

The electrical feedthrough of a piston cylinder cell is the central part of the device. It is also the most delicate and critically it is where all the fine connections are. Almax easyLab supplied its piston cylinder cells with 3 completely epoxied, wired and connected feedthroughs as default. Some variations are possible and they are explained in this application note.

Pre-wired feedthroughs (Default) (SKU: A02005/A17003 (*))

Each feedthrough is epoxied with a low temperature compatible epoxy with 6 twisted 0.1mm copper wires. Each pair is coloured coded for ease of identification.

- 2 pairs for the sample (4 wires)
- 2 pairs for the Manganin coil (300K manometer)
- 2 pairs for the Tin (Sn) (Low T manometer)
- Plastic platform (2x5mm approx.) mounting platform

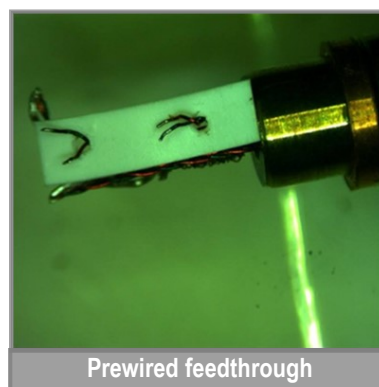
The default option might not be the most suitable for your experiments: requirement for more wires, more space for your sample, special set up... In this case, Almax easyLab can supply the feedthroughs with the epoxied pairs only. It is important to flag this at the time of ordering though!

Epoxied only feedthroughs (SKU: A02007/A17006)

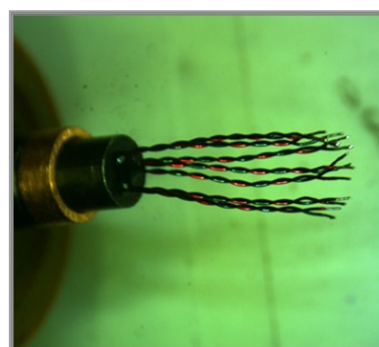
As above the 6 twisted pairs of wires are epoxied but no connections have been prepared as shown in the figure on the left. Twisted pairs are pre-tinned and pairs are still colour coded for ease of identification. The Sn and Manganin manometer coils are provided and you can decide to connect them or not as best fit for your experiment. Guidance for connections are provided in the user guide of the cell.

Feedthroughs only (SKU: M02006/M17009)

You might also want to use different types of wires, vary the number of wires, fit other types of connections (coaxial, optical fibre). In this case, Almax easyLab can also provide you with the feedthrough only. The feedthroughs are made of very hard super alloy and come supplied in the heat-treated condition. The epoxying is left to you. Note that we cannot provide with our own recipe to carry out this epoxying.



Prewired feedthrough



Epoxied only feedthrough



Feedthrough only

When you make your own connections, we recommend you to keep in mind the following good high pressure practice:

- Always use a low temperature manometer as the pressure varies as the cell is cooled down. A manometer will enable you to check the pressure at around 4 K and usually this one remains constant up to around 100 K. It needs to be connected with 4 wires.
- Using a room temperature manometer is recommended during the pressurisation of the cell. It is possible to connect the manganin coil with only 2 wires as the resistance is high enough. In this case the measurement will be less accurate but still sufficient.

The table below gives a couple of possible variations

	Option 1	Option 2
Sample	6 wires	8 wires
Sn	4 wires	4 wires
Manganin	2 wires	-

Magnetic field: Magnetoresistance v Hall effect

These piston cells are particularly suited to be used in a superconducting magnet often providing a vertical field parallel to the main axis of the pressure cell. It is possible to position the sample either according to the long axis (left hand side view) or the short axis (right hand side view) to measure respectively, magnetoresistance ($i//H$) or Hall-effect ($I \perp H$). One needs to be mindful that when the sample is mounted for Hall effect measurements, then the space is reduced to fit the sample to a length of around 1.50 to 2.00 mm.



Custom set ups

Many of our customers have made their own set up over the years and we present below few examples of possible set ups.

