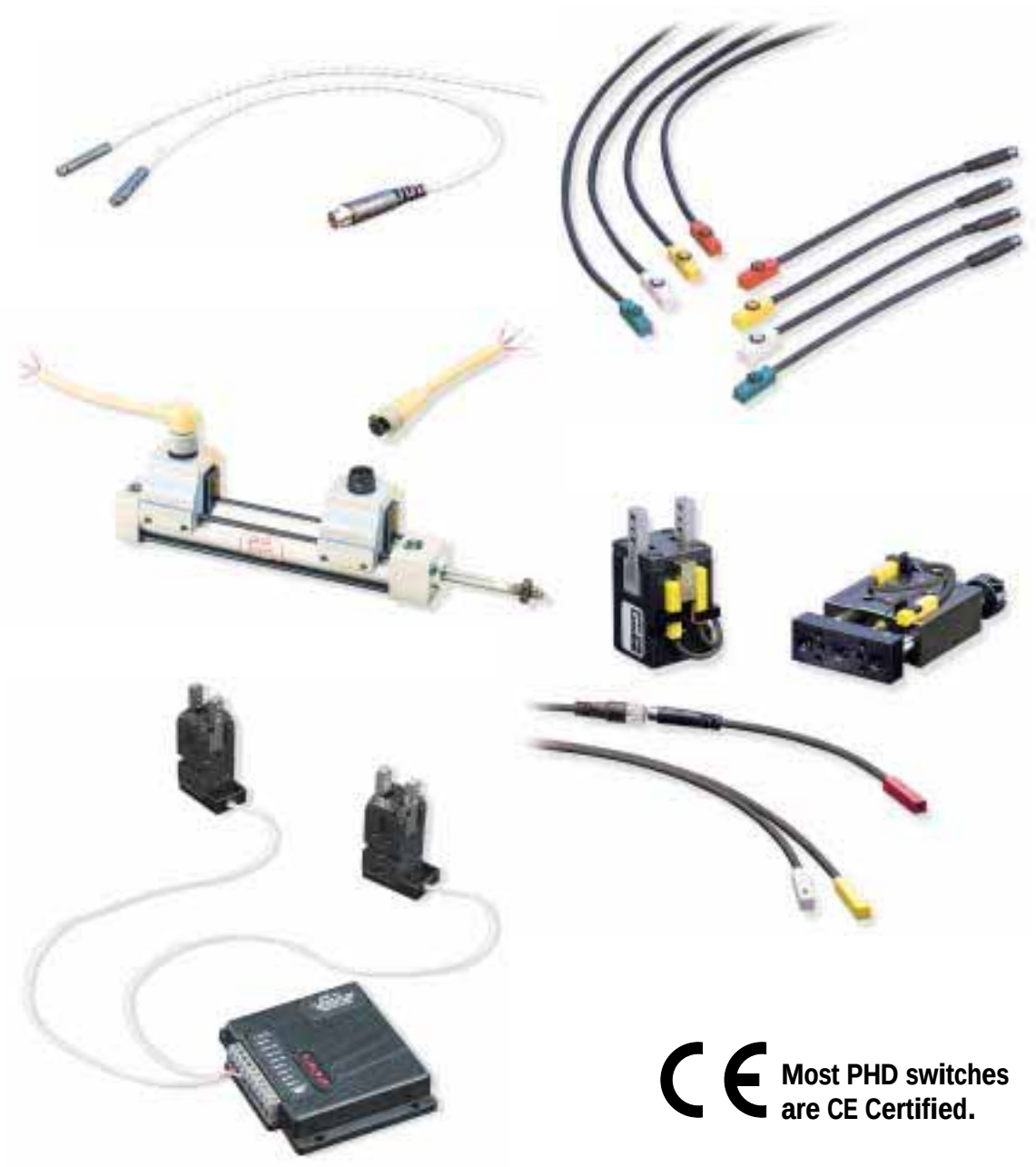
SOLUTIONS FOR INDUSTRIAL AUTOMATION

PROXIMITY SWITCHES AND SENSORS

Hall Effect, Reed, & Magnetoresistive Types of Switches & Sensors for Use with PHD Automation Products



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CE **Most PHD switches are CE Certified.**

SWITCH SELECTION GUIDE

Ⓗ = HALL SWITCH
Ⓢ = HALL SENSOR
Ⓜ = MAGNETORESISTIVE SWITCH
Ⓡ = REED SWITCH

Ⓛ = LINEAR ONLY
Ⓡ = ROTARY ONLY

Ⓢ = COMPATIBLE WHEN ORDERED WITH SWITCH READY KIT

Ⓟ = PROXIMITY KIT AVAILABLE
STD = STANDARD

SWITCHES/SENSORS

PRODUCT TYPE		SERIES 5360			SERIES 6250		SERIES 1750		SERIES 5580		SERIES 1590		SERIES 6790		INDUCTIVE PROXIMITY				SERIES 62002	PHD SENSR.
		Ⓗ	Ⓡ	Ⓜ	Ⓜ	Ⓡ	Ⓜ	Ⓡ	Ⓗ	Ⓡ	Ⓗ	Ⓡ	Ⓜ	Ⓡ	4 mm RND.	6 mm SQ.	8 mm THRD.	12 mm THRD.	8 mm Ⓡ	Ⓢ
	SEE REFERENCED PAGES FOR SPECIFICATIONS & ORDERING DATA	7-6 to 7-11			7-12 to 7-15		7-16 to 7-19		7-20 to 7-22		7-23 to 7-27		7-28 to 7-29		7-31				7-32	7-33 to 7-39
CYLINDERS	SERIES A, AV, HV, EA, EL, NP, NE						-E	-M			-E	-M								
	SERIES CRS & CTS		-M	-I	-M	-M														
	SERIES CV				-M	-M														
ROTARY ACTUATORS	SERIES 0180																			-3
	SERIES 1000-8000						-E	-M			-E	-M								-J
	SERIES RA & RL	-E	-M	-I	-M	-M														
	SERIES RI												-M	-M						
	SERIES RF								Ⓟ	Ⓟ						Ⓟ				
MULTI-MOTION ACTUATORS	SERIES 1000-8000						-E	-M			-E	-M								-H Ⓡ
SLIDES	SERIES SA & SB								Ⓟ	Ⓟ						Ⓟ				
	SERIES SAx												-M	-M						
	SERIES SD & SE, *SK & SL (*size 2-6 only)				-M*	-M*	-E	-M									-GG -GH -GI			
	SERIES SG						-E	-M									-CB			
	SERIES C																	STD		
	SERIES SHP												-M	-M						
	SERIES STP												-M	-M						
	SERIES SIP												-M	-M						
	SERIES SJP												-M	-M						
	SERIES SMx												-M	-M			Ⓟ			

OPTION CODES

Option code, kit, or specification must be specified on the unit ordering number when switches are to be used. For kit numbers or option callouts, see ordering data page in each specific product section. BLANK BOXES INDICATES NOT AVAILABLE OR NOT COMPATIBLE.

SWITCH SELECTION GUIDE

Ⓗ = HALL SWITCH
Ⓜ = MAGNETORESISTIVE SWITCH
Ⓡ = REED SWITCH

Ⓖ = SHURGRIP MODEL
Ⓢ = COMPATIBLE WHEN ORDERED WITH SWITCH READY KIT

STD = STANDARD
Ⓟ = PROXIMITY KIT AVAILABLE

SWITCHES/SENSORS

PRODUCT TYPE	SERIES 5360 Ⓗ	SERIES 5360 Ⓡ	SERIES 5360 Ⓜ	SERIES 5580 Ⓗ	SERIES 5580 Ⓡ	SERIES 1590 Ⓗ	SERIES 1590 Ⓡ	SERIES 6790 Ⓜ	SERIES 6790 Ⓡ	INDUCTIVE PROXIMITY 4 mm RND.	INDUCTIVE PROXIMITY 6 mm SQ.	INDUCTIVE PROXIMITY 8 mm THRD.	INDUCTIVE PROXIMITY 12 mm THRD.	SERIES 62002 8 mm Ⓡ	PHD SENSR. Ⓗ
SEE REFERENCED PAGES FOR SPECIFICATIONS & ORDERING DATA	7-6 to 7-11			7-20 to 7-22		7-23 to 7-27		7-28 to 7-29		7-31				7-32	7-33 to 7-39
ESCAPEMENTS															
SERIES 160	-1									-2	-2				
SERIES LC	-E			-E						STD	STD				
ANGULAR GRIPPERS															
SERIES 8400										-5 Ⓢ					-3
SERIES 190										-5 Ⓢ					-4
SERIES 8600 (3 Jaw)															-3 -4
SERIES 5300	-7														-4
SERIES GRB (180°)								-M	-M	Ⓢ -CU					
PARALLEL GRIPPERS															
SERIES GRD				-2	-1					-6 Ⓢ		-7 Ⓢ	-8* Ⓢ		
SERIES 190 & 191				-5 Ⓢ	-5 Ⓢ						-5 Ⓢ				SENSOR OPTION -4
SERIES 5300	-7														
SERIES GRC	-2**									Ⓖ -5*		Ⓖ -5**	-6**	-3**	
SERIES GRL				-E Ⓢ											
SERIES GRR												Ⓟ	Ⓟ		
SERIES GRW				Ⓟ						Ⓟ		Ⓟ			

OPTION CODES

NOTES:
1) *GRDx5x & GRDx6x •GRCx3x **GRCx4x, 5x, 6x **GRCx3x, 4x, 5x, 6x
2) Option code, kit, or specification must be specified on the unit ordering number when switches are to be used. For kit numbers or option callouts, see ordering data page in each specific product section. BLANK BOXES INDICATES NOT AVAILABLE OR NOT COMPATIBLE.
3) Escapement -2 option only on standard duty 1600x units.
4) -4 option is Hall sensor ready.

SWITCH SELECTION: *PROXIMITY SWITCHES*

PHD Proximity Switches can be used with most PHD Cylinders and Actuators. They are used to supply input signals to programmable controllers, sequencers, relays, and in some cases, to drive valve solenoids.

Use the requirements in the chart below to determine which switch fits the application. By using the process of elimination, you should be able to choose the proper switch. See the specifications for each switch to confirm your choice.

PROXIMITY SWITCH SELECTION CHART

	SERIES 5360				SERIES 6250		SERIES 1750			SERIES 5580		SERIES 1590		
	53603 53604 53623 53624	53605 53605 53625 53625	53602 53622 DC	53609 53629 AC	62505 62506 62515 62516	62507 62517 62515 DC/AC	17503 17504 17523 17524	17502 17522 DC	17509 17529 AC	55803 55804 55823 55824	55802 55822	15902	15901	15900
REQUIREMENTS	**HALL**	**MR**	**REED**	**REED**	**MR**	**REED**	**HALL**	**REED**	**REED**	**HALL**	**REED**	**HALL**	**3 AMP REED**	**REED**
AC				●		●			●				●	●
DC	●	●	●		●	●	●	●		●	●	●		●
MECHANICAL SWITCH			●	●		●		●	●		●		●	●
SOLID STATE SWITCH (ZERO BOUNCE)	●	●			●		●			●		●		
INPUT-PROGRAMMABLE CONTROLLER	●	●	●	●	●	●	●	●	●	●	●	●	●	●
COIL DIRECT												●	●	
LONGEST LIFE	●	●			●			●		●		●	●	
BUILT-IN TRANSIENT PROTECTION	●	●		●	●	●			●	●			●	
HIGH MOISTURE ENVIRONMENT	●	●	●	●	●	●	●	●	●	●	●	●	●	●
CE CERTIFIED	●	●	●		●	●*	●	●		●	●	●		●†
REFERENCE PAGES	7-6 to 7-11				7-12 to 7-15		7-16 to 7-19			7-20 to 7-22		7-23 to 7-27		

*CE certification applicable to 10 to 30 VDC range only.

†CE certification applicable to 4.5 to 24 VDC range only.

It is estimated that 95% of all PHD Switches are integrated with PLC's. The chart below serves as a guide in determining which categories of PHD Switches are compatible with the configuration of PLC being used.

PLC COMPATIBILITY CHART

	INPUT VOLTAGE TYPE REQUIRED		
	AC	DC	
SWITCH TYPE	**COMPATIBLE PHD AC SWITCHES**	**COMPATIBLE PHD DC NPN (SINK) SWITCHES**	**COMPATIBLE PHD DC PNP (SOURCE) SWITCHES**
MECHANICAL REED	1750, 15900, 5360, 61065, & 6250	1750, 5360, 5580, 61065, 62002, 6250 & 6790	1750, 5360, 5580, 61065, 62002, 6250, & 6790
MAGNETORESISTIVE	—	5360, 6250 & 6790	5360, 6250, & 6790
HALL EFFECT	—	1750, 5360, 15902, & 5580	1750, 5360, 15902, & 5580
INDUCTIVE PROXIMITY	15561	18430, 18431, 51422, & 15661	18430, 18431, 51422, & 15561
HALL SENSOR WITH SET POINT MODULE	—	9800-01-0100 & 0300	9800-01-0200 & 0400

NOTE: Not all types of switches are available on all PHD products. Reference charts on pages 7-2 to 7-5 to determine compatibility with product being used.

PROXIMITY SWITCH SELECTION CHART

SERIES 6790		SERIES 18430	SERIES 18431	SERIES 51422	SERIES 62002	SERIES 15561	
67903 67902 67904 67922 67923 67924 MR	REED	4 mm ROUND INDUCTIVE PROXIMITY	6 mm SQUARE INDUCTIVE PROXIMITY	8 mm ROUND INDUCTIVE PROXIMITY	8 mm ROUND THREADED 62002 REED	12 mm ROUND INDUCTIVE PROXIMITY 15561-001 15561-002 DC	15561-003 AC
							●
●	●	●	●	●	●	●	
	●				●		
●		●	●	●		●	●
●	●	●	●	●	●	●	●
●		●	●	●		●	●
●		●	●	●		●	●
●	●	●	●	●	●	●	●
●	●	●	●	●	●	●	●
7-28 to 7-29		7-31			7-32	7-31	

COMPETITOR PART NUMBERS

DESCRIPTION	LENGTH	PHD CORDSET NO.	HIRSCHMANN PART NO.	DANIEL WOODHEAD PART NO.	CROUSE HINDS PART NO.	LUMBERG PART NO.	TURCK PART NO.
8 mm Push-in Straight Connector	2 meter	17533-00-02	ELKA-K-3308 PVC 014-2 Meter	45300-001	5000125-13	RKM 3 06/2M	PKG 3-2M
8 mm Push-in Straight Connector	5 meter	17533-00-05	ELKA-K-3308 PVC 014-5 Meter	45300-002	5000125-16	RKM 3 06/5M	PKG 3-5M

NOTE: PHD reserves the right to supply any of the cordsets listed.

Cordset specifications: 3 conductors, PVC jacket, 60 V (AC or DC) Max., 26 AWG, fine stranded copper conductors. -25°C to +90°C, IP 65 protection class.

CYLINDERS AND ACTUATORS

When ordering a cylinder or actuator for magnetic proximity switch operation, add the suffix -M or -E to proper unit description.

HALL EFFECT MAGNET
Imperial Examples:
AVF 1-1/8 x 2-P-**E** or
MA11B 3180 x 1-PL-**E**

Metric Examples:
AVMF 29 x 50-P-**E** or
MA15B 3180 x 25-PL-**E**

REED MAGNET
Imperial Examples:
AVF 1-1/8 x 2-P-**M** or
MA11RF 3180 x 1-PL-**M**

Metric Examples:
AVMF 29 x 50-P-**M** or
MA15RF 3180 x 25-PL-**M**

OTHER REPLACEMENT SWITCHES
(Previously Catalogued)

PART NO.	COLOR	DESCRIPTION
7518-01-12	Yellow	NPN (Sink) or PNP (Source) Hall Effect
13109-02-6	Green	3 Amp Reed
AN12-6	Blue	10 Watt Reed
AB12	Blue	10 Watt Reed, Quick Connect
16383-1-06	White	Low Voltage DC Reed
9641	—	Universal Bracket

ORDERING DATA: SERIES 5360 PROXIMITY SWITCHES

TO ORDER SPECIFY:
Type, Cord Type, Sensing Circuitry, Design No., and Cable Length.

TYPE
Hall, Reed, Magnetoresistive

CABLE LENGTH
02 - 2 meter length cable
(Leave blank when quick connect is specified)

536 0 2-2 - 02

CORD TYPE
0 - Cabled
2 - Quick Connect

SENSING CIRCUITRY	DESCRIPTION	SWITCH COLOR
2-2	NPN or PNP DC Reed	White
3-1	NPN DC Hall	Yellow
4-1	PNP DC Hall	Red
5-1	NPN DC Magnetoresistive	Black
6-1	PNP DC Magnetoresistive	Orange
9-2	AC Reed w/Current Limiting	Green

NOTES:
1) Cordsets for quick connect switches must be ordered separately. See page 7-10.
2) Other cable lengths available. Consult PHD.

CORDSETS WITH QUICK CONNECT

PART NO.	LENGTH
63549-02	2 meter
63549-05	5 meter

BENEFITS: SERIES 5360 HALL EFFECT SWITCHES

BENEFITS

- Series 5360 Hall Effect Switches are available for use on selected PHD products, making it easy to interface these actuators with various electronic controls.
- Switches have no moving parts or mechanical contacts, providing long switch life and elimination of contact bounce.
- Constant amplitude output is provided for use with most digital logic systems.
- Low profile integral clamp mounting is easy to adjust over the entire piston travel of the cylinder or actuator.
- Several switches may be mounted to control or initiate any sequence or function.
- Dual LED indicators provide convenient means for positioning and troubleshooting circuits. Green LED shows that power is being received at the switch and amber shows when the switch output is on.
- Available in a Quick Connect model for easy installation and maintenance.

Series 5360 Hall Effect Switches are designed specifically to provide an input signal to various types of programmable controllers or logic systems. Since Hall Effect Switches are solid-state, there are no moving parts to wear out. They offer an infinite number of trouble-free operations. Hall Effect Switches operate on DC current only.

NOTE: For Hall Effect Switch dimensions, see page 7-9.

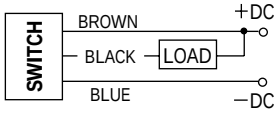


SPECIFICATIONS	53603 & 53623	53604 & 53624
OPERATING PRINCIPLE	Hall Effect	
ACTUATED BY	Moving Magnet	
INPUT VOLTAGE	4.5 to 24 VDC	
OUTPUT TYPE	NPN (Sink)	PNP (Source)
CURRENT RATING	20 mA. Max.	100 mA. Max.
VOLTAGE DROP	.5 VDC Max.	
SWITCH BURDEN	12 mA. Max.	
ENVIRONMENTAL	IP67	
OPERATING TEMP.	0° to 80°C	

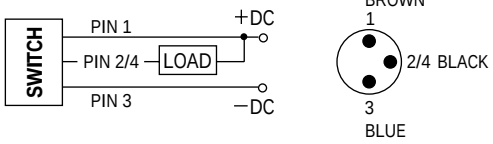
HALL EFFECT WIRING SCHEMATICS

MODEL NO. 53603 & 53623 - NPN (SINK)
INPUT - 4.5-24 VDC
LOAD CURRENT - 20 mA. MAX.
SWITCH HOUSING COLOR - YELLOW
(LED's have been omitted from the schematic for clarity.)

