DynOptic Systems Ltd
www.dynoptic.com

DynOptic Systems Control Unit – DSCU

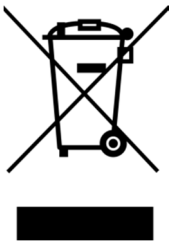
Installation & Operators Manual V1.4

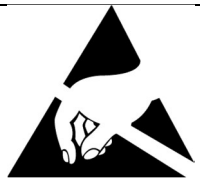
DynOptic Systems Ltd – Furlong House, Crowfield, Brackley, Northamptonshire, NN13 5TW United Kingdom

Contents

Warnings

Throughout the manual the following symbols are used to highlight the potential dangers when installing, operating and servicing the instruments.

	Caution; Care must be taken, refer to specific instructions.
	Warning; Risk of electric shock.
	Protective Conductor Terminal.
	Recycle Responsibly.
	Attention; observe precautions for handling electrostatic

	sensitive devices.
Note:	Highlights a specific instruction or operating procedure.

General Warnings

Each section of the manual outlines the specific warnings for that part of the process or procedure. Below are some general guidelines that should be followed at all times:-

- ***The instrument is particularly vulnerable during transportation and manual handling. Always transport the instrument in its original packaging and handle with utmost care.***

- ***Prior to use, the equipment should be stored in its original packaging in a dry and sheltered area.***

- ***Applications vary and all installations will involve a degree of application engineering which is the responsibility of the customer, not DynOptic Systems.***

- ***All installations and connections must be made by suitably qualified and experienced electrical / mechanical engineers with proper regard to good practice and compliance with applicable legislation.***

- ***The instrument contains sensitive electronics and must be protected from physical shock, vibration and exposure to moisture at all times. Always handle with care, replace lids and covers when not in use and protect from water ingress.***

- ***The instrument contains sensitive electronics which are vulnerable to ESD and therefore care should be taken to avoid making contact with electronic circuit boards & components. Use ESD handling precautions.***

- ***All electrical work must be carried out with the power to the instrument OFF i.e. it must be isolated from any source of voltage. Failure to do so could result in equipment failure, injury or death.***

- ***Do not make or break electrical connections whilst power is connected to any instrument. "Hot plugging" as this is known, may damage the electronics and require a circuit board to be replaced. This is NOT covered under warranty.***

- ***Always calculate the potential voltage drop when specifying the type / length of any DC power cable, taking care to allow for the***

output tolerance of the power supply. The stated voltage supply is that at the point of connection at the instrument.

- ***The cables to and from the instrument carry sensitive electronic signals which can be affected by RFI and EMI, so care should be taken to run the cables away from high voltage power cables, high frequency signal cables, or switch gear cabling. Ideally any cables connecting to the instrument, or between instrument components, will follow an independent route and will not be installed in bundles or cable trays with other cabling.***

- ***The ferrite tubes supplied should be fitted on all cables where they connect to the instrument enclosures.***

- ***Proper connection to a local Earth potential should be given consideration when choosing a location for the instrument components. Protective Earthing is essential, not just as a safety precaution, but also to maintain the instruments compliance with European safety directives and CE marking.***

- ***A Warranty Certificate is provided with each order. Failure to follow the procedures outlined in this manual, unless specifically instructed to do otherwise, could invalidate the warranty.***

- ***Read the manual in full before proceeding. If in doubt contact your local distributor or DynOptic Systems direct.***

Product Overview

The DSCU (DynOptic Systems Control Unit) is an OI (Operator Interface) that consists of a numeric / directional keypad, a two line LCD display and a terminal compartment.

The keypad and display combine to form an interface which can be used to setup and control connected instruments with similar functionality to the PC based Utility software supplied with each instrument.

The terminal compartment is used for electrical connections. The DSCU can be connected directly to a single instrument or to a network of instruments via a single umbilical cable which carries power and communications (RS485). The SCADA interface connections can be made directly to the DSCU (located at ground level, or in a control room) and / or to the instrument. This versatility offers the flexibility to accommodate a wide range of wiring schemes.

The DSCU offers a variety of industry standard interface options. Scalable analogue outputs are available in the form of isolated 0 / 2 / 4-20mA loops. Digital outputs are available in the form of relay contacts for service alarm (data valid) and / or programmable level alarms.

