

Wordentec WAVE QSK Operations Manual

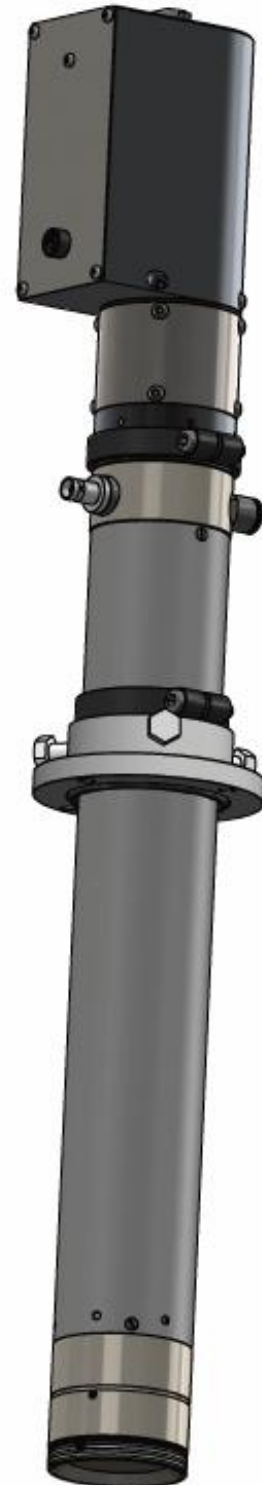
6 Way Crystal Head Assembly

1. Description

The new Wordentec high accuracy six position crystal head is the film measurement device used in the latest WAVE controlled deposition systems where accuracy and repeatability are of paramount importance.

2. Function

The Wordentec 6 way crystal head is used for high accuracy monitoring and measuring of thin film coatings during vacuum processes. The 6 way crystal head is ideal for longer process runs in particular because of the security from having six monitoring crystals in one body.



3. Technical Data

Physical Data

Assembly No.		19991-001
Overall Length	mm	634
Operating Length	mm	300
Body Diameter	mm	59
Crystal Diameter	mm	13.970
	Inch	0.550
Weight	Kg	4.1

Connections

Cooling Water		10mm Push Fitting
Crystal Signal Interface (Oscillator Connection)		Standard BNC (Female)
Control Connection		15 Way D-Type (Male)

Data

Leak Rate		mbar l/s	1×10^{-9}
Bake-out Temperature, Max (No Water)		°C	120
Bake-out Temperature, Max (With Cooling Water)		°C	400
Cooling Water Flow Rate	- Min	l/m	4
	- Max	l/m	6
Cooling Water Temperature	- Min	°C	15
	- Max	°C	25
Crystal Frequency		MHz	6
Guaranteed Life		Hours	10,000
Chamber Connection			QSK Clamp

In-Chamber Materials

Main Body	304 Stainless Steel
Water Connection Channels	304 Stainless Steel
QCM Body	Nickel Plated Brass
Crystal Cassette	Nickel Plated Brass
Front Cover	Nickel Plated Brass
Cassette Back	PEEK
Contact Block	PEEK
Cassette Pins	Gold Plated Brass
Contact Springs	Beryllium Copper

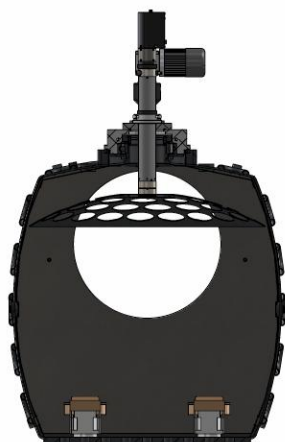
Accessories

Oscillator For SQM
Oscillator For IC5
BD104 QSK Adaptor
High Accuracy Crystal Chiller
Quartz Crystals

