



FluoroCheck II
Oil-in-Water Monitor
includes
instructions for use with the
CT-1000 Solvent-Free Sampling System

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1.0 FluoroCheck and CT-1000 Function and Description

The FluoroCheck II is a filter fluorescence photometer with a fixed excitation bandpass filter (350 nm) and an emission bandpass filter (450 nm). It is designed specifically for the quantification of low ppm concentration measurements of hydrocarbons (oil) in water. Through a calibration against a lab analysis, the targeted aromatics in the oil are correlated to give a total oil reading.

The CT-1000 is a sample delivery accessory that can be used with the Arjay FluoroCheck monitor. The CT-1000 provides a method to stream a large sample volume through the FluoroCheck. The CT-1000 software in the FluoroCheck logs multiple readings as the sample passes through the unit and displays the highest, lowest, and averaged readings of the sample pass.

The FluoroCheck and CT-1000 combination provides a representative reading of the ppm concentration without the need for solvent extraction.

The FluoroCheck II has many applications of use and will provide varying degrees of accuracy depending on its set up. The FluoroCheck II can be used with or without the CT-1000 accessory.

- A single solvent-free sample in a cuvet can provide field screening of a direct water sample using the Arjay supplied calibration. The reading accuracy can be improved by entering a site calibration.
- A streamed solvent-free water sample using the CT-1000 can provide a representative indication of the ppm without the need for solvent extraction and disposal using the Arjay supplied calibration. The reading accuracy can be improved by entering a site calibration.
- A single solvent extracted sample can provide good readings using the Arjay calibration library of crude oil or refined oil. (Refined oil calibration uses diesel)
- A single solvent extracted sample can provide a high degree of accuracy using a site specific calibration correlated to a laboratory result.
- Following the procedures outlined in this manual and using procedures as indicated by the EPA or ISO for sample preparation can provide highly accurate measurements specific to your application.

Determine your own degree of accuracy required and follow procedures consistently for best results.

1.1 Unpacking

Unwrap all packages carefully and compare contents with the packing list, making sure all items arrived. If any part is missing, contact your local sales office. Inspect all components for damage that may have occurred while the unit was in transit. If any parts appear damaged, contact the carrier immediately. Be sure to keep all packing material for damage claims or for repacking should it become necessary to return the unit.

1.2 Specifications

Base Unit

Power Requirements	12 VDC, 0.5 A
Power Supply Unit	Input: 100-240 VAC, 47-63 Hz, 0.5 A Output: 12 VDC 1.5A FW1812 by ELPAC Power Systems
User Interface	4 line x 16 characters Backlit LCD, Membrane keypad
Communication Port	RS232, 9 pin Female serial connector, 9600 baud, 8 data bits, 1 stop bit, even
Measuring Range	0-100 ppm (higher ranges with sample dilution)
Instrument Accuracy	±0.1 ppm The accuracy is based on oil type, calibration mode and operating consistency
Calibration Memory	a library of up to 10 different calibrations can be stored
Calibration Curve	up to five concentration entry points per calibration
Operating Environment	Indoor Use: 15-40 deg. C Relative humidity: ≤ 80% for 15 – 31 °C Decreasing linearly to 50% for 31 – 40 °C Altitude: ≤ 2000 m
Installation Category	II
Pollution degree	2
Light Source	UV LED Excitation Wavelength: 365 nm
Expected Life	10000 hours
Excitation Filter	Excitation wavelength: 350 ± 20 nm at Full Width Half Maximum
Emission Filter	Emission Wavelength: 450 nm ± 40 nm at Full Width Half Maximum
Dimensions:	280 mm x 168 mm x 110 mm High
Weight:	1 kg (2.4 lbs)
Power Supply	
Safety Specifications	UL, CSA, CE
Approval Standards	EN61010-1:2001, EN61326-1:2006, 2006/95/EC, 2004/108/EC

NOTE:

The above specification and protection impairment may be affected if the equipment is not used as specified by the manufacturer.

1.3 Important Information

- Sample and solvent disposal must comply with all applicable regulations.
- Always unplug the instrument before opening the panel or cleaning the instrument.
- Use and store the instrument away from direct sunlight and away from areas where the instrument may become wet.
- Wipe the cuvet exterior before placing it into the well. Take care not to spill any liquid into the well.
- Reliable results depend on measurement accuracy and consistency.
- Rinse the CT-1000 bottle and valve assembly prior to and after each use
- If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.
- Only accessories and parts approved or supplied by Arjay Engineering may be used for operating, maintaining, and servicing this product.
- Use gloves and eye protection when handling hazardous liquids.

Caution: Avoid direct contact with a UV LED that is powered on. Always turn the power switch off before servicing or maintaining this instrument.

