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# IM2297 RL8000/DATANET<sup>+</sup>

## User Manual

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## Document History

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| 1         | Oct 2002   | First release  |
| 2         | Jan 2003   | General revisions  |
| 3         | March 2003 | PT100 Sensor added (section 3.04)                                    |
| 4         | April 2003 | RH Sensor added (section 3.05)                                       |
| 5         | July 2003  | Differential pressure sensor (section 3.06)                          |
| 6         | July 2003  | Thermistor sensor added (section 3.07)                               |
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| 8         | Oct 2004   | Converted to A4, RL8000 added to terminology                         |
| 9         | Jan 2005   | Correction to RH Sensor set-up (section 3.05)                        |
| 10        | March 2005 | Type T Thermocouple additions (section 2.04 added and 3.08 modified) |
| 11        | June 2010  | Amended address and Logo update. Correction to unused PT100channel   |
| 12        | March 2014 | Clarifications to Thermocouple configuration                         |
| 13        | Sep 2016   | TypeT now sent as Dual Precision Type, Extended to -ve temperatures  |
|           |            |  |

## Introduction

### Introduction to the RL8000 / datanet+ philosophy

**Datanet+** is a completely new concept in the management and control of data acquisition, offering a seamless integration of standalone dataloggers, radio telemetry and wired bus systems.

The **datanet+** topology utilises the concept of acquisition nodes. Each acquisition node can range in complexity from a single channel stand-alone datalogger, through 2-channel battery powered radio telemetry transmitters, onto complex multi-channel systems. In order to provide maximum flexibility, a wide range of communication options are available for data recovery.

The unique flexibility offered by the **datanet+** concept ensures significant cost savings both at installation and during the lifetime of the product, an important factor that constantly sets us ahead of the competition.

An extensive range of data interfaces allow systems to be rapidly adapted for client-specific requirements:

- Standalone.
- Bus-wired.
- Radio Telemetry.
- Structured Cabling.
- Modem Access via telephone network.
- Internet and email access.

There is a choice either to accept data directly into a PC or use a Hanwell system controller to interpret and log data from the system. When the PC is connected and active the controller will act in a transparent manner. When a PC is unavailable the controller will automatically take over the logging tasks.

The **datanet+** system is built around locally powered 8-channel modules, the **RL8000** unit. Each module offers inputs that can be individually configured to directly support a wide range of industry standard sensor types. Where greater flexibility is called for, battery powered radio telemetry modules offer an excellent solution.

All instrumentation is controlled by one PC software suite, Hanwell **Radiolog**, with a common data structure and a clear upgrade path. Particular attention has been paid to data integrity, system security and audit trail generation. The software supports networking of data and optional remote control. For many applications the software will provide all the analytical tools required but if necessary the data can be readily exported to a third party system. The **Radiolog** software is available in a validated form, which conforms to CFR21 Part 11 Compliance. For more information about this, please contact the IMC Sales Office.

Each physical component within the system is associated with a plug in software module. This unique structure allows for the effortless accommodation of specialised data processing and calibration requirements, and the integration of new sensor types as and when required.

Our programmers can write specific calibration modules for individual needs and also create "virtual sensors" whose results are generated by applying processing algorithms to data from one or more physical sensors.

### Introduction to this document

This document (IM2297) is designed to detail the connection and configuration settings for 8 channel **datanet+** modules (the **RL8000**).

- **Section 2** covers the constant aspects which remain the same for all modules.
- **Section 3** covers the different communication protocols and how to configure the module for use with them. This section will expand as new communication protocols are added to the system.
- **Section 4** covers the specific input settings required for different sensor types and will also expand as new types are added to the system.

