

# MTC Series Marine Temperature Calibrator



# Save Time, Save Money

## Up to 3 Year Calibration Interval



Maximize accuracy with a one year recommended calibration interval, or lower your cost of ownership by extending your interval up to three years! Reduce costs associated by recalibration and managing assets by 66%.

## Fast Calibration



The MTC-320 A and the MTC-650 A contain an innovative heating block profile, which heats up to 320° C / 608° F in just 4 minutes, and up to 650° C / 1202° F in only 10 minutes. The special heating profile minimizes mass and yet, still accepts an insertion tube with a 1 in (26 mm) outer diameter. It's the perfect compromise between temperature stability, homogeneity, and rapid heating and cooling.

## Easy to Read, Intuitive Operation



Avoid confusing sub-menus or multiple keystroke combinations with simple one-key, one-function logic. Access primary features like automatic switch test and auto-stepping directly from the main screen. The backlit display features dedicated icons, which help in identifying instrument conditions and operational steps.

With wide temperature ranges from -17 to 650° C / 1 to 1202° F, the MTC series of portable temperature calibrators facilitates correct readings on all of your temperature monitoring devices.

### Maintain and Calibrate monitoring devices for:

- Fuel oil inlet
- Exhaust gas
- Crankcase protection
- Turbine & gear bearings
- Steam
- Servo oil propeller pitch
- Purifiers
- Starting air
- Hydraulic systems
- Oil burner
- Generators
- Safety Valves
- Turbo-charger lubrication
- Cylinder/piston/fuel valve cooling media
- Thrust/shaft/plane/stern tube bearings
- Lubricating oil systems
- Scavenge air
- Sea water cooling
- Charge air
- Uptake gas
- Feed water
- Cooling water outlet
- Refrigeration systems
- Gland steam
- Condensing system
- Main steam
- Condensers

# Useful Features



## Auto Switch Test

Program the slope rate from 0.1 to 9.9 °C/°F. The MTC will store the Open, Close, and Deadband values. Use the feature to ensure repeatability when testing thermo-switches.



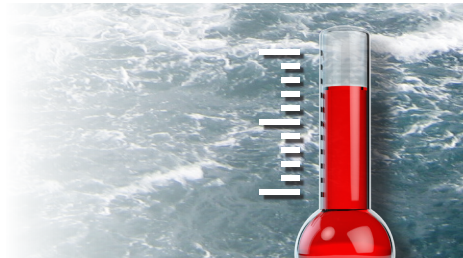
## Interchangeable Inserts

Not limited by fixed holes. Interchangeable insertion tubes are used to match the diameter of the sensor-under-test.



## Auto Stepping

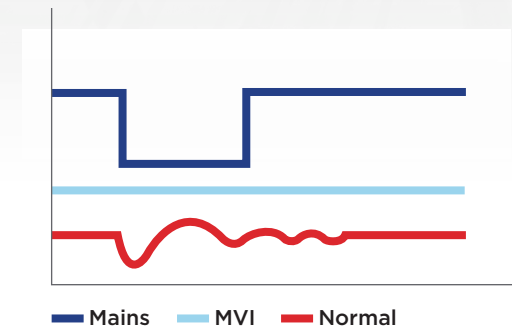
Program up to 9 steps with dwell times on each step. Monitor sensor output from the control room or bridge, while the MTC performs auto step functions from the engine room. Or burn-in new sensors prior to installation.



## Maximum Temperature

Select a maximum temperature limit for the calibrator, avoiding damage to the sensor-under-test by excessive temperatures. Reduces drift resulting from extended periods of exposures to high temperature.

**MVI-** Mains power Variance Immunity improves temperature stability. Unstable mains power supplies are a major contributor to on-board calibration inaccuracies. Traditional temperature calibrators often become unstable in shipboard environments where large electrical motors, heating elements, and other devices are periodically cycled on and off. The cycling of supply power can cause lower quality temperature regulators to perform inconsistently, leading to both inaccurate readings and unstable temperatures. The MTC series calibrators MTC-320 A and MTC-650 A employ the MVI, thus avoiding such stability problems. The MVI circuitry continuously monitors the supply voltage and ensures a constant energy flow to the heating elements.



# Multi-Information Display

**Stability Indicator**  
The bold checkmark on the display indicates that the calibrator has reached the desired temperature and is stable.  
A convenient countdown timer is activated five minutes before the unit reaches stability.

**Dual Readings**  
Set and read temperatures simultaneously.

**Set Temperature**  
The Up and Down arrow keys allow the user to set the exact temperature desired, with a resolution of 0.1°C or °F.

