# OPERATION MANUAL

# FOR

# MODEL 3210

# THERMOMETRY PRE-HEAT AUTO-SWITCH

www.guildline.com

OM3210-B-00
24 July, 2016

# WARRANTY AND SERVICE

**CERTIFICATION:** Guildline Instruments Limited certifies that this product was tested and inspected and found to meet its published specifications when it was shipped from the factory.

**WARRANTY:** This product is warranted against defects in materials and workmanship for a period of one year from date of shipment. During the warranty period, Guildline Instruments Limited will, at its option, either repair or replace products that prove to be defective.

**SERVICE:** For warranty service or repair, this product must be returned to the factory. The buyer shall prepay shipping charges to Guildline Instruments Limited and Guildline Instruments Limited shall pay surface shipping to the buyer. Permission must be obtained from the factory for warranty repair returns.

**LIMITATIONS:** The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by the buyer, or unauthorized modifications or misuse.

Neither Guildline Instruments Limited nor any of its employees shall be liable for any direct or indirect, special, incidental or consequential damages arising out of the use of this product.

**No other warranty is expressed or implied.**

# SAFETY PRECAUTIONS

This product has been designed and tested in accordance with IEC1010-1 / EN61010-1 including amendment 1 (1995) for insulation category II use. Use of this equipment in a manner not specified could result in personal injury.

**AC POWER SOURCE:** This product is intended to operate from an AC power source that will apply not more than 264 VAC between either of the supply conductors and ground.

**POWER CORD:** Use only the power cord and connector appropriate for the voltage and plug configuration in your country. The cord must contain a safety ground conductor and be connected to a plug that has a connection to earth ground. Use only a power cord that is in good condition.

**SIGNAL INPUT POWER:** Signals applied to the input or output terminals must be limited to levels deemed safe by the IEC/EN specifications. When applied voltages are above 30 volts, the current source must limit the current to not more than 2 milliamps.

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# 1. INTRODUCTION

## 1.1. DESCRIPTION

The Guildline Thermometry Pre-Heat Auto-Switch, with extremely low thermal offsets and independent built in pre-heat current sources, is ideal for automating precision thermometry measurements to sub-ppm accuracy.  This versatile Thermometry Pre-Heat Auto-Switch has 8 channels that make it suitable for a wide variety of uses such as fixed-point thermometry and comparison furnace calibration automation.

Special care has been taken to minimize thermal offsets and current source crosstalk. The switches used are high isolation, low thermal, latching relays requiring only a few millisecond pulses to actuate.  Several systems are used to protect the devices connected to the Thermometry Pre-Heat Auto-Switch from being damaged by operator error or Thermometry Pre-Heat Auto-Switch failure.  It can be operated from the front panel touch screen or by commands sent over the USB Interface.



**Figure 1-1:  Guildline Model 3210 Thermometry Pre-Heat Auto-Switch**

The phone number in the USA and Canada to obtain Product Support, Calibration Service or Replacment Parts is (800) 310-8104.

To Contact Guildline Instruments, the following information is provided.

USA and Canada Telephone:  (613) 283-3000
USA and Canada Fax: 1-613-283-6082

Outside US and Canada Telephone:  + [0] [1] 613 283-3000
Outside US and Canada Fax:  + [0] [1] 613 283-6082

You can also contact Guildline Instruments Limted via their Email or Website.

Email is:  sales@guildline.com
Website is:  www.guildline.com

## 1.2.    WARRANTY

Guildline Instruments warrants its products to be free of defects in manufacture and normal operation for a period of two (2) years from the date of purchase, except as otherwise specified.  This warranty applies only in the country of original purchase and only to the original purchaser, who is also the end user.  Equipment, which is defective or fails within the warranty period, will be repaired or replaced at our factory without charge at the discretion of Guildline Instruments.

In addition, systems engineered by Guildline Instruments are warranted to be free of defects in overall system operation for a period of two (2) years from the date of receipt by the original purchaser.

Third party system components purchased by Guildline carry the warranty of the original equipment manufacturer and will be accepted for claim by Guildline Instruments at our factory only after warranty authorization by the original manufacturer.

