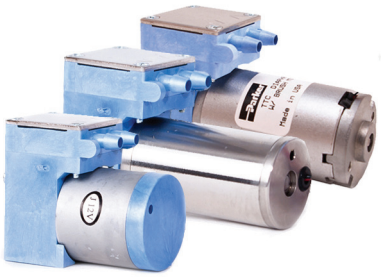
TTC Series

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.

Typical Applications

- Gas Analysis
- Anesthesia Monitors
- Compression Therapy
- CO_2 Monitors
- Wound Therapy
- Trace Detection
- Medical/Training Mannequins
- Degassing

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.

Product Specifications*

Physical Properties

Operating Environment[1]:
41 to 122°F (5 to 50°C)

Storage Environment:
-4 to 212°F (-20 to 100°C)

Media:
Air, Argon, Helium, Nitrogen, Oxygen, and other non-reacting gases

Humidity:
0 – 80% Realtive Humidity

Noise Level[2]:
As low as 45 dB @ 12 in (30 cm)
Muffler recommended for additional noise reduction (see accessories)

Pump Assembly Rated Life[3]:
PMDC Iron Core Brush - 3,000 hrs
Brushless Slotted - 10,000 hrs
Brushless Slotless - 10,000 hrs

Weight:
7.2 oz. (206 g) PMDC Iron Core Brush
5.0 oz. (142 g) Brushless Slotted
7.7 oz. (218 g) Brushless Slotless

Electrical

Motor Type (DC):
PMDC Iron Core Brush,
Brushless Slotted, Brushless Slotless

Nominal Motor Voltages[4]:
6, 12, or 24 VDC
Other voltages available upon request

Electrical Termination:
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)

Current Range[5]:
300-800 mA

Pneumatic

Head Configuration:
Single

Maximum Unrestricted Flow:
6 LPM

Pressure Range:
0 - 10 psig (0 - 0.7 bar)

Vacuum Range:
0 - 16 in Hg (0 - 406 mm Hg)

Filtration:
40 microns - recommended

Efficiency at Free Flow[6]
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*)

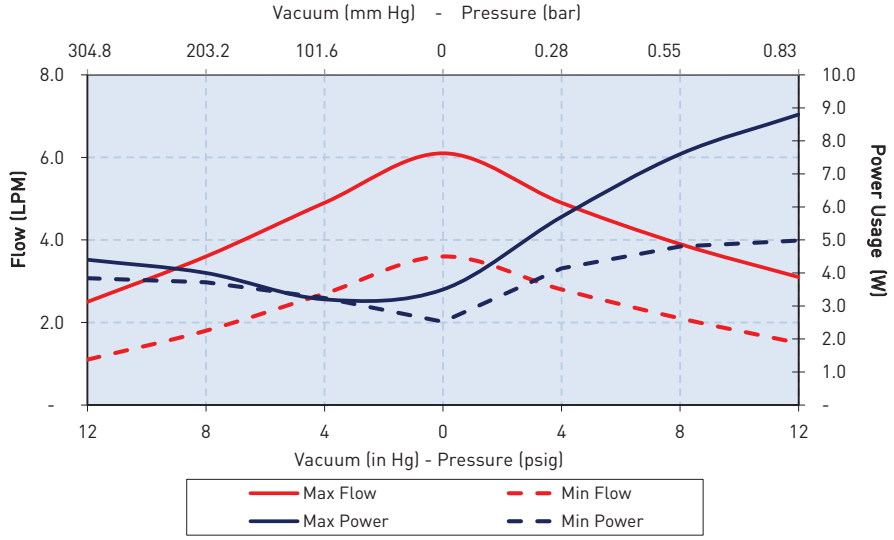
Wetted Materials

Diaphragm:	Pump Head:
EPDM, AEPDM, FKM	Vectra (Liquid Crystal Polymer)
Valves & Gaskets:	**Valve Cover:**
EPDM, FKM	303 Stainless Steel

