

# Technical Document

## HK5 & HKL5 Solenoid Valve Series





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Revision History

Revision	Date	Reason For Change	ECO #
A	1/1/2020	Initial document release	-

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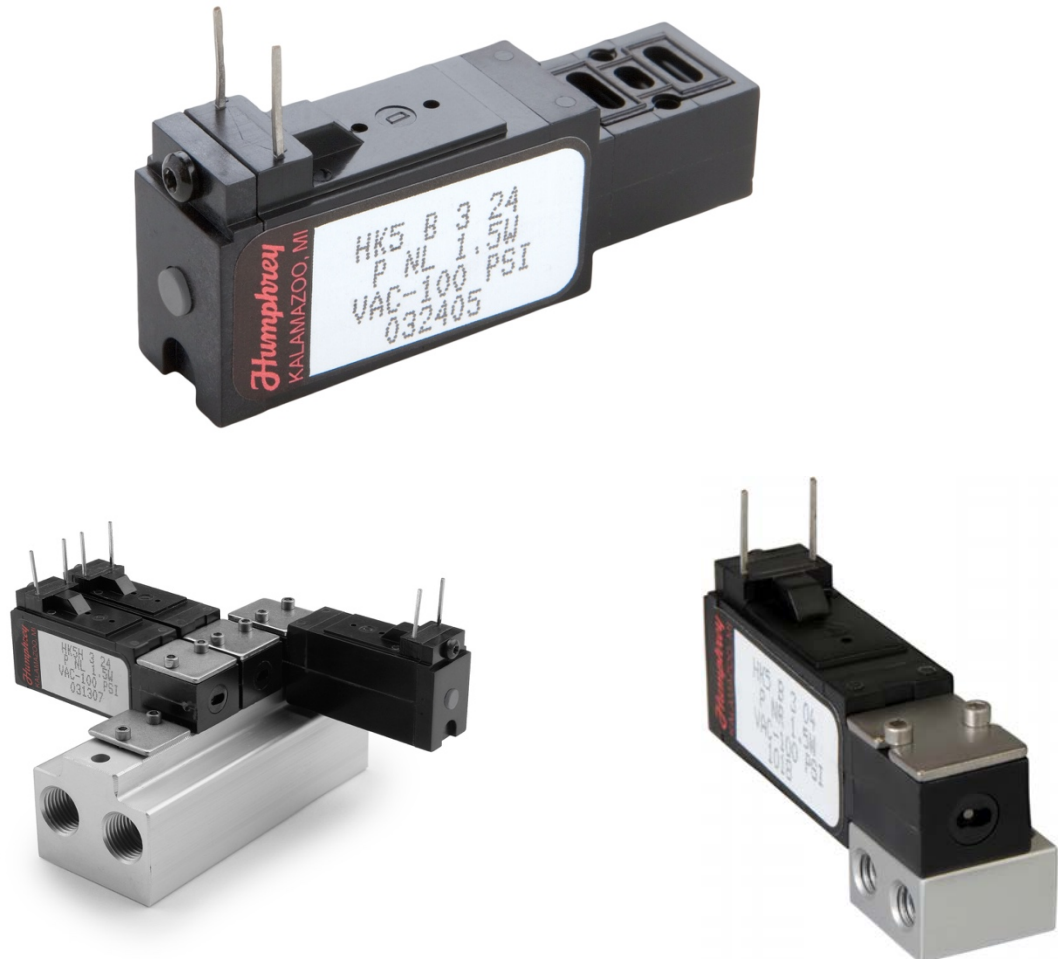
## Technical Document HK5 & HKL5 Solenoid Valve Series

Humphrey Series HK5 are miniature 3-port solenoid valves uniquely designed to reliably control a variety of gas and liquid media in the most demanding applications. Just 12mm in width, HK5 is created for equipment and device makers in high technology industries seeking tight sealing, integration flexibility and extremely reliable operation over millions of cycles.

This technical document describes HK5 functionality, its specifications and expected performance. Additionally, HK5's extensive product offering is presented including a range of standard porting, mounting and integration variations.

Additional information on HK5 and the many other compressed air, inert gas and aggressive media valve technology by Humphrey can be found in the Online Catalog on the Humphrey website (<https://www.humphrey-products.com/catalog/>).

The Humphrey HK5 Series is produced in the USA under certified control of ISO 9001:2015 registration and compliant to ISO 13485 standards.



## **PRODUCT DESCRIPTION – HK5 & HKL5 SERIES**

HK5 solenoid valve is a direct acting, 2 position, single solenoid/spring return, 3-port type. Base valves are constructed as manifold mount and ready for assembly to a variety of single valve porting blocks and sub-bases, or multiple valve manifolds. HK5 is appropriate for compressed air, and a variety of compatible gases. Valve is multi-purpose, offering multiple control functions from a single stock keeping unit, reducing complexity and part count for the user.



**Design:** HK5's opposing ***diaphragm-poppet balanced*** construction is unique to industry. It will reliably control pressurized media for millions of trouble-free cycles. Design is appropriate for gas pressures ranging from vacuum to 100 PSI. Body porting arrangement is symmetrical and customer friendly, ready for variety of standard and customizable porting and mounting choices.

Model HKL5 is like HK5, with wetted materials appropriate for compatible liquids pressurized to 30 PSI.

### ***Performance Highlights:***

**Industry Leading Low Leak Rate:** Total leakage not to exceed 2ccm at 100 PSI (tested with clean, dry air). "Bubble tight" valves are available, particularly at lower pressures (consult factory).

**Inert Flow Path:** Media is controlled within two flexing diaphragm-poppet elastomers assembled to a Stainless Steel stem, within a molded, thermoset epoxy body. Thus, assembly is inert, compatible with a variety of gases. HKL5 is compatible with a variety of liquid media.

**Universal Functionality:** Apply HK5 as 2-port or 3-port valve, normally closed or normally open, and as selector or diverter function. Operates reliably whether pressure is stable or unstable over its full range. Apply HKL5 up to 30 PSI, as 2-port normally closed or open, or 3-port diverter.

**High Flow Capacity / Low Current Consumption:** As a pressure balanced construction, the energized solenoid force overcomes force of return spring only, yielding a quick shift and instantaneous large flow path opened. Up to 85 LPM from 1.7 watts.

