



400 Series Temperature Controls

Types: B400, B402, B403, C400,
C402, C403, E400, E402, E403,
F400, F402, F403



Installation and Operation Instructions

Please read all instructional literature carefully and thoroughly before starting.
Refer to the final page for the Warranty.

GENERAL



MISUSE OF THIS PRODUCT MAY CAUSE DAMAGE TO EQUIPMENT OR PERSONAL INJURY. THESE INSTRUCTIONS MUST BE THOROUGHLY READ AND UNDERSTOOD BEFORE DEVICE IS INSTALLED.

Cert number	E10667-19700604
Applicable Area	North America
Markings	UL Listed (400 and 402 Series) UL Recognized (403 Series)
Applicable Standards	UL 873; CSA-C22.2 No. 24

Cert number	DEMKO 11 ATEX 1105261X
Applicable Area	Europe (EU)
Markings	II 1 G Ex ia IIC T6 Ga -50 °C ≤ Ta ≤ +60 °C
Applicable Standards	EN IEC 60079-0; EN 60079-11

Cert number	IECEx UL 14.0075X
Applicable Area	International
Markings	Ex ia IIC T6 Ga -50 °C ≤ Ta ≤ +60 °C
Applicable Standards	IEC 60079-0; IEC 60079-11

Cert number	FM Project 3021135
Applicable Area	United States of America
Markings	FM Approved
Applicable Standards	FM 3545



ATEX AND IEC SPECIFIC CONDITIONS OF USE: ENCLOSURE CONTAINS ALUMINUM. CARE MUST BE TAKEN TO AVOID IGNITION HAZARD DUE TO IMPACT OR FRICTION.



MAX. TEMPERATURE * LIMITS LISTED ON NAMEPLATE MUST NEVER BE EXCEEDED, EVEN BY SURGES IN THE SYSTEM. OCCASIONAL OPERATION OF UNIT UP TO MAX. TEMPERATURE IS ACCEPTABLE, E.G., START-UP AND TESTING. EXCESSIVE CYCLING AT MAXIMUM TEMPERATURE LIMIT COULD REDUCE SENSOR LIFE. CONTINUOUS OPERATION SHOULD NOT EXCEED THE DESIGNATED ADJUSTABLE TEMPERATURE RANGE.

* Maximum Temperature - the highest temperature to which a sensing element may be occasionally operated without adversely affecting set point calibration and repeatability.



THIS PRODUCT DOES NOT HAVE ANY FIELD REPLACEABLE PARTS. ANY SUBSTITUTION OF COMPONENTS SHALL INVALIDATE AGENCY CERTIFICATION(S).



DEVICE MUST NOT BE ALTERED OR MODIFIED AFTER SHIPMENT. CONSULT UE IF MODIFICATION IS NECESSARY.

The 400 Series temperature switch utilizes either a liquid filled sensing stem (immersion stem, direct mounting) or liquid filled sensing bulb (bulb & capillary, remote mounting) to detect a temperature change. The response at a predetermined set point or set points actuates one, two or three snap-acting switch(es), converting the temperature signal into an electrical signal. Device set point(s) may be varied by turning an internal calibrated dial and pointer (B & E types) or internal adjustment screw (C & F types) (See Part II – Adjustments). Please refer to the datasheet for product specifications. Date code format on nameplate is “YYWW” for year and week.

Part I - Installation



- Flathead screwdriver
- Hammer (for alternate wire knockouts)
- Adjustable wrench

Mounting



INSTALL DEVICE WHERE SHOCK, VIBRATION AND TEMPERATURE FLUCTUATIONS ARE MINIMAL. DO NOT INSTALL DEVICE IN AMBIENT TEMPERATURES THAT EXCEED PUBLISHED LIMITS ON THE NAMEPLATE.



DEVICE SHOULD BE MOUNTED TO PREVENT MOISTURE FROM ENTERING THE ENCLOSURE. VERTICAL MOUNTING IS RECOMMENDED.



