



Durable construction,  
designed for accuracy



Thermo Scientific™ Orion™ AQUAfast™ Colorimeter Launch Packet

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scientific

AQ3140 AQUAfast COD Colorimeter  
Specification Sheet

AQ3170 AQUAfast Chlorine Colorimeter  
Specification Sheet

## Durable construction, designed for accuracy



Designed to provide accurate measurements, the Thermo Scientific Orion AQUAfast AQ3140 COD colorimeter makes it ideal for laboratory testing of chemical oxygen demand (COD).

### Applications

- Wastewater
- Food and Beverage
- Aquaculture
- Agriculture



The Thermo Scientific™ Orion™ AQUAfast™ AQ3140 COD colorimeter is a single parameter instrument for determining chemical oxygen demand in water.

The AQUAfast AQ3140 COD colorimeter and COD reagents measures COD in the range of 0 - 15000 mg/L through dichromate method that estimates the theoretical oxygen demand, i.e. the amount of oxygen consumed in total chemical oxidation of the organic constituents present in the water. The colorimeter is designed to give accurate results that are highly reproducible. AQ3140 measures the COD concentration by photometric detection employing a linear relationship between absorbance and concentration.

The AQUAfast AQ3140 colorimeter offers a number of features designed to improve user experience, including two LED light sources for long-term stability.

### Colorimetry Features

- Large digital backlit display
- Automatic switch-off
- User-friendly keypad
- Real-time clock and date
- Calibration mode
- Storage function
- Waterproof design (IP67)
- Angled, ergonomic design for easy bench top or hand-held use
- 2 year warranty\*

## Ranges

**Low Range:** 0 - 150 mg/L O<sub>2</sub>

**Mid Range:** 0 - 1500 mg/L O<sub>2</sub>

**High Range:** 0 - 15000 mg/L O<sub>2</sub>

## Scroll Memory (SM)

To avoid unnecessary scrolling for the required test method, the instrument memorizes the last method used before switching off. When the instrument is switched on again, the scroll list comes up with the last used test method first.

## Ordering Information

Cat. No.	Description
AQ3140	AQUAfast AQ3140 COD colorimeter with field case, batteries and literature
CODL00	COD, low range 0 - 150 mg/L, dichromate digestion method, 25 tests
CODL150	COD, low range 0 - 150 mg/L, dichromate digestion method, 150 tests
CODH00	COD, mid range 0 - 1500 mg/L, dichromate digestion method, 25 tests
CODM150	COD, mid range 0 - 1500 mg/L, dichromate digestion method, 150 tests
CODHP0	COD, high range 0 - 15000 mg/L, dichromate digestion method, 25 tests
CODH150	COD, high range 0 - 15000 mg/L, dichromate digestion method, 150 tests
COD165	Thermoreactor for digestion methods, 100 to 165 °C selectable temperature controls
CODS01	1000 mg/L COD standard, 475 mL
CODS10	10000 mg/L COD standard, 475 mL



## Product Specifications

<b>Description</b>	Double wavelength, automatic wavelength selection, direct reading colorimeter
<b>Light Source</b>	LEDs, interference filters (IF) and photosensor in transparent cell chamber. Wavelength specifications of the IF: 430 nm $\Delta\lambda = 5$ nm, 610 nm $\Delta\lambda = 6$ nm
<b>Wavelength</b>	430 nm, 610 nm
<b>Wavelength Accuracy</b>	$\pm 1$ nm
<b>Photometric Accuracy</b>	3 % FS (T = 20 °C - 25 °C)
<b>Photometric Resolution</b>	0.01 A
<b>Power Supply</b>	4 batteries (AAA)
<b>Operating Time</b>	17 hours operating time or 5,000 test measurements in continuous mode when display backlight is off
<b>Auto-Off</b>	Automatic switch-off, 10 minutes after last key press
<b>Display</b>	Backlit LCD (on keypress)
<b>Storage</b>	Internal ring memory for 16 data sets
<b>Time</b>	Real-time clock and date
<b>Calibration</b>	User and factory calibration Reset to factory calibration possible
<b>Dimensions</b>	155 x 75 x 35 mm (L x W x H)
<b>Weight</b>	Basic unit approx. 260 g (incl. batteries)
<b>Environmental Conditions</b>	Temperature: 5 - 40 °C Relative humidity: 30 - 90 % (non-condensing)
<b>Certification</b>	CE
<b>Testing Reagents</b>	Digestion vial tubes
<b>Waterproof</b>	IP67

\* Subject to terms of Thermo Fisher Scientific's limited warranty. Please contact your sales representative for more details.

## Water and Lab Products

**Australia:** (613) 9757-4300 In Australia: (1300) 735-295 **China:** (86) 21-6865-4588

**Germany:** (49) 6184-90-6321 **India:** (91) 22-4157-8800 **Japan:** (81) 045-453-9175

**North America:** 1-978-232-6000 Toll Free: 1-800-225-1480 **Singapore:** (65) 6778-6876

Find out more at [thermofisher.com/water](http://thermofisher.com/water)

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## Robust design for accurate chlorine measurements



The rugged, waterproof design of the Thermo Scientific™ Orion™ AQUAfast™ AQ3170 colorimeter makes it ideal for laboratory and field testing of chlorine in water.

### Applications:

- Drinking Water
- Wastewater
- Food and Beverage
- Aquaculture
- Agriculture



The Thermo Scientific Orion AQUAfast AQ3170 colorimeter kit measures free and total chlorine in the range of 0.02 to 2.00 mg/L, or 0.1 to 8.00 mg/L with short pathlength vial (included). Measuring free and total chlorine using the DPD method, the AQ3170 colorimeter and included reagents assist with EPA drinking water measurement requirements. The colorimeter's Interference Filter uniquely narrows (targets) the bandwidth, creating accurate and reproducible readings. The included sample vials also help reduce preparation time by utilizing lid-attached light shields instead of a cumbersome sample chamber cover.

The AQUAfast AQ3170 colorimeter offers a number of features designed to improve user experience, including a large, backlit display, a real time clock and automatic data logging.

### Colorimetry Features

- Convenient scroll-driven menu system
- Automatic switch-off
- 16 point internal data storage with date/time stamp
- Easy-to-read, backlit display
- One-time zero function
- Waterproof design (IP67)
- Angled, ergonomic design for easy bench top or hand-held use
- Calibration to government or organizational standards (ex. NIST or ISO)
- Calibration can be refined for very specific measurement ranges
- Account for any interferences that are known to be present in the sample
- 2 year warranty\*

## AQUAfast AQ3170 colorimeter kit

The meter kit includes a field carrying case, sample vials with light-shielding caps, a vial cleaning brush, 100 each of AQUAfast AC4P71 Free Chlorine and AC4P72 Total Chlorine powder reagent packets and batteries. The meter carries a CE certification and a two year warranty.\*

### Instrument Settings

#### Scroll Memory (SM)

Instrument memorizes the last method used before switching off the instrument. When the instrument is switched on again, the scroll list comes up with the last used test method first.

#### Zero Setting (OTZ)

The zero setting is held in memory until the device is turned off. (One Time Zero - OTZ). The zero setting can be confirmed whenever it is required.

### Ordering Information

Cat. No.	Description
AQ3170	AQUAfast AQ3170 chlorine colorimeter with free and total chlorine powder packs (100 each), sample vials with lids, field case, batteries and literature
AC4P71	Free chlorine reagent powder packs (100 tests)
AC4P72	Total chlorine reagent powder packs (100 tests)
AQ250F	AQUAfast free chlorine DPD bulk powder dispenser with one vial
AC71P1	AQUAfast free chlorine DPD powder refill vial for AQ250F dispenser, 250 count
AC71P2	AQUAfast free chlorine DPD powder refill vials for AQ250F dispenser, 500 count
AQ250T	AQUAfast total chlorine DPD powder dispenser with one vial
AC72P1	AQUAfast total chlorine DPD powder refill vial for AQ250T dispenser, 250 count
AC72P2	AQUAfast total chlorine DPD powder refill vials for AQ250T dispenser, 500 count
AC2V24	Replacement 24 mm glass sample vials, 12 pack
AC2V10	Replacement 10 mm plastic sample vials, 12 pack
AC3CBR	Replacement sample vial cleaning brush, 10 pack
CLSK100	AQUAfast chlorine primary standard kit to prepare 1.5 mg/L NIST-traceable chlorine standard
CLSK200	AQUAfast chlorine secondary standards (0.0, 0.20 and 1.0 mg/L) for AQ3170 chlorine colorimeter