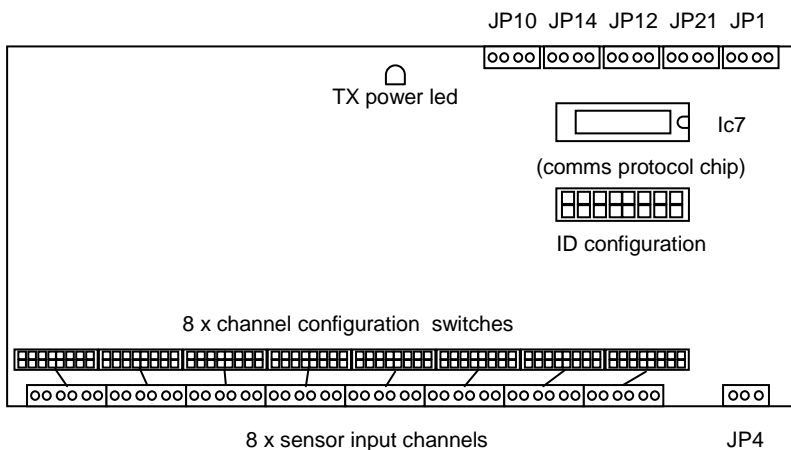
In addition to IM2297, any modules with calibration data will come supplied with a *Calibration Certificate*. Please retain these certificates as they are used to configure the PC software's interpolation of the data received.

# 1 RL8000 8-channel module

This section details the generic elements of the **RL8000** (8-channel **datanet+**) set-up, including the power in and out wiring and the output channel connections.

The wiring details assume that the **RL8000** module is being viewed as per the schematic in section 1.01.

## 1.1 Schematic of RL8000 module



*not to scale*

*all connection numbers run left-right, when viewed as above.*

## 1.2 Power Connections

### 1.2.1 Power In

The **RL8000** module requires a +9V...+12V DC supply (300mA per unit), connected via JP1 (see 1.01), as follows:

| PIN | Connection   |
|-----|--|
| 1   | +V (+9...+12V DC)  |
| 2   | GND  |
| 3   | power out (optional – for daisy chain connection of slave modules) |
| 4   | GND (optional - for daisy chain connection of slave modules)       |

### 1.2.2 Power Out

The power out is an isolated power source, suitable for powering external sensors. Its GND is commoned to the input channel GND. The connections are made on JP4, as follows:

| PIN | Connection     |
|-----|----------------|
| 1   | +12V           |
| 2   | GND (commoned) |
| 3   | -12V           |

### 1.3 Output Connections

There are four additional output connections at the top right of the **RL8000**. These can be used for serial, RS485 or relay connections. All the pin numbers run from left to right, as viewed in section 1.01.

#### 1.3.1 JP10 Relay Output

There are two relay outputs which are normally held open when power is applied. These are connected to JP10 as follows:

| PIN | Connection     |
|-----|----------------|
| 1   | relay output 1 |
| 2   |                |
| 3   | relay output 2 |
| 4   |                |

#### 1.3.2 JP12 / JP14 RS485 Outputs

Both JP12 and JP14 are RS485 outputs. The second one is intended for use in daisy-chained systems (see 1.05). The connections for both J12 and JP14 are as follows:

| PIN | Connection         |
|-----|--------------------|
| 1   | +5V (normally N/C) |
| 2   | RX                 |
| 3   | TX                 |
| 4   | GND                |

#### 1.3.3 JP21 RS232 Output

The connection for RS232 output is via JP21, as follows:

| PIN | Connection     |
|-----|----------------|
| 1   | TX      Red    |
| 2   | RX      Blue   |
| 3   | GND     Yellow |

### 1.4 Sensor Input connections

All input channels share a commoned GND on pin 1. This GND is electrically isolated from any incoming power source and any communications wiring. It is connected to the power out GND on JP4.

- Each Sensor Type has a specific wiring and configuration setting. These are detailed in Section 3.

## 1.5 Slave Connections

'Slave' units are RL8000 units which are wired to a single 'master' unit. This allows several RL8000 units to transmit data via a single transmitter.

### 1.5.1 Power

Each slave unit should be individually powered via JP1, as detailed in section 1.02.

- Do **NOT** use the power connections in the RS232 outputs.