ALWAYS USE A WRENCH ON LOCAL MOUNT, IMMERSION STEM HEX. DO NOT TIGHTEN BY TURNING THE ENCLOSURE AS THIS WILL DAMAGE THE SENSOR AND WEAKEN WELDED JOINTS.



AVOID BENDING OR COILING THE CAPILLARY TUBING TIGHTER THAN 1/2” RADIUS. EXERCISE CAUTION WHEN MAKING BENDS NEAR THE CAPILLARY ENDS.



For remote mounting, mount the unit via the (2) 1/4" screw clearance holes on the enclosure (see dimensions). Fully immerse the bulb and 6" of capillary in the control zone. It is generally desirable to place the bulb close to the heating or cooling source in order to sense temperature fluctuations quickly. Be sure to locate the bulb so that it will not be exposed to temperatures beyond the instrument's range limits.

ON MODELS SUPPLIED WITH AN EXTERNAL MANUAL RESET BUTTON, BE SURE TO LEAVE SUFFICIENT FINGER SPACE OVER THE RESET BUTTON FOR THE OPERATOR TO RESET THE CONTROL.

Wiring

DISCONNECT ALL SUPPLY CIRCUITS BEFORE WIRING DEVICE. WIRE DEVICE IN ACCORDANCE WITH LOCAL AND NATIONAL ELECTRICAL CODES. MAXIMUM RECOMMENDED WIRE SIZE IS 14 AWG AND RECOMMENDED TIGHTENING TORQUE FOR FIELD WIRING TERMINALS IS 7 TO 17 IN-LBS.

DO NOT EXCEED ELECTRICAL RATINGS LISTED ON NAMEPLATE. OVERLOAD ON A SWITCH CAN CAUSE FAILURE, EVEN ON THE FIRST CYCLE.

ENSURE ELECTRICAL CONDUIT ENTRIES ARE PROPERLY SEALED TO PREVENT MOISTURE ENTRY.

1 Remove the two screws retaining the cover and cover gasket.

2 A 3/4" NPT conduit connection is provided on the right side of the enclosure. Two cast-in 7/8" diameter knockouts are located on the left side and rear of the enclosure. These can easily be knocked out by placing the blade of a screwdriver in the groove and tapping sharply with a hammer.

3 Connect conduit to the enclosure and wire directly to the switch terminals according to local and national electrical codes. The three switch terminals are clearly labeled "common", "normally open" and "normally closed". Bring the wires up to terminals from the rear of the enclosure. (see Figure 1)

A grounding screw and clamp (cast in symbol) is provided which meets a 35 lb. pull test. On optional adjustable deaband switches (option 1520), ensure wiring does not interfere with the adjustment wheel. If lead wires are supplied, color coding is as follows:

Manual Reset (Option 1530)			
	400	402	
	Switch 3	Switch 1	Switch 2
Common	Violet	Violet	Yellow
Normally Open (NO)	Blue	Blue	Orange
Normally Closed (NC)	Black	Black	Red

ALLOW ENOUGH SLACK (SEE FIGURE 1) SO AS TO NOT AFFECT SWITCH MOVEMENT WHEN MAKING SETTING ADJUSTMENTS. ENSURE THAT THE WIRES ARE NOT TOUCHING THE COVER WHEN INSTALLED.

NOTE: For larger wire gauges, a one-time shift may be experienced or expected due to space limitations within the enclosure. Verify set point after installation.

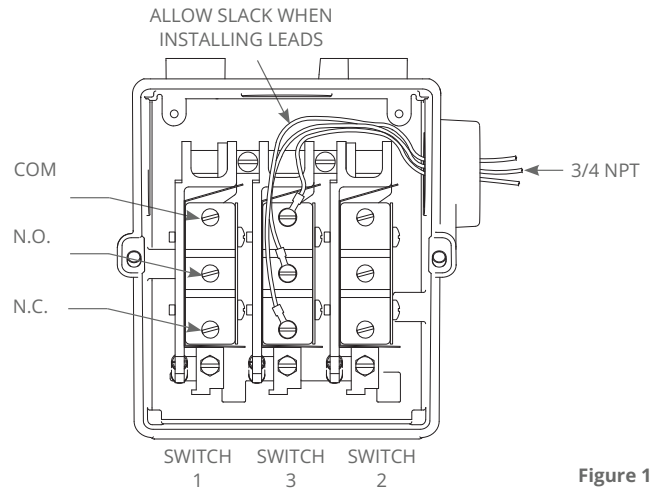


Figure 1

NOTE:

400 models use the middle switch position 3.
402 models use the two outer switch positions 1-2
403 models use all switch positions 1-3.

