CMA90
Advanced
Independent-Metering Mobile Valve

90LPM
440 bar
CAN Bus

EATON
Powering Business Worldwide

Contents

Introduction

The CMA90 is an advanced CAN-Enabled electro-hydraulic sectional mobile valve with independent metering that utilizes pressure and position sensors, on board electronics, and advanced software control algorithms. Where conventional mobile valves often compromise on precision or response, the CMA delivers both. The CMA offers high performance with sub micron hysteresis, closed loop control over the spool position, and repeatable performance.

CMA offers customers the next generation in advanced mobile valves with unlimited possibilities to differentiate your machine capabilities.

Key Benefits of this advanced mobile valve include:

- Precise control maintained for all load conditions
- Reduction in metering losses / energy management
- High valve responsiveness
- Flow Sharing – Pre and Post Comp Capabilities
- Flexibility in configuration / easily change parameters
- Command factory-calibrated flow or pressure from either work port
- Easier communication with the valve
- Reduced load on the Vehicle CAN bus
- Advanced Diagnostics for improved reliability and productivity
  - Hose Burst Detection
  - Limp mode
  - Diagnostics on the inlet, tank, load sense, work port pressures, spool position, consumed flow, and oil temperature.
- Platform can support future software development for future product development.
- Reliable performance across a broad temperature range

CMA90 Specifications and Performance

Pressures	
Inlet Rated	380 bar (5511 psi)
Inlet Max	440 bar (6382 psi)
Work Port Rated	380 bar (5511 psi)
Work Port Max	440 bar (6382 psi)
Tank*	Max 30 bar (435 psi)
Flow	
Work Port (max)	90 lpm (24 gpm) @ 14 bar Δ P
Leakage	
Max Leakage**	20 cc @100 bar @ 21 cst
Construction	
Sectional	Up to 8 sections per block
	Up to 15 sections per VSM
Port Types	
	SAE O-ring
	BSP
Inlet Section Options	
	Variable Displacement (Load Sensing)
Work Section Options	
Standard Spools	90 lpm (24 gpm)
Work Port Valves	Anti-Cavitation
	Port Relief & Anti-Caviation
	Port Relief
Actuation	
Primary	CAN
Emergency	Mechanical Override

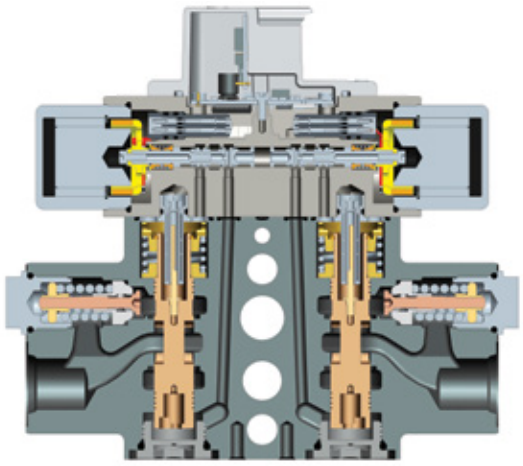
Temperature	
Ambient (operating)	-40°C to 105°C
Standard Oil (operating)	-40°C to 85°C
Extended Oil (operating)	-20°C to 105°C
Storage	-40°C to 105°C
Filtration	
ISO 4406	18/16/13
Electromagnetic Protection	
Conducted Emissions	CISPR 25; 2008.ISO 13766:2006. EN13309:2010. ISO14982:2009
Radiated Emissions	CISPR 25; 2008.ISO 13766:2006. EN13309:2010. ISO14982:2009
Radiated Immunity	ISO 11452,
Electrostatic Discharge	ISO 10605 and SAE J1113-13
Reverse Supply Protection	-36v
Transient Immunity	ISO 7637-2:2007
Environmental	
Ingress Protection	IP67
Oil Temperature Viscosity	
Recommended Viscosity	85 to 10 cSt
Absolute Maximum Viscosity	2250 cSt
Absolute Minimum Viscosity	7 cSt
Electrical	
Input Voltage	9 - 32 VDC
CAN Interface	J1939 2.0B
	CAN Open
Electrical Interface Connectors	
Deutsch (VSM)	DT06-12SB-P012
Deutsch (VSE)	DT06-12SA-P012

*With manual override, tank limited to 10 bar (145 psi) maximum. Max 30 bar is at constant rate.
**Data taken from work port to tank

CMA Cross Sections

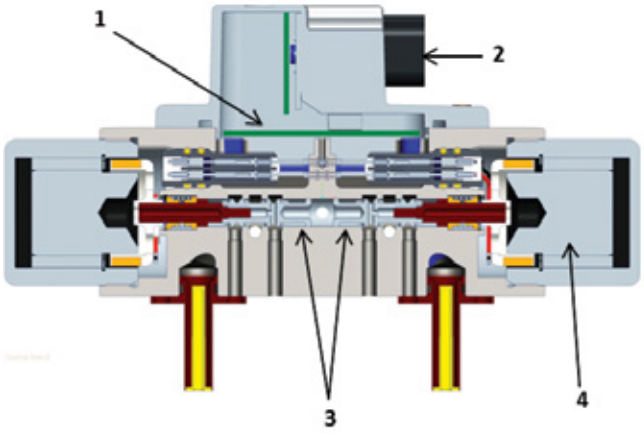
Valve Cross Section:

1. Pilot Valve
2. Main Stage
3. Linear Position Sensor
4. Port Reliefs / Anti Cavs
5. Main Metering Spools
6. Work Port A
7. Work Port B



Pilot Valve

1. Embedded Micro Controller
2. Deutsch Connector Interface
3. Independent Pilot Valves
4. Linear Force Motors



CMA Cross Sections

Principles of Operation

The work section is comprised of two independent spools that act as a pair working to control double acting services, or alternatively as single spools controlling a single acting service (2 single axis services can be controlled from any work section).

Demands to each work section are transmitted over a CAN Bus and power is provided to each work section via a single daisy chain cable arrangement. Each work section has a single pilot valve comprised of on-board electronics, embedded sensors, and two independent 3 position 4 way pilot spools driven by a low power embedded micro controller.

The independent pilot spools control the mainstage spools. Closed loop control of each work section is done locally by leveraging the on-board electronics and sensors.

Each mainstage spool has its own position sensor enabling closed loop position control of the mainstage spool.