### 1.5.2 Signal Connections

The slave unit should be connected to the master RL8000 unit in series or individually, via JP12 and/or JP14, as below:

| PIN | Connection |
|-----|------------|
| 1   | N/C        |
| 2   | RX         |
| 3   | TX         |
| 4   | N/C        |

- For more details about how to set up Slave units, see section 2.03.



## 2 Communications Protocols

**datanet+**'s flexibility includes the option to chose the communications protocol most suitable for the application. This protocol is set by the *communications protocol chip* fitted in the IC7 socket on the board (see section 1.01 for a schematic).

Each **RL8000** needs an ID set on the *configuration ID* set of DIP switches: how these switches are set is defined by the communications protocol used. This section lists the types of communications protocols available, and the corresponding configuration.

### Communication Protocol Codes

The *communications protocol chip* fitted in IC7 will be labelled to indicate its programming. This code label will take the form

DN#\*\*\*

where 'DN' indicates 'datanet+', # will be a number and \*\*\* will be a two or three letter code.

## 2.1 DN2TXF - RL2000 unidirectional radio protocol

This protocol is designed to send radio transmissions compatible with Hanwell RL2000 2 channel sensors.

Each pair of sensor inputs is sent as a 2-channel RL2000 12bit Sensor. The ID set on the *ID configuration* switches defines four consecutive RL2000 Sensor IDs.

For example, if the *ID configuration* were set to 4, the channels would correspond as below:

| Input Channel | RL2000 ID and Channel |
|---------------|-----------------------|
| 1             | ID13 Channel 1        |
| 2             | ID13 Channel 2        |
| 3             | ID14 Channel 1        |
| 4             | ID14 Channel 2        |
| 5             | ID15 Channel 1        |
| 6             | ID15 Channel 2        |
| 7             | ID16 Channel 1        |
| 8             | ID16 Channel 2        |

In the **Radiolog** software, select the appropriate RL2000 sensor to add to the layout.

- **TIP** – the options for pairs of inputs is limited to the RL2000 sensor types available in the **Radiolog** software. For example, RH and Temperature is available, but RH and 4...20mA is not.

### 2.1.1 Setting ID configuration for DN2TXF

The ID configuration and transmission speed is set on the *ID configuration switches* (see section 1.01).

Switches 1-6 set the ID code. These work in binary sequence: the switch contributes 0 when OFF and as tabulated when ON.

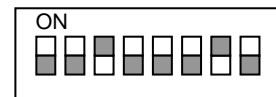
| DIP switch no.: | 1 | 2 | 3 | 4 | 5  | 6  |
|-----------------|---|---|---|---|----|----|
| ID value:       | 1 | 2 | 4 | 8 | 16 | 32 |

Switches 7-8 set the transmission speed.

| Transmission speed    | DIP switch 7 | DIP switch 8 |
|-----------------------|--------------|--------------|
| 5 seconds (TEST mode) | ON           | ON           |
| 30 seconds            | ON           | OFF          |
| 60 seconds            | OFF          | OFF          |
| 150 seconds           | OFF          | ON           |

The example (right) shows a module set to transmit as IDs 13-16 inclusive, at a rate of every 30 seconds (grey indicates switch position).

- 255 (all switches ON) is a reserved code and should not be used.



Note: If Type T thermocouples are in use, see section 2.04.

## 2.2 DN2RXF - RL2000 unidirectional RS232 protocol

This protocol is designed to be used with **RadiologDirect** (a version of Radiolog which accepts direct input rather than via an Architect2 Controller) and is compatible with Hanwell RL2000 2channel sensors.

Each pair of sensor inputs is sent as a 2-channel RL2000 12bit Sensor. The ID set on the *ID configuration* switches defines four consecutive RL2000 Sensor IDs.

