

Thermo Scientific
This update applies to all iSeries Model 80i
Firmware Version 03.00.01.405

*****WARNING*** ***WARNING*** ***WARNING*** ***WARNING*****

iPort Software version 01.04.01 or greater is required to install this update (installation image is included with this software 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 80i 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, 80i030001.bin and 80i030001.cramfs, which can be used to update the Model 80i 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 reads "MODEL 80i" and the VERSION field matches one of the following release versions:

"00.04.54.090"	"01.06.00.276"	"02.02.04.377"
"00.04.55.091"	"01.06.10.288"	"02.03.04.385"
"00.04.76.112"	"01.06.11.295"	"02.03.06.387"
"00.05.68.192"	"01.06.12.308"	"02.03.11.392"
"01.00.00.206"	"01.06.16.315"	"02.03.20.402"
"01.00.04.212"	"02.00.00.235"	"02.03.21.403"
"01.00.21.231"	"02.01.01.342"	"03.00.00.404"
"01.00.41.253"	"02.01.03.358"	
"01.00.48.259"	"02.01.04.361"	
"01.00.60.271"	"02.02.01.368"	

If the instrument is not running a version listed above, it is not field upgradeable using this procedure. Contact our 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.

WARNING

Some of the digital inputs were mistakenly moved when revising some versions of 80i firmware. After upgrading firmware, the digital input settings under I/O configuration must be manually updated to reflect these changes (at a minimum, the HYDRATOR ALARM input will need to be re-configured for digital input 7).

In addition, any control/datalogging systems that interface with the analyzer via MODBUS must be re-configured to address these changes when updating across these versions.

Version 01.00.48 renamed CAL INST SPAN to SET SPAN COEFF (113) and removed CAL PROBE SPAN (114) and CAL SYS SPAN (115) because they were redundant. This re-numbered the following MODBUS write coils:

- PROB SELECT 1 from 116 to 114
- PROB SELECT 2 from 117 to 115
- PROB SELECT 3 from 118 to 116
- PROB SELECT 4 from 119 to 117
- SYS SPAN 1 from 120 to 118
- SYS SPAN 2 from 121 to 119
- SYS SPAN 3 from 122 to 120
- SYS SPAN 4 from 123 to 121
- SYS SPAN 5 from 124 to 122
- SYS SPAN 6 from 125 to 123
- OXI CAL from 126 to 124
- INST SPAN 1 from 127 to 125
- INST SPAN 2 from 128 to 126
- INST SPAN 3 from 129 to 127
- HYDRATOR ALARM from 130 to 128
- EXT ALARM new 129

Version 01.00.60 inserted SPIKING as coil number 125, which re-numbered the following MODBUS write coils:

- INST SPAN 1 from 125 to 126
- INST SPAN 2 from 126 to 127
- INST SPAN 3 from 127 to 128
- HYDRATOR ALARM from 128 to 129
- EXT ALARM from 129 to 130

For any versions after 01.00.60, new items will be added to the end of the list to avoid these types of changes in the future.

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 03.00.01 changes relative to version 03.00.00:

1. Change minimum alarm limit for the Orifice Pressure and Venturi Pressure to -10.0.
2. Change minimum alarm limit for the Hg0, Hg2+, Hgt concentrations to -1.0.
3. Implement EPM probe: it works similar to the 83i/85 probe; all probe alarms and its GUI menu are eliminated; the instrument's 81i status and 82i status alarms are eliminated.
4. Add Click protocol command "(set) alarm oxidizer temp min/max".

Version 03.00.00 changes relative to version 02.03.21:

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.

Version 02.03.21 changes relative to version 02.03.20:

1. Default lamp intensity compensation to ON instead of OFF.

Version 02.03.20 changes relative to version 02.03.11:

1. Add CLINK and Modbus and Digital I/O support for 83i/85 II probe and Watson system.
2. When a user manually goes from Stinger Blowback mode to System Zero or System Span, the system will first go into Sample mode for 5 seconds before going to the selected gas mode.
3. Disallow user from selecting Oxidizer mode from the front panel for 83i/85 II probe.
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).

Version 02.03.11 changes relative to version 02.03.06:

1. Add support for 83i/85 II probe and Watson system.
2. Fix RS-485 user serial port communications.
3. Update logo on splash screen.
4. Invert signs in time zone labels to match the actual functionality and change "GMT" to just "UTC".

