

Ultra High Vacuum Pumps

TiTan

Ion Pumps

DIGITEL

Ion Pump Controllers

TSP

Titanium Sublimation Pumps

NEG

Non-Evaporable Getter Pumps

310.00.02

Excerpt from the Leybold Full Line Catalog (Edition 2021)

Catalog Part Ultra High Vacuum Pumps

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GAMMA

VACUUM

Company

Gamma Vacuum specializes in the design, manufacture and distribution of ion and titanium sublimation pumps as well as NEG pumps and their combinations, serving customers across a diverse range of scientific applications, including R&D and High Energy Physics. Their employees are committed to being the primary source of knowledge in Ultra High Vacuum and expertise globally, delivering consistent superior quality, at a low initial and operational cost.

Based in Shakopee, Minnesota, USA, Gamma Vacuum was established in 2003. Leybold have been distributing and supporting Gamma products for many years.

Log in on the Gamma website: www.gammavacuum.com for specification sheets, manuals and more information.

Any questions? We can customize your ion pump setup. Please contact your local Leybold sales and ask for customer work request (CWR).

The CWR is a questionnaire which is used to specify the customized ion pump system.



TiTan Ion Pumps



Ion pumps are used in a wide variety of high and ultra-high vacuum (UHV) environments. They can reach the lowest possible vacuum for an economical cost. In addition, ion pumps have some technical advantages over other technologies:

Advantage for the User

- Vibration free operation
- Low operational cost
- Bakeable
- Low maintenance
- Pressure indication
- Permanent gas capture
- Radiation tolerance
- Long operational life
- Non-contaminating technology

Characteristics

Lifetime

All Gamma Vacuum ion pumps are designed to operate for 45,000 – 50,000 hours at 1×10^{-6} mbar. Lifetime increases linearly with decreased pressure. At 1×10^{-9} , for example, an ion pump can last for many years.

Ultimate Pressure

Ion pumps are capable of reaching pressures below 1×10^{-10} mbar. Ultimate pressure of an ion pump is dictated by overall system conditions and materials.

Vacuum Processing

Ion pumps are shipped under vacuum at pressures less than 1×10^{-10} mbar. Certificates of conformance are provided and record all leak check points and pump characteristic values. RGA scans can be provided upon request.

Port Configurations

Each ion pump can be configured with a variety of pumping port options. Additional ports are available in most designs on the top, bottom, or side and can accommodate TSP or non-evaporable getter (NEG) modules.

Feedthroughs

Gamma Vacuum has standardized on the commercially available 10kV SHV feedthrough since 1996. For legacy purposes, alternate feedthroughs are available.

Heaters

Integrated heaters can be added to ion pumps for economical and efficient baking.

Cables

In addition to incorporating the SAFE-CONN interlock system, high voltage cables are made of flexible silicone materials that are bakeable and have high radiation tolerance.

Ion Pump Applications

Ion Pump Size Pumping Speed (l/s)	2-3	3-20	20-75	100+
Application				
Industry and Medical Processes				
Radar	■			
Traveling Wave Tubes (TWT)	■			
Klystrons	■			
X-Ray Tube Evacuation	■	■		
X-Ray Sources	■	■		
Treatment & Diagnostics		■	■	
Semiconductor				
Critical Dimension SEM (CD SEM)		■	■	
Lithography			■	■
Instrumentation				
Electron Microscopes (SEM/TEM)		■	■	
Focused Ion Beam (FIB)		■	■	
Scanning Probe Microscope (SPM)		■	■	■
Surface Analysis (AES, XPS, SIMS, EDX)			■	■
Mass Spectrometry (MS)			■	■
Molecular Beam Epitaxy (MBE)			■	■
High Energy Physics				
Accelerators			■	■
Boosters			■	■
Storage Rings			■	■
Front Ends			■	■
Beam Lines			■	■
End Stations			■	■
Free Electron Lasers (FEL)			■	■
Laser Interferometers			■	■

Small Ion Pumps (MINI – 75S)



Small ion pumps come in a wide variety of sizes and configurations. Gamma Vacuum maintains stock of the most common configurations for same-day shipping. These pumps have the added advantage that they can be mounted in any orientation without additional support.

Low Profile Ion Pumps (100L – 1200LX)



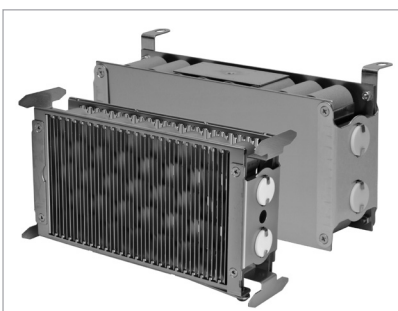
Low Profile ion pumps are under 12 in. (300 mm) high for standard configurations. The closed magnetic loop of these pumps reduces the stray magnetic field created by the pump making these pumps ideal for any type of charged particle application.

