

# Steering solutions for mobile off-highway



# World class steering solutions

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Providing high quality products with robust performance and outstanding service, Eaton offers innovative, reliable and durable Steering Solutions to meet a wide range of platforms and applications.

Our engineering team can customize solutions that reach beyond steering to tailor and customize a solution to your needs. By leveraging our experience and engineering expertise Eaton engineers can offer you high quality, reliable and durable products with designs that simplify installation and increase the performance and competitive advantage of your product.



## How to use this document

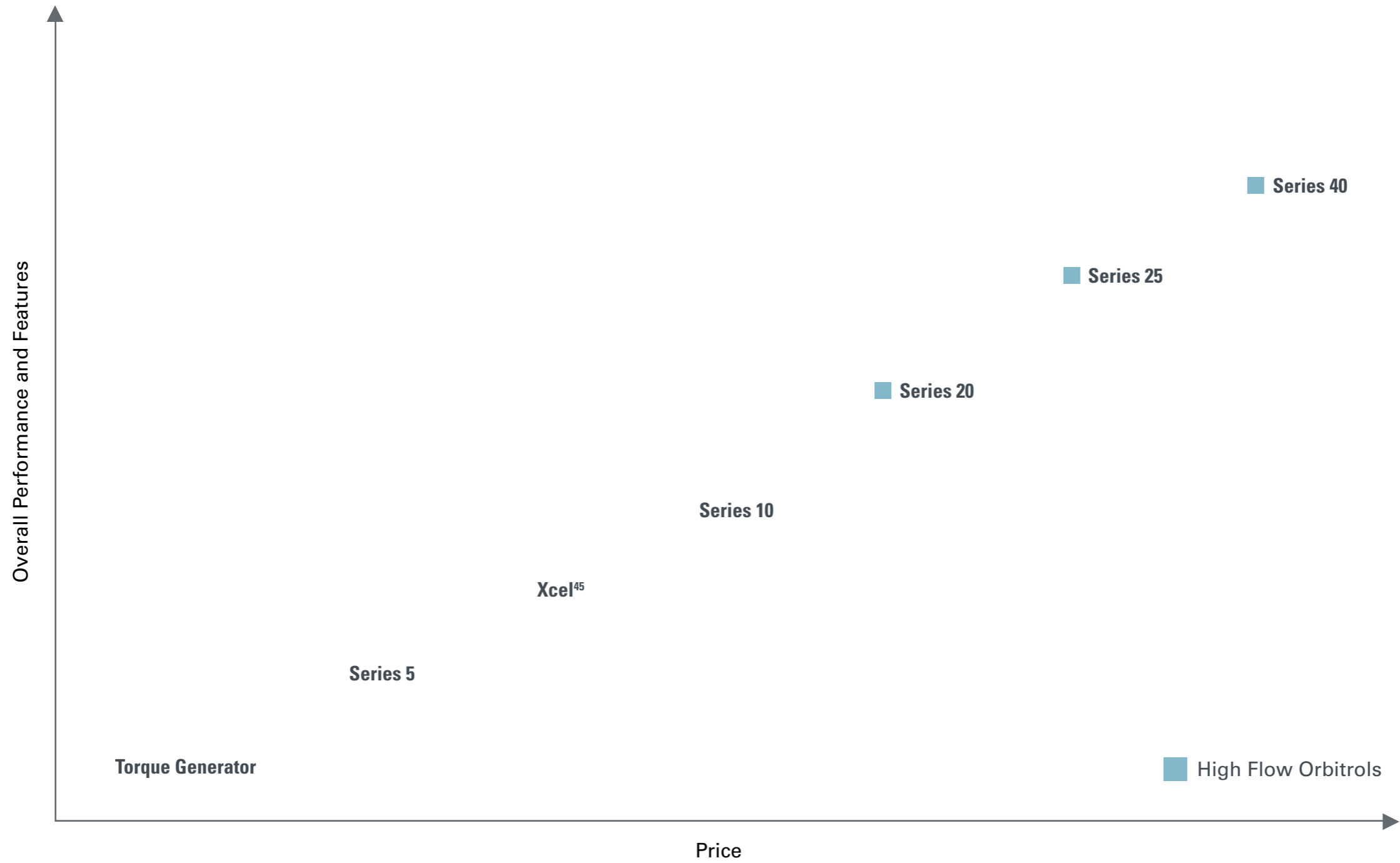
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- This interactive product selection tool makes it easy to select the right steering product based on the performance requirements of your solution or on the vehicle's platform. Compare multiple products using the Product Portfolio Overview or use the Quick Product Index to browse product features and performance ranges or for links to additional information
- To speak with a representative contact Eaton at 1+ (440) 523-4400 or (800) 386-1911  
Or to learn how to reach one of our technical experts

