Bandweaver

OPERATION, INSTALLATION AND MAINTENANCE MANUAL

FIBER OPTIC INTRUSION DETECTION

Bandweaver Product Family: **ZoneSentry**

FOI-ZS-01-MAN-001

Revision Rev 2.1, June 2022

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Revision History

Rev	Date	Reason for issue	Author	Reviewer	Reviewer
DRAFT	19-May-2021	First issue - DRAFT		R. Da Costa	E. Fernandes
01	23-Nov-2021	Major rewrite	E. Fernandes		
02	12-Apr-2022	Add: 8ch, quick start, relay detail, specification corrections	E. Fernandes		
2.1	23-Jun-2022	Optical coupler details added	E. Fernandes		

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1 Overview

The ZoneSentry is Bandweaver's low cost, zone-based optical fiber vibration intrusion detection.

It is a highly sensitive detection unit, with fast response and a low power consumption. Different detection methods are available depending on the fence type and site requirements.

1.1 Abbreviations and Terminology

FC/ APC	A type of optical fiber connector
IP	Internet Protocol: protocols for interconnection between networks
MAC	Media Access Control address, the physical address of the network card
MaxView	A comprehensive monitoring platform software of the company
OFSS1000CM	Optical Fiber Security System Configuration and Monitoring program
PC	Personal Computer
RTC	Real-Time Clock
ZoneSentry	Optical Fiber Security System

2 Safety

Please read the following safety information and warnings before connecting or operating this product.

2.1 Safety Warning Information and Symbols

General Warning Symbol

DO NOT ATTEMPT TO OPEN THE UNIT.
The product does not contain any user serviceable parts.

If smoke or any burning smell is emitted from the product, or in the event of any other emergency, immediately cut the power supply to the product and inform Bandweaver or its authorised agents.

This symbol is used throughout the user manual whenever there is a mandatory requirement or a risk of personal injury or probability of damaging the product.

Laser Radiation Warning Symbol

DO NOT EXAMINE OR LOOK DIRECTLY INTO THE EXPOSED FIBRE OR CONNECTOR WHILE THE LASER IS ON.
DO NOT UNDERTAKE FUSION SPLICING OR SIMILAR FIBRE JOINING WHEN THE PRODUCT IS IN OPERATION AND CONNECTED TO THE FIBER.

This product incorporates a pulsed laser device whose invisible output radiation is potentially hazardous if viewed directly by eye.

Always turn off the product, and if possible disconnect the fibre/connector, before any examination of the fibre.

High Voltage warning Symbol

DO NOT ATTEMPT TO OPEN THE UNIT.
This product has High Voltage (HV) components inside and voltages within the equipment are high enough to endanger life.
Only manufacturer trained and approved service personnel are authorised to remove the covers.

DO NOT GET THE PRODUCT WET, OR EXPOSE TO EXCESSIVE MOISTURE.
In the event of water (or other liquid) ingress, disconnect the power and inform Bandweaver or its authorised agents. Do not touch the case during a lightning storm.

2.2 Laser Safety

The system incorporates a pulsed laser device whose invisible output radiation is potentially hazardous if viewed directly by eye. The laser radiation emission from the laser within the system is permanently coupled into a 9µm/125µm single mode optical fiber whose end is terminated with an FC/APC angled optical fibre connector.

The ZoneSentry system should be interfaced to the sensing fibre, using a patch cord or pigtail assembly. It is recommended that the ZoneSentry system is connected to a test fibre, or use the FC/APC connector cap to prevent the light emitting to free space, and the far end of the test fibre should be optically cut off.

It is recommended that the unit is located where only authorised personnel have access to the front and rear connectors. Similarly, all personnel with such access must be made aware of the risks of working with such equipment, which are as described in the safety sections of this document. For unused output fiber optic connectors on the instrument, the protective caps must be utilised.

2.2.1 Laser Classification

The laser radiation from the ZoneSentry system has been classified in accordance with international standard IEC 60825-1:2014, with the following classification outcome:

ZoneSentry Laser System Classification: Class 1

In accordance with the international standard document for Class 1 laser radiation:

Class 1 lasers are safe under reasonably foreseeable conditions of operation, but may be hazardous if the user employs optics within the beam.

2.2.2 Additional Warnings

Avoid exposing the device to direct sunlight or other heat sources to protect sensitive components.

3 Product Specifications

	DAS-ZS-01-005-4CH	DAS-ZS-01-005-8CH
Performance		
Measurement range	1km per channel	
Number of channels	4 channels	8 channels
Detection distance of channels	≤ 1000m	
Alarm Type	Intrusion alarms, fiber break, system fault, power off alarm	
Alarm History	8000 alarm records	
Alarm Indication	via Relays	
Anti-tamper Alarm	Supported	
Laser Wavelength	1550nm	
Response time	≤ 2s	
Laser Safety Classification	Class 1	
Environmental		
Operating Temperature	-25°C to +70°C	
Operating Humidity	< 95% RH NC	
Storage Temperature	-10°C to +85°C	
Physical Characteristics		
Dimensions	88mm (H) x 384mm (W) x 430mm (D)	
Weight	8.4kgs	
Material	Painted Steel	
Colour/Finish	Matt Black	
Electrical Characteristics and Interfaces		
Supply Voltage	Nominal 12V or 24V DC	
Power Consumption	< 5W	< 10W
Relays	10 relays (8x zone alarms, 1x system fault, 1x power fault)	Contains 2 sets of 4-channel relay modules. See description of 4-ch relays for each set.
Reset switch	Push-button type on front panel	
Data Export	Relay	
Network port (proprietary protocol)	1x 10/100M adaptive ethernet	2x 10/100M adaptive ethernet
Sensor Cable		
Fiber Type	G.652 single mode optical fiber	
Connection for sensor cable	FC/APC fiber interfaces	
Cable installation type	Fence-mounted	

3.1 Product Standard Packing List

No	Item description	Qty
1	Packing list	1
2	CD (with software and User manual)	1
3	Test report	1
4	3-way connector	1
5	11-way connector	2
6	Network cable	1
7	Chassis mounting screws	8
8	Chassis mounting brackets	2
9	Power adapter	1
10	Power cable	1
11	Optical Coupler	4 (for 4ch) 8 (for 8 ch)
12	ZoneSentry Fiber Optic Intrusion Detection Unit	1

Table 3-1 Packing List

4 Product Start-up and Operation

4.1 Front Panel View

Figure 4-1 Front panel view

4.1.1 Front Panel Components

Power Indicator

BLUE indicator
Indicator is lit when the power supply is connected
Steady Blue: Powered ON

Reset Button

Push button
Push the reset button to clear the fault or alarm status of the equipment and related alarm status of the system.
Note:
To reset the hardware to default settings, press and hold the reset button. In this case the network parameters of the device will be restored to the default state.

4.2 Rear Panel View

Figure 4-2 Rear panel view

4.2.1 Rear Panel Components

Power input

Main power in: 12/24 (nominal) VDC

Optical fiber interface

Each ZoneSentry may be comprised of 1 or 2 modules depending on the model. The 4 channel version has 1 module and the 8 channel version has 2 modules.
Each of these modules has 8 FC/APC fiber optic interfaces.
Each zone is connected in a loop configuration. So, each zone utilises 2 optical connectors.

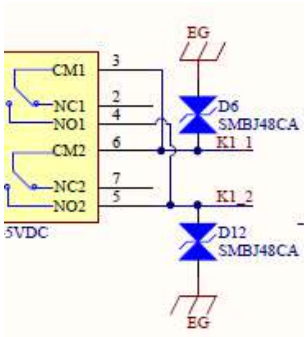
Relays

Each ZoneSentry may be comprised of 1 or 2 modules depending on the model. The 4 channel version has 1 module and the 8 channel version has 2 modules.
Each of these modules has 1 set of 11 signal switching relays:

For each set:

Relay #	*Function*	*Type*
1	*Ch1 intrusion alarm*	*Latched until reset*
2	*Ch1 fiber break*	*Active in fault condition*
3	*Ch2 intrusion alarm*	*Latched until reset*
4	*Ch2 fiber break*	*Active in fault condition*
5	*Ch3 intrusion alarm*	*Latched until reset*
6	*Ch3 fiber break*	*Active in fault condition*
7	*Ch4 intrusion alarm*	*Latched until reset*
8	*Ch4 fiber break*	*Active in fault condition*
9	*System fault*	
10	*Power alarm*	
11	*Switch Input – alarm reset*	

The relays are volt-free:



Note:
Relay 11 is in input relay and only accepts an on/off signal voltage signal.

