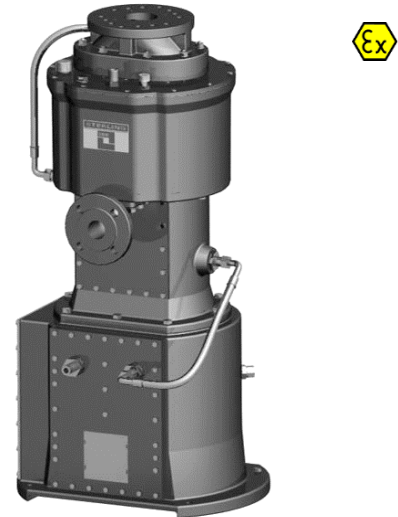
**SIHI® Dry** vacuum systems in compact design have been especially developed for use in hazardous applications. It is based upon a dry running twin screw principle working as a single stage vacuum pump.

- 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 in-situ by own staff members

The **SIHI® Dry M-Version** has been designed to perform maximum pumping speed at low inlet pressure with best efficiency factor.

## 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		M100	M160	M250	M400
Max. suction capacity	m <sup>3</sup> /h	100	160	250	400
Final pressure	mbar a	< 0.7	< 0.5	< 0.01	< 0.001
Prototype test certificate cat 2		2G IIC T3 / T4			
Prototype test certificate cat 1		1G IIC T4 1G IIB3 T4			
Absorbed power at final pressure	kW	2.5	3.5	2	2.5
Max. backpressure	mbar g	100			
Gas inlet temperature	°C	0 to +100			
Gas outlet temperature	°C	≤ 135 (T4)			
Cooling water temperature	°C	+10 to +35			
Sound pressure level <sup>1</sup>	dB (A)	< 54			
Pump weight	kg	260			

<sup>1</sup> DIN ISO 9614 / 21680

## ELECTRICAL DATA

SIHI® Dry		M100	M160	M250	M400
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	7.5		5	
Pre-fuse (3 pole)	A	25			

## PURGE GAS

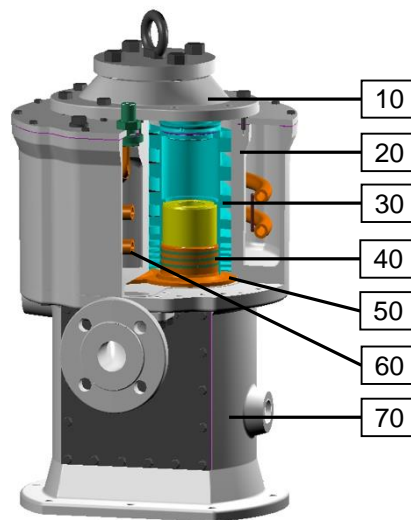
SIHI® Dry		M100	M160	M250	M400
Medium	-	N <sub>2</sub>			
Gas quality		Min. class 2.4.1 (according to ISO 8573-1:2010)			
Purge gas consumption (In operation)	NI/min	20			
pressure	bar g	3 to 8			

## COOLING WATER

SIHI® Dry		M100	M160	M250	M400
Medium	-	water, conductivity > 50 µS (demineralized water on request)			
Medium temperature	°C	10 - 35			
Max. admissible static medium pressure	bar g	6			
Min. flow rate	l/min	3			

## MATERIAL DESIGN

Wetted parts process- and coolant media side



SIHI <sup>dry</sup>		M100	M160	M250	M400
Casing cover	10	EN-GJS-400-18-LT			
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 nickel plated, 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

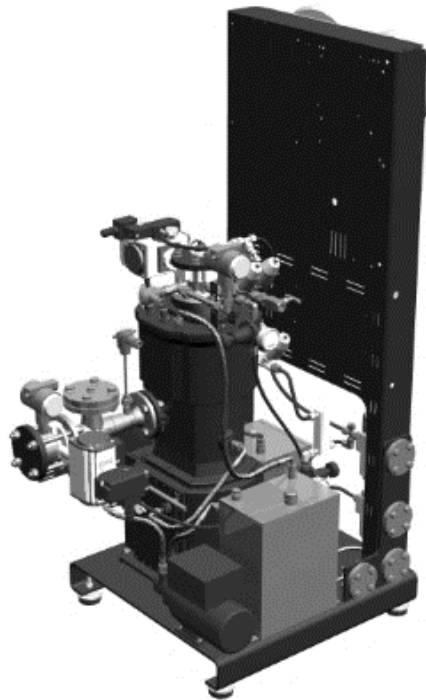
- + Pre-engineered modules matches all individual process needs
- + Small foot print design saves useful space

#### No PLC control for pump necessary

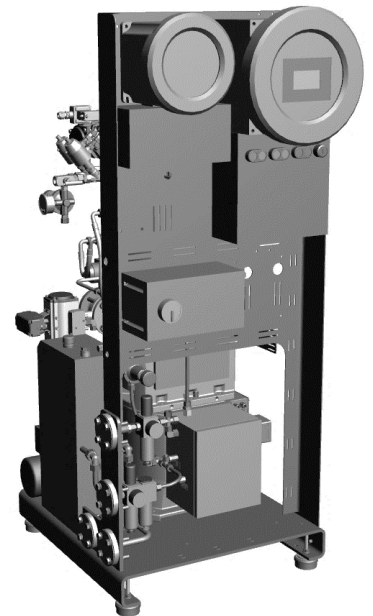
- + Integrated local system control
- + Local control via human machine interface (HMI) panel
- + Data access via Ethernet

