

# PP3006 CoolLok cryo transfer system for SEM, FIB/SEM and other vacuum platforms



## Product description

The CoolLok offers rapid transfer and cryo temperature observation of specimens for SEM, FIB/SEM, beamline or other suitable vacuum systems. Freezing is on contact with the pre-cooled SEM cold stage, or specimens can be rapidly pre-frozen in slushy liquid nitrogen using the optional 24429 freezing station

## System components

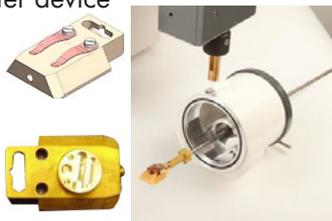
### Vacuum airlock and cooling gas feedthrough

Mounted onto a suitable vacuum chamber port, the CoolLok consists of a loading chamber body with built-in controls for pumping, venting and transfer. A custom-designed interface flange to the vacuum chamber and connections and fittings to the pumping system are included (see: Pumping below). The interface has cold nitrogen gas feeds to and from the microscope cold stage and cold trap.



### Specimen holders and transfer device

The compact vacuum transfer device has a bayonet fitting to a dovetail-profile specimen holder (shuttle). Standard shuttles are included, but optional holders allow a range specimen types to be handled.



## Quick overview

The PP3006 CoolLok offers rapid transfer and cryo temperature observation of specimens for SEM, FIB/SEM, beamline or other vacuum systems. Applications include thermal protection of beam-sensitive specimens and low temperature observation of materials such as plastics, polymers low-K dielectrics and hard-soft mixtures. The system can also be used for inert gas transfer of ambient temperature specimens from a glove box.

## Key features

- Rapid specimen exchange
- Temperature range down to  $-190\text{ }^{\circ}\text{C}$  with stability better than  $0.5\text{ }^{\circ}\text{C}$
- Off-column cooling with all-day runtime between fills
- Independent cooling of cold stage and cold trap
- Vacuum or inert gas transfer
- Rapid specimen freezing option (24429)
- Three-years warranty

## Cold stage and cold trap

A highly stable and thermally isolated nitrogen gas-cooled cold stage attaches to the SEM stage. The location and shape of the cold trap is tailored to suit the internal geometry of the microscope. Both cold stage and cold trap are capable of reaching temperatures down to  $-190\text{ }^{\circ}\text{C}$  with a stability of  $<0.5\text{ }^{\circ}\text{C}$ . For easy specimen exchange an interlocked LED chamber light is fitted.



The cold stage connects to the SEM stage using an adaptor and has a dovetail fitting to accept a cryo specimen holder. When not in use the cold stage is uncoupled and stored within the chamber with the gas and electrical fittings connected.

## Cooling dewar, trolley and controller

The cold stage and cold trap are cooled by a floor-mounted, vacuum isolated 21 litre dewar and heat exchanger assembly, which at normal operating temperatures can run for up to 24 hours between fills. The gas lines between the dewar and the SEM interface are vacuum isolated for maximum thermal efficiency.



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The cooling dewar is located on a floor-mounted trolley which also houses the temperature monitor/controller for the cold stage and temperature monitor for cold trap, plus nitrogen gas flow controllers.

## Rapid freezing station (24429)

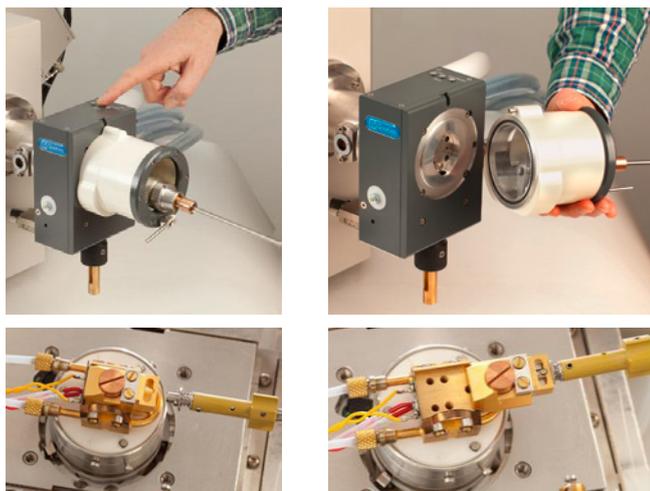
With the standard CoolLok, specimen freezing is by contact with the SEM cold stage following transfer and therefore freezing rates are relatively slowly. This is suitable for hard, non-hydrated specimens, but for liquid-based material rapid freezing is essential to reduce the detrimental effects of ice crystal growth and to allow through-vacuum transfer onto the cold stage.

For these applications the optional 24429 nitrogen slush freezing station is required. However, for many applications (especially lifesciences) cold fracturing and sputter coating are essential process steps and require the advanced capabilities of the Quorum PP3010T – a full cryo-SEM preparation system.

## Using the CoolLok

The specimen is mounted on a suitable holder (shuttle) and the transfer device fitted onto the airlock and the dead space evacuated to a set vacuum level. The gate valve is opened and the specimen guided onto the SEM stage.

For transfers from other vacuum systems, or a glove box, additional interface flanges are available on request. Vacuum transfers can be made from the optional 24429 trolley-mounted nitrogen slush freezing station, if fitted.



## Pumping

The CoolLok requires either a rotary pump or an oil-free turbo pumping station (see Ordering information).

Ordering information	
NB: For a full quotation, including on-site installation and customer training, please contact us	
PP3006	CoolLok Cryo transfer system, consisting of:  Airlock assembly. Pump and vent control buttons, gate valve and fittings to the pumping system (see: Pumping below). Custom-designed interface flange to the microscope vacuum chamber.  Cooling system. Nitrogen gas cooled stage with heater and sensor and cold trap with temperature sensor. Precise temperature control with a range down to 190°C, 21 litre liquid nitrogen dewar with trolley, heat exchanger and LED chamber light.
Specimen holders	
12340	Specimen transfer device
AL200077B	3x Specimen shuttle (to hold 10 mm Ø cryo stubs)
12434	Specimen shuttle blank
20720	Specimen shuttle with holding clips
E7402	blank 10 mm stubs – packet of 10
E7449-7	5x Multi-purpose specimen stubs
Specimen mounting compounds (colloidal graphite and Tissue-Tek®), interlock cable and pump fittings.	

Pumping requirements	
The PP3006 CoolLok requires either a rotary pump or an oil-free, high vacuum turbomolecular pumping station (recommended)	
13034	5 m <sup>3</sup> /hr Pfeiffer Duo 6 rotary vacuum pump with oil mist filter
24426	Pfeiffer HiCube 80 turbomolecular and diaphragm pumping system
The range of specimen holders available with the PP3010T can be used with the PP3006.	

Options and accessories	
24429	Rapid cooling station consisting of a floor-mounted trolley, liquid nitrogen freezing chamber mounted into the work surface which interfaces to the cryo transfer device, connections to vacuum pump (order separately).
PP7450/60L	Pressurised (60 l) liquid nitrogen dewar. Boil-off nitrogen gas is used to cooling the stage and cold trap.
13296	Sircal in-line gas dryer. Helps to reduce water content of nitrogen gas supply if an external gas source is used