# Bi-Directional Control Set Up Guide

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# Contents





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# Principal of Operation

The Videosys camera control system can be configured to operate using one of two fundamentally different architectures:

## Uni-directional

In this mode the Indoor Unit (IDU) acts as a 'Virtual Camera' and talks to the Remote Control Panel (RCP) via its native protocol. Changes to this Virtual Camera are then encoded into our low latency protocol.
Encoded data is routed from the IDU to the Outdoor Unit (ODU) where it is transmitted. Data is then received via the RXSM(E) (RXSM-E or OBTX or AEON with CC option – for the purposes of this manual we will only refer to the RXSM(E). Customers with integrated camera backs should follow the setup procedure as if they are using an OBTX or AEON CC. Within the RXSM(E) a 'Virtual Panel' is updated with the received information, the 'Virtual Panel' then communicates with the camera using its native protocol.

- This approach allows high performance in an extremely poor RF environment as data loss will not cause link failure.
- Uni-directional operation boasts simple setup, as only one data path needs to be configured.
- Due to the use of an intermediate protocol, Uni-directional operation allows operators to mix and match different manufacturers cameras and control panels.
- As each command has to be specifically implemented and handled, not all of the features available on manufacturers cameras and control panels will be available when used with a Uni-directional control link.

*Fig 1. A simple Uni-directional camera control setup*



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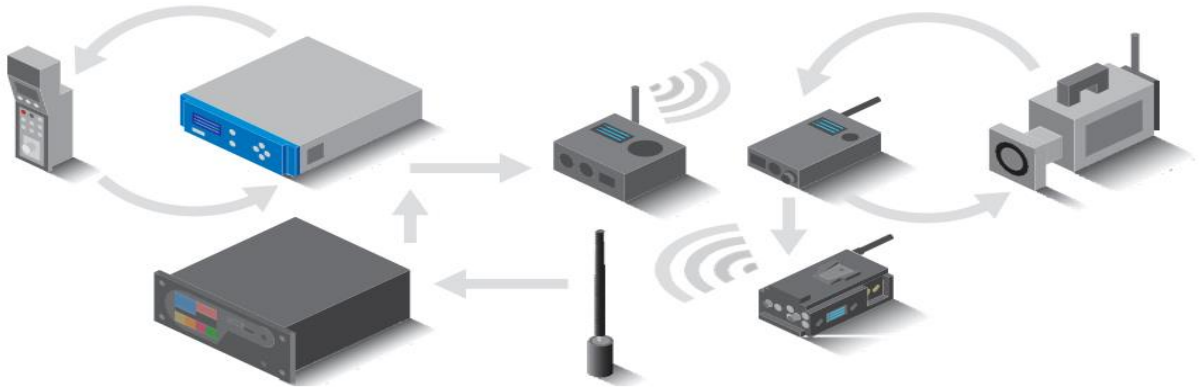
## Bi-directional

In Bi-directional mode an RCP communicates to the IDU in its native protocol. Data is then conditioned and forwarded on to the ODU, where it is then transmitted. The RXSM(E) at the camera receives this data and forwards it to the camera. The Return data is passed from the RXSM(E) via the video transmit path (if there is an Aux data path available on the video TX) back to the IDU.

- All of the features that would be available via a cabled setup are available via our Bi-directional setup.
- Due to the bandwidth restrictions of the RF path, RCP wake-up times might be slightly longer than in a wired or Uni-directional set up.
- Due to the reliance on two communication paths, wireless control is not as robust as with Uni-directional operation.



Bi-directional control can be broken down into four main data paths, each of which must be configured for correct operation, Videosys has added diagnostic information to the Indoor Unit (IDU) to assist in the configuration of the equipment. The IDU and RXSM(E) each send control data between themselves to determine the state of the forward and return data paths forming a data loop upon which the whole Bi Directional data system operates.