1.4 Instrument Power Up

The FluoroCheck operates on 12 VDC power. A 100-240 VDC 47-63 Hz transformer is provided with the unit. The 12 VDC jack of the power supply plugs into the receptacle on the back of the unit marked power input. Plug the AC end to a suitable grounded power outlet.

The power switch is beside the power in receptacle and is marked **(I)** for on, **(O)** for Off.

See section 3.0 for detailed Instrument Function Description.

2.0 Fluorometry Principles and Method Overview

2.1 Fluorescence Measurement

The fluorescence principle is based on the science that certain compounds, when subjected to a specific wavelength of light energy (excitation) and can re-emit this light energy at one, or more, higher wavelengths (emission). These emission wavelengths are registered as peaks.

Aromatic hydrocarbons, when subjected to a specific wavelength, will fluoresce an emission at a predictable wavelength. This is considered its signature wavelength. When the sample is in the cuvet well of the instrument, it is exposed to UV light energy (350 nm) from a high precision filtered LED light source. This light energy excites the hydrocarbon molecules in the sample, which then emit energy at peaks of approximately 460 nm. An emission filter in front of the photodetector allows only fluorescence at 460 nm +/- to register, minimizing background interference caused by other wavelengths. Through the instrument calibration and Arjay processor, the measured fluorescence provides a direct indication of the hydrocarbon concentration in the engineered units of your choice.

The ratio of aromatics to total oil is registered through a customer site calibration or Arjay factory calibration to provide a display of total oil.

Since different oil types may yield different fluorescent intensities at similar concentrations, an instrument calibration can be made specific to your application.

2.2.1 Direct Water Sample Overview

A direct water sample can be tested in the FluoroCheck. This is ideal for fast screening of aromatics in a water sample without any sample conditioning. The Factory Calibration for refined or crude oils eliminates the need for a site calibration. The results are more qualitative than quantitative but are effective for trending and comparison of multiple tests. Samples are tested in the supplied 12mm diameter disposable cuvetts.

2.2.2 CT-1000 Streaming Sample Overview

The CT-1000 provides an enhanced method to test a water sample without performing a solvent extraction. Collecting a larger sample and streaming it through the FluoroCheck provides a more representative indication of process conditions. The FluoroCheck averages hundreds of readings into the resulting value. The supplied 8mm diameter cuvetts are used for this method.

2.2.3 Solvent Extracted Sample Overview

A solvent extraction procedure using Hexane or Pentane as indicated by EPA 1664 Rev 1 and ISO 9377-2 provides high accuracy results. The hydrocarbons are extracted from the water using solvent. This clarifies and defines the sample to be tested. Background influences are left behind in the water sample. The FluoroCheck can be calibrated against your local laboratory methods for correlated results. The supplied disposable 4mm cuvetts are used for crude oil testing and the 12mm disposable cuvetts are used for refined oil testing.

2.3 Instrument Operation Overview

The cuvetts provided are disposable to avoid cross-contamination between samples. These are low wavelength, high transmission disposable borosilicate cuvetts. Use only Arjay supplied or recommended cuvetts. Inappropriately sourced cuvetts may not have the light transmission suitable for this instrument or may not resist solvents.

Although the unit is shipped with factory preset calibrations to allow out-of-the-box use, for best accuracy, the unit should be calibrated against a sample that has been tested by your local lab. This will correlate the unit to your process water conditions and to your local lab methodology.

The FluoroCheck can store up to 10 different calibrations:

- **Location 0 (DIESEL1)** is factory calibrated for solvent extraction testing of refined oils.
- **Location 1 (CRUDE1)** is factory calibrated for solvent extraction testing of crude oils.
- **Location 2 (DIESEL2)** is factory calibrated for direct water samples of refined oils.
- **Location 3 (CRUDE2)** is factory calibrated for direct water samples of crude oils.
- **Location 4 (DIESEL3)** is factory calibrated for CT-1000 water samples of refined oils.
- **Location 5 (CRUDE3)** is factory calibrated for CT-1000 water samples of crude oils.
- **Locations 6 to 9** are available for customer site or oil specific calibrations.

After a calibration is stored, you do not need to re-calibrate the instrument if powering the instrument on and off. However, a 'ZERO' should be performed daily or after power-up to compensate the instrument for normal UV LED and electronic drift.

Calibration Reference Cuvet A Reference Cuvet has been supplied with this instrument. A site specific concentration value will be assigned to the Reference Cuvet that will represent your calibration and oil type. This will allow frequent re-calibrations and checks without having to use prepared or lab tested samples. This value will be assigned after your initial instrument calibration.

Periodic re-calibrations using actual prepared or analyzed samples may be desired to maintain a good correlation against local laboratory results.

3.0 Instrument Function Tutorial

Note: This section offers a functional overview of the unit. It is recommended to have the unit and a power source available to you while you review this section.

3.1 Keypad Review

The keypad is used to select the initial setup options, to zero and calibrate the instrument, and to initiate routine testing. The following keys are available for use.

