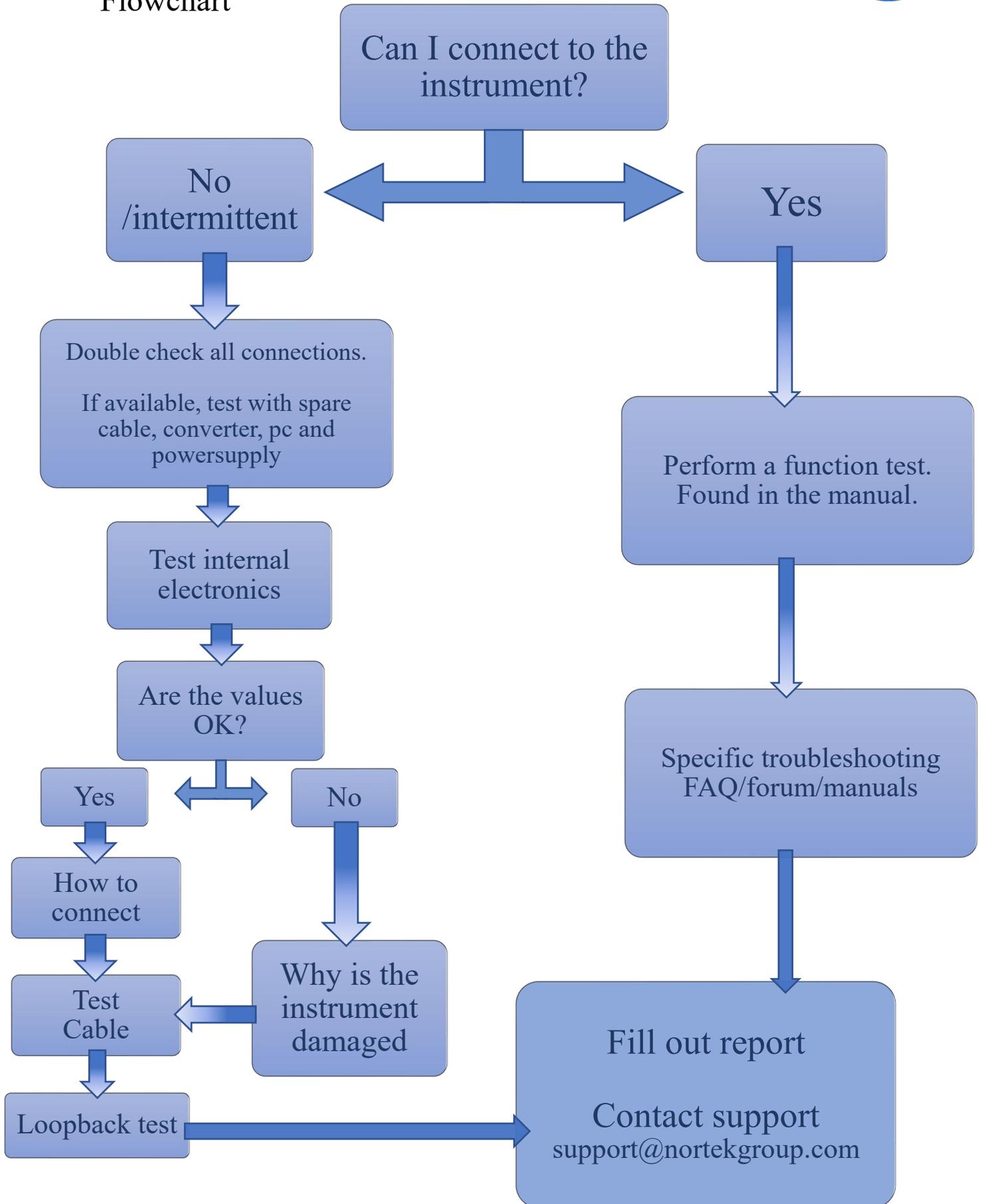


Flowchart



To perform this test you will measure the resistance between the pins at the 8pin inline endbell. Depending on your multimeter and the probes it might require some wiring or ingenuity to access the pins for measurement:



Picture1.

Inline endbell and the 8 pin connector we will be measuring.