Further, a pressure sensor is located in each work port, pressure line and tank line.

With the up and downstream pressure information known at any time, flow delivered to the service can be controlled by moving the spools to create the appropriate orifice area for the desired flow rate.

Figure 1: CMA system with Load-Sensing Inlet & a single work-section

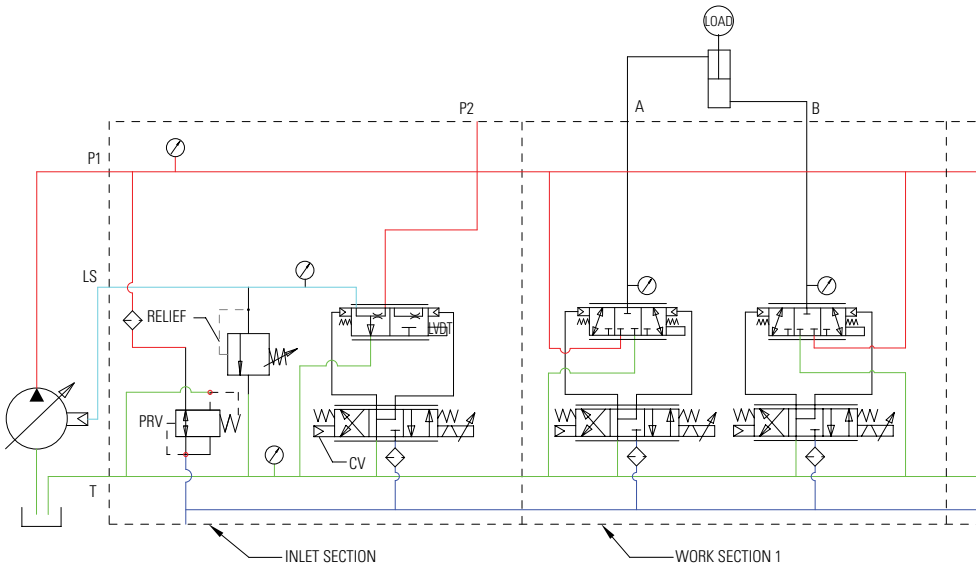
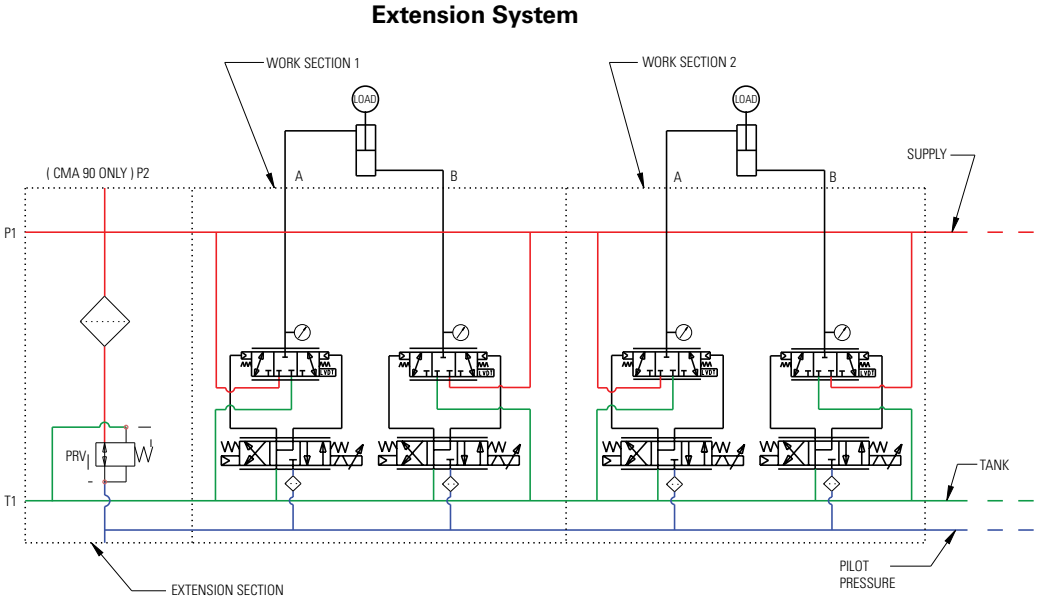


Figure 2: Extension Inlet



CMA System Layout

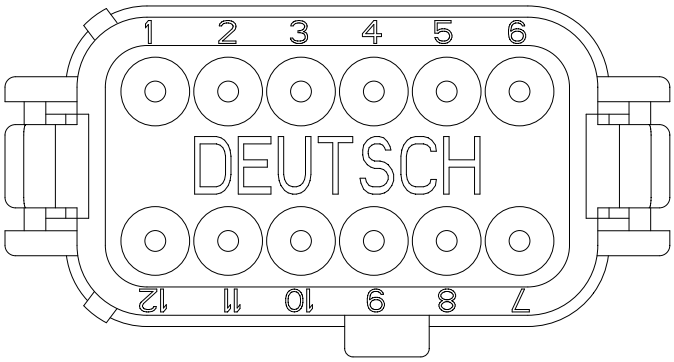
There are multiple interconnection options for the CMA90 valve systems.

The following illustrates possible system configuration options. Configuration is dependent on application requirement and is constrained by the following rules:

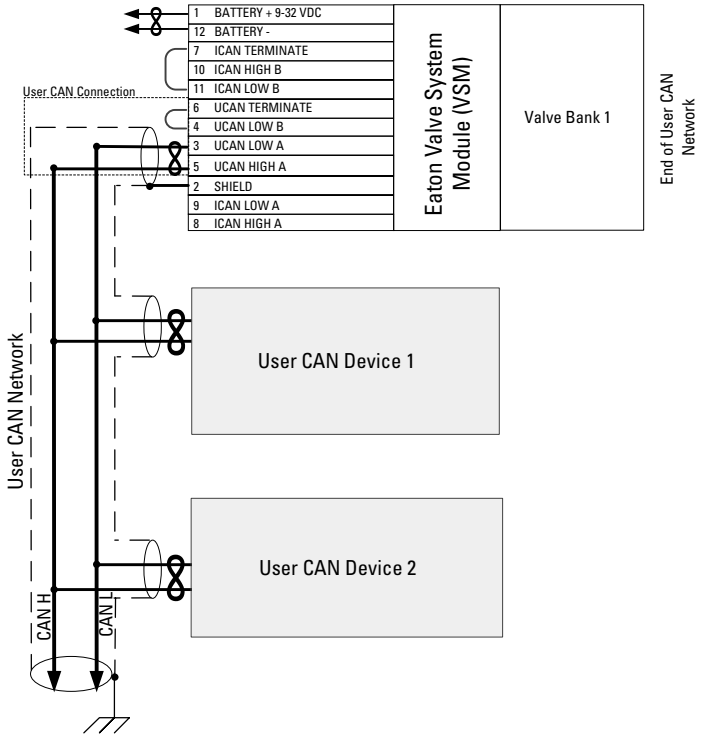
- Sectional construction with up to 8 sections per bank
- Maximum 15 sections per Valve System Module (VSM)
- One VSM and CV required per system
- If distance between an extension valve bank and the VSM or VSE is less than 6 meters, they can be connected using a daisy chain extension cable. See options on page 12
- If distance between valve banks is greater than 6 meters, they must be connected using a VSE and external wiring harness. Max distance between a VSM and VSE is 30 meters. See page Total Interconnect CAN(ICAN) Wiring Lengths
- No more than two (2) valve system extenders (VSE) per system
- If more than 15 work sections are required, this can by accomplished by using additional CMA systems and their corresponding VSM. Additional VSMs will appear as another Node on the User CAN Network.
- If application specific Electromagnetic Compatibility testing indicates CAN cable shielding is needed, connect CAN shield as shown

