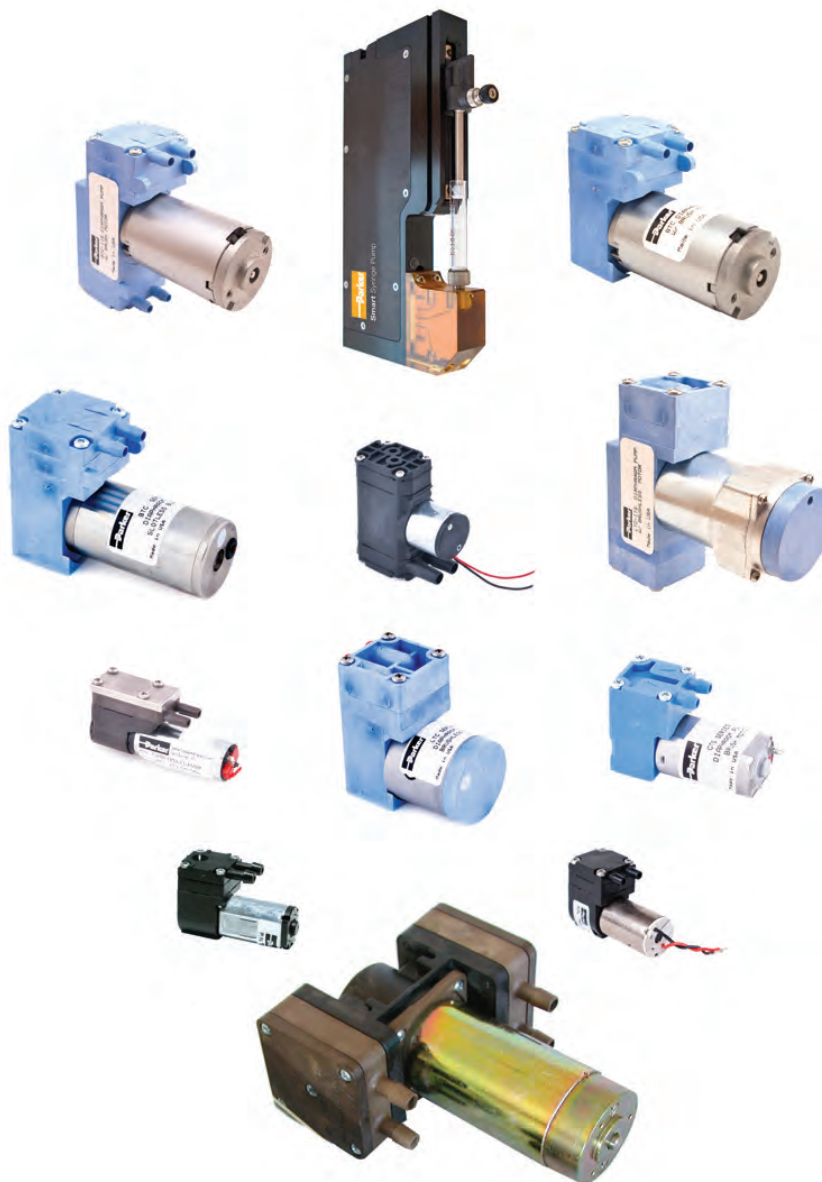
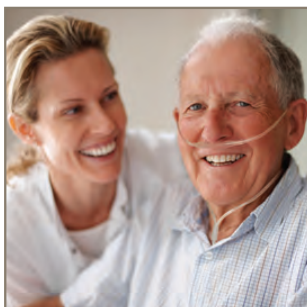




aerospace  
 climate control  
 electromechanical  
 filtration  
**fluid & gas handling**  
 hydraulics  
 pneumatics  
 process control  
 sealing & shielding



# Miniature Pumps

## Precision Fluidics



ENGINEERING YOUR SUCCESS.



# Innovative Solutions for Health Care Success





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When you partner with the global leader in motion and control technologies, expect to move your business and the world forward. From miniature solenoid valves to highly integrated automation systems, our innovations are critical to life-saving medical devices and scientific instruments used for drug discovery and pathogen detection. Not to mention, critical to decreasing time to market and lowering your overall cost of ownership. So partner with Parker, and get ready to move, well, anything.



[www.parker.com/precisionfluidics](http://www.parker.com/precisionfluidics) 1 800 525-2857

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ENGINEERING YOUR SUCCESS.

# Smart SyringePump Precision Aspirate and Dispense Syringe Pump



At one third the size and weight of standard 30mm syringe pumps, the Parker Smart Syringe Pump improves the performance of Clinical Diagnostic and Analytical Chemistry systems by improved resolution and bringing the pump to the point of dispense. This long life pump is designed to a minimum of 5 million cycles, improving system reliability and reducing downtime. Its lightweight and compact size enables smaller instrument designs, decreasing instrument costs and footprint.

## Features

- Designed to a minimum of five million cycle life
- Encoded servo motor with 228,495 step resolution improves low volume and low flow performance
- Non pulsatile flow down to 7.5 nL/sec
- Can be mounted directly on motion systems placing it directly at the point of aspirate and dispense
- Eliminates transfer lines; simplifies fluidic designs, reduces footprint and instrument cost
- Easy drop in replacement for existing syringe pumps
- CE and RoHS Compliant

## Markets:

- Clinical Diagnostics
- Analytical Chemistry

## Typical Applications

- Sampling
- Reagent Addition
- Liquid Handling
- Precision Flow Control

## Product Specifications

### Performance

<b>Drive Type:</b>	Lead nut screw with guide rail, Servo motor with high resolution encoder
<b>Precision:</b>	≤0.1% CV full stroke ≤0.5% CV 10% of full stroke at point of dispense (measured fluidically)
<b>Accuracy:</b>	± 1.0 % full stroke ± 2.0 % at 10% full stroke at point of dispense (measured fluidically)
<b>Resolution:</b>	228,495 steps full scale 0.22nL per step (50 µL syringe)
<b>Minimum Flow Rate:</b>	7.5 nL/sec (50 µL syringe), non pulsatile flow
<b>Stroke Speed:</b>	1 sec to 111 minutes full stroke
<b>Valve Switching Speed:</b>	<50 msec open/close
<b>Pressure:</b>	29 PSIG (2.0 bar)
<b>Syringe Barrel Volumes Supported:</b>	50 µL to 1mL, Standard 30 mm XP type syringe barrels

### Physical Properties

<b>Operating Environment:</b>	15° to 40° C, 20% to 90% Relative Humidity
<b>Storage Environment:</b>	-20° to 70° C, 20% to 90% Relative Humidity
<b>Drive Dimensions:</b>	0.69" (17.5 mm) x 4.1" (104 mm) x 6.35" (162 mm)
<b>Weight:</b>	0.81 lbs (367g)
<b>Valve:</b>	3 way diaphragm isolated solenoid valve
<b>Pump Assembly Rated Life:</b>	5 Million Cycles
<b>Fittings:</b>	¼-28 flat bottom female fittings for fluid connections and syringe
<b>Recommended Filtration:</b>	100 mesh or 150 µm
<b>Wetted Materials</b>	
<b>Manifold:</b>	Polyetherimide (ULTEM® 1000)
<b>Valve Diaphragm and Gasket:</b>	FFKM (KALREZ®)

### Electrical

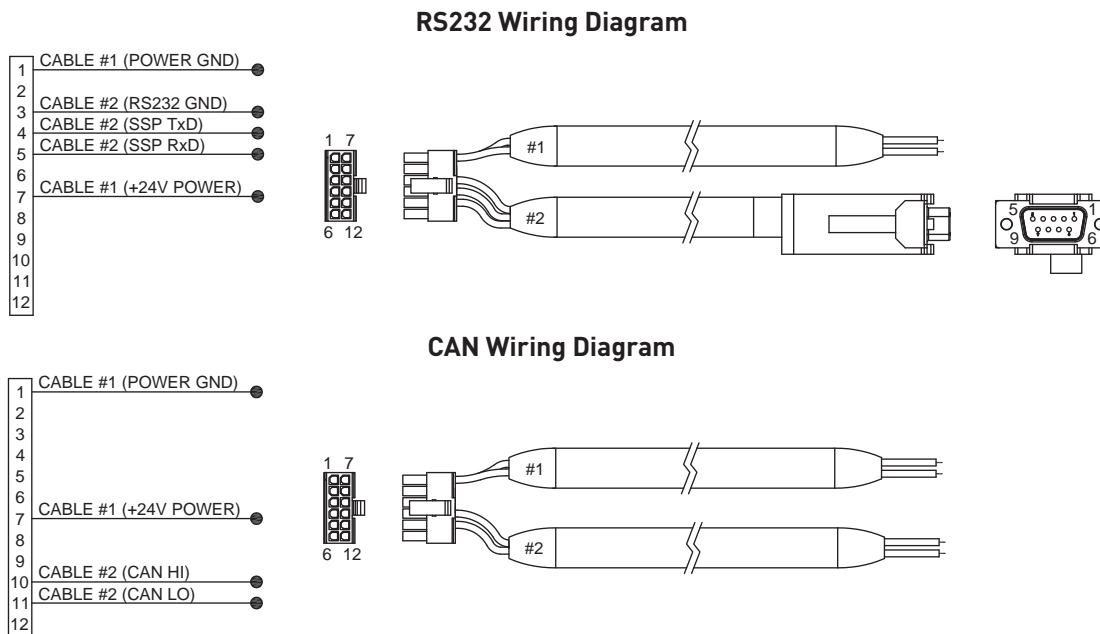
<b>Electrical/Communications Termination:</b>	12 Pin Molex® Micro-Fit Connector
<b>Power:</b>	24 VDC ± 5%, <1 Amp
<b>Command Set:</b>	Cavro® scripting language Smart Syringe Pump command library
<b>Communications:</b>	Interface: CAN, RS-232 Baud Rate: RS232: 9,600, 14,400, 19,200, 38,400, 57,600 and 115,200 CAN: 20K, 50K, 125K, 250K, 500K, 800K and 1M bits per second
<b>Addressing:</b>	Up to 127 pumps can be daisy chained and addressed individually
<b>RS 232 Format:</b>	Data Bits: 8, Parity: None, Stop Bits: 1, Half Duplex
<b>Valve Body:</b>	PEEK



## Precision Aspirate and Dispense Syringe Pump

## SmartSyringePump

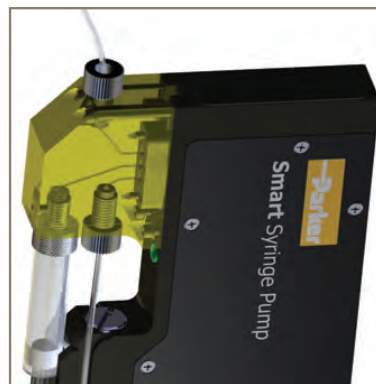
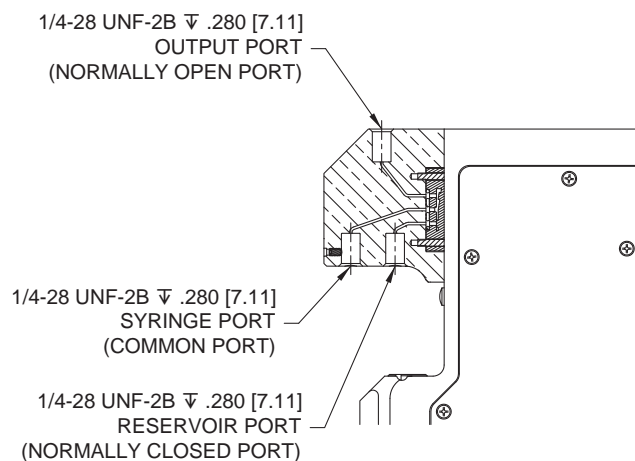
### Electrical Interface



Molex® Connector, Female 12 position Micro – Fit 3.1, Molex® # 43025-1200

Molex® Terminal crimp socket, 20-24 AWG, Molex® # 43030-0007

### Fluidic Interface



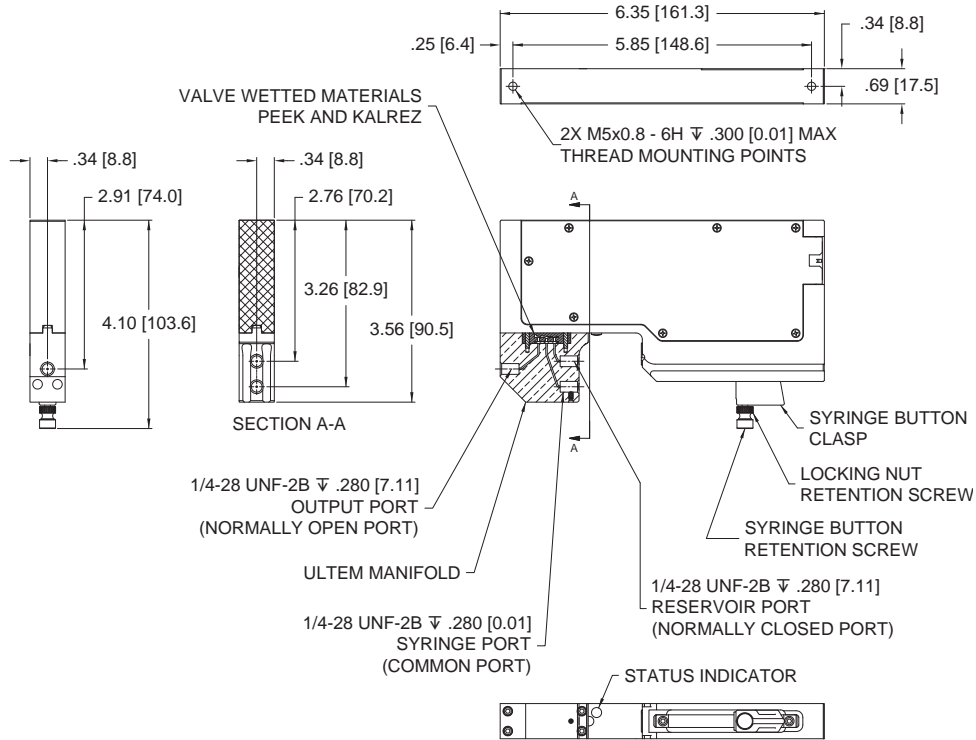
Leak diversion features built in to prevent damage to the pump in the event of leakage



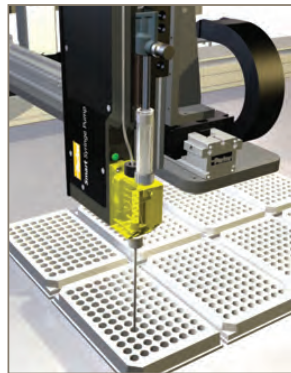
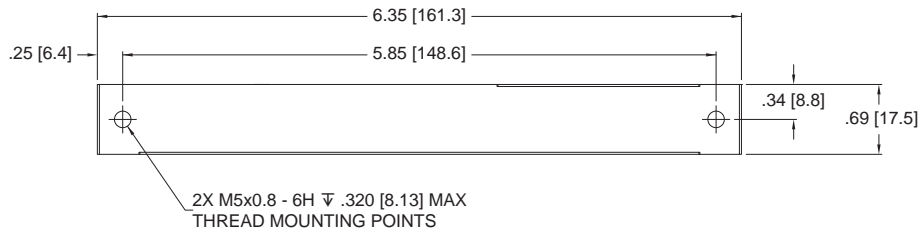
## SmartSyringePump

## Precision Aspirate and Dispense Syringe Pump

### Wetted Materials and Dimensions



### Mounting Dimensions

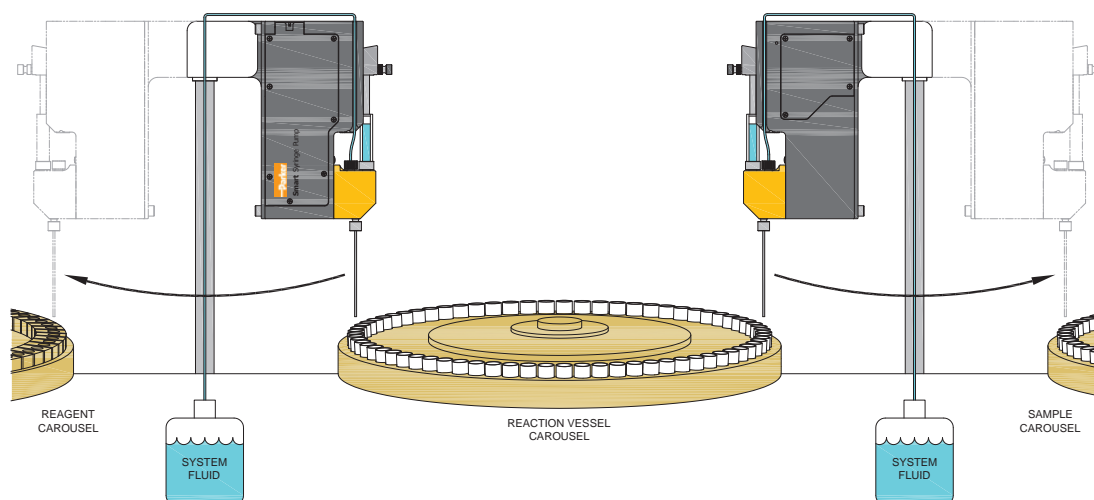


## Precision Aspirate and Dispense Syringe Pump

## SmartSyringePump

### Typical Flow Diagram

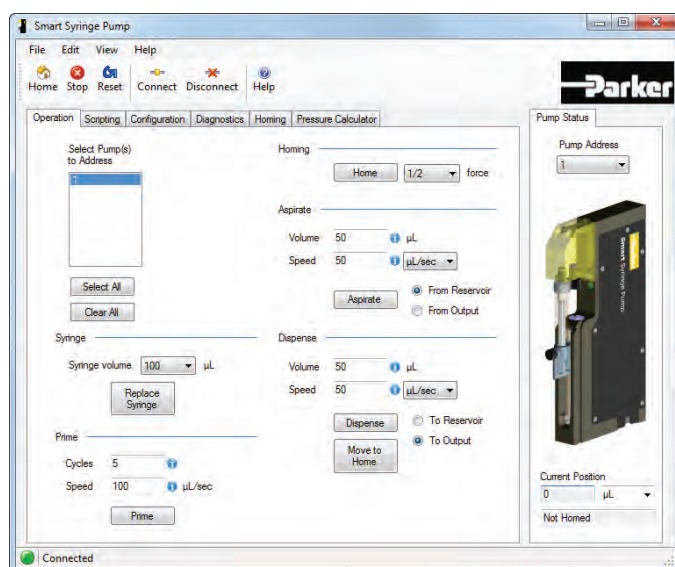
#### IVD Sampling & Reagent Addition System



#### Aspirate and Dispense control of sample and reagent fluids:

- Smart Syringe Pumps mounted directly to motion systems eliminating need for transfer lines between pumps and probes.
- Easily programmed to aspirate and dispense variable amounts and dispense multiple aliquots
- Three way valve allows the use of a system fluid to isolate the pump from samples and reagents
- System fluid can be used to clean inside of probe after dispense

### Software



- Easy to use Smart Syringe Pump Windows® based software simplifies control and testing of the Smart Syringe Pump
- Easy to test, with the Parker Smart Syringe Pump evaluation kit you can be testing in fifteen minutes. Pump, cables, tubing and software all included
- User-friendly graphical user interface for pump evaluation or optimization.
- Simple point and click interface allows access to all Smart Syringe Pump capabilities
- Simplifies bench level testing
- Scripting interface makes developing scripts easy

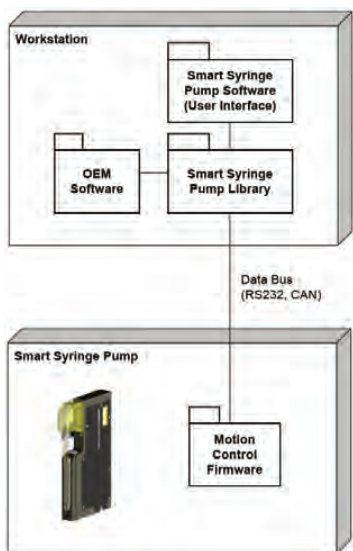


## SmartSyringePump

## Precision Aspirate and Dispense Syringe Pump

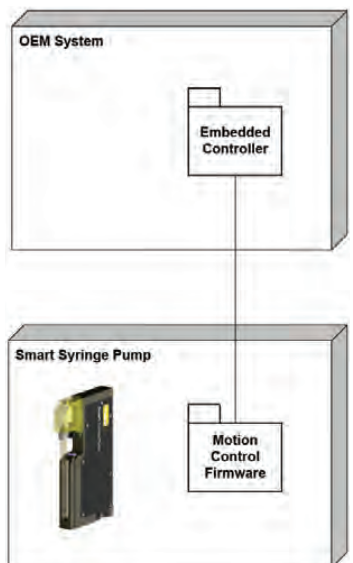
### Smart Syringe Pump Software Libraries and Control

Options for integration into OEM instrumentation



#### Smart Syringe Pump Using Workstation Control

- Supports Cavro<sup>®</sup> scripting commands
- Enhanced Smart Syringe Pump scripting commands available
- Allows for calibrated syringe volumes to be used
- Enables commands to be sent in fluid volumes rather than motor steps
- Smart Syringe Pump and Cavro<sup>®</sup> commands can be used in combination
- Full control and configuration through library commands



#### Smart Syringe Pump Using Embedded Controller

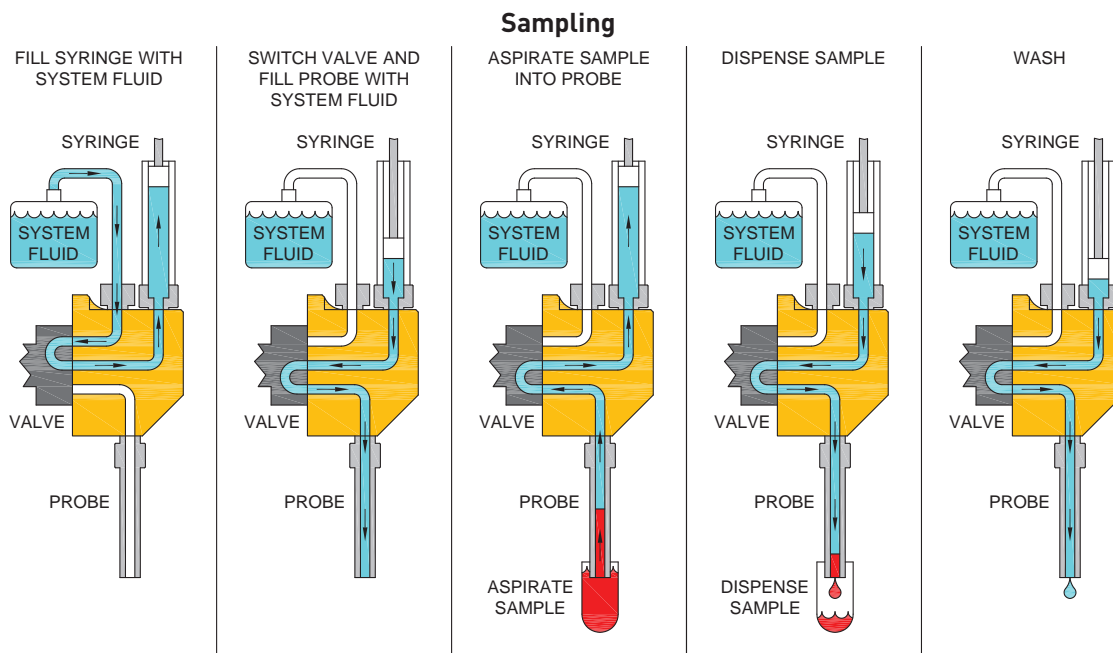
- Commands sent directly from the OEM System embedded controller to the motion control firmware built into the Smart Syringe Pump
- Supports RS232 and CAN communications



Precision Aspirate and Dispense Syringe Pump

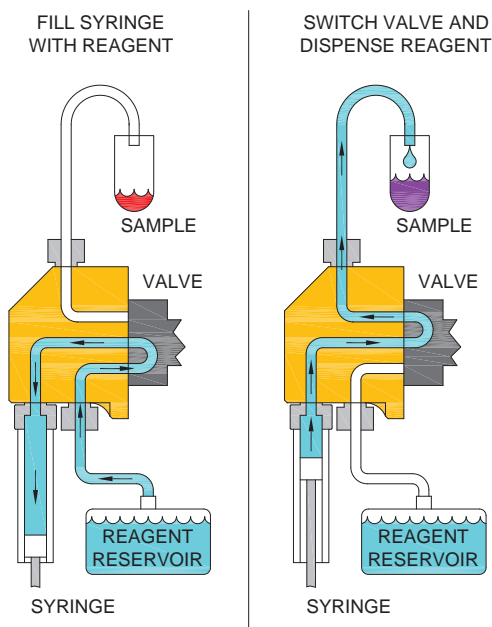
SmartSyringePump

Fluid Flow Diagrams



Miniature Pumps

**Reagent Addition**



## SmartSyringePump

## Precision Aspirate and Dispense Syringe Pump

### Chemical Compatibility Chart\*

Chemical	Valve Diaphragm	Other Wetted Materials	
	FFKM (Kalrez®)	PEEK	Ultem®
DI Water	1	1	1
Methanol	1	1	1
Isopropanol	1	1	1
Ethanol	1	1	1
Acetonitrile	1	1	4
Tetrahydrofuran	1	1	1
Toluene	1	1	2
Organic Acids - Dilute	1	1	1-2
Non Organic Acids - Dilute	1	1	1
Bases - Dilute	1	1	1
Saline	1	1	1
Bleach 12%	2	1-2	4
Sodium Hydroxide 20%	1	1	4

#### Compatibility Legend

- EXCELLENT**  
Minimal or no effect
- GOOD**  
Possible swelling and/or loss of physical properties
- DOUBTFUL**  
Moderate or severe swelling and loss of physical properties
- NOT RECOMMENDED**  
Severe effect and should not be considered

\*The above is an Abbreviated Chemical Compatibility Chart. Please consult factory for details.

### Regulatory

**Regulatory:** CE

**EMC:**

FCC Part 15 Subpart B, Class B

EMC Directive (2004/108/EC)

EN 61326-1:2006 Standard

- CISPR 11 Radiated Emissions Class B
- IEC 61000-4-2:2008 Electrostatic Discharge Criterion A
- IEC 61000-4-3:2006 Radiated RF Immunity Criterion A
- IEC 61000-4-8:2009 Power Frequency Magnetic Field Immunity Criterion A

**Safety:** IEC 61010-2-101 (design review)

**Hazardous Materials:** RoHS Directive (2002/95/EC)



## Precision Aspirate and Dispense Syringe Pump

## SmartSyringePump

### Ordering Information

Manifold	Porting	Valve	Pressure Rating	Internal Control Board	Part Number
Ultem®	1/4 - 28 Female	3 Way FFKM	29PSI (2.0 bar)	Yes	401-101111-000

### Accessories

Part Number	Description
990-000452-001	50µL Syringe Barrel with Teflon® Plunger tip
990-000452-002	100µL Syringe Barrel with Teflon® Plunger tip
990-000452-003	250µL Syringe Barrel with Teflon® Plunger tip
990-000452-004	500µL Syringe Barrel with Teflon® Plunger tip
990-000452-005	1mL Syringe Barrel with Teflon® Plunger tip
191-000264-001	Clasp Screw
193-000029-001	Clasp Screw Locking Nut
590-000111-001	Cable, Smart Syringe Pump
190-006055-004	P Clamp
191-000115-001	P Clamp Screw for Tubing
890-001099-001	Probe Tip, Sized for 100µL Syringe Barrel
790-007025-001	Smart Syringe Pump Software
990-000445-001	Evaluation Kit

### Smart Syringe Pump Evaluation kit:

The Parker Smart Syringe Pump Evaluation kit contains everything needed to set up and start testing the Smart Syringe Pump in less than 15 minutes time. The Smart Syringe Pump Windows® based software provides a fast and easy way to evaluate pump performance using a simple point and click graphical user interface. Install the software on any Windows® PC, connect the RS232 cable to a serial port (or USB to Serial adapter) and connect the power cable to your 24 V power supply and start testing. It couldn't be easier.

### The kit includes:

- Parker Smart Syringe Pump
- Software
- Power and communication cables
- Syringe Barrels (100 µL and 1000µL)
- Probe tip
- Tubing and fittings
- Contact Parker to order at 603.595.1500

Please click on the Order On-line button below (or go to [www.parker.com/ppf/smartsyringepump](http://www.parker.com/ppf/smartsyringepump)) for more information on the Parker Smart Syringe Pump.

NOTE: In order to provide the best possible solution for your application, please provide the following requirements when contacting ApplicationsEngineering:

- Accuracy and Precision Required
- Operating Pressure
- Power Consumption
- Life Requirement
- Description of pump function in the application
- Size
- Flow Rate Required
- Liquids
- Voltage
- Communications Protocol
- Motion Required

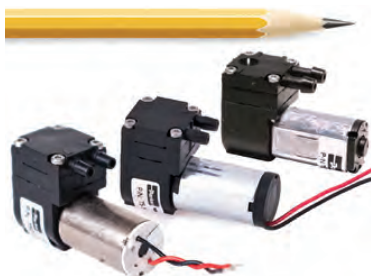


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[www.parker.com/precisionfluidics](http://www.parker.com/precisionfluidics)

# T2-05

## Micro Diaphragm Pumps (air/gas)

Up to 800 mLPM Free Flow



Parker's T2-05 13.5 mm wide micro diaphragm pump is designed to fit where other pumps cannot due to its small, compact package size. The T2-05 flow path is optimized to deliver high flow with high efficiency resulting in extended battery life. The pump's low power, small size, and light weight play a critical role in portable gas detection and medical applications. The T2-05 pump HE and LI pump models enable intrinsic safety capabilities for sampling of hazardous gases, typical of industrial and mining operations. The T2-05-IC is designed for non-explosive environment gas detection instruments and for portable medical devices used in wound therapy and patient monitoring applications.

### Typical Markets

- Safety
- Patient Therapy
- Patient Monitoring

### Typical Applications

- Portable Gas Detection
- Gas Sampling
- Medical Instruments
- Trace Detection
- Sidestream CO<sub>2</sub>
- Negative Pressure Wound Therapy

### Features

- The valve design has been optimized to provide the highest flow rates available with the lowest current draw, allowing for longer battery life and smaller instrument size.
- The T2-05 model pump life ranges up to 10,000 rated hours depending on motor (HE, LI and IC) options
- The pump fits into the extremely tight spaces demanded of today's handheld instruments, such as portable gas detectors and portable negative pressure wound therapy devices for patient mobility. The lightweight design minimizes instrument weight.
- RoHS compliant.

## Product Specifications\*

### Physical Properties

<b>Operating Environment<sup>1</sup>:</b>	-4 to 122°F (-20 to 50°C)
<b>Storage Environment:</b>	14 to 122°F (-10 to 50°C)
<b>Media:</b>	Air, Argon, Helium, Nitrogen, Oxygen, and other non-reacting gases
<b>Humidity:</b>	Most non-condensing gases 5-95% Relative Humidity
<b>Noise Level<sup>2</sup>:</b>	As low as 45dB
<b>Pump Assembly Rated Life<sup>3</sup>:</b>	Coreless Motor-Pump (HE): Up to 10,000 hours Coreless Motor-Pump (LI): Up to 4,000 hours PMDC Iron Core-Pump (IC): Up to 1,500 hours
<b>Weight:</b>	0.5 oz (14 g) HE and LI 0.4 oz (11 g) IC

### Electrical

<b>Motor Type (DC):</b>	High Efficiency Coreless Brush (HE) Low Inductance Coreless Brush (LI) PMDC Iron Core Brush (IC)
<b>Nominal Motor Voltages (DC)<sup>4</sup>:</b>	3.3 VDC
<b>Max Power at Nominal Voltage:</b>	0.36 Watts
<b>Electrical Termination:</b>	HE: Wire Leads LI: Wire Leads IC: Solder Tabs
<b>Current Range<sup>5</sup>:</b>	34 - 105 mA
<b>Inductance<sup>6</sup>:</b>	HE: 0.28 mH maximum @ 1kHz/50mV LI: 0.05 mH maximum @ 1kHz/50mV IC: 4.07 mH maximum @ 1kHz/50 mV

### Pneumatic

<b>Head Configuration:</b>	Single
<b>Maximum Flow:</b>	HE, LI: 800 smlpm, IC: 700 smlpm
<b>Maximum Intermittent Pressure<sup>7</sup>:</b>	6.2 psi (430 mbar)
<b>Maximum Continuous Pressure:</b>	2.0 psi (138 mbar)
<b>Maximum Intermittent Vacuum<sup>7</sup>:</b>	10.8 in Hg (274 mm Hg)
<b>Maximum Continuous Vacuum:</b>	4.1 in Hg (104 mm Hg)
<b>Filtration:</b>	40 micron recommended
<b>Efficiency at Free Flow<sup>8</sup>:</b>	LPM/Watt: 4.66 @ 1.9 VDC (P/N T5-1HE-03-1EEB) LPM/Watt: 4.08 @ 1.9 VDC (P/N T5-1LI-03-1EEB) LPM/Watt: 3.12 @ 1.9 VDC (P/N T5-1IC-03-1EEP)

### Wetted Materials

<b>Diaphragm:</b> EPDM	<b>Valves:</b> EPDM	<b>Pump Head:</b> ABS
------------------------	---------------------	-----------------------

\* See Appendix A for details.

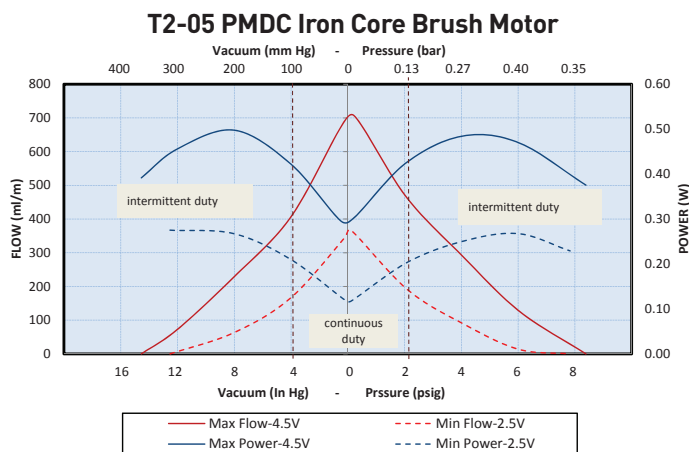
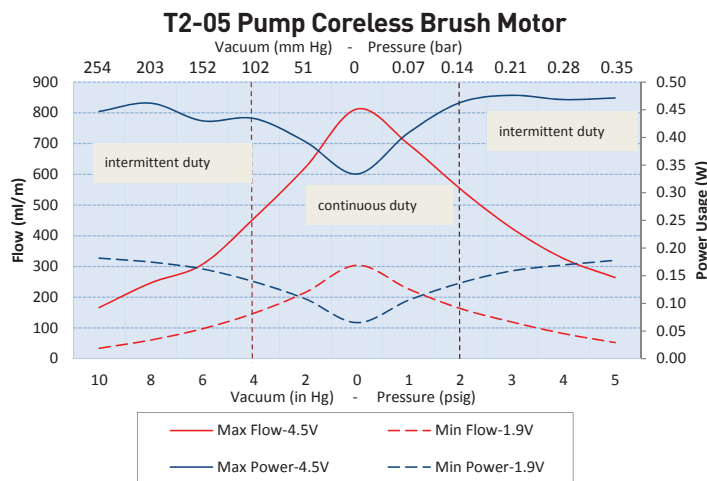


Micro Diaphragm Pumps (air/gas)

T2-05

Performance Specifications

Miniature Pumps



The above graphs represent examples of performance for the pumps series handling air at 800 feet (244M) above sea level at 75° F (24° C). Performance will vary depending on barometric pressure and media temperature. Curves are representative of standard pump configurations. Pump configurations could be customized for higher or lower flows, depending on specific customer requirements.