RJ45

10/100M adaptive ethernet port
Each ZoneSentry may be comprised of 1 or 2 modules depending on the model. The 4 channel version has 1 module and the 8 channel version

has 2 modules.
Each of these modules has 1x 10/100M adaptive ethernet port.
This port supports communication with OFSS1000CM and MaxView

Note:
When used as part of a system, please modify the IP address according to the actual network environment
If there are multiple devices in the LAN, ensure that the MAC address are unique to avoid conflict

RS485 *Not used*

5 Installation

The ZoneSentry has 8 channels, and each corresponds to a channel. Each channel will have a sensing region – which is the zone – and insensitive regions related to the location of the optical couplers in the optical path. The ZoneSentry can therefore support a maximum of 8 monitoring zones, each of which can be independently armed and disarmed.
Each zone is stand alone and can detect intrusion events and fiber break status.

The system connection for a single channel is shown in Figure 5-1.

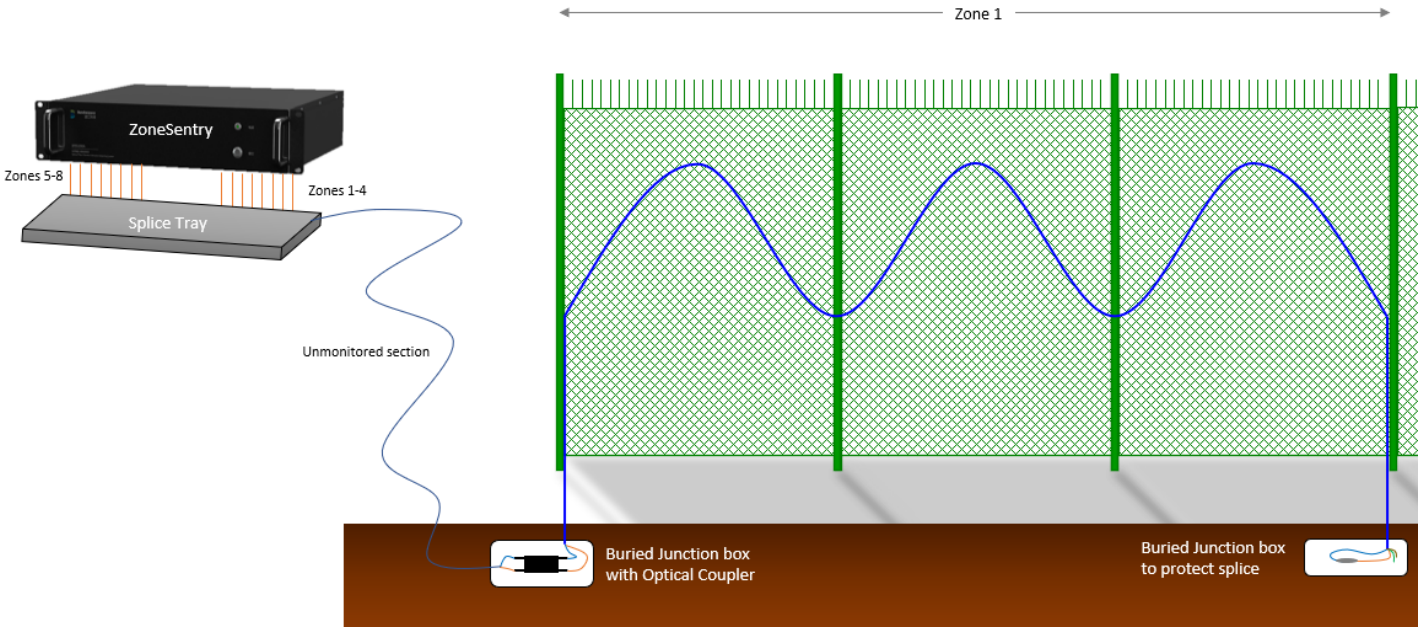


Figure 5-1 ZoneSentry system overview

Each ZoneSentry channel must be connected in a loop configuration. Therefore, each channel requires 2 fibers in the sensing cable.

The optical coupler device marks the start and end of the zone, which is the sensitive monitored area of channel. The optical coupler must be installed in a buried junction box for protection.

Two methodologies may be used for the cable configuration. The configuration shown in Figure 5-1 requires the sensing cable to have 2 fibers for each channel. For an 8 channel system, this means that the sensing cable requires 16 fibers.

However, the advantage of this configuration is that no trench is required along the perimeter to bury an additional cable for the return path.

For a larger number of zones, the sensing cable may be stiff or difficult to attach to the fence. In this case, the system design engineer may also consider the alternate cable installation methodology described in Section 5.4.

5.1 Optical Coupler

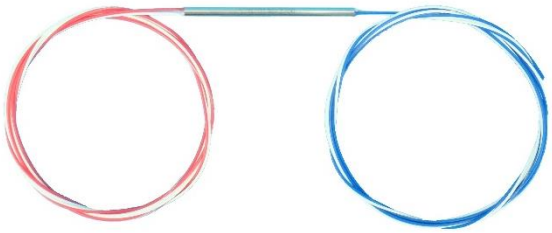
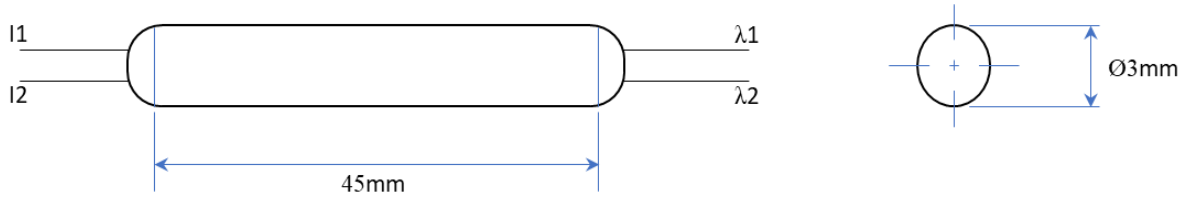


Figure 5-2 Optical Coupler

The optical coupler must be installed at the start of each zone, and it delineates the start and end of the monitored area of each zone. The data sheet supplied with the coupler contains details of the optical properties of the device, and also shows how the device must be connected:



Operating Wavelength:	1550	Bandwidth:	±15nm
Coupling Ratio:	50/50	Max. Insertion loss:	3.20dB
Operation temperature:	-20 to +85°C	Storage temperature:	-40 to +85°C

Figure 5-3 Optical coupler details

Within the ZoneSentry system, for each zone the optical coupler must be spliced to the fibers of the sensing cable as shown in Figure 5-4:

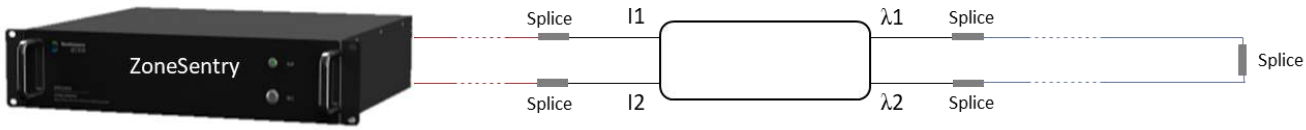


Figure 5-4 Optical Coupler connection detail

The blue and red lines represent the individual fibers in the sensing cable. At the end of the zone, these two fibers must be spliced together to create a loop. The splice must be installed within the buried junction box for protection.

5.2 Buried Junction box

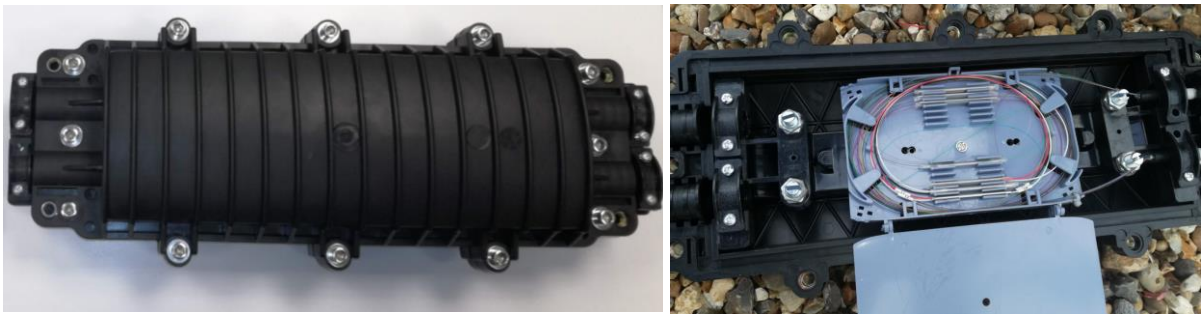


Figure 5-5 Buried Junction box

The buried junction box supplied by Bandweaver is shown in Figure 5-5.