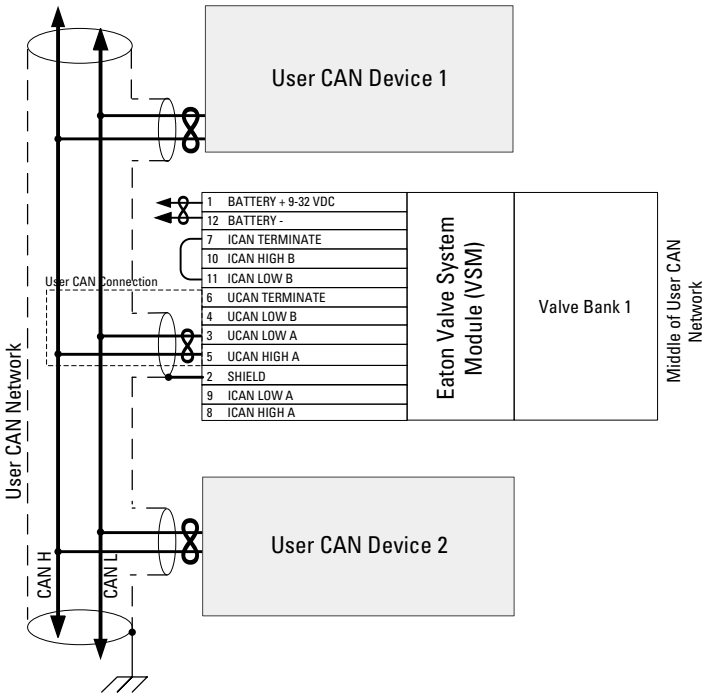
DT Series DT06-12S?-P012

View of Contact / Wire Insertion Side of Connector Body



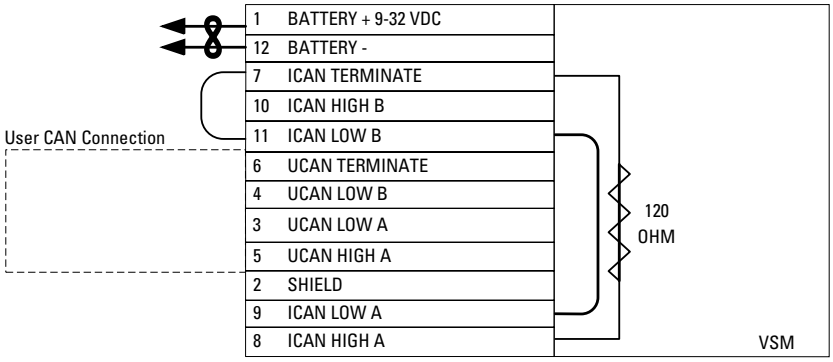
User CAN Diagram



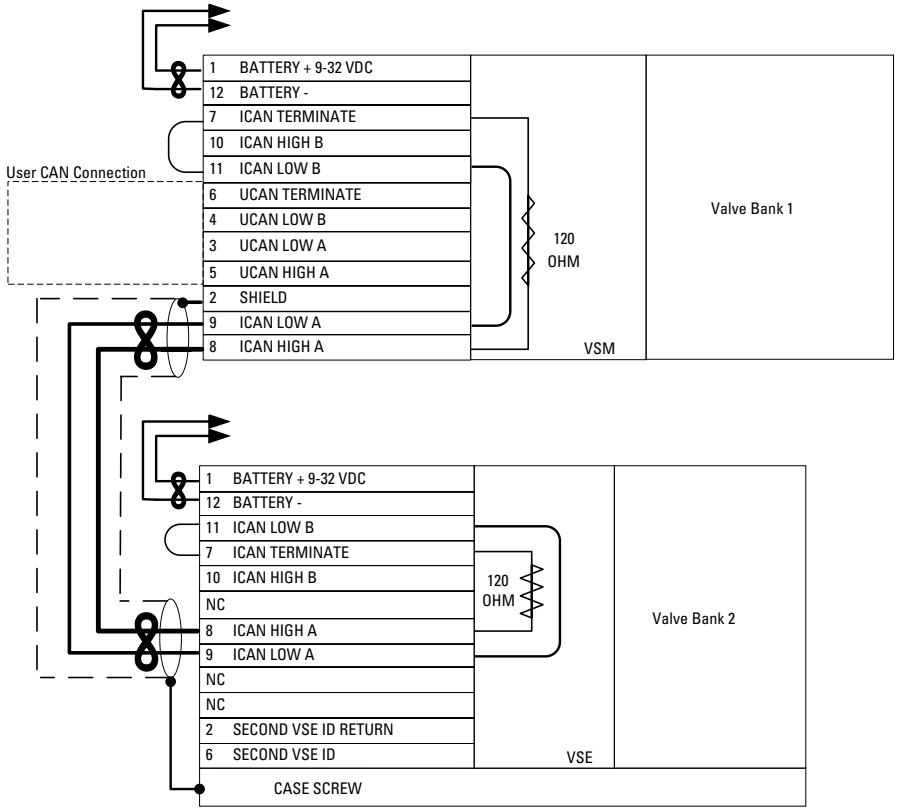


CMA System Layout

Single Base System

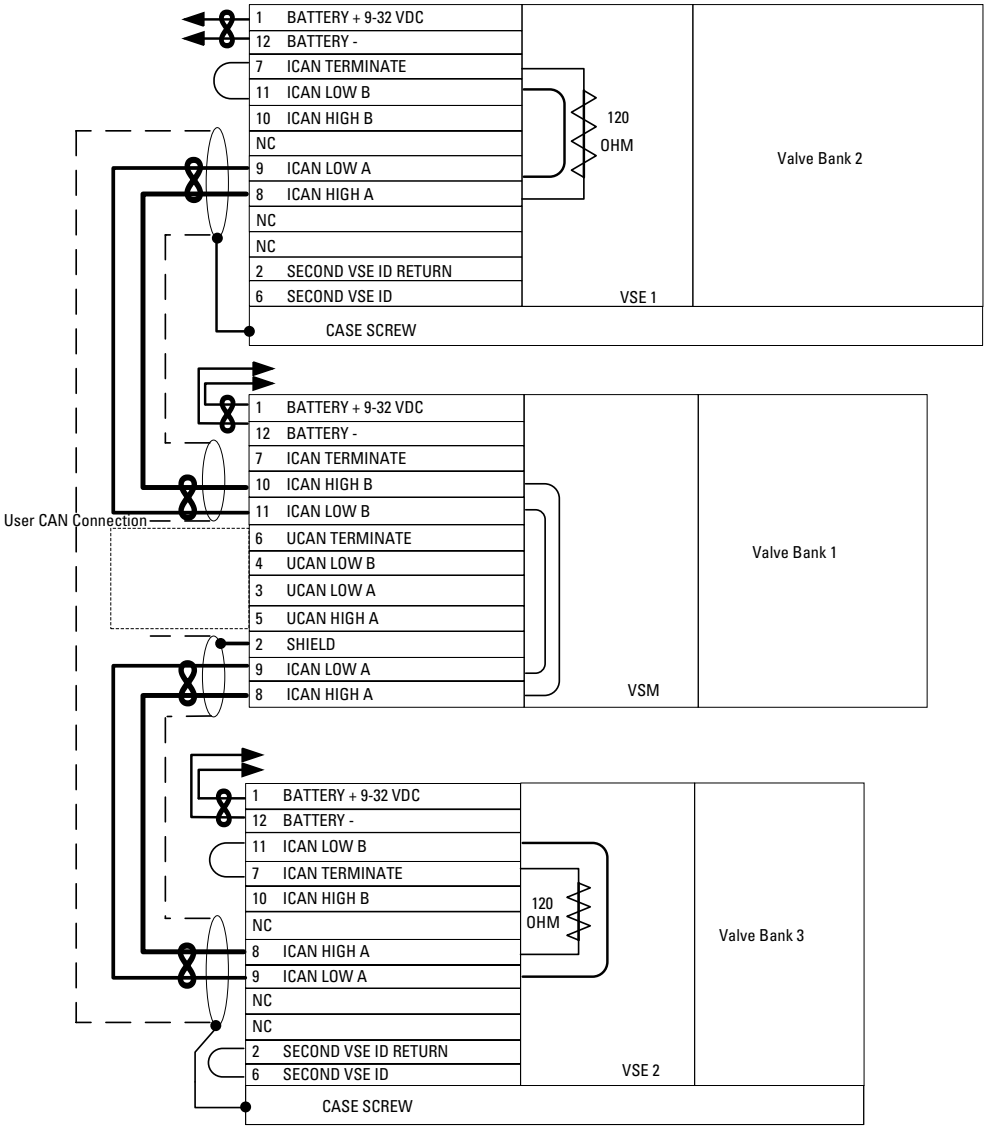


Double Bank System with Valve System Extender (VSE)