Please contact Parker Precision Fluidics Applications Engineering for other considerations



## T2-05

### Micro Diaphragm Pumps (air/gas)

#### Sizing and Selection

##### T2-05 Series

Coreless Brush Motor (High Efficiency)

Coreless Brush Motor (Low Inductance)

PMDC Iron Core Motor (Iron Core)



	HE	LI	IC
Inductance <sup>6</sup>	Better	Best	Good
Efficiency at Free Flow <sup>8</sup>	Best	Best	Better
Life <sup>3</sup>	Best	Better	Good
Cost	Good	Better	Best

##### Mounting Guidelines:

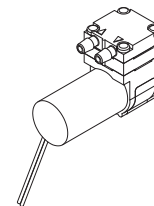
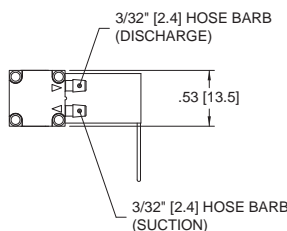
- Parker recommends using a nylon cable tie with a length of at least 4" (100 mm).

##### Port Connections:

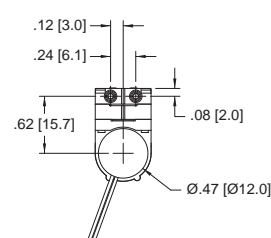
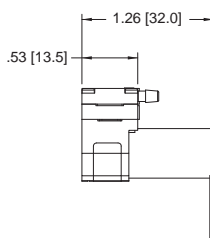
- Barbs are sized for 3/32" ID tubing.

#### Mechanical Integration

##### Dimensions



##### Coreless Brush/HE Version

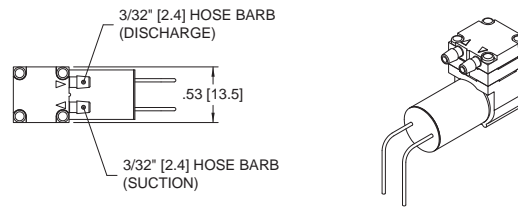


Micro Diaphragm Pumps (air/gas)

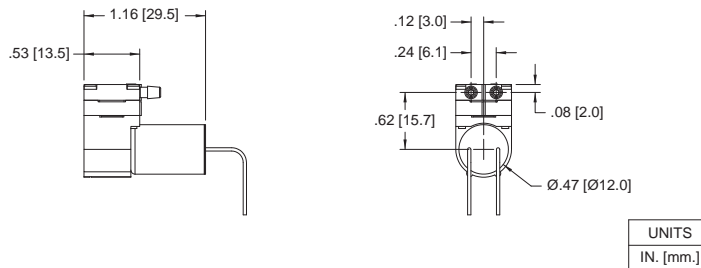
T2-05

Mechanical Integration

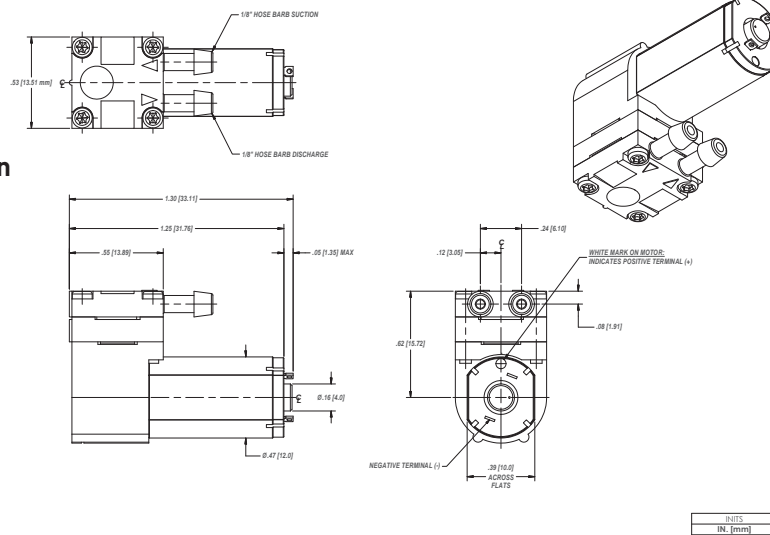
Dimensions



Coreless Brush/LI Version



PMDC Iron Core/IC Version



Miniature Pumps



## T2-05 Micro Diaphragm Pumps (air/gas)

### Electrical Integration and Motor Control

#### Coreless Brush Motor (HE, LI)

2 Wire	Red (+), Black (-)
Wire specification	28 AWG 5.7" (145 mm) Wire Leads

#### PMDC Iron Core Brush Motor (IC)

Tabs	Standard solder tabs for electrical connection
------	--

#### Key Things to Remember

5.7" (145 mm) flying Leads are the standard electrical connection method to the pump. Contact Parker Engineering for other connection requirements.

Pump life is highly dependent on operating conditions. It is not recommended to run the pump continuously, 100% duty cycle, at higher than 2 psig.

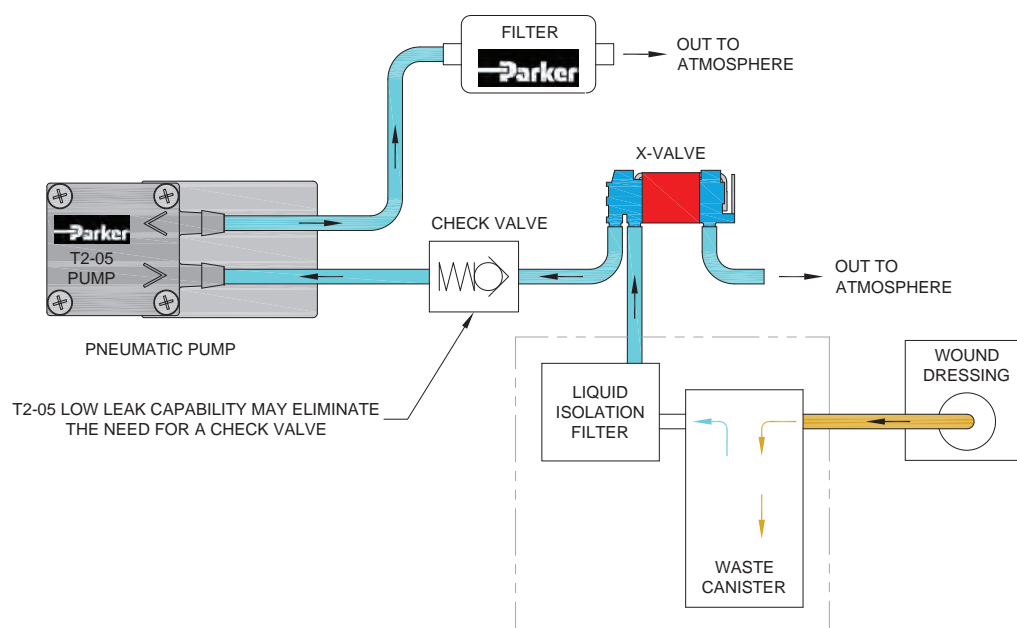
The pump flow and pressure can be controlled by adjusting the input voltage from zero to maximum rated voltage.

The pump is not a pressure holding device. An external check valve is recommended, if there is a pressure holding requirement.

Pump orientation does not affect performance or life.

### Typical Flow Diagram

#### Negative Pressure Wound Therapy Diagram

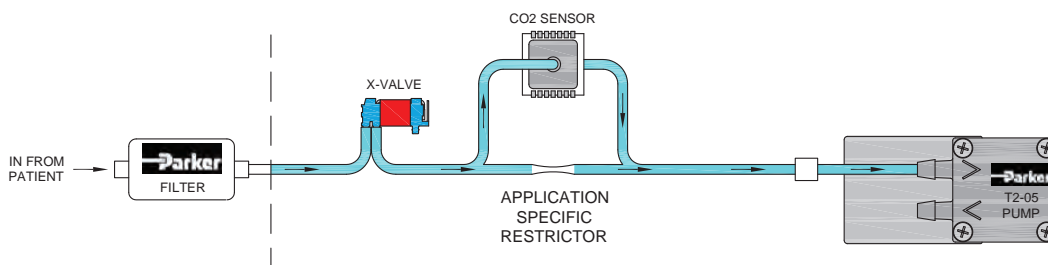


## Micro Diaphragm Pumps (air/gas)

## T2-05

## Typical Flow Diagram

## Side Stream Capnography Diagram



Miniature Pumps

## Ordering Information

## T2-05 Micro Pumps

Configuration	Vacuum: LPM @ Load			Free Flow	Pressure: LPM @ Load			Max		Motor Type	PCD*		Wetted Materials
	12 in Hg 305 mm Hg	8 in Hg 203 mm Hg	4 in Hg 102 mm Hg		2 psig 134 mbar	4 psig 276 mbar	6 psig 414 mbar	Vac in Hg	Press psig		VDC	mA	
<b>T5-1HE-03-1EEB</b>		0.2	0.5	<b>0.8</b>	0.6	0.3		10.8	6.2	Coreless Brush	4.5	438	EPDM
<b>T5-1LI-03-1EEB</b>		0.2	0.5	<b>0.8</b>	0.6	0.3		10.8	6.2	Coreless Brush	4.5	438	EPDM
<b>T5-1IC-03-1EEP</b>		0.2	0.5	<b>0.7</b>	0.5	0.3		10.0	6.2	PMDC	4.5	240	EPDM

\*PCD: Peak Current Draw

Please refer to sizing and selection chart for identifying which one will fit your application

Please click on the Order On-line button below (or go to [www.parker.com/precisionfluidics/t5](http://www.parker.com/precisionfluidics/t5)) to configure your T2-05 Micro Diaphragm Pump.

Serviceable – PPF products are designed for use through the rated life and Parker does not sell replacement parts, nor is it recommended to service these in the field

Note: In addition to Parker's innovative and flexible pump designs, we offer applications engineering expertise to our customers in order to configure and recommend the optimal pump for the application. Contact Parker Applications Engineering to discuss and configure alternate pump configurations to meet your specific application requirements. Providing information on the following requirements will assist us in developing an optimal solution for your application:

- Noise
  - Operating Pressure / Vacuum
  - Power Consumption
  - Life Requirement
- Size
  - Motor Control
  - Media
  - Voltage



**T2-05****Micro Diaphragm Pumps (air/gas)****Appendix A**

All performance data is typical based on standard conditions: 70°F and 14.7 psia (21°C and 1 bar).

1. Duty Dependent. For operation above 122°F (50°C) consult factory
2. Noise is dependent on the configuration and operation of the pump in the application. Parker has the ability to tailor the pump configuration when noise is a critical criterion in the effort to meet the performance requirements of the application. Noise level is tested to Parker protocol P-105.
3. Life rating can vary depending on application and operating conditions.
4. Custom motor options available. Custom motors may require a significant application potential. The standard motors can be configured with a special winding to meet a particular operation point at a specified voltage
5. Current range is dependent on motor type, voltage, pressure/vacuum and flow requirement. Lower levels possible depending on application.
6. Inductance is an indicator of induced voltage with change in current and it is a key parameter to enable customers' low energy intrinsic safety systems
7. Maximum intermittent pressure/vacuum data is a pump capability guideline for applications that go beyond the maximum continuous levels for short periods of time. Please consult customer specific requirements with the factory or Applications Engineering.
8. Pump efficiency is a measure of the flow rate generated per unit of power consumed. Efficiency may change dependent on application and operating condition at free flow.

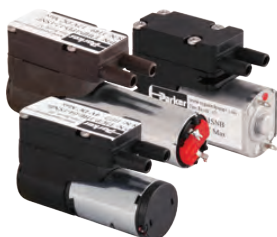


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# T2-03

Up to 2.5 LPM Free Flow



## Micro Diaphragm Pumps (air/gas)

T2-03 micro diaphragm pump series is ideal for higher performance, fixed and portable air and gas detection, and medical applications requiring flow up to 2.5 lpm. T2-03 pumps are proven in fixed and portable applications for sampling of hazardous gases and vapors typical of industrial and mining operations.

### Features

- The valve design has been optimized to provide the highest flow rates available with the lowest power draw in this package size. Lower power results in longer battery life and smaller instrument size.
- The wear components of these pumps have been designed to provide maximum life. Many applications for these pumps require 10,000+ hours of operation.
- The pumps fit into the extremely tight spaces demanded of today's handheld instruments, such as portable gas detectors and portable instruments such as handheld gas detectors and medical devices. The lightweight design minimizes instrument weight.
- RoHS compliant.

### Typical Applications

- Gas Sampling
- Fixed Gas Detectors
- Medical Instruments
- Aerosols and Particle Analysis
- Combustion Analyzers

## Product Specifications\*

### Physical Properties

<b>Operating Environment<sup>1</sup>:</b>
32 to 122°F (0 to 50°C)
<b>Storage Environment:</b>
14 to 122°F (-10 to 50°C)
<b>Humidity:</b>
5-95% Relative Humidity
<b>Noise Level<sup>2</sup>:</b>
As low as 45dB
<b>Pump Assembly Rated Life<sup>3</sup>:</b>
eCompact - 5,000 hrs
Compact - 10,000 hrs
HP - 10,000 hrs
<i>Pressure and speed dependent.</i>
<b>Weight:</b>
1.2 oz. (33 g) eCompact
1.2 oz. (33 g) Compact
1.5 oz. (42 g) HP

### Wetted Materials

<b>Diaphragm:</b>
Neoprene, EPDM, FKM
<b>Valves:</b>
Silicone, FKM
<b>Pump Head:</b>
ABS, PPS

### Electrical

<b>Motor Type:</b>
PMDC Iron Core Brush, Coreless Brush
<b>Nominal Motor Voltages<sup>4</sup>:</b>
4, 5.6, 8.3, 12.4 VDC
<b>Max Power at Nominal Voltage:</b>
eCompact - PMDC Iron Core Brush 2.4 Watts (298 mA @ 8VDC)
Compact - Coreless Brush Motor 2.3 Watts (386 mA @ 6 VDC)
HP - Coreless Brush Motor 0.7 Watts (88 mA @ 8 VDC)
<b>Electrical Termination:</b>
PMDC Iron Core Brush - Solder Tabs Coreless Brush - 5.7 in (145 mm) Wire Leads
<b>Current Range<sup>5</sup>:</b>
18 - 411 mA
<b>Inductance<sup>6</sup>:</b>
eCompact: 18.64 mH max@1kHz/50mV
Compact: 0.47 mH max@1kHz/50mV
HP: 3.4 mH max@1kHz/50mV

### Pneumatic

<b>Head Configuration:</b>
Single
<b>Maximum Flow:</b>
2.5 LPM
<b>Maximum Intermittent Pressure<sup>7</sup>:</b>
12 psi (832 mbar)
<b>Maximum Continuous Pressure:</b>
2 psi (138 bar) - eCompact PMDC Iron Core Brush, Compact Coreless Brush Motor 8 psi (555 mbar) - HP Coreless Brush Motor
<b>Maximum Intermittent Vacuum<sup>7</sup>:</b>
20.8 in Hg (527 mm Hg)
<b>Maximum Continuous Vacuum:</b>
eCompact PMDC Iron Core Brush 4 psi (102 mbar)
Compact Coreless Brush Motor 4 psi (102 mbar)
HP Coreless Brush Motor 12 psi (305 mbar)
<b>Filtration:</b>
40 micron recommended
<b>Efficiency at Free Flow<sup>8</sup>:</b>
eCompact PMDC Iron Core Brush Motor: 3.56 LPM/Watt (P/N: T3EP-1ST-05-3FFP)
Compact Coreless Brush Motor: 11.92 LPM/Watt (P/N: T3CP-1HE-04-2SEB)
HP Coreless Brush Motor: 15.28 LPM/Watt (P/N: T3HP-1PD-12-1SNP)

\* See Appendix A for details.



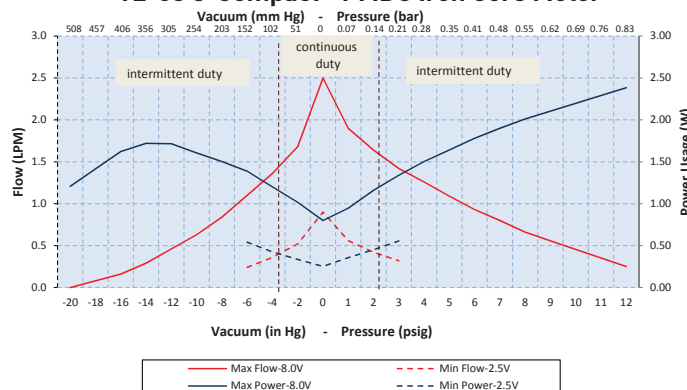
## Micro Diaphragm Pumps (air/gas)

## T2-03

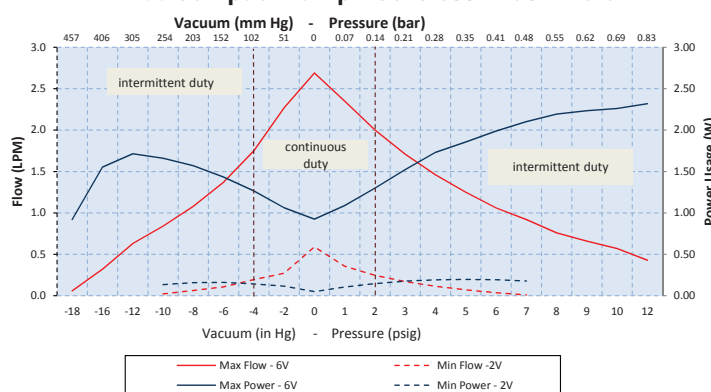
## Performance Specifications

Miniature Pumps

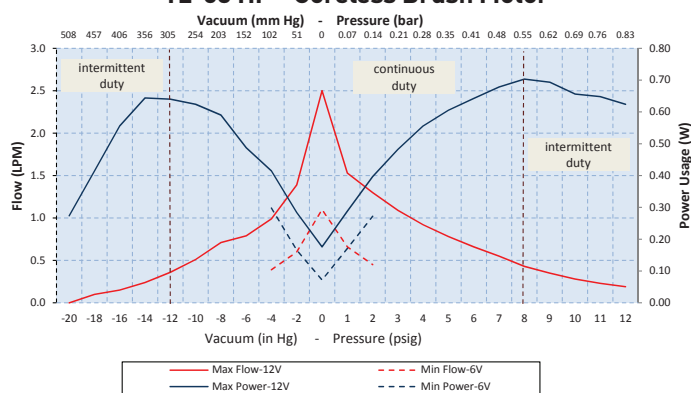
T2-03 e-Compact - PMDC Iron Core Motor



T2-03 Compact Pump - Coreless Brush Motor



T2-03 HP - Coreless Brush Motor



The above graphs represent examples of performance for the pumps series handling air at 800 feet (244M) above sea level at 75° F (24° C). Performance will vary depending on barometric pressure and media temperature. Curves are representative of standard pump configurations. Pump configurations could be customized for higher or lower flows, depending on specific customer requirements.

Please contact Parker Precision Fluidics Applications Engineering for other considerations.



## T2-03 Micro Diaphragm Pumps (air/gas)

### Sizing and Selection

#### T2-03 Series

PMDC Iron Core Brush Motor (eCompact)

Coreless Brush Motor (Compact)

Coreless Brush Motor (HP)



	eCompact	Compact	HP
Inductance <sup>6</sup>	Good	Best	Better
Efficiency at Free Flow <sup>8</sup>	Good	Better	Best
Life <sup>3</sup>	Good - 5,000 hours	Best - 10,000 hours	Best - 10,000 hours
Size/Weight	Better	Best	Good
Cost	Best	Better	Good

#### Mounting Guidelines:

- For eCompact, Parker recommends mounting with (2) #1 screw or using a nylon cable tie with a length of at least 4" (100 mm)
- For Compact & HP, Parker recommends using a nylon cable tie with a length of at least 4" (100 mm)

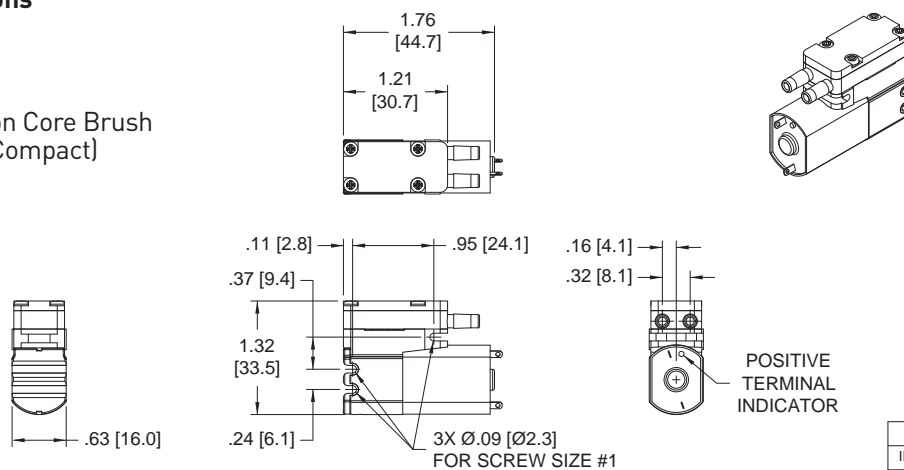
#### Port Connections:

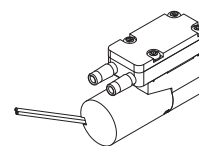
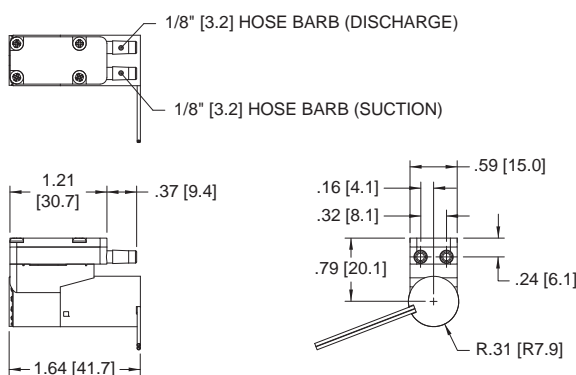
- Barbs are sized for 1/8" ID tubing, 70-80 durometer recommended.
- Flow direction is marked on the pump head with arrows.

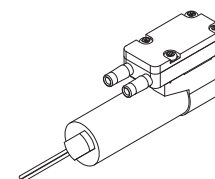
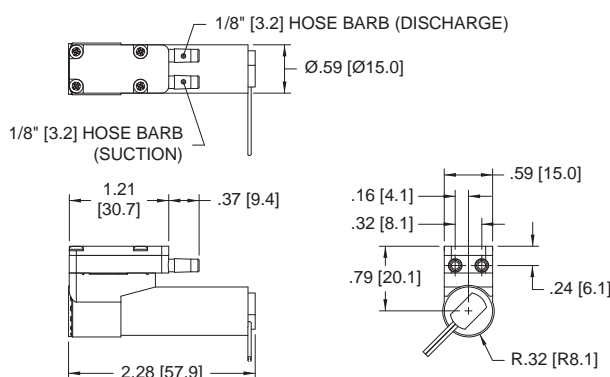
### Mechanical Integration

#### Dimensions

PMDC Iron Core Brush Motor (eCompact)



**Micro Diaphragm Pumps (air/gas)**
**T2-03**
**Dimensions**
**Coreless Brush Motor (Compact)**

 UNITS  
IN. [mm.]

**Coreless Brush Motor (HP)**

 UNITS  
IN. [mm.]

## Electrical Integration and Motor Control

If application requires variable flow, motor control options are available, as follows:

**PMDC Iron Core Brush Motor (eCompact)**

2 Solder Tabs	Positive terminal marked on pump motor
---------------	--

**Coreless Brush Motor (Compact & HP)**

2 Wire	Red (+), Black (-)
Wire specification	28 AWG Wire lead length 5.7" (145 mm)



## T2-03

### Micro Diaphragm Pumps (air/gas)

## Electrical Integration and Motor Control cont'd

### Key Things to Remember

5" (127 mm) flying Leads are the standard electrical connection method to the pump (eCompact standard connection is tabs). Contact Applications for other connection requirements.

The pump lead wires are non-polarized.

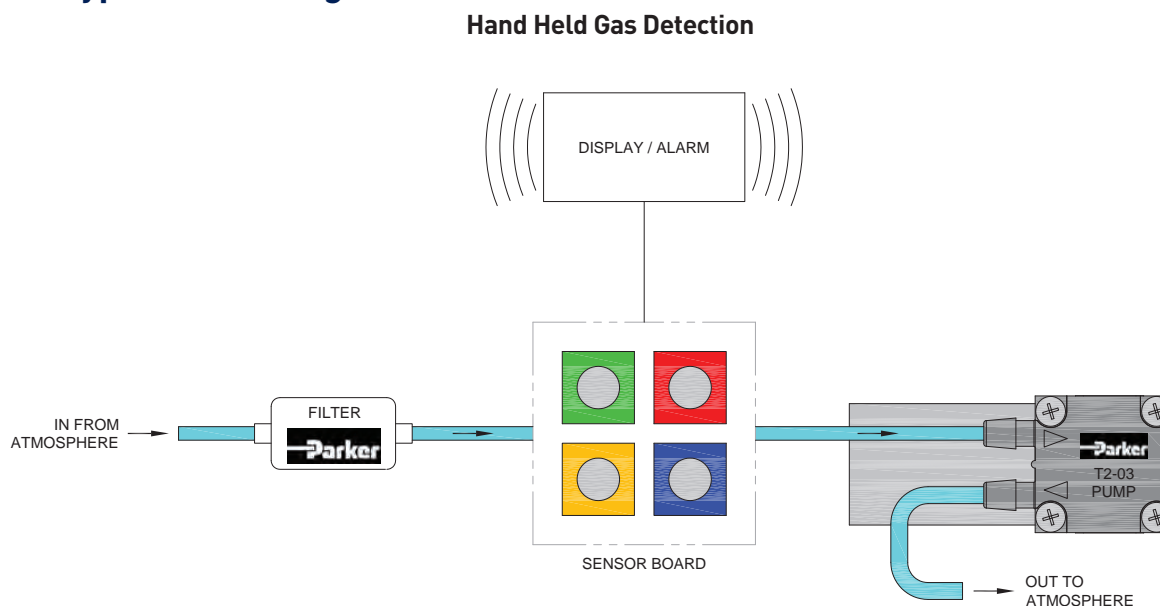
The pump can be controlled by DC voltage or PWM. The minimum recommended PWM frequency is 20kHz.

The pump flow and pressure can be controlled by adjusting the input voltage from zero to maximum rated voltage.

The pump is not a pressure holding device. An external check valve is recommended, if there is a pressure holding requirement.

Pump orientation does not affect performance or life.

## Typical Flow Diagram



## Micro Diaphragm Pumps (air/gas)

## T2-03

## Ordering Information

## T2-03 Micro Pumps

Configuration	Vacuum: LPM @ Load					Free Flow 0	Pressure: LPM @ Load					Max		PCD <sup>1</sup>		Wetted Materials <sup>2</sup> Diaphragm, Valves, Gasket	
	18 in Hg 457 mm Hg	16 in Hg 406 mm Hg	12 in Hg 305 mm Hg	8 in Hg 203 mm Hg	4 in Hg 102 mm Hg		2 psig 134 mbar	4 psig 276 mbar	6 psig 414 mbar	8 psig 552 mbar	10 psig 689 mbar	Vac in Hg	Press psig	Motor Type	VDC		mA
<b>T3CP-1HE-04-1SNB</b>				0.3	0.9	<b>2.5</b>	1.1	0.5			8.6	4.5	Coreless Brush	4	313	CR, VMQ, CR	
<b>T3CP-1HE-04-2SEB</b>				0.1	0.3	<b>1.1</b>	0.5	0.2			10.4	5.5	Coreless Brush	4	103	EPDM, VMQ, CR	
<b>T3CP-1HE-06-1SNB</b>				0.6	1.2	<b>2.8</b>	1.5	0.8	0.5		12.2	6.5	Coreless Brush	6	317	CR, VMQ, CR	
<b>T3EP-1ST-05-3FFP</b>			0.3	0.6	0.8	<b>1.5</b>	1.2	0.7	0.6	0.4	16.7	11.7	PMDC Brush	5.6	411	FKM	
<b>T3EP-1ST-08-1SNB</b>		0.2	0.6	0.7	1.3	<b>2.5</b>	1.6	1.2	0.7	0.6	20.8	10.5	PMDC Brush	8.3	385	CR, VMQ, CR	
<b>T3HP-1PD-12-1SNP</b>		0.2	0.4	0.7	1.0	<b>2.5</b>	1.3	0.9	0.7	0.4	0.3	18.0	12	Coreless Brush	12.4	97	CR, VMQ, CR

1. PCD: Peak Current Draw 2. CR: Neoprene, VMQ: Silicone, FKM: Fluorocarbon, EPDM: Ethylene Propylene Diene Monomer

Please click on the Order On-line button below (or go to [www.parker.com/precisionfluidics/t3](http://www.parker.com/precisionfluidics/t3)) to configure your T2-03 Micro Diaphragm Pump.

Serviceable – PPF products are designed for use through the rated life and Parker does not sell replacement parts, nor is it recommended to service these in the field

Note: In addition to Parker's innovative and flexible pump designs, we offer applications engineering expertise to our customers in order to configure and recommend the optimal pump for the application. Contact Parker Applications Engineering to discuss and configure alternate pump configurations to meet your specific application requirements. Providing information on the following requirements will assist us in developing an optimal solution for your application:

- Noise
- Operating Pressure / Vacuum
- Power Consumption
- Life Requirement
- Size
- Motor Control
- Media
- Voltage



**T2-03****Micro Diaphragm Pumps (air/gas)****Appendix A**

All performance data is typical based on standard conditions: 70°F and 14.7 psia (21°C and 1 bar).

1. Duty Dependent. For operation above 122°F (50°C) consult factory
2. Noise is dependent on the configuration and operation of the pump in the application. Parker has the ability to tailor the pump configuration when noise is a critical criterion in the effort to meet the performance requirements of the application. Noise level is tested to Parker protocol P-105.
3. Life rating can vary depending on application and operating conditions.
4. Custom motor options available. Custom motors may require a significant application potential. The standard motors can be configured with a special winding to meet a particular operation point at a specified voltage
5. Current range is dependent on motor type, voltage, pressure/vacuum and flow requirement. Lower levels possible depending on application.
6. Inductance can be used to measure the viability of a component in a device requiring intrinsic safety.
7. Maximum intermittent pressure/vacuum data is a pump capability guideline for applications that go beyond the maximum continuous levels for short periods of time. Please consult customer specific requirements with the factory or Applications Engineering.
8. Pump efficiency is a measure of the flow rate generated per unit of power consumed. Efficiency may change dependent on application and operating condition at free flow.



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# CTS Series

2.5 LPM Free Flow



## Micro Diaphragm Pumps (air/gas)

Parker's CTS Micro Diaphragm Pump Model delivers up to 2.5 slpm of flow into a compact 20 mm wide package. Configurable with three different motors to meet your application's specific needs and life expectations

### Features

- CTS Series Pumps set the highest benchmark for service free life-expectancy with our advanced proprietary diaphragm elastomer.
- CTS Series Pumps have a unique, compact, and lightweight design making it ideal for portable applications.
- Our 100% oil and grease-free pump and compressor design maintains the purity of your system and are commonly used in FDA-approved systems.
- CTS Series Pumps are uniquely balanced to minimize noise and vibration and to maximize life.
- RoHS compliant.

### Typical Applications:

- Gas Analyzers
- Patient Monitoring
- CO<sub>2</sub> Monitors
- Compression Therapy
- Negative Pressure Wound Therapy
- Surgical Instruments
- Medical Consumer Devices

## Product Specifications\*

### Physical Properties

<b>Operating Environment<sup>1</sup>:</b>
41 to 122°F (5 to 50°C)
<b>Storage Environment:</b>
-4 to 212°F (-20 to 100°C)
<b>Media:</b>
Air, Argon, Helium, Nitrogen, Oxygen, and other non-reacting gases
<b>Humidity:</b>
0 – 80% Relative Humidity
<b>Noise Level<sup>2</sup> :</b>
As low as 45 dB @ 12 in (30 cm)
<i>Muffler recommended for additional noise reduction (see accessories)</i>
<b>Pump Assembly Rated Life<sup>3</sup> :</b>
PMDC Iron Core Brush - 1,500 hrs
Coreless Brush - 3,000 hrs
Brushless Slotless - 10,000 hrs
<b>Weight:</b>
1.7 oz. (48 g) PMDC Iron Core Brush
1.6 oz. (45 g) Coreless Brush
2.2 oz. (62 g) Brushless Slotless

### Electrical

<b>Motor Type (DC):</b>
PMDC Iron Core Brush
Coreless Brush
Brushless Slotless
<b>Nominal Motor Voltages<sup>4</sup>:</b>
PMDC Iron Core Brush: 6, 9, 12, 24 VDC
Coreless Brush: 6, 9, 12, 24 VDC
Brushless Slotless: 6, 9, or 12 VDC
<i>Other voltages available upon request.</i>
<b>Electrical Termination:</b>
Iron Core Brush: Metal Terminals
Brush: 24 AWG Wire Leads, Length 20" (508 mm)
Brushless Slotless: 24 AWG Wire Leads, Length 20" (508 mm)
<b>Current Range<sup>5</sup>:</b>
240 - 880 mA

### Pneumatic

<b>Head Configuration:</b>
Single
<b>Maximum Unrestricted Flow:</b>
2.5 LPM
<b>Pressure Range:</b>
0 - 24 psig (0 - 1.65 bar)
<b>Vacuum Range:</b>
0 - 20 in Hg (0 - 508 mm Hg)
<b>Filtration:</b>
40 microns - recommended
<b>Efficiency at Free Flow<sup>6</sup>:</b>
PMDC Iron Core Brush: 1.7 LPM/Watt (PN: E107-12-090)
Coreless Brush: 2.8 LPM/Watt (PN: E165-11-060)
Brushless Slotless: 1.8 LPM/Watt (PN: E247-12)
<b>Wetted Materials</b>
<b>Diaphragm:</b>
EPDM, AEPDM, Viton
<b>Valves:</b>
EPDM, AEPDM, Viton
<b>Pump Head:</b>
PSU (Polysulfone)

\* See Appendix A for details.

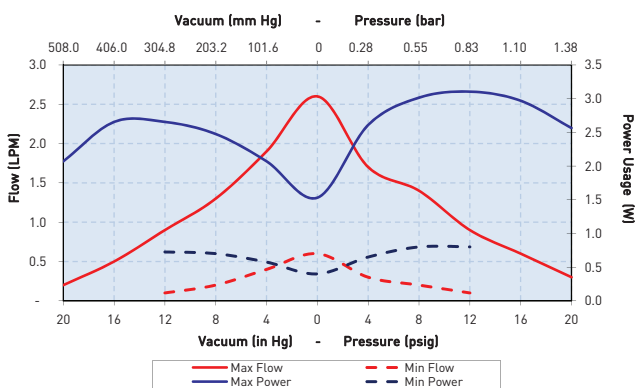


## Micro Diaphragm Pumps (air/gas)

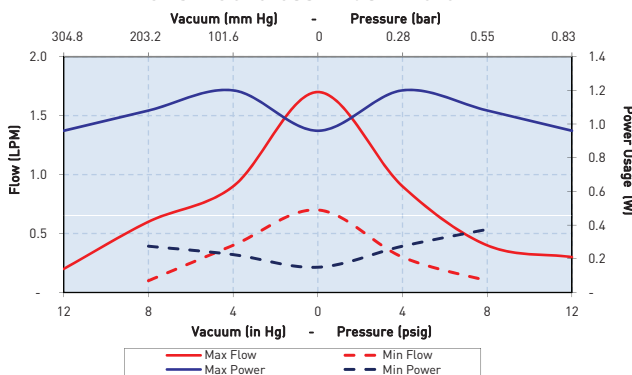
## CTS Series

## Performance Specifications

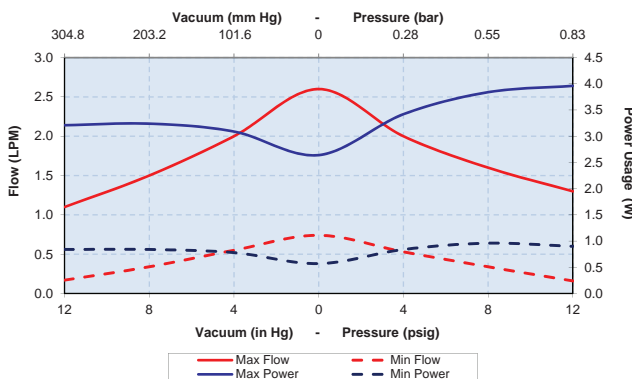
## CTS - PMDC Iron Core Brush



## CTS - Coreless Brush Motor



## CTS - Brushless Slotless Motor



The above graphs represent an example of performance for the pump series handling air at 800 feet (244 m) above sea level at 75°F (24°C). Performance will vary depending on barometric pressure and media temperature. A variety of configurations can be accommodated to meet application requirements. Curves are representative of standard pump configurations. Pump configurations could be customized for higher or lower flows depending on specific customer requirements.

