

**Thermo Scientific**  
**iSeries Model 60i Firmware Version 03.00.00.352**

**\*\*\*WARNING\*\*\*    \*\*\*WARNING\*\*\*    \*\*\*WARNING\*\*\*    \*\*\*WARNING\*\*\***

**iPort Software version 01.04.02 (latest included installation image with this software update) or greater is required to install this update. Earlier versions of iPort could cause the instrument to lock up during the installation process and require the processor board to be replaced.**

**OVERVIEW**

The firmware for the Model 60i is loaded into the instrument's FLASH memory at the factory, but it may be necessary to load updated firmware into the instrument as new features become available.

This release includes two files, 60i030000.bin for the iSeries and 60i030000.cramfs for the iSeries+, which can be used to update the Model 60i only.

Before attempting to upgrade the firmware, it is advisable to check that the instrument is a model supported by this update and that it is currently running an upgradeable version of firmware. This information may be viewed by going to the DIAGNOSTICS > PROGRAM VERSION(S) screen. Make sure that the PRODUCT field matches one of the models listed above and the VERSION field matches one of the following release versions:

01.00.00.213	01.09.00.315	02.02.08.348
01.01.00.233	01.10.00.324	02.02.09.349
01.02.00.294	02.00.00.334	
01.06.00.263	02.00.01.335	
01.07.00.292	02.00.01.336	
01.07.00.294	02.02.06.346	
01.08.00.301	02.02.07.347	

If the instrument is not running a version listed above, it is not field upgradeable using this procedure. Contact Thermo Technical Support for special upgrade instructions or specific information regarding changes to any firmware versions.

The entire firmware update process should take about 30 minutes at 57,600 baud over serial or 5 minutes over Ethernet. There are two steps to upgrading the firmware:

- A. Backup configuration/calibration data onto PC
- B. Upgrade firmware

Note: It may be convenient to print this file out before continuing with the firmware upgrade.

## **A. BACKUP CONFIGURATION/CALIBRATION DATA**

Thermo highly recommends backing up configuration and calibration data before performing a firmware update. If this information is somehow lost or corrupted during the update, then a complete recalibration of all sensors and outputs would be required if this data was not saved.

This procedure assumes that Thermo iPort has already been installed onto a PC and has been configured to communicate with the instrument (over serial or Ethernet). Before updating the firmware, the instrument's current settings should be saved to a data file on a PC.

This procedure is described below:

1. Run iPort. Bring up the connection to the instrument using Instrument > Poll Serial or TCP Connect.
2. Once the instrument's window is displayed and selected, select Instrument > Backup/Restore > Backup Config to back up the configuration from the currently selected instrument to a file on the PC.
3. In the Open dialog box, select the appropriate folder and type in a filename for the backup file, then click Open to retrieve the data from the instrument and save it to the file.

## **B. UPGRADE FIRMWARE**

Below is a procedure for loading the firmware into FLASH memory. The firmware update file transfer process should take about 30 minutes at 57,600 baud. It is assumed that iPort is already talking to the instrument and the instrument window is currently open.

**NOTE: DO NOT TURN OFF THE INSTRUMENT AT ANY TIME DURING THIS UPDATE**

If the instrument is turned off while burning the new image to the FLASH, it may require replacement of the CPU board, motherboard, I/O expansion board, and/or measurement interface board. To reduce this risk, make sure the instrument is running on clean and stable power before performing this update.

1. Close all instrument windows.
2. From the iPort menu, select Instrument > Update Firmware. Select TCP/IP or Serial, depending on the connection.

3. In the Update Instrument Firmware Program dialog box, enter the instrument ID (if using serial port) or the TCP/IP address (if using TCP/IP).
4. In the Open File dialog box, select the firmware update file, then click the Open button.
5. File transfer progress can be monitored by looking at the transferred blocks in the lower left corner of the iPort window as well as on the instrument's display.
6. Once the file transfer is complete, the instrument will automatically reboot. There may be some error messages regarding configuration and calibration files that are displayed, this is normal after a firmware update. At this time, the bootloader and application code in each of the low-level processors will be updated to the latest version.
7. To verify all updates were successful, go to the ALARMS menu and make sure the board status alarms at the bottom of the menu all show "OK". If any board status alarms show "FAIL", try rebooting the instrument and checking the ALARMS menu again. If they still show "FAIL", contact technical service.

