WaveRadar Rex

RS AQUA
SERVING OCEANOGRAPHY

FREQUENTLY ASKED QUESTIONS

We have compiled a listing of Frequently Asked Questions (FAQ) regarding WaveRadar Rex and WaveView software. This listing is divided into five subsections covering distinct areas of interest. We update this listing at regular intervals and the issue version and date is displayed along with update details. Please send us your questions or comments.

A. Specification - Description - Capabilities.

A1.   What are the differences between WaveRadar Rex M and D?

A2.   Does WaveRadar Rex have an analogue output?

A3.   Can we connect our data logger directly to the analogue output?

A4.   Why is the analogue output shown as being EEx"e" (non intrinsically safe)?

A5.   Clarify the digital output from WaveRadar Rex.

A6.   Do we need a RS232/RS422 converter to transmit data over long distances?

A7.   Is the Field Bus Modem powered by the WaveRadar?

A8.   I want to integrate WaveRadar to a met-ocean monitoring system. Can I do that?

A9.   The brochure says that WaveRadar measures at 10Hz but outputs data at 2-10Hz with a default of 4Hz. Please explain this.

A10.   How can the data output be changed from 4Hz?

A11.   After each distance measurement is made, is any filtering applied?

A12.   Where is the datum point for the distance measurement?

A13.   How portable is WaveRadar Rex?

A14.   Can WaveRadar measure directional wave data?

A15.   The Rosemount Tank Radar web site describes the communication on a TRL2 bus and 8 to 10 or up to 16 units can be on one TRL2 bus. Do we need a Field Communications Unit (FCU) and FBM if we are operating just one WaveRadar?

A16.   Is there any local visual indication available to monitor the WaveRadar operation?

A17.   How does the RDU40 connect to the WaveRadar?

B. Installation – Commissioning.

B1.   How do we install WaveRadar Rex?

B2.   What cables should be used?

B3.   What are the integral junction box gland hole sizes?

B4.   What fittings do I require to connect cabling to the WaveRadar junction box?

B5.   What are the correct connections to the Field Bus Modem?

B6.   How do we start WaveRadar?

B7.   Are any special tools or test equipment required for assembling and installing WaveRadar Rex?

B8.   Please quote power consumption figures for WaveRadar Rex D

C. Operation - Servicing - Maintenance - Calibration.

C1.   How often is re-calibration required and how is it performed?

C2.   What is the recommended servicing routine?

C3.   What happens if the sensor it is hit by a wave.

C4.   Does vibration affect the sensor or its measurements?

C5.   Is WaveRadar attitude sensitive?

C6.   Is WaveRadar affected by extremes of temperature?

C7.   What spares should I order for a new installation?

C8.   Is there a test unit that I can purchase?

D. Documentation – Certification.

D1.   What documentation is supplied with WaveRadar Rex?

D2.   What certification applies for potentially explosive atmospheres?

D3.   Can we obtain a copy of the WaveRadar Rex operating manual?

D4.   Can I obtain a drawing for the optional mounting frame?

E. Software.

E1.   Do I need any special software to set up WaveRadar?

E2.   What data analysis software is available for WaveRadar Rex?

E3.   What deliverables does WaveView offer?

E4.   If WaveView software is not used, what is the documentation of the hardware and software protocol?

E5.   Is a data output available from WaveView?

E6.   Can a datum offset be input to WaveView?

E7.   Is the raw distance measurement stored by WaveView?

E8.   How does WaveView calculate tide data?

E9.   After the "tide level" is derived what type of spectral processing does WaveView use to derive the wave parameters?

E10.   How often are WaveView displays updated?

E11.   How does WaveView store data?

E12.   Can we obtain a slave display of the WaveView screen?

E13.   What is the WaveView "on screen information"?

E14.   How do I know if WaveView is receiving data from the WaveRadar Rex?

E15.   Can WaveView give a warning if Hs exceeds a particular value?

E16.   Can I run WaveView and use other programs as well?

E17.   Does WaveView check for errors in the WaveRadar REX data?

E18.   Does WaveView have system status information?

E19.   What is the minimum requirement for running WaveView software?

E20.   How is WaveView supplied and is a manual included?

E21.   Can we obtain a copy of the WaveView software manual?

