AnalyzeIT
Monitors for Organic Pollution, Surrogate Color, THM Precursor Measurement and Coagulation Control

7320 Series
The Company

We are an established world force in the design and manufacture of instrumentation for industrial process control, flow measurement, gas and liquid analysis and environmental applications.

As a part of ABB, a world leader in process automation technology, we offer customers application expertise, service and support worldwide.

We are committed to teamwork, high quality manufacturing, advanced technology and unrivalled service and support.

The quality, accuracy and performance of the Company's products result from over 100 years experience, combined with a continuous program of innovative design and development to incorporate the latest technology.

The UKAS Calibration Laboratory No. 0255 is just one of the ten flow calibration plants operated by the Company and is indicative of our dedication to quality and accuracy.

Electrical Safety

This instrument complies with the requirements of CEI/IEC 61010-1:2001-2 "Safety requirements for electrical equipment for measurement, control, and laboratory use". If the instrument is used in a manner NOT specified by the Company, the protection provided by the instrument may be impaired.

Symbols

One or more of the following symbols may appear on the instrument labelling:

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>⚠️</td>
<td>Warning – Refer to the manual for instructions</td>
</tr>
<tr>
<td>⚠️</td>
<td>Caution – Risk of electric shock</td>
</tr>
<tr>
<td>⚡</td>
<td>Protective earth (ground) terminal</td>
</tr>
<tr>
<td>⚡</td>
<td>Earth (ground) terminal</td>
</tr>
<tr>
<td>⚡</td>
<td>Direct current supply only</td>
</tr>
<tr>
<td>⚡</td>
<td>Alternating current supply only</td>
</tr>
<tr>
<td>⚡</td>
<td>Both direct and alternating current supply</td>
</tr>
<tr>
<td>⚡</td>
<td>The equipment is protected through double insulation</td>
</tr>
</tbody>
</table>

Information in this manual is intended only to assist our customers in the efficient operation of our equipment. Use of this manual for any other purpose is specifically prohibited and its contents are not to be reproduced in full or part without prior approval of the Technical Publications Department.

Health and Safety

To ensure that our products are safe and without risk to health, the following points must be noted:

1. The relevant sections of these instructions must be read carefully before proceeding.
2. Warning labels on containers and packages must be observed.
3. Installation, operation, maintenance and servicing must only be carried out by suitably trained personnel and in accordance with the information given.
4. Normal safety precautions must be taken to avoid the possibility of an accident occurring when operating in conditions of high pressure and/or temperature.
5. Chemicals must be stored away from heat, protected from temperature extremes and powders kept dry. Normal safe handling procedures must be used.
6. When disposing of chemicals ensure that no two chemicals are mixed.

Safety advice concerning the use of the equipment described in this manual or any relevant hazard data sheets (where applicable) may be obtained from the Company address on the back cover, together with servicing and spares information.
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## 1 INTRODUCTION

### 1.1 Introduction

**Warning.** This instrument uses a high intensity light source which emits ultraviolet (UV) radiation and must NOT be viewed with the naked eye. Under normal operating conditions it is not possible to see the light source, but if the sensor is dismantled with the power applied, it may be possible to expose the eyes to the strobe flash.

Many dissolved organic compounds (DOC) commonly found in potable water strongly absorbs ultraviolet radiation. These include Humic Acid, which gives water a characteristic yellow and dissolved organics with results in the formation of Trihalomethanes (THMs).

The monitor is used as a surrogate colour monitor, monitor and control coagulation, and to monitor THM precursors in potable water treatment plants.

### 1.2 Principle of Operation

The monitor employs a broad-spectrum xenon strobe lamp to generate pulses of light which pass through the sample water in the flowcell to a filtering and detection system. The received light pulses are analysed at two wavelengths: the measurement wavelength of 254 nm and the reference wavelength of 400 nm, at which the sample constituents of interest do not absorb. This dual light path system provides information which allows the measured value to be corrected for any turbidity due to suspended matter in the sample. The monitor is calibrated with a pure solution of a suitable organic compound of known carbon content.

An automatic, microprocessor-controlled, dual-wiper system cleans the flowcell optical windows periodically to ensure that the cell remains functional. Samples containing large solids and/or very high concentrations of solids must be pre-filtered.

### 1.3 7320 Series Systems – Fig. 1.1

- The 7320/1000 low range analyzer primarily for use in potable water applications, such as monitoring the effectiveness of the coagulation control, THM precursor detection and final treated water quality. Range: 0 to 20 mg/l C maximum.

- The 7320/2000 high range analyzer is used for intake protection applications on potable water applications to detect the rise in DOC from algal bloom toxins and industrial discharges. Range: 0 to 100 mg/l C maximum.

- The 7320/3000 high range coagulation analyzer is designed to monitor the raw water in potable water treatment plants to predict the coagulant dose. Range: 0 to 100 mg/l C maximum.

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**Fig. 1.1 System Arrangements**

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Low Range System

High Range System

Coagulation Dose System
2 MECHANICAL INSTALLATION

Caution. Do not damage the equipment by dropping, scraping or otherwise abusing it during the installation process. Although the equipment is ruggedly constructed, it contains precision optical components which may be damaged if subjected to impacts or shock loading.