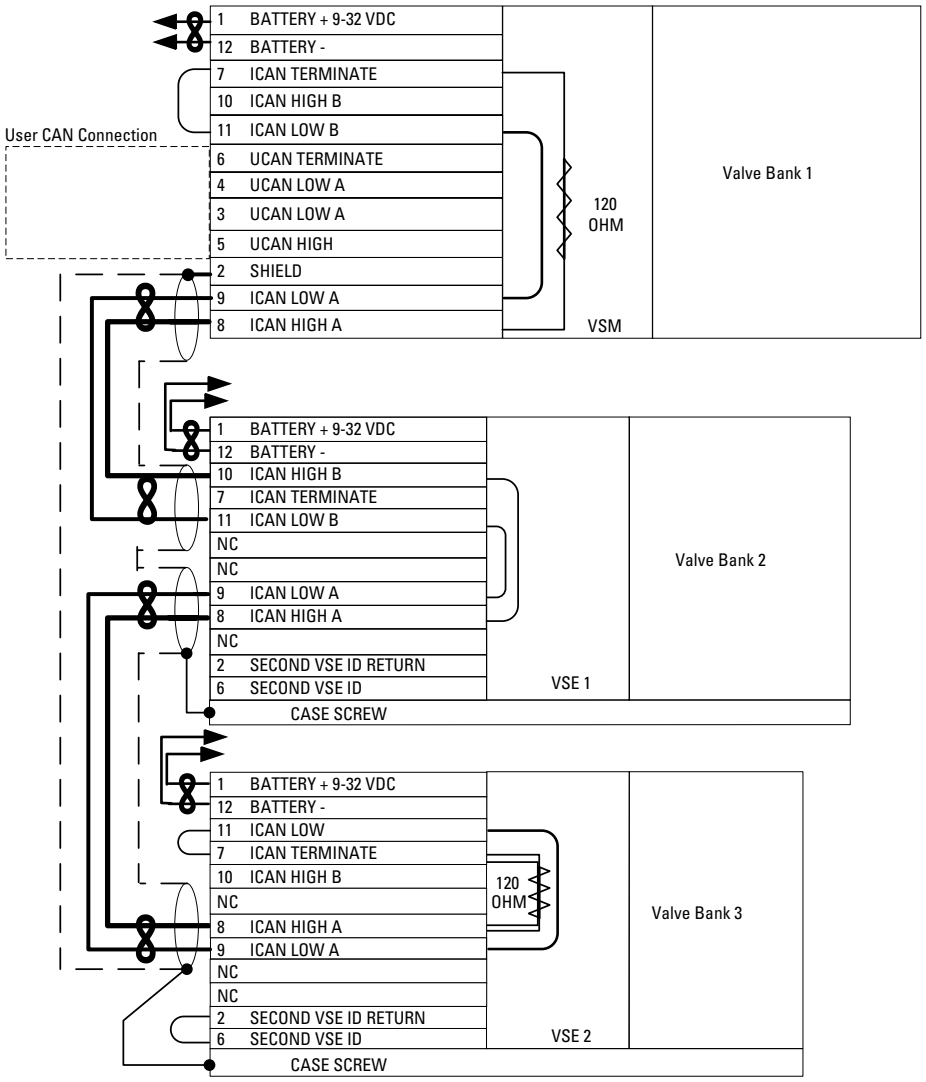


CMA System Layout

Triple Bank System with VSM between VSEs

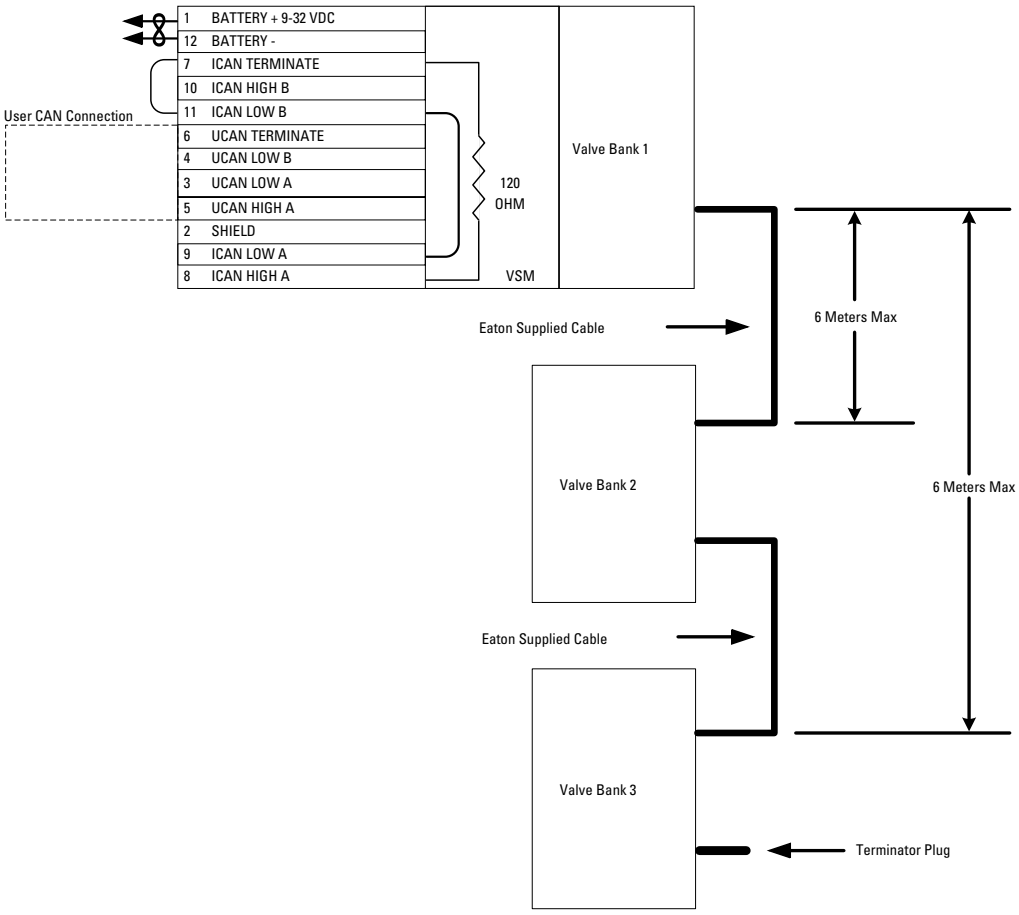


Triple Valve Bank System with VSM at the Start of the System

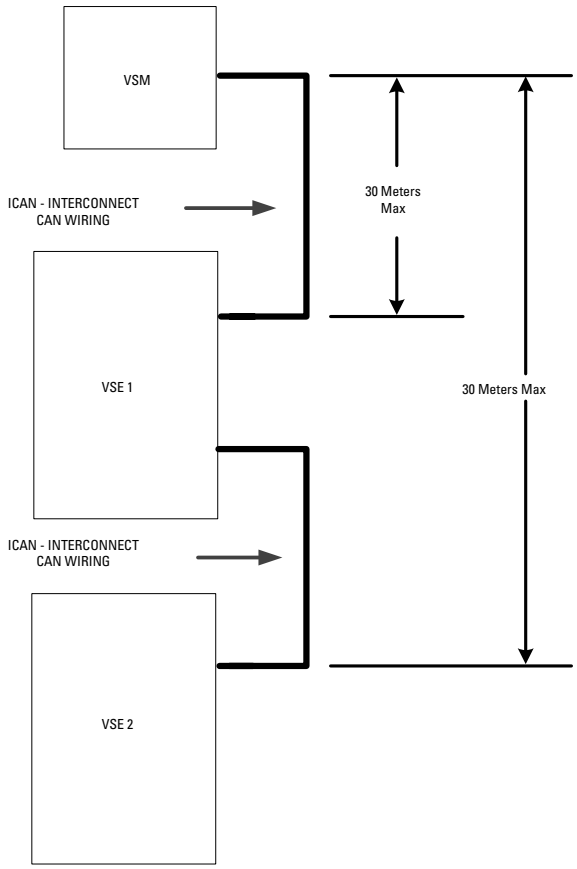


CMA System Layout

Multi-Bank System without Valve System Extenders



Multi-Bank System with Valve System Extenders



Interbank Connection Cables

	Part Numbers	Description
Interbank Connection Cables	6034654-201	2.0 meter interconnection cable
	6034654-401	4.0 meter interconnection cable
	Notes: If more than one cable is used in a single daisy chain with multiple valve banks, then the combined lengths must be <=6m.	
CAN Bus Terminator Assembly	6034032-001	120 ohm CAN Bus terminator for internal CAN network
Compatible Interface Deutsch Connector	DT06-12SB-P012	12-way plug connector body (VSM)
	DT06-12SA-P012	12-way plug connector body (VSE)
Wire Harnesses	6034030-001	Valve to valve harness
	6034031-001	VSM or VSE harness to first valve on the bank

