Torque Generator
Product Description

Char-Lynn torque generators have been completely redesigned to meet the needs of the changing marketplace. These torque generators provide power assist for steering, eliminating the large hand wheels on gate valves, and provide powerful rotary motion with effortless manual rotary input on numerous other applications.

Features

Today's market includes power steering on electric lift trucks. Char-Lynn torque generators have been designed with features that greatly improve the operator's comfort as well as the vehicle's performance.

The increase in port surface area allows for the additional port requirement for units with the following features:

Power Beyond

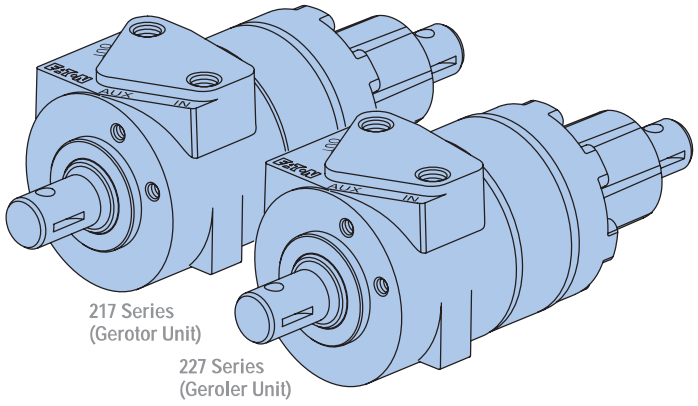
This version has three ports: Inlet (IN), Tank (OUT), and Excess Flow (EF). In the power beyond configuration, flow not used for priority steering exits the EF port and is available for the downstream reach function. Flow used for steering will exit the (OUT) port to tank, and cannot be used for auxiliary functions.

Load Sensing

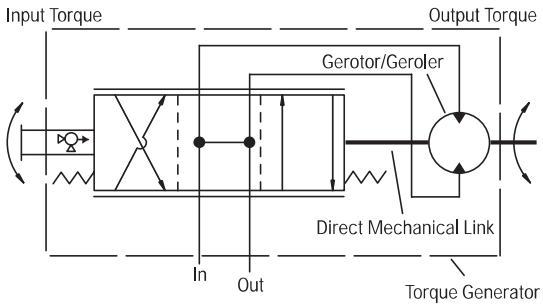
Char-Lynn load sensing torque generators use conventional or load sensing power supplies to achieve load sensing steering. The use of a load sensing torque generator and a priority valve in a normal power steering circuit offers the following advantages:

- Provides smooth pressure compensated steering because load variations in the steering circuit do not affect axle response or maximum steering rate.
- beyond system capability by splitting the system into two independent circuits. Only the flow required by the steering maneuver goes to the steering circuit. Flow not required for steering is available for use in the auxiliary circuits.
- because the steering circuit always has flow and pressure priority.

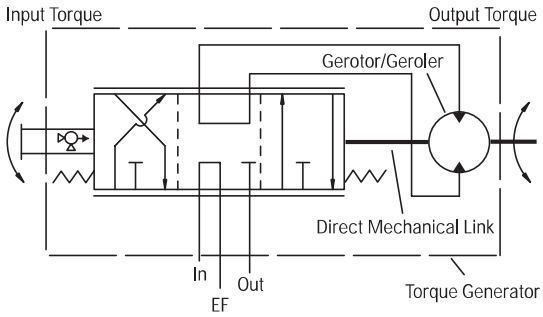
Char-Lynn load sensing torque generators and priority valves can be used with open center, closed center or load sensing systems. Used either in an open center system with a fixed displacement pump or a closed center system with a pressure compensated pump, these torque generators offer many of the features of a load sensing system. Excess flow is available for auxiliary circuits.



Standard Open Center



Power Beyond



Open Center with Case Drain

This high pressure open center torque generator allows the exit flow from the Torque Generator to operate another function (for example reach/tilt function of a fork lift vehicle). An external case drain is needed to protect seals and to allow for adequate recentering of spool and sleeve. The flow out the case drain is internal leakage only. This is a series circuit with some special characteristics that should be noted:

- A relief valve is required in the down stream circuit as well as a relief valve protecting the torque generator.
- The pressures in this circuit are additive. If it takes 41 bar [600 PSI] for steering and 55 bar [800 PSI] for the reach circuit, the pump will see 96 bar [1400 PSI].
- The relief valve for steering must always be set higher than the relief valve on the downstream function (reach). The margin between the two must be enough to provide adequate steering in the worst case (fork lift stationary and unloaded).

Anti-Friction Needle Bearings

Torque generators are available with anti-friction needle bearings at the power end to allow for direct mount sprockets or pinions when compactness of application does not allow for outboard bearings.