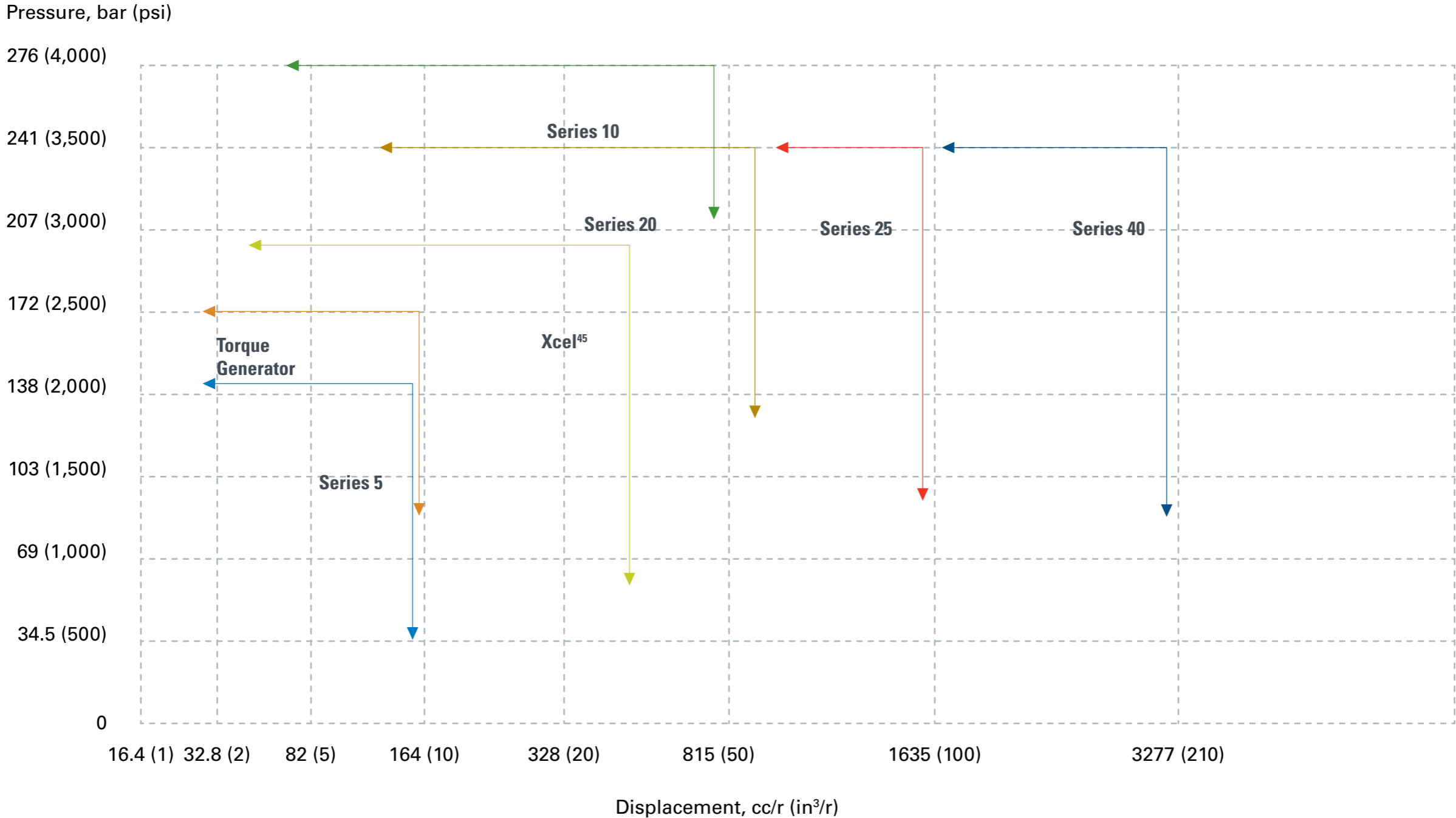


# Steering solutions - product portfolio

View pressure and displacement product comparison graph



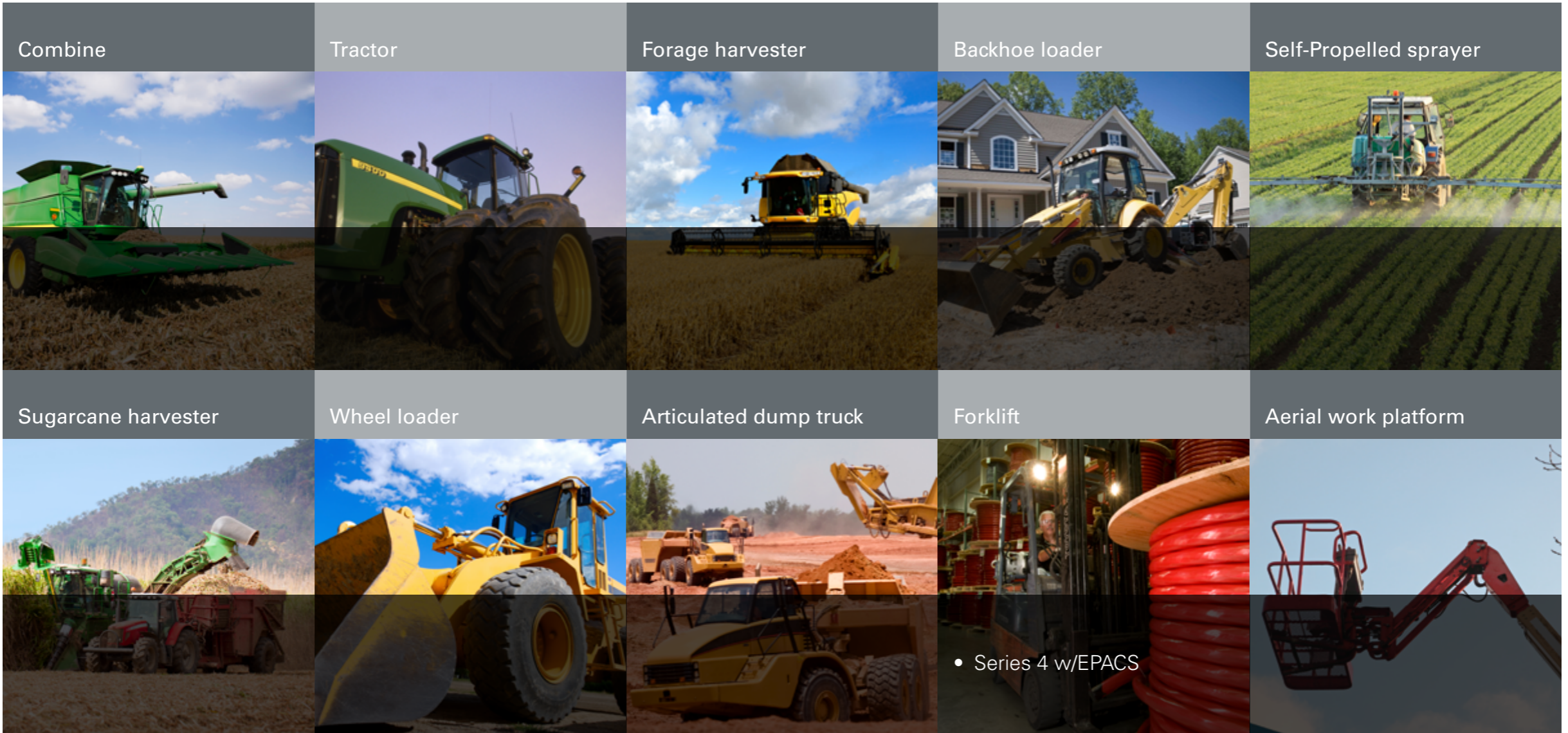
# Products by pressure and displacement



# Solutions by platforms

Agriculture, construction & material handling

View pressure and displacement product comparison graph



# Solutions by Performance Requirements

## Performance matrix

[View pressure and displacement product comparison graph](#)

Product	Flow Rate
<b>XCEL<sup>45</sup></b>	7.5 - 45 l/min 2 - 12 gpm
<b>Series 5</b>	11 - 19 l/min 3 - 5 gpm
<b>Series 10</b>	11 - 76 l/min 3 - 20 gpm
<b>Series 20</b>	38 - 151 l/min 10 - 40 gpm
<b>Series 25</b>	95 - 189 l/min 25 - 50 gpm
<b>Series 40</b>	151 - 227 l/min 40 - 60 gpm
<b>Torque Generators</b>	11 - 19 l/min 3 - 5 gpm

