



BF ENTRON LTD.

Monitoring equipment

Weld Analyser

WA2

MONITORING EQUIPMENT

Weld Analyser WA2

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Issue	Date	Comment
1	02-11-06	Initial release
2	09-01-07	Charger description
3	14-01-13	WA Terminal features
4	11-11-13	USB features. Integrator output.
5	23-04-14	DC duration amendments
6	13-05-14	WA Terminal time/date feature
7	17-08-15	Current sensors
8	09-10-17	Current sensor
9	29-11-17	Logo changed

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Introduction

An overview of the WA2

The Weld Analyser WA2 is an RISC based instrument designed for the comprehensive real-time analysis of resistance welds. It is a compact hand-held battery operated unit that is an ideal tool for welding, maintenance and quality control personnel.

The WA2 is capable of measuring AC and MF DC welding current, the number of pulses in the weld and the duration of each weld. The information is displayed on a backlit FSTN LC display and may be stored in non-volatile EEPROM. The WA2 may also be connected to a computer to extend its storage capabilities.

Every WA2 is supplied with a traceable calibration certificate.

Key features

- Portable, hand-held compact unit
- 128 x 64 LC display with yellow/green backlight and antiglare coating
- Tactile keypad
- Powered by three rechargeable AA batteries
- Automatic power-down after 10 minutes of inactivity
- Menu driven commands
- USB port (data exchange only)
- Measures RMS AC and DC welding current
- Selectable ranges of 60, 120, 180, 240 and 300 kA
- High and low current indicators
- Measures welding time in $\frac{1}{2}$ cycles up to 9999 cycles (AC) or 10 ms intervals up to 199.9 seconds (DC)
- Captures up to 300 $\frac{1}{2}$ cycles (AC) or 3 seconds (DC)
- Measures conduction angle for each $\frac{1}{2}$ cycle (AC)
- Over- and under-range indicators
- Weld indicator
- Multi-pulse weld indicator

Specifications

dimensions	85w x 30d x 170h mm
weight	500 g including batteries
operating temperature	0° to 45° C ambient
power source	three rechargeable NiMH AA batteries
battery life	6 hours minimum, 2000mAh @ 25° C
display	128 x 64 pixels FSTN transflective
keypad	embossed disc tactile switches
weld current	2 to 300 kA, accuracy ± 2 % of full scale
weld time	0.5 to 9999 cycles (AC) or 0.01 to 199.9 seconds (DC)
capture time	300 ½ cycles (AC) or 3 seconds (DC) with programmable end-of-capture
conduction angle	0° to 180° ± 4° (AC)
pulse count	1 to 99

Installation

Connecting the WA2

The rechargeable batteries supplied with the WA2 may be in a discharged state. It is recommended that the batteries are fully recharged before using the WA2.

Caution: use only NiMH batteries rated at 1.2 V. Alkaline batteries rated at 1.5 V must not be used.

Charging the batteries

Warning: do not connect or disconnect the charger while it is switched on.

Note: the USB connection cannot be used to recharge the batteries.

Use only the supplied charger. Other chargers must not be used.

- Ensure that the correct mains adaptor is fitted for your territory. Consult the documentation supplied with the charger.
- Ensure that the 2.5 mm jack plug adaptor is fitted and connected correctly – positive + terminal to positive + terminal.
- Switch off the WA2.
- **Ensure the charger is switched off.** Connect it to the WA2 and switch the charger on. The red Power LED indicates that the charger is ready for use.

INSTALLATION

- If the WA2 batteries are new or have only been used a few times, use the charger's discharge mode before charging. Consult the charger's documentation.
- If the batteries are older or have been conditioned by the charger's discharge cycle, the charger will fast charge the batteries and then revert to a trickle charge; this may take several hours depending on the condition of the batteries.
- The green Ready indicates that the batteries are fully charged. The indicator will flash after two minutes and the charger will revert to trickle charge. At this stage, charging is complete.
- **Switch off the charger** and disconnect it from the WA2. The WA2 is now ready to use.