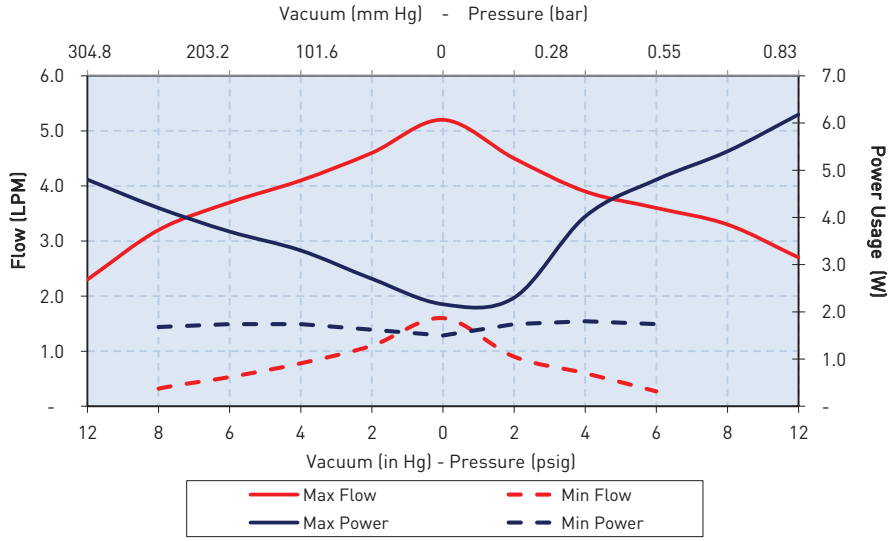
* See Appendix A for details.

Performance Specifications

TTC - Brushless Slotted Motor



TTC - Brushless Slotless Motor



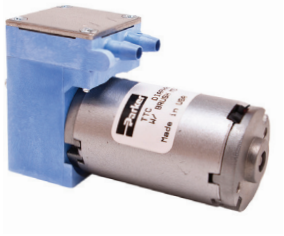
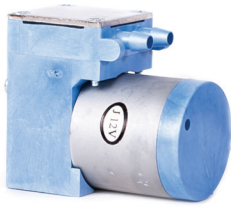
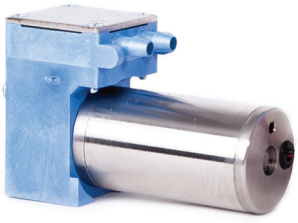
The above graph represents an example of performance for the pumps series handling air at 800 feet (244m) above sea level at 75°F (24°C). Performance will vary depending on barometric pressure and media temperature. Curves are representative of standard pump configurations. Pump configurations could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

Please contact Parker Precision Fluidics Applications Engineering for other considerations.

TTC 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**
Efficiency[1]	Good	**Better** - Up to 60% motor efficiency at low loads	**Best** Up to 75% motor efficiency
Life[2]	Good - 3,000 hrs	**Best** - 10,000 hrs	**Best** - 10,000 hrs
Cost	Best	Better	Premium
Noise	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).

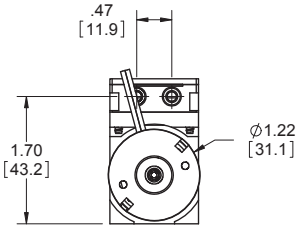
Port Connections:

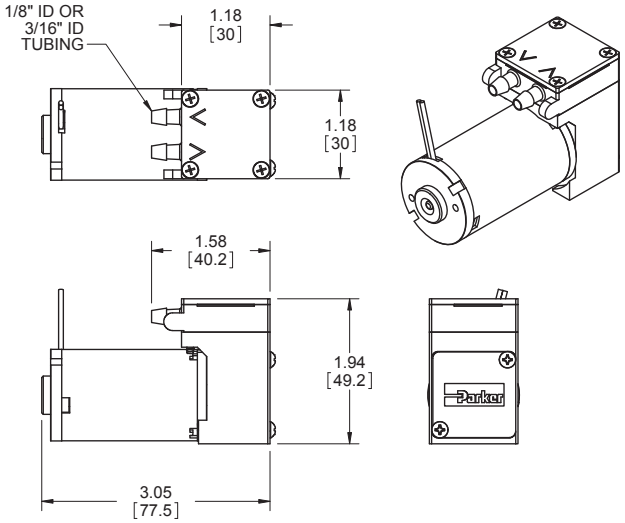
- Barbs are sized for 1/8" (3 mm) ID tubing, 70-80 durometer recommended.
- Flow direction is marked on the pump head with arrows.