Picture2.

Testing resistance between pin 4 and 1. Here we have stripped two wires and used them to access the connector pins.

Take your time and be thorough, measurements might be erratic depending on how you measure.



The following values (approximate) should be measured between the following pins at the instrument connector:

RS232:

Between Pin	Resistance in Ω	And Pin
1 (GND)	1-10 M	2 (PWR +)
3 (Tx)	OL	4 (Rx)
3 (Tx)	OL	1 (GND)
4 (Rx)	4k	1 (GND)

RS422:

Between Pin	Resistance in Ω	And Pin
1 (GND)	1-10 M	2 (PWR +)
3 (Tx +)	OL	4 (Tx -)
3 (Tx +)	OL	1 (GND)
4 (Tx -)	OL	1 (GND)
8 (Rx +)	70k	1 (GND)
7 (Rx -)	70k	1 (GND)
8 (Rx +)	130	7 (Rx -)

OL = Open Loop = or very high resistance (can depend on your multimeter)

You can also perform this test via a cable connected, but you need to be 100% sure that the cable is working. For online setups it might be difficult to retrieve the instrument, so testing via the cable is easier, unfortunately this is also where we often see damaged cables.

Testing via a cable can defeat the purpose of eliminating the working elements.



Connecting to your instrument

The first step when troubleshooting is to ensure that you are connecting to your instrument correctly and with the correct settings.

The following is a step-by-step guide on how to connect to your instrument.

If you are not able to connect to your instrument using this procedure please test (if available) a different cable/converter or even a different computer to rule out any issues with the latter before moving on.

1. Connect 8 pin to instrument.
2. Connect power to the cable and the USB end of the converter to the PC.
3. Open your Nortek program (AquaPro, Aquadopp, Vector or AWAC)
4. Set the correct communication port
(step 5 and 6 show you how to find the correct communication port if this is an issue)
and set the baud rate to the default 9600 (under “Communication” – “Serial port” in the software)
Make sure “hard break” is left unchecked.
5. Open Device Manager (Different from OS to OS, but in Windows 10 you can right click the Windows icon and find Device Manager in the list that shows up).
Click the dropdown for “Ports (Com and LPT)”.
This should look like Picture 3 below and show all your connected ports.
If you cannot find the “Ports (Com and LPT)” in the list, it’s because it is hidden:
Click “View” and “Show hidden devices” if this is the case.
6. Now when you connect the USB to RS232 converter to your PC it should show up in the “Ports” dropdown as a USB serial port (Picture 4).
The exact COM-port number will vary here, but the COM port that appears when you connect the USB to RS232-converter is the correct port to use when you want to communicate with your Nortek instrument.
7. Press “Stop Data Collection” (sending a break) in the software
(This will sync the instrument to the correct baud rate)

Testing cable

Never connect to your instrument using a bad cable.

Here we have tested a standard 8 pin inline RS232 cable, but the principle is the exact same regarding the 8pin RS422; except that you have two additional lines of Rx and Tx to test. If you need to test other cables and/or connectors/harnesses please contact us for schematics. However, the principle is the same:

- Main power is supposed to be applied to ONE line (PWR/PWR GND)
- All lines should be continuous and not shorted in any way.
- The correct voltage is being applied to the instrument.

Making sure power is at the correct pin:

- Disconnect the converter from the cable and disconnect the instrument.
(do not perform this test with the converter connected)
- Connect the power at the dry end of the cable.
- Set the multimeter to measure voltage.
- Connect one pin of the multimeter to ground (pin 1) at the instrument/wet end of the cable, now use the other pin of the multimeter to test each pin in the cable while having the other pin still connected to ground.

See picture 5 where pin 2 (PWR+) is tested on the 8pin (15V).

A result of 0V confirming that power is not connected at a specific pin, is just as important as confirming that power is at the correct pin.

If power is connected to multiple pins, or on the wrong pin, this could damage circuits and result in no communication with the instrument.

Loopback test

Hopefully, and most likely, you will have found the root cause of the issues during the previous tests. Then it is not necessary to perform a loopback test. However, if you still have not found any issues, all values look good and the instrument still isn't responding this is a valuable test to perform.