### Product Specifications

Description	Single wavelength, direct reading colorimeter
Light Source	LED, interference filter (IF) and photosensor in transparent cell chamber. Wavelength specifications of the IF: 530 nm $\Delta\lambda = 5$ nm
Wavelength	530 nm
Wavelength Accuracy	$\pm 1$ nm
Photometric Accuracy	3% FS (T = 20 °C - 25 °C, tested with standard solutions)
Photometric Resolution	0.01 A
Power Supply	4 batteries (AAA)
Operating Time	17 hours operating time or 5,000 test measurements in continuous mode when display backlight is off
Auto - OFF	Automatic switch-off, 10 minutes after last keypress
Display	Backlit LCD (on keypress)
Storage	Internal ring memory for 16 data sets
Time	Real-time clock and date
Calibration	User and factory calibration. Reset to factory calibration possible.
Dimensions	155 x 75 x 35 mm (L x W x H)
Weight	Basic unit approx. 260 g (incl. batteries)
Environmental Conditions	Temperature: 5 - 40 °C Relative humidity: 30 - 90% (non-condensing)
Certification	CE
Testing Reagents	Powder packs
Waterproof	IP67

### Measurement Parameter Specifications

Chlorine Free and Total	
Range	0.02 to 2.00 mg/L 0.1 to 8.0 mg/L
Resolution	0.01 mg/L
Accuracy	$\pm 0.05$ mg/L (0.02 to 1.00 mg/L) $\pm 0.10$ mg/L (1.01 to 2.00 mg/L) $\pm 0.20$ mg/L (2.01 to 3.00 mg/L) $\pm 0.30$ mg/L (3.01 to 4.00 mg/L) $\pm 0.40$ mg/L (4.01 to 8.00 mg/L)

\*Subject to terms of Thermo Fisher Scientific's limited warranty. Please contact your sales representative for more details.

Find out more at [thermofisher.com/water](http://thermofisher.com/water)

### Water and Lab Products

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**Germany:** (49) 6184-90-6321 **India:** (91) 22-4157-8800 **Japan:** (81) 045-453-9175

**North America:** 1-978-232-6000 Toll Free: 1-800-225-1480 **Singapore:** (65) 6778-6876

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AQ3140 & AQ3170 AQUAfast Colorimeter  
Website Product Content

**New Thermo Scientific Orion AQUAfast Chlorine Products**

<b>Cat. No.</b>	<b>Short Description</b>	<b>Related Existing Products</b>	<b>Long Description (Web)</b>
AQ3170	AQUAFast CHLORINE FREE&TOTAL COLORIMETER	AC4P71, AC4P72, AC2V24, AC3SR24	Thermo Scientific Orion AQUAfast chlorine colorimeter with 100 free chlorine DPD powder packs, 100 total chlorine DPD powder packs, sample vials with lids, field case, batteries and literature
AQ250F	AQUAFast FREE CHLORINE DPD DISPENSER	AC4P71	Thermo Scientific Orion AQUAfast free chlorine DPD bulk powder dispenser with one vial x 250 count
AC71P1	AQUAFast FREE CHLORINE 1 VIAL X 250 CT	AC4P71	Thermo Scientific Orion AQUAfast free chlorine DPD powder refill for AQ250F dispenser, 1 vial x 250 count
AC71P2	AQUAFast FREE CHLORINE 2 VIALS X 250 CT	AC4P71	Thermo Scientific Orion AQUAfast free chlorine DPD powder refill for AQ250F dispenser, 2 vials x 250 count each (500 count total)
AQ250T	AQUAFast TOTAL CHLORINE DPD DISPENSER	AC4P72	Thermo Scientific Orion AQUAfast total chlorine DPD powder dispenser with one vial x 250 count
AC72P1	AQUAFast TOTAL CHLORINE 1 VIAL X 250 CT	AC4P72	Thermo Scientific Orion AQUAfast total chlorine DPD powder refill for AQ250T dispenser, 1 vial x 250 count
AC72P2	AQUAFast TOTAL CHLORINE 2 VIALS X 250 CT	AC4P72	Thermo Scientific Orion AQUAfast total chlorine DPD powder refill for AQ250T dispenser, 2 vials x 250 count each (500 count total)
CLSK100	AQUAFast CHLORINE PRIMARY STANDARD KIT	N/A	Thermo Scientific Orion AQUAfast chlorine primary standard kit to prepare 1.5 mg/L NIST-traceable chlorine standard
CLSK200	AQUAFast CHLORINE SECONDARY STANDARD KIT	N/A	Thermo Scientific Orion AQUAfast chlorine secondary standards (0.0, 0.20 and 1.0 mg/l chlorine) for AQ3170 colorimeter
AC2V10	AQUAFast 10MM PLASTIC VIALS, 12 PACK	AC2V24	Thermo Scientific Orion AQUAfast 10mm short path-length plastic vials for high level chlorine, 12 pack

**New Thermo Scientific Orion AQUAfast COD Products**

<b>Cat. No.</b>	<b>Short Description</b>	<b>Related Existing Products</b>	<b>Long Description (Web)</b>
AQ3140	AQUAFast COD COLORIMETER	COD165, CODS01, CODS10, CODL00, CODH00, CODHP0	Thermo Scientific Orion AQUAfast COD colorimeter with field case, batteries and literature
CODL150	AQUAFast COD LR, 0-150PPM, 150 TESTS	CODL00	Thermo Scientific Orion AQUAfast COD test kit, low range 0-150 ppm dichromate digestion tubes, bulk pack 150 tests
CODM150	AQUAFast COD MR, 0-1500PPM, 150 TESTS	CODH00	Thermo Scientific Orion AQUAfast COD test kit, mid range 0-1500 ppm dichromate digestion tubes, bulk pack 150 tests
CODH150	AQUAFast COD HR, 0-15000PPM, 150 TESTS	CODHP0	Thermo Scientific Orion AQUAfast COD test kit, high range 0-15000 ppm dichromate digestion tubes, bulk pack 150 tests



### AQ3140 Product Specifications

<b>Description</b>	Double wavelength, automatic wavelength selection, direct reading colorimeter
<b>Light Source</b>	LEDs, interference filters (IF) and photosensor in transparent cell chamber. Wavelength specifications of the IF: 430 nm $\Delta\lambda = 5$ nm, 610 nm $\Delta\lambda = 6$ nm
<b>Wavelength</b>	430 nm, 610 nm
<b>Wavelength Accuracy</b>	$\pm 1$ nm
<b>Photometric Accuracy</b>	3 % FS (T = 20 °C - 25 °C)
<b>Photometric Resolution</b>	0.01 A
<b>Test Ranges</b>	Low Range: 0 - 150 mg/L oxygen Mid Range: 0 - 1500 mg/L oxygen High Range: 0 - 15000 mg/L oxygen
<b>Power Supply</b>	4 batteries (AAA)
<b>Operating Time</b>	17 hours operating time or 5000 test measurements in continuous mode when display backlight is off
<b>Auto-Off</b>	Automatic switch-off, 10 minutes after last key press
<b>Display</b>	Backlit LCD (on keypress)
<b>Storage</b>	Internal ring memory for 16 data sets
<b>Time</b>	Real-time clock and date
<b>Calibration</b>	User and factory calibration Reset to factory calibration possible
<b>Dimensions</b>	155 x 75 x 35 mm (L x W x H)
<b>Weight</b>	Basic unit approx. 260 g (including batteries)
<b>Environmental Conditions</b>	Temperature: 5 - 40 °C Relative humidity: 30 - 90 % (non-condensing)
<b>Certification</b>	CE
<b>Testing Reagents</b>	Digestion vial tubes
<b>Waterproof</b>	IP67

### AQ3170 Product Specifications

<b>Description</b>	Single wavelength, direct reading colorimeter
<b>Light Source</b>	LED, interference filter (IF) and photosensor in transparent cell chamber. Wavelength specifications of the IF: 530 nm $\Delta\lambda = 5$ nm
<b>Wavelength</b>	530 nm
<b>Wavelength Accuracy</b>	$\pm 1$ nm
<b>Photometric Accuracy</b>	3 % FS (T = 20 °C - 25 °C, tested with standard solutions)
<b>Photometric Resolution</b>	0.01 A
<b>Test Ranges</b>	0.02 - 2.00 mg/L chlorine 0.1 - 8.00 mg/L chlorine
<b>Test Resolution</b>	0.01 mg/L
<b>Test Accuracy</b>	$\pm 0.05$ mg/L (0.02 to 1.00 mg/L) $\pm 0.10$ mg/L (1.01 to 2.00 mg/L) $\pm 0.20$ mg/L (2.01 to 3.00 mg/L) $\pm 0.30$ mg/L (3.01 to 4.00 mg/L) $\pm 0.40$ mg/L (4.01 to 8.00 mg/L)
<b>Power Supply</b>	4 batteries (AAA)
<b>Operating Time</b>	17 hours operating time or 5000 test measurements in continuous mode when display backlight is off
<b>Auto-Off</b>	Automatic switch-off, 10 minutes after last key press
<b>Display</b>	Backlit LCD (on keypress)
<b>Storage</b>	Internal ring memory for 16 data sets
<b>Time</b>	Real-time clock and date
<b>Calibration</b>	User and factory calibration Reset to factory calibration possible
<b>Dimensions</b>	155 x 75 x 35 mm (L x W x H)
<b>Weight</b>	Basic unit approx. 260 g (including batteries)
<b>Environmental Conditions</b>	Temperature: 5 - 40 °C Relative humidity: 30 - 90 % (non-condensing)
<b>Certification</b>	CE
<b>Testing Reagents</b>	Powder packs
<b>Waterproof</b>	IP67