CABLED MODEL 53603

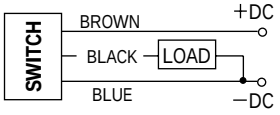


QUICK CONNECT MODEL 53623

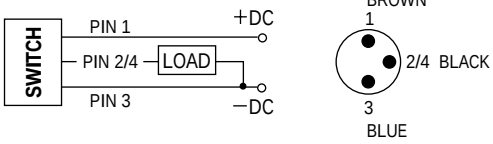


MODEL NO. 53604 & 53624 - PNP (SOURCE)
INPUT - 4.5-24 VDC
LOAD CURRENT - 100 mA. MAX.
SWITCH HOUSING COLOR - RED
(LED's have been omitted from the schematic for clarity.)

CABLED MODEL 53604



QUICK CONNECT MODEL 53624



BENEFITS: SERIES 5360 MAGNETORESISTIVE SWITCHES

BENEFITS

- Series 5360 Magnetoresistive Switches are available for use on selected PHD products, making it easy to interface these actuators with various electronic controls.
- Switches are solid state, having no moving parts or mechanical contacts, providing long switch life and elimination of contact bounce.
- Transient voltage protection.
- Constant amplitude output is provided for use with most digital logic systems.
- Reverse polarity protection.
- Low profile integral clamp mounting is easy to adjust over the entire piston travel of the cylinder or actuator.
- Several switches may be mounted to control or initiate any sequence or function.
- Dual LED indicators provide convenient means for positioning and troubleshooting circuits. Green LED shows that power is being received at the switch and amber shows when the switch output is on.
- Available in a Quick Connect model for easy installation and maintenance.

NOTE: For magnetoresistive switch dimensions, see page 7-9.



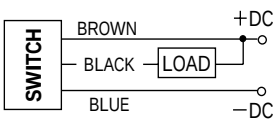
Series 5360 Magnetoresistive Switches are designed specifically to provide an input signal to various types of programmable controllers or logic systems. Since Magnetoresistive Switches are solid-state, there are no moving parts to wear out. They offer an infinite number of trouble-free operations. Magnetoresistive Switches operate on DC current only.

SPECIFICATIONS	53605 & 53625	53606 & 53626
OPERATING PRINCIPLE	Magnetoresistive	
ACTUATED BY	Moving Magnet	
INPUT VOLTAGE	6 to 24 VDC	
OUTPUT TYPE	NPN (Sink)	PNP (Source)
CURRENT RATING	20 mA. Max.	100 mA. Max.
VOLTAGE DROP	.5 VDC Max.	
SWITCH BURDEN	12 mA. Max.	
ENVIRONMENTAL	IP67	
OPERATING TEMP.	0° to 80°C	

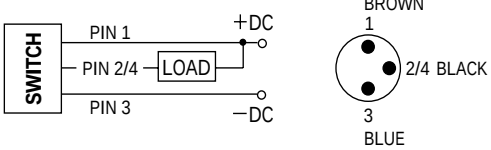
MAGNETORESISTIVE WIRING SCHEMATICS

MODEL NO. 53605 & 53625 - NPN (SINK)
INPUT - 6-24 VDC
LOAD CURRENT - 20 mA. MAX.
SWITCH HOUSING COLOR - BLACK
(LED's have been omitted from the schematic for clarity.)

CABLED MODEL 53605

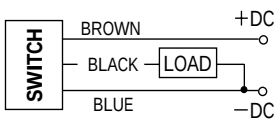


QUICK CONNECT MODEL 53625

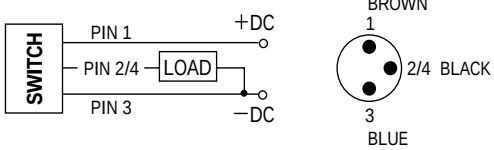


MODEL NO. 53606 & 53626 - PNP (SOURCE)
INPUT - 6-24 VDC
LOAD CURRENT - 100 mA. MAX.
SWITCH HOUSING COLOR - ORANGE
(LED's have been omitted from the schematic for clarity.)

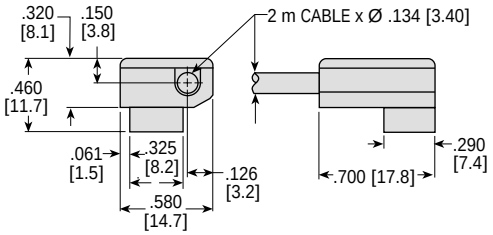
CABLED MODEL 53606



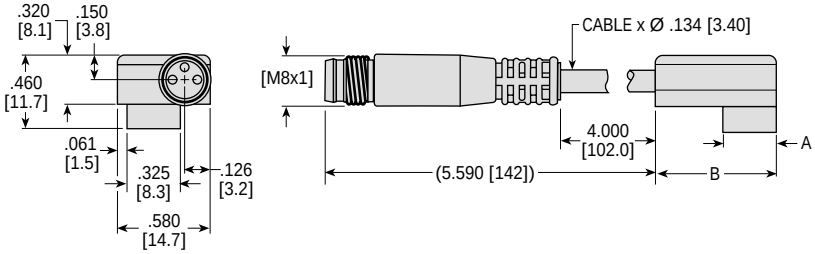
QUICK CONNECT MODEL 53626



HALL EFFECT AND MAGNETORESISTIVE SWITCH



HALL EFFECT AND MAGNETORESISTIVE SWITCH WITH MALE QUICK CONNECT



NUMBERS IN [ ] ARE IN mm–IMPERIAL EQUIVALENTS ARE PROVIDED FOR CONVENIENCE

BENEFITS: SERIES 5360 REED SWITCHES

BENEFITS

- Series 5360 Reed Switches are available for use on selected PHD products, making it easy to interface these actuators with various electronic controls.
- Low profile integral clamp mounting is easy to adjust over the entire piston travel of the cylinder or actuator.
- Several switches may be mounted to control or initiate any sequence or function.
- An LED indicator provides convenient means for positioning and troubleshooting circuits.
- Available in a Quick Connect model for easy installation and maintenance.
- Special current limit model available for AC applications where inrush might otherwise damage the switch.

Series 5360 Reed Switches are available in either AC or DC models. They are ideal for use as inputs for many types of sequencers and programmable controllers. In some cases, they can be used to drive some relays or valve solenoids. However, electrical transients (inrush currents or line spikes) associated with inductive or capacitive loads can damage and shorten the life of the switch.

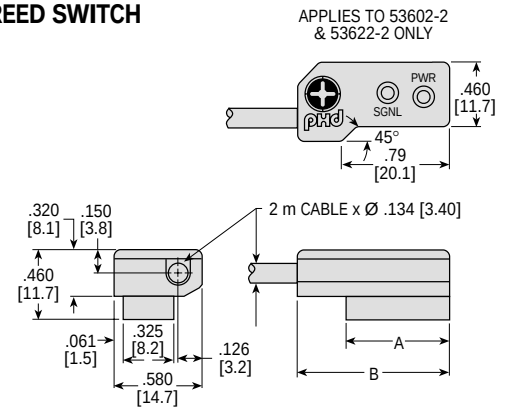


SPECIFICATIONS	53602-2 & 53622-2	53609-2** & 53629-2**
OPERATING PRINCIPLE	Magnetic Reed	
ACTUATED BY	Moving Magnet	
INPUT VOLTAGE	4.5 to 24 VDC	110 to 120 VAC
OUTPUT TYPE	Contact Closure	
POWER CAPACITY	4 Watt Max.	2.5 Watt Max.
CURRENT RATING	200 mA. Max.	Inter. Limited to 20 mA.
CONTACT RESISTANCE	.200 Ohms Max.	1.5 kOhm
ENVIRONMENTAL	IEC IP67	
OPERATING TEMP.	0° to 80°C	

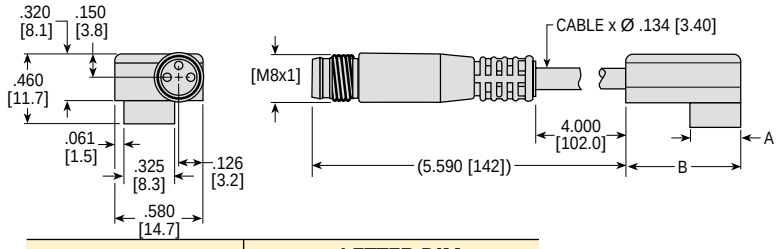
** CE certification not applicable to these switch models.

DIMENSIONS: SERIES 5360 REED SWITCHES

REED SWITCH



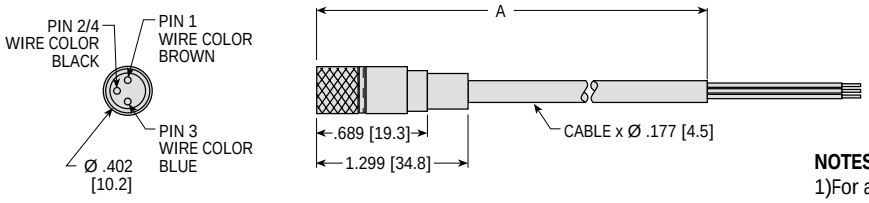
REED SWITCH WITH MALE QUICK CONNECT



MODEL NO.	LETTER DIM. A	LETTER DIM. B
53602-2 & 53622-2	.685 [17.4]	1.090 [27.7]
53609-2 & 53629-2	.895 [22.7]	1.300 [33]

NUMBERS IN [ ] ARE IN mm–IMPERIAL EQUIVALENTS ARE PROVIDED FOR CONVENIENCE

63549-xx CORDSET WITH FEMALE QUICK CONNECT



MODEL NO.	LETTER DIM. A
63549-02	78.74 [2 m]
63549-05	196.85 [5 m]

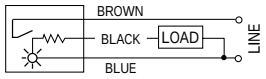
NUMBERS IN [ ] ARE IN mm–IMPERIAL EQUIVALENTS ARE PROVIDED FOR CONVENIENCE

NOTES:
1)For alternative supplier part numbers, see page 7-5.
2)For earlier design switches 1752x-1 and 17529-2, use cordset 17533-00-02 or 17533-00-05.

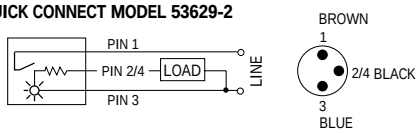
REED WIRING SCHEMATICS

MODEL NO. 53609-2 & 53629-2
INPUT - 110-120 VAC
SWITCHED POWER - 2.5 WATT MAX.
INTERNAL RESISTANCE - 1.5 kOhm
SWITCH HOUSING COLOR - GREEN

CABLED MODEL 53609-2



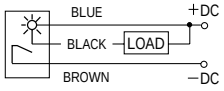
QUICK CONNECT MODEL 53629-2



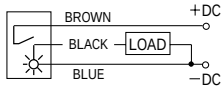
MODEL NO. 53602-2 & 53622-2 - NPN (SINK) OR PNP (SOURCE)
INPUT - 4.5-24 VDC
POWER CAPACITY - 4 WATT MAX.
LOAD CURRENT - 200 mA. MAX.

SWITCH HOUSING COLOR - WHITE
(Bi-polar LED emits a green light in the Sinking circuit and a red light in the Sourcing circuit.)

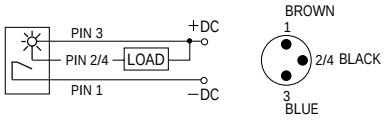
CABLED MODEL 53602-2 - NPN (SINK)



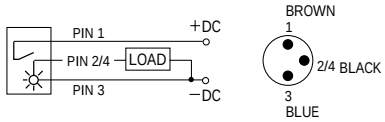
CABLED MODEL 53602-2 - PNP (SOURCE)



QUICK CONNECT MODEL 53622-2 - NPN (SINK)



QUICK CONNECT MODEL 53622-2 - PNP (SOURCE)



NOISE SUPPRESSION

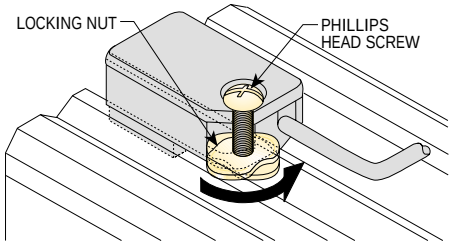
When using PHD Proximity Switches, it is important to consider the possible presence of electrical noise in the control system. The effects of this noise can vary from switch misfire and false signal, to total permanent switch failure, causing the actuator or other machine functions to initiate out of sequence.

Isolating the noise is the best method of dealing with electrical transients. This is accomplished by using separate power supplies for both logic level signals (Microprocessor, P.C., CPU, Input Devices) and Output Field Devices (Motors, Valve Solenoids). Additional physical isolation is recommended for routing of control system wiring (e.g., separate conduit for AC and DC wiring, grounding of all shield or drain wires).

In cases where isolation is not practical, such as direct small relay operation, valve solenoids, etc., inductive transient spikes may be minimized by use of clamping diodes or R-C networks.

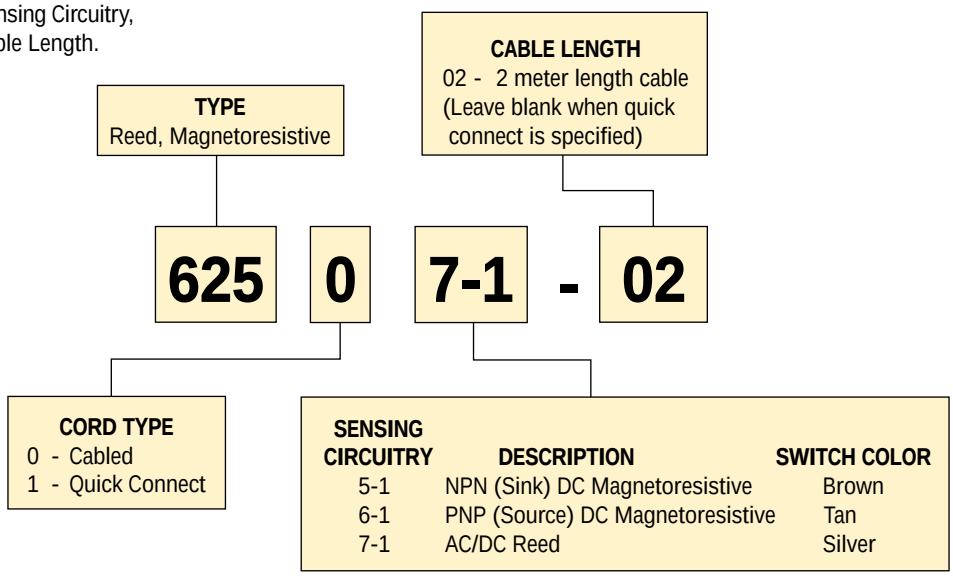
MOUNTING DIRECTIONS

1. Orient the switch assembly so the wire/screw end is directed away from the end of the unit.
2. Insert the switch and locking nut into the “T” slot of the unit.
3. Tighten the Phillips head screw until snug 12 in.-lbs. [1.35 Nm]. The first quarter turn will position the locking nut crossways in the “T” slot. ***Do not overtighten.***
4. The switch may be repositioned by loosening the Phillips head screw and sliding the switch in the “T” slot. Once in the desired position, repeat step number 3.



ORDERING DATA: SERIES 6250 PROXIMITY SWITCHES

TO ORDER SPECIFY:
Type, Cord Type, Sensing Circuitry, Design No., and Cable Length.



NOTES:
1) Cordsets for quick connect switches must be ordered separately. See page 7-15.
2) Other cable lengths available. Consult PHD.

CORDSETS WITH QUICK CONNECT

FOR MAGNETORESISTIVE SWITCH	
PART NO.	**CABLE LENGTH**
61397-02	2 meter/3 wire
61397-05	5 meter/3 wire
FOR REED SWITCH	
PART NO.	**CABLE LENGTH**
61398-02	2 meter/2 wire
61398-05	5 meter/2 wire

BENEFITS: SERIES 6250 REED SWITCHES

BENEFITS

- Series 6250 Reed Switches are available for use with PHD ISO Cylinder and on other select PHD actuators which use the “M” magnet option.
- Series 6250 Reed Switches offer both 120 VAC or 10 to 30 VDC sink and source operation for maximum flexibility in interfacing with various electronic controls.
- Special current limiting feature is designed into each switch for protection against potential current inrush damage to switch components.
- Integral clamp mounting provides easy attachment and adjustment while eliminating the cost of brackets and additional hardware.
- Several switches may be used on an actuator to control or initiate a sequence or function.
- LED indicator provides convenient means for positioning and troubleshooting circuits.
- Switches include either a hard wired 24 AWG, Polyurethane (PUR) jacketed cable making it virtually impervious to chemical or environmental damage, or an integral 8 mm screw type connector mounted directly on the switch.
- IP67 Environmental Protection

NOTE: For Reed Switch dimensions, see page 7-15.



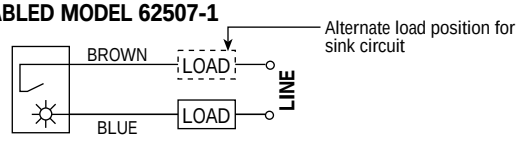
SPECIFICATIONS	62507-1	62517-1
SWITCH COLOR	Silver	
OPERATING PRINCIPLE	Magnetic Reed	
ACTUATED BY	Moving Magnet	
INPUT VOLTAGE	10 to 30 VDC or 110-120 VAC*	
OUTPUT VOLTAGE	Contact Closure	
POWER CAPACITY	2.5 Watt Max.	
CURRENT RATING	Internally Limited to 25 mA.	
IMPEDANCE	2.25 k Ohm	
ENVIRONMENTAL	IP67	
OPERATING TEMP.	0° to 80°C	

* CE certification applicable to 10 to 30 VDC range only.

