







RC-HDBH-OI EN

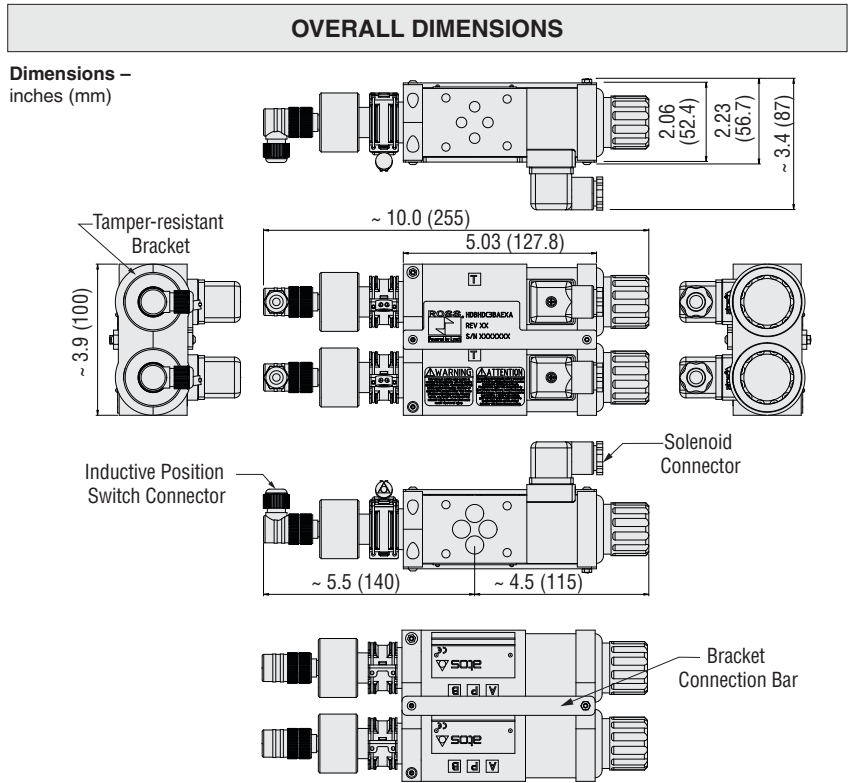
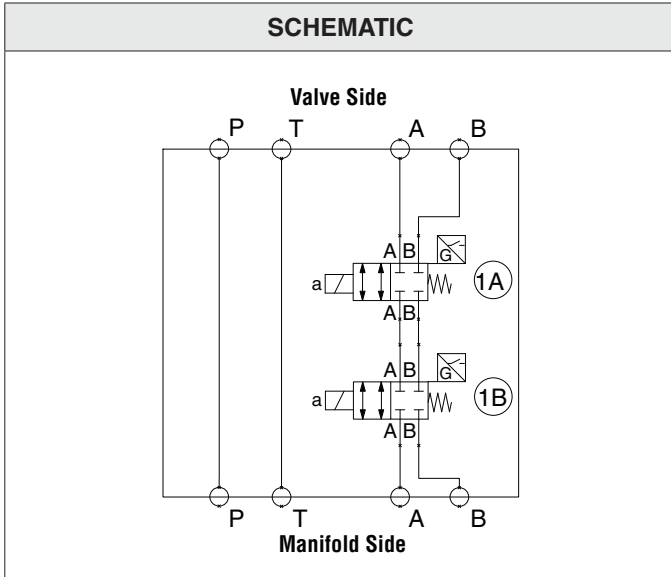
HYDRAULIC DUAL BLOCK & STOP VALVES HDBH SERIES

Operating Instructions



Safety Category	CE Conformity Declaration	UKCA (UK Conformity Assessed)
  (3rd party certification pending)		

MODEL NUMBER	ISO Size	Monitoring	Weight lb (kg)
HDBHDC3BAEXA	06 (D03)	External	15.0 (6.80)



1. About this Documentation

These Instructions contain important information for the safe and appropriate assembly and commissioning of the product.

- ▶ Read these instructions all the way through, particularly section 2 “Notes on Safety,” before working with the product.
For more information see last page for contact information, or visit www.rosscontrols.com.
- ▶ In addition, observe all applicable local and national regulations on accident prevention and on environmental protection.

1.1. Warning Notices in these Operating Instructions

In these operating instructions, warning notices precede sections with handling requirements which incur risks of personal injury or material damage. Warnings are structured as follows:

SIGNAL WORD	
Type or source of hazard!	
Consequences	
▶ Measures to avert danger	

- **Warning triangle:** Indicates a risk of fatal or severe injuries.
- **Signal word:** Indicates the severity of the danger.
- **Type or source of hazard:** States the type of danger or the source of the hazard.
- **Consequences:** Describes possible consequences of ignoring the warning.
- **Measures to avert danger:** Indicates how to avoid the danger. It is essential that the measures to avert danger are complied with.