# Xcel<sup>45</sup> product overview

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- Flow rating up to 45 LPM [12 GPM]
- Displacements up to 500 cc [30.5 in<sup>3</sup>]
- Various system options offer design flexibility
  - Load Sensing
  - Open Center
  - Closed center
- Robust housing design provides 190 bar max [2755 psi] system pressure capability for all models
- Six Integral Valves enable multiple configuration options:
  - Check Valves for Limited Manual Steering
  - Inlet Relief Valve
  - Inlet Check Valve
  - Cylinder Relief Valve
  - Load Sensing Relief Valve
  - Anti-cavitation Valve
- Innovative valving design provides optimized gain characteristics and reduced hydraulic noise level
- Dual Displacement configuration available
- Optional features: Q-Amp, Load Reaction



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## Target Platforms:

- Forage harvesters
- Self-propelled sprayers
- Sugarcane harvesters
- Aerial work platforms
- Forklifts
- Wheel loader (compact)
- Combines
- Tractors

## Superior to the Competition:

- Low slip at the cylinder stops
- Low noise open center designs
- Q-amp to enable efficient powered steering while maintaining manual steering capability

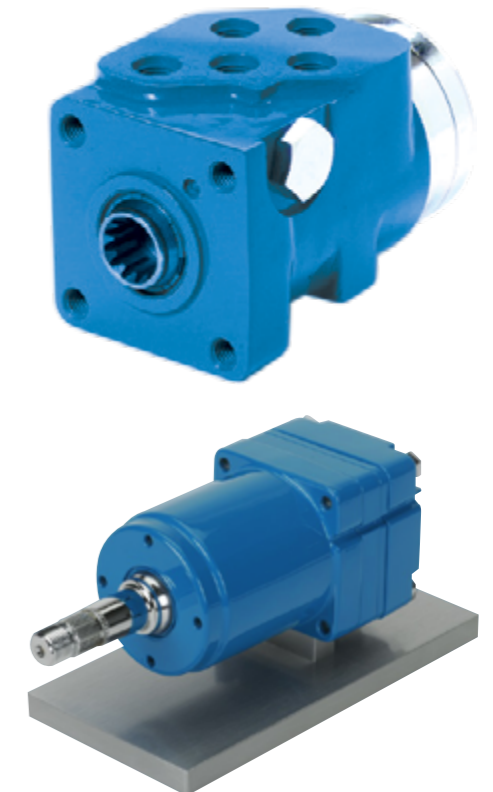
## Important links

## Series 5 product overview

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- Compact design for low flow, low pressure applications
- 140 bar max [2755 psi] system pressure capability
- Flow available to 19 lpm – 5 GPM
- Displacements up to 146 cc/rev – 8.9 in<sup>3</sup>/rev
- Best in-class steering feel and crisp centering
- Optional power beyond steering control units supply steering and flow to auxiliary valve functions for open center (fixed displacement pump) systems in the medium pressure range
- Various system options offer design flexibility
  - Load Sensing
  - Open Center
  - Closed Center

- End-ported configuration available
- Optional features: STC Direct Porting and Integral Column
- Integral Valve options
  - Manual Steering
  - Inlet Check Valve
  - Inlet Relief Valve
  - Cylinder Relief Valves
  - Anti-Cavitation Valves
  - Load Sense Relief Valve



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### Target Platforms:

- Compact utility vehicles
- Small tractors
- Fork lift trucks
- Turf-care

### Superior to the Competition:

- Balanced architecture to reduce vehicle drift
- End and side porting; allows for greater design and assembly flexibility
- Widest displacement and highest pressure rating for similar frame sized steering control unit

### Important links

[Parts and Repair Catalog](#)



# Series 10 product overview

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- Designed for moderate flow, high pressure applications
- Industry-leading pressure rating of 275 bar/4000 psi
- High-pressure rating reduces overall equipment costs, as smaller cylinder sizes can be assigned into the system
- No stiction/binding at high standby pressures
- Flow rating up to 76 LPM [20 GPM]
- Displacements up to 740 cc [45.1 in<sup>3</sup>]
- Ultimate SCU for mid-range flow applications
- Ideal for heavy-duty equipment, such as construction and agricultural machinery
- An internal, balanced architecture and a widewalled sleeve that is 40% thicker than standard designs offer increased performance during transient pressure conditions

- Several patented technologies available
- Balanced Architecture
- Optional features: Q-Amp, 2-Speed, Dual Displacement, VersaSteer, Wide Angle, Cylinder Damping, STC Direct Porting and Load Reaction
- Various system options offer design flexibility
  - Load Sensing
  - Open Center
  - Open Center with Power Beyond
  - Closed Center
- Integral Valves



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## Target Platforms:

- Wheel loaders
- Tractors
- Backhoe loaders
- Harvesters
- Road/Paving equipment
- Articulated vehicles
- Self-Propelled sprayers
- Aerial work platforms