## Limitation of Warranty

Warranty coverage does not apply to equipment which has failed due to misuse, neglect, accident or abnormal conditions of operation or if modifications or repairs have been made without prior authorization of Guildline instruments.

Temperature probes are not warranted against failure due to mechanical shock.

Fuses, lamps and non-rechargeable batteries are not warranted against breakage.

## Damage in Shipment to Original Purchaser

Instrument(s) should be thoroughly inspected immediately on receipt for visible damage.  Any damage should be reported to the carrier and further inspection and operational tests should be carried out if appropriate to determine if there is internal damage.  Contact Guildline Instruments before returning for repair.   The Customer or purchaser must complete all final claims with the carrier.

Regular charges will apply to non-warranty service.  External service charges and expenses will be billed at cost plus handling.

## 1.3.    TO OBTAIN WARRANTY OR CALIBRATION AND REPAIR SERVICE

**Call for a Return Material Autorization (RMA) number.  RMA's are required for all Warranty Returns and/or Calibration and Repair Service Requests.**  Telephone, Fax and email addresses to contact Guildline are provided previously.

Guildline Instruments will pay for all warranty costs including shipping to and from the original shipment point.  However, if the instrument is purchased within one country and shipped to another, Guildline will only pay for shipping to and from the original ship to country or customer point.

**USA Warranty Return Address:**

USA Customers should use the following address to return instruments for warranty service or calibration support.

> Guildline Instruments Limited
> C/O AN Deringer
> 800 Proctor Avenue
> Ogdensburg, NY   13669
>
> Mark on the outside of the box:
> RMA # _____
> Model #_____
> Serial #_____
> The Statement:  "Canadian manufactured goods being returned for repair."

**For all other countries, including Canada, please ship to**:

> Guildline Instruments Limited
> 21 Gilroy Street, PO Box 99
> Smiths Falls, ON   K7A 4S9
>
> Mark on the outside of the box:
> RMA # _____
> Model #_____
> Serial #_____
> The Statement:  "Canadian manufactured goods being returned for repair."

## 1.4.    SPECIFICATIONS

**NUMBER OF CHANNELS**
8 for Model 3210

**THERMOELECTRIC POTENTIALS**
20 nanovolts typical, 50 nanovolts maximum

**CURRENT SOURCE(S)**
0 to 150 mA, 8 independent channels
Maximum of 800 mA combined output for all 8 channels

**ENVIRONMENTAL LIMITS**
Operating:      10 $^{o}$C to 40 $^{o}$C up to 80 % relative humidity
Storage:        -20 $^{o}$C to 65 $^{o}$C up to 95 % relative humidity

** NOTE:  Specifications apply only if temperature is stable within 1 $^{o}$C, free of drafts
and the relative humidity is below 70 %.  Warm the Thermometry Pre-Heat Auto-Switch
up for 2 hours minimum.

**THERMOMETRY PRE-HEAT AUTO-SWITCH CONTROL**
Local, using front panel touch-screen
Remote, via USB (Virtual COM Port)

**RELAY CONTACT RATINGS**
Life: greater than 10,000,000 cycles at low levels
Current:  150 mA maximum at 10 volts
Voltage switched: 10 volts maximum at 1 milliamp
Voltage non-switched*: 100 volts max. (for terminal inputs)

*CAUTION - reduce current before actuating relays.

NOTE: when applied current is above 2 milli-amps, the current source must limit the
voltage to less than 30 volts to meet IEC 1010-1 / EN61010-1 safety requirements.

**SIZE**
L x W x H: 420 mm (16.5 in.) x 451 mm (17.7 in.) x 138 mm (5.4 in.)

**WEIGHT**
8 channel Thermometry Pre-Heat Auto-Switch: 9.1 kg (20.1 lb.)

**LINE POWER**
100 V, 115 V - 127 V, 220 V - 230 V, 240 V, all ± 10 %; 50 - 60 Hz

# 2.  INSTALLATION

## 2.1.  INITIAL INSPECTION

This instrument was carefully inspected both mechanically and electrically before shipment.  It should be free of marks and scratches and in perfect electrical order upon receipt.