DANGER	Indicates an imminent and serious danger that will result in severe or even fatal injury if you fail to avoid it.
WARNING	Indicates a possible danger that could result in severe or even fatal injury if you fail to avoid it.
CAUTION	Indicates a danger that may result in minor to moderate injuries if you fail to avoid it.
ATTENTION	Indicates potential property damage that may be incurred by the product or its surroundings if you fail to avoid it.

2. Notes on Safety

The product has been manufactured according to the accepted rules of current technology. There is risk of injury or damage if the following safety instructions and warnings given in this instruction manual are not observed.

2.1. Intended Use

The HDBH Series Dual Block & Stop Safety Valve System is a safety component designed and manufactured in accordance with Machinery Directive 2006/42/EC.

The HDBH system is comprised of two, direct-solenoid-operated spool valves which make it a redundant design for meeting the needs and requirements of safe hydraulic Block & Stop applications. Typically, these systems are designed to meet Category 4, PL e / SIL 3 applications if properly implemented into the safety control & monitoring system.

The HDBH system allows or blocks flow between the directional valve and its associated cylinder (actuator) by opening both ports to allow movement or by closing both ports to stop movement as needed.

NOTE: Block and Stop functions are intended to momentarily stop an actuator (linear or rotary), but not to hold the actuator in place for an extended period. The HDBH valve is a spool type valve, and normal spool leakage will occur. The valve is intended to be used as a “permissive” safety device. Applications where long-term holding is necessary should also incorporate other components such as PO check, counterbalance, or mechanical locking devices.

NOTE: HDBH valves are intended to be used only for tasks that are routine, repetitive, and integral to production. Maintenance tasks require following full lock-out/tag-out procedures to relieve hazardous energy and prevent unexpected startup.

During normal operation the HDBH system is held actuated, allowing the flow of oil through the HDBH system unit. In a situation where immediate flow shut-off is needed, the HDBH system can be turned off to immediately block the flow both into and out of the cylinder.

The HDBH system is designed to be externally monitored by a safety control & monitoring system for safe, redundant operation of the valves. Each single valve in the HDBH system is equipped with a PNP inductive position switch. Monitoring both of these switches on each actuation and de-actuation of the HDBH system provides a diagnostic coverage of up to 99%. Monitoring of the two inductive position switches must be done by an external monitoring system.

The HDBH system is a sandwich-mount device that is designed to be installed directly between a manifold and a directional valve. In applications where installation on a manifold is not practical, a mounting kit can be used to facilitate installation of the HDBH valve in-line between a directional valve and actuator (cylinder). In applications where higher flows are needed, there is an option to combine both the A and B ports to double the flow capacity of the valve. The Flow Doubling In-Line Mounting Kit converts the HDBH valve to a single-line blocking valve.

The unit cannot be used by itself. It is designed for installation in a machine. ROSS and its suppliers will assume no liability in the event that the system or parts thereof are not used in accordance with their designated use or if modifications are made in a non-authorized manner.

Any drawings, hydraulic or electric circuit diagrams, parts lists and acceptance certificates (inspection reports) supplied do not form a part of these operating instructions. They are supplied for the purpose of illustrating the unit or procuring parts.

2.1.1. Safety Function According to ISO 13849

The HDBH Dual Block & Stop system is designed in accordance with the requirements listed in ISO 13849-1 and -2. The HDBH's "fail-to-safe" safety function is ensured even in case of a fault within the valve (e.g., caused by power loss, wear, contamination, or similar situations).

The safety function of the HDBH Series Dual Block & Stop system is to only supply flow into and out of a cylinder or designated portion of the hydraulic machine/system when the two valve elements are actuated simultaneously, but to block the flow in both directions in both cylinder lines when both valves are shut-off or if only one of the two valves is de-actuated.

A fault in the system where only one valve actuates when switching on or only one de-actuates when switching off blocks normal flow of oil from moving downstream or upstream in both ports. Monitoring of the two inductive position switches by the user's external safety control & monitoring system makes it possible to detect these fault situations and to shut off and prevent further electrical energization of the solenoids until the fault is cleared.

2.1.2. Common Cause Failure – CCF

The product has been engineered and manufactured according to the fundamental and proven safety principles of ISO 13849-1 and -2.

Common Cause Failures (CCF) are failures of different components, resulting from a single event. CCF are not to be confused with cascading faults or common mode faults. Common cause failures can cause loss of the safety function, especially in dual channel circuits where both channels could fail simultaneously due to a single event.

- Maintain hydraulic oil quality, i.e., proper filtration.
- Operate in accordance with the Technical Specifications. See page 5.
- Install the valve such that the normal stroke travel of the valve elements is perpendicular to the main direction of machine vibration and/or mechanical shock.
- Do not use a test pulse longer than recommended by the HDBH Integration Guide.
- Avoid external magnetic fields.

2.1.3. Diagnostic Coverage

A diagnostic coverage of 99% is achievable through appropriate integration of the HDBH Series Dual Block & Stop system into the safety control system. The monitoring system must constantly compare the state of each valve's inductive position switch (Switch 1A and 1B) with the state of the safety control system outputs to the valve solenoids (Sol 1A and 1B). Detection of a fault by the safety control & monitoring system must trigger a shut-off of the safety controller's outputs to the valve solenoids (Sol 1A and 1B).