Tall Profile Ion Pumps (150TV – 600TV)



Tall Profile ion pumps are designed for mounting in narrow locations and matching competitive dimensions. These pumps are built to order and designed to fit into locations where a Low Profile ion pump might not fit.

TiTan Ion Pump Elements



TiTan ion pump elements are “tuned” for specific pumping applications. Surfaces are chemically processed to remove potential surface contaminants and provide maximum adhesion for extended lifetime. Ceramics are optimally shielded to reduce exposure to sputtered material.

- TiTan CV (Conventional)
 - two titanium cathodes for high pumping speed of reactive gases.
- TiTan DI (Differential)
 - a titanium and tantalum cathode for maintained pumping speeds of reactive gases and long term stability of noble gases.
- TiTan TR
 - classic triode element for higher pressure operation

Technical Data

Titan Ion Pumps

	Pumping Speed l/s	Weight kg (lbs)	Available Elements	Available Ports	Available Feedthroughs	Option: Integrated TSP/NEG
MINI	0.2	0.35 (0.8)	DI	1V	MN	N
3S	3	0.45 (1.0)	CV / DI	CU / 1V / 1H / 1D	5K / OV	N
5S	5	2.3 (5)	CV / DI	2V	5K / SC	N
10S	10	6 (13)	CV / DI	2H	SC / OV / FI	N
25S	25	9 (20)	CV / DI / TR / CX / DX	2V / 2H / 2D / 4V / 4D	SC / OP / OV / VR / FI	TSP / N0 / N1
45S	45	16 (34)	CV / DI / TR / CX / DX	2V / 2H / 2D / 4V / 4D	SC / OP / OV / VR / FI	TSP / N0 / N1 / N2
75S	75	22 (48)	CV / DI / TR / CX / DX	2V / 2D / 4V / 4D / 6S / 62	SC / OP / OV / VR / FI	TSP / N0 / N1 / N2 / N3
100L	100	29 (62)	CV / DI / TR	6S / 6D / 8S / 8D	SC / OP / OV / VR / FI	TA / NG
150T	150	32 (70)	CV / DI / TR	6S / 6D / 6P / 8S / 8D / 8P	SC / OP / OV / VR / FI	TC / TA / NG
150TV	150	32 (70)	CV / DI / TR	6S / 6D / 6P	SC / OP / OV / VR / FI	TC / TA / NG
200L	200	50 (112)	CV / DI / TR	6S / 6D / 8S / 8D	SC / OP / OV / VR / FI	TC / TA / NG
200T	200	50 (112)	CV / DI / TR	6S / 6D / 6P / 8S / 8D / 8P	SC / OP / OV / VR / FI	TC / TA / NG
300L	300	66 (145)	CV / DI / TR	8S / 8D	SC / OP / OV / VR / FI	TC / TA / NG
300T	300	66 (145)	CV / DI / TR	8S / 8D / 8P	SC / OP / OV / VR / FI	TC / TA / NG
300TV	300	66 (145)	CV / DI / TR	8S / 8D / 8P	SC / OP / OV / VR / FI	TC / TA / NG
400L	400	67 (148)	CV / DI / TR	8S / 8D	SC / OP / OV / VR / FI	TC / TA / NG
400LX	400	95 (210)	CV / DI / TR	8S / 8D / 8P	SC / OP / OV / VR / FI	TC / TA / NG
500T	500	96 (212)	CV / DI / TR	8S / 8D / 8P	SC / OP / OV / VR / FI	TC / TA / NG
600L	600	103 (226)	CV / DI / TR	8S / 8D / 10 / 18	SC / OP / OV / VR / FI	TC / TA / NG
600LX	600	122 (270)	CV / DI / TR	8S / 8D / 8P / 10 / 18 / 19	SC / OP / OV / VR / FI	TC / TA / NG
600TV	600	109 (243)	CV / DI / TR	8S / 8D / 8P	SC / OP / OV / VR / FI	TC / TA / NG
800LX	800	127 (280)	CV / DI / TR	8S / 8D / 10 / 18	SC / OP / OV / VR / FI	TC / TA / NG
1200LX	1200	206 (452)	CV / DI / TR	8S / 8D / 10 / 18	SC / OP / OV / VR / FI	TC / TA / NG
XW	Xl/s	25 (56)	CV / DI	2D	SC / FI	

For the meaning of abbreviations, like CV, DI, 2H, SC, FI, NG, etc., please check out the ordering information table on the opposing page.