## **RELEASE NOTES**

### **Version 03.00.00 changes from version 02.02.09:**

1. Remove telnet support.
2. Fix boot issue on new iSeries+ processor boards.
3. Fix streaming protocol so the instrument doesn't hang on Ethernet port scan.
4. Fix static gateway address setting so it's saved between power cycles when DHCP is off and update gateway when changed by user (no longer requires instrument reboot).
5. Invert signs in time zone labels to match the actual functionality and change "GMT" to just "UTC".
6. Update logo on splash screen.
7. Fix RS-485 user serial port communications.
8. Improve CLINK protocol communication over serial port.

### **Version 02.02.09 changes relative to version 02.02.08:**

1. Fixed concentration alarm detection.
2. Inverted signs in time zone labels, changed "GMT" to "UTC", changed "UTC (GMT)" label to plain "UTC".
3. Report invalid data error if user sends Modbus write coil function 6 with anything other than 0x0000 or 0xFF00 for data (old code would incorrectly respond with invalid address error).

### **Version 02.02.08 changes relative to version 02.02.07:**

1. Fix O2 span calibration so the reading shows 20.9% after span calibration with pressure compensation on or off.

### **Version 02.02.07 changes relative to version 02.02.06:**

1. Fix Zero Noise issues.

2. Fix "set format", "set lrec format", "set srec format", and "set erec format" CLINK commands to save the new setting if the source of the command is serial.
3. The "host name" CLINK command now responds with a <space> if no host name is found. If "set host name" data does not pass validation, it now responds with "data not valid" instead of "bad command".

**Version 02.02.06 changes relative to version 02.00.01:**

1. Fix over/under range for 4-20mA current outputs so it clamps the output when disabled.
2. Fix the detector board bootloader updates.
3. Change "instr name" CLINK response to "Multigas Analyzer".
4. Fix "lrec" and "srec" CLINK commands to respond with only line feed character after each record and carriage return and line feed after the last record to correct response processing in iPort's terminal window.
5. Fix softkey assignment screen to always show SAVING message for three seconds after the enter key is pressed.
6. Fix logged data averaging where the sum was divided by 'n + 1' instead of 'n' seconds, yielding a possible 1.6% error in logged concentration data for 1-minute logging or 0.03% error in hourly concentration data.
7. Fix handling of IP addresses with 3 digits in each of the four fields in INSTRUMENT CONTROLS> COMMUNICATIONS> TCP/IP SETTINGS> IP ADDRESS screen.
8. Add support for new processor board revision 1.5T.
9. Add message to cycle power when changing NTP server IP address.
10. Fixed time zone and time server issues.
11. Set alarm when communication with MIB is lost and clear it when it's re-established.

**Version 02.00.01 changes relative to version 02.00.00:**

1. Fix cal flow alarm conditions.
2. Add Blowback to data invalid flag reporting.

**Version 02.00.00 changes relative to version 01.10.00:**

1. Change bench temp 58°C safety cutoff to work off of the detector temp at 55°C.
2. Initial release for .cramfs.
3. Add '+' to version string for iSeries+ differentiation.
4. USB keypad support.
5. Fix event lockup after a sequence is aborted.
6. Fix user cal by using correct water coefficients.
7. Stop sequence if exit Sequence Screen.
8. Stop going to sample mode between events.
9. Add purge event to use sample mode.
10. Remove compiler warnings.