#### 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

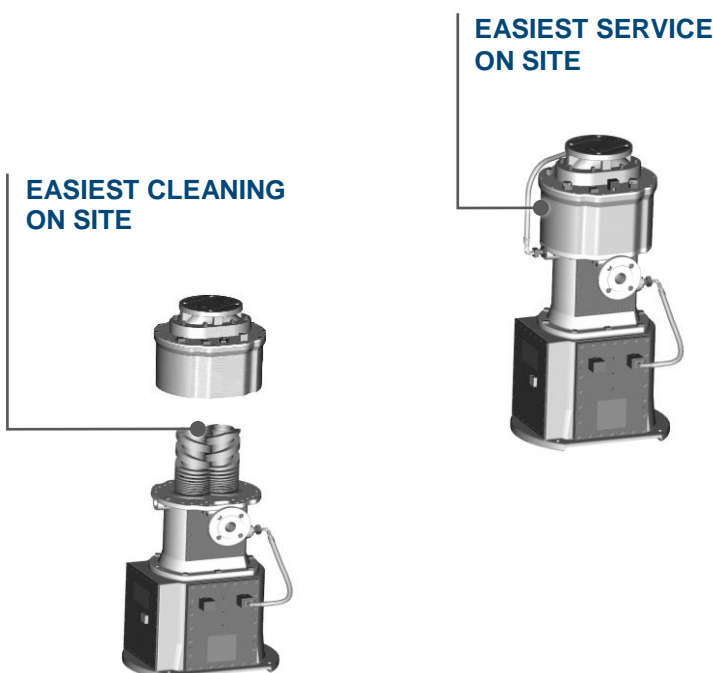
- + Data logging
- + Online monitoring of pump status
- + Simple failure codes

## Installation

### ... FASTEST INSTALLATION & START UP

#### Self-controlled vacuum system

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



Operation



Cleaning

<b>... LOWEST DOWN TIME</b>
<b>Only cleaning on demand</b>
+ Condition monitoring by independent data record of both shafts
+ Pre failure detection
+ liquid cleaning by flushing module
<b>Designed for in situ cleaning</b>
+ 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

<b>... LOWER COST FOR SERVICE</b>
<b>Avoiding consequential damages</b>
+ Pre failure detection

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

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

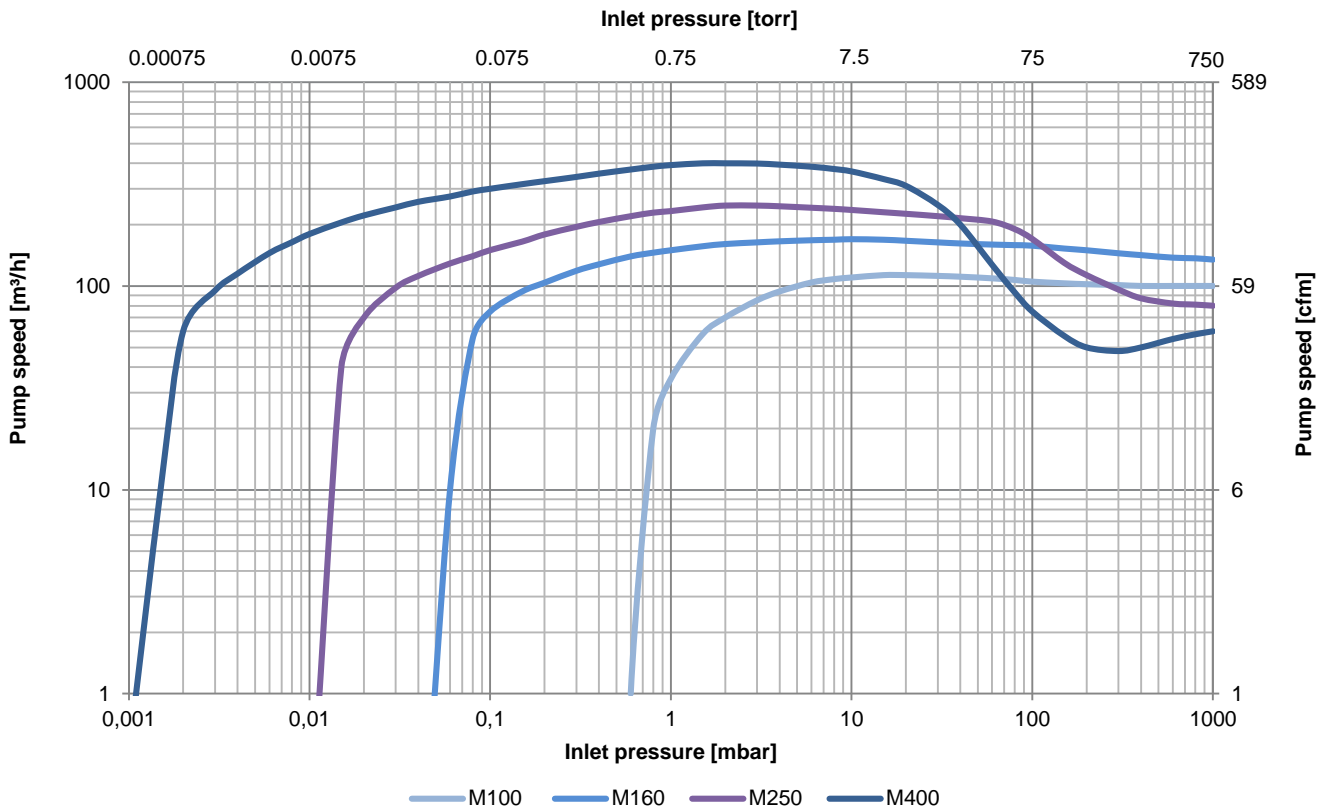
<b>... INCREASED PRODUCT QUALITY</b>
<b>High pumping performance</b>
+ Remarkably high pump speed at low pressure allows higher flow rate of process gases
<b>Zero process contamination</b>
+ Truly dry and touch-less principle with free of any service liquids
+ Absolutely free of gear oil due to electronically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

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

<b>... CAPABILITY FOR USE IN HARSH PROCESSES</b>
<b>Tolerates particle &amp; liquid carry over without any suction side filter</b>
+ 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
<b>Handles condensable &amp; corrosive media</b>
+ Prevention of condensation inside of the pump by optional integrated gas dilution module
+ Optional integrated liquid cleaning by flushing module
+ Reduction of condensation by temperature controlled operation
<b>Trouble free pumping of sensitive media</b>
+ Hermetical tight execution
+ Temperature controlled operation due pump internal secondary cooling loop, decoupled from customer cooling water

