



Model 470
Glove Box Cable Set



Issue 1.02

MODEL 470 Glove Box Cable Set

CONTENTS

Section	Page
Safety Precautions	5
Equipment Use	5
Grounding	5
Explosive Atmospheres.....	5
Live Conductors	5
Connection and Disconnection of Devices.....	5
Safety Symbols	5
Avoid Unsafe Equipment.....	6
Equipment Modification.....	6
Solutions & Environment.....	6
Storage	6
Accessories and 3 rd party equipment	6
Deutsch - Français - Italiano	6
Chapter 1 Introduction	7
Chapter 2 Contents	9
Electrometer Cables (HC470ELE-L)	10
Piezo Strain Gauge Cable (HC470PSG).....	11
Scan Stage Cable (HC470STG):	12
3300 Cell Cable (HC3300CL)	13
Piezo High Voltage Drive Cable (HC470PD)	14
Chapter 3 Assembly	15
Connection of cables.....	19
Chapter 4 Specifications	21
Cables:.....	21
Bulkhead Fittings:.....	21
Cable connectors	22
Chapter 5 Technical Support	24

Safety Precautions

The M470 Glove Box Cable Set described in this manual complies with the Low Voltage Directive (LVD) 2014/35/EU. To avoid injury to an operator or service technician the safety precautions given below, and throughout the manual, must be strictly adhered to whenever the equipment is installed, modified, used, serviced or repaired. For specific operational details refer to the relevant section within this manual.

The manufacturers and distributors accept no responsibility for accidents or damage resulting from any failure to comply with these precautions.

EQUIPMENT USE

The M470 Glove Box Cable Set is designed solely for use with the M470 Scanning Electrochemical Workstation and should be used for no other purpose. This equipment is to be used by **TRAINED PERSONNEL ONLY**. All personnel are to familiarise themselves with the following safety requirements before any use of the product.

GROUNDING

To minimise the hazard of electrical shock it is essential that the equipment's mounting panel (also referred to as "bulkhead") is conductive and is connected to a protective ground whenever the M470 power supply is connected, even if the M470 is switched OFF.

EXPLOSIVE ATMOSPHERES

NEVER OPERATE the Model 470 Glove Box Cable Set, the M470 Scanning Electrochemical Workstation equipment, or any units connected to the equipment (FRA, PSTAT etc.) in a potentially explosive atmosphere. These items are NOT 'Intrinsically Safe' and could possibly cause an explosion.

LIVE CONDUCTORS

When the M470 Glove Box Cable Set is connected to any device, including the M470, **THE DISCONNECTION OF CABLE PLUGS OR SOCKETS IS EXPRESSLY PROHIBITED** due to the exposure of live conductors and the safety of users and equipment.

CONNECTION AND DISCONNECTION OF DEVICES

CAUTION! Never connect or disconnect cabling or electronic devices while the equipment is powered (See "Live Conductors", above). Always turn-off the equipment before adding or removing connections, electronics or other powered devices.

Failure to comply can result in damage to the equipment.

SAFETY SYMBOLS

For guidance and protection of the user, the following safety symbols appear on the equipment and in this manual (where relevant):

Symbol

Meaning



Caution, risk of electric shock.



Earth (ground) TERMINAL.

AVOID UNSAFE EQUIPMENT

The equipment may be unsafe if any of the following statements apply:

- Equipment or cables shows visible damage.
- Equipment or cables have failed to perform the intended operation.
- Equipment or cables have been subjected to prolonged storage under unfavourable conditions.
- Equipment or cables have been subjected to severe physical stress.

If in any doubt as to the serviceability of the equipment, do not use it. Get it properly checked out by a qualified service technician.

EQUIPMENT MODIFICATION

To avoid introducing safety hazards, never install non-standard parts in the equipment, or make any unauthorised modification. To maintain safety, always return the equipment to your supplier for service and repair.

SOLUTIONS & ENVIRONMENT

Keep cables and connectors dry and away from liquids. Do not operate the system in high humidity levels that may cause condensation. Do not operate, connect or disconnect cables while wet.

STORAGE

When the system is not in use, ensure that the system has been left in good order and is clean and fit for purpose. Ensure that it is covered to prevent dust ingress and that it is not left in a high humidity environment.