This box is suitable for direct burial.

However, if future access must be retained for maintenance or other purposes, a valve box type structure may be used for installing the junction box. The bottom of the valve box should be lined with gravel or similar material that allows rainwater to drain away from the junction box.

Figure 5-6 Buried junction box installed within a valve box.

5.3 Cable Installation notes

In general, the requirements for attaching the sensing cable to the fence are the same as those for the FenceSentry, which are covered in the document ***DAS-FS-01-MAN-003 - Cable Installation Guide***.

The following additional notes apply to ZoneSentry installations:

- The sensing fiber must be securely and tightly attached to the fence, and any cable not on the fence must be buried or securely attached off the fence. Care must be taken to ensure that there are no sections of cable that move or twist independently to the fence.
- After the fiber is installed and connected to the ZoneSentry, it is important to check the return power of the channel on the software interface – refer to Section 7.

- The ZoneSentry is sensitive to, and adversely affected by, reflections and attenuations. We do not recommend the use of fiber optic connectors in any of the optical paths, apart from connectors on the sensors/interrogators themselves. If using a connector is unavoidable, it must be an FC/APC type angled connector. No other optical connector types should be used within the optical sensing circuit.

5.4 Alternate cable installation methodology

The following configuration may also be successfully used for a ZoneSentry system, if this is more suitable for the site conditions or constraints:

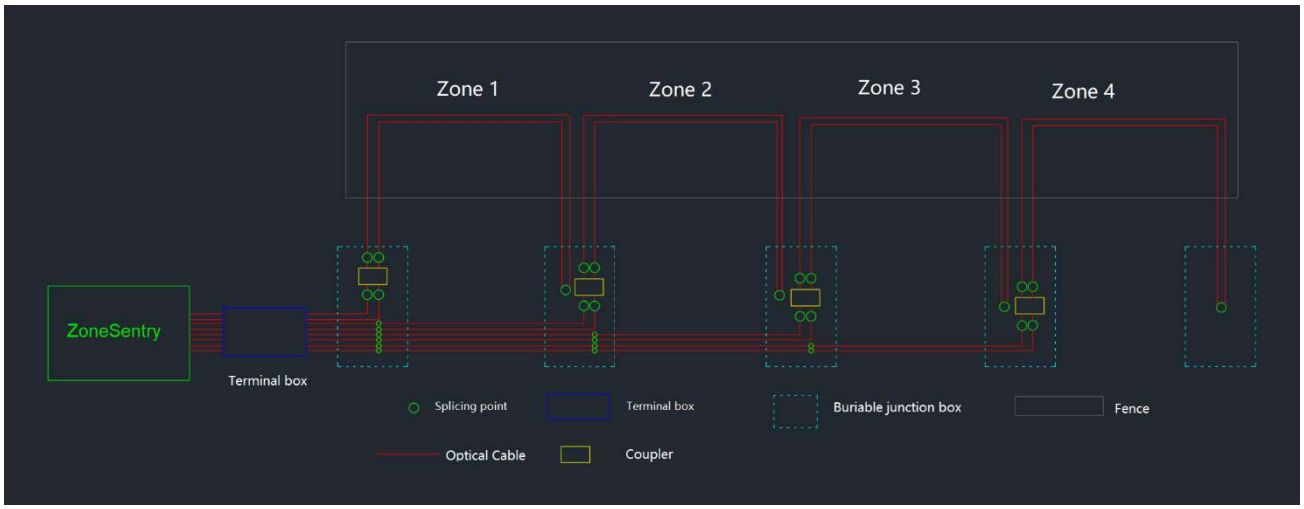


Figure 5-7 ZoneSentry alternate installation configuration

As can be seen from Figure 5-7, this system uses 2 types of cable:

- A smaller cable (minimum 2 fiber cores), used for installation on the fence
- A larger cable with sufficient cores, which acts as the return path for all the zones.

This configuration requires that the larger cable must be buried along the perimeter of the fence, at least until the start of the final zone.

6 Software Installation

6.1 OFSS1000CM

OFSS1000CM is the system configuration and monitoring software for the ZoneSentry product. The software is required for parameter configuration to ensure that the equipment is suitably configured for the site.

Depending on the model, the ZoneSentry is made up of 1 or 2 identical modules of 4 optical channels each. Each of these modules must be connected directly to the OFSS1000CM software to be separately configured. The instructions in this manual relate to one of these modules of 4 channels. The same instructions may be applied to any of the modules.

6.2 Required environment

OFSS1000CM software can operate on a 32-bit or 64-bit Windows® XP, Windows7 system; but Windows® XP system needs an SP2 or later installed. If the basic hardware and software environment requirements are not met, the software will not be installed or function properly. ⚠

- Windows® XP + SP2 or later / Windows7/ Windows 10
- Intel(R)Core (TM) I3 series CPU or better
- 1GB or more available memory
- 10GB or more available hard disk

6.3 Install and Start OFSS1000CM

Copy the software to a suitable location and run the 1000 application to start the program.

6.3.1 Login

When the software is started, the login interface appears as shown in Figure 6-1.

Figure 6-1 Login interface

User: admin
& Password: B@ndwe@ver

The default password can be changed from the login interface.

The main interface of the program will then be displayed as shown in Figure 7-1.

7 Main Interface Window

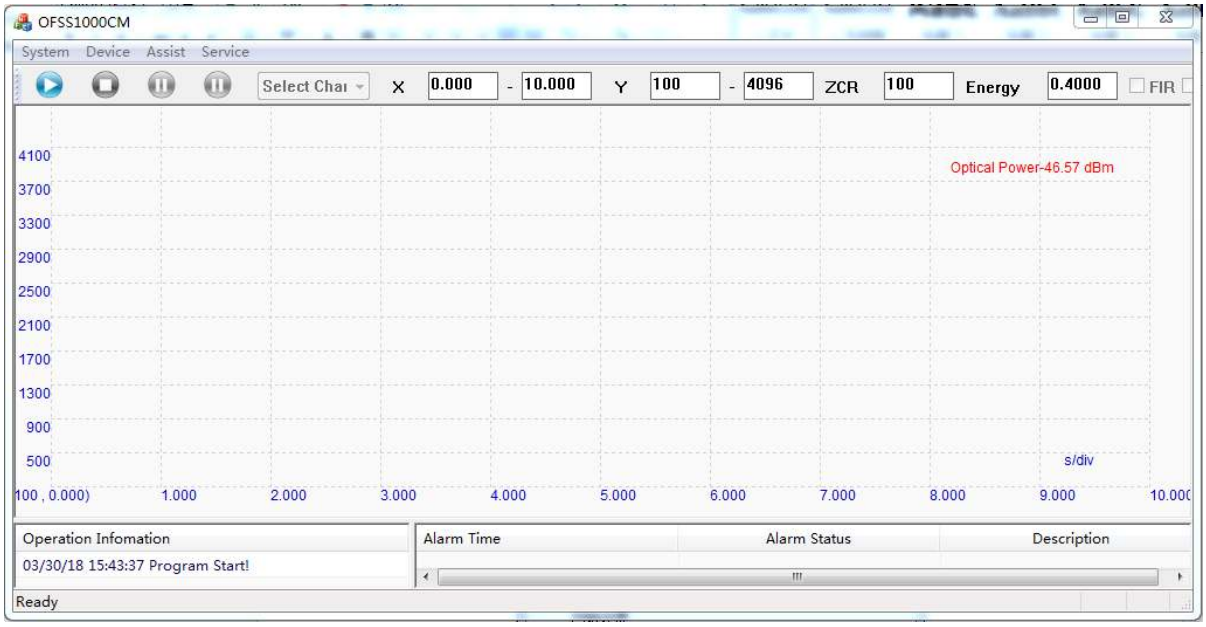


Figure 7-1 Software interface

7.1 Main Menu

The main menu has 4 main items, as shown in Figure 7-2

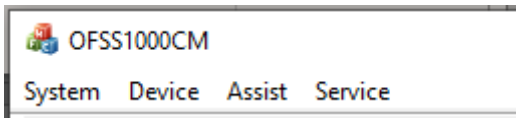


Figure 7-2 Menu Bar

7.2 Quick Toolbar

Figure 7-3 Quick Toolbar - Start measurement, Stop measurement, Pause measurement

Starts measurement and enters measurement mode

Stops measurement and corresponding collection of data

Pauses measurement and corresponding collection of data

7.3 Operation Information

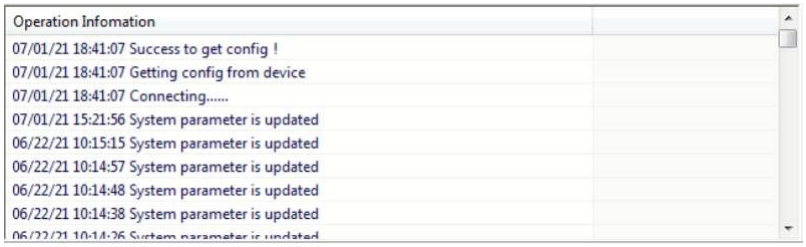


Figure 7-4 Operation Information

The Operation Information panel displays the operation message list. It shows record of operations that have been performed and their outcome.