# AQ3140 & AQ3170 AQUAfast Colorimeter Presentation



# New Thermo Scientific Orion AQUAfast Products

March 2017

# New Thermo Scientific Orion AQUAfast Water Quality Products

- Product line extension
  - Compliments existing Thermo Scientific™ Orion™ AQUAfast™ product offering



- Focus on two key water quality parameters
  - Chlorine – For water, wastewater and industrial applications
  - COD – For wastewater, industrial wastewater applications
- Available for sale starting March 6, 2017



# New Orion AQUAfast Chlorine Colorimeter

- **AQ3170 Chlorine Colorimeter**
  - Measures 0.02-2.00 mg/L free and total chlorine using powder reagents and standard 24mm vials
  - Measures 0.1 to 8.0 mg/L free and total chlorine using powder reagents and new 10mm plastic vials
  - 10mm plastic vials included with AQ3170 colorimeter and re-orderable using new part number **AC2V10**
  - Includes field case, 24mm vials, 10mm vials, batteries and 100 powder packs each free and total chlorine
  - Assists with US EPA testing compliance
  - CE certified and IP-67 waterproof
  - Target markets: drinking water, wastewater, industrial water



# New Orion AQUAfast Chlorine Standards for AQ3170 Colorimeter

- **CLSK100** Primary Chlorine Standard

- Primary chlorine standard kit to prepare 1.5 mg/L NIST-traceable chlorine standard (100 ml)
- Easy preparation without the use of expensive, breakable glassware or error-prone dilutions
- For use with all AQUAfast colorimeters



- **CLSK200** Secondary Chlorine Standards

- Secondary chlorine standards in sealed vials
- 0.0, 0.20 and 1.0 mg/L standards
- For use with AQ3170 colorimeter



# New Orion AQUAfast Chlorine Reagents

- **AQ250F** Free Chlorine Powder Dispenser
  - Includes one vial of free chlorine DPD powder for 250 dispenses (tests)
  - Equivalent to AC4P71 free chlorine powder for AQUAfast colorimeters & 10 ml samples
  - **AC71P1** one replacement vial of free chlorine DPD powder (250 count)
  - **AC71P2** two replacement vials of free chlorine DPD powder (500 count)
- **AQ250T** Total Chlorine Powder Dispenser
  - Includes one vial of total chlorine DPD powder for 250 dispenses (tests)
  - Equivalent to AC4P72 total chlorine powder for AQUAfast colorimeters & 10 ml samples
  - **AC72P1** one replacement vial of total chlorine DPD powder (250 count)
  - **AC72P2** two replacement vials of total chlorine DPD powder (500 count)



# New Orion AQUAfast COD Colorimeter

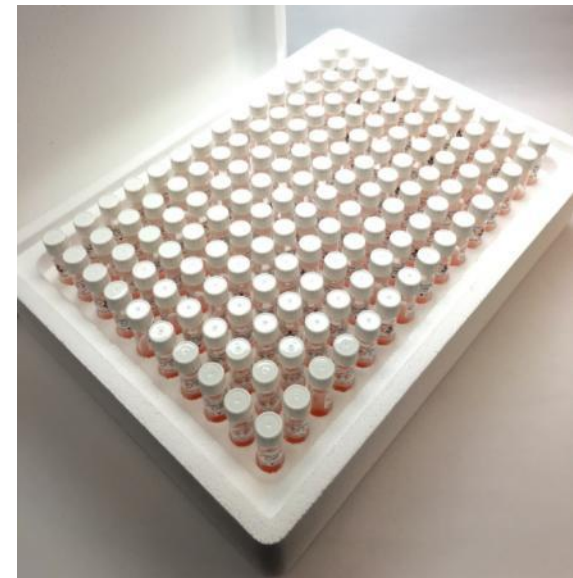
- **AQ3140 COD Colorimeter**
  - Two wavelength (LED) colorimeter to measure three COD testing ranges
    - Low Range: 0 - 150 mg/L O<sub>2</sub>
    - Mid Range: 0 - 1500 mg/L O<sub>2</sub>
    - High Range: 0 - 15000 mg/L O<sub>2</sub>
  - Uses standard 16 mm COD digestion reagent tubes
  - Requires AQUAfast COD165 thermoreactor for digestion tests
  - CE certified and IP-67 waterproof
  - Assists with US EPA testing compliance
  - Target markets: municipal wastewater & industrial wastewater





# New Orion AQUAfast COD Bulk Pack Reagents

- **CODL150** COD Low Range Digestion Tubes, 150 Tube Bulk Pack
  - COD low range 0 - 150 mg/L dichromate digestion tubes, 150 pack
  - Equivalent to CODL00 COD low range 25 tube pack for AQUAfast colorimeters
- **CODM150** COD Mid Range Digestion Tubes, 150 Tube Bulk Pack
  - COD mid range 0 - 1500 mg/L dichromate digestion tubes, 150 pack
  - Equivalent to CODH00 COD mid range 25 tube pack for AQUAfast colorimeters
- **CODH150** COD High Range Digestion Tubes, 150 Tube Bulk Pack
  - COD high range 0 - 15000 mg/L dichromate digestion tubes, 150 pack
  - Equivalent to CODHP0 COD high range 25 tube pack for AQUAfast colorimeters





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Orion AQUAfast AQ3170 Colorimeter

PRODUCT SPECIFICATIONS

## Robust design for accurate chlorine measurements



The AQUAfast AQ3170 colorimeter offers a number of features designed to improve user experience, including a large, backlit display, a real time clock and automatic data logging.

### Colorimetry Features

- Convenient scroll-driven menu system
- Automatic switch-off
- 16 point internal data storage with date/time stamp
- Easy-to-read, backlit display
- One-time zero function
- Waterproof design (IP67)
- Angled, ergonomic design for easy bench top or hand-held use
- Calibration to government or organizational standards (ex. NIST or ISO)
- Calibration can be refined for very specific measurement ranges
- Account for any interferences that are known to be present in the sample
- 2 year warranty\*

The rugged, waterproof design of the Thermo Scientific™ Orion™ AQUAfast™ AQ3170 colorimeter makes it ideal for laboratory and field testing of chlorine in water.

### Applications:

- Drinking Water
- Wastewater
- Food and Beverage
- Aquaculture
- Agriculture



The Thermo Scientific Orion AQUAfast AQ3170 colorimeter kit measures free and total chlorine in the range of 0.02 to 2.00 mg/L, or 0.1 to 8.00 mg/L with short pathlength vial (included). Measuring free and total chlorine using the DPD method, the AQ3170 colorimeter and included reagents assist with EPA drinking water measurement requirements. The colorimeter's Interference Filter uniquely narrows (targets) the bandwidth, creating accurate and reproducible readings. The included sample vials also help reduce preparation time by utilizing lid-attached light shields instead of a cumbersome sample chamber cover.

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AQUAfast AQ3140 COD Colorimeter

PRODUCT SPECIFICATIONS

## Durable construction, designed for accuracy



The Thermo Scientific™ Orion™ AQUAfast™ AQ3140 COD colorimeter is a single parameter instrument for determining chemical oxygen demand in water.

The AQUAfast AQ3140 COD colorimeter and COD reagents measures COD in the range of 0 - 15000 mg/L through dichromate method that estimates the theoretical oxygen demand, i.e. the amount of oxygen consumed in total chemical oxidation of the organic constituents present in the water. The colorimeter is designed to give accurate results that are highly reproducible. AQ3140 measures the COD concentration by photometric detection employing a linear relationship between absorbance and concentration.

The AQUAfast AQ3140 colorimeter offers a number of features designed to improve user experience, including two LED light sources for long-term stability.

### Colorimetry Features

- Large digital backlit display
- Automatic switch-off
- User-friendly keypad
- Real-time clock and date
- Calibration mode
- Storage function
- Waterproof design (IP67)
- Angled, ergonomic design for easy bench top or hand-held use
- 2 year warranty\*

Designed to provide accurate measurements, the Thermo Scientific Orion AQUAfast AQ3140 COD colorimeter makes it ideal for laboratory testing of chemical oxygen demand (COD).