Please contact Parker Precision Fluidics Applications Engineering for other considerations.



## CTS Series

### Micro Diaphragm Pumps (air/gas)

#### Sizing and Selection

CTS Series

PMDC Iron Core Brush

Coreless Brush Motor

Brushless Slotless Motor



	PMDC Iron Core Brush	Coreless Brush Motor	Brushless Slotless Motor
<b>Efficiency<sup>1</sup></b>	Good	Best - Brush Motor Efficiency Up to 90% motor efficiency	Better Up to 75% motor efficiency
<b>Life<sup>2</sup></b>	Good - 1,500 hrs	Better - 3,000 hrs	Best - 10,000 hrs
<b>Cost</b>	Best	Better	Premium
<b>Noise</b>	Good	Better	Best

See Appendix A for details.

#### Mounting Guidelines:

- Mounting may be accomplished by using double-sided tape or wire zip ties secured to the motor housing.
- Hole in the center of the bottom of housing is for manufacturing only—not to be used for mounting.

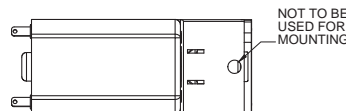
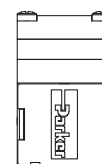
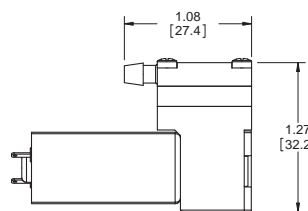
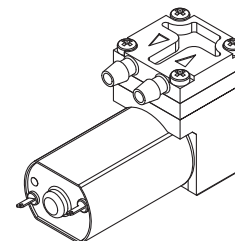
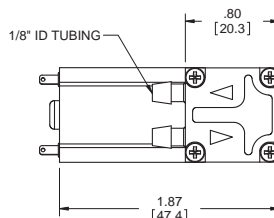
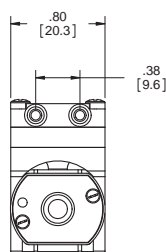
#### Port Connections:

- Barbs are sized for 1/8" [3 mm] ID tubing, 70-80 durometer recommended.
- Flow direction is marked on the pump head with arrows.

## Mechanical Integration

### Dimensions

PMDC Iron Core Brush



UNITS
IN. (mm)



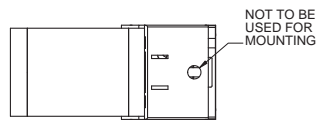
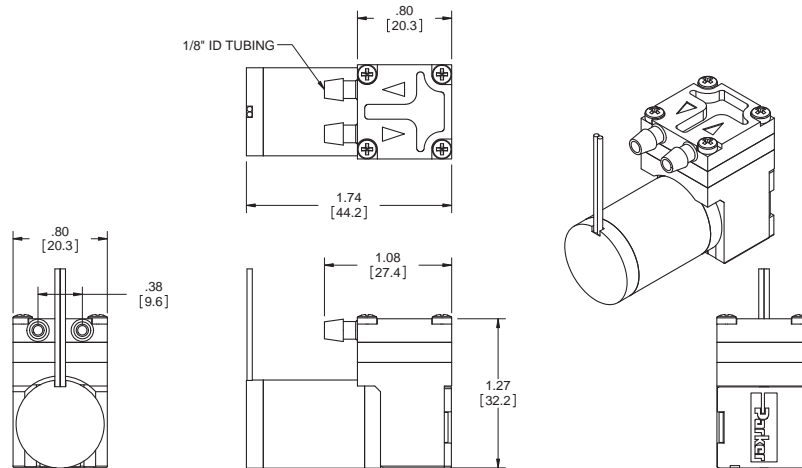
Micro Diaphragm Pumps (air/gas)

CTS Series

Mechanical Integration

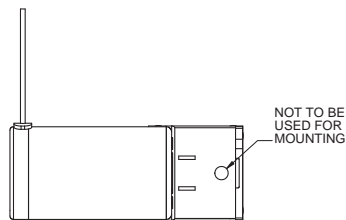
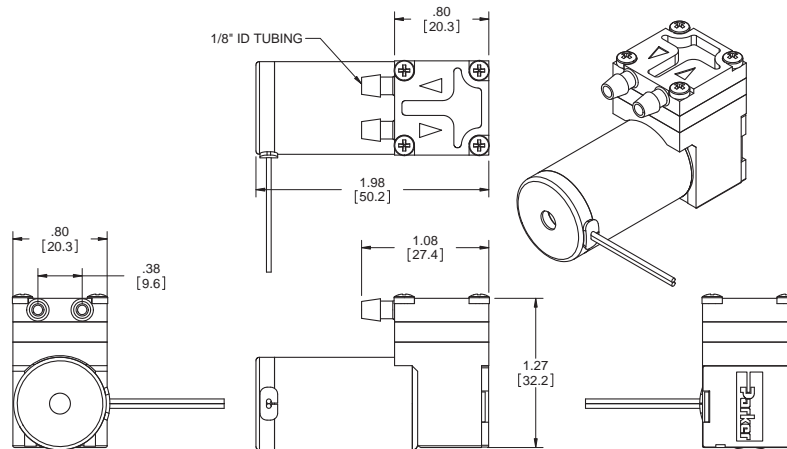
Dimensions

Coreless Brush Motor



UNITS
IN. [mm]

Brushless Slotless



UNITS
IN. [mm]



Miniature Pumps

## CTS Series

### Micro Diaphragm Pumps (air/gas)

## Electrical Integration and Motor Control

### PMDC Iron Core Brush Motor

Metal Terminals	Polarity of the terminals is marked on the motor with the red dot marking the positive terminal.
-----------------	--

### Coreless Brush Motor

2 Wire	Red (+), Black (-)
Wire specification	24AWG, Insulation OD 0.038 in (0.97 mm), 20" (508 mm) Wire Leads

### Brushless Slotless

2 Wire	Red (+), Black (-)
Wire specification	24AWG, Insulation OD 0.042 in (1.07 mm), 20" (508 mm) Wire Leads

### Key Things to Remember

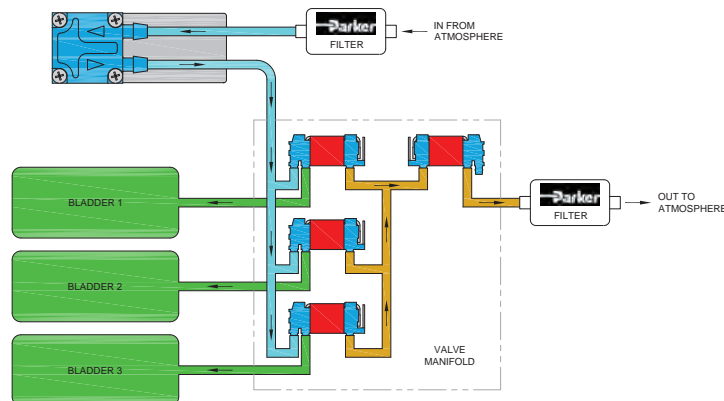
The pump is not a pressure holding device. An external check valve is recommended, if there is a pressure holding requirement.

Onboard PWM control is not provided with this pump.

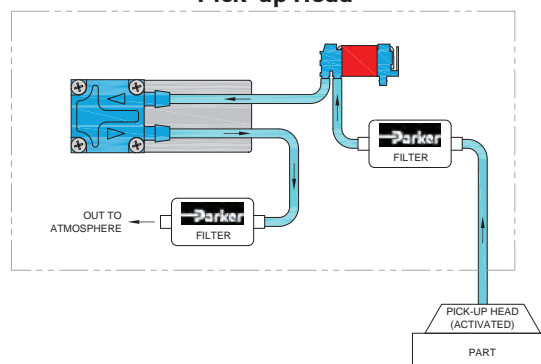
Pump orientation does not affect performance or life.

## Typical Flow Diagram

### Compression Therapy Prevention (DVT)



### Pick-up Head



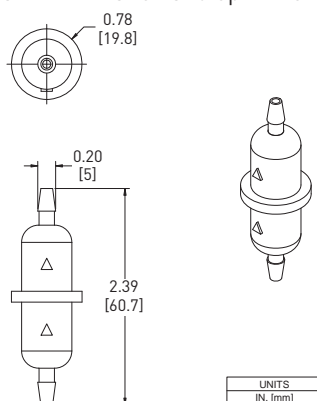
## Micro Diaphragm Pumps (air/gas)

## CTS Series

### Accessory Information

Filter-Mufflers also available to assist with filtration and optimize noise reduction.

Part Number: 00492-15  
(Filters to 10 microns)



Variations in motor type, operating voltage, flow, pressure, diaphragm design, stroke length, head orientation, and wetted materials provide multiple choices for an optimal application to meet customer requirements.

### Ordering Information

#### CTS Single Head Pumps - General Purpose

Part No.	Vacuum: LPM @ Load						Free Flow	Pressure: LPM @ Load								Max		Motor Type	VDC	mA	Diaphragm Valves-Gasket
	24 in Hg 588 mm Hg	20 in Hg 508 mm Hg	16 in Hg 406 mm Hg	12 in Hg 305 mm Hg	8 in Hg 203 mm Hg	4 in Hg 102 mm Hg		0	4 psig 276 mbar	8 psig 552 mbar	12 psig 827 mbar	16 psig 1103 mbar	20 psig 1379 mbar	24 psig 1655 mbar	28 psig 1931 mbar	Vac in Hg	Press psig				
E107-12-090		0.2	0.5	0.9	1.3	1.9	2.6									22.5		Brush PMDC	9	295	EPDM, EPDM
E129-13-120							2.6	1.8	1.4	1.0	0.8	0.5					21.5	Brush PMDC	12	345	AEPDM, EPDM
E107-13-090							2.5	1.7	1.4	0.9	0.6	0.3					23.5	Brush PMDC	9	345	AEPDM, EPDM
E129-12-120		0.2	0.5	0.9	1.4	1.9	2.5									22.0	Brush PMDC	12	265	EPDM, EPDM	
E129-12-090		0.1	0.4	0.6	1.0	1.4	2.0									22.0	Brush PMDC	9	250	EPDM, EPDM	
E129-13-090							2.0	1.3	1.0	0.7	0.5	0.4	0.2			30.0	Brush PMDC	9	330	AEPDM, EPDM	
E163-11-120				0.2	0.8	1.2	2.0	1.1	0.6	0.3					16.0	14.5	Brush PMDC	12	180	AEPDM, EPDM	
E107-12-050			0.1	0.3	0.6	0.9	1.8								20.5		Brush PMDC	5	270	EPDM, EPDM	
E107-12-060			0.2	0.4	0.7	1.0	1.8								20.5		Brush PMDC	6	265	EPDM, EPDM	
E257-11					0.8	1.2	1.8	1.1	0.7						15.5	14.0	BLDC Slotless	12	175	AEPDM, EPDM	
E134-11-120				0.2	0.6	0.9	1.7	0.9	0.4	0.3					14.0	14.0	Coreless Brush	12	100	AEPDM, EPDM	
E155-11-120				0.3	0.6	1.1	1.7	1.2	0.8	0.2					15.0	15.0	Brush PMDC	12	180	EPDM, EPDM	
E161-11-060				0.2	0.6	0.9	1.7	1.0	0.5	0.1					15.5	15.0	Brush PMDC	6	300	AEPDM, EPDM	
E162-11-090				0.3	0.7	1.1	1.6	1.0	0.6	0.3					15.5	15.0	Brush PMDC	9	200	AEPDM, EPDM	
E165-11-090				0.3	0.7	1.1	1.6	1.1	0.7	0.4					15.5	13.5	Coreless Brush	9	140	AEPDM, EPDM	
E164-11-060			0.1	0.3	0.6	1.0	1.5	1.0	0.6	0.3	0.1				17.0	17.5	Coreless Brush	6	200	AEPDM, EPDM	
E155-11-090				0.2	0.5	0.8	1.3	0.8	0.4	0.2					15.0	15.0	Brush PMDC	9	170	EPDM, EPDM	
E242-12			0.3	0.5	0.7	1.0	1.3								22.0		BLDC Slotless	6	300	AEPDM, EPDM	
E129-12-060			0.1	0.3	0.5	0.8	1.2								20.0		Brush PMDC	6	275	EPDM, EPDM	
E134-11-090				0.1	0.4	0.6	1.2	0.6	0.3	0.2					14.0	14.0	Coreless Brush	9	70	AEPDM, EPDM	
E244-11				0.3	0.5	0.9	1.2	0.9	0.6	0.3					16.0	16.0	Coreless BLDC Slotless	9	160	AEPDM, EPDM	

Note: The Ordering Information Section includes a few selected part numbers for the product line. Other performances and configurations are available. Please contact your Sales Representative or an Application Engineer to discuss your application needs.

\*PCD: Peak Current Draw



## CTS Series

## Micro Diaphragm Pumps (air/gas)

### Ordering Information

#### CTS Single Head Pumps - General Purpose

Part No.	Vacuum: LPM @ Load						Free Flow	Pressure: LPM @ Load						Max		Motor Type	VDC	PCD* mA	Wetted Materials	
	24 in Hg 588 mm Hg	20 in Hg 508 mm Hg	16 in Hg 406 mm Hg	12 in Hg 305 mm Hg	8 in Hg 203 mm Hg	4 in Hg 102 mm Hg		0	4 psig 276 mbar	8 psig 55 mbar	12 psig 827 mbar	16 psig 1103 mbar	20 psig 1379 mbar	24 psig 1655 mbar	28 psig 1931 mbar					Vac in Hg
E161-11-050				0.2	0.4	0.8	1.1	0.8	0.4	0.2					16.5	16.5	Brush PMDC	5	300	AEPDM, EPDM
E165-11-060				0.2	0.4	0.7	1.1	0.7	0.4	0.2					13.5	13.5	Coreless Brush	6	135	AEPDM, EPDM
E162-11-060				0.2	0.4	0.7	1.0	0.6	0.4	0.2					16.0	16.0	Brush PMDC	6	190	AEPDM, EPDM
E258-11					0.3	0.7	1.0	0.7	0.2						11.0	9.5	BLDC Slotless	12	135	AEPDM, EPDM
E134-11-060				0.1	0.2	0.4	0.9	0.3	0.2	0.1					14.0	14.0	Coreless Brush	6	80	AEPDM, EPDM
E193-11-120					0.3	0.5	0.9	0.5	0.1						12.5	10.0	Brush PMDC	12	110	AEPDM, EPDM
E155-11-060				0.1	0.3	0.5	0.7	0.4	0.2	0.1					15.0	15.0	Brush PMDC	6	160	EPDM, EPDM
E243-11				0.2	0.3	0.6	0.7	0.5	0.3	0.2					16.0	14.5	BLDC Slotless	6	160	AEPDM, EPDM
E134-11-050				0.1	0.2	0.4	0.5	0.3	0.2						15.5	15.5	Coreless Brush	5	90	AEPDM, EPDM

Note: The Ordering Information Section includes a few selected part numbers for the product line. Other performances and configurations are available. Please contact your Sales Representative or an Application Engineer to discuss your application needs.

\*PCD: Peak Current Draw

### Accessory Information

Part No.	Filtering Level (Micron)	Filter Area	Internal Volume	Operating Limitations:			Wetted Materials
				Max Temperature	Min Temperature	Max Pressure	
00492-15	10	1.71 in <sup>2</sup> (11 cm <sup>2</sup> )	0.24 in <sup>3</sup> (3.9 cm <sup>3</sup> )	80°C	32°C	65 PSI (4.48 bar)	Polypropylene
Filter-Mufflers: To assist with filtration and optimize noise reduction. Tubing: Recommendation 1/8" (3mm) ID.							

Please click on the Order On-line button below (or go to [www.parker.com/precisionfluidics/cts](http://www.parker.com/precisionfluidics/cts)) to configure the CTS Miniature Diaphragm Pump for your application.

Serviceable – PPF products are designed for use through the rated life and Parker does not sell replacement parts, nor is it recommended to service these in the field

Note: In addition to Parker's innovative and flexible pump designs, we offer applications engineering expertise to our customers in order to configure and recommend the optimal pump for the application. Contact Parker Applications Engineering to discuss and configure alternate pump configurations to meet your specific application requirements. Providing information on the following requirements will assist us in developing an optimal solution for your application:

- Noise
- Operating Pressure / Vacuum
- Power Consumption
- Life Requirement
- Function in the Application
- Size
- Motor Control
- Media
- Voltage



**Micro Diaphragm Pumps (air/gas)****CTS Series****Appendix A**

All performance data is typical based on standard conditions: 70°F and 14.7 psia (21°C and 1 bar).

1. Duty Dependent. For operation above 122°F (50°C) consult factory
2. Noise is dependent on the configuration and operation of the pump in the application. Parker has the ability to tailor the pump configuration when noise is a critical criterion in the effort to meet the performance requirements of the application. Noise level is tested to Parker protocol P-105.
3. Life rating can vary depending on application and operating conditions.
4. Custom motor options available. Custom motors may require a significant application potential. The standard motors can be configured with a special winding to meet a particular operation point at a specified voltage
5. Current range is dependent on motor type, voltage, pressure/vacuum and flow requirement. Lower levels possible depending on application.
6. Pump efficiency is a measure of the flow rate generated per unit of power consumed. Efficiency may change dependent on application and operating condition at free flow.



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# BTC Series

Up to 6 LPM Free Flow



## Miniature Diaphragm Pumps (air/gas)

BTC Miniature Diaphragm Pumps are a series of brush and brushless DC motor driven pumps, which are tailored to meet specific application performance requirements. An innovative compact design incorporates leading edge technologies that allow them to operate more efficiently than existing pump designs. BTC Pumps offer multiple component configurations allowing them to be used for either vacuum, pressure, or alternating vacuum and pressure operations. BTC series is ideal for a wide range of pressures and low noise applications.

### Typical Applications

- Gas Analysis
- Anesthesia Monitors
- CO<sub>2</sub> Monitors
- Patient Monitoring
- Wound Therapy
- Urinalysis
- Medical/Training Mannequin

### Features

- Innovative and efficient engineering designs enable the BTC Series to push the performance envelope in a lightweight, compact size.
- Using our proprietary advanced diaphragm elastomer and superior brushless motor design sets the highest benchmark for service-free operation that exceeds 10,000 hours.
- Incorporating the lightweight EZ Mount Accessory facilitates simple system assembly while dampening vibration and reducing noise levels.
- RoHS compliant.

## Product Specifications\*

### Physical Properties

<b>Operating Environment<sup>1</sup>:</b>	41 to 122°F (5 to 50°C)
<b>Storage Environment:</b>	-4 to 212°F (-20 to 100°C)
<b>Media:</b>	Air, Argon, Helium, Nitrogen, Oxygen, and other non-reacting gases
<b>Humidity:</b>	0% - 80% Relative Humidity
<b>Noise Level<sup>2</sup>:</b>	As low as 45 dB @ 12 in (30 cm) <i>Muffler recommended for additional noise reduction (see accessories)</i>
<b>Pump Assembly Rated Life<sup>3</sup>:</b>	PMDC Iron Core Brush - 3,000 hrs Brushless Slotted - 10,000 hrs Brushless Slotless - 10,000 hrs
<b>Weight:</b>	6.5 oz. (184 g) PMDC Iron Core Brush 4.5 oz. (128 g) Brushless Slotted 7.4 oz. (210 g) Brushless Slotless

### Electrical

<b>Motor Type (DC):</b>	PMDC Iron Core Brush, Brushless Slotted, Brushless Slotless
<b>Nominal Motor Voltages<sup>4</sup>:</b>	6, 12, or 24 VDC <i>Other voltages available upon request</i>
<b>Electrical Termination:</b>	PMDC Iron Core Brush: 22 AWG Wire Leads, Length 10" (254 mm) Brushless Slotted Motor: 22 AWG Wire Leads, Length 20" (508 mm) Brushless Slotless: 22 AWG Wire Leads Length 20" (508 mm)
<b>Current Range<sup>5</sup>:</b>	50 - 900 mA

### Wetted Materials

<b>Diaphragm:</b>	EPDM, AEPDM, FKM
<b>Valves:</b>	EPDM, FKM
<b>Pump Head:</b>	Vectra (Liquid Crystal Polymer)

### Pneumatic

<b>Head Configuration:</b>	Single
<b>Maximum Unrestricted Flow:</b>	Flow: 6 LPM
<b>Pressure Range:</b>	0 - 30 psig (0-1.93 bar) Flat 0 - 20 psig (0-1.38 bar) Convoluted
<b>Vacuum Range:</b>	0 - 23 in Hg (0-584 mm Hg) Flat 0 - 20 in Hg (0-508 mm Hg) Convoluted
<b>Filtration:</b>	40 microns - recommended
<b>Efficiency at Free Flow<sup>6</sup>:</b>	PMDC Iron Core Brush: 1.2 LPM/Watt (PN: C103E-13) Brushless Slotted: 1.4 LPM/Watt (PN: C134D-13) Brushless Slotless: 1.5 LPM/Watt (PN: C190-12)

\* See Appendix A for details.

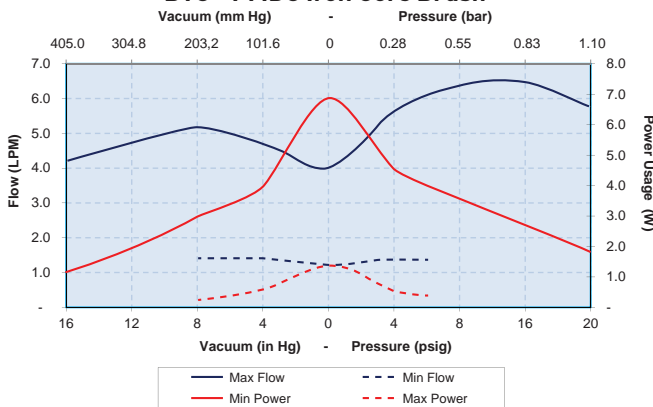


Miniature Diaphragm Pumps (air/gas)

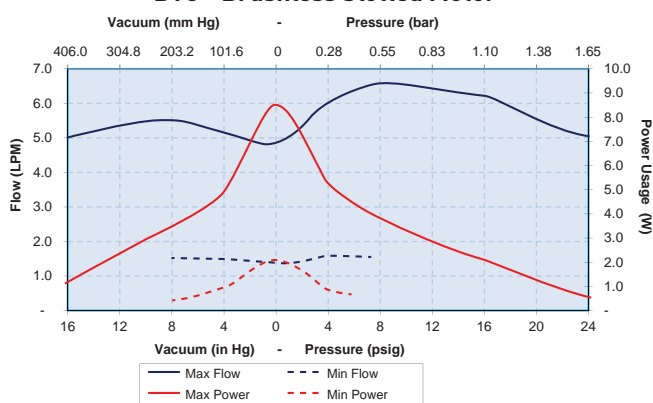
**BTC Series**

**Performance Specifications**

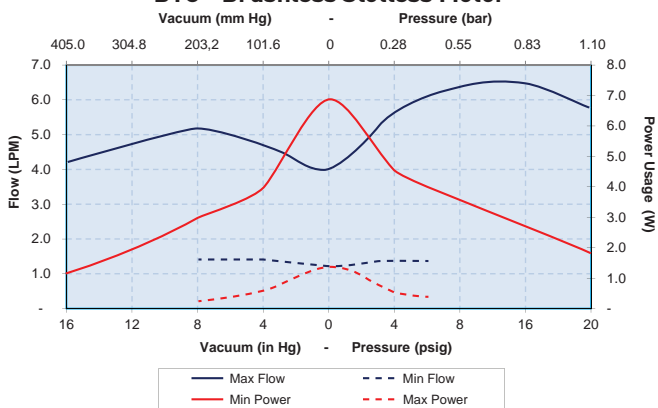
**BTC - PMDC Iron Core Brush**



**BTC - Brushless Slotted Motor**



**BTC - Brushless Slotless Motor**



The above graphs represent an example of performance for the pump series handling air at 800 feet (244 m) above sea level at 75 degree F (24 C). Performance will vary depending on barometric pressure and media temperature. A variety of configurations can be accommodated to meet application requirements. Curves are representative of standard pump configurations. Pump configurations could be customized for higher or lower flows depending on specific customer requirements.

Please contact Parker Precision Fluidics Applications Engineering for other considerations.



## BTC Series

## Miniature Diaphragm Pumps (air/gas)

### Sizing and Selection

**BTC Series**

PMDC Iron Core Brush

Brushless Slotted Motor

Brushless Slotless Motor



	PMDC Iron Core Brush	Brushless Slotted Motor	Brushless Slotless Motor
<b>Efficiency<sup>1</sup></b>	Good	Better - Up to 60% motor efficiency at low loads	Best - Up to 75% motor efficiency at high power levels
<b>Life<sup>2</sup></b>	Good - 3,000 hrs	Best - 10,000 hrs	Best - 10,000 hrs
<b>Cost</b>	Best	Better	Premium
<b>Noise</b>	Good	Better	Best

#### Mounting Guidelines:

- Bracket options available for mounting consideration (See *EZ Mount catalog pages*).
- Hole in the center of the bottom of housing is for manufacturing only—not to be used for mounting.
- Mounting holes are drilled for #6-20 self-tapping screws with 1/4" (6 mm) thread engagement torque to 4 in-lbs (0.45 N-m).

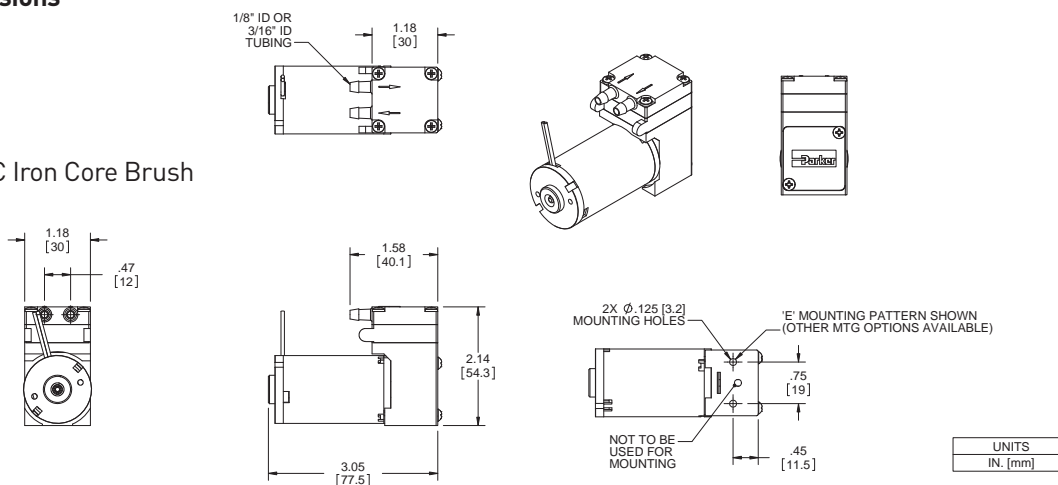
#### Port Connections:

- Barbs are sized for 1/8" (3 mm) ID tubing, 70-80 durometer recommended.
- Flow direction is marked on the pump head with arrows.

## Mechanical Integration

### Dimensions

PMDC Iron Core Brush



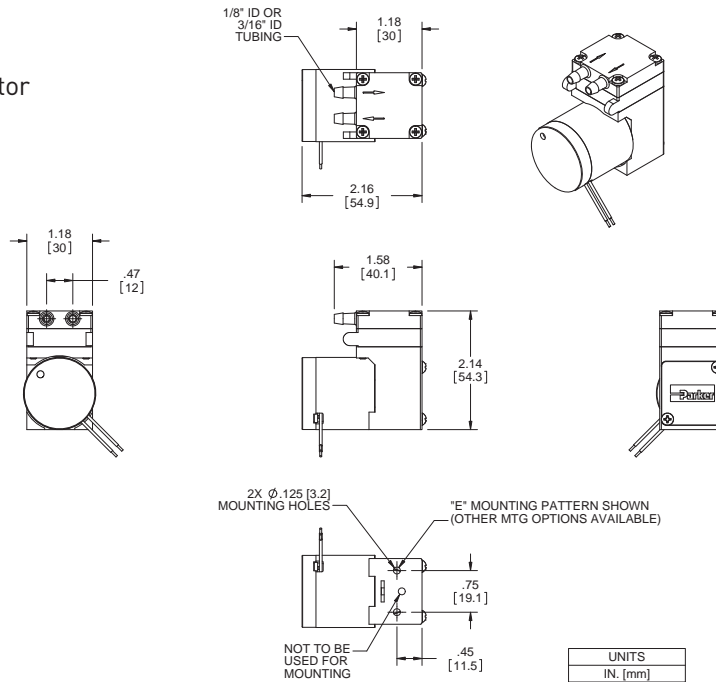
Miniature Diaphragm Pumps (air/gas)

BTC Series

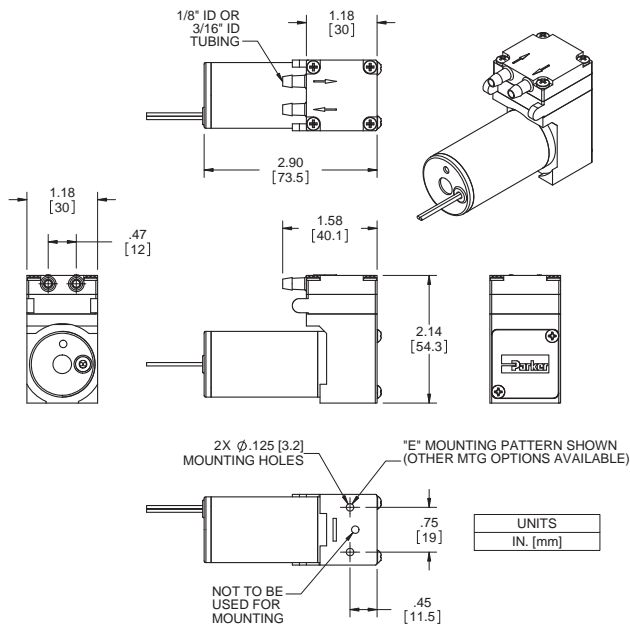
Mechanical Integration

Dimensions

Brushless Slotted Motor



Brushless Slotless Motor



Miniature Pumps

## BTC Series

## Miniature Diaphragm Pumps (air/gas)

### Electrical Integration and Motor Control

#### PMDC Iron Core Brush Motor

2 Wire	Red (+), Black (-)
Wire specification	22AWG, Insulation OD 0.051 in (1.30 mm), 10" (254 mm) Wire Leads

#### Brushless Motor Control Options

2 Wire	Red (+), Black (-)
3 Wire (Speed Control)	Red (+), Black (-), White (PWM) or Yellow (Analog)
4 Wire (Speed Control & Feedback)	Red(+), Black (-), White (PWM) or Yellow (Analog), Blue (Tachometer)
Wire specification	22AWG, Insulation OD 0.051 in (1.30 mm), 20" (508 mm) Wire Leads

#### Other Motor Control Considerations

The drive electronics for the BLDC motors are integrated into the motor itself, all that is needed is a power supply with the sufficient voltage and current.

#### Key Things to Remember

The pump is not a pressure holding device. An external check valve is recommended, if there is a pressure holding requirement.

Pump orientation does not affect performance or life.

### Pulse Width Modulation (PWM)

**Pulse-width modulation** is a commonly used technique for controlling DC motors.

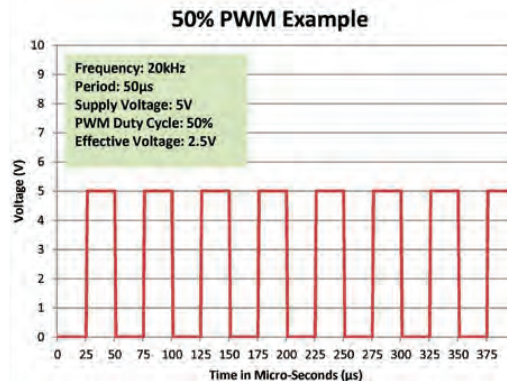
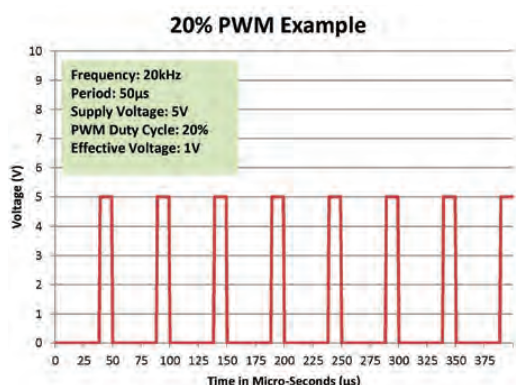
The average value of the voltage fed to the motor is controlled by turning a switch between the voltage supply and the motor on-and-off at a fast pace. The longer the switch is on compared to the off time, the higher the power supplied to the motor.

The PWM switching frequency varies for different types of devices, and is selected based on how it affects the device. For example, some applications require a faster switching frequency to prevent audible noise or electrical noise.

The term duty cycle describes the ratio of on-time to the period (one complete on-and-off cycle). Duty cycle is normally expressed as a percentage of on-time, 100% being full-power and 50% being half-power.

The advantage of PWM is the reduction of power-loss due to switching versus other control methods.

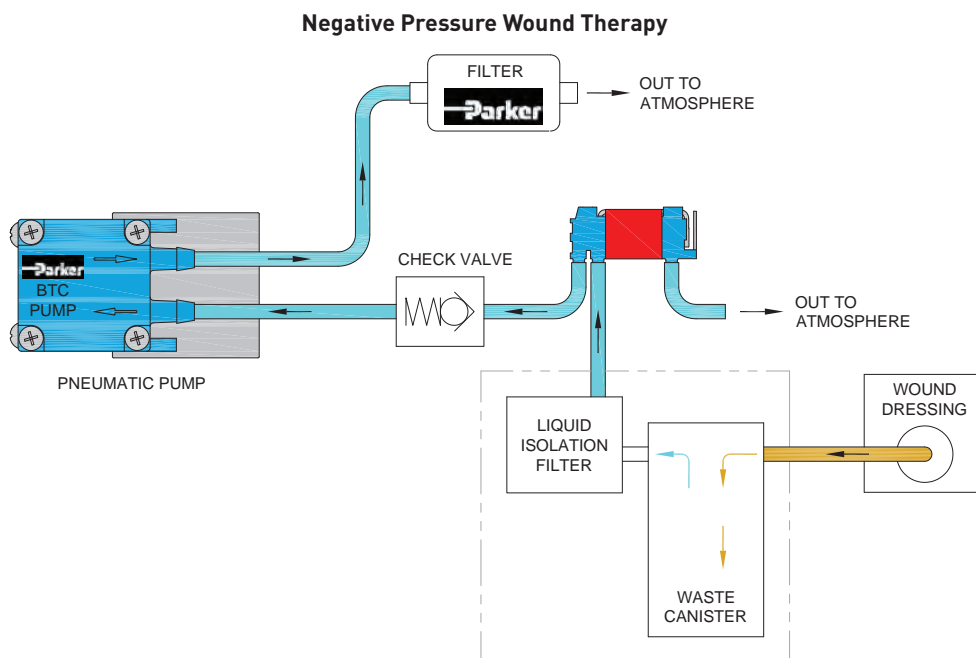
Parker Hannifin recommends controlling the pump using 15kHz - 20 kHz frequency range.