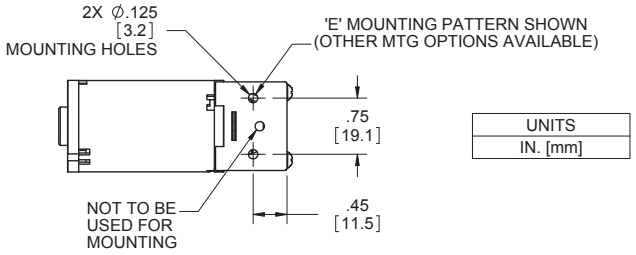
Mechanical Integration

Dimensions

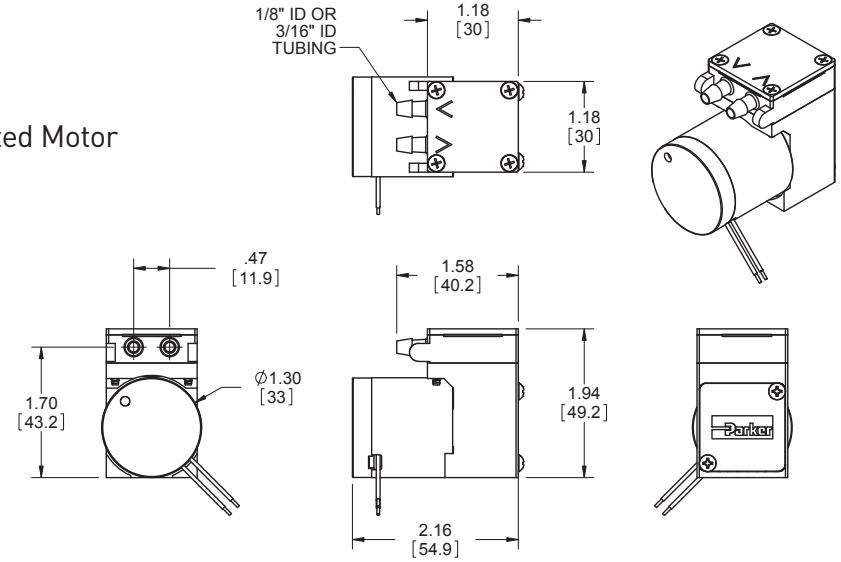
PMDC Iron Core Brush

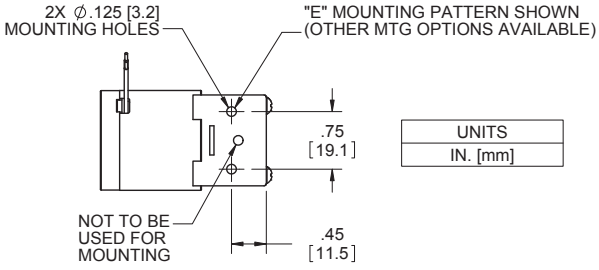




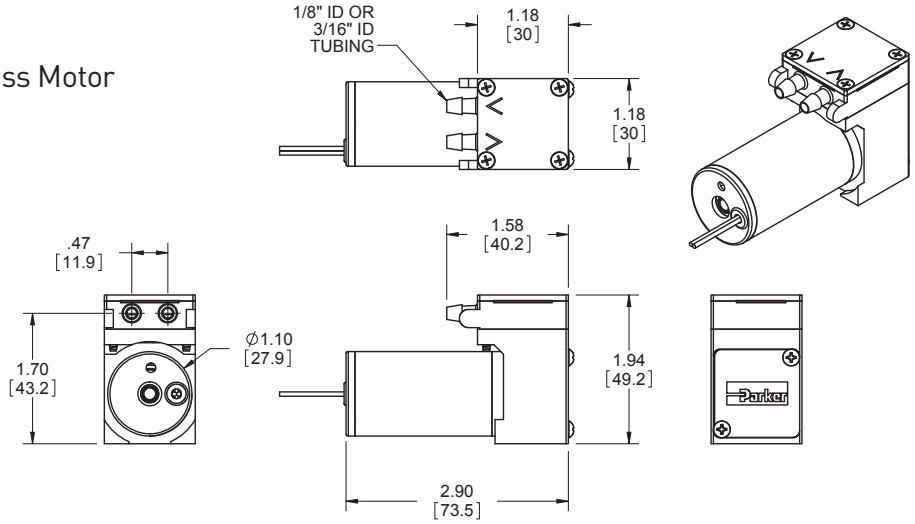


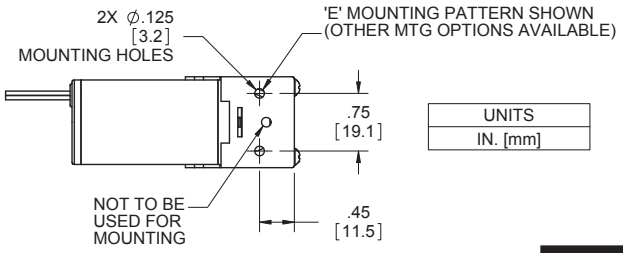
Brushless Slotted Motor





Brushless Slotless Motor





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)

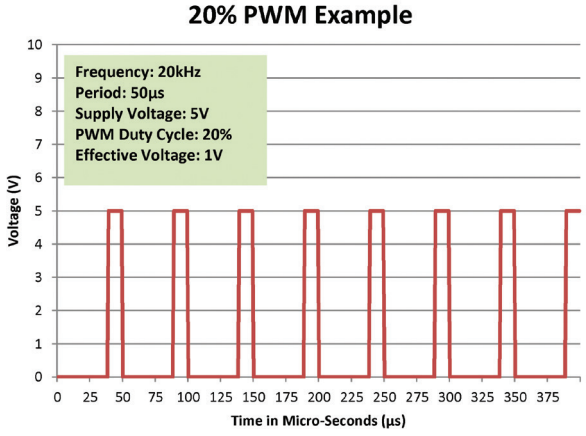
Pulse-width modulation is a commonly used technique for controlling DC motors.

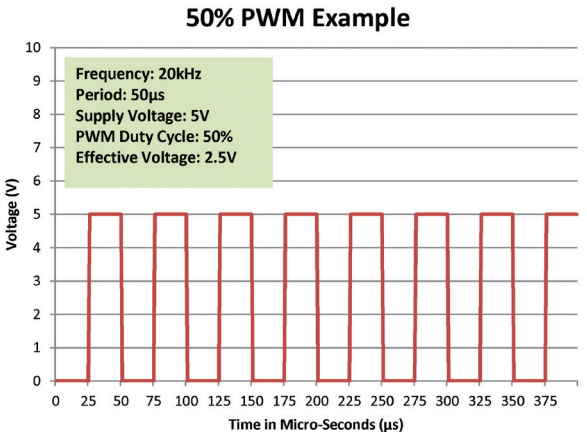
The average value of the voltage fed to the motor is controlled by turning a switch between the voltage supply and the motor on-and-off at a fast pace. The longer the switch is on compared to the off time, the higher the power supplied to the motor.

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.