**Quiet Operation:** Diaphragm-Poppet design is inherently quiet versus comparable valves.

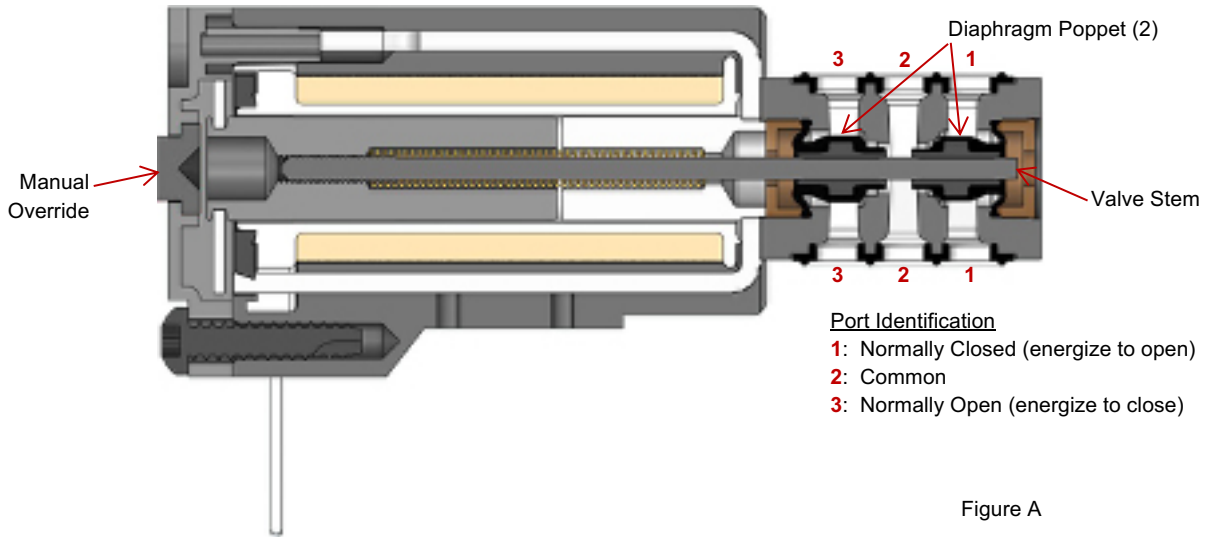
**Many Options Available:** Choices of diaphragm material, electrical entry, numerous porting and mounting options conveniently makes HK5 applicable for nearly any miniature valve challenge.

**Consider Engineered Solutions:** Humphrey design team collaborates with you to tailor a solution for optimized performance and integration into your application. Many successful HK5 valve and valve system solutions to draw from.



## CONSTRUCTION – HK5 & HKL5 SERIES

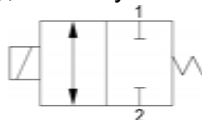
See Figure A. Media is controlled within two opposing Diaphragm-Poppet elastomers positioned on a stainless steel valve stem. Diaphragm-Poppets are precision molded over a PEEK insert and flex when shifted, alternately shuttling into mating seats of valve body. Coil side diaphragm isolates media from the solenoid element. Identical cap side diaphragm seals media within and balances HK5 internal design. Solenoid encapsulation and valve body are precision molded of inert, thermoset epoxy into a single component. Body porting is symmetrical on opposing surfaces for ultimate integration and space savings. Valve may be manually operated for jogging/troubleshooting, when ordered with Override option.



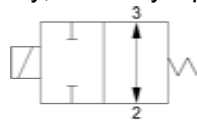
In unenergized state, HK5 port 1 is blocked. Port 2 is open to port 3. When coil is energized, Port 1 opens to port 2. Port 3 becomes blocked.

### HK5 INERT GAS / COMPRESSED AIR FUNCTIONS – Schematics for use of any **HK5** valve as:

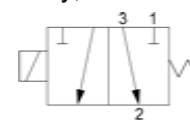
2-Way, Normally Closed (NC)



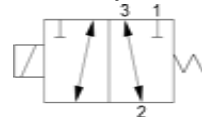
2-Way, Normally Open (NO)



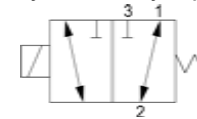
3-Way, Selector



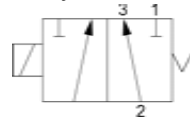
3-Way, Normally Closed (NC)



3-Way, Normally Open (NO)

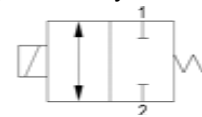


3-Way, Diverter

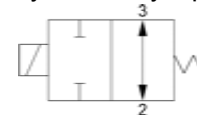


### HKL5 COMPATIBLE LIQUID FUNCTIONS – Schematics for use of any **HKL5** valve as:

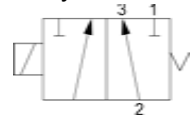
2-Way, Normally Closed (NC)



2-Way, Normally Open (NO)



3-Way, Diverter



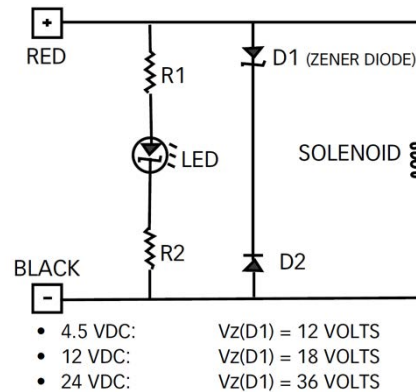
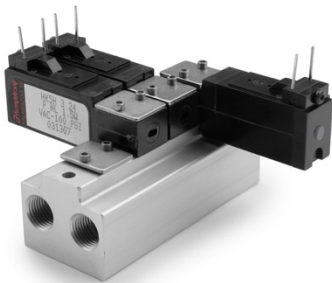
## GENERAL SPECIFICATIONS - HK5 VALVE SERIES

### Mechanical

Type of Operation:	Direct Single Solenoid, Spring Return
Valve Function:	2- or 3-port, normally closed or open, diverter, selector (universal)
Size – Base Valve (W x L x H):	12.5 mm x 50 mm x 21 mm
Media:	Compressed Air & Vacuum, Compatible Gases
Pressure Range	
NBR seal material:	28" Hg vacuum to 100 PSIG (6.8 bar)
FKM seal material:	28" Hg vacuum to 60 PSIG (4.1 bar)
EPDM & HNBR seal mat'l:	28" Hg vacuum to 30 PSIG (2.0 bar)
Ambient Temperature Range	
NBR seal material:	32 to 125 degrees F (0 to 50 degrees C)
FKM seal material:	32 to 212 degrees F (0 to 100 degrees C)
EPDM & HNBR seal mat'l:	32 to 175 degrees F (0 to 80 degrees C)
Flow Capacity	
Std (1.7w) Power:	85 LPM (3 SCFM) @ 100 PSI (Cv: 0.05)
Low (0.9w) Power:	42 LPM (1.5 SCFM) @ 60 PSI (Cv: 0.035)
Std Leak Rate (max allowed):	100% tested <2 cc/minute @ 100 PSI (with compressed air)
Effective Area	
Std power:	0.002 in <sup>2</sup> (1.3mm <sup>2</sup> )
Low power:	0.0014 in <sup>2</sup> (0.9mm <sup>2</sup> )
Lubrication:	None required (if used, must be compatible with seal materials)
Filtration:	40 Micron minimum recommended
Weight:	35 gm (1.2 oz)
Valve Wetted Materials:	Thermoset Epoxy, PEEK, SST, NBR (or HNBR, EPDM or FKM)
Compliance:	RoHS, Conflict Minerals

### Electrical:

Coil Temperature Rise:	45°F (25°C) – standard valve; 32°F (18°C) – low power valve
Coil Response Time:	10ms ON / 4ms OFF
Std Coil Voltages:	12VDC, 24VDC, 4.5VDC
Voltage Tolerance:	+10% / -15% of rated voltage
Power Consumption:	1.7 watt – standard valve; 0.9 watt – low power valve
Insulation:	Conforms to Class B
For Plug-In Electrical Type:	See Circuit B. Includes LED & surge protection Zener Diodes.



