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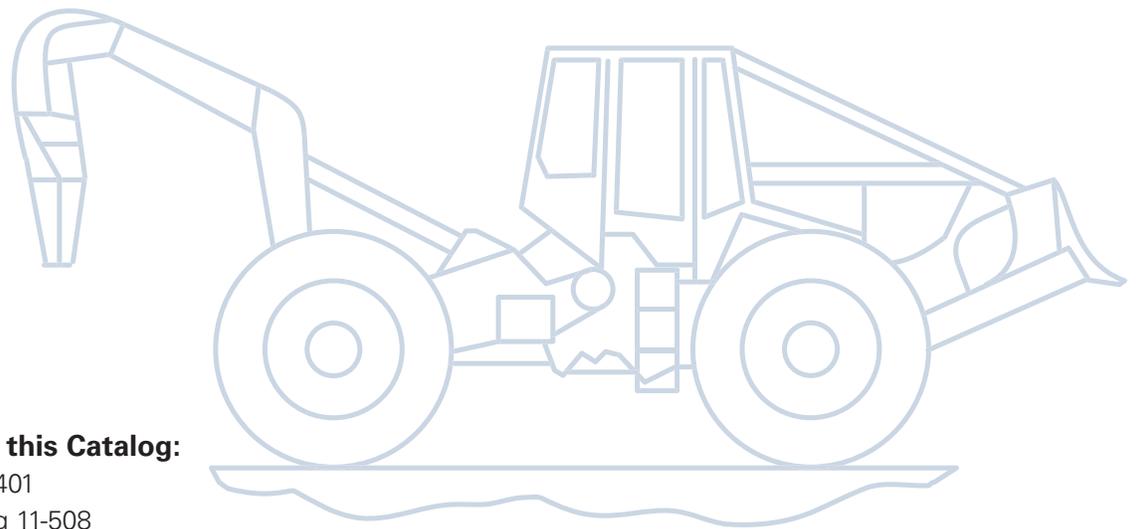
**Char-Lynn**

**Steering Catalog**

Steering Control Units  
Torque Generators  
Steering Columns



**Char-Lynn®**



**Literature Referenced in this Catalog:**

- Eaton Technical Bulletin 3-401
- Eaton Flow Divider Catalog 11-508
- Eaton Gear Pumps Series 26 Model 26000 Catalog 11-609

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Information contained in this publication is accurate as of the publication date and is subject to change without notice. Performance values are typical values. Customers are responsible for selecting products for their applications using normal engineering methods.

# Steering Control Units

## Description and Advantages

The Char-Lynn® steering control unit (SCU) is fully fluid linked. This means there is no mechanical connection between the steering unit, the pump and the steering cylinders. The unit consists of a manually operated directional control servo valve and feedback meter element in a single body. It is used principally for fluid linked power steering systems but it can be used for some servo-type applications or any application where visual positioning is required. The close coupled, rotary action valve performs all necessary fluid directing functions with a small number of moving parts. The manually actuated valve is coupled with the mechanical drive to the meter gear. The control is lubricated and protected by the power fluid in the system and can operate in many environments.

Char-Lynn power steering control units offer the following advantages:

- Minimizes steering linkage—reduces cost, provides flexibility in design.
- Provides complete isolation of load forces from the control station—provides operator comfort.
- Provides continuous, unlimited control action with very low input torque.
- Provides a wide selection of control circuits and meter sizes.
- Can work with many kinds of power steering pumps or fluid supply.

Char-Lynn steering control units are covered by one or more of the following U.S. Patents 25,126; 3,905,728; and 3,953,158. Corresponding foreign Patents pending and issued.

### SERIES 5

|   |                                    |                                     |
|---|------------------------------------|-------------------------------------|
| <b>Displacement</b>                     | <b>31.5 - 120 cm<sup>3</sup>/r</b> | <b>1.92 - 7.33 in<sup>3</sup>/r</b> |
| <b>Flow</b>                             | <b>11 - 19 l/min</b>               | <b>3 - 5 GPM</b>                    |
| <b>Pressure</b>                         | <b>140 bar</b>                     | <b>2030 PSI</b>                     |
| <b>Series 5 can be found on page 18</b> |                                    |                                     |

### SERIES 10

|  |                                    |                                     |
|--|------------------------------------|-------------------------------------|
| <b>Displacement</b>                      | <b>58.7 - 739 cm<sup>3</sup>/r</b> | <b>3.58 - 45.1 in<sup>3</sup>/r</b> |
| <b>Flow</b>                              | <b>11 - 76 l/min</b>               | <b>3 - 20 GPM</b>                   |
| <b>Pressure</b>                          | <b>275 bar</b>                     | <b>4000 PSI</b>                     |
| <b>Series 10 can be found on page 27</b> |                                    |                                     |

### SERIES 20

|  |                                  |                                  |
|--|----------------------------------|----------------------------------|
| <b>Displacement</b>                      | <b>60 - 985 cm<sup>3</sup>/r</b> | <b>3.6 - 60 in<sup>3</sup>/r</b> |
| <b>Flow</b>                              | <b>38 - 114 l/min</b>            | <b>10 - 30 GPM</b>               |
| <b>Pressure</b>                          | <b>241 bar</b>                   | <b>3500 PSI</b>                  |
| <b>Series 20 can be found on page 38</b> |                                  |                                  |

### SERIES 25

|  |                                    |                                 |
|--|------------------------------------|---------------------------------|
| <b>Displacement</b>                      | <b>490 - 1230 cm<sup>3</sup>/r</b> | <b>30 - 75 in<sup>3</sup>/r</b> |
| <b>Flow</b>                              | <b>95 - 151 l/min</b>              | <b>25 - 40 GPM</b>              |
| <b>Pressure</b>                          | <b>241 bar</b>                     | <b>3500 PSI</b>                 |
| <b>Series 25 can be found on page 45</b> |                                    |                                 |

### SERIES 40

|  |                                     |                                  |
|--|-------------------------------------|----------------------------------|
| <b>Displacement</b>                      | <b>1230 - 3030 cm<sup>3</sup>/r</b> | <b>75 - 185 in<sup>3</sup>/r</b> |
| <b>Flow</b>                              | <b>151 - 227 l/min</b>              | <b>40 - 60 GPM</b>               |
| <b>Pressure</b>                          | <b>241 bar</b>                      | <b>3500 PSI</b>                  |
| <b>Series 40 can be found on page 51</b> |                                     |                                  |

# Torque Generator Customized Steering Columns

## Description and Advantages

### Torque Generator

Char-Lynn® torque generators have been completely redesigned to meet the needs of the changing marketplace. These torque generators have served the industry well, providing:

- Power assist for vehicle steering.
- Power assist on gates and valves, eliminating the large hand wheels.
- Powerful rotary motion with effortless manual rotary input on numerous other applications.

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

### Use the Torque Generator as rotary power assist for:

- Large indexing tables
- Manually operated gates and valves
- Manual positioning devices
- Mechanical steering systems
- Turntables

### Customized Steering Columns

Char-Lynn® columns can be custom built to your exact specifications. The column and mounting flange is of a sturdy single weldment design. These columns have high thrust and side load capacity with low shaft torsional friction. A tilt column is also available.

### SERIES 217, 227

|              |                             |                              |
|--------------|-----------------------------|------------------------------|
| Displacement | 76 - 160 cm <sup>3</sup> /r | 4.7 - 9.6 in <sup>3</sup> /r |
| Flow         | 15 l/min                    | 4 GPM                        |
| Pressure     | 69 and 172 bar              | 1000 and 2500 PSI            |

Torque Generators can be found on page 56

### STEERING COLUMNS

|               |                    |                    |
|---------------|--------------------|--------------------|
| Jacket Length | 56 - 836 mm        | 2.2 - 33 inch      |
| Horn Wire     | with and without   | with and without   |
| Upper Ends    | 10 Upper End Types | 10 Upper End Types |

Steering Columns can be found on page 74

# Neutral Circuits: Open Center and Open Center Power Beyond Hydraulic Circuit Explanation

## Open Center:

- Simplest, most economical system
- Uses a fixed displacement pump
- In neutral position pump and tank are connected
- Most suitable on smaller type vehicles

## Open Center Power Beyond:

The power beyond steering control unit supplies steering and auxiliary valve functions. The power beyond unit is used on medium pressure, open center (fixed displacement pump) systems.

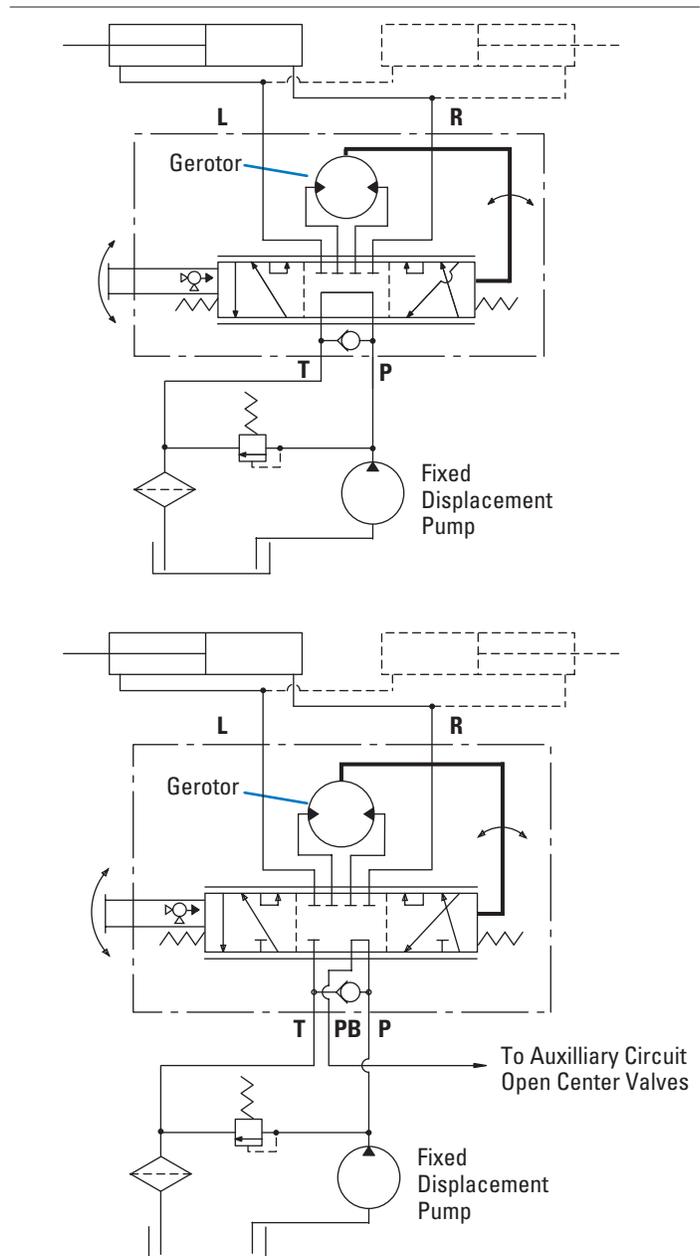
When not steering, the power beyond unit directs all inlet flow to the auxiliary circuit. However once steering is initiated, part of the auxiliary flow is diverted to steering. Since steering has priority, all flow, if required, will be diverted to steering. The tank port of the steering unit has flow only when steering is operated. Thus, flow out of the auxiliary ("PB") port and the tank port will fluctuate or stop depending on steering input.

The following special considerations should be addressed when applying power beyond steering:

- Auxiliary valves (connected to PB) must be open center type. Slight bump or kick may be felt in steering wheel when auxiliary functions are activated during steering operations.
- Pump flow not used for steering is available at power beyond (PB) outlet, except at steering stops where total pump flow goes over the system relief valve. Avoid auxiliary functions that require constant flow while steering.
- Flow is only directed to the tank port when steering is operated. Avoid systems where return flow from tank port is used for auxiliary functions.
- Inlet pressure to the steering unit will be the higher of steering system pressure or auxiliary valve pressure.
- Generally avoid systems where heavy use of auxiliary functions occur while steering.

## Applications

- Lawn and Garden Equipment
- Utility Vehicles

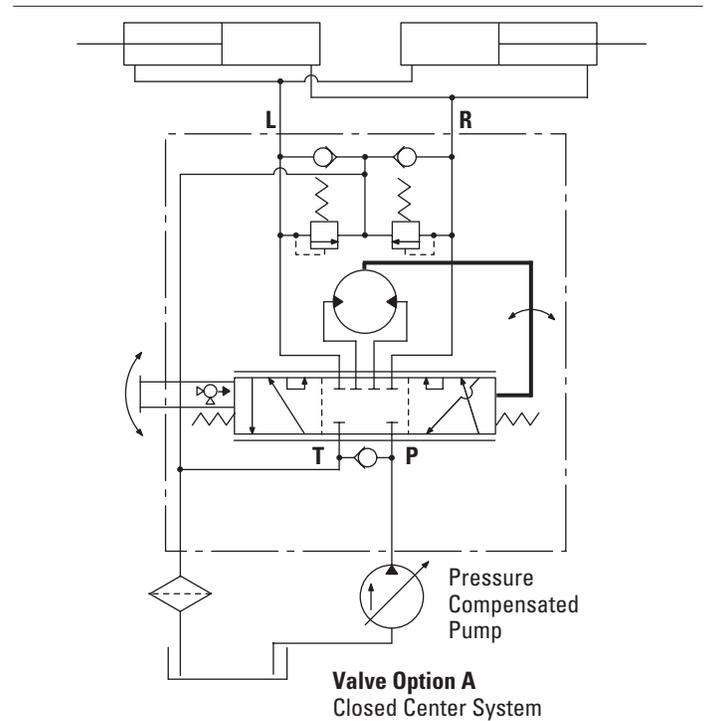


# Neutral Circuits: Closed Center

## Hydraulic Circuit Explanation

### Closed Center:

- Uses a pressure compensated variable displacement pump
- In neutral position pump and tank are disconnected
- Most suitable on large construction equipment



### Closed Center with Neutral Bleed

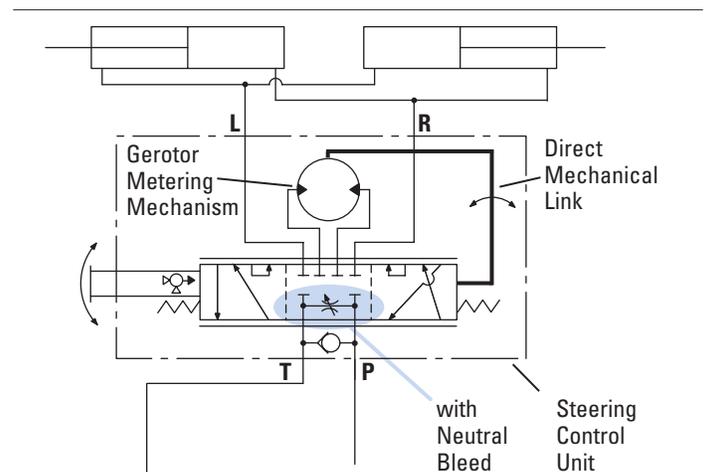
#### Neutral Bleed Feature

Closed Center Steering Control Units are available with and without neutral bleed feature. Most applications may not require the bleed feature, however, the maximum temperature differential between components within the steering circuit must not exceed specification (50° F or 28° C). Order unit with the bleed feature if the temperature differential may exceed this limit. The neutral bleed feature allows a small flow of fluid to pass through the unit when in neutral to reduce the thermal differential. Typical applications where neutral bleed is required are:

- Remote steering position from power source.
- Extended engine idle operation when vehicle is parked.
- High duty cycle operation sharing a common reservoir with the steering circuit.

#### Applications

- Construction Industry



# Neutral Circuits

## Hydraulic Circuit Explanation

### Load Sensing Circuits

Char-Lynn® load sensing power steering uses conventional or load sensing power supplies to achieve load sensing steering. The use of a load sensing steering unit 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.
- Provides true power beyond system capability by splitting the system into two independent circuits. Pressure transients are isolated in each circuit. 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.
- Provides reliable operation because the steering circuit always has flow and pressure priority.

Char-Lynn load sensing steering control units and priority valves can be used with open center, closed center or load sensing systems. Use in an open center system with a fixed displacement pump or a closed center system with a pressure compensated pump, offers many of the features of a load sensing system. Excess flow is available for auxiliary circuits. Listed below are the components of a typical load sensing control circuit and a brief application description.

**Pump**—May be fixed displacement, pressure compensated, or flow and pressure compensated design.

**Priority Valve**—Sized for design pressure drop at maximum pump output flow rate and priority flow requirements. The minimum control pressure must assure adequate steering flow rate and must be matched with the steering control unit.

A dynamic signal priority valve must be used with a dynamic signal steering control unit.

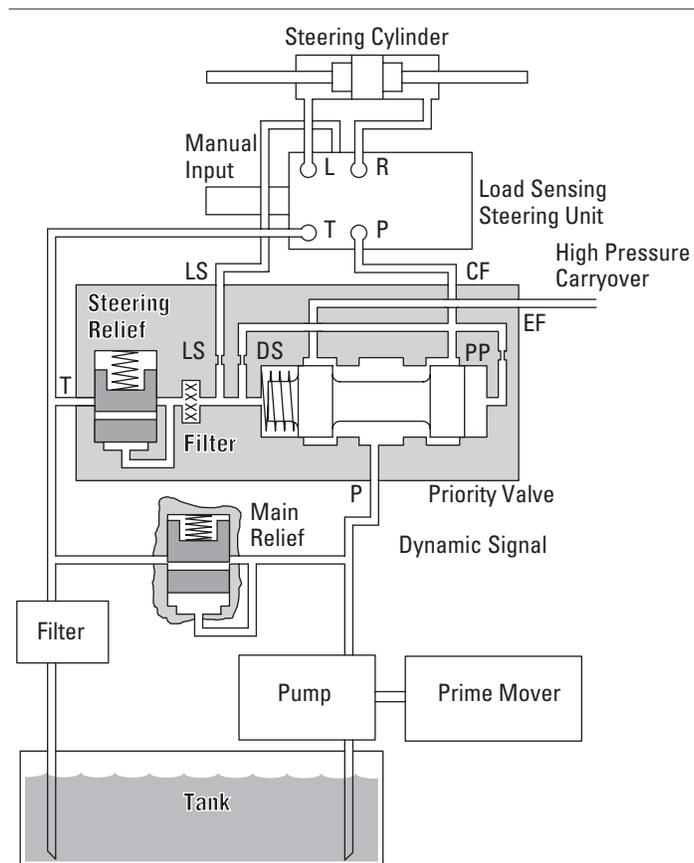
**Steering Control Unit**—Designed for specific rated flows and control pressures. It must be matched with a control pressure in the priority valve to obtain maximum steering rates. Higher flow rates require higher control pressures. Neutral internal bleed assures component temperature equalization.

**LS Line**—A LS line is always needed to sense pressure downstream from the variable control orifice in the steering control unit. This is balanced by an internal passage to the opposite side of the priority control spool.

The total system performance depends on careful consideration of the control pressure chosen and pressure drop in the CF line.

**Steering Relief Valve**—Must be factory set at least 10 bar [145 PSI] above the maximum steering cylinder pressure requirement. Most of the flow will be directed to the auxiliary circuit (EF) when the relief setting is exceeded.

**System Main Relief Valve**—A pressure relief valve for the auxiliary circuit and/or a main safety valve for the protection of the pump is recommended and sized for the maximum pump output flow rate. If a main relief valve is used, it must be set above the priority circuit steering relief valve pressure setting.



- LS — Load Sensing
- DS — Dynamic Signal
- PP — Pilot Pressure
- CF — Control Flow
- EF — Excess Flow

# Neutral Circuits

## Hydraulic Circuit Explanation

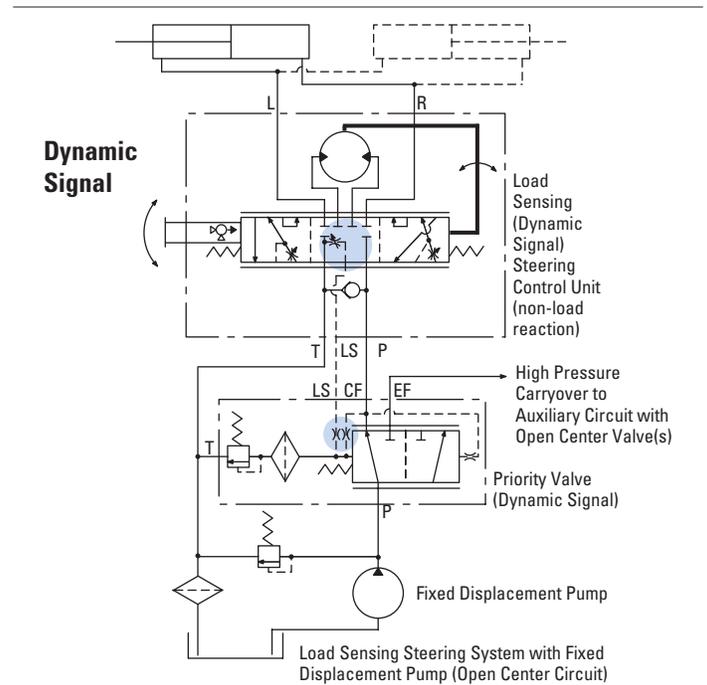
### Load Sensing Circuits—Signal Systems

Two types of load sensing signal systems are available—Dynamic and Static.

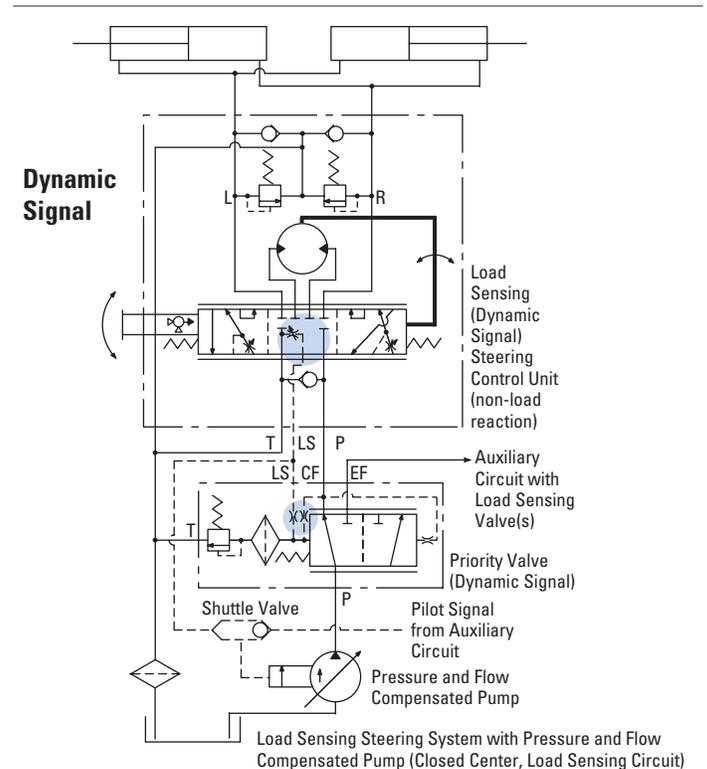
**Dynamic Signal**—Used for more difficult applications. The dynamic signal systems offer the following benefits:

- Faster steering response.
- Improved cold weather start-up performance.
- Increased flexibility to solve problems related to system performance and stability.