## Superior to the Competition:

- No friction or binding at high standby pressures
- Balance architecture and optimized spool/sleeve design reduces vehicle drift and enables smooth performance even under high standby and transient pressure conditions
- Highest pressure rating available in the market

## Important links

[Parts and Repair Catalog](#)

[Wide Angle Technical Brochure](#)

[Dual Displacement](#)

## Series 20 product overview

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- Up to 241 bar max [3500 psi] system pressure capability
  - Flow rating up to 151 LPM [40 GPM]
  - Displacements up to 985 cc [60 in<sup>3</sup>]
  - Load Sensing standard on all units
  - Standard Wide Angle provides smoother steering function on articulated vehicles
  - Wide Angle simplifies systems by reducing need for cushion valves and accumulators
  - Balanced architecture allows for industry-leading pressure and flow ratings
  - Eaton's high capacity gerotor provides ample fluid displacement in a compact unit
  - Robust design provides machine stability in the most demanding applications
- Seal and centering spring designs provide positive, low-effort steering feel for excellent vehicle control
  - Integral Valves enable multiple configuration options:
    - Manual Steering check valve
    - Inlet Check Valve
    - Cylinder Relief Valve
    - Load Sensing Relief Valve
    - Anti-cavitation Valve
  - Optional features: VersaSteer, Q-Amp and Cylinder Damping



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### Target Platforms:

- Articulated dump truck
- Wheel loaders
- Forestry equipment

### Superior to the Competition:

- Compact design
- Typically higher flow capability with lower pressure drop than the competition
- Smoothest steering available for articulated chassis with Wide Angle & Cylinder Damping

### Important links

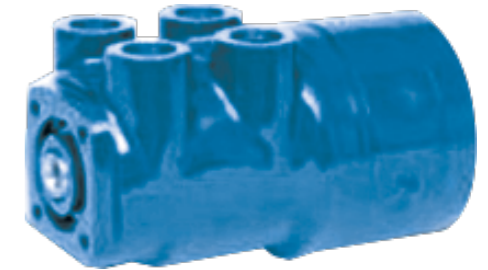
[Parts and Repair Catalog](#)

# Series 25 product overview

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- Up to 241 bar max [3500 psi] system pressure capability
- Flow rating up to 189 LPM [50 GPM]
- Displacements up to 1230 cc [75 in<sup>3</sup>]
- Pilot Pressure Port for diagnostics or increased priority valve flow
- Balanced architecture and optimized spool/sleeve design enables smooth performance even under high standby and transient pressure conditions
- Balanced, precise servo response and uniform steering action
- Optimized Gerotor provides significant flow and displacement in a compact package
- High-grade ductile iron housing provides increased strength for the most demanding applications
- Seal and centering spring designs provide positive, low-effort steering for excellent vehicle control
- Responsive, reliable and cost-effective solution versus multi-valve pilot steering systems

- Various system options offer design flexibility
  - Load Sensing
  - Open Center
  - Closed Center
- Optional features: Wide Angle, Q-Amp and Cylinder Damping
- Integral Valves enable multiple configuration options:
  - Cylinder Relief Valve
  - Anti-cavitation Valve



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## Target Platforms:

- All articulated vehicles
- Wheel loaders
- Forestry equipment
- Articulated tractors

## Superior to the Competition:

- More compact and cost competitive than other steering solutions
- Typically lower pressure drop than the competition
- Smoothest steering available for articulated chassis with Wide Angle & Cylinder Damping
- Competitors require additional valves to match flow and displacement

## Important links

[Parts and Repair Catalog](#)

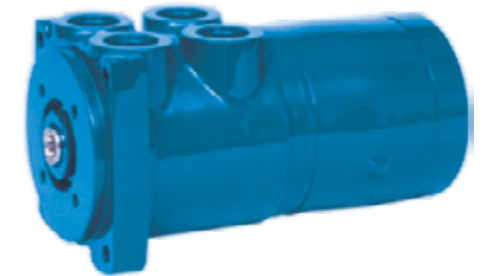
[Wide Angle Brochure](#)

## Series 40 product overview

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- Up to 241 bar max [3500 psi] system pressure capability
- Flow rating up to 227 LPM [60 GPM]
- Displacements up to 3030 cc [185 in<sup>3</sup>]
- Pilot Pressure Port for diagnostics or increased priority valve flow
- Balanced architecture and optimized spool/sleeve design enables smooth performance even under high standby and transient pressure conditions
- Balanced, precise servo response and uniform steering action
- Optimized Gerotor provides significant flow and displacement in a compact package
- High-grade ductile iron housing provides increased strength for the most demanding applications

