



SAFE CONTROL AND LOAD HOLDING CROSSCHECK™ DOUBLE VALVES CC4 SERIES

PRODUCT CATALOG

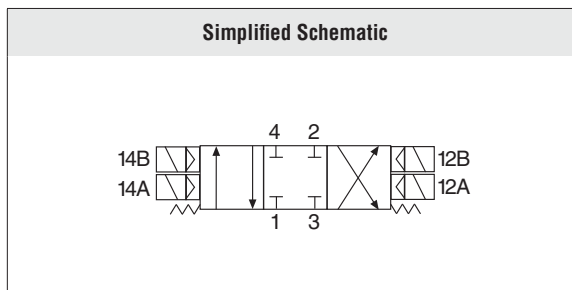


Control Reliable CROSSCHECK™ Double Valves CC4 Series

Product Overview

Safe Control and Load Holding Safety Function

The CC4 Series valve safety function is of safe cylinder control, safe cylinder stop, and/or load-holding. This function is accomplished by blocking further supply of pneumatic energy through the valve and blocking the exhaust of any pneumatic energy from the cylinder lines and cylinder downstream of the valve whenever the valve is shut off or a fault occurs within the valve.



The CC4 Series double valve is a 4/3 safety directional valve, closed center, designed to control the direction of air flow into and out of a double-acting cylinder or other pneumatic actuator in order to drive the cylinder forward or backward to suit the requirements of the machine operation until signaled to shut off and trap pneumatic energy in the cylinder in order to stop cylinder motion (load holding). Thus, reducing the potential hazard of unexpected cylinder motion during employee access for production-related tasks and/or minor servicing. Turning off all solenoids on the 4/3 CC4 Series valve returns the valve to the center position in order to stop cylinder motion - this also allows jogging of the cylinder.

The CC4 Series valve offers this function with the required level of control expected of the machine's (system's) safety control system up to Category 4, PL e. Such a control system must be capable of inhibiting further operation of the valve in the event of a fault within the valve.

VALVE FEATURES

Redundant Control	Redundant control with position feedback - can achieve Category 4, PL e, when used with proper safety controls.
Poppet Type Design	ROSS poppet technology - fast, reliable, dirt-tolerant, face-sealing, low friction. Redundant poppets prevent air from being supplied and exhausted from each outlet port.
Mid-position Sensing	Mid-position sensing using magnetic proximity sensors (PNP) for detection of closed center position providing feedback to the safety control system for external monitoring.
External Monitoring	Dynamic, cyclical, external with customer supplied safety control system. Monitoring should check state of both valve mid-position sensors with any and all changes in state of valve control signals.
LED Indicators	LED indicators on solenoids - aids troubleshooting
Trapped Pressure Relief	Manual trapped pressure relief to remove stored energy when required
SISTEMA Library	Available for download at rosscontrols.com

These valves are not designed for controlling clutch/brake mechanisms on mechanical power presses.

STANDARD SPECIFICATIONS

Function		Safe Control and Load Holding
Construction Design		4/3 Closed Center Valve; Dual Poppet
Actuation		Electrical – Solenoid pilot operated with air assisted spring return; Two solenoids per valve element (4 total) – two for extending and two for retracting
Mounting	Type	Sub-Base
	Orientation	Any, but horizontally with solenoids on top is preferred
Connection		Threaded; G, NPT
Monitoring		Dynamic, cyclical, external with customer supplied equipment. Monitoring should check state of both valve mid-position sensors with any and all changes in state of valve control signals.
Trapped Pressure Relief		Manual
Minimum Operation Frequency		Once per month, to ensure proper function
Maximum Recommended Allowable Discordance Time		150 msec

OPERATING CONDITIONS	Temperature	Ambient	40° to 120°F (4° to 50°C)
		Media	40° to 175°F (4° to 80°C)
	Flow Media		Compressed air according to ISO 8573-1 Class 7:4:2
	Pilot Supply		Internal or External
	Operating Pressure	With Internal Pilot Supply	60 to 120 psig (4 to 8 bar)
		With External Pilot Supply	0 to 120 psig (0 to 8 bar)
		Pilot Supply	60 to 120 psig (4 to 8 bar); <i>Pressure must be equal to or greater than inlet pressure</i>
Static Pressure		0 to 150 psig (0 to 10 bar)	

