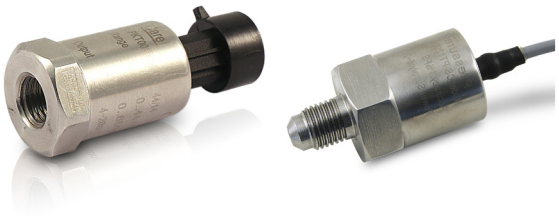
Pressure sensors and cables

CAREL

C Series 4...20mA

D Serie 4...20mA



S Serie 0.5...4.5V ratiometric

P Serie 0.5...4.5V ratiometric

ENG User manual

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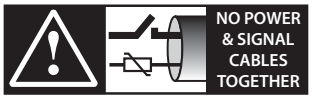
READ AND SAVE THESE INSTRUCTIONS



READ CAREFULLY IN THE TEXT!

Connected Efficiency

WARNINGS

CAREL bases the development of its products on decades of experience in HVAC, on the continuous investments in technological innovations to products, procedures and strict quality processes with in-circuit and functional testing on 100% of its products, and on the most innovative production technology available on the market. CAREL and its subsidiaries nonetheless cannot guarantee that all the aspects of the product and the software included with the product respond to the requirements of the final application, despite the product being developed according to start-of-the-art techniques. The customer (manufacturer, developer or installer of the final equipment) accepts all liability and risk relating to the configuration of the product in order to reach the expected results in relation to the specific final installation and/or equipment. CAREL may, based on specific agreements, acts as a consultant for the correct commissioning of the final unit/application, however in no case does it accept liability for the correct operation of the final equipment/system.

The CAREL product is a state-of-the-art product, whose operation is specified in the technical documentation supplied with the product or can be downloaded, even prior to purchase, from the website www.carel.com.
Each CAREL product, in relation to its advanced level of technology, requires setup / configuration / programming / commissioning to be able to operate in the best possible way for the specific application. Failure to complete such operations, which are required/indicated in the user manual, may cause the final product to malfunction; CAREL accepts no liability in such cases.
Only qualified personnel may install or carry out technical service on the product. The customer must only use the product in the manner described in the documentation relating to the product.

In addition to observing any further warnings described in this manual, the following warnings must be heeded for all CAREL products:

- prevent the electronic circuits from getting wet. Rain, humidity and all types of liquids or condensate contain corrosive minerals that may damage the electronic circuits. In any case, the product should be used or stored in environments that comply with the temperature and humidity limits specified in the manual;
- do not install the device in particularly hot environments. Too high temperatures may reduce the life of electronic devices, damage them and deform or melt the plastic parts. In any case, the product should be used or stored in environments that comply with the temperature and humidity limits specified in the manual;
- do not attempt to open the device in any way other than described in the manual;
- do not drop, hit or shake the device, as the internal circuits and mechanisms may be irreparably damaged;
- do not use corrosive chemicals, solvents or aggressive detergents to clean the device;
- do not use the product for applications other than those specified in the technical manual.

All of the above suggestions likewise apply to the controllers, serial boards, programming keys or any other accessory in the CAREL product portfolio.
CAREL adopts a policy of continual development. Consequently, CAREL reserves the right to make changes and improvements to any product described in this document without prior warning.
The technical specifications shown in the manual may be changed without prior warning.

The liability of CAREL in relation to its products is specified in the CAREL general contract conditions, available on the website www.carel.com and/or by specific agreements with customers; specifically, to the extent where allowed by applicable legislation, in no case will CAREL, its employees or subsidiaries be liable for any lost earnings or sales, losses of data and information, costs of replacement goods or services, damage to things or people, downtime or any direct, indirect, incidental, actual, punitive, exemplary, special or consequential damage of any kind whatsoever, whether contractual, extra-contractual or due to negligence, or any other liabilities deriving from the installation, use or impossibility to use the product, even if CAREL or its subsidiaries are warned of the possibility of such damage.

Warranty on materials: 2 years (from the date of production, excluding consumables).

Certification: the quality and safety of CAREL products are guaranteed by the ISO 9001 certified design and production system.

Pressure sensors-transducers

Series	D Series Female	C Series Female	C Series Male for CO2	D Series Male
Photo				
Refrigerant compatibility	R12, R22, R134a, R404a, R407c, R410a, R502, R507, R744(CO2) R600, R600a, R290, R1270, R1234yf, R1234ze(e), R32, R407A, R407F, R447A, R448A, R449A, R450A, R452A, R452B, R454B, R455, R513A, R407H. Not compatible with R717 (ammonia), not suitable to be used with glycol-water mixtures.	All refrigerants compatible with AISI 316L stainless steel	All refrigerants compatible with AISI 316L stainless steel	R12, R22, R134a, R404a, R407c, R410a, R502 , R507, R744(CO2) R600, R600a, R290, R1270, R1234yf, R1234ze(e), R32, R407A, R407F, R447A, R448A, R449A, R450A, R452A, R452B, R454B, R455, R513A, R407H. Not compatible with R717 (ammonia), not suitable to be used with glycol-water mixtures.
Pressure range	From 7 barg / 101.5 psig / 700 kPag to 60 barg / 870.2 psig / 6000 kPag	From 7 barg / 101.5 psig / 700 kPag to 60 barg / 870.2 psig / 6000 kPag	120 bar / 1740.4 psig / 12000 kPag and 150 bar / 2175.6 psig / 15000 kPag	From 7 barg / 101.5 psig / 700 kPag to 30 barg / 435.1 psig / 3000 kPag
Operating temperature	-40T125°C	-40T125°C	-40T100°C	-40T125°C
Fluid temperature	-40T125°C	-40T120°C	-20T120°C	-40T125°C
Output signal	4-20 mA	4-20 mA	4-20 mA	4-20 mA
Power supply	8 to 32 Vdc (protected against polarity reversal)	8 to 28 Vdc (protected against polarity reversal)	8 to 28 Vdc (protected against polarity reversal)	8 to 32 Vdc (protected against polarity reversal)
Electrical connector	Male, 3-pin Metri-Pack 150	Male, 3-pin Metri-Pack 150	Male, 3-pin Metri-Pack 150	Cable harness
Index of protection	IP55 or IP67, depending on the connector plugged in. For more details, see the SPKC****** accessory table.	IP55 or IP67, depending on the connector plugged in. For more details, see the SPKC****** accessory table.	IP55 or IP67, depending on the connector plugged in. For more details, see the SPKC****** accessory table	IP67
Accuracy (including linearity, hysteresis, repeatability, calibration error) static error @25°C at 5.0 or 24 Vdc	±1% FS (including linearity, hysteresis, repeatability, calibration error) static error @25°C, 24 Vdc	N/A	N/A	±1% FS (including linearity, hysteresis, repeatability, calibration error) static error @25°C, 24 Vdc
Material in contact with refrigerant	AISI 316L stainless steel (housing), ceramic (measurement cell) and chloroprene rubber (gasket)	AISI 316L stainless steel	AISI 316L stainless steel	AISI 316L stainless steel (housing), ceramic (measurement cell) and chloroprene rubber (gasket)
Mechanical connection	Female, 7/16"-20UNF - 45° flare	Female, 7/16"-20UNF - 45° flare	Male, ¼" gas (with water-resistant and oil-resistant gasket)	Male, 7/16"-20UNF - 45° flare
Compliance	REACH RoHS CE	REACH RoHS CE	REACH RoHS CE	REACH RoHS CE
UL certified	File E493623 (P/N SPKT00G1D0 NOT included)	File E198839	File E198839	File E493623

C Series Male	S Series Female	P Series Female	P Series Female IP69K	P Series Welded IP69K
				