- Seal and centering spring designs provide positive, low-effort steering for excellent vehicle control
- Various system options offer design flexibility
  - Load Sensing
  - Open Center
  - Closed Center
- Optional features: Q-Amp and Cylinder Damping



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### Target Platforms:

- Articulated and rigid dump trucks
- Mining trucks
- Paving equipment
- Loaders
- Scrapers frame vehicles
- Large front end loaders
- Large graders
- Mining trucks
- Articulated haulers
- Transporters
- Large dump trucks

### Superior to the Competition:

- Largest flow and displacement capability in a single Steering Valve in the market

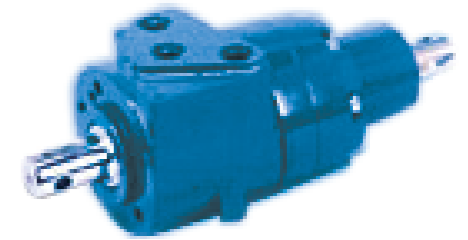
### Important links

[Parts and Repair Catalog](#)

# Torque Generator product overview

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- Up to 131 Nm [1160 lb-in] output torque
- Flow rating up to 19 LPM [5 GPM]
- Displacements up to 160 cc [9.7 in<sup>3</sup>]
- Input and output shaft are mechanically linked
  - Direct mechanical connection between steering wheel and steered wheel
  - Inexpensive power assist for steering
  - Easy to upgrade mechanical steering systems
- Geroler option
  - Offers longer life with less wear on the star
  - Minimizes friction and improves efficiency
  - Reduced friction option available for improved efficiency
- Optional needle bearing on output shaft for direct mount sprockets or pinions



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## Target Platforms:

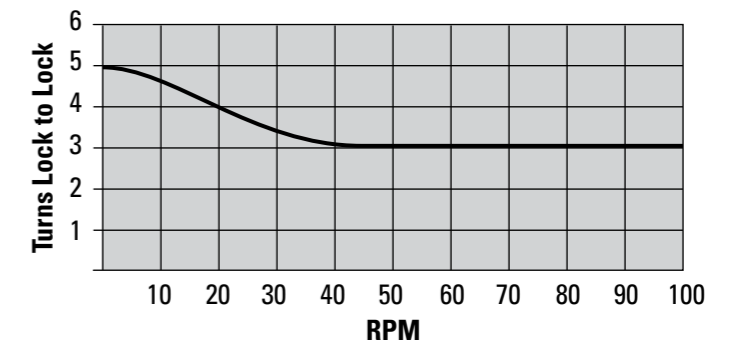
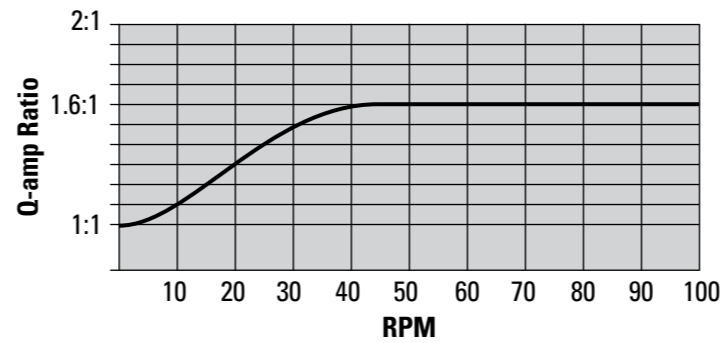
- On-highway vehicles
- Lift trucks
- Small tractors
- Rice planters
- Applications where the customer doesn't have room for a cylinder
- Manually operated gates and valves

## Important links

[Learn more about Torque Generator](#)

# Q-Amp flow amplification overview

- Eliminate the trade off between roading performance and work cycle efficiency
- Variable ratio steering
- Increased steering flow is proportional to steering wheel speed
- Customizable ratios
- Maintains manual steering capability for certain vehicles
- Reduces required gerotor size
- Intuitive operation



## Target Platforms:

- High displacement steering units
- Vehicles with manual steering requirements
- Vehicles that work in various environments (conventional driving/roading or work cycle)