### Dynamic Signal—Open Center Pump



### Dynamic Signal—Load Sensing Pump





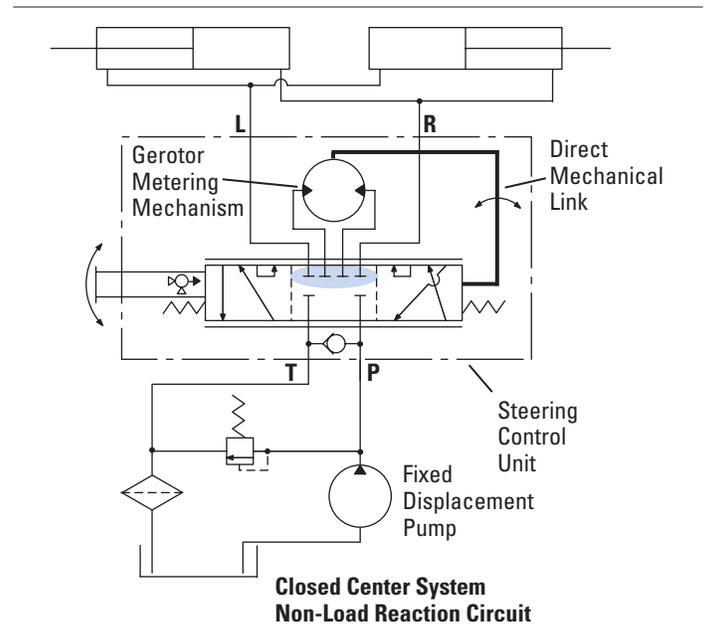
# Work Circuits

## Non-Load Reaction vs. Load Reaction

### Hydraulic Circuit Explanation

#### Non-Load Reaction

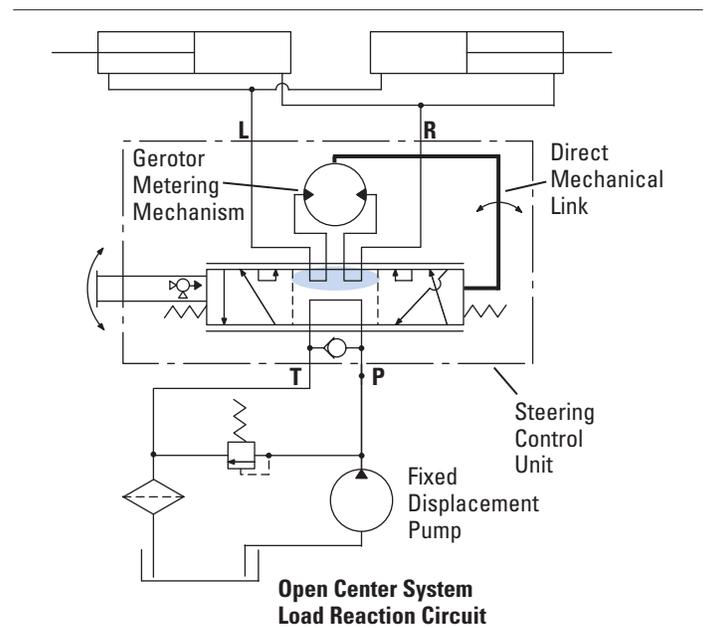
A non-load reaction steering unit blocks the cylinder ports in neutral, holding the axle position whenever the operator releases the steering wheel.



#### Load Reaction

A load reaction steering unit couples the cylinder ports internally (in the neutral position) with the meter gear set. Axle forces are then allowed to return the steering wheel to its approximate original position. Comparable to automobile steering, gradually releasing the wheel mid turn will allow the steering wheel to spin back as the vehicle straightens.

The cylinder system used with load reaction units **must have equal oil volume** displaced in both directions. The cylinders should be a parallel pair (as shown) or one double rod end unit. **Do not use with a single unequal area cylinder system.**



# Steering Units with Integral Valves

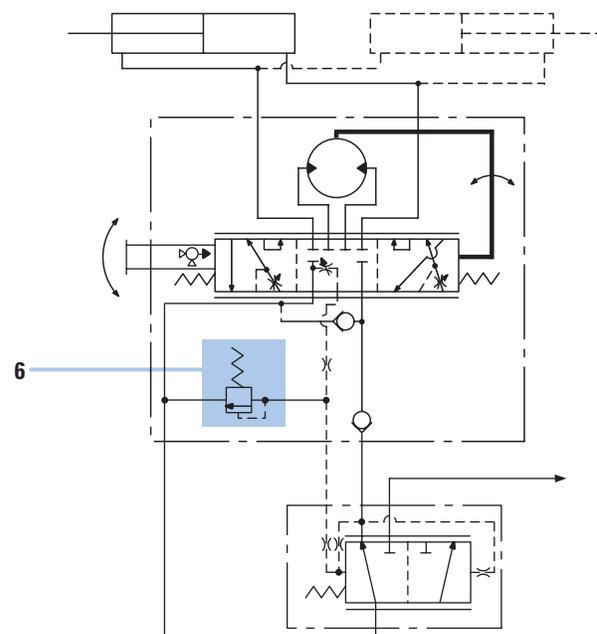
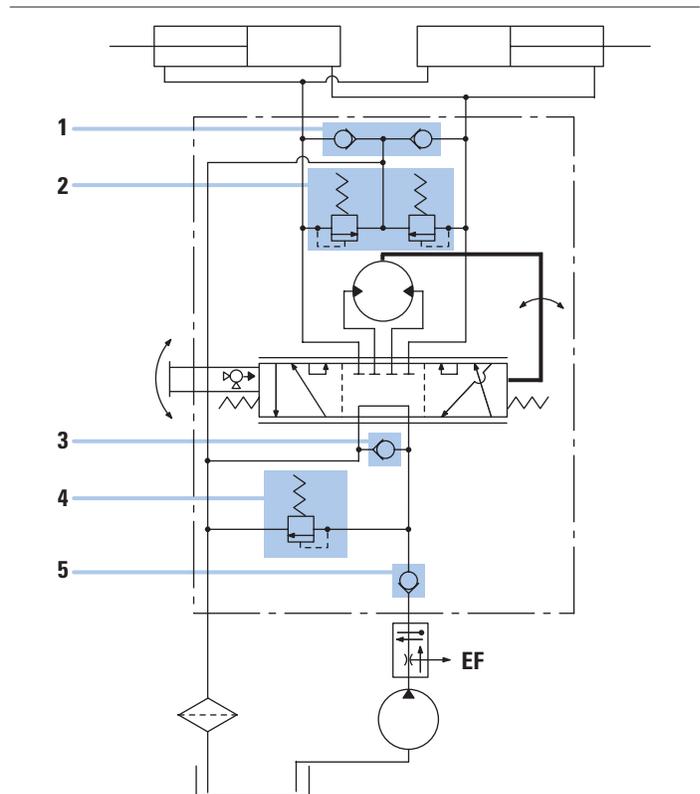
Integral valves are available for the Char-Lynn® steering control unit. Included are: Inlet Relief Valve, Cylinder Port Shock Valves, LS-Relief Valve, and Anti-Cavitation Valves for cylinder ports. In addition, a Manual Steering Check Valve for limited manual steering is included.

The integral valves eliminate the need for a separate valve block, and provides versatility to meet any steering circuit standard.

## Valve Description:

- 1 Anti-cavitation check valve for cylinder ports**—(R & L) protects steering circuit against vacuum (cavitation) conditions.
- 2 Cylinder Port Relief Valves**—(R & L) protects hoses against pressure surge created by ground forces on the steered axle.
- 3 Manual Steering Check Valve**—converts unit to a hand operated pump for limited manual steering. Included in all units except Series 20, 25, and 40.\*\*
- 4 Inlet Relief Valve**—limits maximum pressure drop across the steering unit protecting the steering circuit.
- 5 Inlet Check Valve**—prevents oil from returning through the steering unit when pressure on the cylinder side is greater than pressure on the inlet side to prevent steering wheel kick.
- 6 LS-Relief Valve**—Limits maximum pressure in the steering circuit (LS units only)

\*\*Steering units with displacements larger than 185 cm<sup>3</sup>/r [11.3 in<sup>3</sup>/r] may require a separate power source for limited operation.



# Manual Steering

## Description and Advantages

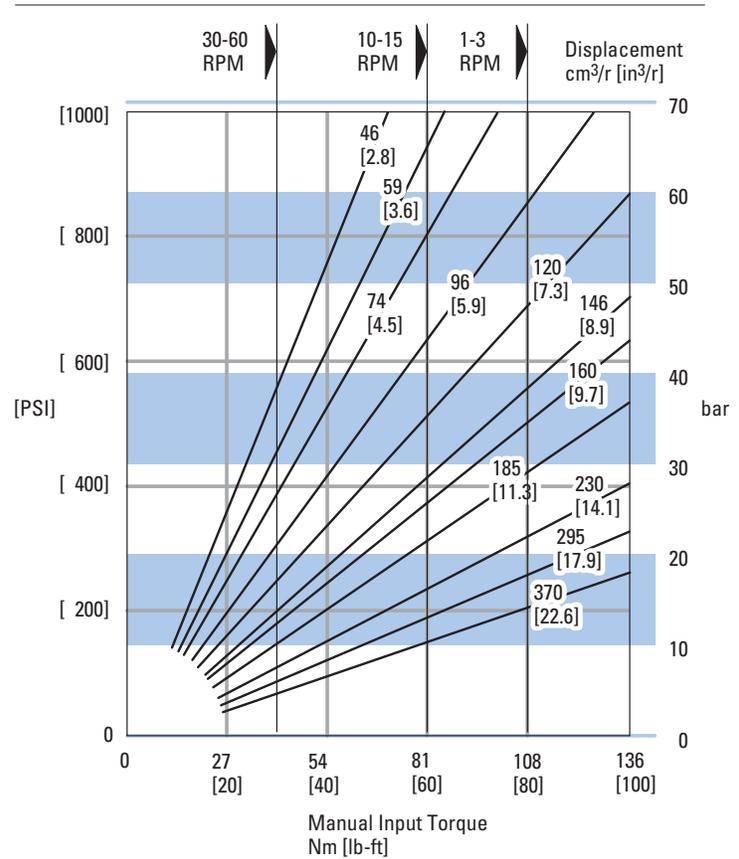
### Description

The steering control unit can provide steering flow when the pump or engine fails. It will pump oil through the meter (gerotor) as the operator applies input or torque to the steering wheel which provides limited manual steering.

This feature is available in all steering models except for Series 25 and 40.

### Use of Graph

1. Determine steering work port pressure required to perform the desired steering maneuver from vehicle test data. This defines the approximate manual steering pressure level required. Find this value on the vertical axis and construct a horizontal line on the graph.
2. Find the input torque limit on the horizontal axis. Follow this vertically until it crosses the required pressure line of step 1.
3. The maximum steering unit displacement is identified by the first angled line to the left of this intersection.



1) Maximum flow less than 7,6 l/min [2 GPM].

2) Actual steering pressures required and manual steering capabilities must be verified with vehicle testing.

The above curves are intended as a design guide only.

# Q-Amp Flow Amplification for Load Sensing Circuits

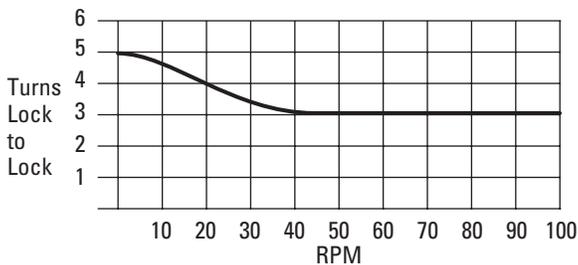
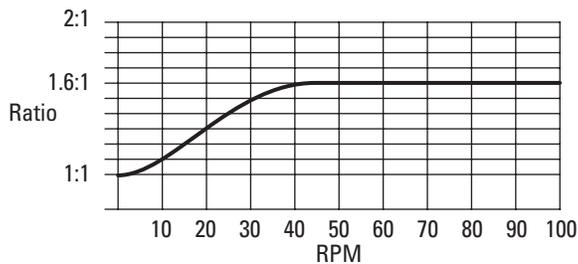
## Description and Advantages

### Description

Q-Amp steering units have built in variable orifices that provide flow directly to the cylinder without going through the gerotor section. The orifices do not open until after the gerotor begins to rotate and then gradually open until the desired flow is achieved which is proportional to the flow going through the gerotor. A typical Q-Amp unit has a ratio of 1.6 : 1 which means the flow of the cylinder is 1.6 times the flow going through the gerotor when turning the steering wheel at medium to fast speeds. (See model code for available ratios.)

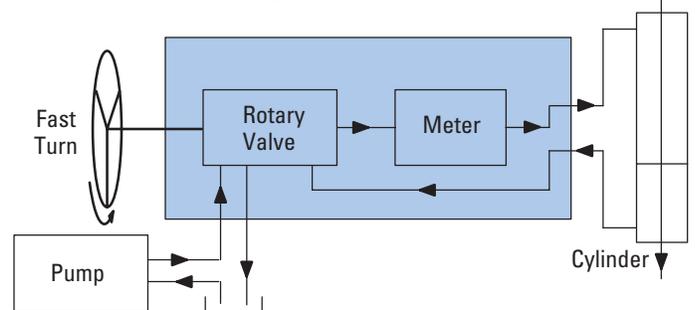
### Features

- Variable Ratio

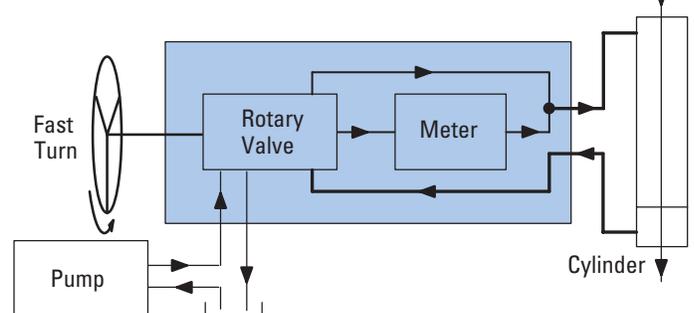


- Manual Steering  
Steering a vehicle with loss of engine power may not be possible with a large displacement steering control unit (SCU). Q-Amp with manual feature has the smaller displacement required for manual steering and has the additional flow requirement of the larger displacement SCU for power steering.
- Single Cylinder (Unequal area)  
On vehicles with **one single unequal area cylinder** the steering wheel turns lock to lock are more in one direction than the other. When extending the rod one would get more turns than when retracting it. A different Q-Amp ratio while turning in one direction versus the other can be used to give an equal number of turns lock to lock in each direction.

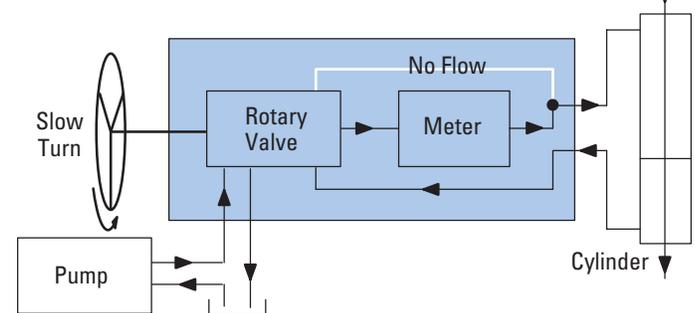
### Conventional Steering Control Unit



### Q-Amp Steering Control Unit – Fast Turn



### Q-Amp Steering Control Unit – Slow Turn



Covered by one or more of the following U.S. and foreign Patents: 4759182, 4862690, 4781219. Unequal area Q-Amp. Patent pending.

# Q-Amp Flow Amplification for Load Sensing Circuits

## Special Features and Application Information

### Applications

Articulated vehicles such as wheel loaders, log skidders, scrapers, trucks, and similar vehicles can benefit from this feature.

While roading, a slow movement of the steering wheel (input speed), will not overcorrect steering. Increasing input speed will produce the additional steering flow required to quickly change the vehicle's direction.

For example, operating log skidders in the woods requires very quick steering. This same log skidder on the road would be extremely difficult to steer a straight normal course. The variable ratio feature provides good steering in both conditions.

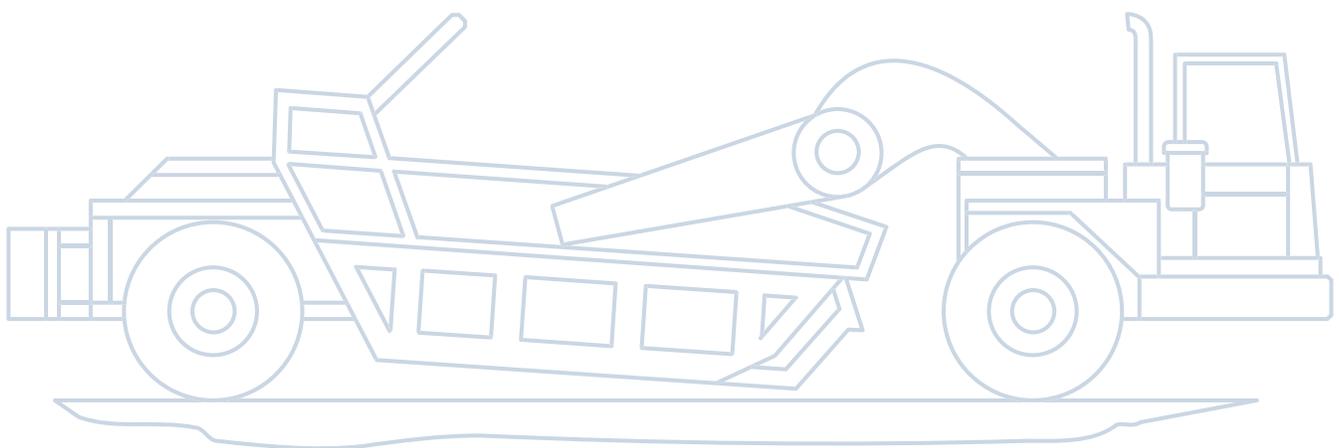
Combines, row crop tractors, and large articulated agricultural tractors also can benefit from this feature when traveling down a field. It will be easier to follow rows or furrows, and still be able to make fast turns at the end of the rows.

### Variable Ratio

- Wheel Loaders
- Scrapers
- Articulated AG Tractors
- Articulated Dumpers
- Mine Trucks
- Forestry Equipment
- Rough Terrain Lift Trucks

### Variable Ratio with Manual Steering

- AG Tractors
- Small Wheel Loaders
- Rubber Tired Excavators
- Sprayers
- Site Handlers
- Graders
- Combines



# Wide Angle

## Special Features and Application Information

### Description

Steering units with wide angle features have been developed to significantly reduce or eliminate the jerky motion of vehicles with articulated steering systems. This has been accomplished by increasing the maximum deflection of the spool relative to the sleeve. Increasing the deflection reduces the gain. This in turn reduces acceleration and jerk levels and provides overall smoother vehicle performance.

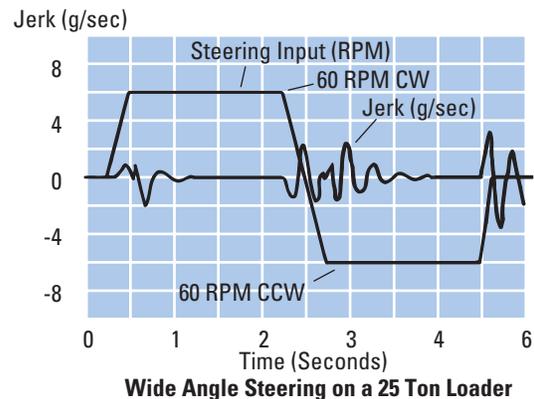
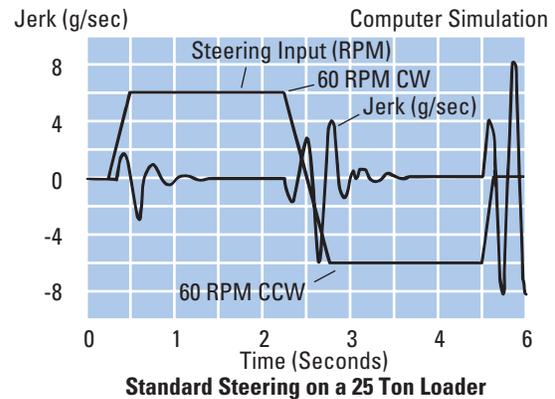
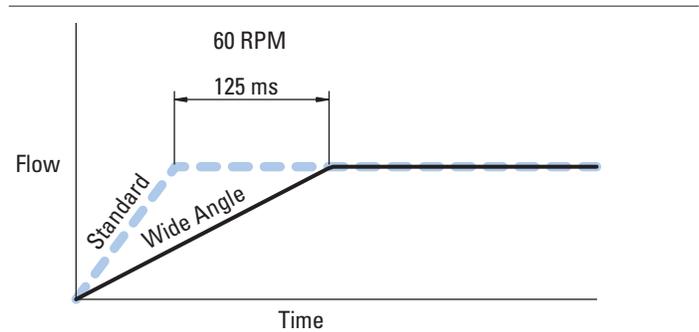
The steering still responds fast enough so the operator does not notice the reduced gain.

### Features

- Minimizes jerking motion on medium and large articulated vehicles.
- Jerk reducing valves and accumulators can be eliminated on most vehicles.
- Available on Series 20, Series 25.

### Applications

- Articulated Vehicles



Wide Angle Steering Control Units  
Patent No. 5080135

These graphs show a computer simulation of the jerk levels and has been verified by actual vehicle tests.

# Cylinder Damping

## Special Features and Application Information

### Description

Cylinder damping can help smooth the steering action of large articulated vehicles such as loaders, scrapers, and skidders. These vehicles have overhanging weight with high inertial loads. This energy is dissipated by the cylinder damping orifices which bleed a small amount of flow from the cylinder port to tank.

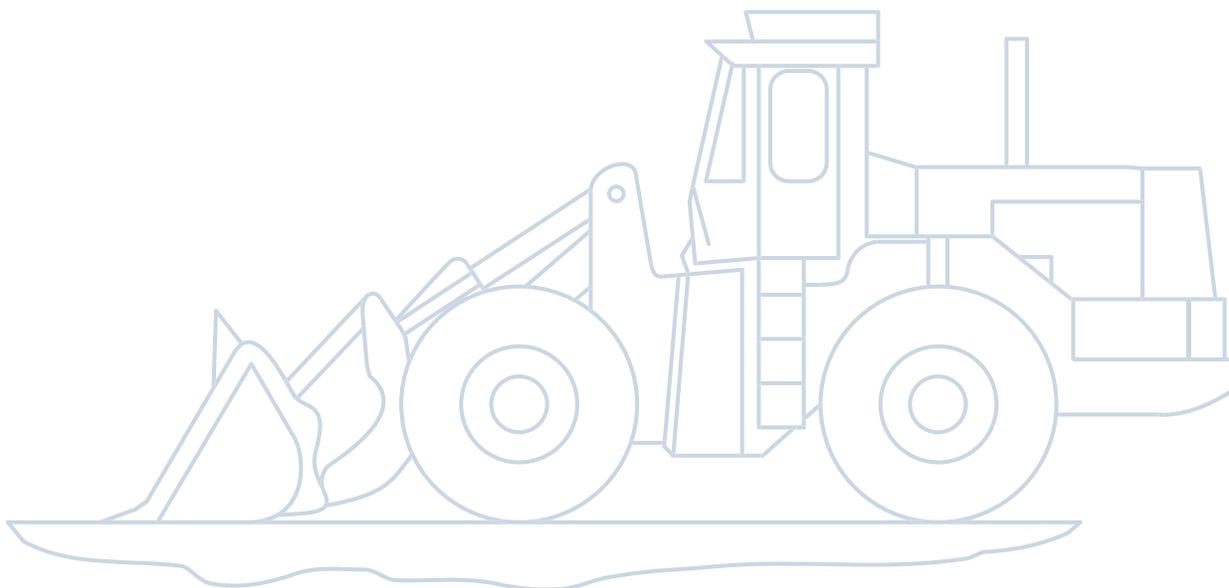
### Features

- Reduces jerking motion on medium and large articulated vehicles.
- Available on the following steering control units (Series 10, 20, 25, 40).
- Damps or stabilizes unstable systems.

### Applications—Large Articulated Vehicles

- Wheel Loaders
- Skidders
- Scrapers

Steering Control Units with  
Cylinder Damping Patent  
No. 5080135



# Steering Control Units—Series 5

## Product Description

The new Series 5 steering control units (SCU) are exciting new products designed for low flow, low pressure applications.

The Series 5 units are available in three compact designs:

### Option 1:

Square Housing (Mount) Unit with Side Ports

### Option 2:

Round Housing (Mount) Unit with Side Ports

### Option 3:

Round Housing (Mount) Unit with End Ports

In addition to the installation flexibility provided by the three options above, this new family of products has best-in-class steering feel and provides crisp centering. These units also have better efficiency (lower pressure drop) than competitive units.