## Suction capacity curves – SIHI® Dry M100 to M400

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



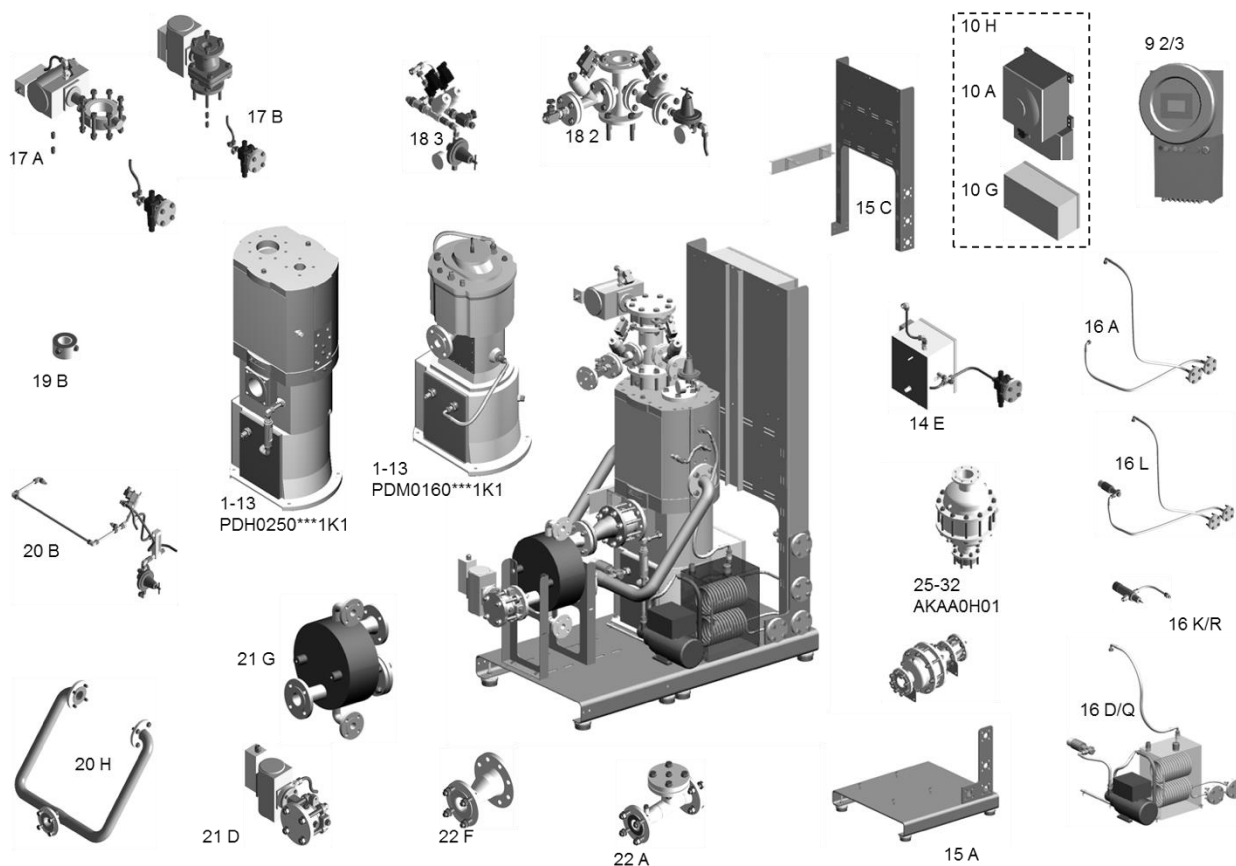
The operating data is valid under following conditions:

- 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


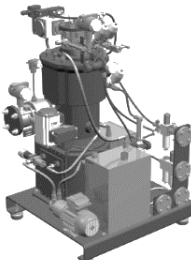
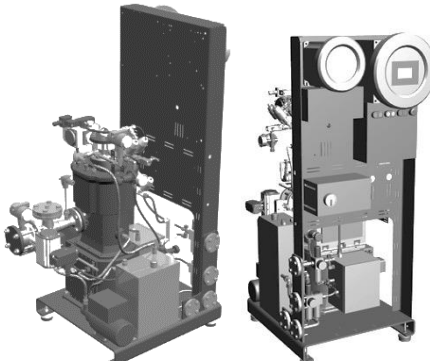
Tolerance on operating data is  $\pm 10\%$ .

## SYSTEM EXECUTIONS

Depending on the process requirements, SIHI® Dry Vacuum Systems can be configured from predefined modules.



In addition, SIHI® Dry is available in the following pre-configured system versions:

STANDARD	CONFIGURED	PREMIUM
<p>Pre-configured vacuum system</p> 	<p>Pre-configured vacuum system with integrated system control</p> 	<p>Pre-configured vacuum system with extended integrated system control, display and supply unit</p> 

## SYSTEM EXECUTION – STANDARD

This system configuration provides basic equipment for the operation of the vacuum pump. The scope of supply includes the following components:

PRODUCT CODE	MODULE	EXECUTION
Pos. 1 – 8 PDMxxxxS	VACUUM PUMP	<ul style="list-style-type: none"> <li>- Pump</li> <li>- Suction sieve</li> <li>- Integrated motors</li> <li>- Integrated drive control</li> </ul>
Pos. 9 7	COTROL UNIT	<ul style="list-style-type: none"> <li>- SIHI Control FX fixed sequence control with sensor evaluation</li> <li>- Integrated communication interface</li> </ul>
Pos. 10 0	SUPPLY UNIT / OPERATION	<ul style="list-style-type: none"> <li>- without supply unit</li> <li>- customer-side circuit switch of the supply voltages (400V / 24V) and communication line</li> <li>- Sensors: wired, mounted and tested</li> </ul>
Pos. 14 E	PURGE GAS	<ul style="list-style-type: none"> <li>- Purge gas control unit Ex-p</li> <li>- Ex-p contact (PS) for customer-side power supply circuit switch</li> </ul>
Pos. 16 T	COOLING	<ul style="list-style-type: none"> <li>- Direct cooling</li> </ul>
Pos. 23 H	SENSORS	<ul style="list-style-type: none"> <li>- Evaluated Pt100 sensor in cooling jacket</li> <li>- Evaluated pressure-side pressure transmitter</li> </ul>



