

The power to
design, engineer
and build without
compromise.



Introducing the Eaton® CLS Load
Sensing Sectional Mobile Valve

EATON

Powering Business Worldwide

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CLS features and benefits

Build without compromise

- Market-leading functionality that eliminates compromise
- Broad range of configuration options for ultimate design flexibility
- Part of Eaton's advanced class of Pro-FX ready products a faster path to smarter machines
- Global network of Eaton-certified experts for end-to-end application support

Features that drive Productivity, Performance, & Efficiency

- Patented load sense bleed for reduced parasitic losses and improved system response
- Patented sectional load sense relief for improved energy efficiency and dynamic response
- Priority flow sharing for improved controllability in all load conditions and continuous performance



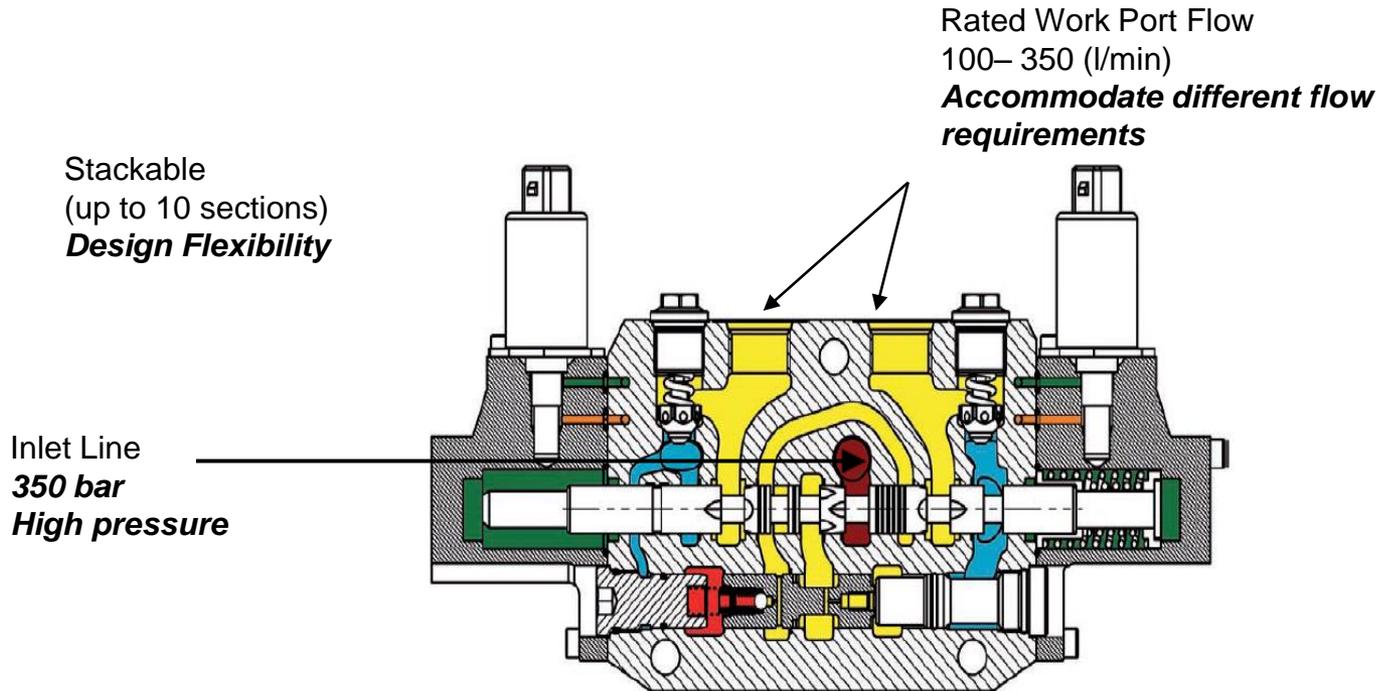
CLS features and benefits

CLS technical specifications

- Four frame sizes: CLS100 (100 LPM), CLS180 (180 LPM), CLS250 (250 LPM) and CLS350 (350 LPM)
- 350 bar max
- CLS100 available in pre and post compensated sections in the same valve assembly
- Sectional construction with up to 10 sections per bank
- Versatile actuation options which include manual, hydraulic pilot, pneumatic, EH, plus manual override levers.
- Standard offering of transition plates and mid-inlets