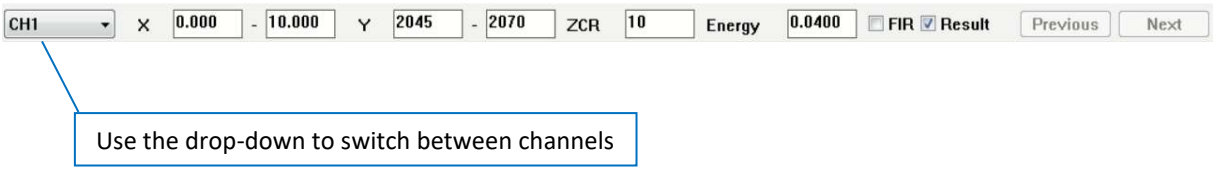
7.4 Alarm Information

Figure 7-5 Alarm Information

The alarm information panel shows the list of intrusion alarms raised by the ZoneSentry, along with the timestamp and corresponding channel number.

There is a scroll bar to the right of the panel to scroll through the past alarms. This is a static alarm view; the user may not clear, sort or acknowledge alarms in this panel.

7.5 Axes configuration



X-axis *Time axis*
Shows a maximum of 10 seconds

Y-axis *Signal intensity axis*
Range is 0 ~ 4095. The DC signal is approximately in the middle.

ZCR *Zero crossing value*
This is the Y-axis value for the zero crossing trace, and is displayed on the right-hand side of the main chart area, along with the Energy Y-Axis value.

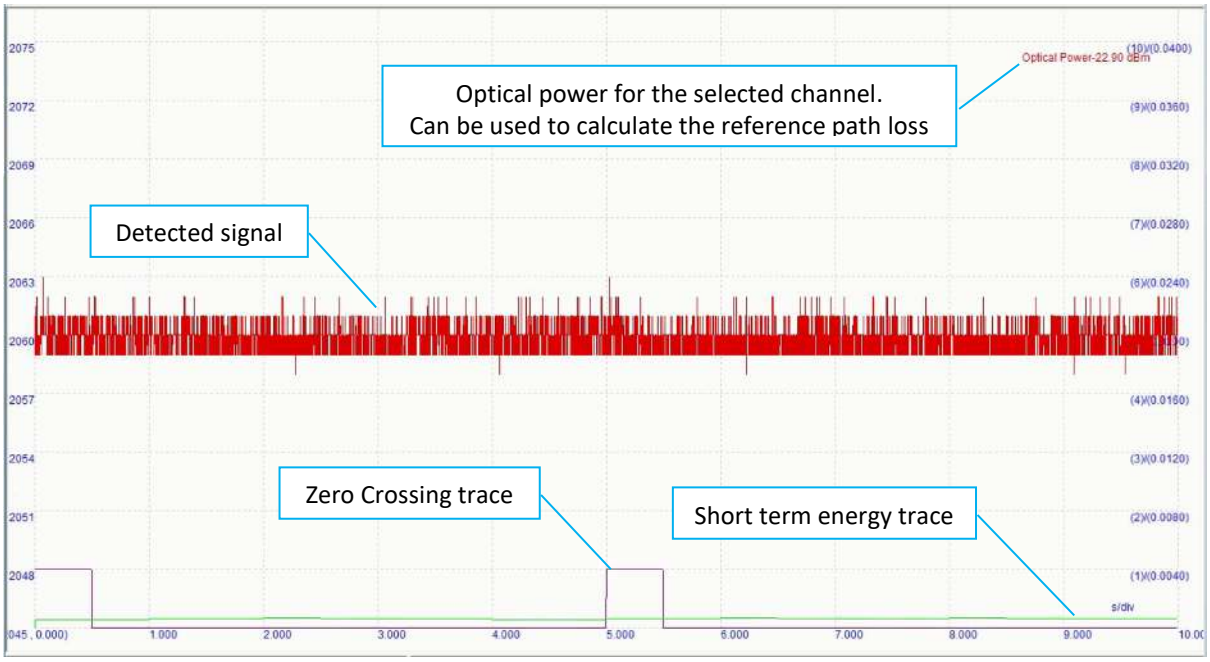
Energy *Energy value*
This is the Y-axis value for the energy trace, and is displayed on the right-hand side of the main chart area, along with the ZCR Y-axis value.

FIR *Refers to FIR Filtering*
Check or uncheck this box to display the filtered or unfiltered signal

Result *Displays the resultant traces*
Unchecking this box will hide the zero crossing and signal traces and their corresponding axes. It is recommended to have this box checked during the configuration or commissioning of the system.

Previous / Next *Previous / Next buttons are disabled in normal operation*
These buttons can be used during the review of historical or saved traces to scroll forwards or back through the saved files.

7.6 Main Chart area



Optical Power: *The optical power value is displayed in the upper right corner of the chart area. It is related to the reference optical path loss.*

Detected Signal: *This is the red trace on the chart area*
It is the signal detected by the ZoneSentry. Checking or unchecking the FIR box will display the filtered or unfiltered signal.

Zero Crossing: *This is the purple trace on the chart area*
Each step on the trace represents a crossing of the user configured threshold.

Short Term Energy: *This is the green trace on the chart area*
It represents the short term energy of the detected signal from the fence.

8 Quick Start

During the cable installation, an OTDR may be used to check the health of the fiber in the various zone sections. However, any desired OTDR traces must be taken ***before*** the optical couplers are spliced to the fiber.

8.1 Connect

Set the network and password in the configuration software to connect with the ZoneSentry.

Refer to Section 9.1.

8.2 Set the Clock

Set the clock to the correct date and time. Refer to Section 10.2.

8.3 Optical Power

Check the Optical Power for each channel in use.

After the installation is complete and the fiber connections to the ZoneSentry are complete, the recommended method to verify the installation is by checking the Optical Power measured by the system:

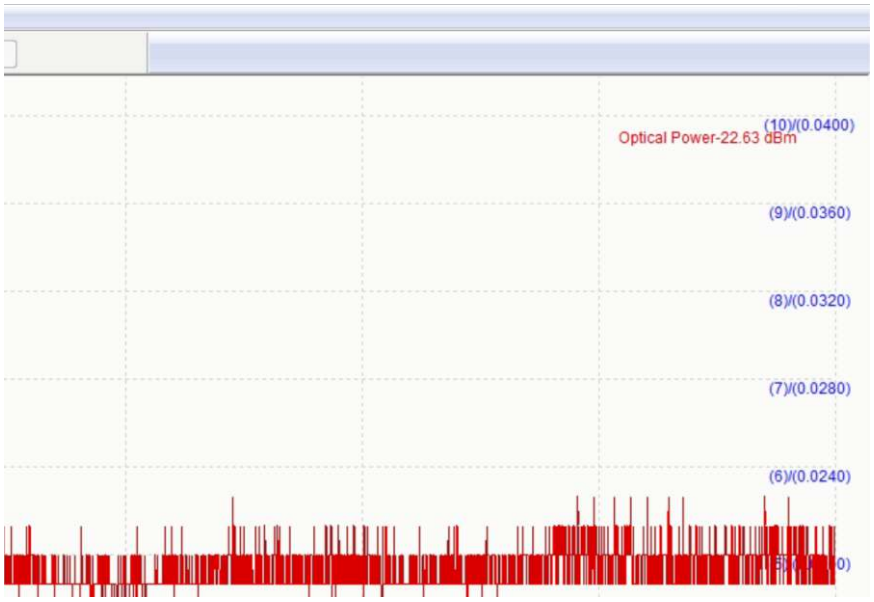


Figure 8-1 Check the Optical Power for each channel

The optical power of each channel in use should be between -20dBm and -25dBm.