Miniature Diaphragm Pumps (air/gas)

BTC Series

Typical Flow Diagram

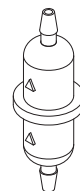
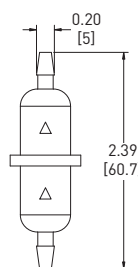
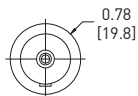


Miniature Pumps

Ordering Information

Filter-Mufflers also available to assist with filtration and optimize noise reduction.

Part Number: 00492-15  
(Filters to 10 microns)



UNITS
IN. [mm]



## BTC Series

## Miniature Diaphragm Pumps (air/gas)

### Accessory Information

EZ Mount available



EZ Mount provides ease of installation and effective control of vibration transfer. EZ Mount was designed to mount easily to the Precision Fluidic BTC Family of diaphragm pumps.

#### Features

- Isolation feet on the EZ mount can be rotated in any one of three ninety-degree planes and is designed for top-down or bottom-up mounting providing simple installation.
- EZ Mount was designed to minimize weight added to the pump assembly. Approximate weights are: Style A - 0.63 oz (18 g), Style B - 0.71 oz (20 g).
- Effectively absorbs vibration to minimize most vibration-induced noise and vibration transfer into an instrument.
- Designed to keep height and size to a minimum.
- Engineered for Parker BTC pumps to ease integration into your system.

### Physical Properties

#### Operating Environment:

41 - 158°F (5 - 70°C)

#### Humidity:

0 - 95% Relative Humidity

#### Base Plate:

Noryl GTX830

#### Feet:

Silicone

#### Feet Insert:

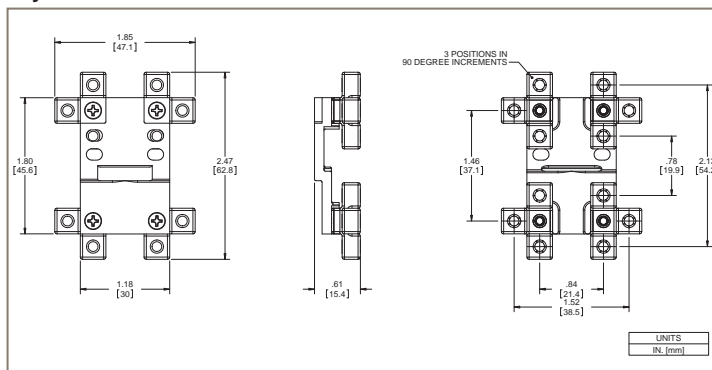
Brass

#### Hardware:

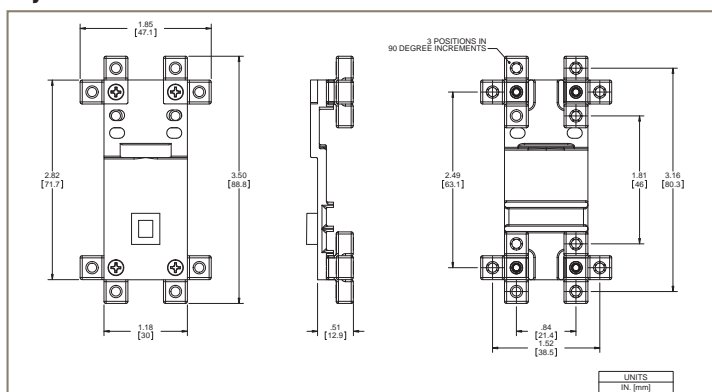
Zinc-Plated Steel

### Dimensions

#### Style A



#### Style B - PMDC Iron Core Brush Motor



EZ Mount kits include all necessary hardware and detailed instructions.

Isolation Feet are available in either threaded or thru-hole clearance for standard #4-40 or #6-32 (M3 for clearance hole only) hardware and can be mounted in any of three ninety-degree planes.



### Miniature Diaphragm Pumps (air/gas)

### BTC Series

## Ordering Information

### BTC Single Head Pumps - General Purpose

Part No.	Vacuum: LPM @ Load					Free Flow	Pressure: LPM @ Load							Max		Motor Type	PCD*		Wetted Materials
	20	16	12	8	4		4	8	12	16	20	24	28	Vac	Press		VDC	mA	
	in Hg	in Hg	in Hg	in Hg	in Hg		psig	psig	psig	psig	psig	psig	psig	in Hg	psig				
	508	406	305	203	102	0	276	55	827	1103	1379	1655	1931						
	mm Hg	mm Hg	mm Hg	mm Hg	mm Hg		mbar	mbar	mbar	mbar	mbar	mbar	mbar						
H022C-11		0.3	0.9	1.4	1.8	3.2	2.0	1.4	1.1	0.9	0.5	0.2		18.0	24.0	Brushless Slotted	12	380	AEPDM,EPDM,EPDM
H041B-11		0.3	0.9	1.4	1.8	3.2	2.0	1.4	1.1	0.9	0.5	0.2		18.0	24.0	Brush PMDC	6	665	AEPDM,EPDM,EPDM
H054B-11		0.3	0.9	1.4	1.8	3.2	2.0	1.4	1.1	0.9	0.5	0.2		18.0	24.0	Brushless Slotted	24	220	AEPDM,EPDM,EPDM
H084-11		0.3	0.9	1.4	1.8	3.2	2.0	1.4	1.1	0.9	0.5	0.2		18.0	24.0	Brush-PMDC	24	180	AEPDM,EPDM,EPDM
H085-11		0.3	0.9	1.4	1.8	3.2	2.0	1.4	1.1	0.9	0.5	0.2		18.0	24.0	Brush-PMDC	12	370	AEPDM,EPDM,EPDM
H127-11		0.3	0.7	1.4	2.1	2.7	2.2	1.8	1.4	1.0	0.6	0.3		18.0	24.0	Brushless Slotless	24	205	AEPDM,EPDM,EPDM
H124-11		0.3	0.9	1.4	2.1	2.6	2.1	1.7	1.3	1.0	0.6	0.3		18.0	24.0	Brushless Slotless	12	380	AEPDM,EPDM,EPDM
H004C-11			0.6	1.0	1.7	2.5	1.7	1.2	0.8	0.3				16.0	20.0	Brushless Slotted	12	350	AEPDM,EPDM,EPDM
H037A-11			0.7	1.2	1.8	2.5	1.7	1.2	0.8					16.0	17.0	Brush-PMDC	12	265	AEPDM,EPDM,EPDM
H050D-11			0.6	1.1	1.7	2.5	1.7	1.2	0.9	0.5				16.0	20.0	Brushless Slotted	24	175	AEPDM,AEPDM,EPDM
H061-11			0.5	0.9	1.6	2.5	1.6	1.1	0.8	0.4				16.0	20.0	Brush-PMDC	6	620	AEPDM,EPDM,EPDM
H070A-11			0.6	1.1	1.8	2.5	1.7	1.2	0.8					16.0	17.0	Brush-PMDC	24	125	AEPDM,AEPDM,EPDM
L008C-11				0.3	0.7	1.5	0.6	0.3**						10.0	7.0	Brushless Slotted	12	195	AEPDM,AEPDM,EPDM
L037B-11				0.4	0.9	1.5	0.9	0.3						12.0	10.0	Brush-PMDC	24	95	AEPDM,AEPDM,EPDM
L045B-11				0.4	0.7	1.5	0.7	0.3						12.0	10.0	Brushless Slotted	24	110	AEPDM,AEPDM,EPDM
L052C-11				0.4	1.0	1.5	0.9	0.3						12.0	10.0	Brush-PMDC	12	160	AEPDM,AEPDM,EPDM
L074-11				0.2	0.5	1.2	0.5	0.3*						9.0	7.0	Brush-PMDC	6	270	AEPDM,AEPDM,EPDM

\* PCD: Peak Current Draw \*\* @ 6psi (414 mbar)

### BTC Single Head Pumps - High Flow

Part No.	Vacuum: LPM @ Load					Free Flow	Pressure: LPM @ Load							Max		Motor Type	PCD*		Wetted Materials
	20	16	12	8	4		4	8	12	16	20	24	28	Vac	Press		VDC	mA	
	in Hg	in Hg	in Hg	in Hg	in Hg		psig	psig	psig	psig	psig	psig	psig	in Hg	psig				
	508	406	305	203	102	0	276	55	827	1103	1379	1655	1931						
	mm Hg	mm Hg	mm Hg	mm Hg	mm Hg		mbar	mbar	mbar	mbar	mbar	mbar	mbar						
C134D-12		0.9	1.7	2.5	3.4	6.0								20.0		Brushless Slotted	12	485	AEPDM,EPDM,EPDM
C117H-12		0.9	1.7	2.5	3.5	6.0								20.0		Brushless Slotted	24	400	AEPDM,EPDM,EPDM
C190-12		0.7	1.5	2.5	3.5	4.7								19.0		Brushless Slotless	12	400	AEPDM,EPDM,EPDM
C191-12		1.0	1.8	2.7	3.7	4.4								21.0		Brushless Slotless	24	250	AEPDM,EPDM,EPDM
C103E-12		0.9	1.8	3.0	3.9	6.0								20.0		Brush-PMDC	12	510	AEPDM,AEPDM,EPDM
C153A-12		1.0	1.7	2.6	3.5	6.0								20.0		Brush-PMDC	24	245	AEPDM,AEPDM,EPDM
C134D-13						6.0	3.8	3.0	2.4	1.9	1.4	1.0		24.0		Brushless Slotted	12	700	AEPDM,EPDM,EPDM
C117H-13						6.0	3.7	2.7	2.0	1.5	0.9	0.4		24.0		Brushless Slotted	24	390	AEPDM,EPDM,EPDM
C190-13						4.3	3.4	2.7	2.0	1.6	1.2			22.5		Brushless Slotless	12	530	AEPDM,EPDM,EPDM
C191-13						4.0	3.2	2.6	1.9	1.4	1.0			21.0		Brushless Slotless	24	260	AEPDM,EPDM,EPDM
C103E-13						6.0	3.9	3.0	2.2	1.4	0.6			24.0		Brush-PMDC	12	670	AEPDM,AEPDM,EPDM
C153A-13						6.0	4.0	3.1	2.4	1.6	1.1			24.0		Brush-PMDC	24	310	AEPDM,AEPDM,EPDM

Note: The Ordering Information Section includes a few selected part numbers for the product line. Other performances and configurations are available. Please contact your Sales Representative or an Application Engineer to discuss your application needs.

\*PCD: Peak Current Draw



## BTC Series Miniature Diaphragm Pumps (air/gas)

### Ordering Information

#### Accessory Information

Part No.	Filtering Level (Micron)	Filter Area	Internal Volume	Operating Limitations:			Wetted Materials
00492-15	10	1.71 in <sup>2</sup> (11 cm <sup>2</sup> )	0.24 in <sup>3</sup> (3.9 cm <sup>3</sup> )	Max Temperature 80°C	Min Temperature 32°C	Max Pressure 65 PSI (4.48 bar)	Polypropylene
Filter-Mufflers: To assist with filtration and optimize noise reduction. Tubing: Recommendation 1/8" (3mm) ID.							

#### EZ Mount for BTC Single Head Pump with PMDC Iron Core Brush Motor

Part Number	Style	Description
00329-10-A45S	B	#4-40 Threaded
00329-10-B45S	B	#4 Clearance
00329-10-D45S	B	#6-32 Threaded
00329-10-C45S	B	#6 / M3 Clearance

#### EZ Mount for BTC Single Head Pump with Brushless Slotted Motor

Part Number	Style	Description
00328-10-A45S	A	#4-40 Threaded
00328-10-B45S	A	#4 Clearance
00328-10-D45S	A	#6-32 Threaded
00328-10-C45S	A	#6 / M3 Clearance

#### EZ Mount for BTC Single Head Pump with Brushless Slotless Motor

Part Number	Style	Description
01074-10-A45S	B	#4-40 Threaded
01074-10-B45S	B	#4 Clearance
01074-10-D45S	B	#6-32 Threaded
01074-10-C45S	B	#6 / M3 Clearance

Please click on the Order On-line button below (or go to [www.parker.com/precisionfluidics/btc](http://www.parker.com/precisionfluidics/btc)) to configure the BTC-II Miniature Diaphragm Pump for your application.

Serviceable – PPF products are designed for use through the rated life and Parker does not sell replacement parts, nor is it recommended to service these in the field

Note: In addition to Parker's innovative and flexible pump designs, we offer applications engineering expertise to our customers in order to configure and recommend the optimal pump for the application. Contact Parker Applications Engineering to discuss and configure alternate pump configurations to meet your specific application requirements. Providing information on the following requirements will assist us in developing an optimal solution for your application:

- Noise
- Operating Pressure / Vacuum
- Power Consumption
- Life Requirement
- Function in the Application
- Size
- Motor Control
- Media
- Voltage



**Miniature Diaphragm Pumps (air/gas)****BTC Series****Appendix A**

All performance data is typical based on standard conditions: 70°F and 14.7 psia (21°C and 1 bar).

1. Duty Dependent. For operation above 122°F (50°C) consult factory
2. Noise is dependent on the configuration and operation of the pump in the application. Parker has the ability to tailor the pump configuration when noise is a critical criterion in the effort to meet the performance requirements of the application. Noise level is tested to Parker protocol P-105.
3. Life rating can vary depending on application and operating conditions.
4. Custom motor options available. Custom motors may require a significant application potential. The standard motors can be configured with a special winding to meet a particular operation point at a specified voltage
5. Current range is dependent on motor type, voltage, pressure/vacuum and flow requirement. Lower levels possible depending on application.
6. Pump efficiency is a measure of the flow rate generated per unit of power consumed. Efficiency may change dependent on application and operating condition at free flow.



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[www.parker.com/precisionfluidics](http://www.parker.com/precisionfluidics)

# BTC-IIS Series Miniature Diaphragm Pumps (air/gas)

Up to 11 LPM Free Flow



BTC-IIS Miniature Diaphragm Pumps are a series of brush and brushless DC motor driven pumps which are tailored to meet the specific application performance requirements. The innovative compact designs incorporate leading edge technologies that allow them to operate more efficiently than existing pump designs. BTC-IIS Pumps offer multiple component configurations allowing them to be used for either vacuum, pressure, or alternating vacuum and pressure operations. BTC-IIS is ideal for compact, high flow, wide pressure ranges, long-life, low noise applications.

## Features

- The BTC-IIS Series pump sets the highest benchmark for service-free performance with our unique brushless DC motor design and advanced proprietary diaphragm elastomer.
- Incorporating the lightweight EZ Mount accessory facilitates simple system assembly while dampening vibration and reducing noise levels.
- The BTC-IIS maximizes flexibility by offering several mount options,
- Our 100% oil and grease-free pump and compressor design maintains the purity of your system and are commonly used in FDA-approved systems.
- RoHS compliant.

## Typical Applications

- Patient Monitoring
- Compression Therapy
- Hemodialysis
- Peritoneal Dialysis
- Respiratory Care
- Wound Therapy
- Medical/Training Mannequins
- Degassing

## Product Specifications

### Physical Properties

<b>Operating Environment<sup>1</sup>:</b>
41 to 122°F (5 to 50°C)
<b>Storage Environment:</b>
-4 to 212°F (-20 to 100°C)
<b>Media:</b>
Air, Argon, Helium, Nitrogen, Oxygen, and other non-reacting gases
<b>Humidity:</b>
0 – 80% Relative Humidity
<b>Noise Level<sup>2</sup>:</b>
As low as 45 dB @ 12 in (30 cm) <i>Muffler recommended for additional noise reduction (see accessories)</i>
<b>Pump Assembly Rated Life<sup>3</sup>:</b>
PMDC Iron Core Brush - 3,000 hrs
Brushless Slotted - 10,000 hrs
Brushless Slotted (High Torque) - 10,000 hrs
Brushless Slotless - 10,000 hrs
<b>Weight:</b>
8.0 oz. (227 g) PMDC Iron Core Brush
6.0 oz. (170 g) Brushless Slotted
11.6 oz. (330 g) Brushless Slotted (High Torque)
8.8 oz. (250 g) Brushless Slotless

### Electrical

<b>Motor Type (DC):</b>
PMDC Iron Core Brush, Brushless Slotted (High Torque), Brushless Slotless
<b>Nominal Motor Voltages<sup>4</sup>:</b>
6, 12, or 24 VDC <i>Other voltages available upon request</i>
<b>Electrical Termination:</b>
PMDC Iron Core Brush: 22 AWG Wire Leads, Length 10" (254 mm)
Brushless Slotted Motor: 22 AWG Wire Leads, Length 20" (508 mm)
Brushless Slotted Motor (High Torque): 22 AWG Wire Leads, Length 20" (508 mm)
Brushless Slotless: 22 AWG Wire Leads, Length 20" (508 mm)
<b>Current Range<sup>5</sup>:</b>
200 - 1400 mA

### Wetted Materials

<b>Diaphragm:</b>
EPDM, AEPDM, FKM
<b>Valves:</b>
EPDM, FKM
<b>Pump Head:</b>
Vectra (Liquid Crystal Polymer)

### Pneumatic

<b>Head Configuration:</b>
Dual
<b>Maximum Unrestricted Flow:</b>
6 LPM (Series) 11 LPM (Parallel)
<b>Pressure Range:</b>
0 - 48 psig (0 - 3.31 bar) Series 0 - 28 psig (0 - 1.93 bar) Parallel
<b>Vacuum Range:</b>
0 - 25 in Hg (635 mm Hg) (Series) 0 - 20 in Hg (508 mm Hg) (Parallel)
<b>Filtration:</b>
40 microns - recommended
<b>Efficiency at Free Flow<sup>6</sup></b>
PMDC Iron Core Brush: 0.9LPM/Watt (PN: D743-21-01)
Brushless Slotted: 1.1LPM/Watt (PN: D713-21-01)
Brushless Slotted: 1.0LPM/Watt (PN: D737-23-01)
Brushless Slotless: 1.3LPM/Watt (PN: D1019-22-01)

\* See Appendix A for details.

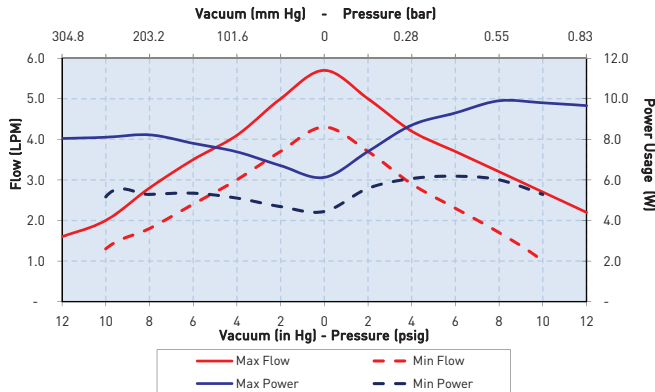


Miniature Diaphragm Pumps (air/gas)

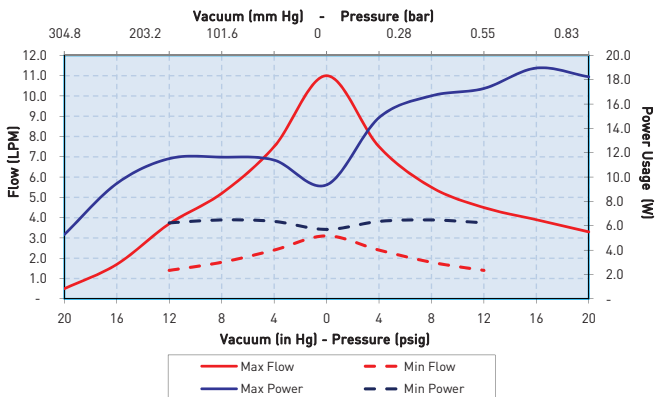
**BTC-IIS Series**

**Performance Specifications**

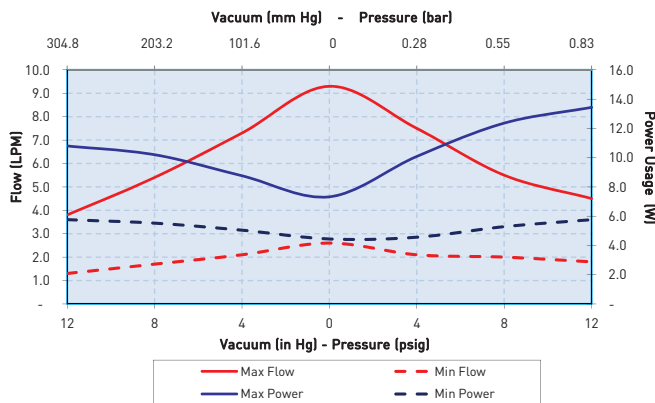
**BTC-IIS - PMDC Iron Core Brush Motor**



**BTC-IIS - Brushless Slotted Motor**



**BTC-IIS - Brushless Slotless Motor**



The above graph represents an example of performance for the pumps series handling air at 800 feet (244m) above sea level at 75°F (24°C). Performance will vary depending on barometric pressure and media temperature. Curves are representative of standard pump configurations. Pump configurations could be customized for higher or lower flows, depending on specific customer requirements.

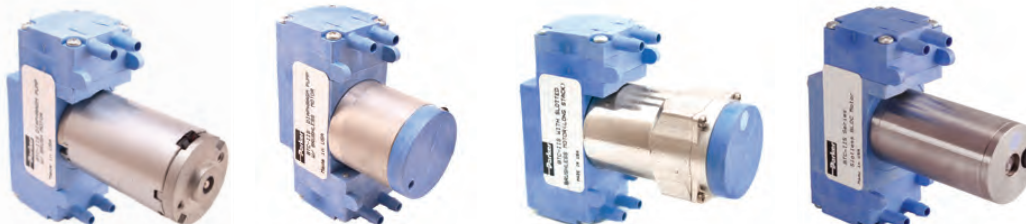
Please contact Parker Precision Fluidics Applications Engineering for other considerations.



## BTC-IIS Series Miniature Diaphragm Pumps (air/gas)

### Sizing and Selection

<b>BTC-IIS Series</b>	PMDC Iron Core Brush	Brushless Slotted Motor	Brushless Slotted Motor (High Torque)	Brushless Slotless Motor
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	PMDC Iron Core Brush	Brushless Slotted	Brushless Slotted (High Torque)	Brushless Slotless
<b>Efficiency<sup>8</sup></b>	Good	Better - Up to 60% motor efficiency at low loads	Better - up to 60% motor efficiency at high power levels with high torque capability	Best - Up to 75% motor efficiency at high power levels
<b>Life<sup>10</sup></b>	Good - 3,000 hrs	Best - 10,000 hrs	Best - 10,000 hrs	Best - 10,000 hrs
<b>Cost</b>	Best	Better	Good	Premium
<b>Noise</b>	Good	Better	Best	Best

#### Mounting Guidelines:

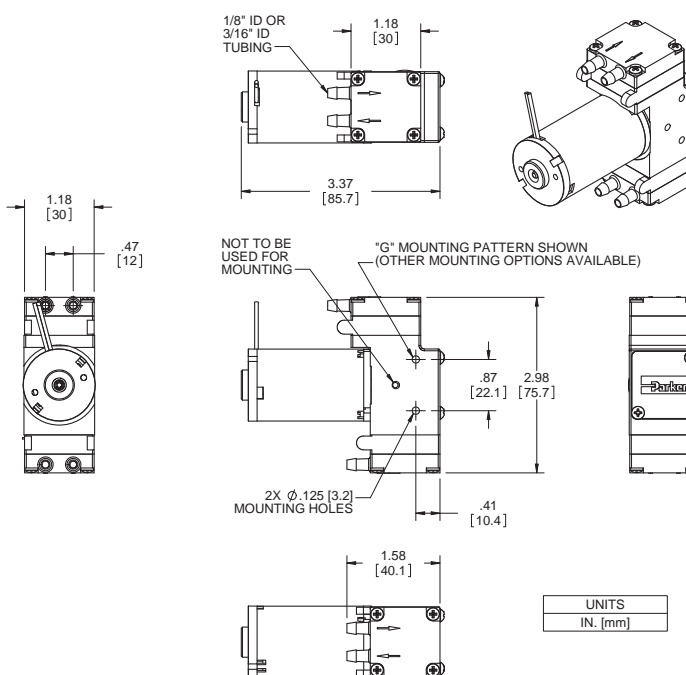
- Bracket options available for mounting consideration (See *EZ Mount catalog pages*).
- Hole in the center of the bottom of housing is for manufacturing only—not to be used for mounting.
- Mounting holes are drilled for #6-20 self-tapping screws with 1/4" (6 mm) thread engagement torque to 4 in-lbs. (0.45 N-m).

#### Port Connections:

- Barbs are sized for 1/8" (3 mm) ID tubing, 70-80 durometer recommended.
- Flow direction is marked on the pump head with arrows.

#### Dimensions

PMDC Iron Core Brush



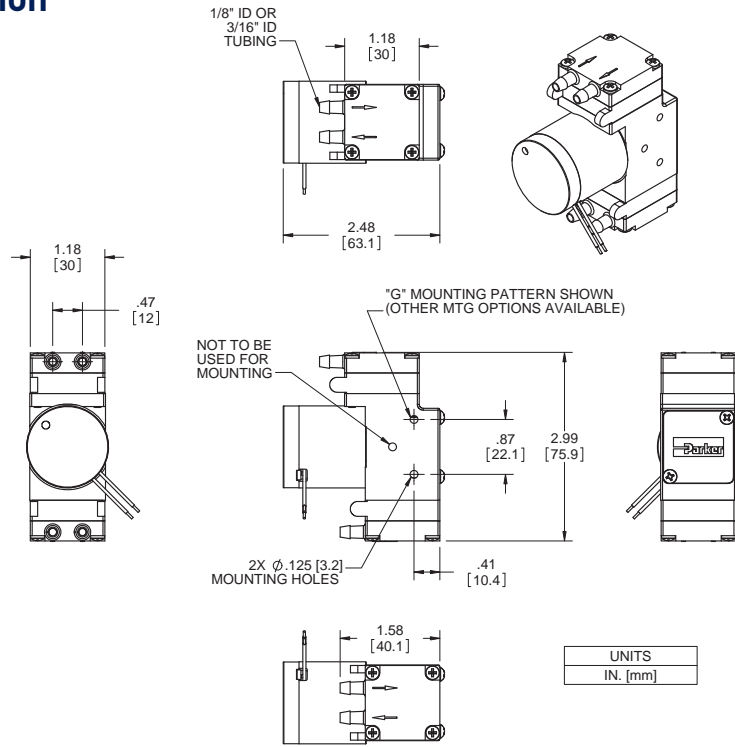
Miniature Diaphragm Pumps (air/gas)

**BTC-IIS Series**

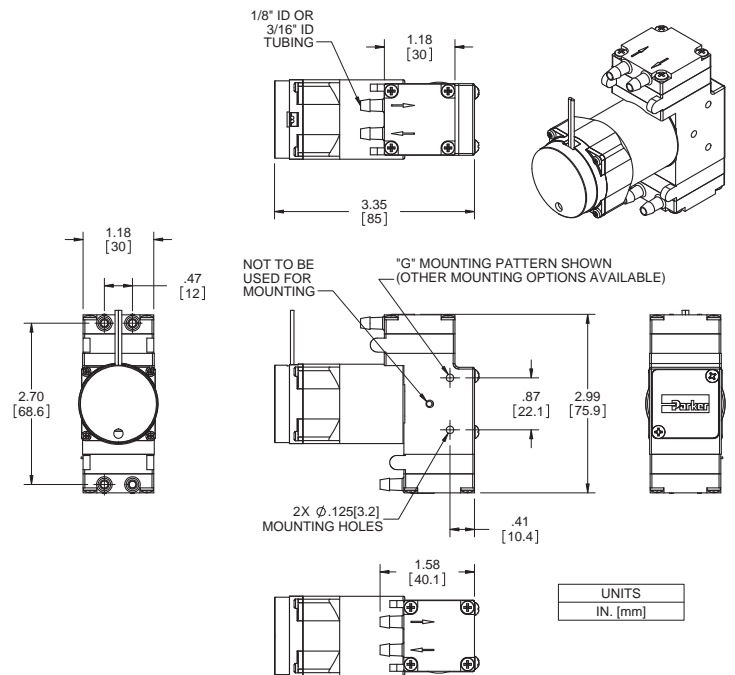
**Mechanical Integration**

**Dimensions**

Brushless Slotted Motor



Brushless Slotted Motor (High Torque)



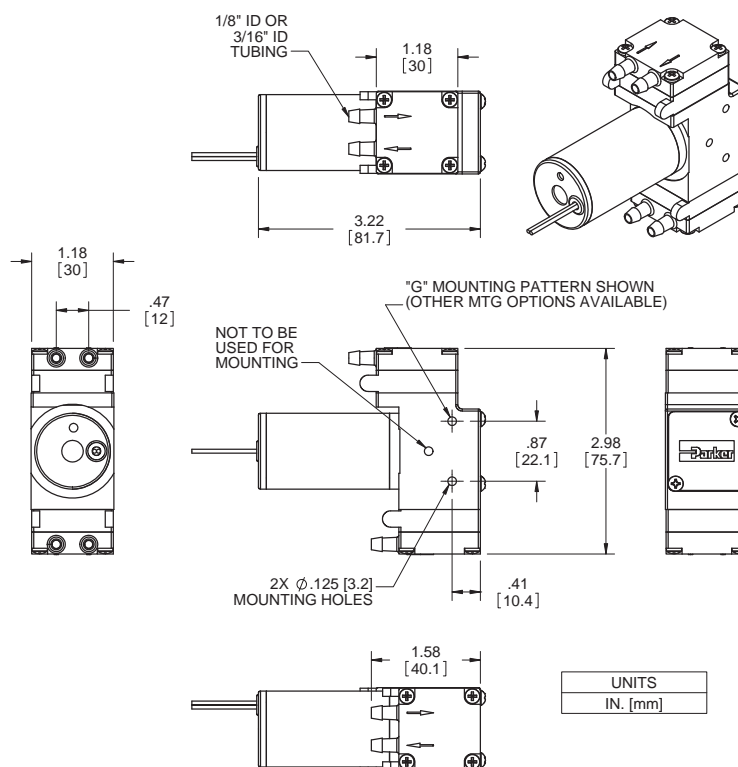
Miniature Pumps

## BTC-IIS Series

### Miniature Diaphragm Pumps (air/gas)

#### Dimensions

Brushless  
Slotless Motor



## Electrical Integration and Motor Control

### PMDC Iron Core Brush Motor

2 Wire	Red (+), Black (-)
Wire specification	22AWG, Insulation OD 0.051 in (1.30 mm), 10" (254 mm) Wire Leads

### Brushless Motor Control Options

2 Wire	Red (+), Black (-)
3 Wire (Speed Control)	Red (+), Black (-), White (PWM) or Yellow (Analog)
4 Wire (Speed Control & Feedback)	Red(+), Black (-), White (PWM) or Yellow (Analog), Blue (Tachometer)
Wire specification	22AWG, Insulation OD 0.051 in (1.30 mm), 20" (508 mm) Wire Leads

### Other Motor Control Considerations

The drive electronics for the BLDC motors are integrated into the motor itself, all that is needed is a power supply with the sufficient voltage and current.

### Key Things to Remember

The pump is not a pressure holding device. An external check valve is recommended, if there is a pressure holding requirement.

Pump orientation does not affect performance or life.



## Miniature Diaphragm Pumps (air/gas)

## BTC-IIS Series

### Pulse Width Modulation (PWM)

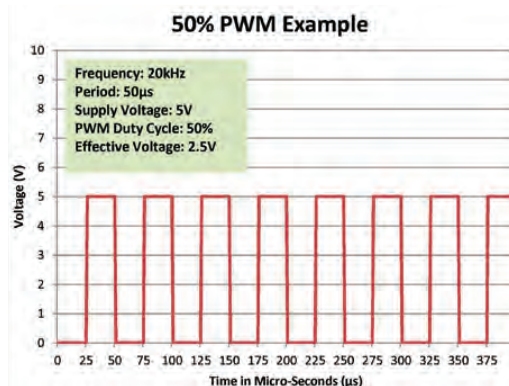
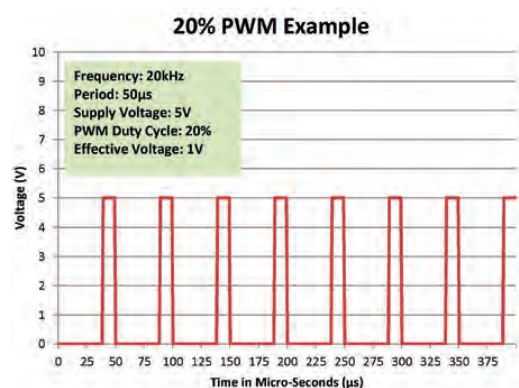
**Pulse-width modulation** is a commonly used technique for controlling DC motors.

The average value of the voltage fed to the motor is controlled by turning a switch between the voltage supply and the motor on-and-off at a fast pace. The longer the switch is on compared to the off time, the higher the power supplied to the motor.

The PWM switching frequency varies for different types of devices, and is selected based on how it affects the device. For example, some applications require a faster switching frequency to prevent audible noise or electrical noise.

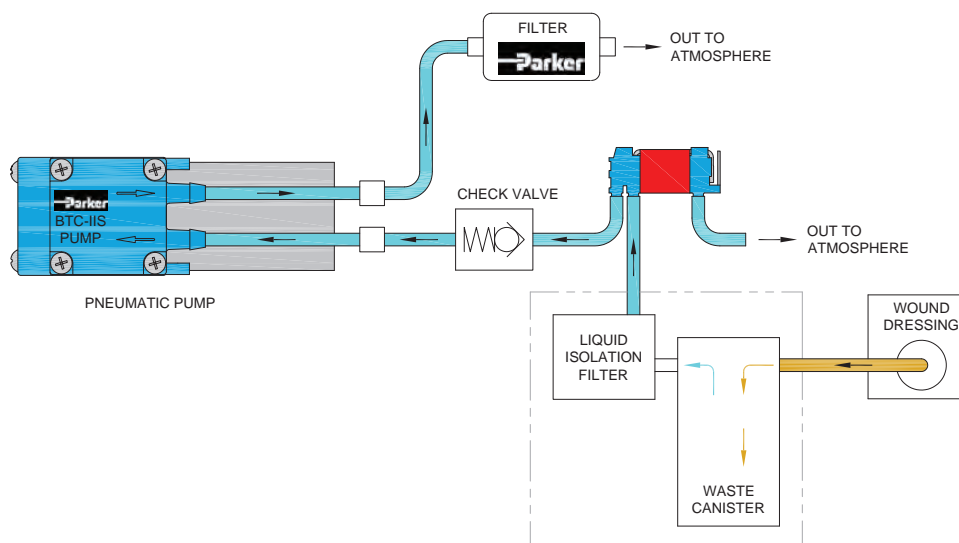
The term duty cycle describes the ratio of on-time to the period (one complete on-and-off cycle). Duty cycle is normally expressed as a percentage of on-time, 100% being full-power and 50% being half-power.

The advantage of PWM is the reduction of power-loss due to switching versus other control methods. Parker Hannifin recommends controlling the pump using 15kHz - 20 kHz frequency range.



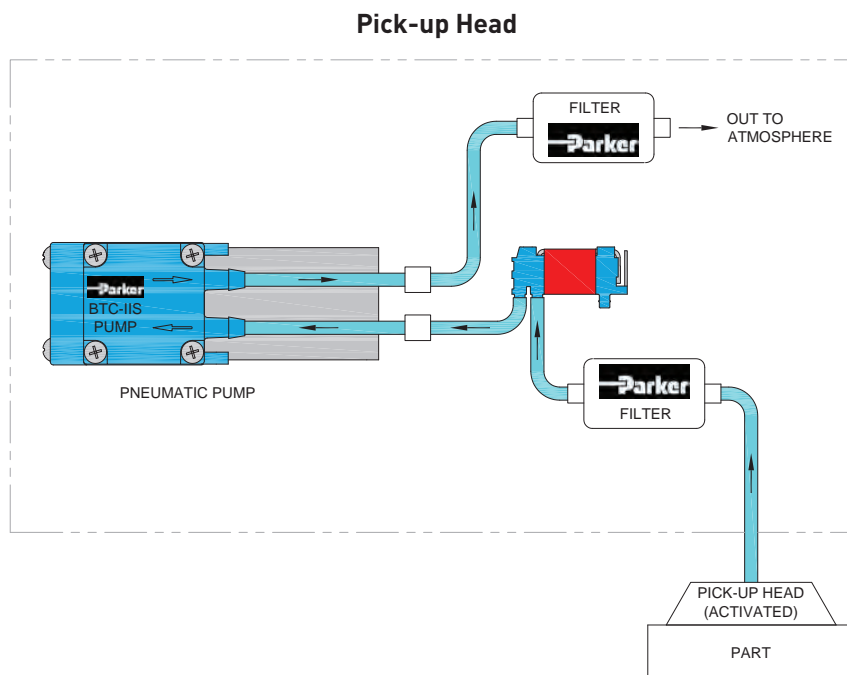
### Typical Flow Diagram

#### Negative Pressure Wound Therapy



## BTC-IIS Series Miniature Diaphragm Pumps (air/gas)

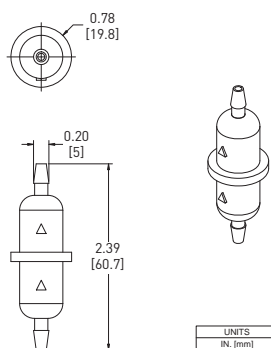
### Typical Flow Diagram



### Accessory Information

Filter-Mufflers also available to assist with filtration and optimize noise reduction.

