

## Perfusion rate/hydraulic resistors

### Background/description

- These resistances control the rate of flow of water (or air from the manometric perfusion pump into the transducer of each measurement channel).
- The development of miniature and micromanometry has required that hydraulic resistors are available for a wide range of infusion rates.
- Dentsleeve has developed two types of hydraulic resistors that meet the requirements of all types of perfused manometry.
- The compact resistor offers significant advantages over other types.

### Standard resistors

These consist of a tubing coil connected at either end to female luer connectors.

Standard resistors are made entirely from plastic materials which are extremely robust, and the coiled tubing stretches to at least 20cm between the luer connectors.

The different physical layout of our horizontal (Mark II) and vertical (Mark III) pumps require use of standard resistors that have a different configuration of the tubing section. We therefore produce Mark II and Mark III versions of the standard resistors.

See the table for the flow values that are available, and for the colour-coding system that identifies the flow value for each resistor.

These resistors are suitable for all types of manometric perfusion pumps.

Autoclaving is not recommended as this destroys the tube coiling.



Compact resistor

### Compact resistors

A compact resistor is illustrated in the photograph below. The hydraulic resistance is installed within a black anodised aluminium casing.

A silicone rubber luer installed in the casing connects to the transducer, and an uncoiled silicone rubber tube delivers perfusate to the resistor circuit from the manometric perfusion pump.

The absence of a coiled resistance tube greatly improves the appearance of the resistor and enhances the function as there are no coils to stretch and tangle.

The neatness of this resistor type makes it especially suited to manometric perfusion pumps which have channel spacings that are less than 36 mm. One design suits both Mark II and Mark III pumps.

The flow value of the resistor is engraved on the lid of the casing, so there is no need for colour coding.

The compact resistor has zero deadspace luer connectors so that it is self-debubbling—a technical advance which helps ensure that measurements are of the highest possible quality.

These resistors are autoclavable, having been validated to withstand 30 to 50 cycles without impairment of function.

Back flushing of the compact resistor requires a very simple and inexpensive tool which supports the silicone rubber luer externally so that the very high pressures generated by syringe flushing do not result in leakage from the luer.

The flush tool is available from Dentsleeve (part code FTO/CR/1).

### Performance

Water infusion rates can be controlled from 0.01 ml/min to 0.6 ml/min (see table) at a driving pressure of 15 psi or 100 kpa.

The range of infusion rates covers all types of Dentsleeve extrusions.

Fractional adjustments of infusion rates can be made by variation of the standard perfusate reservoir driving pressure of 15 psi or 100 kpa from between 7.5 to 20 psi, or 50 kpa to 133 kpa, the flow variation being approximately linear in relation to the driving pressure.

### Hydraulic resistor blockage

Partial or complete blockage of resistors causes unacceptable degradation of pressure rise rates by uncontrolled reduction of manometric infusion rate.

### Correction of hydraulic resistor blockage

This is done by vigorous backflushing of resistors from the end that is attached to the transducer.

### Limitations

- Perfusate must be filtered to prevent resistor blockage (see *Water perfusate filtration*, page 59).

### Product and colour code for Dentsleeve hydraulic resistors

Standard resistors			ml/min	Compact resistors	
Number	PEEK tube colour	Luer screw fitting colour		Number	Printed with flow rate
HRE/ST/1	Black	White	0.01 ml	HRE/CO/1	
HRE/ST/2	Black	Black	0.02 ml	HRE/CO/2	
HRE/ST/4	Yellow	White	0.04 ml	HRE/CO/4	
HRE/ST/8	Red	White	0.08 ml	HRE/CO/8	
HRE/ST/15	Red	Black	0.15 ml	HRE/CO/15	
HRE/ST/30	Green	White	0.30 ml	HRE/CO/30	
HRE/ST/45	Green	Red	0.45 ml	HRE/CO/45	
HRE/ST/60	Green	Black	0.60 ml	HRE/CO/60	