Market Leading Features



Stackable
(up to 10 sections)
Design Flexibility

Rated Work Port Flow
100– 350 (l/min)
Accommodate different flow requirements

Inlet Line
350 bar
High pressure

Priority Flow Sharing
Prevents loss of controllability
Elimination of bleed off
Machine efficiency

Pressure Relief on LS Signal
Per Section
Machine efficiency
Energy Savings



CLS Series Valve Features

- Unique Feature – priority flow sharing
- Patented load sense bleed off
- Patented load sense Relief for both pre and post compensated sections
- 15° Coil Orientation
- Industry Leading Modularity
 - Various section flow ranges with standard mid inlets and transition plates
 - Versatile actuation options



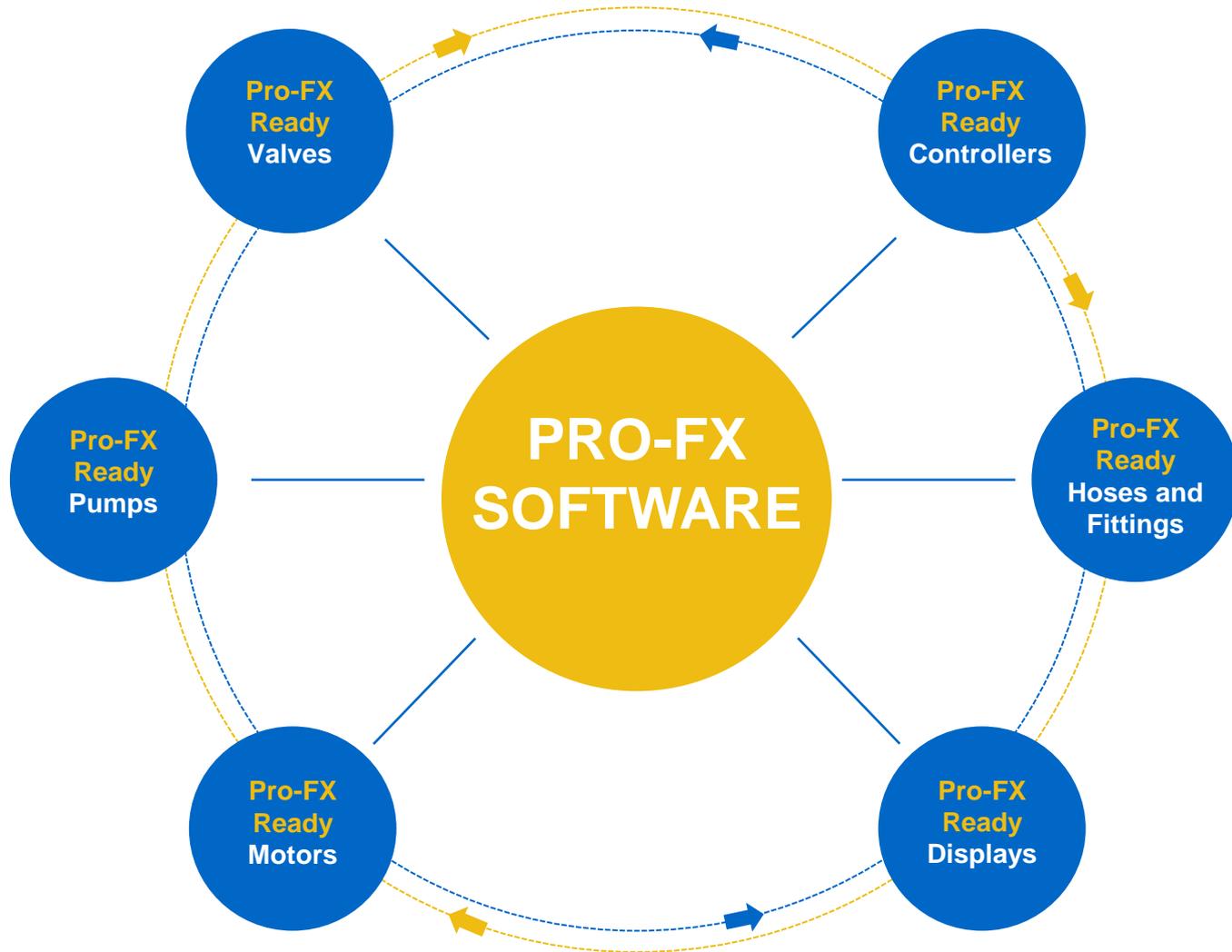
CLS Post-Compensated LS Valves - General Specifications and Options