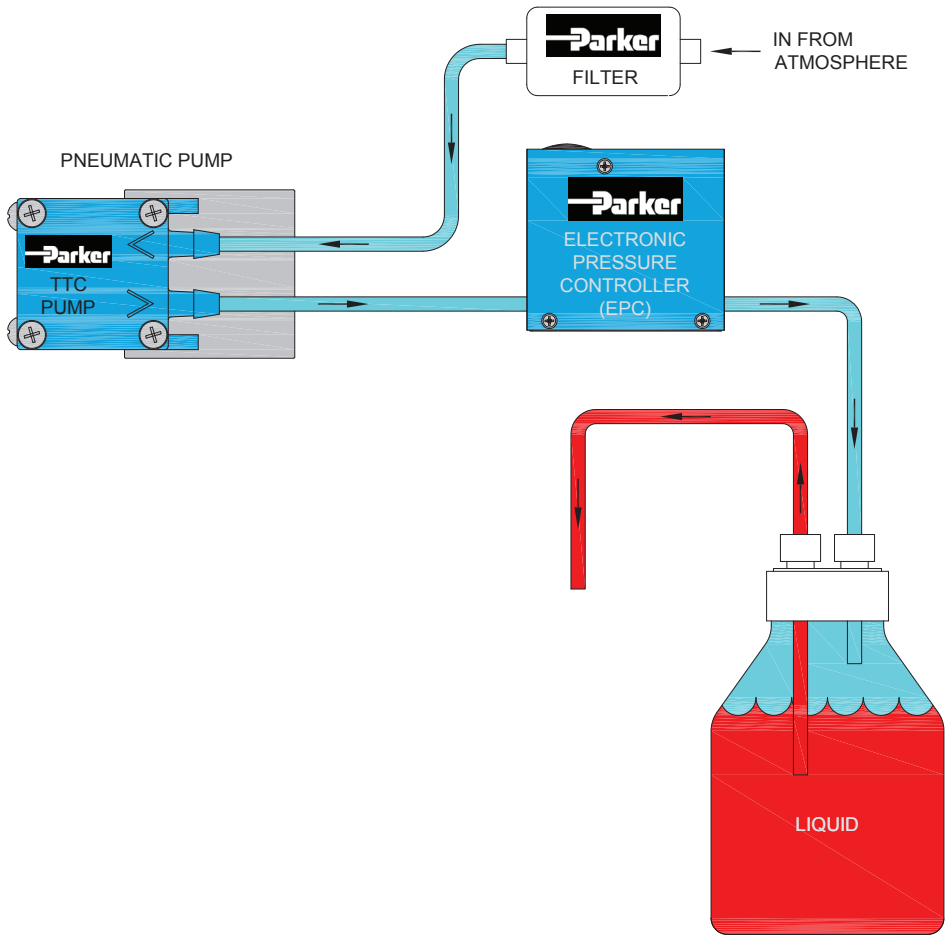
The advantage of PWM is the reduction of power-loss due to switching versus other control methods. Parker Hannifin recommends controlling the pump using 15kHz - 20 kHz frequency range.