### Applications

- Wastewater
- Food and Beverage
- Aquaculture
- Agriculture



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# Questions?



AQ3140 & AQ3170 AQUAfast Colorimeter  
Product Images



AO3140  
CO2

On / Off

Option

Zero / Test

Mode

40.0

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AQ3140 & AQ3170 AQUAfast Colorimeter  
User Guides



# AQUAfast AQ3140 COD Colorimeter User Guide

Version 1

XCALI-97414 Revision A • February 2017

# Important Information



The accuracy of the instrument is only valid if the instrument is used in an environment with controlled electromagnetic disturbances according to DIN 61326. Wireless devices, e.g. wireless phones, must not be used near the instrument.

## Important disposal instructions for batteries and accumulators

EC Guideline 2006/66/EC requires users to return all used and worn-out batteries and accumulators. They must not be disposed of in normal domestic waste. Because our products include batteries and accumulators in the delivery package our advice is as follows :

Used batteries and accumulators are not items of domestic waste. They must be disposed of in a proper manner. Your local authority may have a disposal facility; alternatively you can hand them in at any shop selling batteries and accumulators. You can also return them to the company which supplied them to you; the company is obliged to accept them.



## Important Information

### To Preserve, Protect and Improve the Quality of the Environment

#### Disposal of Electrical Equipment in the European Union

Because of the European Directive 2012/19/EU your electrical instrument must not be disposed of with normal household waste! Thermo Scientific will dispose of your electrical instrument in a professional and environmentally responsible manner. This service, excluding the cost of transportation is free of charge. This service only applies to electrical instruments purchased after 13th August 2005. Send your electrical Thermo Scientific instruments for disposal freight prepaid to your supplier.



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# Special functions - General Notes

## Display Backlight

Option

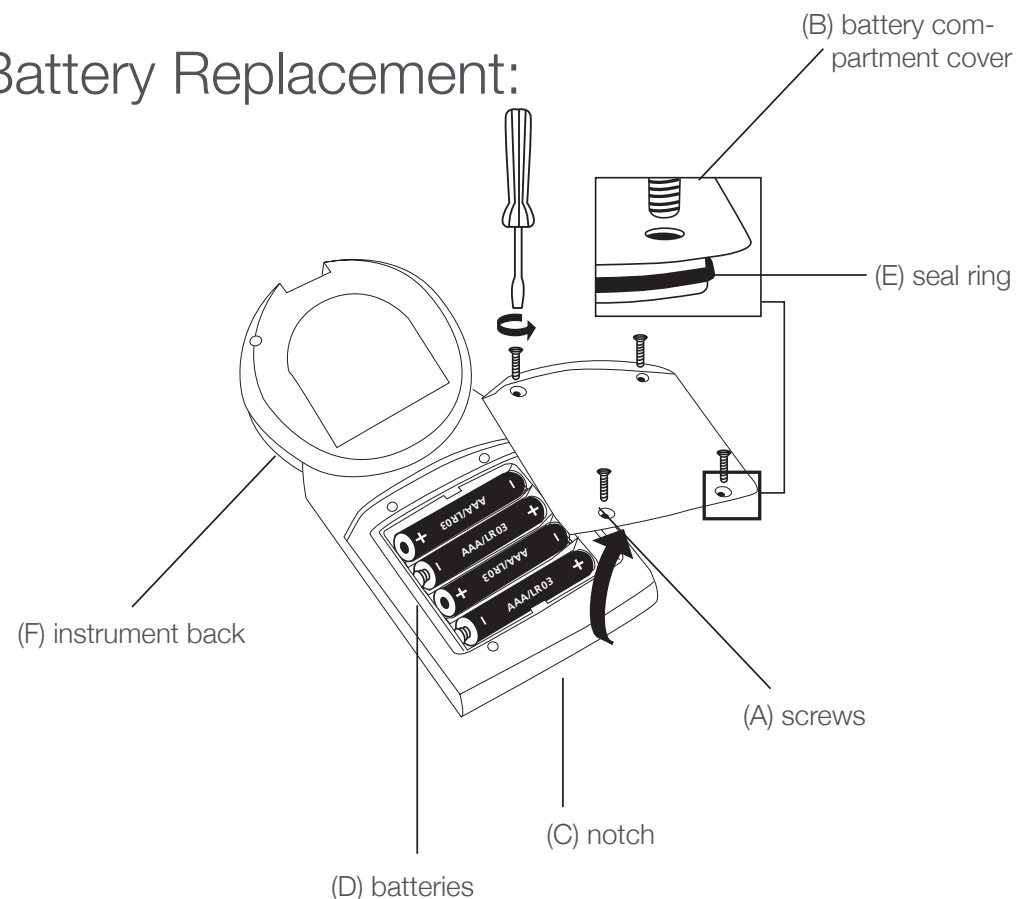
Press the [Option] key to turn the display backlight on or off. The backlight is switched off automatically during the measurement.

## Recall of Stored Data

Option

If the instrument is switched on, press the [Option] key for more than 4 seconds to access the recall menu.

## Battery Replacement:



### CAUTION:

To ensure that the instrument is water proof:

seal ring (E) must be in position

battery compartment cover (B) must be fixed with the four screws

If the batteries are removed for more than one minute the date and time menu starts automatically when the photometer is switched on the next time.

# General Notes

## Method Notes

- Prior to measurement ensure that the sample is suitable for analysis (no major interferences) and does not require any preparation i.e. pH adjustment, filtration etc.
- Reagents are designed for use in chemical analysis only and should be kept well out of the reach of children.
- Ensure proper disposal of reagent solutions.
- Safety Data Sheets are available on request.

## Chemical method notes:

### Method:

The organic material present in the sample is oxidised by a standard amount of a potassium dichromate oxidising mixture. After oxidation is complete, the excess of this reagent is measured photometrically.

### Application:

Samples can be measured if the chloride content does not exceed 1000 mg/l (LR/MR) or 10 000 mg/l (HR).

In exceptional cases, compounds contained in the water cannot be oxidized adequate. This results in minimum findings, compared with the reference method.

Different methods of sampling, preparation of the sample itself and the time elapsed between taking the sample and analysis can all affect the obtained results.

## Guidelines for photometric measurements

1. Run samples and blanks with the same batch of vials.  
The blank is stable when stored in the dark and can be used for further measurements with vials from the same batch.
2. Don't place hot vials in the adapter. Allow the vials to cool to room temperature for minimum 45 minutes. It is recommended to leave the vials to cool over night.
3. Suspended solids in the vial lead to incorrect measurements. For this reason it is important to place the vials carefully in the adapter. The precipitant at the bottom of the sample should not be suspended.
4. Clean the outside of the vials with a towel to remove fingerprints or other marks.
5. Avoid spillage of water or reagent solution into the sample chamber because this can lead to incorrect test results.
6. Contamination of the transparent cell chamber can result in wrong readings. Check at regular intervals and – if necessary – clean the transparent cell chamber using a moist cloth or cotton buds.
7. Large temperature differences between the instrument and the environment can lead to errors – e.g. due to the formation of condensation in the cell chamber or on the vial.
8. To avoid errors caused by stray light do not use the instrument in bright sunlight.

# Methods

## COD

Select the appropriate vial for the desired range:

Reagent	Quantity	Cat. No.
COD LR 0 - 150 mg/l	25 CT 150 CT	CODL00 CODL150
COD MR 0 - 1500 mg/l	25 CT 150 CT	CODH00 CODM150
COD HR 0 - 15000 mg/l	25 CT 150 CT	CODHP0 CODH150

## Preparing the Sample

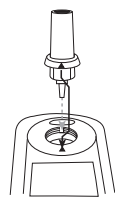
Open a reaction vial with a white cap and add the specified volume.  
(Ensure that appropriate personnel safety equipment is used.)

LR/MR: 2 ml water sample

HR: 0.2 ml water sample

Prepare a blank (Note 1) by using deionised water (TOC-free) instead of the sample (LR/MR: 2 ml, HR: 0.2 ml).

Replace the cap tightly. Invert the vial gently several times to mix the contents (**Caution:** The vial will become hot during mixing!) and digest the vials for 120 minutes in the reactor at a temperature of 150 °C. Remove the vials from the reactor and allow them to cool down to 60 °C or less. Mix the contents by inverting each vial several times while still warm. Then allow the vials to cool to ambient temperature before measuring.



## Measurement

Fix the adapter for 16 mm vials on the sample chamber.



Switch the unit on using the [ON/OFF] key.

The display shows the following: Lr (low range), Mr (medium range) or Hr (high range)



Select the required test using the [MODE] key.

### Scroll Memory (SM)

To avoid unnecessary scrolling for the required test range, the instrument memorizes the last range used before being switched off. When the instrument is switched on again, the scroll list comes up with the last used test range first.