CMA Software Offering

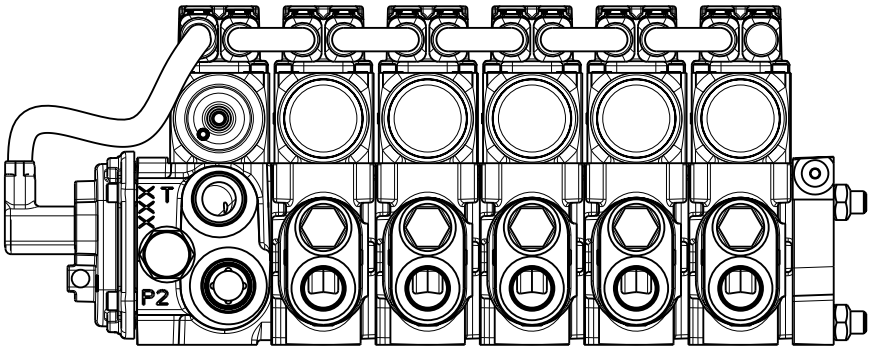
Standard Software Control Features

Software	Description
Pressure compensated flow control	Load-independent flow control
Flow compensated pressure control (standard performance)	Single service pressure control while either sinking or sourcing flow.
Intelli float	Lowers the load at a configurable rate and then enters full float mode
Standard ratio flow share (with priority capability)	Pre or post comp capabilities in one valve bank. All service flow demands are reduced by the same ratio. Can also exempt services from flow-sharing to maintain priority.
Intelligent twin spool flow control (IFC)	Versatile flow controller which maintains the desired flow independent of transitions between passive and overrunning loads
Boom anti-oscillation	A feature of IFC which reduces service oscillation induced by moving large structures, such as a boom.
Electronic load sense enabled	Enables operation with a compatible pump or when multiple CMA systems are present on the same CAN network
Electronic work port relief valve	Configurable electronically controlled relief valve against externally applied loads
Electronic work port pressure limit (feed reducer)	Configurable electronically controlled pressure limit applied to user flow demands without consuming additional pump flow
Anti-fallback protection	Electronically controlled load-drop prevention applied to user flow demands
Single spool flow control	Sink or source flow on individual service ports
Single spool position control	Direct spool position control on each spool
Smart Data	Diagnostics on all on-board sensors. Inlet, Tank, LS, Work Port pressures, Spool Positions, oil temperature sensor data availability.

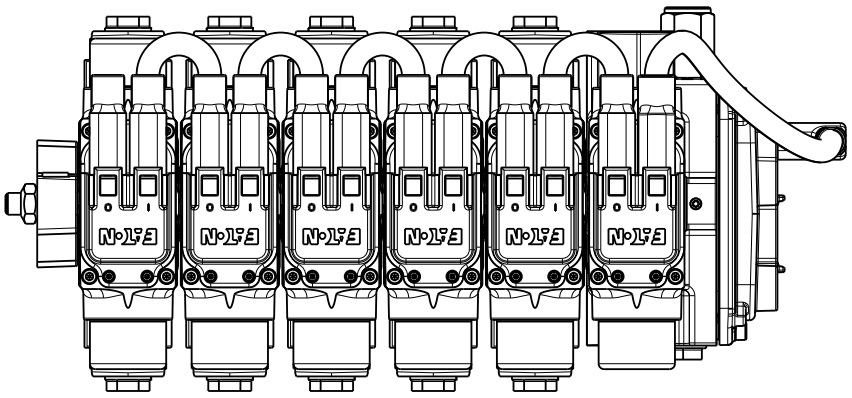
Optional Software Features

Software	Description
Data control package	Broadcast of each spool's flow consumption
Flow compensated pressure control (high performance)	High performance single-spool pressure control while either sinking or sourcing flow
Torque Control	Advanced force or torque control for double-acting cylinders or motors
Hose burst detection	Prevents major oil spill events by monitoring flow consumption on each service and closing the spools for that circuit if a major leak is detected
Limp mode	If a sensor fails, the valve will continue to work with reduced performance until the machine can be serviced
Cascade and Uniform Flow Share	Cascade: maintains demanded flow to selected high priority services by reducing flow to lowest priority services Uniform: All flow demands are reduced by the same absolute amount (i.e. all reduced by 1 LPM)

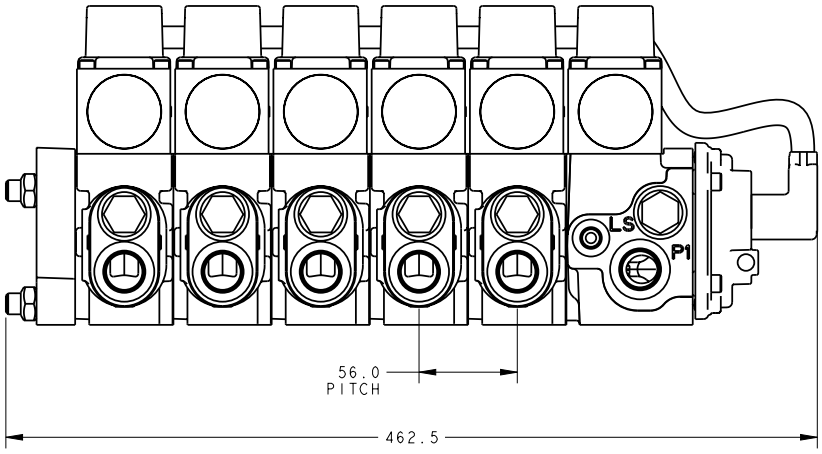
CMA90 Installation Views
(5 section Standard EH Valve)



