

## Installation guide

# Thermostat Type KPU

060R9771

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### Application

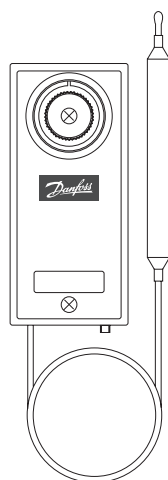
KPU 19 thermostats are used for temperature regulation in refrigeration, freezing, air conditioning, ventilating and heating systems.

KPU 19 thermostats are fitted with Single-Pole Double-Throw (SPDT) or Single-Pole Single-Throw (SPST) contact system.

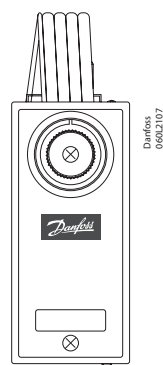
The standard KPU 19 enclosure is rated NEMA ~ 1.  
NEMA ~ 1 is obtained when the thermostat is mounted on a flat surface with all unused holes covered.

### Thermostat bulb types

remote bulb



air coil/room sensor



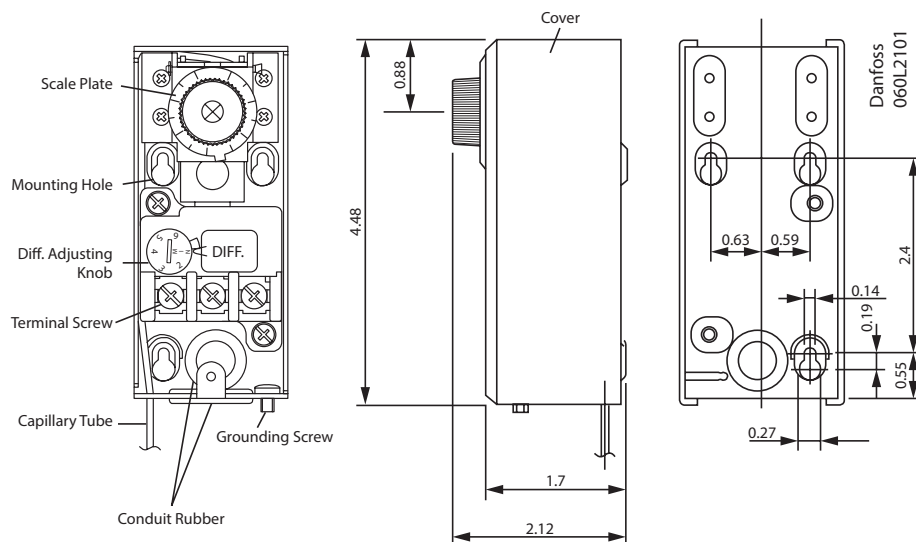
### Important

The KPU 19 thermostat is designed only for use as a temperature regulating operating control. It is the responsibility of the installer to verify that other necessary safety controls are installed and functioning properly as intended by the original equipment manufacturer or system design.

### Product specification

Type	Regulating range [°F]	Differential $\Delta T$ [°F]	Bulb size [in.]	Capillary tube length [in.]	Max. bulb temperature [°F]	Ambient temperature [°F]	Contact type	Reset type	Code no.
KPU 19	-30 – 80	3.6 – 12.6	$\frac{3}{8} \times 4 \frac{1}{2}$	120	140	-31 – 158	SPDT	Auto.	<b>060L2150</b>
KPU 19	-30 – 80	3.6 – 12.6	$\frac{3}{8} \times 4 \frac{1}{2}$	80	140	-31 – 158	SPST (close on temp. rise)	Auto.	<b>060L2151</b>
KPU 19	-30 – 80	3.6 – 12.6	-	Air coil / Room sensor	140	-31 – 140	SPDT	Auto.	<b>060L2152</b>

### Dimensions [in.]

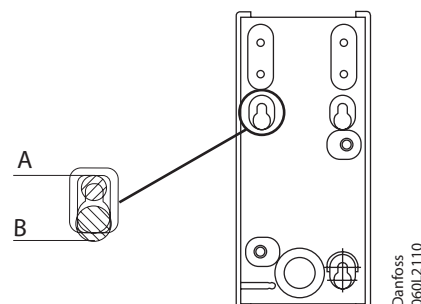


## Installation

Select an accessible location, where the thermostat will not be subject to damage. Mount the KPU 19 on a bracket or on a completely flat surface. Mounting on an uneven surface may cause incorrect thermostat operation. Use only the mounting holes provided at the back of the metal housing.