### AVAILABLE COMMUNICATION INTERFACES:

#### I/O Interface

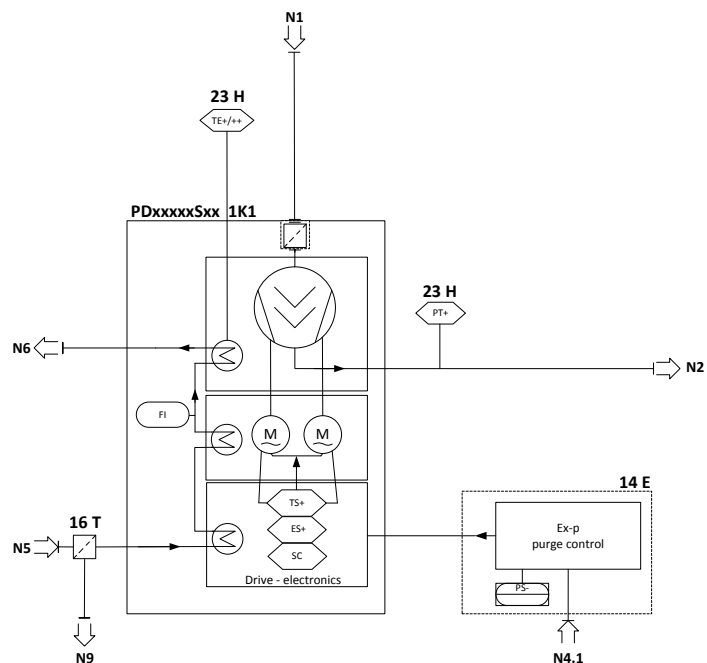
- + Digital I/O
  - Ex – p Release / Start / Stop / Reset / Operation / Failure / Warning
- + Analog I/O
  - Set value speed / Vital status / Actual speed value

#### Bus - Communication

- + CANopen Slave. ISO11898
- + Pump control (see I/O)
- + Display of operation mode

#### Bluetooth® – Communication

- + On-site operation via Tablet-PC, SIHI® BT-Remote App via Bluetooth® communication and Vacuum pump integrated SIHI Control FX sequence control





## SYSTEM EXECUTION – CONFIGURED

This system configuration provides basic equipment for the operation of the vacuum pump. The scope of supply includes the following components:

PRODUCT CODE	MODULE	EXECUTION
Pos. 1 – 8 PDMxxxxS	VACUUM PUMP	- Pump - Suction sieve - Integrated motors - Integrated drive control
Pos. 9 6	CONTROL	- SIHI Control FX fixed sequence control with sensor evaluation and control sequences as Start, Stop, Warm up, Standby, Vacuum, cleaning and Failure - Integrated communication interface
Pos. 10 E	SUPPLY UNIT / OPERATION	- without supply unit - customer-side circuit switch of the supply voltages (400V / 24V) and communication line - Sensors: wired, mounted and tested
Pos. 14 E	PURGE GAS	- Purge gas control unit Ex-p - Ex-p contact (PS) for customer-side power supply circuit switch
Pos. 15 A	BASE FRAME	- Base frame with machine feet
Pos. 16 D	COOLING	- Secondary cooling circuit with cooling pump
Pos. 17 A 21 D	CONNECTION	- Controlled, suction and discharge shut-off valve
Pos. 18 3	FLUSHING	- Controlled N2 flush and cleaning valve
Pos. 20 B	GAS DILUTION	- Controlled gas dilution module
Pos. 23 V	SENSORS	- Evaluated Pt100 sensor in cooling jacket - Evaluated Pt100 sensor in discharge side - Evaluated pressure-side pressure transmitter - Suction-side pressure transmitter



### AVAILABLE COMMUNICATION INTERFACES:

#### I/O Interface

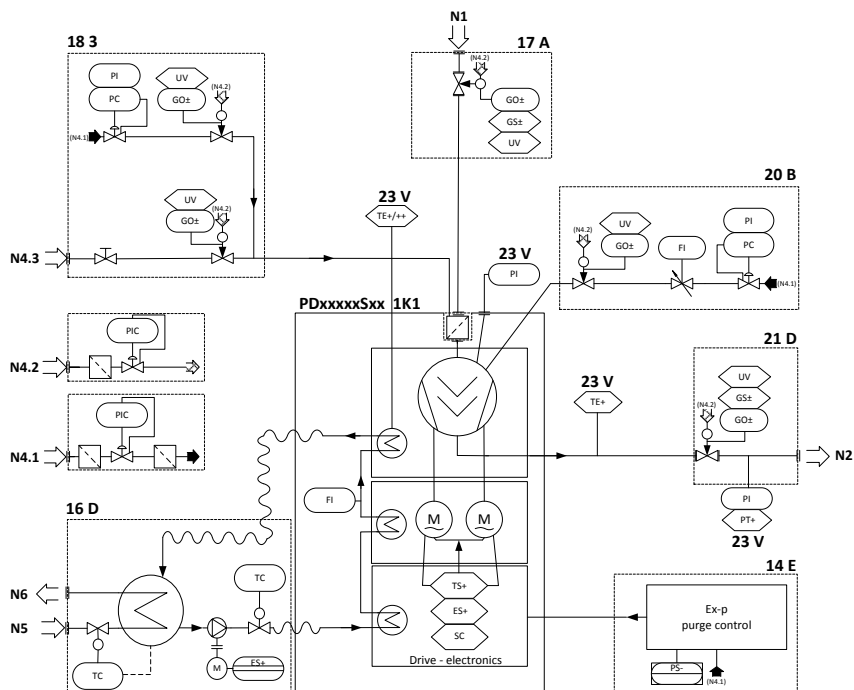
- + Digital I/O
  - Ex – p Release / Start / Stop / Reset / Operation / Failure / Warning
- + Analog I/O
  - Set value speed / Vital status / Actual speed value

