



VACUUMIZER®

MODEL VM-H

HIGH-PRECISION LOW-TEMPERATURE VACUUM STEAM HEATING SYSTEM

Features

Provides rapid start-up, uniform heating and accurate control of jacketed vessels, conical or cylinder dryers, and other process equipment.

1. Steam temperature control of ± 1 °C ensures consistent production quality.
2. Delivers heating temperature below 100 °C to improve manufactured quality of temperature sensitive products.
3. Compared to hot water heating, temperature settings can be changed significantly faster.
4. Packaged models facilitate piping installation.
5. Condition monitoring of operating status to provide advanced warning of anomalies and prevent potential problems. (VM3HPN only)



Product Series

	Type (Model)	Usage	Features
Package Type	VM2HU 	Single equipment production processes and pilot plants • Applications: • Jacketed reaction tanks (Capacity: up to 400 ℓ) • Heating kettles, concentration kettles, cultivation kettles, dryers, kneading kettles, emulsification kettles, etc.	• Package includes all necessary equipment including a control panel • Easy-to-use touch panel • Step heating control function enables shorter heating time • Rapid vacuum generation function to enable shorter start-up times • Built-in data logger
	VM3HPN 	Single equipment production processes and pilot plants • Applications: • Jacketed reaction tanks (Capacity: up to 10 m³) • Shell and tube type heat exchangers, hot air dryers, roll heaters, etc.	• Packaged solution greatly simplifies piping and electrical installation • Easy-to-use touch panel • Step heating control function enables shorter heating time • Recipe-based temperature control for programming frequently used settings • Rapid vacuum generation function to enable shorter start-up times • Built-in data logger
	VM4HPN* 	Multi-equipment product processes and pilot plants • Applications: • Jacketed reaction tanks (Capacity per one unit: up to 7 m³) • Shell and tube type heat exchangers, hot air dryers, roll heaters, etc.	• Packaged solution greatly simplifies piping and electrical installation • Configurable for up to 3 vacuum steam lines for simultaneous supply to 3 users at different temperatures
Engineering Type		Production processes • Applications: • Jacketed reaction tanks, shell and tube type heat exchangers • Roll heaters, etc.	• System can be designed flexibly according to required specifications

* VM4HPN control panel is optional.

Package Types

• Specifications

Model			VM2HU		VM3HPN			VM4HPN		
			25	40	25	40	50	25	40	50
Vacuum Steam Temperature Range (°C)			40 ¹⁾ to 110		30 ¹⁾ to 150			30 ¹⁾ to 150		
Vacuum Steam Temperature Accuracy			Set Temperature ±1 °C							
Number of Steam Supply Lines			1				2 to 3			
Max. Vacuum Steam Capacity (kg/h)			150	390	150	390	600	150 ²⁾	390 ²⁾	600 ²⁾
Max. Heating Energy (kW) [Mcal/h]			85 [73]	225 [190]	85 [73]	225 [190]	345 [300]	85 [73] ²⁾	225 [190] ²⁾	345 [300] ²⁾
Supply Steam Inlet Pressure (MPaG)			0.1 to 0.2		0.1 to 0.37					
Vacuum Generation Unit	Condensate Load (kg/h)		390		600			1500		
	Exhaust Speed (ℓ/s)		1.0		3.0			6.0		
	Motor Power (kW)		0.4		1.5			2.2		
Power Supply ³⁾			200 V AC (50/60 Hz) three-phase		200 V AC (50/60 Hz) three-phase					
Safety Specifications (Motor, Control Valve, Sensor)			Non-explosion-proof		Non-explosion-proof / Flameproof					
Installation Location			Indoor		Indoor or Outdoor					
Material ⁴⁾	Control Valve		Cast Iron FC250 (A126 Cl.B)							
	Vacuum Generation Unit (Wetted Portions)	Pump	Cast Iron FC200 (A126 Cl.A)		Cast Stainless Steel SCS13 (A351 Gr.CF8 or A743 Gr.CF8)					
		Tank	Carbon Steel SGP (A53 Type F)		Stainless Steel SUS304 (AISI304)					
		Ejector	Cast Stainless Steel — (A351 Gr. CF8)		Cast Stainless Steel — (A351 Gr. CF8)					
		Nozzle/Diffuser	Stainless Steel SUS304 (AISI304)							
	Steam Piping Unit		Carbon Steel STPG370 (A53 Type S Gr.A)							
	Casing		—		Stainless Steel SUS304 (AISI304)					
	Connection	Steam Inlet		50 mm ASME Class 150 RF		50 mm ASME Class 150 RF			65 mm ASME Class 150 RF	
Steam Outlet		50 mm ASME Class 150 RF								
Steam Condensate Inlet		80 mm ASME Class 150 RF								
Overflow Connection					40 mm ASME Class 150 RF					
Make Up Water Inlet		Rc(PT) ³ / ₈		Rc(PT) ¹ / ₂			Rc(PT) ³ / ₄			
Tank Condensate Blow Connection		Rc(PT) ¹ / ₂					Rc(PT) ¹ / ₂			
Condensate Discharge Port		—		Rc(PT) ¹ / ₂ ⁵⁾			Rc(PT) 1 ⁵⁾			
Weight (kg) ⁶⁾			210	225	340	360	380	600	640	700
Control Panel			Refer to standard control panel specifications							

