Section 10

# Pre-scan monitor

**In this section:**

Introduction ..... 10-1
Equipment required ..... 10-1
Device connections ..... 10-2
Pre-scan monitor ..... 10-3

## Introduction

Many products need to be environmentally-stressed during performance testing. This is accomplished by placing the device in a chamber where the temperature can be set and controlled and soaking the DUT at the required set-point conditions. Temperature changes are not instantaneous so there is some wait time between scans. The DAQ6510 can monitor the environment until the target temperature has been reached at which point the instrument automatically begins the scan.

This application example demonstrates how to use a DAQ6510 to initiate a scan based on the temperature of the environment around the device under test (DUT). This example will model a situation where resistance DUTs are measured after the temperature exceeds 30 °C.

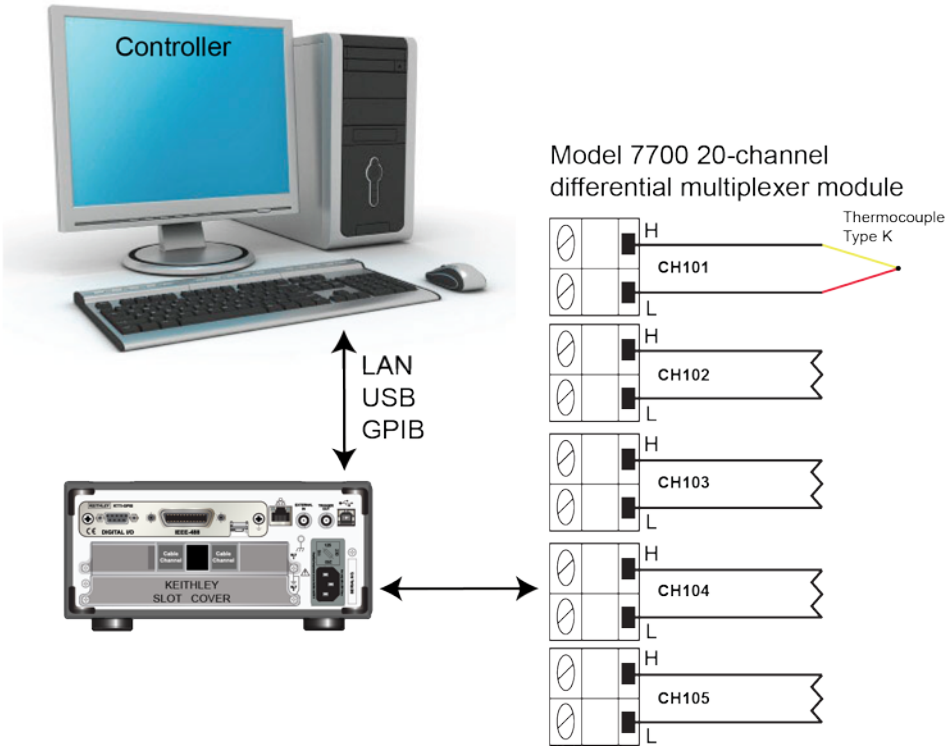
## Equipment required

- One DAQ6510
- One Model 7700 20-channel differential multiplexer module
- One computer setup for communication with the instrument
- One Type K thermocouple
- Four resistors

# Device connections

This application example uses a DAQ6510 with a Model 7700 20-channel differential multiplexer configured to monitor a Type K thermocouple, connected to channel 101, and four DUTs (resistors) connected to channels 102 through 105.

**Figure 42: DAQ6510 Device Connections — Pre-scan Monitor**




## WARNING

**To prevent electric shock, test connections must be configured such that the user cannot come in contact with test leads or any device under test (DUT) that is in contact with the conductors. It is good practice to disconnect DUTs from the instrument before powering the instrument. Safe installation requires proper shields, barriers, and grounding to prevent contact with test leads.**

**There is no internal connection between protective earth (safety ground) and the LO terminals of the DAQ6510. Therefore, hazardous voltages (more than 30 $V_{rms}$) can appear on LO terminals. This can occur when the instrument is operating in any mode. To prevent hazardous voltage from appearing on the LO terminals, connect the LO terminal to protective earth (safety ground) if your application allows it. You can connect the LO terminal to the chassis ground terminal on the front panel or the chassis ground screw terminal on the rear panel. Note that the front-panel terminals are isolated from the rear-panel terminals. Therefore, if you are using the front-panel terminals, ground to the front-panel LO terminal. If using the rear-panel terminals, ground to the rear panel LO terminal. Failure to follow these guidelines can result in injury, death, or instrument damage.**

# Pre-scan monitor

The DAQ6510 uses Monitor Measurement triggering on channel 101.

For this application, you will:

- Configure the instrument to measure the temperature on channel 101 using a thermocouple. The instrument then scans channels 102 to 105 after the specified temperature has been reached.
- Configure the scan on channels 102 to 105 using the 2-wire resistance function.