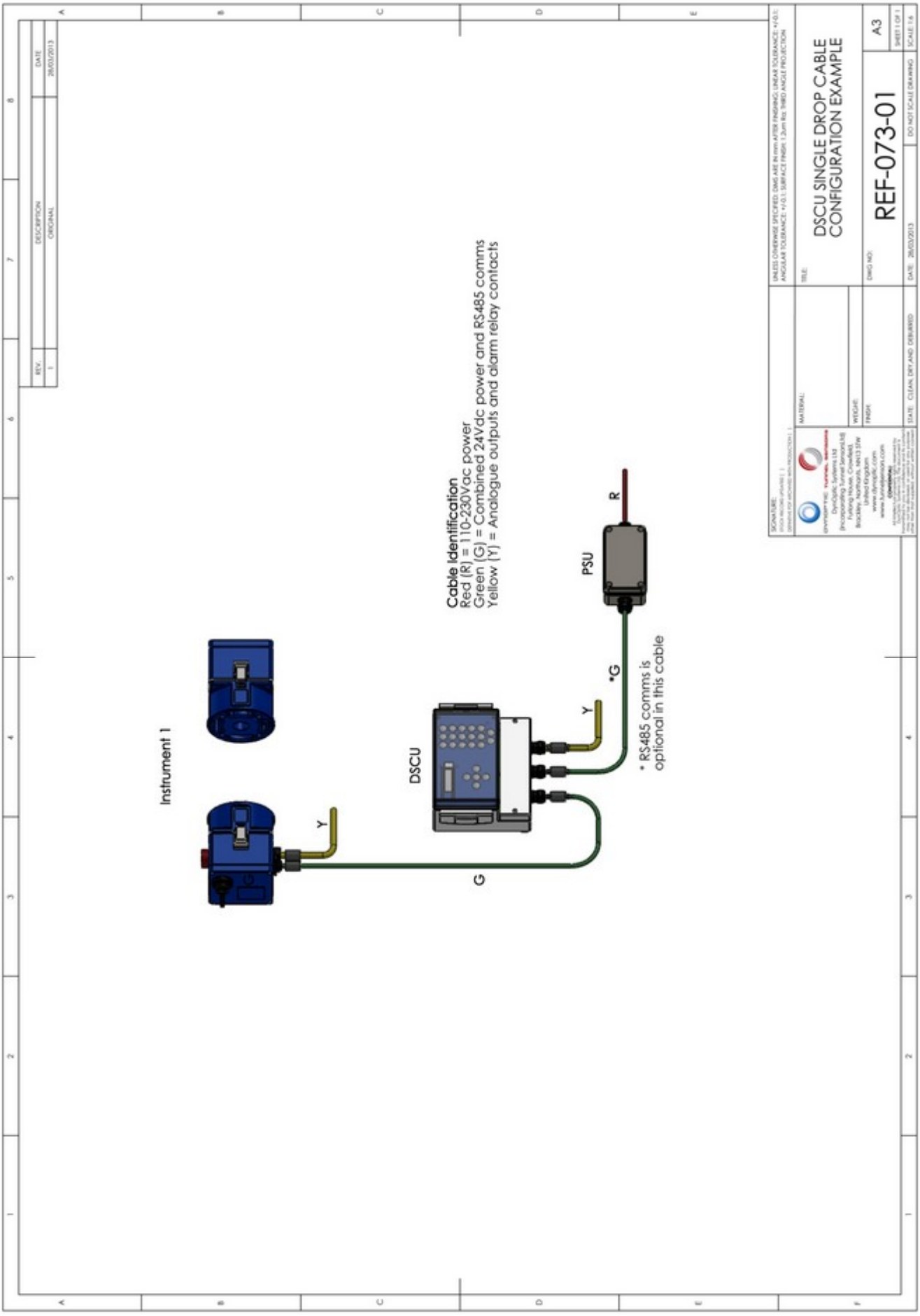
The DSCU is available in three variants which provide a different number of analogue outputs and relays. These variants are summarised in the following table. The wiring diagrams, performance descriptions and screenshots in this document all show the DSCU-8 variant.