E22.   Can extra copies of WaveView be purchased at a discounted price?

F. Shipping.

F1.   How is the WaveRadar shipped?

F2.   How is the RS Aqua mounting frame shipped?

A. Specification – Description – Capabilities.

A1. What are the differences between WaveRadar Rex M and D?

A: The only difference is the power supply requirement. Version M is for AC mains between 100 to 230 V. Version D requires a 24 VDC source.

A2. Does WaveRadar Rex have an analogue output?

A: Yes. A 4 - 20mA output is provided as standard.

A3. Can we connect our data logger directly to the analogue output?

A: Yes.

A4. Why is the analogue output shown as being EEx"e" (non intrinsically safe)?

A: There are two, separated chambers in the junction box. These each contain a connector block. The left-hand chamber/block (X12) is intrinsically safe rated but is used only for the Remote Display Unit (RDU40) or Tank Radar operations. WaveRadar Rex uses the right hand chamber/block (X11). The outputs for the data bus and the analogue signal, along with the power supply input, are all terminated onto the X11 connector block. This chamber is EEx e rated, which conforms to the requirements of the BASEEFA03ATEX (and equivalent) hazardous zone rating.

A5. Clarify the digital output from WaveRadar Rex.

A: It comprises fixed length strings of binary values of measured distance plus radar operating status information. The serial message is frequency shift keyed (FSK) and transmitted from the sensor via a two wire serial data field bus. From the integral junction box, cabling (available from RS Aqua as an optional extra) will run to the FBM, located in some form of "control" location. The FBM will convert the FSK message to RS232. A two metre RS232 cable is supplied to connect the FBM to a PC. The output from the FBM is 4800 Baud, 8 bits, No parity, one stop bit.

A6. Do we need a RS232/RS422 converter to transmit data over long distances?

A: No. The installed field bus system is good for distances up to 4Km.

A7. Is the Field Bus Modem powered by the WaveRadar?

A: No. The FBM is powered by an external DC (6 – 12 Volts). A mains to DC adapter is supplied with the FBM.

A8. I want to integrate WaveRadar to a met-ocean monitoring system. Can I do that?

A: Yes. The FBM RS232 output is easily integrated. In addition, WaveView software outputs a time stamped ASCII serial data stream of processed parameters and raw distance measurement for your monitoring system.

A9. The brochure says that WaveRadar measures at 10Hz but outputs data at 2-10Hz with a default of 4Hz. Please explain this.

A: There are two independent processes, involving two independent processors located within the WaveRadar electronics module. The first is the measuring cycle (sampling duration) which operates at a fixed 10Hz. The other is the control and communication process that acquires values from the measuring cycle buffer and outputs the data at 2 - 10Hz, with a default set at 4Hz.

A10. How can the data output be changed from 4Hz?

A: The data output rate may be set from 2 to 10Hz in steps of 2ms by RS Aqua before delivery. Such a requirement must be specified at the time of order placement.

A11. After each distance measurement is made, is any filtering applied?

A.   No. The output from the sensor is a pure mean of all the measurements taken by the radar during the measurement cycle. Any filtering of data and all tide and wave processing will be performed by the processing software (WaveView).

A12. Where is the datum point for the distance measurement?

A: It is at the point where the main sensor housing mates with the TRL/2 adapter. This coincides with the lowest end of the wave guide. The operating manual provides confirmation.

A13. How portable is WaveRadar Rex?

A: WaveRadar Rex may be dismantled into two sections. The sensor head assembly weighs 14kgs and the antenna dish assembly 11kgs.

A14. Can WaveRadar measure directional wave data?

A: Not directly although system integrators have achieved directional measurements via the installation of multiple WaveRadar sensors.

A15. The Rosemount Tank Radar web site describes the communication on a TRL2 bus and 8 to 10 or up to 16 units can be on one TRL2 bus. Do we need a Field Communications Unit (FCU) and FBM if we are operating just one WaveRadar?

A: No. The FCU is only used with Tank Radar. The FBM is supplied and is all that is required.

A16. Is there any local visual indication available to monitor the WaveRadar operation?

