Thermo
ELECTRON CORPORATION

Orion AQUAfast® II Turbidity Meter

● Operation

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

t 1 — The display shows the method range.

mode — Select measuring range using the "mode" key:
t1 → t2 → t3 → t4 → t1 → ..... (Scroll)

Measuring range t1:	0 - 2 FNU
Measuring range t2:	2 - 20 FNU
Measuring range t3:	20 - 200 FNU
Measuring range t4:	200 - 2000 FNU

RANGE — The display shows the selected method range:

Fill a clean and dust-free vial with the sample up to the mark (pour the sample along the inner wall of the vial to avoid air bubbles, see Note 4). Screw the cap on and align the ∇-mark on the vial with the Δ-mark on the instrument. Close the sample chamber using the sample chamber cover.

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

RANGE — The measuring range symbol flashes for approx. 9 seconds.

RESULT — The display shows the result in formazin FNU turbidity units.

It is advisable to calibrate the instrument before each measurement. If the ambient temperature of the last calibration does not deviate by more than ± 3°C from the current ambient temperature, the measurements are accepted by the unit. If the temperature changes are greater than this, the unit must be re-calibrated.

SEt — If re-calibration is necessary, the display shows the following:

Performance of analysis with reduced accuracy:
Press the "zero/test" key again.
Re-calibration:
see calibration mode

● User messages

E0I	Light absorption too great. Reason - e.g. dirty optics.
+Err	Measuring range exceeded.
-Err	Result below the lowest limit of the measuring range.
LO BAT	Replace 9 V battery immediately, no further analysis are possible.

● Technical data

Optics:	LED, (λ = 875 nm)
Battery:	9 V-block battery (Life 600 tests)
Auto-OFF:	Automatic switch-off occurs approx. 5 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

Measuring Range:	0-2 FNU	2-20 FNU	20-200 FNU	200-2000 FNU
Resolution:	0.1 FNU	0.1 FNU	1 FNU	1 FNU
Accuracy:	± 0.2 FNU	± 1 FNU	± 5 FNU	± 50 FNU

● Notes

1. The vial must be clean and dry (free of dust) before starting the analysis. Clean the inside and outside of the vial using a clean lint-free cloth. Fingerprints or droplets of water as well as scratches on the sides of the vial can result in errors.
2. Once it has been filled to the mark, the vial must be positioned in the sample chamber so that the graduation with the white triangle aligns with the housing mark.
3. Tests must be carried out using closed vials. **Always use black vial caps.** Completely cover the sample chamber with the sample chamber cover.
4. Bubbles on the inside of the vial may also lead to errors. To prevent this, cap vials and remove bubbles by swirling before performing test.
5. Avoid spilling water in the sample chamber. If water should leak into the housing of the turbidity meter, it can damage electronic components and cause corrosion.
6. Contamination of the optical components such as the light source and photo sensor in the sample chamber can result in errors.

   Check the condition of the optics at regular intervals. For cleaning use a moist cloth and cotton balls.

   Re-calibrate the unit each time it has been cleaned.
7. Large temperature differentials between the turbidity meter, the sample 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.
8. Vials and caps should be cleaned thoroughly **after each analysis** to prevent carry-over errors. Even minor residues can cause errors in the test results.

● Method notes

Non-dissolved, finely dispersed substances in liquids (media) cause turbidity. An incident light beam is scattered unevenly in all directions by the existing turbidity. The scatter of the incident **infrared** light is measured in standardized manner **at an angle of 90**°.

● Supplied turbidity standards

Measuring range-based turbidity standards are used for calibration of the meter. Reorder Orion AC201S Turbidity Standards for meter calibrations. Material safety data sheets are available.

The turbidity standards for the measuring ranges

t1	1 NTU
t2	10 NTU
t3	100 NTU
t4	1000 NTU

are supplied in vials. These pre-filled vials with the turbidity standards generally suffice for the purpose of calibration. Changed optical properties of the measuring vials (e.g. extremely fine scratches) have a considerable effect on the measuring results, particularly in the measuring ranges t1 and t2. To ensure that the specific accuracy is achieved, it is therefore necessary to perform measurements in the ranges t1 and t2 using the vial used for calibration of the unit. To this end, the standard for calibration is poured into a clean, dry measuring vial. The measuring vial used for calibration is identified by a black dot on the white triangle. We advise you to retain this method of marking.

In contrast to formazin turbidity standards, these secondary standards are neither toxic nor potentially carcinogenic.

The turbidity standards have a shelf life of one year.

The turbidity standards have been tested and approved by:

- EPA Federal Registry, Vol. 47, No. 42, March 1982
- Standard Methods of Water and Wastewater, APHA-AWWA-WPOC F, 16th and 17th Edition
- Annual Book of ASTM Standards, Standard Test Method for Turbidity of Water, D 1889-88a, June 24, 1989
- Subcommittee Report, American Society of Brewing Chemists, 1986
- Analytica - EBC, 4th Edition, 1987, Brauerei - und Getränke-Rundschau, Zürich

● Calibration Mode (for supplied standards with defined values)

mode — Press and hold "mode" key.

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

CAL / t1 — Press "mode" key to change the measuring range:
CAL t1 → CAL t2 → CAL t3 → CAL t4 → ..... (Scroll)

Position vial (with required standard - see “Supplied turbidity standards”) with alignment of ∇ and Δ marks. Close the sample chamber using the sample chamber cover.

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

RANGE — The measuring range symbol flashes for approx. 9 seconds.

: : — The display confirms that calibration is complete.

power — Switch the unit off using the "power" key. The new correction factor is stored.

● User messages

E 10	Calibration factor “out of range”
E 24	No light at detector or too much light at detector, maybe due to measurement range overflow
E 71	t1: User calibration incorrect / erased
E 73	t2: User calibration incorrect / erased
E 75	t3: User calibration incorrect / erased
E 77	t4: User calibration incorrect / erased
cAL	After using the interim value calibration mode, "cAL" will appear during a new calibration to indicate the previous calibration mode used.

● Calibration Mode (for interim values)

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

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

CAL / t 1 — Press "mode" key to change the measuring range:
CAL t1 → CAL t2 → CAL t3 → CAL t4 → ..... (Scroll)

Fill a clean and dust-free vial with the standard up to the mark (pour the standard along the inner wall of the vial to avoid air bubbles, see Note 5). Screw the cap on and align the ∇-mark on the vial with the Δ-mark on the instrument. Close the sample chamber using the sample chamber cover.

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

RANGE / RESULT — The method symbol flashes for approx. 9 seconds.

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

mode — Otherwise, pressing the "mode" key once increases the displayed value by 1 digit.

zero test — 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.

: : — Confirms calibration (3 seconds).
The unit then switches itself off.

Technical changes without notice
Printed in Germany.

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