2.1 Siting Requirements – Fig. 2.1

2.1.1 Monitor

Caution.
- Mount in a location free from excessive vibration.
- Mount away from harmful vapors and dripping fluids.

The monitor must be fixed to a wall or support in such a position as to make reading the displays and operating the keypad convenient. It is advisable to install a suitably switched and fused isolating box to the right of the monitor, in a position which allows the power to be switched on or off while standing in front of the display.

2.1.2 Flowcell Assembly

The flowcell assembly is supplied on mounting brackets. These must be fixed to a suitable vertical surface such that convenient servicing and calibration is afforded. Allow suitable space to the left and right of the unit for accessing the sensors.

Notes.
- For ease of use it is recommended that the flowcell be mounted at chest height.
- The bracket fitted to the emitter module on a high range flowcell is in two parts – see Fig. 2.5.
### 2.2 Installing the Monitor – Figs. 2.2 and 2.3

**Dimensions in mm (in.)**

<table>
<thead>
<tr>
<th>4 x ø9.5 ((\frac{3}{8})) holes for M8 fixing</th>
<th>Fixing Centers 227 (8.9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>150 (5.9)</td>
<td>5 (0.2)</td>
</tr>
<tr>
<td>403 (15.9)</td>
<td>133 (5.2)</td>
</tr>
<tr>
<td>453 (17.8)</td>
<td></td>
</tr>
<tr>
<td>252 (9.9)</td>
<td></td>
</tr>
</tbody>
</table>

**Fig. 2.2 Overall Dimensions**

1. Mark-out the fixing centers of the four mounting holes – see Fig. 2.2.
2. Drill suitable holes for the type of fixings to be used.
3. Fix the instrument securely to the wall.

**Fig. 2.3 Monitor Fixing Details**
2.3 Installing the Flowcell – Figs. 2.4 and 2.5

Notes.
- Connecting pipework may be flexible plastic or rigid PVC, polypropylene or metal depending on the installation.
- Isolating valves should be fitted to allow removal of the instrument.
- Space should be left on each side of the assembly to allow access to the sensors.

<table>
<thead>
<tr>
<th>Minimum Clearances</th>
<th>Dimensions in mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left (receiver)</td>
<td>100 mm</td>
</tr>
<tr>
<td>Right (emitter)</td>
<td>100 mm</td>
</tr>
<tr>
<td>Top (cleaner)</td>
<td>200 mm</td>
</tr>
</tbody>
</table>

Dimensions in mm

Fig. 2.4 Overall Dimensions and Mounting Details of 7320 100 (Low Range Sensor)
For maintenance purposes the following minimum clearances are recommended:

<table>
<thead>
<tr>
<th>Side</th>
<th>Description</th>
<th>Clearance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left</td>
<td>(for receiver removal)</td>
<td>150 mm</td>
</tr>
<tr>
<td>Right</td>
<td>(for emitter removal)</td>
<td>100 mm</td>
</tr>
<tr>
<td>Top</td>
<td>(for filling with standard solution)</td>
<td>200 mm</td>
</tr>
</tbody>
</table>

Dimensions in mm

Note. The emitter end mounting bracket is in two parts to facilitate emitter module removal during maintenance. See Section 6 - Maintenance.

Fig. 2.5 Overall Dimensions and Mounting Details of 7320 200 and 7320 300 (High Range Sensors)
2.4 Mounting the De-bubbler – Fig. 2.6

Dimensions in mm

![Diagram of De-bubbler with dimensions and fitting details]

**Important Note.**
The de-bubbler MUST be mounted vertically with the flow upwards.

![Fig. 2.6 Overall Dimensions and Mounting Details of the De-bubbler]

2.4.1 Set Up Procedure for Optional De-bubbler – Fig. 2.7

**Important Note.**
The de-bubbler MUST be mounted vertically with the flow upwards.

**Note.** Sample regulating valves together with a flow indicator are recommended to ensure easy maintenance and consistent performance. These devices are not supplied with the 7320 Series UV Organic Pollution Monitoring system.

![Diagram of system installation with optional components]

1. Open the 'sample in' isolating valve (A) such that the overflow from the de-bubbler is at a minimum.
2. Adjust the sample flow through the system (0.5 to 5 l/min) using the regulating valve (B).

**Important Note.** For the high range sensor a higher minimum flowrate is required at high turbidity levels.

![Fig. 2.7 Typical System Installation]
3 ELECTRICAL CONNECTIONS

Warning.
- Although certain instruments are fitted with internal fuse protection, a suitably rated external protection device, e.g. fuse or miniature circuit breaker (MCB), must also be fitted by the installer.
- Before making any connections, ensure that the power supply, any high voltage-operated control circuits and high common mode voltage are switched off.

3.1 Access to Terminals – Fig. 3.1

Fig. 3.1 Access to the Terminal Block

3.2 Connections, General

Warning. The power supply earth (ground) must be connected to ensure safety to personnel, reduction of the effects of RFI and correct operation of the power supply interference filter.