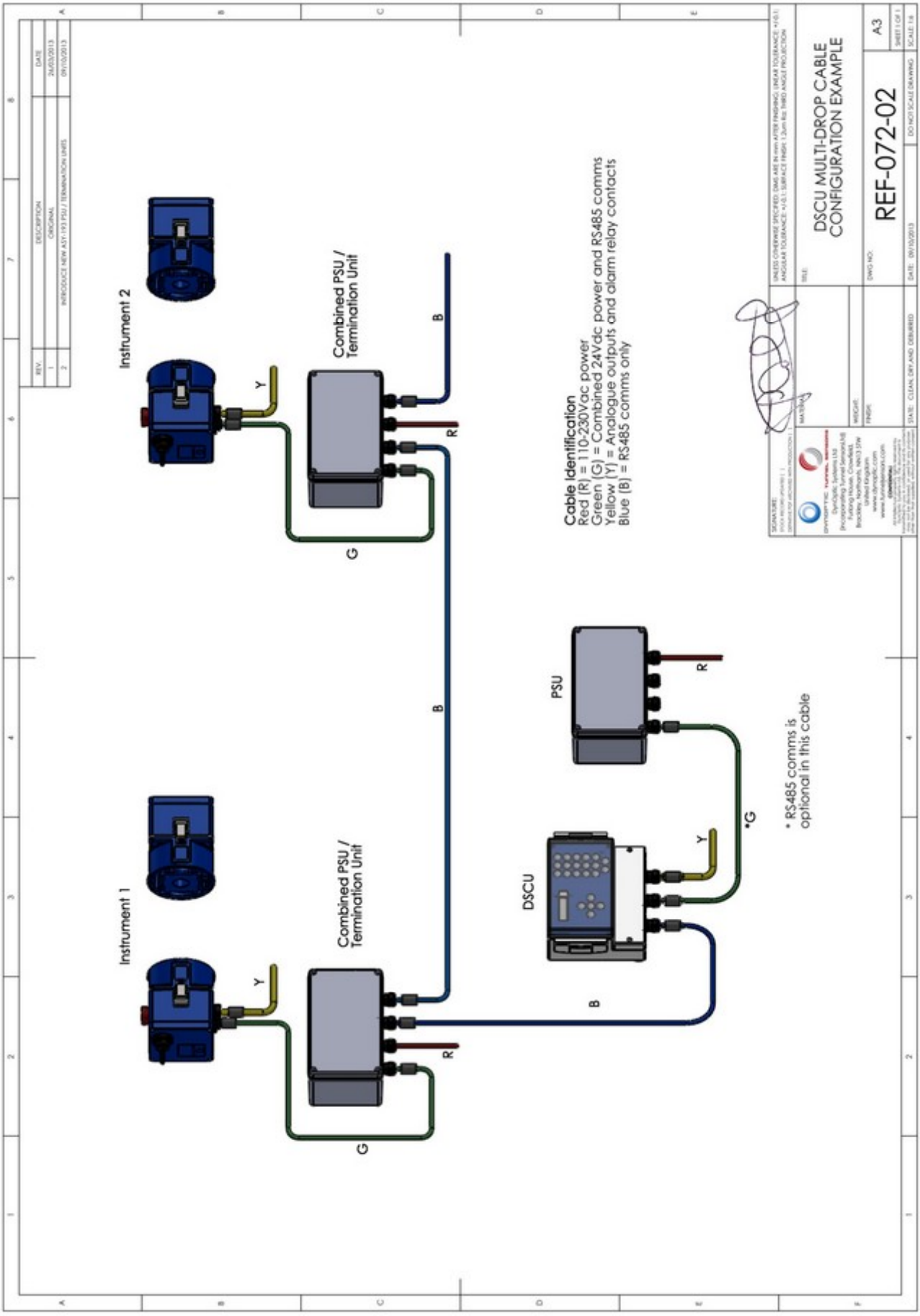
Model	**No. Analogues**	**No. Relays**
DSCU-1	1	1
DSCU-4	4	4
DSCU-8	8	8

A serial communications channel is available in the DSCU. RS485 is available as standard. Please enquire with us directly if you have any specific requirements for serial communications.

The following pages show example cable configurations for a DSCU connected to a single instrument, and connected to multiple instruments.

The first sections of this manual describe the physical and electrical installation of the DSCU. The remaining sections describe the detailed operation of the DSCU menu structure and the Utility software. A basic description of how to use the Utility to set up the DSCU and how to work with multiple instruments is provided in the Appendix.