Current sensors

The WA2 is supplied with a 6" (150 mm) diameter tube-profile current sensor:



Flat-profile current sensors are also available:

3" (75 mm) diameter W296557



6" (150 mm) diameter W296558

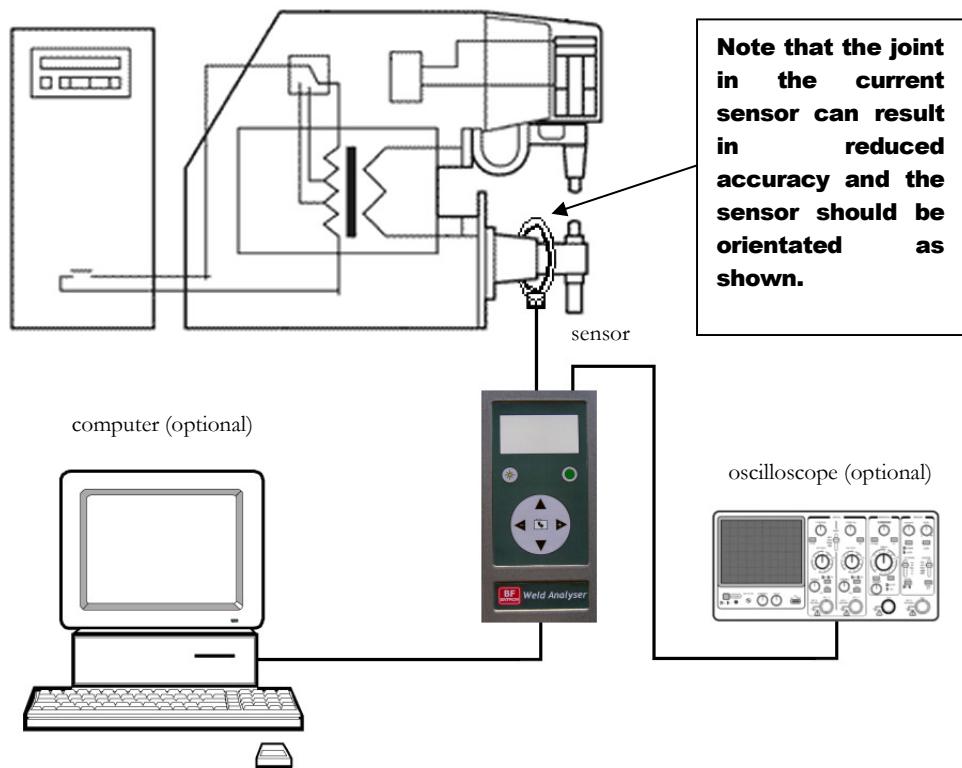


12" (300 mm) diameter W296559



INSTALLATION

Connect the WA2 as shown below:

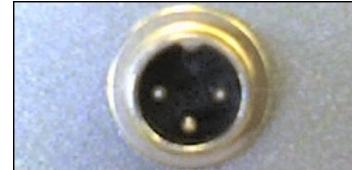


INSTALLATION

Connectors

Current sensor

Connect the calibrated current sensor to the WA2.



USB port

Connect to a computer USB 2.0 port using a USB A to USB mini B cable if required.



The USB device is provided by Future Technology Devices International Ltd. and Windows drivers are included on the WA2 companion CD. Updated drivers and drivers for Mac OS and Linux can be found on the FTDI website: <http://www.ftdichip.com/Drivers/VCP.htm>. Check for updated drivers and install the driver for your system by following the appropriate installation guide: <http://www.ftdichip.com/Support/Documents/InstallGuides.htm>

Integrator output

Connect an oscilloscope or other recording instrument if required.

The signal corresponds to the integrated output from the current sensor, maximum amplitude +/- 15 V.