All refrigerants compatible with AISI 316L stainless steel	All refrigerants compatible with AISI 316L stainless steel	R12, R22, R134A, R404A, R407C, R410A, R448A, R449A, R452A, R502, R507, R513A, R744, HFO 1234ze, R290, R32, water (temperature >3°C). Not compatible with R717 (ammonia), not suitable to be used with glycol-water mixtures.	R12, R22, R134A, R404A, R407C, R410A, R448A, R449A, R452A, R502, R507, R513A, R744, HFO 1234ze, R290, R32, water (temperature >3°C). Not compatible with R717 (ammonia), not suitable to be used with glycol-water mixtures.	R12, R22, R134A, R404A, R407C, R410A, R448A, R449A, R452A, R502, R507, R513A, R744, HFO 1234ze, R290, R32, water (temperature >3°C). Not compatible with R717 (ammonia), not suitable to be used with glycol-water mixtures.
From 7 barg / 101.5 psig / 700 kPag to 30 barg / 435.1 psig / 3000 kPag	From 4.2 barg / 61 psig / 420 kPag to 90 barg / 1305.3 psig / 9000 kPag	From 4.2 barg / 61 psig / 420 kPag to 45 barg / 652.7 psig / 4500 kPag	From 4.2 barg / 61 psig / 420 kPag to 45 barg / 652.7 psig / 4500 kPag	From 4.2 barg / 61 psig / 420 kPag to 45 barg / 652.7 psig / 4500 kPag
-40T80°C	-40T135°C	-40T135°C	-40T135°C	-40T135°C
-40T120°C	-40T135°C	-40T135°C	-40T135°C	-40T135°C
4-20 mA	0.5-4.5 Vdc ratiometric	0.5-4.5 Vdc ratiometric	0.5-4.5 Vdc ratiometric	0.5-4.5 Vdc ratiometric
8 to 28 Vdc (protected against polarity reversal)	5 Vdc ±10% (protected against polarity reversal)	5 Vdc ±10% (protected against polarity reversal)	5 Vdc ±10% (protected against polarity reversal)	5 Vdc ±10% (protected against polarity reversal)
Cable harness	Male, 3-pin Metri-Pack 150	Male, 3-pin Metri-Pack 150	Male, 3-pin Metri-Pack 150	Male, 3-pin Metri-Pack 150
IP67	IP55, IP67 depending on the connector plugged in; for more details, see the sensor table and SPKC****** accessory table.	IP55, IP67 depending on the connector plugged in; for more details, see the sensor table and SPKC****** accessory table.	IP69K, with IP69K cable (SPKC***2*) plugged in only; for more details, see the sensor table and SPKC***** accessory table.	IP69K, with IP69K cable (SPKC***2*) plugged in only; for more details, see the sensor table and SPKC***** accessory table.
N/A	N/A	±1.2% FS	±1.2% FS	±1.2% FS
AISI 316L stainless steel	AISI 316L stainless steel	Ceramic, brass and HNBR O-ring	Ceramic, brass and HNBR O-ring	Ceramic, brass and HNBR O-ring
Male, 7/16"-20UNF - 45° flare	Female, 7/16"-20UNF - 45° flare	Female, 7/16"-20UNF - 45° flare	Female, 7/16"-20UNF - 45° flare	Brass tube Ø 6.35mm ±0.05 mm
REACH RoHS CE	REACH RoHS CE	REACH RoHS CE	REACH RoHS CE	REACH RoHS CE
File E198839	File E198839	File E493623	File E493623	File E493623

Contents

1. D Series Female

1.1 Technical specifications - D Series Female

Carel type D pressure transducers use piezoresistive technology, with a 4 to 20 mA current output and AISI 316L stainless steel housing. Compatible also with the latest refrigerants (HFO & HC with low GWP & ODP).
Not compatible with ammonia.
This series is excluded from the scope of the Pressure Equipment Directive 2014/68/EU (the sensor itself does not have a safety function).

Electrical	
Power supply (protected against polarity reversal)	8 to 32 Vdc
Power supply overvoltage	36Vdc
Maximum reverse voltage	-28 Vdc
Output current	4-20 mA
Output load	RL≤500 Ω
Response time	≤10 ms, 0~99% FS
Insulation resistance	100 MΩ @ 50 V
Dielectric strength	500 V 60"
Electrical connector	Male, 3-pin Metri-Pack 150
Cable	see SPKC****** accessory

Performance	
Operating temperature	-40T125°C
Operating humidity	0-90%rH
Compensation temperature	0T80°C
Fluid temperature	-40T125°C
Storage temperature	-40T135°C
Ingress protection	IP55 or IP67, depending on the connector plugged in. For more details, see the SPKC****** accessory table
Accuracy (including linearity, hysteresis, repeatability, calibration error)	±1% FS static error @25°C, 24 Vdc
Total error band (including linearity, hysteresis, repeatability, calibration error) relative to all operating temperature and humidity values @ 5.0 or 24 Vdc	±2.0% FS at 24 Vdc (0 to 80°C) ±3.0% FS at 24 Vdc (-40 to 125°C)
Life cycle	10 million cycles at FS

Physical	
Vibrations IEC 60068-2-64	5-2000 Hz / 10 g - in direction x - y - z
Shock IEC 60068-2-27	10 g sinusoidal, 11 ms
Drop from any axis	1.0 m (falling from 1 metre high)
Material in contact with refrigerant	• AISI 316L stainless steel (housing), • Ceramic (measurement cell) • Chloroprene rubber (gasket)
Housing	AISI 316L stainless steel
Tightening torque	12 to 16 Nm
Mechanical connection	Female, 7/16"-20UNF - 45° flare
Pressure range	From 7 barg to 60 barg
Over pressure	1.5 times pressure range, see table
Burst pressure	3 times pressure range, see table
Refrigerant compatibility *Not compatible with R717 (ammonia),* *not suitable to be used with glycol-water mixtures.*	R12, R22, R134a, R404a, R407c, R410a, R502 , R507, R744(CO2) R600, R600a, R290, R1270, R1234yf, R1234ze(e), R32, R407A, R407F, R447A, R448A, R449A, R450A, R452A, R452B, R454B, R455, R513A, R407H.
Vacuum pressure (referred to refrigerant circuit)	0.95 bar, 95 kPa (absolute)
Weight	62 g (net weight)

EMC	
Electrostatic discharges: EN 61000-4-2	15 kV (in air)
Radiated immunity: EN 61000-4-3	80 MHz to 2 GHz, 10 V/m; 2 GHz to 2.7 GHz, 10 V/m
Burst: EN 61000-4-4	2 kV
Surge: EN 61000-4-5	2 kV
Immunity to conducted radio-frequency disturbance: EN 61000-4-6	9 kHz to 80 MHz, 3 V
Magnetic fields at power supply frequency: EN 61000-4-8	30 A/m (impulsive magnetic fields)

Compliant with:	
Compliance	• REACH • RoHS • CE
UL certified	File E493623 (P/N SPKT00G1D0 NOT included)

Part numbers

P/N	Pressure (psi)		Pressure (bar)		Pressure (kPa)		over range			burst pressure		
	4 mA	20 mA	4 mA	20 mA	4 mA	20 mA	psi	bar	kPa	psi	bar	kPa
SPKT0021D0	-8	100	-0.5	7	-50	700	150	10.5	1050	300	21	2100
SPKT0011D0	0	145	0	10	0	1000	217.5	15	1500	435	30	3000
SPKT0041D0	0	260	0	18.2	0	1820	390	27.3	2730	780	54.6	5460
SPKT0031D0	0	435	0	30	0	3000	652.5	45	4500	1305	90	9000
SPKT00B1D0	0	650	0	44.8	0	4480	975	67.2	6720	1950	134.4	13440
SPKT00G1D0	0	870	0	60	0	6000	1305	90	9000	2610	180	18000

Notes

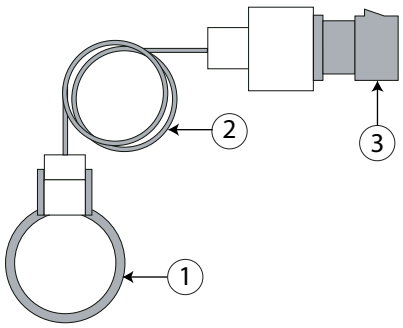
Measurement type: Sealed gauge

Full span definition: FS (full span) = MAX output - MIN output = 16 mA

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.