For example, if the *ID configuration* were set to 4, the channels would correspond as below:

| Input Channel | RL2000 ID and Channel |
|---------------|-----------------------|
| 1             | ID13 Channel 1        |
| 2             | ID13 Channel 2        |
| 3             | ID14 Channel 1        |
| 4             | ID14 Channel 2        |
| 5             | ID15 Channel 1        |
| 6             | ID15 Channel 2        |
| 7             | ID16 Channel 1        |
| 8             | ID16 Channel 2        |

In the **RadiologDirect** software, select the appropriate RL2000 sensor to add to the layout.

- **TIP** – the options for pairs of inputs is limited to the RL2000 sensor types available in the **RadiologDirect** software. For example, RH and Temperature is available, but RH and 4...20mA is not.

### 2.2.1 Setting ID configuration for DN2RXF

The ID configuration and transmission speed is set on the *ID configuration switches* (see section 1.01).

Switches 1-8 set the ID code. These work in binary sequence: the switch contributes 0 when OFF and as tabulated when ON.

| DIP switch no.: | 1 | 2 | 3 | 4 | 5  | 6  | 7  | 8   |
|-----------------|---|---|---|---|----|----|----|-----|
| ID value:       | 1 | 2 | 4 | 8 | 16 | 32 | 64 | 128 |

The example (right) shows a module set to transmit as IDs 13-16 inclusive (grey indicates switch position).

- 255 (all switches ON) is a reserved code and should not be used.



### 2.3 2.03 DN2SLV - RL2000 Slave

This protocol is designed for RL8000s which are wired to transmitter units (masters) as 'slaves'. The slave uses the same transmission method as the master and its channel IDs are based on the master ID set.

Each pair of sensor inputs is sent as a 2-channel RL2000 12bit Sensor. The ID set on the *ID configuration switches* defines four consecutive RL2000 Sensor IDs. These will be sequential to the master ID channels. For example, if the master ID is set to 1 then it uses RL2000 IDs 1-4 inclusive whilst a slave connected to it and set to 1 will use RL2000 IDs 5-8.

See the table below for examples:

| Master ID | Slave ID | Input Channel | RL2000 ID and Channel |
|-----------|----------|---------------|-----------------------|
| 1         | 1        | 1             | ID5 Channel 1         |
|           |          | 2             | ID5 Channel 2         |
|           |          | 3             | ID6 Channel 1         |
|           |          | 4             | ID6 Channel 2         |
|           |          | 5             | ID7 Channel 1         |
|           |          | 6             | ID7 Channel 2         |
|           |          | 7             | ID8 Channel 1         |
|           |          | 8             | ID8 Channel 2         |
| 4         | 1        | 1             | ID17 Channel 1        |
|           |          | 2             | ID17 Channel 2        |
|           |          | 3             | ID18 Channel 1        |
|           |          | 4             | ID18 Channel 2        |
|           |          | 5             | ID19 Channel 1        |
|           |          | 6             | ID19 Channel 2        |
|           |          | 7             | ID20 Channel 1        |
|           |          | 8             | ID20 Channel 2        |

In the **Radiolog** software, select the appropriate RL2000 sensor to add to the layout.

- **TIP** – the options for pairs of inputs is limited to the RL2000 sensor types available in the **Radiolog** software. For example, RH and Temperature is available, but RH and 4...20mA is not.

#### 2.3.1 Setting ID configuration for DN2SLV

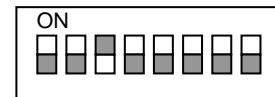
The ID configuration is set on the *ID configuration switches* (see section 1.01).

Switches 1-8 set the ID code. These work in binary sequence: the switch contributes 0 when OFF and as tabulated when ON.

|                 |   |   |   |   |    |    |    |     |
|-----------------|---|---|---|---|----|----|----|-----|
| DIP switch no.: | 1 | 2 | 3 | 4 | 5  | 6  | 7  | 8   |
| ID value:       | 1 | 2 | 4 | 8 | 16 | 32 | 64 | 128 |

The example (right) shows a module set to transmit as the fourth set of IDs (grey indicates switch position).

- Slave ID codes should be set in sequential order, starting at ID1.
- 255 (all switches ON) is a reserved code and should not be used.
- The transmission speed for a slave is dictated by its master unit.