A: There is no integral indicator on WaveRadar but an optional local display unit, the RDU40, is available for installing close by. The RDU40 displays range and distance data and is BASEEFA03ATEX hazardous zone rated. Additionally the FBM 2180 is fitted with LEDs that flash when receiving data from the WaveRadar.

A17. How does the RDU40 connect to the WaveRadar?

A: The RDU40 can be connected via a three wire cable to the X12 terminal (the EEx i rated terminal block) on the WaveRadar.

B. Installation – Commissioning.

B1. How do we install WaveRadar Rex?

A: The unit is normally installed by extending the sensor over the side of the platform or structure. A mounting frame assembly is available from RS Aqua. It is designed to fit within a gap in the platform hand-rails, projecting outwards to offer the WaveRadar an unobstructed beam to the sea surface. It can be vertically rotated for ease of deployment and recovery. When in the deployment position it provides a barrier across the gap in the handrails. This application is particularly suitable for temporary/semi and permanent installations.

An alternative method of mounting the WaveRadar is to install it through the decking of the host platform, or other structure, aligned vertically to the water. The technique used is to remove a section of the decking/grating, cut an opening to suit the mounting plate and then assemble the WaveRadar REX around the section. It is secured via stainless steel nuts and bolts through the mounting flange plate. The mounting plate is made from stainless steel and it is recommended that insulating bushes be fitted to the mounting bolts to prevent electrolytic corrosion of the carbon steel decking.
It is strongly recommended that a grill or grating be used with this method and not a solid metal plate. Use of a solid metal plate may result in the introduction of spurious echoes.

B2. What cables should be used?

A: The recommended cables are: Power cable - to ESI standard, two core 1.5sq mm. PVC/SWA/PVC BLACK. Data cables - for both digital and analogue outputs are to BS 5308, one twisted pair 0.5sq mm. PVC/SCREEN/PVC/SWA/PVC. These can be purchased from RS Aqua Ltd.

B3. What are the integral junction box gland hole sizes?

A   There are three entry holes within the EEx e section of the junction box, being 2 x M25 and 1 x M20.

B4. What fittings do I require to connect cabling to the WaveRadar junction box?

A: A set of EEx dIIC, EEx e II cable glands is supplied with each WaveRadar (fitted to the junction box). Additional Hawk Exd glands, M20 – type 501/453 size OS and a Hawk Exd reducer M25 to M20 – type 25M-20F can be purchased from RS Aqua Ltd. Refer to the price list for costs.

B5. What are the correct connections to the Field Bus Modem?

A: The field bus cable is connected to terminals 2 and 3 of the screw terminal block. The FBM – PC cable should have the DSR, DTR, RTS and CTS connected in addition to the Tx, Rx and GND wires. The full hand shake is needed. The RTS line is used for FBM Tx/Rx control.

B6. How do we start WaveRadar?

A: Once the sensor is connected to the FBM, it will auto-start as soon as power is applied. The unit then performs start up and initialisation procedures, on completion of which it enters the first measuring cycle and commences a continuous output of data. When WaveRadar is operating it should not be interrupted. Any message sent to the radar will be interpreted as a query and the continuous output of data on the bus will cease. The communications processor will wait for a command message. If no message is received within 60 seconds the data output string will recommence but if, within this period, a further query is sent to the radar, the 60 second period will be re-activated from the time of that query.

B7. Are any special tools or test equipment required for assembling and installing WaveRadar Rex?

A: No, although a small spirit level would assist in checking vertical alignment of the assembled Rex.

B8. Please quote power consumption figures for WaveRadar Rex D.

A.   Between 460 and 610mA depending on setup configuration.

C. Operation - Servicing - Maintenance - Calibration.

C1. How often is re-calibration required and how is it performed?

A: Periodic calibration is not required. The microwave and electronics modules are designed with stability control circuits. In addition an integral digital reference oscillator checks measurement accuracy 6 times per second. Any errors, depending on their source and nature, are either self corrected or flagged in the output message.

C2. What is the recommended servicing routine?

A: An annual (or bi-annual) service is recommended when the antenna assembly and wave guide should be inspected for corrosion. If possible, monthly inspections should be undertaken but these are not essential. They would cover washing down the sensor with fresh water plus routine checks for damage, corrosion and security of fixings.

C3. What happens if the sensor it is hit by a wave.