Gerotor or Geroler® Element

This is a fluid displacement element, consisting of an outer ring gear and an internal star. Manual low torque input actuates the spool of the spring centered spool and sleeve valve, allowing high pressure oil to turn the internal star. This star is coupled with a splined drive to the output shaft and also the sleeve of the spool and sleeve valve. High pressure oil turning the star in this gerotor or Geroler element is generating high output torque.

The Geroler elements have not been offered on torque generators in the past. These Gerolers have rolls incorporated into the outer ring, and the rolls provide rolling contact with the star point, minimizing friction and improving efficiency.

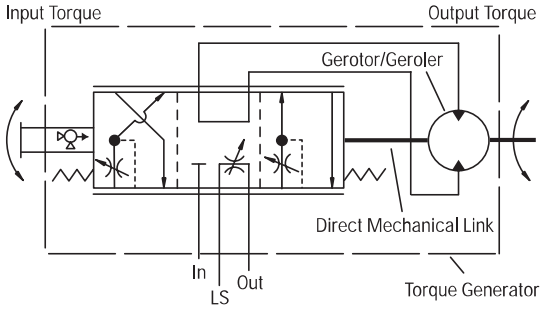
Limited Manual Steering

Relative deflection of the input and output shafts is limited mechanically within the unit so that limited manual steering is still possible in the event of power loss.

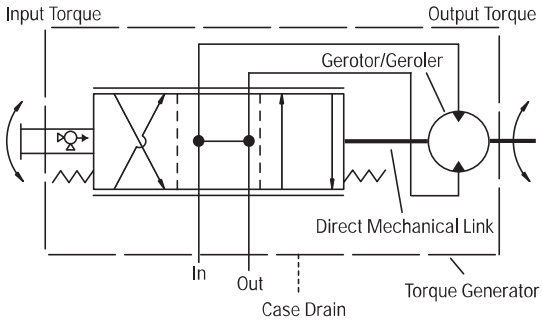
Reaction Torque Resistance

Customer supplied bracket is required for reaction torque resistance.

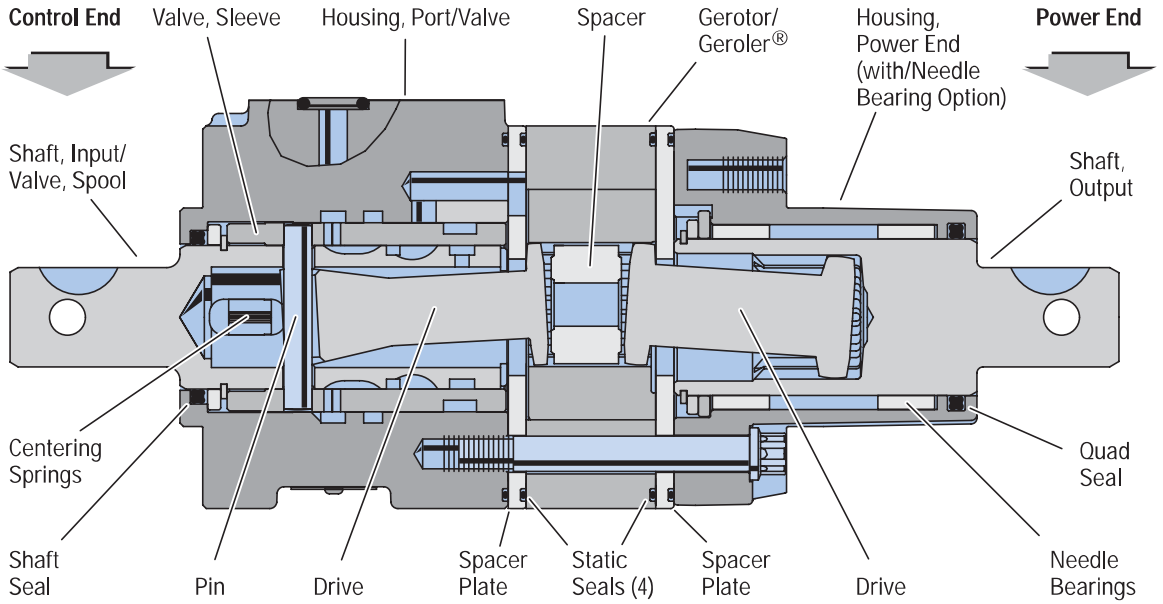
Load Sensing



Open Center (with Case Drain)



Torque Generator
Product Information



SPECIFICATIONS 217 SERIES—GEROTOR UNIT

Displacement cm³/r [in³/r]	76 [4.7]	96 [5.9]	160 [9.7]
Torque Output (at 70 bar [1000 PSI])	62 Nm [550 lb-in]	79 Nm [700 lb-in]	124 Nm [1100 lb-in]
Recommended Flow	11,4 l/min [3 GPM]	13,2 l/min [3.5 GPM]	13,9 l/min [5 GPM]
Max. Operating Speed (at Rated Pressure and Recommended Flow)	125 RPM	118 RPM	102 RPM