4. Installation and Connection

4.1. Ideal Position In The Chamber

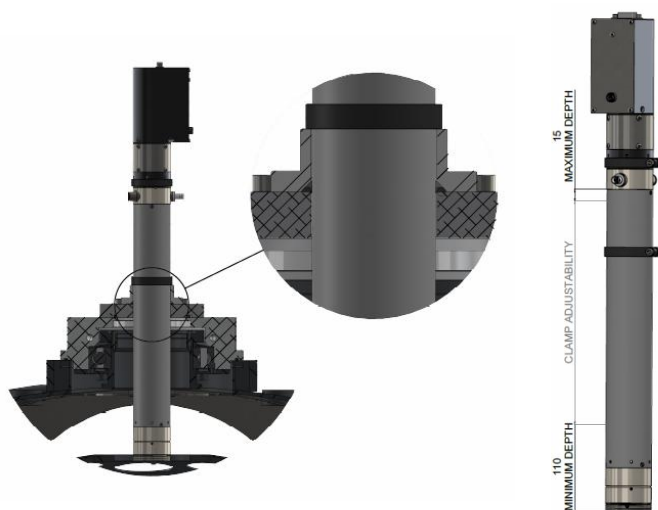
4.1.1. The crystal head must be fitted into the coating system in such a way that from the point of view of the evaporation process it is subjected to the same conditions as the object which is to be coated. When using one crystal head, a central position between sources is normally favoured with the crystal head front face at the same height as the centre of the substrate dome as shown in the image below.



If upgrading from the QSK610 or the QSK610a it is important that the new crystal head is positioned in exactly the same place as the old unit. We suggest taking some accurate measurements of the crystal head position before starting.

4.2. Positioning the Crystal Head and setting the height

4.2.1. Using a 5mm Allen key, ensure that the clamp ring is done up tight. Then position the crystal head in the designated hole at the top of the chamber with the QSK clamp and O-ring, but do not tighten the M6 bolts holding down the QSK clamp so the crystal head height can still be adjusted.



4.2.2. Loosen the clamp ring whilst holding onto the crystal head and adjust the height it will sit in the chamber. Once the desired height has been found, tighten the clamp ring up to lock its position. Then tighten the M8 Nylon bolts on the QSK clamp to keep the crystal head central and finally tighten the QSK clamp down to create a seal around the body.

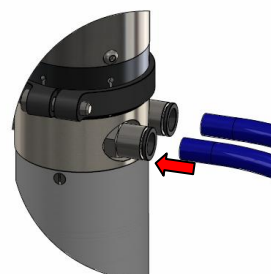
Attention!

Even fine transversal grooves and contaminations may cause leaks of considerable size.

Check the sealing surfaces of the flanges and the seals for scratches and blemishes. Damaged sealing surfaces should be re-polished concentrically with fine emery paper and afterwards carefully cleaned with a lint-free, alcohol drenched cloth and dried.

4.3. Attaching the water connections

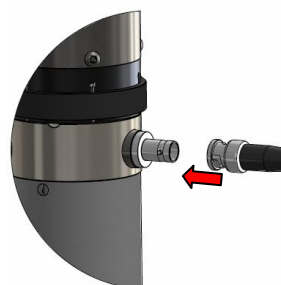
4.3.1. The cooling water connections are 3/8bsp parallel thread. These are fitted with 10mm push fit connectors. To connect the flow and return pipes to the crystal head, push the hose into the fitting until it hits the stop.



Check to make sure you cannot remove the hose by just gently pulling it. The connecting hose must have a 10mm outer diameter.

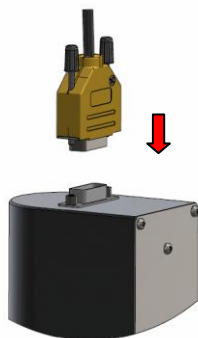
4.4. Attaching the BNC connector

4.4.1. The crystal frequency is read through the BNC connector; this will connect to the oscillator and then to your PC card or crystal readout. You should connect the oscillator as close as possible to the BNC connection to reduce the possibility of induced electrical noise in the circuit.



4.5. Control Connection

4.5.1. Connect the 15 way 'D' connector to the system.

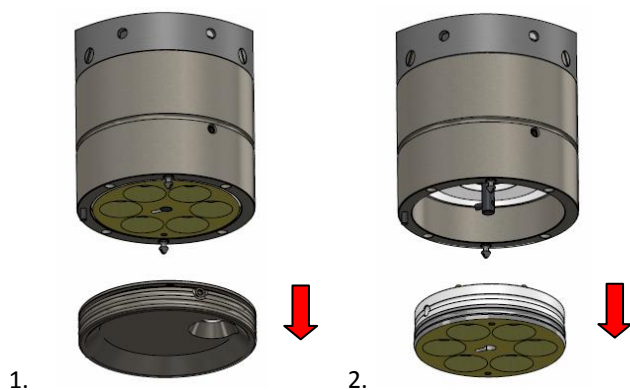


If upgrading from the Balzers QSK610A the control connection is the same however it may be necessary to change the connector hood from the clip type to the more modern bolted type. If upgrading from the older QSK610 with the circular connector it will be necessary to fit the WAVE QSK Crystal Head Controller (part number WCS-0249) to provide the correct automatic and manual signals. The new crystal head can also be integrated into a modern control system by providing the correct inputs and outputs.