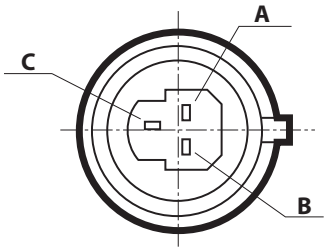
Installation



1	Evaporation pipe
2	Capillary tube
3	Pressure sensor-transducer

Use capillary tubes, do not use sealing glue or copper gaskets for mechanical connection

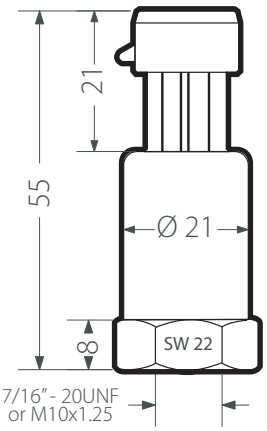
Electrical connection diagram



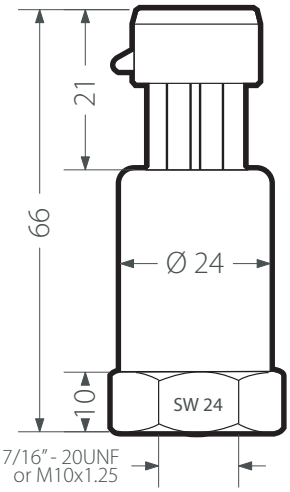
A	Not used
B	Power supply
C	I out

Dimensions

From 7 to 44.8bar



60bar SPKT00G1D0



2. C Series Female

2.1 Technical specifications - C Series Female

Carel type C pressure transducers are highly accurate products that use piezoresistive technology, with a 4 to 20 mA current output and AISI 316L stainless steel housing. Excellent EMC features make these sensors suitable for the harshest environments. Usable with all refrigerants compatible with AISI 316L stainless steel, also with latest low GWP & ODP fluids, including HFOs, HCs and natural (e.g. ammonia, CO_2). This series is excluded from the scope of the Pressure Equipment Directive 2014/68/EU (the sensor itself does not have a safety function).

Electrical	
Power supply (protected against polarity reversal)	8 to 28 Vdc
Output current	4-20 mA
Output load	< (U-8 V) / 0.025 A
Response time	<5 ms, 0~99% FS
Insulation resistance	> 10 MΩ @ 300 VDC
Electrical connector	Male, 3-pin Metri-Pack 150
Cable	See SPKC****** accessory

Performance	
Operating temperature	-40T125°C
Compensation temperature	not available
Fluid temperature	-40T120°C
Storage temperature	-40T120°C
Ingress protection	IP55 or IP67, depending on the connector plugged in. For more details, see SPKC****** accessory table.
Total error band (including linearity, hysteresis, repeatability, calibration error) relative to all operating temperature and humidity values @ 5.0 or 24 Vdc	±1% FS at 24 Vdc (0T50°C) ±2% FS at 24 Vdc (-20T80°C) ±4% FS at 24 Vdc (-40T120°C)
Life cycle	> 10 million cycles, 0-100% FS at 25°C

Physical	
Vibrations IEC 60068-2-64	5-2000 Hz / 10 g - in direction x - y - z
Shock IEC 60068-2-27	20g sinusoidal, 11 ms
Drop from any axis	1.0 m (falling from 1 metre high)
Material in contact with refrigerant	AISI 316L stainless steel
Housing	AISI 316L stainless steel
Tightening torque	12 to 16 Nm
Mechanical connection	Female, 7/16"-20UNF - 45° flare
Pressure range	From 7 barg to 60 barg
Over pressure	2 times pressure range, see table
Burst pressure	See table
Refrigerant compatibility	All refrigerants compatible with AISI 316L stainless steel
Weight	45g (net weight)

Certification	
UL recognised	File E198839

Compliant with:	
Compliance	• REACH • RoHS • CE
UL certified	File E198839

Part numbers

P/N [1]	Pressure (psi)		Pressure (bar)		Pressure (kPa)		over range			burst pressure		
	4 mA	20 mA	4 mA	20 mA	4 mA	20 mA	psi	bar	kPa	psi	bar	kPa
SPKT0021C*	-8	100	-0.5	7	-50	700	210	15	1500	7680	530	53000
SPKT0011C*	0	145	0	10	0	1000	290	20	2000	7680	530	53000
SPKT0041C*	0	260	0	18.2	0	1820	580	40	4000	7680	530	53000
SPKT0031C*	0	435	0	30	0	3000	870	60	6000	7680	530	53000
SPKT00B1C*	0	650	0	44.8	0	4480	1160	80	8000	7680	530	53000
SPKT00G1C*	0	870	0	60	0	6000	1740	120	12000	7680	530	53000

Note:

[1]: 0 = single package; 3= retail market package;

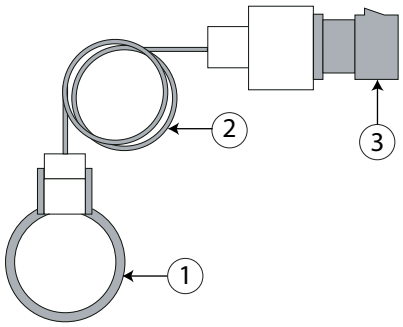
[2]: with built-in connector;

Notes

Measurement type	Sealed gauge
Full span definition	FS (full span) = MAX output - MIN output = 16 mA
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.

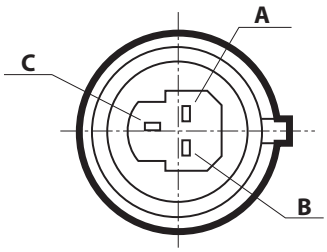
Installation



1	Evaporation pipe
2	Capillary tube
3	Pressure sensor-transducer

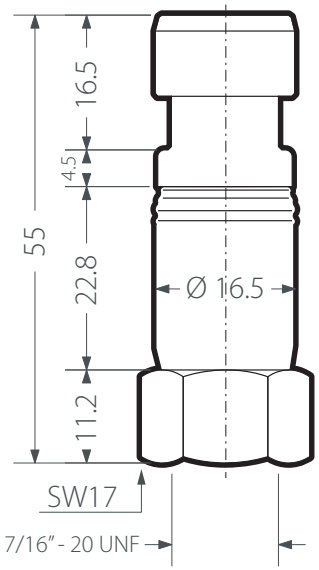
Use capillary tubes, do not use sealing glue or copper gaskets for mechanical connection

Electrical connection diagram



A	Not used
B	Power supply
C	I out

Dimensions



3. C Series Male for CO2

3.1 Technical specifications - C Series Male "High Pressure, ideal for CO_2"

Carel type C pressure transducers are highly accurate products that use piezoresistive technology, with a 4 to 20 mA current output and AISI 316L stainless steel housing. Excellent EMC features make these sensors suitable for the harshest environments. Usable with all refrigerants compatible with AISI 316L stainless steel, also with latest low GWP & ODP fluids, including HFOs, HCs and natural (e.g. ammonia, CO2). This series is excluded from the scope of the Pressure Equipment Directive 2014/68/EU (the sensor itself does not have a safety function).

Electrical	
Power supply (protected against polarity reversal)	8 to 28 Vdc
Output current	4-20 mA
Output load	< (U-8 V) / 0.025 A
Response time	<10ms, 0~99% FS
Insulation resistance	> 10 MΩ @ 50 VDC
Electrical connector	Male, 3-pin Metri-Pack 150
Cable	See SPKC****** accessory

Performance	
Operating temperature	-40T100°C
Fluid temperature	-20T120°C
Storage temperature	-20T120°C
Ingress protection	IP55 or IP67, depending on the connector plugged in. For more details, see SPKC****** accessory table.
Total error band (including linearity, hysteresis, repeatability, calibration error) relative to all operating temperature and humidity values @ 5.0 or 24 Vdc	±1% FS at 24 Vdc (0T50°C) ±2% FS at 24 Vdc (0T80°C) ±4% FS at 24 Vdc (-40T100°C)
Life cycle	> 10 million cycles, 0-100% FS at 25°C

Physical	
Vibrations IEC 60068-2-64	5-2000 Hz / 10 g - in direction x - y - z
Shock IEC 60068-2-27	20g sinusoidal, 11 ms
Drop from any axis	1.0 m (falling from 1 metre high)
Material in contact with refrigerant	AISI 316L stainless steel
Housing	AISI 316L stainless steel
Tightening torque	12 to 16 Nm
Mechanical connection	Male, ¼" gas (with water-resistant and oil-resistant gasket)
Pressure range	120 bar and 150 bar
Over pressure	2 times pressure range, see table
Burst pressure	see table
Refrigerant compatibility	All refrigerants compatible with AISI 316L stainless steel
Weight	55g (net weight)

Certification	
UL recognised	File E198839

Compliant with:	
Compliance	• REACH • RoHS • CE
UL certified	File E198839

Part numbers

P/N	Pressure (psi)		Pressure (bar)		Pressure (kPa)		over range			burst pressure		
	4 mA	20 mA	4 mA	20 mA	4 mA	20 mA	psi	bar	kPa	psi	bar	kPa
SPKT00D8C0	0	2175	0	150	0	15000	7680	530	30000	7680	530	53000
SPKT00H8C0	0	1740	0	120	0	12000	7680	530	30000	7680	530	53000

Notes

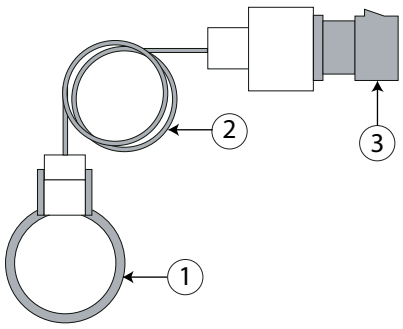
Measurement type: Sealed gauge

Full span definition: FS (full span) = MAX output - MIN output = 16 mA

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.

