Vacuum Cups	www.parker.com/pneu/vaccup	A	Vacuum Cups
Vacuum Generators	www.parker.com/pneu/vacgen	B	Generators
Pressure Sensors	www.parker.com/pneu/sensors	С	Sensors
Safety Guide, Offer of Sale		D	Vacuum Accessories



## **Pressure Sensors**

Section C

## www.parker.com/pneu/sensors





## A Cautions

Pressure sensors are designed to monitor pressure and are not a safety measure to prevent accidents.

The compatibility of the sensor is the responsibility of the designer of the system and specifications.

## **Operating environment**

- Parker sensors have not been investigated for explosionproof construction in hazardous environments.
- Do not use with flammable gases, liquids, or in hazardous environments.
- Avoid installing the sensor in locations where excessive voltage surges could damage or affect the performance of the sensor.

## Operations

- Dedicate a power supply of 10.8 to 26.4VDC to the sensor and set the ripple to Vp-p10% or less. Avoid excessive voltage. Avoid voltage surges.
- A small amount of internal voltage drop is possible. Ensure the power supply minus any internal voltage drop exceeds the operating load.
- Verify the operating media is compatible with the specified sensor. Check the chemical make-up, operating temperatures, and maximum pressure ranges of the system before installing.
- Installation of air dryer system is recommended to remove moisture.

## Installation

- Never insert an object into the pressure port other than an appropriate fluid connector.
- Avoid short-circuiting the sensor. Connect the brown lead to V+ and blue lead to 0V.
- Do not connect the output lead wires (black / white) to the power supply.
- Outputs not being used should be trimmed and insulated.
- Install as shown using the metal mounting bracket.





Catalog 0802-E Index

## Pneumatic Control Components **Pressure Sensors**

	Pressure range	Output type	Media	Maximum IP rating	Hysteresis output mode adjustment	Display	Page number
Technical data							C4
MPS-33							
000	0 to -30 inHg -14.7 to 72.5 PSI 0 to 145 PSI	(2) NPN / PNP with 1-5VDC Analog	Air, Non-corrosive gas	65	Variable, 100% F.S.	LED display (Red)	C5 - C9
MPS-34							
and	0 to -30 inHg 0 to 145 PSI	(1) PNP / NPN with 4 to 20ma Analog	Air, Non-corrosive gas	40	Variable, 100% F.S.	LED display (Red / Green)	C10 - C15
SCP01	-14.7 PSI to 150 PSI -14.7 PSI to 250 PS 0 to 1000 PSI 0 to 3000 PSI 0 to 5000 PSI 0 to 9000 PSI	4 to 20ma Analog	Non- corrosive to 316L SUS	67	_	_	C16 - C17
SCPSD	-14.7 PSI to 250 PSI 0 to 1000 PSI 0 to 2000 PSI 0 to 3000 PSI 0 to 5000 PSI 0 to 9000 PSI	(1 or 2) PNP Analog option	Non- corrosive to 316L SUS	67	Variable, 100% F.S.	LED display (Red)	C18 - C22
Accessories	Cables						C23
Glossary							C24 - C26

## **Programming options**

	MPS	MPS		
Options	33	34	SPC01	SCPSD
Outputs change N.O. / N.C.	<ul> <li>✓</li> </ul>	<b>v</b>	_	
Units of measure change	<b>v</b>	<b>v</b>	_	V
Hysteresis mode	<b>v</b>	<b>v</b>	_	V
Window comparator mode	<b>v</b>	<b>v</b>	_	<b>v</b>
Auto teach mode	<b>v</b>	<b>v</b>	_	_
Output response time	<b>v</b>	<b>v</b>	_	<b>v</b>
Lockout option	<b>v</b>	<b>v</b>	_	-
Password lockout	_	_	_	V
Max. value display	<b>v</b>	<b>v</b>	_	_
Min. value display	<b>v</b>	<b>v</b>	_	_
Zero reset	<b>v</b>	<b>v</b>	_	V
Red / Green LED display options	_	<b>v</b>	_	_
Error output mode	<b>v</b>	<b>v</b>	_	<b>v</b>
Setting of decimal point	_	_	_	<b>v</b>



C

Technical

**MPS-33** 

MPS-34

SCP01

SCPSD

Accessories, Symbols, Glossary

### Selecting the proper pressure sensor

Selecting a Parker Pressure Sensor for an application is more than just selecting the correct operating range of the sensor. Electromechanical pressure sensors convert the applied pressure to an electrical signal. When pressure is applied, the diaphragm is deflected causing the diffused resistors to change resistance (piezoelectric effect), which yields an electrical signal proportional to the pressure change. Applications for pressure switches are numerous and important in today's high-tech manufacturing environment. Parker Pressure Sensors are solid state sensors and not mechanical switches. The outputs are either analog (1 –5vc, 4-20ma or 0-20ma) or PNP/NPN

## Pneumatic Control Components Technical Data

Open Collector Transistor Type Outputs. The application will determine if the Open Collector Output is used in a Hysteresis or Window Comparator Function. The output mode of the sensor, as well as whether the sensor is normally open (nonpassing) or normally closed (passing), can be programmed by you to fit your application. In addition to electrical outputs, most of these sensors have additional programming options that can be integrated into the system logic for additional benefits. These programming options are listed at the bottom of the page and are detailed on the next pages. Choose the best Pressure Sensor for the application based on Pressure Range, Output Type and additional programming options.

## **Programming options:**

#### Outputs change N.O. / N.C.

The status of the Output at 0 PSIG is either Normally Open (Non-Passing) or Normally Closed (Passing) and can be set through programming.

#### Units of measure

Technical

MPS-33

MPS-34

SCP01

SCPSD

Accessories, Symbols, Glossary The units of measure on the display can be changed to suit the application. Some choices are PSI, inHg, Bar, Kpa, Mpa or mmHg and are dependent on the pressure range of the sensor.

#### Hysteresis mode

This output mode provides one switch point and a reversing point When the switch point pressure is achieved, the output (NPN / PNP) changes state and will not change back until the reversing point pressure is achieved.

#### Window comparator mode

This output mode provides two switch points These two points create a window that the sensor output holds it state (NO or NC). This mode is also referred to as High/Low Setting. Anytime the pressure is higher or lower than the "window" the output changes state.

#### Auto setting mode

Programming feature that automatically sets switch point and reversing points for the outputs of the sensor based upon the minimum and maximum pressure readings of the sensor over time.

#### Output response time

Output response time is the time it takes for the output signal to change state after the pressure switch point is achieved. Sensor response time is typically less than 2.0 milliseconds and can be made slower by programming the response time in multiples of the standard sensor response time.

#### Lockout option

All sensor programming is locked out. Programming or LED Display cannot be changed when the sensor is locked out.

#### **Password lockout**

Lockouts the sensor from any programming changes. To unlock the sensor a user programmed 4 digit code must be entered into the sensor.

#### Max. valve display

Sensor will only display the maximum applied pressure reading until reset to measuring mode. A helpful tool in system set up.

#### Min valve display

Sensor will only display the minimum applied pressure reading until reset to measuring mode. A helpful tool in system set up.

#### Zero reset

Just like a pressure gauge, a pressure sensor measures the system pressure in relation to the atmospheric pressure. Pressure Sensors can be calibrated to the current atmospheric pressure by using the Zero Reset Function.

#### Red / Green LED display options

Display LED's change from Red to Green, or Green to Red when the output changes state. This can be a great visual indicator on a plant floor.