Log in on the Gamma website: www.gammavacuum.com for specification sheets, manuals and more information.

Ordering Information

Part No.:					
200L	DI	8D	SC	2	TA
Pump	Element	Flange	Feedthrough	Heater*	Integrated TSP/NEG
<u>MINI</u>	Conventional diode <u>CV</u>	Copper Tube <u>CU</u>	Mini <u>MN</u>	None <u>N</u>	None <u>N</u>
<u>3S</u>	Noble diode <u>DI</u>	Vertical DN16 (1.33") <u>1V</u>	5kV SHV <u>5K</u>	120 V <u>1</u>	TSP single filament <u>TSP</u>
<u>5S</u>	Conventional diode XHV <u>CX</u>	Horizontal DN16 <u>1H</u>	10kV SAFECONN <u>SC</u>	240 V <u>2</u>	50l/s NEG (25/45/75) <u>N0</u>
<u>10S</u>	Noble diode XHV <u>DX</u>	2 ports DN16 <u>1D</u>	Perkin Elmer <u>OP</u>		100l/s NEG (25/45/75) <u>N1</u>
<u>25S</u>	Triode <u>TR</u>	Vertical DN40 (2.75") <u>2V</u>	Old Varian <u>OV</u>		200l/s NEG (45/75) <u>N2</u>
<u>45S</u>		Horizontal DN40 <u>2H</u>	Varian StarCell® <u>VR</u>		300l/s NEG (75) <u>N3</u>
<u>75S</u>		2 ports DN40 <u>2D</u>	Fisher Interlock <u>EI</u>		TSP & Cryoshroud (not 100L) <u>TC</u>
<u>100L</u>		Vertical DN63 (4.5") <u>4V</u>			TSP & Ambient Shield <u>TA</u>
<u>150T</u>		2 ports DN63/40 (4.5"/2.75") <u>4D</u>			400l/s NEG <u>NG</u>
<u>150TV</u>		Single DN100 (6") <u>6S</u>			
<u>200L</u>		2 ports DN100/40 (6"/2.75") perpendicular <u>6Z</u>			
<u>200T</u>		2 ports DN100/40 (6"/2.75") inline <u>6D</u>			
<u>300L</u>		2 ports DN160/100 (8"/6") perpendicular <u>6P</u>			
<u>300T</u>		Single DN160 (8") <u>8S</u>			
<u>300TV</u>		2 ports DN160 inline <u>8D</u>			
<u>400L</u>		2 ports DN160 perpendicular <u>8P</u>			
<u>400LX</u>		Single DN200 (10") <u>10</u>			
<u>500T</u>		2 ports DN200/160 (10"/8") inline <u>18</u>			
<u>600L</u>		2 ports DN200/160 (10"/8") perpendicular <u>19</u>			
<u>600LX</u>					
<u>600TV</u>					
<u>800LX</u>					
<u>1200LX</u>					
<u>XW</u>					

* option only for 10S and bigger, heater option not available (N) for MINI, 3S and 5S

The above example explains what is behind the part number **200LDI8DSC2TA**. It's a 200 l/s ion pump with a low profile and a noble diode element. It has two opposing flanges ("inline") with a diameter of DN 160 (8"). It uses the SAFECONN feedthrough and has an electrical heat-

er with a supply voltage of 240 V. The ion pump contains an integrated TSP with ambient sputtering shield (for more information, please check out the TSP section). For more possibilities or restrictions, please check out the technical data table on the opposing page.



DIGITEL Ion Pump Controllers



The DIGITEL family of Ion Pump Controllers offers the right balance of performance, power and protection.

Advantage for the User

Ease of Use

Each DIGITEL has a highly visible display. The SPCe has an easy-to-read LCD that displays pressure, current and voltage. The QPC and MPCq are each fully controlled with an intuitive touch panel LCD. Digital resolution down to 1nA is possible depending on pump size and current requirements.

Communications

Serial communications (RS232, RS422, and RS485) are standard on all DIGITEL products. Ethernet protocol for advanced facility and instrumentation communications is available on all units.

Connectivity

Each DIGITEL has programmable analog and interlock capabilities. This allows for optimal flexibility when integrating with standard or legacy set-point and analog monitoring systems.

Operator Safety

The integrated SAFECONN high voltage interlock system eliminates electrical shocks and false positive pressure readings. The controller automatically shuts off high voltage when the cable is disconnected from the ion pump or controller end. The system is isolated and guarantees ground, high voltage, and safety connectivity that prevents accidental arcing.