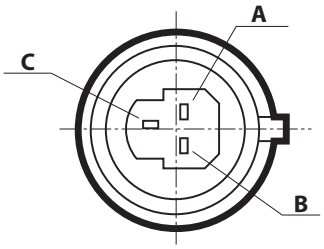
Installation



1	Evaporation pipe
2	Capillary tube
3	Pressure sensor-transducer

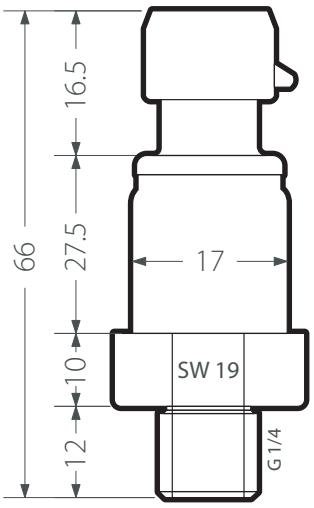
⚠ *Use capillary tubes, do not use sealing glue or copper gaskets for mechanical connection*

Electrical connection diagram



A	Not used
B	Power supply
C	I out

Dimensions



4. D Series Male

4.1 Technical specifications - D Series Male

Carel type D pressure transducers use piezoresistive technology, with a 4 to 20 mA current output and AISI 316L stainless steel housing. Compatible also with the latest refrigerants (HFO & HC with low GWP & ODP).
Not compatible with ammonia. This series is excluded from the scope of the Pressure Equipment Directive 2014/68/EU (the sensor itself does not have a safety function).

Electrical	
Power supply (protected against polarity reversal)	8 to 32 Vdc
Power supply overvoltage	36Vdc
Maximum reverse voltage	-28 Vdc
Output current	4-20 mA
Output load	RL≤500 Ω
Response time	≤10 ms, 0~99% FS
Insulation resistance	100 MΩ @50 V
Dielectric strength	500 V 60"
Electrical connector	Cable harness
Cable	2 m long, double insulation, grey coloured outer insulation, white and brown coloured inner wire insulation, halogen- and silicone-free.

Performance	
Operating temperature	-40T125°C
Operating humidity	0-90%rH
Compensation temperature	0T80°C
Fluid temperature	-40T125°C
Storage temperature	-40T135°C
Ingress protection	IP67
Accuracy (including linearity, hysteresis, repeatability, calibration error)	±1% FS - static error @25°C, 24 Vdc
Total error band (including linearity, hysteresis, repeatability, calibration error) relative to all operating temperature and humidity values @ 5.0 or 24 Vdc	±2.0% FS at 24 Vdc (0 To 80°C) ±3.0% FS at 24 Vdc (-40 To 125°C)
Life cycle	10 million cycles at FS

Physical	
Vibrations IEC 60068-2-64	5-2000 Hz / 10 g - in direction x - y - z
Shock IEC 60068-2-27	10 g sinusoidal, 11 ms
Drop from any axis	1.0 m (falling from 1 metre high)
Material in contact with refrigerant	AISI 316L stainless steel (housing), ceramic (measurement cell) and chloroprene rubber (gasket)
Housing	AISI 316L stainless steel
Tightening torque	12 to 16 Nm
Mechanical connection	Male, 7/16"-20UNF - 45° flare
Pressure range	From 7 barg to 30 barg
Over pressure	1.5 times pressure range, see table
Burst pressure	3 times pressure range, see table
Refrigerant compatibility	R12, R22, R134a, R404a, R407c, R410a, R502 , R507, R744(CO2) R600, R600a, R290, R1270, R1234yf, R1234ze(e), R32, R407A, R407F, R447A, R448A, R449A, R450A, R452A, R452B, R454B, R455, R513A, R407H. Not compatible with R717 (ammonia), not suitable to be used with glycol-water mixtures.
Vacuum pressure (referred to refrigerant circuit)	0.95 bar, 95 kPa (absolute)
Weight	62 g (net weight)

EMC	
Electrostatic discharges: EN 61000-4-2	15 kV (in air)
Radiated immunity: EN 61000-4-3	80 MHz to 2 GHz, 10 V/m 2 GHz to 2.7 GHz, 10 V/m
Burst: EN 61000-4-4	2 kV
Surge: EN 61000-4-5	2 kV
Immunity to conducted radio-frequency disturbance: EN 61000-4-6	9 kHz to 80 MHz, 3 V
Magnetic fields at power supply frequency: EN 61000-4-8	30 A/m (impulsive magnetic fields)

Compliant with:	
Compliance	• REACH • RoHS • CE
UL certified	File E493623

Part numbers

P/N	Pressure (psi)		Pressure (bar)		Pressure (kPa)		over range			burst pressure		
	4 mA	20 mA	4 mA	20 mA	4 mA	20 mA	psi	bar	kPa	psi	bar	kPa
SPK10000D0	-8	100	-0.5	7	-50	700	150	10.5	1050	300	21	2100
SPK24000D0	-15	340	-1	24	-100	2400	520	36	3600	1020	72	7200
SPK30000D0	0	435	0	30	0	3000	652.5	45	4500	1305	90	9000

Notes: All models are sealed gauge sensors

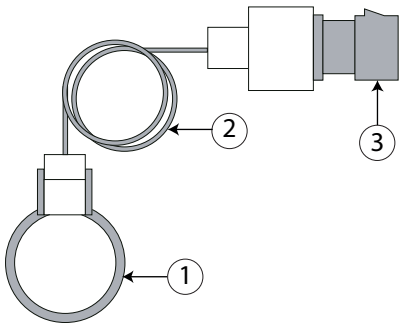
Notes

Full span definition: FS (full span) = MAX output - MIN output = 16 mA

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.

Installation



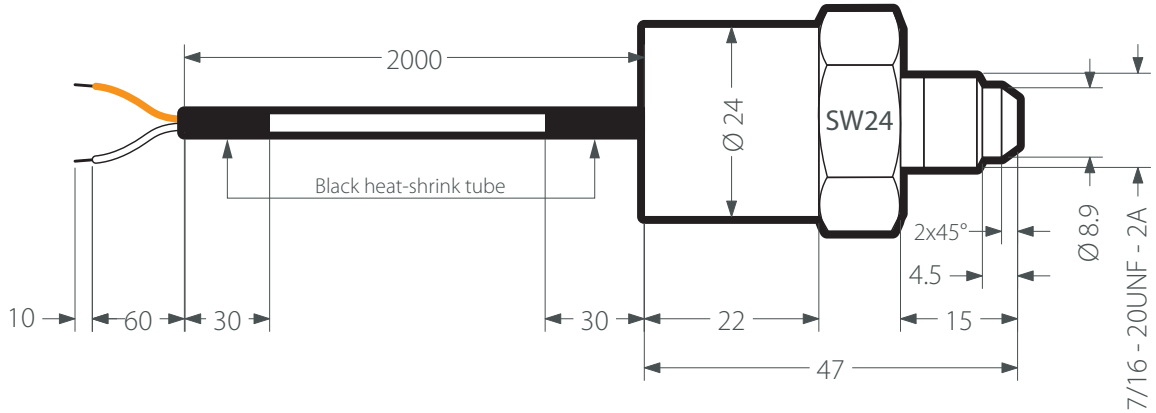
1	Evaporation pipe
2	Capillary tube
3	Pressure sensor-transducer

Use capillary tubes, do not use sealing glue or copper gaskets for mechanical connection

Electrical connection diagram

A	White: I out
B	Brown: Power supply

Dimensions (in millimeters, except thread in inches)



5. C Series Male

5.1 Technical specifications - C Series Male

Carel type C pressure transducers are highly accurate products that use piezoresistive technology, with a 4 to 20 mA current output and AISI 316L stainless steel housing.
Excellent EMC features make these sensors suitable for the harshest environments.
Usable with all refrigerants compatible with AISI 316L stainless steel, also with latest low GWP & ODP fluids, including HFOs, HCs and natural (e.g. ammonia, CO_2). This series is excluded from the scope of the Pressure Equipment Directive 2014/68/EU (the sensor itself does not have a safety function).

