Thermo ELECTRON CORPORATION

Orion AQUAfast® II Photometer Iron

● Operation

power — Switch the unit on using the "power" switch.

FE.1 — This display shows the first method range.

mode — Select the test required using the "mode" key:
FE1 → FE2 → other methods → FE1 → ..... (Scroll)

METHOD — The display shows the selected method.

Fill a clean vial with the sample up to the 10 ml mark, screw the cap on and place in the sample chamber with the Δ-mark on the vial aligned with the ∇–mark on the instrument.

zero test — Press the "zero/test" key.

METHOD (flashing) — The method symbol flashes for approx. 3 seconds.

0.0.0 — Confirms zero calibration.

After zero calibration is completed, remove the vial from the sample chamber.
Add the appropriate reagent tablet; a color will develop in the sample (see "Method Preparation").
Screw the cap back on and place the vial in the sample chamber with the Δ and ∇ marks aligned.

zero test — Press the "zero/test" key.

METHOD (flashing) — The method symbol flashes for approx. 3 seconds.

RESULT — The result appears in the display.

Repeat the analysis:
Press the "zero/test" key again.
New zero calibration:
Press the "mode" key until the desired method symbol appears in the display again.

● User messages

EOI	Light absorption too great. Reasons: zero calibration not carried out or, possibly, dirty optics.
÷Err	Measuring range exceeded or excessive turbidity.
-Err	Result below the lowest limit of the measuring range.
LO BAT	Replace 9 V battery, no further analysis are possible.

● Technical data

Light source:	LED: λ = 528 nm (filter)
Battery:	9 V-block-battery (life = approx. 600 tests).
Auto-OFF:	Automatic switch off occur approx. 10 minutes after last keypress.
Ambient conditions:	5-40°C 30-90% rel. humidity (non-condensing).
Compliance:	DIN EN 55 022, 61 000-4-2, 61 000-4-8, 50 082-2, 50 081-1, DIN V ENV 50 140, 50 204 FCC Part 15 Class A ICES – 003 Issue 2

● Iron (II and III-ions) 0.02 - 1.0 mg/l Method Preparation

0.0.0 — Perform zero calibration (see "Operation").
Add one IRON LR tablet straight from the foil to the 10 ml sample, and crush using a clean stir rod. Mix well with the stir rod to dissolve the tablet completely. Screw the cap on and replace the vial in the sample chamber making sure the Δ and ∇ marks are aligned.

Wait for a color reaction time of 5 minutes!

zero test — Press the "zero/test" key.

FE.1 (flashing) — The method symbol flashes for approx. 3 seconds.

RESULT — The result is shown in the display in mg/l total dissolved iron.

Measuring tolerance: ± 0.05 mg/l

● Iron (II and III-ions) 0.2 - 10 mg/l

FE.2 — The display shows the second method range.

Pour 1 ml of the sample into a clean vial and fill with deionized water to the 10 ml mark. Cap the vial, and place in the sample chamber with the ∇-mark on the vial aligned with the Δ-mark on the instrument.

zero test — Press the "zero/test" key.

FE.2 (flashing) — The method symbol flashes for approx. 3 seconds.

0.0.0 — Confirms zero calibration.

Add one IRON LR tablet straight from the foil to the sample, and crush using a clean stir rod. Mix well with the stir rod to dissolve the tablet. Screw the cap on and replace the vial in the sample chamber making sure the Δ and ∇ marks are aligned.

Wait for a color reaction time of 5 minutes!

zero test — Press the "zero/test" key.

FE.2 (flashing) — The method symbol flashes for approx. 3 seconds.

RESULT — The result is shown in the display in mg/l.

Measuring tolerance: ± 0.5 mg/l

● Calibration Standards

Standards for calibration should be prepared similar to samples.

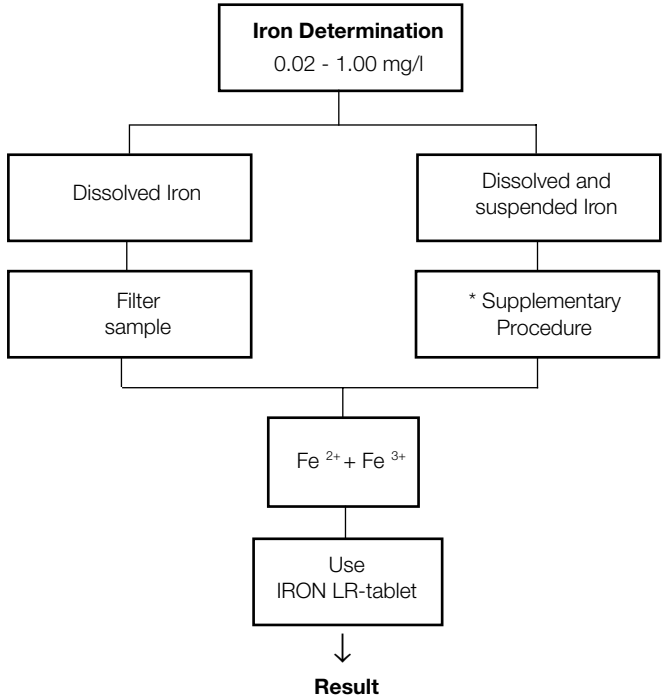
● Notes on the chemical methods

Observe application options, analysis regulations and matrix effects of methods. Reagent tablets are designed for use in chemical analysis only and should be kept well out of the reach of children.