#### 2.3.2 Connecting the DN2SLV to the master unit

See section 1.05 for details.

## 2.4 DNTXTT - RL2000 Type T Thermocouples

This protocol is designed for RL8000s which are to transmit as RL2000 Thermocouple Sensors and whose inputs are to be thermocouple **Type T**.

The RL8000 will be fitted with the following PICs:

- IC7 DNTXTT
- IC12DNATYPET

NOTE: If an RL8000 is fitted with these PICs then the **ONLY** input option is **Type T thermocouples** (or empty channels).

Each pair of sensor inputs is sent as a 2-channel RL2000 Thermocouple Sensor. The ID set on the *ID configuration* switches defines four consecutive RL2000 Sensor IDs.

For example, if the *ID configuration* were set to 4, the channels would correspond as below:

| Input Channel | RL2000 ID and Channel |
|---------------|-----------------------|
| 1             | ID13 Channel 1        |
| 2             | ID13 Channel 2        |
| 3             | ID14 Channel 1        |
| 4             | ID14 Channel 2        |
| 5             | ID15 Channel 1        |
| 6             | ID15 Channel 2        |
| 7             | ID16 Channel 1        |
| 8             | ID16 Channel 2        |

### 2.4.1 Setting ID configuration for DNTXTT

The ID configuration and transmission speed is set on the *ID configuration switches* (see section 1.01).

Switches 1-6 set the ID code. These work in binary sequence: the switch contributes 0 when OFF and as tabulated when ON.

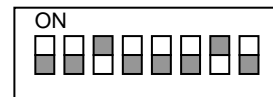
| DIP switch no.: | 1 | 2 | 3 | 4 | 5  | 6  |
|-----------------|---|---|---|---|----|----|
| ID value:       | 1 | 2 | 4 | 8 | 16 | 32 |

Switches 7-8 set the transmission speed.

| Transmission speed    | DIP switch 7 | DIP switch 8 |
|-----------------------|--------------|--------------|
| 5 seconds (TEST mode) | ON           | ON           |
| 30 seconds            | ON           | OFF          |
| 60 seconds            | OFF          | OFF          |
| 150 seconds           | OFF          | ON           |

The example (right) shows a module set to transmit as IDs 13-16 inclusive, at a rate of every 30 seconds (grey indicates switch position).

- 255 (all switches ON) is a reserved code and should not be used.



### 3 Sensor Types

Each Sensor Type has a specific wiring and configuration setting. This section details existing types of Sensor and their corresponding wiring and configuration settings.

The configuration settings are made on the corresponding set of DIP switches to the input channel.

- All input channels share a commoned GND on pin 1. This GND is electrically isolated from any incoming power source and any communications wiring. It is connected to the power out GND on JP4.
- All UNUSED input channels should have their *configuration switches* set as follows:

|     |           |     |     |     |     |           |     |
|-----|-----------|-----|-----|-----|-----|-----------|-----|
| 1   | 2         | 3   | 4   | 5   | 6   | 7         | 8   |
| OFF | <b>ON</b> | OFF | OFF | OFF | OFF | <b>ON</b> | OFF |

- ALWAYS check the configuration settings are correctly set before connecting the sensor, or powering up the datanet+ board.

## 3.1 4...20mA Sensors

### 3.1.1 Input Wiring

All wiring assumes that the **RL8000** is being viewed as illustrated in section 1.01. Pin 1 is on the left, pin 6 on the right.

| PIN        | 1            | 2   | 3            | 4            | 5   | 6   |
|------------|--------------|-----|--------------|--------------|-----|-----|
| CONNECTION | Commoned GND | N/C | - (negative) | + (positive) | N/C | N/C |

- Please note the comment about the commoned GND at the start of section 3.
- ALWAYS check the configuration settings are correctly set before connecting the sensor, or powering up the **RL8000**.