Part Number: 00492-15  
(Filters to 10 microns)



## Miniature Diaphragm Pumps (air/gas)

**BTC-IIS Series**
**Accessory Information**

EZ Mount available



EZ Mount provides ease of installation and effective control of vibration transfer. EZ Mount was designed to mount easily to the Precision Fluidic BTC-IIS Family of diaphragm pumps.

**Features**

- Isolation feet on the EZ mount can be rotated in any one of three ninety-degree planes and is designed for top-down or bottom-up mounting providing simple installation.
- EZ Mount was designed to minimize weight added to the pump assembly. Approximate weights are: Style A - 0.63 oz (18 g), Style B - 0.71 oz (20 g).
- Effectively absorbs vibration to minimize most vibration-induced noise and vibration transfer into an instrument.
- Designed to keep height and size to a minimum.
- Engineered for Parker BTC-IIS pumps to ease integration into your system.

Miniature Pumps

**Physical Properties**
**Operating Environment:**

41 - 158°F (5 - 70°C)

**Humidity:**

0 - 95% Relative Humidity

**Base Plate:**

Noryl GTX830

**Feet:**

Silicone

**Feet Insert:**

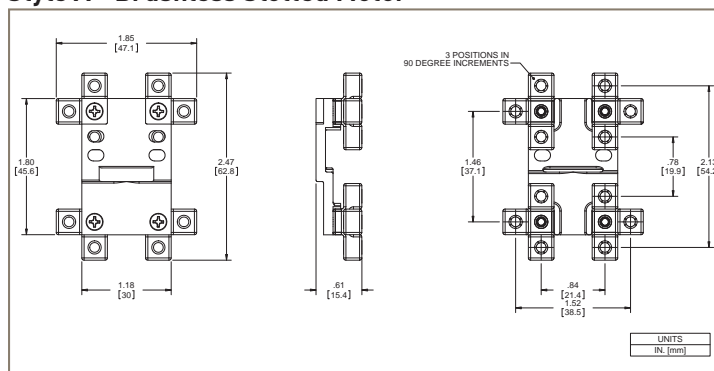
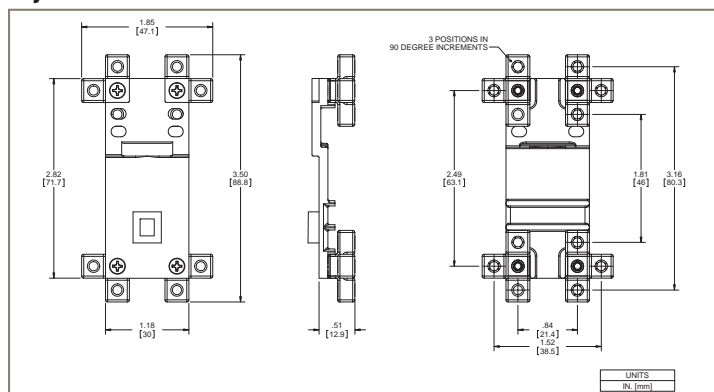
Brass

**Hardware:**

Zinc-Plated Steel

EZ Mount kits include all necessary hardware and detailed instructions.

Isolation Feet are available in either threaded or thru-hole clearance for standard #4-40 or #6-32 (M3 for clearance hole only) hardware and can be mounted in any of three ninety-degree planes.

**Dimensions**
**Style A - Brushless Slotted Motor**

**Style B - PMDC Iron Core Brush Motor**


## BTC-IIS Series Miniature Diaphragm Pumps (air/gas)

### Ordering Information

#### BTC-IIS Dual Head Pumps - General Purpose

Part No.	Vacuum: LPM @ Load						Free Flow	Pressure: LPM @ Load						Max			PCD*		Wetted Materials
	24 in Hg 609 mm Hg	20 in Hg 508 mm Hg	16 in Hg 406 mm Hg	12 in Hg 305 mm Hg	8 in Hg 203 mm Hg	4 in Hg 102 mm Hg		0	4 psig 276 mbar	8 psig 552 mbar	12 psig 827 mbar	16 psig 1103 mbar	20 psig 1379 mbar	24 psig 1655 mbar	Vac in Hg	Press psig	Motor Type	VDC	
D713-21-01			0.5	1.4	2.7	4.0	5.5	4.2	3.0	2.1	1.4	0.9		16.0	20.0	Brushless Slotted	12	700	AEPDM, EPDM, EPDM
D716A-21-01			0.6	1.4	2.5	3.9	5.5	4.2	3.0	2.1	1.4	0.9		18.0	22.0	Brushless Slotted	24	400	AEPDM, EPDM, EPDM
D743-21-01			0.6	1.4	2.8	4.0	5.5	4.2	3.0	2.1	1.4	0.9		18.0	22.0	Brush PMDC	12	800	AEPDM, EPDM, EPDM
D1023-21-01			0.7	1.7	2.8	3.9	5.0	4.0	3.2	2.4	1.4	1.0		18.0	26.0	Brushless Slotless	24	340	AEPDM, EPDM, EPDM
D1008-21-01			0.1	1.3	2.3	3.5	4.6	3.6	2.7	1.5	0.9		16.0	20.0	Brushless Slotless	12	510	AEPDM, EPDM, EPDM	
D713-22-01		0.5	1.0	1.5	2.1	2.6	3.5						24.0		Brushless Slotted	12	700	AEPDM, EPDM, EPDM	
D716A-22-01		0.5	1.0	1.5	2.1	2.6	3.5						24.0		Brushless Slotted	24	400	AEPDM, EPDM, EPDM	
D743-22-01		0.5	1.0	1.5	2.1	2.6	3.5						24.0		Brush PMDC	12	800	AEPDM, AEPDM, EPDM	
D1023-22-01		0.4	0.9	1.3	1.7	2.1	2.6						24.0		Brushless Slotless	24	245	AEPDM, EPDM, EPDM	
D1008-22-01		0.3	0.7	1.1	1.5	2.0	2.4						24.0		Brushless Slotless	12	370	AEPDM, EPDM, EPDM	

\*PCD: Peak Current Draw

#### BTC-IIS Dual Head Pumps - High Flow

Part No.	Vacuum: LPM @ Load						Free Flow	Pressure: LPM @ Load						Max			PCD*		Wetted Materials
	24 in Hg 609 mm Hg	20 in Hg 508 mm Hg	16 in Hg 406 mm Hg	12 in Hg 305 mm Hg	8 in Hg 203 mm Hg	4 in Hg 102 mm Hg		0	4 psig 276 mbar	8 psig 552 mbar	12 psig 827 mbar	16 psig 1103 mbar	20 psig 1379 mbar	24 psig 1655 mbar	Vac in Hg	Press psig	Motor Type	VDC	
D736A-23-02							11.0	7.5	5.5	4.5				12.0		Brushless Slotted	24	750	AEPDM, AEPDM, EPDM
D737-23-01							11.0	7.5	5.5	4.5	3.9	3.3		20.0		Brushless Slotted	12	1500	AEPDM, AEPDM, EPDM
D1020-23-01							9.1	7.4	6.1	4.9				12.0		Brushless Slotless	12	1120	AEPDM, AEPDM, EPDM
D1025-23-01							9.0	7.2	5.8	4.6				12.0		Brushless Slotless	24	585	AEPDM, AEPDM, EPDM
D737B-22-01		0.5	1.7	3.7	5.2	7.5	11.0						20.0		Brushless Slotted	12	1000	AEPDM, AEPDM, EPDM	
D736-22-02		0.8	2.1	3.6	5.4	7.5	10.0						20.0		Brushless Slotted	24	750	AEPDM, AEPDM, EPDM	
D1019-22-01		0.8	2.3	3.7	5.4	7.4	9.3						21.0		Brushless Slotless	12	860	AEPDM, AEPDM, EPDM	
D1024-22-01		0.9	2.2	3.8	5.4	7.3	9.3						21.0		Brushless Slotless	24	450	AEPDM, AEPDM, EPDM	

\*PCD: Peak Current Draw

#### BTC-IIS Dual Head - High Pressure or Vacuum

Part No.	Vacuum: LPM @ Load						FF	Pressure: LPM @ Load						Max			PCD*		Wetted Materials
	24 in Hg 609 mm Hg	20 in Hg 508 mm Hg	16 in Hg 406 mm Hg	12 in Hg 305 mm Hg	8 in Hg 203 mm Hg	4 in Hg 102 mm Hg		0	8 psig 552 mbar	16 psig 1103 mbar	24 psig 1655 mbar	32 psig 2206 mbar	40 psig 2758 mbar	45 psig 3103 mbar	Vac in Hg	Press psig	Motor Type	VDC	
D1008-23-01							2.4	2.0	1.6	1.3	1.1	0.8			50.0	Brushless Slotless	12	620	AEPDM, EPDM, EPDM
D746A-22-01	0.1	0.5	1.0	1.4	1.8	2.4	3.1						26.0		Brushless Slotted	24	300	AEPDM, AEPDM, EPDM	
D754C-22-01	0.1	0.5	1.0	1.4	1.8	2.4	3.1						26.0		Brushless Slotted	12	540	AEPDM, AEPDM, EPDM	

Note: The Ordering Information Section includes a few selected part numbers for the product line. Other performances and configurations are available. Please contact your Sales Representative or an Application Engineer to discuss your application needs.

\*PCD: Peak Current Draw



## Miniature Diaphragm Pumps (air/gas)

**BTC-IIS Series**
**Ordering Information**
**Accessory Information**

Part No.	Filtering Level (Micron)	Filter Area	Internal Volume	Operating Limitations:			Wetted Materials
00492-15	10	1.71 in <sup>2</sup> (11 cm <sup>2</sup> )	0.24 in <sup>3</sup> (3.9 cm <sup>3</sup> )	Max Temperature 80°C	Min Temperature 32°C	Max Pressure 65 PSI (4.48 bar)	Polypropylene
Filter-Mufflers: To assist with filtration and optimize noise reduction. Tubing: Recommendation 1/8" (3mm) ID.							

**EZ Mount for BTC-IIS with PMDC Iron Core Brush Motor**

Part Number	Style	Description
00332-10-A45S	B	#4-40 Threaded
00332-10-B45S	B	#4 Clearance
00332-10-D45S	B	#6-32 Threaded
00332-10-C45S	B	#6 / M3 Clearance

**EZ Mount for BTC-IIS with Brushless Slotted Motor**

Part Number	Style	Description
00328-10-A45S	B	#4-40 Threaded
00328-10-B45S	B	#4 Clearance
00328-10-D45S	B	#6-32 Threaded
00328-10-C45S	B	#6 / M3 Clearance

**EZ Mount for BTC-IIS with Brushless Slotted (High Torque) Motor**

Part Number	Style	Description
00331-10-A45S	B	#4-40 Threaded
00331-10-B45S	B	#4 Clearance
00331-10-D45S	B	#6-32 Threaded
00331-10-C45S	B	#6 / M3 Clearance

**EZ Mount for BTC-IIS with Brushless Slotless Motor**

Part Number	Style	Description
01074-10-A45S	A	#4-40 Threaded
01074-10-B45S	A	#4 Clearance
01074-10-D45S	A	#6-32 Threaded
01074-10-C45S	A	#6 / M3 Clearance

Please click on the Order On-line button below (or go to [www.parker.com/precisionfluidics/btciis](http://www.parker.com/precisionfluidics/btciis)) to configure the BTC-IIS Miniature Diaphragm Pump for your application.

Serviceable – PPF products are designed for use through the rated life and Parker does not sell replacement parts, nor is it recommended to service these in the field

Note: In addition to Parker's innovative and flexible pump designs, we offer applications engineering expertise to our customers in order to configure and recommend the optimal pump for the application. Contact Parker Applications Engineering to discuss and configure alternate pump configurations to meet your specific application requirements. Providing information on the following requirements will assist us in developing an optimal solution for your application:

- Noise
- Operating Pressure / Vacuum
- Power Consumption
- Life Requirement
- Description of pump function in the application
- Size
- Motor Control
- Media
- Voltage



**BTC-IIS Series****Miniature Diaphragm Pumps (air/gas)****Appendix A**

All performance data is typical based on standard conditions: 70°F and 14.7 psia (21°C and 1 bar).

1. Duty Dependent. For operation above 122°F (50°C) consult factory
2. Noise is dependent on the configuration and operation of the pump in the application. Parker has the ability to tailor the pump configuration when noise is a critical criterion in the effort to meet the performance requirements of the application. Noise level is tested to Parker protocol P-105.
3. Life rating can vary depending on application and operating conditions.
4. Custom motor options available. Custom motors may require a significant application potential. The standard motors can be configured with a special winding to meet a particular operation point at a specified voltage
5. Current range is dependent on motor type, voltage, pressure/vacuum and flow requirement. Lower levels possible depending on application.
6. Pump efficiency is a measure of the flow rate generated per unit of power consumed. Efficiency may change dependent on application and operating condition at free flow.



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# TTC Series

Up to 6 LPM Free Flow



## Miniature Diaphragm Pumps (air/gas)

TTC Miniature Diaphragm Pumps are a series of brush and brushless DC motor driven pumps, which are tailored to meet specific application performance requirements. An innovative compact design incorporates leading edge technologies that allow them to operate more efficiently than existing pump designs. TTC Pumps offer multiple component configurations for use in either vacuum, pressure, or alternating vacuum and pressure operations. TTC Series is best for compact and low pressure applications that require high efficiency.

### Features:

- TTC Series' innovative and efficient design pushes the performance envelope in a lightweight, compact size which allows it to operate at the highest performance/size ratio.
- Highest efficiency in class. The TTC supports low power for portable and battery powered instruments.
- Using our proprietary advanced diaphragm elastomer and superior brushless motor design sets the highest benchmark for service-free operation that exceeds 10,000 hours.
- Incorporating the lightweight EZ Mount accessory facilitates simple system assembly while dampening vibration and reducing noise levels.
- RoHS compliant.

### Typical Applications

- Gas Analysis
- Anesthesia Monitors
- Compression Therapy
- CO<sub>2</sub> Monitors
- Wound Therapy
- Trace Detection
- Medical/Training Mannequins
- Degassing

## Product Specifications\*

### Physical Properties

<b>Operating Environment<sup>1</sup>:</b>
41 to 122°F (5 to 50°C)
<b>Storage Environment:</b>
-4 to 212°F (-20 to 100°C)
<b>Media:</b>
Air, Argon, Helium, Nitrogen, Oxygen, and other non-reacting gases
<b>Humidity:</b>
0 – 80% Relative Humidity
<b>Noise Level<sup>2</sup> :</b>
As low as 45 dB @ 12 in (30 cm)
<i>Muffler recommended for additional noise reduction (see accessories)</i>
<b>Pump Assembly Rated Life<sup>3</sup> :</b>
PMDC Iron Core Brush - 3,000 hrs
Brushless Slotted - 10,000 hrs
Brushless Slotless - 10,000 hrs
<b>Weight:</b>
7.2 oz. (206 g) PMDC Iron Core Brush
5.0 oz. (142 g) Brushless Slotted
7.7 oz. (218 g) Brushless Slotless

### Electrical

<b>Motor Type (DC):</b>
PMDC Iron Core Brush, Brushless Slotted, Brushless Slotless
<b>Nominal Motor Voltages<sup>4</sup>:</b>
6, 12, or 24 VDC
<i>Other voltages available upon request</i>
<b>Electrical Termination:</b>
PMDC Iron Core Brush - 22 AWG Wire Leads, Length 10" (254 mm)
Brushless Slotted Motor - 22 AWG Wire Leads, Length 20" (508 mm)
Brushless Slotless - 22 AWG Wire Leads, Length 20" (508 mm)
<b>Current Range<sup>5</sup>:</b>
300-800 mA

### Wetted Materials

<b>Diaphragm:</b>	<b>Pump Head:</b>
EPDM, AEPDM, FKM	Vectra (Liquid Crystal Polymer)
<b>Valves &amp; Gaskets:</b>	<b>Valve Cover:</b>
EPDM, FKM	303 Stainless Steel

### Pneumatic

<b>Head Configuration:</b>
Single
<b>Maximum Unrestricted Flow:</b>
6 LPM
<b>Pressure Range:</b>
0 - 10 psig (0 - 0.7 bar)
<b>Vacuum Range:</b>
0 - 16 in Hg (0 - 406 mm Hg)
<b>Filtration:</b>
40 microns - recommended
<b>Efficiency at Free Flow<sup>6</sup></b>
PMDC Iron Core Brush: 0.8 LPM/Watt (PN: TS008-13)
Brushless Slotted: 1.4 LPM/Watt (PN: TS003-11)
Brushless Slotless: 1.8 LPM/Watt (PN: TS001-13)

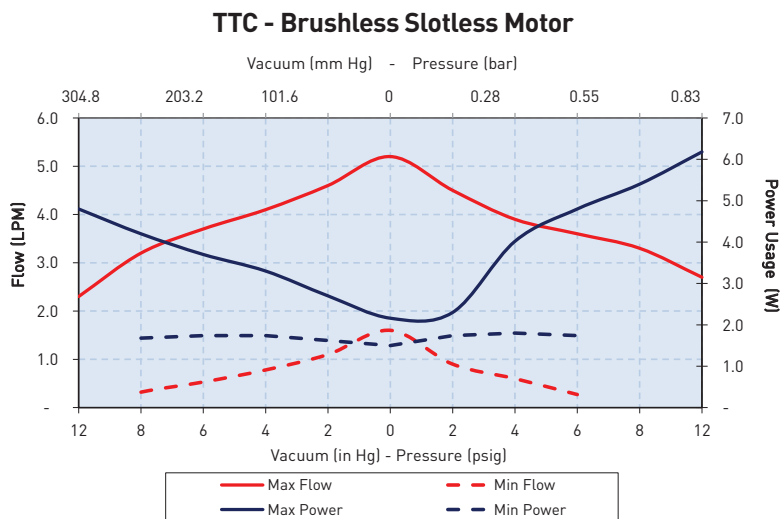
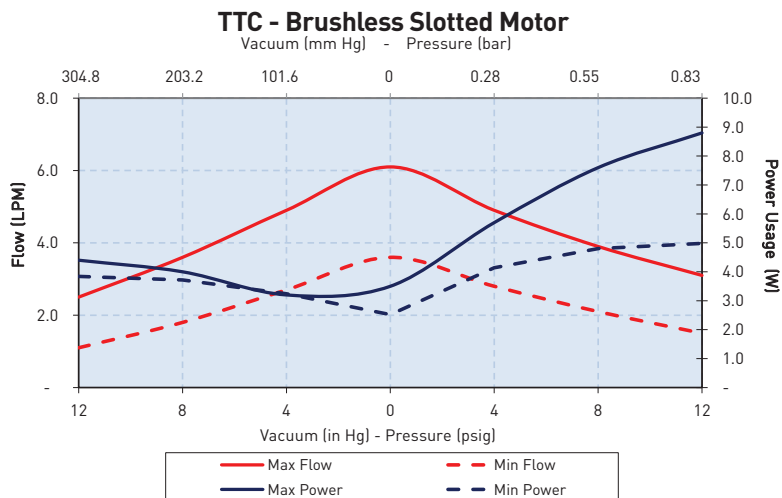
\* See Appendix A for details.



Miniature Diaphragm Pumps (air/gas)

TTC Series

Performance Specifications



The above graph represents an example of performance for the pumps series handling air at 800 feet (244m) above sea level at 75°F (24°C). Performance will vary depending on barometric pressure and media temperature. Curves are representative of standard pump configurations. Pump configurations could be customized for higher or lower flows, depending on specific customer requirements.

Please contact Parker Precision Fluidics Applications Engineering for other considerations.



## TTC Series

### Miniature Diaphragm Pumps (air/gas)

#### Sizing and Selection continued

**TTC Series**

PMDC Iron Core Brush

Brushless Slotted Motor

Brushless Slotless Motor



	PMDc Iron Core Brush	Brushless Slotted Motor	Brushless Slotless Motor
<b>Efficiency<sup>1</sup></b>	Good	Better - Up to 60% motor efficiency at low loads	Best Up to 75% motor efficiency
<b>Life<sup>2</sup></b>	Good - 3,000 hrs	Best - 10,000 hrs	Best - 10,000 hrs
<b>Cost</b>	Best	Better	Premium
<b>Noise</b>	Good	Better	Best

#### Mounting Guidelines:

- Bracket options available for mounting consideration (See *EZ Mount catalog pages*).
- Hole in the center of the bottom of housing is for manufacturing only—not to be used for mounting.
- Mounting holes are drilled for #6-20 self-tapping screws with 1/4" (6 mm) thread engagement, torque to 4 in-lbs (0.45 N-m).

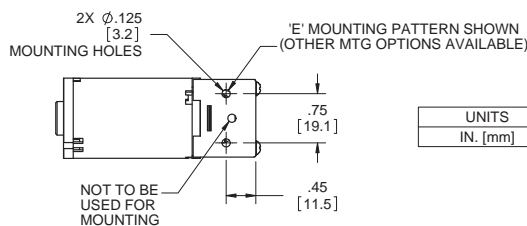
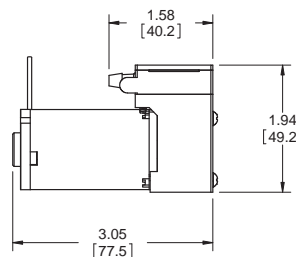
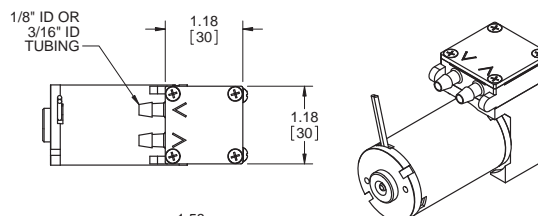
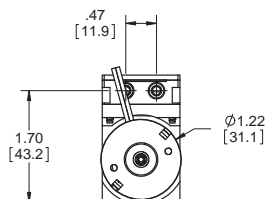
#### Port Connections:

- Barbs are sized for 1/8" (3 mm) ID tubing, 70-80 durometer recommended.
- Flow direction is marked on the pump head with arrows.

## Mechanical Integration

### Dimensions

PMDC Iron Core Brush



UNITS
IN. [mm]

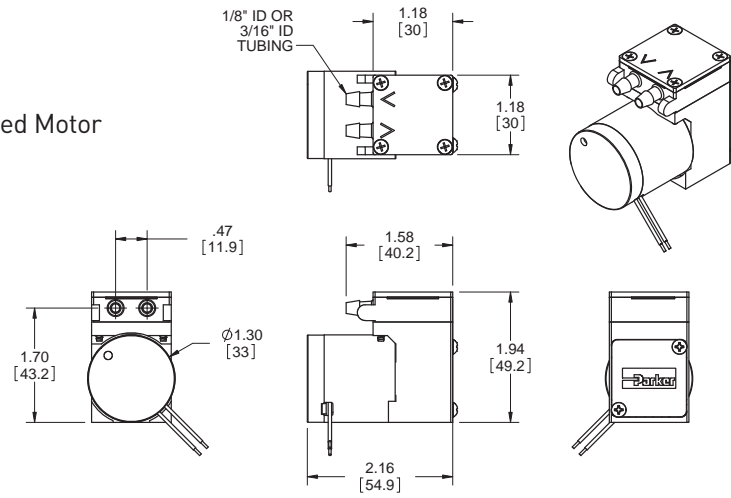


Miniature Diaphragm Pumps (air/gas)

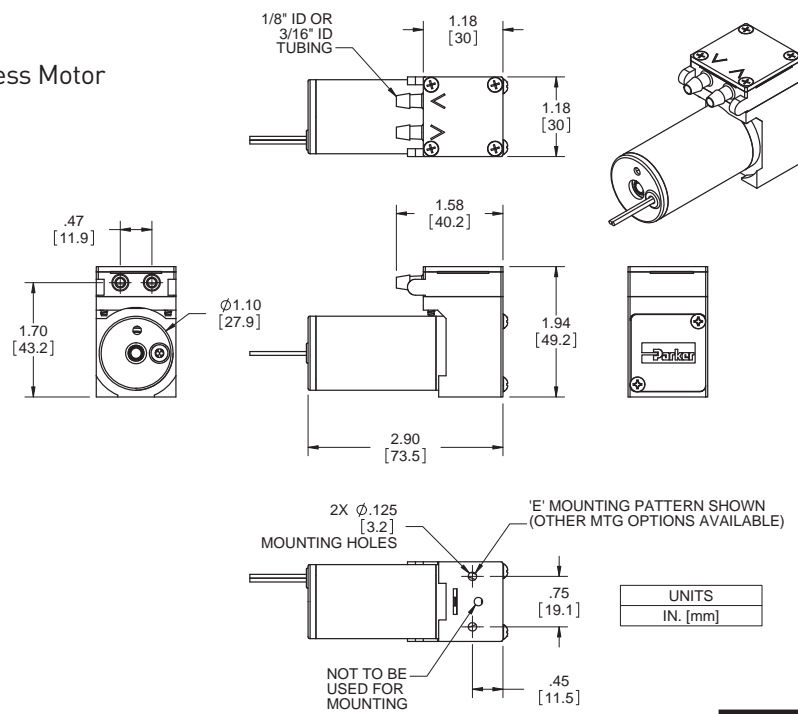
TTC Series

Miniature Pumps

Brushless Slotted Motor



Brushless Slotless Motor



## TTC Series

### Miniature Diaphragm Pumps (air/gas)

## Electrical Integration and Motor Control

### PMDC Iron Core Brush Motor

2 Wire	Red (+), Black (-)
Wire specification	22 AWG, Insulation OD 0.051 in (1.30 mm), 10" (254 mm) Wire Leads

### Brushless Motor Control Options

2 Wire	Red (+), Black (-)
3 Wire (Speed Control)	Red (+), Black (-), White (PWM) or Yellow (Analog)
4 Wire (Speed Control & Feedback)	Red(+), Black (-), White (PWM) or Yellow (Analog), Blue (Tachometer)
Wire specification	22 AWG, Insulation OD 0.051 in (1.30 mm), 20" (508 mm) Wire Leads

### Other Motor Control Considerations

The drive electronics for the BLDC motors are integrated into the motor itself, all that is needed is a power supply with the sufficient voltage and current.

### Key Things to Remember

The pump is not a pressure holding device. An external check valve is recommended, if there is a pressure holding requirement.

Pump orientation does not affect performance or life.

## Pulse Width Modulation (PWM)

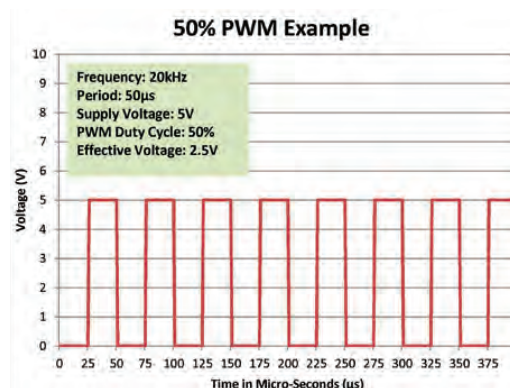
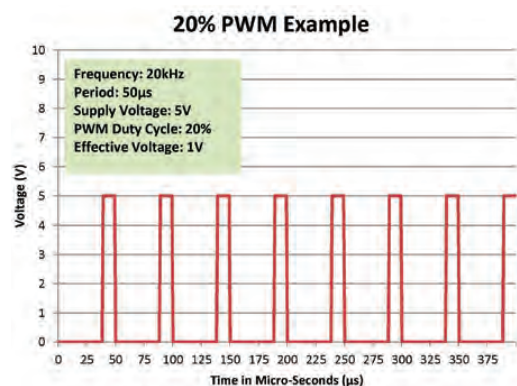
**Pulse-width modulation** is a commonly used technique for controlling DC motors.

The average value of the voltage fed to the motor is controlled by turning a switch between the voltage supply and the motor on-and-off at a fast pace. The longer the switch is on compared to the off time, the higher the power supplied to the motor.

The PWM switching frequency varies for different types of devices, and is selected based on how it affects the device. For example, some applications require a faster switching frequency to prevent audible noise or electrical noise.

The term duty cycle describes the ratio of on-time to the period (one complete on-and-off cycle). Duty cycle is normally expressed as a percentage of on-time, 100% being full-power and 50% being half-power.

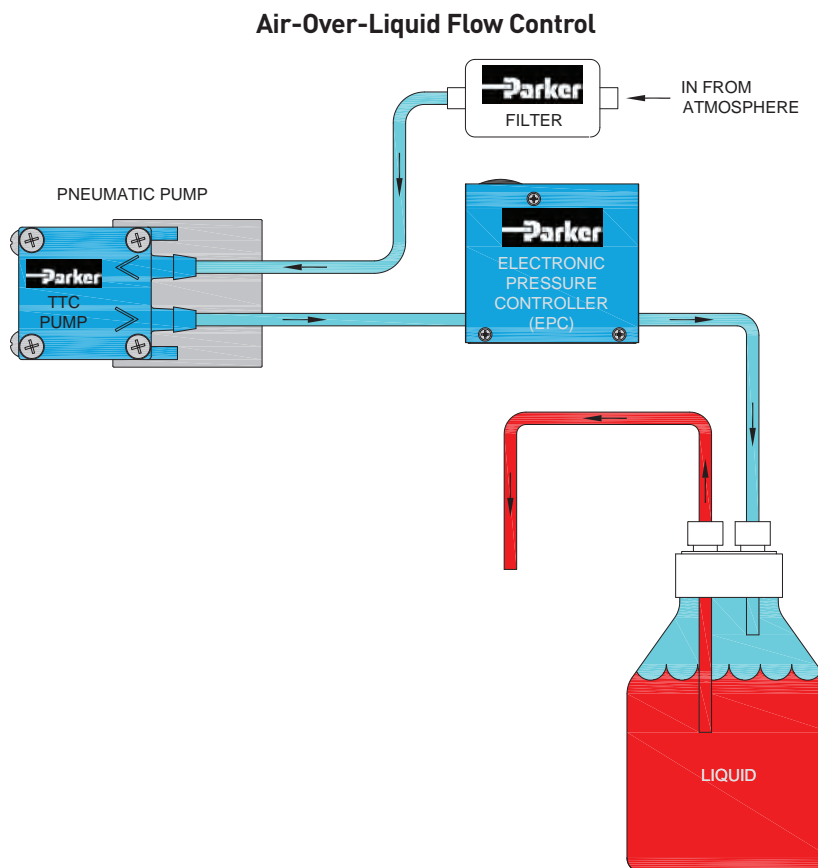
The advantage of PWM is the reduction of power-loss due to switching versus other control methods. Parker Hannifin recommends controlling the pump using 15kHz - 20 kHz frequency range.



Miniature Diaphragm Pumps (air/gas)

TTC Series

Typical Flow Diagram

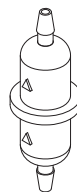
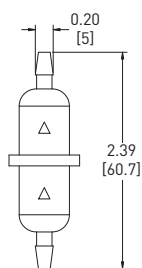
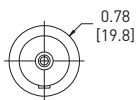


Miniature Pumps

Accessory Information

Filter-Mufflers also available to assist with filtration and optimize noise reduction.

Part Number: 00492-15  
(Filters to 10 microns)



UNITS  
IN. [mm]



## TTC Series

## Miniature Diaphragm Pumps (air/gas)

### Accessory Information

EZ Mount available



**EZ Mount** provides ease of installation and effective control of vibration transfer. EZ Mount was designed to mount easily to the Precision Fluidic TTC Family of diaphragm pumps.

#### Features

- Isolation feet on the EZ mount can be rotated in any one of three ninety-degree planes and is designed for top-down or bottom-up mounting providing simple installation.
- EZ Mount was designed to minimize weight added to the pump assembly. Approximate weights are: Style A - 0.63 oz (18 g), Style B - 0.71 oz (20 g).
- Effectively absorbs vibration to minimize most vibration-induced noise and vibration transfer into an instrument.
- Designed to keep height and size to a minimum.
- Engineered for Parker TTC pumps to ease integration into your system.

### Physical Properties

#### Operating Environment:

41 - 158°F (5 - 70°C)

#### Humidity:

0 - 95% Relative Humidity

#### Base Plate:

Noryl GTX830

#### Feet:

Silicone

#### Feet Insert:

Brass

#### Hardware:

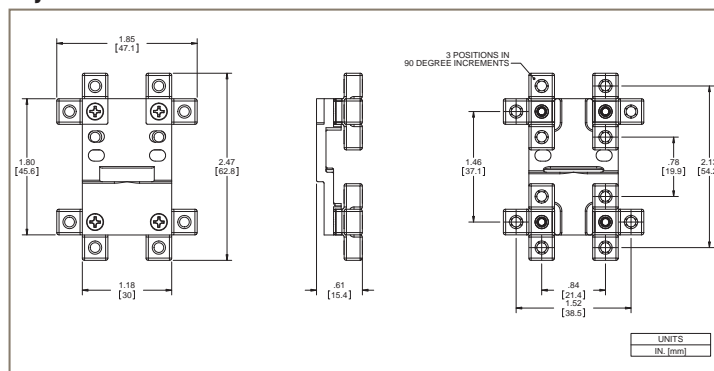
Zinc-Plated Steel

EZ Mount kits include all necessary hardware and detailed instructions.

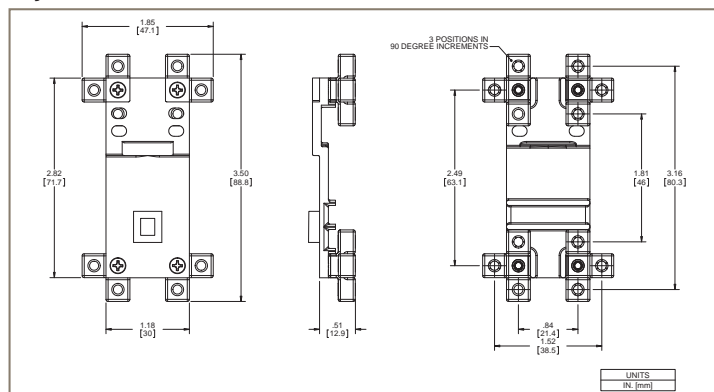
Isolation Feet are available in either threaded or thru-hole clearance for standard #4-40 or #6-32 (M3 for clearance hole only) hardware and can be mounted in any of three ninety-degree planes.