#### Bus - Communication

- + CANopen Slave. ISO11898
- + Pump control (see I/O)
- + Display of operation mode

#### Bluetooth® – Communication

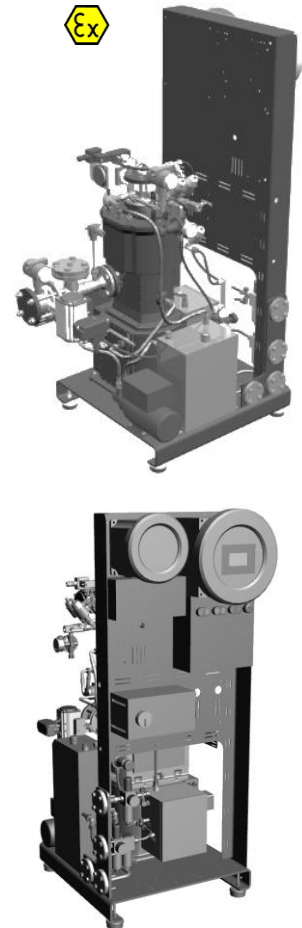
- + On-site operation via Tablet-PC, SIHI® BT-Remote App via Bluetooth® communication and Vacuum pump integrated SIHI Control FX sequence control



## SYSTEM EXECUTION – PREMIUM

In addition to the extended basic equipment, this system configuration includes a supply- and control- unit with HMI display. This allows convenient on-site operation and visualization of the vacuum pump status. The scope of supply includes the following components

PRODUCT CODE	MODULE	EXECUTION
Pos. 1 – 8 PDMxxxxS	VACUUM PUMP	<ul style="list-style-type: none"> <li>- Pump</li> <li>- Suction sieve</li> <li>- Integrated motors</li> <li>- Integrated drive control</li> </ul>
Pos. 9 2	CONTROL	<ul style="list-style-type: none"> <li>- Standard control (sequence control, sensor evaluation) with control sequences as Start, Stop, Warm up, Standby, Vacuum, Injection Cleaning, Post Run and Failure</li> <li>- Variable control parameter as: Warm Up Temperature / Flush- Drying Time / Standby Speed</li> <li>- Integrated communication interface</li> </ul>
Pos. 10 H	SUPPLY UNIT / OPERATION	<ul style="list-style-type: none"> <li>- Plug-in solution with integrated transformer for 24 VDC control voltage generation to supply:               <ul style="list-style-type: none"> <li>+ Display control unit</li> <li>+ integrated Ex-p circuit switch for power supply &amp; communication line switch</li> <li>+ Cooling pump motor overload switch</li> </ul> </li> </ul>
Pos. 14 E	PURGE GAS	<ul style="list-style-type: none"> <li>- Purge gas control unit Ex-p</li> <li>- Ex-p contact (PS) for internal power supply circuit switch</li> </ul>
Pos. 15 C	BASE FRAME	<ul style="list-style-type: none"> <li>- Frame for supply unit and control unit</li> <li>- Base frame with machine feet</li> </ul>
Pos. 16 D	COOLING	<ul style="list-style-type: none"> <li>- Secondary cooling circuit with cooling pump</li> </ul>
Pos. 17 A 21 D	CONNECTION	<ul style="list-style-type: none"> <li>- Controlled, suction and discharge shut-off valve</li> </ul>
Pos. 18 3	FLUSHING	<ul style="list-style-type: none"> <li>- Controlled N2 flush and cleaning valve</li> </ul>
Pos. 20 B	GAS DILUTION	<ul style="list-style-type: none"> <li>- Controlled gas dilution module</li> </ul>
Pos. 23 S	SENSORS	<ul style="list-style-type: none"> <li>- Evaluated Pt100 sensor in cooling jacket, suction and discharge side</li> <li>- Evaluated pressure-side pressure transmitter</li> <li>- Evaluated suction-side pressure transmitter</li> </ul>



### PUMP – SYSTEM CONTROL WITH HMI DISPLAY (CONTROL UNIT) & SEQUENCE CONTROL

- Programmed standard control with control sequences as Start, Stop, Warm up, Standby, Vacuum, Injection Cleaning, Post Run and Failure
- Dirt detection
- Identification bearing life time end
- Detailed display of operation mode
- Programmable performance field