ACCESSORIES AND 3RD PARTY EQUIPMENT

Always refer to the manuals of any item that is to be used in conjunction with the M470.

DEUTSCH - FRANÇAIS - ITALIANO


These Safety Precautions are available in German, French and Italian on request.

Diese Sicherheitshinweise sind in Deutsch, Französisch und Italienisch auf Anfrage erhältlich.

Ces précautions de sécurité sont disponibles en allemand, Français et italien sur demande.


Queste precauzioni di sicurezza sono disponibili in tedesco, francese e Italiano su richiesta.

Chapter 1 Introduction



Caution!

Incorrect use can potentially expose
High Voltage conductors. Read all
Safety precautions and instructions!



The M470 Glove Box Cable Set is intended to allow the user to mount the M470 scan head within a glove box, while maintaining the control electronics outside that environment. The following M470 modules are supported by this cable set:

M470 Technique:	Additional support requirements not supplied here:
Electrochemistry & Corrosion	none
SECM-3300 (dc and ac)	none
ic-SECM-3300 (dc and ac)	none
SKP (including CHM and CTM)	1. BNC bulkhead feed-through.
SVP	none
LEIS	none
SDS (dc and ac)	1. Mains required for SDS pump. 2. Additional earth point.

Please note: OSP is not supported by this Cable Set.

Other items that may need consideration are the VCAM/camera and its display. If mounted within the glove box alongside the M470 scan head, this requires only a mains supply.

Chapter 2 Contents

The following contents may be provided individually, as a full set, or as a mixed variety of cables depending on the M470 electrical modules to be supported. The following subsections outline all the cables that can be provided, and how many are required per M470 module including the absolute maximum number that would be required to support a full system.

The Piezo Strain Gauge, Piezo Drive, Scan Stage and 3300 electronic/electrical module has a glove box cable support requirement that comprises:

- External cable: That which connects from the SCV470 control box to the glove box's external bulkhead.
- Internal cable: That which connects within the glove box, from the equipment sited there to the glove box's internal bulkhead.
- Bulkhead connector: That which provides the hermetic seal and electrical connectivity to couple the above cables.

The Electrometer electronic/electrical module has a glove box cable support requirement that comprises:

- External cable: That which connects from the SCV470 control box to the glove box's external bulkhead.
- Bulkhead connector: That which provides the hermetic seal and electrical connectivity to couple the above cables.

Most bulkhead connectors comprise the connector itself, the sealing O-ring, a locknut washer and a securing nut. The exceptions to this are the 3300 cell cable, which does not include the locknut washer, and the Electrometer cable which does not include a sealing O-ring.

Electrometer Cables (HC470ELE-L)

This cable provides the requirements for the at-head electrometer and is required by the LEIS, SVP, and SKP modules. A maximum of one HC470ELE-L is required for a single M470. Note unlike the other cables, the Electrometer cable connects directly to the internal bulkhead connection.

External Cable (x1):



Bulkhead connector (x1): LEMO SGJ.1B.308.CLLPV



Piezo Strain Gauge Cable (HC470PSG)

This cable provides the requirements for the piezo strain gauge and is required exclusively by the ic-SECM module. A maximum of one HC470PSG is required for a single M470.

External Cable (x1):



Internal Cable (x1):



Bulkhead connector (x1): Jaeger 533 106 006



Scan Stage Cable (HC470STG):

This cable provides the requirements for a single scan head axis. **Three** HC470STG cables are required to support the standard scan head x, y and z axes. HC470STG provides one set.

External Cable (x1):



Internal Cable (x1):



Bulkhead connector (x1): Jaeger 533 108 006



3300 Cell Cable (HC3300CL)

This cable provides the requirements for a single 3300 potentiostat and is required by the SECM module (with two 3300s), ic-SECM module (with two 3300s), SDS module (with one 3300), and LEIS module (with one 3300). SVP may also require a HC3300CL cable set if an SVP-only system has been supplied with a 3300 potentiostat. HC3300CL provides one set, and a maximum of two sets are required for an M470.

External Cable (x1):



Internal Cable (x1):



Bulkhead connector (x1): Jaeger 533 125 006



Note: A locknut (washer) is NOT provided with this connector.