### Dimensions

#### Style A - Brushless Slotted Motor



#### Style B - PMDC Iron Core Brush Motor



## Miniature Diaphragm Pumps (air/gas)

## TTC Series

### Ordering Information

#### TTC Single Head Pumps - General Purpose

Part No.	Vacuum: LPM @ Load				Free Flow	Pressure: LPM @ Load				Max		Motor Type	PCD*		Wetted Materials
	16 in Hg 406 mm Hg	12 in Hg 305 mm Hg	8 in Hg 203 mm Hg	4 in Hg 102 mm Hg		4 psig 276 mbar	8 psig 552 mbar	12 psig 827 mbar	16 psig 1103 mbar	Vac in Hg	Press psig		VDC	mA	
TS002-12		2.5	3.6	5.9	6.1					16.0		Brushless Slotted	12	520	EPDM
TS001-13					6.0	4.9	3.9	3.1			16.0	Brushless Slotted	12	735	EPDM
TS008-13					6.0	4.7	3.9	3.2			16.0	PMDC Brush	12	660	EPDM
TS008-12		2.5	3.6	4.8	5.8					16.0		PMDC Brush	12	500	EPDM
TS005-13					5.2	3.9	3.3	2.7			16.0	Brushless Slotless	12	515	EPDM
TS006-12		2.3	3.2	4.1	5.1					16.0		Brushless Slotless	12	400	EPDM
TS003-11		1.1	1.8	2.7	3.6	2.8	2.1	1.5		12.0	16.0	Brushless Slotted	12	415	EPDM
TS007-11			0.3	0.8	1.6	0.6	0.3*			16.0		Brushless Slotless	12	150	EPDM

Note: The Ordering Information Section includes a few selected part numbers for the product line. Other performances and configurations are available. Please contact your Sales Representative or an Application Engineer to discuss your application needs.

\*PCD: Peak Current Draw

#### Accessory Information

Part No.	Filtering Level (Micron)	Filter Area	Internal Volume	Operating Limitations:			Wetted Materials
				Max Temperature 80°C	Min Temperature 32°C	Max Pressure 65 PSI (4.48 bar)	
00492-15	10	1.71 in <sup>2</sup> (11 cm <sup>2</sup> )	0.24 in <sup>3</sup> (3.9 cm <sup>3</sup> )				Polypropylene
Filter-Mufflers: To assist with filtration and optimize noise reduction. Tubing: Recommendation 1/8" (3mm) ID.							

#### EZ Mount for TTC Single Head Pump with PMDC Iron Core Brush Motor

Part Number	Style	Description
00329-10-A45S	B	#4-40 Threaded
00329-10-B45S	B	#4 Clearance
00329-10-D45S	B	#6-32 Threaded
00329-10-C45S	B	#6 / M3 Clearance

#### EZ Mount for TTC Single Head Pump with Brushless Slotted Motor

Part Number	Style	Description
00328-10-A45S	A	#4-40 Threaded
00328-10-B45S	A	#4 Clearance
00328-10-D45S	A	#6-32 Threaded
00328-10-C45S	A	#6 / M3 Clearance

#### EZ Mount for TTC Single Head Pump with Brushless Slotless Motor

Part Number	Style	Description
01074-10-A45S	B	#4-40 Threaded
01074-10-B45S	B	#4 Clearance
01074-10-D45S	B	#6-32 Threaded
01074-10-C45S	B	#6 / M3 Clearance



## TTC Series

## Miniature Diaphragm Pumps (air/gas)

### Ordering Information

Please click on the Order On-line button below (or go to [www.parker.com/precisionfluidics/ttc](http://www.parker.com/precisionfluidics/ttc)) to configure the TTC Miniature Diaphragm Pump in your application.

Serviceable – PPF products are designed for use through the rated life and Parker does not sell replacement parts, nor is it recommended to service these in the field

Note: In addition to Parker's innovative and flexible pump designs, we offer applications engineering expertise to our customers in order to configure and recommend the optimal pump for the application. Contact Parker Applications Engineering to discuss and configure alternate pump configurations to meet your specific application requirements. Providing information on the following requirements will assist us in developing an optimal solution for your application:

- Noise
- Operating Pressure / Vacuum
- Power Consumption
- Life Requirement
- Function in the Application
- Size
- Motor Control
- Media
- Voltage



### Appendix A

All performance data is typical based on standard conditions: 70°F and 14.7 psia (21°C and 1 bar).

1. Duty Dependent. For operation above 122°F (50°C) consult factory
2. Noise is dependent on the configuration and operation of the pump in the application. Parker has the ability to tailor the pump configuration when noise is a critical criterion in the effort to meet the performance requirements of the application. Noise level is tested to Parker protocol P-105.
3. Life rating can vary depending on application and operating conditions.
4. Custom motor options available. Custom motors may require a significant application potential. The standard motors can be configured with a special winding to meet a particular operation point at a specified voltage
5. Current range is dependent on motor type, voltage, pressure/vacuum and flow requirement. Lower levels possible depending on application.
6. Pump efficiency is a measure of the flow rate generated per unit of power consumed. Efficiency may change dependent on application and operating condition at free flow.





# TTC-IIS Series Miniature Diaphragm Pumps (air/gas)

Up to 11 LPM Free Flow



TTC-IIS Miniature Diaphragm Pumps are a series of brush and brushless DC motor driven pumps, which are tailored to meet the specific application performance requirements. An innovative compact design incorporates leading edge technologies that allow them to operate more efficiently than existing pump designs. TTC-IIS pumps offer multiple component configurations allowing them to be used for either vacuum, pressure, or alternating vacuum and pressure operations. The TTC-IIS Series is best for compact and low pressure applications that require high efficiency.

### Features:

- TTC-IIS Series' innovative and efficient design pushes the performance envelope in a lightweight, compact size which allows it to operate at the highest performance/size ratio.
- Highest efficiency in class. The TTC-IIS supports low power for portable and battery powered instruments.
- Using our proprietary advanced diaphragm elastomer and superior brushless motor design sets the highest benchmark for service-free operation that exceeds 10,000 hours.
- Incorporating the lightweight EZ Mount accessory facilitates simple system assembly while dampening vibration and reducing noise levels.
- RoHS compliant.

### Typical Applications

- Gas Analysis
- Anesthesia Monitors
- CO<sub>2</sub> Monitors
- Patient Monitoring
- Wound Therapy
- Urinalysis
- Trace Detection
- Medical/Training Mannequins
- Degassing

## Product Specifications\*

### Physical Properties

<b>Operating Environment<sup>1</sup>:</b>	41 to 122°F (5 to 50°C)
<b>Storage Environment:</b>	-4 to 212°F (-20 to 100°C)
<b>Media:</b>	Air, Argon, Helium, Nitrogen, Oxygen, and other non-reacting gases
<b>Humidity:</b>	0 – 80% Relative Humidity
<b>Noise Level<sup>2</sup>:</b>	As low as 45dB @ 12 in (30 cm) <i>Muffler recommended for additional noise reduction (see accessories)</i>
<b>Pump Assembly Rated Life<sup>3</sup>:</b>	PMDC Iron Core Brush - 3,000 hrs Brushless Slotted - 10,000 hrs Brushless Slotless - 10,000 hrs
<b>Weight:</b>	8.6 oz. (244 g) PMDC Iron Core Brush 6.2 oz. (176 g) Brushless Slotted 9.0 oz. (255 g) Brushless Slotless

### Electrical

<b>Motor Type (DC):</b>	PMDC Iron Core Brush, Brushless Slotted, Brushless Slotless
<b>Nominal Motor Voltages<sup>4</sup>:</b>	6, 12 or 24 VDC <i>Other voltages available upon request</i>
<b>Electrical Termination:</b>	PMDC Iron Core Brush: 22 AWG Wire Leads, Length 10" (254 mm) Brushless Slotted Motor: 22 AWG Wire Leads, Length 20" (508 mm) Brushless Slotless: 22 AWG Wire Leads, Length 20" (508 mm)
<b>Current Range<sup>5</sup>:</b>	240 - 880 mA
<b>Wetted Materials</b>	
<b>Diaphragm:</b>	EPDM, AEPDM, FKM
<b>Valves &amp; Gaskets:</b>	EPDM, FKM
<b>Pump Head:</b>	Vectra (Liquid Crystal Polymer)
<b>Valve Cover:</b>	303 Stainless Steel

### Pneumatic

<b>Head Configuration:</b>	Dual
<b>Maximum Unrestricted Flow:</b>	6 LPM (Per head), 11 LPM (Parallel)
<b>Pressure Range:</b>	0 - 12 psig (0 - 0.8 bar) Parallel
<b>Vacuum Range:</b>	0 - 16 in Hg (0 - 406 mm Hg)
<b>Filtration</b>	40 microns - recommended
<b>Efficiency at Free Flow<sup>6</sup></b>	PMDC Iron Core Brush: 1.2 LPM/Watt (PN: TD001-13) Brushless Slotted: 1.6 LPM/Watt (PN: TD003-11) Brushless Slotless: 1.5 LPM/Watt (PN: TD005-12)

\* See Appendix A for details.

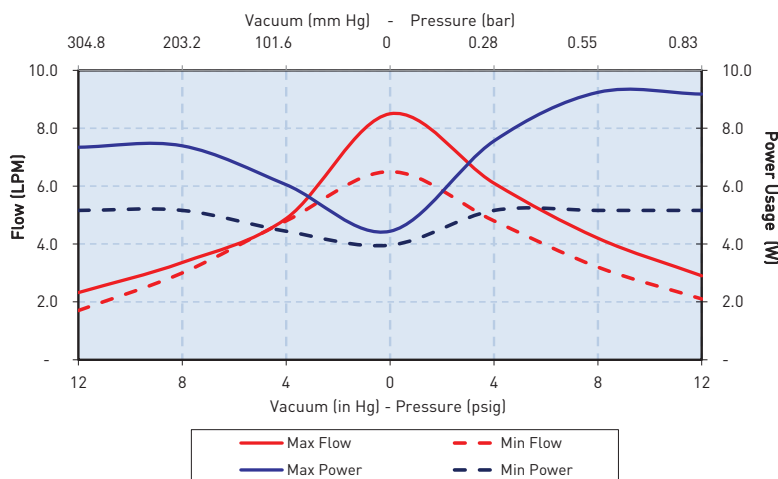


## Miniature Diaphragm Pumps (air/gas)

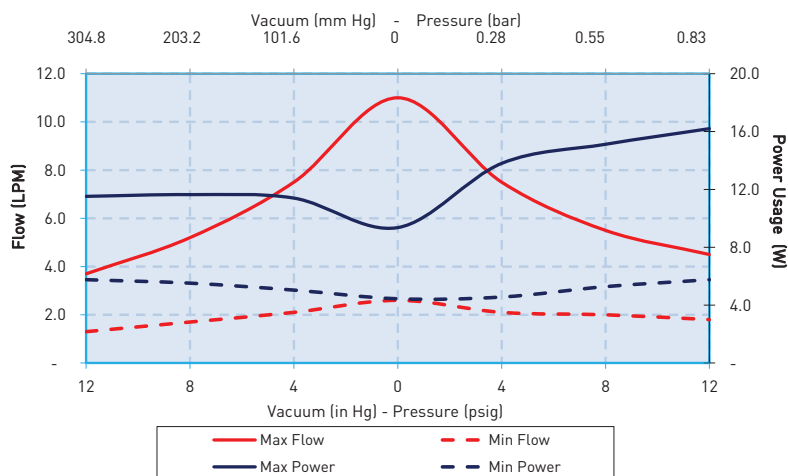
## TTC-IIS Series

## Performance Specifications

## TTC-IIS - Brushless Slotted Motor



## TTC-IIS - Brushless Slotless Motor



The above graph represents an example of performance for the pumps series handling air at 800 feet (244m) above sea level at 75°F (24°C). Performance will vary depending on barometric pressure and media temperature. Curves are representative of standard pump configurations. Pump configurations could be customized for higher or lower flows, depending on specific customer requirements.

Please contact Parker Precision Fluidics Applications Engineering for other considerations.



## TTC-IIS Series

## Miniature Diaphragm Pumps (air/gas)

### Sizing and Selection

TTC-IIS Series

PMDC Iron Core Brush

Brushless Slotted Motor

Brushless Slotless Motor



	PMDC Iron Core Brush	Brushless Slotted Motor	Brushless Slotless Motor
<b>Efficiency<sup>1</sup></b>	Good	Better - Up to 60% motor efficiency at low loads	Best - Up to 75% motor efficiency at high power levels
<b>Life<sup>2</sup></b>	Good - 3,000 hrs	Best - 10,000 hrs	Best - 10,000 hrs
<b>Cost</b>	Best	Better	Premium
<b>Noise</b>	Good	Better	Best

#### Mounting Guidelines:

- Bracket options available for mounting consideration (See *EZ Mount catalog pages*).
- Hole in the center of the bottom of housing is for manufacturing only—not to be used for mounting.
- Mounting holes are drilled for #6-20 self-tapping screws with 1/4" (6 mm) thread engagement 4 in.-lbs. (0.45 N-m).

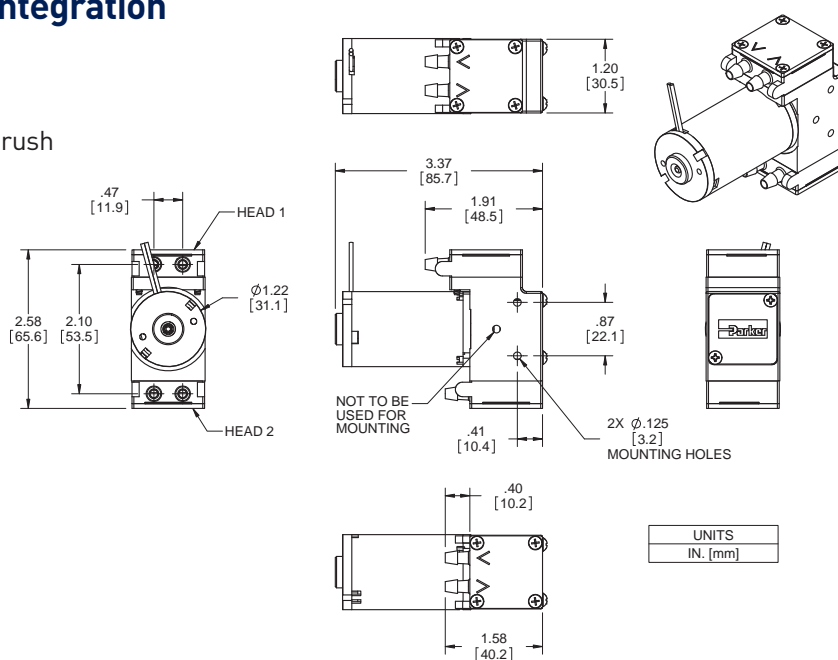
#### Port Connections:

- Barbs are sized for 1/8" (3 mm) ID tubing, 70-80 durometer recommended.
- Flow direction is marked on the pump head with arrows.

## Mechanical Integration

### Dimensions

PMDC Iron Core Brush



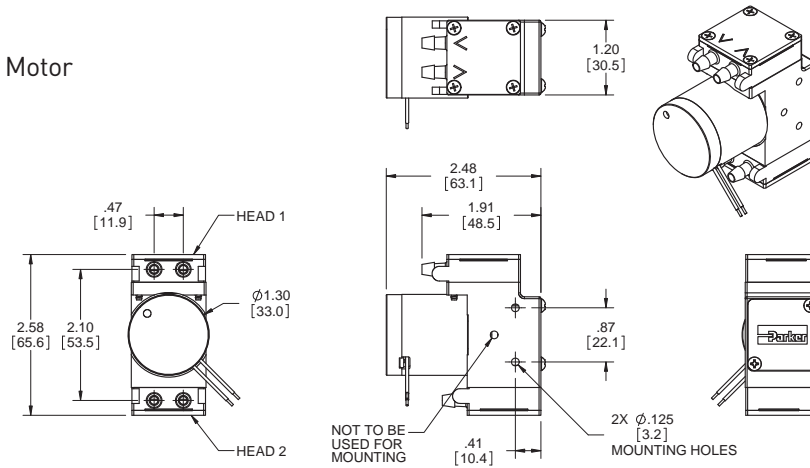
Miniature Diaphragm Pumps (air/gas)

TTC-IIS Series

Mechanical Integration

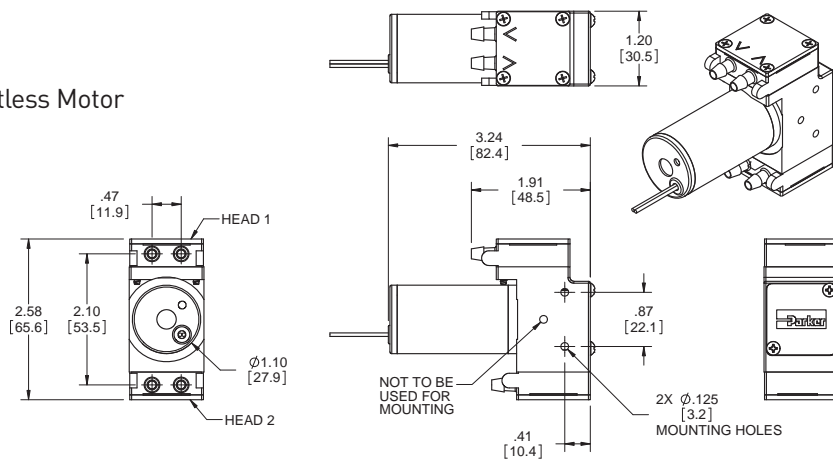
Miniature Pumps

Brushless Slotted Motor



UNITS
IN. [mm]

Brushless Slotless Motor



UNITS
IN. [mm]



## TTC-IIS Series Miniature Diaphragm Pumps (air/gas)

### Electrical Integration and Motor Control

#### PMDC Iron Core Brush Motor

2 Wire	Red (+), Black (-)
Wire specification	22AWG, Insulation OD 0.051 in (1.30 mm), 10" (254 mm) Wire Leads

#### Brushless Motor Control Options

2 Wire	Red (+), Black (-)
3 Wire (Speed Control)	Red (+), Black (-), White (PWM) or Yellow (Analog)
4 Wire (Speed Control & Feedback)	Red(+), Black (-), White (PWM) or Yellow (Analog), Blue (Tachometer)
Wire specification	22AWG, Insulation OD 0.051 in (1.30 mm), 20" (508 mm) Wire Leads

#### Other Motor Control Considerations

The drive electronics for the BLDC motors are integrated into the motor itself, all that is needed is a power supply with the sufficient voltage and current.

#### Key Things to Remember

The pump is not a pressure holding device. An external check valve is recommended, if there is a pressure holding requirement.

Pump orientation does not affect performance or life.

### Pulse Width Modulation (PWM)

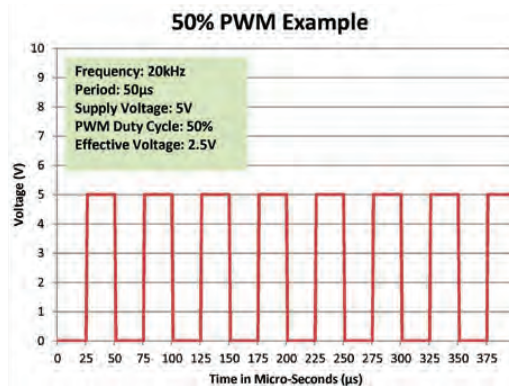
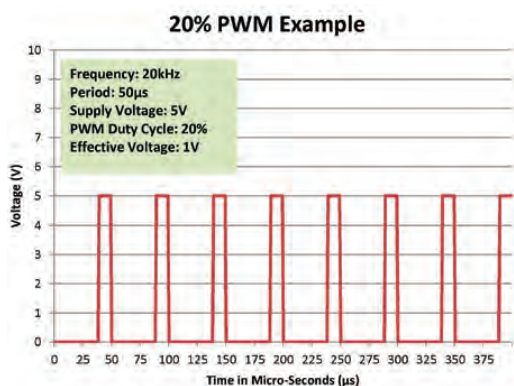
**Pulse-width modulation** is a commonly used technique for controlling DC motors.

The average value of the voltage fed to the motor is controlled by turning a switch between the voltage supply and the motor on-and-off at a fast pace. The longer the switch is on compared to the off time, the higher the power supplied to the motor.

The PWM switching frequency varies for different types of devices, and is selected based on how it affects the device. For example, some applications require a faster switching frequency to prevent audible noise or electrical noise.

The term duty cycle describes the ratio of on-time to the period (one complete on-and-off cycle). Duty cycle is normally expressed as a percentage of on-time, 100% being full-power and 50% being half-power.

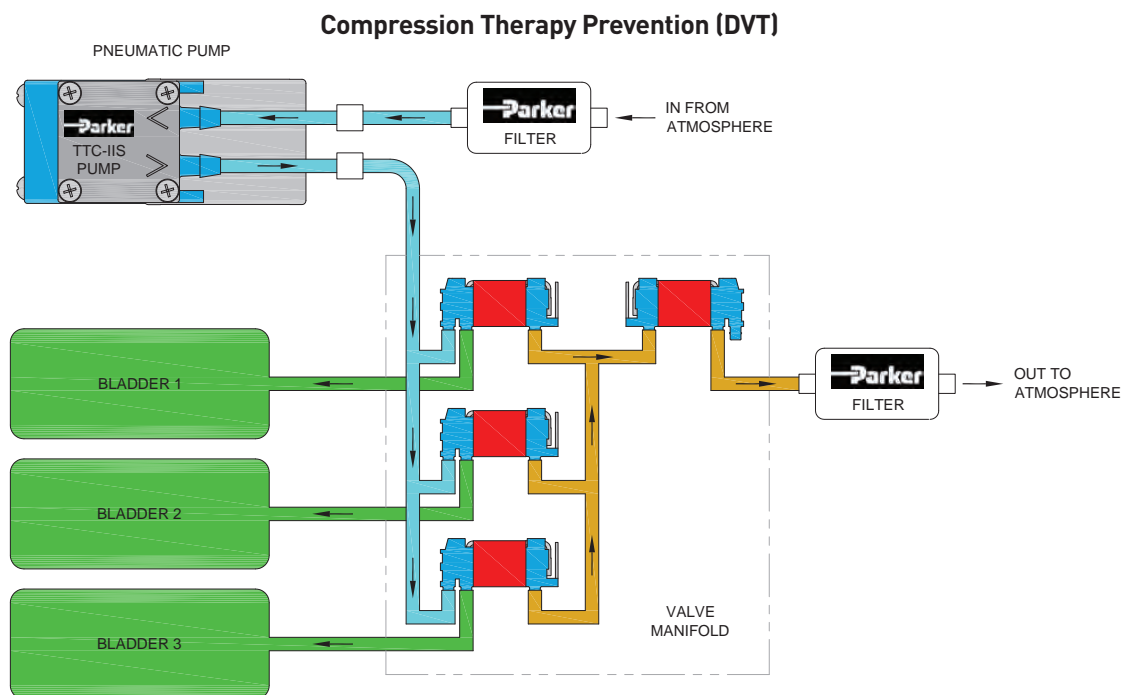
The advantage of PWM is the reduction of power-loss due to switching versus other control methods. Parker Hannifin recommends controlling the pump using 15kHz - 20 kHz frequency range.



Miniature Diaphragm Pumps (air/gas)

TTC-IIS Series

Typical Flow Diagram

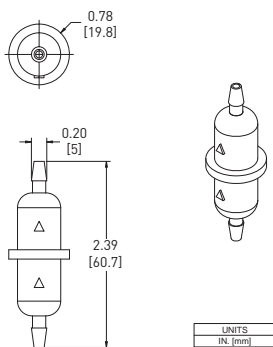


Miniature Pumps

Accessory Information

Filter-Mufflers also available to assist with filtration and optimize noise reduction.

Part Number: 00492-15  
(Filters to 10 microns)



## TTC-IIS Series

## Miniature Diaphragm Pumps (air/gas)

### Accessory Information

EZ Mount available



EZ Mount provides ease of installation and effective control of vibration transfer. EZ Mount was designed to mount easily to the Precision Fluidic TTC-IIS Family of diaphragm pumps.

#### Features

- Isolation feet on the EZ mount can be rotated in any one of three ninety-degree planes and is designed for top-down or bottom-up mounting providing simple installation.
- EZ Mount was designed to minimize weight added to the pump assembly. Approximate weights are: Style A - 0.63 oz (18 g), Style B - 0.71 oz (20 g).
- Effectively absorbs vibration to minimize most vibration-induced noise and vibration transfer into an instrument.
- Designed to keep height and size to a minimum.
- Engineered for Parker TTC-IIS pumps to ease integration into your system.

### Physical Properties

#### Operating Environment:

41 - 158°F (5 - 70°C)

#### Humidity:

0 - 95% Relative Humidity

#### Base Plate:

Noryl GTX830

#### Feet:

Silicone

#### Feet Insert:

Brass

#### Hardware:

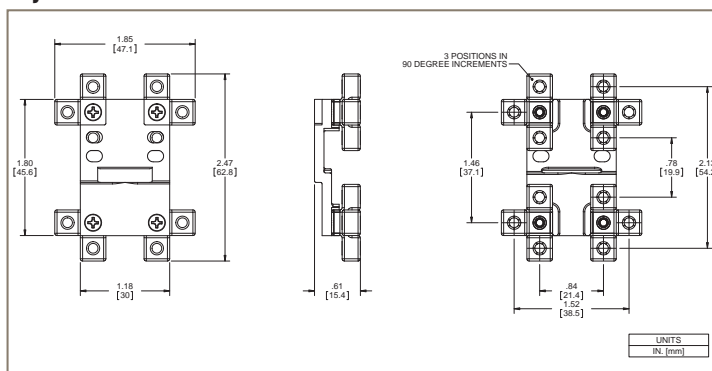
Zinc-Plated Steel

EZ Mount kits include all necessary hardware and detailed instructions.

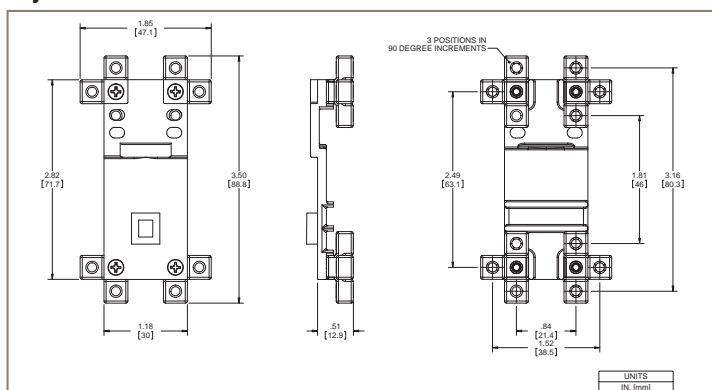
Isolation Feet are available in either threaded or thru-hole clearance for standard #4-40 or #6-32 (M3 for clearance hole only) hardware and can be mounted in any of three ninety-degree planes.

### Dimensions

#### Style A - Brushless Slotted Motor



#### Style B - PMDC Iron Core Brush Motor



## Miniature Diaphragm Pumps (air/gas)

## TTC-IIS Series

### Ordering Information

#### TTC-IIS Dual Head Pumps - General Purpose

Part No.	Vacuum: LPM @ Load				Free Flow	Pressure: LPM @ Load				Max		PCD*	Wetted Materials	
	16 in Hg 406 mm Hg	12 in Hg 305 mm Hg	8 in Hg 203 mm Hg	4 in Hg 102 mm Hg		4 psig 276 mbar	8 psig 55 mbar	12 psig 827 mbar	16 psig 1103 mbar	Vac in Hg	Press psig			Motor Type
TD003-11	1.7	3.0	4.8	6.5	4.8	3.2	2.1		12.0	16.0	Brushless Slotted	12	570	AEPDM, EPDM, EPDM

\* PCD: Peak Current Draw

#### TTC-IIS Dual Head Pumps - High Flow

Part No.	Vacuum: LPM @ Load				Free Flow	Pressure: LPM @ Load				Max		PCD*	Wetted Materials		
	16 in Hg 406 mm Hg	12 in Hg 305 mm Hg	8 in Hg 203 mm Hg	4 in Hg 102 mm Hg		4 psig 276 mbar	8 psig 55 mbar	12 psig 827 mbar	16 psig 1103 mbar	Vac in Hg	Press psig			Motor Type	VDC
TD001-13					6.8	4.9	3.4	2.4	1.5		16.0	PMDC Brush	12	630	EPDM
TD004-13					8.5	6.1	4.2	2.9			16.0	Brushless Slotted	12	880	EPDM
TD005-12					8.8	7.4	5.5	3.8			16.0	Brushless Slotless	12	630	EPDM
TD002-13					8.5	6.1	4.2	2.9			16.0	Brushless Slotted	12	770	EPDM

\* PCD: Peak Current Draw

Note: The Ordering Information Section includes a few selected part numbers for the product line. Other performances and configurations are available. Please contact your Sales Representative or an Application Engineer to discuss your application needs.

### Accessory Information

Part No.	Filtering Level (Micron)	Filter Area	Internal Volume	Operating Limitations:			Wetted Materials
				Max Temperature 80°C	Min Temperature 32°C	Max Pressure 65 PSI (4.48 bar)	
00492-15	10	1.71 in <sup>2</sup> (11 cm <sup>2</sup> )	0.24 in <sup>3</sup> (3.9 cm <sup>3</sup> )				Polypropylene

Filter-Mufflers: To assist with filtration and optimize noise reduction.  
Tubing: Recommendation 1/8" (3mm) ID.

#### EZ Mount for TTC-IIS Dual Head Pump with PMDC Iron Core Brush Motor

Part Number	Style	Description
00332-10-A45S	B	#4-40 Threaded
00332-10-B45S	B	#4 Clearance
00332-10-D45S	B	#6-32 Threaded
00332-10-C45S	B	#6 / M3 Clearance

#### EZ Mount for TTC-IIS Dual Head Pump with Brushless Slotted Motor

Part Number	Style	Description
00328-10-A45S	A	#4-40 Threaded
00328-10-B45S	A	#4 Clearance
00328-10-D45S	A	#6-32 Threaded
00328-10-C45S	A	#6 / M3 Clearance

#### EZ Mount for TTC-IIS Dual Head Pump with Brushless Slotless Motor

Part Number	Style	Description
01074-10-A45S	B	#4-40 Threaded
01074-10-B45S	B	#4 Clearance
01074-10-D45S	B	#6-32 Threaded
01074-10-C45S	B	#6 / M3 Clearance



## TTC-IIS Series Miniature Diaphragm Pumps (air/gas)

### Ordering Information

Please click on the Order On-line button below (or go to [www.parker.com/precisionfluidics/ttciiis](http://www.parker.com/precisionfluidics/ttciiis)) to configure the TTC-IIS Miniature Diaphragm Pump for your application.

Serviceable – PPF products are designed for use through the rated life and Parker does not sell replacement parts, nor is it recommended to service these in the field

Note: In addition to Parker's innovative and flexible pump designs, we offer applications engineering expertise to our customers in order to configure and recommend the optimal pump for the application. Contact Parker Applications Engineering to discuss and configure alternate pump configurations to meet your specific application requirements. Providing information on the following requirements will assist us in developing an optimal solution for your application:

- Noise
- Operating Pressure / Vacuum
- Power Consumption
- Life Requirement
- Description of pump function in the application
- Size
- Motor Control
- Media
- Voltage



### Appendix A

All performance data is typical based on standard conditions: 70°F and 14.7 psia (21°C and 1 bar).

1. Duty Dependent. For operation above 122°F (50°C) consult factory
2. Noise is dependent on the configuration and operation of the pump in the application. Parker has the ability to tailor the pump configuration when noise is a critical criterion in the effort to meet the performance requirements of the application. Noise level is tested to Parker protocol P-105.
3. Life rating can vary depending on application and operating conditions.
4. Custom motor options available. Custom motors may require a significant application potential. The standard motors can be configured with a special winding to meet a particular operation point at a specified voltage
5. Current range is dependent on motor type, voltage, pressure/vacuum and flow requirement. Lower levels possible depending on application.
6. Pump efficiency is a measure of the flow rate generated per unit of power consumed. Efficiency may change dependent on application and operating condition at free flow.





# T2-04

Up to 7.0 LPM Free Flow



## Micro Diaphragm Pumps (air/gas)

The T2-04 is a high flow and ultra compact pump that is ideal for portable air and gas detection applications.. Delivering flow up to 7.0 lpm, the pump works well in environments where high efficiency for extended batter life, high performance, low cost, minimal weight, and compact size are critical.

### Features

- The pump with patented valve design is optimized to provide best-in-class efficiency/size ratio especially for low vacuum applications. Low power consumption enables longer battery life for small instruments.
- The pump fits into the tight spaces demanded of today's battery-powered instruments. The lightweight design keeps the instrument weight minimized.
- The high efficiency coreless brush motor can satisfy intrinsic safety requirements. It has been proven in applications for sampling of medical gases, hazardous gases, particles, and aerosols in a range of fixed and portable instruments.
- Compact dual head design with internal flow paths that require only one set of barbs for intake and discharge simplifies plumbing requirements
- RoHS Compliant

### Typical Applications

- Particle Detection
- Pathogen Detection
- Compression Therapy
- Wound Therapy
- Fuel Cell

## Product Specifications\*

### Physical Properties

<b>Operating Environment<sup>1</sup>:</b>	32 to 122°F (0 to 50°C)
<b>Storage Temperature:</b>	14 to 122°F (-10 to 50°C)
<b>Media:</b>	Air, Argon, Helium, Nitrogen, Oxygen, and other non-reacting gases
<b>Humidity:</b>	5-95% Relative Humidity
<b>Noise Level<sup>2</sup>:</b>	As low as 45dB
<b>Pump Assembly Rated Life<sup>3</sup>:</b>	Up to 5,000 hrs
<b>Weight:</b>	3.3 oz (94 g)

### Electrical

<b>Motor Type:</b>	High Efficiency Coreless Brush
<b>Nominal Motor Voltages<sup>4</sup>:</b>	6 VDC
<b>Max Power at Nominal Voltage:</b>	0.36 Watts
<b>Electrical Termination:</b>	28 AWG Wire Leads lead length 5" (127 mm)
<b>Current Range<sup>5</sup>:</b>	50 - 900 mA
<b>Inductance<sup>6</sup>:</b>	Coreless Brush: 0.266 mH max @ 1kHz/50mV

### Pneumatic

<b>Head Configuration:</b>	Dual (Single Ported)
<b>Maximum Flow:</b>	7.0 lpm
<b>Maximum Intermittent Pressure<sup>7</sup>:</b>	11.9 psi (820 mbar)
<b>Maximum Continuous Pressure:</b>	2 psi (138 mbar)
<b>Maximum Intermittent Vacuum<sup>7</sup>:</b>	17.6 in Hg (596 mbar)
<b>Maximum Continuous Vacuum:</b>	4 in Hg (138 mbar)
<b>Filtration:</b>	40 micron recommended
<b>Efficiency at Free Flow<sup>8</sup>:</b>	Coreless Brush Motor: 8.9 LPM/Watt (P/N: T4-2HE-06-1SNA)

### Wetted Materials

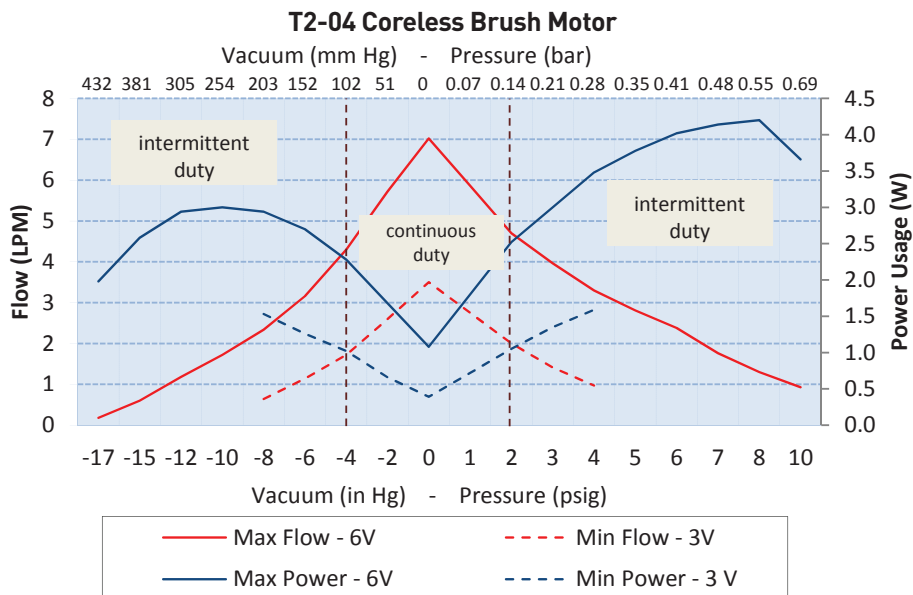
<b>Diaphragm:</b>	Neoprene Rubber	<b>Pump Head:</b>	Polyphthalamide (PPA)
<b>Valves:</b>	Silicone		

\* See Appendix A for details.