5. Changing the Crystals

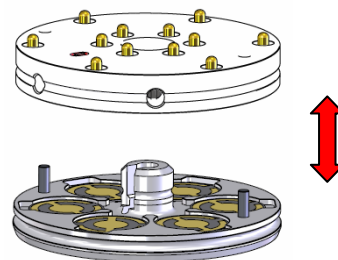
5.1. Removing the cassette from the assembly

5.1.1 With the crystal head bolted in position pull down the front cover to expose the crystal cassette; the cassette will drop slightly so that it can be removed. Gently pull the crystal cassette downward to release it from the crystal head body.



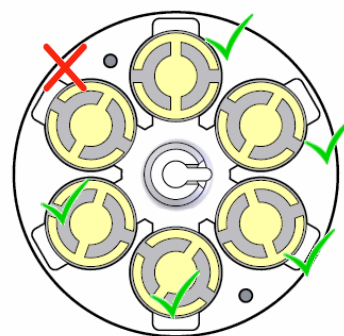
5.2. Separating the Cassette Assembly

5.2.1. Working on a bench, separate the two halves of the crystal cassette taking note that the [0] stamped on the top portion of the cassette is visible so that the assembly is not separated upside down.



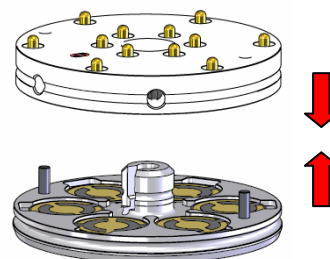
5.3. Changing the Crystals

5.3.1. Remove the old crystals and fit 6 new crystals of your choice taking care that they are positioned correctly. Ensure the gap in the crystal connector is not in line with the connector pin position as shown below.



5.4. Re-assembling the cassette and Crystal Head

5.4.1. With the new crystals fitted gently snap the two halves of the crystal cassette together taking care not to break the delicate crystals. Do not have any pressure applied over the cassette pins when assembling the cassette as this is the most common way crystals are broken. The cassette top will only fit one way on the offset pins and the stamped [0] must be on the outside of the assembly. Once the crystal cassette has been assembled we suggest it is kept horizontal to ensure the crystals do not move away from their supports.



5.4.2. Insert the cassette back into the crystal head where it should support itself when you let go. Then clip the front cover back on.

5.4.3. Rotate the crystal head using the controller to check that each crystal is fitted correctly and has a good frequency. A new, correctly fitted 6MHZ crystal will have a frequency of approximately 5.99 MHz.

6. Service

6.1. Re-adjusting the crystal position

6.1.1. This device is set up at the factory with the correct crystal alignment and also the correct tension of the snap springs located within the crystal cassette.

To re-adjust the crystal position, follow the steps below:

- Set the crystal head to position 1.
- Mark the crystal in the cassette at position 1.
- Loosen the clamp screw holding the motor assembly.
- Rotate the motor assembly anti-clockwise (looking from the top of the crystal head) until the crystal lines up exactly in the middle of the cover aperture.
- Tighten the clamp screw back up.
- Using the manual controls, move each crystal into position to check the alignment.

6.2. Re-adjusting the front cover spring tension

6.2.1. To re-adjust the front cover spring tension, follow the steps below:

- Remove the front cover from the crystal head.
- Make sure the spring is positioned so the 'gap' will be over the locating dowel pin when assembled to the main body as shown below.
- Adjust the two M2 bolts located on the side of the cover to suit the change you want to make. This will change the tension of the spring when located over the front cover pins.
- When fitted, the front cover should be in complete contact with the QCM body to form a good return circuit for accurate results.



7. Cleaning

7.1. Correct cleaning procedure

7.1.1. To ensure reliable operation the crystal cassette must be kept clean of coating debris. Do not sand blast the crystal cassette; instead use some IPA and a lint free cloth to clean the cassette face and connection pins. When blasting the front cover please mask the inner face and ensure that all of the blast media is removed before re-assembly.



Wordentec Limited, Lake Industrial Estate, Shebbear, Devon, UK, EX21 5SP
Tel: 01409 281853 Email: info@wordentec.com Web: www.wordentec.com
Vat Registration Number: GB790895963 Company Registered in England No: 4347418

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