Information.
- Earthing (grounding) – stud terminal(s) is fitted to the transmitter case for bus-bar earth (ground) connection – see Fig. 3.3.
- Cable routing – always route the signal cable and mains-carrying/relay cables separately, ideally in earthed (grounded) metal conduit.
  Ensure that the cables enter the transmitter through the glands nearest the appropriate screw terminals and are short and direct. Do not tuck excess cable into the terminal compartment.
- Cable glands & conduit fittings – ensure a moisture-tight fit when using cable glands, conduit fittings and blanking plugs/bungs (M20 holes). The M16 glands ready-fitted to wall-mounted instruments accept cable of between 4 and 7 mm diameter.

3.2.1 Relay Contact Protection and Interference Suppression – Fig. 3.2

If the relays are used to switch loads on and off, the relay contacts can become eroded due to arcing. Arcing also generates radio frequency interference (RFI) which can result in instrument malfunction and incorrect readings. To minimize the effects of RFI, arc suppression components are required; resistor/capacitor networks for AC applications or diodes for DC applications. These components can be connected either across the load or directly across the relay contacts. On 7320 instruments the RFI components must be fitted to the relay terminal block along with the supply and load wires – see Fig. 3.2.
For AC applications the value of the resistor/capacitor network depends on the load current and inductance that is switched. Initially, fit a 100R/0.022 μF RC suppressor unit (part no. B9303) as shown in Fig. 3.2A. If the instrument malfunctions (incorrect readings) or resets (display shows 88888) the value of the RC network is too low for suppression – an alternative value must be used. If the correct value cannot be obtained, contact the manufacturer of the switched device for details on the RC unit required. For DC applications fit a diode as shown in Fig. 3.2B. For general applications use an IN5406 type (600V peak inverse voltage at 3A – part no. B7363).

**Note.** For reliable switching the minimum voltage must be greater than 12V and the minimum current greater than 100 mA.
3.3 Monitor Connections – Fig. 3.3

Note. Refer to Fig. 3.1 for Access to Terminals.

Caution. Slacken terminal screws fully before making connections.

Warning. The power supply earth (ground) must be connected to ensure safety to personnel, reduction of the effects of RFI and correct operation of the power supply interference filter.

**Terminal** | **Connection Details**
--- | ---
1 | UV signal input
2 | Reference signal input
3 | Receiver 0 V
4 | Receiver 12 V supply
5 | Emitter + ve trigger
6 | Emitter – ve trigger
7 | Emitter 24 V supply
8 | Emitter 0 V
9 | Cleaner earth
10 | Cleaner 0 V
11 | Cleaner 12 V supply
12 | Cleaner initiate impulse
13 | Nu Not Used

 incoming Power Supplies

Optional Wiring to Alarm Devices

Fuse No. 5 in cover holder (see Fig. 3.4 for details)

Fig. 3.3 Monitor Connections – All Sensors
3.3.1 Out of Sample Alarm Input Connections
A digital input is supplied which can be connected to a low flow indicator or sump level switch. This can be used to give indication of the loss of the sample flow or an unacceptable drop in water level. The input is linked to the internal system relay when selected in the program.

The input can be configured in the software to accept an input from a device which has normally open or closed contacts – see Section 5.5.

If this input is not required, leave it open circuit.

3.3.2 Alarm Relay Connections
Up to two alarm relays can be provided with connections to the single set of contacts for each alarm – see Fig. 3.3. Alarms can be connected using suitable signal cable.

The operating sense of the relays can be changed using the service programs – see Section 5.6, Set Up Outputs. This enables normally open or normally closed configurations.

3.3.3 Out of Service Alarm
This alarm can be remotely transmitted via an internal relay provided. This is a fail-safe relay which is de-energised in the event of a diagnostics alarm – see Section 6.3.1 for details.

3.4 Selecting the Mains Voltage – Fig. 3.4

3.5 Start Up
When all sample/drain connections have been made and electrical/signalling installation has been completed and checked, switch on the power supply.

Proceed to Section 5 for programming details.

Caution. Support the cover during the unlocking procedure to prevent it falling and possibly damaging the ribbon cable and/or p.c.b.

<table>
<thead>
<tr>
<th>No.</th>
<th>Function</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mains in</td>
<td>500 mA</td>
</tr>
<tr>
<td>2</td>
<td>24 V out</td>
<td>1 A</td>
</tr>
<tr>
<td>3</td>
<td>Mains in</td>
<td>500 mA</td>
</tr>
<tr>
<td>4</td>
<td>12 V out</td>
<td>1 A</td>
</tr>
<tr>
<td>5</td>
<td>Mains in</td>
<td>500 mA</td>
</tr>
</tbody>
</table>

**Fig. 3.4 Selecting the Mains Voltage**

1. Unlock and carefully remove the upper enclosure cover.
2. Disconnect the front panel ribbon cable at the main p.c.b. end.
3. Identify the mains tappings on the 2 p.c.b.’s and select the required mains voltage using the links supplied.
4. Offer the cover up to the enclosure and reconnect the ribbon cable.
5. Replace and lock secure the upper enclosure cover.
4 CONTROLS AND DISPLAYS

4.1 Displays – Fig. 4.1
The upper display window comprises a 4-digit, 7-segment digital line and shows actual values (Concentration) of dissolved organics. The lower display comprises two 16-character dot-matrix lines showing the current program parameters.