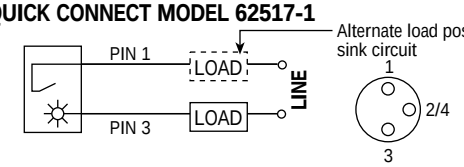
REED WIRING SCHEMATICS

MODEL NO. 62507-1 & 62517-1
INPUT - 110 - 120 VAC
POWER CAPACITY - 2.5 WATTS MAX.
LOAD CURRENT - 25 mA. MAX.
INTERNAL RESISTANCE - 2.25 k Ohm
SWITCH HOUSING COLOR - SILVER

CABLED MODEL 62507-1

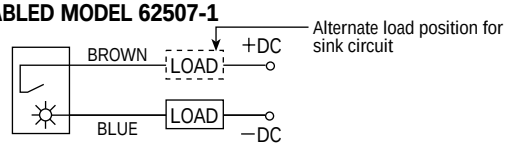


QUICK CONNECT MODEL 62517-1

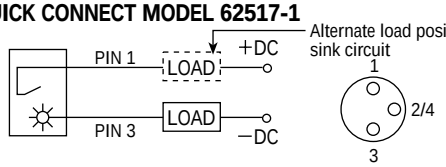


MODEL NO. 62507-1 & 62517-1
INPUT - 10 to 30 VDC
POWER CAPACITY - 2.5 WATTS MAX.
LOAD CURRENT - 25 mA. MAX.
SWITCH HOUSING COLOR - SILVER

CABLED MODEL 62507-1



QUICK CONNECT MODEL 62517-1

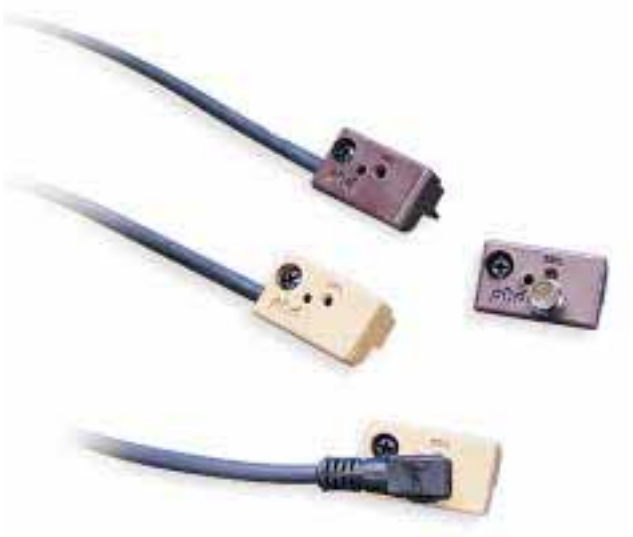


BENEFITS: SERIES 6250 MAGNETORESISTIVE SWITCHES

BENEFITS

- Series 6250 Magnetoresistive Switches are available for use with PHD ISO Cylinders and on other select PHD actuators which use the “M” magnet option
- Available in both current sinking or current sourcing models for maximum flexibility in interfacing with various electronic controls.
- Series 6250 “MR” switch incorporates many features to prevent damage to the switch circuit caused by voltage surges, wiring abuse, or adverse electronic reaction with adjacent equipment.
- Integral clamp mounting provides easy attachment and adjustment while eliminating the cost of brackets and additional hardware.
- Several switches may be mounted to control or initiate any sequence or function.
- An LED indicator provides convenient means for positioning and troubleshooting circuits.
- Switches include either a hard wired 24 AWG, Polyurethane (PUR) jacketed cable making it virtually impervious to chemical or environmental damage, or an integral 8mm screw type connector mounted directly on the switch.
- IP67 Environmental Protection

NOTE: For Magnetoresistive Switch dimensions, see page 7-15.



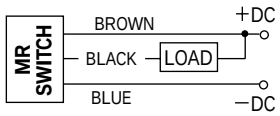
Series 6250 Magnetoresistive Switches are designed specifically to provide an input signal to various types of programmable controllers or logic systems. Since Magnetoresistive Switches are solid-state, there are no moving parts to wear out. They offer an infinite number of trouble-free operations. Magnetoresistive Switches operate on DC current only.

SPECIFICATIONS	62505-1 & 62515-1	62506-1 & 62516-1
SWITCH COLOR	Brown	Tan
OPERATING PRINCIPLE	Magnetoresistive	
ACTUATED BY	Moving Magnet	
INPUT VOLTAGE	10 to 30 VDC	
OUTPUT TYPE	NPN (Sink)	PNP (Source)
CURRENT RATING	100 mA. Max.	100mA. Max.
VOLTAGE DROP	.5 VDC Max.	
SWITCH BURDEN	12 mA. Max.	
ENVIRONMENTAL	IP67	
OPERATING TEMP.	0° to 80°C	

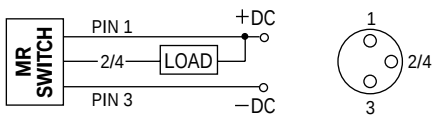
MAGNETORESISTIVE WIRING SCHEMATICS

MODEL NO. 62505-1 & 62515-1 - NPN - (SINK)
INPUT - 10-30 VDC
LOAD CURRENT - 100 mA. MAX.
SWITCH HOUSING COLOR - BROWN
(LED has been omitted from the schematic for clarity.)

CABLED MODEL 62505-1

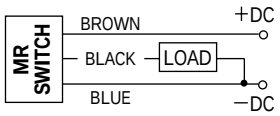


QUICK CONNECT MODEL 62515-1

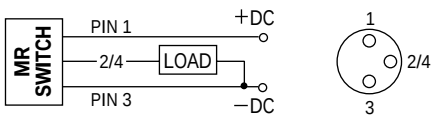


MODEL NO. 62506-1 & 62516-1 - PNP - (SOURCE)
INPUT - 10-30 VDC
LOAD CURRENT - 100 mA. MAX.
SWITCH HOUSING COLOR - TAN
(LED has been omitted from the schematic for clarity.)

CABLED MODEL 62506-1

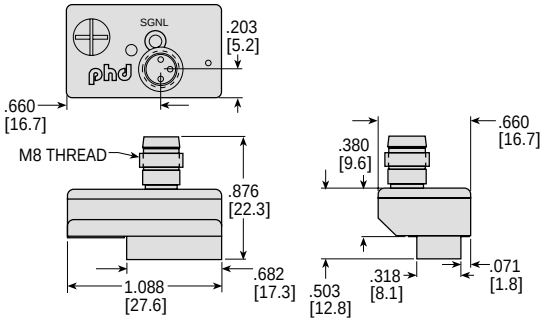


QUICK CONNECT MODEL 62516-1

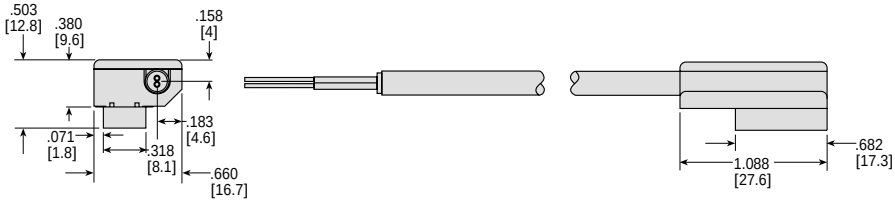


DIMENSIONS: SERIES 6250 REED/MAGNETORESISTIVE SWITCHES

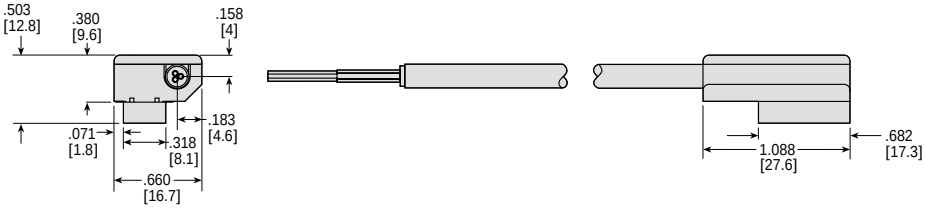
REED AND MAGNETORESISTIVE SWITCH



REED SWITCH

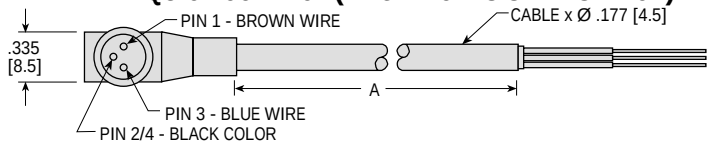


MAGNETORESISTIVE SWITCH

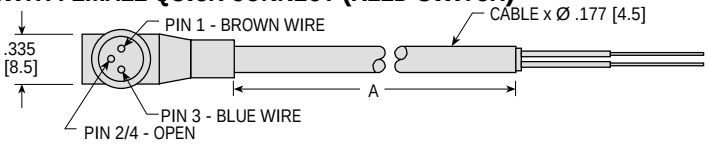


NUMBERS IN [ ] ARE IN mm–
IMPERIAL EQUIVALENTS ARE
PROVIDED FOR CONVENIENCE

61397-xx CORDSET WITH FEMALE QUICK CONNECT (MAGNETORESISTIVE SWITCH)



61398-xx CORDSET WITH FEMALE QUICK CONNECT (REED SWITCH)



NUMBERS IN [ ] ARE IN mm–IMPERIAL EQUIVALENTS ARE PROVIDED FOR CONVENIENCE

MODEL NO.	LETTER DIM. A	LETTER DIM. LENGTH
61397-02	78.7 [2000]	3 wire
61397-05	197.0 [5000]	3 wire
61398-02	78.7 [2000]	2 wire
61398-05	197.0 [5000]	2 wire

ENGINEERING DATA: SERIES 6250 SWITCHES

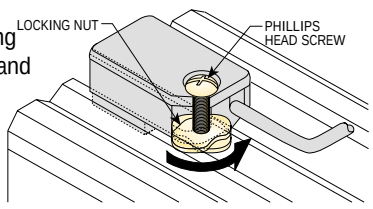
NOISE SUPPRESSION

When using PHD Proximity Switches, it is important to consider the possible presence of electrical noise in the control system. The effects of this noise produce from switch misfire and false signal, causing the actuator or other machine functions to initiate out of sequence.

Isolating the noise is the best method of dealing with electrical transients. This is accomplished by using separate power supplies for both logic level signals (Microprocessor, P.C., CPU, Input Devices) and Output Field Devices (Motors, Valve Solenoids). Additional physical isolation is recommended for routing of control system wiring (e.g., separate conduit for AC and DC wiring, grounding of all shield or drain wires).

MOUNTING DIRECTIONS

1. Orient the switch assembly so the wire/screw end is directed away from the end of the unit.
2. Insert the switch and locking nut into the “T” slot of the unit.
3. Tighten the Phillips head screw until snug 12 in.-lbs. [1.35 Nm]. The first quarter turn will position the locking nut crossways in the “T” slot. ***Do not overtighten.***
4. The switch may be repositioned by loosening the Phillips head screw and sliding the switch in the “T” slot. Once in the desired position, repeat step number 3.



ORDERING DATA: SERIES 1750 SWITCHES

ORDERING DATA

TO ORDER SPECIFY:
Type, Cord Type, Sensing Circuitry, Design No., and Cable Length.

TYPE
Solid State, Reed

CABLE LENGTH
06 - 6 ft [1.8 m] length cable
(Leave blank when quick connect is specified)

175 0 2-2 - 06

CORD TYPE
0 - Cabled
2 - Quick Connect

SENSING CIRCUITRY	DESCRIPTION	SWITCH COLOR
2-2	NPN or PNP DC Reed	White
3-2	NPN DC Solid State	Yellow
4-2	PNP DC Solid State	Red
9-3	*AC Reed w/Current Limiting	Green

CORDSETS WITH QUICK CONNECT

PART NO.	LENGTH
63549-02	2 meter
63549-05	5 meter

NOTES:
1) Cordsets for quick connect switches must be ordered separately. See page 7-17.
2) Other cable lengths available. Consult PHD.
3) *CE certification not applicable to the AC Reed with Current Limiting model.

COMMON BENEFITS

- Series 1750 switches are available for use on most Tom Thumb and PHD products for simple interfacing to many types of electrical controllers.
- The compact low profile design saves space and provides mounting versatility.
- Low profile bracket attaches securely across two tie rods and allows easy position adjustment over the entire piston travel of the cylinder or actuator.
- IP67 Environmental Protection
- Red LED indicator provides convenient method for position setting and troubleshooting.
- Available in a cabled or 8 mm threaded Quick Connect model for easy installation and maintenance.
- 24 AWG polyurethane (PUR) jacketed cable is robust and virtually impervious to chemical and environmental damage.
- Multiple switches may be mounted to control or initiate any sequence or function.



CE

REED BENEFITS

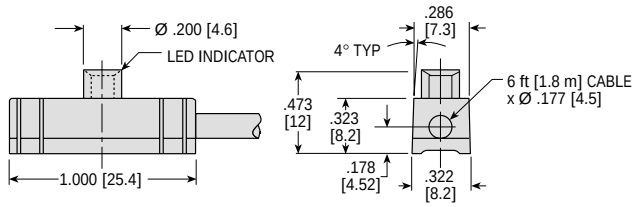
- Available as either 10 -30 VDC or 110-120 VAC models for simple interfacing to sequencers and programmable controllers.
- Can be used to directly drive some types of relays or valve solenoids.

SOLID STATE BENEFITS

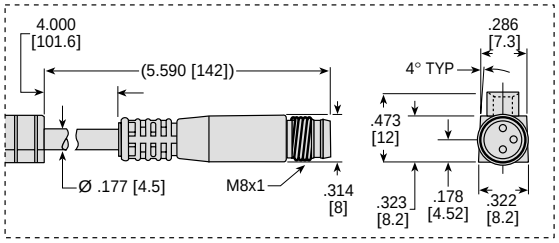
- Solid state switches afford long life. Constant amplitude output allows use with most digital logic systems.
- Switch circuitry protects against voltage surges and other electrical anomalies associated with operating systems.
- Excellent switch hysteresis characteristics and symmetry.
- Offered in 10-30 VDC current sinking and current sourcing versions for simple interfacing to electronic system controllers.

DIMENSIONS: SERIES 1750 SWITCHES

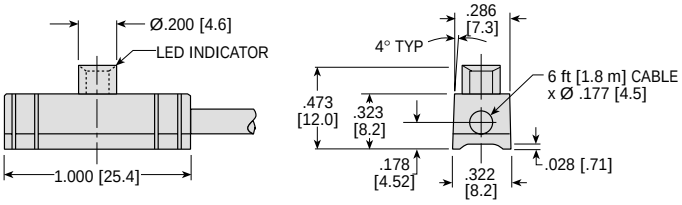
SOLID STATE SWITCH



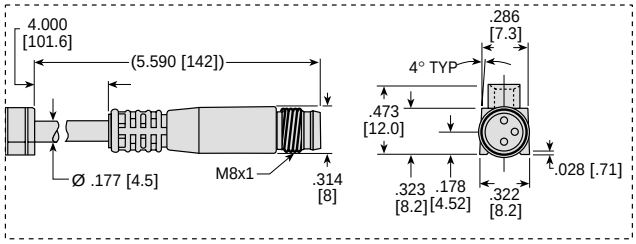
MALE QUICK CONNECT DETAIL



REED SWITCH



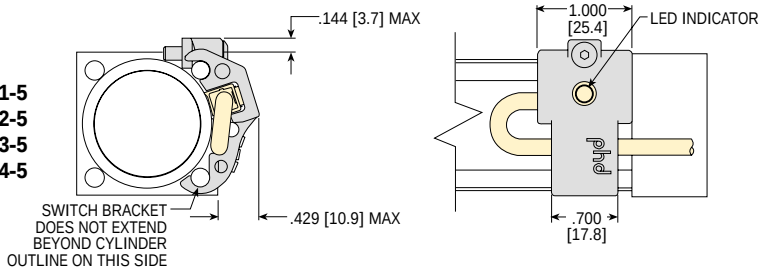
MALE QUICK CONNECT DETAIL



SWITCH BRACKETS 17000-xx-5

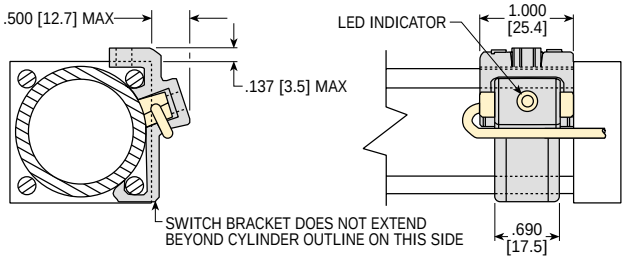
PART NUMBER	DESCRIPTION
17494	Strain relief kit for non -5 brackets (-35-0 through -41-0)

17000-31-5
17000-32-5
17000-33-5
17000-34-5



17000-xx-0

17000-35-0
17000-36-0
17000-37-0
17000-40-0
17000-41-0



NUMBERS IN [ ] ARE IN mm–IMPERIAL EQUIVALENTS ARE PROVIDED FOR CONVENIENCE

CYLINDERS

SERIES	BORE SIZE IMPERIAL	BORE SIZE METRIC	COMPACT BRACKETS
AV & HV	3/4	19	17000-31-5
	1	25	17000-32-5
	1-1/8	29	17000-33-5
	1-3/8	35	17000-34-5
EA, EL, & NEA	3/4	19	17000-35-0
	1-1/8	29	17000-36-0
	1-3/8	35	17000-37-0
	2	51	17000-40-0
	3	75	17000-41-0
NPG	1-1/8	29	17000-33-5
	1-3/8	35	17000-36-0

IMPERIAL LARGE BORE CYLINDERS

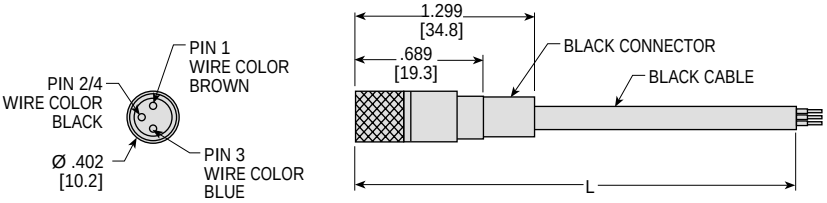
BORE SIZE	COMPACT BRACKETS*
1-1/2	17000-51-0
2	17000-51-0
2-1/2	17000-51-0
3-1/4*	17000-51-0
4	17000-51-0
5, 6, & 8	17000-57-0

*3-1/4" Bore C & C Cylinders require switch bracket 5142-54-3.

ROTARY & MULTI-MOTION ACTUATORS

SERIES	COMPACT BRACKETS LINEAR SECTION	COMPACT BRACKETS ROTARY SECTION
1000 & 2000	17000-36-0	17000-32-5
3000 & 4000	17000-37-0	17000-34-5
5000 & 6000	17000-40-0	17000-38-0
7000 & 8000	17000-41-0	17000-39-0
MINIATURE	17000-35-0	—

63549-xx CORDSET WITH FEMALE QUICK CONNECT



MODEL NO.	LETTER DIM. L
63549-02	78.74 [2 m]
63549-05	196.85 [5 m]

NOTES:

1) For alternative supplier part numbers, see page 7-5.
2) For earlier design switches 1752x-1 and 17529-2, use cordset 17533-00-02 or 17533-00-05.