ELECTRICAL DATA	Solenoids		According to VDE 0580; rated for continuous duty
	Operating Voltage		24 volts DC
	Power Consumption (each solenoid)		3.5 watts
	Enclosure Rating		DIN 400 50 IP 65
	Electrical Connection		Two 5-pin M12 connectors

CONSTRUCTION MATERIAL	Valve Body		Cast Aluminum
	Poppet		Acetal and Stainless Steel
	Seals		Buna-N

SAFETY DATA	Functional Safety Data	Category	CAT 4, PL e
		B _{10D}	10,000,000
		PFH _D	1.62x10 ⁻⁸
		MTTF _D	151 (n _{op} : 662400)
	Vibration/Impact Resistance		Tested to DIN EN 60068-2-6

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

PRODUCT CREDENTIALS

Safety Category	DGVV (German Social Accident Insurance)	CE Conformity Declaration	EAC Conformity Declaration	ISO Standard	CSA Certificate of Compliance
				ISO 13849-1:2015	



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Ordering Information

MODEL NUMBER CONFIGURATOR

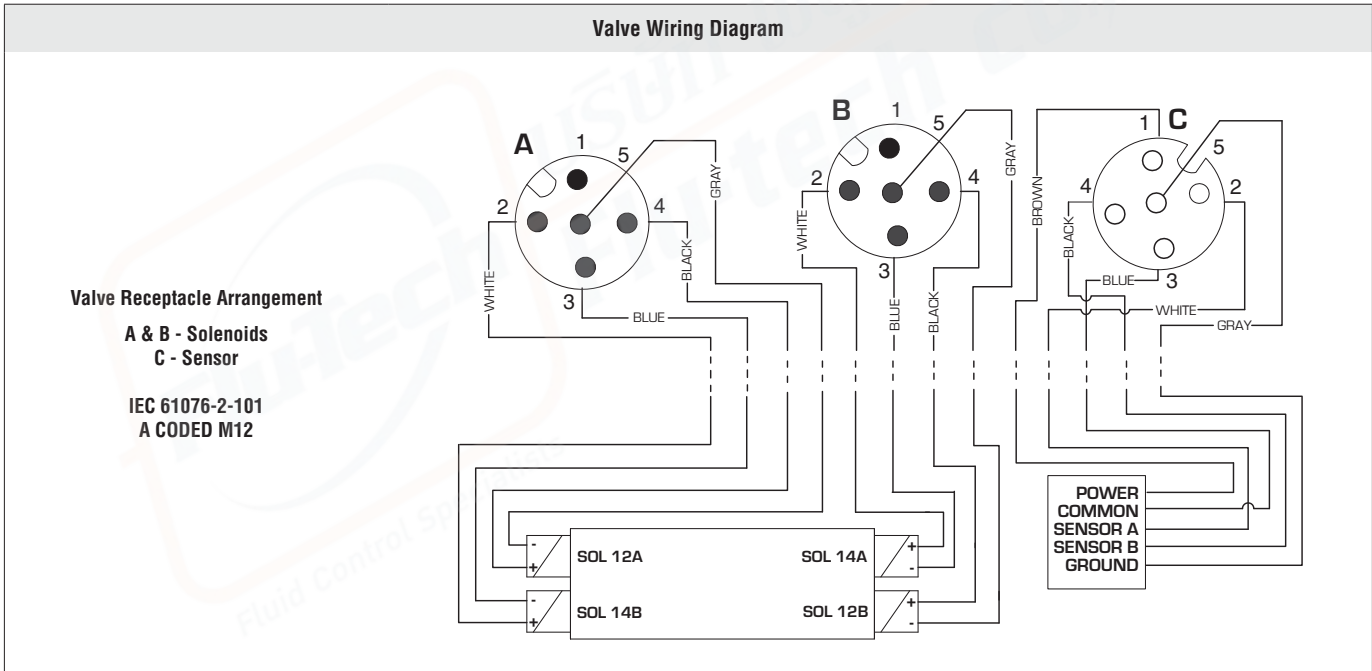
4-Way 3-Position Valves

Series: **CC4** | Pressure Release: Manual | Port Size: **M** | Thread: **23** | Voltage: **G** (24 volts DC) | Monitoring: External | Pin Configuration: Standard | Communication: None | Revision Level: **A**