**Messages and Icons**  
Display alphanumeric message and status icons.

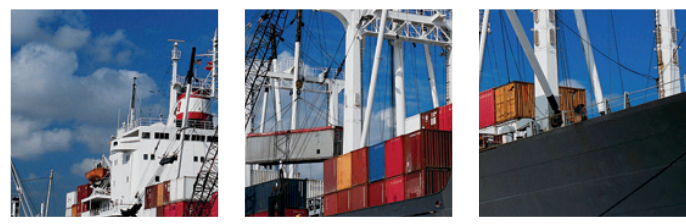
**Instrument Setups**  
Stores the complete instrument setup, including engineering units, stability criteria, resolution, display contrast, slope (ramp) rate, auto-step settings, and maximum temperature.

Buttons shown: SWITCH TEST, AUTO STEP, ESC MENU, and a return arrow.



## Calibrate and Adjust Anywhere

The MTC series has a very easy and straightforward procedure for re-calibration and adjustment. There is no need for a screwdriver or PC software. The only thing you need is a reliable reference thermometer. Simply place the probe in the calibrator and follow the instructions on the display. The unit's serial number, software revision level, and the last calibration date is easily accessible.



# Specifications

## Mains Power

Voltage	115 V (90-127) / 230 V (180-254)
Max Power Consumption	(MTC-140 A) 150 VA
Max Power Consumption	(MTC-320 A / 650 A) 1150 VA
Frequency, US deliveries	60 Hz ±5
Frequency, non US deliveries	50 Hz ±5, 60 Hz ±5

## Temperature

All specifications are given with an ambient temperature 23° C/73.4° F ± 3° C/5.9° F. Specified at 115 V/230 V.

### Accuracy

<b>1 Year</b>	
MTC-140 A	±0.4°C / ±0.72° F
MTC-320 A	±0.5°C / ±0.9° F
MTC-650 A	±0.9°C / ±1.62° F
<b>3 Year</b>	
MTC-140 A	±0.8°C / ±1.44° F
MTC-320 A	±1.2°C / ±2.16° F
MTC-650 A	±1.8°C / ±3.24° F

Specification when using the internal reference. (Load 4 mm OD reference probe in the center of the insert).

### Range—MTC-140 A

Range	-17 to 140°C / 1 to 284° F
Cooling Capacity @ ambient of 0° C / 32° F	-30°C / -22° F
Cooling Capacity @ ambient of 23° C / 73° F	-17°C / -1° F
Cooling Capacity @ ambient of 40° C / 104° F	-2°C / 28° F

### Range—MTC-320 A

Range	33 to 320°C / 91 to 608° F
-------	----------------------------

### Range—MTC-650 A

Range	33 to 650°C / 91 to 1202° F
-------	-----------------------------

### Settings

Resolution	1 or 0.1
Units	°C or ° F

## Temperature (cont.)

### Stability

MTC-140 A	±0.05°C / ±0.09° F
MTC-320 A / 650 A	±0.1°C / ±0.18° F

Measured after the stability indicator has been on for 10 minutes. Measuring time is 30 minutes.

### Time to Stability (typical)

MTC-140 A	5 minutes
MTC-320 A / 650 A	8 minutes

### Heating Time

MTC-140 A	-17 to 23°C / 1 to 73° F	3 minutes
MTC-140 A	23 to 140°C / 73 to 284° F	15 minutes
MTC-320 A	33 to 320°C / 91 to 608° F	4 minutes
MTC-650 A	33 to 650°C / 91 to 1202° F	10 minutes

### Cooling Time

MTC-140 A	140 to 100°C / 284 to 212° F	2 minutes
MTC-140 A	100 to 0°C / 212 to 32° F	10 minutes
MTC-140 A	0 to -15°C / 32 to 5° F	13 minutes
MTC-320 A	320 to 100°C / 608 to 212° F	16 minutes
MTC-650 A	650 to 100°C / 1202 to 212° F	28 minutes

## Physical Specifications

Dimension L x W x H... 241 x 139 x 325 mm / 9.5 x 5.5 x 12.8 in

### Weight

MTC-140 A	6.5 kg / 14.3 lb
MTC-320 A	5 kg / 11 lb
MTC-650 A	6.4 kg / 14.1 lb

### Immersion Depth

MTC-140 A (insulation included)	115 mm / 4.5 in
MTC-320 A/650 A	110 mm / 4.3 in

### Insert Dimensions (diameter x length)

MTC-140 A	19 mm x 100 mm / 0.75 x 3.9 in
MTC-320 A/650 A	26 mm x 120 mm / 1 x 4.7 in

## Electrical

### Switch Input (dry contact)

Test Voltage	Maximum 5 VDC
Test Current	Maximum 2.5 mA

### Digital Interface

RS232 (9-pin Male)