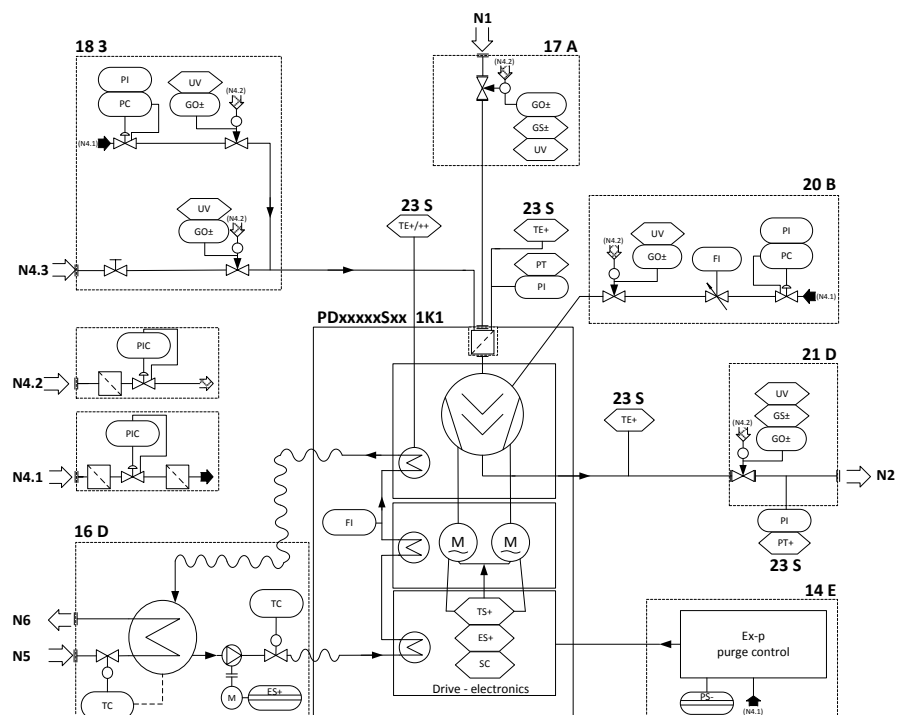
### COMMUNICATION INTERFACES

#### Bus - Communication

- + Profibus DP (IEC 61158)
- + Pump control (see control)
- + Display of operation mode

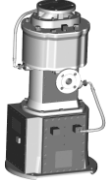
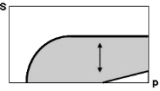
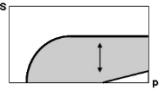
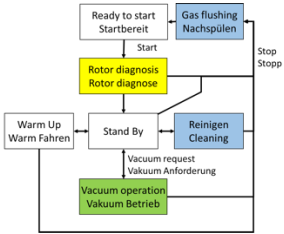
#### On-site Display


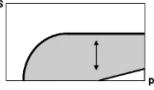
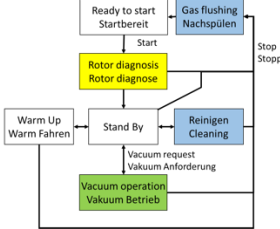




- + Visualisation
- + On-site operation
- + Data logger

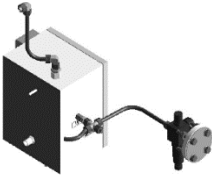
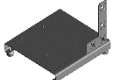
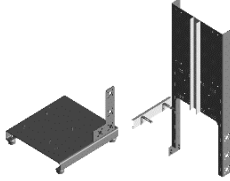


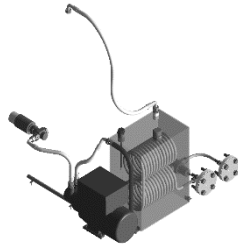



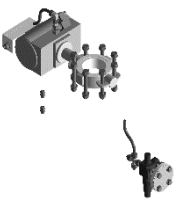
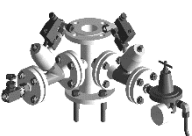



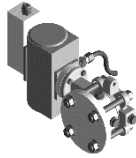
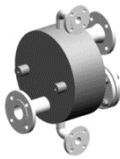
## SYSTEM EXECUTION – MODULE KIT





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

PRODUCT CODE	MODULE / EXECUTION	FEATURE
<b>Pos. 1 - 8</b>	<b>VACUUM PUMP</b>	
<b>SIHI® Dry</b> 	<b>PDM****S</b> <ul style="list-style-type: none"> <li>- Pump</li> <li>- Suction sieve</li> <li>- Integrated motors</li> <li>- Integrated drive control</li> </ul>	Two screw-shaped displacing bodies counter-rotate without contact.
<b>Pos. 9</b>	<b>CONTROL</b>	
<b>BASIC</b>	<b>B</b> <ul style="list-style-type: none"> <li>- In Pump integrated</li> <li>- Control of internal temperature</li> <li>- Control of torque</li> <li>- Electronically overload protection</li> <li>- On-site operation via Tablet-PC, SIHI® BT-Remote App via Bluetooth® communication</li> </ul>	<b>Operation:</b> Start, Stop <b>Status messages:</b> Failure signal <b>No valve control</b> <b>No sensor evaluation</b>
<b>DYNAMIC</b> <b>Characteristic:</b> 	<b>D</b> Like control variant <b>BASIC</b> , additionally: <ul style="list-style-type: none"> <li>- variable speed via integrated frequency converter</li> </ul>	<b>Operation:</b> Start, Stop, Variable Speed <b>Status messages:</b> Failure signal <b>No valve control</b> <b>No sensor evaluation</b>
<b>SIHI CONTROL FX</b> <b>Characteristic:</b>  <b>Sequence chart</b> 	<b>C</b> Like control variant <b>DYNAMIC</b> , additionally: <ul style="list-style-type: none"> <li>- On-site operation via Tablet-PC, SIHI® BT-Remote App via Bluetooth® communication and Vacuum pump integrated SIHI Control FX sequence control</li> <li>- Fixed parameter</li> <li>- Data logger</li> <li>- Display of operation mode</li> <li>- Integrated pressure control</li> <li>- Programmed valve control (for all standard valves)</li> <li>- Input for digital signals</li> <li>- Digital status messages</li> </ul>	<b>Communication</b> : via CAN Bus <b>Operation:</b> <ul style="list-style-type: none"> <li>- Start, Stop, Vacuum, Cleaning, post run</li> </ul> <b>Speed set value</b> : digital <b>Display of operation mode as:</b> <ul style="list-style-type: none"> <li>No failure, Operation, Warning, Failure, Failure messages, ....</li> </ul> <b>Valve control:</b> <ul style="list-style-type: none"> <li>- Valve suction side</li> <li>- Valve discharge side</li> <li>- Gas dilution</li> <li>- Cleaning (Liquid flushing)</li> <li>- Gas flushing (N2-flushing)</li> </ul> <b>Sensor evaluation:</b> <ul style="list-style-type: none"> <li>- Limit switch suction side valve</li> <li>- Limit switch discharge side valve</li> <li>- Pressure transmitter</li> <li>- Temperature sensors</li> </ul> <b>Digital Inputs:</b> <ul style="list-style-type: none"> <li>- Start, Stop, Vacuum, Cleaning, <math>T_{min}</math> (Warm up), <math>X_{max}</math> (Maximum value evaluation for temperature and pressure)</li> </ul> <b>Digital status message:</b> <ul style="list-style-type: none"> <li>- No failure, Operation, Warning, Failure, Failure messages, cleaning</li> </ul>