## Using the front panel

***To setup the application from the front panel:***

1. Press the **POWER** switch on the front panel to turn on the instrument.
2. Select the **REAR** terminals**.**
3. Press the **MENU** key.
4. Under Channel, select **Scan**.
5. Select the **+** button to add a group of channels (101 to 105), and select **OK**.
6. Select **2W Resistance** on the Measure Functions screen.
7. In the upper left corner of the screen, select **Expand Group** from the Menu icon.
8. Select channel 101 by selecting the adjacent 2-Wire Res button. Change the function to **Temperature**.
9. Set Reference Junction to **Internal**.
10. In the Scan tab, change the **Scan Count** to **10**.
11. In the Trigger tab, select **Scan Start** and select **Monitor Measurement**.
12. A second panel opens, select **Above High Limit** for Start Condition.
13. Set Channel to 101.
14. Set Higher Limit to 30 ˚C and select **OK**.
15. Select the **Start** button at the bottom of the left-side pane to start the scan.
16. Select **View Scan Status** to return to the HOME screen.

You will be able to watch the active temperature measurement on channel 101. Once the target temperature has been reached the instrument begins scanning.

## Using SCPI commands

This sequence of SCPI commands executes a scan once the the environment reaches a target temperature.

You may need to make changes so that this code will run in your programming environment. In the table, the SCPI commands have a light gray background.

***Send the following SCPI commands for this example application:***

| Commands | Descriptions |
|---|---|
| `*RST` | • Put the instrument in a known state |
| `FUNC "TEMP", (@101)` | • Monitor temperature on channel 101 |
| `TEMP:TRAN TC, (@101)` | • Set transducer type to thermocouple |
| `TEMP:TC:TYPE K, (@101)` | • Set thermocouple type to K |
| `TEMP:UNIT CELS, (@101)` | • Set unit to Celsius |
| `TEMP:TC:RJUN:RSEL INT, (@101)` | • Set internal reference |
| `ROUT:SCAN:MON:CHAN (@101)` | • Monitor channel 101 |
| `ROUT:SCAN:MON:LIM:UPP 30` | • Set upper limit to 30 Celsius degree |
| `ROUT:SCAN:MON:MODE UPP` | • Set monitor mode to upper |
| `FUNC "RES", (@102:105)` | • Scan resistance on channel 102 through 105 |
| `RES:RANG:AUTO ON, (@102:105)` | • Set auto range |
| `ROUT:SCAN:CREATE (@101:105)` | • Scan channel 101 through 105 |
| `ROUT:SCAN:COUN:SCAN 10` | • Set scan count to 10 |
| `INIT` | • Initiates the monitoring of channel 101 conditions, which will enable the scan when it crosses the temperature threshold |

## Using TSP commands

**NOTE**

**The following TSP code is designed to be run from Keithley Instruments Test Script Builder (TSB). TSB is a software tool that is available from the Keithley webpage on the Tektronix website (tek.com/keithley). You can install and use TSB to write code and develop scripts for TSP-enabled instruments. Information about how to use TSB is in the online help for TSB and in the "Introduction to TSP operation" section of the *DAQ6510 Reference Manual*.**

**To use other programming environments, you may need to make changes to the example TSP code.**

By default, the DAQ6510 uses the SCPI command set. You must select the TSP command set before sending TSP commands to the instrument.

***To enable TSP commands:***

1. Press the **MENU** key.
2. Under System, select **Settings**.
3. For Command Set, select **TSP**.
4. At the prompt to reboot, select **Yes**.

This sequence of TSP commands monitors the temperature measurement on the first channel to ensure the test environment has reached the required temperature to begin scanning. After the code executes, the data is displayed in the Instrument Console of Test Script Builder.

***Send the following commands for this example application:***

```
-- monitor temperature on channel 101
reset()
channel.setdmm("101", dmm.ATTR_MEAS_FUNCTION, dmm.FUNC_TEMPERATURE,
   dmm.ATTR_MEAS_TRANSDUCER, dmm.TRANS_THERMOCOUPLE, dmm.ATTR_MEAS_THERMOCOUPLE,
   dmm.THERMOCOUPLE_K, dmm.ATTR_MEAS_REF_JUNCTION, dmm.REFJUNCT_INTERNAL)
   channel.setdmm("101", dmm.ATTR_MEAS_UNIT, dmm.UNIT_CELSIUS)
-- set limit high on monitor and trigger scan when high limit exceeds
scan.monitor.channel = "101"
scan.monitor.limit.high.value = 30
scan.monitor.mode = scan.MODE_HIGH
-- scan 2-wire resistance on channel 102:105
channel.setdmm("102:105", dmm.ATTR_MEAS_FUNCTION, dmm.FUNC_RESISTANCE,
   dmm.ATTR_MEAS_RANGE_AUTO, dmm.ON)
-- create scan
scan.create("101:105")
scan.scancount = 10
-- initiates the monitoring of channel 101 conditions, which will enable the scan
   when it crosses the temperature threshold.
trigger.model.initiate()
```