Automatic, rotary-pump coating system

A versatile sputter coater and/or carbon coater for W-SEM applications

- Sputtering, carbon coating or both — in one space-saving design
- Fully automatic, touch screen control
- Sputters non-oxidising metals (e.g. Au, Pt, Ag and Pd)
- Carbon fibre evaporation — ideal for SEM (EDS and WDS)
- Controlled, pulsed carbon fibre evaporation — enhanced control and reproducibility
- Precise thickness control using the film thickness monitor option
- Easy-change specimen stages and coating head inserts
- Three-year warranty
Flexible, automatic coating

The Q150R is a fully automatic, compact, rotary-pumped coating system suitable for SEM and other applications requiring thin films of non-oxidising metals.

The Q150R is available in three formats:

- **Q150R S** – an automatic sputter coater for non-oxidising metals. Available sputtering targets including gold, gold-palladium and platinum.
- **Q150R E** – an automatic carbon fibre cord coater for SEM applications (e.g. EDS and WDS).
- **Q150R ES** – a combined system with both sputtering and carbon coating. The deposition head inserts can be swapped in seconds and the intelligent system logic automatically recognises which insert is in place and displays the appropriate operating settings.

The Q150R is mounted in a robust, purpose designed case which houses all the working components, including an automatic bleed control which ensures optimum vacuum conditions during sputtering. The vacuum chamber is 165 mm in diameter and includes an integral implosion guard. A rotary specimen stage is fitted as standard — with other stages available as options.

Fully automatic control using a colour touch screen ensures rapid data input and simple operation.

*Note: for high vacuum coating of non-oxidising and oxidising metals and for carbon evaporation suitable for TEM applications, please see the Q150T turbomolecular-pumped coating system.*

Quick and easy data entry and retrieval

Control is by a touch screen which allows even the most inexperienced or occasional operator to rapidly enter and recall their own process data. For convenience a number of typical coating profiles are already stored.

Interchangeable coating inserts

Interchangeable, plug-in style coating head inserts are available.

- Sputtering head insert, suitable for non-oxidising metals, standard with R S and R ES
- Carbon fibre cord evaporation head insert, standard with R E and R ES
- Carbon rod evaporation head insert, option for R E and R ES

For full details see: Ordering Information

Rapid, automated sputtering

The Q150R S and Q150R ES use easy-change, 57 mm diameter, disc-style targets which are designed to sputter non-oxidising (noble) metals — ideal for applications such as W-SEM. The Q150R S and Q150R ES are fitted as standard with a gold (Au) sputter target. Other targets options include Au/Pd, Pt/Pd, Pd, and Cu.

Platinum (Pt) can also be sputtered but the optional Pt coating vacuum hose assembly (13711) is required.
Automatic, controlled pulsed carbon fibre cord evaporation

Fitted as standard on E and ES models, this profile ensures that carbon is evaporated in short controlled pulses. This significantly reduces the amount debris (including large carbon fragments) associated with traditional carbon “flash” evaporation. It also allows the carbon evaporation process to be accurately controlled using the optional film thickness monitor (see below).

Pumping requirement
A suitable rotary vacuum pump is required. The Pfeiffer DUO 6 5 m³/hr two-stage rotary vacuum pump is recommended for this purpose.

Film thickness monitor
As standard, the Q150R determines film thickness by using a pre-set sputtering time. For a higher level of control and reproducibility the film thickness monitor (FTM) option allows the user to predetermine the coating thickness (in nanometres). The film thickness monitor (10454) uses an oscillating quartz crystal assembly, mounted in the coater vacuum chamber close to specimen stage. Process control is fully integrated into the Q150R – there are no external boxes or leads.

Easy-change, glow discharge option
An important application of glow discharge is the hydrophilisation (wetting) of TEM support films and grids. Other applications include surface modification, for example for enhancing polymer bonding. The glow discharge insert (10262) is available for R S and R ES models, has automatic control and can be quickly exchanged with other head inserts.