Caution: the integrator output should only be connected to high impedance recording instruments.

Controls

Operating the WA2

The WA2 is controlled via a tactile keypad in conjunction with a graphical LC display.

Keypad

The function of the keys is described below:

Key	Function			
	Data display	Detail display	Setup display	File display
	power on/off			
	backlight on/off			
	previous/next pulse	scroll up/down	previous/next parameter	
	n/a	goto start/end when used with scroll keys	decrease/increase value	
	go to next display/confirm			

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Display

The keypad allows navigation through the features of the WA2 via a number of different displays as described below:

Data display

This is the default display and shows a summary of the most recent weld. The diagram shows an example for an AC weld:



For DC welds, the weld time is shown in ms and cycles. The conduction angle is not applicable to DC welds.

Note: DC weld currents less than 4.0kA may lead to inaccuracies in the measured weld time.

The **▲** and **▼** keys may be used to select the previous or next pulse in the weld (if applicable). The pulse count is incremented if there is an interruption in the current of 1 cycle (AC) or 10 ms (DC); an interruption in the current of more than 200 ms is interpreted as the end-of-weld.

Detail display

The Detail Display is accessible by pressing **[F1]** from the Data Display. The Detail Display shows the detailed results of the most recent weld. The diagram below shows an example for an AC weld:

Data/Detail/Setup/File			
cycle number (in pulse)	current for every ½ cycle + indicates highest ½ cycle - indicates lowest ½ cycle	conduction angle for each ½ cycle	
1	1 + 9.79 - 101		
1	1 - 9.99 97		
1	2 + 10.09 + 102		
1	2 - 9.97 102		
1	3 + 9.93 102		

For DC welds, the ½ cycles are replaced with the cumulative weld time in ms. The conduction angle is not applicable to DC welds. The **▲** and **▼** keys may be used to

CONTROLS

scroll through the readings. Press **▲** and **◀** to go to the start of the list; press **▼** and **▶** to go to the end of the list.

Setup display

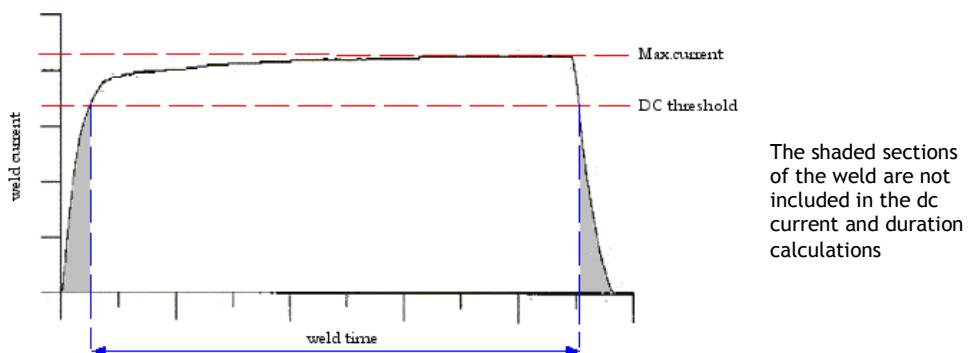
The Setup Display is accessible by pressing **[F1]** from the Detail Display. The Setup Display allows the WA2 to be configured for specific applications. The diagram below shows the typical settings for a 50 Hz AC application.



The **Mode** parameter determines the type of welding current to be measured, AC or DC.

The **Frequency** parameter relates to the mains supply frequency. If **DC mode** is selected, the **Frequency** parameter is used to calculate the equivalent weld time in cycles for the Data Display.

The **DC threshold** determines the % of the maximum weld current that is included in the current and duration calculations; it is not applicable in **AC mode**.



The **Print** parameter determines the output from the USB port at the end of each weld. If printing is **off**, there is no output; if printing is set to **all**, the WA2 outputs the results of every $\frac{1}{2}$ cycle (AC) or 10 ms (DC) reading; if printing is set to **summary**, the WA2 outputs the average current and duration for the weld.