**Version 01.10.00 changes relative to version 01.09.00:**

1. Add water interference compensation curves for low abs values, including clink support.

2. Add screen for auto adjust pre amp gain.
3. Add cal gas auditing functionality.
4. Made absorbance's available for logging.
5. Rework get flags to report appropriate gas modes and data invalids for auto and screen operations.
6. Modify switching to single gas span mode to prevent from display run away when calibration. Mode available when enabled.
7. Initialized srec defaults to contain absorbance's.
8. Initialize default Run Screen 5 to list system parameters.
9. Initialize data logging settings to new defaults.
10. Modified strings to more appropriate.
11. ESM protocol fix for handling commands coming from Ethernet port.
12. Datalog viewing support for 2025i.
13. Datalogging default settings can now be instrument specific.
14. Make p\_ak\_condition\_output a weak callback so 2025 can do its own thing.
15. Add REGS\_TIMING debug printf's for timing the register reads and writes.
16. Added exit code EXIT\_PROGRAM\_USB to allow programming flash from USB.
17. Changes for iSeriesPlus and some warning fixes.
18. Remove password locking from contrast screen.
19. Fram definition for fram data item struct to dv\_fram.h.
20. Removed skipping over radix points from e\_screen\_edit\_float32().
21. Implemented help screen in e\_screen\_edit\_xxx() functions.
22. Add DT\_DATE\_YYYYMONDDHHMM data type.
23. Implement 6th datalogging/screen menu type "OTHER MEASUREMENTS 2".
24. Add DT\_DATE\_YYYYMONDD case to handlers for EPA date display on screens.
25. Add uppercase 'J' and ':' to 24/32 font.
26. Implement F-RAM driver file for use with iSeries+ motherboards.
27. Add support for TEOM controller in PMCEMS.
28. Add conc\_menu\_flag and meas\_menu\_flag variables to enable modules to mask those datalogging/run screen menu selections if desired.
29. Add key-press cleared counter and attendant function to increment and test it.
30. Add weak callback "p\_ak\_check\_cmd\_1st\_two\_char" so that 2025 can respond to AK commands in the expected format while leaving the other modules alone.
31. Add blowback to data invalid flag reporting.
32. Fix cal flow alarm conditions.

**Version 01.09.00 changes relative to version 01.08.00:**

1. Support for CO2 max range of 35%.
2. Support for New interface board with internal temp sensor, including all support for internal temp sensor.
3. System temp control and safety cutoff support.
4. Display system alarms including lost communications.
5. Add support for Action on system alarms.
6. Display Details of Cal fail alarms.
7. Add auto control of system and 60i pump controls.

#### **Version 01.08.00 changes relative to version 01.07.00:**

1. Modify CO2 display to 2 decimal digits when <10.0
2. Changed O2 span factor max limit to 5.0 from 10.0
3. Add pressure compensation for O2.
4. Changed pressure comp check to 400
5. Moved pressure compensation to absorbance for all Channels except water & except SO2. SO2 pressure comp is done at conc level
6. Add Multiple (3) iteration support
7. Add support to speed up response to a ZERO CAL
8. Add averaging for reporting motor voltage.
9. Changed some alarm min max/ default values.
10. Remove restore default user item and add help to ZERO and SPAN display MENU
11. Rename ACTION to EVENTS, changed few other strings.
12. Fixed cal history screen.
13. Add help messages to view span and view zero screen.

#### **Version 01.07.00 changes relative to version 01.06.00:**

1. Improved files read and saving to prevent data corruption. Fixed an aftereffect causing incorrect erasures of config\_iseries and datalogging files.
2. Modularize defaulter functions.
3. Change absorbance clamp, back to 3.0, except for reference channel.
4. Add 10 sec avg time support.
5. Add multipoint linearization support, screens and click for data entry.
6. Eliminated need for bended display channels \_D for SO2 and NO2.
7. Add dewpoint calibration support, screens.
8. Modified significant digits to be displayed for system temperatures and pressure.
9. Add locking functionality and click and screen support, to lock analog outputs to %, current or none.
10. Add faster display response to ZERO.
11. Add support to average internal temp and use it for compensation.
12. Changed ambient temperature to Source temperature, add different method for temperature control.
13. Add temperature compensation at intensity level and remove compensation at absorbance level.
14. Fixed analog output scaling for concentrations.
15. Mask O2 sensor cal if O2 sensor not present.
16. Add report data invalid during manual purge.
17. Add screens to report ref intensity max min and alarm, and in diagnostics.
18. Add flagging to prevent blowback during manual NOx calibration.
19. Move blowback setup screen to cal setup menu from syst svc.
20. Provision to reset individual ZERO and SPAN factors.
21. Move 62i Diagnostic under system menu.
22. Bunch of screen fixes.
23. Converted references to internal temp into source temperature Add temperature control scheme for source control temperature
24. Fixed max conc alarm setting.

25. Change max allowable setpoint for fan set temp to 80 deg C.