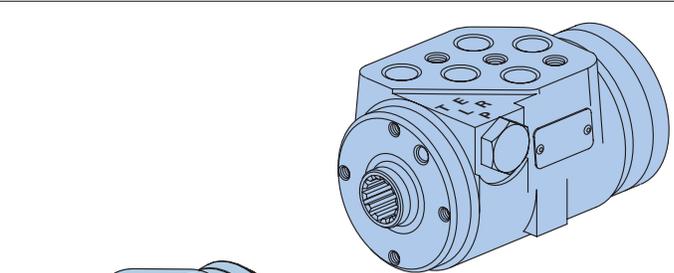
**Power Beyond Models**—Optional power beyond steering control units supply steering and flow to auxiliary valve functions. The power beyond unit is used in open center (fixed displacement pump) systems in the medium pressure range. When not steering, the power beyond unit directs all inlet flow to the excess flow port (power beyond) for use in the auxiliary circuit. Once steering is initiated, and since steering has priority, inlet flow will be diverted to the steering circuit as required. Flow out the excess flow port (power beyond) and tank port will vary or stop depending upon the steering requirement. The tank port of the steering unit has flow only when steering is operating.

## Features

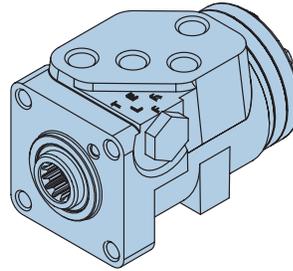
- Open Center
- Load Sensing
- Open Center Power Beyond
- Manual Steering Check Valve
- Inlet Relief Valve, Inlet Check Valve
- Integral Column

## Applications

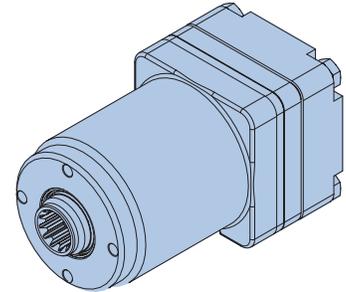
- Lawn and Garden Equipment
- Turf Equipment
- Golf Course Maintenance Equipment
- Lift Trucks
- Compact Utility Tractors



**Option 2: Round Housing with Side Ports**  
refer to Model Code, page 25



**Option 1: Square Housing with Side Ports**  
refer to Model Code, page 24



**Option 3: Round Housing with End Ports**  
refer to Model Code, page 26

## SPECIFICATIONS

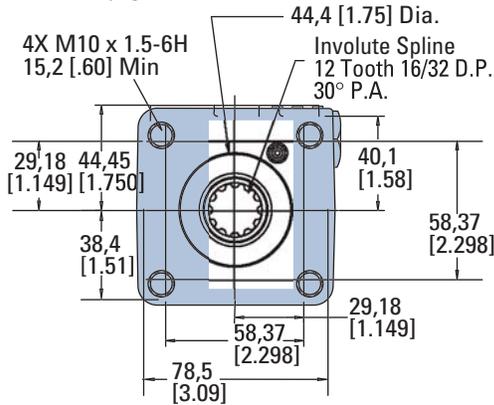
|  |  |
|--|--|
| Max. System Pressure                         | 140 bar [2030 PSI]   |
| Max. Back Pressure                           | 10 bar [ 150 PSI]  |
| Max. System Operating Temperature            | 93°C [200° F]  |
| Max. Flow                                    | 19 l/min [5 GPM]   |
| Max. Differential                            |  |
| Between Steering Unit and System Temperature | 28° C<br>50° F   |
| Input Torque                                 |  |
| Powered - Standard                           | 1,7 - 2,8 Nm @ 6,9 bar tank pressure<br>[15 - 25 lb-in @ 100 PSI tank pressure]                        |
| Low  | 1,1 - 2,0 Nm @ 6,9 bar tank pressure<br>[10 - 17.5 lb-in @ 100 PSI tank pressure]                      |
| Max. Non Powered                             | 81,4 Nm [60 lb-ft]   |
| Rotation Limits                              | None   |
| Fluid  | Petroleum Based Fluids   |
| Recommended Filtration                       | ISO 18/13 cleanliness level  |
| Check Valve for Manual Steering              | Yes  |
| Optional Relief Valve Settings               |  |
| bar [PSI]                                    | 40 [ 580]<br>50 [ 725]<br>63 [ 914]<br>70 [1015]<br>80 [1160]<br>90 [1305]<br>100 [1450]<br>125 [1812] |
| Port Options                                 | 9/16-18 SAE O-ring<br>9/16 Plug-O<br>- 06 STC<br>3/8 BSP Straight thread ports                         |

# Steering Control Units—Series 5

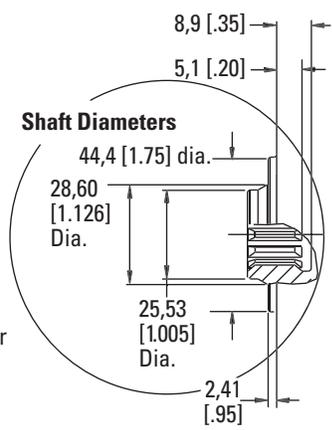
## Installation Drawing

### Option 1: Square Housing with Side Ports

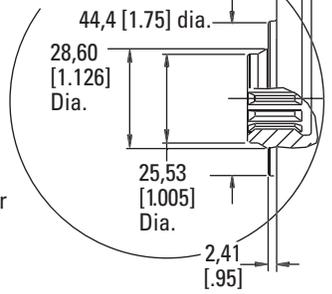
refer to Model Code, page 22



### Spline Depth

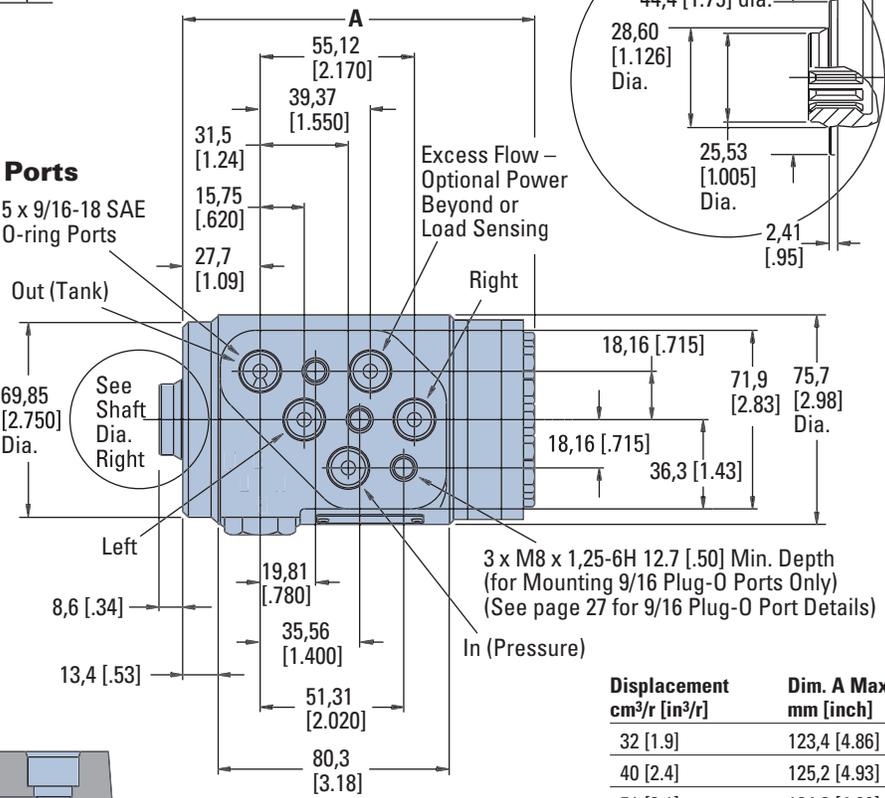
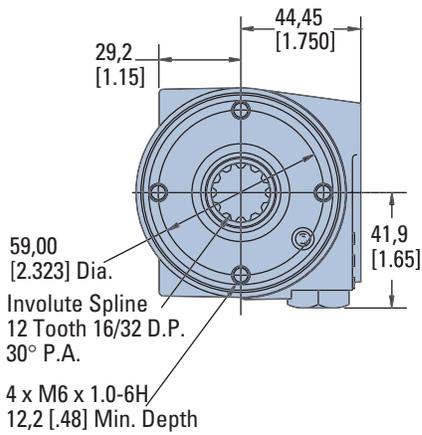


### Shaft Diameters

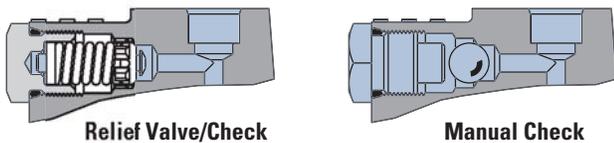


### Option 2: Round Housing with Side Ports

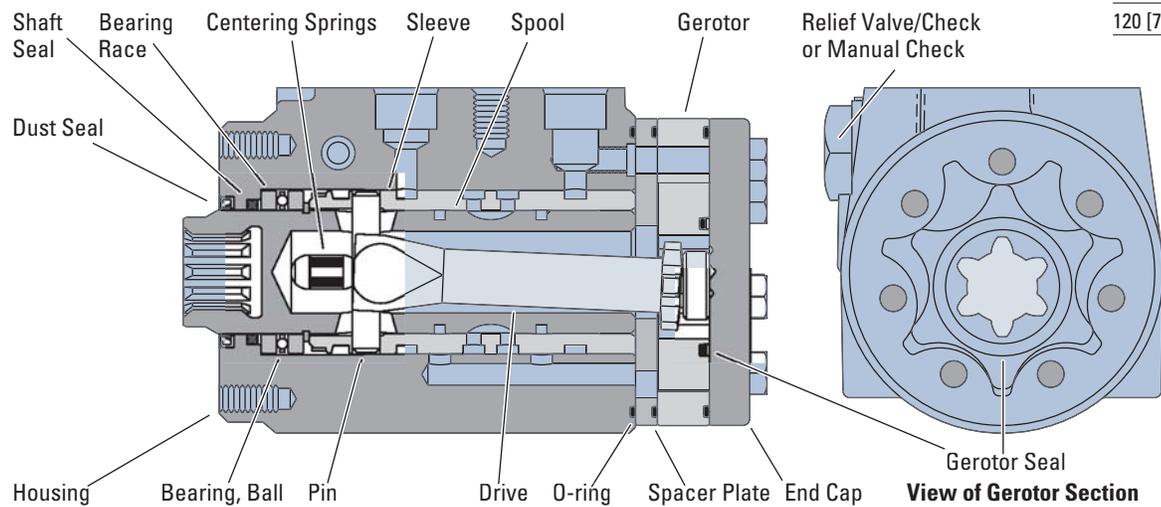
refer to Model Code, page 23



### Sectional Drawing



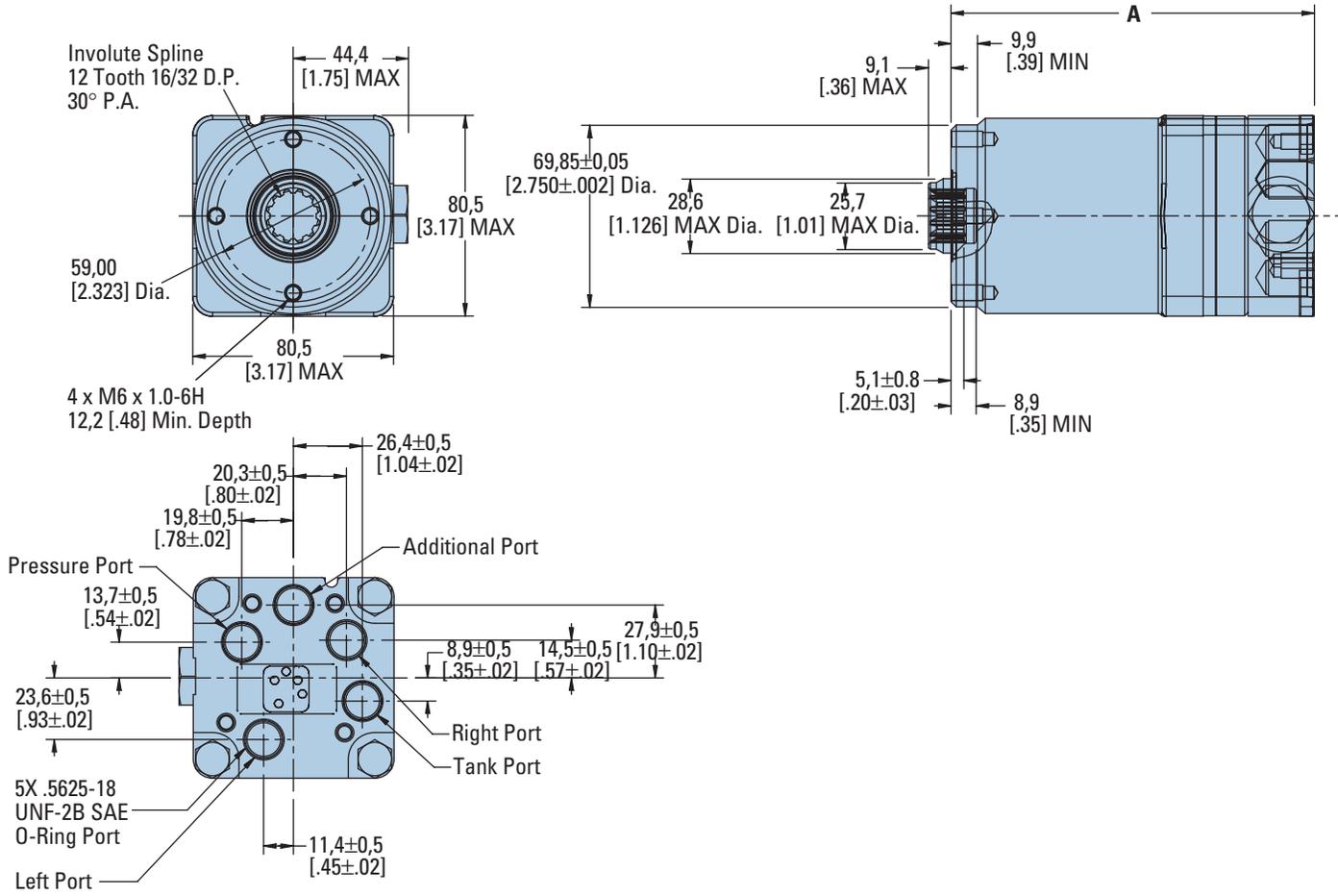
| Displacement<br>cm <sup>3</sup> /r [in <sup>3</sup> /r] | Dim. A Max.<br>mm [inch] |
|---|--------------------------|
| 32 [1.9]  | 123,4 [4.86]             |
| 40 [2.4]  | 125,2 [4.93]             |
| 51 [3.1]  | 124,2 [4.89]             |
| 63 [3.9]  | 126,2 [4.97]             |
| 74 [4.5]  | 128,0 [5.04]             |
| 100 [6.1]   | 132,3 [5.21]             |
| 120 [7.3]   | 135,4 [5.33]             |



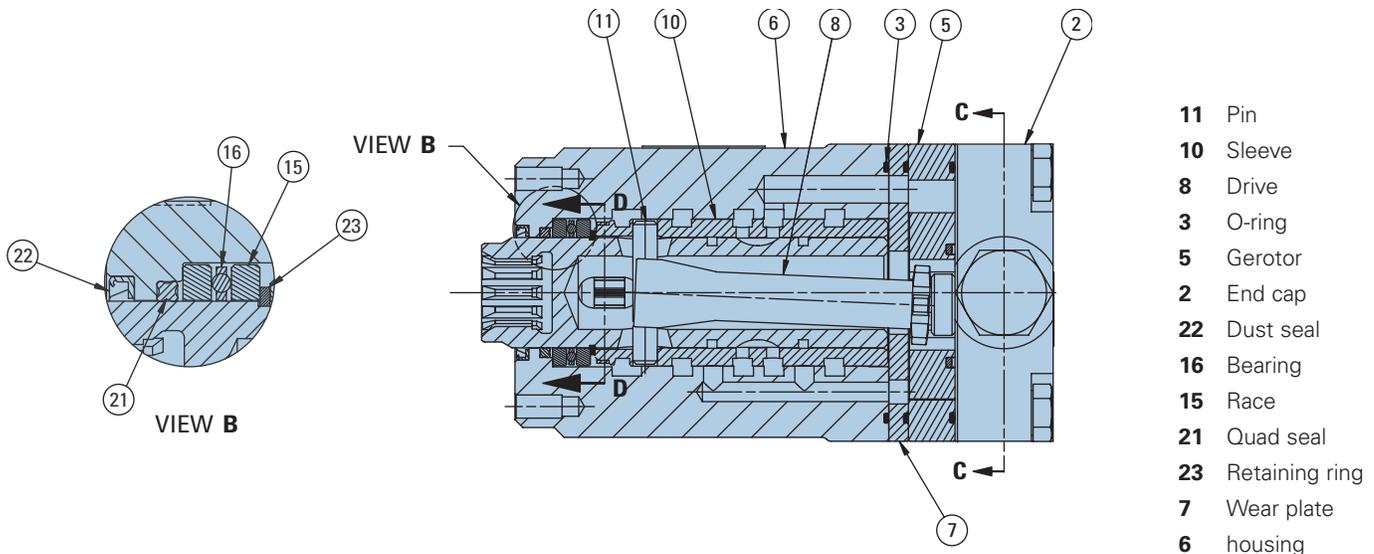
# Steering Control Units—Series 5

## Installation Drawing

### Option 3: Round Housing with End Ports



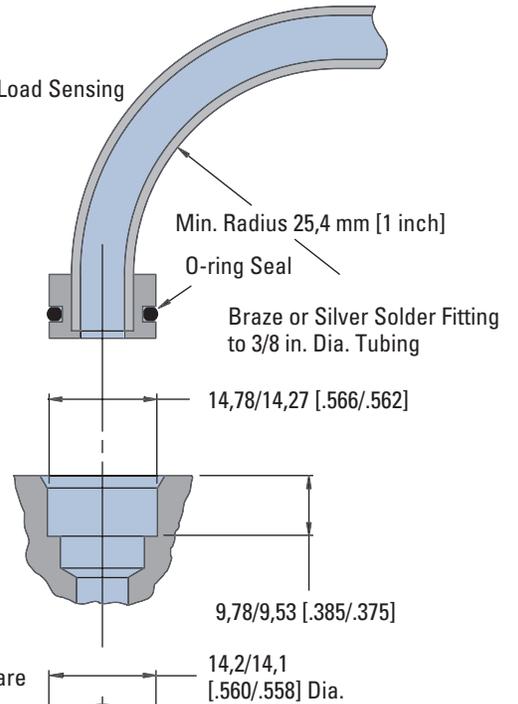
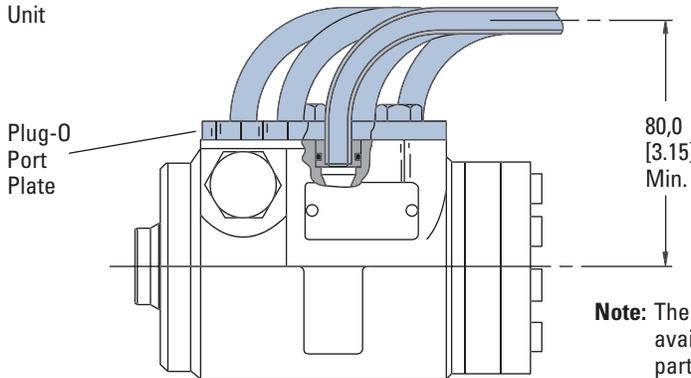
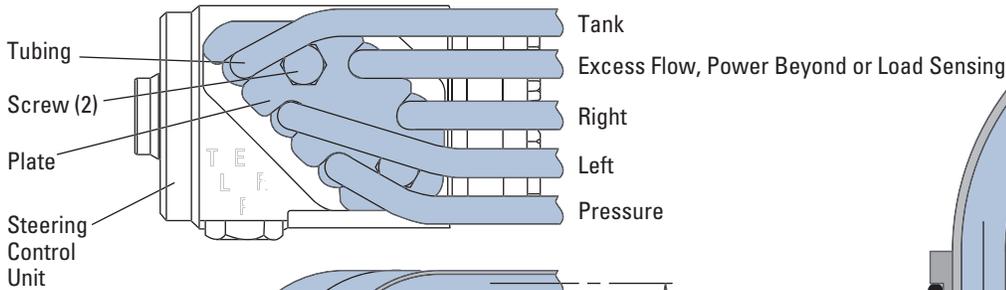
### Sectional Drawing



# Steering Control Units—Series 5

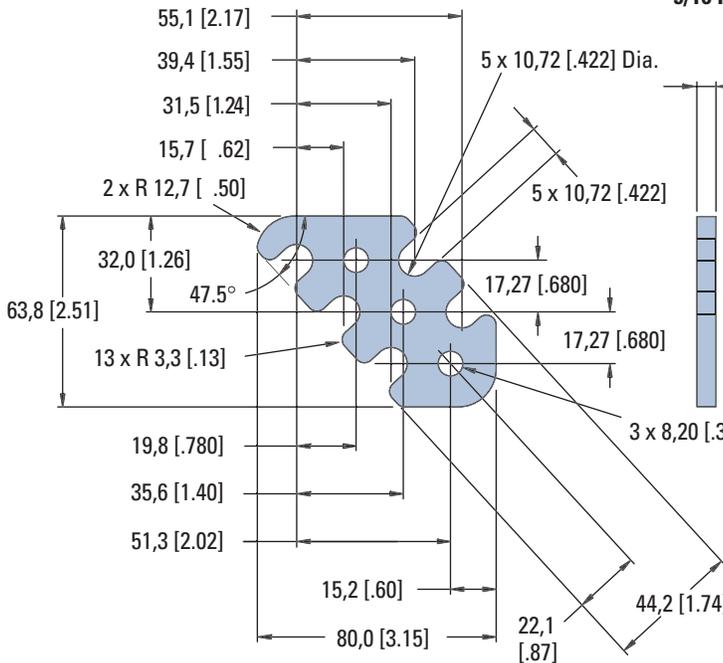
## Installation Drawing

Pertaining to Option 2: Round Housing only  
\*\*Plug-O Port rated to 103 bar [1500PSI]

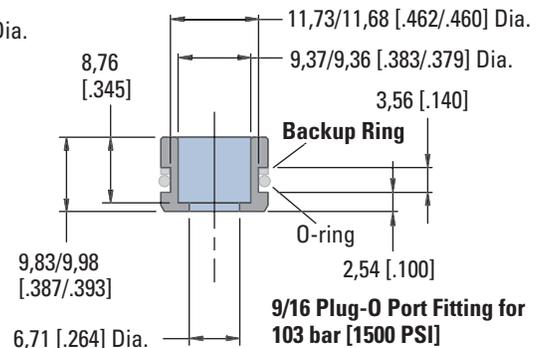
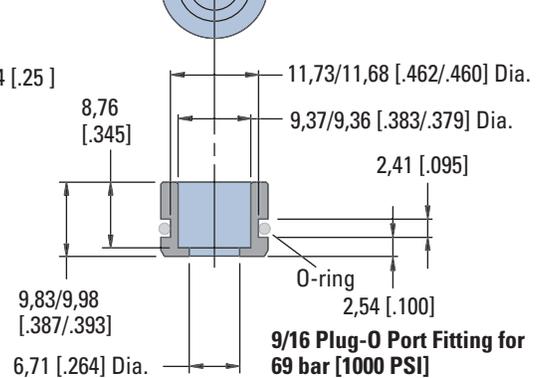


**Note:** The plug-o port plate is available from Eaton – part number **22854-000**. Other fittings and bolts are not supplied by Eaton.