A: Unless there is physical damage there will be no effect. The antenna is designed to deflect and shed water/spray quickly. If a wave enters the invalid zone (0-3 metres from the sensor head) only the minimum distance will be output ie. 3 metres, until the distance from the sensor increases again.

C4. Does vibration affect the sensor or it's measurements?

A: No. WaveRadar Rex is a solid state device and meets European vibration standards. Vibration has no effect on measurement routines but if the mounting or host platform sways or moves this may increase or decrease the measured distance data. In heavy vibration climates, the mountings and fixings should be checked regularly.

C5. Is WaveRadar attitude sensitive?

A: Yes, but commonsense will obviate any problems. There is no tilt sensor in the radar unit. The Rex should be assembled and checked to a vertical alignment at installation. The vertical accuracy of the mounting or frame should be to within +/-3 degrees. Assuming that this is achieved, the sensor itself can be leveled to +/-1.5 degrees by means of the 3 engraved alignment rings on the flange ball assembly. A spirit level should be used to check level alignment.

C6. Is WaveRadar affected by extremes of temperature?

A: No. The weather protection cover provides solar protection. A thermostatically controlled heater is incorporated in the electronics to provide stability in operation.

C7. What spares should I order for a new installation?

A: The WaveRadar is not supplied with any spares. However if the client's operational procedures require that spares are to be stocked, the main item to be considered is a spare FBM with it's RS232 - PC cable and mains/DC adapter.

C8. Is there a test unit that I can purchase?

A: No. The reliability and simplicity of set-up of the WaveRadar Rex is such that there is no need for a test unit. A simple check of the operational accuracy can be made by pointing the radar at a flat surface and physically measuring the distance from the Measuring Datum to that surface.

D. Documentation – Certification.

D1. What documentation is supplied with WaveRadar Rex?

A: A document pack consisting of Certificate of Conformity, Delivery Test Certificate, IP66/67 Certificate, UK Radio Communications Agency exemption notice (UK clients only), BASEEFA03ATEX Certification (or UL Certification), Declaration of Conformity (EMC Directive), Special Safety Instruction and an Operating Manual, accompanies each WaveRadar Rex.

D2. What certification applies for potentially explosive atmospheres?

A.   BASEEFA03ATEX Certification – EX11 1/2G, EEx d[ia] IIb T6 Class 1, Div1, Groups C & D.
B.   Underwriters Laboratory (UL) standard, listed 939U in the USA.
C.   Other countries certification is available, please contact RS Aqua for advise.

D3. Can we obtain a copy of the WaveRadar Rex operating manual?

A: Yes, please apply. An operating manual is delivered with each WaveRadar.

D4. Can I obtain a drawing for the optional mounting frame?

A: Yes. Drawings of the mounting frame are published in the operating manual. Drawings are also available in electronic form (CAD/Sketch/pdf/Word document) or as hard copy in A4 size.

E. Software.

E1. Do I need any special software to set up WaveRadar?

A: No. All set-up and configuration (to default values) procedures are performed by RS Aqua prior to dispatch.

E2. What data analysis software is available for WaveRadar Rex?

A: WaveView processing software is a Windows 98/2000/NT/XP program available from RS Aqua.

E3. What deliverables does WaveView offer?

A: WaveView provides comprehensive processing and display functions for raw distance measurement (Range), water level (Tide), significant wave height (Hs), mean zero crossing point (Tz), maximum wave height (Hmax), maximum wave crest height (HCrest), crest period (TC) and peak wave period (TP). Data are presented in numerical and graphical format on a single screen display. Spectral analysis is also performed to provide calculated results of energy and frequency data which are stored. Please refer to the WaveView brochure, which you can download from our web site.

E4. If WaveView software is not used, what is the documentation of the hardware and software protocol?

A: The message from WaveRadar Rex is a fixed length string of binary values that mainly contains address and command codes, byte counter, distance measurement of values in 1/10mm steps, radar status, other byte allocated data plus a two byte CRC check sum sequence. The output from the FBM is RS232 with a baud rate of 4800, 8 data bits, no parity and 1 stop bit. A full description is given in the WaveRadar Rex Operating Manual.

E5. Is a data output available from WaveView?

