PSK221/PSK231

Digital Thermostats for Medium Temperature Refrigerating Units

INSTALLATION AND OPERATING INSTRUCTIONS

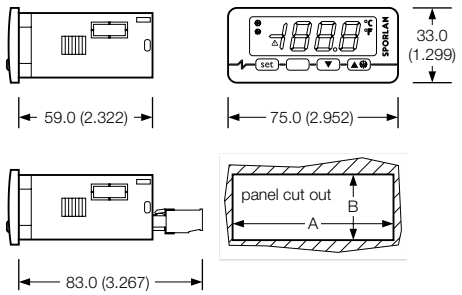
1 GETTING STARTED

1.1 Important

Read these instructions carefully before installing and operating this controller and follow all additional information for installation and electrical connection. Keep this guide for future reference.

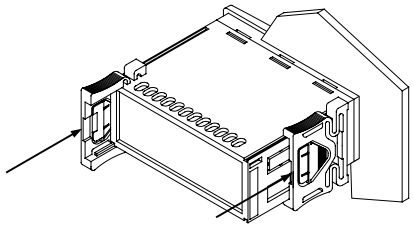
1.2 Installing the controller

Size - mm (inches)



Dimension	Minimum		Typical		Maximum	
	mm	inches	mm	inches	mm	inches
A	71.0	2.79	71.0	2.79	71.8	2.82
B	29.0	1.14	29.0	1.14	29.8	1.17

Installation - Panel mounting, with click brackets (supplied by the builder).



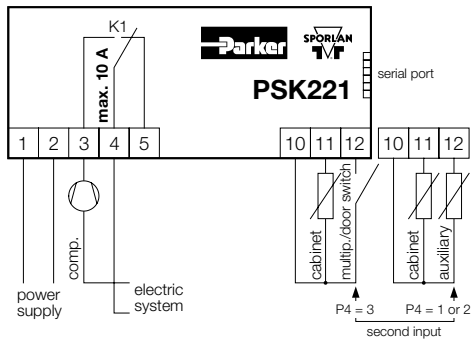
Additional information for installation:

- 59.0 mm (2.322 inches) is the maximum depth with screw terminal blocks
- 83.0 mm (3.267 inches) is the maximum depth with extractable terminal blocks
- the panel thickness must not be greater than 8.0 mm (0.314 in)
- working conditions (working temperature, humidity, etc.) must be between the limits indicated in the technical data
- do not install the controller close to heating sources (heaters, hot air ducts, etc.), devices provided with large magnets (speakers, etc.), locations subject to direct sunlight, rain, humidity, dust, mechanical vibrations or bumps
- according to safety regulations, protection against access to electrical parts must be ensured by a correct installation of the controller; the parts that ensure this protection must be installed so that they can not be removed without the use of a tool.

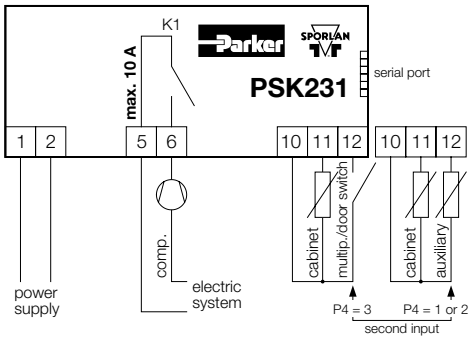
1.3 Wiring diagram

Electrical Connection

PSK221



PSK231



Additional information for electrical connection:

- do not operate on the terminal blocks with electrical screwdrivers/ wrenches
- if the controller has been moved from a cold location to a warm one, condensation may occur on the inside of the unit; wait at least one hour before attempting to power up and use the controller
- make sure that the supply voltage and frequency are correct for the power supply of the controller
- always disconnect power from the unit before servicing it
- this controller is not intended to be used as a safety control device
- please contact your Parker Sporlan Sales Engineer prior to any servicing of this controller.

2 USER INTERFACE

2.1 Turning on/off the controller

The unit is turned on when power is supplied to it, and likewise

turns off when power is removed. Through the digital input it is also possible to turn off the controller remotely via software; in this case the controller remains connected to the power supply and the regulators are turned off.