DIGITEL Flexibility

The DIGITEL line is flexible enough to control a wide variety of ion pump and TSP configurations. The QPC and MPCq can operate up to four ion pumps simultaneously or independent operation of one or two ion pumps, respectively. The MPCq is capable of controlling one or two TSP cartridges independently.

DIGITEL SPCe – Small Pump Controller



The SPCe is a versatile way to fully operate ion pumps 0.2 – 75 l/s with up to 40 mA (50 watts) of power. An LCD pressure/current/voltage display along with standard serial communications makes the SPCe able to accommodate the needs of basic and advanced users. Nano amp resolution provides gauging capabilities using the appropriate ion pump set-up.

DIGITEL QPC – Quad Pump Controller



Ion pumps 100 l/s and larger required higher currents for starting and higher pressure operation. The QPC supplies up to four ion pumps with 125 mA (125 watts) each. The easy-to-read color touchscreen display simultaneously displays pressure, current, and voltage. Standard serial and standard Ethernet communications along with legacy set-point and analog outputs allow for easy system integration. The QPC fits into any rack at just 3U high and 1/2 rack wide.

DIGITEL MPCq – Multiple Pump Controller



Ion Pump Control

The MPCq allows for high current control of one or optionally two ion pumps independently or up to four in parallel with 500 mA (1000 watts). At 3U high and a full rack in width, the MPCq is ideal for operating a wide variety of ion pump configurations on any system.

TSP Control

A TSP can be fully operated from the LCD touchscreen of the QPC or MPCq. They can be fired manually or automatically based on the pressure of either ion pump the controller is monitoring. Timed modes also let the user have full control over exact parameters of operation. A single remote controller can operate up to eight TSP filaments.



Ion Pump Compatibility

Ion Pump Size	SPCe	QPC	MPCq	TSP
Small Ion Pumps				
MINI	■			
3S	■			
5S	■	■		
10S	■	■		
25S	■	■	■	
45S	■	■	■	
75S	■	■	■	
Low Profile Ion Pumps				
100L		■	■	■
200L		■	■	■
300L		■	■	■
400L			■	■
400LX			■	■
600L			■	■
600LX			■	■
800LX			■	■
1200LX			■	■
Tall Profile Ion Pumps				
150TV		■	■	■
300TV		■	■	■
600TV			■	■

Technical Data

Controller

		SPCe	QPC	MPCq
Input power				
Voltage	V	90 – 240 or 24 VDC	100 – 240	90 – 230 or 200 – 240
Frequency	Hz	48 – 62	50 – 60	48 – 62
Output power				
Independent outputs	V	1	1 – 4	1 or 2
Open circuit voltage	VDC	±3000 – 7000 programmable	±3000 – 7000 programmable	±5600 or 7000
Current (maximum)	mA	40	125	500
Watts (maximum)	W	50	4 x 125	1000
Resolution	nA	1	1	100
High voltage connections		One 10kV SHV or Fischer	1-4, 10kV SHV or Fischer	1-4, 10kV SHV or Fischer
Display				
Type		LCD	Wide VGA Touchscreen Color LCD	1/4 VGA Touchscreen LCD
Readouts		Pressure, current, voltage, and programmable options	Pressure, current, voltage, and programmable options	Pressure, current, voltage, and programmable options
Setpoints		One relay, one TTL	Four relay, four TTL	Four relay, four TTL
Analog outputs		linear configurable		
Voltage		linear or logarithmic, configurable		
Current / pressure				
Communications		Local/Remote/Full Ethernet (optional) Serial: 232, 422, 485	Local/Remote/Full Ethernet (standard) Serial: 232, 422, 485	Local/Remote/Full Ethernet (optional) Serial: 232, 422, 485
Conformity to norms		EN 55011 Class A, IEC 801-2 EN 801-3, IEC 801-4, EN 61010-1		
Weight	kg lbs	1.5 3.3	9.5 21	16.8 / 25.4 (min./max.) 37 / 56 (min./max.)
Size		2U high, 1/4 rack wide 313 mm (12.3 in.) deep	3U high, 1/2 rack wide 438 mm (17.2 in.) deep	3U high, full rack wide 438 mm (17.2 in.) deep
Additional features		SAFECONN AUTOSTART/AUTORUN High Voltage Enable Fowler-Nordheim Calibration High-Pot Capability	SAFECONN AUTOSTART/AUTORUN High Voltage Enable Remote TSP Control	SAFECONN AUTOSTART/AUTORUN High Voltage Enable Remote TSP Control

Log in on the Gamma website: www.gammavacuum.com for specification sheets, manuals and more information.