Check the diagnostic screen reports **Return OK** THEN check the forward path is connected and configured correctly by checking the diagnostic screen **Forward OK**. Once BOTH Return and Forward oaths report as OK then the loop is complete and the system can initialise itself.

- Return Data Path: Data is returned from the camera to the Panel via the RXSM(E) and IDU, this is usually sent via a video transmitter using the data/RS232 path.
- Forward Data Path: Data sent from the RCP/ to the camera via the IDU, CCODU and RXSM(E).
- Panel Connection: The connection between the RCP/ and the IDU.
- Camera Connection: This is the connection between the camera and the RXSM(E).



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## Requirements

To use Bi-Directional control the requirements are:

- IDU E (with Legacy option card) or IDU E/L.
- RXSM(E)-RXSM or DTC OBTX or AEON CC with Camera Control option.
- Video transmitter and receiver with configurable data path.
- Data cable for RXSM(E) to Video Transmitter (Not required for OBTX with built in camera control).
- Data cable for Video receiver to IDU.
- IDU RCP/ cables or Ethernet connections for Panels.
- RXSM(E) Camera cables.

# Return Data Path

### Camera end

The return data path is an RS232 9600 baud signal that needs to be sent from the RXSM(E) to the IDU.

The RS232 signal is found on pin 5 of the tally connector (Lemo 0B series) on the RXSM(E). A cable will be needed to connect between the RXSM(E) and the Video transmitters aux data port. Details of the pinout and recommended cable for use with DTC transmitters can be found at the rear of this guide

NOTE: In the case of the DTC OBTX and AEON-CC with camera control option fitted, this connection is already made internally.

Videosys can also assist the customer with connections to other 3rd party video transmitter on request

If using a DTC transmitter and external RXSM(E) with data cable, looking at the control panel on the DTC transmitter the "Data" port must be switched to On, Baud rate set to 9600, with no Parity.

If using an OBTX with built in camera control, the "Data" port must be switched off – This is because the Data menu refers to the external data port on the outside of the transmitter which is accessible on the Lemo connector. Whereas, inside the OBTX and AEON CC the return data path is a separate port to the external data port. The OBTX and AEON CC will switch between the two options so, if the external data port is enabled it will overwrite any BiDi data on the internal data port.



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## Receiver end

The video receiver data output must be connected to the IDU. On earlier IP enabled IDUs the connection is via the RCP inputs (Not available on IDUs with Sony 8pin HRS connectors fitted), on later if IDU-E/L version IDUs this return data is connected via the D9 connector. Details of the required cables can be found at the rear of this document.

NOTE: Due to the limitation of only having four serial ports, when operating RCPs in serial mode two ports connect to the RCPs and two are used for the return data. So, only two cameras can be controlled in Bi-directional control when connected in serial mode. However, when operating in ethernet mode all four serial ports are free and all four serial ports are free to accept return data, so up to four cameras can be controlled.

## Return connection set up - BiDir Ethernet Returns

This feature is found under the "System" menu. This allows the IDU to have a maximum of either 2 or 4 camera control channels when in Ethernet mode. The purpose of this feature is to keep Bi-Directional return wiring the same when switching between using Legacy or Ethernet /RCPs. It may be the case the user has previously made cables or the system is already installed and it is not convenient to use the return connections in their simple default 1 to 1, 2 to 2 etc return connections. It may be the case, even if IP connections are being used with the RCPs, the user wants to connect the return ports in the same way as if the RCPs were connected by serial connection. Bidirectional Mode Setting is outlined below:

If you are connecting the RCPs to the IDU via Ethernet and up to 4 cameras are in use:

Camera 1 return data is connected to port 1; Camera 2 return data is connected to port 2 etc…

If connecting the RCPs to the IDU via Ethernet; and 2 cameras are in use:

Camera 1 return data is connected to port 2, Camera 3 return data is connected to port 4.