### 9/16 Plug-O Port Plate



### 9/16 Plug-O Port Fitting



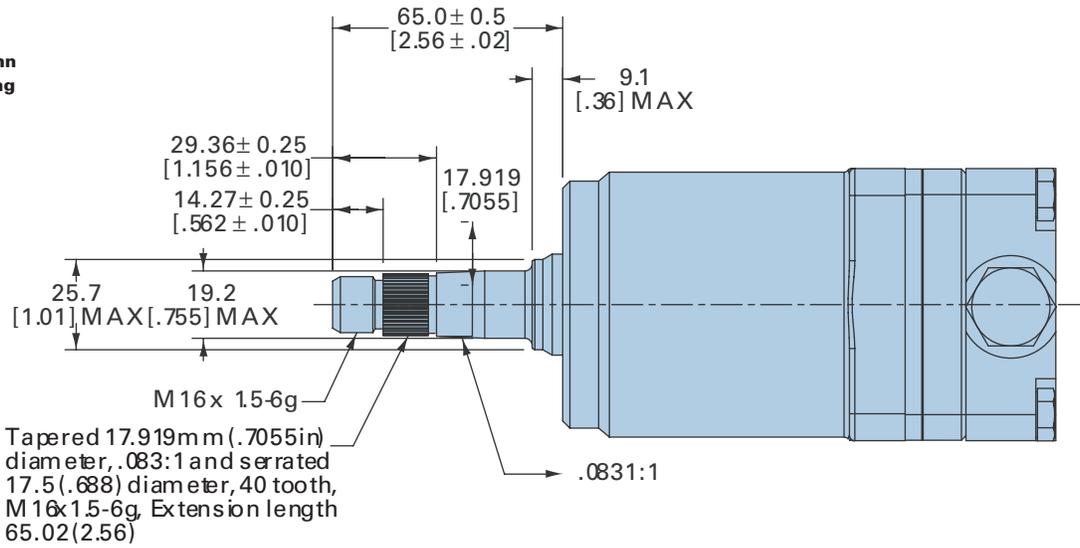
**Seal Specifications for Plug-O Fittings**  
O-rings — Buna N 90 Durometer Size -013  
Backup Ring — Solid Teflon - Scarf Cut Size -013

# Steering Control Units—Series 5

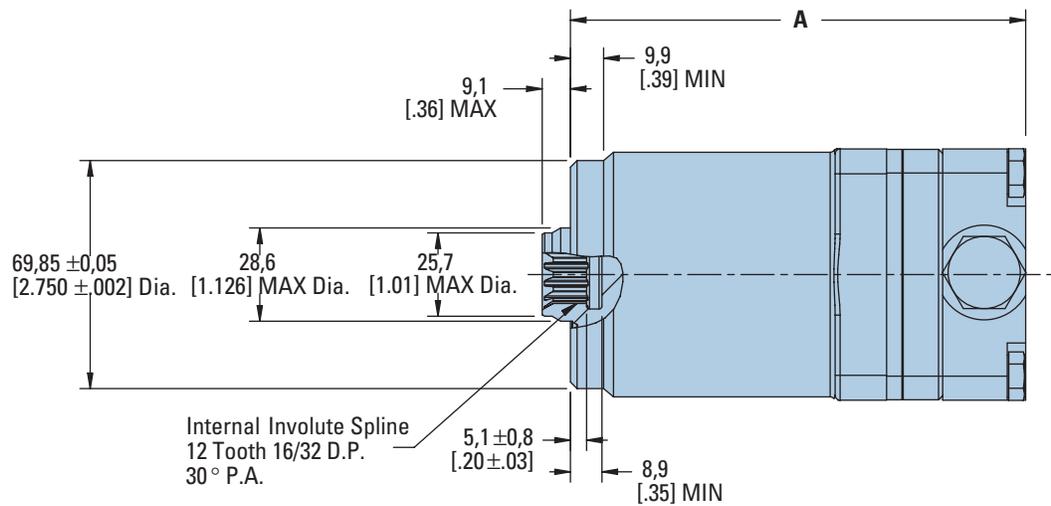
## Integral Column Option

### Integral Column Option Available in Round Housing with Side Ports, Square Housing with Side Ports, and Round Housing with End Ports

#### 40 Tooth Serrated Integral Column Option (Shown on Round Housing with End Ports)



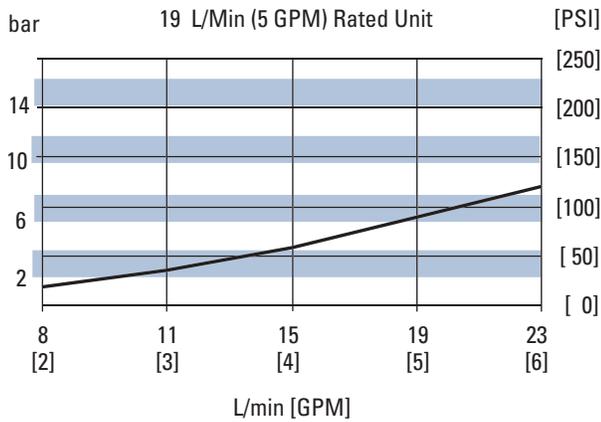
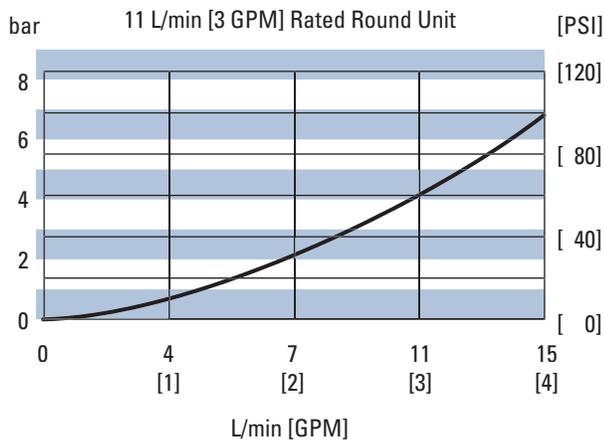
#### 12 Tooth Internal Spline Standard Mechanical Interface (Shown on Round Housing with End Ports)



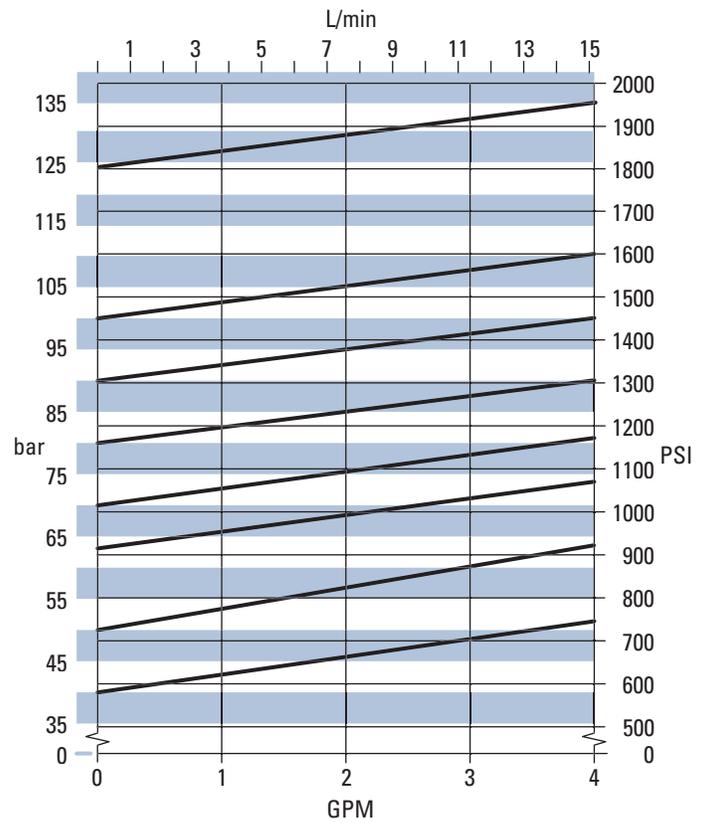
# Steering Control Units—Series 5

## Performance Data

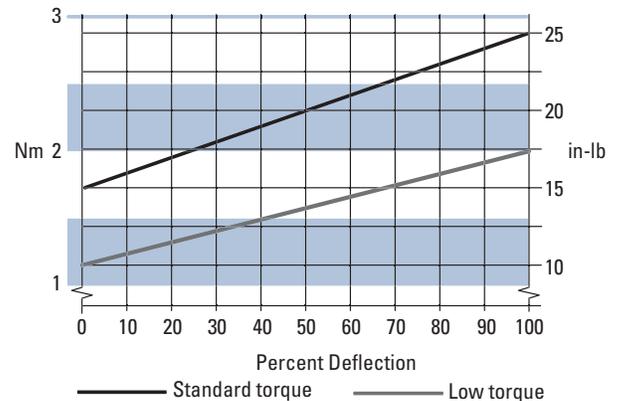
### Neutral Pressure Drop Inlet to Auxiliary



### Relief Valve Curve

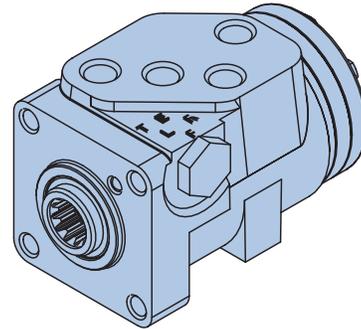


### Input Torque Curve



# Steering Control Units—Series 5

## Model Code – Ordering Information



### Square Housing with Side Ports - Option 1

The following 30-digit coding system has been developed to identify all of the configuration options for the Series 5 steering control units. Use this model code to specify a unit with the desired features. All 30-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.

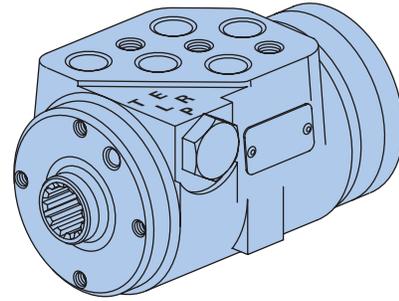
|   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |   |
|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |   |
| A | B | R |   | C | A |   |   | 0 |    | A  |    |    |    |    | 0  | 0  |    |    |    |    |    |    | A  | 0  |    |    | 1  | 0  | D  | A |

| Nos         | Feature                             | Code   | Description   | Nos         | Feature                    | Code   | Description   |
|-------------|-------------------------------------|--|---|-------------|----------------------------|--------|---|
| 1,2,3       | Product Series                      | ABR  | Series 5 Steering Control Unit  | 18,19,20,21 | Ports and Mounting Threads | UAAN   | Square 4 x -06 STC Direct Ports, M10 x 1,5 Column Mounting Threads (Use with Excess Flow)   |
| 4           | Nominal Flow Rating                 | 1<br>B   | 11 l/min [3 GPM]<br>19 l/min [5 GPM]  |             |                            | UBNN   | Square 5 x -06 STC Direct Ports, M10 x 1,5 Column Mounting Threads (Use with Excess Flow)   |
| 5           | Inlet Pressure Rating               | C  | 140 bar [2030 PSI]  |             |                            | UBPN   | Square 5 x -06 STC Direct Ports, M10 x 1,5 Column Mounting Threads (Use with Load Sense)  |
| 6           | Tank Pressure Rating                | A  | 10 bar [150 PSI]  | 22          | Input Torque               | 1<br>3 | Low*<br>Standard  |
| 7-8         | Displacement                        | 35<br>37<br>39<br>41<br>43<br>46<br>48             | 31.5 cm <sup>3</sup> /r [1.92 in <sup>3</sup> /r]<br>39.5 cm <sup>3</sup> /r [2.41 in <sup>3</sup> /r]<br>50.8 cm <sup>3</sup> /r [3.10 in <sup>3</sup> /r]<br>63.1 cm <sup>3</sup> /r [3.85 in <sup>3</sup> /r]<br>73.8 cm <sup>3</sup> /r [4.50 in <sup>3</sup> /r]<br>100 cm <sup>3</sup> /r [6.10 in <sup>3</sup> /r]<br>120 cm <sup>3</sup> /r [7.33 in <sup>3</sup> /r] | 23          | Fluid Type                 | A      | See Eaton Technical Bulletin 3-401  |
| 9           | Flow Amplification                  | 0  | None  | 24          | Special Application        | 0      | None  |
| 10          | Neutral Circuit                     | A<br>B<br>F  | Open Center<br>Open Center, Power Beyond<br>Load Sensing, Dynamic signal  | 25,26       | Special Feature            | AA     | None  |
| 11          | Load Circuit                        | A  | Non-Load Reaction   | 27          | Paint                      | 1      | Black Primer  |
| 12,13       | Valve Options                       | 01<br>05   | Manual Steering Check Valve<br>Inlet Relief Valve,<br>Manual Steering Check Valve   | 28          | Identification             | 0      | Eaton Product Number on Nameplate   |
| 14,15       | Integral Inlet Relief Valve Setting | 00<br>18<br>1J<br>1Z<br>26<br>2G<br>2T<br>34<br>3W | None<br>40 bar [580 PSI]<br>50 bar [725 PSI]<br>63 bar [914 PSI]<br>70 bar [1015 PSI]<br>80 bar [1160 PSI]<br>90 bar [1305 PSI]<br>100 bar [1450 PSI]<br>125 bar [1812 PSI]   | 29          | Mechanical Interface       | A      | Tapered 17919mm (.7055in) diameter, .083:1 and serrated 17.5 (.688) diameter, 40 tooth, M16x1.5-6g, Extension length 65.02 (2.56) |
| 16,17       | Cylinder Relief Setting             | 00   | None  | D           |                            |        | Internal involute spline 12 tooth, 16/32 DP, 30 degree PA   |
| 18,19,20,21 | Ports and Mounting Threads          | BAAN<br>BAKN<br>BAEN                               | Square 4 x 9/16 SAE Ports, M10 x 1,5 Column Mounting Threads (Use with Open Center)<br>Square 5 x 9/16 SAE Ports, M10 x 1,5 Column Mounting Threads (Use with Excess Flow)<br>Square 5 x 9/16 SAE Ports, M10 x 1,5 Column Mounting Threads (Use with Load Sense)  | 30          | Eaton Assigned Design Code | A      | Assigned Design Code  |

\* All low torque units need approval from an Eaton Steering Engineer.

# Steering Control Units—Series 5

## Model Code – Ordering Information



### Round Housing with Side Ports- Option 2

The following 30-digit coding system has been developed to identify all of the configuration options for the Series 5 steering control units. Use this model code to specify a unit with the desired features. All 30-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 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |   |
| A | B | R |   |   | A |   |   | 0 |    | A  |    |    |    |    | 0  | 0  |    |    |    |    |    | A  | 0  |    |    |    | 1  | 0  | D  | A |

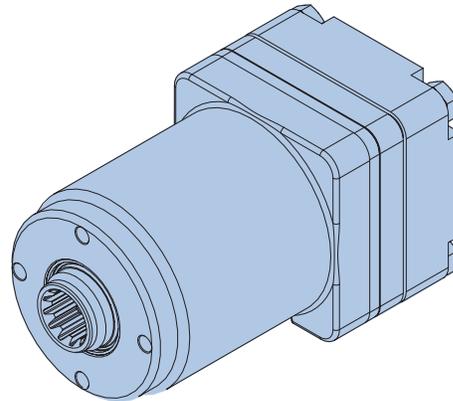
| Nos   | Feature                             | Code   | Description   | Nos         | Feature                    | Code   | Description  |
|-------|-------------------------------------|--|---|-------------|----------------------------|--------|--|
| 1,2,3 | Product Series                      | ABR  | Series 5 Steering Control Unit  | 18,19,20,21 | Ports and Mounting Threads | BAAH   | Round 4 x 9/16 SAE Ports, M6 x 1,0 Column Mounting Threads (Use with Open Center)  |
| 4     | Nominal Flow Rating                 | 1<br>B   | 11 l/min [3 GPM]<br>19 l/min [5 GPM]  |             |                            | BAKH   | Round 5 x 9/16 SAE Ports, M6 x 1,0 Column Mounting Threads (Use with Excess Flow)  |
| 5     | Inlet Pressure Rating               | 2<br>C   | 69 bar [1000 PSI]<br>140 bar [2030 PSI]   |             |                            | BAEH   | Round 5 x 9/16 SAE Ports, M6 x 1,0 Column Mounting   |
| 6     | Tank Pressure Rating                | A  | 10 bar [150 PSI]  |             |                            |        |  |
| 7-8   | Displacement                        | 35<br>37<br>39<br>41<br>43<br>46<br>48             | 31.5 cm <sup>3</sup> /r [1.92 in <sup>3</sup> /r]<br>39.5 cm <sup>3</sup> /r [2.41 in <sup>3</sup> /r]<br>50.8 cm <sup>3</sup> /r [3.10 in <sup>3</sup> /r]<br>63.1 cm <sup>3</sup> /r [3.85 in <sup>3</sup> /r]<br>73.8 cm <sup>3</sup> /r [4.50 in <sup>3</sup> /r]<br>100 cm <sup>3</sup> /r [6.10 in <sup>3</sup> /r]<br>120 cm <sup>3</sup> /r [7.33 in <sup>3</sup> /r] | 22          | Input Torque               | 1<br>3 | Low*<br>Standard   |
| 9     | Flow Amplification                  | 0  | None  | 23          | Fluid Type                 | A      | See Eaton Technical Bulletin 3-401   |
| 10    | Neutral Circuit                     | A<br>B<br>F  | Open Center<br>Open Center, Power Beyond<br>Load Sensing, Dynamic signal  | 24          | Special Application        | 0      | None   |
| 11    | Load Circuit                        | A  | Non-Load Reaction   | 25,26       | Special Feature            | AA     | None   |
| 12,13 | Valve Options                       | 01<br>05   | Manual Steering Check Valve<br>Inlet Relief Valve,<br>Manual Steering Check Valve   | 27          | Paint                      | 1      | Black Primer   |
| 14,15 | Integral Inlet Relief Valve Setting | 00<br>18<br>1J<br>1Z<br>26<br>2G<br>2T<br>34<br>3W | None<br>40 bar [580 PSI]<br>50 bar [725 PSI]<br>63 bar [914 PSI]<br>70 bar [1020 PSI]<br>80 bar [1160 PSI]<br>90 bar [1310 PSI]<br>100 bar [1450 PSI]<br>125 bar [1812 PSI]   | 28          | Identification             | 0      | Eaton Product Number on Nameplate  |
| 16,17 | Cylinder Relief Setting             | 00   | None  | 29          | Mechanical Interface       | A<br>D | Tapered 17.919mm (.7055in) diameter, .083:1 and serrated 17.5 (.688) diameter, 40 tooth, M16x1.5-6g, Extension length 65.02 (2.56) |
|       |                                     |  |   | 30          | Eaton Assigned Design Code | A      | Assigned Design Code   |

\* All low torque units need approval from an Eaton Steering Engineer.

\*\* Plug-O ports rated to 103 bar [1500PSI]

# Steering Control Units—Series 5

## Model Code – Ordering Information



### Round Housing with End Ports - Option 3

The following 30-digit coding system has been developed to identify all of the configuration options for the Series 5 steering control units. Use this model code to specify a unit with the desired features. All 30-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 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| A | B | R |   | A |   |   |   | 0 | A  |    |    |    |    |    | 0  | 0  |    |    |    |    |    | A  | 0  |    |    | 1  | 0  | D  | A  |

| Nos   | Feature                             | Code   | Description   | Nos   | Feature                    | Code   | Description   |
|-------|-------------------------------------|--|---|-------|----------------------------|--------|---|
| 1,2,3 | Product Series                      | ABR  | Series 5 Steering Control Unit  |       |                            | VAKH   | Round 5 x 9/16 SAE Ports, M6 x 1,0 Column Mounting Threads (Use with Excess Flow)   |
| 4     | Nominal Flow Rating                 | 1<br>B   | 11 l/min [3 GPM]<br>19 l/min [5 GPM]  |       |                            | VAEH   | Round 5 x 9/16 SAE Ports, M6 x 1,0 Column Mounting  |
| 5     | Inlet Pressure Rating               | C  | 140 bar [2030 PSI]  |       |                            | WAAH   | Round 4 x -06 STC Direct Ports, M6 x 1,0 Column Mounting Threads (Use with Open Center)   |
| 6     | Tank Pressure Rating                | A  | 10 bar [150 PSI]  |       |                            | WBNH   | Round 5 x -06 STC Direct Ports, M6 x 1,0 Column Mounting Threads (Use with Excess Flow)   |
| 7-8   | Displacement                        | 35<br>37<br>39<br>41<br>43<br>46<br>48                   | 31.5 cm <sup>3</sup> /r [1.92 in <sup>3</sup> /r]<br>39.5 cm <sup>3</sup> /r [2.41 in <sup>3</sup> /r]<br>50.8 cm <sup>3</sup> /r [3.10 in <sup>3</sup> /r]<br>63.1 cm <sup>3</sup> /r [3.85 in <sup>3</sup> /r]<br>73.8 cm <sup>3</sup> /r [4.50 in <sup>3</sup> /r]<br>100 cm <sup>3</sup> /r [6.10 in <sup>3</sup> /r]<br>120 cm <sup>3</sup> /r [7.33 in <sup>3</sup> /r] |       |                            | WBPH   | Round 5 x -06 STC Direct Ports, M6 x 1,0 Column Mounting Threads (Use with Load Sense)  |
| 9     | Flow Amplification                  | 0  | None  | 22    | Input Torque               | 1<br>3 | Low*<br>Standard  |
| 10    | Neutral Circuit                     | A<br>B<br>C<br>F   | Open Center<br>Open Center, Power Beyond<br>Closed Center<br>Load Sensing, Dynamic signal   | 23    | Fluid Type                 | A      | See Eaton Technical Bulletin 3-401  |
| 11    | Load Circuit                        | A  | Non-Load Reaction   | 24    | Special Application        | 0      | None  |
| 12,13 | Valve Options                       | 01<br>05   | Manual Steering Check Valve<br>Inlet Relief Valve,<br>Manual Steering Check Valve   | 25,26 | Special Feature            | AA     | None  |
| 14,15 | Integral Inlet Relief Valve Setting | 00<br>18<br>1J<br>1Z<br>26<br>2G<br>2T<br>34<br>3W<br>4C | None<br>40 bar [580 PSI]<br>50 bar [725 PSI]<br>63 bar [914 PSI]<br>70 bar [1020 PSI]<br>80 bar [1160 PSI]<br>90 bar [1310 PSI]<br>100 bar [1450 PSI]<br>125 bar [1812 PSI]<br>140 Bar [2030 PSI]   | 27    | Paint                      | 1      | Black Primer  |
| 16,17 | Cylinder Relief Setting             | 00   | None  | 28    | Identification             | 0      | Eaton Product Number on Nameplate   |
|       |                                     |  |   | 29    | Mechanical Interface       | A<br>D | Tapered 17.919mm (.7055in) diameter, .083:1 and serrated 17.5 (.688) diameter, 40 tooth, M16x1.5-6g, Extension length 65.02 (2.56)<br>Internal involute spline 12 tooth, 16/32 DP, 30 degree PA |
|       |                                     |  |   | 30    | Eaton Assigned Design Code | A      | Assigned Design Code  |

18,19,20,21 Ports and Mounting Threads VAAH Round 4 x 9/16 SAE Ports, M6 x 1,0 Column Mounting Threads (Use with Open Center)

\* All low torque units need approval from an Eaton Steering Engineer

\*\* Plug-0 ports rated to 103 bar [1500PSI]

# Steering Control Units—Series 10

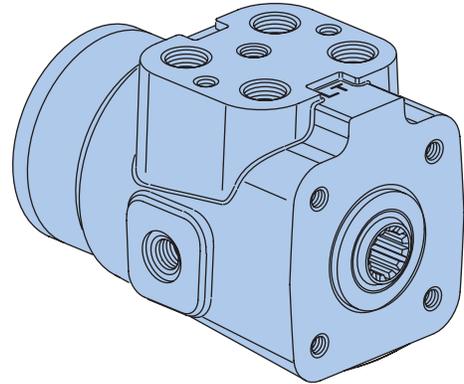
## Product Description and Features

Eaton's new Series 10 Steering Control Unit (SCU) facilitates hydraulic fluid flow like no other unit on the market.

The new Series 10 SCU has an unprecedented, continuous pressure rating of 275 bar (4000 psi), making it ideal for heavy-duty equipment, such as construction and agricultural machinery.

Its **high-pressure rating** reduces overall equipment costs, since smaller cylinder sizes can be assigned into the system.

The new Series 10 incorporates proven Eaton technologies. An internal, balanced architecture and a wide-walled sleeve that is 40% thicker than standard designs offer **increased performance** during transient pressure conditions.