Pre-Compensated sections also available for CLS100



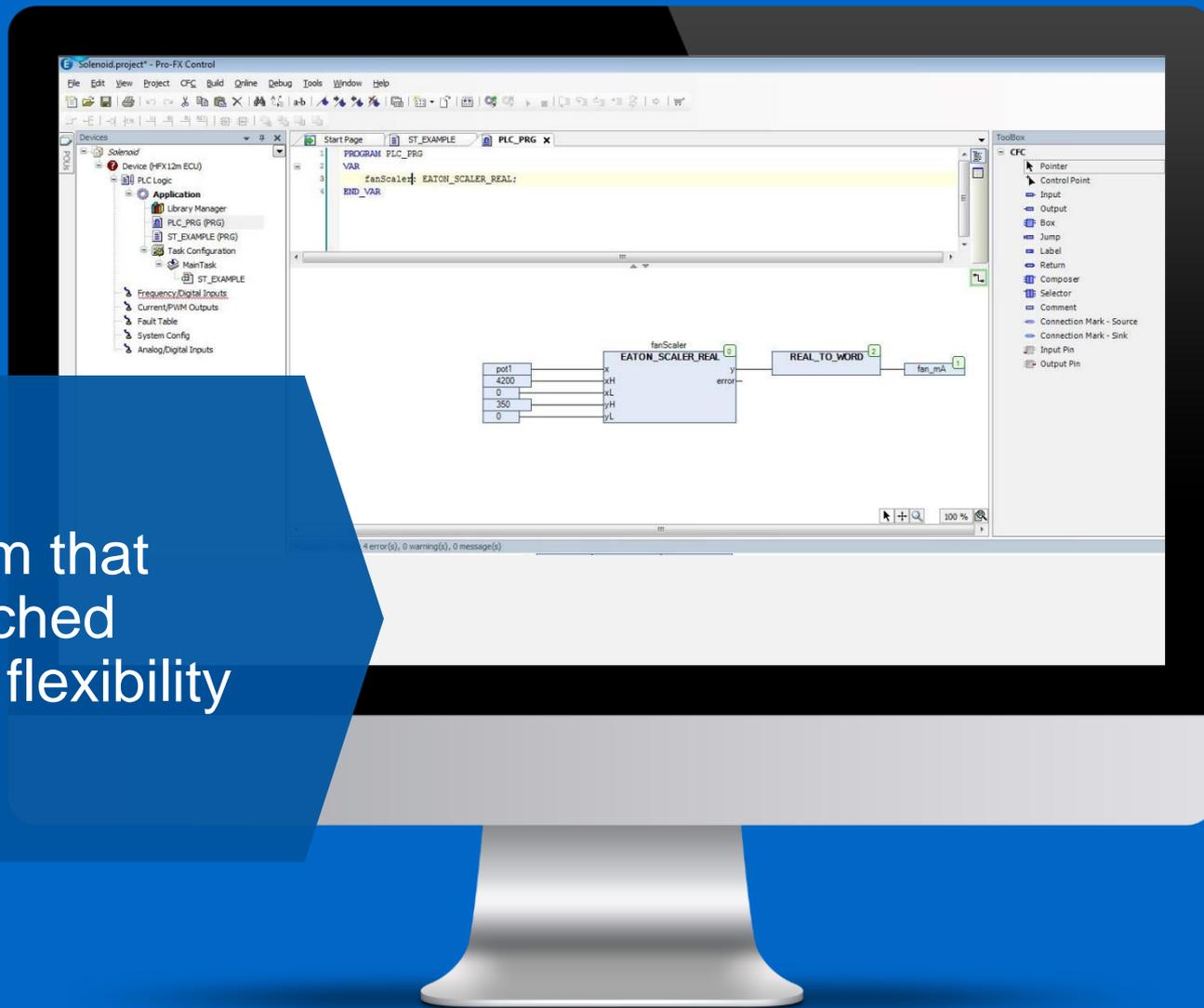
SPECIFICATIONS	CLS100	CLS180	CLS250	CLS350
Max Number of Working Sections	10	10	10	8
Sectional Nominal Thickness (mm)	38	46	54	72
Spool Stroke (mm)	7	7	9	11
RATED FLOW				
Pump Flow Rate (l/min)	150	220	300	450
A/B Port Flow Rate (l/min)	100	180	250	350
RATED PRESSURE				
Working Pressure Inlet Port P (bar)	350	350	350	350
Max Pressure Outlet Port T (bar)	25	25	25	25
OPTIONS				
Unload Valve for Fixed Displacement Pump (Open Center)	•	•	•	•
LS Signal Pressure Relief Valve	•	•	•	•
Pump Pressure Relief Valve – Full Flow	•	•	•	•
LS Signal Dump Valve (Electric 12/24 Vdc)	•	•	•	•
Pump Full Flow Dump Valve (Electric 12/24 Vdc)	•	•		
Anticavitation Valve – A/B Ports	•	•	•	•
Port Relief/Anticavitation Valve – A/B Ports	•	•	•	•