SPECIFICATIONS: SERIES 1750 SWITCHES

SPECIFICATIONS	17503-2 & 17523-2	17504-2 & 17524-2
OPERATING PRINCIPLE	Solid State	
ACTUATED BY	Piston Magnet	
INPUT VOLTAGE	10-30 VDC	
OUTPUT TYPE	NPN (Sink)	PNP (Source)
CURRENT RATING	20 mA. Max	100 mA. Max
VOLTAGE DROP	.5 VDC	
SWITCH BURDEN	10 mA. Max.	
ENVIRONMENTAL	IP67	
OPERATING TEMP.	0° to 80°C	

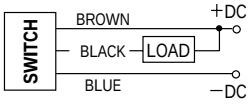
SPECIFICATIONS	17502-2 17522-2	17509-3* 17529-3*
OPERATING PRINCIPLE	Magnetic Reed	
ACTUATED BY	Piston Magnet	
INPUT VOLTAGE	10-30 VDC	110-120 VAC
POWER CAPACITY	10 Watt Max.	10 Watt Max.
OUTPUT TYPE	Contact Closure	
CURRENT RATING	200 mA. Switched	Inter. Limited to 25 mA.
CONTACT RESISTANCE	.1 Ohm Max.	.1 Ohm Max.
ENVIRONMENTAL	IP67	
OPERATING TEMP.	0° to 80°C	

* CE certification not applicable to these switch models.

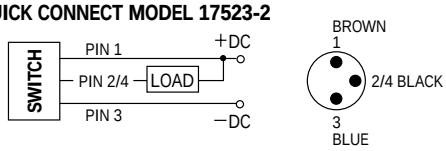
SOLID STATE WIRING SCHEMATICS

MODEL NO. 17503-2 & 17523-2 - NPN (SINK)
INPUT - 10-30 VDC
LOAD CURRENT - 20 mA. MAX.
SWITCH HOUSING COLOR - YELLOW
(LED's have been omitted from the schematic for clarity.)

CABLED MODEL 17503-2

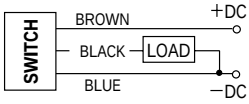


QUICK CONNECT MODEL 17523-2

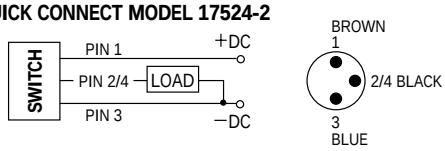


MODEL NO. 17504-2 & 17524-2 - PNP (SOURCE)
INPUT - 10-30 VDC
LOAD CURRENT - 100 mA. MAX.
SWITCH HOUSING COLOR - RED
(LED's have been omitted from the schematic for clarity.)

CABLED MODEL 17504-2



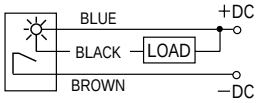
QUICK CONNECT MODEL 17524-2



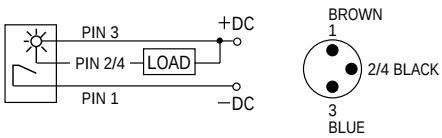
REED WIRING SCHEMATICS

MODEL NO. 17502-2 & 17522-2 - NPN (SINK) OR PNP (SOURCE)
INPUT - 10-30 VDC
POWER CAPACITY - 3 WATT MAX.
LOAD CURRENT - 200 mA. MAX.
SWITCH HOUSING COLOR - WHITE
(Bi-polar LED emits a red light.)

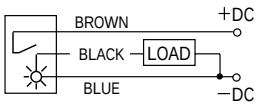
CABLED MODEL 17502-2 - NPN (SINK)



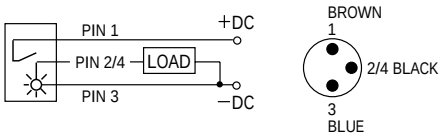
QUICK CONNECT MODEL 17522-2 - NPN (SINK)



CABLED MODEL 17502-2 - PNP (SOURCE)

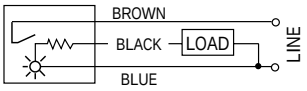


QUICK CONNECT MODEL 17522-2 - PNP (SOURCE)

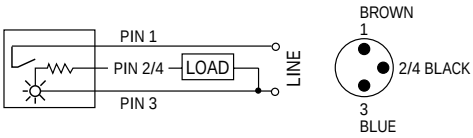


MODEL NO. 17509-3 & 17529-3
INPUT - 120 VAC
SWITCHED POWER - 3 WATT MAX.
INTERNAL RESISTANCE - 1.5 kOhm
SWITCH HOUSING COLOR - GREEN

CABLED MODEL 17509-3



QUICK CONNECT MODEL 17529-3



SOLID STATE SWITCH MODELS (-E OPTION) 17503-2, 17504-2, 17523-2, 17524-2

SERIES	REPEATABILITY*	HYSTERESIS MAXIMUM	BAND WIDTH MINIMUM/ MAXIMUM	MINIMUM TRAVEL** ONE SWITCH ON ONE SIDE	MINIMUM TRAVEL** TWO SWITCHES ON SAME SIDE
3/4, 1, 1-1/8 [19, 25, 29] BORE AV & HV	±.010 [±.25]	.093 [2.36]	.125/.312 [3.18/7.92]	.625 [16]	2.000 [50]
1-3/8 [35] BORE AV & HV	±.010 [±.25]	.125 [3.18]	.218/.375 [5.53/9.52]	.375 [10]	1.500 [40]
3/4, 1-1/8, 1-3/8 [19, 29, 35] BORE EA & EH, 1-1/8, 1-3/8, 2, 3 [29, 35, 51, 75] BORE NEAG, NEHG & 1000-8000 MULTI-MOTION LINEAR SECTION	±.010 [±.25]	.125 [3.18]	.125/.375 [3.18/9.53]	.500 [13]	1.500 [40]
1000 & 2000 ROTARY ACTUATOR & MULTI-MOTION ROTARY SECTION	±1°15'	11°	15°/43°	15°	—
3000-6000 ROTARY ACTUATOR & MULTI-MOTION ROTARY SECTION	±45'	7°30'	9°/29°	10°	—
7000 & 8000 ROTARY ACTUATOR & MULTI-MOTION ROTARY SECTION	±30'	3°30'	4°/15°	5°	—

REED SWITCH MODELS (-M OPTION) 17502-2, 17509-3, 17522-2, 17529-3

SERIES	REPEATABILITY*	HYSTERESIS MAXIMUM	BAND WIDTH MINIMUM/ MAXIMUM	MINIMUM TRAVEL** ONE SWITCH ON ONE SIDE	MINIMUM TRAVEL** TWO SWITCHES ON SAME SIDE
3/4, 1, 1-1/8 [19, 25, 29] BORE AV & HV***	±.030 [±.76]	.060 [1.50]	.218/.400 [5.53/10.16]	.250 [7]	1.750 [45]
1-3/8 [35] BORE AV & HV	±.020 [±.51]	.040 [1.07]	.312/.400 [7.92/10.16]	.125 [4]	1.375 [35]
3/4, 1-1/8, 1-3/8 [19, 29, 35] BORE EA & EH,	±.030 [±.76]	.060 [1.52]	.218/.400 [5.53/10.16]	.125 [4]	1.375 [35]
1-1/8, 1-3/8, 2, 3 [29, 35, 51, 75] BORE NEAG, NEHG & 1000-8000 MULTI-MOTION LINEAR SECTION	±.015 [±.38]	.060 [1.52]	.218/.400 [5.53/10.16]	.125 [4]	1.375 [35]
1000 & 2000 ROTARY ACTUATOR & MULTI-MOTION ROTARY SECTION	±3°30'	7°	25°/46°	7°	—
3000-6000 ROTARY ACTUATOR & MULTI-MOTION ROTARY SECTION	±1°40'	3°	17°/31°	3°	—
7000 & 8000 ROTARY ACTUATOR & MULTI-MOTION ROTARY SECTION	±1°	2°	8°/15°	2°	—

* Dependent upon ability of piston and rod assembly to rotate in actual application

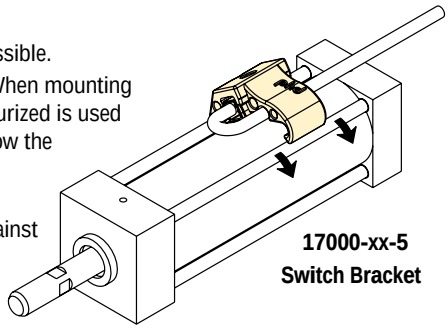
** Minimum strokes can be affected by cylinder options such as shock pads, spring returns and stop tubes. Consult PHD.

*** Switch may turn on by as much as .090 inch [2.3 mm] prior to end of travel.

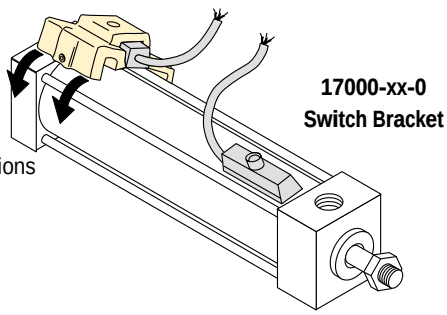
MOUNTING DIRECTIONS FOR SWITCH BRACKETS

1. Orient the bracket with respect to the cylinder so that the locking screw is readily accessible.
2. Slide the switch into the bracket with the cable end toward the center of the cylinder. When mounting switches on rotary actuators, ensure that the driving piston in the cylinder being pressurized is used for signaling. The pistons are not attached to the gear rack and this can sometimes allow the piston on the exhaust side to lose contact with the end of the rack and move ahead of the actual rotation.
3. **17000-xx-5 Switch Brackets:** Hook the nut over one tie rod and push the assembly against the cylinder until the free side snaps over the other tie rod. Tighten the screw until the nut contacts firmly under the tie rod. Finally, loosen it sufficiently to enable the switch and bracket assembly to slide along the cylinder tube.

   17000-xx-0 Switch Brackets: Hook the bracket over one tie rod and push assembly against the cylinder until the side with the set screw rests against the other tie rod. (Make sure the set screw is clear of the tie rod.) Tighten the set screw until it contacts firmly underneath the tie rod. Loosen the screw sufficiently for the switch and bracket assembly to slide along the cylinder tube.
4. Locate the switch assembly where required for a position signal and lock in place by tightening the locking screw. (This step is normally performed after all electrical connections have been made. The LED indicator will then show at what point the switch gate actually closes.)



17000-xx-5 Switch Bracket



17000-xx-0 Switch Bracket

ORDERING DATA: SERIES 5580 PROXIMITY SWITCHES

TO ORDER SPECIFY:
Type, Cord Type, Sensing Circuitry, Design No., and Cable Length.

TYPE
Hall, Reed

CABLE LENGTH
02 - 2 meter length cable
(Leave blank when quick connect is specified)

558 0 2-1 - 02

CORD TYPE
0 - Cabled
2 - Quick Connect

SENSING CIRCUITRY	DESCRIPTION	SWITCH COLOR
2 - 1	NPN or PNP DC Reed	White
3 - 1	NPN DC Hall	Yellow
4 - 1	PNP DC Hall	Red

CORDSETS WITH QUICK CONNECT

PART NO.	LENGTH
63549-02	2 meter
63549-05	5 meter

NOTES:
1) Cordsets for quick connect switches must be ordered separately. See page 7-21.
2) Other cable lengths available. Consult PHD.

BENEFITS

CE

- Series 5580 Proximity Switches are available for use on selected PHD products making it easy to interface these actuators with various electronic controls.
- Hall Effect Switches are solid state for long life and elimination of contact bounce. Constant amplitude output is provided for use with most digital logic systems.
- Low profile mounting is easy to adjust at the ends of travel of the slide or gripper.
- LED indicator provides convenient means for positioning and troubleshooting circuits. An LED shows when the switch output is on.
- Available in a Quick Connect model for easy installation and maintenance.



HALL EFFECT

PHD Series 5580 Hall Effect Proximity Switches are designed specifically to provide an input signal to various types of programmable controllers or logic systems. Since Hall Effect Switches are solid-state, there are no moving parts to wear out. The switches offer an infinite number of trouble-free operations. Hall Effect Switches operate on DC current only.

SPECIFICATIONS	55803 & 55823	55804 & 55824
OPERATING PRINCIPLE	Hall Effect	
ACTUATED BY	Target Magnet	
INPUT VOLTAGE	4.5 to 24 VDC	
OUTPUT TYPE	NPN (Sink)	PNP (Source)
CURRENT RATING	20 mA. Max.	100 mA. Max.
VOLTAGE DROP	.5 VDC Max.	
SWITCH BURDEN	12 mA. Max.	
ENVIRONMENTAL	IP67	
OPERATING TEMP.	0° to 80°C	

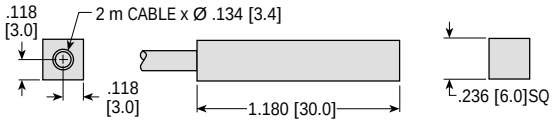
REED

PHD Series 5580 Reed Switches are available in a DC model. They are ideal for use as inputs for many types of sequencers and programmable controllers. In some cases, they can be used to drive some relays or valve solenoids. However, electrical transients (inrush currents or line spikes) associated with inductive or capacitive loads can damage and shorten the life of the switch.

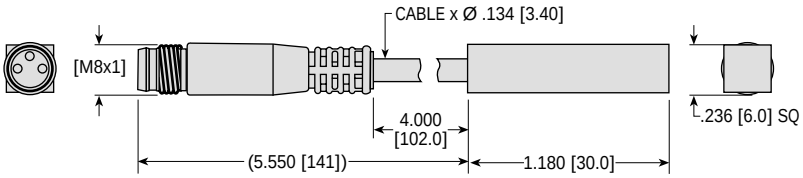
SPECIFICATIONS	55802 & 55822
OPERATING PRINCIPLE	Magnetic Reed
ACTUATED BY	Target Magnet
INPUT VOLTAGE	4.5 to 24 VDC
OUTPUT TYPE	NPN (Sink) or PNP (Source)
CURRENT RATING	200 mA. Switched
CONTACT RESISTANCE	.090 Ohm Max.
ENVIRONMENTAL	IP67
OPERATING TEMP.	0° to 80°C

DIMENSIONS: SERIES 5580 PROXIMITY SWITCHES

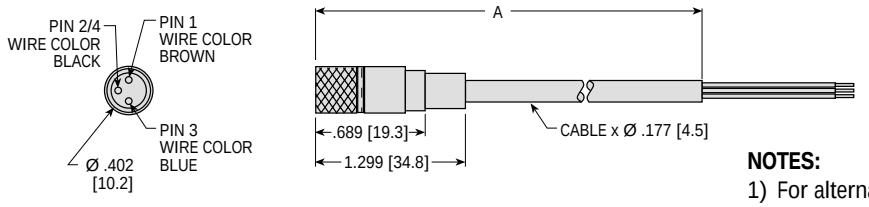
HALL EFFECT AND REED SWITCH



HALL EFFECT AND REED SWITCH WITH MALE QUICK CONNECT



63549-xx CORDSET WITH FEMALE QUICK CONNECT



MODEL NO.	LETTER DIM. A
63549-02	78.74 [2 m]
63549-05	196.85 [5 m]

NUMBERS IN [ ] ARE IN mm–IMPERIAL EQUIVALENTS ARE PROVIDED FOR CONVENIENCE

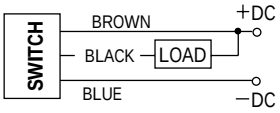
NOTES:
1) For alternative supplier part numbers, see page 7-5.
2) For earlier design switches 1752x-1 and 17529-2, use cordset 17533-00-02 or 17533-00-05.

HALL EFFECT WIRING SCHEMATICS

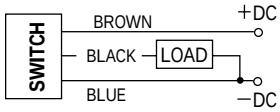
MODEL NO. 55803 & 55823 - NPN (SINK)
INPUT - 4.5-24 VDC
LOAD CURRENT - 20 mA. MAX.
SWITCH HOUSING COLOR - YELLOW
(LED has been omitted from the schematic for clarity.)

MODEL NO. 55804 & 55824 - PNP (SOURCE)
INPUT - 4.5-24 VDC
LOAD CURRENT - 100 mA. MAX.
SWITCH HOUSING COLOR - RED
(LED has been omitted from the schematic for clarity.)

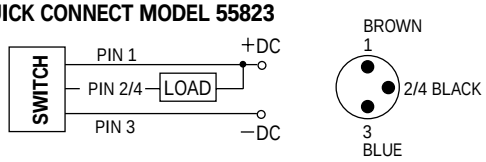
CABLED MODEL 55803



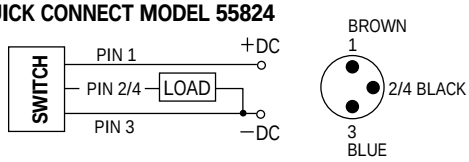
CABLED MODEL 55804



QUICK CONNECT MODEL 55823



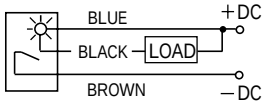
QUICK CONNECT MODEL 55824



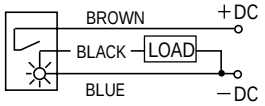
REED WIRING SCHEMATICS

MODEL NO. 55802 & 55822 - NPN (SINK) OR PNP (SOURCE)
INPUT - 4.5-24 VDC
LOAD CURRENT - 200 mA. MAX.
SWITCH HOUSING COLOR - WHITE
(Bi-polar LED emits a green light in the Sinking circuit and a red light in the Sourcing circuit.)

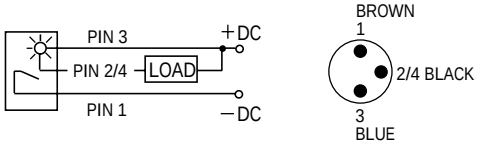
CABLED MODEL 55802 - NPN (SINK)



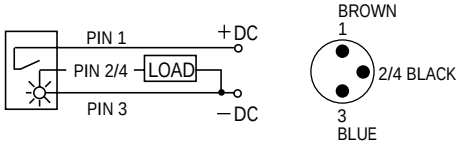
CABLED MODEL 55802 - PNP (SOURCE)



QUICK CONNECT MODEL 55822 - NPN (SINK)



QUICK CONNECT MODEL 55822 - PNP (SOURCE)



NOISE SUPPRESSION

When using PHD Proximity Switches, it is important to consider the possible presence of electrical noise in the control system. The effects of this noise can vary from switch misfire and false signal, to total permanent switch failure, causing the actuator or other machine functions to initiate out of sequence.

Isolating the noise is the best method of dealing with electrical transients. This is accomplished by using separate power supplies for both logic level signals (Microprocessor, P.C., CPU, Input Devices) and Output Field Devices (Motors, Valve Solenoids). Additional physical isolation is recommended for routing of control system wiring (e.g., separate conduit for AC and DC wiring, and grounding of all shield or drain wires).

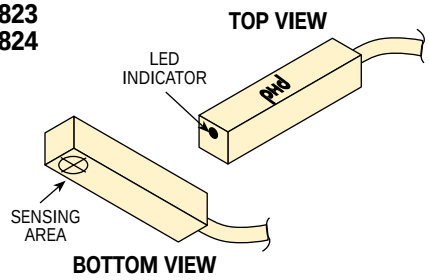
In cases where isolation is not practical, such as direct small relay operation, valve solenoids, etc., inductive transient spikes may be minimized by use of clamping diodes or R-C networks.