If the Optical Power is outside of this range, please contact Bandweaver support at support@bandweaver.com or your local Bandweaver representative.

8.4 Energy Calibration

Ensure that the Result option is checked, so that the green trace is visible:

Perform an Energy Calibration for each channel in use. Refer to Section 10.1.4.

8.5 Configure each channel

Use the Device < Parameters menu selection to access the Settings menu.

Configure each channel in use as required for the site. Refer to Section 10.1.

The Short Time Energy method is adequate for most applications. This is an easy method that only requires an energy threshold value and number of frame to meet the condition (which may be 1).

Refer to Section 10.1.4 to configure this.

9 Menu – System

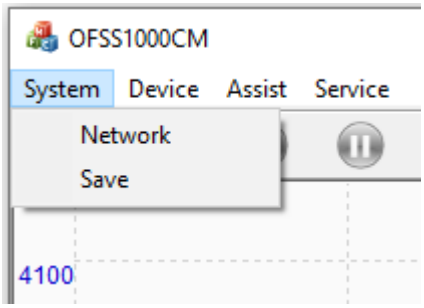


Figure 9-1 System Menu

9.1 System – Network

Accessed from: System < Network

The network settings window is shown in Figure 9-2.

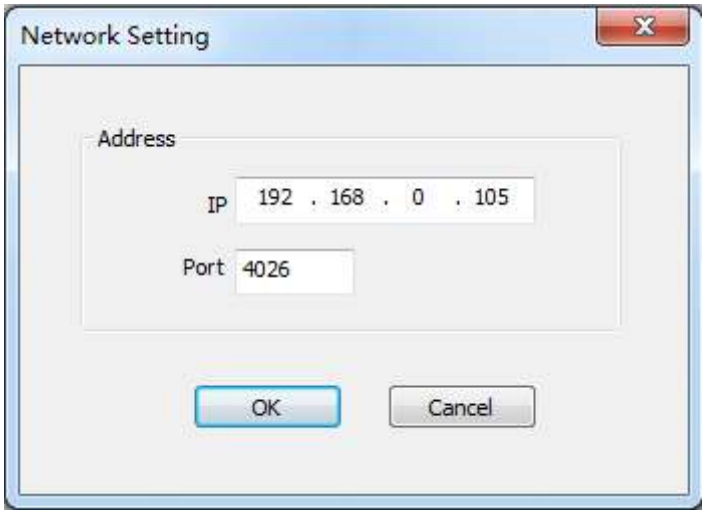


Figure 9-2 Network settings interface

IP: *The default IP address of the device is 192.168.0.100*

Port: *Use port 4026 when connected directly to the ZoneSentry*

Once the IP address has been set and the device is successfully connected, click the start icon on the quick tool bar. The software will automatically acquire the parameter configuration and enter the monitoring state.
The stop button and pause buttons will now be enabled for the user, and can be used to stop or pause the acquisition.

An example monitored system when the program starts monitoring is as shown in Figure 9-3.

Figure 9-3 Monitoring interface

9.2 System – Save

Accessed from: System < Save

It will open the Storage settings interface, as shown in Figure 9-4.

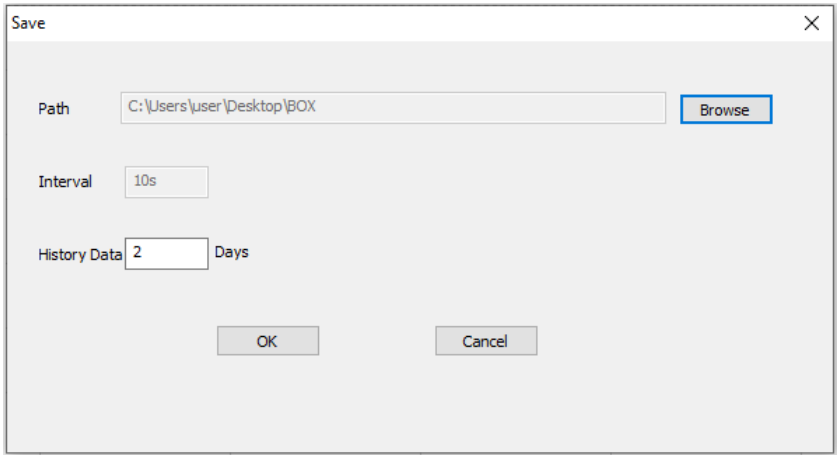


Figure 9-4 Storage settings interface

The historical data is recorded and stored according to the channel and date, as can be seen in Figure 9-5. Each file contains 10s of data.

The number of days should be set according to the size of the disk.

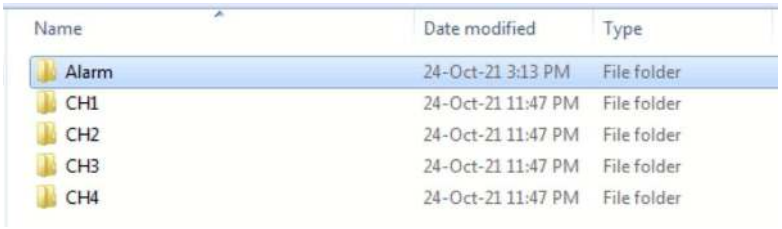


Figure 9-5 Historical data folder classification

When a new alarm occurs, the data from the event is stored in the dedicated Alarm folder, as shown in Figure 9-6. The naming of the data files is stored in HH-MM-SS.dat format e.g. 17_45_56.dat.

The interval of history data that is stored before and after an alarm event is 5 seconds.

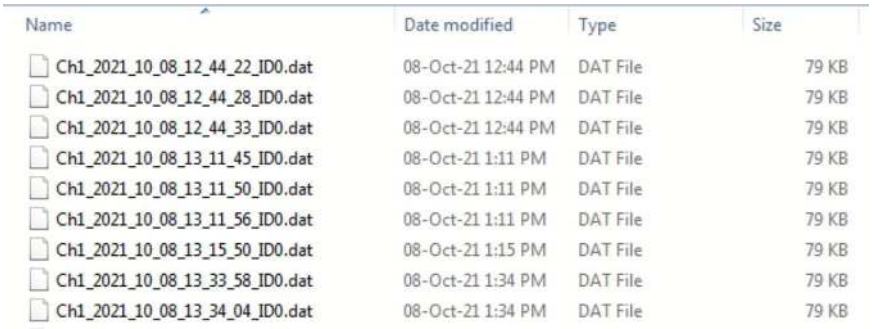


Figure 9-6 Data classified according to date

The default storage path for the data and alarms is within the installation directory.

10 Menu – Device

10.1 Device – Parameter

Accessed from: Device < Parameter

It will open a parameter settings interface, as shown in Figure 10-1.