The KPU 19 thermostat and the sensing bulb can be mounted in any position. The sensing element is filled in with liquid expansion type charging with no limitations in terms of temperature at switch body (TS), temperature at sensing bulb (TB) or temperature at capillary tube (TC). KPU 19 can operate in all following conditions:  
 $TS > TB$ ;  $TS < TB$ ,  $TS = TB$ .  
 Taking into consideration time constant of the thermostat it is recommended to install KPU 19 where temperature is not changing

Do not make additional holes. Locking mounting holes must be fastened at position A as shown in diagram to the right. Fastening at position "B" may result in housing deformation and KPU 19 malfunction.



It is recommended to install the thermostat at a place where vibration is 1G or less.



### Important

Do not dent or deform the bulb of the thermostat, as doing so could damage the bulb and cause charge leakage.  
 Do not turn any other screws except screws on the scale plate, on the micro switch knob and on the terminal block.

## General recommendations for capillary tube and bulb installation:

1. Protect the capillary tube from damage due to vibration.
  - a) When the thermostat unit is mounted directly on the compressor, the capillary tube must be secured to the compressor so that both vibrate together.
  - b) For mounting otherwise, form surplus capillary tube into a loose loop and secure the loop to the base on which the thermostat is mounted.
2. Leave a little slack in the capillary tube to help dampen vibration.

3. Avoid sharp bends (with the radius of  $\frac{1}{2}$ " or less) and bending the capillary tube at the same point several times, as these actions can weaken the material and increase the likelihood of the tube cracking.
4. Bending of the capillary tube within 1.75" from soldering point with bulb is not allowed.
5. Form and locate the capillary tube away from sharp or abrasive objects that might damage it.

6. For thermostats with room sensor coils, make sure that placement allows free airflow around the coil and bulb. At the same time, ensure that the bulb is not exposed to drafts from doors, or to heat radiated from the evaporator surface. Make sure that the bulb does not come into contact with a wall surface. Never mount the thermostat directly on a cold wall. Instead, mount the unit on an insulating plate.

7. KPU 19 sensing bulb is made of copper, copper alloy, silver solder – do not use it for media which are harmful for these materials .

## Wiring

Voltage [V] Amps [A]		P.F. cos Ø	A C	
			120	240
Resistive load		1	0.5 ~ 16	0.5 ~ 8
Inductive load	Full load Amps	0.75	0.5 ~ 16	0.5 ~ 8
	Locked rotor Amps	0.45	96	48

Pilot duty: 125VA; 120/240V AC

## Note:

All wiring should conform to the National Electrical Code and to applicable local regulations. Use only copper wire. Use only the terminal screws furnished in the terminal block. Do not exceed tightening torque of 10 lb. in. (1.18 Nm). Do not exceed the thermostat's specified electrical ratings.

Do not use impact driver(shock driver). The terminal block as well as grounding screw are accessible after removing the front cover.



## Caution

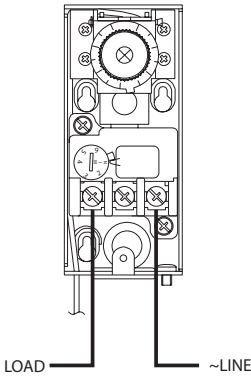
Do not remove cover while power is supplied as it may cause electrical shock. To avoid the possibility of electric shock and damage to equipment, disconnect the power supply before any wiring connections are made. Never touch current conducting (LIVE) parts with your fingers or with tools.

Electrical wires should be connected through the conduit rubber or alternatively by conduit boss.

Wiring options

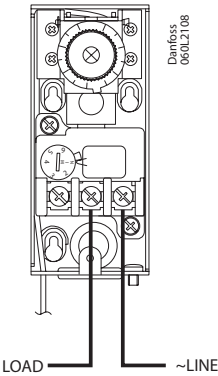
For Cooling Unit:

cut-out on temperature decrease



For Heating Unit:

cut-out on temperature increase



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060L2108

Contact function	Example for application and wiring		
 SPDT	 For Cooling Unit	 For Heating Unit	 For both cooling and Heating with Manual Changeover Switch

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Arrow marking indicates a direction of switch action.

Contact function	Example for application and wiring
 SPST	 For Cooling Unit

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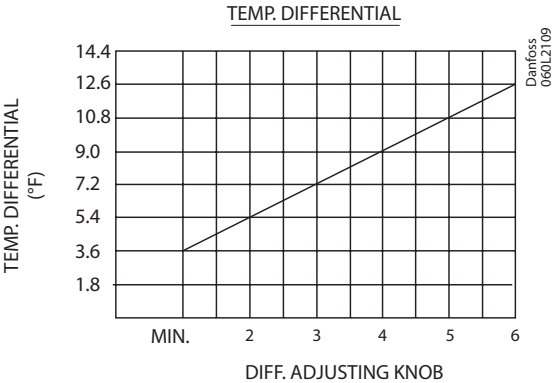
Arrow marking indicates a direction of switch action.