2.1.4. Fault Modes

Note that normal operation requires that Sol 1A and 1B be energized simultaneously for switching the HDBH system on, and de-energizing both Sol 1A and 1B simultaneously for switching the HDBH system off.

NOTE: The switches are supplied with both NC and NO contacts. The statements below only refer to whether or not the switches are actuated.

Faults that could occur during normal operation are:

Sol 1A and 1B energized simultaneously

- Switch 1A ON, Switch 1B OFF
- Switch 1A OFF, Switch 1B ON
- Switch 1A OFF, Switch 1B OFF

Sol 1A and 1B de-energized simultaneously

- Switch 1A ON, Switch 1B OFF
- Switch 1A OFF, Switch 1B ON
- Switch 1A ON, Switch 1B ON

2.1.5. Foreseeable Misuse



WARNING

Risk of Injury!

Misuse may result in injury or damage.

- ▶ The product must be used exclusively as intended.

Foreseeable misuse includes:

- Bypassing the safety function or diagnostics.
- Replacing the safety valves with unauthorized valves.
- Tampering with the position switches.
- Failing to utilize the position switches to verify valve operation on every cycle - when energizing and de-energizing.
- Allowing continued operation of the valve when a fault is detected.
- Operating outside the Technical Specifications.

2.2. Responsibilities of the System Owner

The HDBH must be integrated to meet the Category and/or Performance Level requirements of the safety system, as determined by the risk assessment of the machine.

Observation of general requirements pertaining to hazards:

- Unusual noises, vibration, defects or damage is to be remedied immediately as it may point to potential hazards.
- No maintenance work may be done on the hydraulic system and power units as long as they are under hydraulic pressure or the power supply has not been switched off.
- Prior to performing any maintenance work, pressure accumulators are to be depressurized.
- Note the load pressures present. Also note any loads applied. If necessary, make sure that the loads are secured or properly supported.
- Hydraulic systems may only be operated by properly trained and instructed personnel.
- All safety devices and equipment are to be checked to see that they function properly.
- Safety devices and equipment must not be removed or bypassed.
- General safety and accident prevention regulations pertaining to operating the unit/system are to be adhered to.
- Comply with the further requirements of ISO 13849 (e. g., MTTFD, CCF, DC, PLr.) if you intend to use the product in higher categories (2 to 4).
- Check the valve at least once a month to ensure its proper operation.
- Make sure that the fundamental and proven safety principles in accordance with ISO 13849 for implementation and operation of the component are complied with.
- Selection and installation of replacement valves must take place in accordance with the manufacturer's specifications.

2.3. Safety Instructions

The HDBH Series Dual Block & Stop System features a state-of-the-art design. Reliable and safe operation cannot be ensured unless all the instructions, settings and output limits applicable to the unit supplied are adhered to.

The systems involved are pressure-generating systems whose components feature pressurized liquid; consequently, the systems may pose a hazard if not dealt with properly.

2.3.1. Additional Safety Considerations

- When implementing surge suppression measures, be sure to check whether or not this extends the valve system shut off response time which could extend the machine stopping time.
- In case of high levels of machine vibration, use appropriate vibration-reducing elements when installing the valve system.
- Operate only with the proper supply voltage. Improper voltage can damage solenoids and switches.
- Excessive hydraulic fluid temperature can damage valve seals as well as cause premature degradation of hydraulic fluid. Both of these situations can cause improper operation of the hydraulic system.

3. Prerequisites for Use of the Product

- ▶ Make these operating instructions available to the engineer and assembly technician of the machine/system in which the product will be used.
- ▶ Keep these operating instructions for the entire product life cycle.

3.1. Qualified Personnel

Assembly, installation, commissioning, maintenance, and decommissioning should only be carried out by qualified personnel that have the required knowledge and experience in dealing with electrical and hydraulic control technology.

All work may be performed only by properly trained and qualified individuals who have been specifically instructed for the tasks assigned to them. The levels of responsibility of personnel are to be clearly delineated by the owner/operator. Protective clothing and gear is to be worn when performing all work. The relevant safety and accident prevention regulations are to be adhered to. Any special safety requirements specified in the documentation for the unit/system are to be complied with.

4. Package Contents

Items included:

- Dual Block & Stop Safety Valve System
- Operating instructions

5. Service, Repair, and Maintenance

- ▶ In case of technical problems or a required repair, please contact your local ROSS® representative.
- ▶ Checks should be conducted once a month to ensure valves are in functioning order.