MOUNTING DIRECTIONS

The switch should be mounted so that the sensing area is oriented parallel to the moving target magnet.

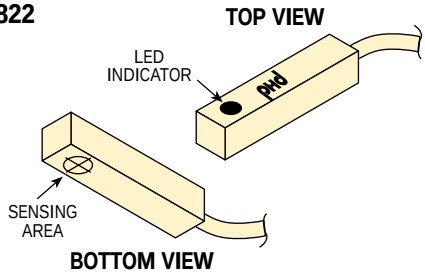
HALL EFFECT SWITCH

MODEL 55803 & 55823
55804 & 55824



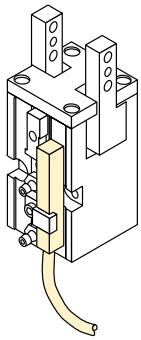
REED SWITCH

MODEL 55802 & 55822



FOR USE WITH THESE PHD PRODUCTS

SERIES 190 & 191 GRIPPERS

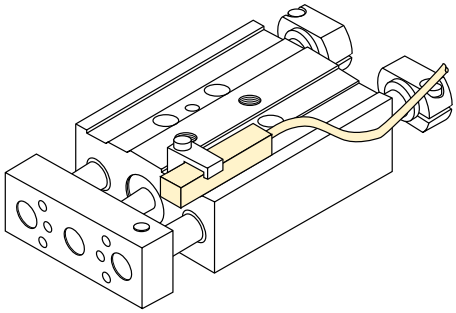


GRIPPER MODEL NO.	KIT NUMBER IMPERIAL	KIT NUMBER METRIC
19x6x	59794-1	55770
19x7x	59795-1	55771
19x8x	55772	55772
19x9x	55773	55773

NOTE: Part number suffix (-1) indicates Buna-N seals. Part number suffix (-2) indicates Fluoro-Elastomer seals. Proximity Switches must be ordered separately. Each Proximity Switch Kit will contain 1 target and 2 brackets to mount two switches (Models 19x6x and 19x7x utilize a one-piece bracket for both switches).

Please refer to the Grippers section for ordering and dimensional information.

SERIES SA & SB SLIDES



SLIDE MODEL NO.		KIT NUMBERS IMPERIAL	KIT NUMBERS METRIC
Sx012	Sx017	55967	55968
Sx022	Sx027	55969	55970
Sx033	Sx038	60417	60420
Sx044	Sx049	60584	60608
Sx066	Sx068	60363	59824

NOTES:

1)Proximity Switches must be ordered separately.
The following items are included with this kit:
- 1 target pin with magnet
- 2 shaft collars (1 has been modified with magnet)
- 2 shock pads
- 2 switch mounting brackets with screws

Please refer the Powered Slides section for ordering and dimensional information.

2)For old design slides consult factory for kit number.

ORDERING DATA: SERIES 1590 SWITCHES

TO ORDER SPECIFY:
Type, Sensing Circuitry, and Design No.

NOTES:
1) Cordsets for quick connect switches must be ordered separately. See page 7-25.
2) Other cable lengths available. Consult PHD.

TYPE
Hall, Reed

1590 **0-1**

SENSING CIRCUITRY	DESCRIPTION
0-1	10 WATT DC or AC Reed
1-1	3 AMP AC Reed
2-1	NPN or PNP DC Hall

CORDSETS

PART NO.	DESCRIPTION
15903-00-12	12 ft [3 m] Cordset for Reed Switch, Straight Connector
15903-90-12	12 ft [3 m] Cordset for Reed Switch, 90° Connector
15904-00-12	12 ft [3 m] Cordset for Hall Effect Switch, Straight Connector
15904-90-12	12 ft [3 m] Cordset for Hall Effect Switch, 90° Connnector

NOTE: Cordsets must be ordered separately.

BENEFITS: SERIES 1590 HALL SWITCHES

BENEFITS

CE

- Hall Effect Switches are suitable for use on most Tom Thumb/ PHD products.
- Liquid Resistant Switches can be used in applications where coolant or moisture due to washdown is present (IEC IP67 rating). Consult PHD for compatibility with caustic or hazardous liquids.
- Hall Effect Switches are solid state for long life and elimination of contact bounce. Constant amplitude output is provided for use with most digital logic systems.
- Adjustable mounting allows switches to be located anywhere within range of piston travel.
- Several switches may be mounted to control or initiate any sequence function.
- Suitable for use in plant environments where dirt and contamination create difficulties for electromechanical and other types of controls.
- LED indicator provides convenient means for positioning and troubleshooting circuits.
- Reverse Voltage Protection is built into these switches to safeguard against switch failure due to reverse hookup.

The PHD Hall Effect Switch is a solid-state device designed specifically to provide an input signal to various types of programmable controllers or logic systems. Since the Hall Effect Switch is solid-state, there are no moving parts to wear out. Because of this, the switch offers an infinite number of trouble-free operations. The Hall Effect Switch operates on DC current only, and is a dual output for either current sinking or a current sourcing input.



SPECIFICATIONS	15902-1
OPERATING PRINCIPLE	Hall Effect
ACTUATED BY	Piston Magnet
INPUT VOLTAGE	4.5 to 24 VDC
OUTPUT TYPE	NPN (Sink) or PNP (Source)
OUTPUT CURRENT RATING	200 mA. Max. NPN (Sink) or 100 mA. Max. PNP (Source)
OUTPUT VOLTAGE DROP	.4 VDC Max. NPN (Sink) or .5 VDC Max. PNP (Source)
SWITCH BURDEN	19 mA. Max.
CIRCUIT PROTECTION	
FALSE PULSE	No
LOAD SHORT	No
REVERSE VOLTAGE	Yes
400 Hz INTERFERENCE	No
TRANSIENTS	No
SPECIAL FEATURE	Groundable Braided Shield
POWER DISSIPATION	300 milliwatt Max.
ENVIRONMENTAL	IP67
OPERATING TEMP.	0° to 48°C

BENEFITS: SERIES 1590 REED SWITCHES

BENEFITS

- Reed Switches are suitable for use on most Tom Thumb/PHD products.
- Adjustable mounting allows switches to be located anywhere within range of piston travel.
- Several switches may be mounted to control or initiate any sequence function.
- Liquid Resistant Switches can be used in applications where coolant or moisture due to washdown is present (IEC IP67 rating). Consult PHD for compatibility with caustic or hazardous liquids.
- No externally moving parts to wear or maintain.
- Suited for use in plant environments where dirt and contamination create difficulties for electromechanical and other types of controls.
- LED provides convenient means for positioning and trouble-shooting switch and circuits.
- Standard Reed suitable for AC or DC service.
- 3 Amp Switch provides internal transient protection under normal conditions (AC only).

The PHD Reed Switch can be operated on either AC or DC current. They are ideal for use as inputs for many types of sequencers and programmable controllers. In some cases they can be used to drive some relays or valve solenoids. However, electrical transients (inrush currents or line spikes) associated with inductive or capacitive loads can damage and shorten the life of the switch. PHD offers a 3 Amp Reed Switch (AC only) to be used for these types of applications.

The 3 Amp Switch is very similar to the Reed Switch in construction. The difference is the inclusion of a triac which upgrades the contact rating to 3 amps. The 3 Amp Switch also has built-in protection against electrical transients.

15900-1 10 WATT REED SWITCH

SPECIFICATIONS	15900-1
OPERATING PRINCIPLE	Magnetic Reed
ACTUATED BY	Piston Magnet
INPUT VOLTAGE	4.5 to 24 VDC or 110 to 120 VAC*
OUTPUT TYPE	Contact Closure
POWER CAPACITY	10 Watt Max.
CURRENT RATING	200 mA. Switched
CONTACT RESISTANCE	.100 Ohm
LED INDICATOR	Visible voltage range from 24 to 120 AC or DC
ENVIRONMENTAL	IP67
OPERATING TEMP.	0° to 80°C

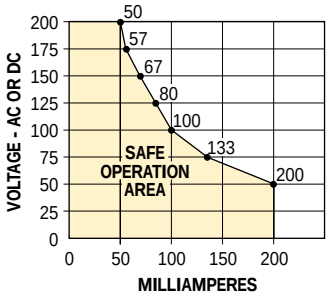
* CE certification applicable to 4.5 to 24 VDC range only.

15901-1 3 AMP REED SWITCH (TRIAC)

SPECIFICATIONS	15901-1*
OPERATING PRINCIPLE	Magnetic Reed
ACTUATED BY	Piston Magnet
INPUT VOLTAGE	65 to 120 VAC (50/60 Hz)
VA MAX.	360
CURRENT (BREAK)	3 Amp
LEAKAGE	1.7 mA.
RESPONSE TIME	1.5 ms On, 0-8.3 ms Off
LED INDICATOR	Visible throughout voltage range
ENVIRONMENTAL	IP67
OPERATING TEMP.	0° to 80°C

* CE certification not applicable to this switch model.

VOLTAGE VS. AMPERES DERATING CURVE



NOTE: *All incandescent loads derate switch capacity to 10% due to inrush current. Consult PHD for higher load requirement for the 3 Amp switch.*

SHOCK RATING

The basic switch can withstand up to 60G maximum in the direction of contact closure without misfire or malfunction.

VIBRATION SENSITIVITY

Switch will withstand vibration amplitude of 30G at frequencies up to 6000 Hz without misfire. False operation can occur at vibration frequency levels higher than 6000 Hz.

OPERATING TEMPERATURE

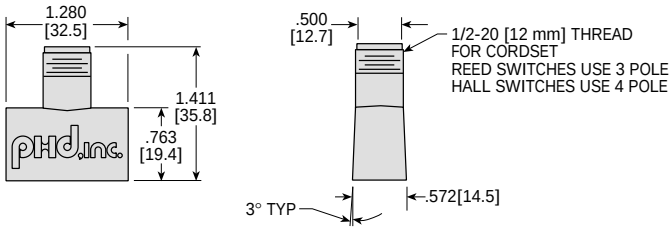
0° to 80°C for standard cable.

CORDSET SPECIFICATIONS

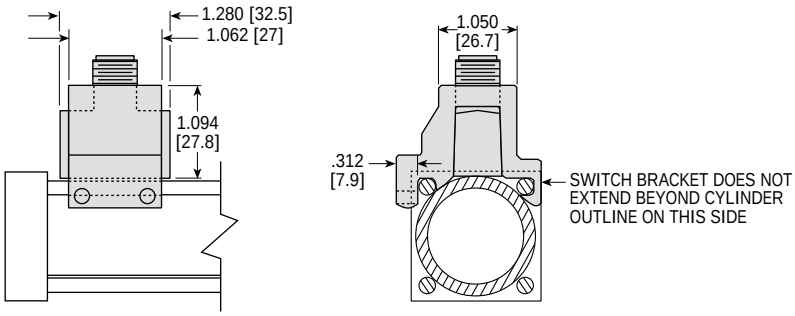
22 AWG PVC insulated, metallic braid, fine stranded copper conductors. Yellow munsell 5Y 8/12 PVC jacket. Nominal cable O.D. .225 300V, 105°C. UL Recognized, CSA Certified.

DIMENSIONS: SERIES 1590 SWITCHES

HALL EFFECT AND REED SWITCH



5142-xx-3 SWITCH BRACKET



CYLINDERS

SERIES	BORE SIZE IMPERIAL	BORE SIZE METRIC	LIQUID RESISTANT*
AV & HV	3/4	19	5142-31-3
	1	25	5142-32-3
	1-1/8	29	5142-33-3
	1-3/8	35	5142-34-3
EA, EL, & NEA	3/4	19	5142-35-3
	1-1/8	29	5142-36-3
	1-3/8	35	5142-37-3
	2	51	5142-40-3
	3	75	5142-41-3
NPG	1-1/8	29	5142-33-3
	1-3/8	35	5142-36-3

ROTARY & MULTI-MOTION ACTUATORS

SERIES	LIQUID RESISTANT SWITCH* LINEAR SECTION	LIQUID RESISTANT SWITCH* ROTARY SECTION
1000 & 2000	5142-36-3	5142-32-3
3000 & 4000	5142-37-3	5142-34-3
5000 & 6000	5142-40-3	5142-38-3
7000 & 8000	5142-41-3	5142-39-3
MINIATURE	5142-35-3	—

STRAIN RELIEF KITS

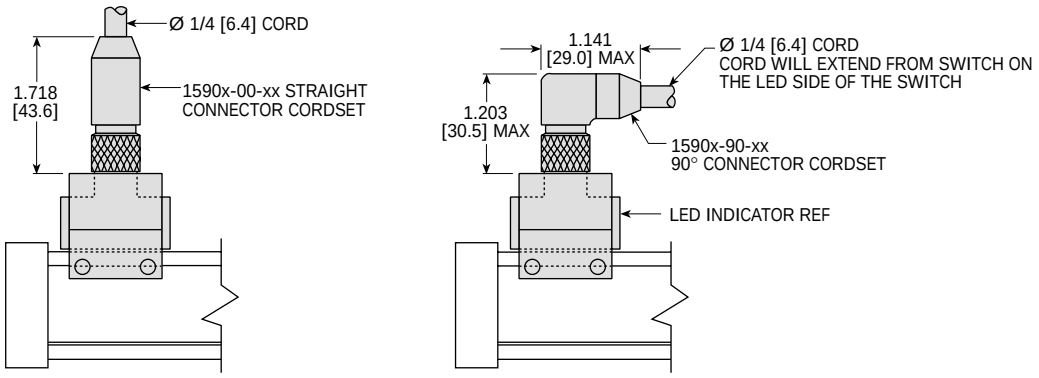
PART NO.	DESCRIPTION
18412	Strain Relief Kit for use with Large Bore Cylinder Switch Brackets

LARGE BORE CYLINDERS

BORE SIZE IMPERIAL	BORE SIZE METRIC	LIQUID RESISTANT*
1-1/2	—	5142-51-3
2	—	5142-52-3
2-1/2	—	5142-53-3
3-1/4*	—	5142-55-3
4	—	5142-56-3
5, 6, & 8	—	—

*3-1/4" Bore C & C Cylinders require switch bracket 5142-54-3

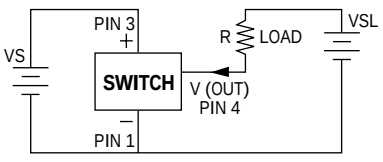
SWITCH CORDSETS



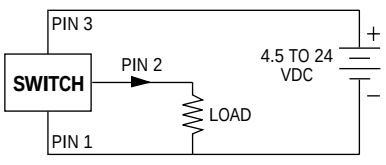
NUMBERS IN [ ] ARE IN mm–IMPERIAL EQUIVALENTS ARE PROVIDED FOR CONVENIENCE

HALL EFFECT WIRING SCHEMATICS

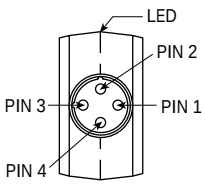
15902-1 - NPN (SINK)



15902-1 - PNP (SOURCE)



PIN ASSIGNMENT

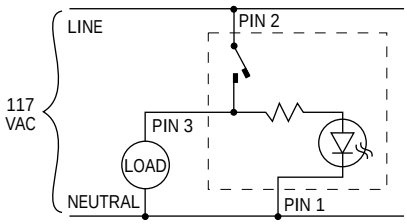


All dimensions are reference only unless specifically toleranced.

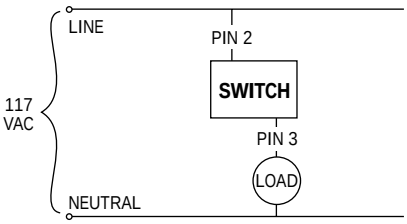
phd SOLUTIONS FOR INDUSTRIAL AUTOMATION
(800) 624-8511
www.phdinc.com/products/switchesandsensors

REED WIRING SCHEMATICS

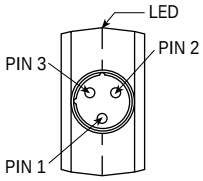
15900-1 AC



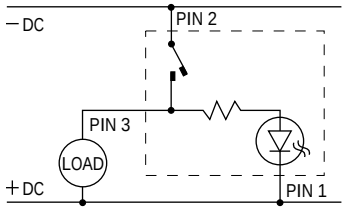
15901-1 AC ONLY



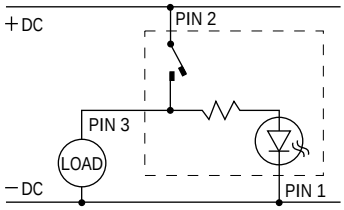
PIN ASSIGNMENT



15900-1 DC NPN (SINK)



15900-1 DC PNP (SOURCE)



(Bi-polar LED emits a green light in the Sinking circuit and a red light in the Sourcing circuit.)

HALL EFFECT SWITCH MODELS (-E OPTION) 15902-1

SERIES	REPEATABILITY*	HYSTERESIS MAXIMUM	BAND WIDTH MINIMUM/ MAXIMUM	MINIMUM TRAVEL ONE SWITCH ON ONE SIDE	MINIMUM TRAVEL TWO SWITCHES ON SAME SIDE
3/4, 1, 1-1/8 [19, 25, 29] BORE AV & HV	±.010 [±.25]	.093 [2.36]	.125/.312 [3.18/7.92]	.625 [16]	2.000 [50]
1-3/8 [35] BORE AV & HV	±.010 [±.25]	.125 [3.18]	.218/.375 [5.53/9.52]	.375 [10]	1.500 [40]
3/4, 1-1/8, 1-3/8 [19, 29, 35] BORE EA & EH, 1-1/8, 1-3/8, 2, 3 [29, 35, 51, 75] BORE NEAG, NEHG & 1000-8000 MULTI-MOTION LINEAR SECTION	±.010 [±.25]	.125 [3.18]	.125/.375 [3.18/9.53]	.500 [13]	1.500 [40]
1000 & 2000 ROTARY ACTUATOR & MULTI-MOTION ROTARY SECTION	±1°15'	11°	15°/43°	15°	—
3000-6000 ROTARY ACTUATOR & MULTI-MOTION ROTARY SECTION	±45'	7°30'	9°/29°	10°	—
7000 & 8000 ROTARY ACTUATOR & MULTI-MOTION ROTARY SECTION	±30'	3°30'	4°/15°	5°	—

REED SWITCH MODELS (-M OPTION) 15900-1, 15901-1

SERIES	REPEATABILITY*	HYSTERESIS MAXIMUM	BAND WIDTH MINIMUM/ MAXIMUM	MINIMUM TRAVEL ONE SWITCH ON ONE SIDE	MINIMUM TRAVEL TWO SWITCHES ON SAME SIDE
3/4, 1, 1-1/8 [19, 25, 29] BORE AV & HV	±.030 [±.76]	.060 [1.52]	.218/.400 [5.53/10.16]	.250 [7]	1.750 [45]
1-3/8 [35] BORE AV & HV	±.020 [±.51]	.040 [1.07]	.312/.400 [7.92/10.16]	.125 [4]	1.375 [35]
3/4, 1-1/8, 1-3/8 [19, 29, 35] BORE EA & EH,	±.030 [±.76]	.060 [1.52]	.218/.400 [5.53/10.16]	.125 [4]	1.375 [35]
1-1/8, 1-3/8, 2, 3 [29, 35, 51, 75] BORE NEAG, NEHG & 1000-8000 MULTI-MOTION LINEAR SECTION	±.015 [±.38]	.060 [1.52]	.218/.400 [5.53/10.16]	.125 [4]	1.375 [35]
1000 & 2000 ROTARY ACTUATOR & MULTI-MOTION ROTARY SECTION	±3°30'	7°	25°/46°	7°	—
3000-6000 ROTARY ACTUATOR & MULTI-MOTION ROTARY SECTION	±1°40'	3°	17°/31°	3°	—
7000 & 8000 ROTARY ACTUATOR & MULTI-MOTION ROTARY SECTION	±1°	2°	8°/15°	2°	—

*Dependent upon ability of piston and rod assembly to rotate in actual application. Minimum strokes can be affected by cylinder options such as shock pads, spring returns and stop tubes. Consult PHD.