Opening the instrument and accessing the electronics or performing repairs requires technical understanding, please follow the manual and if you are unsure about anything have a technician perform the work or contact Nortek support.

A standard Nortek midlife setup consists of these connectors:

- 9-pin D-sub (Converter)
- 8-pin end-bell connector at the wet end of the cable
- 9-pin Molex connected to the connector on the inside of the end-bell
- 24-pin Molex connected to the electronics card

A loopback test can be performed at every step within the setup to track down a potential error in the communication lines.

Working your way from the converter to the electronics card will test all parts of the setup, one by one.

What is a loopback test?

The PC will send a signal via the “receive” pin (from instruments point of view) that is looped back to the transmit pin by connecting the transmit and receive pins.

The signal the PC sends out is then sent back to the PC and is shown in the terminal emulator. This is called a loopback test.

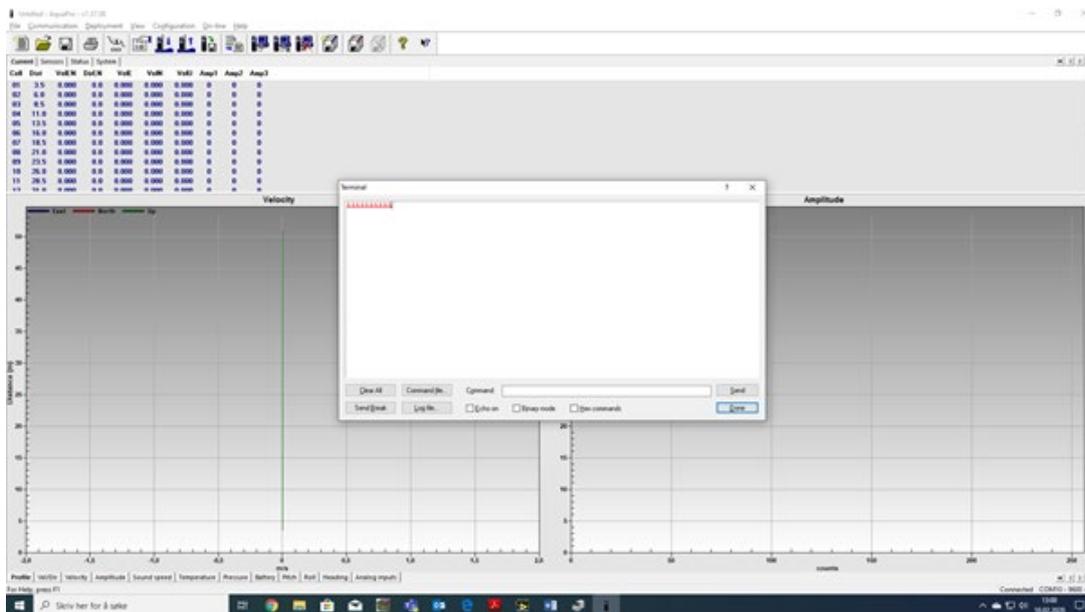
It basically loops back the sent signal as the received signal. This can be a very helpful tool when troubleshooting.



How to perform the loopback-test:

- Loop the transmit and receive pin (Tx = transmit, Rx = receive)
See [appendix](#) for termination.
- Connect the converter to the PC via the USB port.
- Open the Nortek program normally used to connect to the instrument (AquaPro, Aquadopp, AWAC or Vector).
- Choose the correct com port via “Communication - Serial port”
(see [connecting to your instrument](#) if unsure)
- Open the terminal emulator “Communication - Terminal Emulator”.
- Now type the letter A as a command and press send, this letter/signal should be echoed back.
Any letter written SHOULD be shown on the screen when sent.

Picture 9 showing how this will look on your screen:



If the letter(s) appear then the part being tested is doing its job (there could still be other issues with the part).

If the part is not responding, then there is something wrong with the wiring or the part is damaged.

Use a working part when moving on to test the next part of the setup.



End notes

If these tests do not help you re-establish a working connection chances are your instrument has more severe issues or you may have overlooked something.

If this is the case please fill out the short troubleshooting report available [here](#) and contact Nortek support and we will be happy to help.