Part II - Adjustments

• Flathead screwdriver

FOR SET POINT ADJUSTMENTS AND RE-CALIBRATION, INSERT BULB OR IMMERSION STEM INTO A CALIBRATED TEMPERATURE BATH. ALLOW TEMPERATURE TO STABILIZE FOR 10 MINUTES.

Types "B" and "E" controls have an internal calibrated dial and pointer and types "C" and "F" have an internal adjustment screw (See Figure 2).

Types C400 & F400

1 Remove cover.

2 Adjust set point by turning adjustment screw clockwise to raise set point or counterclockwise to lower set point. When making adjustments, do not exceed the maximum temperature rating on nameplate as this may cause a shift in set point.

Types C402, C403, F402 & F403

1 Remove cover.

2 Adjust set point(s) by turning adjustment screw clockwise to raise set point(s) or counterclockwise to lower set point(s). When making adjustments, do not exceed the maximum temperature rating on nameplate as this may cause a shift in set point. **NOTE:** On C402 & F402 models, either switch #1 or #2 may be set high. On C403 & F403 models, the middle switch - switch #3 - must always be the highest set point.

3 Switches may be set together or apart, up to 100% of range.

Types B400, B402, E400, E402 & E403

- 1 Remove cover.
- 2 Adjust set point(s) by turning adjustment screw(s) and pointer(s) to desired value on scale (see Figure 2). Scale division for models are noted in product datasheet. **NOTE:** The device is factory calibrated for maximum accuracy at the dial midpoint. **NOTE:** On B402 & E402 models, either switch #1 or #2 may be set high. On E403 models, the middle switch - switch #3 - must always be the highest set point.
- 3 Switches may be set together or apart, up to 100% of range.
- 4 If recalibration is required, insert bulb or immersion stem into a calibrated temperature bath. Follow instructions in Step 2 until switch(es) transfer. If each set point chosen on the dial(s) does not match the temperature reading, turn the zero adjustment screw(s) (see Figure 2) clockwise to raise the temperature or counterclockwise to lower the temperature until the temperature matches.

Types with Manual Reset (Option 1530)

These models incorporate a snap switch that, when actuated on rising temperature, remains actuated until the reset button (located on top of the device) is manually depressed to reset the switch.

Types with Adjustable Deadband Switch (Option 1520)

Models with option code 1520 incorporate a snap switch with integral adjustment wheel. Turning this wheel raises or lowers the temperature rise set point and sets the deadband between rise and fall settings. The fall set point remains constant.

Setting the adjustable deadband switch:

- 1 Determine rise or fall set point or set points and deadband.
- 2 Adjust each **fall** set point by turning the adjustment screw clockwise to raise each set point or counterclockwise to each lower set point (see Figure 2). The **fall** setting is constant.
- 3 Adjust each **rise** set point (and deadband) by turning the adjustment wheel on the snap switch counterclockwise to raise each set point (and widen deadband) or clockwise to lower each set point (and narrow deadband).