The **Blanking** parameter is used to mask transient conditions at the start of the weld.

C O N T R O L S

The **Range** parameter is used to determine the maximum current that can be measured. This parameter should match the setting on the optional attenuator module or set to 60 kA if no attenuator module is used.

The **Auto shutdown** parameter (not shown) is used to enable or disable the automatic shutdown feature. If this parameter is set to **on**, the WA2 will shutdown after 10 minutes of inactivity to conserve battery power. If this parameter is set to **off**, the WA2 will not automatically shutdown.

The **Stop** parameter (not shown) can be used to capture a specific section of a long weld. The WA2 will capture 300 cycles (AC) or 3 seconds (DC) of welding prior to the **Stop** parameter.

If **DC mode** is selected, the **Blanking** and **Stop** parameters are programmed in ms.

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File display

The File Display is accessible by pressing  from the Setup Display. The File Display allows welds to be stored and retrieved for analysis at a later date.



The display shows the memory that is available for storing welds; the value will change according to the quantity and duration of welds that are stored.

The **Action** parameter determines if the weld will be **saved**, **loaded** from memory, **erased** from memory or **printed**.

The **ID** is a numeric identifier that is used to access the stored weld.

Select an action and an ID (if applicable), then press  to confirm the action. The WA2 will perform the action and then revert to the Data Display.

Measuring welds

Using the WA2

When the WA2 is charged and installed as described in Section 2, it is ready to measure the parameters of every weld.

- Connect the WA2 sensor to the welding machine and ensure the sensor is connected securely to the WA2.
- Switch on the WA2 by pressing the  button; wait for the Data Display to appear.
- Use the  button to access the Setup Display and check that the values correspond to the application. Select the Print format if required.
- Use the  button to return to the Data Display.
- Use the welding machine to produce a weld and check that the WA2 has read the welding current, duration and (if appropriate) the conduction angle and pulses. The Data Display shows a summary of the weld.
- Use the  button to view the results in greater detail using the Detail Display. Use the  and  to scroll through the list.
- Use the  button to access the File Display and save the results if required. The results can be retrieved, printed or erased at a later date if required.

Capturing data with WA terminal

An overview of WA Terminal

The WA Terminal utility is a Microsoft Windows compatible program that allows you to capture the data from your WA2 in applications where long-term data logging is required.

WA Terminal connects to your WA2 via your computer's USB port. As your WA2 records each weld the information is transmitted to WA Terminal where the information can be inspected, saved or printed. The program has minimal setup requirements and virtually unlimited storage capacity.

Key features

- Microsoft Windows compatible
- Minimal installation
- Minimal set-up requirements
- Minimal performance overhead
- Virtually unlimited storage capacity
- Data is recorded in real time
- Data can be saved automatically