Support@nortekgroup.com

Appendix

Schematics:

These schematics cover the standard termination for midlife instruments.

Different variations exist, but the communication (Rx/Tx) and Power (Pwr/Gnd) lines should have the same pin assignment.

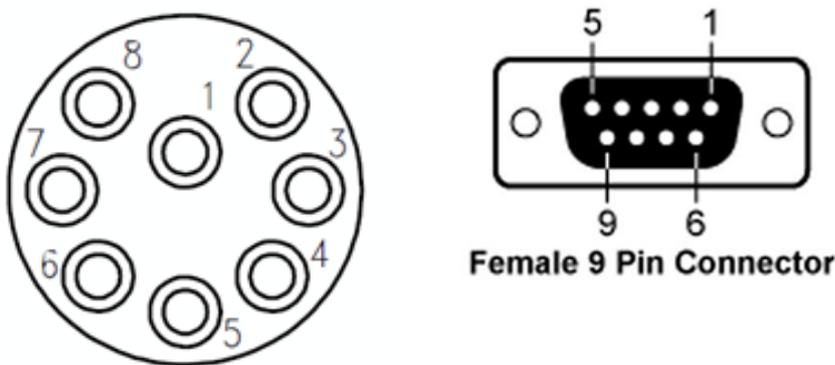
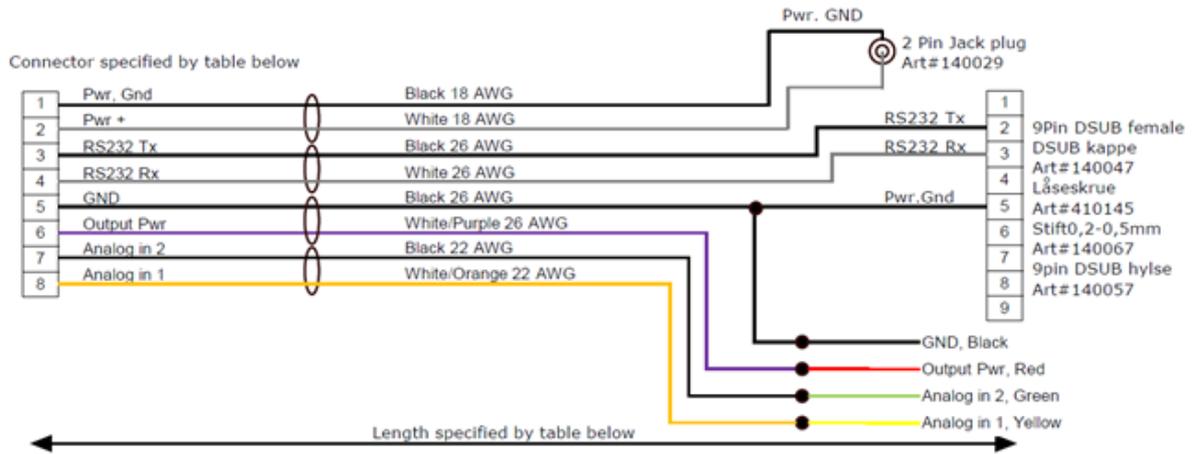
Opening the instrument and accessing the electronics or performing repairs requires technical understanding, please follow the manual and if you are unsure about anything have a technician perform the work or contact Nortek support.

If you have a different wiring setup or connectors please contact us at Nortek Support with the specifications of your cable(s) and we can provide you with the schematics you need.