Numeric and alpha-Keys <0> to <9> Use the numeric keypad to enter a calibration standard value or to choose menu options.

The **<DISPLAY>** key exits any menu to return to the normal operating display. While entering numeric values in the menus, the **<DISPLAY>** key will reverse an entry to allow a correction.

The **<CAL>** key enters the menu to select the calibration from the stored calibration locations list or perform a new calibration.

The **<SETUP>** key accesses the user-selected functions including diagnostics, units and mode.

The **<ZERO>** key compensates the normal UV LED and electronic drift.

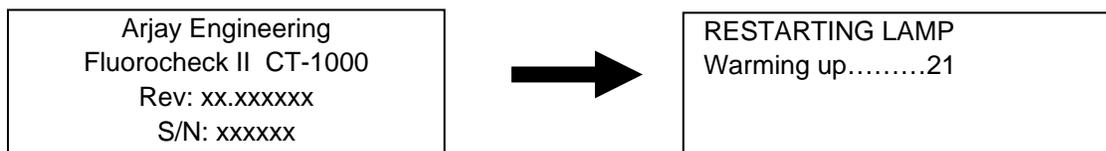
The **< . >** key represents a decimal point for numeric entries.

The **<ENTER>** key registers numeric values or advances to the next screen.

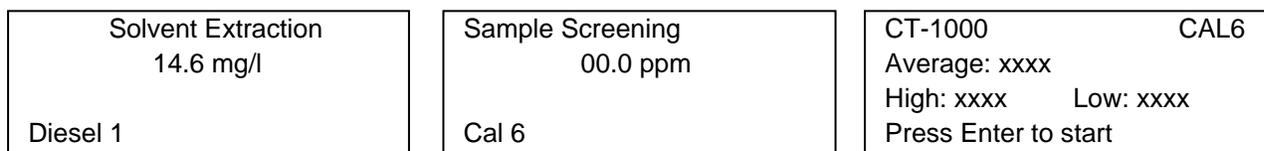
3.2 Power Up and Main Display

Plug in the power supply to an AC source. **Plug in** the DC jack into the back of the Fluorocheck II and turn the power switch to on (**I**). If already powered on, turn the switch off then on again to start this tutorial.

A screen will momentarily flash with the Hardware and Software version. A countdown will begin to allow the LED to warm up and stabilize.



When complete, the display will read the Testing Mode that has most recently been used. It will be one of these three.



Samples can be tested in 3 different modes.

1. Solvent Extraction. This is the most accurate test. It requires a Hexane or Pentane extraction of the water sample following the extraction procedures indicated by EPA 1664 Rev 1 or ISO-9377-2. The extraction procedure removes the hydrocarbons from the water into the solvent. This defines the oil to be tested, clarifies the sample for better readings, and concentrates the extracted oil into the solvent to provide a more intense response.

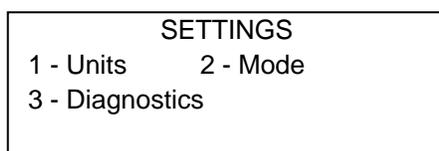
2. Sample Screening. This is for general water sample screening. A water sample can be inserted into the instrument to determine if a fluorescence response is present. No response will confirm that there are no aromatic hydrocarbons in the water. A response will indicate the likelihood of hydrocarbons. The value indicated should be used for trending and process conditions and not for precise quantitative purposes.

3. CT-1000 Streaming Sample This provides a method to stream a large sample volume through the FluoroCheck. This will typically be used in process applications where the background variables are stable. A site calibration provides good accuracy and the large volume streaming provides a more representative result.

Press <SETUP>, to continue this tutorial.

A password is requested when entering any menu where a calibration or operation parameter can be changed. The password is 2000. Key in <2000> now. If you enter a wrong number in this or any other screen, you can press the Display key to backspace the cursor. **Press <DISPLAY>** now to backspace and re-enter the password. With 2000 now keyed in, press <ENTER> to continue.

The SETTINGS screen offers a menu of user selectable operation settings and diagnostics.



Press <1> for Units. The concentration readings can be displayed in different engineered units:

SETTINGS		
1 - ppm	2-mg/l	3-FLR
Current units: mg/l		

You can select the units of measurement you prefer to display. FLR refers to Raw Fluorescence units and would be used for specialty applications where absolute values are not applicable. FLR is a millivolt reading of the sensor.

The unit does not mathematically convert from one type of unit to another after calibration. Choose your desired display mode prior to calibration. **Select <1> or <2> now to continue this tutorial.**

The SETTINGS menu will return.

Press <3> for Diagnostics

Temp. : 15 C	DIESEL2
FLR: 91.7 mV	
LED Power: 10.0 mA	
1=Change mA	E=Return

Temp.: 15 C. The FluoroCheck includes an onboard temperature compensation circuit to improve results if ambient temperatures are different from the time of calibration. The present internal temperature is displayed here.