DSCU SINGLE DROP CABLE CONFIGURATION EXAMPLE
REF-073-01
A3
Instrument 1
Y
G
DSCU
Y
*G
R
PSU
Cable Identification
Red (R) = 110-230Vac power
Green (G) = Combined 24Vdc power and RS485 comms
Yellow (Y) = Analogue outputs and alarm relay contacts
* RS485 comms is optional in this cable


DSCU MULTI-DROP CABLE CONFIGURATION EXAMPLE
REF-072-02
A3
Instrument 2
Instrument 1
Combined PSU / Termination Unit
Combined PSU / Termination Unit
PSU
DSCU
Cable Identification
Red (R) = 110-230Vac power
Green (G) = Combined 24Vdc power and RS485 comms
Yellow (Y) = Analogue outputs and alarm relay contacts
Blue (B) = RS485 comms only
* RS485 comms is optional in this cable
R
G
Y
B
*G

Physical Installation of the DSCU

All installations and connections must be made by suitably qualified and experienced electrical / mechanical engineers with proper regard to good practice and compliance with applicable legislation.

The instrument contains sensitive electronics and must be protected from physical shock, vibration and exposure to moisture at all times. Always handle with care, replace lids and covers when not in use and protect from water ingress.

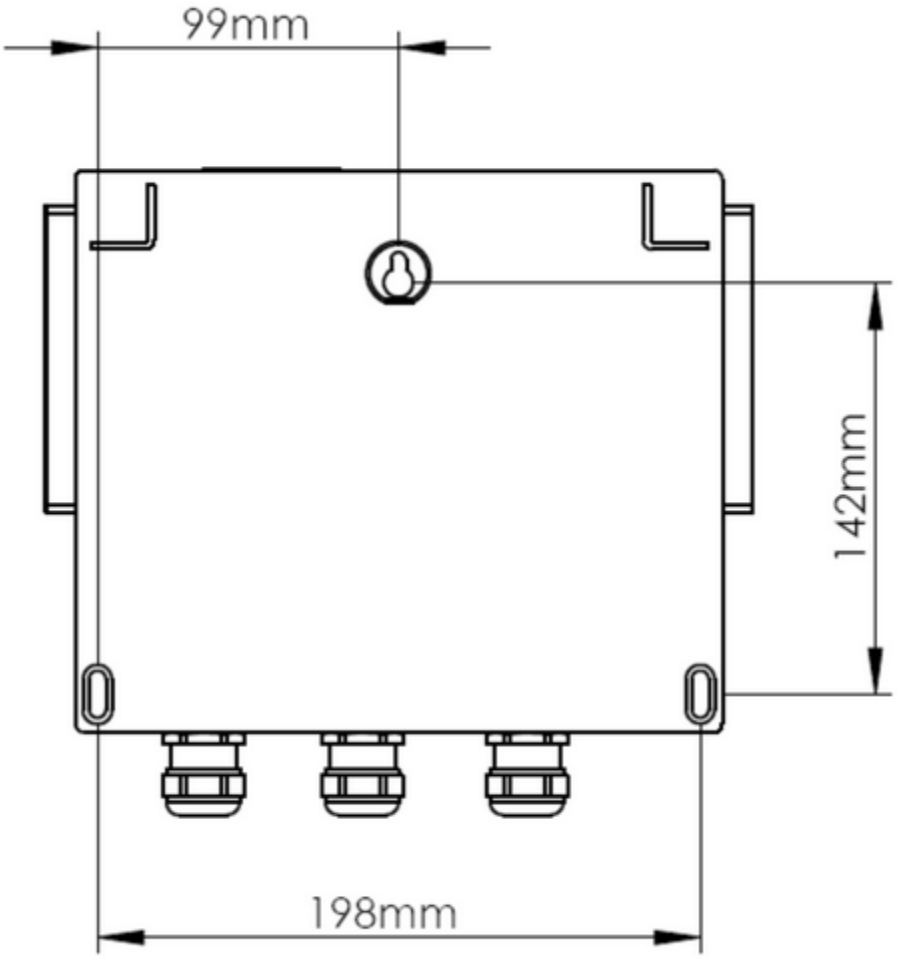
WARNING: Do not remove the front panel to access the main circuit board. If the ribbon connector from the front panel to the circuit board comes unplugged this can damage the instrument.

The instrument contains sensitive electronics which are vulnerable to ESD and therefore care should be taken to avoid making contact with electronic circuit boards & components. Use ESD handling precautions.

Wall mounting the DSCU

The DSCU can be fixed to a wall or panel using 3 off M5 bolts or no.10 sized self-tapping screws.