Right



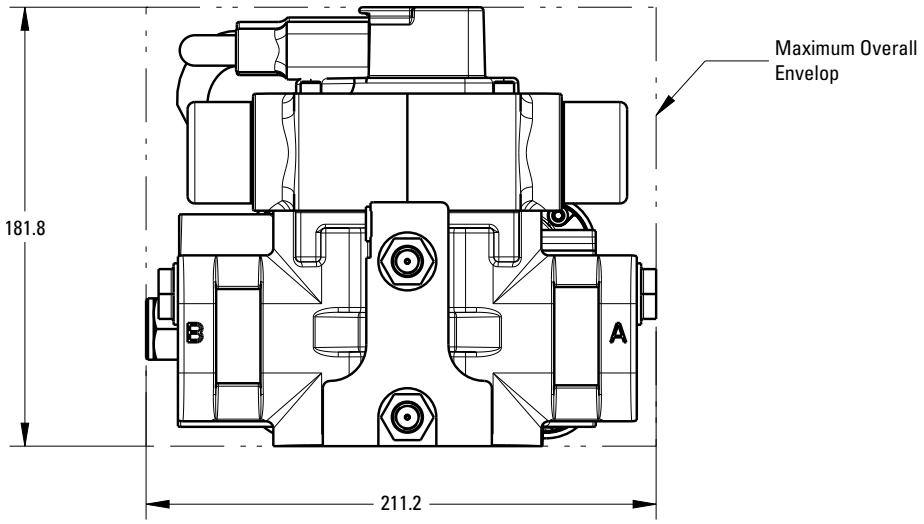
Top



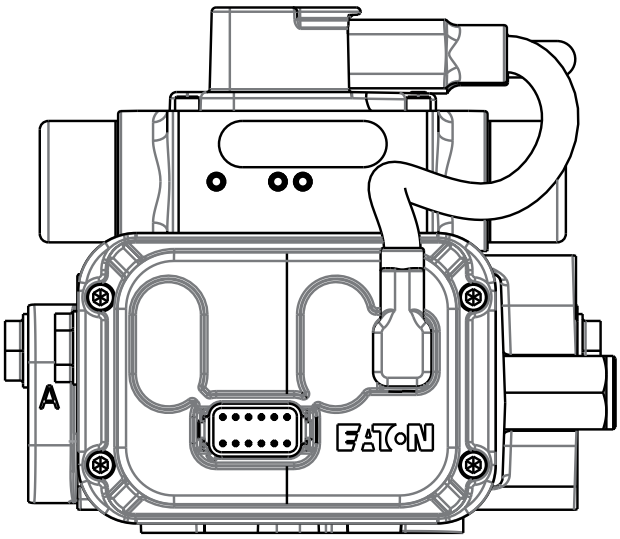
Maximum Overall
Envelop

Left

CMA90 Installation Views
(5 section Standard EH Valve)

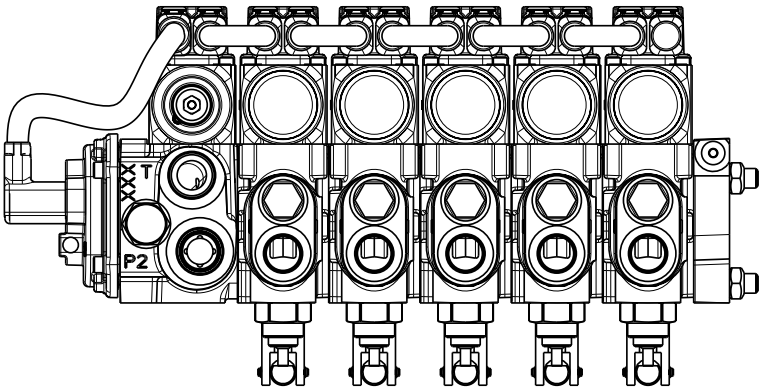


Back



Front

CMA90 Installation Views
(5 Section with manual override)



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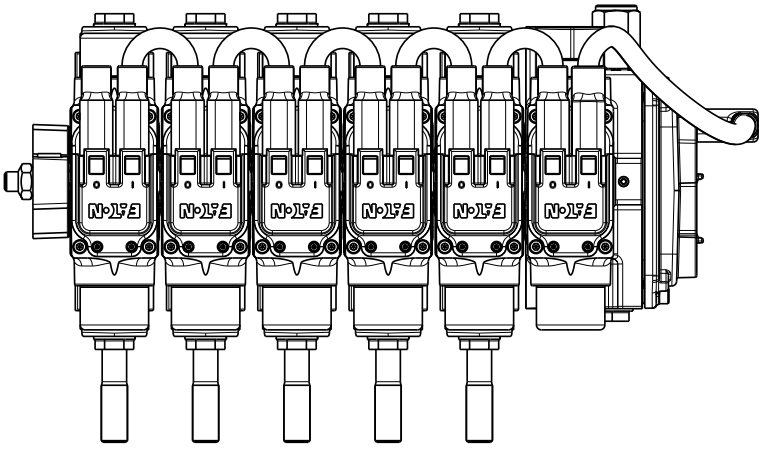