## Superior to the Competition:

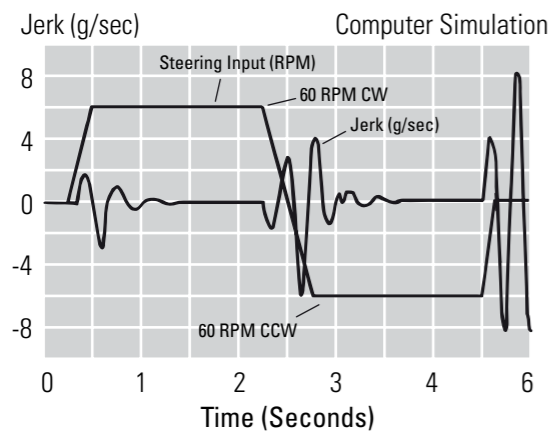
- Available across a wide range of displacements

## Important links

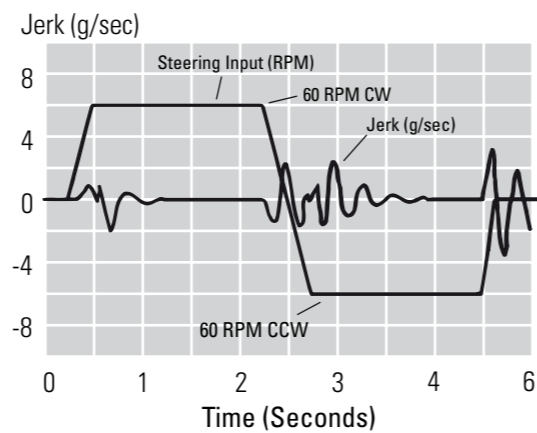
[Learn more about Q-Amp](#)

# Wide Angle technology

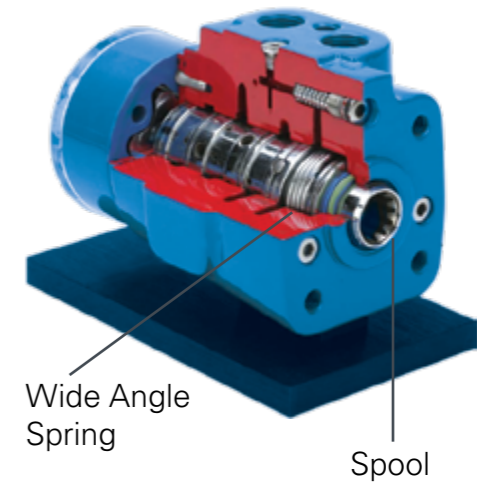
- Significantly improves steering smoothness for start and stop steer conditions on articulated vehicles
- Reduces lateral jerk by a factor of 2!
- Improves operator efficiency and reduced operator fatigue
- Eliminates system need for accumulators and cushion valves
- Available only from Eaton



**Standard Steering on a 25 Ton Loader**



**Wide Angle Steering on a 25 Ton Loader**



# VersaSteer™ operation

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- Dual operator-selectable steering modes in one compact steering control unit
- “Metered Steering” mode for conventional driving or roading
  - Steering (flow) is a function of steering wheel speed
- “Quick Steering” mode for high productivity
  - Steering (flow) is a function of steering wheel angle
- Used in environments where the operator performs fast turns repeatedly
- Reduces operator effort when turning lock to lock
- Requires Wide Angle feature
- Low cost alternative to joystick steering



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## Superior to the Competition:

- Dual steering modes in one integrated Steering Control Unit (SCU)
- Compact and versatile design for tight space constrains
- High pressure rating and flow capabilities
- Compatible with current steering options
- Easily retrofit to existing vehicles

## Important links

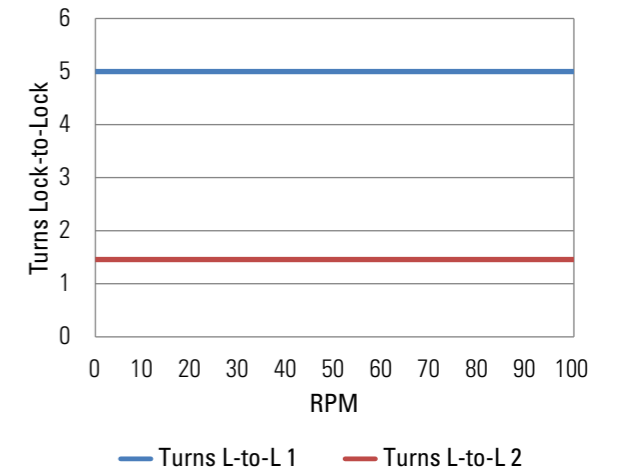
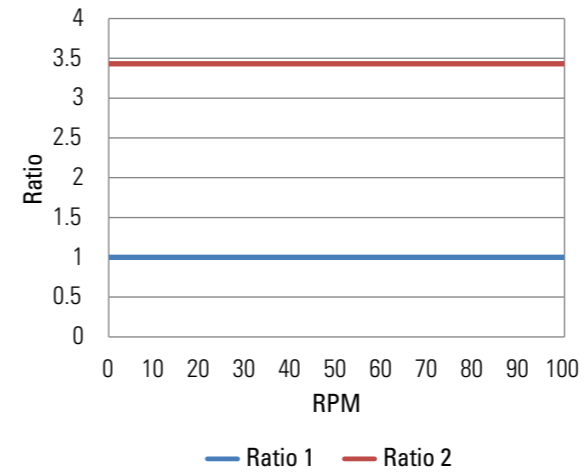
[Learn more about VersaSteer™](#)