5.1. Maintenance

WARNING

- All activities of maintenance must be conducted by competent and qualified staff.
- Always depressurize the relevant part of the system before any maintenance operation on the hydraulic system.
- Always ensure cleanliness when working on the HDBH valve.
- Do not perform maintenance with the equipment functioning!
- Penetrating dirt and liquids will cause faults!
- Safe function of the HDBH valve is not ensured when operated with contaminated fluid.
- Never use solvents or aggressive detergents as these can cause damage to the hydraulic system and seals!
- Pay attention to prevent detergent penetration into the HDBH valve.
- Check that all seals and electrical plug connections are firmly fitted to prevent the penetration of detergents.
- Do not use a high-pressure cleaner. The water pressure of a high pressure cleaner can damage the seals of the HDBH valve.

When/if a valve is replaced; a basic functional test should be performed (see 8.1 Test Procedure). It is important that all the check-up operations, even if simple, are programmed and reported on specific maintenance program schedules. Before the inspection, cleaning should be undertaken if necessary.

6. Product Identification

The valve assembly is marked with Model Number, Revision level, and a serial number which can be used to identify date of manufacture and location. Please contact ROSS CONTROLS® for further information.

Product Label Identification & Product Key Identification Example



7. Assembly and Installation

CAUTIONS

Risk of injury due to installation while pressurized or with live parts!

- ▶ Installation while pressurized or with electrical power switched on can result in injuries due to sudden pressure build-up or electric shock.
- ▶ De-energize and de-pressurize the relevant system parts before installing the valves.
- ▶ Secure the system to prevent it from being switched back on again.

ATTENTION

Destruction of components!

- ▶ Chemical substances can damage the surface, the markings and the seals of the device.
- ▶ Install the valve such that it is protected against the effects of chemicals.

7.1. Installation Instructions

Secure the system using the through holes in the valves. Refer to pattern for the required dimensions, - see dimensional drawings on page 2.

7.1.1. Component Inspection: Prior to use, a careful examination of the HDBH valve system must be performed. The HDBH valve system must be checked for correct style, size, catalog number and external condition, and must be examined for cleanliness, absence of external defects or gouges or otherwise deformed parts or other imperfections. DO NOT use any item that displays any signs of non-conformance. Any accessory including, but not limited to, fittings, bolt kits, hoses, in-line mounting kits, and electrical connectors must be subjected to the same examination.

7.1.2. Port identification on the manifold according to ISO 16874: The HDBH Series Dual Block & Stop system is designed and manufactured in accordance with the identification requirements laid out in the ISO 16874:2004 standard.

7.1.3. T Port: At least one of the provided T ports should be piped to the reservoir. This connection is automatic when sandwich mounting the HDBH but when using the In-line mounting kit or In-line Flow-doubling mounting kit, at least one of the T ports should be piped to the reservoir. Do not plug the T port.

7.1.4. Filtration: Fluid cleanliness is a necessity in any hydraulic system. Fluid filters need to be installed and maintained in the system to provide the required level of cleanliness. Filters can be placed in the inlets. See Maximum Fluid Contamination info under Specifications, page 5.

7.1.5. Accessory Ratings: All accessories used in combination with the selected or intended HDBH valve system must be used in accordance with the HDBH specifications.

7.1.6. Spool Valve Replacement: Do not replace individual valves in the HDBH valve system. The whole assembly should be replaced if necessary. Consult ROSS.

7.2. Electrical Connections

Use two DIN EN 175301-803, Form A type electrical connectors to connect the valve solenoids.

Use a female M12 cord set (4-pin or 5-pin, A-coded) to connect to each inductive position switch according to the electrical wiring schematic of the switches on page 6.

8. Commissioning and Operation

Before commissioning, the installation must be carefully inspected by a qualified, trained professional.

Make sure that the technical specifications match the operating criteria of the machine and/or the hydraulic system.

8.1. HDBH Test Procedure for Valve Operation

NOTE 1: This valve test procedure only checks for proper function of the HDBH system. Please refer to the HDBH Integration Guide for the External Monitoring Validation Procedure.

NOTE 2: The valve test procedure requires fault simulation. It will be necessary to induce faults electrically by disabling a different solenoid or switch at different times. This will be most easily done by disconnecting solenoid or switch cables at the valve.

NOTE 3: The HDBH is designed to work in association with a directional control valve and a cylinder (or other actuator). The following test procedure only checks the function of the HDBH system, and it may be necessary to modify this procedure to accommodate the various operating modes of the directional valve being used with the HDBH.

NOTE 4: The PNP position switches are supplied with both NC and NO contacts.

NOTE 5: “-” indicates no change from previous step.