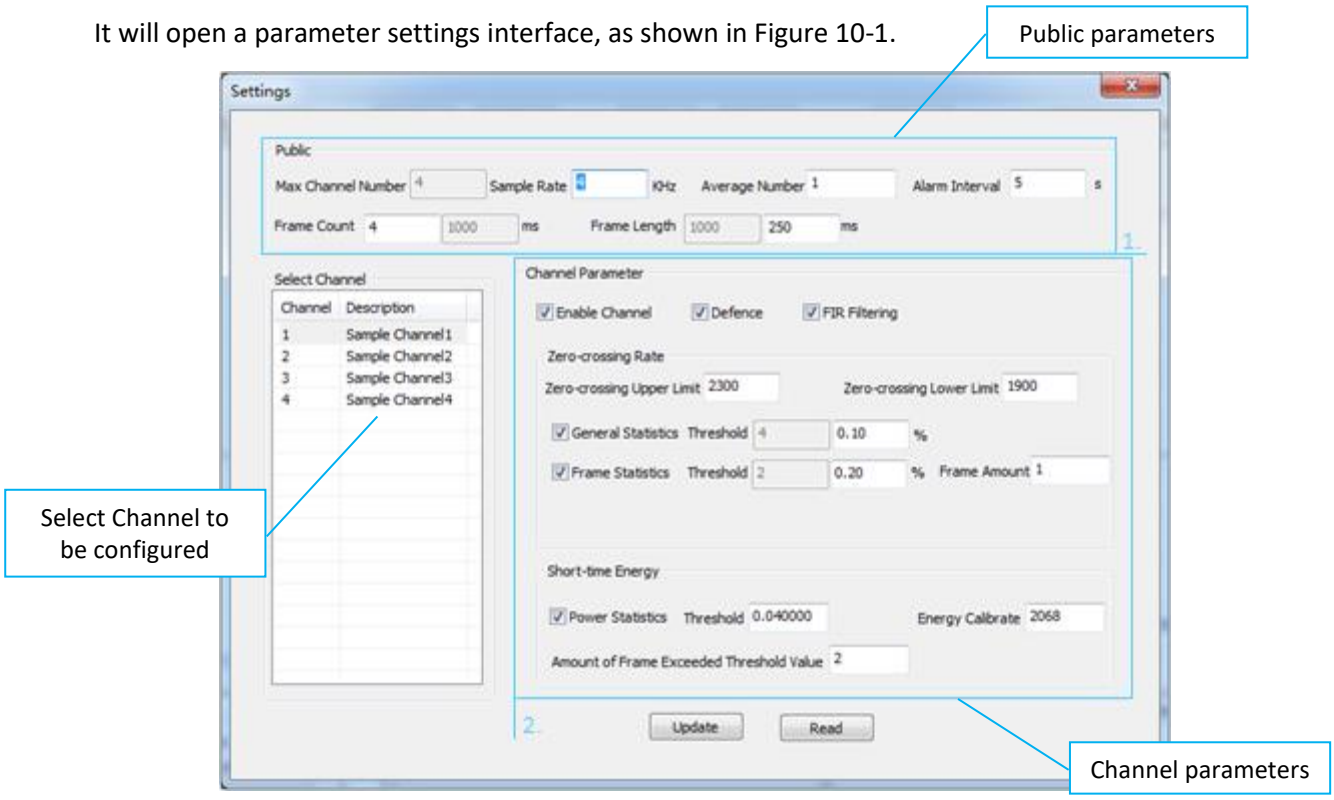


Figure 10-1 Parameter settings interface

The system has two types of parameters to be configured:

- Public parameters
- Channel parameters

10.1.1 Public parameters

The Public parameters are properties that are shared by all 4 channels of the corresponding module. The parameters set here will apply to all channels.

Max Channel Number *The default value of this module is 4, namely 4 channel modules. Do not change.*

Sample Rate (kHz) *This parameter is used to set the frequency of data acquisition. The default value is 4. Do not change this value.*

Average Number *The average of the sampled data in the time domain. The default value is 1. Do not change this value.*

Alarm Interval (s) *The time interval between two alarms in the same zone, if the first alarm was not reset. This alarm interval must have elapsed before a new alarm is raised.*

Frame Count *The number of frames that the system should use to calculate an alarm. This parameter can be used in conjunction with the **Frame Length** to calculate the time to trigger an alarm.*
Frame Count x Frame Length = Calculation time

Frame Length (ms): *The length of each frame in milli seconds*
*However, in conjunction with the **Sample Rate** and **Average number**, this parameter represents the number of sampling points in each frame.*
For example, a for a Frame length of 500ms, sample rate of 4kHz and average number of 1, this equates to 2000 sample points per frame.

10.1.2 Channel parameters

The parameter set under the Channel parameters are for the selected channel only.

Enable Channel: *Check the enable channel checkbox to enable the selected channel – i.e. the intrusion alarms and fibre break status on the selected channel.*
Uncheck the box to disable the selected channel.

Defence: *Check the defence checkbox to enable only the intrusion alarms on the selected channel. The fibre break status will still be active if this checkbox is unchecked.*
Uncheck the box to disable the intrusion alarms on the selected channel.

FIR Filtering: *Check the FIR filtering checkbox to enable the raw data pre-processing algorithm. The recommended setting is to have this enabled.*
Uncheck the box to disable FIR filtering.

Two different methods may be used for the ZoneSentry to identify intrusion events:

- Zero Crossing Rate
- Short-time Energy

Either one of these may be used, or both may be used together. The most appropriate method to be used will depend on the fence type. If the fence is of a stiff material so that the vibration dissipates quickly, the short-time energy method may be recommended.

10.1.3 Zero-crossing Rate

The zero-crossing rate settings enable the system to trigger alarms based on the percentage of signal passing through a certain value.

There are two ways to set the Zero-crossing Rate alarm:

- General Statistics — Sets the conditions for the full frame set included in the calculation
- Frame Statistics — Sets the conditions of each frame included in the calculation

Zero-crossing Upper Limit *Upper threshold that will trigger an alarm when the signal crosses this value*

Zero-crossing Lower Limit *Lower threshold that will trigger an alarm when the signal crosses this value*

General Statistics *Check the General Statistics checkbox to enable the conditions for the frame set. Uncheck the box to disable the frame set conditions.*

If checked, the Threshold value represents the count of signal crossing the upper and lower limit within the frame set. The percentage value is the percentage of sample points that must meet the condition.

The user types in the percentage value and the software displays the corresponding number of points that are required to meet the condition, as shown in Figure 10-2:

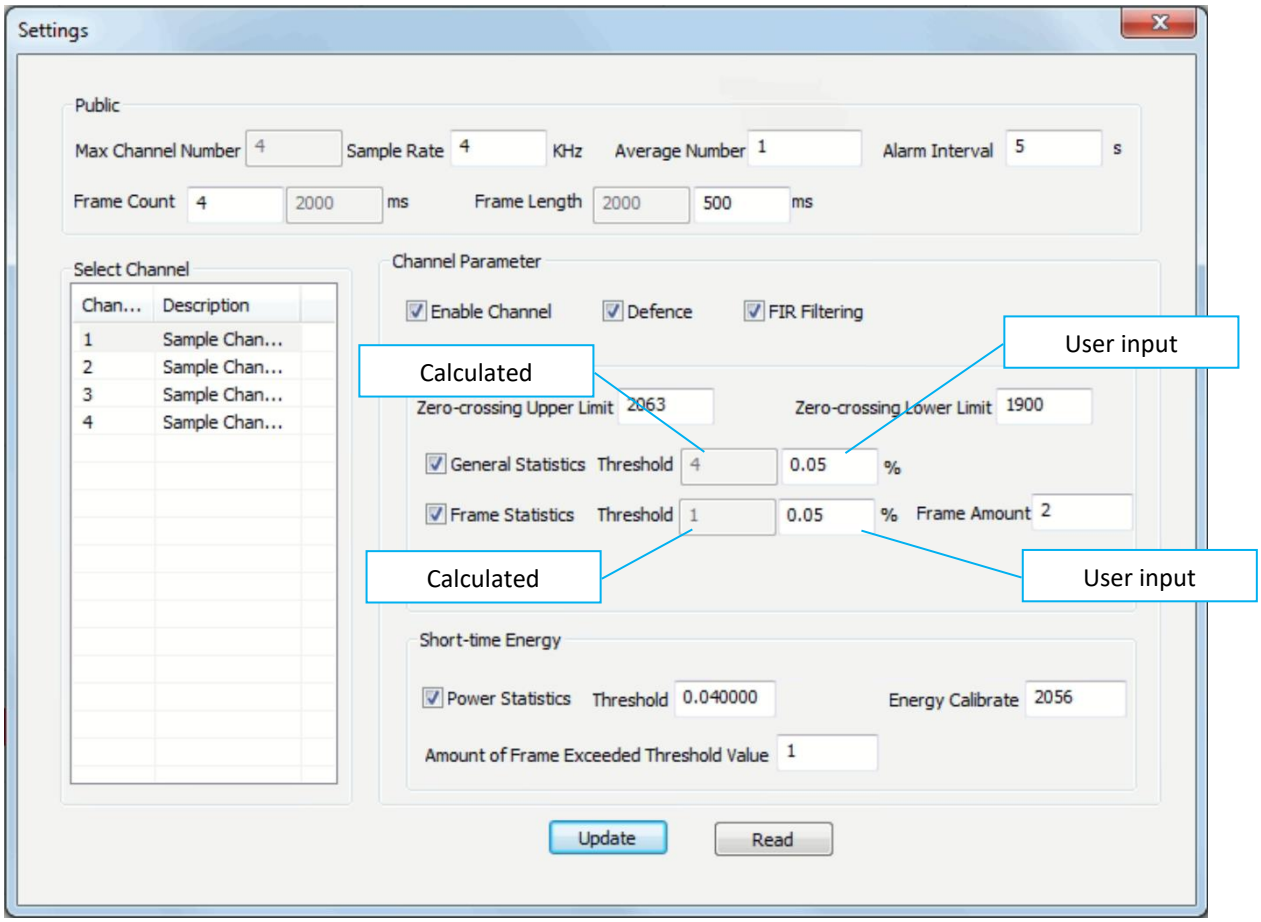


Figure 10-2 Settings

Frame Statistics

Check the Frame Statistics checkbox to enable the conditions for calculation within a single frame. Uncheck the box to disable the conditions for each frame.

