Turbomolecular-pumped coating system

High vacuum sputtering, carbon and metal evaporation for SEM, TEM and thin film applications

- Sputtering, carbon and metal evaporation — all available in one space-saving design
- Fine grain sputtering — ideal for high resolution FE-SEM
- High vacuum sputtering of oxidising and non-oxidising metals
- High vacuum carbon coating — for SEM and TEM
- Pulsed or ramped carbon coating modes — for enhanced control and reproducibility
- Glow discharge, film thickness monitor, metal evaporation and aperture cleaning options
- Fully automatic touch screen control
- Easy-change specimen stages
- Three-year warranty
High vacuum, high resolution coating

The Q150T is a compact turbomolecular-pumped coating system suitable for SEM, TEM and many thin film applications.

The Q150T is available in three formats:

- **Q150T S** — a high resolution sputter coater for oxidising and non-oxidising (noble) metals. A wide selection of sputtering targets is available, including iridium (Ir) and chromium (Cr) which are highly recommended for FE-SEM applications.

- **Q150T E** — a high vacuum carbon coater, ideal for the production of highly stable carbon films for transmission electron microscopy (TEM) and SEM applications.

- **Q150T 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 Q150T is mounted in a robust, purpose designed case which houses all the working components, including the 70 L/s air cooled turbomolecular pump. Automatic bleed control ensures optimum vacuum conditions during sputtering. The vacuum chamber is 165 mm in diameter and includes an integral implosion guard. The Q150T has “vacuum shutdown” which enhances performance by allowing the chamber vacuum to be maintained when the system is not in use. A rotary specimen stage is fitted as standard, with other stages available as options.

**Easy data entry, rapid cycle times**

At its operational heart the Q150T has a colour 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.

**Flexible coating capabilities**

A range of interchangeable, plug-in style coating head inserts is available.

- Sputtering head insert. Suitable for oxidising and non-oxidising metals
- Carbon rod evaporation head insert (for 3.05 mm Ø rods)
- Carbon fibre evaporation head insert
- Metal evaporation and aperture cleaning head insert with the ability to evaporate upwards or downwards (TE and TES versions only). For full details see: Ordering Information

**Automatic, high resolution sputtering**

The Q150T S and Q150T ES use easy-change, 57 mm diameter disc-style targets which are designed to sputter an extensive range of oxidising and non-oxidising metals — ideal for W-SEM, FE-SEM and many thin film applications. The Q150T S and Q150T ES are fitted as standard with a 0.3 mm thick chromium (Cr) target (TK8845), but there are over 30 different target options available — please contact Quorum or visit our website for details.
Controlled, automatic carbon coating – pulsed or ramped evaporation modes

Controlled ramped carbon rod evaporation
Careful evaporation allows precise control of carbon thickness (with or without the optional film thickness monitor). The quality of the resulting carbon films is also enhanced by the eradication of “sparking” that is a common feature of less advanced coaters.

Controlled pulse carbon 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 of debris (large carbon fragments) associated with traditional carbon “flash” evaporation. It also allows the carbon cord evaporation process to be accurately controlled using the optional film thickness monitor (FTM).

Pumping requirement
A suitable rotary vacuum pump is required. The Pfeiffer DUO 6 5 m3/hr two-stage rotary vacuum pump is ideal for this purpose. Dry pumping alternatives are also available. See: Ordering Information for details.

Film thickness monitor and other options
Additional options include an extended height chamber for tall specimens, film thickness monitor (FTM) and a full range vacuum gauge for low and high vacuum measurement (a Pirani gauge is fitted as standard).

Pulsed cleaning for aluminium sputtering
Aluminium (Al) rapidly forms an oxide layer which can be difficult to remove, but the Q150T ES and Q150T S have special profiles for aluminium that reduce the oxide removal time and prevent excessive pre-sputtering of the target.

Extended height chamber
The Q150TE and T ES have extended height cylinders as standard. The increased source to sample distance is useful for tall samples and for use with the “Rotacota” stage (at higher tilt angles).

Importantly, it also allows sputtering and carbon evaporation to be done in separate chambers to minimise cross contamination.

Easy-change glow discharge option
The primary application of glow discharge is for the surface modification or wetting of newly evaporated TEM carbon support films.