DIESEL2 This indicates the present Calibration Storage Location that has been selected for the instrument.

FLR: 80.0 mV This is the active Fluorescence that the sensor is presently reading. There is always some offset Fluorescence, even with a clean sample. It is Zeroed out during calibration. Open the sample lid now and you will see this reading change due to the background light entering the well. Since this reading is always active, this screen is a helpful tool if you want to check and compare samples for a fluorescence response.

LED Power: 10 mA The LED setting can be adjusted to maximize it's intensity for optimal accuracy during a calibration. The LED intensity can be changed in this screen to determine an optimal fluorescence value. You will be requested to enter a mA value into a Storage Location during calibration.

With the FluoroCheck lid closed, observe the FLR reading on the screen. **Now Press <1>** to change the LED intensity to a higher or lower value by 5 or more. The settable range is 0-25 mA. **Enter your new value and press <ENTER>**. You will notice the FLR value as changed up or down accordingly.

This technique will be used during the calibration procedure to optimize your calibration.

Press <ENTER> to return to the SETTINGS menu

Press <2> for Mode This will allow you to choose the mode of sample delivery for your sample testing. This screen can be accessed at any time if you wish to change to a different test mode.

Select Mode
1 Solvent Extraction
2 Sample Screening
3 CT-1000

These are the three screens that can be used during routine testing.

Solvent Extraction 00.0 ppm Cal 6	Sample Screening 00.0 ppm Cal 6	CT-1000 Average: xxxx High: xxxx Low: xxxx Press Enter to start CAL6
---	---	---

The screen will depend on the test mode that you use. In most applications, you will routinely use the same mode. The mode you last used will appear on power up.

Press <3 for> CT-1000, the press <DISPLAY>

This is the normal operating screen when using the CT-1000 solvent-free streaming mode. After a sample has been streamed, the average of all readings will be displayed as well as the highest and lowest reading that passed through.

Press <ENTER> to continue

This screen displays the SAMPLE RUN TIME

This will determine how many seconds the unit will log readings during the streaming sample. Different bottle sizes will have different run times. The run time for the supplied 150 ml bottle is 20 seconds and this is the factory default. If required, you can change the run time while in this screen. If you are using a different bottle size, it is recommended to run a bottle of clean water to determine a suitable Run Time that will stop the logging prior to running dry. At any time during a sample run, you can press ENTER to stop the logging. If a run time is not known, you can choose a high run time and stop it manually.

Press <ENTER> to continue

Instructions will display for the sample run. You do not need to prepare a sample for this tutorial.

Press <ENTER> to continue

The sample logging will begin after a 2 second countdown. This provides time for the cuvet to fill. After completion of the Run Time, the results will automatically display and the screen will be ready to run the next test.

Press <SETUP>, enter the password 2000, press <ENTER>, press <2> for Mode, press <2> for Sample Screening, then press <Display>.

This is the normal operating screen for Sample Screening. The Solvent Extraction screen also looks the same.

The sensing circuit is constantly active and will be able to read any time a sample is inserted. Software acknowledges a sample test change and initiates the test accordingly.

The Calibration Storage Location being used is indicated in the bottom left corner. When doing tests, routinely check that you are using the correct Calibration Location for your test.

Press <ENTER> to continue this tutorial.

A routine Zero of the instrument is recommended at least once a day or when you change test modes. The Zero compensates for any offset drift that may occur as components age.

To ZERO, you will need to insert a cuvet for the Test Mode you have chosen. For the CT-1000 or the Sample Screening method, you will fill the appropriate cuvet to about 3/4 full with clean water. For the Solvent Extraction, you will fill the appropriate cuvet to about 3/4 full with the pure solvent. This not required for the tutorial.

Press <DISPLAY> and you be back to the main screen.

Press the <CALIB> key. Enter the password **2000** and press <ENTER>. The menu will allow you to choose a calibration from the stored calibration locations list or perform a new calibration.

CALIBRATION	
1 –	Select from list
2 –	Perform new cal
Current:	xxxxxx

Select from list will allow you to choose a calibration that has been stored by the factory or by the user. The factory calibrations are based on factory sourced oils. Actual oils at your site may indicate a different response. The factory calibrations should only be used for qualitative indication and not absolute quantitative readings. This procedure will be detailed during Calibration.

Perform new cal will allow you to perform a calibration using your own sample and then store it into a Calibration location. This procedure will be detailed during Calibration.

The current Calibration Location being used is shown on the bottom line.

3.3 Communication

Operations can be monitored from the RS232 port if a computer or printer is connected to the unit. This may be desirable if logging or printed records are required.