Test Procedures									
Step	Action	Sol 1A	Sol 1B	Flow YES/NO?	Switch Conditions (ref. Output Signal Status For Each Valve, page 6)				Pass/Fail
					Switch 1A		Switch 1B		
					(NC)	(NO)	(NC)	(NO)	(P/F)
1	Energize solenoid 1A	ON	OFF	NO	OPEN	CLOSED	CLOSED	OPEN	
2	De-energize both solenoids	OFF	OFF	NO	CLOSED	OPEN	-	-	
3	Energize solenoid 1B	OFF	ON	NO	-	-	OPEN	CLOSED	
4	De-energize both solenoids	OFF	OFF	NO	-	-	CLOSED	OPEN	
5	Energize both solenoids 1A & 1B	ON	ON	YES	OPEN	CLOSED	OPEN	CLOSED	
6	De-energize both solenoids	OFF	OFF	NO	CLOSED	OPEN	CLOSED	OPEN	

8.2. Limitations Due to System Leakage

Even though the HDBH is designed to redundantly block flow, it is important to periodically test for leakage within the HDBH and the system it controls, as any leak within the HDBH itself, interconnecting hoses, connectors, cylinders or other actuators, or even other valves in the circuit may cause unexpected movement. In order to test for leakage within the HDBH itself, it is necessary to check for actuator (cylinder) movement when the HDBH is in each of the following conditions:

! WARNING

Performing this test could cause injury or damage to equipment due to unexpected or uncontrolled movement. Take all necessary precautions to ensure worker safety prior to initiating this test.

- A) fully de-energized (both solenoids 1A & 1B de-energized)
- B) solenoid 1A energized with solenoid 1B de-energized
- C) solenoid 1A de-energized with solenoid 1B energized.

Depending on the application, it may be necessary to preposition actuators and/or other valves such that energizing the HDBH would allow motion to occur. This sets up the circuit so that the HDBH valve is the sole motion-controlling device during testing. For example, if a cylinder is fully retracted, a leak that normally allows retract motion to occur could be masked because the cylinder is already fully retracted.

This test helps to troubleshoot leaks within the HDBH system. Other leaks within the associated system can affect the outcome of this test.

! WARNING

If any leakage is discovered within the system, measures should be taken to eliminate the leak(s) as failing to do so could limit the ability of the safety system to safely stop motion when required.

! WARNING

Continued operation of the system without periodic leakage inspections can lead to unexpected movement.

9. Disconnecting and Removal

! WARNING

Risk of injury due to installation while pressurized or with live parts!

- ▶ Disconnecting a hydraulic component while the system is pressurized or while electrical power is supplied can result in injury or death due to sudden pressure release, unexpected movement, or electric shock.
- ▶ Isolate and lock out the electrical and hydraulic systems before disconnecting the unit.

! WARNING

Risk of Injury!
Misuse may result in injury or damage.

- ▶ The product must be used exclusively as intended.

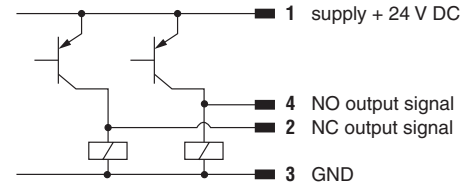
1. Failure to observe the prescribed procedures and cautions may represent a risk for personal injury.
2. Safety valves must only be installed by qualified personnel.
3. Safety valves must not be disassembled.
4. The inductive position switches can only be adjusted by the valve manufacturer.
5. Valve components must not be interchanged.

10. Technical Specifications

Function		Dual Block & Stop - blocks both cylinder lines when sandwich mounted or mounted with the In-line Mounting Kit. Blocks only one line when mounted with the Flow-doubling In-line Mounting Kit.
Construction Design		Redundant valve system, Spool
Actuation		One solenoid per valve element Solenoids must be operated synchronously Direct solenoid operated, spring return
Mounting	Type / Orientation	Sandwich-style mounting (interposed) between base/manifold and directional valve In-line mount between directional valve and actuator (in-line mounting kit required) Flow-doubling In-Line mount between directional valve and actuator (In-Line) for single-line blocking only (flow-doubling In-Line mounting kit required)
	Footprint	ISO 4401-03-02-0-05, NFPA D03, NG size 6
	Monitoring	Dynamic, cyclical, external with customer supplied equipment. Monitoring should check state of both valve position switches with any and all changes in state of valve control signals. See Integration Guide.
Temperature	Ambient	-22° to 158°F (-30° to 70°C)
	Media	-4° to 140°F (-20° to 60°C)
Flow Media	Hydraulic Fluids	Mineral Oil HLP, HL-DIN 51524
		Vegetable Oil HETG - VDMA 24568
Flow		5 gpm (10 gpm with Flow-doubling in-line mounting kit)
Max Fluid Contamination Level		ISO 4401 class 21/19/16 NAS 1638 class 10 (filters at 25 µm value with B25 ≥ 75 recommended)
Operating Pressure	Ports P, A, B	5000 psi (350 bar)*
	Port T	3000 psi (210 bar)*
	*Operating Pressure for Ports P, A, & B limited to 3000 psi (210 bar) unless T port is used (not blocked)	
Solenoids		Version as per VDE 0580. Rated for continuous duty. Electrical connection according to DIN EN 175301-803 Form A Enclosure rating according to DIN 60529 IP 65
Operating Voltage		24 volts DC
Power Consumption (each solenoid)		30 watts
Inductive Position Switch (2 per system)		PNP (M12, 4-pin, A-coded, male); works with both 4-pin & 5-pin female cord sets
Maximum Current (each switch)		400mA maximum
Construction Material	Valve Body	Cast Steel
	Spool	Steel
	Seals	Buna-N
	End-brackets	Unfilled Nylon 12
	Side-brackets (label)	304 Stainless Steel
	In-line Mounting Kit	Ductile Iron
	Flow-doubling In-line Mounting Kit	Ductile Iron
Functional Safety Data		MTTFd: 150 years