**Ports 2 and 4 are unavailable.**

If connecting the RCP to the IDU via serial cables:

RCP 1 panel connects to port 1 and Camera Return 1 connects to port 2.

RCP 2 panel connects to port 3 and Camera Return 2 connects to port 4.

**Ports 2 and 4 are unavailable.**



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## Forward Data Path

The forward data path describes the data path from the IDU via the ODU to the camera end. Be that an RXSM(E), OBTX CC or AEON CC. The IDU, ODU and RXSM are all connected in the same way as for Uni-directional operation.

The IDU can connect to the ODU and ODU-E via RS485 or RS232 on the 3 pin XLR or via IP connection. The Camera data receiver, be that RXSM/RXSM-E or OBTX CC or AEON CC is connected to the camera by the supplied serial data cable.

## Selecting Bi-Directional Mode

To select Bi-Directional mode on the IDU, go to “Camera Manufacturer” menu. Select the desired manufacturer then select desired connection mode – serial or if available IP, then select “Bi-Directional”.

The camera receiver be that RXSM/RXSM-E or OBTX CC or AEON CC, auto detects if the system is operating in Bi-directional mode. NOTE: With the exception of Grass Valley cameras, where the correct camera type must be selected via the CCAM “Camera Manufacturer” menu: “GV BiDir”.

A Grass Valley camera should be re-powered when switching between Uni/Bi-Directional.

## Bi-Directional Mode Settings

The IDU has some additional settings for use in Bi-Directional mode:

BiDir Panel Drop: This is found under the “System” menu. This option allows the IDU to keep the connection to the RCP established even if the Bi-Directional link is broken, for example if the camera is disconnected/repowered due to battery change, or there is RF breakup in the forward or return paths. This is useful as some panels can take a while to become fully operational after a connection reset. However, in some circumstances, users find it useful to allow the RCP connection to be dropped. In this case the number of seconds the RCP connection will be maintained can be entered.

The default value is set to 0000sec and is used to disable the panel drop completely, keeping the panel connected to the IDU indefinitely.



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# IDU Diagnostics Information

The main screen gives an overall view of how each channel is operating. Scrolling down, there is further pages of more detailed diagnostics.

The main screen possible diagnostics are:

- **Not Ready:** At least one of the four data paths are not currently connected/configured correctly.
- **Sync:** All four data paths are connected, but there is some initialising still occurring.
- **Active:** The system is initialised and operation.

Return data link, the possible diagnostics are:

- **Return Not OK:** There is no valid data being received on the return port. Check connections and settings from RXSM(E) all the way through to the IDU.
- **Return ID ??:** There is valid data but the camera ID being returned from the RXSM(E) does not match the Channel number on the IDU.
- **Return OK:** The return path appears to be connected correctly.

Forward data link, the possible diagnostics are:

- **Forward ??:** The state of the forward link cannot be determined as the return path is not correct.
- **Forward Not OK:** The forward link is known not to be OK. Check connections from the IDU to the CCODU and camera control radio frequencies.
- **Forward OK:** Both Return and Forward links are both OK. The Bi-Directional link is established.

Panel connection, the possible diagnostics are:

- **Panel ??:** The status of the connection to the panel cannot be determined. This could be due to the "BiDir Panel Drop" option being enabled.
- **Panel Not Ok:** The connection to the panel is not established.
- **Panel Sync:** The connection the panel is established, but not yet initialised.
- **Panel Ok:** The connection is OK and read to be used by an operator.

Camera connection, the possible diagnostics are:

- **Camera ??:** Status of the connection to the camera cannot be determined. This is likely to be due to the Bi-Directional link not being established.
- **Camera Type?:** RXSM(E) has an invalid camera type selected.
- **Camera Not OK:** Connection between the RXSM(E) and the camera is not established.
- **Camera Sync:** Connection to the camera is established, but not yet initialised.
- **Camera OK:** Connection is OK and read to be used by an operator.