## Environmental

### Operating Temperature

0 to 40° C / 32 to 104° F

### Storage Temperature

-20 to 50° C / -4 to 122° F

### Humidity

Up to 90% Rh

### Protection Class

IP-10

## Certificates

CE	2004/108/EC: EN61326-1: 2006 2006/95/EC: EN61010-1:2010 • EN61010-2-030: 2010
DNV	Marine type approval from Det Norske Veritas. See the certificate at <a href="http://ametekcalibration.com">ametekcalibration.com</a>

## Shipping Weight

### With Standard Accessories

MTC-140 A	10 kg / 22 lb
MTC-320 A	8 kg / 17.5 lb
MTC-650 A	9.5 kg / 21 lb
Size: L x W x H	410 x 250 x 370 mm / 16.2 x 9.8 x 14.6 in

### With Standard Accessories and Rugged Carrying Case

MTC-140 A	13 kg / 28.6 lb
MTC-320 A	11 kg / 24 lb
MTC-650 A	12.5 kg / 27.6 lb
Size: L x W x H	515 x 200 x 390 mm / 20.3 x 7.9 x 15.4 in

# MTC Series Inserts

Inserts for MTC-140 A and MTC-320 A are made of aluminum. Inserts for MTC-650 A are made of brass. All specifications on hole sizes refer to the outer diameter of the sensor-under-test. The correct clearance size is applied in all predrilled inserts.

## Predrilled Inserts—metric (mm)

Probe Diameter	Part Numbers			
	Insert Code <sup>1</sup>	MTC-140 A <sup>2</sup>	MTC-320 A	MTC-650 A
3 mm	003	123428	123436	123444
4 mm	004	60F451	100177	100196
5 mm	005	123429	123437	123445
6 mm	006	60F453	100179	100198
7 mm	007	123430	123438	122516
8 mm	008	105185	100182	100201
9 mm	009	105186	100183	100202
10 mm	010	105187	100185	105188
11 mm	011	123431	100188	100204
12 mm	012	123432	100186	100206
13 mm	013	123433	60F339	105189
14 mm	014	N/A	100190	100208
15 mm	015	N/A	100191	100209
16 mm	016	N/A	123439	123446
18 mm	018	N/A	123440	122517
20 mm	020	N/A	123441	122518
Package of the above inserts	—	124679	124681	124685
Multi-hole type 1	M01	123479 <sup>3</sup>	123475	123476

## Predrilled Inserts—imperial (in)

Probe Diameter	Part Numbers			
	Insert Code <sup>1</sup>	MTC-140 A <sup>2</sup>	MTC-320 A	MTC-650 A
1/8 in	125	60F450	100176	100195
3/16 in	187	60F452	100178	100197
1/4 in	250	60F454	100180	100199
5/16 in	312	60F456	100181	100200
3/8 in	375	60F458	100184	100203
7/16 in	437	60F460	100187	100205
1/2 in	500	60F462	100189	100207
9/16 in	562	60F464	60F344	60F408
5/8 in	625	60F466	100192	100210
11/16	688	N/A	60F348	60F412
3/4 in	750	N/A	100193	100211
3/16 in	813	N/A	60F352	60F416
7/8 in	875	N/A	60F354	60F418
Package of the above inserts	—	124680	124682	124686
Multi-hole type 2	M02	123480 <sup>3</sup>	123477	123478

**Note 1:** Use the insert code when ordered as the standard insert together with a new calibrator.

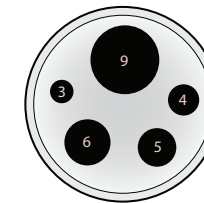
**Note 2:** MTC-140 A only: Remember to use matching insulation plugs.

**Note 3:** MTC-140 A only: All multi-hole inserts are delivered with a matching insulation plug.

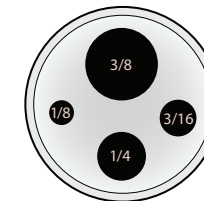
## Undrilled Inserts

Inserts	Part Numbers		
	MTC-140 A	MTC-320 A	MTC-650 A
5-pack	60F448	100175	100194
Insulation Plug	123937	N/A	N/A