4.2 Switch Familiarisation – Figs 4.1 and 4.2

A – Advancing to Next Page

B – Moving Between Parameters

C – Adjusting and Storing a Parameter Value

D – Selecting and Storing a Parameter Choice

Fig. 4.1 Location of Controls and Displays

Fig. 4.2 Functions of the Membrane Switches
Fig. 5.1 Overall Programming Chart
5.2 Operating Display Page

**Note.** This is the default page. The programme returns to this point from any of the programming pages if no data has been entered after four minutes.

**Dissolved Organics Mode Operating Page**

- Display in inferred units (see Appendix)
- Absorbance/metre; colour °H; Coag. Dose mg/l⁻¹; mg/l⁻¹ T.O.C.
- Equivalent value in mg/l⁻¹ Dissolved Organics.

This is for display only. See Set Up Outputs Page for programming details.

This is for display only. See Set Up Outputs Page for programming details.

**Switching the Lamp On/Off**

In the interests of safety it is essential that the lamp is switched off before doing any maintenance on the sensor. When off, Lamp Disabled is displayed in the lower window of the Diss. Organics page; the top window will be blank.

Press the [ ] switch to disable the lamp and [ ] to switch the lamp back on.

**Manual Cleaning**

Press the [ ] switch to change No to Yes and press the [ ] switch to start a manual clean.

Return to top of Operating Display Page.
5.3 Sensor Calibration

Note. Output is held during a calibration.

Note. The calibration pages have a 60 minute timeout after which the instrument reverts to normal operation.

Sensor Calibration Page

Calibration Access Code
Enter the code in the range 0000 to 9999.

Fill the flowcell with carbon-free de-ionized water.

This message is displayed for about one minute, then changes to Fill Span Sol.

Fill the flowcell with the required calibration solution.
- 7320 100 (low range) ............... 10.00 mg/l C
- 7320 200 (high range) ............. 40.00 mg/l C
- 7320 300 (coagulation dose) ... 40.00 mg/l C

This message is displayed for about one minute, then changes to Cal Complete.

Return to top of Sensor Calibration Page.

5.4 Security Code

Secure Parameter Access
Use the \[\uparrow\] and \[\downarrow\] switches to enter the appropriate security code between 0000 and 9999.

Advance to Set Up Parameter Page.
5.5 Set Up Parameters

Set Up Parameter Page

Select the appropriate sensor:
- 7320 100 = Low Range Sensor.
- 7320 200 = High Range Sensor.
- 7320 300 = Coagulation Dose Sensor.

When changed Please Wait is displayed for 20 seconds.

Enter a damping value in the range 1 to 20. This is used to prevent short term variations in reading, typically due to bubbles in the sample. Always use the lowest value which gives an acceptably stable reading.

Dissolved Organics mode

Inferred Units mode
See Appendix.

Enter the conversion factor between Dissolved Organics and the Inferred Unit selection.

Note. Absorbance/metre has a fixed factor of 1.5.

Cleaning Interval
Enter required interval between automatic cleaning procedures. Options: 15, 30, 45 & 60 minutes, 2, 4, 6, 12 & 24 hours.

Flow Alarm Input Configuration
Set the normal ‘none’ alarm condition (normally open or closed), or disable by setting to Off.

Alter Set Up Parameter Security Code
Enter value in the range 0000 to 9999.

Alter Calibration Security Code
Enter value in the range 0000 to 9999.

Return to top of Set Up Parameters Page.
5.6 Set Up Outputs

Set Up Outputs Page

Set the current output span between the following limits:
- Low range sensor: 0 to 2 and 0 to 20 mg/l C
- High range sensor: 0 to 20 and 0 to 100 mg/l C

Set the current output to a default in the event of a diagnostic alarm.

Select the current output:
- 4 to 20mA
- 0 to 20mA
- 0 to 10mA

Set the value within the current o/p span.
The instrument automatically transmits a test signal to represent the current output range.

Alarm 1 Action
This can be set as a high or low alarm contact.
Select High or Low as appropriate.
Select Off to disable this alarm.

Adjust setpoint to a value within the range of the sensor.

Alarm 2 Action
This can be set as a high or low alarm contact.
Select High or Low as appropriate.
Select Off to disable this alarm.

Adjust setpoint to a value within the range of the sensor.

Return to top of Set Up Outputs Page.

5.7 Factory Settings

These parameters are set at the factory and will not normally require adjustment on site. However, if the receiver/emitter modules have been changed then the emitter light will need setting. The full Factory Settings page is given in Section 6.4.
6.1 Standard Solutions
Because UV absorption is a non-specific, aggregate measurement of organic carbon concentration, true standards are not available. In this situation it is convenient to use a standard solution made from a single known organic compound. The monitor then produces readings in units of mg/l of carbon defined against the calibration standard. Potassium hydrogen phthalate is the recommended standard but other suitably pure, soluble and stable organic compounds could be used instead. If, as is to be expected, an alternative standard solution absorbs more or less strongly at 254 nm than the recommended solution, then different monitor readings will be obtained on a given sample.

The monitor does not require frequent calibration but, when calibrating, particular care must be taken to avoid contamination of standard solutions, particularly the zero standard, with organic material which may be present inside the flowcell.