The RS232 serial port of FluoroCheck II is a DB9-pin female connector. Connect the serial port of FluoroCheck II to computer serial port. The FluoroCheck II requires these settings in the device receiving the data:

Baud rate	9600
Data bits	8
Stop bit	1
Start bit	1
Parity	Even

In the computer, under the standard windows setup, the **Hyper Terminal** program resides in the **Communications** file under **Accessories**. Click on the **Hyper Terminal** icon to open the program. Cancel "Connection Description", then open the file named Fluorocheck2 Hyper Terminal Emulator"

The following data output is sent by pressing the <0> key anytime while in a normal testing screen.

Cal Location

LED mA current

Display Value (Extraction and Screening mode) the Average Value (CT-1000 mode)

This unit does not internally log data and does not provide time or date stamping.

This completes the Operation Tutorial. The following section details how to calibrate and run a sample.

4.0 Initial Site or Oil Specific Calibration

Although the unit is shipped with factory preset calibrations to allow out-of-the-box use, for best accuracy, the unit should be calibrated against a site sample that has been tested by your local lab. This will correlate the unit to your process water conditions and to your local lab methodology

The FluoroCheck can store up to 10 different calibrations. Factory preset calibrations cannot be changed in the field.

Location 0 is factory calibrated for solvent extraction testing of refined oils. (calibrated against diesel)

Location 1 is factory calibrated for solvent extraction testing of crude oils.

Location 2 is factory calibrated for direct water samples of refined oils. (calibrated against diesel)

Location 3 is factory calibrated for direct water samples of crude oils.

Location 4 is factory calibrated for CT-1000 water samples of refined oils. (calibrated against diesel)

Location 5 is factory calibrated for CT-1000 water samples of crude oils.

Locations 6 to 9 are available for customer site or oil specific calibrations.

4.1 Solvent Extraction Technique

If calibrating or testing using the Solvent Extraction Mode, your water samples will need to be solvent extracted for the calibration and all ensuing tests.

If not using a Solvent Extraction method, proceed to Section 4.2.

The following explains the solvent extraction technique that will be used for calibration and testing in the Solvent Extraction Mode.

EPA 1664 Rev 1 uses Hexane and ISO 9377-2 uses Pentane in their solvent extraction procedures.

Since this is a correlation instrument, either solvent or alternative non-fluorescing solvents can be used. Be consistent: Choose a solvent for your calibration and use the same solvent for all testing.

ISO and EPA methodologies recommend lowering the water pH to < 2.0 for sample preservation and improved release of solubles. If this is desirable, add 10 ml of HCL acid to your water sample and shake well prior to adding the solvent.

Since this is a correlation instrument, the use of HCL is your option. Be consistent: If you add HCL to your calibration sample, you should add HCL to all sample testing.

The following is the standard procedure for solvent extracting oil from water.

1. For the calibration procedure fill two jars; one for the calibration and one to send to your lab.

Fill the sample jar or a glass graduated cylinder to 100 ml of the water to be tested (or 90 ml water + 10 ml HCL). This will be for your calibration. Fill a second jar full (no air), use HCL if required, tighten the lid and send to your lab. Some labs will provide water sample kits to use.

2. Add 10 ml of solvent to your calibration jar using the Solvent dispenser. Do not add solvent to the jar tagged for the lab.

3. Close the lid on the jar and shake the sample for 2 minutes.

4. Rest the jar on a table to settle for 2 minutes. The solvent will separate and rise to the surface with the extracted oils.

5. Tap the jar lightly on the table to release any trapped bubbles or emulsions.

6. Insert a disposable pipet so the tip is halfway into the solvent layer and extract some solvent into the pipet bulb.
7. Fill the appropriate cuvet to about 3/4 full.
8. Wipe the cuvet with clean tissue prior to testing.

4.2 LED Intensity Set-up

The Fluorocheck II uses a UV LED that is driven by current. The more current, the more intense the LED. Different oil types yield different fluorescence energy. Refined and light oils yield lower fluorescence energy and need more UV light. Crude and heavy oils have higher fluorescence energy and need less UV light. The current for the UV LED can be set from 0-25 mA.

The Calibration Locations of 6-9 can each have their own LED intensity assigned.

The Factory default intensity is set at 10 mA but to enhance a site specific calibration, it is recommended to maximize the LED intensity for your sample. To determine the best intensity, obtain a sample of contaminated water with an approximate known concentration. Ideally, source a sample with a concentration that is at the high range of your expected routine tests.

If you are calibrating for a solvent extraction Mode, you will need to perform a solvent extraction of the water sample for this LED intensity test. Refer to 4.1 above for the solvent extraction procedure.

Press < SETUP>, then Press <3> for Diagnostics

The current LED Power is displayed. Choose the cuvet for the Mode you are calibrating to.