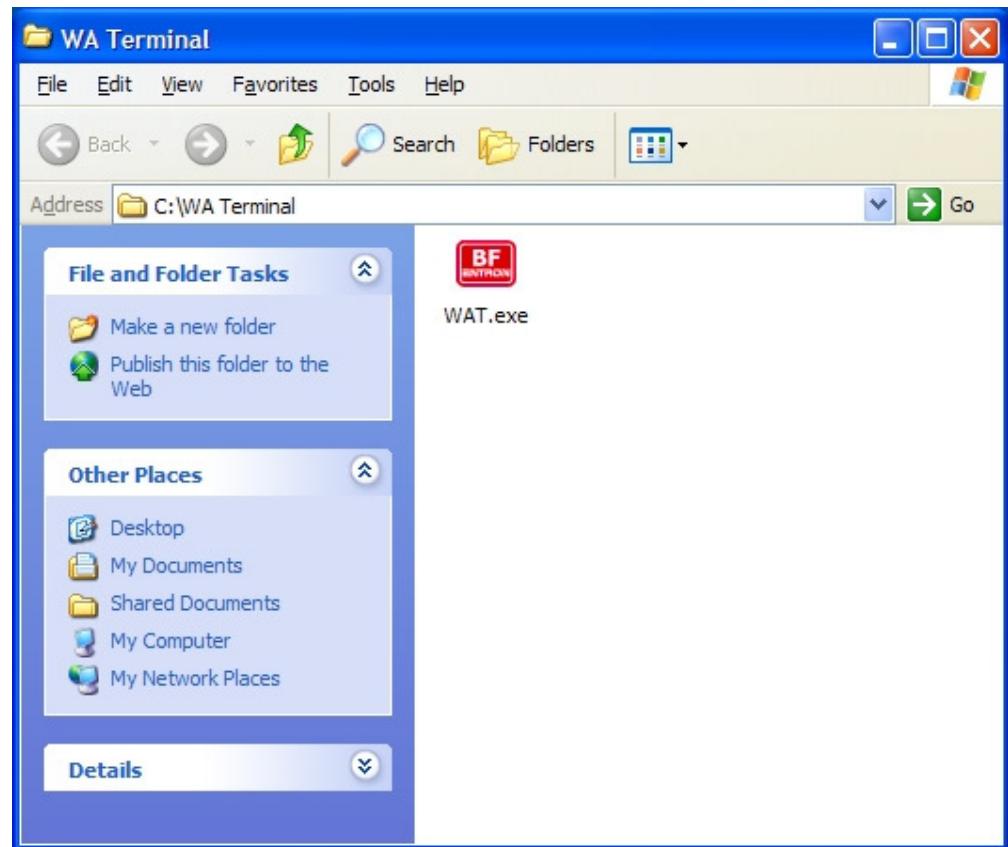
Specifications

compatibility	Microsoft Windows: 8/7/Vista/XP Server 2008
minimum requirements	Pentium 233-megahertz (MHz) processor or faster (300 MHz is recommended) At least 64 megabytes (MB) of RAM (128 MB is recommended) At least 1.5 gigabytes (GB) of available space on the hard disk Keyboard and a compatible pointing device Video adapter and monitor with Super VGA (800 x 600) or higher resolution USB 2.0 port USB A to USB mini B cable
user interface	conforms to user's display and scheme settings resizeable main window with persistent settings horizontally and vertically scrollable data display Start/Stop recording function Start/Stop recording indicator Save data function Auto-save data function
communication ports	COM1 to COM8

CAPTURING DATA WITH WA TERMINAL

Installing WA terminal

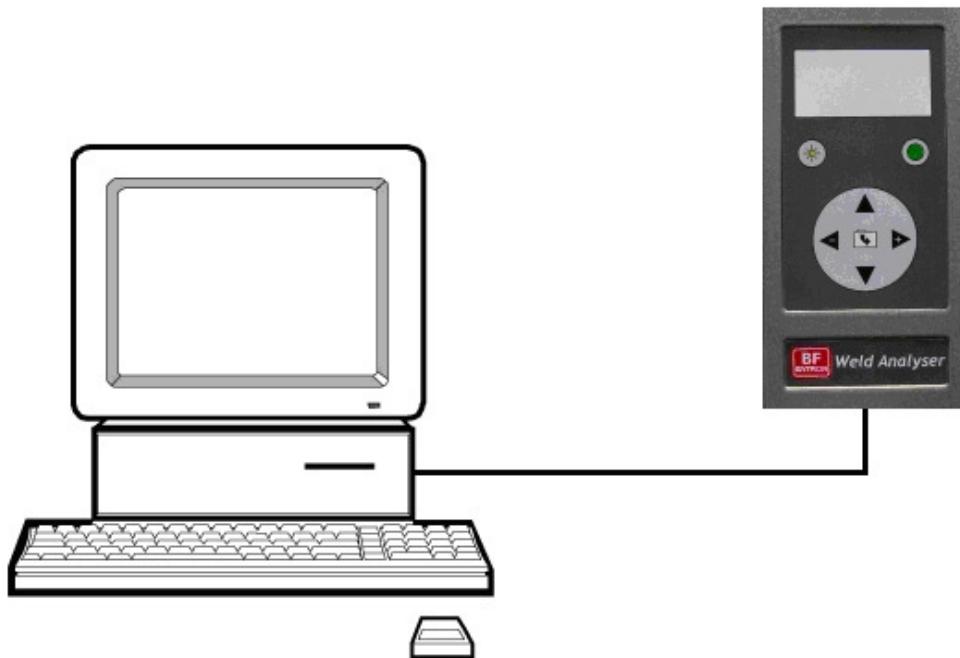
WA Terminal is a self-contained program and requires no installation. The program is supplied as a single executable file named WAT.EXE and is included on the WA2 companion CD. Copy the WAT.exe file to a location on your computer and run the program from there.