The display shows the following: Lr, Mr or Hr

# Methods



Place the blank in the adapter (Note 1–4) making sure that the marks  $\Delta$  are aligned.  
Blanks are specially prepared for each individual test range.  
Press the [ZERO/TEST] key.

The "Lr, Mr or Hr" symbol flashes for approx. 8 seconds.

The display shows the following: 0.0.0

After zeroing remove the vial from the adapter.

Place the sample in the adapter (Note 2–4) making sure that the marks  $\Delta$  are aligned.



Press the [ZERO/TEST] key.

The "Lr, Mr or Hr" symbol flashes for approx. 3 seconds.

The result appears in the display.

LR-/MR-range: in mg/l

HR-range: in g/l

The result is saved automatically.

Tolerance:  $\pm 3.5\%$  (full scale)



### Repeating the test:

Press the [ZERO/TEST] key again.



### New zero calibration:

Press the [ZERO/TEST] key for 2 seconds.



# Menu options

## Menu Selections

Switch the unit off

Mode

Press the [MODE] key and hold.

On  
Off

Switch the unit on using the [ON/OFF] key.

Allow the 3 decimal points to be displayed before releasing the [MODE] key.

Option

The [Option] key allows for selection of the following menu points:

diS recall stored data

dAtE setting the date and time

CAL user calibration

diS

## diS – Recall of Stored Data

After confirming the selection with the [MODE] key the photometer shows the last 16 data sets in the following format (automatically proceeds every 3 seconds until result is displayed):

Number	n xx (xx: 16...1)
Year	YYYY (e.g. 2014)
Date	mm.dd (monthmonth:dayday)
Time	hh:mm (hourhour:minuteminute)
Test	Method
Result	x,xx

Zero  
Test

The [ZERO/TEST] key repeats the current data set.

Mode

The [MODE] key scrolls through all stored data sets.

Option

Quit the menu by pressing [Option] key.

dAtE

## Setting Date and Time (24-hour-format)

After confirming the selection with the [MODE] key the value to be edited will be shown for 2 sec.

Mode

SET

The setting starts with the year (YYYY) followed by the actual value to be edited. The same applies for month (mm), day (dd), hour (hh) and minutes (mm). Set the minutes first in steps of 10, press the [Option] key to continue setting the minutes in steps of 1.

DATE

YYYY

(2 sec.)

Mode

Increase the value by pressing the [MODE] key.

Zero  
Test

Decrease the value by pressing [ZERO/TEST] key.

Option

Proceed to the next value to be edited by pressing [Option] key.

After setting the minutes and pressing the [Option] key the display will show "IS SET" and the instrument returns to the measurement mode.

# Menu options - Calibration Mode

Cal CAL

## CAL – User Calibration

### Note:

user calibration (Display in calibration mode)

factory calibration (Display in calibration mode)

cAL

CAL

CAL

METHOD

After confirming the selection with the [MODE] key the instrument will show CAL/"Method".

Scroll through methods using the [MODE] key.

Fill a clean vial with the standard up to the 10 ml mark, screw the cap on and place the vial in the sample chamber making sure that the  $\Delta$  marks are aligned.

Zero  
Test

Press the [ZERO/TEST] key.

METHOD

The method symbol flashes for approx. 8 seconds.

0.0.0

The display shows the following in alternating mode:

CAL

Perform calibration with a standard of known concentration (see "Operation").

Zero  
Test

Press the [ZERO/TEST] key.

METHOD

The method symbol flashes for approx. 3 seconds.

RESULT

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

CAL

If the reading corresponds with the value of the calibration standard (within the specified tolerance), exit calibration mode by pressing the [ON/OFF] key.

Changing the displayed value:

Mode

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

Press the corresponding key until the reading equals the value of the calibration standard.

RESULT + x

By pressing the [ON/OFF] key, the new correction factor is calculated and stored in the user calibration software.

On  
Off

Confirmation of calibration (3 seconds).

: :

**Note:** The instrument calibration in the range MR is automatically taken also for HR.

# Calibration Mode

## Factory Calibration Reset

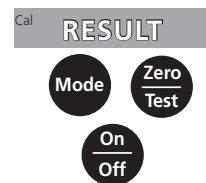
Resetting the user calibration to the original factory calibration will reset all methods and ranges.

A user calibrated method is indicated by a "Cal" symbol while the test result is displayed.

To reset the calibration press both the [MODE] and [ZERO/TEST] key and **hold**.

Switch the unit on using the [ON/OFF] key.

Release the [MODE] and [ZERO/TEST] keys after approx. 1 second.



The following messages will appear in turn on the display:

The factory setting is active.  
(SEL stands for Select)

**or:**

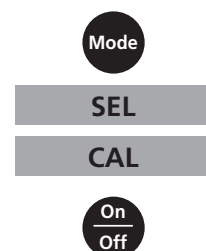
Calibration has been set by the user.  
(If the user calibration is to be retained, switch the unit off using the [ON/OFF] key).



Calibration is reset to the factory setting by pressing the [MODE] key.

The following messages will appear in turn on the display:

Switch the unit off using the [ON/OFF] key.



# Technical Data

## Technical Data


Instrument	double wavelength, automatic wavelength selection, direct reading colorimeter
Light source:	LEDs, interference filters (IF) and photosensor in transparent cell chamber. Wavelength specifications of the IF: 430 nm $\Delta \lambda = 5 \text{ nm}$ 610 nm $\Delta \lambda = 6 \text{ nm}$
Wavelength accuracy	$\pm 1 \text{ nm}$
Photometric accuracy*	3% FS (T = 20° C – 25° C)
Photometric resolution	0.01 A
Power supply	4 batteries (AAA/LR 03)
Operating time	17hr operating time or 5000 test measurements in continuous mode when display backlight is off
Auto-OFF	automatic switch off 10 minutes after last keypress
Display	backlit LCD (on keypress)
Storage	internal ring memory for 16 data sets
Time	real time clock und date
Calibration	user and factory calibration resetting to factory calibration possible
Dimensions	155 x 75 x 35 mm (LxWxH)
Weight	approx. 260 g (incl. batteries)
Ambient conditions	temperature: 5–40°C rel. humidity: 30–90% (non-condensing)
Waterproof	as defined in IP 67
CE	Certificate for Declaration of CE-Conformity

\*measured with standard solutions

To ensure maximum accuracy of test results, always use the reagent systems supplied by the instrument manufacturer.

# Operating Messages - Error Codes

## Operating Messages

<b>Hi</b>	Measuring range exceeded or excessive turbidity.
<b>Lo</b>	Result below the lowest limit of the measuring range.
	Replace batteries, no further tests possible.
<b>btLo</b>	Battery capacity is too low for the display backlight; measurement is still possible.
<small>Cal</small> <b>RESULT</b>	A user calibrated method is indicated by a "Cal" symbol while the test result is displayed. (see "Factory calibration reset").

## Error Codes

<b>E27 / E28 / E29</b>	Light absorption too great. Reasons: e.g. dirty optics.
<b>E 10 / E 11</b>	Calibration factor "out of range"
<b>E 20 / E 21</b>	Too much light reaching the detector.
<b>E23 / E24 / E25</b>	Too much light reaching the detector.
<b>E 22</b>	Battery capacity was too low during measurement. Change battery.
<b>E 70</b>	LR: Factory calibration incorrect / erased
<b>E 71</b>	LR: User calibration incorrect / erased
<b>E 72</b>	HR: Factory calibration incorrect / erased
<b>E 73</b>	HR: User calibration incorrect / erased

## Technical Support

For any questions or if you require assistance, contact our Technical Support Specialists:

- Email [wai.techservbev@thermofisher.com](mailto:wai.techservbev@thermofisher.com)
- Within the United States, call 1-800-225-1480
- Outside the United States, call +1-978-232-6000 or fax +1-978-232-6031

For additional product information, contact your local authorized dealer, Thermo Scientific Orion technical sales representative or contact us using the Water and Laboratory Products (WLP) information on the back page of this user manual.

## Ordering Information

AQ3140	Orion AQUAfast COD colorimeter with field case, batteries and literature
CODL00	Orion AQUAfast COD low range 0-150 mg/l digestion tubes, 25 tests
CODL150	Orion AQUAfast COD low range 0-150 mg/l digestion tubes, 150 tests
CODH00	Orion AQUAfast COD medium range 0-1500 mg/l digestion tubes, 25 tests
CODM150	Orion AQUAfast COD medium range 0-1500 mg/l digestion tubes, 150 tests
CODHP0	Orion AQUAfast COD high range 0-15000 mg/l digestion tubes, 25 tests
CODH150	Orion AQUAfast COD high range 0-15000 mg/l digestion tubes, 150 tests
COD165	Orion AQUAfast thermoreactor for digestion methods, selectable 100, 120, 150, 160 and 165°C temperature control settings
CODS01	Orion AQUAfast 1000 mg/l COD standard, 475 mL
CODS10	Orion AQUAfast 10000 mg/l COD standard, 475 mL

Find out more at [thermofisher.com/water](http://thermofisher.com/water)

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# AQUAfast AQ3170 Chlorine Colorimeter User Guide

Version 1

XCALI-97414 Revision A • February 2017

# Important Information



The accuracy of the instrument is only valid if the instrument is used in an environment with controlled electromagnetic disturbances according to DIN 61326. Wireless devices, e.g. wireless phones, must not be used near the instrument.