Circuit B

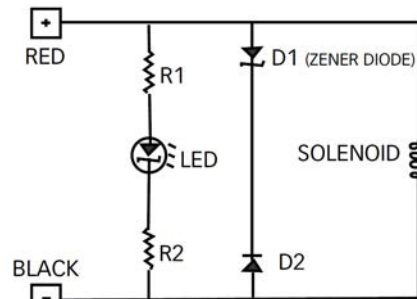
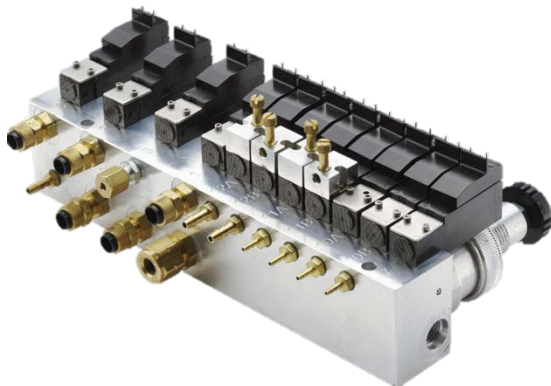
## GENERAL SPECIFICATIONS - HKL5 VALVE SERIES

### Mechanical

Type of Operation:	Direct Single Solenoid, Spring Return
Valve Function:	2-port normally closed or open, 3-port diverter
Size – Base Valve (W x L x H):	12.5 mm x 50 mm x 21 mm
Media:	Compatible Liquids (and Gases)
Pressure Range:	0 to 30 PSIG
Ambient Temperature Range	
NBR seal material:	32 to 125 degrees F (0 to 50 degrees C)
FKM seal material:	32 to 212 degrees F (0 to 100 degrees C)
EPDM & HNBR seal mat'l:	32 to 175 degrees F (0 to 80 degrees C)
Flow Capacity:	85 LPM (3 SCFM) @ 100 PSI (Cv: 0.05)
Std Leak Rate (max allowed):	<2 cc/minute @100 PSI (tested with compressed air)
Effective Area:	0.002 in <sup>2</sup> (1.3mm <sup>2</sup> )
Filtration:	40 Micron minimum recommended
Weight:	35 gm (1.2 oz)
Valve Wetted Materials:	Thermoset Epoxy, PEEK, SST, and NBR (or HNBR, EPDM or FKM)
Compliance:	RoHS, Conflict Minerals

### Electrical:

Coil Temperature Rise:	45°F (25°C) – standard valve; 32°F (18°C) – low power valve
Coil Response Time:	10ms ON / 4ms OFF
Std Coil Voltages:	12VDC, 24VDC, 4.5VDC
Voltage Tolerance:	+10% / -15% of rated voltage
Power Consumption:	1.7 watt
Insulation:	Conforms to Class B
For Plug-In Electrical Type:	See Circuit B. Includes LED and surge protection Zener Diodes



- 4.5 VDC: Vz(D1) = 12 VOLTS
- 12 VDC: Vz(D1) = 18 VOLTS
- 24 VDC: Vz(D1) = 36 VOLTS

Circuit B

## MEDIA COMPATIBILITY – HK5 & HKL5

In the wetted flow path, gas or liquid media is controlled between two flexing diaphragm-poppet elastomers. Diaphragm-poppets are molded to PEEK stem inserts. Stem inserts are assembled dry to a stainless steel stem within an injection molded, thermoset epoxy valve body. Poppets alternately seal into seats of the valve body.

Completed assembly is inert and free of assembly grease or lubricant, thus making it compatible with a variety of gases and liquids. Materials of Model HKL5 are suited more for liquid media.

Specific wetted materials (ie those in contact with media):

HK5:	Elastomer Seats / Gaskets:	NBR, HNBR, FKM or EPDM
	Elastomer Seat Insert:	PEEK
	Valve Stem:	Nicotuf (Nickel-TFE) plated 303 Stainless Steel
	Valve Body:	Thermoset Epoxy, See below

HKL5:	Elastomer Seats / Gaskets:	NBR, HNBR, FKM or EPDM
	Elastomer Seat Insert:	PEEK
	Valve Stem:	316 Stainless Steel, Passivated
	Valve Body:	Thermoset Epoxy, See below

Additional Information for Thermoset Epoxy (Valve Body):

Cosmic FARBOSET 1115: Granular, mineral-filled, anhydride epoxy molding compound featuring fast cure rates and excellent hot strength. Technical data sheet available upon request.

Note: HK5 may be compatible with certain liquids and HKL5 may be compatible with certain gases. Consult factory. Consult factory if the media pressure and/or ambient temperature exceeds recommended minimums or maximums. It is possible for valve to be prepared to your parameters.

Media Pressure:

HK5:	Gases (compressible fluids)	NBR & HNBR: 28" Hg ~ 100 PSI
		FKM & EPDM: 28" Hg ~ 60 PSI
HKL5:	Liquids (incompressible fluids):	0-30 PSI

Ambient Temperature:

NBR:	32° ~ 125° F (0° ~ 50° C)
HNBR:	32° ~ 175° F (0° ~ 80° C)
EPDM:	32° ~ 175° F (0° ~ 80° C)
FKM:	32° ~ 212° F (0° ~ 100° C)