Port Size		
In-Out	Exhaust	
1/4	1/4	22
3/8	3/8	23
Valve Only (No Base)		2X
1/2	1/2	44
3/4	3/4	45
Valve Only (No Base)		4X

Thread	
G	G
NPT	N
Valve Only	X

Port Size		Flow C _v				Weight lb (kg)
1, 2, 4	3	1-2	1-4	2-3	4-3	
1/4	1/4	0.9	0.9	0.7	0.6	11.2 (5.1)
3/8	3/8					
1/2	1/2	1.7	1.6	1.8	1.7	18.3 (8.3)
3/4	3/4					



An Integration Guide for CC4 Series Double Valves is available from ROSS to provide information such as operation, monitoring, and integration into users control circuits, please visit www.rosscontrols.com.

[Integration Guide - CC4 Series Safe Control and Load Holding Double Valves](#)



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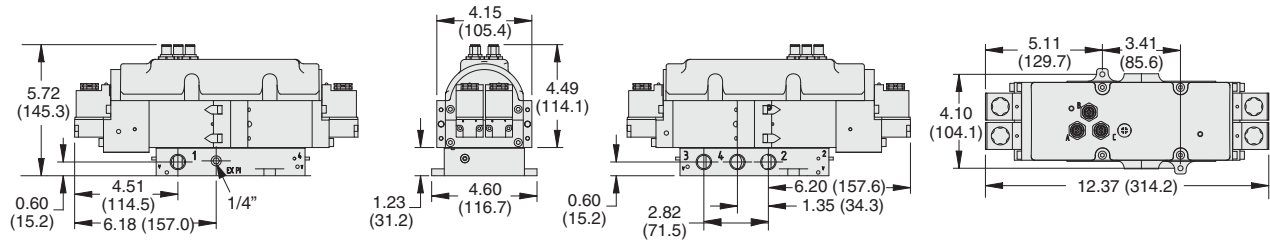
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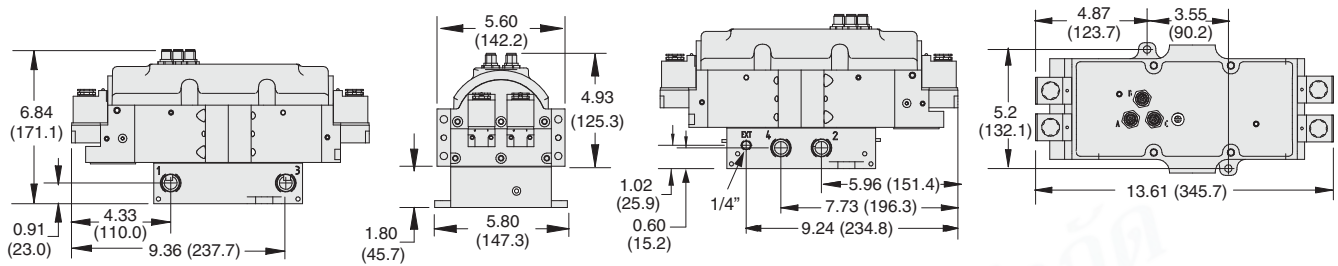
DIMENSIONS

Inches (mm)