## Important disposal instructions for batteries and accumulators

EC Guideline 2006/66/EC requires users to return all used and worn-out batteries and accumulators. They must not be disposed of in normal domestic waste. Because our products include batteries and accumulators in the delivery package our advice is as follows :

Used batteries and accumulators are not items of domestic waste. They must be disposed of in a proper manner. Your local authority may have a disposal facility; alternatively you can hand them in at any shop selling batteries and accumulators. You can also return them to the company which supplied them to you; the company is obliged to accept them.



## Important Information

### To Preserve, Protect and Improve the Quality of the Environment

#### Disposal of Electrical Equipment in the European Union

Because of the European Directive 2012/19/EU your electrical instrument must not be disposed of with normal household waste! Thermo Scientific will dispose of your electrical instrument in a professional and environmentally responsible manner. This service, excluding the cost of transportation is free of charge. This service only applies to electrical instruments purchased after 13th August 2005. Send your electrical Thermo Scientific instruments for disposal freight prepaid to your supplier.



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# General Notes

## Guidelines for photometric measurements

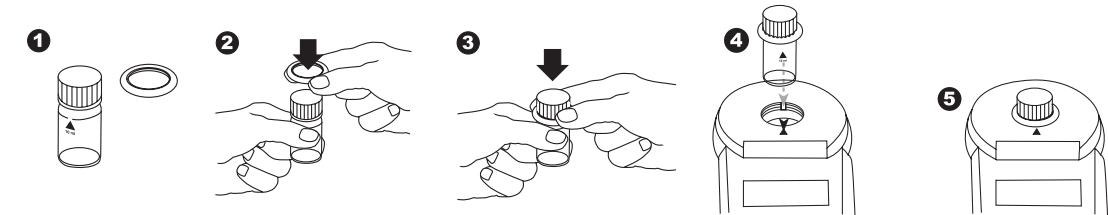
1. Vials, caps and stirring rods should be cleaned thoroughly after each analysis to prevent interference. Even minor reagent residues can cause errors in the test result.
2. The outside of the vial must be clean and dry before starting the analysis. Clean the outside of the vials with a towel to remove fingerprints or other marks.
3. Zero calibration and test must be carried out with the same vial as there may be slight differences in optical performance between vials.
4. The vials must be positioned in the sample chamber for zeroing and test with the  $\Delta$  mark on the vial aligned with the  $\Delta$  mark on the instrument.
5. Always perform zeroing and test with the vial cap tightly closed. Only use the cap with a sealing ring.
6. Bubbles on the inside wall of the vial lead to incorrect measurements. To prevent this, remove the bubbles by swirling the vial before performing the test.
7. Avoid spillage of water into the sample chamber because this can lead to incorrect test results.
8. Contamination of the transparent cell chamber can result in wrong readings. Check at regular intervals and – if necessary – clean the transparent cell chamber using a moist cloth or cotton buds.
9. Large temperature differences between the instrument and the environment can lead to errors – e.g. due to the formation of condensation in the cell chamber or on the vial.
10. To avoid errors caused by stray light do not use the instrument in bright sunlight.
11. The reagents must be added in the correct sequence.

## Method Notes

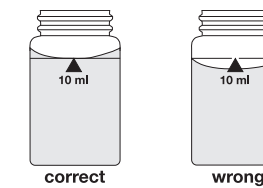
- Prior to measurement ensure that the sample is suitable for analysis (no major interferences) and does not require any preparation i.e. pH adjustment, filtration etc.
- Reagents are designed for use in chemical analysis only and should be kept well out of the reach of children.
- Ensure proper disposal of reagent solutions.
- Safety Data Sheets are available on request.

# General Notes

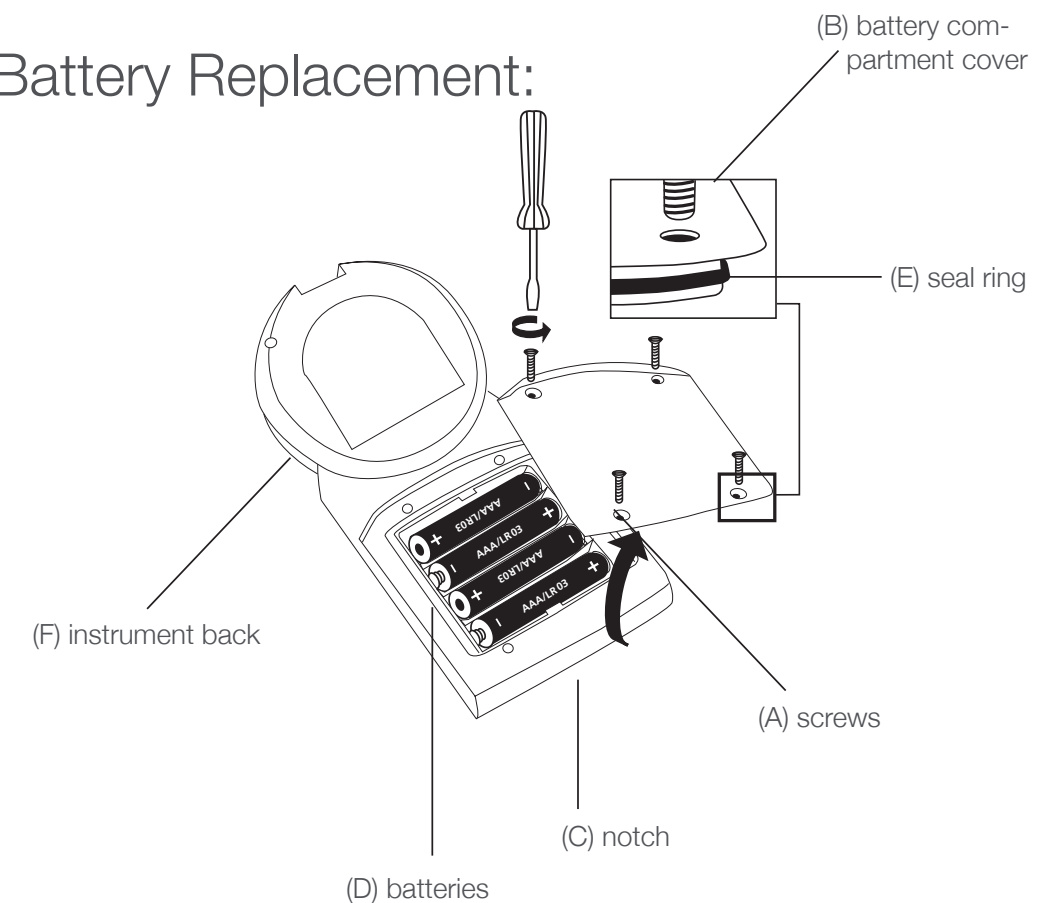
Correct position of the vial ( $\varnothing$  24 mm):



Correct filling of the vial:



## Battery Replacement:



### CAUTION:

To ensure that the instrument is water proof:

seal ring (E) must be in position

battery compartment cover (B) must be fixed with the four screws

If the batteries are removed for more than one minute the date and time menu starts automatically when the photometer is switched on the next time.

# Functional Description

## Operation



Switch the unit on using the [ON/OFF] key.

The display shows the following: "CL L" or "CL H"



Select the required test using the [MODE] key.

### Scroll Memory (SM)

To avoid unnecessary scrolling for the required test method, the instrument memorizes the last method used before being switched off. When the instrument is switched on again, the scroll list comes up with the last used test method first.

The display shows the following: "CL L" or "CL H"

Fill a clean vial with the water sample up to the 10 ml mark, screw the cap on and place the vial in the sample chamber making sure that the  $\Delta$  marks are aligned.



Press the [ZERO/TEST] key.

The "CL L" or "CL H" symbol flashes for approx. 8 seconds.

0.0.0

The display shows the following: 0.0.0

After zero calibration is completed, remove the vial from the sample chamber. Add the reagent to the vial according to the specific reagent instructions. The characteristic coloration appears after the addition of the reagent.

Replace the cap on the vial and place in the sample chamber making sure that the  $\Delta$  marks are aligned.



Press the [ZERO/TEST] key.  
(For Countdown/reaction period see page 7)

The "CL L" or "CL H" symbol flashes for approx. 3 seconds.