Piezo High Voltage Drive Cable (HC470PD)



This cable provides the requirements for the piezo element and contains high voltage. This cable is required by SVP, SKP and ic-SECM. A maximum of one HC470PD is required for an M470.

Caution should be maintained where connection and disconnection of the cable is performed as even after power is disconnected, the piezo can still maintain its charge.

The HC470PD cable set is provided secured so that the High Voltage output pins are not accessible to the user at any time.



Under no circumstances should the combined internal cable & bulkhead connector be separated.

External Cable (x1):



Combined: Internal Cable and Bulkhead connector (x1): Jaeger 533 103 006




Nb. Internal cable connector secured to the bulkhead connector to prevent exposure of live pins.

Chapter 3 Assembly

To enable the scan head and control electronics to be separated, the M470 Glove Box Cable Set is used between the XYZ scan head and the associated electronics and the M470 main control electronics housed within the SCV470. The bulkhead connectors shown in the previous chapter should be mounted to your glove box's bulkhead (or cable port). As each glove box manufacturer can use their own arrangement for this facility, the following assumes adequate space is available for all connectors.

Mounting-hole dimensions for each of the bulkhead connectors is outlined below. Additional information can be found in the Jaeger Connectors' catalogue for the HC470PSG, HC470PD, HC470STG, and HC3300CL connectors. Please refer to <https://www.hummel.com/jaeger-connecteurs/>. For the HC470ELE-L connector more information can be found in the LEMO catalogue. Please refer to <https://www.lemo.com/en>.

Design guidelines:

- Prior to making any changes to the equipment, mount the M470 scan head and electronics inside the glove box in a trial-run to check for suitable placement of the following options:
 - Reach of the cable set from the instrument to the intended bulkhead location.
 - The range of movement of the scan head is not restricted.
 - Reach of the gloves to access the electrochemical cell and the instrument.
 - Positioning / location of the VCAM/camera and its display, if used.
- Ensure sufficient space between mounting-holes so that access to each individual connector can be made by a suitable spanner for tightening and/or loosening.
- Assemble the connectors with the smooth bevel and O-ring on the inside of the glove box (this part provides the seal), and the securing nut and grooved locknut (washer) on the outside.
- When mounting, ensure the bulkhead connector's main body key sits in the panel mounting hole described by dimension 'B' in figure 2 before tightening the nut and sealing the connector.
-  Ensure that the glove box bulkhead panel is earthed to maintain both safety (in the case of the High-Voltage) and the connectors' shielding of the sensitive signals. Where the panel is not conductive, use a thin sheet of metal plate on the outside of the glove box (or glove box bulkhead panel) to provide the same function.
- The SDS module requires that an earth point is provided on the inside of the glove box. This may be taken from the earthed bulkhead panel, if convenient. Mechanism to provide this is not provided in this cable set.
- Consider any other requirements, as outlined in Chapter 1.