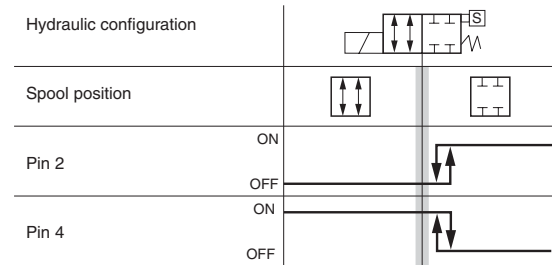
Technical Characteristics Of PNP Inductive Position Switch

Type Of Switch	Contactless inductive position switch with integrated amplifier
Supply Voltage [V]	20-32 V DC
Ripple Max [%]	≤ 10
Max Current [mA]	400
Reaction Time [ms]	15
Max Peak Pressure [bar]	400
Mechanical Life	Virtually Infinite
Switch Logic	PNP



NOTE: PNP (M12, 4-pin, A-coded, male); works with both 4-pin and 5-pin female cord sets.

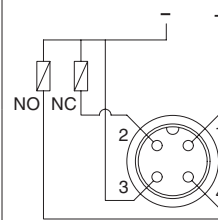
OUTPUT SIGNAL STATUS FOR EACH VALVE IN THE HDBH SYSTEM



Note: PNP Position Switch can be electrically wired by the consumer as NO or NC and then the status of the output signal will be in accordance to the selected configuration.

= Intermediate spool position corresponding to the hydraulic configuration change.

Inductive Position Switch Connector Pinout



- 1 = Supply +24 V DC
- 2 = Output Signal NC
- 3 = Ground
- 4 = Output Signal NO

NOTE: PNP (M12, 4-pin, A-coded, male); works with both 4-pin & 5-pin female cord sets.

NOTE: The switches must be wired with 24 volt (+) and 0 volt (-) connections in parallel with each other.

11. Disposal

Dispose of the valve in accordance with the applicable statutory regulations in your country.

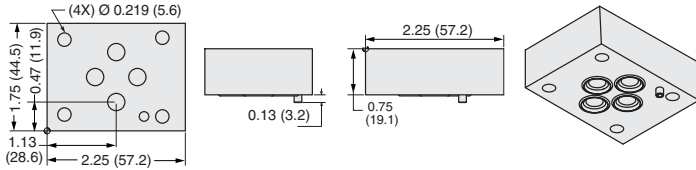
Spacer Kits	Height	Model Number
	0.75 in (19.1 mm)	2548B25
	1.75 in (44.5 mm)	2549B25

Spacer kits can be used to raise the HDBH system higher above the manifold surface in order to avoid interference with other devices on the manifold. Kits are either 0.75" or 1.75" tall. Combine kits as necessary to achieve the desired spacing.

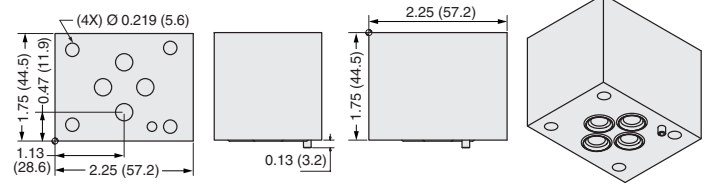
KIT DIMENSIONS – TECHNICAL DATA

Inches (mm)

0.75 in (19.1 mm)



1.75 in (44.5 mm)



Mounting Kits	Kit Selection	Model Number
	In-line (Blocks 2 lines)	2790B77
	In-line Flow-doubling (Blocks 1 line)	2819B77

In applications where installation on a manifold is not practical, the in-line mounting kit can be used to facilitate installation in-line between a directional valve and actuator (typically a cylinder). The 2790B77 kit provides 2 mounting plates with multiple SAE 06 ports for the A, B, and T ports in order to provide for flexibility in piping. At least one of the T ports must be piped back to the tank. Through holes (0.422" dia.) for mounting the assembly are included in the plates. All assembly hardware and plugs are included, but mounting hardware for the assembly must be provided by the customer.

For applications where higher flows are needed, there is an option to combine the flow through both the A & B ports to double the flow capacity of the HDBH valve. This doubling effect converts the HDBH valve to a single-line blocking valve instead of blocking two lines. The In-line Flow-doubling Mounting kit provides 2 mounting plates with multiple SAE 10 ports for the inlet and outlet for flexibility in piping and two SAE 06 T(DR) ports. At least one of the T(DR) ports must be piped back to the tank to perform a drain function. All assembly hardware and plugs are included, but mounting hardware for the assembly must be provided by the customer.

