

## Overview

Properly wired sensors, sensor connectors (Woodheads), and J Boxes are important parts of any Pason system. These connections are critical to the proper functioning of sensors and accurate readings in the EDR—inaccurate or fluctuating readings in the EDR are often caused by improper wiring. Because of this, Pason developed sensor wiring standards with these goals:

- To reduce inaccurate readings
- To enable field technicians to quickly understand sensor wiring on *any* rig, regardless of who wired it
- To make troubleshooting easier

The remainder of this document describes Pason’s sensor wiring standards.

## Sensor Connectors

Canadian and US installations require different parts than international installations. The table below summarizes the required parts. Figures 1 and 2 illustrate these parts.

Part	Canadian/US Installations	International Installations
Universal Sensor Cable	CBL170	CBL170
Sensor Connector Plug (male Woodhead)	CON010	CON497
Sensor Connector Receptacle (female Woodhead)	CON011	CON498



Figure 1: Canadian/US Woodheads



Figure 2: International Woodheads

## About Universal Junction Box (UJB) Wiring

UJBs, which are designed to replace both EDR J Boxes and PVT J Boxes, have their own sensor wiring requirements. The shield wire, ground loop, and preparation information in this document applies to both UJBs and J Boxes, but the internal connections of sensors to UJBs are not covered here.

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**Note:**

The assistance of a Pason field technician is required when setting up and wiring UJBs.

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## About the Shield Wire and Ground Loops

**What is the shield wire?** The shield wire, also known as the drain wire, makes direct physical contact with the shield in each cable. The shield is the thin metal foil that wraps the sensor wires and insulates them from stray electrical energy (noise) that can distort electrical current. The shield collects electrical noise and channels it to the shield wire, which is grounded at one end to dissipate the energy. For more detailed information on wire shielding, go to [http://en.wikipedia.org/wiki/Faraday\\_cage](http://en.wikipedia.org/wiki/Faraday_cage).

**What is a ground loop?** If a sensor's location has a different electrical potential than the J Box's location (due to poor grounding or bad power) then having the shield wire connected at both the sensor end and the J Box end allows an electrical current to form, which adversely affects the accuracy of measurements. This is called a ground loop.

**Can I use the shield wire in place of another wire?** No, because it is extremely vulnerable to electrical noise. If you use it as a conductor, you are using what is essentially a large antenna designed to collect noise, which is almost certain to cause problems.

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**Important:**

The wiring connections shown below have been designed and tested to avoid ground loops and reduce electrical noise. They are your best precaution against inaccurate or intermittent EDR readings.

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## Preparing Wires

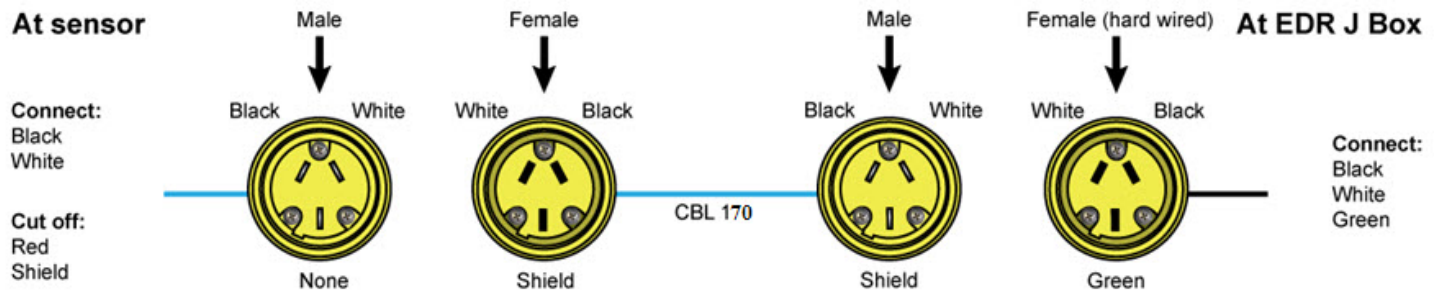
When preparing sensor wires, keep these things in mind:

- When stripping the sensor cable jacket, do not nick the insulation on the inner wires because this can short the cable.
- When preparing the wires, strip ½" of a wire's insulation to allow for solid contact. Ensure that the wires are pushed no more than ½" into the connector otherwise the wire will not

make solid contact with the connector. This can result in intermittent readings.

- Twisting wire strands before tightening them under screws provides better contact and increased strength.