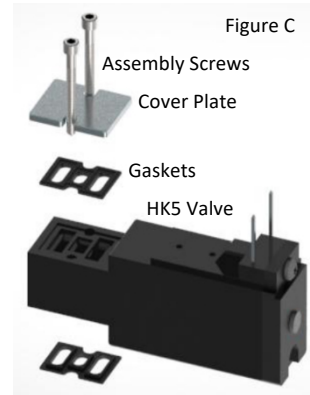


## HK5 DURABILITY TESTING

Product Testing Report			
Product Name	HK5	Product No.	Standard Models
Seal & Poppet Materials	NBR	Other Materials if Appl.	NA
Other Product Desc.	Diaphragm Isolated Balanced 3 way 12mm valve 24 VDC (1.7 Watt)		
Durability Test Conditions			
Gas or Fluid Type	Air	If Gas Dryness (C) etc	Non-Condensing
Test Pressure (PSI)/Bar	(100)/7	Filtration Level (um)	5
Ambient Temp. (F)/C	(70)/21	Fluid or Gas Temp (F)/C	(70)/21
Durability Cycle Rate (Hz)	5	Duty Cycle (%)	TBD
Durability Cycle Voltage	24 VDC	Durability Cycles	30,000,000
Durability Cycle Other Desc.	Valves mounted in groups of 6 on each manifold		
Quantity Tested	25	Quantity Passed	25
Test Characteristic	Specification	Test Pass or Fail	Quantity Tested if Diff.
Flow (liters/min)	30 Min	Pass	
Leak (sccm/min)	0.5 Max	Pass	
Pullin (V)	10.8 Max	Pass	
Drop out (V)	9 Min	Pass	
Opening Response (ms)	10 Max	Pass	
Closing Response (ms)	4 Max	Pass	
Hysteresis %	NA	Pass	
Lift Off Current (mA)	NA	Pass	
Validation Limit Testing			
Quantity Tested	10	Quantity Passed	10
Test Characteristic	Test Pressure (psi)/bar	High Temp. ( F )/C	Low Temp ( F )/C
	(100)/7	(215)/102	(0)/-18
	Specification	Pass or Fail	Pass or Fail
Flow (liters/min)	30	Pass	Pass
Leak (sccm/min)	4	Pass	Pass
Pullin (V)	10.8	Pass	Pass
Drop out (V)	9	Pass	Pass
Hysteresis %	NA	Pass	Pass
Lift Off Current (mA)	NA	Pass	Pass
Other Tests			
Test Characteristic	Specification	Test Pass or Fail	Test Conditions
Proof Pressure (PSI)/Bar >=	(150)/10	Pass	Temp. (70)/21 C
Ingress Protection (IP) 64 to 69	67	Pass	Temp. (70)/21 C
Vibration	NA	Pass	Temp. (70)/21 C
Drop from X foot	NA	Pass	NA
Conclusions:	Product tested above meets all applicable specifications		
Test Author:	Marc Larson	Date	4-Mar-19
Test Approved By:	Todd Bordewyk	Date	5-Mar-19

## HK5 / HKL5 PRODUCT OFFERING

Additional information and CAD files on HK5 and HKL5 product offering can be accessed from the Humphrey Online Catalog ( [www.humphrey-products.com/catalog/](http://www.humphrey-products.com/catalog/) ). Obtain product images, CAD files, view CAD, see list price and lead time, request quote, download/view brochure and Engineered Solution case histories.

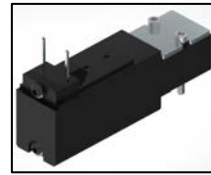
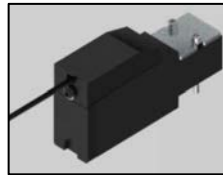
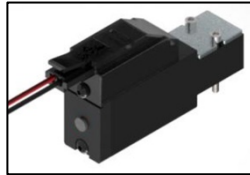


**Models: includes valve, gaskets, screws, cover plate (Figure C).**

- HK5 – Standard Valve for Compressed Air and Inert Gas
- HK5 – Low Power Valve for Compressed Air and Inert Gas
- HKL5 – Compatible Gas and Liquids



### Valve Options

Elastomers: Select from NBR (B), HNBR (H), EPDM (E) or FKM (F).  
 Function: Select 2-port or 3-port.  
 Voltages: Select from 12VDC, 24VDC or 4.5VDC.  
 Override: Select from Non-Locking Manual Operator (NL) or without (NR).  
 Electrical Entry: Plug-In w/ LED (C)    Lead Wire (A)    Pin Connector (P)



**Assembled Subbases:** Available with 2- & 3-port Standard types M, S, Y, Z

### Standard Accessories

For Valves: 3-port gasket, Bag of 10   
 2-port gasket, Bag of 10 (orient for NC or NO function)   
 Connector, Bag of 10 (Included with Plug-In type Electrical Entry)  
 IDC Connector, Bag of 10 (Not included, for Pin type Electrical Entry)  
 For Manifolds: Block Off Plate (cover unused manifold stations)

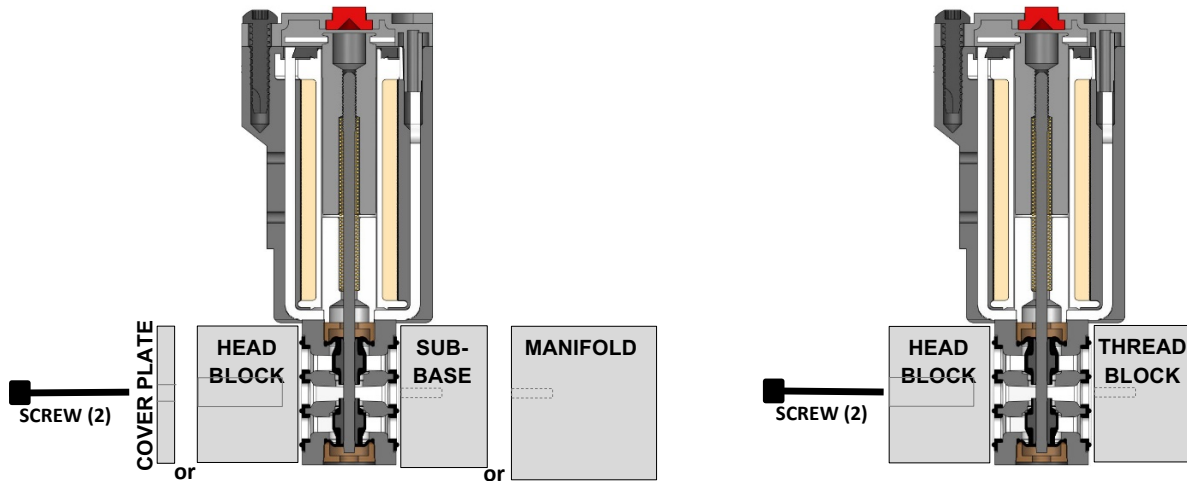
### Standard and Non-Standard Product Line Items (presented on following pages)

Porting Blocks: Variety of Head Block & Thread Block types offered.  
 Subbases: 1-2-3 Port and 1-2 Port types offered.  
 Manifolds: 1-2-3 Port, 1 Port, and 1-3 Port types offered.  
 Vented Cover Plate

**Pre-Assemblies of Valve(s) to Porting Blocks, Subbases and Manifolds may be available in minimum quantities. Consult factory.**

## COVER PLATES, PORTING BLOCKS, SUBBASES AND MANIFOLDS





A variety of individual and multiple valve porting blocks, subbases and manifolds are offered to fit most any application. A cover plate with two assembly screws and gaskets are included with each HK5 individual valve. Selectively substituting 2-port gasket on Head Block side expands range of Porting Block variations and product flexibility.



Cover Plates and certain Head Blocks are paired with Subbases and Manifolds. Cover Plates and Head Blocks include assembly screw thru-holes and are shipped with two assembly screws. Subbases, Manifolds and Thread Blocks include corresponding female threaded holes for Cover Plates' or Head Blocks' assembly screws. Pair Head Blocks with Thread Blocks to complete a functional 2- or 3-port individual valve.

The following tables list available Cover Plates, Head Blocks, Thread Blocks, Subbases and Manifolds.

Note: Rotate HK5 valve 180° and orient electrical entry over opposite side for fit within your device. On 2-port valves, gaskets are oriented for Normally Closed function as standard. Flip and reposition gaskets for 2-port Normally Open function.