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# Initialising a Bi-directional System

When setting up the Videosys Camera Control in Bi-Directional data mode, the approach may seem a little counter intuitive! As mentioned, firstly the IDU and RXSM(E) each send control data between themselves to determine the state of the forward and return data paths forming a data loop upon which the whole Bi Directional data system operates. **The system will only start the panel to camera initialisation process once the data loop is established and stable.**

The system cannot report back the state of the forward path if there is no return path to convey this information. **Therefore, it is important to check the return path is working first;** The diagnostic status pages have been ordered so as to aid the diagnostic process.

Check the diagnostic screen reports **Return OK** if the Return path is not OK;

1. Do you have a picture from the video link to ensure the video link which carries the return path is up and working correctly?
2. Check the connections from the data receiver to the video transmitter (these may be internal) and the same on the video receiver to the IDU.
3. Check the set up of the data port on the video transmitter
4. Check the data output is enabled on the video receiver
5. Check the set up of the IDU

Once you have a good Return Path, check the forward path is connected and configured correctly by checking the diagnostic screen **Forward OK**. If the Forward path is not OK;

1. Is the IDU configured correctly for Bi-directional mode
2. Check connections to the ODU.
3. Is the ODU transmitting?
4. Check frequencies match on the ODU and Camera receiver.

Once BOTH Return and Forward oaths report as OK then the loop is complete and the system can initialise itself.

## System reports Not Ready

This means at least one of the four channels is not ready to initialise. In this case follow the guidlines above.

## System fails to sync

If the Return and Forward paths are OK, the diagnostic pages will reveal why the sync process has failed. For example, **Camera Type?** - the wrong camera type selected on the camera receiver, the user will need to look at the menu set up on the camera receiver and selected the correct camera manufacturer. For each potential fault reported on the diagnostic screens, there could be a few reasons that could be cable or menu set up related. **Panel Not OK** could be the cable is broken or the panel might not be powered up or the wrong panel manufacture has been selected. However, each diagnostic report should guide the user to the area of concern and allow successful resolution of the problem.



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# Pin Outs

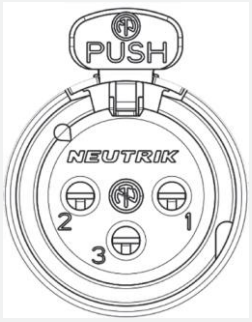
## Data Out

3-Pin XLR, Female

*NEUTRIK NC3FD-LX -HD*

Pin 1: Ground

| **In RS232 Mode:** | **In RS484 Mode:** |
|---|---|
| Pin 2: RS232 Tx | Pin 2: RS485 Data – |
| Pin 3: RS232 Rx | Pin 3: RS485 Data + |

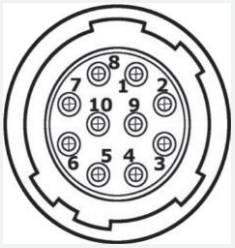



## Generic Connector *(RCP legacy connector)*

10-pin, Female

*HIROSE HR10A-10R-10S(71)*

| | |
|---|---|
| Pin 1: RS422 TX + | Pin 6: Power |
| Pin 2: RS422 TX – | Pin 7: Ground |
| Pin 3: RS422 RX + | Pin 8: NC |
| Pin 4: RS422 RX – | Pin 9: Power |
| Pin 5: Ground | Pin 10: Ground |




## Power Input Connector

4-Pin XLR, Male

*NEUTRIK NC4MD*

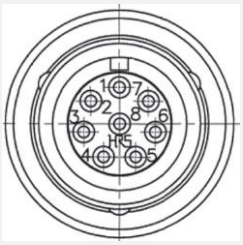
| | |
|---|---|
| Pin 1: Ground | Pin 3: NC |
| Pin 2: NC | Pin 4: Power |