6.1.1 Zero Standard
Calibration is performed using carbon-free de-ionized water. The practicality of obtaining water which is truly carbon-free is questionable so, as zero is the more important calibration point, it is necessary to use the best quality water available and to ensure that it is not subsequently contaminated by organic matter. In some cases distilled water, while less chemically pure, may contain less organic carbon than de-ionized water.

The zero standard solution should be as fresh as possible but, if storage is unavoidable, a glass container should be used to avoid possible contamination due to leaching of chemicals from a plastic bottle.

6.1.2 Span Standard
Prepared from potassium hydrogen phthalate (KOOCH₂COOH, carbon content = 47.05 %), Analytical Reagent grade, and high quality de-ionized or distilled water.

To prepare a 1000 mg/l C carbon stock standard solution: dissolve 2.125 (± 0.005) g of potassium hydrogen phthalate, previously dried at 120 °C for 2 hours, in about 500 ml de-ionized water and make up to 1 litre in a volumetric flask. This solution may be stored in a glass bottle in a refrigerator, without freezing, for up to 3 months.

Working standard solutions for monitor calibration should be freshly prepared from the stock standard when required. Dilute the stock solution with high quality de-ionized or distilled water; the standard solution should be discarded after use.

Low Range, 10 mg/l C: Dilute 10 ml of the stock standard solution to 1 litre in a volumetric flask.

High Range, 40 mg/l C: Dilute 40 ml of the stock standard solution to 1 litre in a volumetric flask.

6.1.3 Calibration Checks
The system uses an optical system with very stable electronics which avoids the risk of electronic drift. Therefore, routine calibration is normally unnecessary. However, it may be necessary to routinely check the system accuracy (particularly after cleaning). The should then be considered as a calibration check and not a calibration adjustment.

The calibration check can be simply carried out by filling the flowcell with the Zero and Span Standards and observing the readings on the Operating Display Page.

The solutions are poured in from the top of the flowcell.

High Range Sensors:
Remove filler plug on top of the flowcell and use the funnel provided.

Low Range Sensor:
Remove the Cleaner Module, fill flowcell and fit Cleaner Module.

6.2 Scheduled Servicing

Warning. Do NOT open the emitter unit as it uses high voltages which could cause serious injury or death.

Caution. Both emitter and receiver units contain no user serviceable parts and are sealed in clean air conditions at the factory. Opening them could lead to degraded performance. See also the warning above.

The following servicing schedule has been produced as a general guide only. Because the systems are designed for a wide range of applications, where the nature of the sample can vary considerably, it may be necessary to amend the schedule to suit the particular installation and sample conditions.

6.2.1 Cleaning the Flowcell
The required automatic cleaning frequency of the flow chamber and optical windows can only be determined by plant experience. It is recommended that checks are made at appropriate intervals.

Routine servicing is limited to manually cleaning out the flowcell to remove any fouling or sediment which has accumulated over a lengthy period. In particular, if there is a need to calibrate the instrument it is important that no contamination occurs when setting the zero condition. To clean out the high range sensor the cell it must be ‘split’. Four stainless steel screws hold it together, but two of them provide a jacking action when unscrewed, thus affording a controlled splitting operation. See Section 6.2.3, Fig. 6.2, for details.
6.2.2 Dismantling the Flowcell for Cleaning and Wiper Maintenance – Figs 6.1 and 6.2

Caution. The emitter and receiver modules contain precision optical components and must be handled accordingly. In particular, the emitter contains all of the power supply, voltage control and lamp components and is quite heavy. Do not support on the wires entering the enclosure.
Always switch off the power to the instrument before starting any service work.

Warning. This instrument uses a high intensity light source which emits UV radiation and must NOT be viewed with the naked eye. Under normal operating conditions it is not possible to see the light source, but if the sensor is dismantled with the power applied, it may be possible to expose the eyes to the strobe flash.

Important Notes.
• Ensure that O-rings are removed with the screw collars; it is possible for these seals to be left inside the flowcell.
• During the cleaning procedure, support the modules to remove any strain from the cables.
• Either grub screw pins or pegs ensure that the modules locate in only one position.
• The emitter module is heavier than the receiver, so extra support is needed.

Caution. Care must be taken while handling the emitter module and, for safety reasons, it must NEVER be operated while outside the measurement cell.

Perform a manual clean (see Section 5.2) to ensure that the wiper blade is in the 'parked' position.

1. Unscrew the collar and carefully withdraw the module.
2. Unscrew the collar and carefully withdraw the module.
3. Clean the inside of the flow chamber and other assemblies thoroughly using mild detergent and rinse with de-ionized water.
4. Inspect the wiper blade for wear or damage and fit a new one if necessary, ensuring that it is fitted in the 'parked' position.
5. Reassemble emitter and receiver modules using new seals ensuring that the modules locate in the keyways before tightening the collars.

Before fitting the wiper module, apply power to the sensor and perform a manual clean to ensure that the blade has been fitted correctly and is orientated as shown above when in the park position. Fit module in flowcell as detailed in step 7.

Fig. 6.1 Low Range Sensor – Dismantling the Flowcell for Cleaning
Clean the inside of the flow chamber and other assemblies thoroughly. Use mild detergent and rinse with de-ionized water.

Inspect the wiper blades for wear or damage and fit new ones if necessary – see Fig. 6.4 for assembly details.