SPECIFICATIONS 227 SERIES—GEROLER® UNIT

Displacement cm³/r [in³/r]	80 [4.9]	102 [6.2]	160 [9.7]
Torque Output (at 70 bar [1000 PSI])	69 Nm [608 lb-in]	86 Nm [760 lb-in]	131 Nm [1160 lb-in]
Recommended Flow	11,7 l/min [3.1 GPM]	15,1 l/min [4 GPM]	18,9 l/min [5 GPM]
Max. Operating Speed (at Rated Pressure and Recommended Flow)	125 RPM	118 RPM	102 RPM

COMMON SPECIFICATIONS 217 AND 227 SERIES

Rated Flow	15,1 l/min [4 GPM]
Max. System Operating Temperature	93° C [200° F]
Input Torque Powered	1,6 - 2,5 Nm [14 - 22 lb-in]
Non-Powered (Max.)	136 Nm [100 lb-ft]
Output Shaft Side Load at Keyway Centerline without Bearing with Bearing	 23 kg [50 lb] 272 kg [600 lb]
Fluid	Most petroleum hydraulic fluids—see your Eaton representative for use of fire-resistant and other special fluids
Recommended Filtration	As needed to maintain ISO 18/13 cleanliness level
Rated Pressure	Depends on model—See chart circuit type below

Circuit Type	In Port	Out Port	Aux. Port	Max. In minus Out
Open Center	69 bar [1000 PSI]	3 bar [50 PSI]	—	—
Power Beyond	138 bar [2000 PSI]	3 bar [50 PSI]	138 bar [2000 PSI]	69 bar [1000 PSI]
Load Sensing	69 bar [1000 PSI]	3 bar [50 PSI]	69 bar [1000 PSI]	—
Open Center w/Case Drain	172 bar [2500 PSI]	103 bar [1500 PSI]	3 bar [50 PSI]	69 bar [1000 PSI]

Torque Generator

Model Code Ordering Information

The following 20-digit coding system has been developed to identify all of the configuration options for the torque generator. Use this model code to specify a torque generator with the desired features. All 20 digits of the code must be present when ordering. You may want to photocopy the matrix below to ensure that each number is entered in the correct box.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
A	B	P								0	1	A	1	A			A	1	B

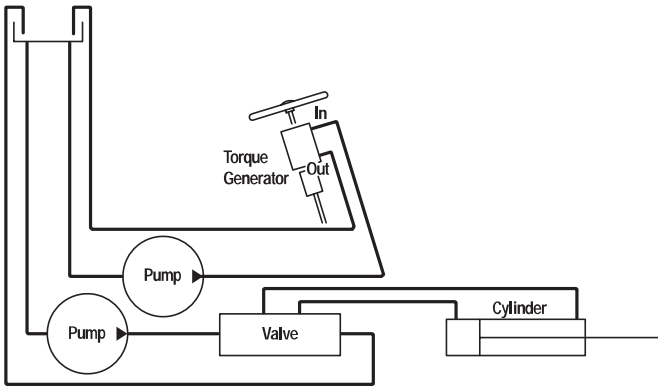
Nos	Feature	Code	Description
1,2,3	Product Series	ABP	Torque Generator
4,5,6	Circuit Type . and Ratings —Max	A4A	15,1 l/min [4 GPM] Open Center Inlet 69 bar [1000 PSI] Out 3 bar [50 PSI]
		D4C	15,1 l/min [4 GPM] Open Center Power Beyond Inlet 138 bar [2000 PSI] Out 3 bar [50 PSI] Aux. (PB) 138 bar [2000 PSI] Dp (Inlet – out) <69 bar [1000 PSI] (Limited to 76 [4.7], 80 [4.9], 96 [5.9] cm3/r [in3/r])
		E4B	15,1 l/min [4 GPM] Open Center with High Back Pressure (Case Drain) Inlet 172 bar [2500 PSI] Out 103 bar [1500 PSI] Aux. (CD) 3 bar [50 PSI] Dp (Inlet – out) <69 bar [1000 PSI]
		C4D	15,1 l/min [4 GPM] Load Sensing Dynamic Signal Inlet 69 bar [1000 PSI] Out 3 bar [50 PSI] Aux. (LS) 69 bar [1000 PSI]
7,8	Displacement cm3/r [in3/r]	08	76 [4.7] Gerotor
		10	96 [5.9] Gerotor
		17	160 [9.7] Gerotor
		58	80 [4.9] Geroler
		60	102 [6.2] Geroler
		66	160 [9.6] Geroler
9	Ports	A	2 x .625 inch Dia. Manifold Ports with 2 x 5/16-18 UNC Mounting Holes (use with port block) - open center only
		B	3 x .625 inch Dia. Manifold Ports with 3 x 5/16 - 18 UNC Mounting Holes (use with port block)
		C	2 x 9/16 SAE Ports— open center only
		D	3 x 9/16 SAE Ports
		E	2 x G3/8 (BSP) Ports— open center only
		F	3 x G3/8 (BSP) Ports
10	Shaft Bearings	0	None
		1	Output Shaft Needle Bearings
11	Integral Valves	0	None
12	Input Torque	1	Standard
13	Shaft Ends	A	22,17 [.874] Dia. with Keyway and Cross Hole
14	Shaft Seals	1	Quad Rings
15	Mounting Threads	A	5/16-18 UNC
16,17	Special Feature	00	None
		01	Port Block Installed
18	Paint and Packaging	A	Black Primer
19	Identification	1	Eaton Product Number on Nameplate
20	Eaton Assigned Design Code	B	Assigned Design Code