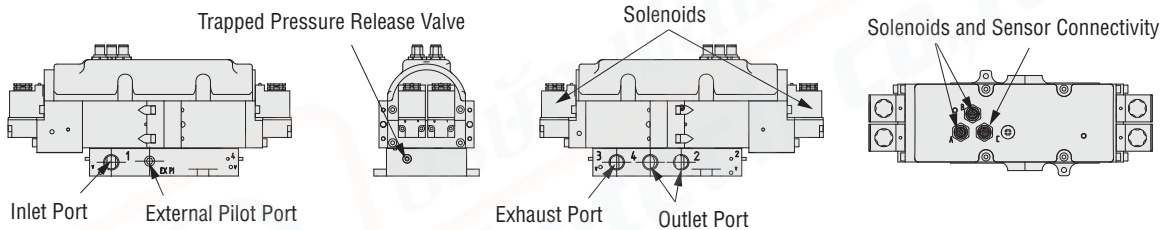
Port Size 1/4 & 3/8



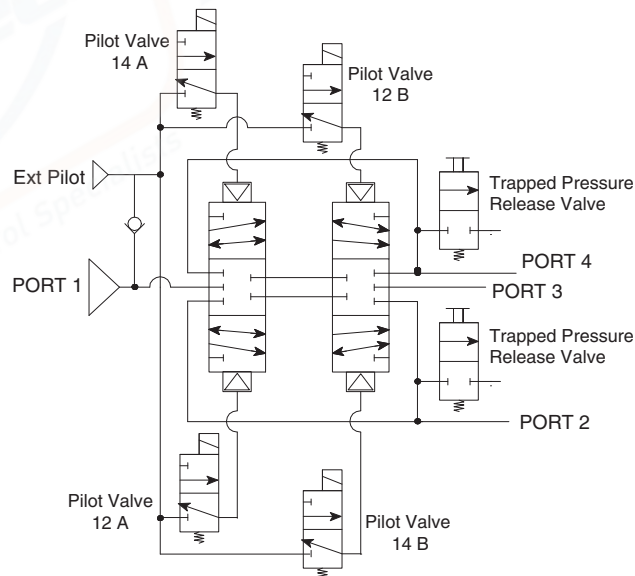
Port Size 1/2 & 3/4



For additional information, and to assist you with piping and connectivity designs, our products are available in downloadable 2D drawings and 3D CAD models in a wide range of options including native formats, visit www.rosscontrols.com.



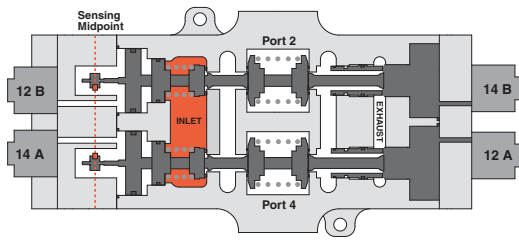
Valve Schematic



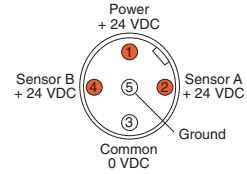
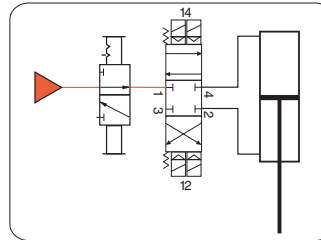
Valve Operation

Conditions at Start

Pressure applied to port 1, but all solenoids off. All ports (1, 2, 3, & 4) are blocked.



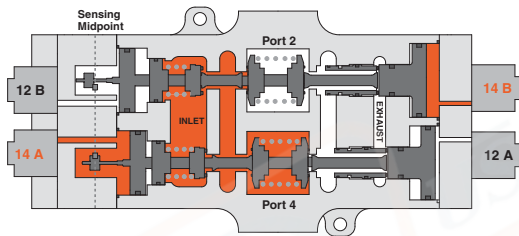
Valve De-energized



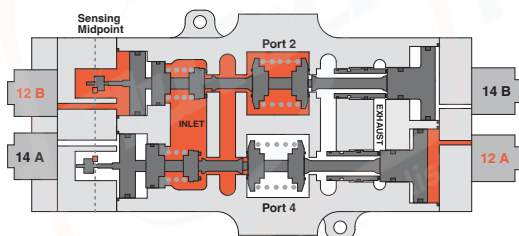
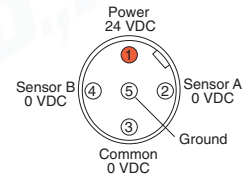
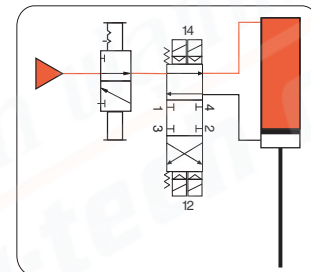
Normal Operation