#### Error output

Error Message is displayed if the pressures, inputs, or outputs exceed the parameters of the sensor

#### Setting of decimal point

Depending on the units of measure, the decimal point can be adjusted up to three decimal points. (SCPSD only



## Pressure Sensors MPS-33 1-Color Panel Mount

## Features

- Sensor output: 2 NPN or PNP open collector Transistor output, 30VDC, 125mA with Analog output, 1 to 5VDC
- Output response time less than 2.0 milliseconds
- RoHS
- Air and non-corrosive gase

## **Programming options**

<ul> <li>✓</li> </ul>
<b>v</b>
V
_
<b>v</b>
<b>v</b>
<b>v</b>
_
<b>v</b>



## MPS-33 Sensor only ordering numbers

			Part number	Part number
Pressure range	Electrical output	Electrical connection	1/8 NPSF Female	1/8 BSPP Female
0-30 inHg	(2) PNP with (1) 1-5VDC	2M 5 Wire Lead Wire	MPS-V33N-PGAT	MPS-V33G-PGAT
0-30 inHg	(2) NPN with (1) 1-5VDC	2M 5 Wire Lead Wire	MPS-V33N-NGAT	MPS-V33G-NGAT
-14.5 to 72 PSI	(2) PNP with (1) 1-5VDC	2M 5 Wire Lead Wire	MPS-R33N-PGAT	MPS-R33G-PGAT
-14.5 to 72 PSI	(2) NPN with (1) 1-5VDC	2M 5 Wire Lead Wire	MPS-R33N-NGAT	MPS-R33G-NGAT
0-145 PSI	(2) PNP with (1) 1-5VDC	2M 5 Wire Lead Wire	MPS-P33N-PGAT	MPS-P33G-PGAT
0-145 PSI	(2) NPN with (1) 1-5VDC	2M 5 Wire Lead Wire	MPS-P33N-NGAT	MPS-P33G-NGAT

### **MPS-33 Accessories**

Description	Part Number	sc
Panel mounting bracket Note : Add "H" in suffex of Sensor Only Part Number to include with sensor	MPS-ACCH8	lis,
Surface mounting bracket Note : Add "K" in suffex of Sensor Only Part Number to include with sensor	MPS-ACCK8	Symbo
	221/2	

circuit

main

vitch

NPN Output (Analog: 1-5V)

+V (Brown

Out 1 (Black)

Out 2 (White)

(DC: 1-5V) 0V (Blue)

Analog (Orange)

+ DC 12~24V

Example: MPS-P33N-PGATK, includes sensor MPS-P33N-PGA with bracket MPS-ACCK8

## Internal circuit for open collector and analog output wiring



## Lead Wiring



 Brown
 24VDC

 White
 NPN / PNP Open Collector Output 2

 Blue
 0VDC

 Black
 NPN / PNP Open Collector Output 1

 Orange
 Analog (1-5V)

Most popular.



SCP01

SD

Glossary

#### **Specifications**

Technical

**MPS-33** 

MPS-34

SCP01

SCPSD

Accessories, Symbols, Glossary

	Vacuum (V)	Compound (R)	Positive (P)
Pressure range	-101.3 - 0 kPa (-14.5 to 0 PSI)	0 - 500 kPa (0 to 72 PSI)	-0.1 - 1 Mpa (0 to 145 PSI)
Proof pressure	0.3 Mpa (44 PSI)	0.8 Mpa (116 PSI)	1.5 Mpa (218 PSI)
	0.1, kPa	1, kPa	0.001, Mpa
	0.001, kgf/cm <sup>2</sup>	0.01, kgf/cm <sup>2</sup>	0.01, kgf/cm <sup>2</sup>
Dianlay resolution	0.001, bar	0.01, bar	0.01, bar
Units of measure	0.01, PSI	0.1, PSI	0.1, PSI
	0.1, inHg	_	_
	1, mmHg	_	_
	0.1, mmH <sub>2</sub> O		
Media	Air & non-corrosive gases, incomb	ustible gases	
Pressure port	(N) 1/8" NPSF, (G) 1/8" BSPP fema	ale	
Operating temperature	32 to 122°F (0 to 50°C)		
Storage temperature	-4 to 140°F (-20 to 60°C)		
Humidity	40 - 85% RH (no condensation)		
Electrical connection	(G) Grommet open lead, 5 wire (0.	15mm²)	
Power supply	12 to 24VDC $\pm 10\%$ or less, Ripple	(Vp-p) 10% or less	
Display	3 + 1/2 digit, 1 color, 7-segment R	ED LED	
Display refresh	.1 to 3.0 Seconds, Variable (factor	y set at 0.1)	
Control output	NPN (Sinking), PNP (Sourcing), Op	en collector, max 80mA, 2 output	
Analog output	1 to 5VDC $\leq \pm 2.5\%$ F.S. Linearity $\leq$	≤1% of F.S.;	
Switch output	Output signal, NPN or PNP, Norma	ally open or closed, LED indicator	
Output indicator	Green LED (OUT1), Red LED (OUT	2)	
Output modes	Hysteresis or Window Comparator		
Response time		24ms, 192ms, 786m selections)	
Repeatability	$\pm$ 0.2% of F.S. $\pm$ 1 digit or less		
Thermal error	$\leq$ ± 2% of F.S. or less at range of 3	32 to 122°F (0 to 50°C)	
General protection	IP65, CE marked, EMC-EN61000-	6-2: 2001, with dust tube connectio	n
Current consumption	<55mA		
Vibration resistance	10 to 150Hz, Double amplitude 1.8	5mm, XYZ, 2 hrs.	
Shock resistance	980 m/s² (about 10G), 3 times/eac	h directions X, Y, Z	
Noise resistance	Vp-p400V, 10 ms, 0.5µs noise sim	ulator	
Material	Housing: ABS (gray), Pressure por	t: Zinc die-cast, Diaphragm: Silicone	2
Mass	3.3 oz. (105g) (including cable)		





FPC-1

PA-2

## **MPS-ACCH8**

**Panel mounting** bracket



PA-1





SCP01 SCPSD Accessories, Symbols, Glossary

C

Technical

**MPS-33** 

MPS-34







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## Initial setting mode



## Zero point setting / the max. & min. display mode

#### Zero setting:

SCP01

SCPSD

Accessories, Symbols, Glossary • press the V▲ button at the same time until the "00" is shown. Release the button to end zero setting.

#### The max. value display mode:

- Press ▲ button 2 seconds to enter the max. value mode, pressure sensor will detect the max. value and keep max. value displayed.
- Press ▲ button 2 seconds to return to measure mode display.

#### The min. value display mode:

- Press ▼ button 2 seconds to enter the min. value mode, pressure sensor will detect the min. value and keep min. value displayed.
- Press ▼ button 2 seconds to return to measure mode display.

## Dustproof protector

Note: Required for IP65 rating protection and is included with sensor.



## Key lock / unlock mode

## Key lock / unlock mode

LoE

Lock Mode

Press **SET** button for less than 5 seconds.



SET

Use the ▲ or ▼ button to select Lock / Unlock Mode.

## SET 1x Measure mode

• Key lock mode can prevent operation mistakes.



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SET

## **Output type**



pressure is quite near, pressure sensor output might cause chattering.

## Manual setting mode

The LED shows: ( $P_*$  at normal open mode and ( $n_*$ ) at normal close mode. Pressure setting value is shown normally and will not lead to pressure sensor pause or stop working.





#### Calculation of setting value

A = The max. pressure value under auto setting mode.  $P2(n2) = B - \frac{A-B}{4}$ B = The min. pressure value under auto setting mode.

#### Display Error name Description Solutions OUT1 Er1 Turn off power and check the cause of overload Excess load Excess load current of 80 mA current or lower the current load under 80 mA, current error OUT2 Er2 then restart Change input pressure to ambient pressure and Residual pressure error Er3 During zero reset, ambient pressure is over ±3% F.S. perform zero reset again The applied pressure is excess the upper limit of \_ \_ \_ pressure setting Applied pressure error Adjust the pressure within applied pressure range The applied pressure is excess the lower limit of \_ \_ \_ \_ pressure setting Er4 Internal data error

Internal system error

Internal data error

Turn power off and then restart. If error condition remains, please return to factory for inspection



Er6

Er7

System error

Error messages

## Pressure Sensors MPS-34 2-Color Panel Mount

## Features

- Sensor output: 1 NPN or PNP Open collector Transistor output, 30VDC, 125mA with Analog output, 4 to 20mA
- Output response time less than 2.0 milliseconds
- RoHS
- Air and non-corrosive gases
- Sensor face includes icons to show sensor programming status

## **Programming options**

V	
V	
V	
V	
V	
V	
_	
V	
V	
V	
V	
V	
	V       V



## Sensor pin out with analog output Pin #

- 1 Brown: 24VDC
- 2 White: 4 to 20mA
- 3 Blue: 0VDC
- 4 Black: PNP Open Collector Output 1

## MPS-34 Sensor only ordering numbers

			Part number	Part number
Pressure range	Electrical output	Electrical connection	1/8 NPSF male	1/8 BSPP male
0-30 inHg	(1) PNP with (1) 4-20ma	M8, 4 Pin	MPS-V34N-PCI	MPS-V34G-PCI
0-145 PSI	(1) PNP with (1) 4-20ma	M8, 4 Pin	MPS-P34N-PCI	MPS-P34G-PCI

## **MPS-34 Accessories**

Description	Part number
Panel mounting bracket Note : Add "H" in suffex of Sensor Only Part Number to include with sensor	MPS-ACCH9
Surface mounting bracket Note : Add "K" in suffex of Sensor Only Part Number to include with sensor	MPS-ACCK10
Example: MPS-P34N-PCIK, includes sensor MPS-P34N-PCI witth bracket MPS-ACCK10	
M8, 4-Pin, 2 meter cable	CB-M8-4P-2M-PUR

M8, 4-Pin, 5 meter cable

## Internal circuit for open collector and analog output wiring

PNP Output (Analog (4-20mA)



Most popular.