Unpack the instrument and retain the shipping container until the instrument has been inspected for damage in shipment.  If in-shipment damage is observed, notify the carrier and obtain authorization for repairs before returning the instrument to the factory.

## 2.2.  POWER REQUIREMENTS

The instrument is shipped with a three-wire line cord and must be connected to a grounded 50 to 60 Hz AC power source.  This product will operate at between 100 V and 240 V all ± 10 %.

> **WARNING**: BEFORE SWITCHING ON THIS INSTRUMENT, THE PROTECTIVE TERMINAL OF THIS INSTRUMENT MUST BE CONNECTED TO A PROTECTIVE EARTH CONTACT.  THE POWER LINE CORD SUPPLIED WILL PROVIDE THE PROTECTIVE GROUNDING WHEN INSERTED INTO A SOCKET OUTLET PROVIDED WITH AN EARTH CONTACT.  THE PROTECTIVE ACTION MUST NOT BE NEGATED BY THE USE OF AN EXTENSION CORD OR ADAPTOR WITHOUT A PROTECTIVE GROUNDING CONDUCTOR.

## 2.3.  LOCATION

To insure optimum performance, the Thermometry Pre-Heat Auto-Switch should be installed in an area having reasonably constant temperature, no strong electrostatic or magnetic fields, and a minimum amount of vibration.  The unit should not be located near heating or cooling vents or in direct sunlight.  Such locations can cause sudden temperature changes resulting in generation of thermal errors in the measurements.  A cloth can be placed over the binding posts on the rear and front panels (and at the connections to your devices) to shield it from drafts to further reduce thermal errors.

# 3.   MANUAL OPERATION

## 3.1.   FRONT PANEL



**Figure 3-1:  Front Panel Guildline Model 3210**

1.  **TOUCH SCREEN INTERFACE** - Used for front panel operation.  Refer to section 3.3. for operation.

2.  **PRT Terminals** - Connect red terminals to one side of probe(s) under test and black terminals to the opposite side of the probe(s) under test.  Low thermal binding posts are used with tellurium copper, gold flashed per MIL-G-45204.

3.  **PRT LEDs** – Multi-color LED that indicates Channel Status.  Pre-heat enabled (yellow), Active Measurement Channel (green), Channel Off (not illuminated).

4.  **POWER LED** - Indicates the 3210 is powered on (red).

## 3.2. REAR PANEL



**Figure 3-2: Rear Panel Guildline Model 3210**

1. **RX INPUT** - Connect to potential and current terminals of the RX input of the Bridge. Low thermal binding posts are used with tellurium copper, gold flashed per MIL-G-45204.

2. **USB INTERFACE BUS** - Type A connector used to connect Thermometry Pre-Heat Auto-Switch to controller.

3. **POWER** - Line input voltage on/off switch.

4. **120 V – 240 V AC POWER INPUT** - IEC Line cord to AC mains. 100 V, 115 V – 127 V, 220 V – 230 V, 240 V, all ± 10 %; 50 - 60 Hz.

5. **FUSE** - 1/2 A Slow Blow for 100 V – 127 V, 1/4 A Slow Blow for 220 V – 240 V.

## 3.3.   FRONT PANEL OPERATION

The Thermometry Pre-Heat Auto-Switch is operated manually using the touch screen interface.  The screen dims after a short period of time of inactivity.  To wake up the display simply touch anywhere on the screen.

## 3.4.   TOUCH SCREEN DISPLAY FUNCTIONS

### 3.4.1.  Opening Banner
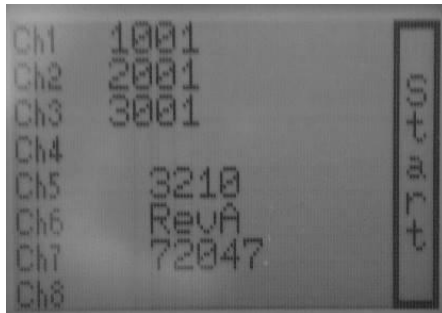


The opening banner only appears on start-up of the 3210.  The opening banner provides system information of the 3210 such as firmware revision and serial number of the 3210.  To dismiss the opening banner simply touch anywhere on the screen.