Torque Generator

Conventional System Circuits

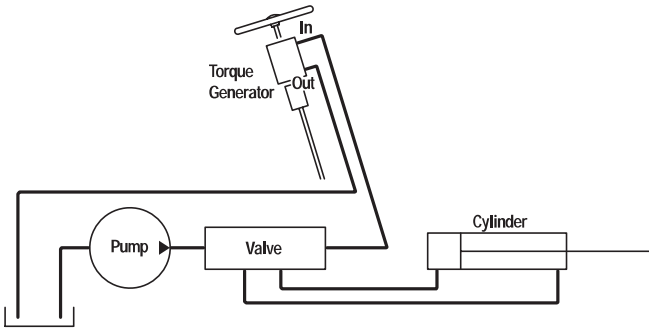
Conventional System with Two Pumps

- Extra cost of two separate circuits



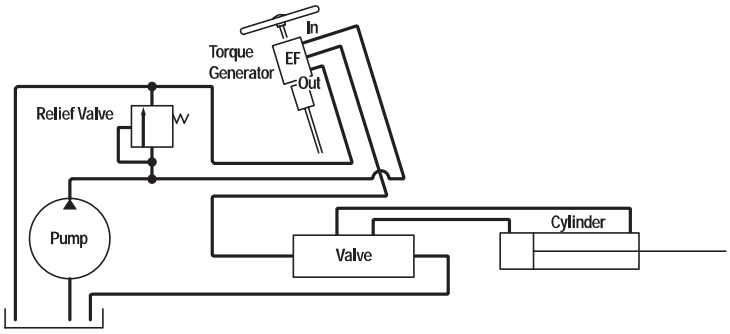
Conventional System with One Pump

- Can result in insufficient steering flow when operating the auxiliary function



Power Beyond Torque Generator

- Parallel circuit
- Steering has priority
- Simple system
- Single relief valve
- Flow to auxiliary function is reduced while steering

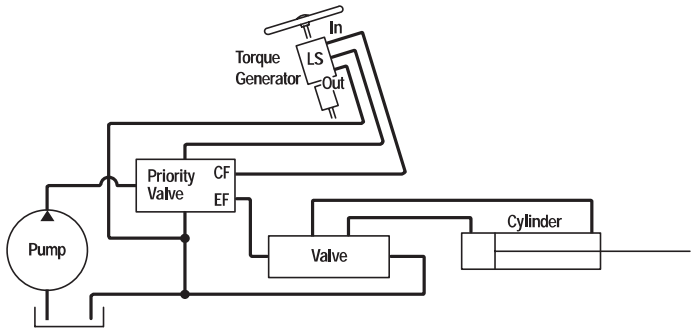


Torque Generator

Conventional System Circuits

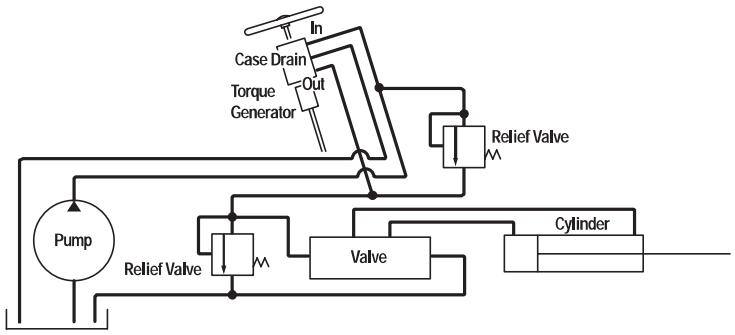
Load Sensing System

- Steering has priority
- Auxiliary function can operate at higher pressure than steering rating; priority valve isolates CF side from EF side pressures.
- Flow to auxiliary functions reduced while steering