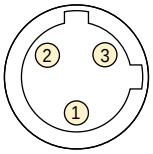
TYPE OF SWITCH	DESCRIPTION	PHD CORDSET PART NO.	DANIEL WOODHEAD PART NO.	JOY PART NO.	LUMBERG PART NO.
REED	straight connector	15903-00-12	70215	5000 114-3	RKT 3U-618/12F
REED	90° connector	15903-90-12	70219	5000 114-6	RKWT 3U-618/12F
HALL EFFECT	straight connector	15904-00-12	70434	5000 115-3	RKT 4U-674/12F
HALL EFFECT	90° connector	15904-90-12	70429	5000 115-6	RKWT 4U-674/12F

NOTE: PHD reserves the right to supply any of the cordsets listed.

PIN/WIRE COLOR ASSIGNMENT FOR PHD, DANIEL WOODHEAD, JOY, AND LUMBERG CORDSETS

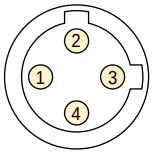
FACE VIEW OF PLUGS

3 WIRE



3 POLE PIN ASSIGNMENT	
1	GREEN
2	RED WITH BLACK TRACER
3	RED WITH WHITE TRACER

4 WIRE



4 POLE PIN ASSIGNMENT	
1	RED WITH BLACK TRACER
2	RED WITH WHITE TRACER
3	RED
4	GREEN

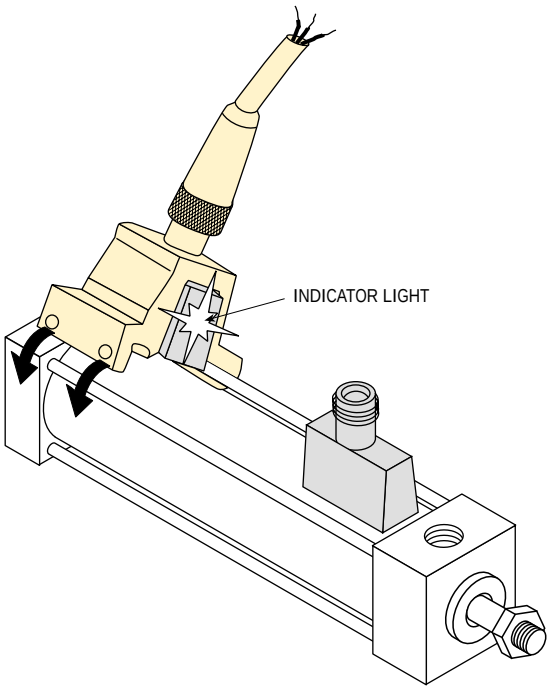
MOUNTING DIRECTIONS

1. Orient bracket with respect to cylinder so that set screws are located on the most convenient side.

2. Slide switch into bracket with end containing LED indicator toward center of cylinder. When mounting switches on rotary actuators, make sure that the powered piston is used for signal. Pistons are not attached to the gear rack which sometimes allow the piston on the exhaust side to move ahead of the actual rotation.

3. Hook bracket over one tierod and push assembly against cylinder until the side with the set screws rests against the other tierod. (Make sure set screws are clear of tierod.) Tighten set screws until they contact firmly underneath the tierod. Then loosen enough to enable switch and bracket assembly to slide along the cylinder tube.

4. Locate switch assembly where desired and lock in place by tightening the set screws. (This step is normally performed after all electrical connections have been made. Indicator light will then show at what point switch is made.)



ORDERING DATA: SERIES 6790 SWITCHES

ORDERING DATA

TO ORDER SPECIFY:
Product Type, Cable Type,
Sensing Circuitry, Cable Length

CORD TYPE
0 - Cabled
2 - Quick Connect

CABLE LENGTH
02 - 2 meter length cable
05 - 5 meter length cable
(Leave blank when quick connect is specified

679 0 2-1 - 02

PRODUCT TYPE
Reed, Solid State

SENSING CIRCUITRY
2-1 PNP or NPN DC Reed
3-1 NPN DC Solid State
4-1 PNP DC Solid State

CORDSETS WITH QUICK CONNECT

PART NO.	LENGTH
63549-02	2 meter
63549-05	5 meter

NOTES:
1) Cordsets for quick connect switches must be ordered separately.
2) Other cable lengths available. Consult PHD.

COMMON BENEFITS

- Series 6790 Switches are available for use on Series ST and SH Slides and Series RIS Rotary Actuators and allow simple interfacing to many types of electrical controllers.
- Saving space and providing mounting versatility, the round design fits into grooves in the body of the actuator.
- IP67 Environmental Protection
- LED indicator provides convenient method for position setting and troubleshooting.
- Available in a cabled or 8 mm threaded Quick Connect model for easy installation and maintenance.
- 28 AWG PVC jacketed cable
- Multiple switches may be mounted to control or initiate any sequence or function.





SOLID STATE BENEFITS

- Solid state switches afford long life. Constant amplitude output allows use with most digital logic systems.
- Switch circuitry protects against voltage surges and other electrical anomalies associated with operating systems.
- Excellent switch hysteresis characteristics and symmetry.
- Offered in 4.5 - 30 VDC current sinking and current sourcing versions for simple interfacing to electronic system controllers.

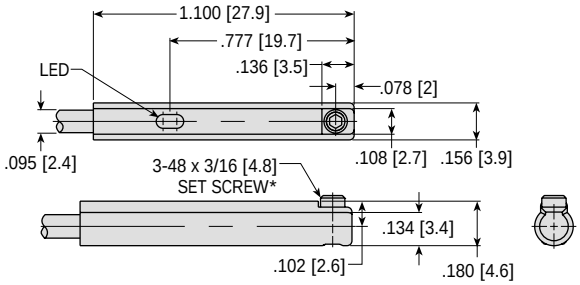
SPECIFICATIONS	67903 & 67923	67904 & 67924
OPERATING PRINCIPLE	Solid State	
ACTUATED BY	Piston Magnet	
INPUT VOLTAGE	4.5 - 30 VDC	
OUTPUT TYPE	NPN (Sink)	PNP (Source)
CURRENT RATING	50 mA. Max	
VOLTAGE DROP	.5 VDC	
SWITCH BURDEN	10 mA. Max.	
ENVIRONMENTAL	IP67	
OPERATING TEMP.	-20° to 85°C	

REED BENEFITS

- Available as 4.5 - 30 VDC model for simple interfacing to sequencers and programmable controllers.
- Can be used to directly drive some types of relays or valve solenoids within the switch specifications stated.

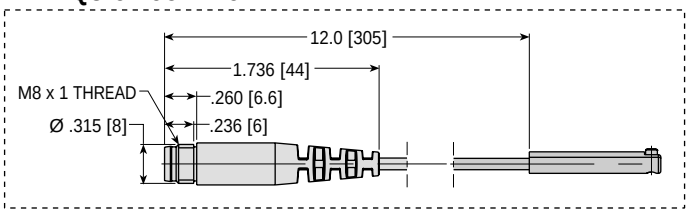
SPECIFICATIONS	67902 & 67922
OPERATING PRINCIPLE	Magnetic Reed
ACTUATED BY	Piston Magnet
INPUT VOLTAGE	4.5 - 30 VDC
OUTPUT TYPE	Contact Closure
CURRENT RATING	50 mA Max.
CONTACT RESISTANCE	.115 Ohm Max.
ENVIRONMENTAL	IP67
OPERATING TEMP.	-20° to 85°C

BENEFITS: SERIES 6790 SWITCHES



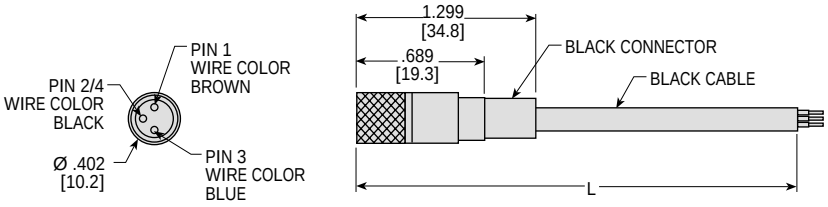
*MAX. SCREW TORQUE 1.0 in-lb [.110 Nm]

MALE QUICK CONNECT DETAIL



METRIC INFORMATION SHOWN IN [ ]

63549-xx CORDSET WITH FEMALE QUICK CONNECT

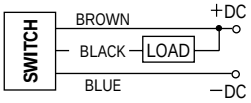


MODEL NO.	LETTER DIM. L
63549-02	78.74 [2 m]
63549-05	196.85 [5 m]

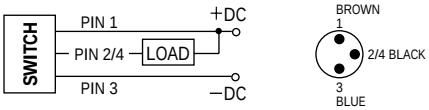
SOLID STATE WIRING SCHEMATICS

MODEL NO. 67903-1 & 67923-1 - NPN (SINK)
INPUT: 4.5 - 30 VDC
LOAD CURRENT: 50 mA. MAX.
SWITCH HOUSING COLOR: BLACK
(Bi-polar LED emits a yellow light)

CABLED MODEL 67903

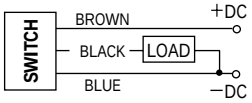


QUICK CONNECT MODEL 67923

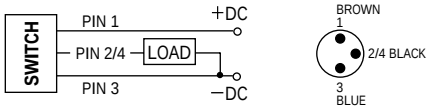


MODEL NO. 67904-1 & 67924-1 - PNP (SOURCE)
INPUT: 4.5-30 VDC
LOAD CURRENT: 50 mA. MAX.
SWITCH HOUSING COLOR: BLACK
(Bi-polar LED emits a red light.)

CABLED MODEL 67904



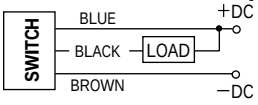
QUICK CONNECT MODEL 67924



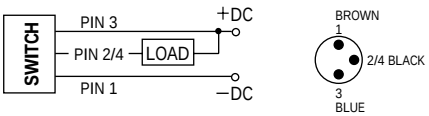
REED WIRING SCHEMATICS

MODEL NO. 67902-1 & 67922-1 - NPN (SINK) OR PNP (SOURCE)
INPUT: 4.5 - 30 VDC
LOAD CURRENT: 50 mA. MAX.
SWITCH HOUSING COLOR: BLACK
(LED emits a red light)

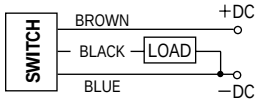
CABLED MODEL 67902 - NPN (SINK)



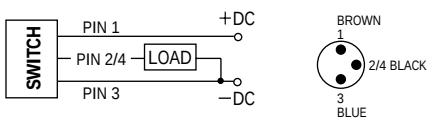
QUICK CONNECT MODEL 67922 - NPN (SINK)



CABLED MODEL 67902 - PNP (SOURCE)



QUICK CONNECT MODEL 67922 - PNP (SOURCE)



EXPLANATION OF TERMS: PROXIMITY SWITCHES

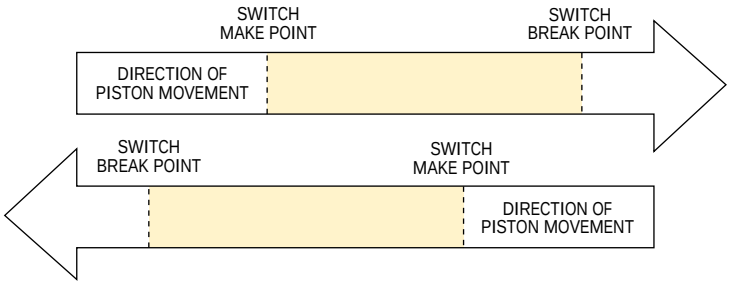
HYSTERESIS:

The differential in distance between where the switch makes with the piston moving one direction, and where it breaks with the piston moving in the reverse direction.

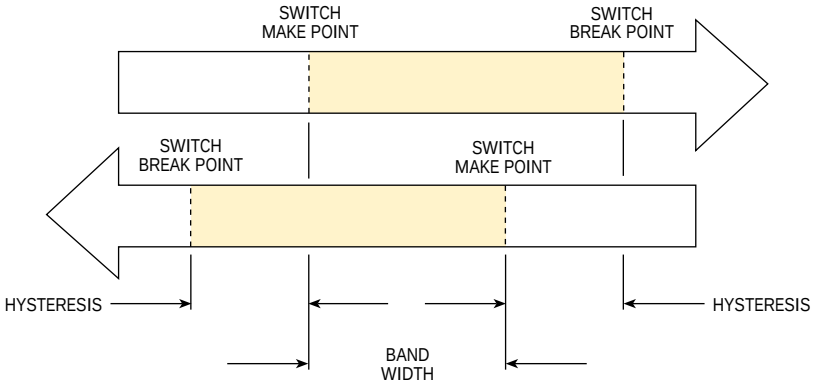
BAND WIDTH:

The distance the piston moves while the switch is made, less the hysteresis. (See charts on page 7-19 and 7-26 for Hall Effect Switches and Reed Switches.)

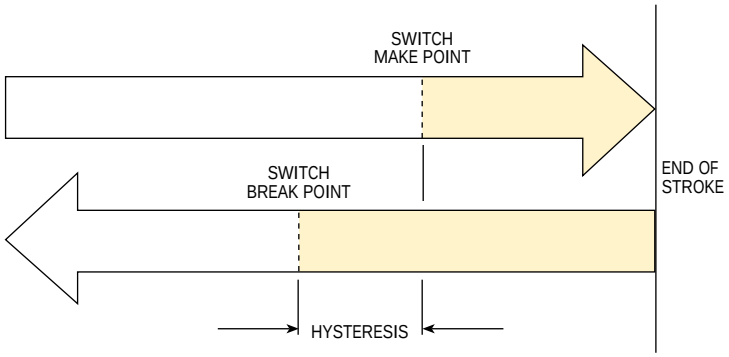
HYSTERESIS AND BAND WIDTH ILLUSTRATION



MID STROKE EXAMPLE



END OF STROKE EXAMPLE



NOISE SUPPRESSION

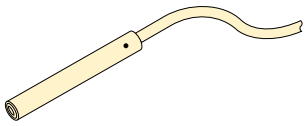
When using PHD Proximity Switches, it is important to consider the possible presence of electrical noise in the control system. The effects of this noise can vary from switch misfire and false signal to total permanent switch failure, causing the actuator or other machine functions to initiate out of sequence.

Isolating the noise is the best method of dealing with electrical transients. This can be accomplished by using separate power supplies for both logic level signals (Microprocessor, P.C., CPU, Input Devices) and Output Field Devices (Motors, Valve Solenoids). Additional physical isolation is recommended for routing of control system wiring (e.g., separate conduit for AC and DC wiring, grounding of all shield or drain wires).

In cases where isolation is not practical, such as direct small relay operation, valve solenoids, etc., inductive transient spikes may be minimized by use of clamping diodes or R-C networks.

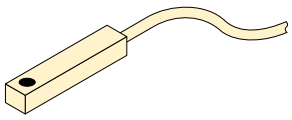
DC INDUCTIVE PROXIMITY SWITCHES

4 mm ROUND



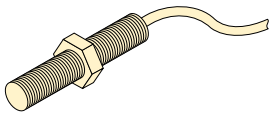
PART NO.	DESCRIPTION
18430-001-02	NPN (Sink) 10-30 VDC, 2 meter cable
18430-002-02	PNP (Source) 10-30 VDC, 2 meter cable

6 mm SQUARE



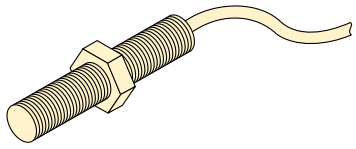
PART NO.	DESCRIPTION
18431-001-02	NPN (Sink) 10-30 VDC, 2 meter cable
18431-002-02	PNP (Source) 10-30 VDC, 2 meter cable

8 mm THREADED



PART NO.	DESCRIPTION
51422-005-02	NPN (Sink) 5-30 VDC, 2 meter cable
51422-006-02	PNP (Source) 5-30 VDC, 2 meter cable

12 mm THREADED



PART NO.	DESCRIPTION
15561-001	NPN (Sink) 10-30 VDC, 3 meter cable
15561-002	PNP (Source) 10-30 VDC, 3 meter cable
15561-003	20-250 VAC, 3 meter cable

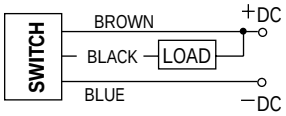
BENEFITS

- High reliability provided by solid state inductive sensing technology.
- Ease of mounting with PHD's Proximity Switch Bracket Kit and Target Kits for grippers. These kits include all hardware for mounting the switch and the target that is used to actuate the switch. (See Slide and Gripper sections for details.)
- Suitable for plant environments where dirt and contamination create difficulties for electromechanical and other types of switches.
- LED indicator circuits are standard on 4 mm round, 6 mm square, and 8 mm threaded and provide a convenient means of positioning and troubleshooting.