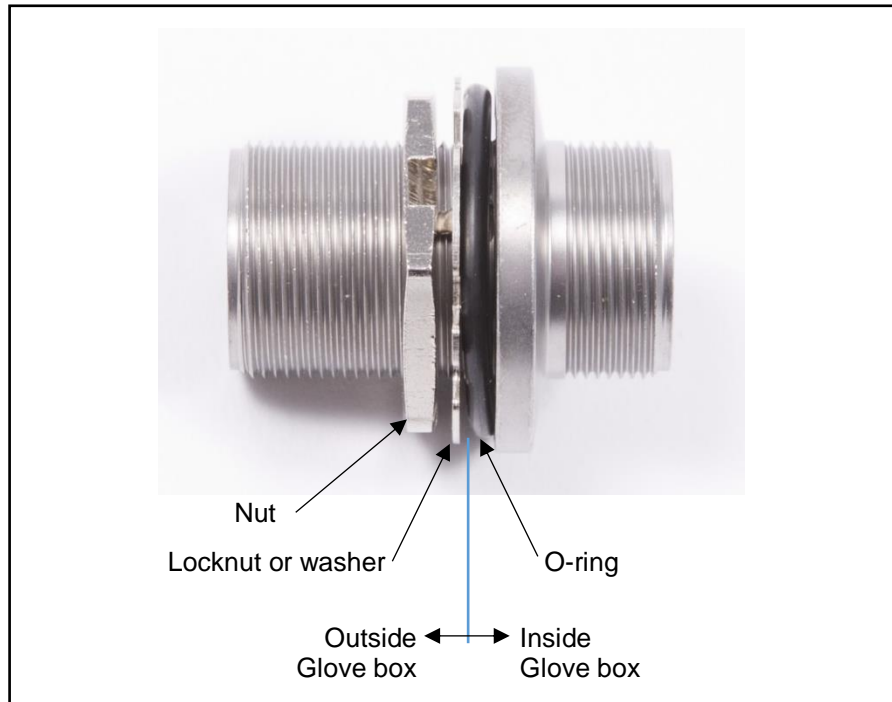


Figure 1. Jaeger bulkhead connector assembly.

The following table describes the mounting-hole requirements for the HC470PSG, HC470PD, HC470STG, and HC3300CL bulkhead fitting, as defined in Figure 2.

Cable	Connector	Housing [†]	A	B	C	D
Piezo Strain Gauge	533 106 006	1	21.1	2.5	24.9	34
Piezo High Voltage	533 103 006	1	21.1	2.5	24.9	34
Scan Stage	533 108 006	2	27.1	2.5	30.9	40
3300 Cell Cable	533 125 006	4	45.1	1.6	47.4	62.2

Table 1. Dimensions of the connectors' cut-outs for the bulkhead fittings. See Figure 2.
All dimensions are given in millimetres.

[†] As specified in <http://www.jaegerconnecteurs.com>

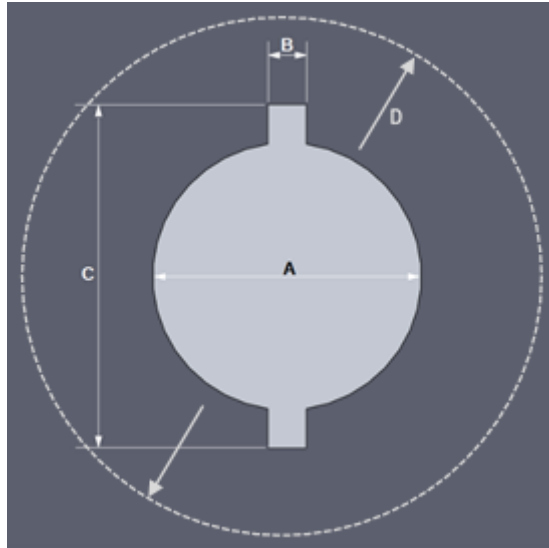


Figure 2. Panel cut-out dimensions for Jaeger Hermetic connector series: attachment by locknuts.
Do not scale from this drawing.

The minimum/maximum panel thickness is specified between 2 and 4 millimetres. Panels that are thicker than this will need a recess-cut with a diameter of at least that shown in table 1, column 'D' so that the specified panel thickness is presented to the connector.

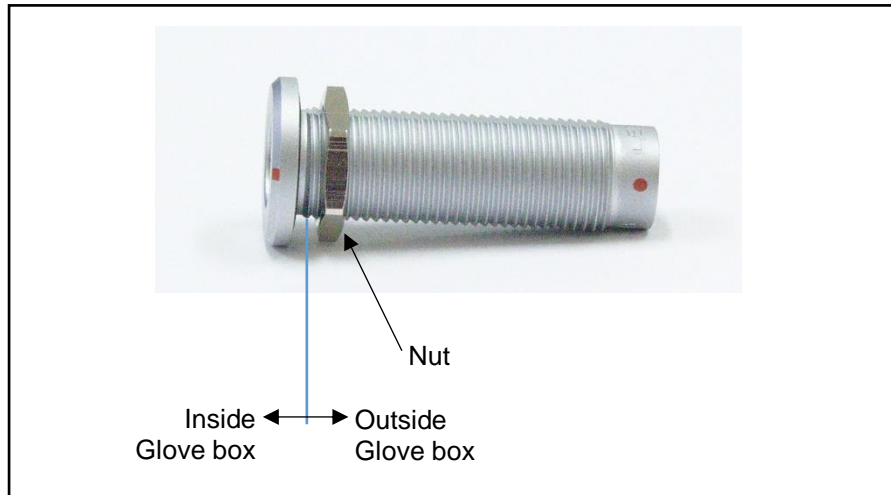


Figure 3. LEMO bulkhead connector assembly.