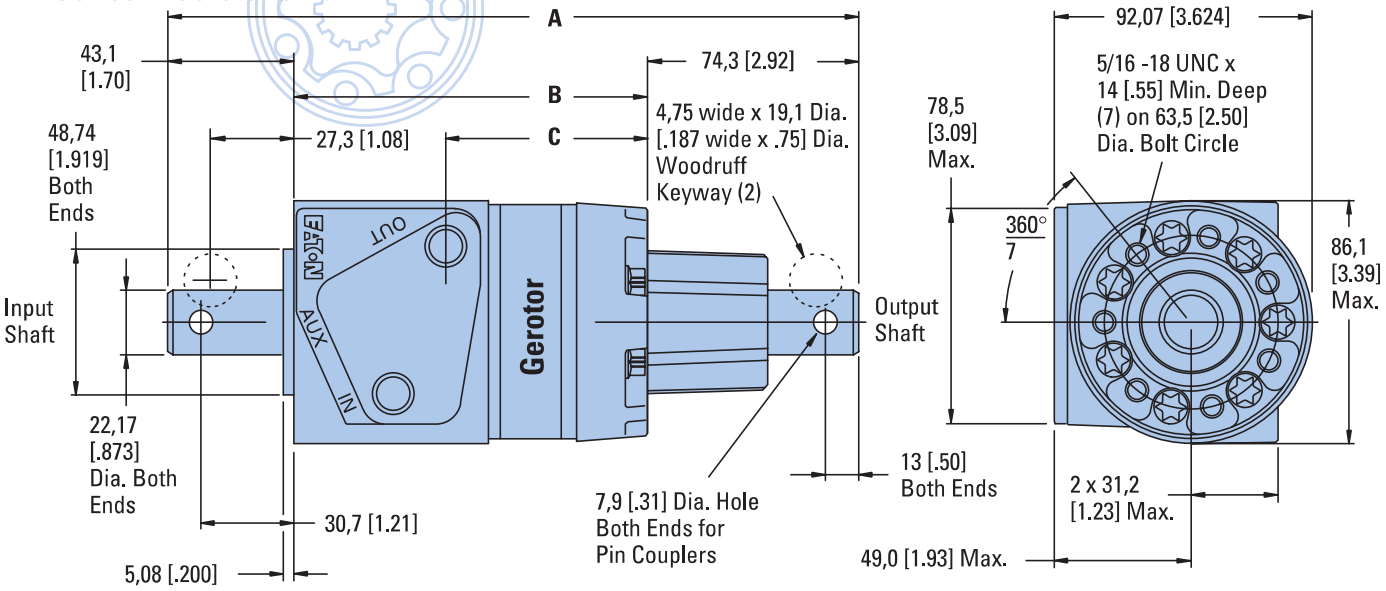
High Back Pressure Torque Generator

- Series circuit; auxiliary and steering pressures are additive
- All flow available to auxiliary function, even while steering
- Separate relief valves required for steering and auxiliary