Typical Flow Diagram

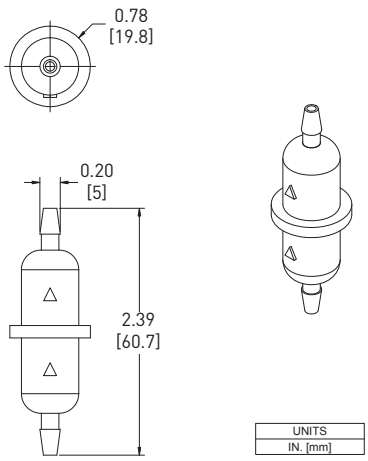
Air-Over-Liquid Flow Control



Accessory Information

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

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

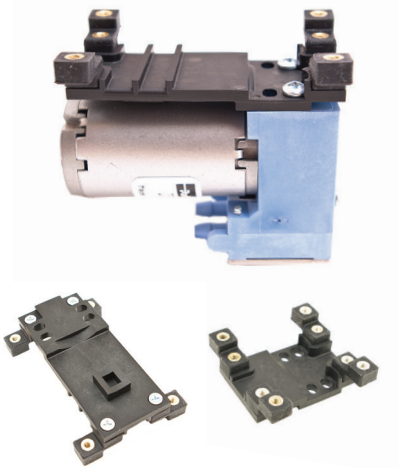


TTC Series

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

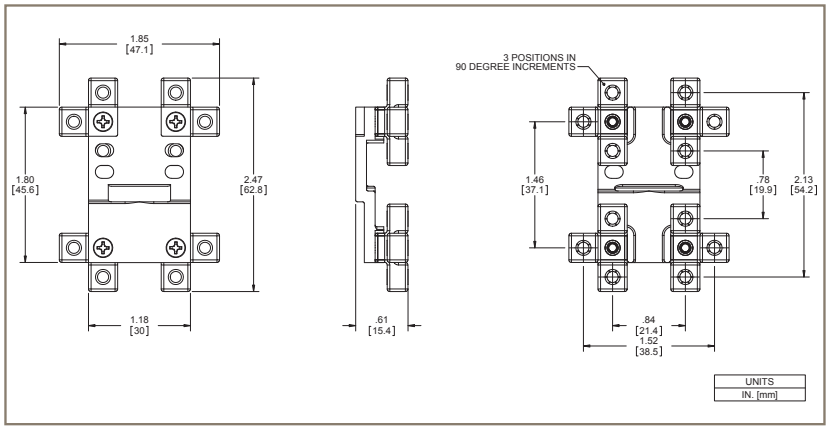
Operating Environment:
41 - 158°F (5 - 70°C)
Humidity:
0 - 95% Relative Humidity
Base Plate:
Noryl GTX830
Feet:
Silicone
Feet Insert:
Brass
Hardware:
Zinc-Plated Steel

EZ Mount kits include all necessary hardware and detailed instructions.

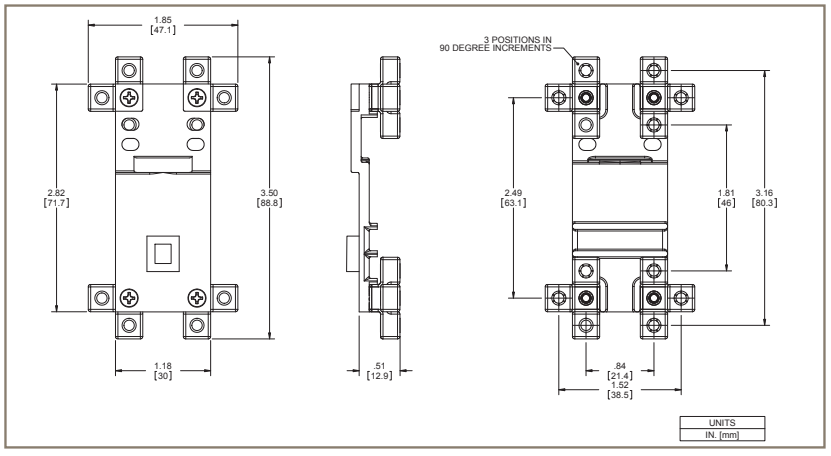
Isolation Feet are available in either threaded or thru-hole clearance for standard #4-40 or #6-32 (M3 for clearance hole only) hardware and can be mounted in any of three ninety-degree planes.

Dimensions

Style A - Brushless Slotted Motor



Style B - PMDC Iron Core Brush Motor



Chemical Compatibility Chart*

	Chemical Compatibility of Wetted Path Materials					
Chemical	FKM	EPDM	AEPDM	PTFE	Vectra A130	303 Stainless
Air	1	1	1	1	1	1
Ozone (1000 ppm)	4	4	4	2	2	2
Oxygen	1	1	1	1	1	1
Ethylene (Ethene)	1	4	1	1	3	2
Acetylene	1	1	1	1	1	1
Propane	1	4	4	1	1	1
Methane	1	4	4	1	1	1
Nitrogen	1	1	1	1	1	1
Carbon Dioxide	1	2	2	1	1	1
Halothane (Up to 5%)	1	4	4	1	1	1

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

Compatibility Legend

1. EXCELLENT
   Minimal or no effect
2. GOOD
   Possible swelling and/or loss of physical properties
3. DOUBTFUL
   Moderate or severe swelling and loss of physical properties
4. NOT RECOMMENDED
   Severe effect and should not be considered

Note: Consult factory fo rother gases.

Ordering Information

TTC Single 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	0	4 psig 276 mbar	8 psig 552 mbar	12 psig 827 mbar	16 psig 1103 mbar	Vac in Hg	Press psig	Motor Type	VDC	mA	Diaphragm, Valves, Gasket
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

*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.

TTC 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^2 (11 cm^2)	0.24 in^3 (3.9 cm^3)	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 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

Please click on the Order On-line button below (or go to 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.

Parker Hannifin Corporation
Precision Fluidics Division
26 Clinton Dr., Unit 103
Hollis, NH 03049
phone: +1 603 595 1500
email: ppfinfo@parker.com
www.parker.com/precisionfluidics