### 3.1.2 Configuration Settings

These are set on the corresponding set of *configuration switches* .

| 1   | 2         | 3   | 4   | 5   | 6         | 7         | 8   |
|-----|-----------|-----|-----|-----|-----------|-----------|-----|
| OFF | <b>ON</b> | OFF | OFF | OFF | <b>ON</b> | <b>ON</b> | OFF |

### 3.2 0...10V Sensors

#### 3.2.1 Input Wiring

All wiring assumes that the **RL8000** is being viewed as illustrated in section 1.01. Pin 1 is on the left, pin 6 on the right.

| PIN        | 1            | 2   | 3            | 4            | 5   | 6   |
|------------|--------------|-----|--------------|--------------|-----|-----|
| CONNECTION | Commoned GND | N/C | - (negative) | + (positive) | N/C | N/C |

- Please note the comment about the commoned GND at the start of section 3.
- ALWAYS check the configuration settings are correctly set before connecting the sensor, or powering up the **RL8000**.

#### 3.2.2 Configuration Settings

These are set on the corresponding set of *configuration switches* .

| 1   | 2         | 3   | 4   | 5   | 6         | 7   | 8         |
|-----|-----------|-----|-----|-----|-----------|-----|-----------|
| OFF | <b>ON</b> | OFF | OFF | OFF | <b>ON</b> | OFF | <b>ON</b> |



### 3.3 0...1V Sensors

#### 3.3.1 Input Wiring

All wiring assumes that the **RL8000** is being viewed as illustrated in section 1.01. Pin 1 is on the left, pin 6 on the right.

| PIN        | 1            | 2   | 3            | 4            | 5   | 6   |
|------------|--------------|-----|--------------|--------------|-----|-----|
| CONNECTION | Commoned GND | N/C | - (negative) | + (positive) | N/C | N/C |

- Please note the comment about the commoned GND at the start of section 3.
- ALWAYS check the configuration settings are correctly set before connecting the sensor, or powering up the **RL8000**.

#### 3.3.2 Configuration Settings

These are set on the corresponding set of *configuration switches* .

| 1   | 2         | 3   | 4   | 5   | 6         | 7   | 8   |
|-----|-----------|-----|-----|-----|-----------|-----|-----|
| OFF | <b>ON</b> | OFF | OFF | OFF | <b>ON</b> | OFF | OFF |

### 3.4 PT100 Sensors

#### Input Wiring

All wiring assumes that the **RL8000** is being viewed as illustrated in section 1.01. Pin 1 is on the left, pin 6 on the right.

In addition to the sensor, two resistors should be fitted, as indicated.

|                   |              |              |              |              |              |     |   |
|-------------------|--------------|--------------|--------------|--------------|--------------|-----|---|
| PIN               | 1            | 2            | 3            | 4            | 5            | 6   | • |
| SENSOR CONNECTION | Commoned GND | - (negative) | - (negative) | + (positive) | + (positive) | ref |   |
| RESISTOR          | 200R         |              |              |              | 1K           |     |   |

- Please note the comment about the commoned GND at the start of section 3.
- ALWAYS check the configuration settings are correctly set before connecting the sensor, or powering up the **RL8000**.
- The recommended resistor type is **0.125Watt metal film resistors**.
- PT100 Sensors should be added in pairs (for example, input channels 1 and 2). See *3.04 Additional Notes*.

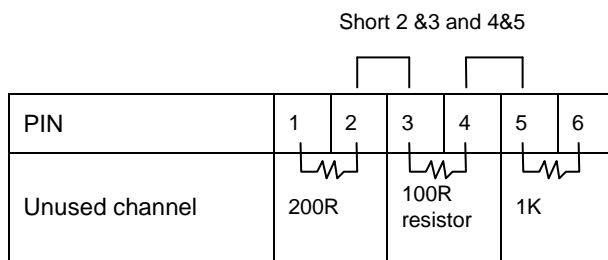
#### 3.4.1 Configuration Settings

These are set on the corresponding set of *configuration switches* .