Consult UE for additional information

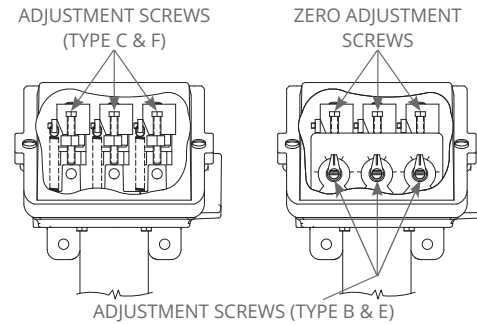


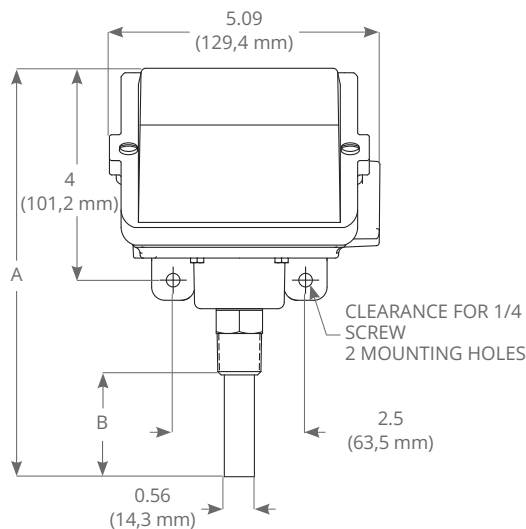
Figure 2

Recommended Practices

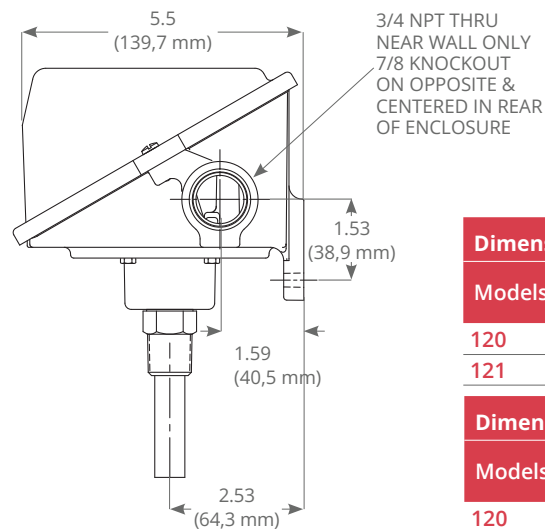
- A redundant device is necessary for applications where damage to the primary device could endanger life, limb or property. A high or low limit switch is necessary for applications where a dangerous runaway condition could result.
- Monitor operation to observe warning signs of possible damage to device, such as drift in set point. Check device immediately.
- Preventative maintenance and periodic testing is necessary for critical applications where damage could endanger property or personnel.

Part III - Dimensions

Dimensions are for reference only. Drawings for all models may be found at www.ueonline.com

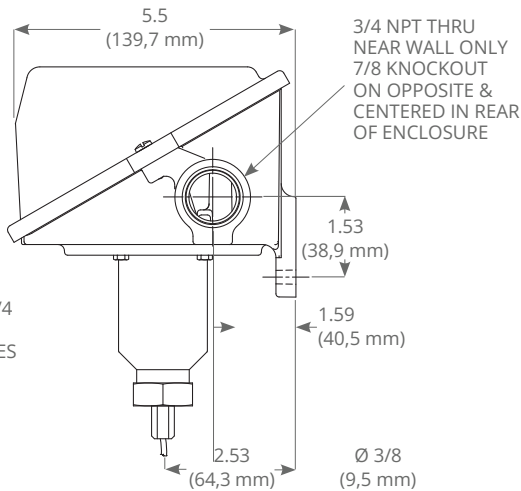
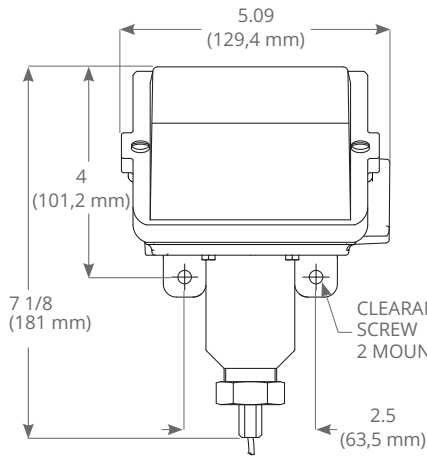