Electrical	
Power supply (protected against polarity reversal)	8 to 28 Vdc
Output current	4-20 mA
Output load	< (U-8 V) / 0.025 A
Response time	<5ms, 0~99% FS
Insulation resistance	> 10 MΩ @ 300 VDC
Electrical connector	Cable harness
Cable	2 m long, double insulation, grey coloured outer insulation, white and brown coloured inner wire insulation.

Performance	
Operating temperature	-40T80°C
Fluid temperature	-40T120°C
Storage temperature	-40T120°C
Ingress protection	IP67
Total error band (including linearity, hysteresis, repeatability, calibration error) relative to all operating temperature and humidity values @ 5.0 or 24 Vdc	±1% FS at 24 Vdc (0T50°C) ±2% FS at 24 Vdc (-20T80°C) ±4% FS at 24 Vdc (-40T120°C)
Life cycle	> 10 million cycles, 0-100% FS at 25°C

Physical	
Vibrations IEC 60068-2-64	5-2000 Hz / 10 g - in direction x - y - z
Shock IEC 60068-2-27	20 g sinusoidal, 11 ms
Drop from any axis	1.0 m (falling from 1 metre high)
Material in contact with refrigerant	AISI 316L stainless steel
Housing	AISI 316L stainless steel
Tightening torque	12 to 16 Nm
Mechanical connection	Male, 7/16"-20UNF - 45° flare
Pressure range	From 7 barg to 30 barg
Over pressure	up to 2 times pressure range, see table
Burst pressure	see table
Refrigerant compatibility	All refrigerants compatible with AISI 316L stainless steel
Weight	45 g (net weight)

Certification	
UL recognised	File E198839

Compliant with:	
Compliance	• REACH • RoHS • CE
UL certified	File E198839

Part numbers

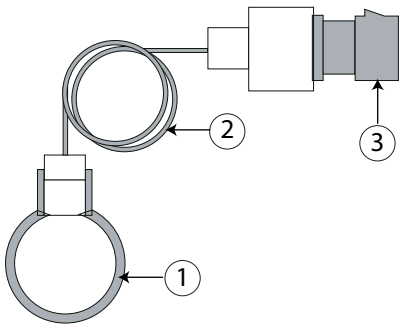
P/N [1]	Pressure (psi)		Pressure (bar)		Pressure (kPa)		over range			burst pressure		
	4 mA	20 mA	4 mA	20 mA	4 mA	20 mA	psi	bar	kPa	psi	bar	kPa
SPK100000*	-8	100	-0.5	7	-50	700	200	14	1400	7680	530	53000
SPK240000*	-15	340	-1	24	-100	2400	520	36	3600	7680	530	53000
SPK250000*	0	360	0	25	0	2500	530	37	3700	7680	530	53000
SPK300000*	0	435	0	30	0	3000	650	45	4500	7680	530	53000

Notes

Measurement type: Sealed gauge
Full span definition: FS (full span) = MAX output - MIN output = 16 mA
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.

Installation



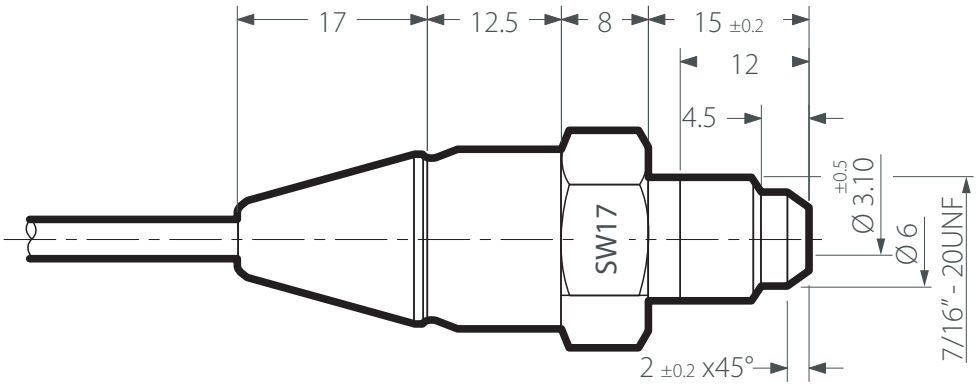
1	Evaporation pipe
2	Capillary tube
3	Pressure sensor-transducer

⚠ *Use capillary tubes, do not use sealing glue or copper gaskets for mechanical connection*

Electrical connection diagram

A	White: I out
B	Brown: Power supply

Dimensions (in millimeters, except thread in inches)



6. S Series Female

6.1 Technical specifications - S Series Female

Carel type S pressure transducers are highly accurate products that use piezoresistive technology, with a 0.5-4.5 ratiometric output and AISI 316L stainless steel housing.
Excellent EMC features make these sensors suitable for the harshest environments.
The electronic parts are hermetically sealed so that the sensor can be installed on the refrigerant pipe (no capillary tube is needed)
Usable with all refrigerants compatible with AISI 316L stainless steel, also with latest low GWP & ODP fluids, including HFOs, HCs and natural (e.g. ammonia, CO2). This series is excluded from the scope of the Pressure Equipment Directive 2014/68/EU (the sensor itself does not have a safety function).

Electrical	
Power supply (protected against polarity reversal)	5 Vdc ±10%
Power supply overvoltage	24 Vdc
Current draw	max 8 mA
Output voltage	0.5-4.5 Vdc ratiometric
Short-circuit protection	yes
Output load	>5 kΩ
Response time	<5 ms, 0~99% FS
Insulation resistance	> 10 MΩ @ 500 VDC
Electrical connector	Male, 3-pin Metri-Pack 150
Cable	See SPKC****** accessory

Performance	
Operating temperature	-40T135°C
Fluid temperature	-40T135°C
Storage temperature	-40T125°C
Ingress protection	IP55 or IP67 depending on the connector plugged in. For more details, see SPKC****** accessory table.
Total error band (including linearity, hysteresis, repeatability, calibration error) relative to all operating temperature and humidity values @ 5.0 or 24 Vdc	±1% FS at 5 Vdc (0T50°C) ±2% FS at 5 Vdc (0T80°C) ±4% FS at 5 Vdc (-40T125°C)
Life cycle	> 10 million cycles, 0-100% FS at 25°C

Physical	
Vibrations IEC 60068-2-64	5-2000 Hz / 10 g - in direction x - y - z
Shock IEC 60068-2-27	20 g sinusoidal, 11 ms
Drop from any axis	1.0 m (falling from 1 metre high)
Material in contact with refrigerant	AISI 316L stainless steel
Housing	AISI 316L stainless steel
Tightening torque	12 to 16 Nm
Mechanical connection	Female, 7/16"-20UNF - 45° flare
Pressure range	From 4.2 barg to 90 barg
Over pressure	2.5 times pressure range, see table
Burst pressure	see table
Refrigerant compatibility	All refrigerants compatible with AISI 316L stainless steel
Vacuum pressure (referred to refrigerant circuit)	not available
Weight	55g (net weight)