CB-M8-4P-5M-PUR



Technical

MPS-33

MPS-34

SCP01

SCPSD

#### **Specifications**

	Vacuum (V)	Positive (P)
Pressure range	-101.3 to 0 kPa (-14.5 to 0 PSI)	-0.1 to 1 Mpa (0 to 145 PSI)
Proof pressure	0.3 Mpa (44PSI)	1.5 Mpa (218 PSI)
	0.1, kPa	1, kPa
	0.001, kgf/cm <sup>2</sup>	0.01, kgf/cm <sup>2</sup>
Display resolution ,	0.001, bar	0.01, bar
Units of measure	0.01, PSI	0.1, PSI
	0.01, inHg	-
	1, mmHg	-
Media	Air & non-corrosive gases	
Pressure port	(N) 1/8" NPT male, (G) 1/8 BSPP male b	ooth with M5 female port
Operating temperature	32 to 122°F (0 to 50°C)	
Storage temperature	-4 to 140°F (-20 to 60°C)	
Humidity	35 to 85% RH (no condensation)	
Electrical connection	(C) 4-pin, M8 connector on 150mm lead	wire
Power supply	12 to 24VDC ±10%, Ripple (P-P) 10% or	r less
Display	3 + 1/2 digit, 2 color, 7-segment RED / G	GREEN LED
Display refresh	Timing update : 0.1 ~ 3 sec. (Factory Set	t Unit: 0.1 sec.)
Switch output	Output signal, PNP, Normally open or clo	sed. LED indicator. 125 mA max. output load
Output modes	Hysteresis or Window Comparator	
Response time	≤ 2.5ms (chattering-proof function: 24ms	s, 250ms, 500ms, 1000ms and 1500ms selections)
Repeatability	± 0.2% of F.S. ± 1 digit	, , , ,
Output current	Output current 4 to 20mA; Linearity ±1.0 supply of 12V; 600Ω at power supply of	% of F.S.; Maximum load impedance $300\Omega$ at power 12V; Minimum load impedance $50\Omega$
Thermal error	32 to 122°F (0 to 50°C) 25°C (77°C) + 29	% of F.S. or less at range of 32 to 122°F (0 to 50°C)
General protection	IP40, CE marked, EMC-EN61000-6-2: 2	001
Current consumption	45mA (with no load)	
Vibration resistance	10 to 150Hz, Double amplitude 1.5mm, 2	XYZ, 2 hrs.
Shock resistance	980 m/s² (about 10G), 3 times/each direa	ctions X, Y, Z
Noise Resistance	Vp-p400V, 10 ms, 0.5µs noise simulator	
Material	Housing: ABS (gray) , Pressure port: Zinc	c die-cast, Diaphragm: Silicone
Mass	1.45 oz. (45g) with M8 connector	-

## Dimensions





Technical

**MPS-33** 



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## **MPS-ACCH9**

**Panel mounting** 

bracket





.17 (4.2)

.51 (13)

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1.24 (6.1)

.79 (20)

(4.2)

## Initial setting mode



# Technical **MPS-33** 34 -S-UM SCP01 SCPSD Accessories Symbols, Glossary

## Zero point setting / the max. & min. display mode

#### Zero settina:

 press the▼▲ button at the same time until the "00" is shown. Release the button to end zero setting.

#### The max. value display mode:

- Press ▲ button 2 seconds to enter the max. value mode, pressure sensor will detect the max. value and keep max. value displayed.
- Press ▲ button 2 seconds to return to measure mode display.

#### The min. value display mode:

- Press ▼ button 2 seconds to enter the min. value mode, pressure sensor will detect the min. value and keep min. value displayed.
- Press ▼ button 2 seconds to return to measure mode display.



800

SET ۲

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SET V

## Key lock / unlock mode

Unlock Mode



#### Key lock / unlock mode Press **SET** button for less than 5 seconds.

Auto

Use the ▲ or ▼ button to Lo[ lini 🗸 select Lock / Unlock Mode. Lock Mode

#### SET 1x Measure mode

• Key lock mode can prevent operation mistakes.



## Pressure setting mode



In case hysteresis is set at less than or equal to 2 digits, switch output may chatter if input pressure fluctuates near the set point.

#### Manual setting mode

Technical

MPS-33

The LED shows: ( $P_{-}^*$  at normal open mode and ( $n_{-}^*$ ) at normal close mode. Pressure setting value is shown normally and will not lead to pressure sensor pause or stop working.



## Auto setting mode

- 1. The LED shows:
- (AP1) at normal open mode and (An1) at normal close mode.
- In case of without need of auto pressure value setting, press ▼+▲ at the same time to enter measure mode.





**A** = **The max.** pressure value under auto setting mode. **B** = **The min.** pressure value under auto setting mode.

$(m) = A^2 - \frac{4}{4}$	ļ
$H = B \frac{A - B}{4}$	1



0

Applied Pressure

## Fine adjustment mode



#### **Error messages**

Error name	or name Display Description		Solutions Turn off power and check the cause of overload current or lower the current load under 125 mA, then restart		
Excess load oCP		Output load current of 125 mA			
Residual pressure error	<i>oUr</i> During zero reset, ambient pressure is over ±3% F.S.		Change input pressure to ambient pressure and perform zero reset again		
Applied pressure error	ННН	The applied pressure is excess the upper limit of pressure setting			
	LLL	The applied pressure is excess the lower limit of pressure setting	- Adjust the pressure within applied pressure range		
	Er4	Internal data error			
System Error	Er6	Internal system error	Turn power off and then restart. If error condition remains, please return to factory for inspection		
	Er7	Internal data error			
	Er8	Internal system error			

Accessories rmbols Glossar



SCP01 Pressure Sensors are industrial pressure sensors offering long-term stability, resistance to interference and rugged construction. They are available in a wide range of standard and configured to order versions to meet your application needs.

These sensors are manufactured with the highest quality standards for reliable and repeatable measurements.

#### **Features:**

- Stainless steel body
- Compact construction
- Shock and vibration proof
- Resistant to pressure spikes
- Accuracy +/- 0.5% FS

#### **Applications include:**

- Test and measurement
- Hydraulic power units
- Power generation
- Mobile hydraulics



## SCP01 Ordering numbers

Pressure	Electrical	Electrical	Part number	Part number
range (psi)	output	connection	1/4 NPT male	7/16-20UNF-2A, male SAE-4 with o-ring
-14.5 to 250	4 - 20 mA, 3 wire	M12 X 1, 4 pin	SCP01-0250P-25-07	SCP01-0250P-27-07
0 to 1000	4 - 20 mA, 3 wire	M12 X 1, 4 pin	SCP01-1000P-25-07	SCP01-1000P-27-07
0 to 3000	4 - 20 mA, 3 wire	M12 X 1, 4 pin	SCP01-3000P-25-07	SCP01-3000P-27-07
0 to 5000	4 - 20 mA, 3 wire	M12 X 1, 4 pin	SCP01-5000P-25-07	SCP01-5000P-27-07
0 to 9000	4 - 20 mA, 3 wire	M12 X 1, 4 pin	SCP01-9000P-25-07	N/A

Technical

**MPS-33** 

MPS-34

SCP01

## Sensor pin out with analog output

- Pin #
  - 1 Supply
  - 2 Signal output
  - 3 Ground
  - 4 —



Most popular.



