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PRODUCTION SPECIFICATIONS

Vanquish Pumps

The collective power of Chromatography

LC that takes your productivity to new heights

Vanquish platform benefits

- Precision and reproducibility to meet every application demand
- Widest portfolio of detection technologies
- Less maintenance, and easy set-up with Thermo Scientific™ Viper™ fingertight fittings
- Dedicated solutions for exceptional LC-MS performance

Keywords
Vanquish Horizon, Vanquish Flex, Vanquish Core, Vanquish Duo, pumps, binary, quaternary, ternary, dual, isocratic

Solvent delivery for highest confidence in peak identification and quantification

Thermo Scientific™ Vanquish™ HPLC and UHPLC pumps offer more performance without any tradeoff on durability and robustness, for highest system up-time and lowest total cost of ownership. The industry-leading Thermo Scientific™ SmartFlow™ pumping technology of the Vanquish pumps always provides you with unmatched retention time, reproducibility, and lowest baseline noise for highest detection sensitivity, independent of eluent composition and for backpressures up to 150 MPa (1500 bar, 22,000 psi) the productivity can be maximized using two pumps with Vanquish Duo HPLC and UHPLC workflows.

- Thermo Scientific™ Vanquish™ Horizon UHPLC System – more pressure capabilities than ever before, without any tradeoff on durability and robustness, from ultra-fast to extremely shallow binary gradients at pressures up to 150 MPa
- Thermo Scientific™ Vanquish™ Flex UHPLC System – biocompatible binary, quaternary and dual-gradient pumps for maximum flexibility and advanced performance in LC-MS and LC applications
- Thermo Scientific™ Vanquish™ Core HPLC System – binary, quaternary, dual-gradient and isocratic pumps for standard, routine and highly productive HPLC applications

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Product specification				
	Binary Pump H	Binary Pump F	Binary Pump C	Isocratic Pump C
Operating Principle	Parallel dual piston with independent piston drives and variable stroke volume	Serial dual-piston pump		
Flow Range (settable)	0.001–5 mL/min, in 1 µL/min increments	0.001–8 mL/min, in 1 µL/min increments	0.001–10 mL/min, in 1 µL/min increments	
Pressure Range	5–151 MPa, (50–1517 bar, 700–22,000 psi)	2–103 MPa (20–1034 bar, 290–15,000 psi) With a flow rate above 5 mL/min, the pressure range decreases linearly down to 80 MPa (800 bar, 11,600 psi)	2–70 MPa (20–700 bar, 290 - 10,100 psi) With a flow rate above 5 mL/min, the pressure range decreases linearly down to 30 MPa (300 bar, 4,350 psi)	
Compressibility Compensation	Fully automated, independent of mobile phase composition			
Flow Accuracy	±0.1%			
Flow Precision	<0.05% RSD or <0.01 min SD, whichever is greater			
Pulsation	<0.4% or <0.2 MPa, whichever is greater; Typically <0.2% or <0.05 MPa, whichever is greater	Typically < 1.0% or < 0.2 MPa, whichever is greater		
Gradient Formation	High-pressure gradient proportioning			-
Proportioning Accuracy	±0.2% of full-scale (from 0.2 to 4.0 mL/min and 1 to 99%)	±0.2% of full-scale		-
Proportioning Precision	<0.15% SD (from 0.2 to 4.0 mL/min and 1% to 99%)	< 0.15% SD		-
Number of Solvent Lines	2 out of 6			1
Mixer Volume	25 µL (default configuration)	200 µL (50 µL proprietary capillary mixer and 150 µL static mixer, default configuration)	400 µL (50 µL proprietary capillary mixer and 350 µL static mixer, default configuration)	200 µL (50 µL proprietary capillary mixer and 150 µL static mixer, default configuration)
Dwell Volume (contribution of the pump to the system gradient delay volume)	35 µL (25 µL proprietary capillary mixer and 10 µL filter, default configuration)	200 µL (default configuration)	400 µL (default configuration)	-
Solvent Degassing	Built-in, 6 channels	Built-in, 2 channels		Optional (1 channel)
Wetted Parts	MP35N, DLC, titanium, ceramics, PEEK, UHMW PE, fluoropolymers	MP35N, titanium, ceramics, sapphire, PEEK, UHMW PE, fluoropolymers	Stainless steel, titanium, ceramics, sapphire, PEEK, UHMW PE, fluoropolymers	
Biocompatible	Yes; pH range 2–12, chloride concentration up to 1 mol/L	Yes; pH range 2–12, chloride concentration up to 1 mol/L	No; pH range 1–13, chloride concentration up to 0.1 mol/L	
Safety Features	Leak detection and safe leak handling, excess pressure monitoring			
PC Connection	USB 2.0 3-port-HUB to connect further Vanquish modules			
I/O Interfaces	2× 6 pin Mini-DIN connectors each having functionality: 1 input, 1 relay out, 1 bidirectional input/output			
GLP	Predictive Performance functions for scheduling maintenance procedures based on the actual operating and usage conditions of the pump. All system parameters logged in the Thermo Scientific™ Chromeleon™ Chromatography Data System Audit Trail.			