Pro-FX Technology Platform





Open platform that
offers unmatched
freedom and flexibility



What challenges are
you experiencing?



Key benefits of CLS Valve

- Design Flexibility
- Lower Cost Systems
- Drive System Efficiency
- Productivity



Design Flexibility

Problem:

Given all the recent regulations and the need for machine updates, I need a valve that offers me a lot of flexibility

CLS Solution:

CLS offers four frame sizes with flow rates of 100,180,250, and 350 with a wide range of actuation options.

Most competitive valves **offer too few actuation methods**, forcing the customer to adapt the system to what is available

Space is a premium, some competitive valves are **too big**, occupying valuable real estate

With CLS valves, there is **greater design flexibility**, with actuation options of manual, hydraulic, electrohydraulic, manual override levers, and more

CLS features modular valve banks with up to 10 sections, taking minimal space in the machine envelope. **With compact space, it is easier to work with. And less need to “reorganize” component layout**



Lower Cost Systems

Problem:

Multiple components from multiple suppliers must be integrated to meet an optimal range of flow demands

CLS Solution:

CLS can combine different frame sizes in a single valve bank by offering a number of configuration options with mid inlets and transition plates. Additionally, unique CLS features can optimize your system and drive down cost.

Sometimes the amount of hydraulic content on my machine really **drives up machine cost**

With CLS valves mid inlets and transition plates, you only need one inlet, **driving down cost with fewer components**

With priority flow sharing and patented sectional load sense relief, customers can design in lower HP engines or smaller displacement pumps, **driving down cost on major system components**



System Efficiency / Productivity

Problem:

With operating cost and performance being buying criteria, my end user customers are looking for equipment that will lower their cost while driving high production.

CLS Solution:

CLS offers us a number of market leading functionality options that improve efficiency.

Inconsistent multiservice movement during pump saturation, **slows operator productivity or can even stall / stop the machine.**

Wasted energy can be found in valves speced using a full flow port relief to limit the actuator's pressure.