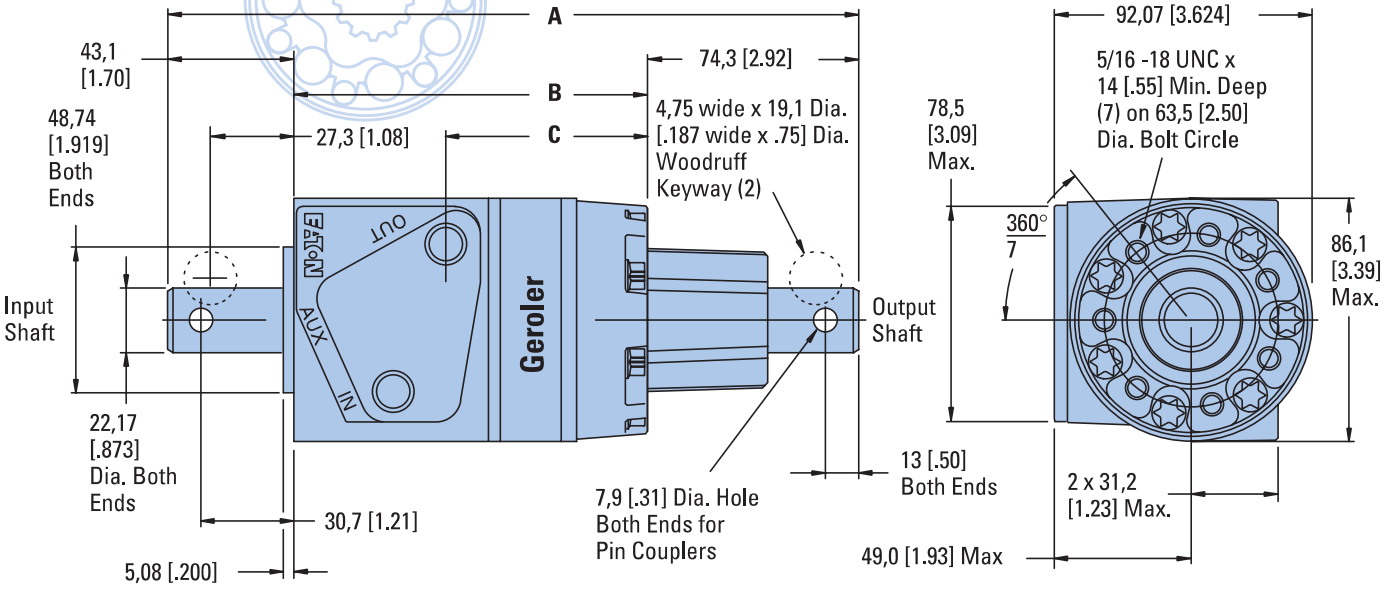
Torque Generator
Installation Drawing

217 Series—Gerotor Unit



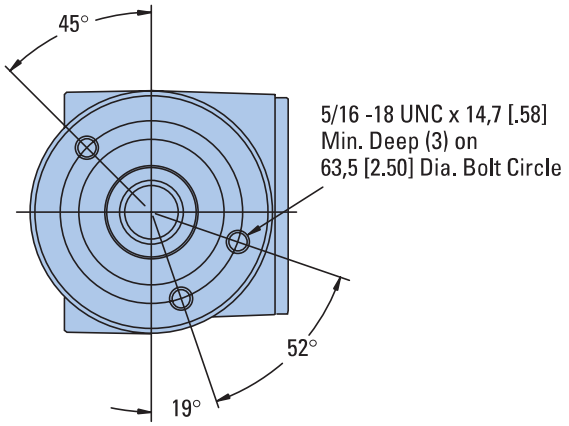
	Displacement cm³/r [in³/r]	Dimension mm [inch] A	B	C
217 Series (Gerotor Unit)	96,1 [5.86]	231,9 [9.13]	114,5 [4.51]	60,4 [2.38]
	159,6 [9.73]	240,6 [9.47]	123,2 [4.85]	69,3 [2.73]
227 Series (Geroler® Unit)	80,3 [4.90]	233,3 [9.18]	115,9 [4.56]	62,0 [2.44]
	101,6 [6.20]	237,2 [9.34]	119,8 [4.72]	65,9 [2.59]
	160,0 [9.64]	247,5 [9.74]	130,1 [5.12]	76,2 [3.00]