Adjustment

Note:

Adjust the thermostat to settings specified by the manufacturer of the controlled equipment. When checking thermostat operation, or operating the controlled equipment, do not exceed the manufacturer's temperature ratings for the controlled equipment or for any of its components. To avoid inaccurate thermostat operation, do not adjust the KPU's pointers beyond the highest or lowest indicator marks on the scale plate.  
Scale is indicative only. For accurate setting please use thermometer.

Determination of differential

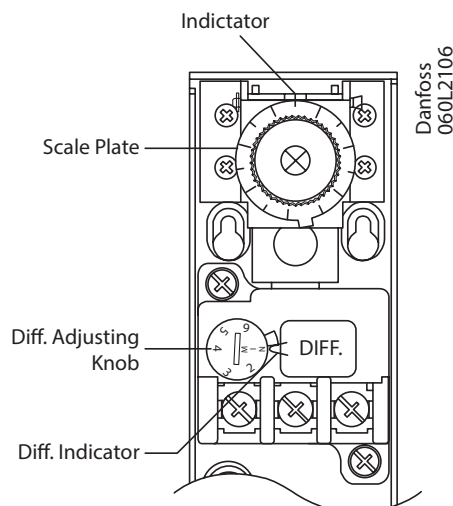
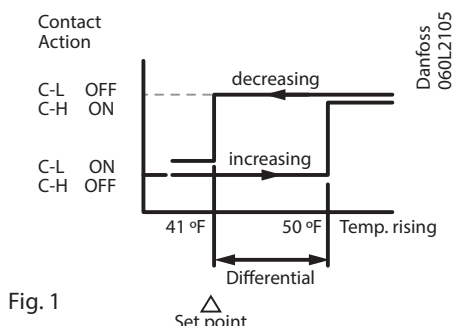


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## Setting example (SPDT type)

Set at 41 °F for temp. decrease and  
50 °F for temp. increase.

Upper Switch Point (USP): 50 °F  
Lower Switch Point (LSP): 41 °F



1. Set at 41 °F  
Turn the scale plate to match indicator pointer with the required value (verify with the thermometer)

2. Set at 50 °F  
Calculate the differential between USP and LSP (Differential = USP – LSP; 50 °F – 41 °F = 9 °F).  
Find the proper Differential Adjusting Knob position from the characteristic presented on the graph

"Determination of differential".  
The same characteristics is shown on the back side of the KPU 19 cover. Differential of 9 °F is equivalent to the indication 4 set on the Differential Adjustment Knob.

3. After setting, install the cover and supply power supply for checking the actual switching points. Adjust the setting if necessary as scales are indicative only.

Enclosed accessories:

- Sensor clamp for bulb fastening.
- Blinding sticker to cover the hole after dial knob removal. Blinding sticker can be used only once.
- Hand knob for adjustment.

**Note:**

Scale values are indicative only. It is often necessary to use a thermometer when setting working points.

We, Danfoss A/S, (hereinafter referred to as "Danfoss") truly appreciate your choosing Danfoss' products (hereinafter referred to as "Products").

When the Products are used, this document as provided below shall be applicable except to the extent that there is anything to the contrary in any applicable estimate, agreement, catalogue, specification, etc.

### • CONFIRMATION OF OPERATION

All customers using the Products (hereinafter referred to as "Customers") are requested to, after properly installing the Products, test the operation of the Products to confirm that all the systems in connection with the Products fully function.

In order to prevent the occurrence of bodily injury, fire accidents, serious damage, etc., in connection with the Customers' machinery or equipment due to improper installation of the Products, Danfoss kindly requests the Customers to take the necessary safety measures by preparing safe designs such as a fail-safe design (\*1) and a fire spread prevention design, as well as to make the proper adjustments for product reliability necessary for fault-tolerance (\*2).

(\*1) Fail-safe design: Design to ensure safety in the event of any mechanical failure

(\*2) Fault-tolerance: Utilization of redundancy technology

### Periodic Inspection of the Products

Be sure to confirm the proper operation of the Products and keep records of such operation at least once a year.

Danfoss shall be held harmless and be indemnified by the Customers from any damages incurred due to the Customers failing to conduct the above operational procedures, provided, however, that, this shall not apply if the damages which the Customers incurred due to the defect of the Products caused by Danfoss.

### • RESTRICTIONS OF USE

The Products are designed and manufactured for the purpose of using them for cooling and heating and refrigerating appliances and air conditioning equipment or various industrial equipment (hereinafter referred to as "Purposes"), but are not designed and manufactured for the purpose of using the Products for any instrument or system related to human life or health purposes.