If necessary, request material safety data sheets.

Ensure proper disposal of reagent solutions.

● Differentiation



● * Supplementary Procedure

Add 1 ml of concentrated sulfuric acid to 100 ml of the sample. Heat and boil for 10 minutes or until all particles have dissolved. Cool and make the volume back up to 100 ml with deionized water. Mix well. Pour into the vial and fill to the 10 ml mark. Add an IRON LR-tablet, crush and mix well to dissolve. Allow to stand for 5 minutes. Neutralize the solution by adding concentrated ammonia solution drop by drop until the sample turns purple. Water which has been treated with organic compounds as corrosion inhibitors must be oxidized where necessary to break down the iron complexes - add 1 ml of concentrated sulfuric acid and 1 ml of concentrated nitric acid to a 100 ml sample and boil to approximately half volume. Cool and then make up to 100 ml with deionized water and then proceed with the neutralization stage and analysis as described above.

● Calibration mode

mode — Press and hold "mode" key.

power — Switch unit on using "power" key.
Release "mode" key after approx. 1 second.

CAL / FE.1 — These messages will alternate in the display.
If necessary, press "mode" key until the desired method alternates with CAL.

zero test — Perform zero calibration (see "Operation").
Press the "zero/test" key.

METHOD — The method symbol flashes for approx. 3 seconds.

0.0.0 / CAL — These messages will alternate in the display.

zero test — Place the calibration standard to be used in the sample chamber with the Δ and ∇ marks aligned (see "Method Preparation"). Press the "zero/test" key.

METHOD — The method symbol flashes for approx. 3 seconds.

RESULT / CAL — The result is shown in the display, alternating with CAL.

If the result displayed corresponds with the value of the calibration standard (within the allowed tolerance), exit calibration mode by pressing the "power" key.

mode / zero test — Otherwise, pressing the "mode" key once increases the displayed value by 1 digit.
Pressing the "zero/test" key once decreases the displayed value by 1 digit.

CAL / RESULT ÷ x — Press the relevant key until the displayed value equals the value of the calibration standard.

power — By pressing the "power" key twice, the new correction factor is calculated and stored in the user calibration software.

: : — Confirms calibration (3 seconds).

● Note

It is not necessary to make a calibration of the FE2-range as the software refer to the calibration of the FE1-range.

CAL — Factory calibration active.

cAL — Calibration has been set by the user.

● Recommended calibration value

Iron: between 0.3 and 0.7 mg/l Fe^{2+}

● User calibration : cAL
Manufacturing calibration : CAL

To reset the calibration to the factory setting:

mode / zero test / power — Press and hold both the "mode" and "zero/test" together.

Switch the unit on using the "power" key. Release the "mode" and "zero/test" keys after approx. 1 second.

The following messages will alternate in the display:

SEL / CAL — The calibration is reset to the factory setting.
(SEL stands for Select)

or:

SEL / cAL — Calibration has been set by the user. (If the user calibration is to be retained, switch the unit off using the "power" key.)

mode — Calibration is reset to the factory setting by pressing the "mode" key. The following messages will alternate in the display:

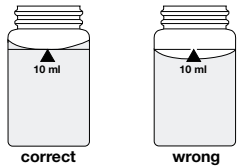
SEL / CAL

power — Switch the unit off using the "power" key.

● User notes

E 10	Calibration factor “out of range”
E 70	Manufacturing calibration incorrect / erased
E 71	User calibration incorrect / erased

● Correct filling of the vial



● Avoiding errors in photometric measurements

1. Vials, caps and stir rods should be cleaned thoroughly **after each analysis** to prevent carry-over errors. Even minor reagent residues can cause errors in the test results. Use the brush provided for cleaning.
2. The outside of the vial must be clean and dry before starting the analysis. Fingerprints or droplets of water on the sides of the vial can result in errors.
3. Zero calibration and test must be carried out with the same vial since there may be slight differences in optical performance between vials.
4. The vials must be positioned in the vial compartment for zero calibration and test with the graduations aligned with the housing mark.
5. Zero calibration and test must be carried out with capped vials.
6. Bubbles on the inside of the vial may also lead to errors. In this case, cap the vial and remove bubbles by swirling the contents before starting test.
7. Avoid spilling water into the vial compartment. If water should leak into the photometer housing, it can damage electronic components and cause corrosion.
8. Contamination of the windows over the light source and photo sensor in the vial compartment can result in errors. If this is suspected check the condition of the windows.
9. The reagent tablets should be added to the sample without being handled.
10. Large temperature differentials between the photometer and the operating environment can lead to incorrect measurement due to, for example, the formation of condensate in the area of the lens or on the vial.

    Specified tolerances at T = 20 °C.
11. For best results pipette samples.

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Water Analysis
166 Cummings Center
Beverly, MA
01915-6110
(978) 232-6015 Dom Fax
(978) 232-6031 Int'l Fax
www.thermo.com
(800) 225-1480 Tech Info

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