### PORT SIZES:

|                             |                             |
|-----------------------------|-----------------------------|
| Work Ports (4)              | Load Sense (LS) Port (1)*   |
| 3/4-16 (SAE)                | 7/16-20                     |
| M18 x 1,5 - 6H              | M12 x 1,5 - 6H              |
| G 1/2 (BSP) Straight Thread | G 1/4 (BSP) Straight Thread |
| STC Dash 08**               | STC Dash 06**               |

\*Top or side when applicable

\*\*STC® Ports, Aeroquip patented, feature snap to connect technology

### Features

- Open Center
- Closed Center
- Load Sensing
- Integral Valves
- Q-Amp
- Bolt on Priority Valve

### SPECIFICATIONS

|  |  |
|--|--|
| Max. System Pressure   | 275 bar [4000 PSI]   |
| Max. Back Pressure   | 21 bar [305 PSI]   |
| Rated Flow   |  |
| – Low  | 7,6 - 15 l/min [ 2 - 4 GPM]  |
| – Medium   | 15 - 30 l/min [ 4 - 8 GPM]   |
| – High   | 30 - 61 l/min [ 8 - 16 GPM]  |
| – Low (with Q-Amp)   | 8 - 19 l/min [ 2 - 5 GPM]  |
| – Medium (with Q-Amp)  | 19 - 38 l/min [ 5 - 10 GPM]  |
| – High (with Q-Amp)  | 38 - 76 l/min [10 - 20 GPM]  |
| Max. System Operating Temperature                              | 93°C [200° F]  |
| Max. Differential Between Steering Unit and System Temperature | 28° C [50° F]  |
| Input Torque Powered   | 1,1-2,8 Nm @ 6,9 bar back pressure [10-25 lb-in @ 100 PSI back pressure] |
| Non-Powered  | 136 Nm [100 lb-ft]   |
| Fluid  | See Eaton Technical Bulletin 3-401                                       |
| Recommended Filtration   | ISO 18/13 cleanliness level  |

# Steering Control Units—Series 10

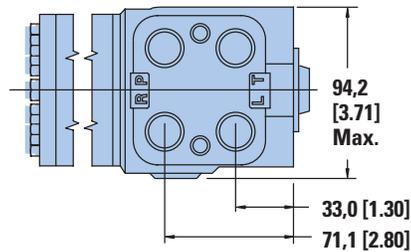
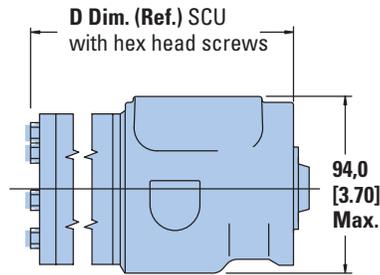
Comparison to Series 3, 6, 12, 110, 230, 450

## Features and Benefits

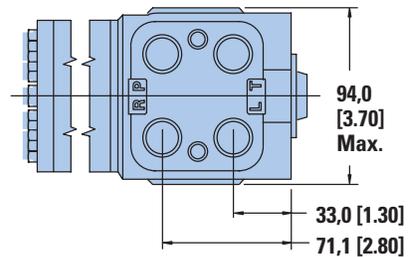
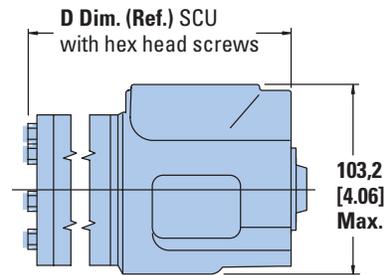
- Robust design with **balanced architecture** is based on existing and proven technology of our current Series 5, Series 20, and Series 25 steering control units (SCU).
- Only Steering Control Unit in the market capable of **275 bar [4000 PSI] continuous pressure rating**.
- Physically and functionally interchangeable to our 3, 6, 12, 110, 230, and 450 units.

## Dimensional Data

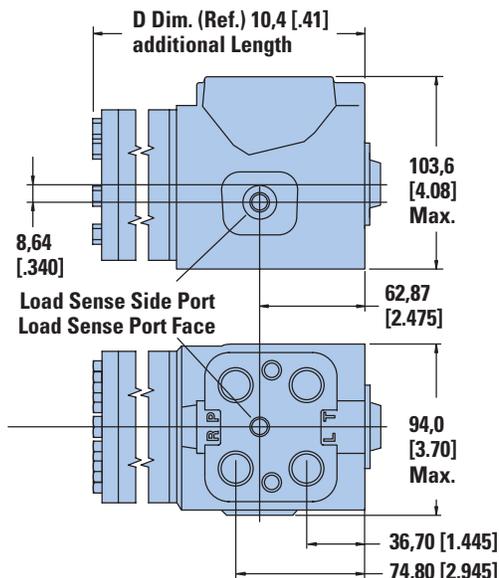
- Column interface is identical.
- Port pattern is identical.
- Load sense hole location on port face has been standardized to one location (see below).
- On Series 10 units, the overall length is increased by approximately 12 mm [0.5 inch].



**Series 3, 6, 12**



**Series 110, 230, 450**



**New Series 10**

# Steering Control Units—Series 10

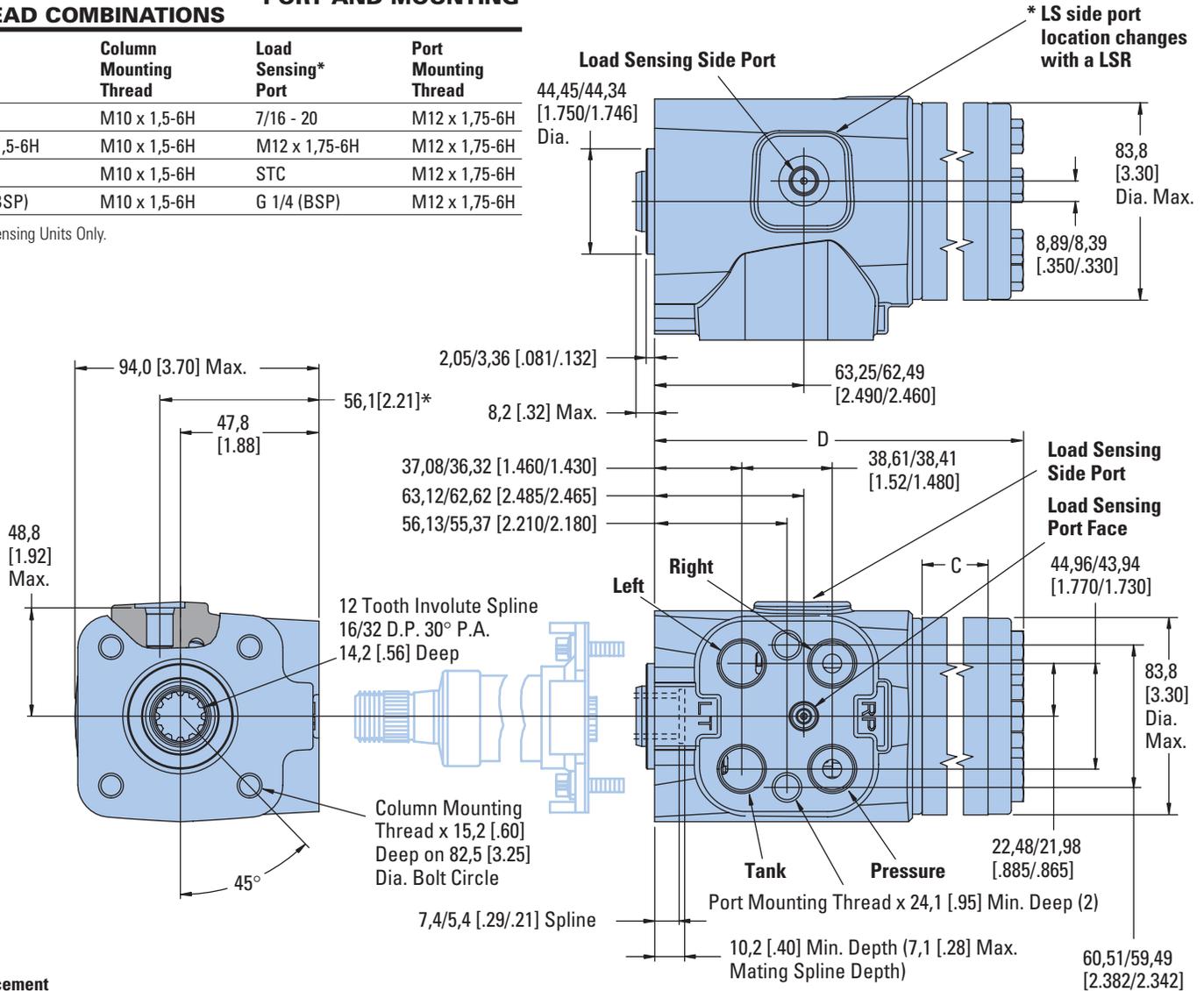
## Installation Drawing

### THREAD COMBINATIONS

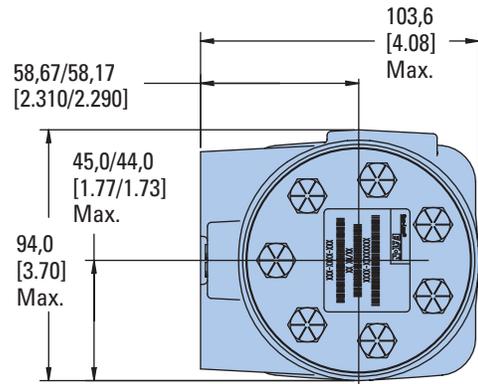
| Port         | Column Mounting Thread | Load Sensing* Port | Port Mounting Thread |
|--------------|------------------------|--------------------|----------------------|
| 3/4 -16      | M10 x 1,5-6H           | 7/16 - 20          | M12 x 1,75-6H        |
| M18 x 1,5-6H | M10 x 1,5-6H           | M12 x 1,75-6H      | M12 x 1,75-6H        |
| STC          | M10 x 1,5-6H           | STC                | M12 x 1,75-6H        |
| G 1/2 (BSP)  | M10 x 1,5-6H           | G 1/4 (BSP)        | M12 x 1,75-6H        |

\*Load Sensing Units Only.

### PORT AND MOUNTING

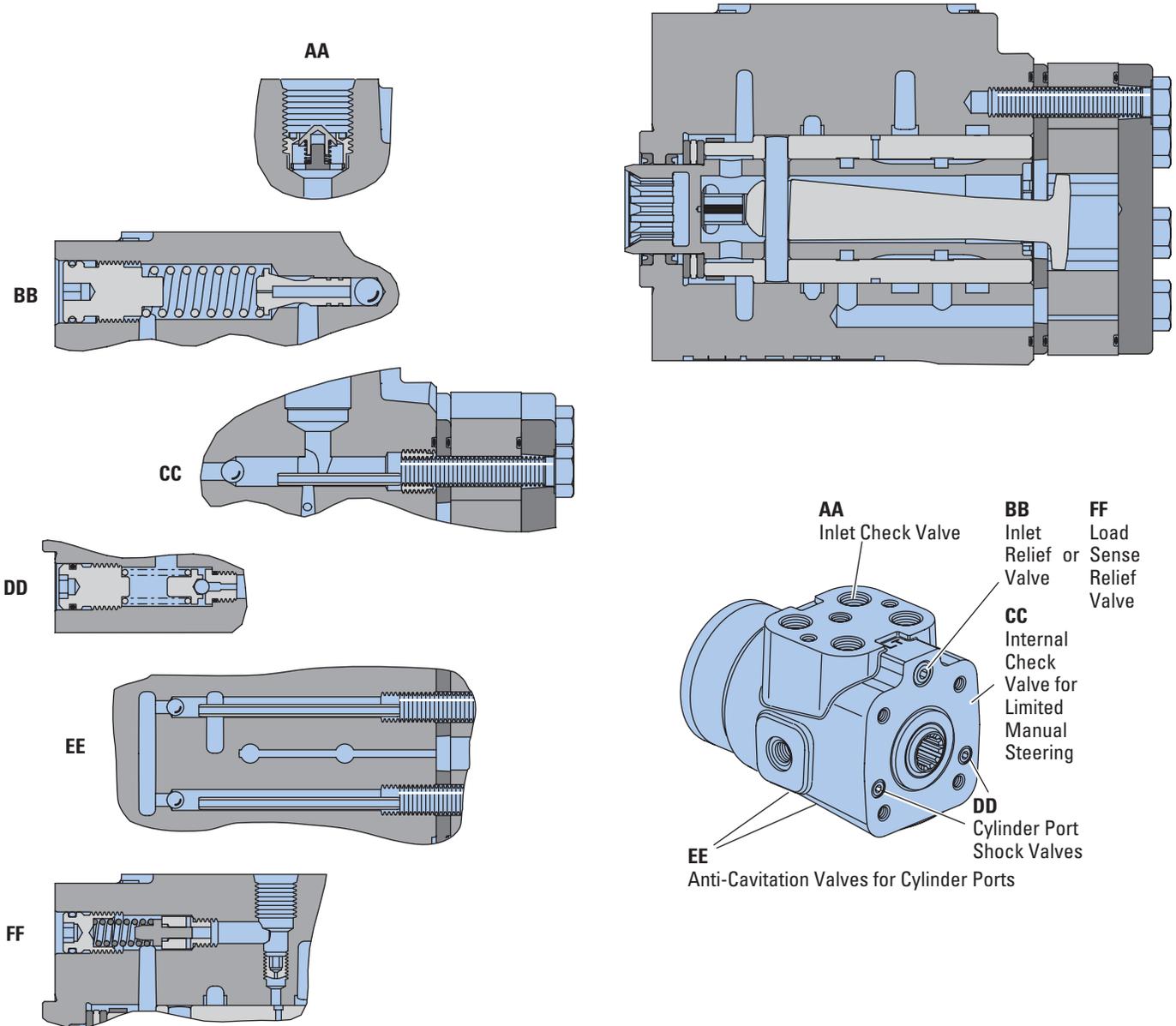


| Displacement<br>cm <sup>3</sup> /r<br>[in <sup>3</sup> /r] | Dimension C<br>mm [in.] | Dimension D<br>mm [in.] |
|--|-------------------------|-------------------------|
| 60 [ 3.6]  | 10,2 [ .40]             | 138,1 [5.44]            |
| 75 [ 4.5]  | 10,2 [ .40]             | 138,1 [5.44]            |
| 95 [ 5.9]  | 13,2 [ .52]             | 141,1 [5.56]            |
| 120 [ 7.3]   | 16,5 [ .65]             | 144,4 [5.69]            |
| 146 [ 8.9]   | 20,1 [ .79]             | 148,0 [5.83]            |
| 159 [ 9.7]   | 21,8 [ .86]             | 149,9 [5.90]            |
| 185 [11.3]   | 25,4 [1.00]             | 153,3 [6.04]            |
| 231 [14.1]   | 31,7 [1.25]             | 159,7 [6.29]            |
| 293 [17.9]   | 40,4 [1.59]             | 168,3 [6.63]            |
| 370 [22.6]   | 50,8 [2.00]             | 178,7 [7.04]            |
| 462 [28.2]   | 63,5 [2.50]             | 191,4 [7.54]            |
| 588 [35.9]   | 80,8 [3.18]             | 208,8 [8.22]            |
| 739 [45.1]   | 101,6 [4.00]            | 229,6 [9.04]            |



# Steering Control Units—Series 10

## Sectional Drawing and Integral Valves

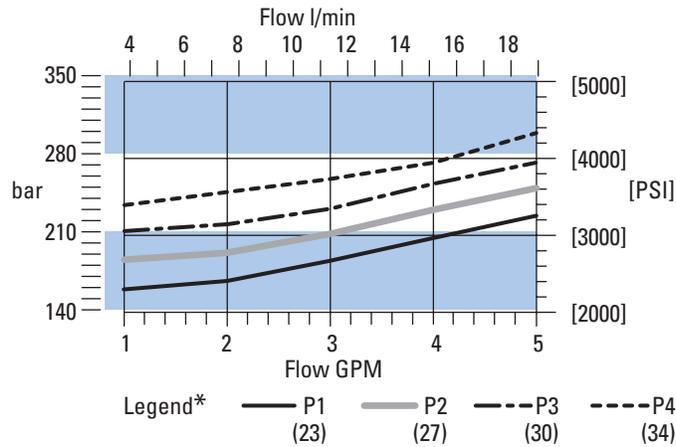


# Steering Control Units—Series 10

## Performance Data

### Cylinder Relief Valve

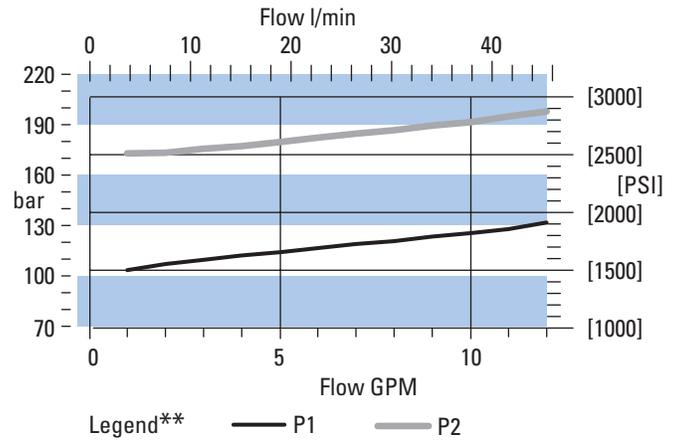
Pressure Drop versus Flow



\*The examples above are 4 of 27 pressure settings shown in model code page 11 [Position 19, 20](#)

### Inlet Relief Valve

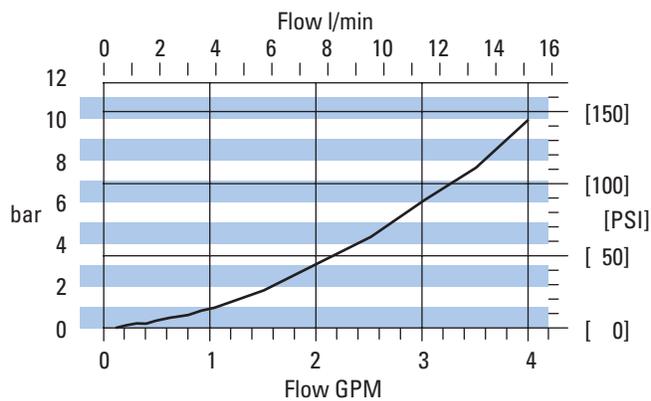
Pressure Drop versus Flow



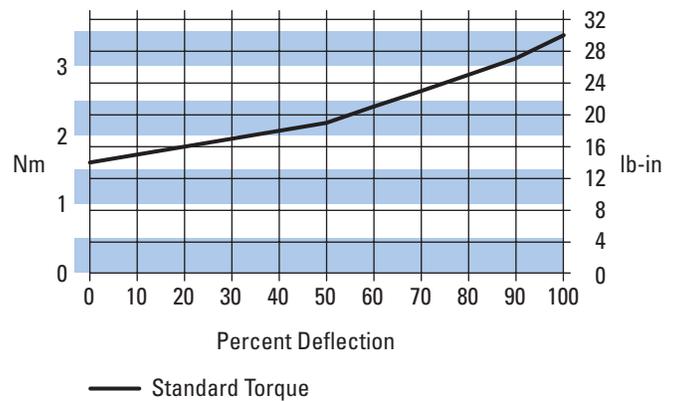
\*\*The examples above are 2 of 24 pressure settings shown in model code page 10 [Position 17, 18](#)

### Anti-Cavitation Valve

Pressure Drop versus Flow



### Input Torque

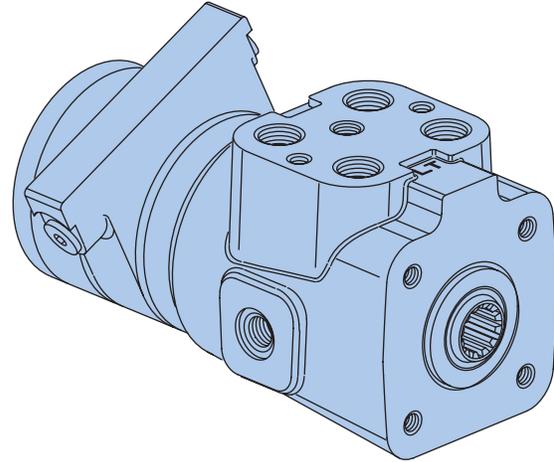


# Steering Control Units— Series 10 Dual Displacement

## Product Description and Features

The dual displacement steering control unit allows manufacturers of off road vehicles to retain manual steering capabilities while reducing the number of components in their system. By using two displacements in one unit we offer a better solution to manually steer a vehicle in an unpowered mode without the need of a back-up power system—resulting in a more economical machine.

The dual displacement steering unit uses two gerotors and a pressure controlled logic valve. The logic valve switches between two displacements, one displacement for manual steering and the total of both displacements for powered operation. The logic valve is spring returned to the smaller manual displacement when inlet pressure falls below 8 bar [120 psi]. Above 8 bar [120 psi] the logic valve connects both gerotors to provide full powered displacement.



### Manual steering capabilities in unpowered mode

- Eliminates the need of a back-up emergency system.
- Engages the small displacement in an unpowered mode and allows manual steering.
- Allows vehicles to meet ISO/TUV road regulations without the need of the currently used emergency system.

### Performance in powered mode

- Both gerotors are engaged to steer the vehicle.
- Same performance as other Char-Lynn steering units.

### Additional Features

- Steering circuit: Load Sensing Dynamic Signal.
- Max. system pressure: 275 bar [4000 psi].
- Valve options and other features: same as those available on Series 10 (single displacement) units.

### DISPLACEMENT CHART:

| Gerotor 1<br>Manual displ. | Gerotor 1 and 2<br>Powered displ. | Gerotor 1<br>Manual displ. | Gerotor 1 and 2<br>Powered displ. |
|----------------------------|-----------------------------------|----------------------------|-----------------------------------|
| in <sup>3</sup> /rev       | in <sup>3</sup> /rev              | cm <sup>3</sup> /rev       | cm <sup>3</sup> /rev              |
| 3.6                        | 9.5                               | 60                         | 156                               |
| 3.6                        | 10.9                              | 60                         | 179                               |
| 3.6                        | 12.5                              | 60                         | 205                               |
| 3.6                        | 13.3                              | 60                         | 218                               |
| 3.6                        | 14.9                              | 60                         | 244                               |

For any other displacement please see your Eaton Representative.