CAPTURING DATA WITH WA TERMINAL

Connecting your WA2

Connect your WA2 as shown below:



USB port

Connect to a computer USB 2.0 port using a USB A to USB mini B cable.



The USB device is provided by Future Technology Devices International Ltd. and Windows drivers are included on the WA2 companion CD. Updated drivers and drivers for Mac OS and Linux can be found on the FTDI website: <http://www.ftdichip.com/Drivers/VCP.htm>. Check for updated drivers and install the driver for your system by following the appropriate installation guide: <http://www.ftdichip.com/Support/Documents/InstallGuides.htm>

The USB driver will allocate a COM port number to be used for the connection. The COM port number can be determined via Windows Device Manager as follows:

Windows 8

- type: **device manager**, select Device Manager and then press enter

Windows 7/Vista

- Select the Start Orb.
- In the Start Search box type: **device manager** and then press enter.

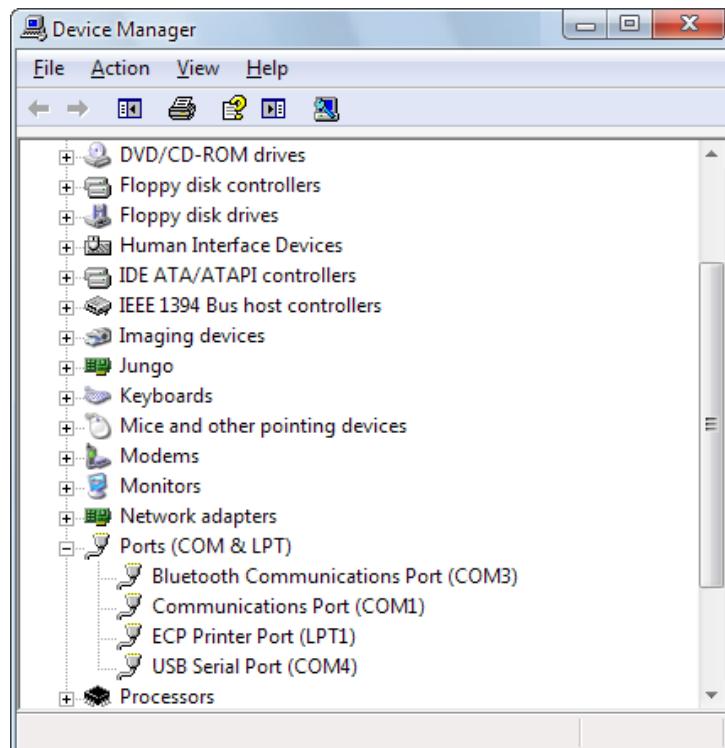
Windows Server

- Open the Administrative Tools in Control Panel.
- Within the Administrative Tools select Computer Management.