There is a single central fixing point by which the DSCU enclosure is “hung” on the wall. Two further fixing points are located at the base of the terminal compartment. These two fixings are accessed from the front of the enclosure (through the terminal compartment) and serve to secure the enclosure tight to the wall.



Mark, drill and if necessary tap the mounting holes. Insert a screw into the top hole in the wall, screwing almost all the way down but leaving just a few millimetres of thread protruding from the wall.

Hang the DSCU on this screw using the top “keyhole” mounting point and ensure that the DSCU has dropped down properly over the screw head. Adjust the hanging screw as necessary to ensure the enclosure is pulled gently against the wall.

Open the terminal compartment of the DSCU and insert screws into the two (2) slotted fixing holes to secure the DSCU against the wall and to prevent it from being “lifted” off the central hanging screw.

Electrical Installation & Wiring

All installations and connections must be made by suitably qualified and experienced electrical / mechanical engineers with proper regard to good practice and compliance with applicable legislation.

The instrument contains sensitive electronics and must be protected from physical shock, vibration and exposure to moisture at all times. Always handle with care, replace lids and covers when not in use and protect from water ingress.

All electrical work must be carried out with the power to the instrument OFF i.e. it must be isolated from any source of voltage. Failure to do so could result in equipment failure, injury or death.

Do not make or break electrical connections whilst power is connected to any instrument. "Hot plugging" as this is known, may damage the electronics and require a circuit board to be replaced. This is NOT covered under warranty.

WARNING: If long cable runs are used, ensure that the difference in earth potential at either end of the cable is less than +/-5V (AC or DC).

Protective Earth Terminal

Proper connection to a local Earth potential should be given consideration when choosing a location for the instrument components. Protective Earthing is essential, not just as a safety precaution, but also to maintain the instruments compliance with European safety directives and CE marking.

Installing the umbilical cable (DSCU to Instrument)

Due to the variable lengths possible, this cable is not normally supplied with the instruments. Suitable cable can be organised locally or purchased separately from DynOptic Systems. This cable must have a minimum of 4 cores and meet the specification shown below.

When the DSCU is connected to a single instrument this cable can be used to power the instrument as well as provide the RS485 communication between the DSCU and the instrument head. However, when the DSCU is connected to multiple instruments these instruments must be powered locally and the umbilical cable to the DSCU only carries the RS485 communications.

When the DSCU is used to power a single instrument the maximum length of this cable is limited by the voltage drop likely to occur on the 24Vdc supply carried in this cable. Always calculate the potential voltage drop when specifying the type/length of this cable, taking care to allow for the output tolerance of the power supply. The 24Vdc supply to the instrument must not fall below 22Vdc.

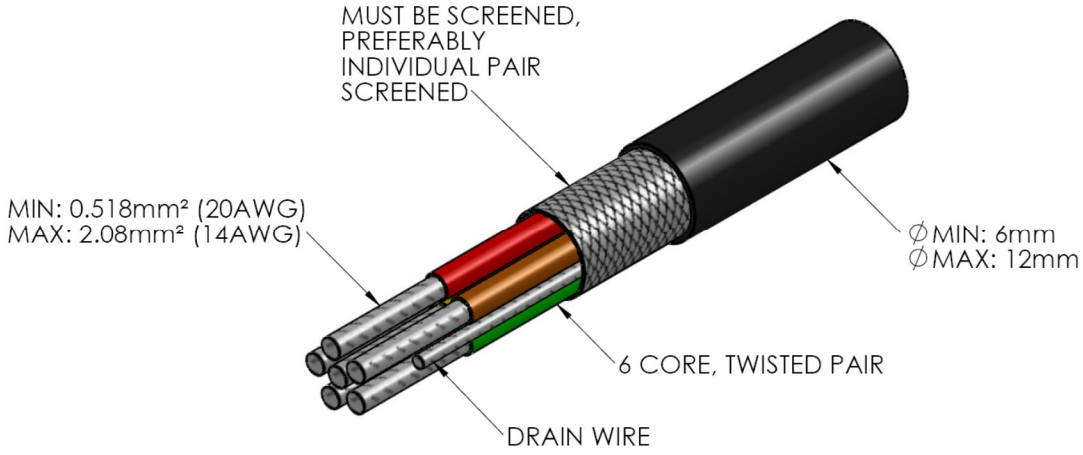
If separate power supplies are used the voltage drop is no longer the limiting factor, the maximum cable length is then 1km which is the recommended limit for the RS485 communications. When the DSCU is connected to multiple instruments the total cable length to the furthest instrument must be less than 1km.