|     |     |     |     |    |     |     |     |
|-----|-----|-----|-----|----|-----|-----|-----|
| 1   | 2   | 3   | 4   | 5  | 6   | 7   | 8   |
| OFF | OFF | OFF | OFF | ON | OFF | OFF | OFF |

#### 3.4.2 Additional Notes (continue on next page)

- If the second input channel of a pair is not being used for a PT100 Sensor, it should **not** be used for a different type of sensor.
- Instead connect it as follows:



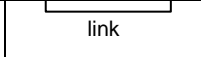
- This second unused channel will send a 0C trace. If not connected as above, neither channel will be received.
- If adding the Sensor to the **Radiolog** software, select the **Sensor Type RL2000 Dual PT100**, even if only one channel is being used.
- If using the PT100 Sensor in combination with a RH Sensor, the RH Sensor should be Channel 1.

### 3.5 RH Sensors

#### 3.5.1 Input Wiring

All wiring assumes that the **RL8000** is being viewed as illustrated in section 1.01. Pin 1 is on the left, pin 6 on the right.

| PIN        | 1                             | 2   | 3 | 4           | 5   | 6  |
|------------|-------------------------------|-----|---|-------------|-----|----|
| CONNECTION | Commoned GND<br>RH signal GND | N/C |   | RH signal + | N/C | +V |



- Please note the comment about the commoned GND at the start of section 3.
- ALWAYS check the configuration settings are correctly set before connecting the sensor, or powering up the **RL8000**.

#### 3.5.2 Configuration Settings

These are set on the corresponding set of *configuration switches* .

| 1  | 2  | 3  | 4   | 5   | 6  | 7   | 8   |
|----|----|----|-----|-----|----|-----|-----|
| ON | ON | ON | OFF | OFF | ON | OFF | OFF |

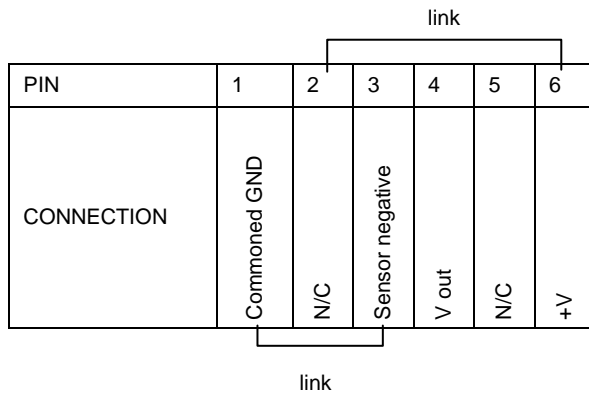
#### 3.5.3 Additional Notes

- If using RH sensors which require a 12V power supply, change switch 8 to ON. Please check with The IMC Group if another different type of RH sensor is going to be used.
- If using the RH Sensor in combination with a PT100 Sensor or Thermistor Sensor, the RH Sensor should be Channel 1.

### 3.6 Differential Pressure Sensors

#### 3.6.1 Input Wiring

All wiring assumes that the **RL8000** is being viewed as illustrated in section 1.01. Pin 1 is on the left, pin 6 on the right.



- Please note the comment about the commoned GND at the start of section 3.
- ALWAYS check the configuration settings are correctly set before connecting the sensor, or powering up the **RL8000**.

#### 3.6.2 Configuration Settings

These are set on the corresponding set of *configuration switches* .

|     |           |           |     |           |     |     |           |
|-----|-----------|-----------|-----|-----------|-----|-----|-----------|
| 1   | 2         | 3         | 4   | 5         | 6   | 7   | 8         |
| OFF | <b>ON</b> | <b>ON</b> | OFF | <b>ON</b> | OFF | OFF | <b>ON</b> |

#### 3.6.3 Additional Notes

These settings are for a 5V Sensortechics Differential Pressure sensor (PXL01X0DNC) with a nominal 2.25V output at 0 and a +/-2V swing.

For connecting other types of differential pressure sensor, please contact The IMC Group Ltd.