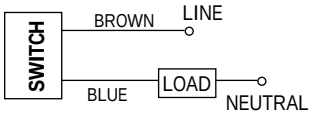
SPECIFICATIONS	18430-001-02 18431-001-02	18430-002-02 18431-002-02	51422-005-02	51422-006-02	15561-001	15561-002	15561-003
INPUT VOLTAGE	10 to 30 VDC	10 to 30 VDC	5 to 30 VDC	5 to 30 VDC	10 to 30 VDC	10 to 30 VDC	20 to 250 VAC
OUTPUT TYPE	NPN (Sink)	PNP (Source)	NPN (Sink)	PNP (Source)	NPN (Sink)	PNP (Source)	Solid State
SENSING RANGE	0.8 mm Max.	0.8 mm Max.	1.5 mm Max.	1.5 mm Max.	1.6 mm Max.	1.6 mm Max.	1.6 mm Max.
OUTPUT CURRENT RATING	100 mA. Max.	100 mA. Max.	200 mA. Max.	200 mA. Max.	200 mA Max.	200 mA Max.	130 mA Max.
SWITCH BURDEN	10 mA. Max.	10 mA. Max.	10 mA. Max.	10 mA. Max.	8 mA Max.	8 mA Max.	—
VOLTAGE DROP	2.5 VDC Max.	2.5 VDC Max.	1.0 VDC Max.	1.0 VDC Max.	1.5 V Max.	1.5 V Max.	11 V Max.
CIRCUIT PROTECTION	Yes	Yes	No	No	Yes	Yes	No
REVERSE VOLTAGE	Yes				Yes		
OUTPUT STATE	Normally Open				Normally Open		
ENVIRONMENTAL	IP67				IP68		

WIRING SCHEMATICS

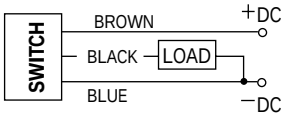
DC NPN (Sink)
MODEL 15561-001
18430-001-02
18431-001-02
51422-005-02



AC
MODEL 15561-003



DC PNP (Source)
MODEL 15561-002
18430-002-02
18431-002-02
51422-006-02



SERIES 62002 8 mm ROUND THREADED PROXIMITY SWITCH

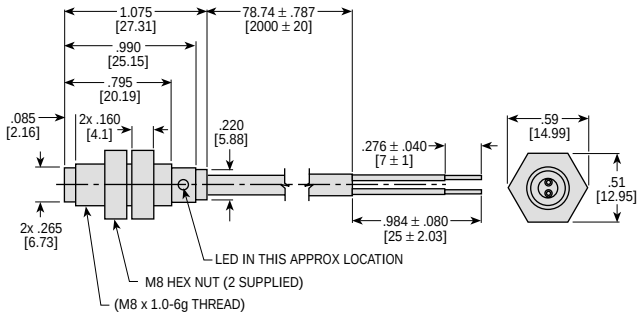
CE

PART NO.	DESCRIPTION
62002-1-02	8 mm Threaded Reed Switch with 2 meter cable

SPECIFICATIONS	62002-1-02
OPERATING PRINCIPLE	Magnetic Reed
ACTUATED BY	Target Magnet
INPUT VOLTAGE	4.5 to 24 VDC
OUTPUT VOLTAGE	Contact Closure
POWER CAPACITY	10 Watt Max.
CURRENT RATING	.2 Amp Max.
CONTACT RESISTANCE	.110 Ohm Max.
ENVIRONMENTAL	IP67
OPERATING TEMP.	0° to 80°C

* CE certification not applicable.

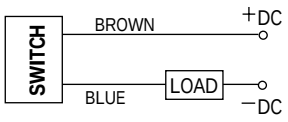
NUMBERS IN [ ] ARE IN mm–IMPERIAL EQUIVALENTS ARE PROVIDED FOR CONVENIENCE



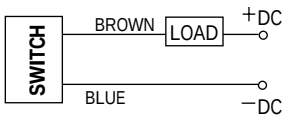
SERIES 62002 PROXIMITY WIRING SCHEMATICS

MODEL NO. 62002-1-02 - NPN (SINK) OR PNP (SOURCE)
INPUT - 4.5-24 VDC
POWER CAPACITY - 10 WATT MAX.
LOAD CURRENT - .2 AMP MAX.

CABLED MODEL 62002 - PNP (SOURCE)



CABLED MODEL 62002 - NPN (SINK)



NUMBERS IN [ ] ARE IN mm–IMPERIAL EQUIVALENTS ARE PROVIDED FOR CONVENIENCE

ORDERING DATA: HALL SENSOR WITH SET POINT MODULE

DUAL INPUT SET POINT MODULE

PART NO.	DESCRIPTION
9800-01-0300	NPN (Sink) 4.5-24 VDC
9800-01-0400	PNP (Source) 4.5-24 VDC

HALL SENSOR KIT

FOR SERIES 190, 191, & 8400 MINIATURE GRIPPERS

PART NO.		DESCRIPTION
IMPERIAL	METRIC	
18674-04	18057-04	Size 6 Models 19x60, 19x61, & 19x62 Parallel
18675-04	18058-04	Size 7 Models 19x70, 19x71, & 19x72 Parallel
18676-04	18059-04	Size 8 Models 19x80, 19x81, & 19x82 Parallel
18677-04	18060-04	Size 9 Models 19x90, 19x91, & 19x92 Parallel
—	18057-04	Size 0 Model 19x02 Angular
—	18058-04	Size 1 Model 19x12 Angular
—	18059-04	Size 2 Model 19x22 Angular
—	18060-04	Size 3 Model 19x32 Angular
10906-012	—	8400 Gripper Angular
10907-012	—	8410 Gripper Angular
10908-012	—	8420 Gripper Angular
18686-04	—	8430 Gripper Angular

INDIVIDUAL REPLACEMENT SENSORS

PART NO.	DESCRIPTION
10688-2-012	Sensor for all 8600, 7900, and 5300 Angular Grippers, and 8600 Parallel Grippers
10832-1-1-012	Sensor for all Rotary Actuators and Multi-Motion Actuators

NOTE: All sensors come with 12 ft [3 m] minimum of shielded cable.

HALL EFFECT SENSOR/TRANSDUCER

The Sensor/Transducer must be ordered as part of the Gripper or Actuator assembly. The Sensor/Transducer will be mounted to the unit with a transition plate. See individual unit Ordering Data for availability and ordering information. Individual replacement sensors are available as shown.

APPLICATIONS

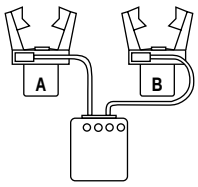
GRIPPERS

- Provides two adjustable sensing positions throughout jaw travel for two grippers (through a single set point module).
- Allows the assurance of part presence by ensuring the jaws have closed or opened to the proper size.
- Permits “go, no go” type gauging to occur as parts are gripped.

ROTARY ACTUATORS & MULTI-MOTION ACTUATORS

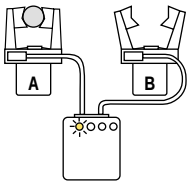
- Provides two adjustable sensing positions throughout the 180° rotation of two rotary actuators or multi-motion actuators.
- Can be used to signal ends of rotation of two units.

DUAL INPUT SET POINT LOGIC EXAMPLE



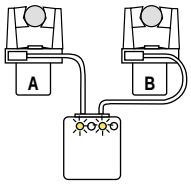
CASE 1

Both gripper jaws are wide open. No set points are made.



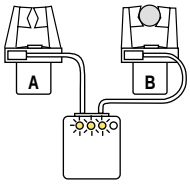
CASE 2

The jaws of gripper A are closed to grip a part and are wide open on gripper B. One set point is made for gripper A.



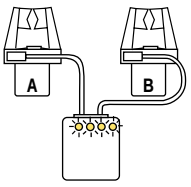
CASE 3

Both gripper jaws are closed to grip a part. Two set points are made, one for gripper A and one for gripper B.



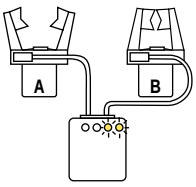
CASE 4

Gripper A jaws are closed all the way (no parts) and Gripper B jaws are closed to grip a part. Two set points for gripper A and one set point for gripper B are made.



CASE 5

Both gripper jaws are closed all the way (no parts). Two set points are made for both grippers A and B.



CASE 6

In the event one gripper is wide open (A) and the other is closed all the way (B), only the two set points for the closed gripper would be made.

CASE	SET POINT OUTPUT			
	A1	A2	B1	B2
1	0	0	0	0
2	1	0	0	0
3	1	0	1	0
4	1	1	1	0
5	1	1	1	1
6	0	0	1	1

BENEFITS: HALL SENSOR WITH SET POINT MODULE

BENEFITS

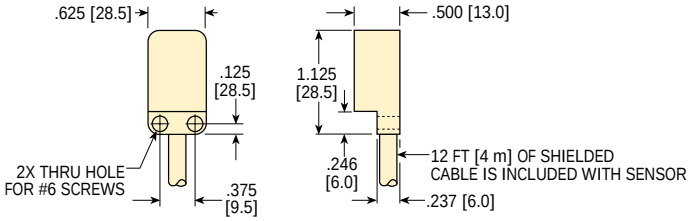
- Provides independent and fully adjustable multiple position sensing on Series 8400 Angular Grippers, Series 190 & 191 Parallel and 190 Angular Grippers, Series 5300 Oval Grippers, and all Rotary Actuators and Multi-Motion Actuators.
- Independent adjustment of two set point positions from two sensors allows one set point module to interface with two actuators. Or, can be used with a single unit providing 4 adjustable set points throughout jaw travel or rotation.
- Solid state electronics with Hall Effect sensing technology for an infinite number of trouble-free cycles.
- Wide signal range capability permits interfacing with most programmable controllers and other logic systems.
- LED indicators for visual confirmation of each output state.
- Set Point Module is available for either current sinking or current sourcing models with 4.5 to 24 VDC output capability.



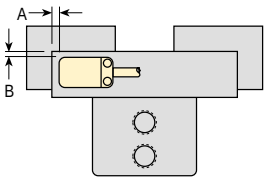
SPECIFICATIONS	9800-01-0300	9800-01-0400
OPERATING PRINCIPLE	Linear Hall Effect	
INPUT VOLTAGE	18 to 24 VDC	
OUTPUT TYPE	NPN (Sink) Open Collector	PNP (Source) Collector Output
OUTPUT VOLTAGE	4.5 to 24 VDC	
OUTPUT CURRENT RATING	200 mA. Max.	
OUTPUT VOLTAGE DROP	.4 VDC Max. at Rated Current	.5 VDC Max. at 50 mA.
SWITCH BURDEN	150 mA. Max.	
OPERATING TEMP.	0° to 60°C (32° to 140°F)	
HUMIDITY (NON CONDENSING)	5 to 95%	

DIMENSIONS: HALL SENSOR

10688-2-012 BASIC HALL SENSOR

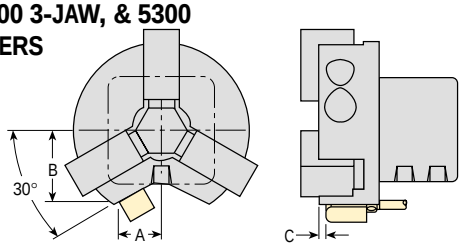


SERIES 7900 JAW STYLE 1 & 2, SERIES 8600, & SERIES 5300 ANGULAR GRIPPERS



GRIPPER MODEL NO.	LETTER DIM. A	LETTER DIM. B
792x, 862x, & 1532x	.031 [1.0]	0.00 [0.0]
793x, 863x, & 1533x	.187 [5.0]	.122 [3.0]
794x, 864x, & 1534x	.437 [11.0]	.250 [6.5]
795x, 865x, & 1535x	.562 [14.0]	.562 [14.0]

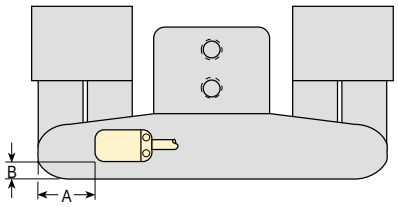
SERIES 7900, 8600 3-JAW, & 5300 ANGULAR GRIPPERS



GRIPPER MODEL NO.	LETTER DIMENSION A	LETTER DIMENSION B	LETTER DIMENSION C
792x, 862x, & 1532x	.854 [21.5]	1.257 [32.0]	0.00 [0.0]
793x, 863x, & 1533x	.917 [23.5]	1.540 [39.0]	.122 [3.0]
794x, 864x, & 1534x	1.112 [28.5]	1.945 [49.5]	.247 [6.0]
795x, 865x, & 1535x	1.586 [40.5]	2.500 [63.5]	.441 [11.0]

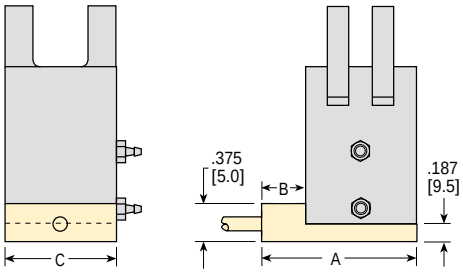
SERIES 8600 PARALLEL GRIPPERS

Imperial units only



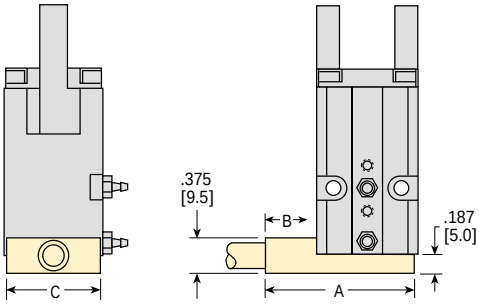
GRIPPER MODEL NO.	LETTER DIM. A	LETTER DIM. B
866x	.750	.165
867x	1.125	.338
868x	1.500	.457
869x	2.062	.813

SERIES 8400 & 190 ANGULAR GRIPPERS



GRIPPER MODEL NO. IMPERIAL	GRIPPER MODEL NO. METRIC	LETTER DIMENSION A	LETTER DIMENSION B	LETTER DIMENSION C
840x	19002	1.354 [36.5]	.654 [16.5]	.700 [20.0]
841x	19012	1.454 [39.5]	.554 [14.0]	.900 [25.0]
842x	19022	1.704 [46.0]	.304 [7.6]	1.400 [38.0]
843x	19032	2.237 [58.0]	.300 [7.6]	1.910 [50.0]

SERIES 190 & 191 PARALLEL GRIPPERS



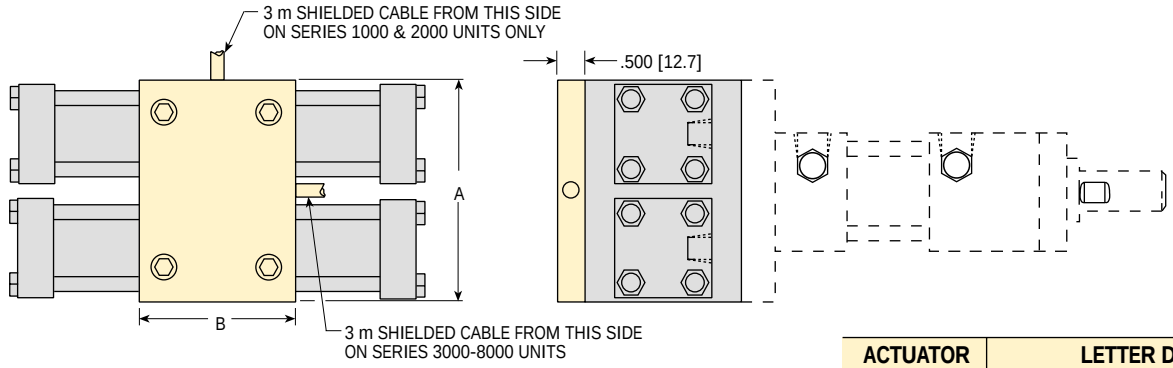
GRIPPER MODEL NO.	LETTER DIMENSION A	LETTER DIMENSION B	LETTER DIMENSION C
19x6x	1.437 [36.5]	.650 [16.5]	.787 [20.0]
19x7x	1.555 [39.5]	.550 [14.0]	.985 [25.0]
19x8x	1.810 [46.0]	.295 [7.5]	1.496 [38.0]
19x9x	2.283 [58.0]	.295 [7.5]	1.968 [50.0]

NUMBERS IN [ ] ARE IN mm–IMPERIAL EQUIVALENTS ARE PROVIDED FOR CONVENIENCE

All dimensions are reference only unless specifically toleranced.

DIMENSIONS: HALL SENSOR AND SET POINT MODULE

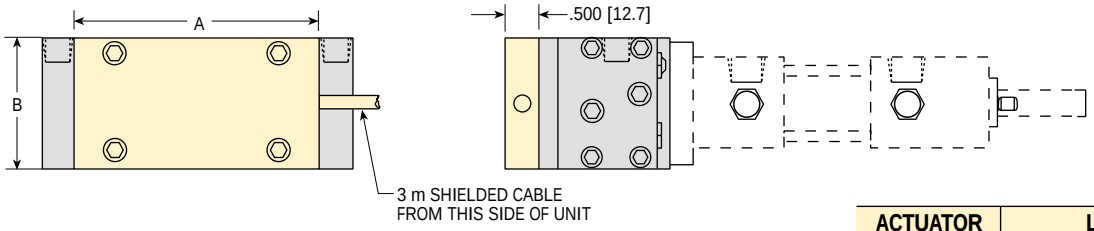
SERIES 1000-8000 ROTARY ACTUATORS & MULTI-MOTION ACTUATORS



LIMITATIONS: SENSOR MAY BE USED ON UNITS WITH MAXIMUM ROTATION UP TO AND INCLUDING 180°

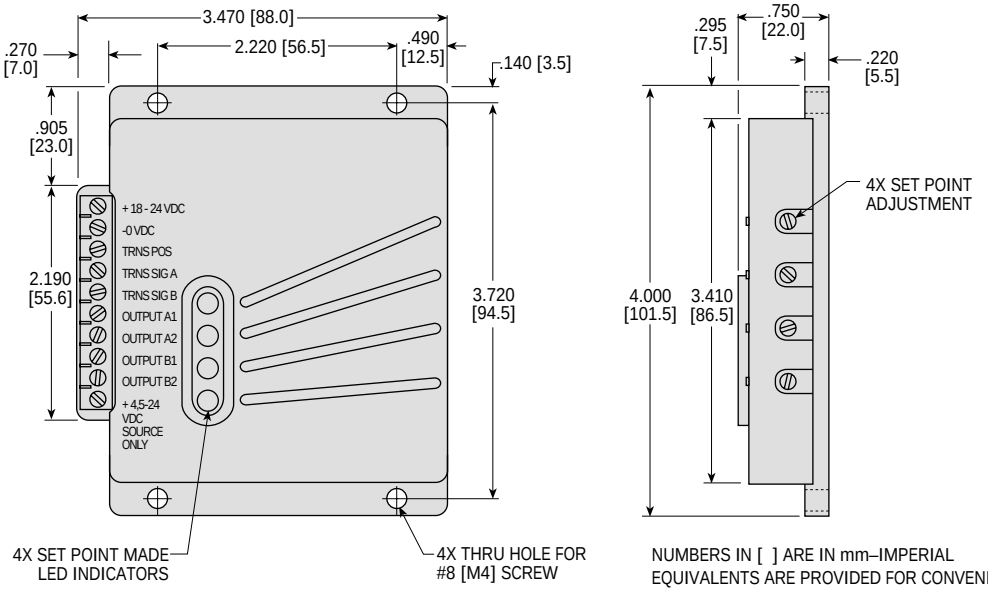
ACTUATOR SERIES	LETTER DIM. A	LETTER DIM. B
1000 & 2000	2.980 [75.7]	2.000 [50.8]
3000 & 4000	4.230 [107.4]	3.000 [76.2]
5000 & 6000	4.980 [126.5]	4.000 [101.6]
7000 & 8000	7.980 [202.7]	5.000 [127.0]

MINIATURE ROTARY ACTUATORS & MINIATURE MULTI-MOTION ACTUATORS



ACTUATOR MODEL NO.	LETTER DIM. A	LETTER DIM. B
018x75	3.750 [95.3]	2.000 [50.8]
018x50	2.500 [63.5]	1.500 [38.1]
MA & MT	3.750 [95.3]	2.000 [50.8]

SET POINT MODULE #9800-01-0x00



NUMBERS IN [ ] ARE IN mm–IMPERIAL EQUIVALENTS ARE PROVIDED FOR CONVENIENCE

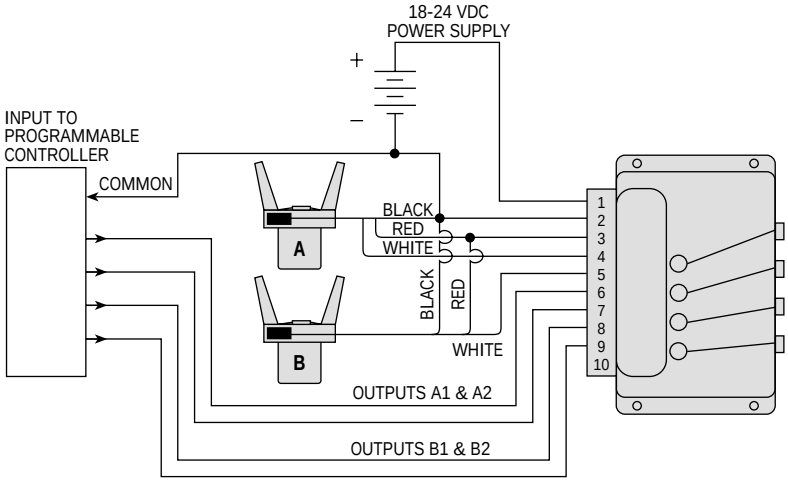
All dimensions are reference only unless specifically toleranced.