Extended height chamber
The optional extended height cylinder (10429) is a useful for when increased source-to-sample distance is required. For example, for tall samples and for use with the optional “Rotacota” stage (at higher tilt angles). It is also recommended for use with the optional carbon rod insert (10879).

Extensive specimen stage options
The Q150R has specimen stages to meet most requirements. All are easy-change, drop-in style (no screws) and are height adjustable (except for the rotary planetary stage). Some examples:

- Rotation stage: 50 mm Ø (supplied as standard)
- Rotate-tilt stage: 50 mm Ø with height adjustment. The tilt angle can be pre-set
- Variable angle, rotary planetary stage
- Large flat rotation stage for 4”/100 mm wafers
- Rotation stage for glass microscope slides

Examples of stages, shown with with optional FTM

Microscope slide stage
Rotation stage
Wafer stage
Rotacota planetary stage
Ordering Information

NB: For a full quotation, including on-site installation and user training, please contact us or our local distributor.

10417. Q150R S
Rotary-Pumped Sputter Coater. Includes a SC502-314A 57 mm Ø × 0.1 mm gold (Au) sputter target.

10419. Q150R F
Rotary-Pumped Carbon Coater suitable for SEM applications. Fitted with a carbon fibre evaporation insert. Supplied with 1 m of carbon fibre cord (C5421).

10418. Q150R ES
Rotary-Pumped Sputter Coater and SEM Carbon Coater. Includes a SC502-314A 57 mm Ø × 0.1 mm gold (Au) target and 2 m of carbon fibre cord (C5421).

Rotary pump requirements

13034. Pfeiffer 5 m³/hr DUO 6 two-stage rotary pump with oil mist filter.

Options and accessories

Coating inserts and glow discharge

10879. Carbon rod evaporation insert for 3.05 mm Ø rods (R E and R ES only). Includes a carbon rod shaper (13232) and wedge tool (2097). CS422 (3.05 mm Ø × 300 mm) packet of ten carbon rods.

10455. Additional carbon fibre insert. Supplied with 2 m of CS421 carbon fibre cord. Additional carbon supplies are available (see right).

10726. Additional sputter insert for quick metal change (R S and R ES versions only). NB: this is a complete sputtering assembly — individual targets can also be purchased (see right).

10262. Glow discharge insert. Used to modify surface properties e.g. hydrophobic to hydrophilic conversion (R S and R ES versions only).

Specimen stages

10357. Rotacota. Variable tilt angle stage with adjustable tilt up to 90°. 50 mm Ø specimen platform with six stub positions for 15 mm, 6.5 mm, M4 thread or 1/8" pin stubs.

10360. Variable angle, rotary planetary stage. A 50 mm Ø platform with six stub positions for 15 mm, 6.5 mm, M4 thread or 1/8" pin stubs.

10358. Stage for glass microscope slides. (two x 75 mm × 25 mm slides).

10458. Flat rotation stage for 4"/100 mm wafers. Includes gear box for increased coating area coverage.

10787. 4" wafer stage.

10808. Eight-place SEM stub stage. For 30 mm and 32 mm Ø stubs.

10856. 14-place SEM stub stage. For 25 mm and 30 mm Ø stubs.

11847. Fibre stage. Rotates fibres (up to 1 mm Ø) to ensure even coating.

12043. Cover slip stage. 92 mm Ø stage accepts nine 20 x 20 mm cover slips.

12305. Four-place 25 mm Ø SEM stub stage.

Other options

10454. Film thickness monitor (FTM) attachment. Including oscillator, feed-through, quartz crystal holder and two quartz crystals.

C5460. Spare quartz crystal.

10429. Extended height vacuum chamber (214 mm high — the standard chamber is 127 mm high). For increased source-to-specimen distance and for coating tall specimens.

10422. Rotating vacuum spigot. For a more convenient connection of the vacuum hose to the rear of the Q150R — useful if bench depth is limited.