Reassemble flowcell using new seals.

Ensure that the modules locate in the keways before tightening the collars.

**Fig. 6.2 High Range Sensors – Cleaning the Flowcell**
Vew from emitter end

Remove the securing screws to free the mounting plate from the angle bracket (2).

Remove the four stainless steel closing screws holding the flowcell halves together.

Thread two of the stainless steel screws into holes provided and advance them slowly and evenly to push the cell halves apart. When the O-ring seal is clear of the body the cell halves should separate easily.

Thoroughly check and clean the inside of the cell. The wiper blades can also be serviced/changed – see Fig. 6.4.

Reassemble.

Fig. 6.3 Splitting the High Range Flowcell
Note. The proper functioning of the wiper system depends on the correct assembly of the washers and orientation of the wiper blades.

1. Remove the wiper blades securing nut.
2. Remove the blades and washers from the drive shaft.
3. Before reassembling the components on the drive shaft, perform a Manual Clean (section 5.2) to 'park' the blades.
4. Reassemble the components on the drive shaft in the order shown and tighten the nut. Also ensure that the blades are in the parked position, i.e. horizontal.
5. Perform another Manual Clean (section 5.2) to 'park' the blades as a final check.

Fig. 6.4 Servicing the High Range Wipers
6.3 Unscheduled Servicing

6.3.1 Monitor Diagnostic Information
The software incorporates diagnostic facilities which provide information on the status of the instrument (lower line of the Program Parameters display) in the Operating Display Page. All diagnostic messages result in de-energising the ‘Out of Service’ relay with the exception of the ‘Out of Range’ condition.

Due to the fail-safe operation of the relay, an alarm condition is generated in the event of a loss of mains supply.

<table>
<thead>
<tr>
<th>Display Message</th>
<th>Cause</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flashing numeric display</td>
<td>Measured value higher than the full scale value of the sensor.</td>
<td>None.</td>
</tr>
<tr>
<td>Alarm One/Two</td>
<td>Either Alarm 1 or 2 is in the alarm state.</td>
<td>None.</td>
</tr>
<tr>
<td>Lamp Disabled</td>
<td>The flowcell light source has been manually disabled in the Operating Display Page.</td>
<td>See Section 5.2.</td>
</tr>
<tr>
<td>Flow Failure</td>
<td>Loss of sample/flow pressure detected by the external sample switch contact.</td>
<td>Re-instate sample.</td>
</tr>
<tr>
<td>Loss of Signal</td>
<td>No signal received from the two receivers. Possible causes:</td>
<td>Dismantle flowcell – see Section 6.2.2.</td>
</tr>
<tr>
<td></td>
<td>a) Flowcell requires cleaning.</td>
<td>Dismantle flowcell to reveal wiper – see Section 6.2.3 – and check operation of cleaner by performing a manual clean – see Section 5.2.</td>
</tr>
<tr>
<td></td>
<td>b) Failure of the automatic cleaner.</td>
<td>Check sensor connections in the transmitter – see Section 3.3.</td>
</tr>
<tr>
<td></td>
<td>c) Faulty connections between sensor and transmitter.</td>
<td>Suspect an electronic malfunction*.</td>
</tr>
<tr>
<td></td>
<td>d) Failure of lamp power supply.</td>
<td>Suspect an electronic malfunction*.</td>
</tr>
<tr>
<td></td>
<td>e) Failure of either the emitter or receiver.</td>
<td>Suspect an electronic malfunction*.</td>
</tr>
<tr>
<td>No Reply- Timeout</td>
<td>There is a hardware problem between the internal circuit boards.</td>
<td>Suspect an electronic malfunction*.</td>
</tr>
<tr>
<td>Conversion Error</td>
<td>There is a hardware communication problem regarding signal interrogation.</td>
<td>Suspect an electronic malfunction*.</td>
</tr>
<tr>
<td>Bad Data</td>
<td>There is a hardware communication problem regarding signal interrogation.</td>
<td>Suspect an electronic malfunction*.</td>
</tr>
</tbody>
</table>

*These conditions indicate an internal electronic malfunction which cannot be rectified by other than ABB personnel.

Table 6.1 Diagnostic Information

6.3.2 Unstable or Erratic Readings
This is usually caused by air bubbles entrained in the sample and is usually more pronounced on the low level sensor due to its greater sensitivity. These bubbles are usually as a result of degassing of the sample caused by a drop in sample pressure, or a rise in temperature. Cleaning the optical windows and increasing the flow through the flowcell usually overcomes the problem. If severe, it is recommended that a de-bubbler unit is installed – see Section 2.4.
6.4 Replacing the Emitter and Receiver Modules

Having replaced the emitter/receiver module(s) (procedure in Section 6.4.1) it will be necessary to adjust the emitter brightness (procedure in Section 6.4.2).

Please observe all **Warnings**, **Cautions** and **Notes** in Section 6.2.2.

### 6.4.1 Changing the Modules

1) Electrically isolate the equipment.

2) Disconnect the receiver and/or emitter wires at the receiver/emitter.

3) Follow the procedures in Fig. 6.1 (Low Ranger Sensor) and/or Fig. 6.2 (High Range Sensor) for removing the modules.