5. **Note:** Version 02.03.11 doesn't properly update the following platform settings when upgrading from any previous version and these settings will need to be manually re-set after upgrading to this version: analog overrange, user-defined run screens, digital outputs, Geysitech protocol serial number, file format, date format, and language selection.

Version 02.03.06 changes relative to version 02.03.04:

1. Sample flow error flag in the CLink flag set now depends on the state of the Flow alarms.
2. Modified .hex files for bootloader and application to address bootloader corruption when upgrading from older version of the bootloader.

Version 02.03.04 changes relative to version 02.02.04:

1. For applications measuring high levels of mercury concentration (greater than 80 ug/m3) the user can change the gain algorithm to the "Enhanced Gain" setting via the DIAGNOSTICS> INSTRUMENT CONFIGURATION> ENHANCED GAIN screen. Using the Enhanced Gain setting will not affect measurement sensitivity, linearity, or repeatability. All 80i specifications remain the same whether or not the Enhanced Gain setting is chosen. Changing the Enhanced Gain setting will set backgrounds to 0.00 and coefficients to 1.000. A PMT calibration, instrument calibration and system calibration will be required.
2. Fixed CLINK "mb read registers" diagnostic command to eliminate garbage first value.
3. Fixed miscellaneous compiler warnings, mostly for changes to common code used in other instruments.

Version 02.02.04 changes relative to version 02.02.01:

1. Added status alarm on digital out/coil 46 "O2 Quenching Status" which is active when O2 Quenching is in AUTO mode and either the O2 Sensor input voltage is near zero or the O2 Sensor's own status input is active (and connected to the existing external alarm input). The alarm is also shown in the Alarm Menu and the screen's Status Bar.
2. Added digital out/coil 62: Oxidizer Status, combining the functions of coils 41, 49, and 50 which are Oxidizer Base, Oxidizer CI and Oxidizer Purge.
3. Changed lower limit for Hg span conc value to 0.1 (was 1.0).
4. Added additional inputs for calibration in speciation mode (coils 137 and 138). Changed set bkg input (112) to set both HG0 and HGt if in speciated mode.
5. Fixed "set program bootloader procboard" clink command so that it no longer causes iSeries+ units to hang.
6. Added new screen when Permeation Option menu is selected. Users can now select the 84i configuration to be either Primary System, Secondary System or OFF.
7. Fixed Modbus read registers for Ranges to show the correct range values: Hg(0) RANGE 7&8, Hg(2+) RANGE 9&10, Hg(t) RANGE 11&12.
8. Items in the system configuration menu can only be changed when the unit is in service mode.

9. "Perm Oven Setpoint" and "Set Perm Oven Setpoint" service menu items now read "Perm Gas Setpoint" and "Set Perm Gas Setpoint".
10. Setting the Zero/Span Period Hours to 0 now disables the Zero/Span check.
11. 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.
12. 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 02.02.01 changes relative to version 02.01.04:

1. Modified operation of A/B channel control for 84i
2. Increased the limit for custom range value entry to 5000.
3. Mask orifice pressure from DIAGNOSTICS>PRESSURE>PROBE menu if the unit is configured for the M&C probe.
4. 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.
5. Fix handling of IP addresses with 3 digits in each of the four fields in INSTRUMENT CONTROLS> COMMUNICATIONS> TCP/IP SETTINGS> IP ADDRESS screen.
6. Add support for new processor board revision 1.5T.

Version 02.01.04 changes relative to version 02.01.03:

1. Hydrator blowout fix for M&C probe
2. Add editing of o2 quenching coefficients and manual o2 quenching mode
3. Updated kernel to support future iSeries plus processor board.

Version 02.01.03 changes relative to version 02.01.01:

1. Add "perm oven heater" Clink command to enable and disable the perm oven heater
2. Mask venturi and orifice pressure alarms for M&C probe.
3. Remove automatic blowback on change of gas mode from zero or span. (scheduled blowback is not affected)
4. Added "INST" and "PERM" to inst span and perm span screen titles in Perm Span setup menu.
5. Perm audit next start time is now not settable into the past
6. Disabling the auto perm audit stops audit and returns unit to sample mode
7. Add ability to enable and disable the perm span audit schedule
8. 84i flow alarm failure shuts down the perm oven. Oven will NOT automatically start re-heating if flow alarm clears.
9. Add screen to allow enable/disable of perm oven heater
10. Change "AUTO PERMEATION CAL" to "AUTO PERMEATION SCHEDULE" in menu and screen.
11. Change "CAPILLARY" label to "CAPILLARY HT" and short label from "84cap" to "84cpt"