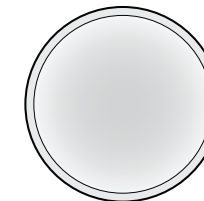
### MTC-320/650 A Inserts



Multi-hole M01



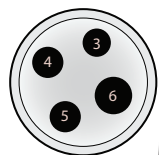
Multi-hole M02



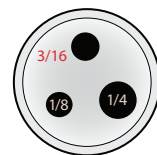
Undrilled

Typical Weight
MTC-320 A: 5.8 oz / 170 g
MTC-650 A: 17.8 oz / 510 g

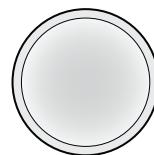
### MTC-140 A Inserts



Multi-hole M01



Multi-hole M02



Undrilled

Typical Weight
MTC-140 A: 2.6 oz / 75 g

# Ordering Information

## Standard Delivery

- MTC dry-block calibrator (user specified)
- Mains power cable (user specified)
- Traceable certificate - temperature performance
- Insert (user specified)
- Tool for insertion tubes
- User manual
- Test cables (1 x red, 1 x black)
- RS232 cable
- JOFRACAL calibration software
- MTC-140 A includes 3 pieces insulation plugs (p/n 123469).

Base Model Number	
MTC140A	MTC-140 A, -17 to 140° C (-1 to 284° F)
MTC320A	MTC-320 A, 50 to 320° C (122 to 608° F)
MTC650A	MTC-650 A, 50 to 650° C (122 to 1202° F)
Power Supply (US deliveries 60 Hz only)	
115	115 VAC
230	230 VAC
Mains Power Cable Type	
A	European 230 V
B	USA/Canada 115 V
C	UK 240 V
D	South Africa 220 V
E	Italy 220 V
F	Australia 240 V
G	Denmark 230 V
H	Switzerland 220 V
I	Israel 230 V
Insert Type and Size	
XXX	1x insert for dry-block configuration (Please see insert section for correct code.)
Calibration Certificate	
F	Traceable Calibration Certificate
H	17025 Accredited Calibration Certificate (Optional)
Option	
C	Rugged Carrying Case

MTC650A 230 A M01 F C ... JOFRA MTC-650 A with standard accessories, 230 VAC, European power cord, multi-hole type M01, NPL traceable certificate, and carrying case.



## Accessories

- 122832** . . . . Cleaning Brushes - 4 mm - Package of 3 pcs
- 60F174** . . . . Cleaning Brushes - 6 mm - Package of 3 pcs
- 22822** . . . . Cleaning Brushes - 8 mm - Package of 3 pcs
- 65-F100** . . . . Insulation in Tube, 100 mm x Ø25 mm
- 65-F101** . . . . Insulation in Tube, 150 mm x Ø25 mm
- 65-F102** . . . . Insulation in Tube, 200 mm x Ø25 mm
- 65-F103** . . . . Insulation in Tube, 250 mm x Ø25 mm
- 65-F104** . . . . Insulation in Tube, 300 mm x Ø25 mm
- 65-F105** . . . . Insulation in Tube, 350 mm x Ø25 mm
- 65-F106** . . . . Insulation in Tube, 400 mm x Ø25 mm
- 65-F107** . . . . Insulation in Tube, 450 mm x Ø25 mm
- 123469** . . . . Set of 3 pcs insulation plugs for MTC-140 A
- 123408** . . . . Carrying Case

**USA, Florida**  
Tel +1 (800) 527 9999  
[cal.info@ametek.com](mailto:cal.info@ametek.com)

**USA, California**  
Tel +1 (800) 444 1850  
[crystal@ametek.com](mailto:crystal@ametek.com)

**India**  
Tel +91 22 2836 4750  
[jofra@ametek.com](mailto:jofra@ametek.com)

**Singapore**  
Tel +65 6484 2388  
[jofra@ametek.com](mailto:jofra@ametek.com)

**China, Shanghai**  
Tel +86 5868 5111  
[jofra-china.sales@ametek.com.cn](mailto:jofra-china.sales@ametek.com.cn)

**China, Beijing**  
Tel +86 10 8526 2111-19/24/25  
[jofra-china.sales@ametek.com.cn](mailto:jofra-china.sales@ametek.com.cn)

**United Kingdom**  
Tel +44 (0) 1243 833 302  
[jofra@ametek.co.uk](mailto:jofra@ametek.co.uk)

**France**  
Tel +33 (0) 30 68 89 40  
[general.lloyd-instruments@ametek.fr](mailto:general.lloyd-instruments@ametek.fr)

**Germany**  
Tel +49 (0) 2159 9136 510  
[info.mct-de@ametek.de](mailto:info.mct-de@ametek.de)

**Denmark**  
Tel +45 4816 8000  
[jofra@ametek.com](mailto:jofra@ametek.com)

[www.jofra.com](http://www.jofra.com)

**JOFRA**<sup>®</sup>  
**calibration**

No part of this document may be reproduced or modified in any form or by any means, electronic or mechanical, without express written permission from Crystal Engineering Corporation.