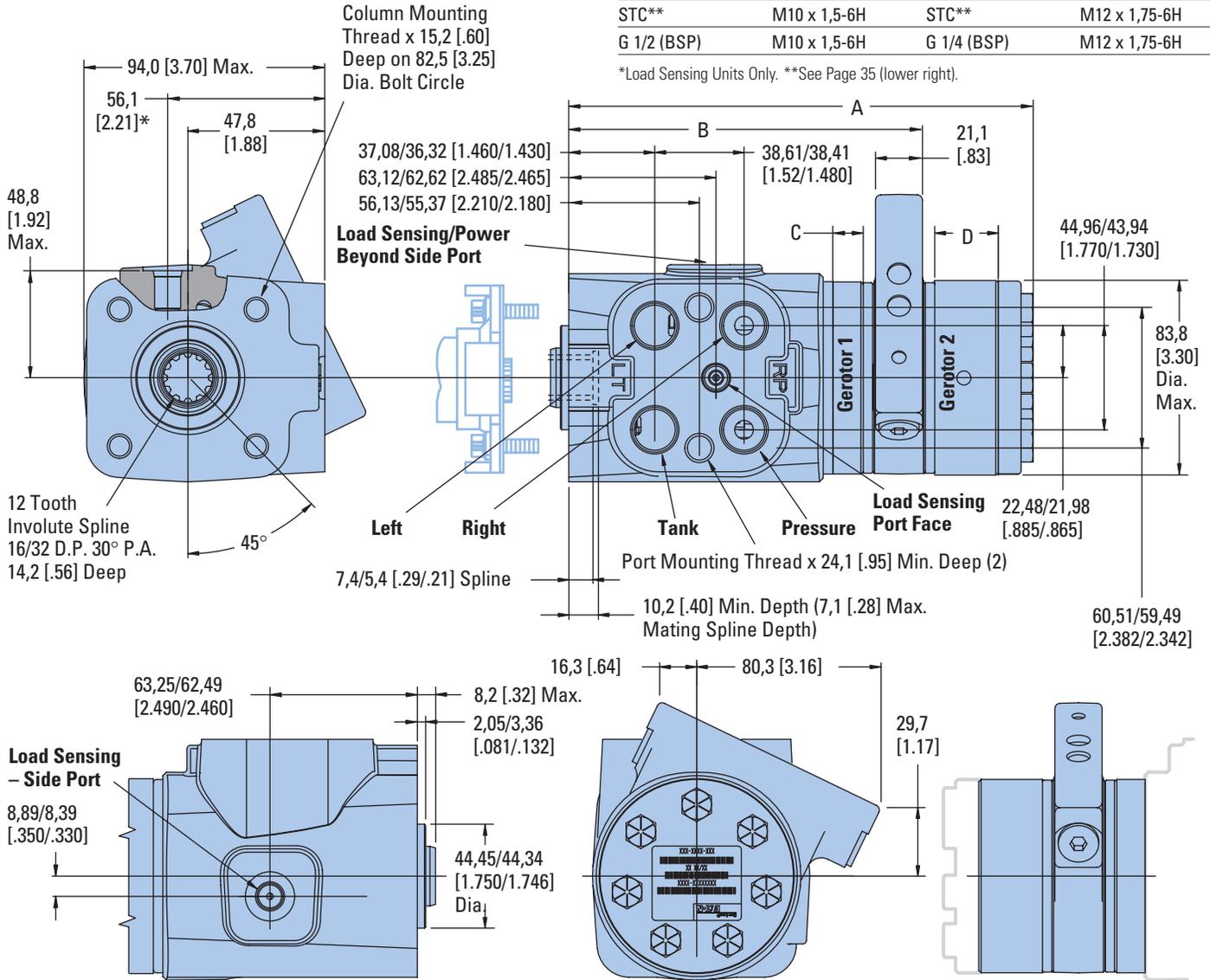
# Steering Control Units— Series 10 Dual Displacement

## Installation Drawing

### PORT AND MOUNTING THREAD COMBINATIONS

| Port         | Column Mounting Thread | Load Sensing* Port | Port Mounting Thread |
|--------------|------------------------|--------------------|----------------------|
| 3/4 -16      | M10 x 1,5-6H           | 7/16 - 20          | M12 x 1,75-6H        |
| M18 x 1,5-6H | M10 x 1,5-6H           | M12 x 1,75-6H      | M12 x 1,75-6H        |
| STC**        | M10 x 1,5-6H           | STC**              | M12 x 1,75-6H        |
| G 1/2 (BSP)  | M10 x 1,5-6H           | G 1/4 (BSP)        | M12 x 1,75-6H        |

\*Load Sensing Units Only. \*\*See Page 35 (lower right).

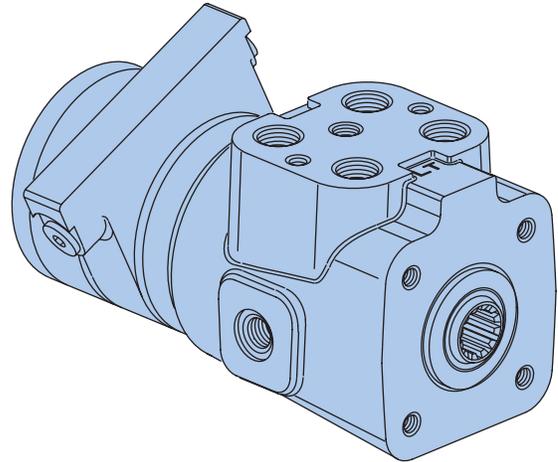
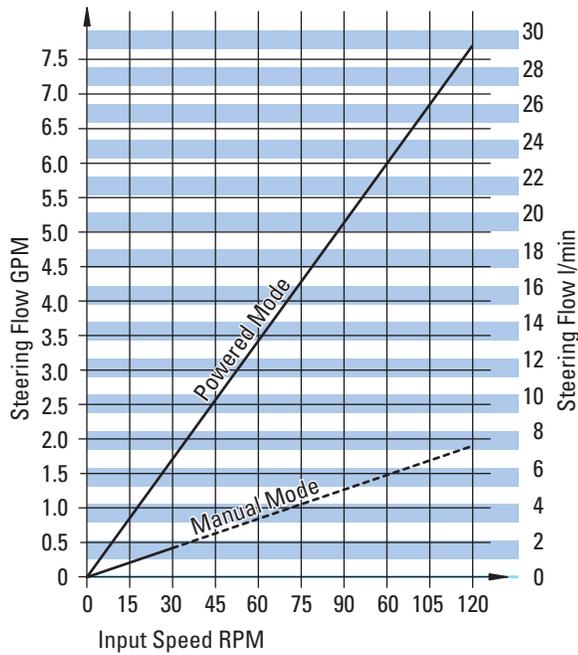


| Powered Displacement<br>cm <sup>3</sup> /r [in <sup>3</sup> /r]<br><b>Gerotor 1 and 2</b> | Dimension B<br>mm [in.] | Dimension A<br>mm [in.] | Manual Displacement<br>cm <sup>3</sup> /r [in <sup>3</sup> /r]<br><b>Gerotor 1</b> | Dimension C<br>mm [in.] | Displacement<br>cm <sup>3</sup> /r [in <sup>3</sup> /r]<br><b>Gerotor 2</b> | Dimension D<br>mm [in.] |
|---|-------------------------|-------------------------|--|-------------------------|---|-------------------------|
| 156 [ 9.5]  | 146,5 [5.77]            | 182,9 [7.20]            | 60 [ 3.6]  | 10,2 [ .40]             | 95 [ 5.9]   | 13,2 [ .52]             |
| 179 [10.9]  | 146,5 [5.77]            | 186,2 [7.33]            | 60 [ 3.6]  | 10,2 [ .40]             | 120 [ 7.3]  | 16,5 [ .65]             |
| 205 [12.5]  | 146,5 [5.77]            | 189,7 [7.47]            | 60 [ 3.6]  | 10,2 [ .40]             | 145 [ 8.9]  | 20,0 [ .79]             |
| 218 [13.3]  | 146,5 [5.77]            | 191,5 [7.54]            | 60 [ 3.6]  | 10,2 [ .40]             | 160 [ 9.7]  | 21,8 [ .86]             |
| 244 [14.9]  | 146,5 [5.77]            | 195,1 [7.68]            | 60 [ 3.6]  | 10,2 [ .40]             | 185 [11.3]  | 25,4 [1.00]             |

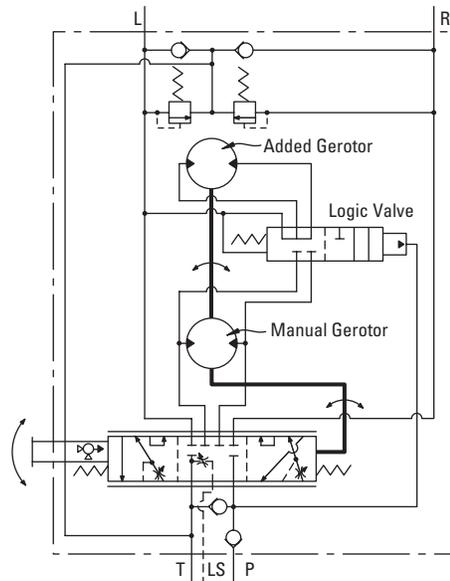
# Steering Control Units—Series 10—Dual Displacement

Performance Data  
(Example)

Manual 60 cm<sup>3</sup>/r [3.6 in<sup>3</sup>/r]  
Powered 244 cm<sup>3</sup>/r [14.9 in<sup>3</sup>/r]



Flow vs RPM (for each operating mode)



# Steering Control Units—Series 10

## Model Code— Ordering Information

The following 32-digit coding system has been developed to identify all of the configuration options for the Series 10 steering control units. Use this model code to specify a unit with the desired features. All 32-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 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 |
| A | D | R |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    | A  |    | A  | A  |    | A  | A  | A  | 1  | 0  | A  |

| Nos   | Feature  | Code | Description   | Nos   | Feature                           | Code | Description                                   |
|-------|--|------|---|-------|-----------------------------------|------|---|
| 1,2,3 | Product Series   | ADR  | Series 10 Steering Control Unit                     | 10    | Flow Amplification**              | A    | None (No Q-Amp)                               |
| 4     | Unit Type  | A    | Standard  |       |                                   | B    | 1.6 : 1.0 Ratio†                              |
|       |  | B    | Dual Displacement                                   |       |                                   | C    | 1.6 : 1.0 Ratio (with Manual Steering)†       |
| 5     | Nominal Flow Rating  | 1    | 11 l/min [3 GPM] (Open Center)                      |       |                                   | E    | 2.0 : 1.0 Ratio (with Manual Steering)†       |
|       |  | 2    | 23 l/min [6 GPM] (Closed Center and LS)             |       |                                   | G    | 1.3 : 1.0 Ratio (with Manual Steering)†       |
|       |  | 3    | 45 l/min [12 GPM] (OC, CC, and LS)                  |       |                                   |      | †Use with closed center or load sensing only. |
|       |  | 4    | 19 l/min [5 GPM] (Q-Amp)                            | 11    | Neutral Circuit                   | A    | Open Center                                   |
|       |  | 5    | 38 l/min [10 GPM] (Q-Amp)                           |       |                                   | C    | Closed Center                                 |
|       |  | 6    | 76 l/min [20 GPM] (Q-Amp)                           | 12    | Load Circuit                      | D    | Load Sensing, Static Signal                   |
|       |  | 7    | 23 l/min [6 GPM] (Open Center)                      |       |                                   | E    | Load Sensing, Dynamic Signal                  |
| 6     | Inlet Pressure Rating  | 1    | 276 bar [4000 PSI]—(Load sensing and closed center) | 13,14 | Special Spool/Sleeve Modification | 00   | None  |
|       |  | 2    | 207 bar [3000 PSI]—(Open center)                    | 15,16 | Valve Options                     |      |   |
| 7     | Return Pressure Rating   | A    | 21 bar [305 PSI] Max.—(standard rating*)            |       | Manual Steering Check             |      |   |
|       |  | B    | 10 bar [145 PSI] Max.                               | 01    | •                                 |      |   |
| 8-9   | Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r] — Dual Displacement Combined/Manual | 03   | 244 [14.9] / 60 [3.6]                               | 02    | •                                 | •    |   |
|       |  | 04   | 177 [10.9] / 60 [3.6]                               | 03    | •                                 |      | •   |
|       |  | 05   | 218 [13.3] / 60 [3.6]                               | 04    | •                                 | •    | •   |
| 8-9   | Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]                                     | 40   | 60 [3.6]  | 05    | •                                 |      | •   |
|       |  | 43   | 75 [4.5]  | 06    | •                                 | •    | •   |
|       |  | 45   | 95 [5.9]  | 07    | •                                 |      | •   |
|       |  | 48   | 120 [7.3]   | 08    | •                                 | •    | •   |
|       |  | 50   | 145 [8.9]   | 09    | •                                 | •    | •   |
|       |  | 51   | 160 [9.7]   | 10    | •                                 | •    | •   |
|       |  | 52   | 185 [11.3]  | 11    | •                                 | •    | •   |
|       |  | 54   | 230 [14.1]  |       |                                   |      |   |
|       |  | 57   | 295 [17.9]  |       |                                   |      |   |
|       |  | 59   | 370 [22.6]  |       |                                   |      |   |
|       |  | 61   | 460 [28.2]  |       |                                   |      |   |
|       |  | 64   | 590 [35.9]  |       |                                   |      |   |
|       |  | 65   | 740 [45.1]  |       |                                   |      |   |

\* 12 GPM open center requires 145psi back pressure  
 \*\* All Q-amp applications need approval from an Eaton Applications Engineer

Continued on next page

# Steering Control Units—Series 10

## Model Code— Ordering Information— Continued

| Nos   | Feature                                      | Code       | Description | Nos         | Feature                    | Code | Description   |  |
|-------|--|------------|-------------|-------------|----------------------------|------|---|--|
| 17,18 | Inlet or Load Sense Relief Valve — bar [PSI] | 00         | None        | 21,22,23,24 | Ports and Mounting Threads | AAAA | 4 x 3/4-16 (SAE) Ports<br>None (No Additional Port)<br>2 x M12 Mounting Threads<br>Port Face<br>4 x M10 Mounting Threads<br>Mounting Face         |  |
|       |  | 18         | 124 [1800]  |             |                            | AABA | 4 x 3/4-16 (SAE) Ports<br>7/16-20 Load Sensing Port on Side<br>2 x M12 Mounting Threads<br>Port Face<br>4 x M10 Mounting Threads<br>Mounting Face |  |
|       |  | 19         | 131 [1900]  |             |                            |      | AACA  | 4 x 3/4-16 (SAE) Ports<br>7/16-20 Load Sensing Port Port Face<br>2 x M12 Mounting Threads<br>Port Face<br>4 x M10 Mounting Threads<br>Mounting Face                              |
|       |  | 20         | 138 [2000]  |             |                            |      | BAAA  | 4 x M18 x 1,5 - 6H Metric<br>O-ring Ports<br>None (No Additional Port)<br>2 x M12 Mounting Threads<br>Port Face<br>4 x M10 Mounting Threads<br>Mounting Face                     |
|       |  | 21         | 145 [2100]  |             |                            |      | BADA  | 4 x M18 x 1,5 - 6H Metric<br>O-ring Ports<br>M12 x 1,5 - 6H Load Sensing Port on Side<br>2 x M12 Mounting Threads<br>Port Face<br>4 x M10 Mounting Threads<br>Mounting Face      |
|       |  | 22         | 152 [2200]  |             |                            |      | BAEA  | 4 x M18 x 1,5 - 6H Metric<br>O-ring Ports<br>M12 x 1,5 - 6H Load Sensing Port<br>Port Face<br>2 x M12 Mounting Threads<br>Port Face<br>4 x M10 Mounting Threads<br>Mounting Face |
|       |  | 23         | 158 [2290]  |             |                            |      | CAAA  | 4 x G 1/2 (BSP) Straight Thread<br>Ports<br>None (No Additional Port)<br>2 x M12 Mounting Threads<br>Port Face<br>4 x M10 Mounting Threads<br>Mounting Face                      |
|       |  | 24         | 165 [2390]  |             |                            |      |   |  |
|       |  | 25         | 172 [2490]  |             |                            |      |   |  |
|       |  | 26         | 179 [2600]  |             |                            |      |   |  |
|       |  | 27         | 186 [2700]  |             |                            |      |   |  |
|       |  | 28         | 193 [2800]  |             |                            |      |   |  |
|       |  | 29         | 200 [2900]  |             |                            |      |   |  |
|       |  | 30         | 207 [3000]  |             |                            |      |   |  |
|       |  | 31         | 214 [3100]  |             |                            |      |   |  |
|       |  | 32         | 220 [3190]  |             |                            |      |   |  |
|       |  | 33         | 227 [3290]  |             |                            |      |   |  |
|       |  | 34         | 234 [3390]  |             |                            |      |   |  |
|       |  | 35         | 241 [3500]  |             |                            |      |   |  |
|       |  | 36         | 248 [3600]  |             |                            |      |   |  |
|       | 37   | 255 [3700] |             |             |                            |      |   |  |
|       | 38   | 262 [3800] |             |             |                            |      |   |  |
|       | 39   | 269 [3900] |             |             |                            |      |   |  |
|       | 40   | 276 [4000] |             |             |                            |      |   |  |
|       | 99   | 136 [1970] |             |             |                            |      |   |  |
| 19,20 | Cylinder Relief Valve — bar [PSI]            | 00         | None        |             |                            |      |   |  |
|       |  | 23         | 158 [2290]  |             |                            |      |   |  |
|       |  | 24         | 165 [2390]  |             |                            |      |   |  |
|       |  | 25         | 172 [2490]  |             |                            |      |   |  |
|       |  | 26         | 179 [2600]  |             |                            |      |   |  |
|       |  | 27         | 186 [2700]  |             |                            |      |   |  |
|       |  | 28         | 193 [2800]  |             |                            |      |   |  |
|       |  | 29         | 200 [2900]  |             |                            |      |   |  |
|       |  | 30         | 207 [3000]  |             |                            |      |   |  |
|       |  | 31         | 214 [3100]  |             |                            |      |   |  |
|       |  | 32         | 220 [3190]  |             |                            |      |   |  |
|       |  | 33         | 227 [3290]  |             |                            |      |   |  |
|       |  | 34         | 234 [3390]] |             |                            |      |   |  |
|       |  | 35         | 241 [3500]  |             |                            |      |   |  |
|       |  | 36         | 248 [3600]  |             |                            |      |   |  |
|       |  | 37         | 255 [3700]  |             |                            |      |   |  |
|       |  | 38         | 262 [3800]  |             |                            |      |   |  |
|       |  | 39         | 269 [3900]  |             |                            |      |   |  |
|       |  | 40         | 276 [4000]  |             |                            |      |   |  |
|       |  | 41         | 283 [4100]  |             |                            |      |   |  |
|       | 42   | 289 [4190] |             |             |                            |      |   |  |
|       | 43   | 296 [4290] |             |             |                            |      |   |  |
|       | 44   | 303 [4390] |             |             |                            |      |   |  |
|       | 45   | 310 [4500] |             |             |                            |      |   |  |
|       | 46   | 317 [4600] |             |             |                            |      |   |  |
|       | 47   | 324 [4700] |             |             |                            |      |   |  |
|       | 48   | 331 [4800] |             |             |                            |      |   |  |
|       | 49   | 338 [4900] |             |             |                            |      |   |  |

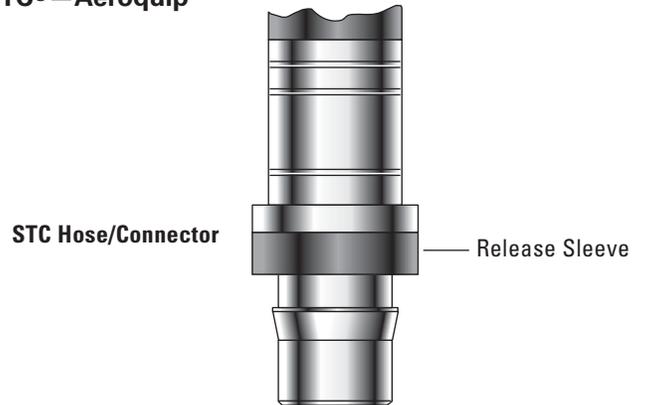
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# Steering Control Units—Series 10

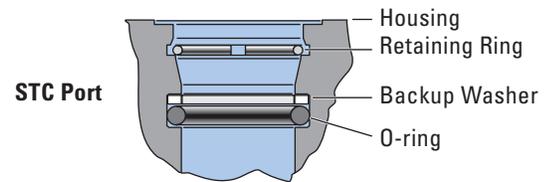
## Model Code— Ordering Information— Continued

| Nos         | Feature                                | Code | Description   |
|-------------|--|------|---|
| 21,22,23,24 | Ports and Mounting Threads (continued) | CAFA | 4 x G 1/2 (BSP) Straight Thread Ports<br>G 1/4 (BSP) LS Straight Thread Port on Side<br>2 x M12 Mounting Threads Port Face<br>4 x M10 Mounting Threads Mounting Face      |
|             |  | CAGA | 4 x G 1/2 (BSP) Straight Thread Ports<br>G 1/4 (BSP) LS Straight Thread Port on Port Face<br>2 x M12 Mounting Threads Port Face<br>4 x M10 Mounting Threads Mounting Face |
|             |  | DAAA | Dash 08 STC® Ports ***<br>None (No Additional Port)<br>2 x M10 Mounting Threads Port Face<br>4 x M10 Mounting Threads Mounting Face                                       |
|             |  | DAHA | Dash 08 STC® Ports ***<br>Dash 06 STC® Port on Side<br>2 x M10 Mounting Threads Port Face<br>4 x M10 Mounting Threads Mounting Face                                       |
|             |  | DAJA | Dash 08 STC® Ports ***<br>Dash 06 STC® Port Face<br>2 x M10 Mounting Threads Port Face<br>4 x M10 Mounting Threads Mounting Face  |
| 25          | Mechanical Interface                   | A    | Internal Involute Spline, 12 Tooth 16/32 DP 30° PA  |
| 26          | Input Torque                           | 3    | Standard  |
| 27          | Fluid Type                             | A    | See Eaton Technical Bulletin 3-401  |
| 28,29       | Special Features                       | AA   | None  |
| 30          | Paints and Packaging                   | 1    | Black Primer  |
| 31          | Identification                         | 0    | Eaton Product Number on Nameplate   |
| 32          | Eaton Assigned Design Code             | A    | Assigned Design Code  |

### STC®—Aeroquip



**Dash 08 Port Face (4)**  
**Dash 06 LS Port Side (1)**



Patent numbers: 5,553,895  
5,226,682  
5,570,910

\*\*\* STC with inlet check requires threaded adapter. Contact your Eaton Account Representative for assistance.

# Steering Control Units—Series 20

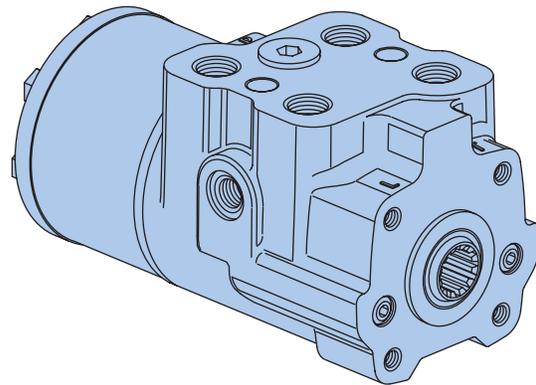
## Product Description

The Series 20 steering control unit continues Eaton®'s tradition of innovative design and high quality that began with the first fluid linked power steering system.

You can count on this steering unit to provide the same smooth, predictable steering as the Char-Lynn® steering units that provide dependable, trouble-free steering on applications around the world.