KIT DIMENSIONS – TECHNICAL DATA

Inches (mm)

In-line Mounting Kit

A	SAE # 6
B	SAE # 6
T	SAE # 6

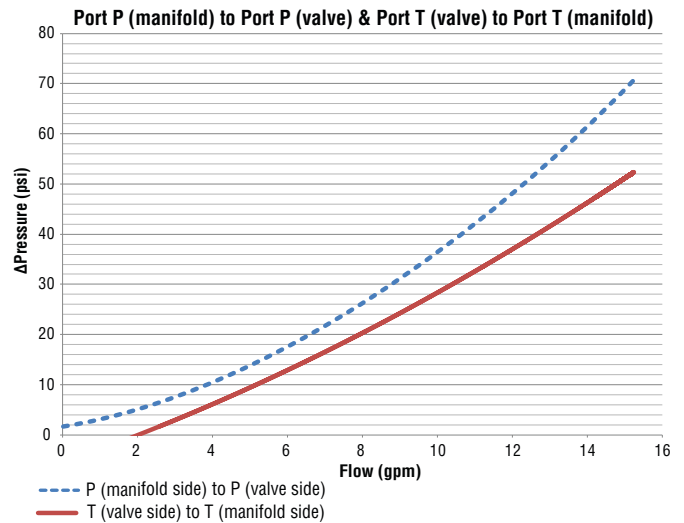
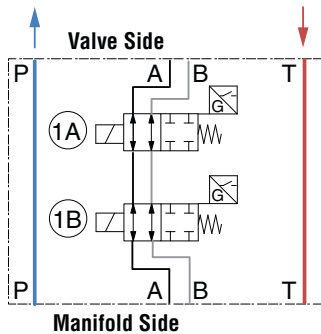
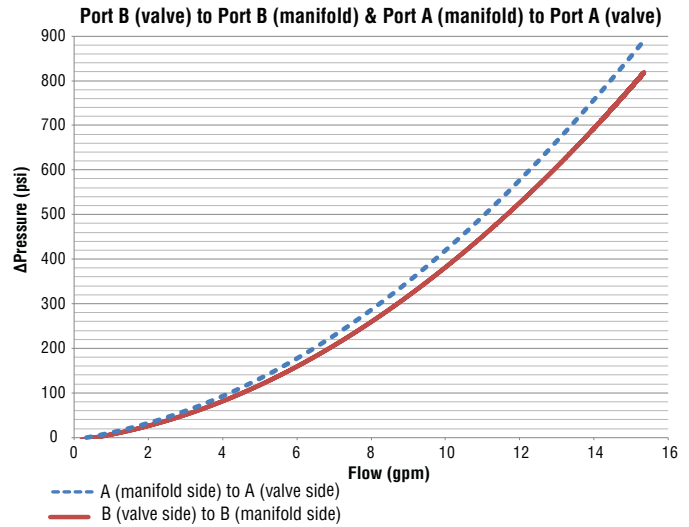
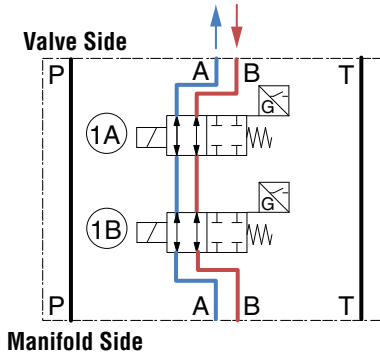
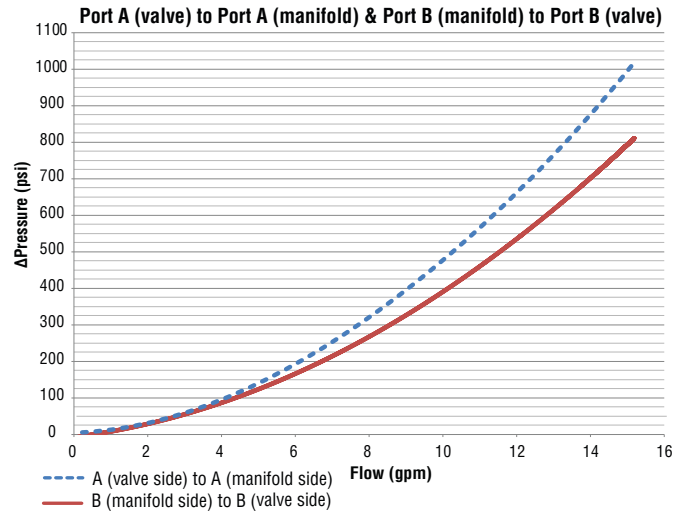
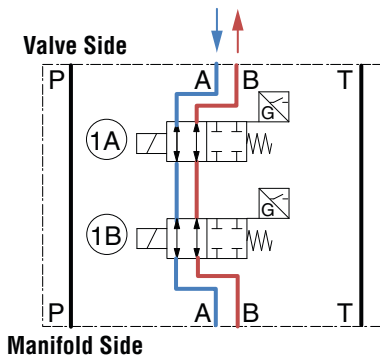
Schematic diagram showing the in-line mounting kit installed between a directional valve and an actuator. The valve has ports A, B, and T. The kit consists of two mounting plates, 1A and 1B, which provide additional ports for A, B, and T. Technical drawings show the kit's dimensions: a width of 4.0 (101.6) and a height of 2.0 (50.8). The kit is shown in perspective and top views.