¹⁾ Minimum steam temperature will be 25 °C above make up water temperature, e.g. steam temperature of 30 °C will require make up water at 5 °C.

²⁾ Steam flow (heat quantity) per one line is shown. Total quantity of steam flow cannot exceed 1500 kg / h.

³⁾ Consult TLV for information on alternative specifications.

⁴⁾ Materials shown in () are equivalent materials.

⁵⁾ Discharge pressure: approx. 0.15 MPaG

⁶⁾ Approx.



To avoid abnormal operation, accidents or serious injury, DO NOT use this product outside of the specification range. Local regulations may restrict the use of this product to below the conditions quoted.

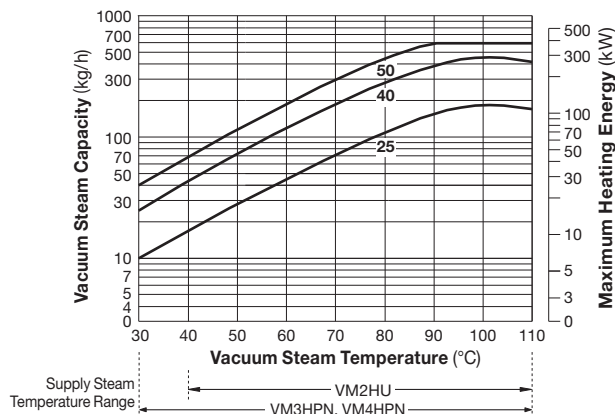
• Options

Control Panel	For VM4HPN
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Please consult TLV for other available specifications.