## **Specifications**

Overload pressure	200% FS
Burst pressure	250% FS
Accuracy	+/- 0.5% FS
Protection class	IP67
Response time	< 1ms
Long term stability	< 0.1% FS/a
Load reversals	> 20 M
Electrical protection	Short circuit, reverse polarity, overload production
Supply voltage	9-30VDC
Temperature range:	
Environmental	-40° F to 185° F
Media, storage	-40° F to 257° F
Compensated	-4° F to 185° F
Temperature coefficient	< +/- 0.3% FS/10K
Vibration resistance	Meets IEC 60068-2-29
Shock resistance	Meets IEC 60068 2-32
EMI compatibility	DIN EN 61000-6-3, DIN EN 61000-6-2
Material - housing	304 SS
Material - fitting	630 SS
Material - seal	Fluorocarbon
Sensing element	Thin film (poly Si on SiO2)
Pressure bore	0.024 in.
Long term stability	< 0.1% FS/a
Load reversals	> 20 M

## Dimensions



Technical



## Pressure Sensors SCPSD High Pressure 316 Stainless Steel

## Features

- Stainless steel or ceramic diaphragms
- UL listed and CE marked
- Sensor outputs
   2 PNP Open collector transistor
   Output, 30 VDC, 100mA
- Optional additional current, 4 to 20mA
- Output response time less than 5.0ms
- Polarity protected
- Short circuit protected
- 4 digit LED

Technical

MPS-33

MPS-34

SCP01

SCPSD

Accessories, Symbols, Glossary • Display head swivels 290°







## SCPSD-1000P-1727

#### **Programming options**

~	
<b>~</b>	
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V	
_	
<b>v</b>	
_	
✓	
_	
_	
~	
_	
~	
<b>v</b>	
	V V V  V  V  V  V V  V V V



SCPSD-600-14-15

## **SCPSD Ordering numbers**

Pressure range	Port size	Electrical output	Electrical connection	Part number
-14.7 to 250 PSI	7/16-20 UNF-2b (SAE-4)	(2) PNP	M12, 4 Pin	SCPSD-0250P-0727
-14.7 to 250 PSI	7/16-20 UNF-2b (SAE-4)	(1) PNP with 4-20MA	M12, 4 Pin	SCPSD-0250P-1727
0 to 1000 PSI	7/16-20 UNF-2b (SAE-4)	(2) PNP with 4-20MA	M12, 5 Pin	SCPSD-1000P-1725
0 to 1000 PSI	7/16-20 UNF-2b (SAE-4)	(1) PNP with 4-20MA	M12, 4 Pin	SCPSD-1000P-1727
0 to 3000 PSI	7/16-20 UNF-2b (SAE-4)	(2) PNP	M12, 4 Pin	SCPSD-3000P-0727
0 to 3000 PSI	7/16-20 UNF-2b (SAE-4)	(1) PNP with 4-20MA	M12, 4 Pin	SCPSD-3000P-1727
0 to 3000 PSI	7/16-20 UNF-2b (SAE-4)	(2) PNP with 4-20MA	M12, 5 Pin	SCPSD-3000P-1725
0 to 5000 PSI	7/16-20 UNF-2b (SAE-4)	(1) PNP with 4-20MA	M12, 4 Pin	SCPSD-5000P-1727
0 to 5000 PSI	7/16-20 UNF-2b (SAE-4)	(2) PNP with 4-20MA	M12, 5 Pin	SCPSD-5000P-1725
0 to 9000 PSI	7/16-20 UNF-2b (SAE-4)	(2) PNP	M12, 4 Pin	SCPSD-9000P-0727
0 to 9000 PSI	7/16-20 UNF-2b (SAE-4)	(2) PNP with 4-20MA	M12, 4 Pin	SCPSD-9000P-1725
-1 to 16 Bar	1/4 BSPP Male	(2) PNP	M12, 4 Pin	SCPSD-016-04-17
-1 to 16 Bar	1/4 BSPP Male	( 2 ) PNP with 4-20ma	M12, 5 Pin	SCPSD-016-14-15
0 to 250 Bar	1/4 BSPP Male	(2) PNP	M12, 4 Pin	SCPSD-250-04-17
0 to 250 Bar	1/4 BSPP Male	(2) PNP with 4-20ma	M12, 5 Pin	SCPSD-250-14-15
0 to 600 Bar	1/4 BSPP Male	(2) PNP	M12, 4 Pin	SCPSD-600-04-17
0 to 600 Bar	1/4 BSPP Male	( 2 ) PNP with 4-20ma	M12, 5 Pin	SCPSD-600-14-15

Most popular.



## Pressure Sensors SCPSD High Pressure 316 Stainless Steel

## **Specifications**

Pressure code	0250	016	1000	3000	5000	9000	250	600
Measure range PSI, (bar )	-14.7 to 250	(-1 to 16)	0 to 1000	0 to 3000	0 to 5000	0 to 9000	(0 to 250)	(0 to 600)
Overload pressure PSI, (bar)	725	(40)	2900	7250	11600	21750	(500)	(1200)
Burst pressure PSI, (bar )	725	(50)	11600	17400	24650	31900	(1200)	(2200)
Sensing element	Ceramic			Stainless Ste	el			
	Stainless steel	1.4404		Staiplass staal 1 4404 1 4542 NPD*				
Parts in contact with media	Ceramic AL20	Ceramic AL203, NBR*		Stall 1985 Steel 1.4404, 1.4342, NDK				
	*FPDM, EPDM special request							
Units of measure	PSI, bar, MPA							
Switch cycles	>100 million							
Output response time	< 10ms							
Power supply	15 to 30VDC,	Class 2 powe	r supply					
Short circuit protection	Yes, 2.4 amp /	open collecto	or output					
Reverse polarity protection	Yes							
Overload protection	Yes							
Current consumption	< 100mA							
Output circuit	2 PNP (Sourcing) open collector transistor							
Analog output	0/420mA, Programmable, freely scaleable							
Output functions	Hysteresis, Window comparator							
Switching voltage	-1.5VDC							
Maximum current output	1A with 2 oper	n collector out	puts, .5A per o	output				
Accuracy	± 0.5% F.S. Ty	p., ± 1% Max						
Repeatability	± 0.25% F.S.							
Display accuracy	± 0.5% F.S. Ty	p., ± 1 Digit						
Thermal error max.	±0.03% F.S. a	t -4 to 185°F (	(-20 to 85°C)					
Material	Pressure Die-c	ast zinc Z 410	): Surface-finis	hing				
Display material	Polyester							
General protection	IP 67, EN6052	9, UL, CE Ma	rked, EMC-EN	150082-2 Clas	s B, EN 5008	1-2		
Temperature range of media	-4 to 185°F (-20 to 85°C)							
Ambiant temperature range	-4 to 185°F (-20 to 85°C)							
Storage temperature	-40 to 212°F (-40 to 100°C)							
Display	4-Digit, 7-Segment LED, Red, 9mm height							
Tightening torque	35Nm							
Vibration resistance	20G, 10 to 500Hz, IEC60068-2-6							
Shock resistance	50 G, XYZ, 11	ms, IEC60068	3-2-29					
Mass	10.6 oz. (300g	)						

## Internal circuit

#### M12, 4-Pin, (2) PNP Outputs



#### M12, 4-Pin, (1) PNP Output with 4 to 20mA Analog



#### M12, 5-Pin, (2) PNP Outputs with 4 to 20mA Analog



Note: M12, 5-Pin Female Cable Connector will fit on both M12, 4-Pin and 5-Pin Male Sensor Connector.



## Dimensions

Technical

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**To program outputs and options of SCPSD**, press and hold the **I** (Up Arrow Icon) then press the **I** (Circle Icon) until Pro6 is displayed. Release all buttons and follow menu to program outputs and options.

#### To review programed outputs and options of SCPSD,

press and hold the <a>

 (Circle Icon) until Pro6 is displayed.

 Release the 
 (Circle Icon) and follow menu to program option and status.



## Parameters shown in digital display

To program switch outputs in menu S1 (S1 = output 1) or S2 (S2 = output 2), press  $\square$  and hold, then press  $\square$ . Pro6 will be displayed for 2 seconds.

alopiag	
PRS	This is dedicated to a password. Entry into the programming mode can be secured only when the correct figures have been entered
	Menu for programming the switch outputs:
S1	<b>S1</b> = Switch output 1
S2	<i>S2</i> = Switch output 2 (Menu is not active if S2 is being used as an error output)
	Switching point (SP): upper limiting value / pressure, at which the switch output changes its status.
SP1	<b>SP1</b> = Switch output 1; input as pressure value (e.g. 400 bar)
SP2	<b>SP2</b> = Switch output 2; input as pressure value (e.g. 430 bar)
	Reverse switching point (rSP): lower limiting value/ pressure at which switch output changes its status.
rSP1	<b>rSP1</b> = Reverse switching point (rSP1) of switch output 1; input as pressure value (e.g. 390 bar)
rSP2	<i>rSP2</i> = Reverse switching point (rSP2) of switch output 2; input as pressure value (e.g. 420 bar) The reverse switching point is always smaller than its respective switching point. If the reverse switching point is set higher than the switching point, the reverse switching point will be set automatically 0.5% of the instrument nominal pressure below the switching point. The warning sign Att (attention) will appear, which can be cleared with Enter. ■
cont	Switch output as noPn = closer nCLS = opener
Func	Selection of switching functions: <i>HySt</i> = Hysteresis function <i>FEn</i> = Window fu nction
	Delay times; input from 0 to 9.99 s.
dSPI	<i>dSPI</i> = delay time switching point output 1
drSL	<i>drSI</i> = delay time reverse switching point output 1
dSP2	<i>dSP2</i> = delay time switching point output 2
drS2	<i>drS2</i> =delay time reverse switching point output 2

