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107909-P1
Rev D, 08/96
Instruction Manual

MKS Type 273
Three Channel
Temperature Controller

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WARRANTY

Type 273 Equipment

MKS Instruments, Inc. (**MKS**) warrants that the equipment described above (the "equipment") manufactured by **MKS** shall be free from defects in materials and workmanship for a period of one year from date of shipment and will for a period of two years from the date of shipment, correctly perform all date-related operations, including without limitation accepting data entry, sequencing, sorting, comparing, and reporting, regardless of the date the operation is performed or the date involved in the operation, provided that, if the equipment exchanges data or is otherwise used with equipment, software, or other products of others, such products of others themselves correctly perform all date-related operations and store and transmit dates and date-related data in a format compatible with **MKS** equipment. THIS WARRANTY IS **MKS'** SOLE WARRANTY CONCERNING DATE-RELATED OPERATIONS.

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107909-P1
Rev D, 8/96

MKS Type 273
Three Channel
Temperature Controller

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Safety Procedures and Precautions

The following general safety precautions must be observed during all phases of operation of this instrument. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of intended use of the instrument and may impair the protection provided by the equipment. MKS Instruments, Inc. assumes no liability for the customer's failure to comply with these requirements.

DO NOT SUBSTITUTE PARTS OR MODIFY INSTRUMENT

Do not install substitute parts or perform any unauthorized modification to the instrument.
Return the instrument to an MKS Calibration and Service Center for service and repair to ensure that all safety features are maintained.

SERVICE BY QUALIFIED PERSONNEL ONLY

Operating personnel must not remove instrument covers. Component replacement and internal adjustments must be made by qualified service personnel only.

DO NOT SERVICE OR ADJUST ALONE

Do not attempt internal service or adjustment unless another person capable of rendering first aid and resuscitation, is present.

GROUNDING THE PRODUCT

This product is grounded through the grounding conductor of the power cord. To avoid electrical shock, plug the power cord into a properly wired receptacle before connecting it to the product input or output terminals. A protective ground connection by way of the grounding conductor in the power cord is essential for safe operation.

DANGER ARISING FROM LOSS OF GROUND

Upon loss of the protective-ground connection, all accessible conductive parts (including knobs and controls that may appear to be insulating) can render an electrical shock.

GROUND AND USE PROPER ELECTRICAL FITTINGS

Dangerous voltages are contained within this instrument. All electrical fittings must be of the type specified, and in good condition. All electrical fittings must be properly connected and grounded.

USE THE PROPER POWER CORD

Use only the power cord and connector specified for your product.
Use only a cord in good condition.

USE THE PROPER POWER SOURCE

This product is intended to operate from a power source that does not apply more than 250 Volts RMS between the supply conductors, or between either of the supply conductors and ground. A protective ground connection by way of the grounding conductor in the power cord is essential for safe operation.

USE THE PROPER FUSE

Use only a fuse of the correct type, voltage rating, and current rating, as specified for your product.

KEEP AWAY FROM LIVE CIRCUITS

Do not replace components with power cable connected. Under certain conditions, dangerous voltages may exist even with the power cable removed. To avoid injuries, always disconnect power and discharge circuits before touching them.

DO NOT OPERATE IN EXPLOSIVE ATMOSPHERES

To avoid explosion, do not operate this product in an explosive atmosphere unless it has been specifically certified for such operation.

Definitions of WARNING, CAUTION, and NOTE messages used throughout the manual.

Warning 

The WARNING sign denotes a hazard. It calls attention to a procedure, practice, condition, or the like, which, if not correctly performed or adhered to, could result in injury to personnel.

Caution 

The CAUTION sign denotes a hazard. It calls attention to an operating procedure, practice, or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of all or part of the product.

Note 

The NOTE sign denotes important information. It calls attention to a procedure, practice, condition, or the like, which is essential to highlight.

Chapter One: General Information

Introduction

The Type 273 Temperature Controller provides individual temperature control for up to three bakeable sensors. It supports the Baratron® Types 615, 616, and 617 sensors, with temperatures ranging from 40 to 150° C. The ½ rack provides a digital display for sequential monitoring of the actual temperatures.

The 273 temperature controller consists of the electronics unit, a cast aluminum heater shell, and an interconnecting cable. The heater enclosure is formed by two similar halves fastened together, each half containing two heaters and a temperature sensing resistor. The voltage developed across these two resistors is used to display and control the temperature. Each electronics unit can support up to three heaters shells. The electronics unit contains a three digit display to show the temperature of the selected heater.

How This Manual is Organized

This manual is designed to provide instructions on how to set up, install, and operate a Type 273 unit.

Before installing your Type 273 unit in a system and/or operating it, carefully read and familiarize yourself with all precautionary notes in the *Safety Messages and Procedures* section at the front of this manual. In addition, observe and obey all WARNING and CAUTION notes provided throughout the manual.

Chapter One, *General Information*, (this chapter) introduces the product and describes the organization of the manual.

Chapter Two, *Installation*, explains the environmental requirements and describes how to mount the instrument in your system.

Chapter Three, *Operation*, describes how to use the instrument and explains all the functions and features.

Appendix A, *Product Specifications*, lists the specifications of the instrument.

Appendix B, *Model Code Explanation*, describes the model code.