Package Types

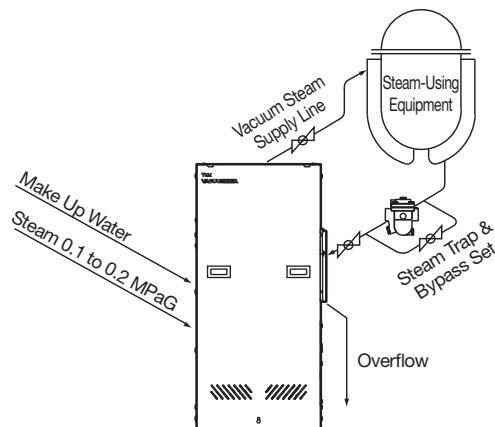
• Vacuum Steam & Heating Energy



1. Vacuum steam and heating energy values for VM4HPN are per steam supply line.

$$1 \text{ kW} = 3600 \text{ kJ/h} = 860 \text{ kcal/h}$$

• Piping Example

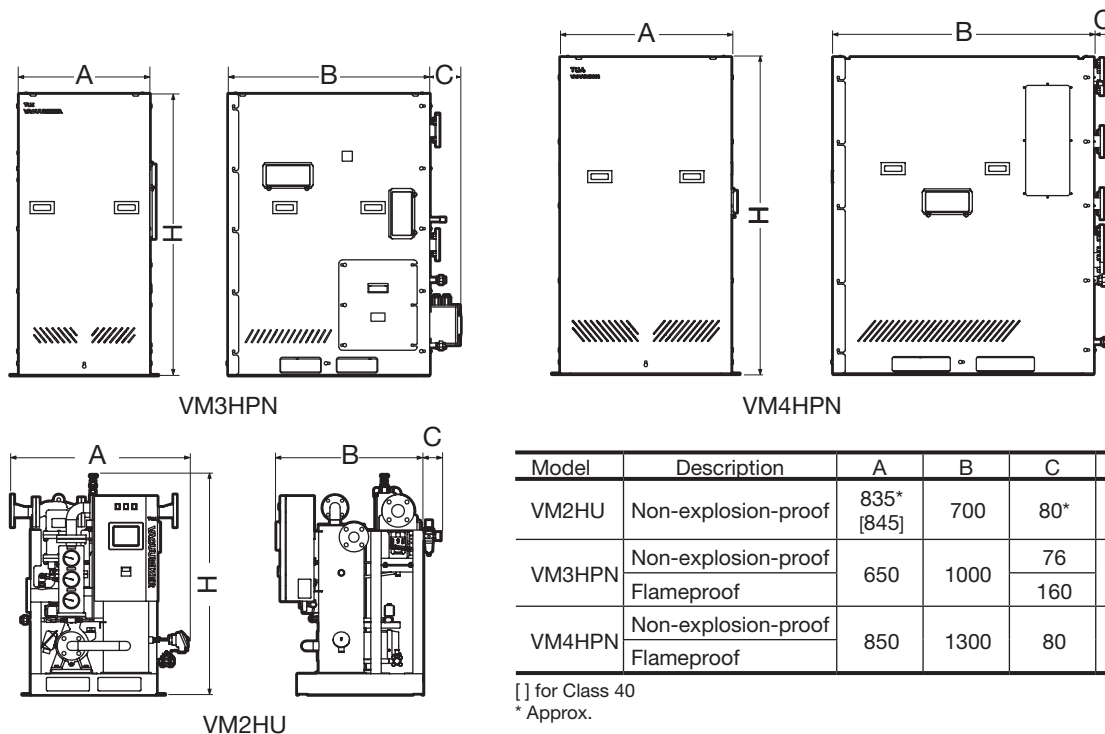


1. A steam trap and bypass set are required in the following conditions.

Type	VM2HU	VM3HPN	VM4HPN
Vacuum Steam Temperature	Over 90 °C	Over 95 °C	Installation required

2. When a steam trap is installed, initial vacuum generation within the application will require more time. To shorten the vacuum generation time, open the bypass valve at start-up and close the bypass valve once steady operation is achieved. The control system automatically operates the solenoid valve/motor valve as a bypass valve. (VM2HU, VM3HPN)

• Dimensions



(mm)					
Model	Description	A	B	C	H
VM2HU	Non-explosion-proof	835* [845]	700	80*	1010* [1045]
VM3HPN	Non-explosion-proof	650	1000	76	1400
	Flameproof			160	
VM4HPN	Non-explosion-proof	850	1300	80	1580
	Flameproof				

[] for Class 40

* Approx.

Standard Control Panel

• Specifications

Model		VM2HU	VM3HPN	
			Indoor Type	Outdoor Type
Control Target		Set steam temperature: automatically controlled at saturated pressure equivalent to set steam temperature		
Standard Functions	Permanent Functions	Tank water level and tank water temperature control (make up water supply)		
		Pump control		
		Steam pressure (temperature) control		
		Alarm notifications		
		Maintenance notifications for key components		
		Troubleshooting and fault identification		
		—	Pump performance loss prediction and maintenance notification (pump discharge pressure, pump amperage monitoring)	
	Selected Functions	Target value area switching function: register 8 target values and switch between "Local" and "Remote"		
		Rapid vacuum generation function: enabling shorter start-up times		
		Step heating control function: change target steam temperature step by step depending on the temperature of the product		
		Recipe-based temperature control: programmable target temperature and heating times (3 stages)		
		Data logging: steam temperature, steam pressure, tank water temperature, product temperature, and control valve opening degree (VM3HPN records pump discharge pressure and pump amperage) Measurement period is configurable. (1 to 300 sec.)		
		External input for operation start/stop: can be turned ON/OFF via external non-voltage contact input		
		Switching target area with external input: area switching via combination input of external non-voltage contact input (3 contacts)		
		Product temperature external input: product temperature input using external analog signal. Used with the step heating control function, recipe heating control function, and when displaying the data log function.		
		—	Product target temperature external input: set the product target temperature via an external analog signal (used for the step heating control function)	
		Operation signal output: output via non-voltage contact during operation		
		Steam temperature measured value external output: steam temperature measured value output via external analog signal		
		—	Steam pressure measured value external output: steam pressure measured value via external analog signal	
		Emergency Shutdown Function		—
Power Supply Voltage*		200 V AC three-phase	• Motor: 200 V AC three-phase • Internal components: 24 V DC	
Intrinsic Safety Specification		Non-explosion-proof		
Installation Location		Installed on tank (indoor)	Indoor, wall-mounted	Outdoor, wall-mounted
Paint		Munsell 5Y 7/1		