Ordering Information

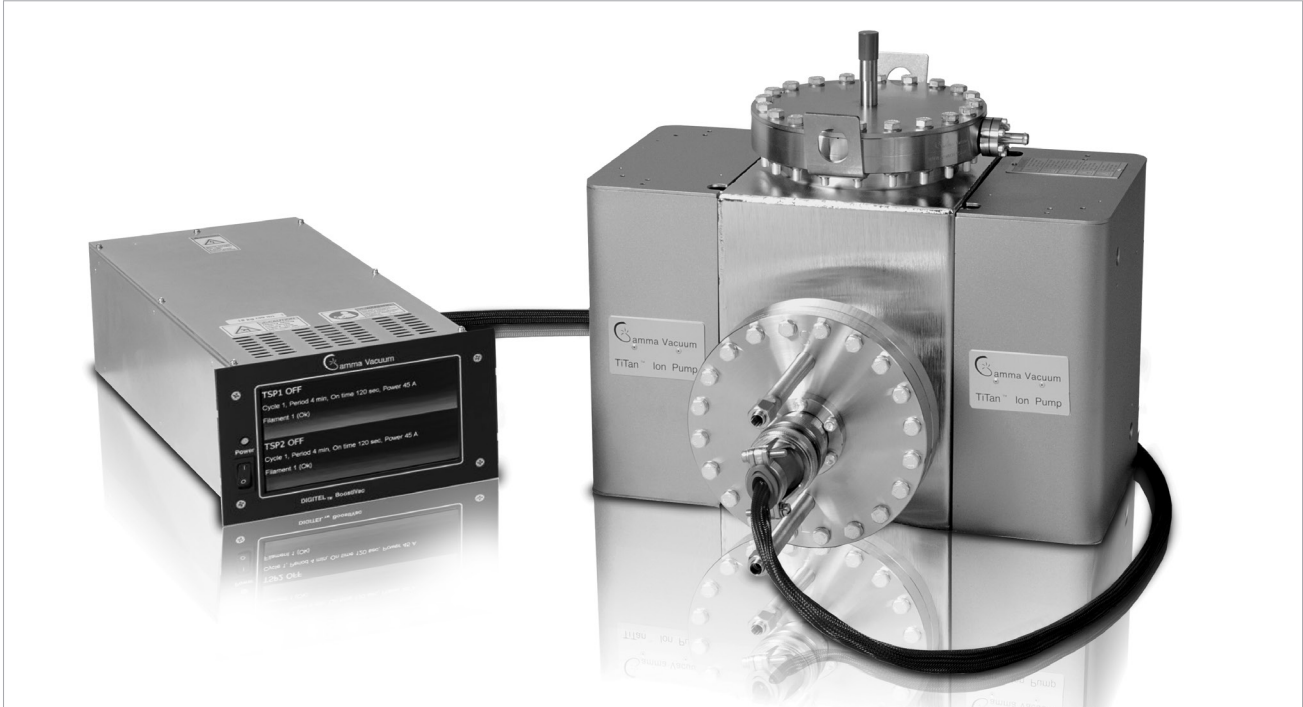
Part No.									
QPC	1	P	S	1	U1	SS	NI		
Controller	HV Channels	HV Polarity	Connector Style	Connections/Channel	Input Voltage	Communications	TSP Control		
QPC ¹⁾	One 1	Positive (CV/DI) P	10kV (SAFECONN) S	One output 1	110 V, US U1	Serial/Ethernet SS	Not Installed NI		
MPCq ²⁾	Two 2	Negative (TR) N	Fisher (Interlock) E	Two outputs 2	220 V US U2	Profibus/Serial/Ethernet PRS	Remote TSP Control ST		
SPC ³⁾	Three 3			Three outputs 3	230 V, EC E2	Ethernet ES	Dual Remote TSP Control DT		
	Four 4			Four outputs 3	230 V, UK K2	Serial (User Configurable) SS	Internal Remote TSP Control IT		
					230 V, AU A2				

¹⁾ no Internal Remote TSP Control

²⁾ 1 or 2 HV Channels only, Communications "SS" and "PRS" only

³⁾ 1 HV Channel only, 1 output only, Communications "ES" and "SS (Serial (User Configurable))" only, TSP Control not installed

TSP Titanium Sublimation Pumps



Titanium Sublimation Pumps (TSPs) are often used in combination with ion pumps or independently to remove reactive gases from the vacuum environment. Combined with an ion pump, the TSP allows for low ultimate pressures in a shorter amount of time. All TSP components are bakeable to 400°C.

