7. P Series Female

7.1 Technical specifications - P Series Female

Carel type P pressure sensors are cost-effective, highly accurate products that use piezoresistive technology, with a 0.5-4.5 ratiometric output and brass housing. Excellent EMC features make these sensors suitable for the harshest environments. These sensors can be directly installed on the refrigerant pipe (no capillary tube is needed) Compatible with the most common refrigerants. This series is excluded from the scope of the Pressure Equipment Directive 2014/68/EU (the sensor itself does not have safety function). The sensors are equipped with aesthetic o-rings to recognise the pressure range easily.

Electrical	
Power supply (protected against polarity reversal)	5 Vdc ±10%
Power supply overvoltage	18Vdc
Maximum reverse voltage	11Vdc
Current draw	5 mA typical
Output voltage	0.5-4.5 Vdc ratiometric
Short-circuit protection	yes
Output load	>47 kΩ
Response time	10 ms max
Insulation resistance	1 GΩ @ 50 Vdc
Electrical connector	Male, 3-pin Metri-Pack 150
Electrical connector insulation material	PBT 30GF
Electrical contact material and surface finish material	Cu Zn20, Ni 2-3µm Sn 5 ± 2.5 µm
Cable	See SPKC****** accessory

Performance	
Operating temperature	-40T135°C
Operating humidity	0-90%rH
Fluid temperature	-40T135°C
Storage temperature	-40T150°C
Ingress protection	IP55, IP67 depending on the connector plugged in. For more details, see sensor table and SPKC****** accessory table.
Accuracy (including linearity, hysteresis, repeatability, calibration error) static error @25°C at 5.0Vdc	±1.2% FS
Temperature error	±0.013% FS/°C
Total error band (including linearity, hysteresis, repeatability, calibration error) relative to all operating temperature and humidity values	±1.5% FS at 5 Vdc (0T50°C) ±2.1% FS at 5 Vdc (-40T90°C) ±2.6% FS at 5 Vdc (40T135°C)"
Life cycle	10 million cycles, 0-100% FS

Physical	
Vibrations IEC 60068-2-64	12 g (rms)
Shock IEC 60068-2-27	50 g 6 ms
Drop from any axis	1.5m (falling from 1.5 metre high)
Material in contact with refrigerant	Ceramic, brass and HNBR O-ring
Housing	Brass
Tightening torque	12 to 16 Nm
Mechanical connection	Female, 7/16"-20UNF - 45° flare
Pressure range	From 4.2 barg to 45 barg
Over pressure	See table
Burst pressure	See table
Refrigerant compatibility	R12, R22, R134A, R404A, R407C, R410A, R448A, R449A, R452A, R454B, R454C, R502, R507, R513A, R600, R600A, R744, HFO 1234ze, R290, R32, water (temperature >3°C). Not compatible with R717 (ammonia), not suitable to be used with glycol-water mixtures.
Oil compatibility	PAG
Vacuum pressure (referred to refrigerant circuit)	0 bar absolute
Weight	30 g (net weight)

EMC	
Electrostatic discharges: EN 61000-4-2	±4 kV contact, ±8 kV in air
Radiated immunity: EN 61000-4-3	10 V/m (80 MHz - 1 GHz) 3 V/m (1.4 GHz - 2 GHz) 1 V/m (2 GHz - 2.7 GHz)
Burst: EN 61000-4-4	±1 kV
Surge: EN 61000-4-5	±500 V
Immunity to conducted radio-frequency disturbance: EN 61000-4-6	10 V (150 kHz - 80 MHz)
Magnetic fields at power supply frequency: EN 61000-4-8	30 A/m continuous 300 A/m impulsive

Compliant with:	
Compliance	REACH - RoHS - CE IEC 60335-2-24 clause 22.110; IEC 60335-2-40 clause 22.117; IEC 60335-2-89 clause 22.114
UL certified	File E493623
ATEX - Directive 2014/34/EU	EN60079-0 & EN60079-15