2.2 The display

If the controller is turned on, during normal operation the display will show the quantity you have set with parameter P5:

- if P5 = 0, the display will show the cabinet temperature
- if P5 = 1, the display will show the working setpoint
- if P5 = 2 or 3, the display will show "- - - -" (reserved)
- if P5 = 4, the display will show the temperature read by the auxiliary probe (only if parameter P4 has value 1 or 2).

2.3 Showing the cabinet temperature

- make sure the keyboard is not locked and no procedure is running
- press and hold ▼ for 2 seconds: the display will show the first available label
- press ▲ or ▼ to select "**Pb1**"
- press set

To quit the procedure:

- press set or do not press any other buttons for 60 seconds
- press ▲ or ▼ as long as the display shows the quantity you have set with parameter P5 or do not press any other buttons for 60 seconds.

2.4 Showing the temperature read by the auxiliary probe (only if parameter P4 has value 1 or 2)

- make sure the keyboard is not locked and no procedure is running
- press and hold ▼ for 2 seconds: the display will show the first available label
- press ▲ or ▼ to select "**Pb3**"
- press set

To quit the procedure:

- press set or do not press any other buttons for 60 seconds
- press ▲ or ▼ as long as the display shows the quantity you have set with parameter P5 or do not press any other buttons for 60 seconds.

If the function of the second input is not for an auxiliary probe (parameter P4 = 0 or 3), the label "**Pb3**" will not be shown.

2.5 Activating the defrost by hand

- make sure the keyboard is not locked and no procedure is running
- press and hold ▲ for 4 seconds.

If the function of the second input is set for an evaporator probe (parameter P4 = 1) and the evaporator temperature is above the one you have set with parameter d2, the defrost will not be activated.

2.6 Locking/unlocking the keyboard

To lock the keyboard:

- make sure no procedure is running
- press and hold set and ▼ for 2 seconds: the display will show "**Loc**" for 1 second.

If the keyboard is locked, you will not be allowed to:

- show the temperature read by the auxiliary probe
- activate defrost by hand
- modify the working setpoint with the procedure related in paragraph 3.1 (also can modify the working setpoint through parameter SP).

Attempting any of these operations will cause the display to show "**Loc**" for 1 second.

To unlock the keyboard:

- press and hold set and ▼ for 2 seconds: the display will show "**UnL**" for 1 second.

2.7 Silencing the alarm

- make sure no procedure is running
- press (do not hold) any button (pressing a button without holding it will not initiate any functions of the controller).

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3 SETTINGS

3.1 Setting the working setpoint

- make sure the keyboard is not locked and no procedure is running
- press set: LED ❄ will flash
- press ▲ or ▼ within 15 seconds; also look at parameters r1, r2 and r3
- press set or do not press any other button for 15 seconds.

You also can modify the working setpoint through parameter SP.

3.2 Setting configuration parameters

To gain access to the procedure:

- make sure no procedure is running
- press and hold ▲ and ▼ for 4 seconds: the display will show "**PA**"
- press set
- press ▲ or ▼ within 15 seconds to set the display to "-**19**"
- press set or do not press any other button for 15 seconds
- press and hold ▲ and ▼ for 4 seconds: the display will show "**SP**".

To select a parameter:

- press ▲ or ▼

To modify a parameter:

- press set
- press ▲ or ▼ within 15 seconds
- press set or do not press any other button for 15 seconds.

To quit the procedure:

- press and hold ▲ and ▼ for 4 seconds or do not press any other button for 60 seconds.

Switch off/on the power supply of the controller after the modification of the parameters.

3.3 Restoring the default value of configuration parameters

- make sure no procedure is running
- press and hold ▲ and ▼ for 4 seconds: the display will show "**PA**"
- press set
- press ▲ or ▼ within 15 seconds to set the display to "**743**"
- press set or do not press any other button for 15 seconds
- press and hold ▲ and ▼ for 4 seconds: the display will show "**dEF**"
- press set
- press ▲ or ▼ within 15 seconds to set the display to "**149**"
- press set or do not press any other buttons for 15 seconds: the display will flash "**dEF**" for 4 seconds, after which the controller will quit the procedure
- switch the controller off then back on after these procedures then confirm that the default values have been reset.