CLS100 offers priority flow sharing (pre and post comp valves in the same assembly) ensuring priority functions maintain speed while other function are reduced proportionally, **improving controllability in all conditions with the added benefit of operator safety**

CLS offers a patented section load sense relief for pre and post compensated sections. This feature limits actuator pressure at the work port without absorbing the full flow, **consuming very little energy.**



Efficiency / Productivity (Slide 2)

Problem:

With operating cost and performance being buying criteria, my end user customers are looking for equipment that will lower their cost while driving high production.

CLS Solution:

CLS offers us a number of market leading options that improve functionality and efficiency.

Traditional valves use a load sense bleed orifice to unload the load sense pressure, **which can slow response time and decreases efficiency**

CLS offers a patented load sense bleed off, which eliminate the bleed orifice once the valve is in stroke, **this reduces parasitic losses and improved system response.**

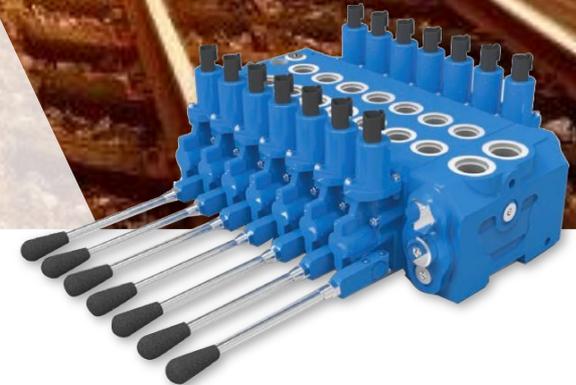
Eaton CLS 100 Valve Railway Maintenance Equipment (Tie Crane) Manufacturer

Current Situation

- Manufacturer designing next generation crane to comply with tier 4 regulations
- Previous design used
 - Cummins 3.3 liter, 80 hp, tier 3 engine,
 - PVH 74 pump and competitor pre-compensated, load sense, proportional valves

Challenge

- Comply with tier 4 regulations
- Reduce machine cost and improve operator productivity



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Customer Visit - Evaluate duty cycle and evaluate needs/opportunities

Loading old ties to flat car

1. Position grapple to tie and clamp
2. Move tie to flat car with simultaneous operation:
 - With LH joystick, raise boom while moving the stick inward.
 - With RH joystick, rotate grapple and slew crane to line up with flat car on the tracks
3. Position grapple to flat car and unclamp tie

Customer Needs & Opportunities

1. Multi-Functioning

- A experienced operator can saturate pump supply during simultaneous operation of boom, stick, grapple rotate, and slew functions. Slew function is most important for productivity

2. Grapple function

- Requires pressure limitation (1000 psi)

3. Boom function

- Need pressure limit (1000 psi) on boom down to prevent machine tipping; but need full system pressure for boom up.

4. Slew function

- Requires pressure limitation (1500 psi) for acceleration and deceleration (2000 psi)