In-line Flow-doubling Mounting Kit

P	SAE # 10
A	SAE # 10
T(DR)	SAE # 6

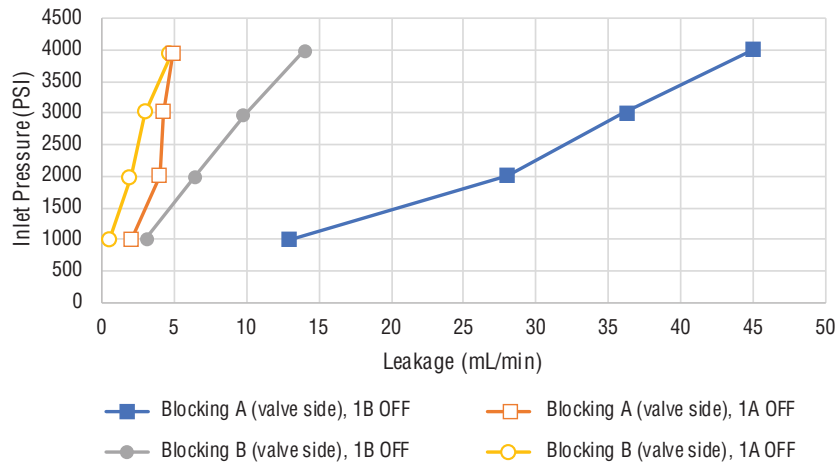
Schematic diagram showing the in-line flow-doubling mounting kit installed between a directional valve and an actuator. The valve has ports A, B, and T(DR). The kit consists of two mounting plates, 1A and 1B, which provide additional ports for P, A, and T(DR). Technical drawings show the kit's dimensions: a width of 4.0 (101.6), a height of 2.50 (63.5) for the actuator side, and a total height of 8.94 (227.08) for the valve side. The kit is shown in perspective and top views.

PRESSURE DROP CURVES

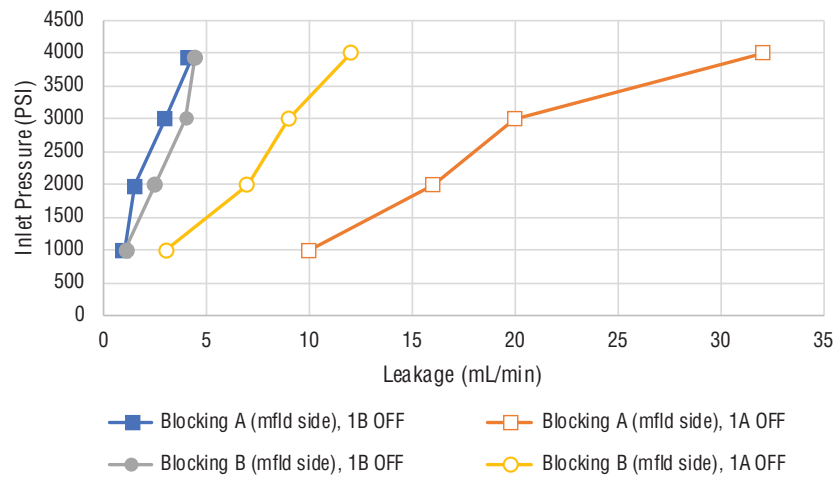


Leakage at Port T (Faulted)

Leakage at Port T - Blocking on Port A & B (valve side)



Leakage at Port T - Blocking on Port A & B (mflid side)





EU declaration of conformity

(Original Version)

This declaration of conformity is issued under the sole responsibility of the manufacturer

ROSS® hydraulic double valve series **HDBH** is in full accordance with the following Directives:

Machinery Directive 2006/42/EC

Applied harmonized standards:

EN ISO 13849-1: 2015: Safety of Machinery- Safety related parts of a control system -Part 1
EN ISO 13849-2: 2012: Safety of Machinery- Safety related parts of a control system -Part 2
EN 60204-1: 2018: Safety of Machinery- Electrical equipment of machines -Part 1
EN IEC 60947-5-2: 2020 Low-voltage switchgear and control gear - Part 5-2: Control circuit devices and switching elements - Proximity switches
EN ISO 4413: 2010-11: Hydraulic fluid power - General rules and safety requirements for systems and their components

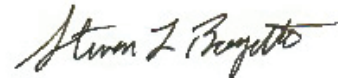
Tested in accordance to: GS-IFA-M13:2021-03 (as applicable)

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Ferdale, MI, 2022-07-19

Signed for and on behalf of ROSS®



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Global Product Manager
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subject to change, actual version on request

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