# 2-Speed

## Benefits

- Two selectable displacements in one
- Smaller displacement while roading, emergency steering
- Larger displacement during work cycle
- Precise control at both steering speeds
- More aggressive displacement ratios than Q-Amp possible
- Improves operator efficiency while maintaining precise vehicle control



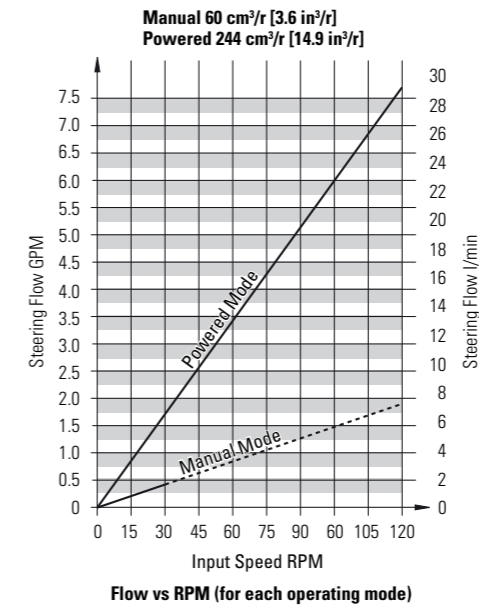
## Target Platforms:

- Backhoe loaders
- Tractors
- Telehandlers
- Lawn & turf equipment
- Sweepers
- Sprayers
- Combines
- Forklifts

# Dual Displacement

## Benefits

- Full displacement engaged when machine is on and operating
    - Same performance as standard Eaton SCU
  - Diverts to smaller displacement when pressure is lost
    - Increases mechanical advantage in unpowered manual steering
    - Eliminates need for back-up emergency system\*
- \* Manual steering capability must be verified by OEM where applicable



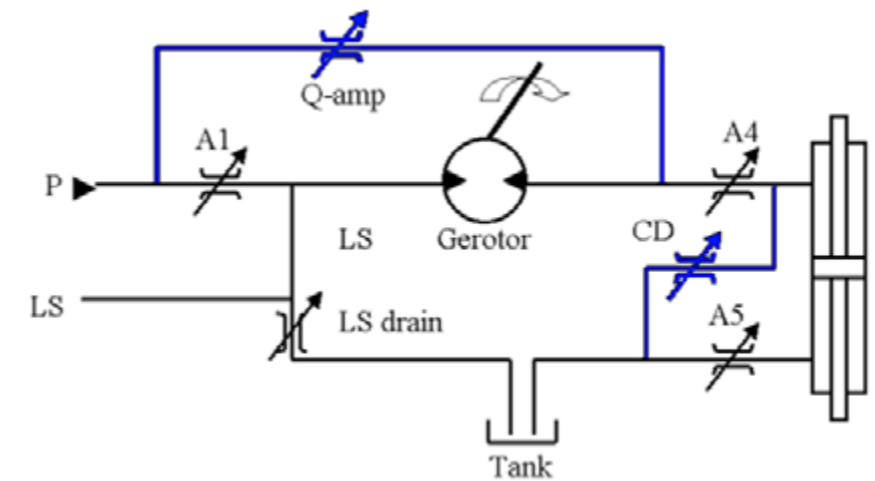
## Target Platforms:

- Tractors
- Combines
- Sprayers
- Compact wheel loaders

# Cylinder Damping

## Benefits

- Dissipates energy to prevent unstable vehicle control
- Dampens or stabilizes unstable systems
- Improves operator comfort and efficiency
- No additional moving parts
- Requires Q-Amp



## Target Platforms:

- Articulated vehicles
  - Wheel loaders
  - Skidders
  - Scrapers

# Quick product index

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Xcel<sup>45</sup>

Series 5

Series 10

Series 20

Series 25

Series 40

Torque Generator

**Learn more about  
critical performance  
features**

## Links to more steering solutions information

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