Make sure the default value of the parameters is correct, in particular note if the probes are PTC probes.

4 SIGNALS

4.1 Signals

LED	EXPLANATION
❄	LED compressor if lit, the compressor will be turned on if it flashes: • the modification of the working setpoint will be running • a compressor protection will be running (parameters C0, C1, C2 and i7)
❄	LED defrost if lit, the defrost will be running
⚠	LED alarm if lit, an alarm will be running
°C	LED Celsius degree if lit, the unit of measure of the temperatures will be degrees Celsius (parameter P2)
°F	LED Fahrenheit degree if lit, the unit of measure of the temperatures will be degrees Fahrenheit (parameter P2)

CODE	EXPLANATION
Loc	the keyboard and/or the working setpoint are locked (parameter r3); also look at paragraph 2.6
- - - -	no data available (for example because the probe is not enabled)

5 ALARMS

5.1 Alarms

CODE	EXPLANATION
AL	Low temperature alarm
AH	High temperature alarm
id	Door switch input alarm (only if parameter P4 has value 3 and parameter i0 has value 3)
iA	Multipurpose input alarm (only if parameter P4 has value 3 and parameter i0 has value 0)
iSd	Controller locked alarm (only if parameter P4 has value 3 and parameter i0 has value 0)
COH	Overheated condenser alarm (only if parameter P4 has value 2)
CSd	Compressor locked alarm (only if parameter P4 has value 2)

When the cause of the alarm disappears, the controller restores to normal operation, except for the controller locked alarm (code "**iSd**") and the compressor locked alarm (code "**CSd**"). These alarms can only be reset by switching the power supply to the controller off/on.

6 INTERNAL DIAGNOSTICS

6.1 Internal diagnostics

CODE	EXPLANATION
Pr1	Cabinet probe error
Pr3	Auxiliary probe error (only if parameter P4 has value 1 or 2)

When the cause of the alarm disappears, the controller restores to normal operation.

7 TECHNICAL DATA

7.1 Technical data

Frontal bezel protection: IP 65.

Connections (use copper conductors only): extractable terminal blocks (power supply, inputs and output), 6 pole connector (serial port).

Working temperature: from 0 to 55°C (32 to 131°F, 10 to 90% of relative humidity without condensate).

Power supply: 115 VAC/230 VAC, 50/60 Hz, 3 VA (approximate).

Insulation class: 2.

Alarm buzzer

Measure inputs: 1 (cabinet probe) for PTC/NTC probes.

Digital inputs: 1 (multipurpose/door switch) for NO/NC contact (free of voltage, 5 V 1 mA) also configurable for measure input (evaporator or condenser probe, for PTC/NTC probes).

Working range: from -50.0 to 150.0°C (-50 to 300°F) for PTC probe, from -40.0 to 105.0°C (-40 to 220°F) for NTC probe.

Resolution: 0.1°C/1°C/1°F.

Digital outputs PSK221: 1 relay:
- compressor relay: 16 res. A @ 250 VAC, 5 FLA, 30 LRA (change-over contact).

Digital outputs PSK231: 1 relay:
- compressor relay: 30 res. A @ 250 VAC, 12 FLA, 72 LRA **(NO contact).**

The maximum current allowed on the load is 10 A.

Serial port: port for communication with a management system (through a serial interface, via TTL, with MODBUS communication protocol) or with the programming key.

8 WORKING SETPOINTS and CONFIGURATION PARAMETERS

8.1 Working setpoints

	Minimum	Maximum	U.M.	DEF.	Working Setpoints
	r1	r2	°C/°F	0.0	working setpoints

8.2 Configuration parameters

Parameters	Minimum	Maximum	U.M.	DEF.	Working Setpoints
SP	r1	r2	°C/°F	0.0	working setpoints
Parameters	**Minimum**	**Maximum**	**U.M.**	**DEF.**	**Temperature Inputs**
CA1	-25.0	25.0	°C/°F	0.0	cabinet probe offset
CA3	-25.0	25.0	°C/°F	0.0	auxiliary probe offset (only if P4 = 1 or 2)
P0	0	1	—	1	kind of probe 0 = PTC 1 = NTC
P1	0	1	—	1	display decimal point value during normal operation (Celsius mode only) 1 = YES