Solvent Extraction of Refined Oils: 12mm cuvette

Solvent Extraction of Crude Oils: 4 mm cuvet (use cuvet holder)

Direct Water of Refined Oils: 12 mm cuvet

Direct Water of Crude Oils: 12 mm cuvet

CT-1000 Streaming of Refined Oils: 8mm (use CT-1000 to hold cuvet)

CT-1000 Streaming of Crude Oils: 8mm (use CT-1000 to hold cuvet)

With your water or extracted sample in the appropriate cuvet, insert it into the FluoroCheck. Close the lid or ensure the CT-1000 is snug in place. The fluorescence (FLR) response will be indicated in mV.

The maximum mV response of this instrument is 2,000 mV. If your sample is at the high range of expected routine values, change the LED mA to achieve a mV of about 1500. If your sample concentration is about 50% of your expected range of readings, change the LED mA to achieve a mV reading of about 1,000.

When the best intensity is determined, record this mA value to be used during the calibration procedure.

4.3 Site Calibration

When a site specific calibration is performed, one sample of clean water plus up to four samples of different concentrations can be used to make the internal calibration curve.

The first sample must be oil-free (0) water, preferably the process water.

Although the unit can be calibrated using only one other sample of process contaminated water, additional samples will improve the calibration accuracy. For calibrating, choose sample concentrations that will be typical of routine samples.

For example, if typical samples range from 0 to 50 mg/l or ppm, a calibration value of 40 would be appropriate. If sample concentrations of 10 mg/l or ppm are more common, calibration samples around 10 or 15 would be more appropriate.

If the sample concentrations are unknown during calibration, reserve an identical sample for analysis by your local lab. A temporary value can be used during calibration and corrected later.

Using a process contaminated water sample for calibration will provide the most reliable calibration rather than a manually prepared sample. Preparing a sample with water and oil may not be indicative of actual process conditions of oil type, oil dispersion, and background contaminants. Prepared samples may be unstable and retention of oil injected into the water can be difficult. If preparing your own standard, use glass containers only (plastic containers draw oil out of the water). Use a carrying agent, such as acetone, to help disperse the oil into the water prior to the extraction. A method of preparing samples is available in Appendix 1.

4.4 Calibrating the Instrument

Press <SETUP>, enter password 2000 <ENTER>. Press 1 for Units. Select ppm or mg/l for the display and calibration units.

Press 2 for Mode. Select the Test Mode that you are calibrating for.

Press the <CAL> key.

```
CALIBRATION
1 - Select from list
2 - Perform new cal
Current:  xxxxxxx
```

Press <2> to perform new calibration,

```
NEW CALIBRATION
For: Cal 6
Press 6-9 then enter
```

Select a Calibration Location from # 6 to # 9 to store your calibration, **then press <ENTER>**. Locations 0-5 are reserved for Factory Calibrations and cannot be changed. The screen will display the following:

```
Current LED:  xx.x mA
Change LED Power ?
No= Press <ENTER> key
Yes= Any other key
```

If you are accepting the mA intensity value as displayed, Press <ENTER>. If you have determined a new LED Intensity value for your sample from 4.2 above, press any other key to proceed, key in the new value and press <ENTER>

```
NEW CALIBRATION
For: Cal 6
1-Auto      2-Manual
Current LED:  xx.x mA
```

1 – Auto will calibrate the unit based on the user presently having contaminated water samples ready (the concentration value may be known or unknown).

2 – Manual will allow you to later view and change the concentration and mV values that were entered during the Auto calibration mode. This is used to correct any temporary values that were entered while waiting for laboratory results of true values.

3 – LED power: This indicates the LED intensity you have chosen.

Press <1> for Auto.

AUTO CAL: Cal 6 Enter= Continue - Pt 1 0 = Calibration done 1st pt: Must be 0 ppm
--

1. The first calibration point must be oil-free water or a solvent sample. Press **<Enter>** to proceed.

Fill the appropriate cuvet for your chosen mode (as you did in 4.2) to about 3/4 full with clean water or the pure solvent of choice and insert into the FluoroCheck. **Cal point 1 : 0** will be displayed along the the raw fluorescence. Wait a few seconds for this reading to stabilize and then Press **<ENTER>**.

2. The display will now prompt to enter Cal point 2. Press **<Enter>** to continue with Point 2 calibration.

If doing a Solvent Extraction Calibration, the water sample must be extracted with solvent first.

Enter the known oil concentration of your contaminated water sample to be calibrated (ie. 15.0). **Do Not Press <Enter> yet.** If the value is not known, enter a suspected temporary value. This can be corrected after a lab test of your sample.

Fill the appropriate cuvet to about 3/4 full with the sample and insert into the FluoroCheck. The raw fluorescence (FLR value) is displayed. Wait a few seconds for this reading to stabilize and then Press **<ENTER>**.

If the value was unknown, label saved lab jar of this water sample as Point #2. Send it to the lab for analysis. Do not send the sample with solvent in it. If using HCL acid, send a sample with HCL added.