PRODUCT CODE	MODULE / EXECUTION	FEATURE
<p><b>Pos. 9</b></p> <p><b>SIHI CONTROL</b></p>  <p><b>Characteristic:</b></p>  <p><b>Sequence chart:</b></p> 	<p><b>CONTROL</b></p> <p><b>2</b></p> <ul style="list-style-type: none"> <li>- Control and supply unit mounted directly on the vacuum system</li> <li>- On site operation via HMI</li> <li>- Variable parameter for process optimising as: Pre Run- Flushing-, Post Run timers</li> <li>- Data logger</li> <li>- Ethernet connection for additional monitoring respectively connection of modem for remote maintenance</li> <li>- Display of operation mode</li> <li>- Input for digital signals</li> <li>- Digital status messages</li> <li>- Control of internal temperature</li> <li>- Control of torque</li> <li>- Electronically overload protection</li> <li>- Integrated pressure control</li> <li>- Programmed valve control (for standard valves)</li> <li>- Input for digital signals</li> <li>- Digital status messages</li> <li>- Cooling pump control (incl. Post Run)</li> <li>- Cooling pump status message via bus available</li> </ul>	<p><b>Housing</b> : Coated aluminium / polyester resin</p> <p><b>Protection class</b> : Ex-e</p> <p><b>Communication</b> : via Profibus DP (IEC 61158)</p> <p><b>Operation:</b></p> <ul style="list-style-type: none"> <li>- Start, Stop, Vacuum, Cleaning, post run</li> </ul> <p><b>Speed set value</b> : digital</p> <p><b>Display of operation mode as:</b></p> <ul style="list-style-type: none"> <li>- No failure, Operation, Warning, Failure, Failure messages, ....</li> </ul> <p><b>Valve control:</b></p> <ul style="list-style-type: none"> <li>- Valve suction side</li> <li>- Valve discharge side</li> <li>- Gas dilution</li> <li>- Cleaning (Liquid flushing)</li> <li>- Gas flushing (N2-flushing)</li> </ul> <p><b>Sensor evaluation:</b></p> <ul style="list-style-type: none"> <li>- Limit switch suction side valve</li> <li>- Limit switch discharge side valve</li> <li>- Pressure transmitter</li> <li>- Temperature sensors</li> </ul> <p><b>Digital Inputs:</b></p> <ul style="list-style-type: none"> <li>- Start, Stop, Vacuum, Cleaning, T<sub>min</sub> (Warm up), X<sub>max</sub> (Maximum value evaluation for temperature and pressure)</li> </ul> <p><b>Digital status message:</b></p> <ul style="list-style-type: none"> <li>- No failure, Operation, Warning, Failure, Failure messages, cleaning</li> </ul>
<p><b>Pos. 10</b></p> 	<p><b>SUPPLY UNIT / OPERATION</b></p> <p><b>A</b></p> <p>Plug-in solution with integrated transformer for 24 VDC control voltage generation to supply:</p> <ul style="list-style-type: none"> <li>- Display control unit</li> <li>- integrated Ex-p circuit switch for power supply &amp; communication line switch</li> <li>- Cooling pump motor overload switch</li> <li>- Main switch (lockable)</li> <li>- Installation of SIHI® Dry and supply unit in Ex-zone 1</li> </ul>	<p><b>Housing</b> : Coated aluminium / polyester resin</p> <p><b>Protection class</b> : Ex-e</p> <p><b>Electrical connection:</b></p> <p><b>Frequency</b> : 50 Hz</p> <p><b>Voltage</b> : 3 x 400 – 500 VAC, PE</p>
	<p><b>G</b></p> <ul style="list-style-type: none"> <li>- coolant pump is controlled via control unit (9X) started and stopped</li> <li>- reset-button for motor overload switch. (external accessible)</li> </ul>	<p><b>Housing</b> : Coated aluminium / polyester resin</p> <p><b>Protection class</b> : Ex-e</p> <p><b>Frequency</b> : 50 Hz</p> <p><b>Voltage</b> : 3 x 400 – 500 VAC, PE</p>
 	<p><b>H</b></p> <ul style="list-style-type: none"> <li>- Combination of 10 A and 10 G</li> </ul>	

PRODUCT CODE	MODULE / EXECUTION	FEATURE
<b>Pos. 14</b>	<b>PURGE GAS</b>	
	<b>E</b> 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.	<b>Housing</b> : stainless steel <b>Connection</b> : DN25/PN40
<b>Pos. 15</b>	<b>BASE FRAME</b>	
	<b>A</b> Pump (and if so the emission condenser or flame arrester) are mounted together on a base frame with four machine feet.	
	<b>C</b> Like A additionally: Frame assembly for supply unit and control unit	
<b>Pos. 16</b>	<b>COOLING</b>	
	<b>A</b> The connection to customer's coolant system is done via flanges	<b>Material execution</b> service side pipe / fittings : 1.4571/NBR <b>Cooling water connections:</b> : 2 x DN25 PN40
	<b>L</b> Like A additionally: A temperature controller is installed to adapt the actual demand of customer's coolant. Minimum flow is ensured	Like A additionally : <b>Material execution</b> service side thermostatic valve : brass
	<b>D/Q</b> Closed cooling loop for SIHI® Dry <ul style="list-style-type: none"><li>- the internal secondary cooling loop are decoupled from customer side cooling water</li><li>- protection against contamination and calcifying</li><li>- homogeneous tempered SIHI® Dry via temperature controller</li></ul>	<b>Material execution</b> service side Cooling loop : 1.4571 Pipe / fittings : 1.4571 <b>Cooling water connections:</b> : 2x DN25 PN40 <b>Protection class</b> : Ex-d <b>Electrical connection:</b> Frequency : 50 Hz D: voltage : 3 x 400 V AC, PE Q: voltage : 3 x 500 V AC, PE
	<b>K/R</b> Like D/Q additionally: A temperature controller is installed to adapt the actual demand of customer's coolant.	Like D/Q additionally: <b>Material execution</b> service side thermostatic valve : 1.4581 K: voltage : 3 x 400 V AC, PE R: voltage : 3 x 500 V AC, PE