Version 02.01.01 changes relative to version 02.00.00:

1. Add support for the Model 84i Permeation Calibrator

2. Add support for oxygen quenching compensation

Version 02.00.00 changes relative to version 01.06.16:

1. Remove Gesytec protocol from valid protocol list
2. Fix 'span inst' command (was returning the span sys value) and fix the indexing to return a value 1-6 instead of 0-5
3. Fix range hg0, ght, and hg2+ commands to allow custom range indices
4. MAX SYS SPAN CHECK OFFSET now checks for and does not allow invalid values ($> 0.1 \times \text{max range}$)
5. Allow user to set the lamp temperature alarm between 40 and 60 degrees
6. Support for new M&C probe
7. Add message to cycle power when changing NTP server IP address
8. Set alarm when communication with MIB is lost and clear it when it's re-established

Version 01.06.16 changes relative to version 01.06.12:

1. Add CLINK commands to set the intensity alarm min/max values.
2. Remove the intensity normalization.
3. Add T_Zero and T_Span to Erec gas mode selections.
4. Modify the default value of lamp temperature from 0°C to 49°.
5. When type is MODEL_80_THC then display "THC ZERO" and "THC SPAN".
6. Remove the "LAMP NORMALIZATION" screen.
7. Add commands "t zero" & "t span" for the THC model.
8. Modify alarm lamp temperature default max value from 50 to 60.
9. Add new model "MODEL_80_THC".
10. Add gas mode strings for the THC model.
11. When instrument is in type 4 (MODEL_80_THC) and gas mode is probe zero or probe span then put 81i in standby mode.
12. Replace "BB_System" with "BB_Sys" and "BB_Stinger" with "BB_Stin" to be displayed correctly in IPort.
13. Fix bug, in the returned flag, to display gas mode correctly in IPort.
14. Replace "bb filter" with "bb sys" and "bb stinger" with "bb stin".
15. Set the lamp temperature to default value.
16. Use the desired lamp temperature to set the appropriate ranges.
17. Modify the gain tables.
18. Start lamp voltage at 0 and ramp up to desired lamp set point.
19. Change the alarm intensity max value from 200000 to 400000.
20. Add screens to set the lamp temperature in deg C.
21. Modify the default lamp set point from 3200 to 4000.
22. Modify the alarm chamber temperature min default value from 47 to 43.

Version 01.06.12 changes relative to version 01.06.10:

1. Fix reference intensity update during background calibrations triggered by scheduled calibration, digital input, or updates in the CALIBRATION FACTORS menu.

2. Change "System Span" digital inputs to allow the user to change the span level during an oxidation sequence for the system integrity test. This is to facilitate multi-level integrity checks.
3. Fix ALARMS> INSTRUMENT> ZERO/SPAN CHECK> MAX OFFSET screens to limit the value to 1/10th of the largest range in the proper units.
4. Modify ALARMS> INSTRUMENT> INTENSITY> MIN screen to allow setting down to 0 KHz.
5. Remove ALARMS> PROBE > ORIFICE PRESSURE menu from the alarms menu.
6. Change the maximum intensity normalization coefficient from 2.5 to 10.0.
7. Fix possible lockup during analog input initialization on power-up.
8. Cosmetic fixes to various screens.

Version 01.06.10 changes relative to version 01.06.00:

1. Change default umbilical temperature setpoint from 160 to 120 degrees C and fix heater control so it ramps up to the set point slowly.
2. Fix precision values in output list and use them for printing logged data.
3. Add list index validation on power-up.
4. Fix analog output scaling for later items in the output list, fix possible divide-by-zero errors.
5. Add INSTRUMENT CONTROLS> TIMEZONE screen.
6. Modify floating-point and integer numeric entry screen routines to improve performance and handle big jumps.
7. Fix possible MODBUS data corruptions when handling multiple connections simultaneously.
8. Increase MODBUS response registers buffer length to ensure maximum data request will not overflow buffer.
9. Add software watchdog in low level processors to detect loss of communications.
10. Fix internal protocol handling in low-level processors to respond properly to single register requests.
11. Add error logging in /tmp/errorlog for debugging.
12. Remove possible "junk" output over serial port.