## Settings for options program

оP	Options program
PA5	Password input 0000 = no password Example pageword 1224 - 1224
uni	Sotting of units:
um	bAr = bar NPA= MPa $PSi$ = PSI
diS	Display: Value which will be shown on the digital display in run mode.
	Act = Actual system pressure
	<ul> <li>NA = Maximum system pressure; (pressure roughs)</li> <li>NA = Maximum system pressure; (pressure peaks)</li> </ul>
	SPI = Switch point 1
	OFF = off indication
AnA	Setting of analog output (see point 4) <b>0-20</b> = 0-20 mA <b>4-20</b> = 4-20 mA
FroN	Calibration of starting value (0 or 4 mA) for the analog output. Settable from 0 to nominal instrument pressure. Example for $AnA = 4-20$ .
	0000 =  at 0 bar the analog output yields 4mA.
$\mathbf{A}$	The starting value is always smaller than the end value. If the starting value is set greater than the end value, then the starting
<u> </u>	value will be automatically set 5% of the nominal instrument
	pressure below that of the end value. The warning sign <i>Att 1</i> will appear which can be cleared with the Enter sign
to	Calibration of end value (20mA) for the analog output
	Settable from 0 up to nominal instrument pressure.
	0010 = at 10 bar the analogue output yields 20 mA.
0Set	Zero adjustment: The actual pressure will be stored as a new zero point. For safety reasons this is limited to the range $\pm$ 5% of the nominal instrument pressure. Application example: a system with a continuous residual pressure, but which should be displayed as 0 bar. <b>OFF</b> = factory calibration
	yES = undertake zeroing adjustment now no = ao back to the menu and do not make any new zeroing
$\triangle$	adjustments. After a zeroing adjustment, a pressure of up to 20 bar can be displayed as 0 on a 400 bar SCPSD. Before working on a system, it must be ensured that there is no pressure in it.
rES	Clearing the minimum and maximum value memory
	<b>yES</b> = yes, clear memory now
Frr	Programming switch output 2 as an error output
L11	<i>yES</i> = yes
	<b>no</b> = no Switch Output 2 can be used optionally as an error output to
	display pressure switch function errors. As an error output it is
	normally closed, and in case of errors ( <i>Err 1, Err 2, Err 3</i> ) it is
	output remain active until the error is cleared.
SUn	Indication of Software Version
dPP	Setting of the decimal point. (The maximum number of decimal points depends on the nominal pressure of the SCPSD instrument) 0000 = no decimal point
	00.00 = 1 decimal point 00.00 = 2 decimal points
	0.000 = 3 decimal points
End	End of programming mode

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SCP01

SCPSD

Accessories, Symbols, Glossary



ullet

## Installation

#### Mechanical:

## CAUTION: Install and de-install the SCPSD only when there is no pressure present.

Attach the SCPSD to the appropriate process connection. Installation should be undertaken only with a 22mm, across flats spanner. Ensure that the digital display is placed in the best viewing position by using the rotational housing adjustment. Turn the SCPSD manually to the required position. Maximum 290°.

Excessive turning beyond the easily detectable end stop will lead to damage.

- The housing can be attached:
- with self-tapping screws into two blind holes at the back of the housing
- with the mounting plate provided
- with cable ties

#### Electrical:

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# CAUTION: The SCPSD may be installed only by a qualified electrician in accordance with the respective national and international regulations.

Protect the SCPSD from electromagnetic influences and overvoltages.

Optional installation tips which are shown by experience to reduce the influence of interference:

- Use shorter cables
- Avoid short distances between connecting leads and power consuming devices and interference generating electrical and electronic equipment
- Use free running diodes

## Electrical test unit (M12, 5-Pin) SCSN-450-PSD



Avoid static and dynamic over-pressures which exceed the specified overload pressure. Even when the overload pressure is exceeded only for a short time the SCPSD may be damaged. Parker SensoControl diagnostic systems are recommended for measuring pressure peaks exactly.

If there is a danger of excessively high pressure peaks, it is recommended to:

- use an SCPSD with a higher nominal instrument pressure (analog output can then be correspondingly matched)
- install a standard throttling device upstream from the SCPSD

Display	Description		
Att	The set value is lower than the other respective parameters. When Enter is activated, the smaller value is matched up.		
Err1	System Error (Internal)		
Err2	Nominal instrument pressure range was exceeded by 10%. Please check system pressure.		
Err3	Nominal instrument pressure range has been exceeded Error in analog electronics. Please check system pressure.		

#### Error messages

## SCPSD programming kit SCSD-PRG-KIT

Optical Interface Device that allows read / write and storing of SCPSD configuration data. Kit includes optical interface device, electrical test unit with PC cable (RS232 connector) and software.





## Catalog 0802-E Pressure Sensor Cables

### Features

- M8, M12 female connector
- Length: 2m or 5m
- Cover: PVC or PUR
- Connection type: Swivel straight or angled
- IP67 swivel connector



## **Common Part Numbers**

Connector	Contacts	Length	Cover	Part number
M8 female	4	2m	PUR	CB-M8-4P-2M-PUR
M8 female	4	5m	PUR	CB-M8-4P-5M-PUR
M8 angled female	4	5m	PUR	CB-M8-4P-5M-90-PUR
M12 female	4	2m	PVC	CB-M12-4P-2M
M12 female	5	2m	PVC	CB-M12-5P-2M

## Dimensions

CB-M8-4P-2M, Female to Open Lead





#### CB-M8-4P-5M-90, Female to Open Lead





CB-M12-4P-2M, Female to Open Lead CB-M12-5P-2M, Female to Open Lead





Most popular.



#### Accuracy

The PERCENTAGE difference between the true value and that indicated by an instrument is the measure of the instrument's accuracy. It is expressed as a percentage of the full-scale value of the reading according to the type of instrument.

Α

#### Analog output

An analog output provides an output voltage that is proportional and linear to the pressure measured by the sensor. This output signal provides continuous feedback to the analog card of the PLC.



#### Cable connector type

4-Pin, M8 cable connector referred to as PICO or Micro connector. 4-Pin, 5-Pin, M12 cable connector referred to as Mini connector.

#### Class 2 power supply

Power source not exceeding 30VDC and 8 amps.

#### **Connection port size**

Pressure port connections on the back or bottom of the sensor.

#### Current consumption

Maximum current consumed during operation. Does not include the load current.

#### \_D\_\_

#### **Display resolution**

Resolution is 1/1024. The least possible measurable unit to display on the display. This will vary with the units of measure and is adjustable on some sensors.

Shown below are the different unit increments displayed for different pressures.

Compound	Low pressure	Vacuum	Pressure
bar: 0.01	bar: 0.001	bar: 0.001	bar: 0.01
kPa: 1	kPa: 0.1	kPa: 0.1	mPa: 0.001
kgf/cm <sup>2</sup> : 0.01	kgf/cm <sup>2</sup> : 0.001	mmHg: 1	kgf/cm <sup>2</sup> : 0.01
PSI: 0.1	PSI: 0.1	inHg: 0.1	PSI: 1

#### **Dielectric strength**

Sensors ability to withstand excess voltages.

#### Digital display unit

Minimum unit displayed on the sensor.

## \_\_E\_

#### Error message

Error message is displayed if the pressures, inputs, or outputs exceed the parameters of the sensor.

#### Full scale

Abbreviated as F.S. this is the operating pressure scale of the sensor.

н

F

## \_\_G\_

#### Grommet type

Electrical lead from the sensor.

## Hysteresis

The difference in pressure below the switch point pressure which controls the ON-OFF status of the output signal. (See Output modes)

## \_\_\_\_

The source of the electrical response of the sensing element expressed in ohms.

#### **IP** ratings

Input impedance

- IP40 Protected against solid foreign objects of 0.04" (1mm) and greater.
- Non-protected against the penetration of liquids. IP65 - Dust tight.
  - Protected against water jets.
- IP67 Dust tight.

Protected against the effects of temporary immersion water.

#### Insulation resistance

Resistance between electrical circuit and the body, expressed in ohms at a voltage rating.