Part numbers

Carel P/N	Pressure (psi)		Pressure (bar)		Pressure (kPa)		Over pressure			Burst pressure			O-Ring
	0.5 V	4.5 V	0.5 V	4.5 V	0.5 V	4.5 V	psi	bar	kPa	psi	bar	kPa	
SPKT0053P* (1)	-15	60	-1	4.2	-100	420	360	25	2500	1595	110	11000	Blue
SPKT0013P* (1)	-15	135	-1	9.3	-100	930	430	30	3000	1595	110	11000	NONE
SPKT00E3P* (1)	-15	185	-1	12.8	-100	1280	550	38	3800	1595	110	11000	Brown
SPKT0043P* (1)	0	250	0	17.3	0	1730	780	54	5400	1595	110	11000	Green
SPKT00F3P* (1)	0	300	0	20.7	0	2070	900	62	6200	1595	110	11000	White
SPKT0033P* (1)	0	500	0	34.5	0	3450	1010	70	7000	2494	172	17200	Black
SPKT00B6P* (1)	0	650	0	45	0	4500	1310	91	9100	2494	172	17200	Red

*Digit 10: 0=single packaging; 1=multiple packaging; 3=distribution package

Notes

Measurement type: Sealed gauge

Full span definition: FS (full span) = MAX output - MIN output = 4 V

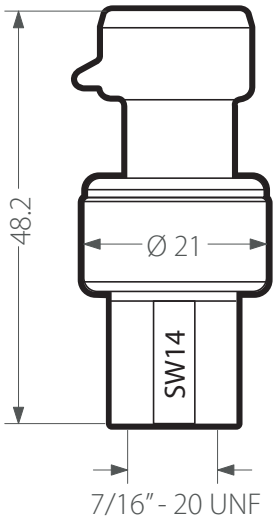
Requirements: Important, for the purpose of protecting the sensor against damage due to inducted overvoltage and incorrect use, it is recommended to proceed as follows.

- **Power supply:** pressure sensors must be powered by a PELV source. If not connected to a Carel controller, protect with a 50 mA fuse on the power supply positive.
- **Connection cable:** avoid winding the cable in spirals and adequately separate the cable from power cables.

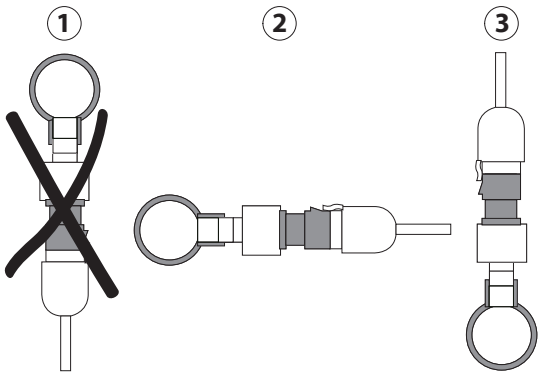
If the SPKT00**P* devices are used in ATEX applications, following Specific Conditions of Use shall be employed:

- Transient protection shall be provided that is set at a level not exceeding 140% of the peak rated voltage value at the supply terminals to the devices. (5Vdc).
- The devices shall be protected in end-use application by another suitable Ex certified enclosure or by an enclosure which has been submitted to Thermal endurance to heat and cold (Clauses 26.8 and 26.9 of IEC/EN 60079-0) and Test for resistance to impact (Clause 26.4.2 of IEC/EN 60079-0).

Dimensions



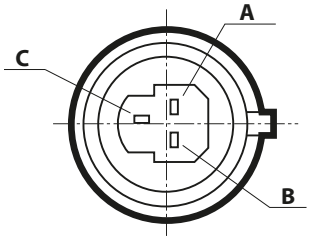
Installation



1	NOT RECOMMENDED
2	RECOMMENDED
3	ACCEPTED

Do not use sealing glue or copper gaskets for mechanical connection

Electrical connection diagram



A	GND
B	Power supply
C	V out