EMC

Compliant with:	
Compliance	• REACH • RoHS • CE
UL certified	File E198839

Part numbers

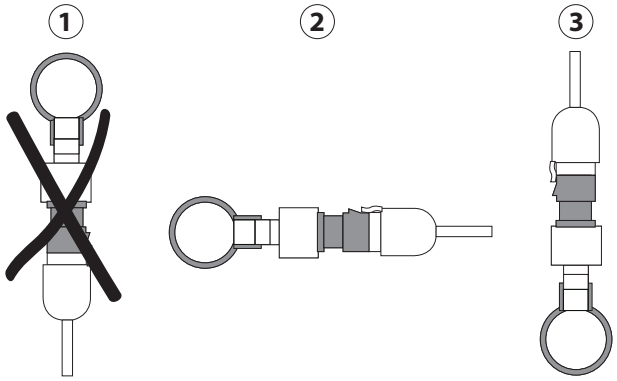
P/N	Pressure (psi)		Pressure (bar)		Pressure (kPa)		over range			burst pressure		
	0.5 V	4.5 V	0.5 V	4.5 V	0.5 V	4.5 V	psi	bar	kPa	psi	bar	kPa
SPKT0051S0	-15	60	-1	4.2	-100	420	152	10.5	1050	6380	440	44000
SPKT0011S0	-15	135	-1	9.3	-100	930	338.7	23.3	2330	6380	440	44000
SPKT00E1S0	-15	185	-1	12.8	-100	1280	464.1	32	3200	6380	440	44000
SPKT0041S0	0	250	0	17.3	0	1730	627.3	43.2	4320	6380	440	44000
SPKT00F1S0	0	300	0	20.7	0	2070	750.6	51.7	5170	6380	440	44000
SPKT0031S0	0	500	0	34.5	0	3450	1251	86.2	8620	6380	440	44000
SPKT00B1S0	0	650	0	45.0	0	4500	1631.7	112.5	11250	6380	440	44000
SPKT00G1S0	0	870	0	60,0	0	6000	2175.6	150	15000	6380	440	44000
SPKT00L1S0	0	1305	0	90,0	0	9000	3263.2	225	22500	6380	440	44000

Notes

Measurement type	Sealed gauge
Full span definition	FS (full span) = MAX output - MIN output = 16 mA
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.

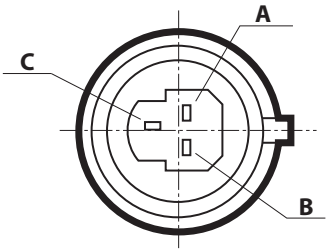
Installation



1	NOT RECOMMENDED
2	RECOMMENDED
3	ACCEPTED

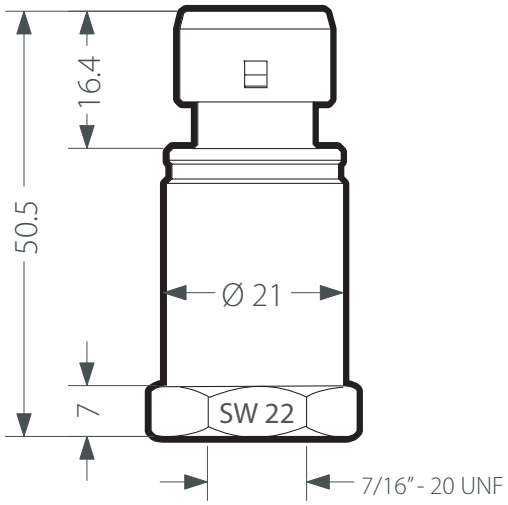
Do not use sealing glue or copper gaskets for mechanical connection

Electrical connection diagram



A	GND
B	Power supply
C	V out

Dimensions



7. P Series Female

7.1 Technical specifications - P Series Female

Carel type P pressure transducers 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 a safety function).

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 5.0 or 24 Vdc	±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 @ 5.0 or 24 Vdc	±1.5% FS at 5 Vdc (0T50°C) ±2.1% FS at 5 Vdc (-40T90°C) ±2.6% FS at 5 Vdc (90T135°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, R502, R507, R513A, 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
UL certified	File E493623

Part numbers

Carel P/N	Pressure (psi)		Pressure (bar)		Pressure (kPa)		Over pressure			Burst pressure		
	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
SPKT0013P* (1)	-15	135	-1	9.3	-100	930	430	30	3000	1595	110	11000
SPKT00E3P* (1)	-15	185	-1	12.8	-100	1280	550	38	3800	1595	110	11000
SPKT0043P* (1)	0	250	0	17.3	0	1730	780	54	5400	1595	110	11000
SPKT00F3P* (1)	0	300	0	20.7	0	2070	900	62	6200	1595	110	11000
SPKT0033P* (1)	0	500	0	34.5	0	3450	1010	70	7000	2494	172	17200
SPKT00B6P* (1)	0	650	0	45	0	4500	1310	91	9100	2494	172	17200

Notes

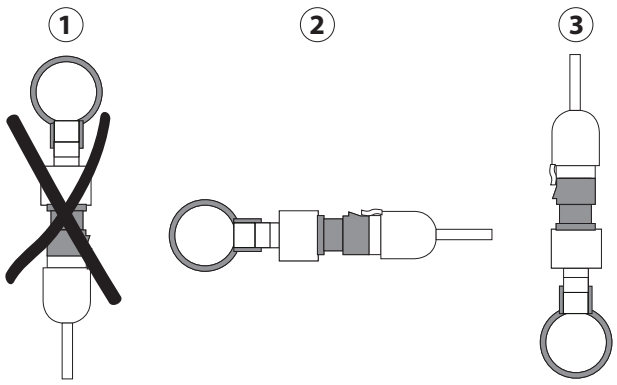
Measurement type: Sealed gauge

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.

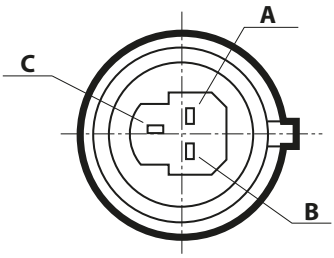
Installation



1	NOT RECOMMENDED
2	RECOMMENDED
3	ACCEPTED

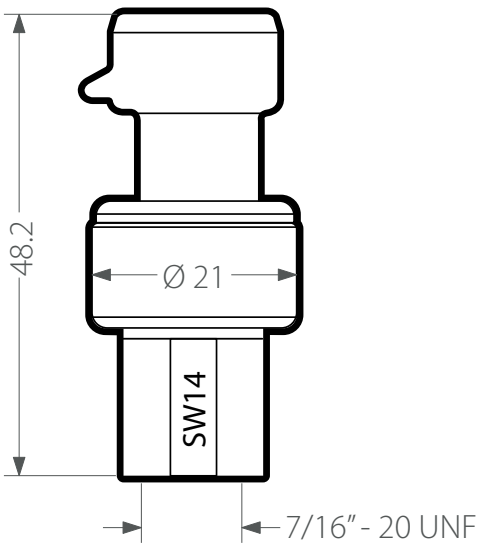
⚠ *Do not use sealing glue or copper gaskets for mechanical connection*

Electrical connection diagram



A	GND
B	Power supply
C	V out

Dimensions



8. P Series Female IP69K

8.1 Technical specifications - P Series Female IP69K

Carel type P pressure transducers 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 a safety function).