## T2-04 Micro Diaphragm Pumps (air/gas)

### Typical Flow Curve



The above graphs represent examples of performance for the pumps series handling air at 800 feet (244M) above sea level at 75° F (24° C). Performance will vary depending on barometric pressure and media temperature.

Curves are representative of standard pump configurations. Pump configurations could be customized for higher or lower flows, depending on specific customer requirements.

Please contact Parker Precision Fluidics Applications Engineering for other considerations

### Sizing and Selection

**T2-04 Series** Coreless Brush Motor



#### Mounting Guidelines:

- Parker recommends using a nylon cable tie with a length of at least 4" (100 mm).

#### Port Connections:

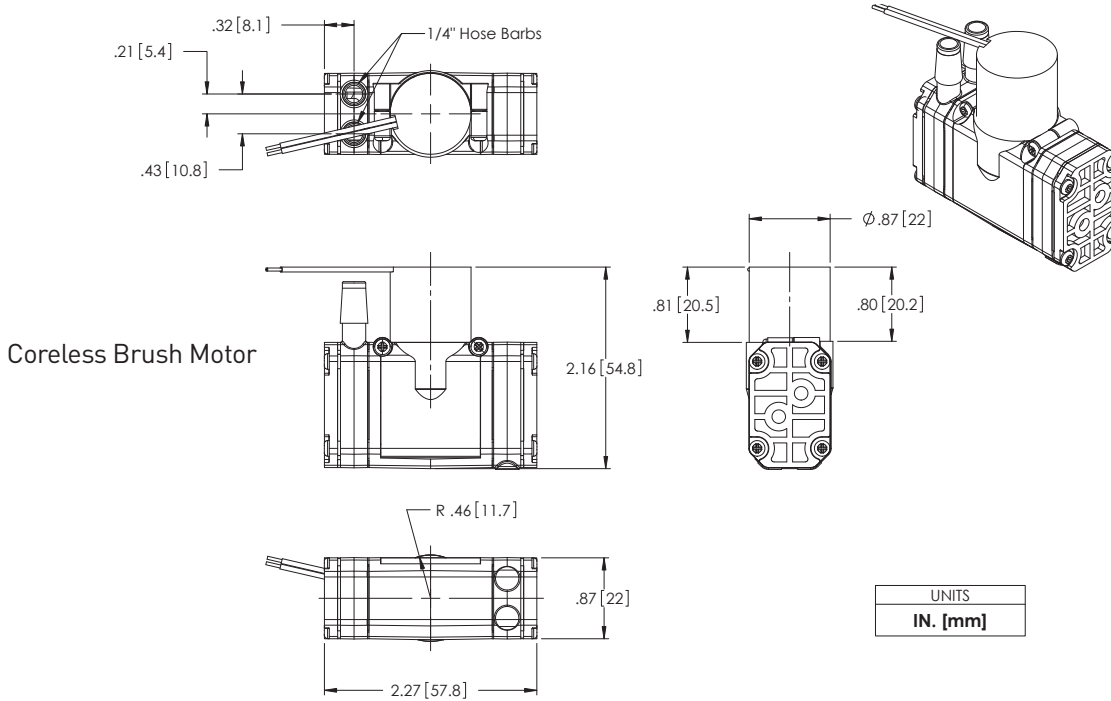
- Barbs are sized for 1/4" ID tubing, 70-80 durometer recommended



## T2-04 Micro Diaphragm Pumps (air/gas)

### Mechanical Integration

#### Dimensions



### Electrical Integration and Motor Control

If application requires variable flow, motor control options are available, as follows:

#### Brush Motor

2 Wire	Red (+), Black (-)
Wire specification	28 AWG 5" (127 mm) Wire Leads

#### Key Things to Remember

5" (127mm) flying Leads are the standard electrical connection method to the pump. Contact Applications for other connection requirements.

The pump lead wires are non-polarized.

The pump can be controlled by DC voltage or PWM through a control board supplied by the customer. The minimum recommended PWM frequency is 20kHz.

The pump flow and pressure can be controlled by adjusting the input voltage.

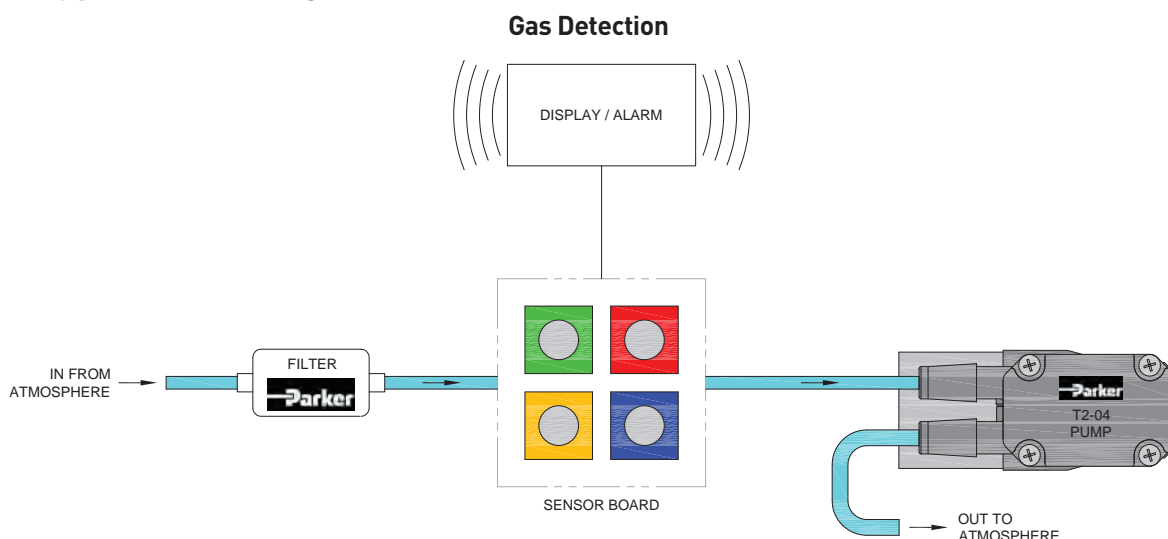
The pump is not a pressure holding device. An external check valve is recommended, if there is a pressure holding requirement.

Pump orientation does not affect performance or life.



## T2-04 Micro Diaphragm Pumps (air/gas)

### Typical Flow Diagram



### Ordering Information

#### T2-04 Mini Pumps

Configuration	Vacuum: LPM @ Load				Free Flow	Pressure: LPM @ Load			Max	PCD <sup>1</sup>		Wetted Materials <sup>2</sup>		
Part No.	16 in Hg	12 in Hg	8 in Hg	4 in Hg	0	4 psig	8 psig	12 psig	Vac in Hg	Press psig	Motor Type	VDC	mA	Diaphragm, Valves, Gasket
	406 mm Hg	305 mm Hg	203 mm Hg	102 mm Hg		276 mbar	552 mbar	827 mbar						
<b>T4-2HE-06-1SNA</b>		1.0	2.3	4.1	<b>7.5</b>	3.5	0.9		17.6	11.9	Coreless Brush	6	583	CR, VMQ, EPDM

Note: Other part number could be available for specific application configurations

1. Peak Current Draw

2. CR: Neoprene, VMQ: Silicone, EPDM: Ethylene Propylene Diene Monomer

Please click on the Order On-line button below (or go to [www.parker.com/precisionfluidics/t4](http://www.parker.com/precisionfluidics/t4)) to configure the T2-04 micro pump for your application.

Serviceable – PPF products are designed for use through the rated life and Parker does not sell replacement parts, nor is it recommended to service these in the field

Note: In addition to Parker's innovative and flexible pump designs, we offer applications engineering expertise to our customers in order to configure and recommend the optimal pump for the application. Contact Parker Applications Engineering to discuss and configure alternate pump configurations to meet your specific application requirements. Providing information on the following requirements will assist us in developing an optimal solution for your application:

- Noise
- Operating Pressure / Vacuum
- Power Consumption
- Life Requirement
- Function in the Application
- Size
- Motor Control
- Media
- Voltage



## T2-04

### Micro Diaphragm Pumps (air/gas)

#### Appendix A

All performance data is typical based on standard conditions: 70°F and 14.7 psia (21°C and 1 bar).

1. Duty Dependent. For operation above 122°F (50°C) consult factory
2. Noise is dependent on the configuration and operation of the pump in the application. Parker has the ability to tailor the pump configuration when noise is a critical criterion in the effort to meet the performance requirements of the application. Noise level is tested to Parker protocol P-105.
3. Life rating can vary depending on application and operating conditions.
4. Custom motor options available. Custom motors may require a significant application potential. The standard motors can be configured with a special winding to meet a particular operation point at a specified voltage
5. Current range is dependent on motor type, voltage, pressure/vacuum and flow requirement. Lower levels possible depending on application.
6. Inductance can be used to measure the viability of a component in a device requiring intrinsic safety.
7. Maximum intermittent pressure/vacuum data is a pump capability guideline for applications that go beyond the maximum continuous levels for short periods of time. Please consult customer specific requirements with the factory or Applications Engineering.
8. Pump efficiency is a measure of the flow rate generated per unit of power consumed. Efficiency may change dependent on application and operating condition at free flow.



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[www.parker.com/precisionfluidics](http://www.parker.com/precisionfluidics)



# LTC Series Miniature Diaphragm Pumps (liquid)

Up to 650 mLPM Free Flow



LTC Miniature Diaphragm Pumps are offered in both brush and brushless DC motor drives that can be configured for your specific performance requirements and handle a wide range of liquid media over a wide range of pressures. LTC's patented Fluid-Blok™ Advanced Sealing Technology provides redundant sealing capabilities to eliminate potential leaks. Monolithic diaphragm design enables maximum suction, priming, and continuous dry operation. Ideal for waste, transfer and bulk movement of liquids.

### Features

- LTC Series Pumps set the highest benchmark for service free life-expectancy with our advanced proprietary diaphragm elastomer.
- Port design allows for top or bottom face seal and is molded for 1/4-28 UNF threaded fittings.
- Overmolded diaphragm eliminates metal components in the wetted path resulting in a design that is inert to variety of media.
- Incorporating the lightweight EZ Mount Accessory facilitates simple system assembly while dampening vibration and reducing noise levels.
- Our 100% oil and grease-free pump and compressor design maintains the purity of your system and are commonly used in FDA-approved systems.
- RoHS Compliant

### Typical Markets

- Clinical Diagnostics
- Analytical Chemistry
- Printing

### Typical Applications

- Clinical Chemistry
- Wash and Waste Circuits
- Urinalysis
- Liquid Chromatography
- Large Format Printers
- Photo Processing Printers

## Product Specifications\*

### Physical Properties

<b>Operating Environment<sup>1</sup>:</b>	41 to 122°F (5 to 50°C)
<b>Storage Environment:</b>	-4 to 212°F (-20 to 100°C)
<b>Media:</b>	Most Gases and Liquids
<b>Humidity:</b>	0 – 95% Relative Humidity
<b>Pump Assembly Rated Life<sup>2</sup>:</b>	PMDC Iron Core Brush - 3,000 hrs Brushless Slotted - 10,000 hrs
<b>Weight:</b>	7.0 oz. (198 g) PMDC Iron Core Brush 5.0 oz. (142 g) Brushless Slotted

### Wetted Materials

<b>Diaphragm:</b>	EPDM, AEPDM, FKM, Teflon/EPDM Laminate
<b>Valves:</b>	EPDM, AEPDM, FKM, FFKM
<b>Pump Head:</b>	Vectra (Liquid Crystal Polymer)

### Electrical

<b>Motor Type (DC):</b>	PMDC Iron Core Brush, Brushless Slotted
<b>Nominal Motor Voltages<sup>3</sup>:</b>	12, or 24 VDC <i>Other voltages available upon request</i>
<b>Electrical Termination:</b>	PMDC Iron Core Brush: 22 AWG Wire Leads, Length 10" (254 mm) Brushless Slotted Motor: 22 AWG Wire Leads, Length 20" (508 mm)
<b>Current Range<sup>4</sup>:</b>	240 - 880 mA

### Pneumatic

<b>Head Configuration:</b>	Single
<b>Maximum Unrestricted Flow:</b>	650 mLPM
<b>Pressure Range (Liquid):</b>	0 - 30 psig (0 - 193 kPa)
<b>Vacuum Range (Air):</b>	0 - 14.5 in Hg (0 - 368 mm Hg)
<b>Filtration:</b>	40 microns - recommended
<b>Efficiency at Free Flow<sup>5</sup>:</b>	PMDC Iron Core: 0.1 LPM/Watt (PN: W311-11) Brushless Slotted: 0.1 LPM/Watt (PN: W312-11)

\* See Appendix A for details.

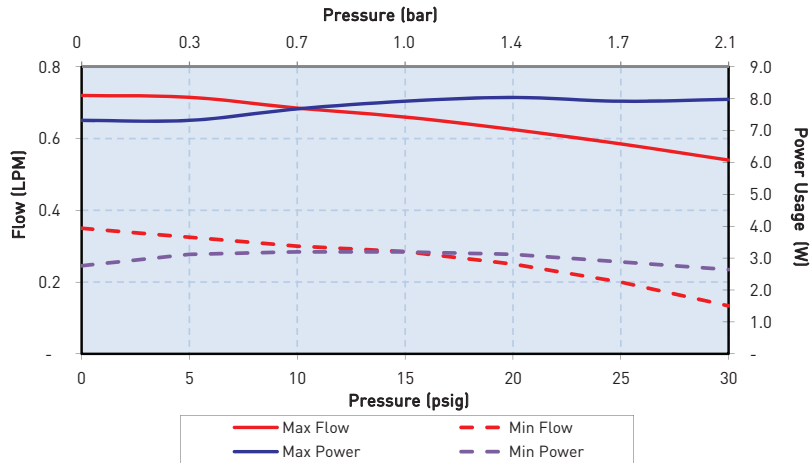


Miniature Diaphragm Pumps (liquid)

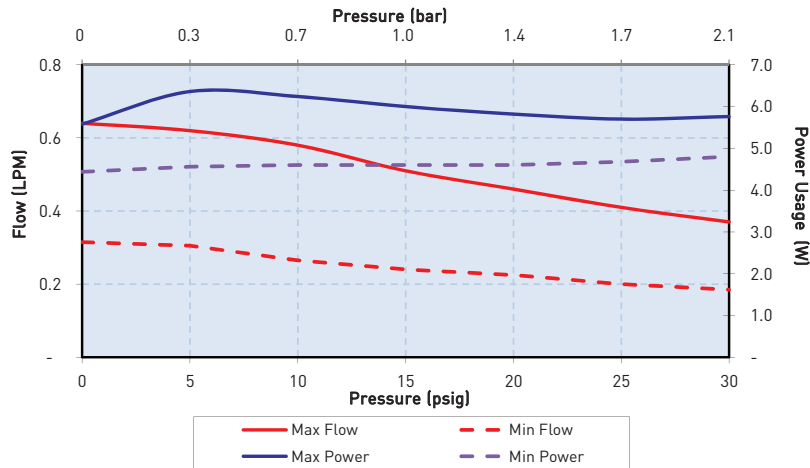
LTC Series

Performance Specifications

LTC - PMDC Iron Core Brush Motor



LTC - Brushless Slotted Motor



The above graph represents an example of performance for the pumps series handling water at 800 feet (244m) above sea level at 75°F (24°C). Performance will vary depending on barometric pressure and media temperature. Curves are representative of standard pump configurations. Pump configurations could be customized for higher or lower flows, depending on specific customer requirements.

Please contact Parker Precision Fluidics Applications Engineering for other considerations.



## LTC Series

## Miniature Diaphragm Pumps (liquid)

### Sizing and Selection

LTC Series

PMDC Iron Core Brush

Brushless Slotted Motor



PMDC Iron Core Brush

BLDC Slotted Motor

Efficiency <sup>1</sup>	Good	Better
Life <sup>2</sup>	Good - 3,000 hrs	Best - 10,000 hrs
Cost	Best	Better

#### Mounting Guidelines:

- Bracket options available for mounting consideration (See EZ Mount catalog pages).
- Hole in the center of the bottom of housing is for manufacturing only—not to be used for mounting.
- Mounting holes are drilled for #6-20 self-tapping screws with 1/4" (6 mm) thread engagement torque to 4 in-lbs (0.45 N-m).

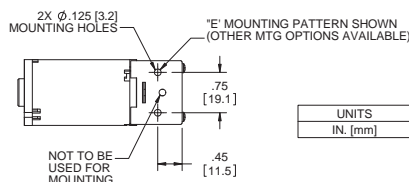
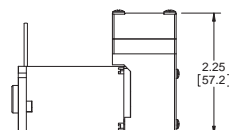
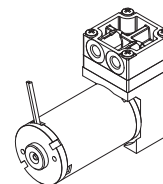
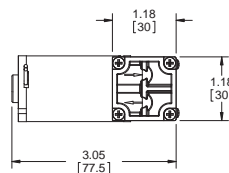
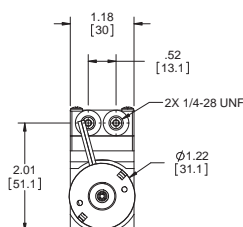
#### Port Connections:

- Flow direction is marked on the pump head with arrows.
- Ports are sized for 1/4"-28 UNF male fittings.

## Mechanical Integration

### Dimensions

PMDC Iron Core Brush



UNITS  
IN. [mm]



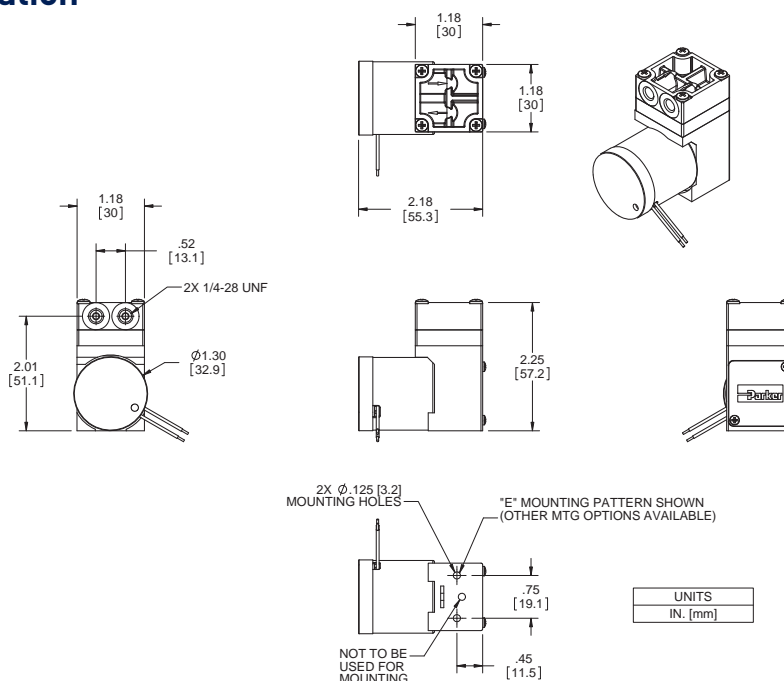
## Miniature Diaphragm Pumps (liquid)

## LTC Series

## Mechanical Integration

## Dimensions

Brushless Slotted Motor



Miniature Pumps

## Electrical Integration and Motor Control

## PMDC Iron Core Brush Motor

2 Wire	Red (+), Black (-)
Wire specification	22AWG, Insulation OD 0.051 in (1.30 mm) 10" (254 mm) Wire Leads

## Brushless Slotted Motor Control Options

2 Wire	Red (+), Black (-)
Wire specification	22AWG, Insulation OD 0.051 in (1.30 mm) 20" (508 mm) Wire Leads

## Other Motor Control Considerations

The drive electronics for the BLDC motors are integrated into the motor itself, all that is needed is a power supply with the sufficient voltage and current.

## Key Things to Remember

The pump is not a pressure holding device. An external check valve is recommended, if there is a pressure holding requirement.

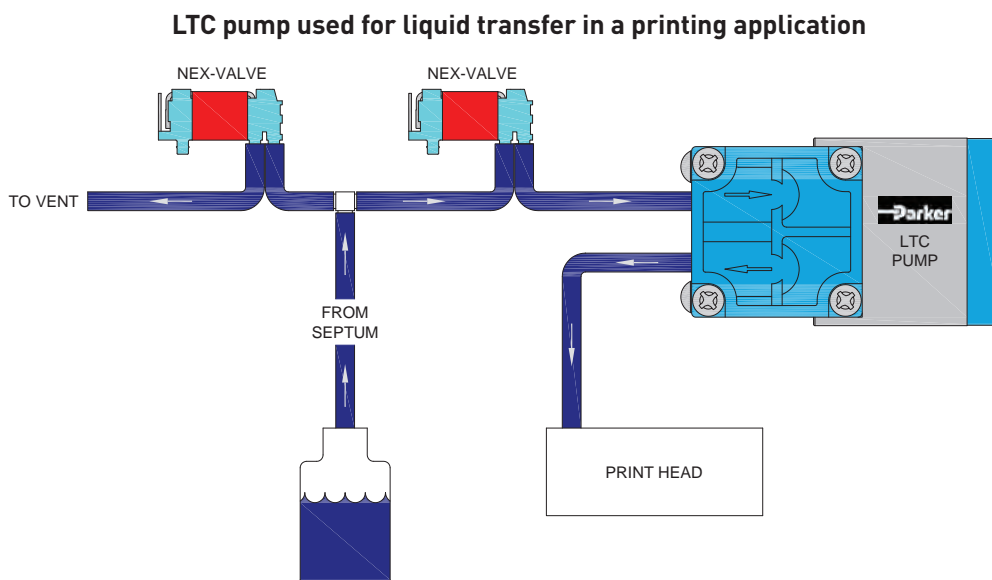
Pump orientation does not affect performance or life.



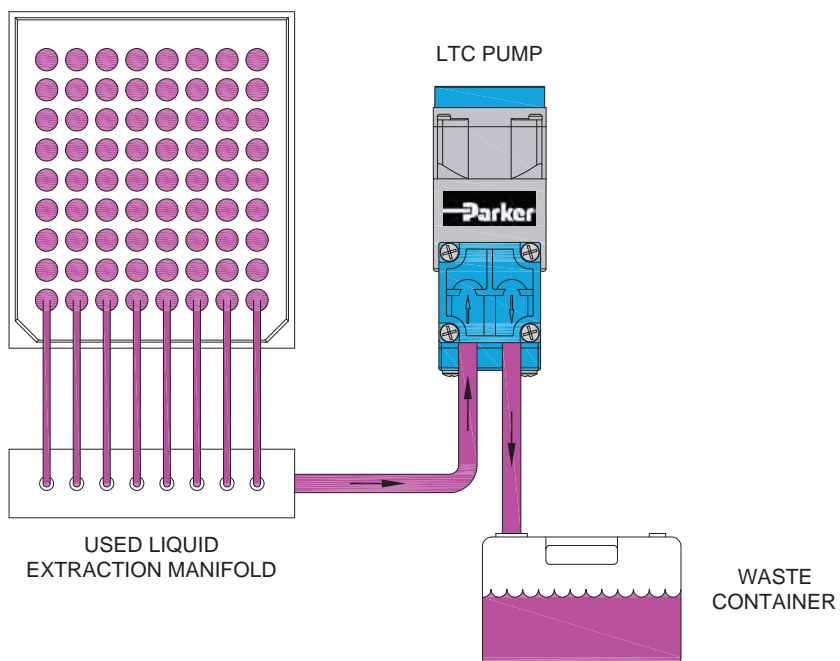
## LTC Series

## Miniature Diaphragm Pumps (liquid)

### Typical Flow Diagram



### LTC Waste Pump



## Miniature Diaphragm Pumps (liquid)

## LTC Series

### Accessory Information

EZ Mount available



**EZ Mount** provides ease of installation and effective control of vibration transfer. EZ Mount was designed to mount easily to the Precision Fluidic LTC Family of diaphragm pumps.

#### Features

- Isolation feet on the EZ mount can be rotated in any one of three ninety-degree planes and is designed for top-down or bottom-up mounting providing simple installation.
- EZ Mount was designed to minimize weight added to the pump assembly. Approximate weights are: Style A - 0.63 oz (18 g), Style B - 0.71 oz (20 g).
- Effectively absorbs vibration to minimize most vibration-induced noise and vibration transfer into an instrument.
- Designed to keep height and size to a minimum.
- Engineered for Parker LTC pumps to ease integration into your system.

### Physical Properties

#### Operating Environment:

41 - 158°F (5 - 70°C)

#### Humidity:

0 - 95% Relative Humidity

#### Base Plate:

Noryl GTX830

#### Feet:

Silicone

#### Feet Insert:

Brass

#### Hardware:

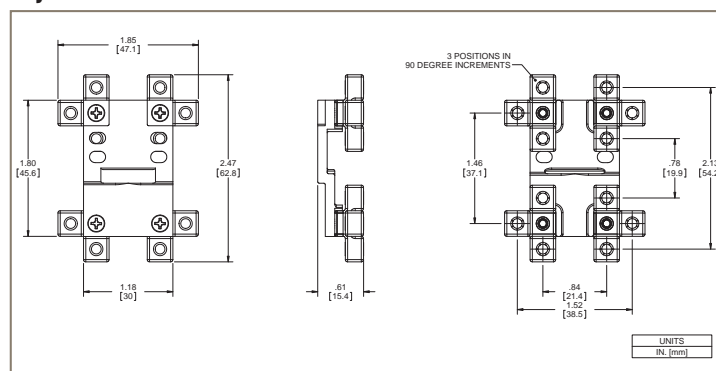
Zinc-Plated Steel

EZ Mount kits include all necessary hardware and detailed instructions.

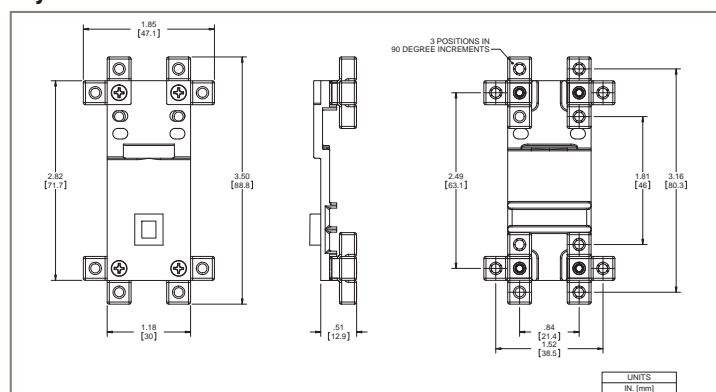
Isolation Feet are available in either threaded or thru-hole clearance for standard #4-40 or #6-32 (M3 for clearance hole only) hardware and can be mounted in any of three ninety-degree planes.

### Dimensions

#### Style A - Brushless Slotted Motor



#### Style B - PMDC Iron Core Brush Motor



## LTC Series Miniature Diaphragm Pumps (liquid)

### Ordering Information

#### LTC Liquid Single Head Pumps

Part No.	Free Flow	Liquid Flow (Water) mLPM @ Load						Max Vac in Hg	Continuous psig [Liquid]	Motor Type	VDC	PCD*	Wetted Materials
		0	5	10	15	20	25						
	0 psig 0 mbar	5 psig 345 mbar	10 psig 689 mbar	15 psig 1034 mbar	20 psig 1379 mbar	25 psig 1724 mbar	30 psig 2068 mbar						Diaphragm, Valves, Gasket
<b>W309-11</b>	<b>720</b>	715	685	660	625	585	540	14.5	30.0	Brush PMDC	24	335	EPDM, AEPDM, EPDM
<b>W311-11</b>	<b>670</b>	650	600	550	505	450	390	14.5	30.0	Brush PMDC	12	530	EPDM, AEPDM, EPDM
<b>W312-11</b>	<b>640</b>	630	570	510	455	415	375	14.5	30.0	Brushless Slotted	24	305	EPDM, AEPDM, EPDM
<b>W313-11</b>	<b>640</b>	620	580	510	460	410	370	14.5	30.0	Brushless Slotted	12	530	EPDM, AEPDM, EPDM

Note: The Ordering Information Section includes a few selected part numbers for the product line. Other performances and configurations are available. Please contact your Sales Representative or an Application Engineer to discuss your application needs.

\*PCD: Peak Current Draw

#### EZ Mount for LTC Single Head Pump with PMDC Iron Core Brush Motor

Part Number	Style	Description
00329-10-A45S	B	#4-40 Threaded
00329-10-B45S	B	#4 Clearance
00329-10-D45S	B	#6-32 Threaded
00329-10-C45S	B	#6 / M3 Clearance

#### EZ Mount for LTC Single Head Pump with Brushless Slotted Motor

Part Number	Style	Description
00328-10-A45S	A	#4-40 Threaded
00328-10-B45S	A	#4 Clearance
00328-10-D45S	A	#6-32 Threaded
00328-10-C45S	A	#6 / M3 Clearance

Please click on the Order On-line button below (or go to [www.parker.com/precisionfluidics/ltc](http://www.parker.com/precisionfluidics/ltc)) to configure your LTC Miniature Diaphragm Pump.

Serviceable – PPF products are designed for use through the rated life and Parker does not sell replacement parts, nor is it recommended to service these in the field

Note: In addition to Parker’s innovative and flexible pump designs, we offer applications engineering expertise to our customers in order to configure and recommend the optimal pump for the application. Contact Parker Applications Engineering to discuss and configure alternate pump configurations to meet your specific application requirements. Providing information on the following requirements will assist us in developing an optimal solution for your application:

- Noise
- Operating Pressure / Vacuum
- Power Consumption
- Life Requirement
- Description of pump function in the application
- Size
- Motor Control
- Media
- Voltage



**Miniature Diaphragm Pumps (liquid)****LTC Series****Appendix A**

All performance data is typical based on standard conditions: 70°F and 14.7 psia (21°C and 1 bar).

1. Duty Dependent. For operation above 122°F (50°C) consult factory
2. Life rating can vary depending on application and operating conditions.
3. Custom motor options available. Custom motors may require a significant application potential. The standard motors can be configured with a special winding to meet a particular operation point at a specified voltage
4. Current range is dependent on motor type, voltage, pressure/vacuum and flow requirement. Lower levels possible depending on application.
5. Pump efficiency is a measure of the flow rate generated per unit of power consumed. Efficiency may change dependent on application and operating condition at free flow.



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[www.parker.com/precisionfluidics](http://www.parker.com/precisionfluidics)

# LTC-IIS Series Miniature Diaphragm Pumps (liquid)

Up to 1.5 LPM Free Flow



Parker's LTC-IIS Miniature Diaphragm Pumps are offered in brushless DC motor drives that can be configured for your specific performance requirements and handle a wide range of liquid media over a range of pressures. LTC-IIS patented Fluid-Blok™ Advanced Sealing Technology provides redundant sealing capabilities to eliminate potential leaks. Monolithic diaphragm design enables maximum suction, priming, and continuous dry operation. Ideal for waste, transfer and bulk movement of liquids.

### Features

- LTC-IIS Series Pumps set the highest benchmark for service free life expectancy with our advanced proprietary diaphragm elastomer.
- Port design allows for top or bottom face seal and is molded for 1/4-28 UNF threaded fittings.
- Overmolded diaphragm eliminates metal components in the wetted path resulting in a design that is inert to variety of media.
- Incorporating the lightweight EZ Mount Accessory facilitates simple system assembly while dampening vibration and reducing noise levels.
- Our 100% oil and grease-free pump and compressor design maintains the purity of your system and are commonly used in FDA-approved systems.
- RoHS Compliant

### Typical Markets

- Clinical Diagnostics
- Analytical Chemistry
- Printing

### Typical Applications

- Clinical Chemistry
- Wash and Waste Circuits
- Urinalysis
- Liquid Chromatography
- Large Format Printers
- Photo Processing Printers

## Product Specifications\*

### Physical Properties

<b>Operating Environment<sup>1</sup>:</b>	41 to 122°F (5 to 50°C)
<b>Storage Environment:</b>	41 to 122°F (5 to 50°C)
<b>Media:</b>	Most Liquids and Gases
<b>Humidity:</b>	0 – 95% Relative Humidity
<b>Pump Assembly Rated Life<sup>2</sup>:</b>	Brushless Slotted - 10,000 hrs
<b>Weight:</b>	11.7 oz. (333 g) Brushless Slotted

### Electrical

<b>Motor Type (DC):</b>	Brushless Slotted
<b>Nominal Motor Voltages<sup>3</sup>:</b>	12, or 24 VDC <i>Other voltages available upon request</i>
<b>Electrical Termination:</b>	Brushless Slotted Motor: 22 AWG Wire Leads, Length 20" (508 mm)
<b>Current Range<sup>4</sup>:</b>	350 - 1025 mA

### Wetted Materials

<b>Diaphragm:</b>	EPDM, AEPDM, FKM, Teflon/ EPDM Laminate
<b>Valves:</b>	EPDM, AEPDM, FKM, FFKM
<b>Pump Head:</b>	Vectra (Liquid Crystal Polymer)

### Pneumatic

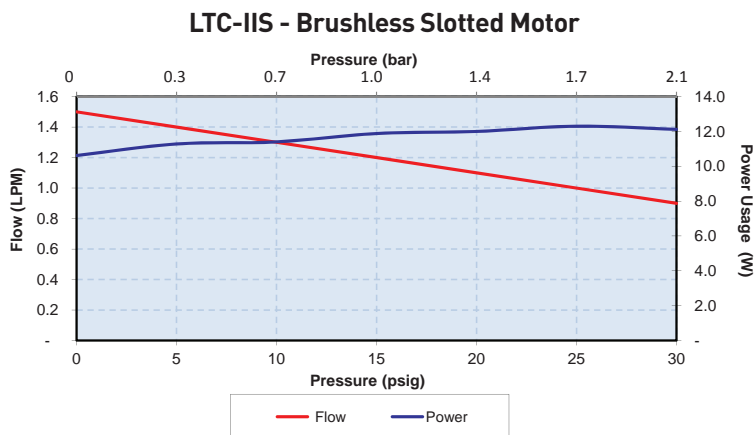
<b>Head Configuration:</b>	Dual
<b>Maximum Unrestricted Flow:</b>	1.5 LPM
<b>Pressure Range (Liquid):</b>	0 - 30 psig (0 - 2.07 bar)
<b>Vacuum Range (Air):</b>	0 - 11.5 in Hg (0 - 292 mm Hg)
<b>Filtration:</b>	40 microns - recommended
<b>Efficiency at Free Flow<sup>5</sup>:</b>	Brushless Slotted: 0.1 LPM/Watt (PN: V015-11)

\* See Appendix A for details.



## LTC-IIS Series Miniature Diaphragm Pumps (liquid)

### Performance Specifications



The above graph represents an example of performance for the pump series handling water at 800 feet (244 m) above sea level at 75 degree F (24 C). Performance will vary depending on barometric pressure and media temperature. A variety of configurations can be accommodated to meet application requirements.

Please contact Parker Precision Fluidics Applications Engineering for other considerations.

### Sizing and Selection

**LTC-IIS Series** Brushless Slotted (High Torque) Motor



**Brushless Slotted (High torque) Motor**

<b>Efficiency<sup>1</sup></b>	High Efficiency at high loads
<b>Life<sup>2</sup></b>	10,000 hrs

#### Mounting Guidelines:

- Bracket options available for mounting consideration (See *EZ Mount catalog pages*).
- Hole in the center of the bottom of housing is for manufacturing only—not to be used for mounting.
- Mounting holes are drilled for #6-20 self-tapping screws with 1/4" thread engagement (torque to 4 in-lbs).

#### Port Connections:

- Ports are sized for 1/4-28 UNF threaded fittings. The design allows for top or bottom face seal.
- Flow direction is marked on the pump head with arrows.