When using long cable runs it is essential to check for differences in earth potential between the different locations and to ensure that the difference is no more than +/-5V AC or DC.

All cables should have an individual core size of between 0.518mm² (20AWG) and 2.08mm² (14AWG).

All cables must be screened, ideally individually screened twisted pairs with a common drain wire, such as Belden 9873 (6 core, screened pair, 20AWG).

The overall diameter of the cable should be between 6 and 12mm.



The umbilical cable carries sensitive electronic signals which can be affected by RFI and EMI. Care should be taken to run the cables away from high voltage power cables, high frequency signal cables, or switch gear cabling.

Ideally any cables connecting to the instrument, or between instrument components, will follow an independent route and will not be installed in bundles or cable trays with other cabling.

The supplied ferrite tubes should be fitted on the cables where the cables enter any instrument or DSCU enclosure. The ferrites should be secured in place so that they remain fixed adjacent to the cable gland entry.

To fit the ferrite, pass the cable through the centre of the ferrite and then pass the cable through the cable gland and into the enclosure. Fix the ferrite in place by fitting a cable tie either side of the ferrite, thus preventing it from sliding along the cable.

Installation Wiring Diagram

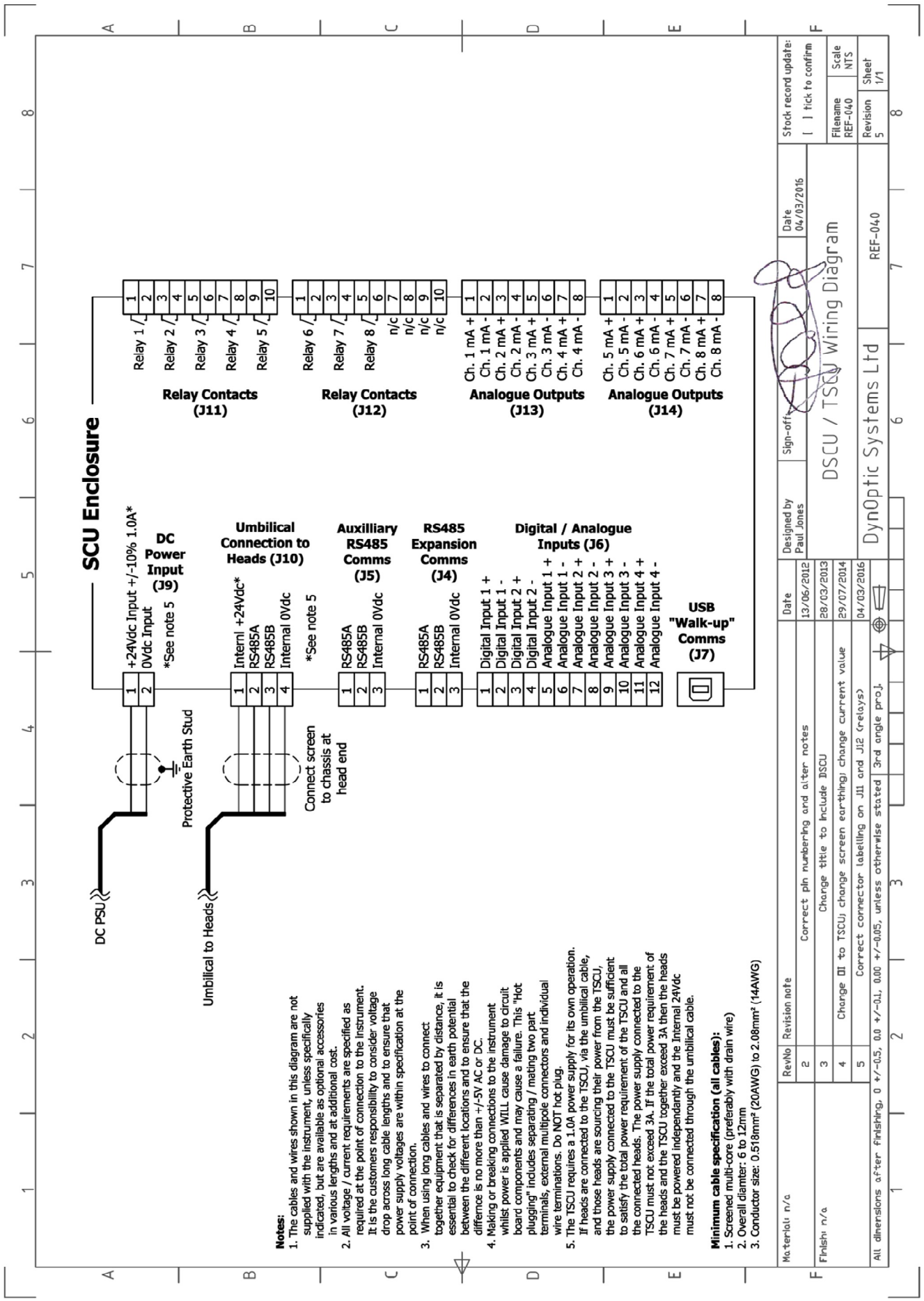
The following drawing shows the installation wiring diagram for the DSCU.