If adding to the Hanwell **Radiolog** system, select the **Sensor Type** *RL2000 Linear* in the software.

### 3.7 Thermistor Sensors

#### 3.7.1 Input Wiring

All wiring assumes that the **RL8000** is being viewed as illustrated in section 1.01. Pin 1 is on the left, pin 6 on the right.

| PIN        | 1            | 2   | 3          | 4          | 5 | 6   |
|------------|--------------|-----|------------|------------|---|-----|
| CONNECTION | Commoned GND | N/C | thermistor | thermistor |   | N/C |

link
link

- Please note the comment about the commoned GND at the start of section 3.
- ALWAYS check the configuration settings are correctly set before connecting the sensor, or powering up the **RL8000**.

#### 3.7.2 Configuration Settings

These are set on the corresponding set of *configuration switches* .

| 1   | 2   | 3   | 4   | 5   | 6         | 7   | 8   |
|-----|-----|-----|-----|-----|-----------|-----|-----|
| OFF | OFF | OFF | OFF | OFF | <b>ON</b> | OFF | OFF |

#### 3.7.3 Additional Notes

- If adding to the Hanwell **Radiolog** system, select the appropriate Thermistor **Sensor Type** (typically the *RL2000 RH/Thermistor* or the *RL2000 Dual Thermistor*).
- If using an RH Sensor in combination with a Thermistor Sensor, the RH Sensor should be Channel 1.

### 3.8 Thermocouple Sensors

#### 3.8.1 Input Wiring

All wiring assumes that the **RL8000** is being viewed as illustrated in section 1.01. Pin 1 is on the left, pin 6 on the right.

| PIN        | 1   | 2   | 3                | 4                 | 5   | 6   |
|------------|-----|-----|------------------|-------------------|-----|-----|
| CONNECTION | N/C | N/C | Thermocouple neg | Thermocouple plus | N/C | N/C |

- ALWAYS check the configuration settings are correctly set before connecting the sensor, or powering up the **RL8000**.

#### 3.8.2 Configuration Settings

These are set on the corresponding set of *configuration switches* .

| 1   | 2         | 3   | 4   | 5   | 6         | 7   | 8   |
|-----|-----------|-----|-----|-----|-----------|-----|-----|
| OFF | <b>ON</b> | OFF | OFF | OFF | <b>ON</b> | OFF | OFF |

#### 3.8.3 Additional Notes

- For Type T use, the datanet module is fitted with microcontrollers labelled 'dnaTypeT' and 'dnTxTT'
- For Type K use, the datanet module is fitted with microcontrollers labelled 'dnetaTC' and 'dnTxKK'
- ALL inputs to a thermocouple **RL8000** MUST be of the same Type (for example, all Type T).
- Cold junction compensation is performed by a single Thermistor mounted under the **RL8000** PCB, adjacent to the centre of the input connections.
- The thermocouple negative is internally connected to the commoned GND via a 10K resistor.

#### 3.8.4 Type T Notes - From Sept 2016 onwards.

**For RadioLog 8:**

- Add to Radiolog8 as 4 successive ID's of type 'Dual Type T'
- The nominal Offset should be set to 0 and the nominal Count at 4000uV is 1350 (differs from defaults), however you should ensure that you manually enter the **actual** calibration data as provided on the associated calibration sheet.

**For Synergy:**

- Add to Synergy as 4 successive 'Dual Precision TC'
- Enter ALL calibration values as provided on the associated calibration sheet.

#### 3.8.5 Type K Notes

**For RadioLog 8:**

- Add to Radiolog8 as a 'Dual Thermocouple and in the calibration section select Thermocouple type as 'K'. **DO NOT SELECT 'DUAL TYPE K'**
- Enter the offset and gain values as provided on the instrument's calibration sheet.

**For Synergy:**

- Add to Synergy as 4 successive 'Dual Thermocouple', **DO NOT select 'DUAL TYPE K'**
- Enter 'K' in Thermocouple type; and the offset and gain values as provided on the instrument's calibration sheet.