Advantage for the User

Ease of Use

The TSP and MPCq controllers are each fully controlled with an intuitive touch panel LCD.

Filaments

Each titanium-molybdenum filament contains 1.5 grams of usable titanium and averages 20 hours of operation.

Connectivity

TSP cables have MS style connectors that are bakeable and radiation resistant.

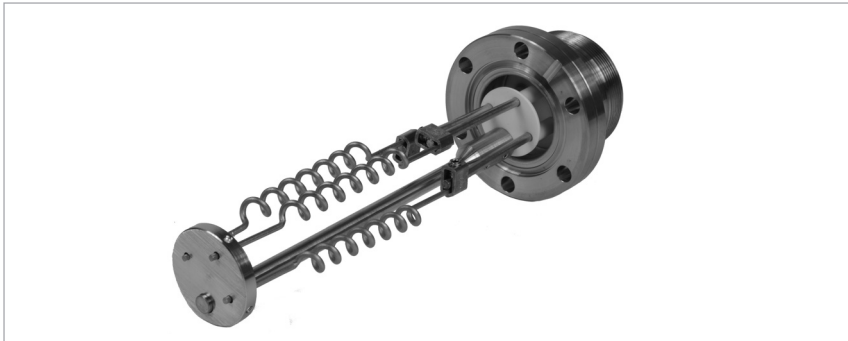
Safety

High currents travel over distances up to 15 meters through bakeable and radiation-resistant insulated and strain relief cabling.

DIGITEL Flexibility

The DIGITEL line is flexible enough to control a wide variety of ion pump and TSP configurations. The QPC and MPCq can operate up to four ion pumps simultaneously or independent operation of one or two ion pumps respectively. The MPCq and QPC are capable of controlling one or two TSP cartridges independently from the remote TSP controller or the MPCq's optional internal TSP (iTSP).

TSP Filament Cartridge



The filament cartridge is mounted on a 2- 3/4" CFF (DN 40 CF). The feed-through supports three titanium-molybdenum filaments and a return path for ground isolation. Each filament contains 1.5 grams of usable titanium and averages 20 hours of operation.

Liquid Cryoshroud



The liquid cryoshroud consists of a double walled, type 304L stainless steel cylinder with two liquid nitrogen feedthroughs with flare type fittings. It provides 1578 cm² (245 in.²) of liquid nitrogen cooled surface area that provides pumping speeds up to 12,000 l/s for hydrogen (see table). The shroud is mounted on an 8 in. CFF (DN 160) or 10 in. CFF (DN 200).

Ambient Sputter Shield



The ambient sputter shield economically maximizes surface area when cooling is not practical or possible. It provides 827cm² (128 in.²) of ambient temperature surface area that provides pumping speeds up to 2,200 l/s for hydrogen (see table). The shield is mounted on an 8 in. CFF (DN 160) or a 6 in. CFF (DN 100).

DIGITEL TSPq Controller



The TSPq controller has an easy-to-read color touchscreen display that displays all manual or programmed firing parameters. Manual operation is as simple as pressing one button. Programming is just as easy by viewing all programming options on one screen. The TSPq controller can operate up to 8 TSP filaments.

Ultra High Vacuum Pumps



Technical Data

Controller

		DIGITEL TSPq	Remote rTSP
Input power			
Voltage	V	100 – 120 or 200 – 240	100 – 120 or 200 – 240
Frequency	Hz	47 – 63	47 – 63
Output power			
Independent outputs		1	1
Current (maximum)	A	55	55
Watts (maximum)	W	800	800
Resolution	A	0.1	0.1
High current connections		1 - 2 MS type ¹⁾ configurable	1 - 2 MS type ¹⁾ configurable
Display			
Type		7" TFT WVGA 800 x 480 color LCD touchscreen	–
Readouts		Current, on-time, and programmable options	Current, on-time, and programmable options via MPCq/QPC
Analog outputs			
Voltage		linear configurable	linear configurable
Current / pressure		linear or logarithmic, configurable	linear or logarithmic, configurable
Control modes		Manual, programmed, or remote	Manual, programmed, or remote
Communications		Ethernet Serial: RS-232, RS-485 2 wire, RS-485 4 wire Profibus (optional, coming soon)	Ethernet via MPCq Serial: RS-232, RS-422 2 wire, RS-485 4 wire via MPCq
Conformity to norms		EN 55011 Class A, IEC 801-2 EN 801-3, IEC 801-4, EN 61010-1	EN 55011 Class A, IEC 801-2 EN 801-3, IEC 801-4, EN 61010-1
Weight	kg lbs	16 36	13.1 29
Size (L x W x H)	mm in.	3U high. 1/2 rack wide 462 x 208 x 130 – 18.2 x 8.2 x 5.1 –	– 293 x 219 x 130 (min.) 293 x 219 x 150 (max.) 12 x 9 x 5 (min.) 12 x 9 x 6 (max.)
Additional features		TSP interlock	TSP interlock via MPCq

¹⁾ Amphenol MIL-DTL-5015 P/N 97-3102A-24-22S(946)

Log in on the Gamma website: www.gammavacuum.com for specification sheets, manuals and more information.