COVER PLATE	Description	Assembled Image	Use with ...
Part Number: <b>HK5PX</b> 	Blocking Cover Plate Kit (includes screws). Included with standard HK5 or HKL5 valve.		Any <b>HK5025</b> Subbase Any <b>HK5M</b> Manifold
Part Number: <b>HK5PV</b> 	Vented Cover Plate Kit (includes screws). Order separately. Orient Plate for NC or NO 3-way function.		<b>HK5025S</b> Subbase <b>HK5025B</b> Subbase <b>HK5025C</b> Subbase



Blocking Cover Plate **HK5PX** is included with valve as standard, except when ordered with option code **X**.



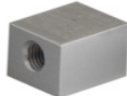







**COVER PLATES, PORTING BLOCKS, SUBBASES AND MANIFOLDS (continued)**

HEAD BLOCK	Description	Assembled Image	Use with Thread Block # ....
Part Number: <b>HK5HC1</b> 	Axial 10-32 UNF Port 2; Perpendicular 10-32 UNF Port 3; 3-way NC function. Optional 2-port gasket included.		<b>HK5TMA</b> Thread Block <b>HK5TMB</b> Thread Block <b>HK5TMC</b> Thread Block <b>HK5MMA</b> __ Manifold <b>HK5MMB</b> __ Manifold*
Part Number: <b>HK5HC2</b> 	Axial Port 2 barb fitting for 1/8" tube; Port 3 not threaded. 3-way NC function. Optional 2-port gasket included.		<b>HK5TMA</b> Thread Block <b>HK5TMB</b> Thread Block <b>HK5TMC</b> Thread Block <b>HK5MMA</b> __ Manifold <b>HK5MMB</b> __ Manifold*
Part Number: <b>HK5HC3</b> 	Barb Fitting for 1/8" Tubing; 10-32 UNF Port 3. 3-way NC function; Optional 2-port gasket included.		<b>HK5TMA</b> Thread Block <b>HK5TMB</b> Thread Block <b>HK5TMC</b> Thread Block <b>HK5MMA</b> __ Manifold <b>HK5MMB</b> __ Manifold*
Part Number: <b>HK5HC4</b> 	Axial Port 2 Barb Fitting for 5/32" (4mm) Tubing; Port 3 not threaded. 3-way NC function; Optional 2-port gasket included.		<b>HK5TMA</b> Thread Block <b>HK5TMB</b> Thread Block <b>HK5TMC</b> Thread Block <b>HK5MMA</b> __ Manifold <b>HK5MMB</b> __ Manifold*
Part Number: <b>HK5HC5</b> 	Axial Port 2 & 3 Barb Fittings for 5/32" (4mm) ID Tubing; For 3-way NC function. For Pin or Lead Wire HK5 valves only.		<b>HK5TMA</b> Thread Block <b>HK5TMB</b> Thread Block <b>HK5TMC</b> Thread Block <b>HK5MMA</b> __ Manifold <b>HK5MMB</b> __ Manifold*
Part Number: <b>HK5HC6</b> 	Perpendicular Port 2 Barb Fitting for 5/32" (4mm) Tubing; Port 3 vent via slot. 3-way NC function.		<b>HK5TMA</b> Thread Block <b>HK5TMB</b> Thread Block <b>HK5TMC</b> Thread Block <b>HK5MMA</b> __ Manifold
Part Number: <b>HK5HM1</b> 	Perpendicular 10-32 UNF Port 1. Aluminum. Rotate for NO function.		<b>HK5TMX</b> Thread Block <b>HK5025A</b> Subbase <b>HK5025Z</b> Subbase
Part Number: <b>HK5HM2</b> 	Perpendicular 10-32 UNF Port 1 & 3. Aluminum.		<b>HK5TMX</b> Thread Block

\* Substitute optional 2-port gasket on Head Side of Valve assembly & route Port 3 flow through Manifold.

**COVER PLATES, PORTING BLOCKS, SUBBASES AND MANIFOLDS (continued)**

HEAD BLOCK	Description	Assembled Image	Use with Thread Block # ....
Part Number: <b>HK5HM3</b> 	Axial 10-32 UNF Port 2; Perpendicular 10-32 UNF Port 3. 3-way NC function; Aluminum.		<b>HK5TMA</b> Thread Block <b>HK5TMB</b> Thread Block <b>HK5TMC</b> Thread Block <b>HK5MMA</b> __ Manifold

THREAD BLOCK	Description	Assembled Image	Use with ...
Part Number: <b>HK5TMX</b> 	Perpendicular 10-32 UNF Port 2. Aluminum.		<b>HK5HM1</b> Head Block <b>HK5HM2</b> Head Block
Part Number: <b>HK5TMA</b> 	Axial 10-32 UNF Port 1 for NC Function. Aluminum.		<b>HK5HC1</b> Head Block <b>HK5HC2</b> Head Block <b>HK5HC3</b> Head Block <b>HK5HC4</b> Head Block <b>HK5HC5</b> Head Block <b>HK5HC6</b> Head Block
Part Number: <b>HK5TMB</b> 	Perpendicular 10-32 UNF Port 1 for NC or NO Function. Aluminum.		<b>HK5HC1</b> Head Block <b>HK5HC2</b> Head Block <b>HK5HC3</b> Head Block <b>HK5HC4</b> Head Block <b>HK5HC5</b> Head Block <b>HK5HC6</b> Head Block
Part Number: <b>HK5TMC</b> 	Side 10-32 UNF Port 1 for NC or NO Function. Aluminum.		<b>HK5HC1</b> Head Block* <b>HK5HC2</b> Head Block* <b>HK5HC3</b> Head Block* <b>HK5HC4</b> Head Block* <b>HK5HC5</b> Head Block* <b>HK5HC6</b> Head Block
Part Number: <b>HK5TMD</b> 	Threaded Subbase 1 & 3 port		<b>HK5HC1</b> Head Block** <b>HK5HC2</b> Head Block** <b>HK5HC3</b> Head Block** <b>HK5HC4</b> Head Block** <b>HK5HC5</b> Head Block**



\* Substitute Head Block's 2-port gasket on valve assembly for 2-Way function.










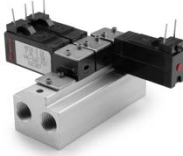
\*\* Substitute Head Block's 2-port gasket on valve assembly to route Port 3 through Thread Block.