#### Internal voltage drop

Caused by the resistance of an electrical part in an electronic circuit. Example is a 2-wire pneumatic pressure switch.

L

Electronic Display Technology

#### Load current

LED

Amount of current flowing through the sensor once the output is activated.

#### Lock-out mode

Noise resistance

Prevents accidental changes to the sensor settings.

## \_\_M\_

**Maximum operating pressure** Maximum operating pressure the sensor is rated for. Exceeding this pressure could damage the unit and will display FFF.



Amount of electrical noise in the surrounding environment that could affect the sensor performance.

#### NPN pressure sensor output

NPN type open collector transistor outputs are solid state circuits that provide sinking output capabilities. When the transistor is on, the current for the load flows into the transistor. This output "sinks" toward 0VDC, 0mA.



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## Pressure Sensors

#### Window comparator setting

This output mode provides two switch points (A) and (b) that control the output signals (NPN / PNP) between the two pressures. This creates a "window" of operation and is sometimes referred to as "high / low" setting. The Window Comparator Mode provides an output or alarm when pressures exceed the upper or lower limit.

The sensor in the below application monitors the pressure to the valve controlling a pneumatic gripper. If the pressure is below (A), the gripper may not have enough holding capacity for the application and the part could drop. If the pressure is above b, the gripper may excerpt too much force on the part and damage the part. If the pressure is in the window of operation, in-between (A) and (b), the application is within design specification.



#### Output response time

Response time of the output signal after the pressure switch point is achieved. Measured in milliseconds.



**Panel mounting brackets** Brackets used to panel mount the sensor.

#### PNP pressure sensor output

PNP type open collector transistor outputs are solid state circuits that provide sourcing output capabilities. When the transistor is on, the current for the load flows out of the transistor. This output "sources" toward 24VDC, 125mA.

R



The repeatability refers to the sensor's ability to provide the same output with consecutive applications of the same pressure input.



Repeatability is represented as a percentage of the full scale value of the sensor. All Parker sensors are rated  $\pm$  0.2% F.S. P1 would be represented as 145 PSI x 0.002 =  $\pm$ 0.29 PSI.

## ON / OFF output

The electrical state of the output signal.

#### Open collector transistor

Output circuit that sinks (NPN) or sources (PNP) at the pressure switch-point setting.

\_0\_

#### Operating humidity range

Humidity range for proper operation of equipment.

#### **Operating indicator light**

LED indicator is on when ON-OFF output is ON.

#### Operating pressure range

The pressure range the unit was designed to operate in.

#### Operating temperature range

Acceptable temperature range for the specifications listed in the catalog.

#### **Operating voltage**

Voltage range for normal operation.

#### **Output modes**

#### Switch point with hysteresis settings

This output mode provides one switch set point and a reversing point. The difference of these points is the hysteresis range **(h)**. When the switch point pressure is achieved, the output (NPN / PNP) is activated if normally open or deactivated if normally closed. Typically, this mode is used for pressure confirmation. For positive pressure applications, this operating mode does not provide any output or alarms beyond the switch point in the case of excessive pressures.

In the Air Driven Cabinet Cooler application below, H=10 PSIG, h=2 PSIG The unit will function properly above 10 PSIG and given some pressure variations, the sensor output will remain "on" until 8 PSIG. Below 8 PSIG the output will change to "off", which will be an indication that the cabinet is not being cooled efficiently or not at all.







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#### Reverse voltage protection

Diode circuitry to prevent "cross-wire" damage during installation of the sensor.

## \_\_S\_\_

#### Setpoints

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Accessories, Symbols, Glossary The number of the ON-OFF output signals in one product. Product with 2 setting points means 2 output type.

#### Shock resistance

The amount of vibration the sensor can withstand without affecting performance.

#### Silicon diaphragm

This type of sensor is used for air and non-corrosive gas applications.



#### Stainless steel diaphragm

This type of sensor is used for liquids, non-corrosive to 316L or 630 stainless steel.



#### Switch output

This is a reference to a digital or NPN / PNP open collector transistor output from the sensor. The technology is binary logic.

\_T\_\_

#### Thermal error

Temperature characteristics vary with applications. The performance of the sensor can be affected by changes in ambient temperatures. The sensor rating is represented by a percentage of the F.S.

W

#### Wetted parts

Sensor body parts that are in contact with process-type fluids are refered to as wetted parts.





**Zero reset** The sensor technology is PSIA. Periodically, the sensor's atmospheric reference may need to be adjusted manually or automatically as a result of small changes in the atmospheric reference point.

## Safety Guide For Selecting And Using Pneumatic Division Products And Related Accessories

## WARNING:

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF PNEUMATIC DIVISION PRODUCTS, ASSEMBLIES OR RELATED ITEMS ("PRODUCTS") CAN CAUSE DEATH, PERSONAL INJURY, AND PROPERTY DAMAGE. POSSIBLE CONSEQUENCES OF FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THESE PRODUCTS INCLUDE BUT ARE NOT LIMITED TO:

- Unintended or mistimed cycling or motion of machine members or failure to cycle
- Work pieces or component parts being thrown off at high speeds.
- Failure of a device to function properly for example, failure to clamp or unclamp an associated item or device.
- Explosion
- Suddenly moving or falling objects.
- Release of toxic or otherwise injurious liquids or gasses.

Before selecting or using any of these Products, it is important that you read and follow the instructions below.

#### **1. GENERAL INSTRUCTIONS**

- **1.1. Scope:** This safety guide is designed to cover general guidelines on the installation, use, and maintenance of Pneumatic Division Valves, FRLs (Filters, Pressure Regulators, and Lubricators), Vacuum products and related accessory components.
- **1.2. Fail-Safe:** Valves, FRLs, Vacuum products and their related components can and do fail without warning for many reasons. Design all systems and equipment in a fail-safe mode, so that failure of associated valves, FRLs or Vacuum products will not endanger persons or property.
- **1.3 Relevant International Standards:** For a good guide to the application of a broad spectrum of pneumatic fluid power devices see: ISO 4414:1998, Pneumatic Fluid Power General Rules Relating to Systems. See www.iso.org for ordering information.
- **1.4. Distribution:** Provide a copy of this safety guide to each person that is responsible for selection, installation, or use of Valves, FRLs or Vacuum products. Do not select, or use Parker valves, FRLs or vacuum products without thoroughly reading and understanding this safety guide as well as the specific Parker publications for the products considered or selected.
- **1.5. User Responsibility:** Due to the wide variety of operating conditions and applications for valves, FRLs, and vacuum products Parker and its distributors do not represent or warrant that any particular valve, FRL or vacuum product is suitable for any specific end use system. This safety guide does not analyze all technical parameters that must be considered in selecting a product. The user, through its own analysis and testing, is solely responsible for:
  - Making the final selection of the appropriate valve, FRL, Vacuum component, or accessory.
  - Assuring that all user's performance, endurance, maintenance, safety, and warning requirements are met and that the application presents no health or safety hazards.
  - Complying with all existing warning labels and / or providing all appropriate health and safety warnings on the equipment on which the valves, FRLs or Vacuum products are used; and,
  - Assuring compliance with all applicable government and industry standards.
- **1.6. Safety Devices:** Safety devices should not be removed, or defeated.
- 1.7. Warning Labels: Warning labels should not be removed, painted over or otherwise obscured.
- **1.8. Additional Questions:** Call the appropriate Parker technical service department if you have any questions or require any additional information. See the Parker publication for the product being considered or used, or call 1-800-CPARKER, or go to www.parker.com, for telephone numbers of the appropriate technical service department.

#### 2. PRODUCT SELECTION INSTRUCTIONS

- **2.1. Flow Rate:** The flow rate requirements of a system are frequently the primary consideration when designing any pneumatic system. System components need to be able to provide adequate flow and pressure for the desired application.
- **2.2. Pressure Rating:** Never exceed the rated pressure of a product. Consult product labeling, Pneumatic Division catalogs or the instruction sheets supplied for maximum pressure ratings.
- **2.3. Temperature Rating:** Never exceed the temperature rating of a product. Excessive heat can shorten the life expectancy of a product and result in complete product failure.
- **2.4. Environment:** Many environmental conditions can affect the integrity and suitability of a product for a given application. Pneumatic Division products are designed for use in general purpose industrial applications. If these products are to be used in unusual circumstances such as direct sunlight and/or corrosive or caustic environments, such use can shorten the useful life and lead to premature failure of a product.
- **2.5. Lubrication and Compressor Carryover:** Some modern synthetic oils can and will attack nitrile seals. If there is any possibility of synthetic oils or greases migrating into the pneumatic components check for compatibility with the seal materials used. Consult the factory or product literature for materials of construction.
- 2.6. Polycarbonate Bowls and Sight Glasses: To avoid potential polycarbonate bowl failures:
  - Do not locate polycarbonate bowls or sight glasses in areas where they could be subject to direct sunlight, impact blow, or temperatures outside of the rated range.
  - Do not expose or clean polycarbonate bowls with detergents, chlorinated hydro-carbons, keytones, esters or certain alcohols.
  - Do not use polycarbonate bowls or sight glasses in air systems where compressors are lubricated with fire resistant fluids such as phosphate ester and di-ester lubricants.