### 3.4.2.  Main Display
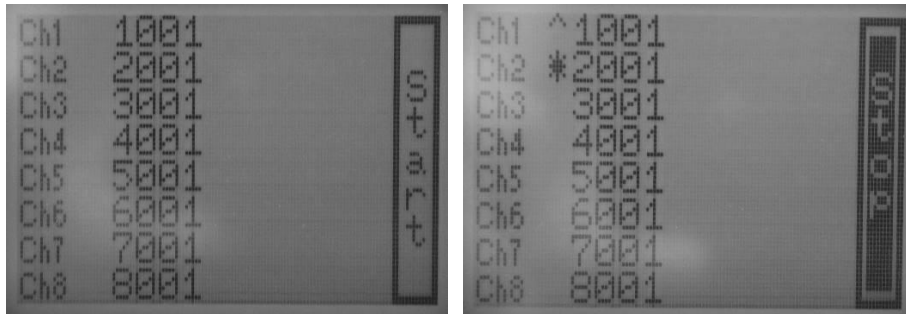


The Main Display screen indicates the selected channels and the pre-heat status current of all channels.  On the display you will also see the status of each channel indicated by "*" signifying the active measuring channel as well as "^" indicating the channels with active Pre-heat.

You can access the setup menus to set the current output value used for pre-heat, and control the state of the channel output by simply pressing on the screen on the line of the desired channels. Also to the right of the screen is a vertical Start/Stop button which activates the internal pre-heat current sources as set up for each individual channel.

**Note that the display responds better with the use of a touch screen stylus rather than a finger.**

### 3.4.3. Data Entry Screens

Other Data Entry Screens will be displayed after any numeric field is touched. The screen will indicate the name of the value being changed, the value currently in the field, and display the user input value. Pressing Ok will load the new value an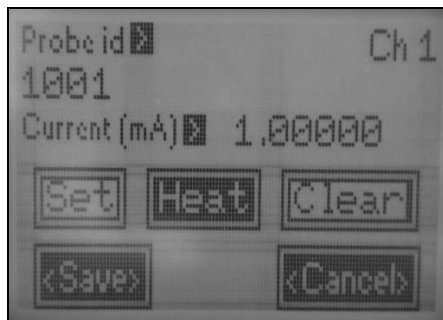d return to the previous screen. Pressing Cancel will return to the previous screen with no change to the value. Pressing Clear will clear the entry and remain in the screen to allow new values to be entered.

### 3.4.4. Setup Screen



The Setup Screen displays and allows changes to be made to each channel of the 3210. There are both settings for state and pre-heat current. The "Set" function sets the channel as the active channel with the PRT being measured. The "Heat" function sets the channel to an active pre-heat with the entered amount of current. Lastly the "Clear" function clears the channel of both pre-heat and of being the active measurement channel.

Touching the arrow beside "Probe id" or "Current (mA)" will allow you to change these parameters.

**Note: This screen will update the settings in real time if the 3210 is already in the running/enabled state.**

### 3.4.5. Current - Data Entry Screen



The Current - Data Entry screen allows the user to input the numeric parameters to control the pre-heat current magnitude. This screen is displayed when the "Current (mA)" arrow in the Setup display is touched. This screen will indicate the name of the value being changed, the value currently in the field, and display the user input value. Pressing Ok will load the new value and return to the previous screen. Pressing Cancel will return to the previous screen with no change to the value. Pressing Clear will clear the entry and remain in the screen to allow a new value to be entered.

### 3.4.6. Probe ID Screen
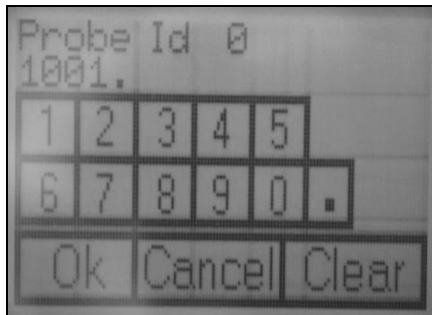


The Probe Id Screen displays and allows changes to the probe ID or serial number. To edit the existing number simply touch the number(s) on the screen. Pressing Ok will load the new value and return to the previous screen. Pressing Cancel will return to the previous screen with no change to the value. Pressing Clear will clear the entry and remain in the screen to new values to be entered.