**COVER PLATES, PORTING BLOCKS, SUBBASES AND MANIFOLDS (continued)**

SUBBASE	Description	Assembled Image	Use With ...
Part Number: <b>HK5025A</b> 	1 & 2 Port. 10-32 UNF Ports on Two End Surfaces.		<b>HK5PX</b> Blocking Cover Plate (Std w/Valve) <b>HK5PV</b> Vented Cover Plate <b>HK5HM1</b> Head Block
Part Number: <b>HK5025B</b> 	1 & 2 Port. 10-32 UNF Ports on Two Side Surfaces.		<b>HK5PX</b> Blocking Cover Plate (Std w/Valve) <b>HK5PV</b> Vented Cover Plate <b>HK5HM1</b> Head Block
Part Number: <b>HK5025C</b> 	1 & 2 Port. 10-32 UNF Ports on One Side Surface.		<b>HK5PX</b> Blocking Cover Plate (Std w/Valve) <b>HK5PV</b> Vented Cover Plate <b>HK5HM1</b> Head Block
Part Number: <b>HK5025M</b> 	1, 2 & 3 Port. M3x0.5 Ports on One Side Surface. (May order mounted to HK5.)		<b>HK5PX</b> Blocking Cover Plate (Std w/Valve)
Part Number: <b>HK5025S</b> 	1, 2 & 3 Port. 10-32 UNF Ports on Two Side Surfaces. (May order mounted to HK5.)		<b>HK5PX</b> Blocking Cover Plate (Std w/Valve)
Part Number: <b>HK5025T</b> 	Molded Port Cover with Perpendicular 1/8" ID Tubing 1, 2 & 3 Ports. Optional 2-port gasket included for 2-way function.		<b>HK5PX</b> Blocking Cover Plate (Std w/Valve)
Part Number: <b>HK5025Y</b> 	1, 2 & 3 Port. 10-32 UNF Ports on One Surface. (May order mounted to HK5.)		<b>HK5PX</b> Blocking Cover Plate (Std w/Valve)

## COVER PLATES, PORTING BLOCKS, SUBBASES AND MANIFOLDS (continued)

SUBBASE	Description	Assembled Image	Use With ...
Part Number: <b>HK5025Z</b> 	1 & 2 Port. 10-32 UNF Ports on One Surface. (May order mounted to HK5.)		<b>HK5PX</b> Blocking Cover Plate (Std w/Valve) <b>HK5PV</b> Vented Cover Plate <b>HK5HM1</b> Head Block

MANIFOLD	Description	Image	Use With ...
Part Number: <b>HK5MM_</b> 	Small 10-32 UNF Port 1, 2 & 3 Type. Select 2 or 3 station		<b>HK5PX</b> Blocking Cover Plate (Std w/Valve)
Part Number: <b>HK5M_</b> 	Large Type w/ 1/8 NPSF Port 1&3, 10-32 UNF Port 2. Select 4, 6, 8, 10 or 12 station		<b>HK5PX</b> Blocking Cover Plate (Std w/Valve)
Part Number: <b>HK5MMA_</b> 	Small Port 1 only Threaded Manifold, select 2, 4 or 6 station.		<b>HK5HC1</b> Head Block* <b>HK5HC2</b> Head Block* <b>HK5HC3</b> Head Block* <b>HK5HC4</b> Head Block* <b>HK5HC5</b> Head Block* <b>HK5HC6</b> Head Block
Part Number: <b>HK5MMB_</b> 	Small Port 1&3 only Threaded Manifold, select 2, 4 or 6 station		<b>HK5HC1</b> Head Block** <b>HK5HC2</b> Head Block** <b>HK5HC3</b> Head Block** <b>HK5HC4</b> Head Block** <b>HK5HC5</b> Head Block**
Part Number: <b>HK5BOP</b> 	Block Off Plate. Includes screws and gasket. For unoccupied valve station on manifold.		<b>HK5MM-__</b> Manifold <b>HK5M-__</b> Manifold <b>HK5MMA-__</b> Manifold <b>HK5MMB-__</b> Manifold

\* Substitute Head Block's 2-port gasket on valve assembly for 2-Way valve function.

\*\* Substitute Head Block's 2-port gasket on valve assembly to route Port 3 through Manifold.

**HOW TO ORDER Valves. Valve Includes Cover Plate, Screws (2), Gaskets (2)**



	<u>CODE</u>	<u>Description</u>
I. BASE MODEL:	<b>HK5</b>	Suitable for Vac ~ 100 PSI gases / compressible fluids
	<b>HKL5</b>	Suitable for 0~30 PSI liquids / incompressible fluids
II. SEAL MAT'L	<b>B</b>	Buna Nitrile (NBR)
	<b>E</b>	Ethylene Propylene (EPDM)
	<b>F</b>	Fluorocarbon (FKM)
	<b>H</b>	Highly Saturated Buna Nitrile (HNBR)
III. PORT QTY	<b>2</b>	Two Ports (Configured Normally Closed as Standard*)
	<b>3</b>	Three Ports
IV. VOLTAGE	<b>04</b>	4.5 VDC w/std 1.7 watt (Valve flow: 0.05 Cv)
	<b>L04</b>	4.5 VDC w/low 0.9 watt (Valve flow: 0.035 Cv)
	<b>12</b>	12 VDC w/std 1.7 watt (Valve flow: 0.05 Cv)
	<b>L12</b>	12 VDC w/low 0.9 watt (Valve flow: 0.035 Cv)
	<b>24</b>	24 VDC w/std 1.7 watt (Valve flow: 0.05 Cv)
	<b>L24</b>	24 VDC w/low 0.9 watt (Valve flow: 0.035 Cv)
V. COIL ENTRY	<b>A</b>	Wire Leads (50 cm wire length)
	<b>AL</b>	Wire Leads (100 cm wire length)
	<b>C</b>	Plug-In Connector w/LED & 50 cm wire lead length
	<b>CL</b>	Plug-In Connector w/LED & 100 cm wire lead length
	<b>P</b>	Pins (0.025" Sq)
VI. OVERRIDE	<b>NL</b>	Non-Locking – Momentary/Spring Return
	<b>NR</b>	No Override
VII. W/ SUBBASE	<b>nil</b>	Valve only, without Subbase or Manifold separately
	<b>M</b>	Mounted HK5-025M Subbase
	<b>S</b>	Mounted Subbase w/3 10-32 UNF threaded ports (two surfaces)
	<b>Y</b>	Mounted Subbase w/3 10-32 UNF threaded ports (single surface)
	<b>Z</b>	Mounted Subbase w/2 10-32 UNF threaded ports (single surface)
VIII. OPTION	<b>O</b>	Configure valve with subbase as Normally Open
	<b>R</b>	Rotate valve's coil entry to subbase side, or to 1 & 3 port side.
	<b>X</b>	Valve without Blocking Cover Plate and Screws

Order Examples:

**HK5H3L12CLNLMO** (Gas-type HK5; HNBR seals; 3-Way; Low Watt 12VDC; Plug-In w/LED coil; Non-locking override; w/M3x0.5 ported subbase assembled for Normally Open function)

**HKL5E224ANR** (Liquid-type HKL5; EPDM seals; 2-Way; 24VDC; Lead wires with 50cm length; without override.



## HOW TO ORDER Cover Plates, Porting Blocks, Subbases and Manifolds

### Cover Plates (includes two assembly screws)

Part #	Description
HK5PX	Blocking Type. SST. Included w/valve.
HK5PV	Venting Type. SST. Exhaust path for 3-Way function.

### Head Blocks (includes two assembly screws)

Part #	Description
HK5HC1	Molded 10-32 UNF Port 2, Port 3 vent. 3-Way NC Function.
HK5HC2	Molded 1/8" ID Barb Port 2 Fitting, Port 3 vent. 3-Way NC Function.
HK5HC3	Molded 1/8" ID Barb Port 2 Fitting; 10-32 UNF Port 3. 3-Way NC Function.
HK5HC4	Molded 5/32" (4mm) ID Barb Port 2 Fitting, Port 3 vent. 3-Way NC Function.
HK5HC5	Molded 5/32" (4mm) ID Barb Port 2 & 3 Fitting. 3-Way NC or NO Function.
HK5HC6	Molded 5/32" (4mm) ID Barb Perpendicular Port 2 Fitting, Port 3 vent. 3-Way Function.
HK5HM1	Aluminum 10-32 UNF Port 1.
HK5HM2	Aluminum 10-32 UNF Port 1 & 3. 3-Way NC or NO Function.
HK5HM3	Aluminum Axial Port 2 & Perpendicular Port 3. 10-32 UNF. 3-Way NC Function.