Ordering Information

Controller

	DIGITEL TSPq	Remote rTSP
	Part No.	Part No.
Single MS connector		
110 V, US	TSPQ1U1SSN	RTSP1U1NNN
220 V, US	TSPQ1U2SSN	RTSP1U2NNN
230 V, EC	TSPQ1E2SSN	RTSP1E2NNN
230 V, UK	TSPQ1K2SSN	RTSP1K2NNN
230 V, AU	TSPQ1A2SSN	RTSP1A2NNN
Dual MS connector		
110 V, US	TSPQ2U1SSN	RTSP2U1NNN
220 V, US	TSPQ2U2SSN	RTSP2U2NNN
230 V, EC	TSPQ2E2SSN	RTSP2E2NNN
230 V, UK	TSPQ2K2SSN	RTSP2K2NNN
230 V, AU	TSPQ2A2SSN	RTSP2A2NNN
Remote Connection		
110 V, US	TSPQ0U1SSST	–
220 V, US	TSPQ0U2SSST	–
230 V, EC	TSPQ0E2SSST	–
230 V, UK	TSPQ0K2SSST	–
230 V, AU	TSPQ0A2SSST	–

Technical Data

		TSP Filament Cartridges	Liquid Cryoshroud		Ambient Sputter Shield	
			(8 in.)	(10 in.)	(8 in.)	(6 in.)
Area	cm ²	-	709	1578*	827	621
	(in. ²)	-	110	245*	128	96
Temperature	°C	-	20	-195	20	20
H ₂ Rate	l/s /cm ²	-	2.6	17	2.6	2.6
	Speed l/s	-	1.843	12.053	2.150	1.614
CO Rate	l/s /cm ²	-	8.2	11	8.2	8.2
	Speed l/s	-	5.814	7.799	6.780	5.092
H ₂ O Rate	l/s /cm ²	-	7.3	14.6	7.3	7.3
	Speed l/s	-	5.176	23.039	6.037	4.533
Mounting flange	in.	2 3/4 CFF (DN 40)	8 CFF (DN 160)	10 CFF (DN 200)	8 CFF (DN 160)	6 CFF (DN 100)
Weight		3.1 - 3.5 grams	8 kg (17.5 lbs)	8 kg (17.5 lbs)	6 kg (13 lbs)	6 kg (13 lbs)
Surface area	mm ² (sq in.)	-	70,900 (110)	70,900 (110)	82,700 (128)	82,700 (128)
Liquid volume	l	-	1.15	1.15	-	-

*Applies to H₂O speed only

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Ordering Information

	Part No.	Liquid Cryoshroud		Ambient Sputter Shield	
		(8 in.)	(10 in.)	(8 in.)	(6 in.)
TSP Cryoshroud	—	G360051	G360685	—	—
TSP Ambient Shield, X2 3/4"	—	—	—	G360044	G360190
TSP, 1 FILAMENT, 2.75 CF, MS	G360549	—	—	—	—
TSP, 3 FILAMENT, 2.75 CF, MS, STD	G360819	—	—	—	—

NEG Non-Evaporable Getter Pumps



Non-evaporable getter (NEG) pumps operate with a non evaporable, compact getter material with a porous structure. The gas molecules either adsorb on the surface of the getter material or diffuse rapidly into it. The NEG pump contains a heating element which is used for regeneration. The getter material consists of a zirconium-aluminum alloy which allows for

hydrocarbon-free operation. After activation the pump operates at room temperature without consumption of electrical energy. A great advantage is the absence of vibrations. Similar to TSPs, NEG pumps are often combined with ion getter pumps. Such combinations are especially useful when a lower pressure is desired. In UHV, hydrogen plays the dominant role and NEG

pumps have a particularly high pumping speed for that. Applications, in which NEG pumps are often used, are particle accelerators, surface analysis instruments, SEM columns and sputtering systems.