# 4.  THEORY OF OPERATION

## 4.1.  INTRODUCTION

3210 Low Thermal Thermometry Pre-Heat Auto-Switches with extremely low thermal offsets are ideal for automating precision thermometry measurements to sub-ppm accuracy. This versatile Thermometry Pre-Heat Auto-Switch has sensitive latching relays.  The major problem with conventional relays is the thermal offset voltage caused by the heat generated by the current in the relay coil.  With this latching relay a short pulse of only 10 milliseconds is all that is required to toggle the contacts from one side to the other.  Thus the heat generated is negligible.

On each PRT connection there is an independent programmable pre-heat current source. This pre-heat capability makes the 3210 ideal for use with not only multiple probes, but also for multiple probe types.  Some common examples are SPRT, PRT, HTPRT and thermistors.  Having the ability to pre-heat the probes prior to measurement removes the latency due to self-heating of the PRT and greatly improves the settling time for measurements.

## 4.2.  LOW THERMAL DESIGN

Special care has been taken to minimize thermal offsets.  The switches used are latching relays requiring only a short pulse to actuate, and thus no self-heating occurs.

Switching assemblies with eight relays to a PC board are housed in a heavy machined aluminium box.  This isothermal enclosure helps to maintain a uniform temperature at each of the relay contacts.

The printed circuit edge connectors carry only the relay coil and panel light circuits.  All the channel input lines are soldered to the relay boards directly to prevent the thermal and noise voltages caused by connectors.

## 4.3.  INTERNAL CIRCUITS

The Thermometry Pre-Heat Auto-Switch is designed to allow easy operation from both the USB interface and the front panel.  The USB interface is designed to work with a connected computer and installs as a Virtual COM Port and can be used with any terminal program which supports serial interfaces, such as HyperTerminal.

To operate from the front panel, the touch screen interface allows for the setting of each channel's parameters as well as to activate the 3210 current sources.

Both the touch screen interface and USB interface are controlled by a microprocessor which is kept isolated from the low thermal relays and current sources that are part of the measurement path. This high isolation ensures no noise or offsets will be present in measurements conducted with the 3210 due to heat and noise from the rest of the circuitry inside the 3210.

Particular care has been taken to avoid cross-talk on adjacent channels, which can be an issue for sub ppm measurements.

## 4.4. CHANNEL PROTECTION

The 3210 has several protection features to help ensure the equipment used with the 3210, as well as the 3210, will be safe from damage. If output current is turned on and the probe is not connected, or incorrectly connected, the light will turn red above the respective channel. The 3210 will also not allow for two probes to be simultaneously selected. Selecting any PRT channel will automatically disengage the previously selected channel.

The second method for protection is the 'close gate' lines to the decoder circuits. The control circuit will allow these gates to open only if the series protection line is complete to ground. One of the contacts on each relay is connected in series, and will complete the series protection circuit only if all the relays on the line are in the clear position. Thus, no relay on the A line can be closed if any other relay on the A line is already closed; and similarly no B line relay can be closed if any other relay on the B line is already closed. These series protection lines are brought out to terminals on the rear panel. Thus if more than one Thermometry Pre-Heat Auto-Switch is used in a large system and these terminals are connected together, all units in the system will be protected.

The third protection mechanism to protect devices from damage is not shown on the diagram but is part of the control logic circuit. This is the requirement that two push-buttons on the front panel must be pressed at the same time for any relay to actuate. These would be either the A or B line button and any of the 16 relay selector push-buttons. This is to help prevent accidental operation. It takes two hands to operate the Thermometry Pre-Heat Auto-Switch from the front panel.