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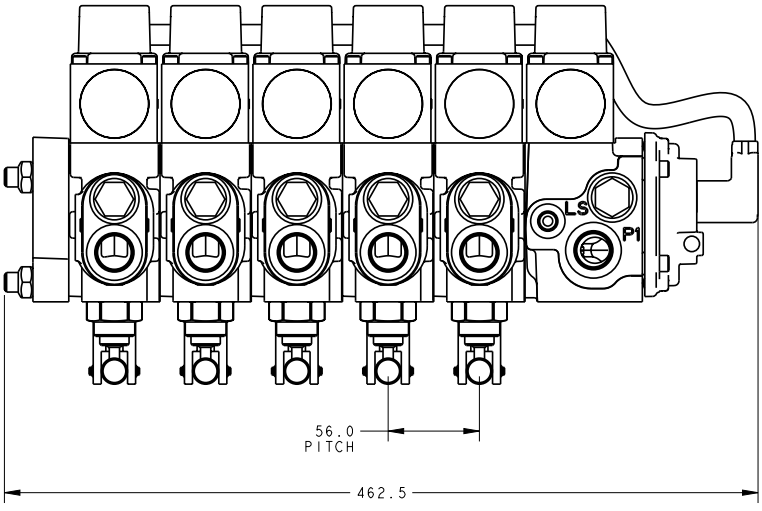
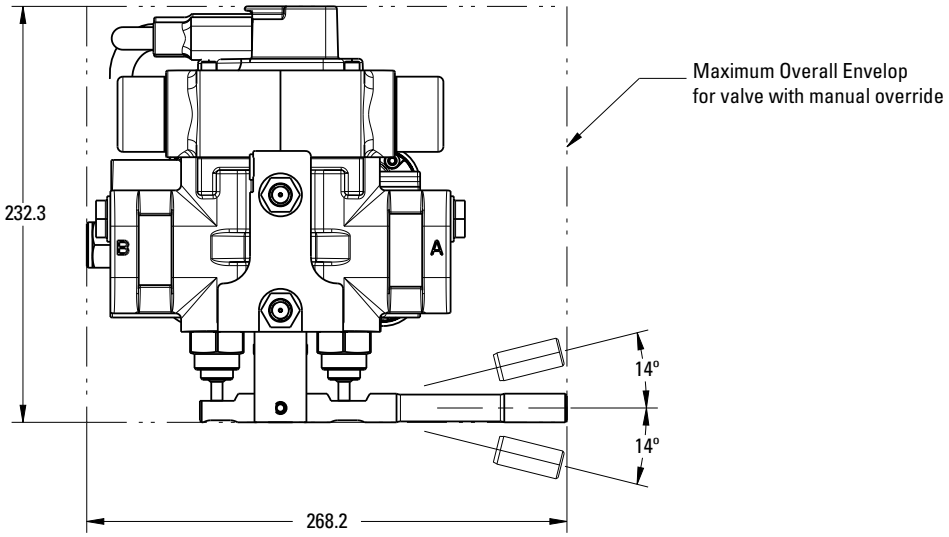
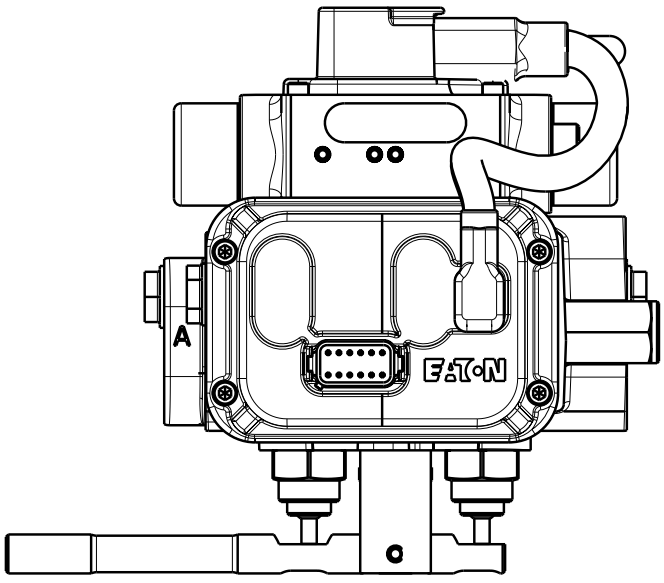


Left

CMA90 Installation Views
(5 Section with manual override)



Back



Front

Model Code – Inlet Section

CMA90 - * - * - * - * - * - * - * - * - * - * - ** - XX* - **

1 2 3 4 5 6 7 8 9 10 11 12 13

1 CMA90 Series

2 Communication Protocol
- J J1939
- C CAN OPEN
- 0 None

3 Interface Module
- M VSM
- E VSE
- 0 None

4 Port Types
- S SAE P1= SAE-10, P2= SAE-12, T = SAE-12, LS= SAE-4
- B BSP P1= G 1/2, P2= G 3/4, T = G 3/4, LS= G 1/4

5 Inlet Pressure Controller
- V Variable Displacement
- F Fixed Displacement
- 0 none, Used on VSE or extension block

6 Active Pressure Port
- 1 P1
- 2 P2
- 3 P1 & P2

7 Manual Override
- 0 None
- M Manual Override on CV

8 Main Relief Setting (In bar)
000 = None

155	293
172	310
190	328
207	345
224	362
241	379
259	397
276	414

9 Paint Type
- A No paint
- B Blue Primer
- K Std. Flat Black

10 Seals
- 1 Default
- H HNBR
- V Viton

11 Special Features
- 00 None

12 Software Version*
- XXA Standard Software

13 Design Code
- 10 Design Code

Note: In the software specification, XX will be determined by the latest available software version

Model Code – Work Section

CMZ90 * - ** - * - * - ** - * - *** - * - * - ** - XX* - **

1 2 3 4 5 6 7 8 9 10 11 12 13

1 CMZ90 Series

2 Body Port Thread Sizes
- A 3/4" 16 UNF (SAE-8)
- B 7/8" 14 UNF (SAE-10)
- D G 1/2"

3 Spool Type at Position A
- MC 90 lpm, biased to center
- HT 90 lpm, biased to tank
- HP 90 lpm, biased to pressure

4 Valve Option at A
- 0 None
- B Anti-cavitation valve with shock valve
- C Anti-cavitation valve
- S Shock valve

5 Relief Setting at Position A

RV Setting in Bar

155	293
172	310
190	328
207	345
224	362
241	379
259	397
276	414

000 = None

6 Spool Type at Position B
- MC 90 lpm, biased to center
- HT 90 lpm, biased to tank
- HP 90 lpm, biased to pressure

7 Valve Option at B
- 0 None
- B Anti-cavitation valve with shock valve
- C Anti-cavitation valve
- S Shock valve

8 Relief Setting at Position B

RV Setting in Bar

155	293
172	310
190	328
207	345
224	362
241	379
259	397
276	414

000 = None

9 Manual Override Type
- 0 None
- A Lever-handle toward port A
- B Lever-handle toward port B

10 Paint Type
- A No paint
- B Blue Primer
- K Std. Flat Black

11 Seal
- 1 Default (NBR)
- H HNBR
- V Viton

12 Special Features
- 00 None

13 Software Version*
- XXA Standard Software
- XXB Data Control Package (DCP)
- XXC High Performance Flow Compensated Pressure Control (FCPF)
- XXD Torque Control (TQ)
- XXE Hose Burst Detection (HBD)
- XXF Limp Mode (LM)
- XXG DCP & FCPC
- XXH DCP & TQ
- XXI DCP & HBD
- XXJ DCP & LM
- XXK DCP & HBD & LM
- XXL FCPC & TQ
- XXM FCPC & HBD
- XXN FCPC & LM
- XXO FCPC & HBD & LM
- XXP TQ & HBD
- XXQ TQ & LM
- XXR TQ & HBD & LM
- XXS HBD & LM
- XXT Standard plus optional package to include all software

14 Design Code
- 10 Design Code

Note: In the software specification, XX will be determined by the latest available software version

Notes

Notes

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