*If checked, the **Threshold** value represents the count of signal crossing the upper and lower limit in a single frame. The percentage value is the percentage of sample points that must meet the condition.*
The user types in the percentage value and the software displays the corresponding number of points that are required to meet the condition, as shown in Figure 10-2.

If checked, the Frame Amount is the number of frames in the set that must meet the frame conditions.
*Therefore, the **Frame Amount** must be ≤ **Frame Count**.*

10.1.4 Short-time Energy

The short-time energy settings enables the system to trigger alarms based on the intensity change of a single frame signal. This is the recommended method for stiff or rigid fences where the vibration dissipates quickly, so the duration of the intrusion signal is very short.

Power Statistics

Check the Power Statistics checkbox to enable the short time energy method of calculation for the intrusion alarms.
Uncheck the box to disable the short term energy calculation.

Threshold

The energy threshold that must be exceeded

Amount of Frame Exceeded Threshold Value

The number of frames that must meet the energy threshold value conditions to set the alarm.

Energy Calibrate

Energy calibration
This calibration must be performed for the system to work correctly.
This value must be so that the energy value is as close to zero as possible without disturbance
Procedure:
1. Make sure that the green energy trace is displayed on the main interface.
2. Check the DC value of the red detected signal (usually approximately 2056), and start the calibration at this value.
3. Adjust the Energy axis if necessary to visualise the Energy trace in detail.
4. By trial and error, increase and decrease the Energy calibrate value around this value, and select the best value for the energy signal to be as close to zero and as flat as possible.
5. Use this as the energy calibrate value.

Note:
If there is activity on the fence in the corresponding zone, the line will not be flat. If possible, stop activity at the fence during this calibration to minimise disturbances on the fence.

10.2 Device – RTC

The Date and time settings can be seen in Figure 10-3.

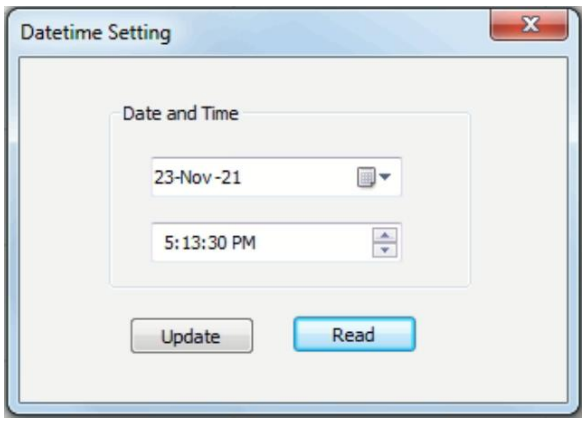


Figure 10-3 Date and time settings

The default time is the PC time when the interface is first opened. The user can click the **Read** button to get the equipment time.

10.3 Device – Device Network

The device setwork settings can be seen in Figure 10-4.

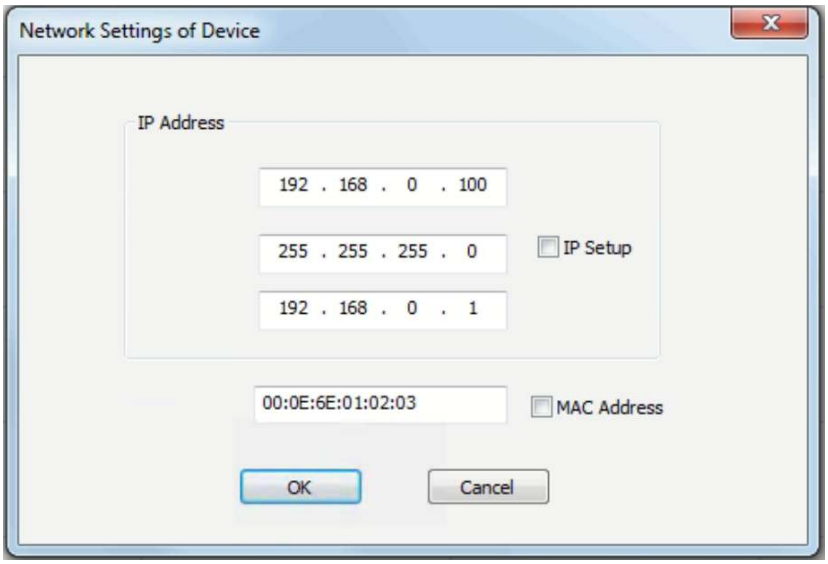


Figure 10-4 Device network settings

This interface allows the user to set the IP address settings and the MAC address.

WARNING:
DO NOT TRY TO SET THE IP CONFIGURATION AND MAC ADDRESS SIMULTANEOUSLY.
PLEASE SET THE MAC ADDRESS CAREFULLY SO AS NOT TO CONFLICT WITH OTHER DEVICES IN THE NETWORK.

10.4 Device – RTU

This function is not implemented.

10.5 Device – Firmware Update

The firmware settings can be seen in Figure 10-5.

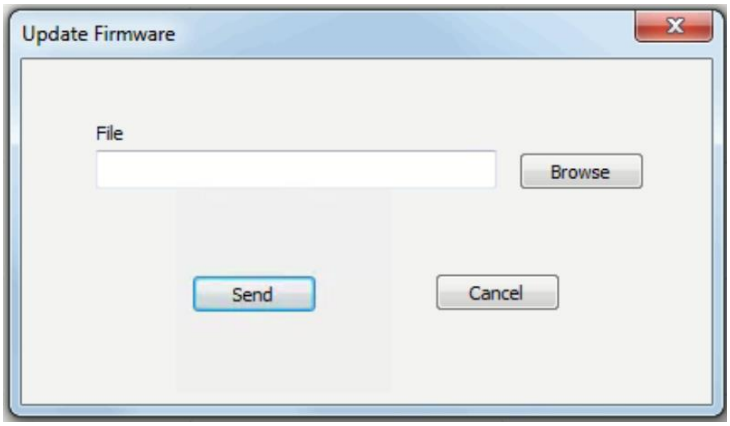


Figure 10-5 Update Firmware

Click **Browse** to select the firmware upgrade file with the suffix **.bin**.

Once the correct file is selected, click Send to begin the firmware update process. The process and the result will be updated in the operation message list in the bottom left panel of the software interface. The ZoneSentry will automatically restart after a successful firmware update.

After the device has restarted, the OFSS1000CM software must also be restarted.

10.6 Device – Self-test

The device self-test controls can be seen in Figure 10-6.

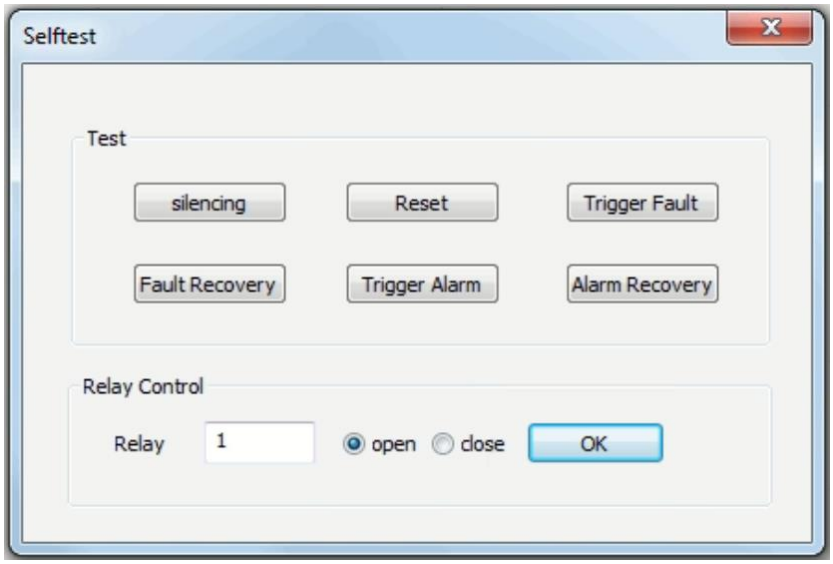


Figure 10-6 Self test

WARNING:
NO NOT USE THE SELF-TEST FUNCTION WHEN THE DEVICE IS IN NORMAL OPERATION.