# 5.   MAINTENANCE AND TROUBLE SHOOTING

## 5.1.   PERIODIC MAINTENANCE

There are no adjustments or controls in the Thermometry Pre-Heat Auto-Switch.  Each relay should be operated at least 10 times in a given month to ensure it does not become stuck in a fixed position and that the contacts are kept clean.

## 5.2.   UNSTABLE READINGS

The most common cause for unstable readings is poor connections between the units being measured and the Thermometry Pre-Heat Auto-Switch inputs.  Loose connections or leads that are oxidized or unclean will cause unstable readings.  The leads should be shiny and can be restored by lightly sanding with fine sandpaper and/or cleaning with isopropyl alcohol.  Periodic cleaning of the leads and tightening connections may improve your readings.  Ideally gold flashed copper banana jacks should be used for connection to Thermometry Pre-Heat Auto-Switch terminals for best contact quality and reliability.

Thermometry Pre-Heat Auto-Switch channels that are used less than once a month may develop a film on the relay contacts.  The relay contacts are wiped clean each time they are used; however, if a relay is not used for a while the film may not be wiped clean with only one closing of the relay.  Infrequently used relays should be switched on and off a few times before use.

## 5.3.   RELAY FAILURES

Relay failure is the primary cause of Thermometry Pre-Heat Auto-Switch malfunction.  All relays are carefully adjusted and very thoroughly screened.  Improved relay drive circuits have minimized but not yet completely eliminated these failures.  It is essential that all relays are operated on a monthly basis to minimize relay failures.

## 5.4.   SERVICE

There are no user serviceable parts in the Thermometry Pre-Heat Auto-Switch.  Contact Guildline Instruments for instructions should a fault be experienced.

# 6. REMOTE CONTROL

## 6.1. REMOTE OPERATION

The 3210 has a USB type A port located on the rear panel which is used for remote operation. The 3210, when powered on and connected to a computer, will install as a virtual COM Port on the computer. This COM Port can be used to communicate with the Guildline 3210 BridgeWorks software plugin, with any COM Port terminal program, or accessed programmatically in any software as a serial port. The communication is bi-directional thus allowing both setting the device and querying the status.

This section supplies a command reference for the 3210. For remote operation with the 3210 BridgeWorks plugin please refer to the plugin manual PLM3210.

## 6.2. REMOTE COMMANDS

A brief description of each of the possible remote commands and their syntax in BNF (Backus Naur Form) follows:

- words inside angle brackets (ie. < and > ) are defined items
- :== means "is defined to be"
- | means "or"
- [] means optional
- required letters are shown in upper case but may be upper or lower case

        $<digit>$ :== 0|1|2|3|4|5|6|7|8|9
        $<letter>$     :== A|B|C|...|Z|a|b|c|...|z
        $<string>$     :== $<letter>$ | $<letter><string>$
        $<boolean>$    :== 0|1
        $<unsigned>$   :== $<digit>$ | $<digit><unsigned>$
        $<nr1>$       :== [+|-]$<unsigned>$
        $<nr3>$       :== $<nr1>$[.[$<unsigned>$]][E$<nr1>$]
        $<?>$        :== $<letter>$ | $<digit>$
        $<*>$        :== $<?>$ | [$<*>$]       : not to be confused with *
        $<DD>$      :== $<unsigned>$     : limited to range 1...31
        $<MM>$     :== $<unsigned>$     : limited to range 1...12
        $<YYYY>$   :== $<unsigned>$     : limited to ranges 1999 and up

The STB Bits are as follows:

bit 7 = (unused)
bit 6 = SRQ (service request)
            ; set when (SRQ_mask|GPIB_STAT_PORT) != 0
bit 5 = ESB (event summary)
            ; set when bitwise AND of ESE, register is not zero
bit 4 = MAV (message available)
            ; set when GPIB Tx buffer has data available
            ; cleared when the buffer is empty
bit 3 = IFL (input buffer full)
            ; set when input buffer is over 80 % full
            ; cleared when input buffer drops under 20 % full
bit 2 = CHK (Checksum calculation complete)
bit 1 = RDY (ready)
            ; set when unit has a stable reading
            ; cleared when unit is working
bit 0 = OVR (over range)
            ; set when over range detected (in ISR)
            ; cleared when over range cleared