Energizing both solenoids 14A & 14B causes the valve to shift and supply pressure to port 4 while exhausting pressure from port 2, thus, extending the cylinder. Conversely, energizing solenoids 12A & 12B causes the valve to shift and supply pressure to port 2 while exhausting pressure from port 4, thus, causing the cylinder to retract. Turning all the solenoids off allows the strong return springs to shift the redundant valves back to the center position, which blocks all ports. This traps any downstream pressure in the cylinder and holds it in its current position (see below on the right, image of valve de-energized trapping pressure). Each of the mid-position feedback sensors provide a voltage output when the valve is in the center, safe position, but no voltage output when the valve internals are shifted out of the center position. This provides a detectable center position for both sets of valve internals.

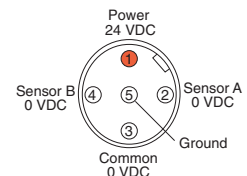
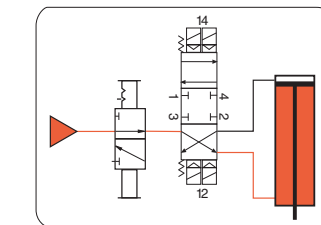
NOTE: Momentary operation of either the 12A & 12B solenoids (or 14A & 14B solenoids) can be utilized to jog the cylinder to intermediate positions instead of just fully extended or fully retracted. This is sometimes referred to as "inching."



Solenoids 14A & 14B Energized Port 4 Pressurized



Solenoids 12A & 12B Energized Port 2 Pressurized



Monitoring

External monitoring of the CROSSCHECK™ mid-position sensors must be performed by an external monitoring system. Such a monitoring system must be capable of inhibiting the operation of the valve. The safety control system must de-energize the valve's solenoids in the event of a fault within the valve and/or within the safety control system, and check for achievement of the valve center position before allowing an attempt to re-energize the valve. Valve reset is accomplished by de-energizing all of the valve's solenoids. Reset of the safety control system should not occur unless the valve has fully returned to its center position (both sets of internals).

The output voltage of the sensors, when switched on (center position), equals approximately the voltage supplied to the sensors by the safety controller. For example, 24 volts DC In = 24 volts DC Out, etc.



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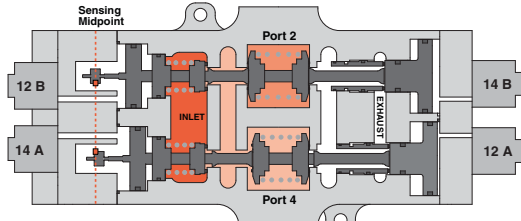
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Valve Operation