## Wiring Connections for EDR Sensors (EDR J Box System)



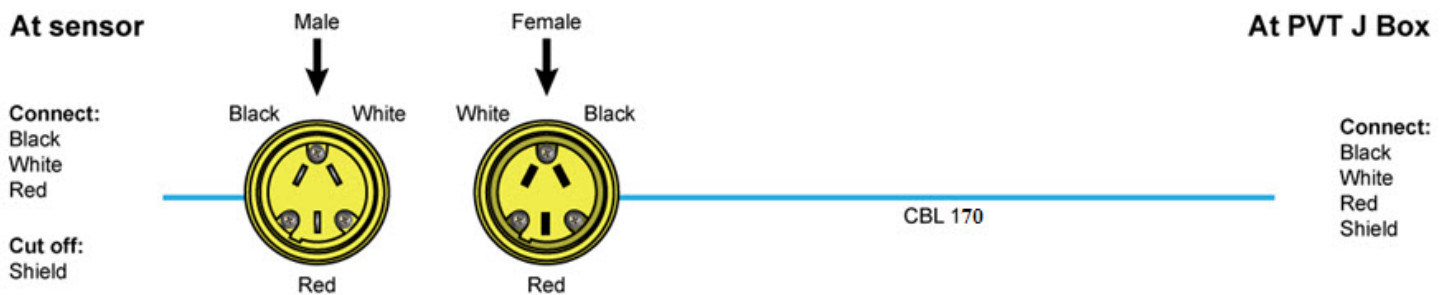
**Why is the shield not connected to the sensor?** To prevent a ground loop.

**Why is the red wire cut off?** It isn't required, and cutting it off reduces the risk of a ground loop.

**Note:**

If you need to use a CBL170 to replace the hard wired Woodhead that ships with the EDR J Box, connect the black, white, and shield wires, and cut off the red wire.

## Wiring Connections for a PVT Mud Probe or Flow Paddle (PVT J Box System)



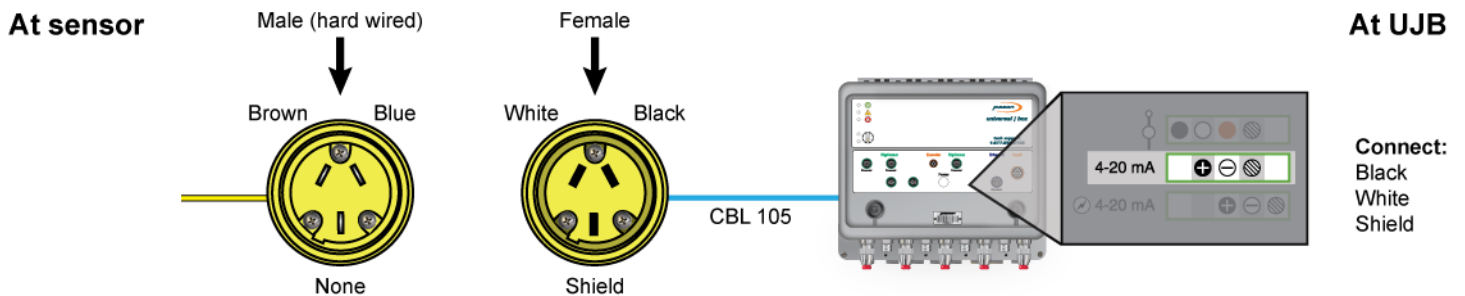
**Why is the shield not connected to the sensor?** To prevent a ground loop.

**Note:**

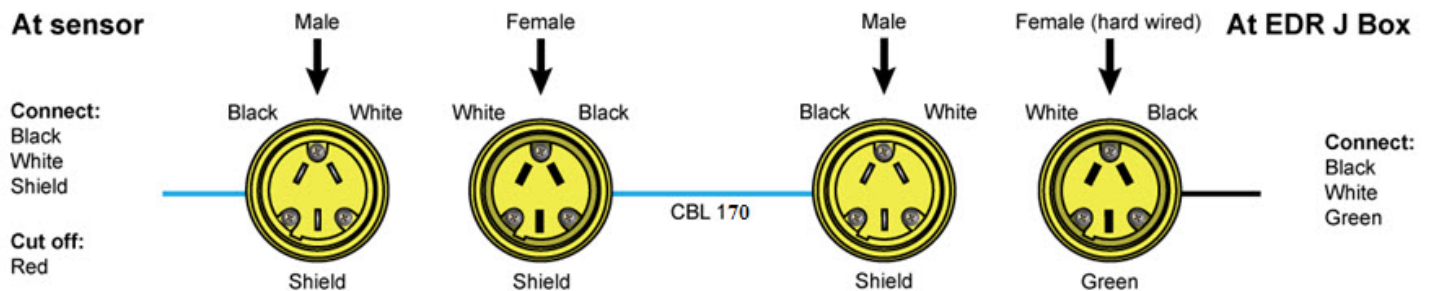
Ideally, you should not use Woodheads when wiring PVT mud probes or paddles—wire them directly to the PVT J Box. If you need to use a Woodhead, install it at the PVT sensor, not at the J Box. The connections in the above diagram apply whether you use Woodheads or not.

## Wiring Connections for a FLOW008 Flow Paddle (UJB System)

If the PVT system uses UJBs, you must use a 4-20 mA flow paddle (FLOW008). The diagram below shows the proper wiring of a FLOW008.



## Wiring Connections for a Mud Temperature Probe (EDR J Box System)



**Why is the shield wire connected to both the sensor and J Box?** This is an exception to the ground loop rule due to the way the sensor works. The 4-20 mA transmitter component in Pason SENASS105, SENASS106, and SENASS139 temperature probes requires a shield connection at both ends to prevent coupling in of ambient AC. This exception *only applies* to SENASS105, SENASS106, and SENASS139, not to all temperature probes.

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**Note:**

If you need to use a CBL170 to replace the hard wired Woodhead that ships with the EDR J Box, connect the black, white, and shield wires, and cut off the red wire.

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