## Sony Connector *(RCP legacy connector)*

8-Pin, Female

*HIROSE MXR-8RA-8S(71)*

| | |
|---|---|
| Pin 1: RS422 TX + | Pin 5: Ground |
| Pin 2: RS422 TX - | Pin 6: Power |
| Pin 3: RS422 RX + | Pin 7: Ground |
| Pin 4: RS422 RX – | Pin 8: NC |

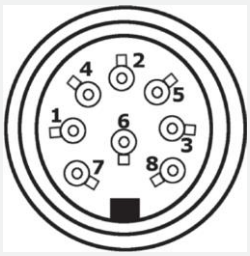



## Tally Input Connector

8-Pin DIN, Female

*LUMBERG KFV 80*

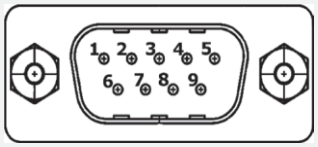
| | |
|---|---|
| Pin 1: Ground | Pin 5: Input 3 |
| Pin 2: Ground | Pin 6: Ground |
| Pin 3: Ground | Pin 7: Input 1 |
| Pin 4: Input 2 | Pin 8: Input 4 |




## Bi-directional Data Return Port

D-sub 9 pin, Male *AMPHENOL G17S0910110EU*

| | | |
|---|---|---|
| Pin 1: RS232 Rx (CH1) | Pin 8: Ground | Pin 9: NC |
| Pin 2: RS232 Rx (CH2) | | |
| Pin 3: RS232 Rx (CH3) | | |
| Pin 4: RS232 Rx (CH4) | | |
| Pin 5: Ground | | |
| Pin 6: Ground | | |
| Pin 7: Ground | | |



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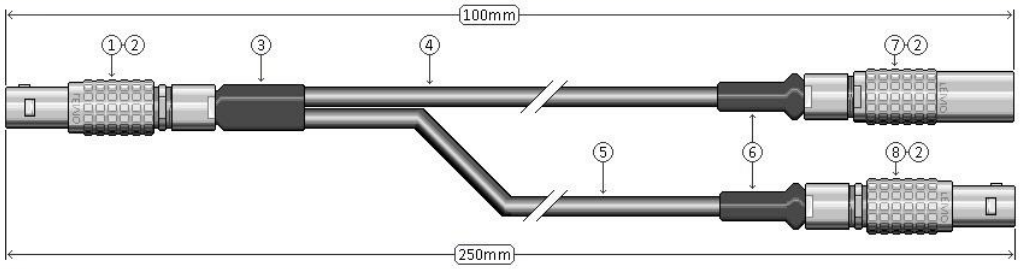
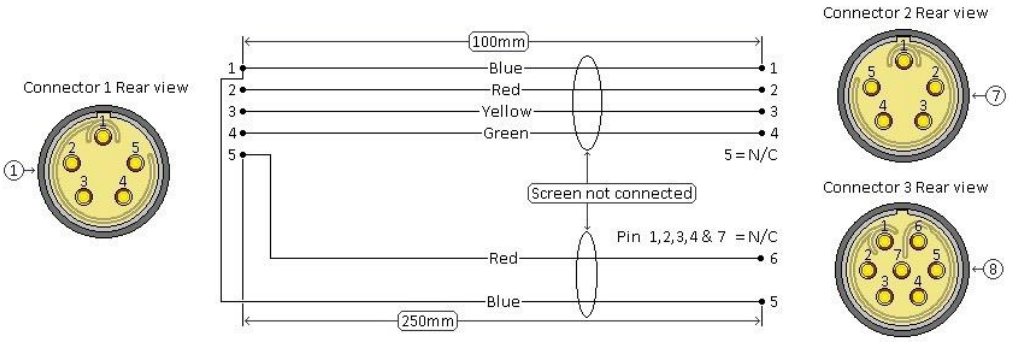
## Cables

