Refrigerator Testing
using the TempScan™

A large refrigerator manufacturer interested in improving product reliability underwent a major upgrade of its engineering facility. The manufacturer's goal was to replace a manual system with state-of-the-art equipment and thereby gather better product test data. This multi-phase upgrade project included the installation of a new environmental chamber at the facility with an integrated control and data acquisition system.

Application Summary
The outdated test system was slow, tedious, and error-prone. Data was manually gathered from thermocouples located in pre-defined areas throughout each appliance under test. Collected data was recorded on paper, then hand-entered into a spreadsheet for later analysis. This process was highly labor intensive. As such, the manufacturer found it prohibitive to test the large number of refrigerators for a valid data sample. Moreover, the system was prone to human error at every stage. For example, temperature values were sometimes incorrectly recorded from the thermocouples, and incorrect values were also sometimes entered into the spreadsheet for analysis.

The manufacturer hoped to achieve the following results: to save money by completing tests more quickly and accurately, and to monitor a larger number of products over a longer period of time, yielding more substantial data samples.

IOtech's Solution
The appliance manufacturer had a new environmental chamber, replete with instrumentation installed at its facility. This new chamber is able to control the test room environment, monitor and control test-refrigerator power, and collect key parameters from the refrigerator under test.

The new test system is equipped to collect data from up to 10 refrigerators, each fitted with 12 thermocouples and 3 sensors for capturing line voltage, current, wattage, and special events such as the opening and closing of the refrigerator door and the operation or non-operation of the fan. Every 30 seconds the system samples data points, stamps date and time, and logs data to the hard disk for later review. Because the system is operated remotely, it is equipped with a modem to download data or to upload changes in the control software.
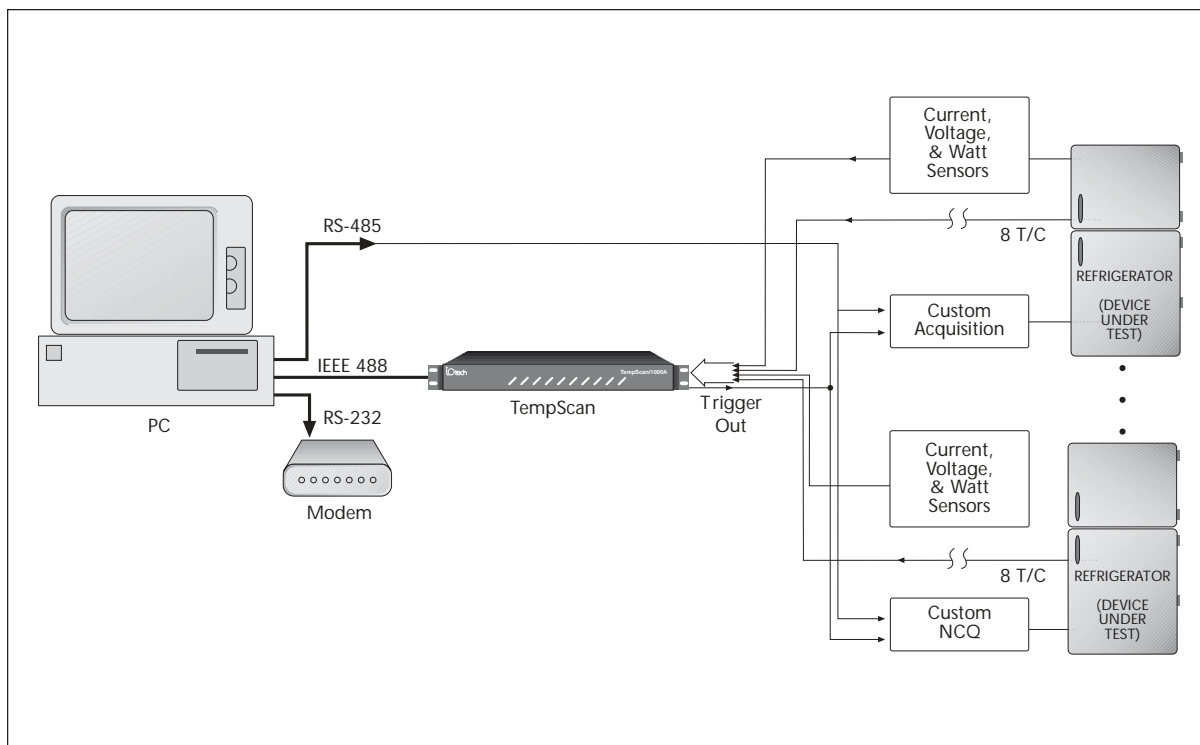
This TempScan-based test system collects data from up to 10 refrigerators, each of which is fitted with 12 thermocouples and 3 sensors for capturing voltage, current, and wattage