Windows XP/2000

- Right-click on My Computer and select Properties or open the Control Panel and select the System applet.
- In the System Properties window select the Hardware tab.
- In the Hardware tab select the Device Manager button.

A typical example is shown below:



CAPTURING DATA WITH WA TERMINAL

Expand the Ports node and determine which COM port has been allocated to the USB port (in this example the connection has been allocated to COM4). You will need to select this COM port when you use WA Terminal.

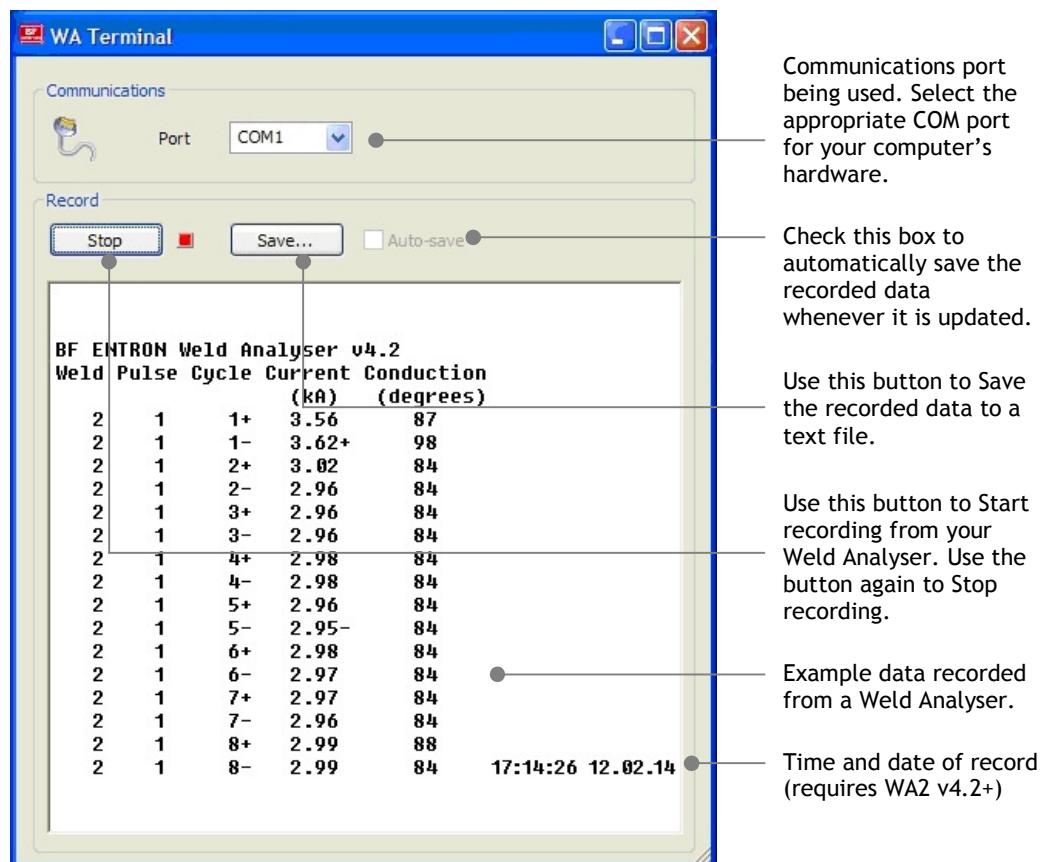
CAPTURING DATA WITH WA TERMINAL

Using WA Terminal

Note: The WA2's Print parameter determines the data that is transmitted to WA Terminal at the end of each weld. If printing is off, no data is transmitted; if printing is set to All, the WA2 transmits the results of every ½ cycle (AC) or 10 ms (DC) reading; if printing is set to Summary, the WA2 transmits the average current and duration for the weld.

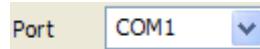
The Print parameter can be accessed via the Setup screen on your Weld Analyser.