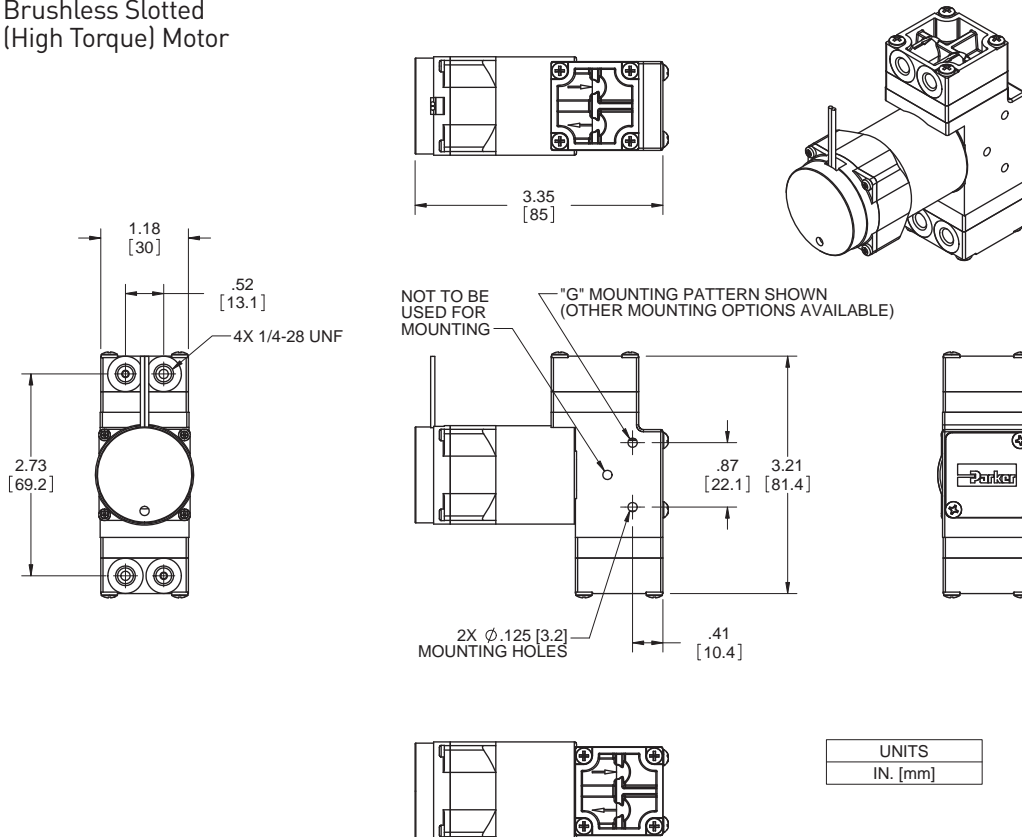
## LTC-IIS Series

## Miniature Diaphragm Pumps (air/gas)

### Mechanical Integration

#### Dimensions

Brushless Slotted  
(High Torque) Motor



## LTC-IIS Series Miniature Diaphragm Pumps (air/gas)

### Electrical Integration and Motor Control

#### Brushless Motor Control Options

2 Wire	Red (+), Black (-)
Wire specification	22AWG, Insulation OD 0.051 in (1.30 mm)

#### Other Motor Control Considerations

The drive electronics for the BLDC motors are integrated into the motor itself, all that is needed is a power supply with the sufficient voltage and current.

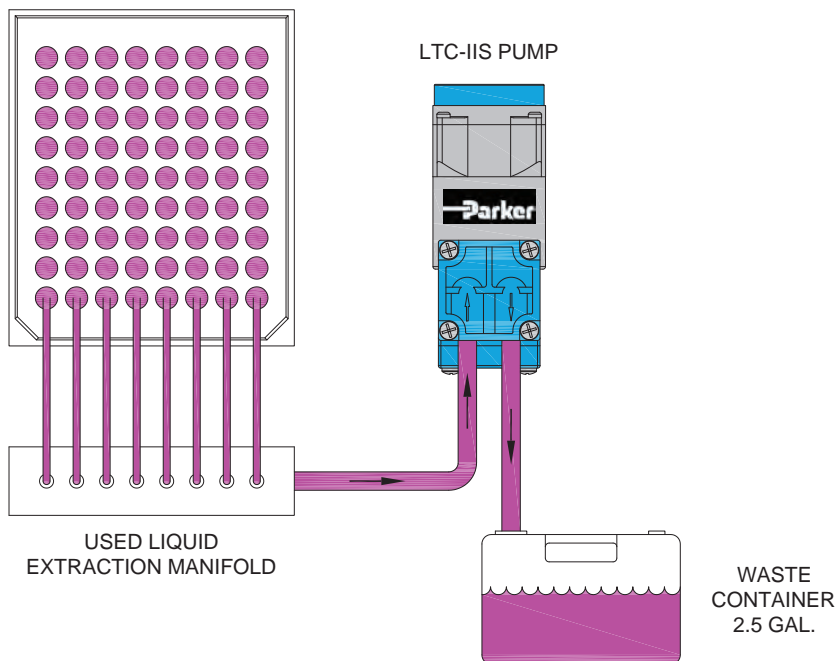
#### Key Things to Remember

The pump is not a pressure holding device. An external check valve is recommended, if there is a pressure holding requirement.

Pump orientation does not affect performance or life.

### Typical Flow Diagram

LTC-IIS Waste Pump



## LTC-IIS Series

## Miniature Diaphragm Pumps (air/gas)

### Accessory Information

EZ Mount available



EZ Mount provides ease of installation and effective control of vibration transfer. EZ Mount was designed to mount easily to the Precision Fluidic LTC-IIS Family of diaphragm pumps.

#### Features

- Isolation feet on the EZ mount can be rotated in any one of three ninety-degree planes and is designed for top-down or bottom-up mounting providing simple installation.
- EZ Mount was designed to minimize weight added to the pump assembly. Approximate weights is: Style B - 0.71 oz (20 g).
- Effectively absorbs vibration to minimize most vibration-induced noise and vibration transfer into an instrument.
- Designed to keep height and size to a minimum.
- Engineered for Parker LTC-IIS pumps to ease integration into your system.

### Physical Properties

**Operating Environment:**

41 - 158°F (5 - 70°C)

**Humidity:**

0 - 95% Relative Humidity

**Base Plate:**

Noryl GTX830

**Feet:**

Silicone

**Feet Insert:**

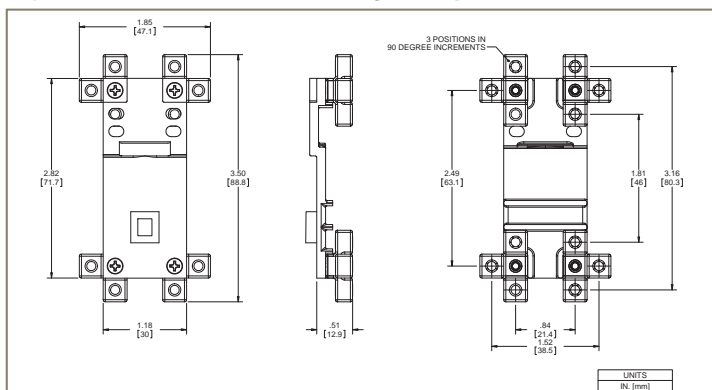
Brass

**Hardware:**

Zinc-Plated Steel

### Dimensions

#### Style B - Brushless Slotted (High Torque) Motor



EZ Mount kits include all necessary hardware and detailed instructions.

Isolation Feet are available in either threaded or thru-hole clearance for standard #4-40 or #6-32 (M3 for clearance hole only) hardware and can be mounted in any of three ninety-degree planes.



## LTC-IIS Series Miniature Diaphragm Pumps (air/gas)

### Ordering Information

#### LTC-IIS Liquid Dual Head Pumps

Configuration	Liquid Flow (Water) mLPM @ Load							FF	Max		PCD*	Wetted Materials	
	0 psig	5 psig	10 psig	15 psig	20 psig	25 psig	30 psig		Vac in Hg	Countinuous psig [Liquid]			Motor Type
	0 mbar	345 mbar	689 mbar	1034 mbar	1379 mbar	1724 mbar	350 mbar						Diaphragm, Valves, Gasket
V015-11	1,500	1,400	1,300	1,200	1,100	1,000	900	11.5	30.0	BLDC Slotted	12	1025	EPDM, AEPDM, EPDM
V016-11	1,500	1,400	1,300	1,200	1,100	1,000	900	11.5	30.0	BLDC Slotted	24	505	EPDM, AEPDM, EPDM

Note: The Ordering Information Section includes a few selected part numbers for the product line. Other performances and configurations are available. Please contact your Sales Representative or an Application Engineer to discuss your application needs.

\*PCD: Peak Current Draw

#### EZ Mount for LTC-IIS Dual Head Pump with Brushless Slotted (High Torque) Motor

Part Number	Style	Description
00331-10-A45S	B	#4-40 Threaded
00331-10-B45S	B	#4 Clearance
00331-10-D45S	B	#6-32 Threaded
00331-10-C45S	B	#6 / M3 Clearance

Please click on the Order On-line button below (or go to [www.parker.com/precisionfluidics/ltciis](http://www.parker.com/precisionfluidics/ltciis)) to configure the LTC-IIS miniature liquid diaphragm pump for your application.

Serviceable – PPF products are designed for use through the rated life and Parker does not sell replacement parts, nor is it recommended to service these in the field

Note: In addition to Parker's innovative and flexible pump designs, we offer applications engineering expertise to our customers in order to configure and recommend the optimal pump for the application. Contact Parker Applications Engineering to discuss and configure alternate pump configurations to meet your specific application requirements. Providing information on the following requirements will assist us in developing an optimal solution for your application:

- Noise
- Operating Pressure / Vacuum
- Power Consumption
- Life Requirement
- Description of pump function in the application
- Size
- Motor Control
- Media
- Voltage



## LTC-IIS Series

## Miniature Diaphragm Pumps (air/gas)

### Appendix A

All performance data is typical based on standard conditions: 70°F and 14.7 psia (21°C and 1 bar).

1. Duty Dependent. For operation above 122°F (50°C) consult factory
2. Life rating can vary depending on application and operating conditions.
3. Custom motor options available. Custom motors may require a significant application potential. The standard motors can be configured with a special winding to meet a particular operation point at a specified voltage
4. Current range is dependent on motor type, voltage, pressure/vacuum and flow requirement. Lower levels possible depending on application.
5. Pump efficiency is a measure of the flow rate generated per unit of power consumed. Efficiency may change dependent on application and operating condition at free flow.



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# T2-01

Up to 66 LPM Free Flow



## High Flow Diaphragm Pumps (air/gas)

Parker's T2-01 series are high performance and high efficiency diaphragm pumps. Compact and lightweight package configurations make the T2-01 series the technology of choice for fixed and portable high-capacity air and gas applications.

### Typical Markets

- Respiratory
- Agent Detection
- Clinical Diagnostics

### Typical Applications

- Portable Aspirators
- Wash and Waste Circuits
- Transport Ventilators
- Medical Instruments
- Air-over-liquid or Vacuum Pressure Supply
- Industrial Agent Detection

### Features

- Parker's patented highly efficiency dynamic valve design provides high capacity in a compact package
- Pumps provide up to 32LPM in a single head version and 66 LPM in a dual head version
- Provides the highest flow rates available with lowest power consumption.
- The most compact and lightweight package within its performance range.
- RoHS Compliant

## Product Specifications\*

### Physical Properties

<b>Operating Environment<sup>1</sup>:</b>
32 to 122°F (0 to 50°C)
<b>Storage Environment:</b>
14 to 122°F (-10 to 50°C)
<b>Media:</b>
Air, Argon, Helium, Nitrogen, Oxygen, and other non-reacting gases
<b>Humidity:</b>
5-95% Relative Humidity
<b>Noise Level<sup>2</sup>:</b>
As low as 50dB
<b>Pump Assembly Rated Life<sup>3</sup>:</b>
PMDC Iron Core Brush - Up to 2,400 hrs
Brushless- Minimum 3,500 hrs
<b>Weight:</b>
53 oz. (1502 g) - Single Head with PMDC Iron Core Brush Motor
61 oz. (1729 g) - Twin Head with PMDC Iron Core Brush Motor
49 oz. (1381 g) - Twin Head with Brushless Motor

### Electrical

<b>Motor Type:</b>
PMDC Iron Core Brush, Brushless
<b>Nominal Motor Voltages<sup>4</sup>:</b>
12, 24 VDC
<b>Max Power at Nominal Voltage:</b>
39 Watts - Single Head PMDC Iron Core Brush
69 Watts - Twin Head PMDC Iron Core Brush
72 Watts - Twin Head Brushless
<b>Electrical Termination:</b>
2-wire (analog or PWM) - PMDC Iron Core Brush
Multi-wire 24V Power, 0-5V Speed Control - Twin Head Brushless
<b>Current Range<sup>5</sup>:</b>
1.0 - 5.7 A
<b>Inductance<sup>6</sup>:</b>
PMDC Iron Core Brush Motor:
12 VDC: 0.50 mH max @ 1kHz/50mV
24 VDC: 2.0 mH max @ 1kHz/50mV
Brushless Motor:
24 VDC: 0.73 mH max @ 1kHz/50mV

### Pneumatic

<b>Head Configuration:</b>
Single, Twin
<b>Maximum Flow:</b>
32 LPM - Single Head
66 LPM - Twin Head
<b>Maximum Intermittent Pressure<sup>6</sup>:</b>
22 psi (1517 mbar)
<b>Maximum Continuous Pressure:</b>
8 psi (552 mbar)
<b>Maximum Intermittent Vacuum<sup>6</sup>:</b>
24 in Hg (610 mm Hg)
<b>Maximum Continuous Vacuum:</b>
12 in Hg (310 mm Hg)
<b>Filtration:</b>
40 micron - recommended
<b>Efficiency at Free Flow<sup>7</sup></b>
Single Head PMDC Iron Core Brush Motor: 3.6 LPM/Watt (P/N: T1-1HD-12-1NEA)
Twin Head PMDC Iron Core Brush Motor: 3.6 LPM/Watt (P/N: T1-2HD-12-1NEA)
Twin Head Brushless Motor: 4.4 LPM/Watt (P/N: T1-2BL-24-1NEA)

### Wetted Materials

<b>Diaphragm:</b> EPDM	<b>Valves &amp; Gasket:</b> Neoprene	<b>Head:</b> PPS, PTFE
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\* See Appendix A for details.

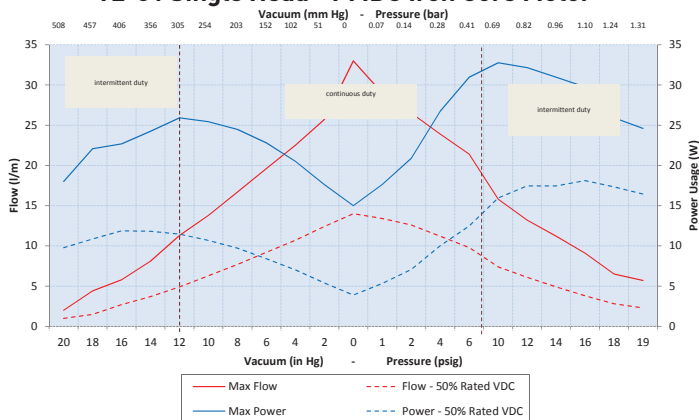


## T2-01

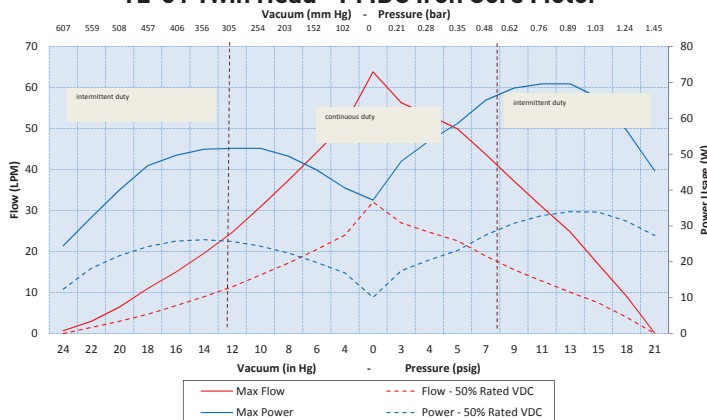
### High Flow Diaphragm Pumps (air/gas)

#### Typical Flow Curves

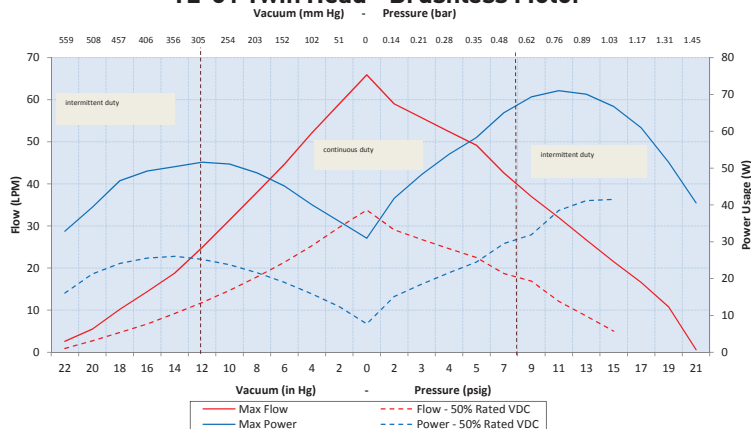
##### T2-01 Single Head - PMDC Iron Core Motor



##### T2-01 Twin Head - PMDC Iron Core Motor



##### T2-01 Twin Head - Brushless Motor



The above graphs represent examples of performance for the pumps series handling air at 800 feet (244M) above sea level at 75° F (24° C). Performance will vary depending on barometric pressure and media temperature. Curves are representative of standard pump configurations. Pump configurations could be customized for higher or lower flows, depending on specific customer requirements.

Please contact Parker Precision Fluidics Applications Engineering for other considerations



## T2-01

### High Flow Diaphragm Pumps (air/gas)

#### Sizing and Selection

##### T2-01 Series

PMDC Iron Core Brush Motor (Twin Head)

Brushless Motor (Twin Head)



	Twin Head	Twin Head
Efficiency <sup>a</sup>	Better	Best
Life <sup>3</sup>	Better - up to 2400 hrs	Best - Minimum 3,500 hrs
Size/Weight	Good	Better
Cost	Better	Good

##### Mounting Guidelines:

- Pump can be mounted using #8-32 screws and nuts on the pump body mounting ears.

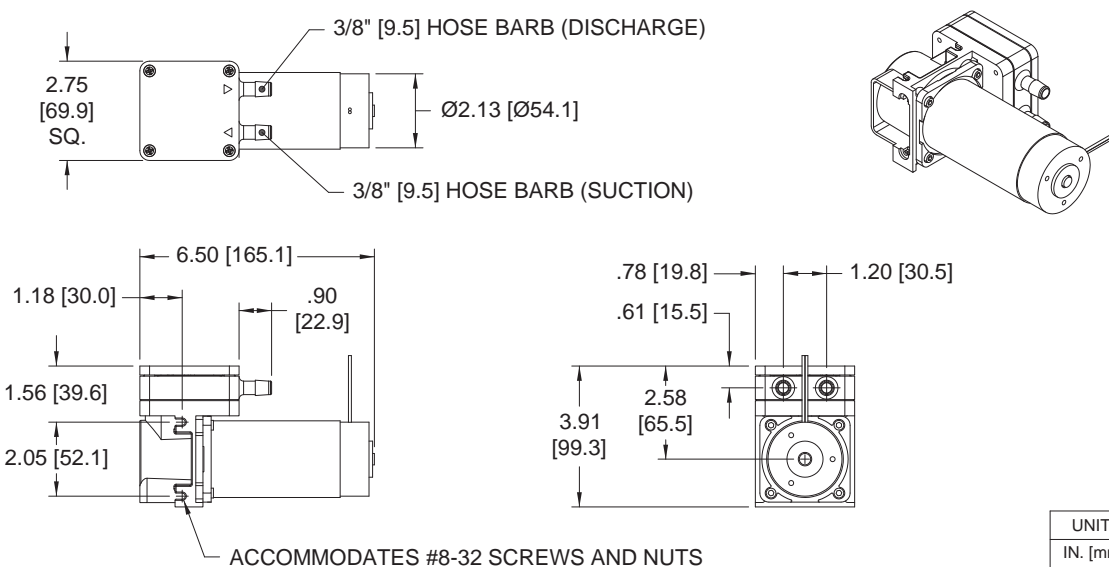
##### Port Connections:

- Barbs are sized for 3/8" ID tubing, 70-80 durometer recommended.
- Flow direction is marked on the pump head with arrows.

#### Mechanical Integration

##### Dimensions

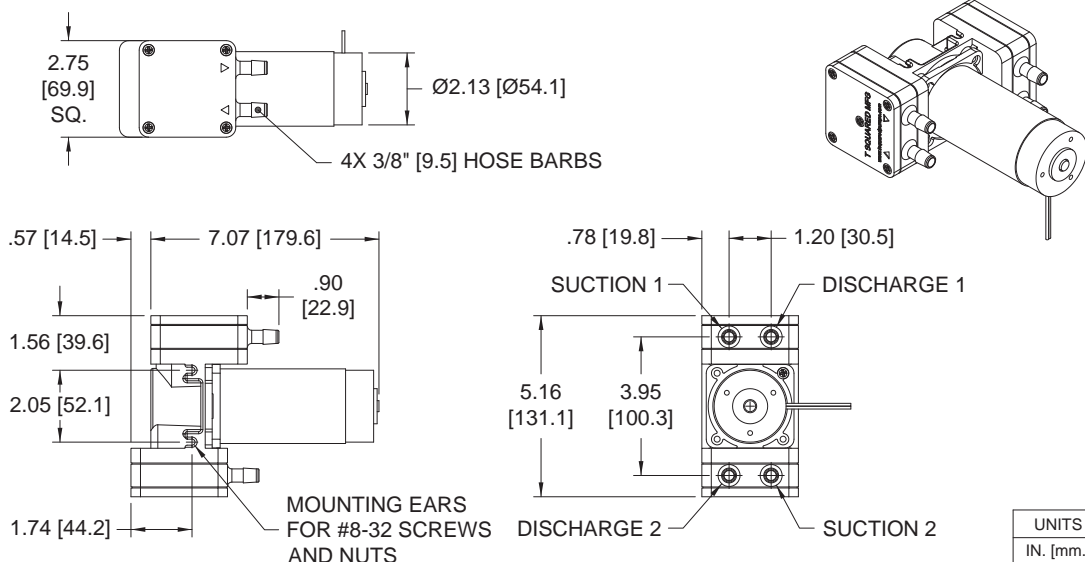
PMDC Iron Core Brush Motor (Single Head)



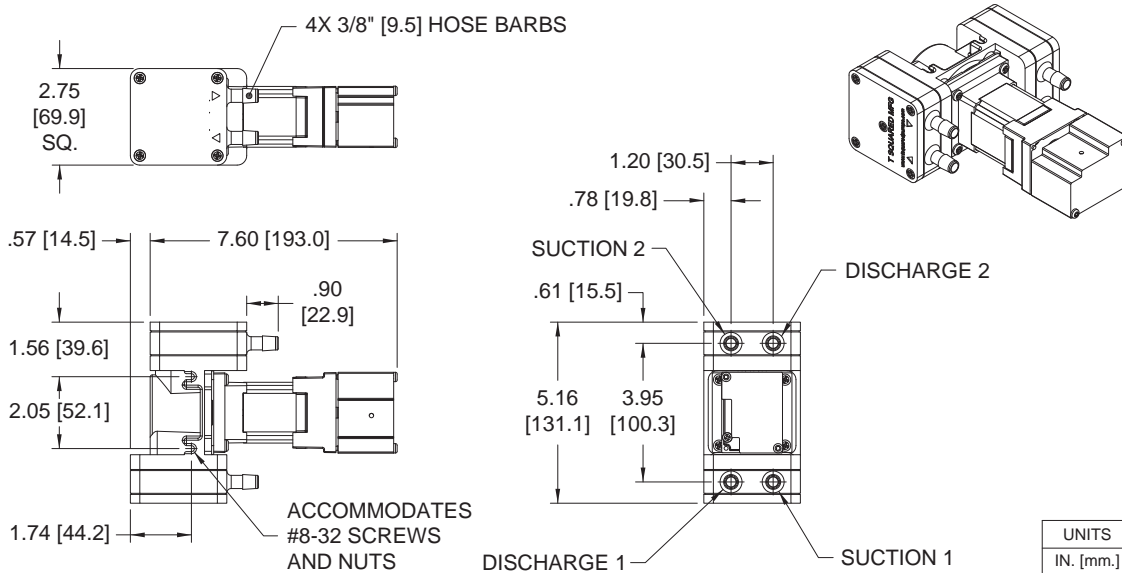
## T2-01

### High Flow Diaphragm Pumps (air/gas)

PMDC Iron Core Brush Motor (Twin Head)



Brushless Motor (Twin Head)



## T2-01

### High Flow Diaphragm Pumps (air/gas)

## Electrical Integration and Motor Control

If application requires variable flow, motor control options are available, as follows:

### PMDC Iron Core Brush Motor

2 Wire	Red (+), Black (-)
Wire specification	20 AWG Wire lead length 18" ± 0.5" (457 mm ± 13 mm)

### Brushless Motor

Mutli Wire Connector	24V Power, 0-5V Speed Control
Wire specification	22 AWG Wire lead length 24" ± 0.5" (610 mm + 13 mm)

### Key Things to Remember

Flying Leads are the standard electrical connection method to the pump. Contact Applications for other connection requirements.

The pump lead wires are non-polarized.

The pump can be controlled by DC voltage or PWM through a control board supplied by the customer. The minimum recommended PWM frequency is 20kHz.

The pump flow and pressure can be controlled by adjusting the input voltage. (See typical flow curve for reference).

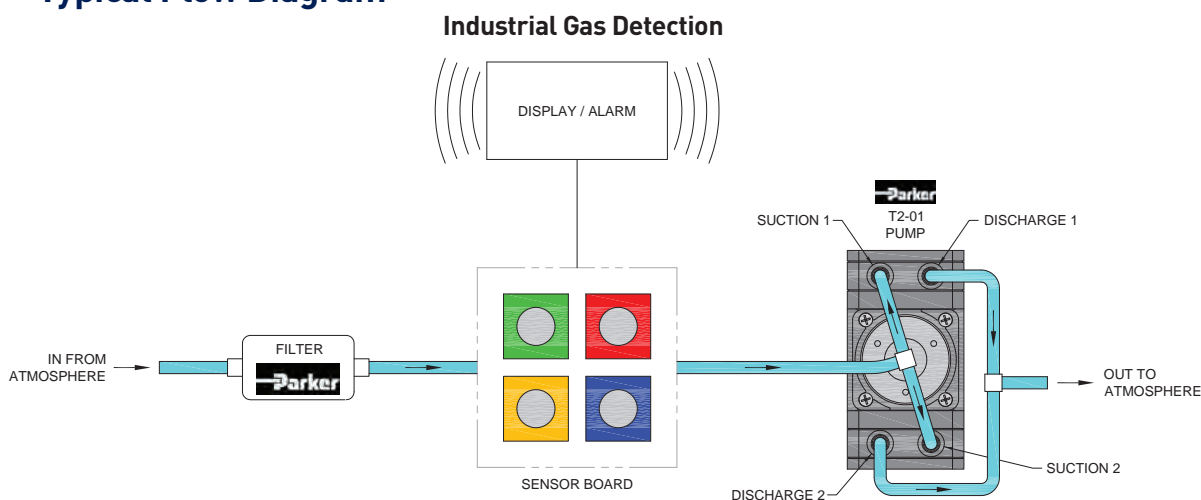
The pump is not a pressure holding device. An external check valve is recommended, if there is a pressure holding requirement.

Pump orientation does not affect performance or life.

### Brushless Motor Control Connector Pin Function

Pin	Description
1	24V Power Input
2	24V Power Return
1	Tachometer
2	0-5VDC Motor Control Input
3	PWM
4	Encoder "B"
5	Encoder "A"
6	Direction Indicator
7	Direction (Fwd/Rev)
8	Enable
9	0-5VDC Motor Control Output
10	+5Volt Out

## Typical Flow Diagram



## T2-01

### High Flow Diaphragm Pumps (air/gas)

#### Ordering Information

##### T2-01 High Capacity Pumps

Configuration	Vacuum: LPM @ Load								Free Flow	Pressure: LPM @ Load						Max		PCD*	Wetted Materials	
	0 psig 0 mbar	28 in Hg 711 mm Hg	24 in Hg 609 mm Hg	20 in Hg 508 mm Hg	16 in Hg 406 mm Hg	12 in Hg 305 mm Hg	8 in Hg 203 mm Hg	4 in Hg 102 mm Hg		0	4 psig 276 mbar	8 psig 552 mbar	12 psig 827 mbar	16 psig 1103 mbar	20 psig 1379 mbar	24 psig 1655 mbar	Vac in Hg			Press psig
<b>T1-1HD-12-1NEA</b>		2.0	4.0	7.0	12.0	17.0	25.0	<b>32.0</b>	26.0	21.0	16.0	5.0			25.0	20.0	PMDC Brush	12	3083	EPDM, N, N
<b>T1-1HD-24-1NEA</b>			4.0	7.0	12.0	17.0	25.0	<b>32.5</b>	28.0	22.0	17.0	10.0			23.8	22.0	PMDC Brush	24	1625	EPDM, N, N
<b>T1-2BL-24-1NEA</b>			4.0	24.0	33.0	37.0	50.0	<b>66.0</b>	55.0	41.0	25.0	18.0			24.0	20.0	Brushless	24	3041	EPDM, N, N
<b>T1-2HD-12-1NEA</b>			4.0	17.0	29.0	34.0	48.0	<b>62.5</b>	52.0	41.0	28.0	18.0			24.4	21.7	PMDC Brush	12	5750	EPDM, N, N
<b>T1-2HD-24-1NEA</b>			4.0	17.0	29.0	34.0	48.0	<b>64.5</b>	53.0	42.0	28.0	18.0	10.0		25.0	22.0	PMDC Brush	24	3021	EPDM, N, N

Note: Other part number could be available for specific application configurations

\*PCD: Peak Current Draw

Please click on the Order On-line button below (or go to [www.parker.com/precisionfluidics/t1](http://www.parker.com/precisionfluidics/t1)) to configure the T2-01 high flow diaphragm pump for your application.

Serviceable – PPF products are designed for use through the rated life and Parker does not sell replacement parts, nor is it recommended to service these in the field

Note: In addition to Parker's innovative and flexible pump designs, we offer applications engineering expertise to our customers in order to configure and recommend the optimal pump for the application. Contact Parker Applications Engineering to discuss and configure alternate pump configurations to meet your specific application requirements. Providing information on the following requirements will assist us in developing an optimal solution for your application:

- Noise
- Operating Pressure / Vacuum
- Power Consumption
- Life Requirement
- Description of pump function in the application
- Size
- Motor Control
- Media
- Voltage



## T2-01

### High Flow Diaphragm Pumps (air/gas)

#### Appendix A

All performance data is typical based on standard conditions: 70°F and 14.7 psia (21°C and 1 bar).

1. Duty Dependent. For operation above 122°F (50°C) consult factory
2. Noise is dependent on the configuration and operation of the pump in the application. Parker has the ability to tailor the pump configuration when noise is a critical criterion in the effort to meet the performance requirements of the application. Noise level is tested to Parker protocol P-105.
3. Life rating can vary depending on application and operating conditions.
4. Custom motor options available. Custom motors may require a significant application potential. The standard motors can be configured with a special winding to meet a particular operation point at a specified voltage
5. Current range is dependent on motor type, voltage, pressure/vacuum and flow requirement. Lower levels possible depending on application.
6. Inductance can be used to measure the viability of a component in a device requiring intrinsic safety. Inductance values are for motor winding only.
7. Maximum intermittent pressure/vacuum data is a pump capability guideline for applications that go beyond the maximum continuous levels for short periods of time. Please consult customer specific requirements with the factory or Applications Engineering.
8. Pump efficiency is a measure of the flow rate generated per unit of power consumed. Efficiency may change dependent on application and operating condition at free flow.



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# EZ-Mount

## Vibration Isolation Mounting System

For BTC/TTC/LTC Series Pumps



*Pictured EZ Mounts shown fully assembled with baseplate and isolation feet.*

**EZ Mount** provides ease of installation and effective control of vibration transfer. EZ Mount was designed to mount easily to all Precision Fluidic BTC, TTC and LTC Family of diaphragm pumps.

### Features

- Isolation feet on the EZ mount can be rotated in any one of three ninety-degree planes and is designed for top-down or bottom-up mounting providing simple installation.
- EZ Mount was designed to minimize weight added to the pump assembly. Approximate weights are: Style A - 0.63 oz (18 g), Style B - 0.71 oz (20 g).
- Effectively absorbs vibration to minimize most vibration-induced noise and vibration transfer into an instrument.
- Designed to keep height and size to a minimum.
- Engineered for Parker BTC, TTC and LTC pumps to ease integration into your system.

## Physical Properties

Operating Environment:	41 - 158°F (5 - 70°C)
Humidity:	0 - 95% Relative Humidity
Base Plate:	Noryl GTX830
Feet:	Silicone
Feet Insert:	Brass
Hardware:	Zinc-Plated Steel

## Product Assemblies

BTC/LTC/TTC



PMDC Iron Core Brush Motor

BTC IIS/LTC IIS



Brushless Slotted (High Torque) Motor

BTC IIS /TTC IIS



Brushless DC Motor

EZ Mount kits include all necessary hardware and detailed instructions.

Isolation Feet are available in either threaded or thru-hole clearance for standard #4-40 or #6-32 (M3 for clearance hole only) hardware and can be mounted in any of three ninety-degree planes.



## Product Specifications

### BTC/LTC/TTC Single Head Pump with PMDC Iron Core Brush Motor

Part Number	Style	Description
00329-10-A45S	B	#4-40 Threaded
00329-10-B45S	B	#4 Clearance
00329-10-D45S	B	#6-32 Threaded
00329-10-C45S	B	#6 / M3 Clearance

### BTC/LTC/TTC Single Head Pump with Brushless Slotless Motor

Part Number	Style	Description
01074-10-A45S	B	#4-40 Threaded
01074-10-B45S	B	#4 Clearance
01074-10-D45S	B	#6-32 Threaded
01074-10-C45S	B	#6 / M3 Clearance

### BTC/LTC/TTC Single Head Pump and BTCIIS/TTC IIS Dual Head Pump with Brushless Slotted Motor

Part Number	Style	Description
00328-10-A45S	A	#4-40 Threaded
00328-10-B45S	A	#4 Clearance
00328-10-D45S	A	#6-32 Threaded
00328-10-C45S	A	#6 / M3 Clearance

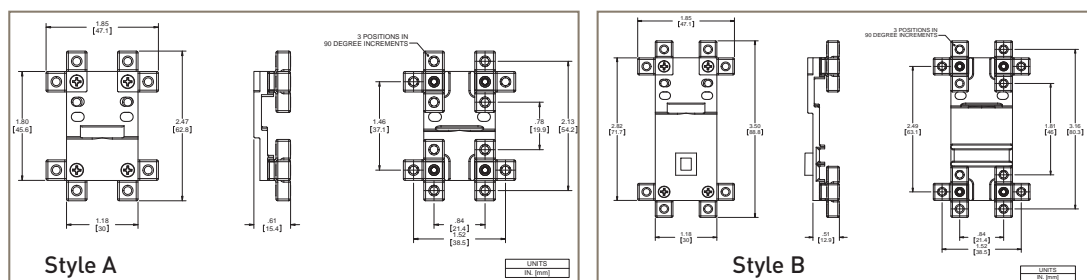
### BTC-IIS/LTC-IIS Dual Head Pump with Brushless Slotted Motor (High Torque)

Part Number	Style	Description
00331-10-A45S	B	#4-40 Threaded
00331-10-B45S	B	#4 Clearance
00331-10-D45S	B	#6-32 Threaded
00331-10-C45S	B	#6 / M3 Clearance

### BTC-IIS/TTC-IIS Dual Head Pump with PMDC Iron Core Brush Motor

Part Number	Style	Description
00332-10-A45S	B	#4-40 Threaded
00332-10-B45S	B	#4 Clearance
00332-10-D45S	B	#6-32 Threaded
00332-10-C45S	B	#6 / M3 Clearance

## Dimensions



## Ordering Information

Please click on the Order On-line button (or go to [www.parker.com/precisionfluidics/ezmount](http://www.parker.com/precisionfluidics/ezmount)) to select your EZ Mount Accessory.

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## WARNING

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