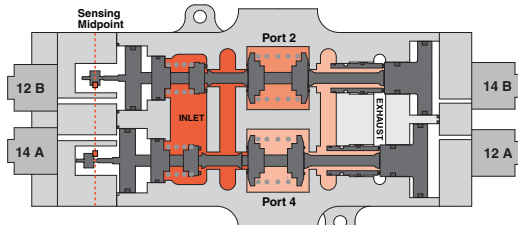


Abnormal Operation

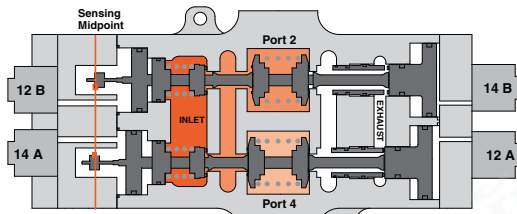
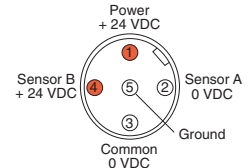
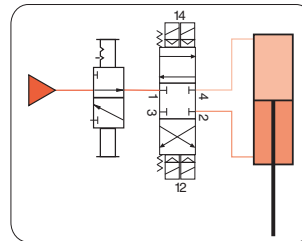
When energizing, if both sets of valve internals do not shift synchronously (either on or off), the CROSSCHECK™ valve will block all ports. While in this fault condition, the valve cannot further pressurize or exhaust the cylinder lines. Also, as long as the fault condition exists, there will be a voltage output from the valve internals that did not shift from center, but there will not be an output from the other valve internals that did shift off center. This provides a detectable fault condition as both sensors need to agree in order to not indicate a fault.



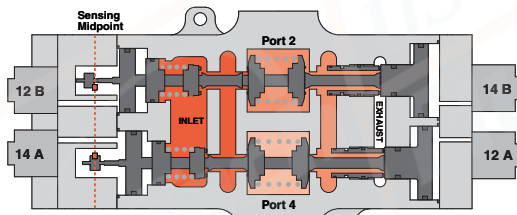
Valve Faulted Side A, Right



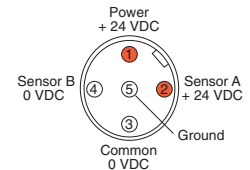
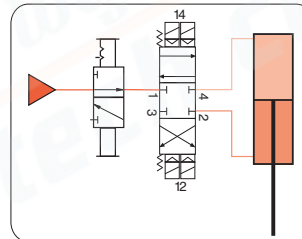
Valve Faulted Side A, Left



Valve Faulted Side B, Right



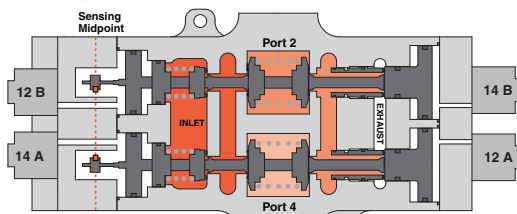
Valve Faulted Side B, Left



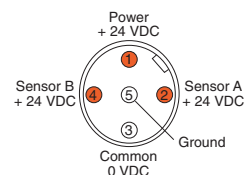
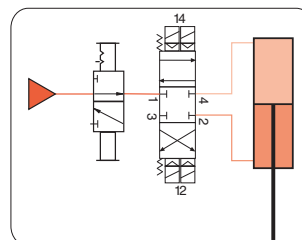
Trapped Pressure Release

In order to perform machine maintenance, after stopping the machine and performing lockout/tagout, pressure trapped in the cylinder by the CROSSCHECK™ valve can be released (exhausted) by the two manually-operated 2-way valves that are provided in the CROSSCHECK™ valve sub-base - one each per valve outlet port. This provides a way to slowly lower the cylinder to its lowest position.

NOTE: Operating the manual trapped pressure release valves will cause movement of the cylinder. Use caution to avoid any hazards associated with this movement.



Valve De-energized Trapping Pressure

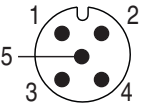


Accessories & Options

ELECTRICAL CONNECTORS

Pre-wired Connector Kit	Connection Type	Connector Type		End 1	End 2	Quantity	Length meters (feet)	Kit Number
		M12	5-pin					Without Light
	Solenoids & Sensor	M12	5-pin	Male & Female Connector	Flying Leads	3	5 (16.4)	2642K77

Solenoid and Sensor Connector Pinout

Male Connector		Female Connector	
	1 - Brown 2 - White 3 - Blue 4 - Black 5 - Grey		1 - Brown 2 - White 3 - Blue 4 - Black 5 - Grey

SILENCERS

Silencers	Port Size	Thread Type	Model Number		Flow Avg. C _v	Pressure Range psig (bar)
			R/Rp Thread	NPT Thread		
	1/4	Male	D5500A2003	5500A2003	2.1	0-290 (0-20) maximum
	3/8	Male	D5500A3013	5500A3013	2.7	
	1/2	Male	D5500A4003	5500A4003	4.7	
	3/4	Male	D5500A5013	5500A5013	5.1	



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