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The Integrated Solution

The new test chamber employs IOtech's TempScan to collect thermocouple and sensor data. The TempScan was chosen because it offers:

- Up to 992 expansion channels with a very low cost-per-point

- Trigger output, permitting synchronization of the test chamber's event recorder with the start of each scan

- Insertable temperature (TempTC/32) and voltage (TempV/32) cards that reduce overall system cost and complexity by integrating temperature, voltage, current, and wattage collection into one instrument

- An efficient, low-profile rack-mount design

- Automatic date and time stamping that eases software programming

In addition, the TempScan can read all 150 of the application's channels involved up to six times per second, with each reading being derived from the average of 16 samples taken in even intervals over one AC line cycle. This technique eliminates the 60-cycle noise that plagues thermocouple measurements.

Conclusion

The TempScan offers a cost-effective means of measuring a large number of thermocouple or voltage inputs. Its design makes it easy to use as a stand-alone instrument or to incorporate as a component of a larger system.

TempScan

The TempScan is well suited for temperature and lower-voltage measurement because its solid state scanning provides temperature readings at speeds up to 960 channels/s, an important feature in applications that require monitoring of tens or hundreds of channels. The TempScan includes ChartView™, one of IOtech's *Out-of-the-Box*™, Windows®-based setup and acquisition applications. ChartView provides a graphical spreadsheet-style user interface that lets you easily configure your hardware, acquisition, and display parameters. Compatible with all versions of Windows®, ChartView features a no-programming approach that enables data collection and display within minutes of taking your TempScan/1100 *Out-of-the-Box*™.

Features

- Measures thermocouples, volts, and RTDs at up to 960 channels/s

- Accepts optional scanning modules for measuring thermocouples, RTDs, or DC volts

- Expandable up to 992 channels

- IEEE 488 & RS-232/422 interfaces

- Ethernet communication with optional Net232

- 32 TTL digital alarm outputs and 8 TTL-compatible digital inputs

- Custom thermocouple types for user-defined linearization tables

- Two programmable scan rates for:
  - pre-trigger & post-trigger sampling
  - accelerated sampling on-event detection

- 128 Kreadings of memory, expandable up to 4 Mreadings

- Built-in real-time clock:
  - synchronizes acquisition to time of day
  - provides time and date stamping for trend monitoring
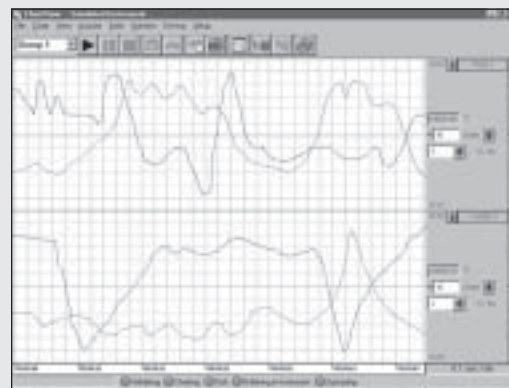
Software

- ChartView™, an *Out-of-the-Box*™ data logging application for effortless setup, acquisition, & real-time display

- eZ-PostView™ included free with *Out-of-the-Box*™ application software

- ScanCal™, calibration software

- Citect SCADA/HMI software with dedicated TempScan and MultiScan drivers

ChartView™, eZ-PostView™, TempScan™, and *Out-of-the-Box*™ are the property of IOtech; all other trademarks and tradenames are the property of their respective holders.