Types B & C, Models 120-121



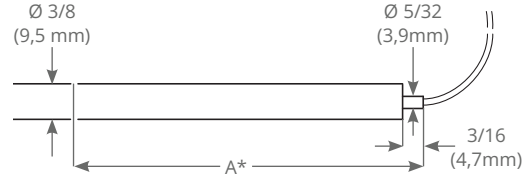
Dimension A		
Models	Inches (± 1/4)	mm (± 7)
120	7 3/4	197
121	7 5/8	194

Dimension B		
Models	Inches (± 1/4)	mm (± 7)
120	1 7/8	48
121	1 3/4	45



Types E & F, Models 2BS-8BS

Dimension A		
Models	Inches (± 1/4)	mm (± 7)
2BSA	2 5/8	67
2BS	2 5/8	67
2BSB	2 5/8	67
3BS	2 1/4	57
4BS	6 3/4	171
5BS	5	127
6BS	4 1/2	114
7BS	3	76
8BS	3 1/4	83



* USE DIMENSION "A" FOR SEPARABLE WELL INSTALLATIONS

French Warnings Translations

Pg	Warning Text	Texte d'Avertissement
1	MISUSE OF THIS PRODUCT MAY CAUSE DAMAGE TO EQUIPMENT OR PERSONAL INJURY. THESE INSTRUCTIONS MUST BE THOROUGHLY READ AND UNDERSTOOD BEFORE UNIT IS INSTALLED.	Une mauvaise utilisation de cet appareil peut endommager l'équipement ou provoquer des blessures corporelles. Ces consignes doivent être lues attentivement et bien comprises avant l'installation de l'appareil.
1	ATEX AND IEC SPECIFIC CONDITIONS OF USE: ENCLOSURE CONTAINS ALUMINUM. CARE MUST BE TAKEN TO AVOID IGNITION HAZARD DUE TO IMPACT OR FRICTION.	Conditions spécifiques d'utilisation ATEX et IEC: Le boîtier contient de l'aluminium. Des précautions doivent être prises pour éviter tout risque d'inflammation dû à un choc ou à un frottement.
1	THIS PRODUCT DOES NOT HAVE ANY FIELD REPLACEABLE PARTS. ANY SUBSTITUTION OF COMPONENTS SHALL INVALIDATE AGENCY CERTIFICATION(S).	Aucun composant ne peut être remplacé sur le terrain. Tout remplacement de composant invalidera toutes les approbations et certifications données par un tiers.
1	INSTALL DEVICE WHERE SHOCK, VIBRATION AND TEMPERATURE FLUCTUATIONS ARE MINIMAL. DO NOT MOUNT DEVICE IN AMBIENT TEMPERATURES THAT EXCEED THE LIMITS ON THE NAMEPLATE FOR THE APPROPRIATE AREA	Installer l'appareil dans un endroit où les chocs, les vibrations et les variations de température sont minimales. Ne pas installer l'appareil dans un lieu où les températures ambiantes dépassent les limites indiquées sur la plaque signalétique de l'appareil.
2	DISCONNECT ALL SUPPLY CIRCUITS BEFORE WIRING DEVICE. WIRE DEVICE IN ACCORDANCE WITH LOCAL AND NATIONAL ELECTRICAL CODES. MAXIMUM RECOMMENDED WIRE SIZE IS 14 AWG AND RECOMMENDED TIGHTENING TORQUE FOR FIELD WIRING TERMINALS IS 7 TO 17 IN-LBS	Avant le branchement de l'appareil, déconnecter l'installation sur laquelle l'appareil doit être monté. Réaliser le branchement électrique selon les codes électriques nationaux et locaux. Le diamètre maximal recommandé pour les fils est de 14 AWG. Le couple de serrage pour la borne de raccordement est de 7 à 17 IN-LBS.
2	DO NOT EXCEED ELECTRICAL RATINGS LISTED ON NAMEPLATE. OVERLOAD ON A SWITCH CAN CAUSE FAILURE, EVEN ON THE FIRST CYCLE.	Les seuils électriques indiqués dans la documentation et sur les plaques signalétiques ne doivent jamais être dépassés. La surtension peut causer une panne de l'appareil dès les premier cycle.

TERMS AND CONDITIONS OF SALE



UE specifications subject to change without notice.



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