### Cam End Return Data Cable For Domo OBTX With Tally Output.


| Item | Description | Qty | Supplier | Part No: | Location |
|---|---|---|---|---|---|
| 1 | Connector 1 = Lemo FGG.0B.305.CLAD52Z, 5 way, Male. | 1 | | VNMB002 | |
| 2 | Heatshrink sleeving 1.2 X 5mm, Black. | 11 | R.S. | 433-0692 | |
| 3 | Adhesive lined Heatshrink sleeving 9.5 X 20mm, Black. | 1 | Farnell | 1187637 | |
| 4 | Cable = PP000295: DEF 7-1-4C, 0.055mm, 4 Core screened, Black. | 1 | Farnell | 2440079 | |
| 5 | Cable = PP000291: DEF 7-1-2C, 0.055mm, 2 Core screened, Black. | 1 | Farnell | 2440075 | |
| 6 | Adhesive Lined Heatshrink Sleecing, 6.4 X 20mm, Black. | 2 | Farnell | 1187634 | |
| 7 | Connector 2 = Lemo PHG.0B.307.CLLD52Z, 5 way, Female. | 1 | Farnell | 3817660 | |
| 8 | Connector 3 = Lemo FGG.0B.307.CLAD52Z, 7 Way, Male. | 1 | Farnell | 3817271 | |
| | Drawing Revised | | Drawn By | F.D. 06-04-2018 | |



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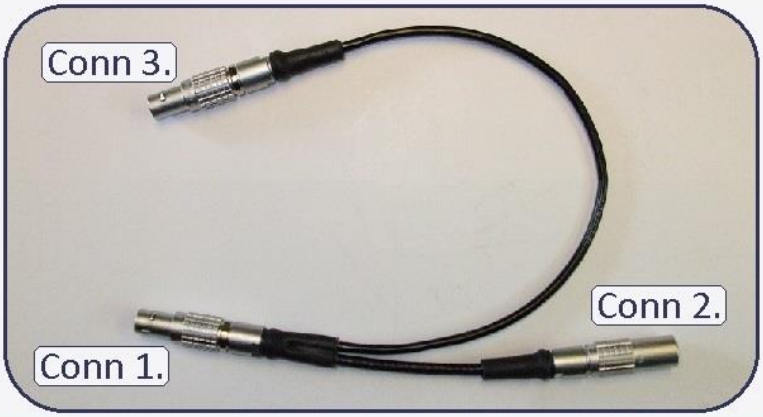
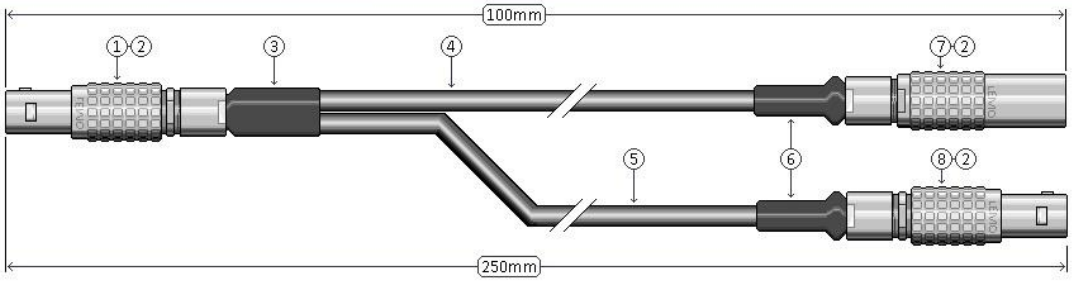
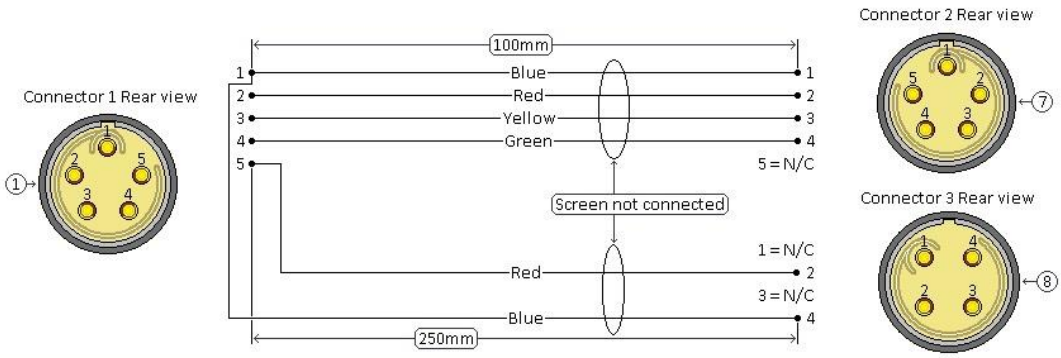
# Cam End Return Data Cable
## For Domo SOLO 4 TX with Tally Output.