The user interface is described below:



CAPTURING DATA WITH WA TERMINAL

Communications Port



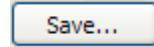
Your WA2 should be connected to your computer via a USB port. Use this function to select the appropriate COM port that will be used for communications. WA Terminal will reprogram the port with the appropriate settings.

Record Start/Stop

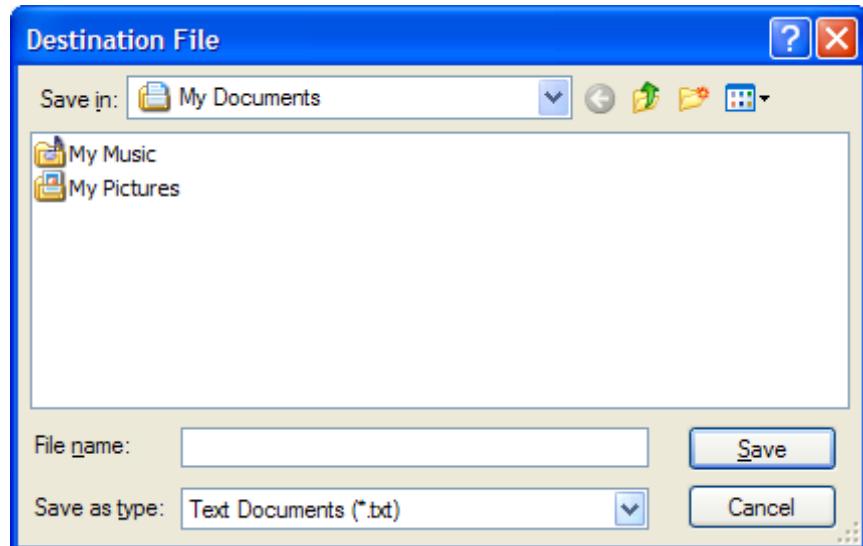


Use this button to start recording from your WA2. The indicator will activate and WA Terminal will start capturing data via the COM port. Use the button again to Stop recording data.

Save



Use this button to save the recorded data to a disk file. A File Save dialog is displayed:



Choose a location and a filename and the recorded data will be saved as a plain text file.

CAPTURING DATA WITH WA TERMINAL

Auto-save



Use this function to automatically save the recorded data each time it is updated. The data is saved to the file selected via the Save button. If no file has been selected, the Auto-save function is disabled.

Data display

```
BF ENTRON Weld Analyser v4.2
Weld Pulse Cycle Current Conduction
                           (kA)   (degrees)
 2   1     1+   3.56    87
 2   1     1-   3.62+   98
 2   1     2+   3.02    84
 2   1     2-   2.96    84
 2   1     3+   2.96    84
 2   1     3-   2.96    84
 2   1     4+   2.98    84
 2   1     4-   2.98    84
 2   1     5+   2.96    84
 2   1     5-   2.95-   84
 2   1     6+   2.98    84
 2   1     6-   2.97    84
 2   1     7+   2.97    84
 2   1     7-   2.96    84
 2   1     8+   2.99    88
 2   1     8-   2.99    84      17:14:26 12.02.14
```

The data display shows the data that has been recorded from your WA2. The exact format depends on the configuration of your WA2. The time and date feature requires WA2 v4.2+

Closing WA Terminal

The program can be closed at any time using any of the standard Windows actions. Recorded data that has not been saved will be discarded.

Removing WA Terminal

The program can be removed from your computer by deleting the WAT.exe file. There are no other files.

Data persistence

Warning: editing the Registry incorrectly can cause serious system-wide problems that may require you to re-install Windows to correct them. Changes made to the Windows registry happen immediately, and no backup is automatically made. Do not edit the Windows registry unless you are confident about doing so.

The size and position of WA Terminal's main window, together with the last used COM port is stored in the System Registry. The registry key is HKEY_CURRENT_USER\Software\BF ENTRON WA Terminal