227 Series—Geroler® Unit



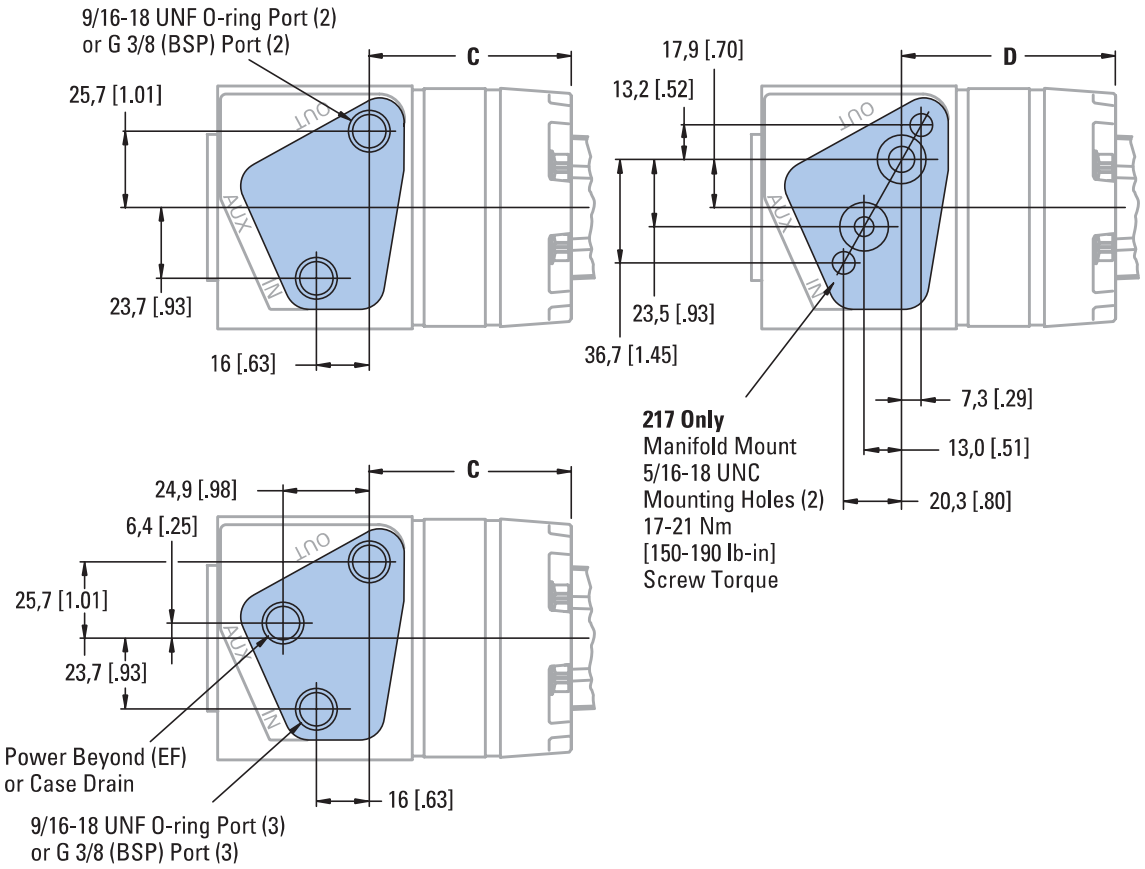
Torque Generator
Ports

Input End



	Displacement cm³/r [in³/r]	Dimension mm [inch] C	D
217 Series (Geroler® Unit)	96,1 [5.86]	60,4 [2.38]	63,5 [2.50]
	159,6 [9.73]	69,3 [2.73]	72,1 [2.84]
227 Series (Gerotor Unit)	80,3 [4.90]	62,0 [2.44]	
	101,6 [6.20]	65,9 [2.59]	
	160,0 [9.64]	76,2 [3.00]	

Port Options

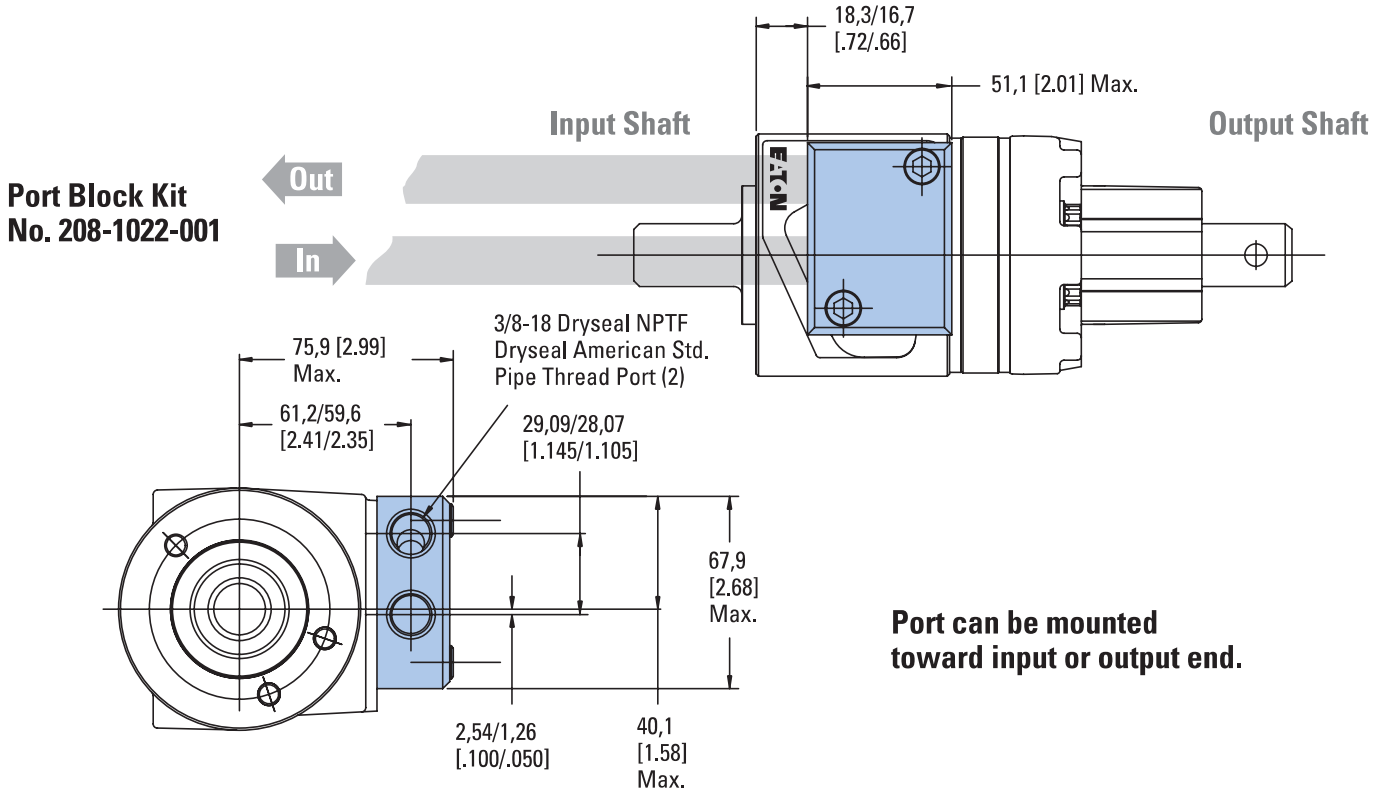


For proper operation it is recommended that the unit be installed so no radial load or thrust load is applied to either the input or output shafts. Misalignment of shafts will cause binding.