The buttons may be used to manually test various controls and functions of the device. The Relay control may also be used to select specific relays and manually set them to open or close.

10.7 Device – Laser

The device laser settings can be seen in Figure 10-7.

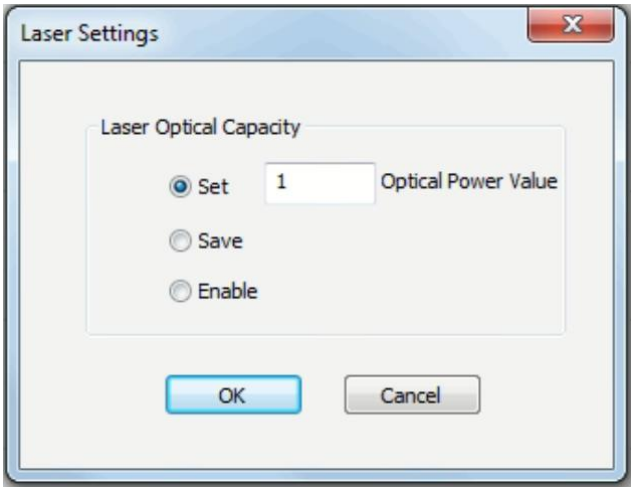


Figure 10-7 Laser settings

Do not operate. For use by Bandweaver engineers only.

10.8 Device – Device Info

The device information can be seen in Figure 10-8

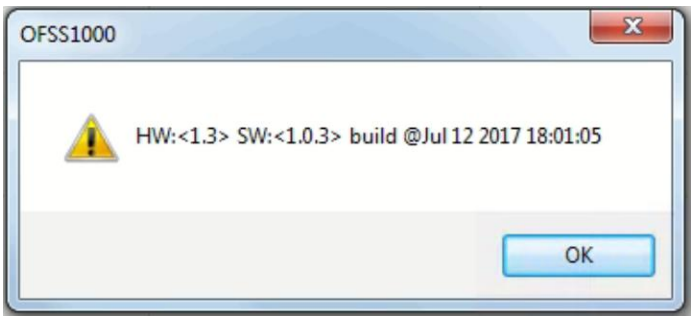


Figure 10-8 Device info

The pop-up displays the hardware version and software version of the device.

10.9 Device – WIFI Modular

This function is not implemented.

10.10 Device – Alarm History

The system can retain up to 8000 records. The latest 8000 alarm records are saved.

The alarm information can be queried and cleared. Cleared alarm records cannot be recovered.

History Query *Opens the alarm record interface.*
Click Search to display the alarm records in the list as shown in Figure 10-9.
The alarm history cannot be exported.

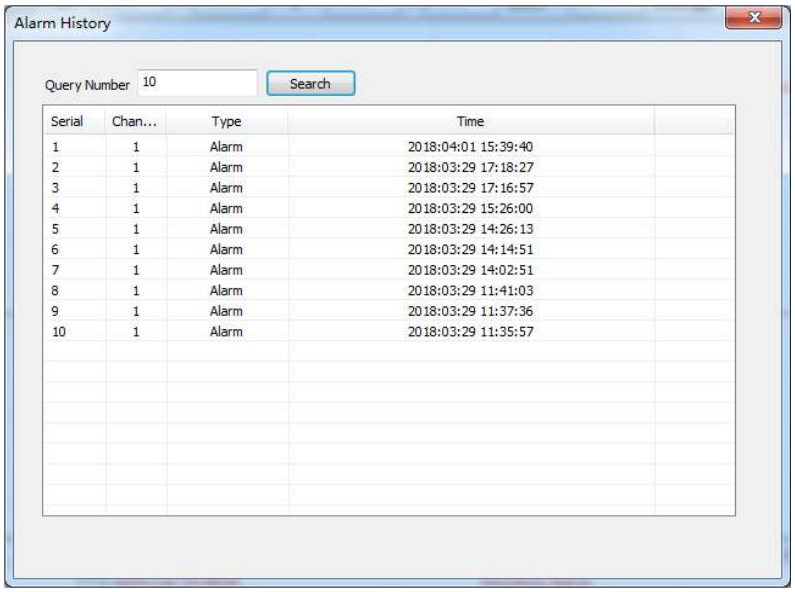


Figure 10-9 Alarm history

Clear Record

Clears all alarm records.
Before the data is cleared, a pop-up interface asks the user to confirm the request:

Figure 10-10 Clear alarm records

*If the user confirms **YES**, all the alarm records are irretrievably deleted. This action cannot be undone.*

11 Menu – Assist

11.1 Historical Curve Replay

The historical curve reply enables playback of historical data.

Select the file of interest from the saved data to open it in the main interface.

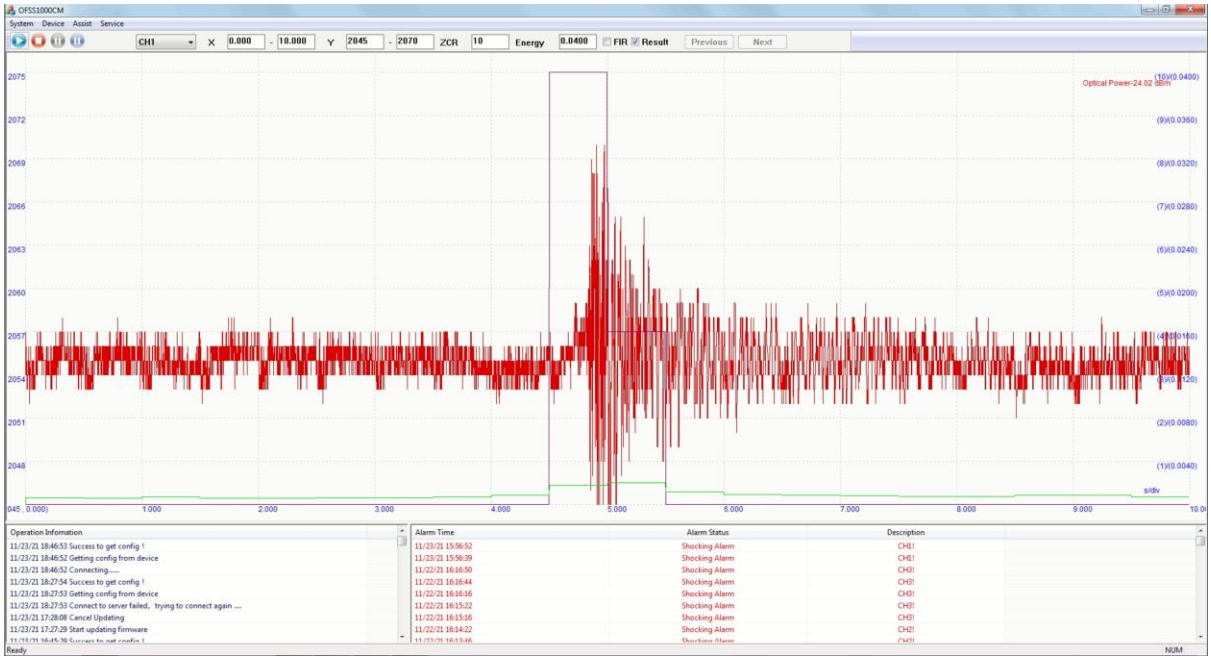


Figure 11-1 Historical curve replay

The data can be analysed and counted during the playback of the historical waveform.

The playback is displayed in the same window as the live data, so both cannot be displayed simultaneously. The live data is automatically paused when the historical playback is in process.

Click the pause button to continue with the normal live data display.

12 Menu – Service

12.1 About

The About pop-up displays the software version as can be seen in Figure 12-1

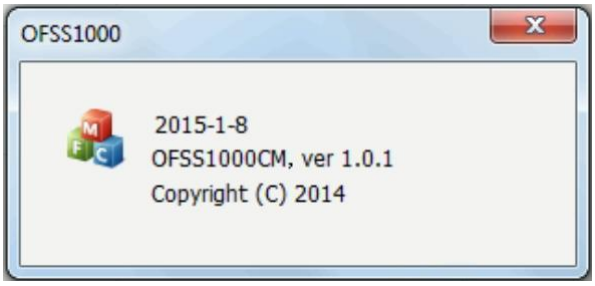


Figure 12-1 Software version