The following table describes the mounting-hole requirements for the HC470ELE-L, bulkhead fitting, as defined in Figure 4.

Cable	Connector	Series [±]	øA	B	C (min)
Electrometer	SGJ.1B.308.CLLPV	1B	12.1 (+0.1/-0)	10.6 (+0.1/-0)	19

Table 2. Dimensions of the connectors' cut-outs for the bulkhead fittings. See Figure 3. All dimensions are given in millimetres.

[±] As specified in https://www.lemo.com/catalog/ROW/UK_English/unipole_multipole.pdf

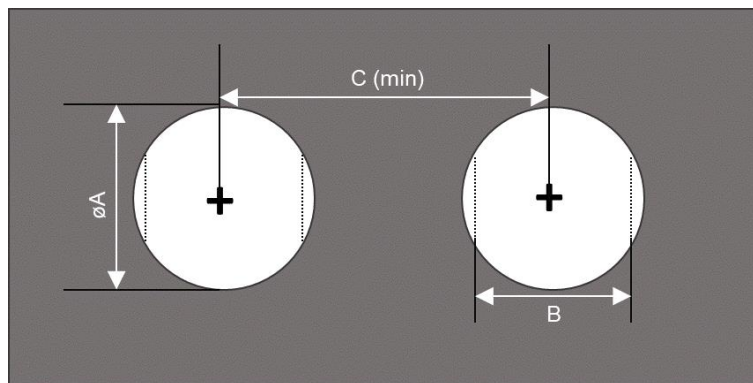


Figure 4. Panel cut-out dimensions for LEMO connector series: attachment by locknuts. Do not scale from this drawing.

The maximum allowable distance between the flange end and the locking nut of the SGJ.1B.308.CLLPV connector is 28 mm.

Figure 5 indicates an example glove box bulkhead connector plate. A bulkhead may be provided as part of the glove box by the supplier, or be integrated into an existing glove box by the user. Where there is no conductive bulkhead or the bulkhead is not conductive, the user must provide a thin conductive panel that the connectors secure against. It is recommended

that this panel is mounted on the outside of the glove box so that the internal sealing surfaces are not compromised.