| Item | Description | Qty | Supplier | Part No: | Location |
|---|---|---|---|---|---|
| 1 | Connector 1 = Lemo FGG.0B.305.CLAD52Z, 5 way, Male. | 1 | | VNMB002 | |
| 2 | Heatshrink sleeving 1.2 X 5mm, Black. | 11 | R.S. | 433-0692 | |
| 3 | Adhesive lined Heatshrink sleeving 9.5 X 20mm, Black. | 1 | Farnell | 1187637 | |
| 4 | Cable = PP000295: DEF 7-1-4C, 0.055mm, 4 Core screened, Black. | 1 | Farnell | 2440079 | |
| 5 | Cable = PP000291: DEF 7-1-2C, 0.055mm, 2 Core screened, Black. | 1 | Farnell | 2440075 | |
| 6 | Adhesive Lined Heatshrink Sleecing, 6.4 X 20mm, Black. | 2 | Farnell | 1187634 | |
| 7 | Connector 2 = Lemo PHG.0B.305.CLLD52Z, 5 way, Female. | 1 | Farnell | 3817660 | |
| 8 | Connector 3 = Lemo FGG.0B.304.CLAD52Z, 4 way, Male. | 1 | Farnell | 3817246 | |
| | Drawing Revised 02-01-2018 | | Drawn By | F.D. 04-08-2017 | |