8.2 Configuration parameters (continued)

Parameters	Minimum	Maximum	U.M.	DEF.	Temperature Inputs (continued)
P2	0	1	—	0	unit of measure, temperature 0 = °C 1 = °F
P4	0	3	—	3	second input function 0 = input not enabled 1 = measure input (evaporator probe) 2 = measure input (condenser probe) 3 = digital input (multipurpose/door switch input)
P5	0	4	—	0	quantity to show during the normal operation 0 = cabinet temperature 1 = working setpoint 2 = reserved 3 = reserved 4 = temperature read by the auxiliary probe (only if P4 = 1 or 2)
Parameters	**Minimum**	**Maximum**	**U.M.**	**DEF.**	**Setpoints**
r0	0.1	15.0	°C/°F	2.0	working setpoint differential
r1	-99.0	r2	°C/°F	-50.0	minimum working setpoint
r2	r1	99.0	°C/°F	50.0	maximum working setpoint
r3	0	1	—	0	lock the working setpoint (with the procedure related in paragraph 3.1) 1 = YES
r4	0.0	99.0	°C/°F	0.0	temperature increase during Energy Saving function (only if P4 = 3 and i0 = 0); also look at i5
Parameters	**Minimum**	**Maximum**	**U.M.**	**DEF.**	**Compressor Protections**
C0	0	240	min	0	compressor delay after turning on the controller
C1	0	240	min	5	minimum time between two activations in succession of the compressor; also compressor delay from the end of the cabinet probe error
C2	0	240	min	3	minimum time the compressor remains turned off
C3	0	240	s	0	minimum time the compressor remains turned on
C4	0	240	min	10	time the compressor remains turned off during the cabinet probe error; also look at C5
C5	0	240	min	10	time the compressor remains turned on during the cabinet probe error; also look at C4
C6	0.0	199.0	°C/°F	80.0	condenser temperature above which the overheated condenser alarm is activated (only if P4 = 2)
C7	0.0	199.0	°C/°F	90.0	condenser temperature above which the compressor locked alarm is activated (only if P4 = 2)
C8	0	15	min	1	compressor locked alarm delay (only if P4 = 2)
Parameters	**Minimum**	**Maximum**	**U.M.**	**DEF.**	**Defrost**
d0	0	99	h	8	defrost interval; also look at d8 0 = the defrost at intervals will never be activated
d2	-99.0	99.0	°C/°F	2.0	defrost termination temperature (only if P4 = 1)
d3	0	99	min	30	defrost duration if P4 = 0, 2 or 3; defrost maximum duration if P4 = 1 0 = the defrost will never be activated
d4	0	1	—	0	defrost when you turn on the controller 1 = YES
d5	0	99	min	0	defrost delay when you turn on the controller (only if d4 = 1); also look at i5
d6	0	1	—	1	temperature shown during the defrost 0 = cabinet temperature 1 = if, upon activation of defrost, the cabinet temperature is below “working setpoint + r0”, at most “working setpoint + r0”; if, upon activation of defrost, the cabinet temperature is above “working setpoint + r0”, at most the cabinet temperature to the defrost activation
d8	0	2	—	0	kind of defrost interval 0 = the defrost will be activated when the controller has remained turned on for time d0 1 = the defrost will be activated when the compressor has remained turned on for time d0 2 = the defrost will be activated when the evaporator temperature has remained below temperature d9 for time d0 (only if P4 = 1)
d9	-99.0	99.0	°C/°F	0.0	evaporator temperature above which the count of the defrost interval is suspended (only if P4 = 1 and d8 = 2)
Parameters	**Minimum**	**Maximum**	**U.M.**	**DEF.**	**Temperature Alarms**
A0	0	2	—	0	measured input used for the low temperature alarm 0 = cabinet temperature 1 = evaporator temperature 2 = temperature read by the auxiliary probe (only if P4 = 1 or 2)