The display will now prompt to enter Cal point 3. If another sample is available to increase the points on the calibration curve, press **<ENTER>** to continue and repeat the above procedures for each sample.

If no more sample points are to be entered press **<0>** for Calibration Done.

Press the <DISPLAY> key to exit the Calibration Menu.

1) If the sample values were known during calibration, **Go to 4.5. to complete the calibration.**

2) If the samples were unknown and have been sent to a lab, **Stage 1 Calibration is complete.**

You can use the unit with the temporary values while waiting for the test results.

When the results are received from the lab, the temporary values need to be corrected.

Press the **<CAL>** key, enter the password then press **<ENTER>**

Press **<2>** for Perform new Cal. Confirm the Calibration Location is the same as originally selected, then press **<ENTER>**. **Press <ENTER> to proceed without LED changes.**

Press <2> for Manual

The values from your original calibration have been held in memory and will be displayed.

Press **<ENTER>** to view the First Point 0 ppm.

Press <ENTER> to accept the First Point FLR reading.

Press <ENTER> to view the 2nd ppm value entered. Key in the correct ppm or mg/l value received from the laboratory.

Press <ENTER>.

Press <ENTER> to accept the Second Point FLR reading.

Follow this procedure for any further calibration points entered or press <0> for Calibration done.

Press the <DISPLAY> key to exit the Calibration Menu. Go to Section 4.5. to complete the calibration.

4.5 Setting the Reference Cuvet

You can now assign a value to your Reference Cuvet.

A Reference Cuvet will allow frequent re-calibrations and checks without having to use prepared samples. Insert the supplied Reference Cuvet into the testing well. Always match the dots on the cuvet holder and testing well. Close the lid. If in the Solvent Extraction or sample Screening Mode, a reading is displayed. If in the CT-1000 mode, run the routine sample procedure with the Reference Cuvet in place.

Record the displayed or average reading for future calibrations. This value is specific to your calibration. It is not indicative of other hydrocarbon types or sites.

Periodic re-calibrations using actual prepared or analyzed samples may be desired to maintain a good correlation against local laboratory results.

5.0 Testing a Sample

5.1 Choose your Test Mode and Calibration Location

Press the <DISPLAY> key if not in one of these main displays

Solvent Extraction 00.0 ppm Cal 6

Sample Screening 00.0 ppm Cal 6

CT-1000	CAL 6
Average: xxxx	
High: xxxx	Low: xxxx
Press Enter to start	

1. Confirm your Test Mode is displayed: Solvent Extraction, Sample Screening, or CT-1000.

If not, enter SETUP > Mode > select your mode.

2. Confirm your desired Calibration Location has been chosen. ie Cal6.

If not, enter <CAL> > Select from List > select a new Calibration Location. Press <ENTER>.

5.2 Important Measurement Notes

1. The Solvent extraction procedure consistent measurements of water and solvent are key.
2. Consistent shaking for the prescribed time is important to the extraction process.
3. Zero the unit with an oil free solvent or water daily.

4. Always orientate the cuvet holder with the dots matching for the extracted crude mode.
5. Clean the cuvetts with a low-lint tissue prior to inserting.
6. For the Sample Screening or Solvent Extraction test, repeat the test of each sample to verify that the results are reproducible

5.3 Solvent Extraction Test

Confirm your test mode and Cal Location are correct.

1. Fill the sample jar or a glass graduated cylinder to 100 ml of the water to be tested (or 90 ml water + 10 ml HCL).
2. Add 10 ml of solvent using the Solvent dispenser.
3. Close the lid on the jar and shake for 2 minutes.
4. Rest the jar on a table to settle for 5 minutes. The solvent will separate and rise to the surface with the extracted oils.
5. Tap the jar lightly on the table to release any trapped bubbles or emulsions.
6. Insert a disposable pipet so the tip is halfway into the solvent layer and extract some solvent into the pipet bulb.
7. Choose the appropriate cuvet; small 4mm round cuvet for crude, 12 mm square cuvet for refined. Fill the cuvet to about 3/4 full. Always wipe the cuvet with a clean tissue prior to placement into FluoroCheck to remove any contaminants from handling.
8. Use the cuvet holder for the 4mm cuvet. Insert the cuvet or holder into the FluoroCheck and check that the cuvet holder dots are matched. Close the lid. .
9. The reading will be display automatically.
10. Dispose of the cuvet, solvent and water sample according to local regulations

5.4 Sample Screen Test

Confirm your test mode and Cal Location are correct.

1. Take a sample of water in a 12mm square cuvet. Fill to about 3/4 full. Always wipe the cuvet with a clean tissue prior to placement into FluoroCheck to remove any contaminants from handling.
2. Insert into the FluoroCheck and close the lid.
3. The reading will be displayed automatically.
4. Dispose of the cuvet and water sample according to local regulations

5.5 CT-1000 Streaming Sample Test

Confirm your test mode and Cal Location are correct.