Customer Support

Standard maintenance and repair services are available at all of our regional MKS Calibration and Service Centers, listed on the back cover. In addition, MKS accepts the instruments of other manufacturers for recalibration using the Primary and Transfer Standard calibration equipment located at all of our regional service centers. Should any difficulties arise in the use of your Type 273 instrument, or to obtain information about companion products MKS offers, contact any authorized MKS Calibration and Service Center. If it is necessary to return the instrument to MKS, please obtain an ERA Number (Equipment Return Authorization Number) from the MKS Calibration and Service Center before shipping. The ERA Number expedites handling and ensures proper servicing of your instrument.

Please refer to the inside of the back cover of this manual for a list of MKS Calibration and Service Centers.

Warning  **All returns to MKS Instruments must be free of harmful, corrosive, radioactive, or toxic materials.**

Chapter Two: Installation

How To Unpack the Type 273 Unit

MKS has carefully packed the Type 273 unit so that it will reach you in perfect operating order. Upon receiving the unit, however, you should check for defects, cracks, broken connectors, etc., to be certain that damage has not occurred during shipment.

Note 

Do *not* discard any packing materials until you have completed your inspection and are sure the unit arrived safely.

If you find any damage, notify your carrier and MKS immediately. If it is necessary to return the unit to MKS, obtain an ERA Number (Equipment Return Authorization Number) from the MKS Service Center before shipping. Please refer to the inside of the back cover of this manual for a list of MKS Calibration and Service Centers.

Caution 

Only qualified individuals should perform the installation and any user adjustments. They must comply with all the necessary ESD and handling precautions while installing and adjusting the instrument. Proper handling is essential when working with all highly sensitive precision electronic instruments.

Unpacking Checklist

Standard Equipment:

- Type 273-1 Unit (with one heater shell) *or*

  Type 273-2 Unit (with two heater shells) *or*

  Type 273-3 Unit (with three heater shells)
- Type 273 Instruction Manual (this book)
- Interconnecting cable (to connect the heater shell(s) to the electronics unit)

Optional Equipment:

- Type 615, 616, or 617 sensor(s)
- Interface cables for the sensor
- Heater Shell Oven Set, with cable, part number 106205-G1

Setup

How To Remove the Outer Case of the Sensor

1. Loosen the knurled thumb nuts and slide the two case pieces over the pressure port.
2. Remove the standoffs and studs to which the thumb nuts were attached. ***Do not*** dislodge the washer at the base of the stud.
3. Attach the 4-40 x ¼ socket head screws supplied with the 273 unit in place of the removed studs.

How To Mount the Heater Shell to the Sensor

1. Loosen the knurled thumb screws on the heater shell to open the unit.
2. Slide the adapters provided over the pressure ports.
3. Slide the unit over the bottom half of the sensor. Be sure that the tubing adapters straddle the casting.
4. Lower the top half of the heater shell onto the sensor.
5. Tighten the knurled thumb screws.

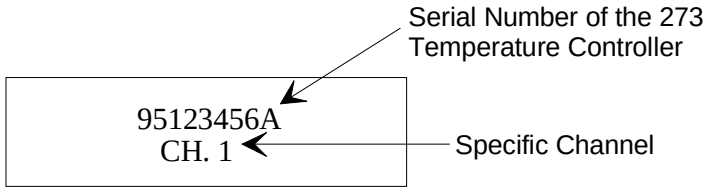
   The heater shell will rest on the sensor itself.
6. Determine how the unit will be supported.

   If the sensor (through its tubulations) will support the heater shell: Orient the tubing adapters with the open end of the slots facing down. This will automatically center the heaters about the sensor.

   If the heater shell will support the sensor: Position the adapters facing up.

How To Configure the 273 Unit

To provide the best temperature control, each heater shell is matched to a *specific* channel on the 273 Temperature Controller. A label on the heater shell cable identifies the channel number and the serial number of the temperature controller.



Note Connecting a heater shell to a channel other than the one specified on its cable, may result in an inaccurate temperature reading.

1. Connect the interconnecting cables between the 273 electronics unit and the heater shell(s).
2. On the rear panel of the 273 electronics unit, set the power select switch to the correct line voltage (115 or 230 V).
3. Plug in the power cord.

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Chapter Three: Operation

How To Operate the 273 Unit

The 273 controller can control the heater shell temperature in the range of 40 to 150° C. Although there is sufficient power to reach 170° C, the upper limit of 150° C is necessary to protect the epoxy adhesive attaching the sensing resistor to the heater.

1. Set the dial on the front of the 273 electronics unit to the desired temperature.

   The dial will turn three complete turns, however, only one turn is used.

2. Turn on the front power switch.

   The temperature of the selected heater will be displayed. The temperature will climb slowly to the desired temperature and remain stable.

3. Allow approximately four (4) hours for the unit to stabilize at the set temperature.

Caution 

Do not tamper with the internal pot settings. The unit is carefully calibrated at the factory. Any changes to the internal pots will destroy its calibration.

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Appendix A: Product Specifications

Specifications

Operating Voltage	105 to 130 VAC, 210 to 260 VAC, 50-60 Hz
Power Consumption	450 Watts maximum with all heaters at 150° C
Temperature Range	40 to 150° C (104 to 302° F)
Temperature Stability	30 to 1[1]
Digital Readout Units	° C
Readout Accuracy	±3° C

Due to continuing research and development activities, these product specifications are subject to change without notice.

[1] Example: for a 3° C change in ambient temperature, the sensor variation is 0.1° C

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Appendix B: Model Code Explanation

Model Code

The model code of your 273 controller identifies in the number of heaters shells included. The model codes are defined as follows:

273-1: Temperature Controller with three channels and one heater shell

273-2: Temperature Controller with three channels and two heater shells

273-3: Temperature Controller with three channels and three heater shells

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