Torque Generator—

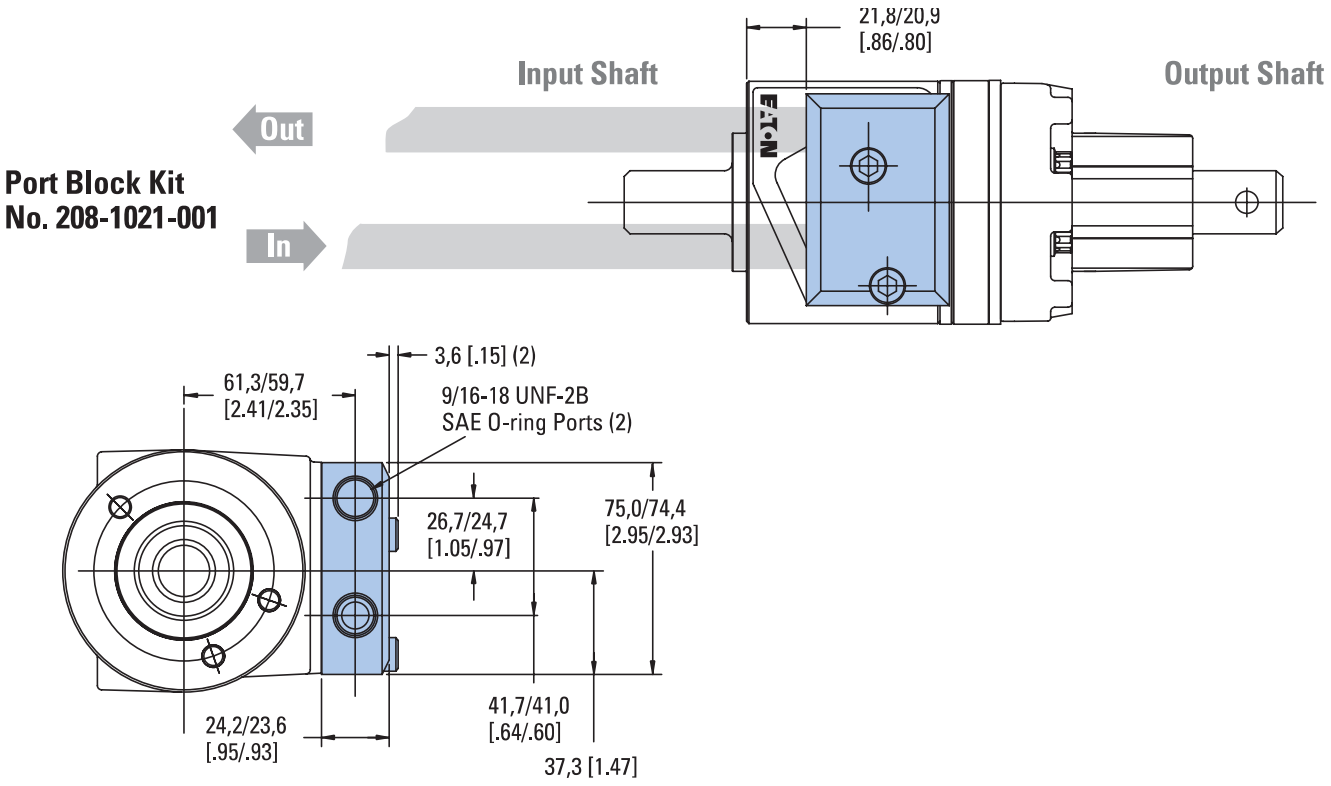
217 Series
Port Block

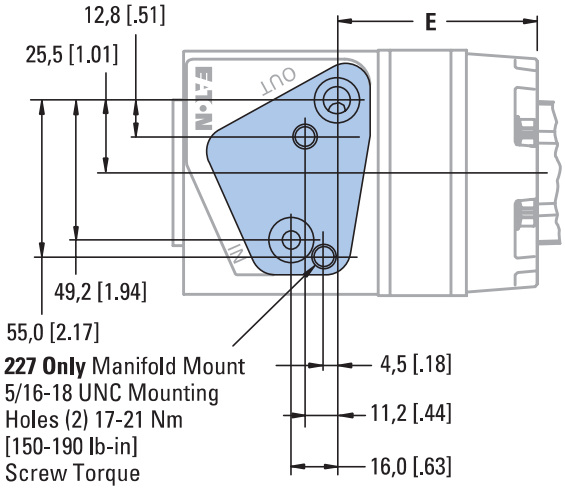
Installation Drawing
Port Block with 3/8-18 Dryseal NPTF Ports



Torque Generator—

227 Series
Port Block
Installation Drawing
9/16-18 UNF SAE
O-ring Port





Displacement cm³/r [in³/r]	Dim. mm [inch] E	
	80,3 [4.90]	62,0 [2.44]
227 Series	101,6 [6.20]	71,2 [2.80]
(Geroler® Unit)	160,0 [9.64]	76,2 [3.00]

Torque Generator
Performance Data

Torque Generator Pressure Drop