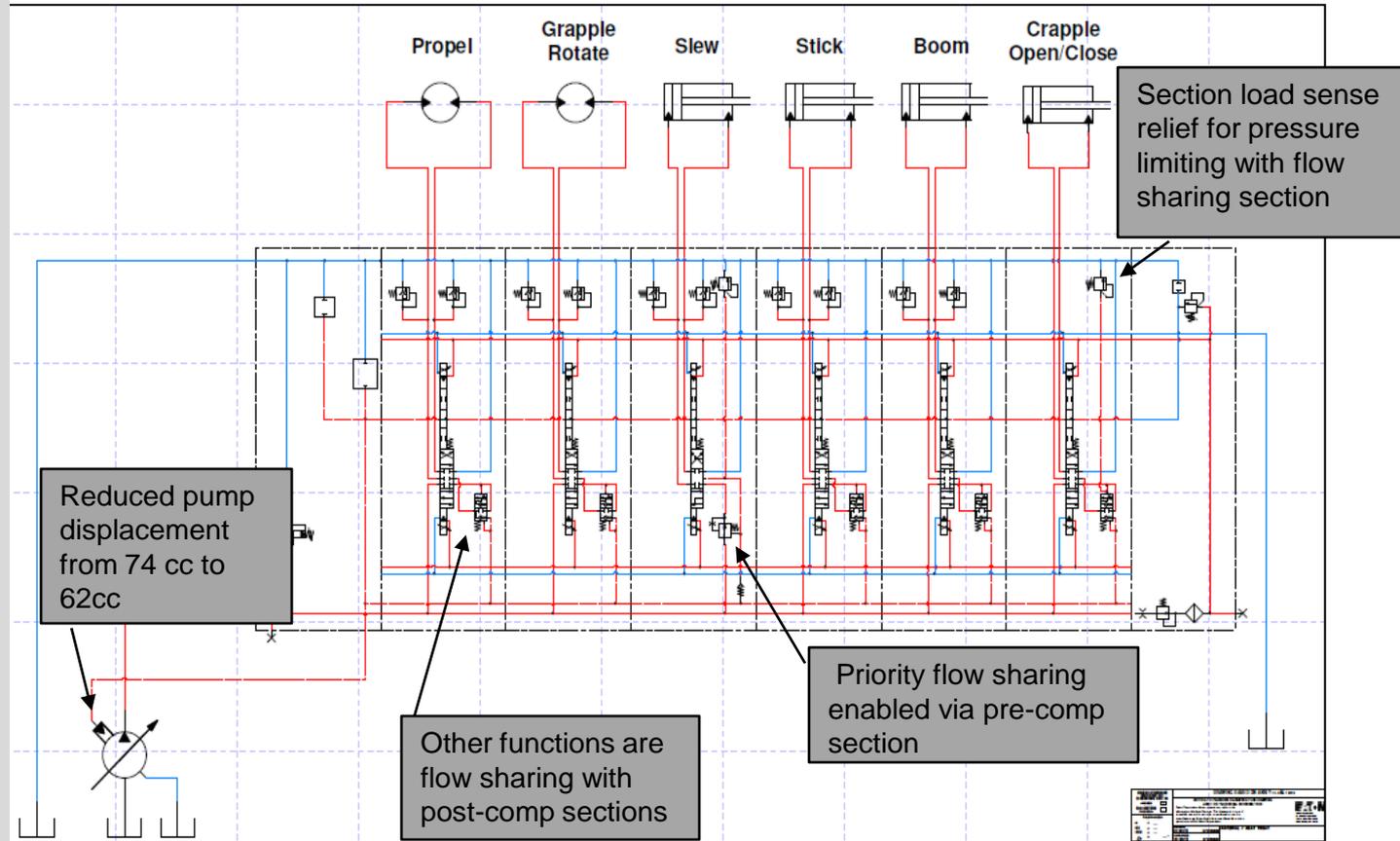
CLS 100 Solution

CLS Valve:

- Priority Flow Sharing is specified to maintain priority flow for slew function and balance of functions will be flow sharing
- Unique LS section relief utilized for grapple function

Advantages:

- Reduces hp consumption by 10 hp; enabling use of lower displacement pump
- HP Savings enabled use of Tier 4 compliant engine (Cummins 2.8 L, 74 hp, tier 4).
- Machine productivity is increased with priority flow sharing



CLS Valve Delivers Value with Unique Offerings

Benefit Summary

System Component	Estimated Design Change Savings (\$USD)
Engine - (80 hp tier 3 to 74 hp tier 4)	\$2,000
PCLS Pump- (Reduced displacement from 74 cc to 62 cc)	\$200
Control Valve- (Changed to Eaton CLS 100)	Even
System Component Total	\$2,200
Other Benefits	
Improved operator productivity and control with priority flow sharing	
Tier 4 Compliance	

Eaton CLS Valves Offer Significant Potential for System Cost Savings and Improved