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	IP69K, with IP69K cable (SPKC***2*) plugged in only; for more details, see the sensor table and SPKC***** accessory table.
Accuracy (including linearity, hysteresis, repeatability, calibration error) static error @25°C at 5.0 or 24 Vdc	±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 @ 5.0 or 24 Vdc	±1.5% FS at 5 Vdc (0T50°C) ±2.1% FS at 5 Vdc (-40T90°C) ±2.6% FS at 5 Vdc (90T135°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, R502, R507, R513A, 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	±1kV
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
UL certified	File E493623

Part numbers

Carel P/N	Pressure (psi)		Pressure (bar)		Pressure (kPa)		Over pressure			Burst pressure		
	0.5 V	4.5 V	0.5 V	4.5 V	0.5 V	4.5 V	psi	bar	kPa	psi	bar	kPa
SPKT0153P* (1)	-15	60	-1	4.2	-100	420	360	25	2500	1595	110	11000
SPKT0113P* (1)	-15	135	-1	9.3	-100	930	430	30	3000	1595	110	11000
SPKT01E3P* (1)	-15	185	-1	12.8	-100	1280	550	38	3800	1595	110	11000
SPKT0143P* (1)	0	250	0	17.3	0	1730	780	54	5400	1595	110	11000
SPKT01F3P* (1)	0	300	0	20.7	0	2070	900	62	6200	1595	110	11000
SPKT0133P* (1)	0	500	0	34.5	0	3450	1010	70	7000	2494	172	17200
SPKT01B6P* (1)	0	650	0	45	0	4500	1310	91	9100	2494	172	17200

*(1) = 0 single pack, 1 multiple pack 50 pcs, 3 distribution pack

Notes

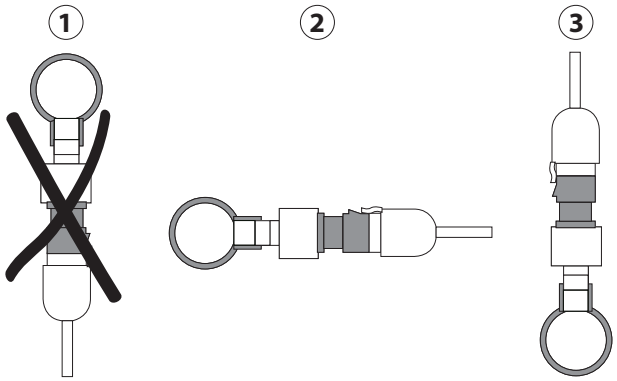
Measurement type: Sealed gauge

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.

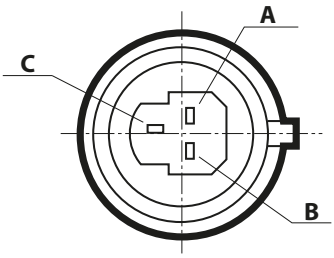
Installation



1	NOT RECOMMENDED
2	RECOMMENDED
3	ACCEPTED

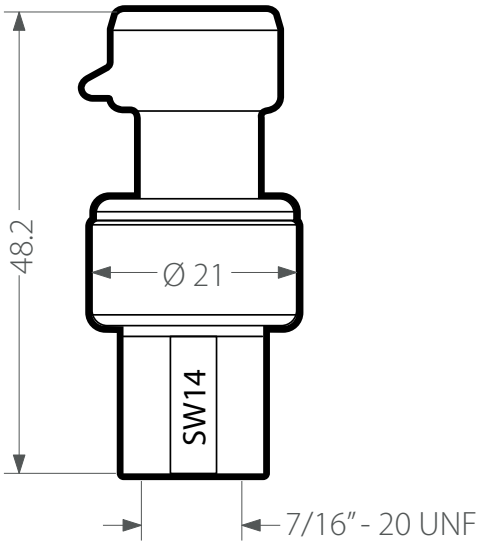
Do not use sealing glue or copper gaskets for mechanical connection

Electrical connection diagram



A	GND
B	Power supply
C	V out

Dimensions



9. P Series Welded IP69K

9.1 Technical specifications - P Series Welded IP69K

Carel type P pressure transducers 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. They also help reduce gas leakages, as screw-on joints are no longer necessary.
These sensors can be directly welded to 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 a safety function).

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	IP69K, with IP69K cable (SPKC***2*) plugged in only; for more details, see the sensor table and SPKC***** accessory table.
Accuracy (including linearity, hysteresis, repeatability, calibration error) static error @25°C at 5.0 or 24 Vdc	±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 @ 5.0 or 24 Vdc	±1.5% FS at 5 Vdc (0T50°C) ±2.1% FS at 5 Vdc (-40T90°C) ±2.6% FS at 5 Vdc (90T135°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	Pipe Ø 6.35 mm
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, R502, R507, R513A, 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	37g (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	±1kV
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
UL certified	File E493623

Part numbers

Carel P/N	Pressure (psi)		Pressure (bar)		Pressure (kPa)		Over pressure			Burst pressure		
	0.5 V	4.5 V	0.5 V	4.5 V	0.5 V	4.5 V	psi	bar	kPa	psi	bar	kPa
SPKS0153P1 [3]	-15	60	-1	4.2	-100	420	360	25	2500	1595	110	11000
SPKS0113P1 [3]	-15	135	-1	9.3	-100	930	430	30	3000	1595	110	11000
SPKS01E3P1 [3]	-15	185	-1	12.8	-100	1280	550	38	3800	1595	110	11000
SPKS0143P1 [3]	0	250	0	17.3	0	1730	780	54	5400	1595	110	11000
SPKS01F3P1 [3]	0	300	0	20.7	0	2070	900	62	6200	1595	110	11000
SPKS0133P1 [3]	0	500	0	34.5	0	3450	1010	70	7000	2494	172	17200
SPKS01B6P1 [3]	0	650	0	45	0	4500	1310	91	9100	2494	172	17200

[3] = multiple pack 25 pcs.

Notes

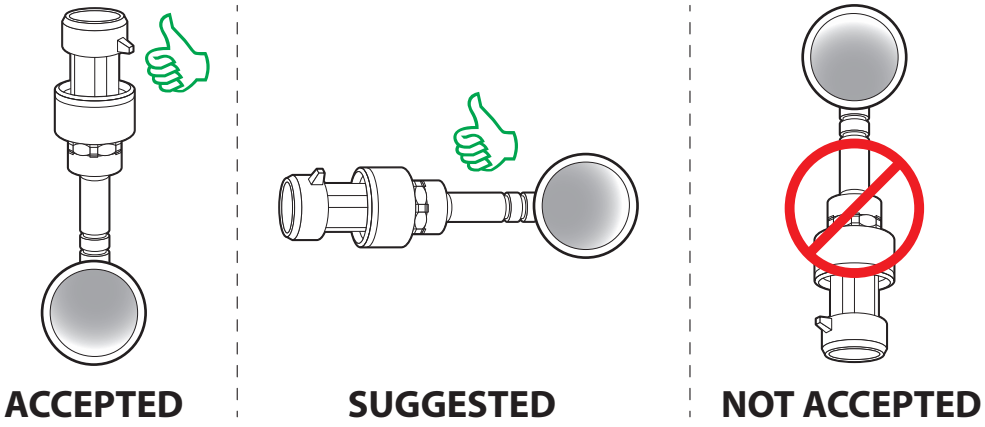
Measurement type: Sealed gauge

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

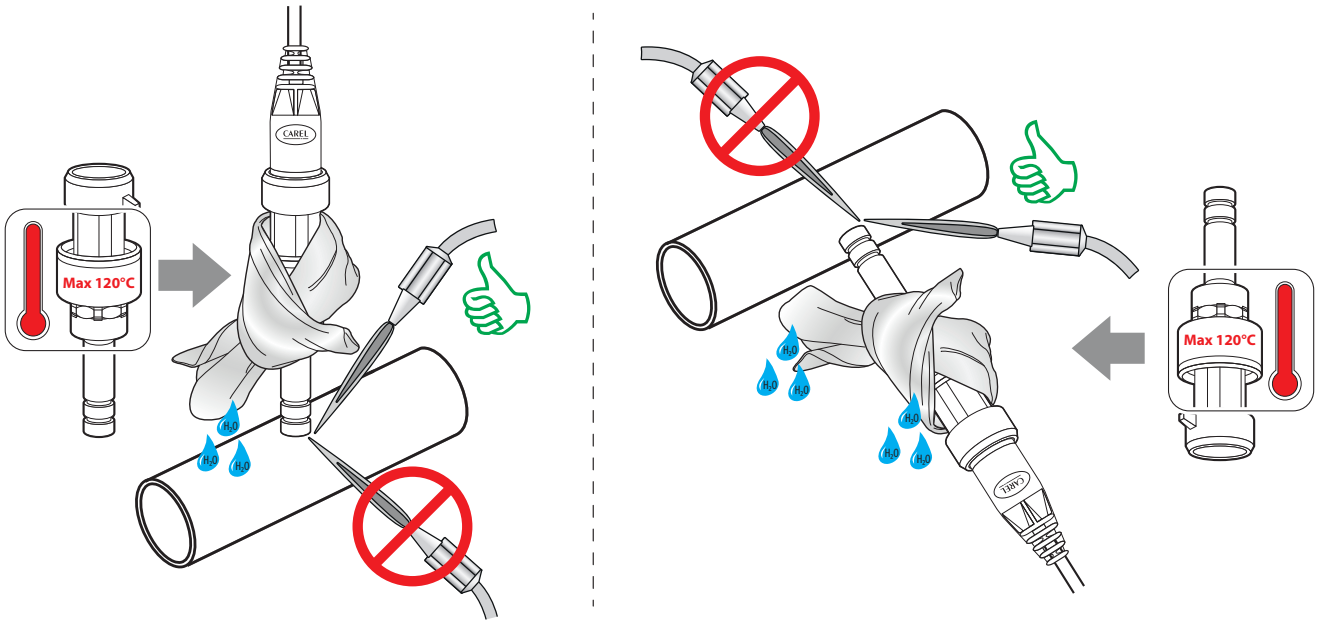
Requirements: Important, for the purpose of protecting the sensor against damage due to inducted overvoltage and incorrect use, it is recommended to proceed as follows.