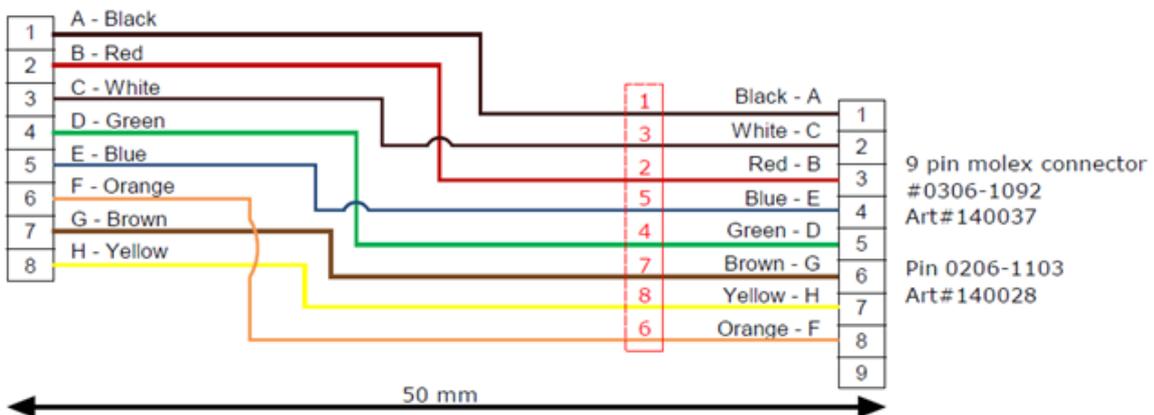


RS232 setup:

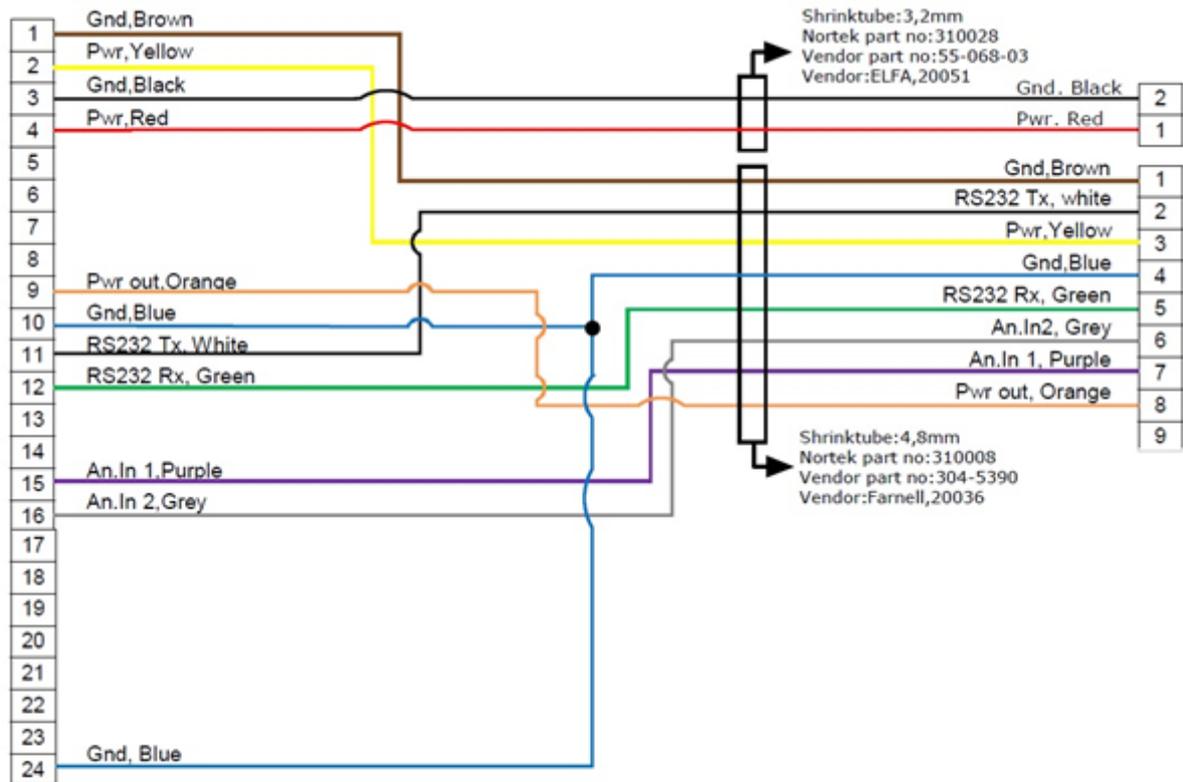
8 pin inline (wet-end/endbell, at instrument) to D-sub (to converter):



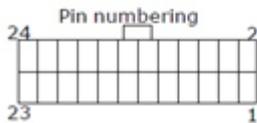
End bell 8 pin to 9 pin Molex (first part inside instrument):