### Features

- Provides much smoother steering function by minimizing jerky motion on articulated vehicles.
- Jerk-reducing valves and accumulators can be eliminated on most vehicles, providing customer savings through fewer components required and reduced system cost.
- **Symmetrical valving** provides passageways and valving that are equally placed, and pressure areas that are staged for minimum internal leakage. This results in balance, precise servo response and uniform left or right steering action.
- Eaton's **high capacity gerotor** provides ample fluid displacement from an even more compact unit than was previously offered.
- A **thicker sleeve design** provides stability, especially during pressure and thermal transient conditions.
- The seal and centering spring designs provide **positive, low-effort steering** feel to ensure excellent vehicle control, an important feature for the vehicles for which these steering control units were designed.
- Load Sensing
- Integral Valves
- Q-Amp
- Wide Angle

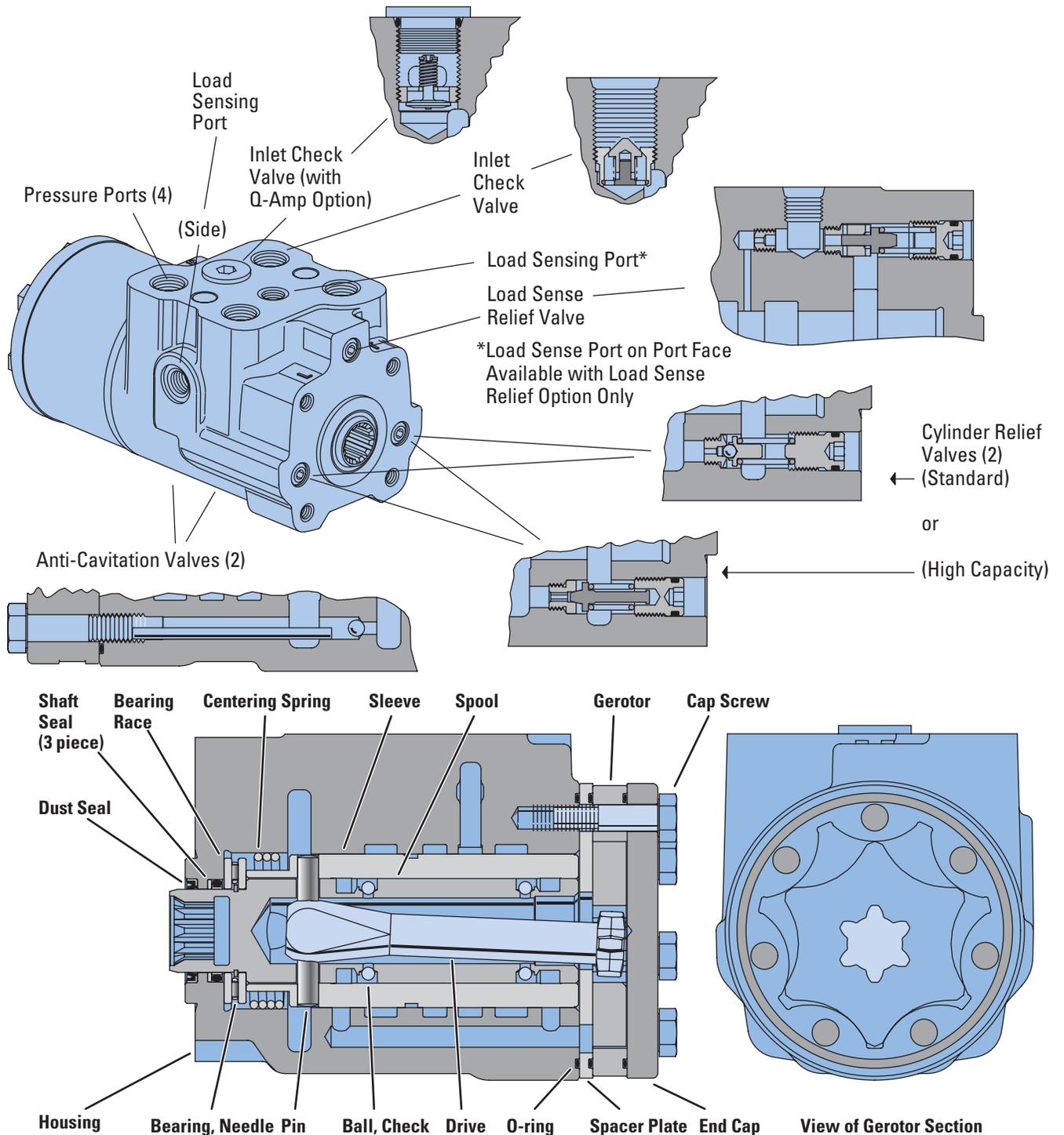


### SPECIFICATIONS

|  |   |
|--|---|
| Max. System Pressure   | 241 bar [3500 PSI]  |
| Max. Back Pressure   | 10 bar [145 PSI]  |
| Rated Flow   | 95 l/min [25 GPM]   |
| Max. Flow  | 125 l/min [33 GPM]  |
| Max. System Operating Temperature                              | 93°C [200° F]   |
| Max. Differential Between Steering Unit and System Temperature | 28° C<br>50° F  |
| Input Torque Powered   | 1,1-2,8 Nm @ 6,9 bar back pressure<br>[10-25 lb-in @ 100 PSI back pressure] |
| Non-Powered  | 136 Nm [100 lb-ft]  |
| Fluid  | See Eaton Technical Bulletin 3-401  |
| Recommended Filtration   | ISO 18/13 cleanliness level   |

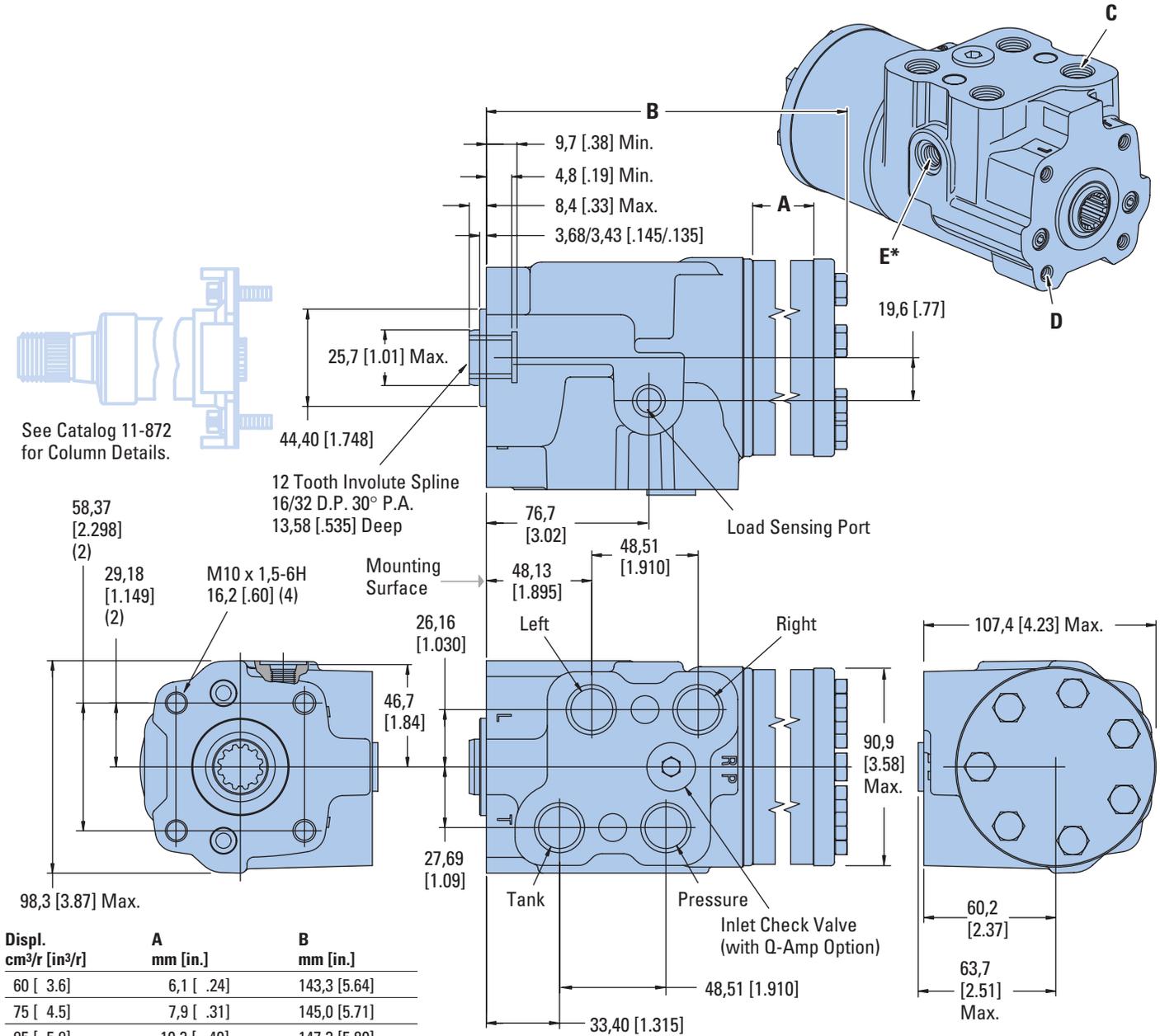
# Steering Control Units—Series 20

## Sectional Drawing



# Steering Control Units—Series 20

## Installation Drawing



| Displ.<br>cm <sup>3</sup> /r [in <sup>3</sup> /r] | A<br>mm [in.] | B<br>mm [in.] |
|---|---------------|---------------|
| 60 [ 3.6]   | 6,1 [ .24]    | 143,3 [5.64]  |
| 75 [ 4.5]   | 7,9 [ .31]    | 145,0 [5.71]  |
| 95 [ 5.9]   | 10,2 [ .40]   | 147,3 [5.80]  |
| 120 [ 7.3]  | 12,7 [ .50]   | 149,9 [5.90]  |
| 145 [ 8.9]  | 15,5 [ .61]   | 152,7 [6.01]  |
| 160 [ 9.7]  | 16,8 [ .66]   | 153,9 [6.06]  |
| 185 [11.3]  | 19,6 [ .77]   | 156,7 [6.17]  |
| 230 [14.1]  | 24,4 [ .96]   | 161,5 [6.36]  |
| 295 [17.9]  | 31,0 [1.22]   | 168,1 [6.62]  |
| 370 [22.6]  | 39,1 [1.54]   | 176,3 [6.94]  |
| 460 [28.2]  | 48,8 [1.92]   | 185,9 [7.32]  |
| 590 [35.9]  | 62,2 [2.45]   | 199,3 [7.85]  |
| 740 [45.1]  | 78,2 [3.08]   | 215,3 [8.48]  |
| 985 [60.0]  | 103,9 [4.09]  | 241,0 [9.49]  |

### PORT AND MOUNTING THREAD COMBINATIONS

| C               | D            | E*                |
|-----------------|--------------|-------------------|
| 3/4-16 UNF 2B** | M10 x 1,5-6H | 7/16-20 UNF 2B**  |
| G 1/2***        | M10 x 1,5-6H | G 1/4***          |
| M18 x 1,5-6H    | M10 x 1,5-6H | M12 x 1,5-6H, M14 |
| M22 x 1,5-6H    | M10 x 1,5-6H | M12 x 1,5-6H, M14 |

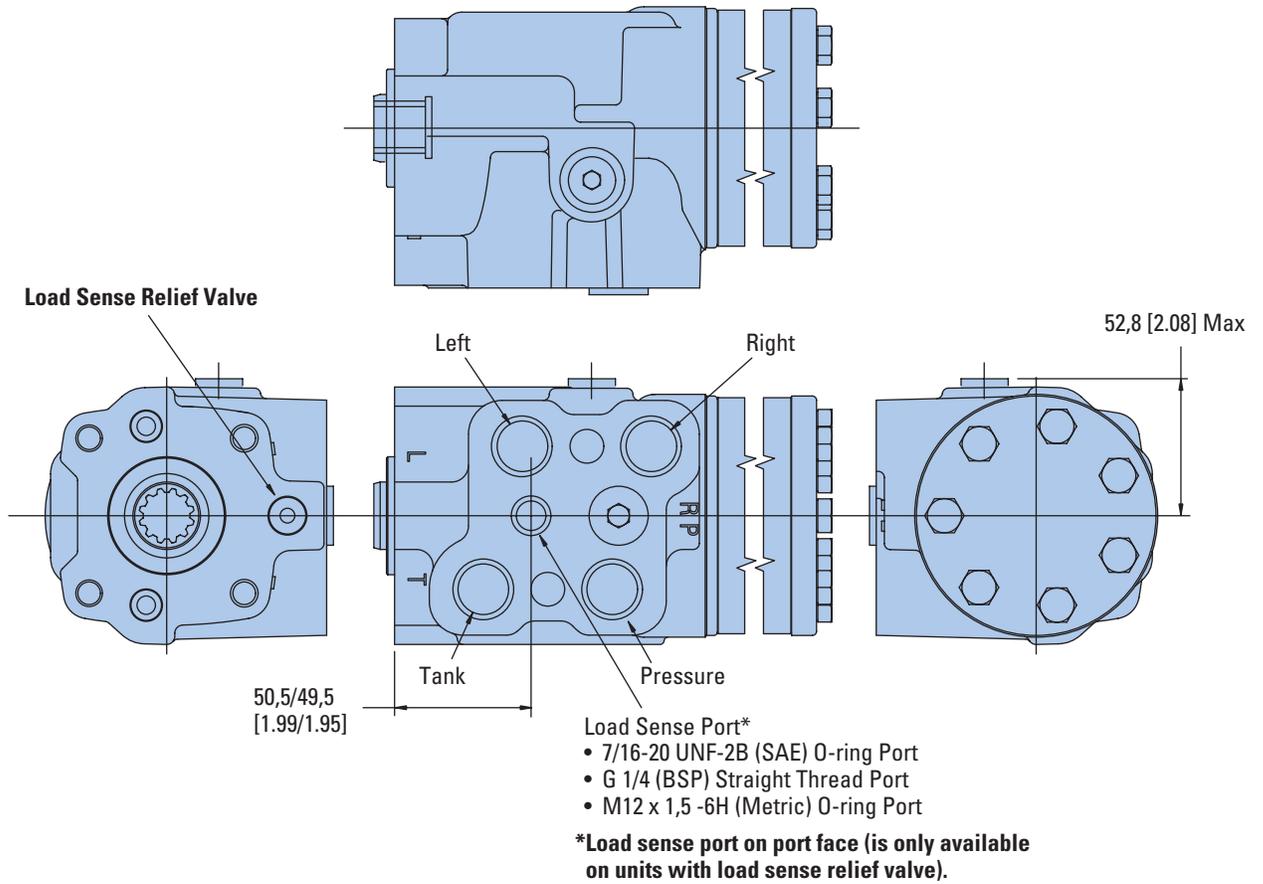
\*Load sensing port option—on side (load sense relief port face only - see page 44).

\*\*SAE O-ring Port Port

\*\*\*BSP Straight Thread Port

# Steering Control Units—Series 20

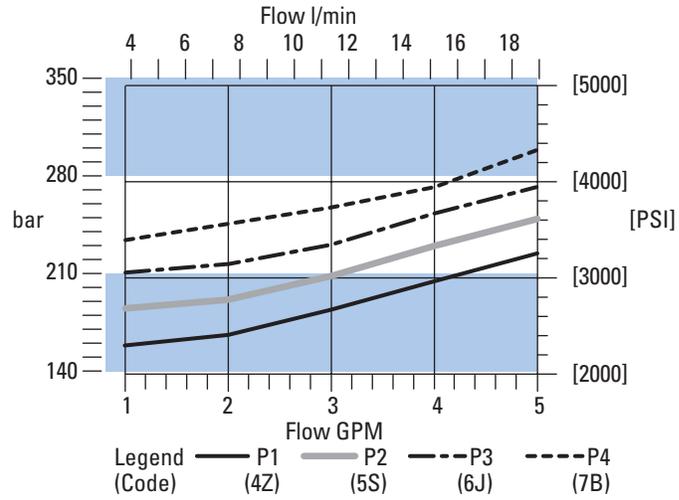
## Installation Drawing (Load Sense Relief Option)



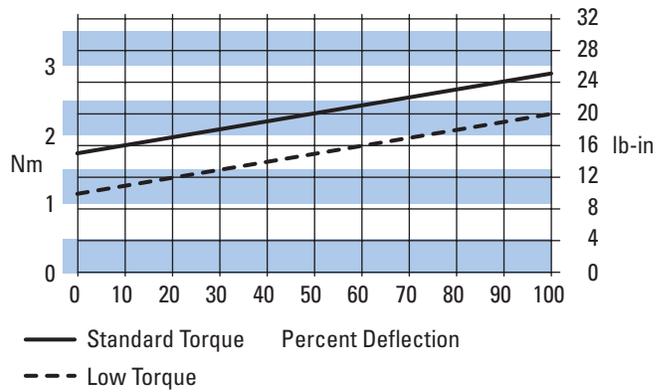
# Steering Control Units—Series 20

## Performance Data

### Cylinder Relief Valve Pressure Drop versus Flow



### Input Torque



# Steering Control Units—Series 20

## Model Code – Ordering Information

### Applications

#### Articulated Vehicles

- Loaders
- Scrapers
- Skidders
- AG Tractors
- Dumpers
- Sprayers
- Forestry Equipment

#### Rigid Frame Vehicles

- Front End Loaders
- Large Graders
- Mining Trucks
- Transporters
- AG Tractors

The following 29-digit coding system has been developed to identify all of the configuration options for the Series 20 steering control units. Use this model code to specify a unit with the desired features. All 29-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 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 |
| A | C | C |   | 6 | A |   |   |   | F  |    |    |    |    |    |    |    |    |    | N  |    | A  |    | A  | A  | 1  | 0  | 0  |    |

| Nos   | Feature  | Code       | Description  | Nos   | Feature               | Code | Description |
|-------|--|------------|--|-------|-----------------------|------|-------------|
| 1,2,3 | Product Series                                       | ACC        | Series 20 Steering Control Unit  | 12,13 | Valve Options*        |      |             |
| 4     | Nominal Flow Rating                                  | 4          | 38 l/min [10 GPM] (Q-Amp)  |       | Manual Steering Check |      |             |
|       |  | 6          | 76 l/min [20 GPM] (Q-Amp)  |       | Load Sensing Relief   |      |             |
|       |  | A          | 114 l/min [30 GPM] (Q-Amp)   |       | Inlet** Check Valve   |      |             |
|       |  | 7          | 95 l/min [25 GPM] (Non-Q-Amp)  | 00    | Cylinder Relief Valve |      |             |
| 5     | Inlet Pressure Rating                                | 6          | Inlet Pressure Rating 241 bar [3500 PSI]   | 01    | Anti-Cavitation Valve |      |             |
| 6     | Return Pressure Rating                               | A          | 10 bar [145 PSI]   | 02    |                       |      |             |
| 7-8   | Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r] | 40         | 60 [3.6]   | 09    |                       |      |             |
|       |  | 43         | 75 [4.5]   | 10    |                       |      |             |
|       |  | 45         | 95 [5.9]   | 13    |                       |      |             |
|       |  | 48         | 120 [7.3]  | 21    |                       |      |             |
|       |  | 50         | 145 [8.9]  | 24    |                       |      |             |
|       |  | 51         | 160 [9.7]  | 40    |                       |      |             |
|       |  | 52         | 185 [11.3]   |       |                       |      |             |
|       |  | 54         | 230 [14.1]   |       |                       |      |             |
|       |  | 57         | 295 [17.9]   |       |                       |      |             |
|       |  | 59         | 370 [22.6]   |       |                       |      |             |
|       |  | 61         | 460 [28.2]   |       |                       |      |             |
|       |  | 64         | 590 [35.9]   |       |                       |      |             |
|       | 66   | 740 [45.1] |  |       |                       |      |             |
|       | 69   | 985 [60.0] |  |       |                       |      |             |
| 9     | Flow Amplification                                   | 0          | No Q-Amp   |       |                       |      |             |
|       |  | 1          | 1.6 : 1.0 Ratio<br>(Actual Displ. 185 to 985 cm <sup>3</sup> /r [11.3 to 60.0 in <sup>3</sup> /r]) |       |                       |      |             |
|       |  | 3          | 2.0 : 1.0 Ratio<br>(Actual Displ. 60 to 370 cm <sup>3</sup> /r [3.6 to 22.6 in <sup>3</sup> /r])   |       |                       |      |             |
| 10    | Neutral Circuit                                      | F          | Load Sensing, Dynamic Signal   |       |                       |      |             |
| 11    | Load Circuit   | A          | Non-Load Reaction  |       |                       |      |             |
|       |  | D          | Non-Load Reaction, Cylinder Damped   |       |                       |      |             |

\*Not all valve options will work with all unit combinations  
 \*\*76 l/min [20 GPM] Max.

| 14,15 | Load Sensing Relief Valve Setting | Code | Description        |
|-------|-----------------------------------|------|--------------------|
|       |                                   | 00   | None               |
|       |                                   | 4N   | 150 bar [2180 PSI] |
|       |                                   | 50   | 160 bar [2320 PSI] |
|       |                                   | 5A   | 170 bar [2470 PSI] |
|       |                                   | 5L   | 180 bar [2610 PSI] |
|       |                                   | 5Y   | 190 bar [2760 PSI] |
|       |                                   | 68   | 200 bar [2900 PSI] |
|       |                                   | 6J   | 210 bar [3050 PSI] |
|       |                                   | 6V   | 220 bar [3190 PSI] |
|       |                                   | 76   | 230 bar [3340 PSI] |
|       |                                   | 7G   | 240 bar [3480 PSI] |

Continued on next page

# Steering Control Units—Series 20

## Model Code— Ordering Information— Continued

| Nos         | Feature   | Code  | Description  | Nos   | Feature                     | Code                  | Description                         |       |   |    |                |    |                                   |   |                      |
|-------------|---|---|--|-------|-----------------------------|-----------------------|-------------------------------------|-------|---|----|----------------|----|-----------------------------------|---|----------------------|
| 16,17       | Cylinder  | 00  | None   | 22    | Input Torque                | 1                     | Low                                 |       |   |    |                |    |                                   |   |                      |
|             | Relief  | 6J  | 210 bar [3050 PSI]   |       |                             | 3                     | Standard (Includes Stiffer Springs) |       |   |    |                |    |                                   |   |                      |
|             | Valve   | 6V  | 220 bar [3190 PSI]   |       |                             | 23                    | Fluid Type                          | A     | See Eaton Technical Bulletin 3-401  |    |                |    |                                   |   |                      |
|             | Setting   | 76  | 230 bar [3340 PSI]   |       |                             |                       |                                     |       |   |    |                |    |                                   |   |                      |
|             |   | 7G  | 240 bar [3480 PSI]   |       |                             |                       |                                     |       |   |    |                |    |                                   |   |                      |
|             |   | 7T  | 250 bar [3630 PSI]   |       |                             |                       |                                     |       |   |    |                |    |                                   |   |                      |
|             |   | 84  | 260 bar [3770 PSI]   |       |                             |                       |                                     |       |   |    |                |    |                                   |   |                      |
|             |   | 8E  | 270 bar [3920 PSI]   |       |                             |                       |                                     |       |   |    |                |    |                                   |   |                      |
|             |   | 8R  | 280 bar [4060 PSI]   |       |                             |                       |                                     |       |   |    |                |    |                                   |   |                      |
|             |   | 92  | 290 bar [4210 PSI]   | 24    | Special Application Options | 0                     | Not Available                       |       |   |    |                |    |                                   |   |                      |
|             | 9C  | 300 bar [4350 PSI]  | 1  |       |                             | Wide Angle Deflection |                                     |       |   |    |                |    |                                   |   |                      |
| 18,19,20,21 | Ports and Mounting Threads  | AABN  | 4 x G 1/2 (BSP) Ports with G 1/4 (BSP) Load Sensing Port on Side, M10 Mounting Threads   | 25,26 | Special Features            | AA                    | None                                |       |   |    |                |    |                                   |   |                      |
|             |   | DACN  | 4 x 3/4 (SAE) Ports with 7/16 (SAE) Load Sensing Port on Side, M10 Mounting Threads      |       |                             | 27                    | Paints and Packaging                | 1     | Black Paint   |    |                |    |                                   |   |                      |
|             |   | FAFN  | 4 x M18 (Metric) Ports with M12 (Metric) Load Sensing Port on Side, M10 Mounting Threads |       |                             |                       |                                     |       |   |    |                |    |                                   |   |                      |
|             |   | FBFN  | 4 x M18 (Metric) Ports with M14 (Metric) Load Sensing Port on Side, M10 Mounting Threads |       |                             |                       |                                     |       |   |    |                |    |                                   |   |                      |
|             |   | RACN*   | 4 x 7/8 (SAE) Ports with 7/16 (SAE) Load Sensing Port on Side, M10 Mounting Threads      |       |                             |                       |                                     |       |   |    |                |    |                                   |   |                      |
|             |   | SAFN*   | 4 x M22 (Metric) Ports with M12 (Metric) Load Sensing Port on Side, M10 Mounting Threads |       |                             |                       |                                     |       |   |    |                |    |                                   |   |                      |
|             |   | SBFN*   | 4 x M22 (Metric) Ports with M14 (Metric) Load Sensing Port on Side, M10 Mounting Threads |       |                             |                       |                                     |       |   |    |                |    |                                   |   |                      |
|             |   | 18,19,20,21   | Ports and Mounting Threads (Load Sensing Relief Only)                                    |       |                             |                       |                                     | DADN  | 4 x 3/4 (SAE) Ports with 7/16 (SAE) Load Sensing Port on Port Face, M10 Mounting Threads    | 28 | Identification | 0  | Eaton Product Number on Nameplate |   |                      |
|             |   |   |  |       |                             |                       |                                     | AAWN  | 4 x G 1/2 (BSP) Ports with G 1/4 (BSP) Load Sensing Port on Port Face, M10 Mounting Threads |    |                | 29 | Eaton Assigned Design Code        | 0 | Assigned Design Code |
|             |   |   |  |       |                             |                       |                                     | RADN* | 4 x 7/8 (SAE) Ports with 7/16 (SAE) Load Sensing Port on Port Face, M10 Mounting Threads    |    |                |    |                                   |   |                      |
| FAVN        | 4 x M18 (Metric) Ports with M12 (Metric) Load Sensing Port on Port Face, M10 Mounting Threads |   |  |       |                             |                       |                                     |       |   |    |                |    |                                   |   |                      |
|             | SAVN*   | 4 x M22 (Metric) Ports with M12 (Metric) Load Sensing Port on Port Face, M10 Mounting Threads |  |       |                             |                       |                                     |       |   |    |                |    |                                   |   |                      |

\*Use with 114 l/min [30 GPM]

# Steering Control Units—Series 25

## Product Description and Features

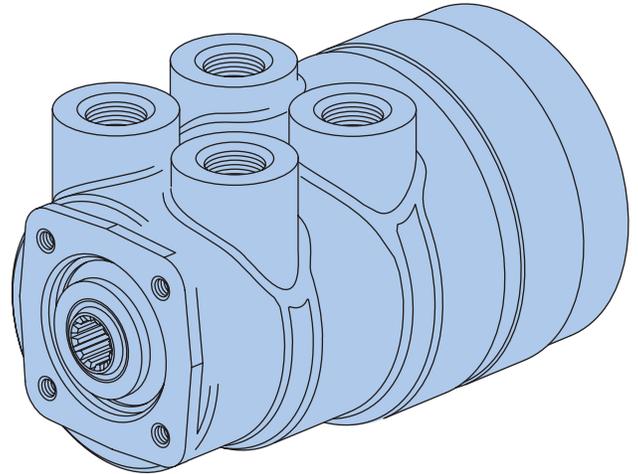
The Series 25 steering control unit includes two patented designs that make it even more responsive, reliable and cost effective.