### Thread Blocks

Part #	Description
HK5TMX	Aluminum 10-32 UNF Perpendicular Port 2.
HK5TMA	Aluminum 10-32 UNF Axial Port 1.
HK5TMB	Aluminum 10-32 UNF Perpendicular Port 1.
HK5TMC	Aluminum 1 & 3 Port subbase (one surface)
HK5TMD	Aluminum 1 & 3 Port subbase (one surface)

### Subbases

Part #	Description
HK5025A	Aluminum 1 & 2 Port Subbase. 10-32 UNF ports (two end surfaces).
HK5025B	Aluminum 1 & 2 Port Subbase (two side surfaces)
HK5025C	Aluminum 1 & 2 Port Subbase (one side surface)
HK5025M	Aluminum 1, 2 & 3 Port. M3x0.5 (one side surface)
HK5025S	Aluminum 1, 2 & 3 Port. 10-32 UNF Ports (two side surfaces).
HK5025T	Molded 1/8" ID Tubing 1, 2 & 3 Perpendicular Porting Posts.
HK5025Y	Aluminum 1, 2 & 3 Port. 10-32 UNF Ports (one side surface).
HK5025Z	Aluminum 1 & 2 Port. 10-32 UNF Ports (one side surface).

### Manifolds

Part #	Description
HK5MM_*	Small Port 1, 2 & 3-type. Select 2 or 3 station (order codes <b>02, 03</b> ).
HK5M_*	Std Port 1, 2 & 3-type. Select even numbered stations 4-12 (codes <b>04, 06, 08, 10, 12</b> ).
HK5MMA_*	Small Port 1-type. Select even numbered stations 2-8 (order codes <b>02, 04, 06, 08</b> ).
HK5MMB_*	Small Port 1 & 3-type. Select even numbered stations 2-8 (order codes <b>02, 04, 06, 08</b> )

\* Order example: **HK5M08** (8 station Standard Port 123-type manifold)

## HOW TO ORDER HK5 / HKL5 Accessories

### Valve Accessories

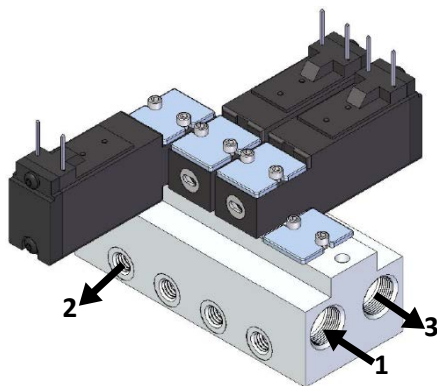
Part #	Description
35000B	NBR Gasket (BOP); Bag of 10
35000E	EPDM Gasket (BOP); Bag of 10
35000F	FKM Gasket (BOP); Bag of 10
35000H	HNBR Gasket (BOP); Bag of 10
35002B	NBR Gasket (2-Way Valve); Bag of 10
35002E	EPDM Gasket (2-Way Valve); Bag of 10
35002F	FKM Gasket (2-Way Valve); Bag of 10
35002H	HNBR Gasket (2-Way Valve); Bag of 10
35003B	NBR Gasket (3-Way Valve); Bag of 10
35003E	EPDM Gasket (3-Way Valve); Bag of 10
35003F	FKM Gasket (3-Way Valve); Bag of 10
35003H	HNBR Gasket (3-Way Valve); Bag of 10
35006	Plug-In Connector (30cm Leads), Replacement Connector for Valve Order Code C
35007	Plug-In Connector (100cm Leads), Replacement Connector for Valve Order Code CL
35008L	IDC Connector w/50cm Leads for Valve Order Code P; Bag of 10
35008LL	IDC Connector w/100cm Leads for Valve Order Code P; Bag of 10

### Manifold Accessories

Part #	Description
HK5BOP	Block Off Plate. Includes screws and gasket. For unoccupied station on Manifold.
PFBAGOF10	Port Plug Fitting with Gasket. 10-32 UNF. Bag of 10.
130-31	Pipe Plug. 1/8 NPT. For Port 1 & 3 on HK5M__ type manifolds.

## HOW TO ORDER HK5 / HKL5 Manifold Assemblies

Pre-assembled HK5 and HKL5 assemblies are possible. Consult factory. Completed factory assemblies are identified with suffix code “SA” (Ship Assembled) following the specified manifold.



Example illustration of a finished manifold assembly:

#### HK5M04SA

Stn1:HK5B324PNRO

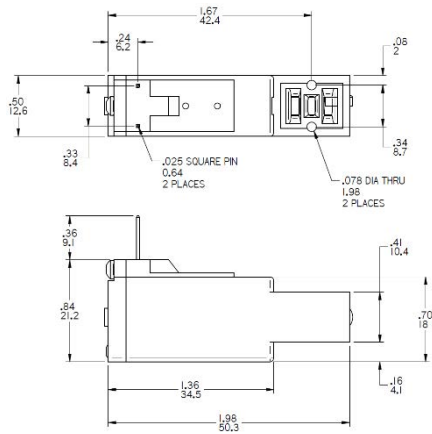
Stn2-3:HK5B224PNR

Stn4:HK5BOP

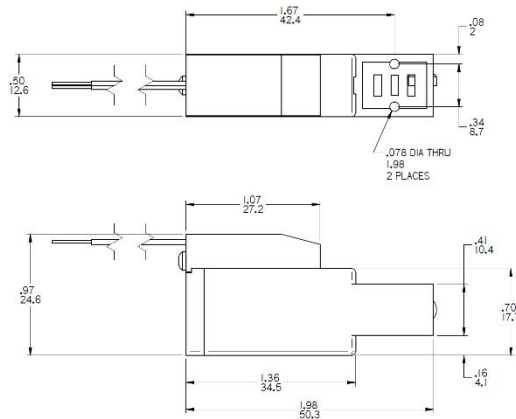
Description: Four station manifold assembly with Normally Open y3-Way valve at Station 1, two Normally Closed 2-Way valves at Station 2 & 3, and Block Off Plate at Station 4. Media, compressed air, supplied to Manifold Port 1. Station 1, 2, 3 outlets at Port 2. Station 1, Normally Open Valve's exhaust at Manifold Port 3.