Environmental Conditions	5–35 °C; 20–80% RH (non condensing) max. 2000 m above sea-level, Storage: -20–45 °C max. 60% RH (non condensing)			
Power Requirements	100–240 V AC, 50/60 Hz, max. 525 W/550 VA	100–240 V AC, 50/60 Hz, max. 245 W/255 VA		
Dimensions (h x w x d)	192 mm × 420 mm × 620 mm (7.6 in. × 16.5 in. × 24.4 in.)			
Weight	32 kg (70.5 lbs)	20 kg (44.1 lbs)	20 kg (44.1 lbs)	17kg (37.5 lbs)

	Quaternary Pump F	Quaternary Pump C/CN
Operating Principle	Serial dual-piston pump	
Flow Range (settable)	0.001–8 mL/min, in 1 µL/min increments	0.001–10 mL/min, in 1 µL/min increments
Pressure Range	2 – 103 MPa (20 – 1034 bar, 290 – 15,000 psi). With a flow rate of above 5 mL/min, the pressure range decreases linearly down to 80 MPa (800 bar, 11,600 psi)	2 – 70 MPa (20 – 700 bar, 290 – 10,100 psi). With a flow rate above 5 mL/min, the pressure range decreases linearly down to 30 MPa (300 bar, 4,350 psi)
Compressibility Compensation	Fully automated, independent of mobile phase composition	
Flow Accuracy	±0.1%	
Flow Precision	<0.05% RSD or <0.01 min SD, whichever is greater	
Pulsation	Typically <1.0% or <0.2 MPa, whichever is greater	
Gradient Formation	Low-pressure gradient proportioning	
Proportioning Accuracy	±0.5% of full-scale	
Proportioning Precision	<0.15% SD	
Number of Solvent Lines	4	
Mixer Volume	400 µL (50 µL proprietary capillary mixer and 350 µL static mixer, default configuration)	
Dwell Volume (contribution of the pump to the system gradient delay volume)	679 µL (default configuration)	
Solvent Degassing	Built-in, 4 channels	
Wetted Parts	MP35N, titanium, ceramics, sapphire, PEEK, UHMW PE, fluoropolymers	Stainless steel, titanium, ceramics, sapphire, PEEK, UHMW PE (only Pump C), carbon-fibre filled PTFE (only Pump CN), fluoropolymers
Biocompatible	Yes; pH range 2–12, chloride concentration up to 1 mol/L	No; pH range 1–13, chloride concentration up to 0.1 mol/L
Safety Features	Leak detection and safe leak handling, excess pressure monitoring	
PC Connection	USB 2.0; 3-port-HUB to connect further Vanquish modules	
I/O Interfaces	2× 6 pin Mini-DIN connectors each having functionality: 1 input, 1 relay out, 1 bidirectional input/output	
GLP	GLP Predictive Performance functions for scheduling maintenance procedures based on the actual operating and usage conditions of the pump. All system parameters logged in the Chromeleon CDS Data System Audit Trail.	

Environmental Conditions	5–35 °C; 20–80% RH (non condensing) max. 2000 m above sea-level, Storage: -20–45 °C max. 60% RH (non condensing)
Power Requirements	100–240 V AC, 50/60 Hz, max. 245 W/255 VA
Dimensions (h x w x d)	192 mm × 420 mm × 620 mm (7.6 in. × 16.5 in. × 24.4 in.)
Weight	17 kg (37.5 lbs)