PRODUCT CODE	MODULE / EXECUTION	FEATURE
<b>Pos. 17</b>	<b>CONNECTION SUCTION SIDE</b>	
	<p><b>A</b> Isolation of the vacuum pump from the reactor:</p> <ul style="list-style-type: none"> <li>- entry of medium into the working chamber after process is prevented</li> <li>- backflow through the pump, ventilation of the reactor, is disabled.</li> </ul>	<p><b>Scope of supply:</b></p> <ul style="list-style-type: none"> <li>- valve, PFA/PTFE- conductive lined</li> <li>- drive, designed for control pressure of 3...6 bar g, closed by spring energy</li> <li>- solenoid valve (Ex-e)</li> <li>- limit switch (Ex-d)</li> </ul>
<b>Pos. 18</b>	<b>FLUSHING</b>	
	<p><b>2</b> 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><b>Scope of supply:</b></p> <ul style="list-style-type: none"> <li>- 2/2-ways-valve, DN25, stainless steel / PTFE with drive, designed for control pressure of 3...6 bar g, closed by spring energy</li> <li>- solenoid valve (Ex-e)</li> <li>- pressure reducer</li> <li>- needle valve</li> </ul>
	<p><b>3</b> Like 3, but:  threaded connections instead of flange connections</p>	<p><b>Scope of supply:</b></p> <ul style="list-style-type: none"> <li>- 2/2-ways-valve, DN25, stainless steel / PTFE with drive, designed for control pressure of 3...6 bar g, closed by spring energy</li> <li>- solenoid valve (Ex-e)</li> <li>- pressure reducer</li> <li>- needle valve</li> </ul>
<b>Pos. 19</b>	<b>CONNECTION</b>	
	<p><b>B</b> Adapter for installation of sensors and/or flushing valves on suction side on systems with flame arresters.</p>	<p><b>Material execution:</b> Stainless steel 1.4571</p>
<b>Pos. 20</b>	<b>GAS DILUTION</b>	
	<p><b>B</b> To minimize deposits and corrosion, dry inert gas (e.g., nitrogen) is fed into the working space of the SIHI® Dry</p>	<p><b>Scope of supply:</b></p> <ul style="list-style-type: none"> <li>- 2/2-ways-valve, DN25, stainless steel / PTFE with drive, designed for control pressure of 3...6 bar g, closed by spring energy</li> <li>- solenoid valve (Ex-e)</li> <li>- Flow indicator (430 – 4300 NI/h) with needle valve and pressure reducer</li> </ul>
<b>Pos. 21</b>	<b>CONNECTION DISCHARGE SIDE</b>	
	<p><b>D</b> Isolation of the vacuum pump from the exhaust line.  The pump will be decoupled from the vent system and is protected from condensable media during stand still.</p>	<p><b>Scope of supply:</b></p> <ul style="list-style-type: none"> <li>- valve, PFA/PTFE- conductive lined</li> <li>- drive, designed for control pressure of 3...6 bar g, closed by spring energy</li> <li>- solenoid valve (Ex-e)</li> <li>- limit switch (Ex-d)</li> </ul>
	<p><b>G/M</b></p> <ul style="list-style-type: none"> <li>- condensation of vapours</li> <li>- cooling/drying for gas dilution (for Pos. 20 H/D)</li> </ul>	<p><b>Type:</b></p> <ul style="list-style-type: none"> <li>- Plate &amp; Shell – Condenser</li> <li>- Exchange area 1,7 m<sup>2</sup></li> </ul> <p><b>Material execution (Product-/ Service side):</b></p> <ul style="list-style-type: none"> <li>- Stainless steel / Stainless steel : [G]</li> <li>- Stainless steel / steel : [M]</li> </ul> <p><b>Connection:</b></p> <ul style="list-style-type: none"> <li>- Process side : DN50/PN16</li> <li>- Service side : DN25/PN16</li> </ul>
	<p><b>H</b> Combination of 21D and 21G</p>	
	<p><b>N</b> Combination of 21D und 21M</p>	

PRODUCT CODE	MODULE / EXECUTION	FEATURE
<b>Pos. 22</b>	<b>CONNECTION DISCHARGE SIDE</b>	
	<b>A</b> Transition pipe	<b>Material execution</b> : stainless steel  <b>Connections:</b> Inlet : DN40/PN16 Outlet : DN50/PN16
<b>Pos. 23</b>	<b>SENSORS</b>	
<b>Product code is built by combination of sensors</b>		
	Resistance thermometer (Pt100) for measuring of temperature on suction side <b>and/or</b>  Resistance thermometer (Pt100) for measuring of coolant temperature <b>and/or</b>  Resistance thermometer (Pt100) for measuring of temperature on discharge side	<b>Protection class</b> : Ex-i
	Pressure transmitter for measuring of suction pressure <b>and/or</b>  Pressure transmitter for measuring of stagnation pressure or exhaust pressure	<b>Protection class</b> : Ex-d
<b>Pos. 25 - 32</b>	<b>PROTECTION SYSTEMS</b>	
	<b>***A0A0*</b> Besides the necessary measurement devices, flame arresters (IIB3 or IIC) are equipped to fulfil the requirements of a cat. 1 system.	<b>Material execution</b>  Flame arrester IIB3 : stainless steel  Flame arrester IIC : stainless steel



**Cat SIHI Dry PD M100 – M400 EN 04/2019 133.76130.51.01**

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