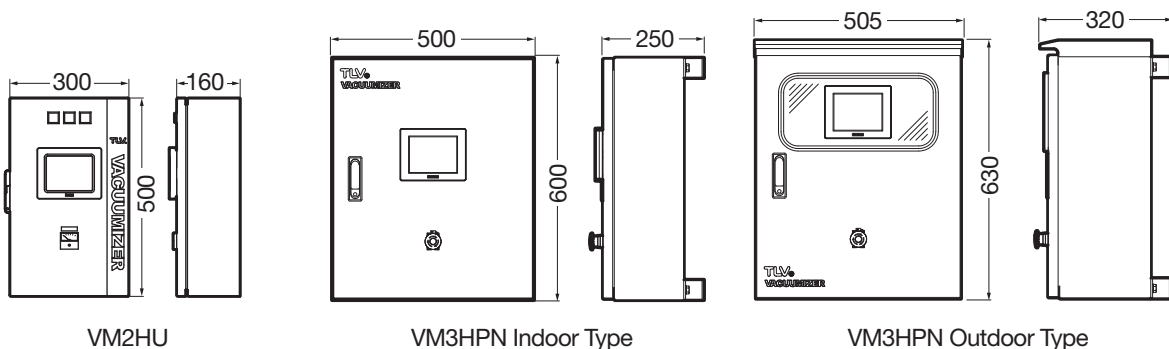
Note: control panel design is non-explosion proof. Consult TLV for explosion proof type.

Non-standard specifications are also available, contact TLV for details.

* Consult TLV for information on alternative specifications.

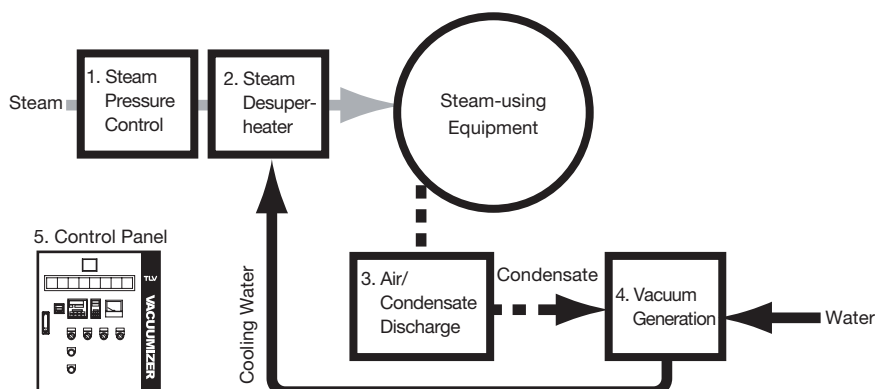
• Dimensions

Unit: mm



Engineering Type

• Standard System Components



1	Steam Pressure Control	Reduces the pressure of positive pressure steam supplied from the boiler to the saturated steam pressure (below atmospheric) of the set steam temperature
2	Steam Desuperheater	Changes superheated steam to stable low temperature saturated steam
3	Air/Condensate Discharge*	Discharges initial air from the steam-using equipment, and discharges condensate from the equipment during heating
4	Vacuum Generation	Discharges air when the process starts up, discharges condensate from the equipment during heating, and controls the set level of vacuum
5	Control Panel	Controls the system

* Steam trap and bypass valve set is required when steam supply temperature is over 95 °C

• Specifications

Vacuum Steam Temperature Range (°C)	30* to 110						
Vacuum Steam Temperature Stability	Set temperature ± 1 °C						
Class	25	40	50	65	80	100	150
Max. Vacuum Steam Capacity (kg/h)	150	390	600	920	1550	2400	4500
Max. Heating Energy Amount (kW [Mcal/h])	85 [73]	225 [190]	345 [300]	530 [460]	890 [770]	1380 [1190]	2600 [2240]

* Minimum steam temperature will be 25 °C above make up water temperature, e.g. steam temperature of 30 °C will require make up water at 5 °C.