The result appears in the display.

The result is saved automatically.

### Repeating the test:



Press the [ZERO/TEST] key again.

### Repeating the zero:



Press the [ZERO/TEST] key for 2 seconds.

# Functional Description

## Display Backlight



Press the [Option] key to turn the display backlight on or off. The backlight is switched off automatically during the measurement.

## Recall of Stored Data



If the instrument is switched on, press the [Option] key for more than 4 seconds to access the recall menu.

## Timer / Reaction Period

If a reaction period is included in a method a countdown function can be used:



Press the [Option] key and hold.



Press the [ZERO/TEST] key.

Release the [Option] key; the countdown starts.

After the countdown is finished the measurement starts automatically.

It is possible to interrupt the countdown by pressing the [ZERO/TEST] key. Measurement starts immediately.

Caution:

An incomplete reaction period can lead to incorrect test results.

# Methods

CL L

## Chlorine, Low Range, with Powder Pack Reagent 0.02 – 2.0 mg/l

If necessary, press the [MODE] key until the CL L mode is shown.

### a) Free Chlorine

1. Fill a clean vial (24 mm Ø) with **10 ml of the water sample** and close the vial tightly with the cap. Wipe the exterior of the vial with a lint-free tissue. (See Notes 2 and 3)
2. Place the vial into the sample chamber making sure that the marks are aligned.
3. Press the [ZERO/TEST] key to perform a zero calibration.
4. Remove the vial from the sample chamber.
5. Add the contents of **one Chlorine Free-DPD Powder Pack Reagent** straight from the foil into the water sample.
6. Close the vial tightly with the cap and invert several times to mix the contents (20 seconds).
7. Place the vial in the sample chamber making sure that the marks are aligned.
8. Press the [ZERO/TEST] key. The **CL L** symbol will flash for approximately 3 seconds.
9. The result will be shown in the display in mg/l Free Chlorine.

### b) Total Chlorine

1. Remove the vial from the sample chamber.
2. Rinse the vial and the cap several times and then fill the vial with **10 ml of water sample** (see Notes 2 and 3).
3. Add the contents of **one Chlorine Total-DPD Powder Pack Reagent** straight from the foil into the water sample.
4. Close the vial tightly with the cap and invert several times to mix the contents (20 seconds).
5. Place the vial in the sample chamber making sure that the marks are aligned.
6. **Wait for a reaction period of 3 minutes.**  
To activate the countdown:
  - a. Press and hold the [Option] key.
  - b. Press the [ZERO/TEST] key.
  - c. Release the [Option] key and the countdown will start.
7. After the 3 minute countdown, the measurement will start automatically or press the [ZERO/TEST] key. The **CL L** symbol will flash for approximately 3 seconds.
8. The result will be shown in the display in mg/l Total Chlorine.

### c) Combined Chlorine

Combined Chlorine = Total Chlorine – Free Chlorine

#### Tolerances:

- 0 – 1 mg/l: ± 0.05 mg/l
- > 1 – 2 mg/l: ± 0.10 mg/l

Zero Test

Zero Test

CL L

Option

Zero Test

Zero Test

CL L

# Methods

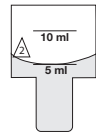
#### Notes:

1. Vial cleaning:  
As many household cleaners (e.g. dishwasher detergent) contain reducing substances, the subsequent determination of chlorine may show lower results. To avoid any measurement errors, only use glassware free of chlorine demand.  
Preparation: Put all applicable glassware into sodium hypochlorite solution (0.1 g/l) for one hour, then rinse all glassware thoroughly with deionised water.
2. For individual testing of free and total chlorine, the use of different sets of glassware is recommended (EN ISO 7393-2, 5.3).
3. Do not use the same sample vial for free and total chlorine without thoroughly rinsing the vial between the two different tests.
4. Preparing the sample:  
The analysis must take place immediately after taking the sample.
5. The DPD color development is carried out at a pH value of 6.2 to 6.5. The reagents therefore contain a buffer for the pH adjustment.  
Strong alkaline or acidic water samples must be adjusted between pH 6 and pH 7 before the reagent is added (use 0.5 mol/l sulfuric acid resp. 1 mol/l sodium hydroxide).
6. Exceeding the measuring range:  
Concentrations above 2 mg/l chlorine can lead to results showing 0 mg/l. In this case, the water sample must be diluted with water free of chlorine and the measurement repeated.
7. Oxidizing agents such as bromine, ozone etc. interfere as they react in the same way as chlorine.

Reagent	Quantity	Cat. No.
Chlorine Free-DPD Powder Pack Reagent	100 CT	AC4P71
Chlorine Total-DPD Powder Pack Reagent	100 CT	AC4P72
Chlorine Bulk Powder Dispenser, Free	250 CT	AQ250F
AQ250F Refill Free Chlorine, 1 Vial	250 CT	AC71P1
AQ250F Refill Free Chlorine, 2 Vials	2 x 250 CT	AC71P2
Chlorine Bulk Powder Dispenser, Total	250 CT	AQ250T
AQ250T Refill Total Chlorine, 1 Vial	250 CT	AC72P1
AQ250T Refill Total Chlorine, 2 Vials	2 x 250 CT	AC72P2
Chlorine Primary Standard Kit	1.5 mg/l	CLSK100
Chlorine Secondary Standard Kit	0.0, 0.20 and 1.0 mg/l	CLSK200

# Methods

CL H



## Chlorine with Powder Pack Reagent (plastic vial type 2, $\varnothing$ 10 mm) 0.1 – 8.0 mg/l

If necessary, press the [MODE] key until the CL H mode is shown.

### a) Free Chlorine

0.0.0

Fill a clean vial (10 mm  $\varnothing$ ) with **5 ml of the water sample** and perform zero calibration (see "Operation").

Add the contents of **two Chlorine Free-DPD Powder Pack Reagents** straight from the foil into the water sample.

Close the vial tightly with the cap and invert several times to mix the contents (20 sec.).

Place the vial in the sample chamber making sure that the  $\Delta$  marks are aligned.

Press the [ZERO/TEST] key.



CL H

The **CL H** symbol flashes for approx. 3 seconds.

The result is shown in the display in mg/l Free Chlorine.

### b) Total Chlorine

0.0.0

Fill a clean vial (10 mm  $\varnothing$ ) with **5 ml of the water sample** and perform zero calibration (see "Operation").

Add the contents of **two Chlorine Total-DPD Powder Pack Reagents** straight from the foil into the water sample.

Close the vial tightly with the cap and invert several times to mix the contents (20 sec.).

Place the vial in the sample chamber making sure that the  $\Delta$  marks are aligned.

**Wait for a reaction period of 3 – 6 minutes.**

Press the [ZERO/TEST] key.



CL H

The **CL H** symbol flashes for approx. 3 seconds.

The result is shown in the display in mg/l Total Chlorine.

### c) Combined Chlorine

Combined Chlorine = Total Chlorine – Free Chlorine

#### Tolerances:

- 2 – 3 mg/l:  $\pm$  0.2 mg/l
- > 3 – 4 mg/l:  $\pm$  0.3 mg/l
- > 4 – 8 mg/l:  $\pm$  0.4 mg/l

# Methods

#### Notes:

1. Vial cleaning:  
As many household cleaners (e.g. dishwasher detergent) contain reducing substances, the subsequent determination of chlorine may show lower results. To avoid any measurement errors, only use glassware free of chlorine demand.  
Preparation: Put all applicable glassware into sodium hypochlorite solution (0.1 g/l) for one hour, then rinse all glassware thoroughly with deionised water.
2. For individual testing of free and total chlorine, the use of different sets of glassware is recommended (EN ISO 7393-2, 5.3)
3. Do not use the same sample vial for free and total chlorine without thoroughly rinsing the vial between the two different tests.
4. Preparing the sample:  
When preparing the sample, the lost of chlorine, e.g. by pipetting or shaking, must be avoided. The analysis must take place immediately after taking the sample.
5. The DPD color development is carried out at a pH value of 6.2 to 6.5. The reagents therefore contain a buffer for the pH adjustment.  
Strong alkaline or acidic water samples must be adjusted between pH 6 and pH 7 before the reagent is added (use 0.5 mol/l sulfuric acid resp. 1 mol/l sodium hydroxide).
6. Concentrations above 8 mg/l chlorine can lead to results showing 0 mg/l. In this case, the water sample must be diluted with water free of chlorine and the measurement repeated.
7. If chlorine is at concentrations under 2 mg/l, the 0.02 - 2 mg/l measurement range should be used (CL L).
8. Oxidizing agents such as bromine, ozone etc. interfere as they react in the same way as chlorine.