- **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.

Installation

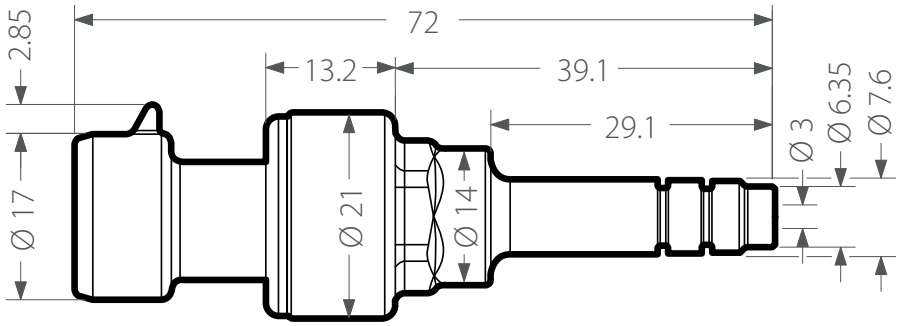


Welding



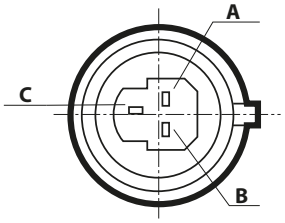
Wrap a wet rag around the sensor body and weld without overheating the sensor, aiming the flame at the end of the pipe.

Dimensions (mm)



Electrical connection diagram

A	GND
B	Power supply
C	V out



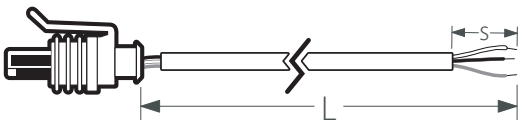
10. Pressure sensor cables

10.1 SPKC Series cables

The SPKC series pressure sensor cables are flexible and feature a PVC insulating sheath with a wide temperature range (from -20°C up to 105°C). These are ideal for use as static internal wiring in electronic equipment. The cables are available in various lengths, in versions with IP55 - IP67 - IP69K Packard connectors. They are used to connect the entire range of Carel SPKT* series pressure sensors (ratiometric and 4-20 mA). A series is available with JST XHP 2- and 3-pin connector for quick connection (where a compatible connector is available).

Caracteristics for all cables		
Nominal voltage (V)	300Vac	
Wire size (mm2)	3 x 0.324mm^2 - AGW22/19	
Operating temperature	-20°C to 105°C	
Wire resistance	≤ 59.4 Ω/km	
Cable insulation	PVC Class 43. Hardness (91 ± 2) Sh-A	
Sheath colour	Grey, RAL 7035	
Wire colours and assignment	Ratiometric sensors: White = V out Black = Power supply Green = GND	4-20 mA sensors: White = I out Black = Power supply Green = Not used
Average sheath thickness	≥0.76 mm - ≥30 mils	
Radius of curvature	≥12 x D	
Cable outside diameter	5.1 mm	
Flame resistance	VW1 – FT-1	
Compliant with standards	UL758 & UL1581	
Delphi-Packard connector specifications		
Pins	3 x 0.35-0.50mm^2	
Material	Nylon	
Model	Female with seal gasket	
Maximum current	14 A	
Operating temperature	-40°C to 105°C	
Colour	Black	

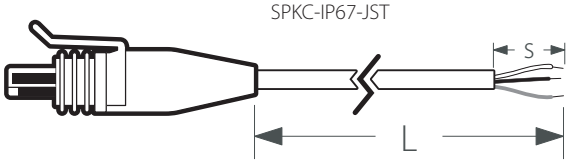
SPKC-IP55



Packard IP protection	IP55
Terminations	Tin-plated terminals

P/N	Length (ref. L)		s (mm)	Min. orderable quantity
	m	inch		
SPKC002300	2	78.7	50	1 pc
SPKC005300	5	196.8	50	1 pc
SPKC00A300	12	472.4	50	1 pc

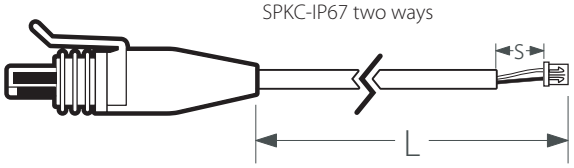
SPKC-IP67-JST



Packard IP protection	IP67 (EN60529)
Terminations	Tin-plated terminals
Moulding material	Thermoplastic polyamide
Colour	Black

P/N	Length (ref. L)		s (mm)	Min. orderable quantity
	m	inch		
SPKC00D311	0.65	25.5	70	50 pc
SPKC00E311	0.83	32.6	70	50 pc
SPKC00B311	1	39.3	150	50 pc
SPKC00C311	1.3	51.1	150	50 pc
SPKC002310	2	78.7	50	1 pc
SPKC002311	2	78.7	50	100 pc
SPKC00M311	3	118	50	10 pc
SPKC00F310	4	157.4	50	1 pc
SPKC005310	5	196.8	50	1 pc
SPKC005311	5	196.8	50	50 pc
SPKC00G310	6.6	259.8	50	1 pc
SPKC00A310	12	472.4	50	1 pc

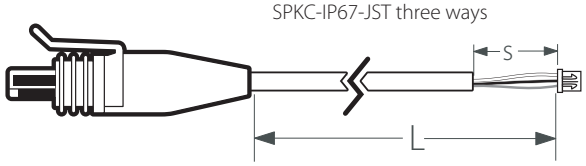
SPKC-IP67 two ways



Packard IP protection	IP67 (EN60529)
Terminations	2-pin JST
Moulding material	Thermoplastic polyamide
Colour	Black
Housing P/N	XHP-2
Pins	2 pins
Pin-to-pin pitch	2.5 mm
Electrical contact P/N	SXH-001T-P0.6
Operating temperature	-25°C to 85°C

P/N	Length (ref. L)		s (mm)	Min. orderable quantity
	m	inch		
SPKC002410	2	78.7	50	1 pc
SPKC005410	5	196.8	50	1 pc

SPKC-IP67-JST three ways



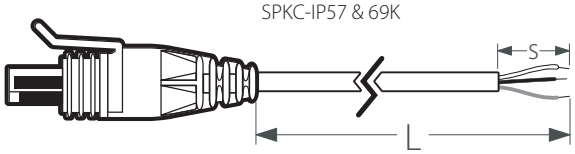
Packard IP protection	IP67 (EN60529)
Terminations	3-pin JST

Moulding material	Thermoplastic polyamide
Colour	Black

Housing P/N	XHP-3
Pins	3 pins
Pin-to-pin pitch	2.5 mm
Electrical contact P/N	SXH-001T-P0.6
Operating temperature	-25°C to 85°C

P/N	Length (ref. L)		s (mm)	Min. orderable quantity
	m	inch		
SPKC002510	2	78.7	50	1 pc
SPKC005510	5	196.8	50	1 pc

SPKC-IP57 & 69K



Packard IP protection	IP67 (EN60529) - IP69K (ISO20653)
Terminations	Tin-plated terminals

Moulding material	TPU
Colour	Red, type 2/R325

P/N	Length (ref. L)		s (mm)	Min. orderable quantity
	m	inch		
SPKC002321	2	78.7	50	10 pc
SPKC005321	5	196.8	50	10 pc
SPKC00A321	12	472.4	50	10 pc
SPKC00Q321	18	708.7	50	10 pc

Note

Note

CAREL

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