A: Yes. An ASCII serial data stream output is provided for remote applications. This one line of data comprises a date and time stamp, raw distance (Range), water level (Tide), significant wave height (Hs), mean zero crossing point (Tz), maximum wave height (Hmax), maximum wave crest height (HCrest), crest period (TC) and peak wave period (TP). It is available from the PC second COM port and is updated every minute.

E6. Can a datum offset be input to WaveView?

A.   Yes. A datum offset can be entered by the user via the on screen display controls.

E7. Is the raw distance measurement stored by WaveView?

A: Raw data in the form of distance measurements, with no offset for radar datum positioning and radar status data from the WaveRadar, are stored in a file created hourly. Control of storage is operator selected.

E8. How does WaveView calculate tide data?

A: The incoming data stream from the WaveRadar Rex (default 4Hz) is collected for 256 values (60 seconds approximately) and processed to derive a tidal value. The value is updated every minute. The tidal value is written to file.

E9. After the "tide level" is derived what type spectral processing does WaveView use to derive the wave parameters?

A.   Distance measurements are collected in an array and a Fast Fourier Transform is applied to produce Hs and Tz. Also from this array Hmax is produced.

E10. How often are WaveView displays updated?

A: Range and tide are updated every minute. On completion of the processing of the first wave array, approximately 30 minutes after start-up, the wave displays are updated every minute.

E11. How does WaveView store data?

A: All raw, processed and spectra data, with time tags, may be stored on the hard disk in a structured folder system. An additional text file is created every time the software is activated to log all actions, changes and events that are made to the display and data storage. This also logs any errors detected during processing or communications, while the software is running.

E12. Can we obtain a slave display of the WaveView screen?

A: No. Only the ASCII serial output stream of processed data, updated and transmitted every minute, can be displayed on the remote VDU.

E13. What is the WaveView "on screen information"?

A: Raw range data plus all processed parameters are presented in numerical and graphical format on a single screen display. The graphical display (strip chart) can be switched between parameters. Its time base and scaling can be changed by active user controls. Data storage and system information is also displayed.

E14. How do I know if WaveView is receiving data from the WaveRadar Rex?

A: The incoming raw data string is displayed in the input stream window in HEX with the distance measurement and the radar status information converted to decimal.

E15. Can WaveView give a warning if Hs exceeds a particular value?

A: WaveView can be operator configured to present a visual alarm if selected parameters fall or rise above user defined levels. There are two levels available: "red" (warning) and "amber" (caution).

E16. Can I run WaveView and use other programs as well?

A: Yes. The software will function normally in the minimised position and other programs can be operated so long as they do not conflict with the communications ports being used by WaveView.

E17. Does WaveView check for errors in the WaveRadar REX data?

A: Yes. The checks include readings that are outside the possible measured range and unchanged readings.

E18. Does WaveView have system status information?

A: Yes. A visual indication of PC time and date, HDD storage data and error conditions are contained within the screen display.

E19. What is the minimum requirement for running WaveView software?

A: The lowest specification for host hardware is 400Mhz PC with 125Mb RAM and 740Mb hard disk, with Windows 98/NT installed.

E20. How is WaveView supplied and is a manual included?

A: WaveView is supplied on a CD accompanied by an Operating Manual.

E21. Can we obtain a copy of the WaveView software manual?

A: Yes, please apply. An operating manual is delivered with each copy of WaveView.

E22. Can extra copies of WaveView be purchased at a discounted price?

A: Yes. Apply to the office for details.

F. Shipping.

F1. How is the WaveRadar shipped?

A: As standard the WaveRadar REX is shipped in a plywood pallet case with dimensions 80 x 60 x 60 cm at gross 45 Kg. The wood packing used meets the requirements of the International Standard for Phytosanitary Measures of ISPM-15 and bears the International Plant Protection Convention (IPPC) mark on the pallet case showing that the material has been subjected to an approved measure.

F2. How is the RS Aqua mounting frame shipped?

A: The mounting frame is shipped in a plywood pallet case with dimensions 150 x 75 x 60 cm, gross weight at 88 Kg. The wood packing used bears the International Plant Protection Convention (IPPC) mark on the pallet case showing that the material has been subjected to an approved measure.

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