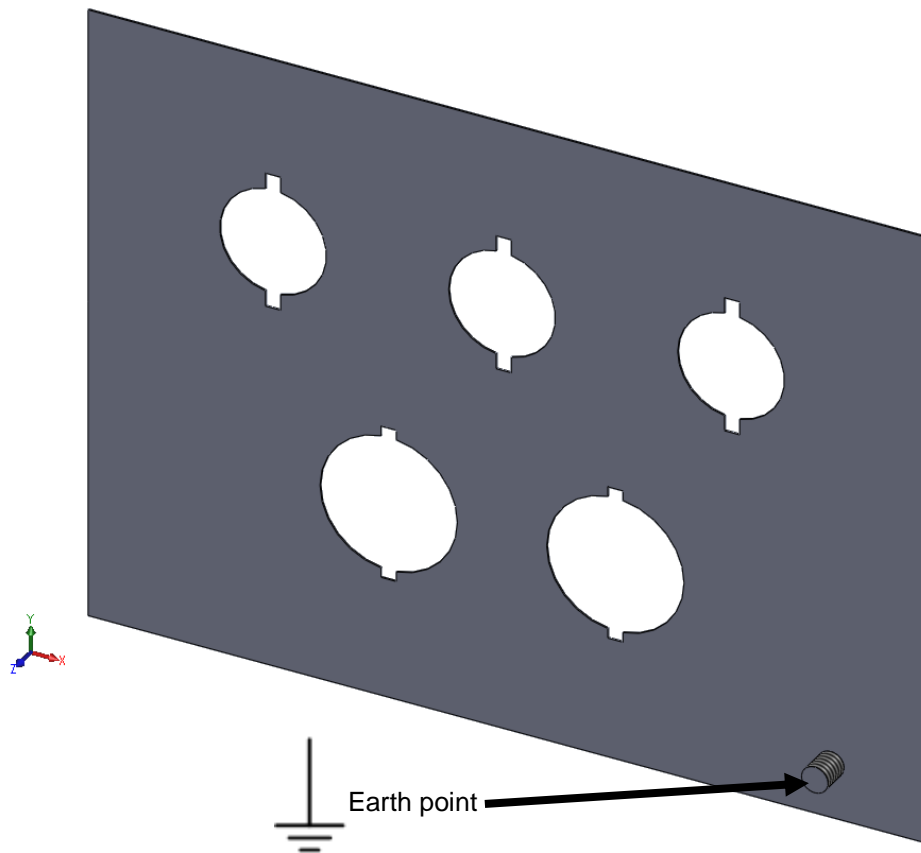


Figure 5. Example conductive bulkhead for three axes and two 3300 cables. The arrow indicates the user-provided earth point that is available on both the inside and the outside of the bulkhead. Do not scale from this drawing.



Essential to user safety and the correct function of this cable set is the provision of an earth point on the panel.

Connection of cables

After mounting the bulkhead connectors on the glove box's bulkhead, the following connection information should be considered:

- **Do not connect cables with the instrument turned on.**
- The connectors have been designed/selected so they cannot connect to the wrong components.
- Items that use multiple similar connectors (such as X, Y and Z stages, or 3300 cell cables) are not sensitive to which device they connect to. At boot-time, the software will understand the connections provided within the equipment.
- The internal and external cables should be connected to the bulkhead connectors as tightly as possible. This may require a number of repeated efforts to push-together, tighten, push-together, tighten (repeat). Failure to completely tighten may result in intermittent or high-impedance contacts, affecting result quality and system operation.

- Directions for assembling the M470 and its connections are shown in the M470 manual. Follow these instructions, replacing the connection points with the M470 Glove Box Cable Set alternative.

Where all connections are made as intended, the software will boot as normal. If boot-time error messages are presented it is likely that one or more electronic modules cannot be found. It is likely that in this case, the cables need tightening. Please ensure any tightening is done with the equipment turned off.

Chapter 4 Specifications

Cables:

Cable	Section	Length
3300 Cell cable	External	1 m
	Internal	1 m
Electrometer cable	External	1 m
	Internal	N/A
Piezo High Voltage cable	External	1 m
	Internal	150 mm [†]
Piezo Strain Gauge cable	External	1 m
	Internal	150 mm [†]
Scan Stage Cable	External	1.1 m
	Internal	1.1 m

[†] This cable provides a short flying-lead connector to attach to.
The equipment that attaches to it has an integrated cable.

Bulkhead Fittings:

Cable Types:	3300 Cell Cable Piezo High Voltage Cable Piezo Strain Gauge Cable Scan Stage Cable
Manufacturer:	Jaeger Connector
Series:	Hermetic
Protection:	Depends on cable connector (see below)
Helium leak rate:	< 10 ⁻⁹ Atm.cm ³ / sec
Operating temperature:	-25 °C to +100 °C (500 hours at +125 °C)

Cable Types:	Electrometer Cable
Manufacturer:	LEMO
Series:	1B
Protection:	IP50 to IP68 vacuum tight
Helium leak rate:	Not Specified
Operating temperature:	- 55 to 250°C

Cable connectors

Cable Types:	3300 Cell Cable Piezo High Voltage Cable Piezo Strain Gauge Cable Scan Stage Cable
Manufacturer:	Jaeger Connector
Series:	Standard
Protection:	IP 50 to IP 54 with elastomer in the housing, gasket under panel connector.
Operating temperature:	-40 °C to +100 °C (500 hours at +125 °C)

Cable Types:	Electrometer Cable
Manufacturer:	LEMO
Series:	1B
Protection:	IP50
Helium leak rate:	Not Specified
Operating temperature:	- 55 to 250°C

Dimensions and specifications may be changed without prior notice.

Chapter 5 Technical Support

For technical support, please contact your distributor initially. In the event that your distributor cannot provide a solution please contact:

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