The connection terminals are located in a separate terminal compartment at the bottom of the enclosure.

This diagram includes details of common interface wiring, but not all these connections are essential for functional operation. The drawing shows 8 relays and 8 analogue outputs. The actual number of outputs supplied is dependent on the option selected (1, 4 or 8).

Some interface connections available in the DSCU may also be available within the connected instruments as well. In this case, interface connections can be made at either the DSCU or the instrument, or even both.

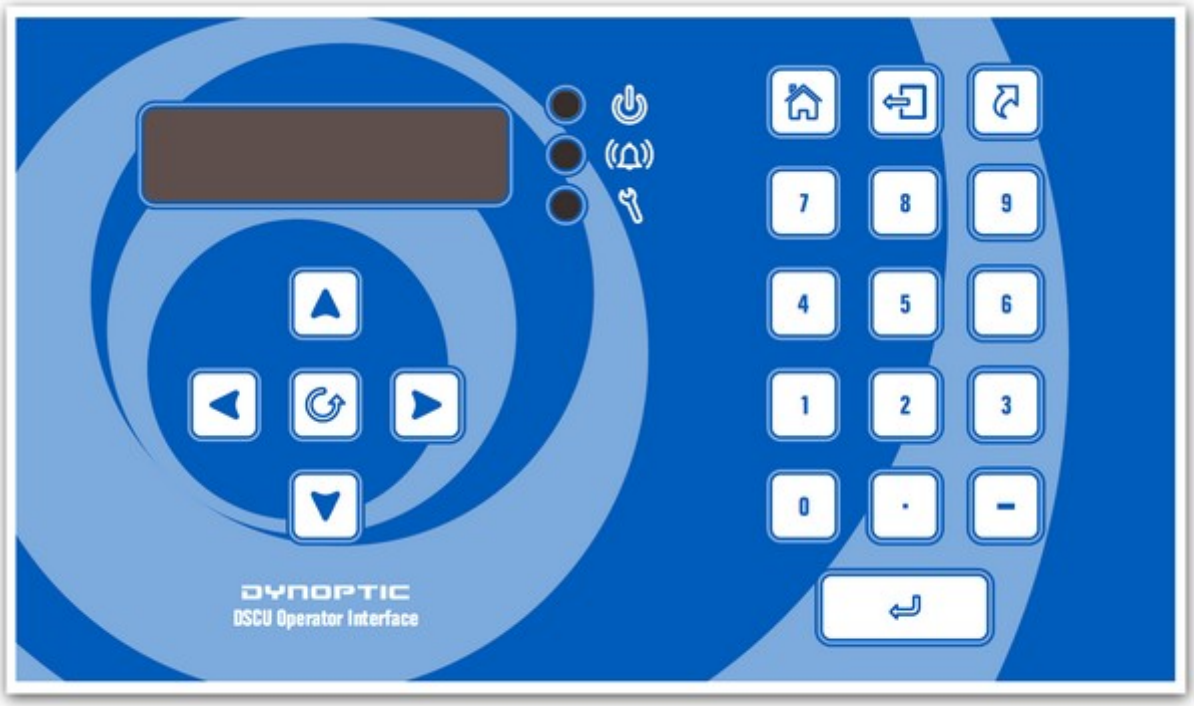
See Appendix C for installation and wiring details for the optional Combined PSU / Termination Unit