Technical Data

		NEG				
		50NP	100NP	200NP	300NP	400NP
Pumping speed *						
H ₂	l/s	55	106	208	312	412
CO (25°C)	l/s	27	51	94	125	156
Sorption capacity *						
H ₂	torr x l	630	1170	2160	2880	3600
CO (25°C)	torr x l	0.1	0.2	0.4	0.6	0.8
CO (total)	torr x l	284	526	972	1296	1620
Alloy composition	%	Zr (70), V (24.6), Fe (5.4)				
Getter mass	g	31.5	58	108	144	180
Getter surface area	cm ²	187	348	642	856	1070
Total mass	kg (lbs)	0.48 (1.05)	0.54 (1.19)	0.75 (1.65)	0.80 (1.79)	0.85 (1.87)
Flange		DN 40 (2.75 in) CFF				

*Pumping speeds reference initial speed values at 25° C exposed configuration

Log in on the Gamma website: www.gammavacuum.com for specification sheets, manuals and more information.

Ordering Information

		NEG				
		50NP	100NP	200NP	300NP	400NP
		Part No.	Part No.	Part No.	Part No.	Part No.
NEG Non-Evaporable Getter Pumps		50NP	100NP	200NP	300NP	400NP

DIGITEL SPC_{NEG} - NEG Pump Controller



Creating ultra-high vacuum is a huge challenge, no matter what the type of application. Analytical instruments, accelerators for medical treatment, fundamental physics research, electron microscopes, and a broad spectrum of various experiments require pressure levels that demand intense preparation. Many components need to be considered in complex systems, so the less worries the better.

GAMMA's new DIGITEL SPC_{NEG} controller serves this purpose. It operates NEG pumps with a high pumping speed for hydrogen, which is the most relevant gas type in ultra-high vacuum. Unlike standard power supplies, the SPC_{NEG} can not only push a current into the NEG's heater, but uses pre-defined routines, with certain

parameters, such as current values or heating duration. Those values are chosen by the SPC_{NEG} depending on the connected NEG pump. The routines are customizable to allow for experiments with different parameters. Reliable operation is accomplished by open-loop detection as well as over-load protection.

High ease-of-use is established by a large touch screen. In addition, the ethernet interface allows for remote control. The new DIGITEL SPC_{NEG} is a milestone in GAMMA's product portfolio: a modern NEG controller in a compact design, optimized in both performance and cost with increased functionality that helps to reach ultra-high vacuum more conveniently for your application.

Advantage for the User

Ease of Use

- Pre-defined routine
- Bright color touch panel
- Intuitive operation

Communications

Ethernet is the standard interface for the SPC_{NEG}. It is used for

- Software updates
- Data logging
- Remote control

Operation

The DIGITEL SPC_{NEG} activates, conditions or regenerates all of GAMMA's NEG pumps as well as any NEG pump on the market with a pumping speed of up to 400 l/s.

Technical Data

DIGITEL SPC_{NEG}

Input power		
Voltage	V	90 – 240
Frequency	Hz	48 – 62
Output power		
Independent outputs		1
Open circuit voltage	VDC	0 – 27
Current (maximum)	A	10
Watts (maximum)	W	270
Resolution	mA	10
Voltage connections		Fischer Type 105
Display		
Type		320 x 240 touchscreen with backlight
Readouts		Power, current, and programmable options
Communications		Ethernet
Conformity to norms		EN 55011 Class A, IEC 801-2, EN 801-3, IEC 801-4, EN 61010-1
Weight	kg lbs	2.0 4.5
Size		2U high. 1/4 rack wide, 11.3 in. deep (82 x 110 x 288 mm)
Additional features		AUTOSTART / AUTORUN

Log in on the Gamma website: www.gammavacuum.com for specification sheets, manuals and more information.

Ordering Information

DIGITEL SPC_{NEG}

	Part No.
DIGITEL SPC-NEG	
Ethernet, 110 V US	SPCNSU1E
Ethernet, 220 V US	SPCNSU2E
Ethernet, 230 V EC	SPCNSE2E
Ethernet, 230 V UK	SPCN SK2E
Ethernet, 230 V AU	SPCN SA2E
Cable SPC-NEG	
1 m, small connector (suitable for 50NP - 400NP)	F14S1MSS
3 m, small connector (suitable for 50NP - 400NP)	F14S3MSS
6 m, small connector (suitable for 50NP - 400NP)	F14S6MSS
1 m, large connector (suitable for 410NP)	F14S1MSL
3 m, large connector (suitable for 410NP)	F14S3MSL
6 m, large connector (suitable for 410NP)	F14S6MSL

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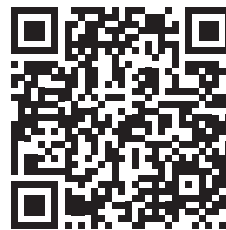
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