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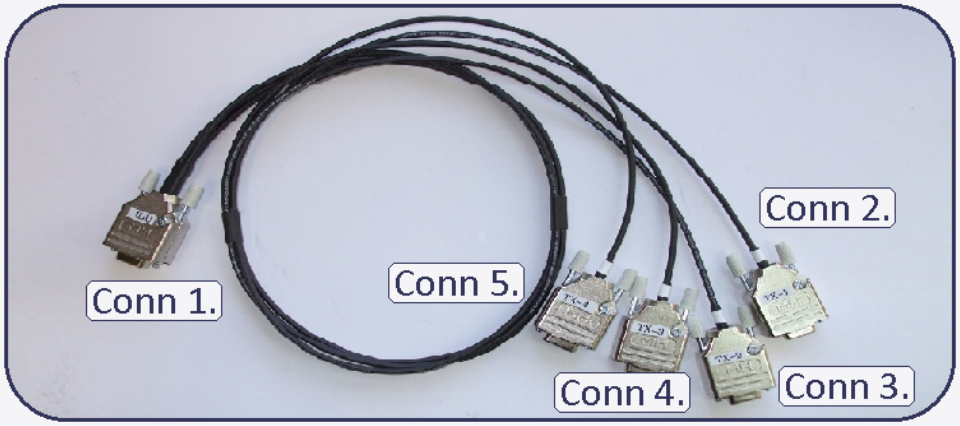
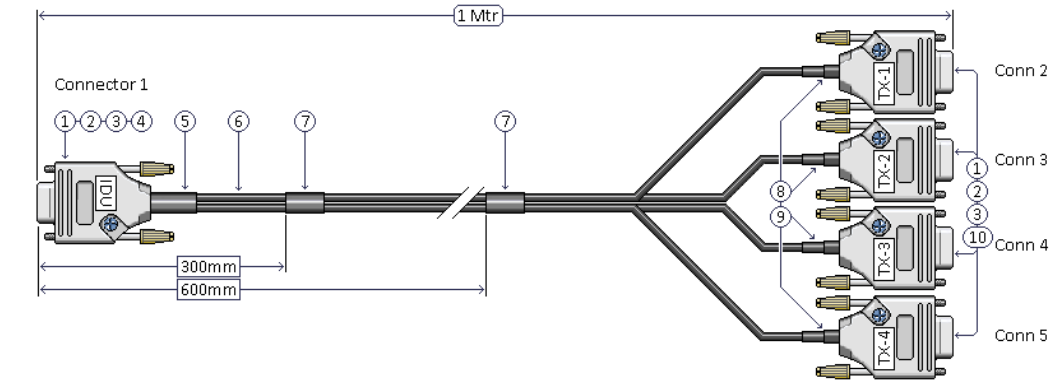
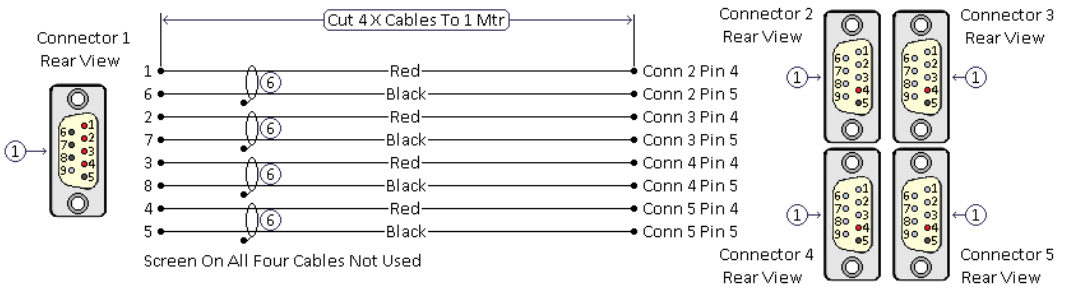
# Bidirectional Test Cable 2
## D-9 To 4 X D-9`s




| Item | Description | Qty | Supplier | Part No: | Location |
|---|---|---|---|---|---|
| 1 | Connector 1,2,3,4 and 5 = D-Type 9 Way, Female. | 5 | | VNTD001 | 8-10-1 |
| 2 | D-Type Shell For Connector 1,2,3,4, and 5. | 5 | | VNAS001 | 8-12-1/2 |
| 3 | Heatshrink Sleeving 1.6 X 8mm, Black. | 16 | | VBWA006 | |
| 4 | Label at Connector 1, Print ( IDU ). | 1 | Farnell | 603351 | |
| 5 | Adhesive Lined Heatshrink Sleeving 9.5 X 40mm, Black. | 1 | Farnell | 1187637 | |
| 6 | Cable = Belden 2 Core Screened, Black. | 4 | Farnell | 1610271 | |
| 7 | Adhesive Lined Heatshrink Sleeving 9.5 X 20mm, Black. | 2 | Farnell | 1187637 | |
| 8 | Heatshrink Sleeving 3.2 X 20mm, Black. | 4 | | VBWA004 | |
| 9 | Adhesive Lined Heatshrink Sleeving 4.8 X 40mm, Black. | 4 | Farnell | 1187633 | |
| 10 | Label at Connector 2,3,4 and 5, Print ( TX-1,TX-2, TX-3 and TX-4 ). | 4 | Farnell | 603351 | |
| | Drawing Revised | | Drawn By | F.D. 28-01-2020 | |



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