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- 2.7. Chemical Compatibility: For more information on plastic component chemical compatibility see Pneumatic Division technical bulletins Tec-3, Tec-4, and Tec-5
- **2.8. Product Rupture:** Product rupture can cause death, serious personal injury, and property damage.
  - Do not connect pressure regulators or other Pneumatic Division products to bottled gas cylinders.
  - Do not exceed the maximum primary pressure rating of any pressure regulator or any system component.
  - Consult product labeling or product literature for pressure rating limitations.

#### 3. PRODUCT ASSEMBLY AND INSTALLATION INSTRUCTIONS

- 3.1. Component Inspection: Prior to assembly or installation a careful examination of the valves, FRLs or vacuum products must be performed. All components must be checked for correct style, size, and catalog number. DO NOT use any component that displays any signs of nonconformance.
- 3.2. Installation Instructions: Parker published Installation Instructions must be followed for installation of Parker valves, FRLs and vacuum components. These instructions are provided with every Parker valve or FRL sold, or by calling 1-800-CPARKER, or at www.parker.com.
- 3.3. Air Supply: The air supply or control medium supplied to Valves, FRLs and Vacuum components must be moisture-free if ambient temperature can drop below freezing

#### 4. VALVE AND FRL MAINTENANCE AND REPLACEMENT INSTRUCTIONS

- 4.1. Maintenance: Even with proper selection and installation, valve, FRL and vacuum products service life may be significantly reduced without a continuing maintenance program. The severity of the application, risk potential from a component failure, and experience with any known failures in the application or in similar applications should determine the frequency of inspections and the servicing or replacement of Pneumatic Division products so that products are replaced before any failure occurs. A maintenance program must be established and followed by the user and, at minimum, must include instructions 4.2 through 4.10.
- 4.2. Installation and Service Instructions: Before attempting to service or replace any worn or damaged parts consult the appropriate Service Bulletin for the valve or FRL in guestion for the appropriate practices to service the unit in guestion. These Service and Installation Instructions are provided with every Parker valve and FRL sold, or are available by calling 1-800-CPARKER, or by accessing the Parker web site at www.parker.com.
- 4.3. Lockout / Tagout Procedures: Be sure to follow all required lockout and tagout procedures when servicing equipment. For more information see: OSHA Standard - 29 CFR, Part 1910.147, Appendix A, The Control of Hazardous Energy - (Lockout / Tagout)
- 4.4. Visual Inspection: Any of the following conditions requires immediate system shut down and replacement of worn or damaged components:
  - Air leakage: Look and listen to see if there are any signs of visual damage to any of the components in the system. Leakage is an indication of worn or damaged components.
  - Damaged or degraded components: Look to see if there are any visible signs of wear or component degradation.
  - Kinked, crushed, or damaged hoses, Kinked hoses can result in restricted air flow and lead to unpredictable system behavior.
  - Any observed improper system or component function: Immediately shut down the system and correct malfunction.
  - Excessive dirt build-up: Dirt and clutter can mask potentially hazardous situations.

#### Caution: Leak detection solutions should be rinsed off after use.

#### 4.5. Routine Maintenance Issues:

- Remove excessive dirt, grime and clutter from work areas.
- Make sure all required guards and shields are in place.
- 4.6. Functional Test: Before initiating automatic operation, operate the system manually to make sure all required functions operate properly and safely.
- 4.7. Service or Replacement Intervals: It is the user's responsibility to establish appropriate service intervals. Valves, FRLs and vacuum products contain components that age, harden, wear, and otherwise deteriorate over time. Environmental conditions can significantly accelerate this process. Valves, FRLs and vacuum components need to be serviced or replaced on routine intervals. Service intervals need to be established based on:
  - Previous performance experiences.
  - Government and / or industrial standards.
  - When failures could result in unacceptable down time, equipment damage or personal injury risk.
- 4.8. Servicing or Replacing of any Worn or Damaged Parts: To avoid unpredictable system behavior that can cause death, personal injury and property damage:
  - Follow all government, state and local safety and servicing practices prior to service including but not limited to all OSHA Lockout Tagout procedures (OSHA Standard - 29 CFR, Part 1910.147, Appendix A, The Control of Hazardous Energy - Lockout / Tagout).
  - Disconnect electrical supply (when necessary) before installation, servicing, or conversion.
  - Disconnect air supply and depressurize all air lines connected to system and Pneumatic Division products before installation, service, or conversion.
  - Installation, servicing, and / or conversion of these products must be performed by knowledgeable personnel who understand how pneumatic products are to be applied.
  - After installation, servicing, or conversions air and electrical supplies (when necessary) should be connected and the product tested for proper function and leakage. If audible leakage is present, or if the product does not operate properly, do not put product or system into use.
  - Warnings and specifications on the product should not be covered or painted over. If masking is not possible, contact your local representative for replacement labels.
- 4.9. Putting Serviced System Back into Operation: Follow the guidelines above and all relevant Installation and Maintenance Instructions supplied with the valve FRL or vacuum component to insure proper function of the system.



The goods, services or work (referred to as the "Products") offered by **Parker-Hannifin Corporation**, its subsidiaries, groups, divisions, and authorized distributors ("Seller") are offered for sale at prices indicated in the offer, or as may be established by Seller. The offer to sell the Products and acceptance of Seller's offer by any customer ("Buyer") is contingent upon, and will be governed by all of the terms and conditions contained in this Offer of Sale. Buyer's order for any Products specified in Buyer's purchase document or Seller's offer, proposal or quote ("Quote") attached to the purchase order, when communicated to Seller verbally, or in writing, shall constitute acceptance of this offer.

1. <u>Terms and Conditions</u>. Seller's willingness to offer Products for sale or accept an order for Products is subject to the terms and conditions contained in this Offer of Sale or any newer version of the same, published by Seller electronically at www.parker.com/ saleterms/. Seller objects to any contrary or additional terms or conditions of Buyer's order or any other document or other communication issued by Buyer.

2. Price: Payment. Prices stated on Seller's Quote are valid for thirty (30) days, except as explicitly otherwise stated therein, and do not include any sales, use, or other taxes or duties unless specifically stated. Seller reserves the right to modify prices to adjust for any raw material price fluctuations. Unless otherwise specified by Seller, all prices are F.C.A. Seller's facility (INCOTERMS 2010). Payment is subject to credit approval and payment for all purchases is due thirty (30) days from the date of invoice (or such date as may be specified by Seller's Credit Department). Unpaid invoices beyond the specified payment date incur interest at the rate of 1.5% per month or the maximum allowable rate under applicable law.

3. <u>Shipment; Delivery; Title and Risk of Loss</u>. All delivery dates are approximate. Seller is not responsible for damages resulting from any delay. Regardless of the manner of shipment, delivery occurs and title and risk of loss or damage pass to Buyer, upon placement of the Products with the shipment carrier at Seller's facility. Unless otherwise stated, Seller may exercise its judgment in choosing the carrier and means of delivery. No deferment of shipment at Buyers' request beyond the respective dates indicated will be made except on terms that will indemnify, defend and hold Seller hamless against all loss and additional expense. Buyer shall be responsible for any additional shipping charges incurred by Seller due to Buyer's acts or omissions.

4. <u>Warranty</u>. Seller warrants that the Products sold hereunder shall be free from defects in material or workmanship for a period of twelve (12) months from the date of delivery or 2,000 hours of normal use, whichever occurs first. All prices are based upon the exclusive limited warranty stated above, and upon the following disclaimer: <u>DISCLAIMER OF WARRANTY</u>: THIS WARRANTY IS THE SOLE AND ENTIRE WARRANTY PERTAINING TO PRODUCTS PROVIDED. SELLER DISCLAIMS ALL OTHER WARRANTIES, EXPRESS AND IMPLIED, INCLUDING DESIGN, MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

5. Claims; Commencement of Actions. Buyer shall promptly inspect all Products upon receipt. No claims for shortages will be allowed unless reported to the Seller within ten (10) days of delivery. No other claims against Seller will be allowed unless asserted in writing within thirty (30) days after delivery. Buyer shall notify Seller of any alleged breach of warranty within thirty (30) days after the date the defect is or should have been discovered by Buyer. Any claim or action against Seller based upon breach of contract or any other theory, including tort, negligence, or otherwise must be commenced within twelve (12) months from the date of the alleged breach or other alleged event, without regard to the date of discovery.