1. Take a water sample using the 150 ml sample jar. Fill to about 140 ml.
2. Press **<ENTER>**. Key in a run time of 20 seconds or your custom run time. **Press <ENTER>**
3. Screw the CT-1000 accessory onto the bottle. Make sure the valves are closed. The valve near the bottle allows air into the bottle. The valve near the cuvet drains the sample.

4. Insert a fresh cuvet firmly into the CT-1000. You will notice a light 'click' when it inserts. Always wipe the cuvet with a clean tissue prior to placement into FluoroCheck to remove any contaminants from handling.
5. Shake the sample if it has been resting.
6. Invert the assembly and place it into FluoroCheck support plate. This accessory must be installed on the FluoroCheck for these tests. Be sure a collection container is in place for the sample to drain.
7. Open both valves and then **press <ENTER>**. The readings will automatically calculate. If the bottle is almost empty before the time runs down, press **<ENTER>** to force the calculation.
8. After the sample run is complete, the high, low, and averaged readings will be displayed.
9. Rinse the sample bottle and valve prior to and after each use.
10. Dispose of the sample water according to local regulations.

6.0 TROUBLESHOOTING

Always be sure to:

- Operate the unit in a location isolated from equipment that radiates high-frequency electromagnetic interference.
- Operate the unit away from direct sunlight.
- Take care of the instrument. Do spill any liquid into the testing well.

6.1 Symptoms

Fluorescence values drift

- Sample solutions must be at a stable and ambient temperature for consistent readings. (Fluorescence decreases as temperature increases).
- Protect test samples and the Calibration Standard from light to prevent photobleaching.
- Take readings immediately after sample preparation. Oil will deteriorate over time.
- If air bubbles are present, the reading will first drift upward as the light is scattered by the bubbles until they move out of the beam range or dissipate.
- If particulates are present, the reading may suddenly rise as a particulate drifts in the light path, then drop as it moves out of the beam range.

Wide fluctuations in fluorescence or ppm values

- Wipe the outside of the cuvet before placing it into the sample chamber.
- Use consistent measurement techniques, timing of the solvent mix, and a consistent point in the solvent layer that you extract from the sample bottle.

Readings negative or lower than expected

- Use a freshly prepared sample at ambient temperatures to set the zero and for all subsequent measurements.

Readings are higher than expected

- Fluorescent enhancement may result from high levels of detergents or background contaminants.

6.2 Maintenance, Error and Other Messages

Warming up Please Wait

- The unit has been turned on.

Zero not Done

- The Instrument requires the 'Zero',

Identical ppm

- During calibration, two identical ppm values were attempted to be entered for different sample concentrations, or different ppm values were attempted to be entered for the same sample concentration

Overrng: Lower LED mA

- The mV reading is too high, you need to lower LED current and recalibrate the instrument.

7.0 CUSTOMER SERVICE INFORMATION

Arjay Engineering offers complete technical support for all our products. If you have any questions about how to use this product, or would like to make an arrange to repair it, please call, fax, or e-mail Arjay or your local Arjay representative.

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Appendix A: Sample Preparation Method

Samples may be prepared in a number of ways.

1. An unknown concentration may be used to provide a response test. This does not verify the accuracy or calibration of the instrument but does confirm that it will respond and alarm to a high concentration condition.
2. An unknown sample with a concentration of contaminant can be sent to a lab for analysis.
3. A concentration blend may be made using the stream fluid and a known concentration of contaminant.

If a sample concentration is to be made, the oil contaminant must be made to emulsify in the stream fluid. This can be difficult, as the concentrate often will not break down enough to provide an even distribution in the low PPM range.

For example, a sample of 50 PPM (parts per million) is equal to 1 oz in 20,000 oz. (125 gallons). To use an amount of water for the base that is manageable such as one gallon, a syringe is required to inject a small enough amount of the concentrate to make 50 PPM. This droplet of oil will tend to separate (float) to the surface.

A typical approach to making a concentration is as follows:

Acquire 10 liters of 0 PPM process water in a glass jar (plastic containers will draw the hydrocarbons out of the prepared sample).

Separately, thoroughly mix 1 ml of the sample oil (type of oil to be found in stream) with 1 ml of acetone. The oil will readily mix with the acetone and the acetone will act as an agent to distribute the oil throughout the water.

Thoroughly mix the oil/acetone sample with the 10 liters of 0 PPM process water. This will make a 100 ppm sample.

This sample can be used directly in the instrument for the Screening or CT-1000 Calibration. If doing a Solvent Extraction calibration, this sample will require the solvent extraction procedure prior to calibration.

Important. This is not a precise method. Standing time, the volatility of the oil, operator measurements and equipment will all contribute to errors in the blend. This should be used quickly and only when actual process conditions cannot be used for calibration.