8.2 Configuration parameters (continued)

Parameters	Minimum	Maximum	U.M.	DEF.	Temperature Alarms (continued)
A1	-99.0	99.0	°C/°F	-10.0	temperature below which the low temperature alarm is activated; also look at A0 and A2
A2	0	2	—	1	kind of lower temperature alarm 0 = alarm not enabled 1 = relative to the working setpoint (or "working setpoint - A1"; consider A1 without sign) 2 = absolute (or A1)
A3	0	1	—	0	measured input used for high temperature alarm 0 = cabinet temperature 1 = temperature read by the auxiliary probe (only if P4 = 1 or 2)
A4	-99.0	99.0	°C/°F	10.0	temperature above which the high temperature alarm is activated; also look at A3 and A5
A5	0	2	—	1	kind of upper temperature alarm 0 = alarm not enabled 1 = relative to the working setpoint (or "working setpoint + A4"; consider A4 without sign) 2 = absolute (or A4)
A6	0	240	min	120	high temperature alarm delay since you turn on the controller (only if A3 = 0)
A7	0	240	min	15	temperature alarm delay
A8	0	240	min	15	high temperature alarm delay since the end of the defrost (only if A3 = 0)
A9	0	240	min	15	high temperature alarm delay since the deactivation of the door switch input (only if P4 = 3 and i0 = 3)
Parameters	**Minimum**	**Maximum**	**U.M.**	**DEF.**	**Digital Inputs (Only if P4 = 3)**
i0	0	3	—	3	kind of digital input 0 = **MULTIPURPOSE INPUT** - in this case look at parameters i1, i5, i7, i8 and i9 1 = **RESERVED** 2 = **RESERVED** 3 = **DOOR SWITCH INPUT** - in this case look at parameters i1, i2 and i3; the activation of the input will turn off the compressor (for at most time i3 or until the input is deactivated)
i1	0	2	—	0	digital input contact type 0 = NO (the input will be active if you close the contact) 1 = NC (the input will be active if you open the contact) 2 = input not enabled
i2	-1	120	min	30	delay before the door switch alarm is activated -1 = no signal
i3	-1	120	min	15	maximum duration of the effect provoked by the activation of the door switch input -1 = the effect will last as long as the input will be deactivated
i5	0	5	—	3	effect provoked by the activation of the multipurpose input 0 = no effect 1 = **SYNCHRONIZING THE DEFROSTS** - after time d5, the defrost will be activated 2 = **ACTIVATING ENERGY SAVING** - Energy Saving function will be activated (until the input is deactivated); also look at r4 3 = **ACTIVATING THE EXTERNAL ALARM** - after time i7, the display will flash the code **"iA"** and the buzzer will be activated (until the input is deactivated) 4 = **ACTIVATING THE COMPRESSOR LOCKOUT** - the compressor will be turned off, the display will flash the code **"iA"** and the buzzer will be activated (until the input is deactivated); also look at i7, i8 and i9 5 = **TURNING OFF THE CONTROLLER** - the controller will be turned off via software (until the input is deactivated); also look at C0, d4 and A6
i7	0	120	min	0	if i5 = 3, delay before the multipurpose input alarm is activated if i5 = 4, compressor delay after the deactivation of the multipurpose input
i8	0	15	—	0	number of multipurpose input alarms such as to provoke the controller locked alarm (only if i5 = 4) 0 = alarm not enabled
i9	1	999	min	240	time without multipurpose input alarms such as to provoke the alarm counter to be cleared (only if i5 = 4)
Parameters	**Minimum**	**Maximum**	**U.M.**	**DEF.**	**Serial Network**
LA	1	247	—	247	controller address
Lb	0	3	—	2	baud rate 0 = 2,400 baud 1 = 4,800 baud 2 = 9,600 baud 3 = 19,200 baud
LP	0	2	—	2	parity 0 = none 1 = odd 2 = even
Parameters	**Minimum**	**Maximum**	**U.M.**	**DEF.**	**Reserved**
E9	0	1	—	0	reserved

⚠WARNING – USER RESPONSIBILITY

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Parker Hannifin Corporation
Sporlan Division
206 Lange Drive, Washington, MO 63090 USA
phone 636 239 1111
fax 636 239 9130
www.sporlan.com