6. LIMITATION OF LIABILITY. IN THE EVENT OF A BREACH OF WARRANTY, SELLER WILL, AT ITS OPTION, REPAIR OR REPLACE A DEFECTIVE PRODUCT, OR REFUND THE PURCHASE PRICE WITHIN A REASONABLE PERIOD OF TIME. IN NO EVENT IS SELLER LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF, OR AS THE RESULT OF, THE SALE, DELIVERY, NON-DELIVERY, SERVICING, USE OR LOSS OF USE OF THE PRODUCTS OR ANY PART THEREOF, OR FOR ANY CHARGES OR EXPENSES OF ANY NATURE INCURRED WITHOUT SELLER'S WRITTEN CONSENT, WHETHER BASED IN CONTRACT, TORT OR OTHER LEGAL THEORY. IN NO EVENT SHALL SELLER'S LIABILITY UNDER ANY CLAIM MADE BY BUYER EXCEED THE PURCHASE PRICE OF THE PRODUCTS.

7. <u>User Responsibility</u>. The user, through its own analysis and testing, is solely responsible for making the final selection of the system and Product and assuring that all performance, endurance, maintenance, safety and warning requirements of the application are met. The user must analyze all aspects of the application and follow applicable industry standards and Product information. If Seller provides Product or system options based upon data or specifications provided by the user, the user is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the Products or systems.

8. Loss to Buyer's Property. Any designs, tools, patterns, materials, drawings, confidential information or equipment furnished by Buyer or any other items which become Buyer's property, will be considered obsolete and may be destroyed by Seller after two (2) consecutive years have elapsed without Buyer ordering the items manufactured using such property. Seller shall not be responsible for any loss or damage to such property while it is in Seller's possession or control.

9. Special Tooling. A tooling charge may be imposed for any special tooling, including without limitation, dies, fixtures, molds and patterns, acquired to manufacture Products. Such special tooling shall be and remain Seller's property notwithstanding payment of any charges by Buyer. In no event will Buyer acquire any interest in apparatus belonging to Seller which is utilized in the manufacture of the Products, even if such apparatus has been specially converted or adapted for such manufacture and notwithstanding any charges paid by Buyer. Unless otherwise agreed, Seller has the right to alter, discard or otherwise dispose of any special tooling or other property in its sole discretion at any time.
10. Buyer's Obligation; Rights of Seller. To secure payment of all sums due or otherwise, Seller retains a security interest in all Products delivered to Buyer and this agreement is deemed to be a Security Agreement under the Uniform Commercial Code. Buyer altorizes Seller as its attorney to execute and file on Buyer's behalf all documents Seller deems necessary to perfect its security interest.

11. <u>Improper Use and Indemnity.</u> Buyer shall indemnify, defend, and hold Seller harmless from any losses, claims, liabilities, damages, lawsuits, judgments and costs

(including attorney fees and defense costs), whether for personal injury, property damage, patent, trademark or copyright infringement or any other claim, brought by or incurred by Buyer, Buyer's employees, or any other person, arising out of: (a) improper selection, application, design, specification or other misuse of Products purchased by Buyer from Seller; (b) any act or omission, negligent or otherwise, of Buyer; (c) Seller's use of patterns, plans, drawings, or specifications furnished by Buyer to manufacture Products; or (d) Buyer's failure to comply with these terms and conditions. Seller shall not indemnify Buyer under any circumstance except as otherwise provided.

12. <u>Cancellations and Changes</u>. Buyer may not cancel or modify or cancel any order for any reason, except with Seller's written consent and upon terms that will indemnify, defend and hold Seller harmless against all direct, incidental and consequential loss or damage. Seller may change Product features, specifications, designs and availability.

**13.** <u>Limitation on Assignment</u>. Buyer may not assign its rights or obligations under this agreement without the prior written consent of Seller.

14. <u>Force Majeure</u>. Seller does not assume the risk and is not liable for delay or failure to perform any of Seller's obligations by reason of events or circumstances beyond its reasonable control (hereinatter "Events of Force Majeure"). Events of Force Majeure shall include without limitation: accidents, strikes or labor disputes, acts of any government or government agency, acts of nature, delays or failures in delivery from carriers or suppliers, shortages of materials, or any other cause beyond Seller's reasonable control.

15. <u>Waiver and Severability</u>. Failure to enforce any provision of this agreement will not invalidate that provision; nor will any such failure prejudice Seller's right to enforce that provision in the future. Invalidation of any provision of this agreement by legislation or other rule of law shall not invalidate any other provision herein. The remaining provisions of this agreement will remain in full force and effect.

16. <u>Termination</u>. Seller may terminate this agreement for any reason and at any time by giving Buyer thirty (30) days prior written notice. Seller may immediately terminate this agreement, in writing, if Buyer: (a) breaches any provision of this agreement (b) appoints a trustee, receiver or custodian for all or any part of Buyer's property (c) files a petition for relief in bankruptcy on its own behalf, or one if filed by a third party (d) makes an assignment for the benefit of creditors; or (e) dissolves its business or liquidates all or a majority of its assets.

17. Governing Law. This agreement and the sale and delivery of all Products are deemed to have taken place in, and shall be governed and construed in accordance with, the laws of the State of Ohio, as applicable to contracts executed and wholly performed therein and without regard to conflicts of laws principles. Buyer irrevocably agrees and consents to the exclusive jurisdiction and venue of the courts of Cuyahoga County, Ohio with respect to any dispute, controversy or claim arising out of or relating to this agreement.

18. Indemnity for Infringement of Intellectual Property Rights. Seller is not liable for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights except as provided in this Section. Seller will defend and indemnify Buyer against allegations of infringement of U.S. patents, U.S. trademarks, copyrights, trade dress and trade secrets ("Intellectual Property Rights"). Seller will defend at its expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on an allegation that a Product sold pursuant to this agreement infringes the Intellectual Property Rights of a third party. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of such allegations of infringement, and Seller having sole control over the defense of any allegations or actions including all negotiations for settlement or compromise. If a Product is subject to a claim that it infringes the Intellectual Property Rights of a third party, Seller may, at its sole expense and option, procure for Buyer the right to continue using the Product, replace or modify the Product so as to make it noninfringing, or offer to accept return of the Product and refund the purchase price less a reasonable allowance for depreciation. Notwithstanding the foregoing, Seller is not liable for claims of infringement based on information provided by Buyer, or directed to Products delivered hereunder for which the designs are specified in whole or part by Buyer, or infringements resulting from the modification, combination or use in a system of any Product sold hereunder. The foregoing provisions of this Section constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for infringement of Intellectual Property Rights.

19. Entire Agreement. This agreement contains the entire agreement between the Buyer and Seller and constitutes the final, complete and exclusive expression of the terms of sale. All prior or contemporaneous written or oral agreements or negotiations with respect to the subject matter are herein merged. The terms contained herein may not be modified unless in writing and signed by an authorized representative of Seller.

20. Compliance with Laws. Buyer agrees to comply with all applicable laws, regulations, and industry and professional standards of care, including those of the United Kingdom, the United States of America, and the country or countries in which Buyer may operate, including without limitation the U. K. Bribery Act, the U.S. Foreign Corrupt Practices Act ("FCPA"), the U.S. Anti-Kickback Act ("Anti-Kickback Act") and the U.S. Food Drug and Cosmetic Act ("FDCA"),each as currently amended, and the rules and regulations promulgated by the U.S. Food and Drug Administration ("FDA"), and agrees to indemnify and hold harmless Seller from the consequences of any violation of such provisions buyer, its employees or agents. Buyer acknowledges that it is familiar with the provisions of the U.K. Bribery Act, the FCPA, the FDA, and the Anti-Kickback Act, and certifies that Buyer will adhere to the requirements thereof. In particular, Buyer represents and agrees that Buyer will not make any payment or give anything of value, directly or indirectly to any governmental official, any foreign political party or official thereof, any candidate for foreign political office, or any commercial entity or person, for the purpose of influencing such person to purchase Products or otherwise benefit the business of Seller.

05/14

Safety Guide,

Offer of Sale