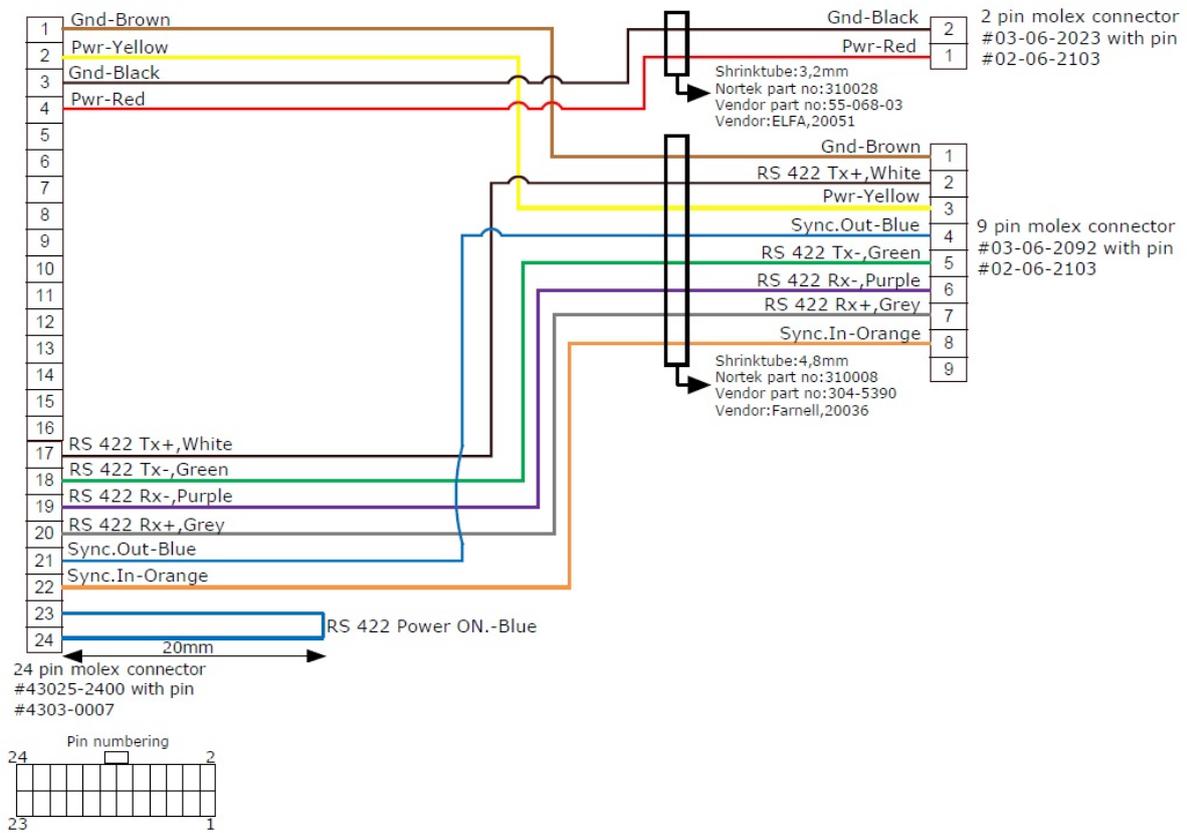
Harness 9 pin Molex to 24 pin Molex on mainboard:



24 pin molex connector
#43025-2400 with pin
#43030-0007



Harness 9 pin Molex to 24 pin Molex on mainboard:



Troubleshooting report

Troubleshooting report

Company:	
Contact person:	

Instrument type:	
S/N:	

Short description of the initial trouble:

--

If no connection is established with the instrument, fill out the following pages with results from the tests:



Cable test:

Continuity result:	
OK	Damage
Short circuits:	
Yes	No
If “yes”, what pins?:	

Loopback test:

Part:	Working:	
Converter:	Yes	No
+ cable:	Yes	No
+ endbell:	Yes	No
+ harness:	Yes	No

Additional information:
<p><i>Please attach any relevant pictures.</i></p> <p>Original equipment? Modifications? Online/not online? Deployment site. Etc. Etc.</p>

