Plessey PS25006 - EPIC 6:2 Multiplex box Instruction Manual.

Standard Components

PS25006

- One PS25006 EPIC 6 input, 2 output multiplex box unit.

User Guide Contents

1.0 Introduction

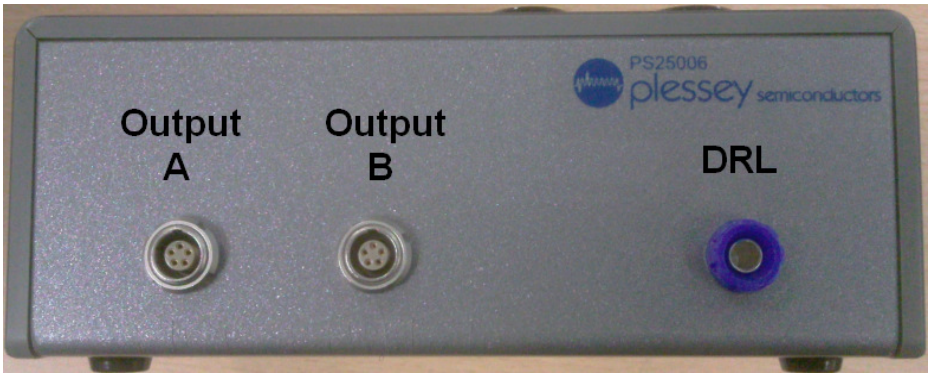
The Plessey PS25006 unit provides an interface between up to six EPIC sensors and one standard 2-input EPIC Control and Interface Box, (PS25000A, PS25001A or PS25003). It includes a driven right leg (DRL) output with manually adjustable gain. It is primarily designed to be used as a part of a multiple sensor system for non-contact seat back capacitive ECG measurements. It uses LEMO sockets for both inputs and outputs.

2.0 The PS25006 Box

Front Panel

The front panel of the PS25006 box contains input sockets for connection of up to 6 EPIC sensors. The inputs are via 5 pin LEMO sockets to ensure the good quality connection of the cable shielding to the system ground that is essential in non-contact ECG applications. The connection details of the sockets are shown in section 5.

Rear Panel



The rear panel contains two sensor outputs, A and B, also in the form of LEMO sockets. Power to the box is provided by pin 3 (Supply) of these two sockets. The driven right leg (DRL) output is also located on the back panel in the form of a blue 4mm socket.

Top Panel

The top panel of the box contains two six-position rotary “Channel Select” knobs to control which two of the six sensors are routed to the channel A and channel B outputs. In each case sensor 1 is selected by rotating the knob fully anti-clockwise and sensor 6 by rotating it fully clockwise. The two selected channels also provide the inputs to the DRL circuit. Note that all connected sensors are powered, regardless of the switch position; the selectors only switch the sensor signal path.

Also located on the top panel are the DRL controls, which consist of a “INV/NON INV” switch and a gain knob. The switch is used to set the polarity of the DRL signal. When used with non-inverting sensors, the switch should be set to INV, and vice versa. At the time of writing, all of Plessey’s EPIC sensor range are non-inverting. The gain knob on the top panel is used to set the gain of the DRL circuit from zero (fully anticlockwise) to maximum (fully clockwise). See section 4 for details on setting the DRL gain.

A red LED indicator shows when the box is powered. Power is provided through the supply pin of the cables connected from this box to the main EPIC Control and Interface Box.

3.0 Operation

1. Insert the LEMO connectors from the EPIC sensors to the sockets on the front panel. If using the box with Plessey’s 6 sensor seat pad, plug the numbered connectors into the sockets with the same numbers.

2. If using DRL function, insert the DRL plug into the socket on the rear panel.

3. Using 2xPS25013 cables (4 pin DIN to 5 pin LEMO), connect the outputs form the PS25006 box to the A and B inputs on the Control and Interface Box.

4. Connect the Control and Interface Box to the USB port of a computer, and switch on the Control and Interface Box. The red LED indicators on both boxes should light.

5. Use the “Channel Select” knobs to select the pair of sensors that you wish to view.

4.0 Setting the DRL (Driven Right Leg) Gain

DRL is most commonly used in electrophysiology measurement systems. It is referred to as “Driven Right Leg” since in conventional ECG systems the signal is attached to the patient’s right leg. It works by feeding back an inverted version of the common mode (i.e. noise) signal onto the body. In non-contact electrophysiology systems the DRL signal can be capacitively coupled onto the body to provide a driven ground plane for reducing noise and improving signal stability. Despite the name, there is no need to attach the signal to the user’s right leg, and for systems with sensors incorporated into a seat back the DRL is normally attached to a piece of conductive fabric placed on the base of the seat.

The gain of the DRL loop is set by adjusting the “Gain” knob on the top panel of the box. If the gain is too low, there will be insufficient signal to cancel the noise. If the gain is too high the system will become unstable and the feedback signal will be limited by the supply rails (+/-5V), and thus become distorted.

Either of these two methods are suggested for setting the DRL gain:

1. Whilst viewing the differential signal, turn the DRL gain to minimum (fully anticlockwise), and then increase it slowly until the ECG signal can be observed. As the DRL gain is increased further, at some point the signal may disappear into noise as the gain becomes too high. This will define the allowable range for gain in that particular setup. Use a setting that is not too close to the minimum or the maximum that gives the best signal in terms of noise, stability and ECG amplitude.

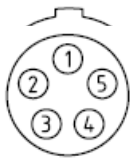
2. The alternative method is to look at the individual sensor signals. If using the EPIC demo software, select signals “A and B”, disable all software filters and set the time base to minimum (0.1 s/div). If the system is being used in an environment with mains electricity noise, then at minimum DRL gain (fully anticlockwise), the 50 or 60Hz signal should be seen strongly on the A and B outputs. As the gain is increased this noise signal will decrease. At some point as the gain is increased further the basic 50 or 60Hz sine wave noise signal may become distorted. This defines the maximum usable DRL gain for that situation. Use a gain setting that is slightly lower than this point.

When using the system in a car mains electricity noise will not be significant. In this case method 1 is recommended for the setting the DRL gain, choosing a value that will give maximum stability. Connecting the DRL output to the 0V of the car is also recommended for improving stability.

5.0 Electrical connectors

The input and output sockets are wired as below:

Pin 1	Output
Pin 2	Gnd
Pin 3	Supply
Pin 4	Gnd
Pin 5	Not used
Case	Gnd



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