13530. Coating shield assembly — reduces sputtering debris in the chamber.

11880. Extend height coating shield assembly.

10711. Platinum coating vacuum hose assembly — required for optimum coating with platinum (Pt).

Sputtering targets, carbon fibre and carbon rod
The Q150R S and Q150R ES are fitted as standard with a 0.1 mm thick gold (Au) target (SC502-314A). Targets are 57 mm Ø × 0.1 mm thick (unless specified otherwise). Pt targets require the optional 10711 vacuum hose assembly.

- SC502-314A/0.2 mm: Gold (Au) 0.2 mm.
- TK8889: Gold (Au) 0.3 mm.
- TK8891: Gold/palladium (Au/Pd – 80:20) 0.3 mm.
- SC502-314B: Gold/palladium (Au/Pd — 80:20).
- SC502-314B/0.2mm: Gold/palladium (Au/Pd – 80:20) 0.2 mm.
- SC502-314C: Platinum (Pt).
- SC502-314C/0.2mm: Platinum (Pt) 0.2 mm.
- TK8892: Platinum (Pt) 0.3 mm.
- TK8887: Platinum/palladium (Pt/Pd – 80:20%) 0.3 mm.
- SC502-314E: Silver (Ag).
- SC502-314H: Copper (Cu).

Carbon rod evaporation insert: C5421 (3.05 mm Ø × 300 mm) packet of ten carbon rods.

Carbon fibre evaporation insert: SC502-314H (1 m) carbon fibre cord. Supplied with 1 m of carbon fibre cord (C5421).

Carbon fibre cord (10 m).

Carbon fibre cord (1 m).

Carbon fibre cord (100 m).

Carbon rod evaporation insert: SC502-314A/0.2 mm gold (Au) target (SC502-314A).

Rotary-Pumped Sputter Coater. Includes a SC502-314A 57 mm Ø × 0.1 mm gold (Au) target and 2 m of carbon fibre cord (C5421).

Rotary-Pumped Carbon Coater suitable for SEM applications. Fitted with a carbon fibre evaporation insert. Supplied with 1 m of carbon fibre cord (C5421).

Carbon evaporation: C5422 (3.05 mm Ø × 300 mm) packet of ten carbon rods.

Carbon rods 3.05 mm Ø × 300 mm (unshaped) pack of 10.

Specifications

General

Instrument case: 585 mm W × 470 mm D × 410 mm H (total height with coating head open: 650 mm)

Weight: 28.4 kg (packed: 42 kg)

Packed dimension: 725 mm W × 660 mm D × 680 mm H

Work chamber: Borosilicate glass 150 mm ID × 127 mm H

Display: Size: 145 mm, resolution: 320 x 240 colour display.

User interface: Full graphical interface with touch screen buttons, includes features such as a log of the last 100 coatings and reminders for when maintenance is due.

Sputter target: Disc-style 57 mm Ø. 0.1 mm thick gold (Au) target (SC502-314A) is fitted as standard. R S and R ES versions only.

Specimen stage: 50 mm Ø rotation stage with rotation speed of 8-20 rpm. For alternative stages see: Ordering Information.

Vacuum

Rotary pump: 5 m³/hr two-stage rotary pump with oil mist filter (order separately, see 13034).

Vacuum measurement: Pirani gauge.

Typical ultimate vacuum: 2 x 10⁻⁶ mbar.

Sputter vacuum range: Between 7 x 10⁻³ and 1 x 10⁻¹ mbar for gold.

Processes

Sputtering: 0-80 mA to a predetermined thickness (with optional FTM) or by the built-in timer. The maximum sputtering time is 60 minutes (without breaking vacuum and with automatically built-in rest periods).

Carbon evaporation: A robust, ripple free DC power supply featuring pulse functions.

Evaporation ensures reproducible carbon evaporation from rod or fibre sources. Current pulse: 1-70 A.

Quorum Technologies Ltd | Judges House, Lewes Road, Laughton, Lewes, East Sussex BN8 6BN UK