Reagent	Quantity	Cat. No.
Chlorine Free-DPD Powder Pack Reagent	100 CT	AC4P71
Chlorine Total-DPD Powder Pack Reagent	100 CT	AC4P72
Chlorine Bulk Powder Dispenser, Free	250 CT	AQ250F
AQ250F Refill Free Chlorine, 1 Vial	250 CT	AC71P1
AQ250F Refill Free Chlorine, 2 Vials	2 x 250 CT	AC71P2
Chlorine Bulk Powder Dispenser, Total	250 CT	AQ250T
AQ250T Refill Total Chlorine, 1 Vial	250 CT	AC72P1
AQ250T Refill Total Chlorine, 2 Vials	2 x 250 CT	AC72P2
Chlorine Primary Standard Kit	1.5 mg/l	CLSK100
10 mm Plastic Vials	12 Pack	AC2V10

# Methods

## Menu Selections

Switch the unit off.

Press the [MODE] key and hold.

Switch the unit on using the [ON/OFF] key.

Allow the 3 decimal points to be displayed before releasing the [MODE] key.

The [Option] key allows for selection of the following menu points:

diS recall stored data

dAtE setting the date and time

CAL user calibration

Mode

On  
Off

Option

diS

## diS – Recall of Stored Data

After confirming the selection with the [MODE] key the photometer shows the last 16 data sets in the following format (automatically proceeds every 3 seconds until result is displayed):

Number	n xx (xx: 16...1)
Year	YYYY (e.g. 2014)
Date	mm.dd (monthmonth:dayday)
Time	hh:mm (hourhour:minuteminute)
Test	Method
Result	x,xx

The [ZERO/TEST] key repeats the current data set.

The [MODE] key scrolls through all stored data sets.

Quit the menu by pressing [Option] key.

Zero  
Test

Mode

Option

dAtE

## Setting Date and Time (24-hour-format)

After confirming the selection with the [MODE] key the value to be edited will be shown for 2 sec.

The setting starts with the year (YYYY) followed by the actual value to be edited. The same applies for month (mm), day (dd), hour (hh) and minutes (mm). Set the minutes first in steps of 10, press the [Option] key to continue setting the minutes in steps of 1.

Increase the value by pressing the [MODE] key.

Decrease the value by pressing [ZERO/TEST] key.

Proceed to the next value to be edited by pressing [Option] key.

After setting the minutes and pressing the [Option] key the display will show "IS SET" and the instrument returns to the measurement mode.

Mode

SET

DATE

YYYY

(2 sec.)

Mode

Zero  
Test

Option

# Menu options - Calibration Mode

Cal CAL

cAL

CAL

CAL

METHOD

Zero  
Test

METHOD

0.0.0

CAL

Zero  
Test

METHOD

RESULT

CAL

Mode

Zero  
Test

CAL

RESULT + x

On  
Off

: :

## CAL – User Calibration

### Note:

user calibration (Display in calibration mode)

factory calibration (Display in calibration mode)

After confirming the selection with the [MODE] key the instrument will show CAL/"Method".

Scroll through methods using the [MODE] key.

Fill a clean vial with the standard up to the 10 ml mark, screw the cap on and place the vial in the sample chamber making sure that the  $\Delta$  marks are aligned.

Press the [ZERO/TEST] key.

The method symbol flashes for approx. 8 seconds.

The display shows the following in alternating mode:

Perform calibration with a standard of known concentration (see "Operation").

Press the [ZERO/TEST] key.

The method symbol flashes for approx. 3 seconds.

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

If the reading corresponds with the value of the calibration standard (within the specified tolerance), exit calibration mode by pressing the [ON/OFF] key.

Changing the displayed value:

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.

Press the corresponding key until the reading equals the value of the calibration standard.

By pressing the [ON/OFF] key, the new correction factor is calculated and stored in the user calibration software.

Confirmation of calibration (3 seconds).



# Calibration Mode

## Factory Calibration Reset

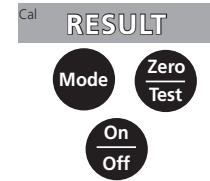
Resetting the user calibration to the original factory calibration will reset all methods and ranges.

A user calibrated method is indicated by a "Cal" symbol while the test result is displayed.

To reset the calibration press both the [MODE] and [ZERO/TEST] key and **hold**.

Switch the unit on using the [ON/OFF] key.

Release the [MODE] and [ZERO/TEST] keys after approx. 1 second.



The following messages will appear in turn on the display:

The factory setting is active.  
(SEL stands for Select)

**or:**

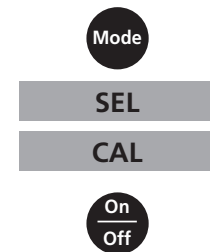
Calibration has been set by the user.  
(If the user calibration is to be retained, switch the unit off using the [ON/OFF] key).



Calibration is reset to the factory setting by pressing the [MODE] key.

The following messages will appear in turn on the display:

Switch the unit off using the [ON/OFF] key.



# Technical Data

## Technical Data

Instrument	single wavelength, direct reading colorimeter
Light source:	LED, interference filter (IF) and photosensor in transparent cell chamber. Wavelength specifications of the IF: 530 nm $\Delta \lambda = 5 \text{ nm}$
Wavelength accuracy	$\pm 1 \text{ nm}$
Photometric accuracy*	3% FS (T = 20° C – 25° C)
Photometric resolution	0.01 A
Power supply	4 batteries (AAA/LR 03)
Operating time	17hr operating time or 5000 test measurements in continuous mode when display backlight is off
Auto-OFF	automatic switch off 10 minutes after last keypress
Display	backlit LCD (on keypress)
Storage	internal ring memory for 16 data sets
Time	real time clock and date
Calibration	user and factory calibration resetting to factory calibration possible
Dimensions	155 x 75 x 35 mm (LxWxH)
Weight	approx. 260 g (incl. batteries)
Ambient conditions	temperature: 5– 40°C rel. humidity: 30–90% (non-condensing)
Waterproof	as defined in IP 67
CE	Certificate for Declaration of CE-Conformity


\*measured with standard solutions

To ensure maximum accuracy of test results, always use the reagent systems supplied by the instrument manufacturer.



# Operating Messages - Error Codes

## Operating Messages

<b>Hi</b>	Measuring range exceeded or excessive turbidity.
<b>Lo</b>	Result below the lowest limit of the measuring range.
	Replace batteries, no further tests possible.
<b>btLo</b>	Battery capacity is too low for the display backlight; measurement is still possible.
<sup>Cal</sup> <b>RESULT</b>	A user calibrated method is indicated by a "Cal" symbol while the test result is displayed. (see "Factory calibration reset").

## Error Codes

<b>E27 / E28 / E29</b>	Light absorption too great. Reasons: e.g. dirty optics.
<b>E 10 / E 11</b>	Calibration factor "out of range"
<b>E 20 / E 21</b>	Too much light reaching the detector.
<b>E23 / E24 / E25</b>	Too much light reaching the detector.
<b>E 22</b>	Battery capacity was too low during measurement. Change battery.
<b>E 70</b>	CL L: Factory calibration incorrect / erased
<b>E 71</b>	CL L: User calibration incorrect / erased
<b>E 72</b>	CL H: Factory calibration incorrect / erased
<b>E 73</b>	CL H: User calibration incorrect / erased

## Technical Support

For any questions or if you require assistance, contact our Technical Support Specialists:

- Email [wai.techservbev@thermofisher.com](mailto:wai.techservbev@thermofisher.com)
- Within the United States, call 1-800-225-1480
- Outside the United States, call +1-978-232-6000 or fax +1-978-232-6031

For additional product information, contact your local authorized dealer, Thermo Scientific Orion technical sales representative or contact us using the Water and Laboratory Products (WLP) information on the back page of this user manual.

## Ordering Information

AQ3170	Orion AQUAfast chlorine colorimeter with 100 free chlorine DPD powder packs, 100 total chlorine DPD powder packs, sample vials, field case, batteries and literature
AC4P71	Orion AQUAfast free chlorine DPD powder packs, 100 tests
AC4P72	Orion AQUAfast total chlorine DPD powder packs, 100 tests
AQ250F	Orion AQUAfast free chlorine DPD bulk powder dispenser with one vial x 250 count
AQ250T	Orion AQUAfast total chlorine DPD bulk powder dispenser with one vial x 250 count
CLSK100	Orion AQUAfast chlorine primary standard kit to prepare 1.5 mg/L NIST-traceable chlorine standard
CLSK200	Orion AQUAfast chlorine secondary standards kit (0.0, 0.20 and 1.0 mg/l chlorine)
AC2V24	Orion AQUAfast replacement 24mm vials, 12 pack
AC3SR24	Orion AQUAfast replacement sealing rings for 24mm vials, 12 pack
AC2V10	Orion AQUAfast replacement 10mm vials, 12 pack

Find out more at [thermofisher.com/water](http://thermofisher.com/water)

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