## DIMENSIONS – BASE HK5 / HKL5 VALVE

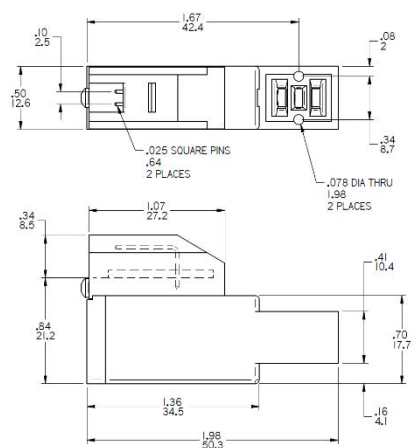
### 0.025" Sq Pin Electrical Entry Type



### Lead Wire Electrical Entry Type



### Plug-In w/LED Electrical Entry Type



CAD Viewer, Download CAD Model, 2D Dimensional Drawing and HK5 Product Brochure may be accessed on specific product detail pages of the Humphrey Online Catalog.

( [www.humphrey-products.com/catalog](http://www.humphrey-products.com/catalog) )

## **INSTALLATION / PRODUCT HANDLING / PACKAGING**

**Environment:** HK5/HKL5 may be mounted in any position in most environments. Location near water or dusty conditions requires adequate solenoid entry and bottom end cap protection to prevent solenoid actuator contamination and/or valve malfunction. Valve bottom end cap (opposite of solenoid) should remain vented and free of contaminants. Contact factory if environment is dust laden.

Avoid external masses creating lateral forces on valve body.

**Mounting:** Two valve mounting screws are provided and are socket head type (1/16" hex key). They are prepared for a corresponding threaded hole #1-72 UNF-2B x 0.230" dp minimum full thread. Secure valve to sub-base using screws with recommended 4.2-4.6 lbf-in (4.8-5.3 kgf-cm) torque. When mounting individual valve to a surface of your make, please design mounting / sealing surface to  $\sqrt{32}$  finish or better, and porting footprint at right. Position of your 0.094" diameter corresponding port is flexible per the drawing. An accommodation for solenoid overhang is necessary. See valve dimensions.

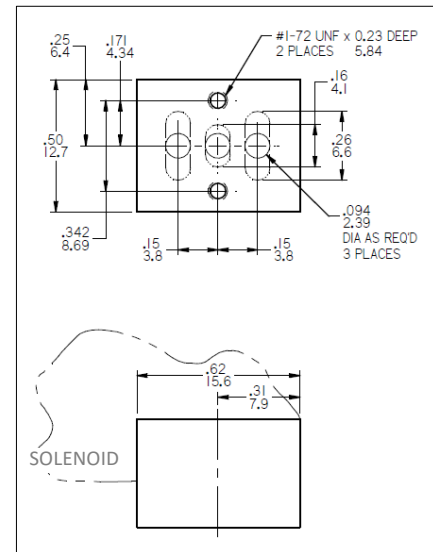
**Mounting Gaskets:** Valves are shipped with two porting gaskets (nested top and bottom), porting cover and two mounting screws. Should gaskets become loose in shipment, orient and replace. 2-way gaskets have two openings and are oriented, as standard, for Normally Closed function. If 2-way Normally Open function is desired, remove gaskets, rotate 180° and replace.

**Media:** Should be clean and uncontaminated. When in doubt, include a filter with a filtering capacity of 40 microns. Periodically remove and clean or replace filter element. Some compressed air systems are lubricated. In these cases, ensure lubrication is not excessive and compatible with HK5 elastomers.

**Piping:** For optimum performance, use largest possible tubing size and minimum tubing length. To ensure adequate Supply and Exhaust capacity on manifolds of six stations or greater, consider piping media supply and exhaust to both ends of manifold.

Be sure to blow out fittings with compressed air prior to installation, removing foreign debris. If using thread sealant on Port 1 & 3 of HK5M\_\_ type manifolds, take extra care that sealant does not enter manifold passageways. Contamination may cause valve malfunction and/or leaks.

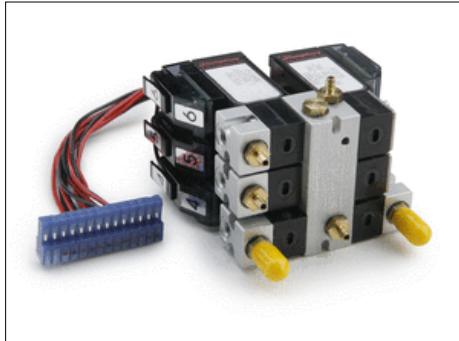
Compressed gases are powerful and may be dangerous. Before attempting to remove any component from a pneumatic system, always disconnect from the supply source first and thoroughly exhaust the downstream line. Never attempt to construct, operate or troubleshoot a pneumatic system unless you have been properly trained to do so. Failure to heed this warning could result in SERIOUS, EVEN FATAL INJURY.



## **HK5 – FACTORY MODIFICATIONS AND ASSEMBLIES**

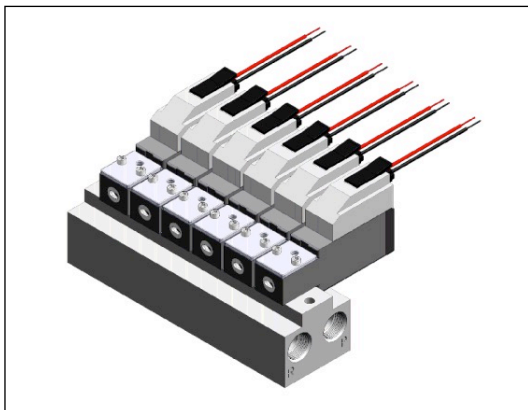
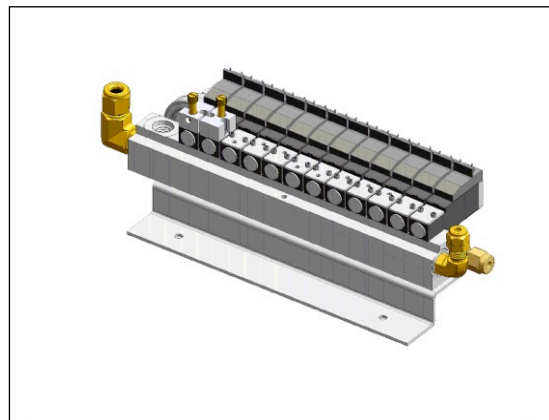
Since 1995, the Humphrey Engineered Solutions Group have created numerous custom product assemblies using the HK5 valve platform. Taking advantage of the HK5's unique characteristics, such as the symmetrical porting arrangement, the inert internal construction and industry leading leakage performance, customer specific products have been produced for OEM equipment and device makers.

Here are a few examples:



No Leakage Allowed: Customer determined 2cc/hour total manifold leak rate required to ensure proper function. Custom HK5 assembly with saved the project.

Versatility Desired: A single HK5 model number replaced 45 competitive model numbers used for air and liquid handling on an analytical chemistry equipment manufacturer's full product offering.



Safety in Toxic Environment. HK5 delivers pilot signal for analytical medias. Must withstand trace elements of chemicals & cleaning agents from daily system flush that may enter pilot lines.

Visit our website to learn more about the HK5 and Humphrey Engineered Solutions.

[www.humphrey-products.com/HK5-Miniature-Solenoid-Valves](http://www.humphrey-products.com/HK5-Miniature-Solenoid-Valves)

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