Therefore, the use of the Products in fields related to items (1) through (9) below is not intended whatsoever. Danfoss shall be held harmless and be indemnified from any and all damages incurred by use of the Products under item (3). Also, when using the Products under the fields related to items (1) through (9) below (except for item (3)), in relation to which the Products must never be used, please be sure to notify our Danfoss contact desk in charge of sales and obtain Danfoss' prior written approval for such use. Danfoss shall be held harmless and be indemnified from any and all damages incurred by use of the Products in relation to these fields if the Customers do not notify Danfoss' contact desk and obtain Danfoss' prior written approval.

(1) In any field related to nuclear power and radiation;

(2) In any field related to space or seafloor equipment;

(3) In any equipment or device requiring a high degree of reliance on such equipment or device with respect to which it is reasonably foreseeable that failure or malfunction of the equipment or device would either directly or indirectly cause serious damage to human life, health or property;

(4) Transportation device (railroad, aviation, ship or vessel, vehicle equipment, etc.);

(5) Disaster-prevention or crime-prevention device;

(6) Facility or application directly related to medical equipment, burning appliances, electro thermal equipment, amusement rides and devices, facilities/applications associated directly with billing, or device using flammable fluid;

(7) Equipment requiring high reliance on supply systems such as electricity, gas, water, etc., in large-scale communication system, or in transportation or air traffic control system;

(8) Facilities that are to comply with regulations of governmental / public agencies or specific industries or

(9) Other machinery or equipment requiring a high degree of reliance and safety (excluding item(3)).

Be sure to replace the Products within 5 to 10 years of delivery if no other duration of use is provided in the applicable specifications or instruction manual because the conditions and environment of use also have an impact on the Products.

### • SCOPE OF WARRANTY

DANFOSS WILL PROVIDE THE CUSTOMERS WITH REPLACEMENT OR REPAIRED PRODUCTS DELIVERED, FREE OF COST, IF THE CUSTOMERS PROVIDES TO DANFOSS WRITTEN NOTICE WITHIN BOTH (i) 12 MONTHS FROM THE DELIVERY OF THE PRODUCT TO THE INITIAL CUSTOMERS AND (ii) 18 MONTHS FROM THE MANUFACTURED DATE OF THE PRODUCT, IN CASE THAT FAILURE OCCURS IN THE CUSTOMERS' EQUIPMENT USING THE PRODUCTS DUE TO A DEFECT OF THE PRODUCTS; PROVIDED, HOWEVER, THAT IN ANY EVENT THE RATIO OF THE AMOUNT THAT DANFOSS BEARS FOR THE DAMAGES INCURRED BY THE FAILURE OF THE PRODUCTS OR CUSTOMERS' EQUIPMENT SHALL NOT EXCEED THE PRICE OF THE PRODUCTS WE DELIVERED. IN ADDITION, DANFOSS SHALL BE HELD HARMLESS AND BE INDEMNIFIED FROM ANY AND ALL DAMAGES INCURRED WHEN THE FAILURE OF THE CUSTOMERS' EQUIPMENT OCCURRED DUE TO ANY CAUSE SET FORTH BELOW.

(1) WHEN CAUSED BY INAPPROPRIATE HANDLING OR USE OF THE PRODUCTS BY THE CUSTOMERS (SUCH AS NOT COMPLYING WITH THE CONDITIONS, ENVIRONMENTAL SPECIFICATIONS OR CAUTIONS INDICATED IN ANY APPLICABLE CATALOGUE, SPECIFICATIONS, INSTRUCTION MANUAL, ETC.);

(2) WHEN FAILURE OCCURRED DUE TO ANY REASON OTHER THAN THE PRODUCTS;

(3) WHEN CAUSED BY MODIFICATION OR REPAIR OF THE PRODUCTS MADE BY ANYONE OTHER THAN DANFOSS OR DESIGNEE OF DANFOSS;

(4) WHEN CAUSED BY THE USE OF THE PRODUCTS IN VIOLATION OF THE ABOVE "RESTRICTIONS OF USE" OR "CONFIRMATION OF OPERATION";

(5) WHEN SUCH FAILURE WAS NOT REASONABLY FORESEEABLE AT THE TIME OF DANFOSS' SHIPMENT; OR

(6) BY ANY OTHER CAUSE NOT ATTRIBUTABLE TO DANFOSS, SUCH AS AN ACT OF GOD, DISASTER, OR ACT OF ANY THIRD PARTY.

PLEASE NOTE THAT THE CUSTOMERS WILL NOT BE ENTITLED TO ANY OF THE ABOVE WARRANTY IF THE CUSTOMERS PURCHASED THE PRODUCTS FROM ANY THIRD PARTY INCLUDING WITHOUT LIMITATION BY INTERNET AUCTION, ETC.