4) Check that the 'O' ring is fitted to the new emitter/receiver.

5) Insert the emitter/receiver modules into the flowcell; rotate them to align with internal keys before tightening the collars.

6) Connect the appropriate wires the emitter/receiver (see Fig. 3.3).

7) Switch on the mains supply and allow the instrument to warm up for five minutes.

### 6.4.2 Adjusting the Emitter Brightness

1) Fill the flowcell with high purity water.

2) Enter the Factory Programming Page (see overpage) using the security code 73. If this has been changed at any time, use 7300.

3) Scroll to **Interrogate Display**.

4) Remove the small plug on the left hand side of the emitter. Inside is a multi-turn potentiometer which may be adjusted using a small bladed screwdriver.

5) Bearing in mind that the display updates every six seconds, adjust the brightness control so that a **Signal Total Value** of '3900' ±300 is displayed.

6) Check that the two **Peak** values are between 50 and 62; otherwise contact Stonehouse.

7) When adjusted correctly, fit the plug into the body of the receiver.

8) Carry out a calibration (see Section 5.3).

9) Return the instrument to normal operation (see Section 5.2).
Factory Settings
These parameters are set at the factory and will not need further adjustment on site. Access must only be undertaken by nominated personnel.

Secure Factory Settings Access
Enter the required security code (between 0000 and 9999). Access will be denied if an incorrect value is entered.

Displays the raw signals from the sensor. 
S = UV254 Signal, R = IR880 Reference Signal.

This value is updated after a sensor calibration and is for diagnostic purposes only.

This value is updated after a sensor calibration and is for diagnostic purposes only.

This value is updated after a sensor calibration and is for diagnostic purposes only.

This value is updated after a sensor calibration and is for diagnostic purposes only.

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This value is updated after a sensor calibration and is for diagnostic purposes only.

This value is updated after a sensor calibration and is for diagnostic purposes only.

Set Up Outputs

Factory Settings

Factory Set Code
0000

Diss. Organics

Ref. Total Low
xxxx

Sig. Total Low
xxxx

Ref. Total High
xxxx

Sig. Total High
xxxx

Ref. Peak Low
xxxx

Sig. Peak Low
xxxx

Ref. Peak High
xxxx

Sig. Peak High
xxxx

Reference Factor
1.000

Cal. Span Value
40.00 mg/l

Continued...
...Continued

Low Linear Val.
20.00 mg/l

Calculating Coef.

Low Linear Coef.
1.29

High Linear Val.
80.00 mg/l

Calculating Coef.

High Linear Coef.
1.38

Alter Fac. Code
0000

This setting does not need to be adjusted.

This setting does not need to be adjusted.

This setting does not need to be adjusted.

This setting does not need to be adjusted.

This setting does not need to be adjusted.

After ‘Factory Setting’ security code enter value in the range 0000 to 9999.

Note.
To reset factory default settings:
1) Switch off the instrument.
2) Switch on again with the down arrow switch pressed.
Overall Specification
Range (based on potassium hydrogen phthalate calibration standards):
- 7320 100 (low range) ....... 0 to 20 mg/l°C
- 7320 200 (high range) ...... 0 to 100 mg/l°C
- 7320 300 (coagulate dose) 0 to 100 mg/l°C

Linearity:
- Low range: ........................ 0.5 mg/l°C
- High range: ........................ 2 mg/l°C

Reproducibility:
- Low range: ........................ 0.25 mg/l°C
- High range: ........................ 1 mg/l°C

Inferred Units
- Absorbance Units/metre
- Colour °H
- Coag. Dose mg/l
- mgl⁻¹ T.O.C.

Maximum current output
- scale expansion:
  - Low range: ........................ 0 to 2 mg/l°C
  - High range: ........................ 0 to 20 mg/l°C

Display Resolution:
- Low range: ........................ 0.01 mg/l°C
- High range: ........................ 0.1 mg/l°C

Reproducibility: ........................ ±3% of reading.

Response time: ........................ Normally three minutes for 90% step change depending on signal damping factor.

Sample flow-rate: ........................ 0.5 to 5 l/min (free of air bubbles). A higher minimum flow-rate is required at high turbidity levels when using the high range sensor.

Sample temperature: ........................ 0 to 40 °C.

Sample pressure: ........................ 3 bar maximum.

Lamp life: ............................. Rated by the manufacturer at 1.2 x 10⁶ flashes per min.
(10 years continuous operation at the rate of one flash at 6 second intervals (typical) equates to 5.2% of the rated lamp life).

Display:
- Measured value: ........................ 4-digit backlit LCD window.
- Information: .......................... 2 x 16-character dot matrix, backlit LCD window.

Current output: .......................... 0 to 10, 0 to 20 and 4 to 20mA.
- Maximum load resistance: .......................... 750 ohms.
- Accuracy: .......................... ±0.25% of FSD or ±0.5% of reading.

Diagnostics: .......................... Out of sample.
- Lamp disabled.
- Loss of signal.
- Electronic failure.

Set points and relays:
- Number of setpoints: .......................... Programmable over the instrument range.
- Relay contacts: .......................... single pole changeover.
- Diagnostic relay: .......................... Out of service, single pole/ single contact.
- Rating: .......................... 250V AC, 5A maximum noninductive.