Extensive specimen stage options
The Q150T 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 with optional FTM fitted
- Microscope slide stage
- Rotation stage
- Wafer stage
- Rotary planetary stage
**Ordering Information**

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

10027. Q150T S
High Resolution Turbomolecular-Pumped Sputter Coater, including a TK8845 54 mm Ø x 0.3 mm chromium (Cr) target

10028. Q150T E
High Resolution Turbomolecular-Pumped Carbon Evaporator, suitable for TEM and SEM applications. Fitted with a 10879 high vacuum carbon rod evaporation insert for 3.05 mm Ø carbon rods. Supplied with carbon rods (C5422 3.05 mm Ø x 100 mm) and a carbon rod shaper (manual operation)

10029. Q150T ES
High Resolution Turbomolecular-Pumped Sputter Coater and Carbon Evaporator, including a TK8845 57 mm Ø x 0.3 mm chromium (Cr) target and a 10879 high vacuum carbon rod evaporation insert for 3.05 mm Ø carbon rods. Coating inserts are interchangeable

**Rotary pump requirements**

13034 | Pfeiffer 5 m³/hr DUO 6 two-stage rotary pump with oil mist filter
11540 | Diaphragm pump. Vacuubrand MD1 23 L/m
20063 | Scroll pump. Edwards nXDS6i

**Options and accessories**

**Coating inserts and glow discharge**

10879 | Additional carbon rod evaporation insert for 3.05 mm Ø rods (T E and T ES only). Includes carbon rod shaper 13232 and wedge tool 2097. C5422 (3.05 mm Ø x 300 mm packet of ten) carbon rods
10455 | Carbon fibre insert. Supplied with 2 m C5421 carbon fibre cord. Additional carbon are available
10457 | Metal evaporation and cleaning aperture insert. Including the ability to evaporate upwards or downwards (T E and T ES version only). Supplied with a pack of 10 tungsten filaments (BS530) and a molybdenum (Mo) boat
10453 | Additional sputter insert for quick metal change (T E and T ES versions only). NB: this is an entire sputtering assembly — individual targets can also be purchased
10262 | Glow discharge insert. Used to modify surface properties e.g. hydrophobic to hydrophilic conversion (T E and T ES versions only)

**Specimen stages**

10357 | Rotacota. Variable tilt angle specimen 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 specimen stage. A 50 mm Ø specimen platform with six stub positions for 15 mm, 6.5 mm, M4 thread or 1/8” pin stubs
10358 | Specimen stage for glass microscope slides (two x 75 mm x 25 mm slides)
10458 | Flat rotation specimen stage for 4”/100 mm wafers. Includes gear box for increased coating area coverage
10787 | 4” wafer stage.
10808 | Eight-place stub stage. For 30 mm and 32 mm Ø stubs
10856 | 14-place stub stage. For 25 mm and 30 mm Ø stubs
11847 | Fibre stage. Rotates fibres (up to 1 mm Ø) to ensure even coating on all sides

**Other options**

12043 | Cover slip stage. 92 mm Ø stage accepts nine 20 x 20 mm cover slips
12305 | Four-place 25 mm Ø stub stage
10454 | Film thickness monitor (FTM) attachment. Including oscillator, feed-through, quartz crystal holder and two quartz crystals
C5460 | Spare quartz crystal
10428 | Full range gauge for high vacuum measurement (Pirani as standard)
10429 | Extended height vacuum chamber. (214 mm high — the standard chamber is 127 mm high). For increased source-to-specimen distance and for coating large specimens — standard with T E and T ES
10422 | Rotating vacuum spigot. For a more convenient connection of the vacuum hose to the rear of the Q150T — useful if bench depth is limited
13530 | Standard coating shield assembly
11880 | Extend height coating shield assembly

**Sputtering targets, carbon rod and carbon fibre.** For a full list of targets and carbon consumables please visit our website: www.quorumtech.com

**Specifications**

**General**

- **Instrument case:** 585 mm W x 470 mm D x 410 mm H
- **Weight:** 72.5 kg (packed: 57 kg)
- **Packed dimension:** 800 mm W x 660 mm D x 680 mm H
- **Work chamber:** Borosilicate glass 150 mm ID x 127 mm H
- **Display:** 104 mm x 240 mm x 240 mm colour display