| COMMAND | COMMENT |
|---|---|
| *CLS | clear status register |
| *ESR? | query, display event status register |
| *ESE? | query, display event status enable |
| *ESE <unsigned> | set event status enable |
| *IDN? | query, display identity of unit |
| *OPT? | query, display any reportable options |
| *OPC? | query, operation complete |
| *OPC | set operation complete bit in event status register |
| *RST | reset the instrument to a known defined state |
| *STB? | query, display serial poll status byte |
| *SRE? | query, display service request mask |
| *SRE <unsigned> | set the service request mask |
| *TST? | query, display results of self-test |
| *WAI | set communication wait timeout |

| COMMAND | COMMENT |
|---|---|
| MEASure <state> | select the measurement state<br><state>:== 0\|1<br>type <boolean><br>0 :== OFF<br>1 :== ON |
| MEASure? | query, display the measurement state of the instrument |
| CURRent <channel>,<cur> | set the channel pre-heat current<br><channel>:== 1\|2\|3\|4\|5\|6\|7\|8<br>type <digit><br><cur>:== value from 0 to 150.000mA<br>type <unsigned> |
| CURRent? {1\|2\|3\|4\|5\|6\|7\|8} | query, display the channel pre-heat current<br><channel>:== 1\|2\|3\|4\|5\|6\|7\|8<br>type <digit> |
| PROBe:State <channel>,<state> | set the channel state<br><channel>:== 1\|2\|3\|4\|5\|6\|7\|8<br>type <digit><br><state>:== 0\|1\|2<br>type <digit><br>0 :== OFF<br>1 :== SET<br>2 :== PRE-HEAT |
| PROBe:State? {1\|2\|3\|4\|5\|6\|7\|8} | query, display the channel state<br><channel>:== 1\|2\|3\|4\|5\|6\|7\|8<br>type <digit> |
| PROBe:ID <channel>,<id> | set the channel probe ID<br><channel>:== 1\|2\|3\|4\|5\|6\|7\|8<br>type <digit><br><id>:== Probe ID or Serial Number<br>type <string> |
| PROBe:ID? {1\|2\|3\|4\|5\|6\|7\|8} | query, display the channel probe ID<br><channel>:== 1\|2\|3\|4\|5\|6\|7\|8<br>type <digit> |

| COMMAND | COMMENT |
|---------|---------|
| SYSTem:TERSe | respond to commands with a minimum data set |
| SYSTem:VERBose | respond to commands with a minimum data set |
| | |
| SYSTem:VERSion? | query, display the installed software version |
| SYSTem:LOCAl | respond to local operation (unlock local) |
| SYSTem:REMOTE | respond to remote operation (lock out local) respond to local operation (unlock local) |
| | |
| SerialNumber <serial> | set the system serial number <serial>:== 32 bit integer value type <unsigned> |
| SerialNumber? | query, display the system serial number |
| | |
| RESET | reset instrument to power on reset state |

# 7. DECLARATION OF CONFORMITY

(according to ISO/IEC Guide and EN 54014)

**Manufacturer's Name:**          Guildline Instruments Limited
**Manufacturer's Address:**       21 Gilroy St. Smiths Falls,
                                  Ontario, Canada K7A 4S9

**Declares, the product**

    **Product Name:**          Thermometry Pre-Heat Auto-Switch

    **Model Numbers:**         3210

    **Product Options:**       All Options


**Conforms to the following Product Specifications**

    **EMC:**          EN50081-1 (1992) / EN55022 Class B
               EN50082-2 (1992) / IEC 801-2 (1984)
               EN50082-2 (1992) / IEC 801-3 (1984)
               EN50082-2 (1992) / IEC 801-4 (1988)

    **SAFETY:**       EN61010-1:1993/1995

**Supplementary Information:**    The Product herewith complies with the requirements of the EMC Directive 89 / 336 / EEC.

Smiths Falls, Ontario

Richard Timmons, President
January 14, 2016

Note: The declaration of conformity applies to all Thermometry Pre-Heat Auto-Switches with the CE Mark on the rear panel.