	Dual Pump F	Dual Pump C/CN
Number of Pump Units	2	
Operating Principle	Serial dual-piston pump	
Flow Range (settable)	0.001–8 mL/min, in 1 µL/min increments	0.001–10 mL/min, in 1 µL/min increments
Pressure Range	2 – 103 MPa (20 – 1034 bar, 290 – 15,000 psi). With a flow rate of above 5 mL/min, the pressure range decreases linearly down to 80 MPa (800 bar, 11,600 psi)	2 – 70 MPa (20 – 700 bar, 290 – 10,100 psi). With a flow rate above 5 mL/min, the pressure range decreases linearly down to 30 MPa (300 bar, 4,350 psi)
Compressibility Compensation	Fully automated, independent of mobile phase composition	
Flow Accuracy	±0.1%	
Flow Precision	<0.05% RSD or <0.01 min SD, whichever is greater	
Pulsation	Typically <1.0% or <0.2 MPa, whichever is greater	
Gradient Formation	Dual low-pressure gradient proportioning	
Proportioning Accuracy	±0.5% of full-scale	
Proportioning Precision	<0.15% SD	
Number of Solvent Lines	2 x 3	
Mixer Volume	400 µL (50 µL proprietary capillary mixer and 350 µL static mixer, default configuration)	
Dwell Volume	679 µL (default configuration)	
Solvent Degassing	Built-in, 6 channels	
Wetted Parts	MP35N, titanium, ceramics, sapphire, PEEK, UHMW PE, fluoropolymers	Stainless steel, titanium, ceramics, sapphire, PEEK, UHMW PE (only Pump C), carbon-fibre filled PTFE (only Pump CN), fluoropolymers
Biocompatible	Yes; pH range 2–12, chloride concentration up to 1 mol/L	No; pH range 1–13, chloride concentration up to 0.1 mol/L
Safety Features	Leak detection and safe leak handling, excess pressure monitoring	
PC Connection	USB 2.0; 3-port-HUB to connect further Vanquish modules	
I/O Interfaces	2× 6 pin Mini-DIN connectors each having functionality: 1 input, 1 relay out, 1 bidirectional input/output	
GLP	GLP Predictive Performance functions for scheduling maintenance procedures based on the actual operating and usage conditions of the pump. All system parameters logged in the Chromeleon CDS Data System Audit Trail.	
Environmental Conditions	5–35 °C; 20–80% RH (non condensing), max. 2000 m above sea-level, Storage: -20–45 °C max. 60% RH (non condensing)	
Power Requirements	100–240 V AC, 50/60 Hz, max. 245 W/255 VA	
Dimensions (h x w x d)	192 mm × 420 mm × 620 mm (7.6 in. × 16.5 in. × 24.4 in.)	
Weight	20 kg (44.1 lbs)	

Ordering information

Description	Part Number
Binary Pump H	VH-P10-A-02
Binary Pump F	VF-P10-A-01
Quaternary Pump F	VF-P20-A
Dual Pump F	VF-P32-A-01
Binary Pump C	VC-P10-A-01
Quaternary Pump C	VC-P20-A-01
Quaternary Pump CN	VC-P21-A-01
Dual Pump C	VC-P32-A-01
Dual Pump CN	VC-P33-A-01
Isocratic Pump C	VC-P40-A-01
Accessories	
Set inline filters, 35 µL, VH-P1 (includes 25 µL capillary mixer and 10 µL inline filter) (Binary Pump H)	6044.5018
Optional mixer kit for TFA applications, volume 200 µL (Binary Pump H)	6268.5120
Set inline filters, 35 µL, VF-P1 (includes 25 µL capillary mixer and 10 µL inline filter), MP35N (Binary Pump F)	6044.3870
Set inline filters, 35 µL, VC-P1 (includes 25 µL capillary mixer and 10 µL inline filter), Stainless steel (Binary Pump C)	6045.3020
Static mixer, volume: 150 µL (for total volume of mixing system: 200 µL*)	6044.5110
Static mixer, volume: 350 µL (for total volume of mixing system: 400 µL*)	6044.5310
Static mixer, volume: 750 µL (for total volume of mixing system: 800 µL*)	6044.5750A
Static mixer, volume: 1500 µL (for total volume of mixing system: 1550 µL*)	6044.5450A
Capillary mixer, VF-pumps, volume 50 µL (for use with static mixers, volumes: 150 µL up to 1500 µL), MP35N	6044.5026
Capillary mixer, VC-pumps, volume 50 µL (for use with static mixers, volumes: 150 µL up to 1500 µL), Stainless steel	6044.3015
Mixing system, VF-pumps, volume: 100 µL (includes 25 µL capillary mixer and 75 µL static mixer), MP35N	6044.5100
Mixing system, VC-pumps, volume: 100 µL (includes 25 µL capillary mixer and 75 µL static mixer), Stainless steel	6045.5100
Capillary to connect the pump to the autosampler, for use with the 100 µL mixing system (Binary and Quaternary VF-pumps), MP35N	6042.2330
Capillary to connect the pump to the autosampler, for use with the 100 µL mixing system (VC-pumps), Stainless steel	6040.2325
Normal-Phase (NP) kit	6036.3972

** Static mixers for use with 50 µL capillary mixer*

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