**Rotary pump**

- **Rotary pump:** Pfeiffer 5 m³/hr DUO 6 two-stage rotary pump with oil mist filter
- **Scroll pump:** Edwards nXDS6i
- **Diaphragm pump:** Vacuubrand MD1 23 L/m

**Turbomolecular pump**

- **Internally mounted air-cooled:** 70 L/s Pfeiffer DUO 2200 4-bar turbomolecular pump

**Vacuum**

- **Sputter vacuum range:** Between 5 x 10⁻⁵ and 5 x 10⁻¹ mbar
- **Typical ultimate vacuum:** 5 x 10⁻¹ mbar
- **Sputter vacuum range:** Between 5 x 10⁻⁵ and 5 x 10⁻¹ mbar
- **Processes**
- **Spattering:** 0-150 mA to a predetermined thickness (with optional FTM) or by the built-in timer. The maximum spattering 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 evaporation ensures reproducible carbon evaporation from rod or fibre sources. Current pulse: 1-70 A
- **Metal evaporation and aperture cleaning insert (option):** For thermal evaporation of metals from filaments or boats. For cleaning TEM apertures a standard molybdenum boat (supplied) can be fitted

**Other options**

11036 | Eight-place stub stage. For 30 mm and 32 mm Ø stubs
11040 | Transparent carbon rod evaporation insert for 3.05 mm Ø carbon rods. Supplied in a separate pack of ten
11048 | Carbon rod shaper (manual operation)
11052 | Rear exhaust extension (for increased source-to-specimen distance)
11057 | Front exhaust extension (for increased source-to-specimen distance)
11061 | DI water feed-through, quartz crystal holder and two quartz crystals
11063 | Film thickness monitor (FTM) attachment. Including oscillator, feed-through, quartz crystal holder and two quartz crystals
C5460 | Spare quartz crystal
11065 | Full range gauge for high vacuum measurement (Pirani as standard)
11069 | Extended height vacuum chamber. (214 mm high — the standard chamber is 127 mm high). For increased source-to-specimen distance and for coating large specimens — standard with T E and T ES
11072 | Rotating vacuum spigot. For a more convenient connection of the vacuum hose to the rear of the Q150T — useful if bench depth is limited
11074 | Standard coating shield assembly
11078 | Extend height coating shield assembly
11085 | Cover slip stage. 92 mm Ø stage accepts nine 20 x 20 mm cover slips
11088 | Four-place 25 mm Ø stub stage
11089 | Additional carbon rod evaporation insert for 3.05 mm Ø rods (T E and T ES only). Includes carbon rod shaper 13232 and wedge tool 2097. C5422 (3.05 mm Ø x 300 mm packet of ten) carbon rods
11091 | Carbon fibre insert. Supplied with 2 m C5421 carbon fibre cord. Additional carbon are available
11093 | Metal evaporation and cleaning aperture insert. Including the ability to evaporate upwards or downwards (T E and T ES version only). Supplied with a pack of 10 tungsten filaments (BS530) and a molybdenum (Mo) boat
11095 | Additional sputter insert for quick metal change (T E and T ES versions only). NB: this is an entire sputtering assembly — individual targets can also be purchased
11099 | Glow discharge insert. Used to modify surface properties e.g. hydrophobic to hydrophilic conversion (T E and T ES versions only)
11103 | Rotacota. Variable tilt angle specimen 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
11106 | Variable angle, rotary planetary specimen stage. A 50 mm Ø specimen platform with six stub positions for 15 mm, 6.5 mm, M4 thread or 1/8” pin stubs
11108 | Specimen stage for glass microscope slides (two x 75 mm x 25 mm slides)
11110 | Flat rotation specimen stage for 4”/100 mm wafers. Includes gear box for increased coating area coverage
11112 | 4” wafer stage.
11115 | Eight-place stub stage. For 30 mm and 32 mm Ø stubs
11118 | Four-place stub stage. For 25 mm and 30 mm Ø stubs
11120 | Fibre stage. Rotates fibres (up to 1 mm Ø) to ensure even coating on all sides
11122 | Add a book cover

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