WIRING SCHEMATICS

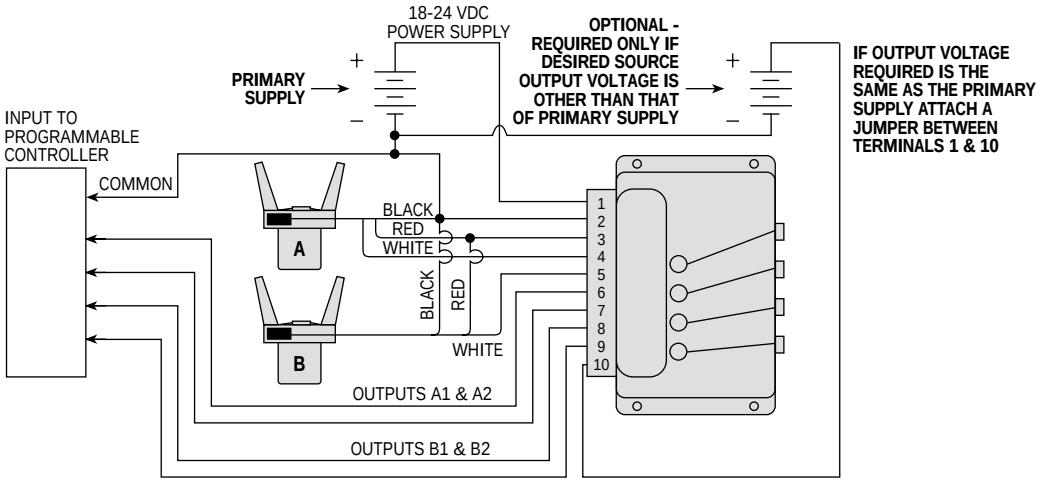
Diagrams are typical for many programmable controller interface applications. Modules may also be used to signal TTL. CMOS, relays or solenoids within rated electrical specifications.

NOTE: For single applications where four outputs are desired, install a jumper between terminals 4 & 5.

MODEL 9800-01-0300
NPN (SINK)



MODEL 9800-01-0400
PNP (SOURCE)



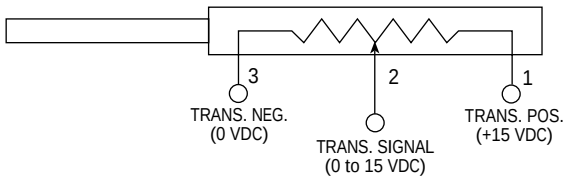
APPLICATION NOTES

In addition to the normal use with PHD Sensors, the PHD Set Point Module can be used with other voltage feedback-type devices. The most common of these is a potentiometer used as a voltage divider.

SPECIFICATIONS	SET POINT MODULE WITH POTENTIOMETER
REPEATABILITY	2 mV.
HYSTERESIS	15 mV. Typ.
MINIMUM DISTANCE BETWEEN TWO SET POINTS WITHOUT CROSSTALK (DISCRIMINATION)	30 mV. Typ. 20 mV. Min. 35 mV. Max.
SENSOR RESISTANCE	1 kOhm Min.

Example 1 (linear application):

Using a 6 in [152.0 mm] linear potentiometer as a voltage divider to supply a signal to a PHD Set Point Module.



$$\text{Linear Discrimination} = \frac{(6.0 \text{ in [152.0 mm] stroke}) \times (.035 \text{ mV.})}{15 \text{ Volt supply}}$$

= .014 in [0.36 mm] min. distance between two points without crosstalk

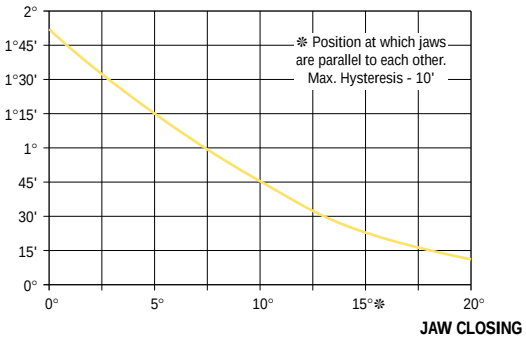
Example 2 (rotary application):

$$\text{Rotary Discrimination} = \frac{(\text{degrees rotation}) \times (.035 \text{ mV.})}{15 \text{ Volt supply}}$$

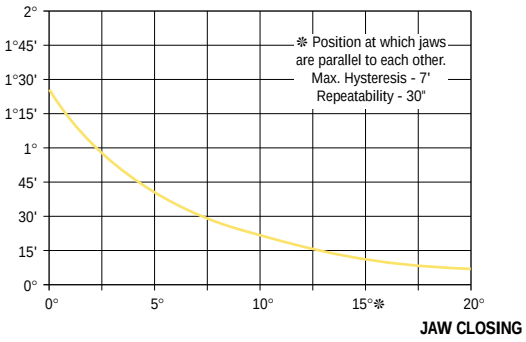
PERFORMANCE SPECIFICATIONS

Specifications for Series 8400 Angular and 190 & 191 Parallel and 190 Angular Grippers with Sensors vary according to the degree of jaw closing. The graphs below cover the performance for Sensors on Miniature Grippers. See the chart on page 7-39 for all other units.

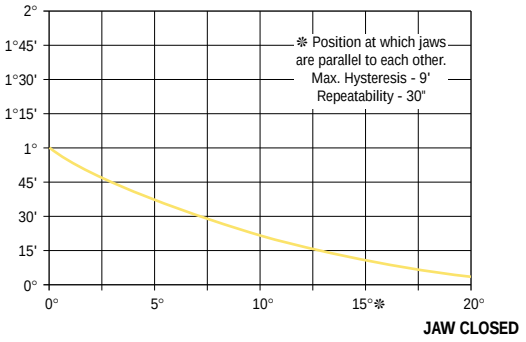
8400



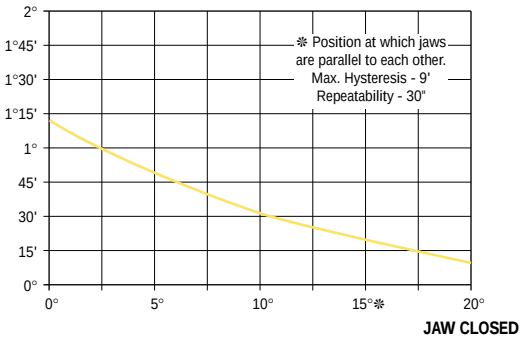
8410



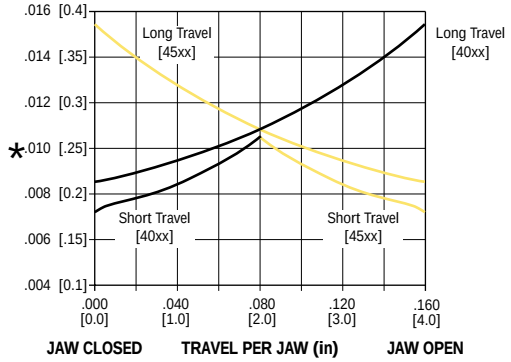
8420



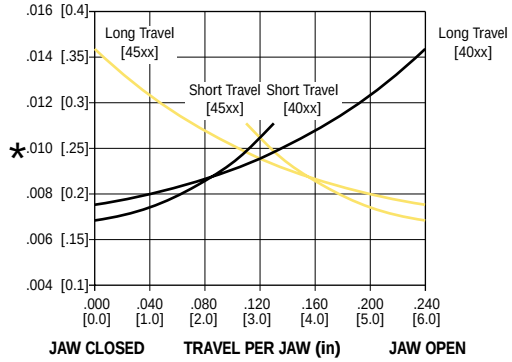
8430



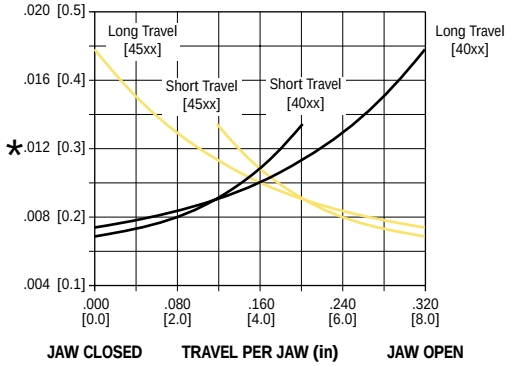
19x6x PARALLEL SET POINT PERFORMANCE



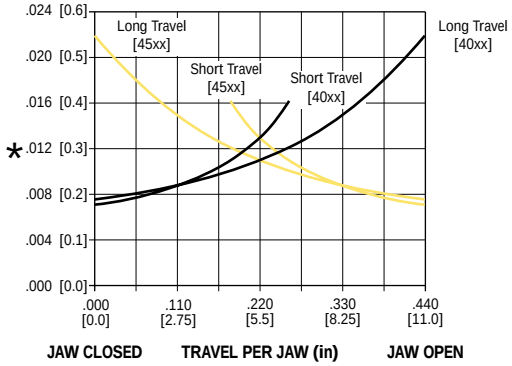
19x7x PARALLEL SET POINT PERFORMANCE



19x8x PARALLEL SET POINT PERFORMANCE



19x9x PARALLEL SET POINT PERFORMANCE

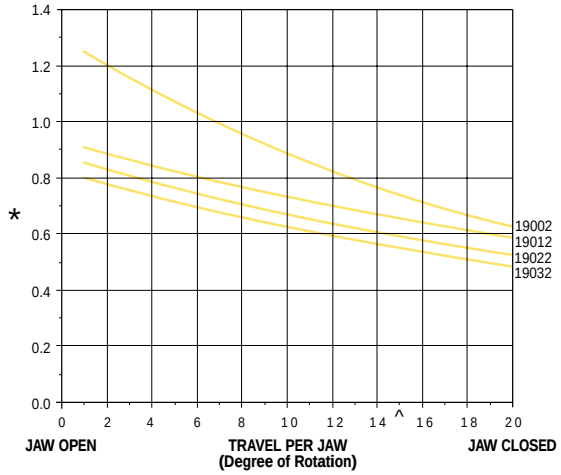


***Minimum distance between two set points without crosstalk in inches [mm] of jaw movement.**

NUMBERS IN [ ] ARE IN mm OR FOR METRIC UNITS.

ENGINEERING DATA: HALL SENSOR WITH SET POINT MODULE

190 ANGULAR SET POINT PERFORMANCE



^ Position at which jaws are parallel to each other - 15°

* Minimum distance between two set points without crosstalk in degrees of jaw movement

PERFORMANCE

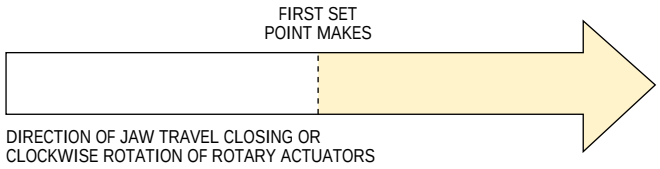
UNIT	REPEATABILITY	HYSTERESIS MAXIMUM	MINIMUM DISTANCE BETWEEN TWO POINTS WITHOUT CROSSTALK
ANGULAR GRIPPERS* SERIES 7900, 8600, & 5300	1' ARC	10' ARC	10' ARC
PARALLEL GRIPPERS**			
8660	.0005 [.013]	.0015 [.038]	.0040 [.102]
8670	.0006 [.015]	.0025 [.064]	.006 [.152]
8680	.0006 [.015]	.0030 [.076]	.008 [.204]
8690	.0010 [.025]	.0040 [.102]	.012 [.306]
ROTARY & MULTI-MOTION ACTUATORS	10' ARC	1.5° ARC	2° ARC

* Values shown are for rotation per jaw.
** Values shown are for movement per jaw in inches.

EXPLANATION OF TERMS

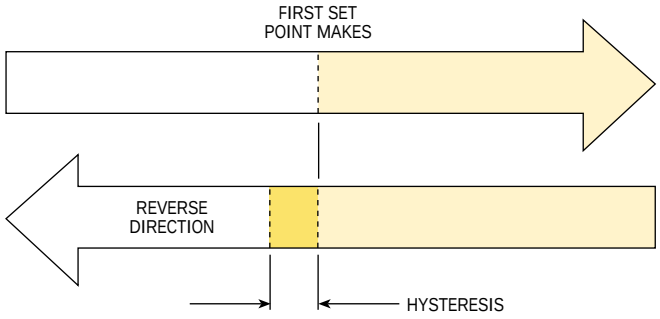
SET POINT:

Each set point is a graduated position. The first set point remains made as the second set point makes. Each set point will repeat to its adjusted position each time it is made within the tolerances shown above.



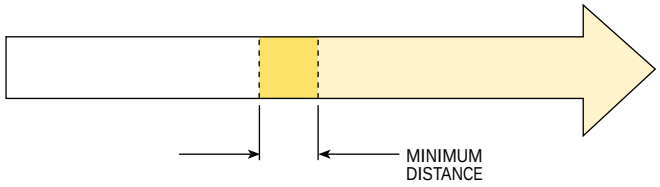
HYSTERESIS:

The differential in distance between where the set point makes and where it breaks with the units moving in the reverse direction.



MINIMUM DISTANCE BETWEEN SET POINTS:

Minimum sensing distance between two points without crosstalk.



NOISE SUPPRESSION

When using PHD Set Point Modules, it is important to consider the presence of electrical noise in the system. Some considerations should be taken to minimize the chances for electrical noise which can adversely affect the set point module. It is important to keep the control and sensing circuits separate from any air valves, motor cables, etc. The maximum length of any switch or sensor cable should not exceed 50 feet [15 m]. Cable should be shielded with the shield being grounded. On floating ground systems, the shield should be connected to the “O” voltage.

BENEFITS & DIMENSIONS: BRACKETS FOR NFPA CYLINDERS



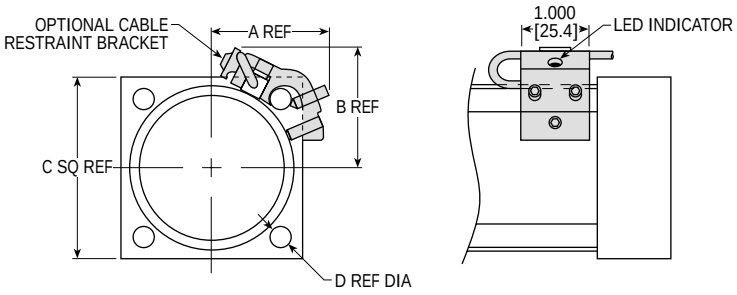
BENEFITS

- Allows PHD Series 1750 Reed and Hall Effect Switches to be mounted to 1-1/2" [38.1 mm] to 8" [203.2 mm] bore NFPA Cylinders.
- The brackets' flexible design means only two brackets are required to cover 8 sizes of NFPA Cylinders.
- The extruded aluminum bracket attaches securely to a single tierod and does not allow the switch to pull away from the cylinder barrel.
- The low profile of the switch and bracket saves space and provides additional mounting flexibility.
- Optional strain relief clamp may be used to protect the switch cable from damage at the switch due to flexing.

PHD SWITCH MODELS		NFPA CYLINDER BORE	SWITCH BRACKET NUMBER	STRAIN RELIEF BRACKET
PART NO.	DESCRIPTION			
17509-3-06	AC Reed	1-1/2, 2, 2-1/2, 3-1/4, & 4	17000-51-0	18412
17502-2-06	DC Reed			
17529-3	AC Reed, Quick Connect			
17522-2	DC Reed, Quick Connect			
17503-2-06	Hall Effect NPN (Sink)	5, 6, & 8	17000-57-0	18412
17504-2-06	Hall Effect PNP (Source)			
17523-2	Hall Effect NPN (Sink), Quick Connect			
17524-2	Hall Effect PNP (Source), Quick Connect			

See pages 7-16 to 7-19 for switch information. NFPA cylinder must have the proper magnetic piston for the PHD Switches to function correctly.

17000-xx-0 NFPA SWITCH BRACKET
18412 CABLE RESTRAINT KIT



BORE SIZE	LETTER DIMENSION			
	A	B	C	D
1-1/2	1.375	1.500	2.000	.250
2	1.500	1.750	2.500	.312
2-1/2	1.750	1.875	3.000	.312
3-1/4	2.000	2.187	3.750	.375
4	2.375	2.500	4.500	.375
5	3.000	3.125	5.500	.500
6	3.375	3.375	6.500	.500
8	4.000	4.125	8.500	.625

PHD SWITCH MODELS

DESCRIPTION	PART NO.
DC Reed NPN/PNP (White)	17502-2-06
AC Reed (Green)	17509-3-06
Solid State NPN (Yellow)	17503-2-06
Solid State PNP (Red)	17504-2-06

All dimensions are reference only unless specifically toleranced.