CAUTION

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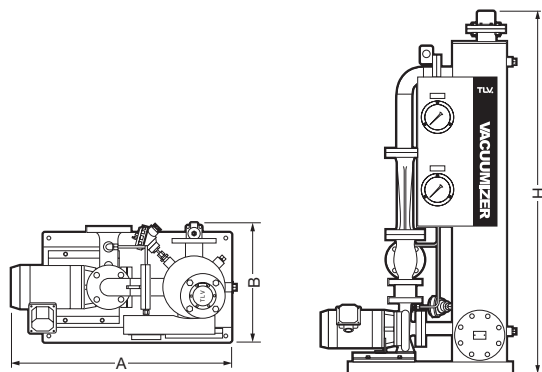
• Vacuum Generation Unit Specifications

Model		VG3		VG4	
Principle		Water Ejector System			
Motor Power (kW)		0.75		1.5	
Power Supply Voltage		200 V AC or 400 V AC three-phase			
Safety Specifications	Motor	Non-explosion-proof	Flameproof	Non-explosion-proof	Flameproof
	Other Electric Equipment				
Process Fluid		Air, Steam (Steam Condensate), Water			
Condensate Load (kg/h)		600		1500	
Exhaust Speed (ℓ/s)		3		6	
Minimum Pressure		Saturated pressure corresponding to the motive water temperature			
Connection	Steam Condensate Inlet	50 mm ASME Class 150 RF		80 mm ASME Class 150 RF	
	Overflow Connection				
	Make Up Water Inlet	Rc(PT) ½		Rc(PT) ¾	
	Condensate Discharge Connection*	Rc(PT) ¾		Rc(PT) 1	
	Tank Condensate Blow Connection	Rc(PT) ½			
Material		Stainless Steel SUS304 (AISI304)			
Control		Tank water automatic priming, tank water temperature automatic adjustment			

* Condensate discharge function is optional.

Engineering Type

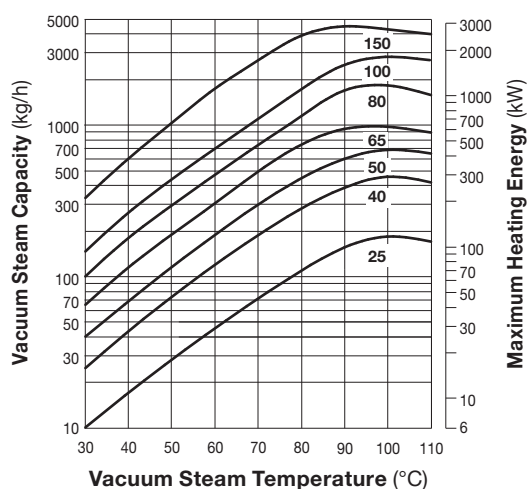
• External Dimensions of Vacuum Generation Unit



(mm)					
Model	Intrinsic Safety Specification (motor)	A	B	H	Weight (kg)
VG3	Non-explosion-proof	800	430	1450	130
	Flameproof	880	496	1630	
VG4	Non-explosion-proof	980	500	1520	185
	Flameproof	1030		1650	

All dimensions are approximate.

• Vacuum Steam Capacity & Heating Energy



Select the size for the vacuum pressure reducing valve using the table left after determining the temperature of the steam used and maximum required heating energy.

1 kW = 3.6 × 10³ kJ/h
1 kW = 860 kcal/h

• Options

Condensate Discharge Function	• Detect the water level in the tank of the vacuum generation unit and pump condensate by opening and closing the discharge valve automatically • Discharge pressure: approx. 0.15 MPaG • Maximum discharge capacity: VG3: 1.0 t/h, VG4: 2.5 t/h
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Note: other specifications also available on request, consult TLV for more information and availability.

Manufacturer
TLV® CO., LTD.
Kakogawa, Japan
is approved by LRQA Ltd. to ISO 9001/14001

ISO 9001
ISO 14001