- Symmetrical valving provides passageways and valving that are equal in both directions and pressure areas that are staged for minimum leakage. This gives balance, precise servo response and uniform steering action in both directions.
- Progressive valving makes it possible to produce the spool/sleeve valve in a way that assures reliability and reduces costs.
- Eaton's high capacity gerotor assembly provides a lot of capacity in a small package.
- Heavier valve components—housing, spool and sleeve—provides stability, especially during pressure and thermal transient conditions.
- The seal and centering spring designs provides positive, low-effort steering feel assuring excellent vehicle control, an important feature on large vehicles for which this steering control was designed.
- Cylinder port relief/check valves are needed on any machine that is subject to high steering cylinder pressures caused by external loads. For example, when one edge of an articulated front end loader bucket encounters an obstruction (external load), the full force of the load and the momentum of the machine cause the machine to buckle at the articulation point and raise pressure in the steering cylinders far in excess of system pressure. This pressure must be relieved to absorb the impact load and prevent damage to the hydraulic systems and to the machine itself.
- The traditional method of relieving system pressure involves interruption of cylinder port lines with a variety of fittings and plumbing. By designing cylinder port relief valves integral to the steering control unit housing, Series 25 steering control units equipped with cylinder port relief valves eliminate the additional hardware used to relieve pressure and return oil to the tank.

### Features

- Open Center
- Closed Center
- Load Sensing
- Q-amp
- Integral Valves
- Wide Angle
- Pilot Pressure Port\*

\* This is an added feature that can be used for  
 1) pilot pressure to priority valve.  
 2) diagnostics.



### SPECIFICATIONS

|  |  |
|--|--|
| Max. System Pressure   | 241 bar [3500 PSI]   |
| Max. Back Pressure   | 21 bar [300 PSI]   |
| Rated Flow   | 95 l/min [25 GPM]  |
| Max. Flow  | 151 l/min [40 GPM]   |
| Max. System Operating Temperature                              | 93°C [200° F]  |
| Max. Differential Between Steering Unit and System Temperature | 28° C<br>50° F   |
| Input Torque Powered   | 2,8-3,4 Nm @ 6,9 bar back pressure [25-30 lb-in @ 100 PSI back pressure] |
| Non Powered  | †††  |
| Rotation Limits  | None   |
| Fluid  | ATF Type A and most petroleum based fluids                               |
| Recommended Filtration   | ISO 18/13 cleanliness level  |

††† Manual steering is **not** possible without hydraulic power.

### Applications

#### Articulated Vehicles

- Loaders
- Scrapers
- Skidders
- Ag Tractors

#### Fixed Frame Vehicles

- Large Front End Loaders
- Graders
- Mining Trucks
- Articulated Dump Haulers
- Transporters

# Steering Control Units—Series 25

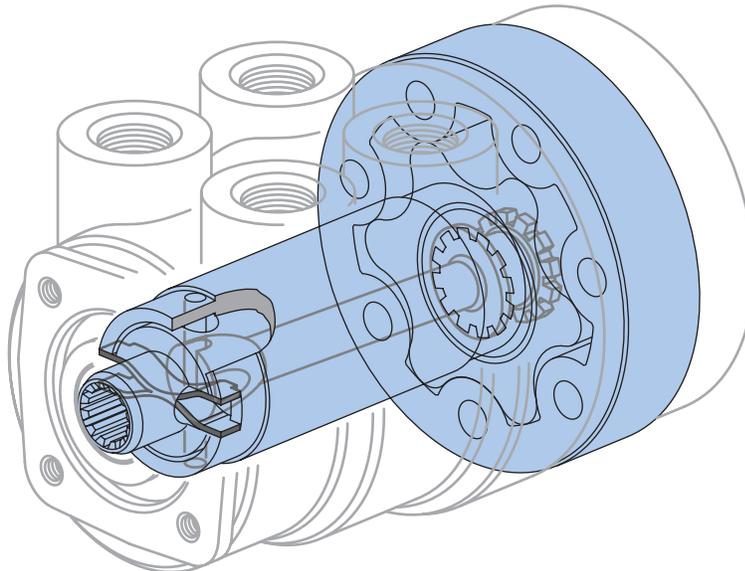
## Standard Product Releases

### SERIES 25

| System        | Signal  | Load Circuit           | Rated Flow l/min [GPM] | O-ring Port Size | Actual Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]—Product Number |            |            |            |            |
|---------------|---------|------------------------|------------------------|------------------|--|------------|------------|------------|------------|
|               |         |                        |                        |                  | 490 [30]   | 625 [38]   | 795 [48]   | 985 [60]   | 1230 [75]  |
| Open Center   | N/A     | Non Load Reaction [25] | 95                     | 1 1/16-12        | 251-1001   | 251-1002   | 251-1003   | 251-1004   | 251-1005   |
| Closed Center | N/A     | Non Load Reaction [25] | 95                     | 1 1/16-12        | 252-1001   | 252-1002   | 252-1003   | 252-1004   | 252-1005   |
|               |         |                        |                        | 1 1/16-12        | 252-1008**   | 252-1009** | 252-1012** | 252-1013** | 252-1016** |
| Load Sensing  | Dynamic | Non Load Reaction [25] | 95                     | 1 1/16-12        | 253-1001   | 253-1002   | 253-1003   | 253-1004   | 253-1005   |

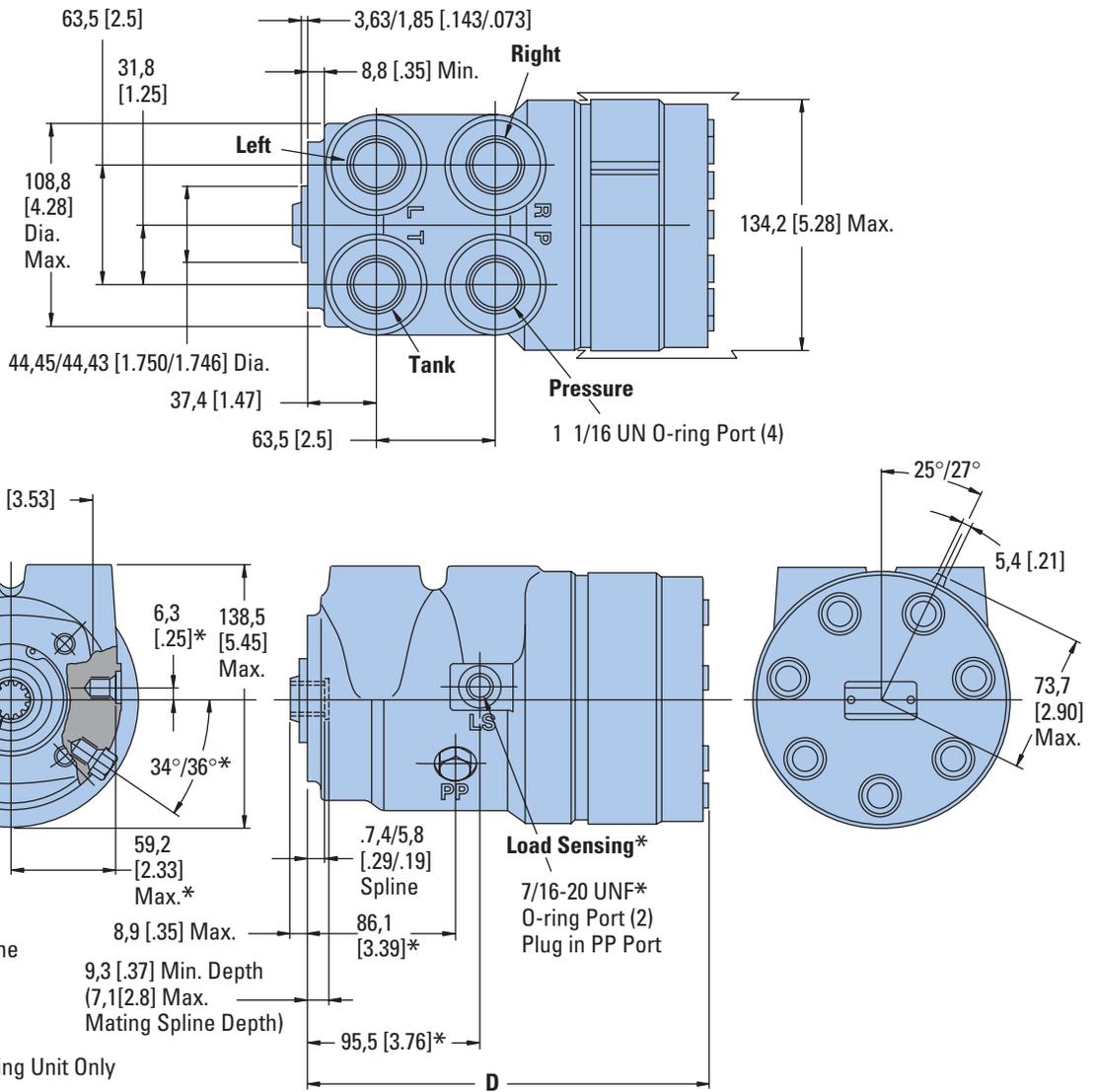
\*\*Closed center units with neutral bleed 2,3 l/min [.6 GPM] at 172 bar [2500 PSI] (see Page 7).

Example: 251-1001-002  
 |  
 Product Number      Design Code



# Steering Control Units—Series 25

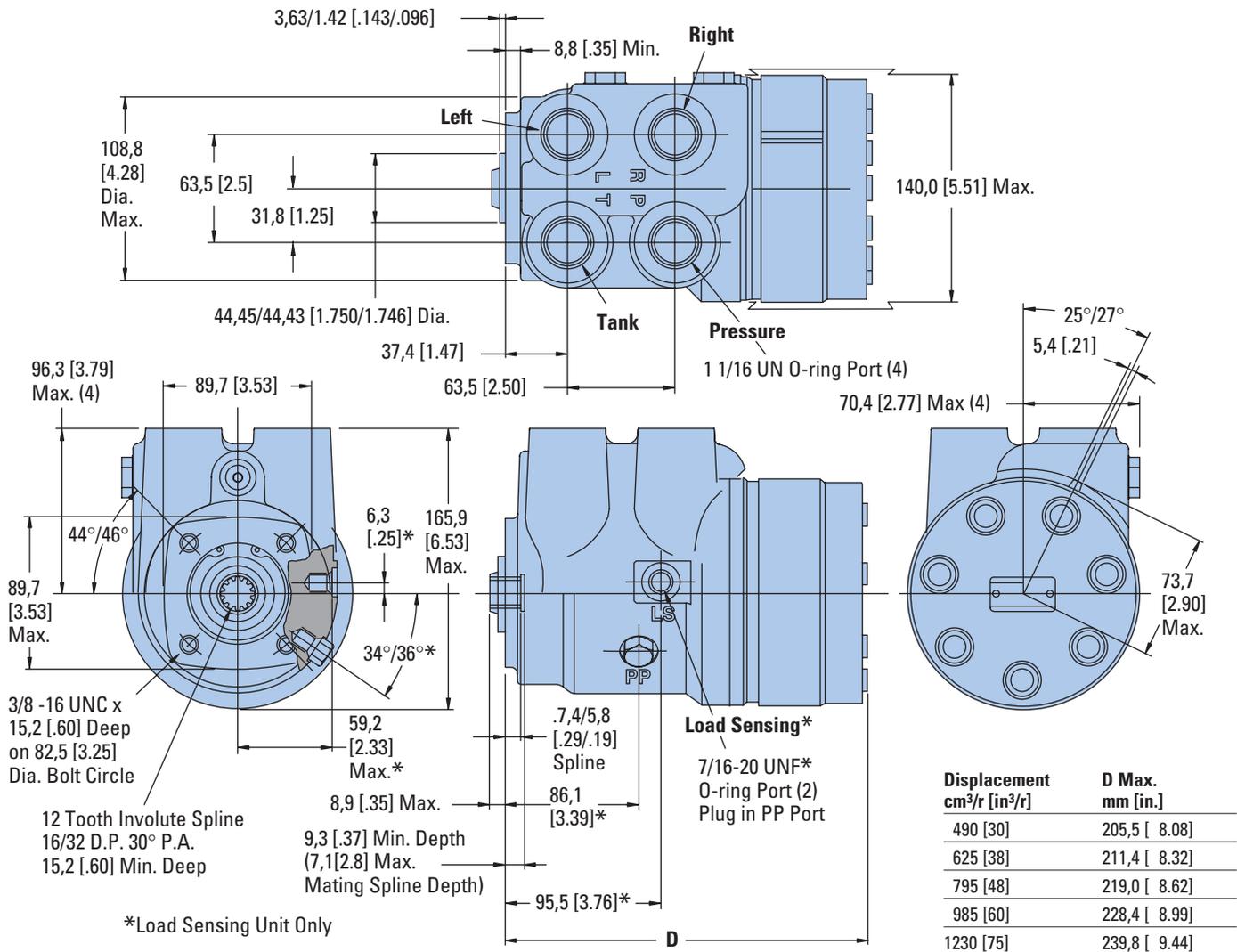
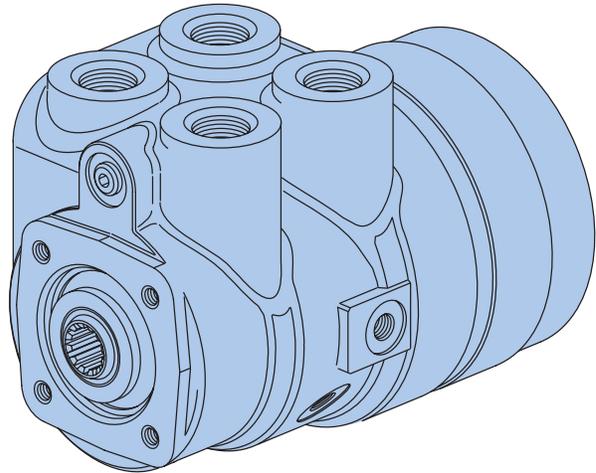
## Installation Drawing



| Displacement<br>cm <sup>3</sup> /r [in <sup>3</sup> /r] | D Max.<br>mm [in.] |
|---|--------------------|
| 490 [30]  | 205,5 [ 8.08]      |
| 625 [38]  | 211,4 [ 8.32]      |
| 795 [48]  | 219,0 [ 8.62]      |
| 985 [60]  | 228,4 [ 8.99]      |
| 1230 [75]   | 239,8 [ 9.44]      |

# Steering Control Units—Series 25 with Cylinder Relief, Anti-Cavitation

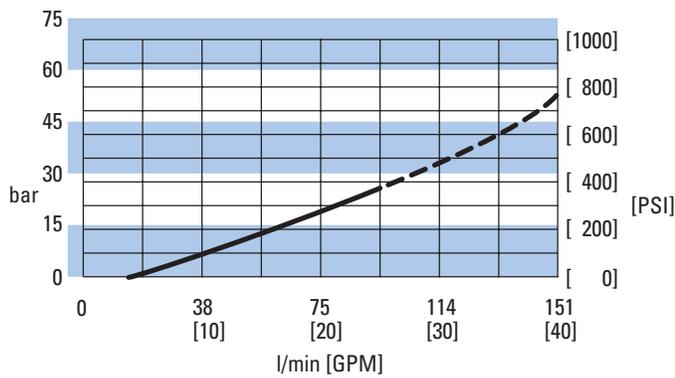
## Installation Drawing



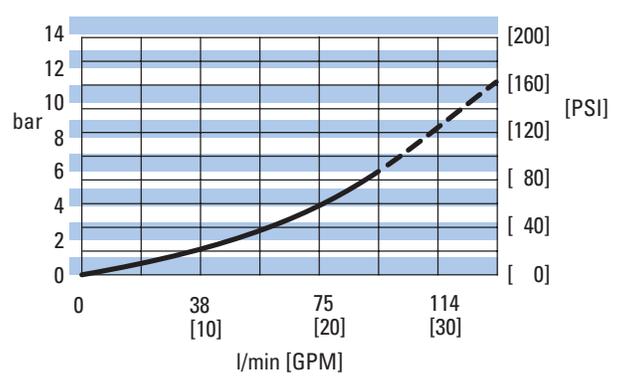
# Steering Control Units—Series 25

## Performance Data

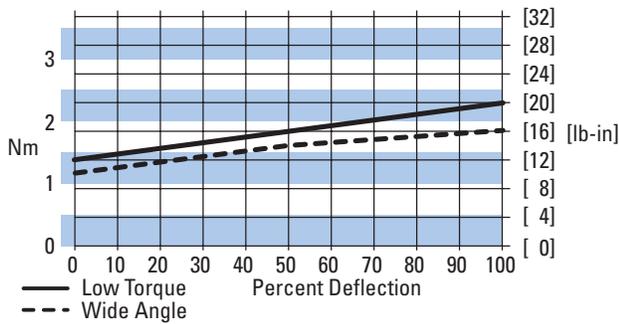
**Average Pressure Drop at Full Valve Deflection**



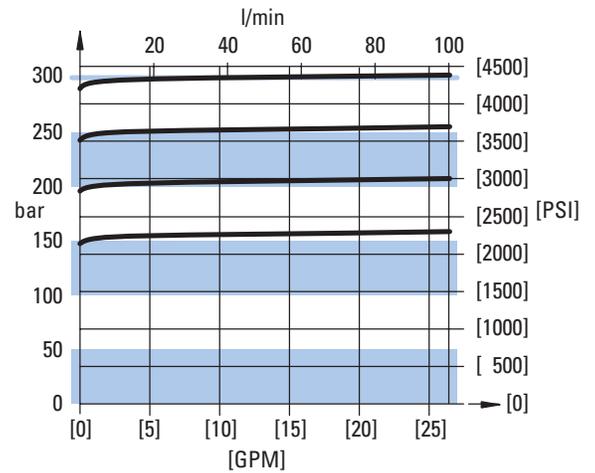
**Neutral Pressure Drop - Open Center Fluid Viscosity 25 cSt [120 SUS]**



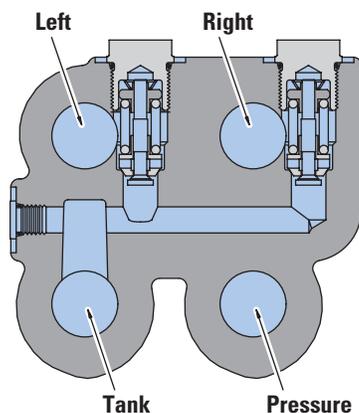
**Input Torque**



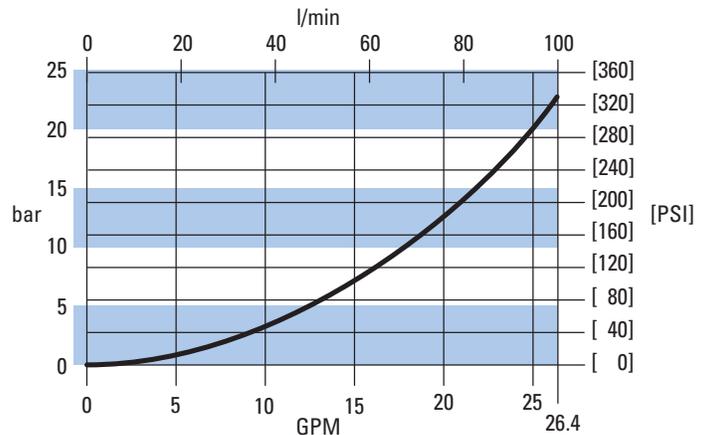
**Pressure Relief Characteristics**



**SCU Valve Section**



**Check Valve Characteristics**



# Steering Control Units—Series 25

## Model Code – Ordering Information

The following 29-digit coding system has been developed to identify all of the configuration options for the Series 25 steering control units. Use this model code to specify a unit with the desired features. All 29 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 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 |
| A | B | W |   | 6 | A |   |   |   |    |    |    |    | 0  | 0  |    |    |    |    |    |    | 3  | A  |    | A  | A  | 1  | 0  | C  |

| Nos    | Feature  | Code | Description   | Nos         | Feature                    | Code | Description  |
|--------|--|------|---|-------------|----------------------------|------|--|
| 1,2,3  | Product Series                                       | ABW  | Series 25 Steering Control Unit   | 18,19,20,21 | Ports and Mounting Threads | EAAA | 4 x 1—1/6 Ports with 3/8-16 UNC Column Mounting  |
| 4      | Nominal Flow Rating                                  | 7    | 95 l/min [25 GPM]   |             |                            | EAGA | 4 x 1—1/6 Ports with 7/16 Load Sensing Port and 7/16 SAE Pilot Pressure Port (Capped) with 3/8-16 UNC Column Mounting (Use with Load Sensing Units Only) |
|        |  | 8    | 151 l/min [40 GPM] (Q-amp only)   |             |                            | NBDN | 4 x M27 with M12—LS and M12 PP (Capped) M10 Mounting Threads (Use with Load Sensing Units Only)  |
| 5      | Inlet Pressure Rating                                | 6    | 241 bar [3500 PSI]  |             |                            | NAAN | 4 x M27 with M10 Mounting Threads  |
| 6      | Return Pressure Rating                               | A    | 10 bar [150 PSI]  | 22          | Input Torque               | 3    | Standard   |
| 7-8    | Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r] | 62   | 490 [30]  | 23          | Fluid Type                 | A    | See Eaton Technical Bulletin 3-401   |
|        |  | 65   | 625 [38]  | 24          | Special Applications       | 00   | None   |
|        |  | 67   | 795 [48]  |             |                            | 1    | Wide Angle (Use with Load Sensing Units Only)  |
|        |  | 69   | 985 [60]  | 25, 26      | Special Features           | AA   | None   |
|        |  | 71   | 1230 [75]   | 27          | Paint                      | 1    | Black Paint  |
| 9      | Flow Amplification                                   | 0    | None  | 28          | Identification             | 0    | Eaton Product Number on Nameplate  |
|        |  | 1    | 1.6 : 1.0 Ratio   | 29          | Eaton Assigned Design Code | C    | Assigned Design Code   |
| 10     | Neutral Circuit                                      | A    | Open Center   |             |                            |      |  |
|        |  | C    | Closed Center   |             |                            |      |  |
|        |  | D    | Closed Center with Neutral Bleed  |             |                            |      |  |
|        |  | F    | Load Sensing, Dynamic Signal  |             |                            |      |  |
| 11     | Load Circuit   | A    | Non-Load Reaction   |             |                            |      |  |
|        |  | D    | Non-Load-Reaction, Cylinder Damping (Use with Flow Amp and Wide Angle Only) |             |                            |      |  |
| 12,13  | Valve Options  | 00   | None  |             |                            |      |  |
|        |  | 21   | Anti-Cavitation Valves, Cylinder Relief Valves                              |             |                            |      |  |
| 14, 15 | Load Sense Relief Valve Setting                      | 00   | None  |             |                            |      |  |
| 16,17  | Cylinder Relief Valve Setting                        | 00   | None  |             |                            |      |  |
|        |  | 6F   | 207 bar [3000 PSI]  |             |                            |      |  |
|        |  | 70   | 224 bar [3250 PSI]  |             |                            |      |  |
|        |  | 7H   | 241 bar [3500 PSI]  |             |                            |      |  |
|        |  | 83   | 259 bar [3760 PSI]  |             |                            |      |  |
|        |  | 8L   | 276 bar [4000 PSI]  |             |                            |      |  |
|        |  | 95   | 293 bar [4250 PSI]  |             |                            |      |  |