Internal wiper cleaning system: .......................... Programmable operation frequency 15, 30, 45 & 60 minutes. 2, 4, 6, 12 & 24 hours.

Power supply: .......................... 100 to 130V AC and 200 to 260V AC, 50 to 60Hz.

Power consumption: .......................... Less than 15W.

Environmental data:
- Operating temperature: .......................... 0 to 40 °C.
- Protection: .......................... IP65 enclosure.
- Operating humidity: .......................... Up to 95% non-condensing.

Maximum distance between transmitter and sensor: .......................... 200mm to 750mm

Overall dimensions:
- Transmitter: .......................... 252mm wide 453mm high 133mm deep
- Sensors:
  - Low range: .......................... 327mm wide 410mm high
  - High range: .......................... 408mm wide 373mm high 191mm deep

Weight (ex packing):
- Transmitter: .......................... 11kg
- Sensor: .......................... 6kg
Fig. 8.1 7320 100 Spares

Fig. 8.2 7320 200/300 Spares

Fig. 8.3 Transmitter Spares

<table>
<thead>
<tr>
<th>Transmitter Item</th>
<th>ABB Part No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motherboard</td>
<td>7320 040</td>
</tr>
<tr>
<td>Software EPROM</td>
<td>7320 041</td>
</tr>
<tr>
<td>Display/Keypad board</td>
<td>7320 043</td>
</tr>
<tr>
<td>Sampling board</td>
<td>7320 044</td>
</tr>
<tr>
<td>Current output board</td>
<td>7320 045</td>
</tr>
<tr>
<td>Alarm board</td>
<td>7320 046</td>
</tr>
<tr>
<td>12 v PSU assy (main electronics)</td>
<td>7320 047</td>
</tr>
<tr>
<td>24 v PSU assy (emitter supply)</td>
<td>7320 048</td>
</tr>
</tbody>
</table>
A.1 Inferred Units

In normal mode of operation the instrument is calibrated in mg/l dissolved organic carbon. However, the monitor can be configured to display values in one of four inferred units. The value is calculated by the instrument using a conversion factor shown below.

<table>
<thead>
<tr>
<th>Unit</th>
<th>Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absorbance Units/metre</td>
<td>Fixed at 1.5</td>
</tr>
<tr>
<td>Colour (°H)</td>
<td>Variable 0.10 to 9.00</td>
</tr>
<tr>
<td>Coagulant Dose (mg/l)</td>
<td>Variable 0.10 to 9.00</td>
</tr>
<tr>
<td>T.O.C. (mg/l)</td>
<td>Variable 0.10 to 9.00</td>
</tr>
</tbody>
</table>

With the exception of 1, the conversion factor needs to be determined by laboratory analysis of the actual sample and it assumes that the factor is constant.

When using these inferred units it must always be remembered that the instrument only measures absorbance of dissolved organics at 254nm. Therefore, if the conversion factor changes, the instrument readings may not agree with independent laboratory results until a new conversion factor is entered.

Note. When the above inferred units are selected, the alarm settings, current output range and the calibration solution values remain in mg/l dissolved organics.
PRODUCTS & CUSTOMER SUPPORT

Products

Automation Systems
- for the following industries:
  - Chemical & Pharmaceutical
  - Food & Beverage
  - Manufacturing
  - Metals and Minerals
  - Oil, Gas & Petrochemical
  - Pulp and Paper

Drives and Motors
- AC and DC Drives, AC and DC Machines, AC motors to 1kV
- Drive systems
- Force Measurement
- Servo Drives

Controllers & Recorders
- Single and Multi-loop Controllers
- Circular Chart, Strip Chart and Paperless Recorders
- Paperless Recorders
- Process Indicators

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- Industrial Robots and Robot Systems

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- Mass Flow Meters
- Turbine Flowmeters
- Flow Elements

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- Electrical Systems
- Marine Equipment
- Offshore Retrofit and Refurbishment

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- Process Gas Analysis
- Systems Integration

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- Pressure
- Temperature
- Level
- Interface Modules

Valves, Actuators and Positioners
- Control Valves
- Actuators
- Positioners

Water, Gas & Industrial Analytics Instrumentation
- pH, conductivity, and dissolved oxygen transmitters and sensors
- ammonia, nitrate, phosphate, silica, sodium, chloride, fluoride, dissolved oxygen and hydrazine analyzers.
- Zirconia oxygen analyzers, katharometers, hydrogen purity and purge-gas monitors, thermal conductivity.

Customer Support

We provide a comprehensive after sales service via a Worldwide Service Organization. Contact one of the following offices for details on your nearest Service and Repair Centre.

United Kingdom
ABB Limited
Tel: +44 (0)1453 826661
Fax: +44 (0)1453 829671

United States of America
ABB Inc.
Tel: +1 775 850 4800
Fax: +1 775 850 4808

Client Warranty

Prior to installation, the equipment referred to in this manual must be stored in a clean, dry environment, in accordance with the Company's published specification.

Periodic checks must be made on the equipment's condition. In the event of a failure under warranty, the following documentation must be provided as substantiation:

1. A listing evidencing process operation and alarm logs at time of failure.
2. Copies of all storage, installation, operating and maintenance records relating to the alleged faulty unit.