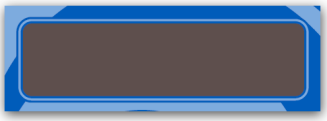

SCU Enclosure
DC PSU
Umbilical to Heads
Protective Earth Stud
Connect screen to chassis at head end
DC Power Input (J9)
+24Vdc Input +/-10% 1.0A*
0Vdc Input
*See note 5
Umbilical Connection to Heads (J10)
Internl +24Vdc*
RS485A
RS485B
Internal 0Vdc
*See note 5
Auxilliary RS485 Comms (J5)
RS485A
RS485B
Internal 0Vdc
RS485 Expansion Comms (J4)
RS485A
RS485B
Internal 0Vdc
Digital / Analogue Inputs (J6)
Digital Input 1 +
Digital Input 1 -
Digital Input 2 +
Digital Input 2 -
Analogue Input 1 +
Analogue Input 1 -
Analogue Input 2 +
Analogue Input 2 -
Analogue Input 3 +
Analogue Input 3 -
Analogue Input 4 +
Analogue Input 4 -
USB "Walk-up" Comms (J7)
Relay Contacts (J11)
Relay 1
Relay 2
Relay 3
Relay 4
Relay 5
Relay Contacts (J12)
Relay 6
Relay 7
Relay 8
n/c
n/c
n/c
n/c
Analogue Outputs (J13)
Ch. 1 mA +
Ch. 1 mA -
Ch. 2 mA +
Ch. 2 mA -
Ch. 3 mA +
Ch. 3 mA -
Ch. 4 mA +
Ch. 4 mA -
Analogue Outputs (J14)
Ch. 5 mA +
Ch. 5 mA -
Ch. 6 mA +
Ch. 6 mA -
Ch. 7 mA +
Ch. 7 mA -
Ch. 8 mA +
Ch. 8 mA -
Notes:
1. The cables and wires shown in this diagram are not supplied with the instrument, unless specifically indicated, but are available as optional accessories in various lengths and at additional cost.
2. All voltage / current requirements are specified as required at the point of connection to the instrument. It is the customers responsibility to consider voltage drop across long cable lengths and to ensure that power supply voltages are within specification at the point of connection.
3. When using long cables and wires to connect together equipment that is separated by distance, it is essential to check for differences in earth potential between the different locations and to ensure that the difference is no more than +/-5V AC or DC.
4. Making or breaking connections to the instrument whilst power is applied WILL cause damage to circuit board components and may cause a failure. This "Hot plugging" includes separating / mating two part terminals, external multipole connectors and individual wire terminations. Do NOT hot plug.
5. The TSCU requires a 1.0A power supply for its own operation. If heads are connected to the TSCU, via the umbilical cable, and those heads are sourcing their power from the TSCU, the power supply connected to the TSCU must be sufficient to satisfy the total power requirement of the TSCU and all the connected heads. The power supply connected to the TSCU must not exceed 3A. If the total power requirement of the heads and the TSCU together exceed 3A then the heads must be powered independantly and the Internal 24Vdc must not be connected through the umbilical cable.
Minimum cable specification (all cables):
1. Screened multi-core (preferably with drain wire)
2. Overall diamter: 6 to 12mm
3. Conductor size: 0.518mm² (20AWG) to 2.08mm² (14AWG)
Material: n/a
Finish: n/a
RevNo
Revision note
Date
2 Correct pin numbering and alter notes 13/06/2012
3 Change title to include DSCU 28/03/2013
4 Change DI to TSCU; change screen earthing; change current value 29/07/2014
5 Correct connector labelling on J11 and J12 (relays) 04/03/2016
All dimensions after finishing, 0 +/-0.5, 0.0 +/-0.1, 0.00 +/-0.05, unless otherwise stated
3rd angle proj.
Designed by Paul Jones
Sign-off
Date 04/03/2016
DSCU / TSCU Wiring Diagram
DynOptic Systems Ltd
REF-040
Stock record update:
[ ] tick to confirm
Filename REF-040
Scale NTS
Revision 5
Sheet 1/1

DSCU Interface & Operation

The DSCU can be set up and operated via the keypad / display or via the Utility software.

The DSCU keypad / display interface is shown below:-





Two line LCD Display.

The **Power** LED will illuminate (green) when the DSCU is powered on.

The **System Alarm** LED will illuminate (red) when the threshold of any level alarm is exceeded.

The **Service Fault** LED will illuminate (red) when any instrument detects a fault condition that requires attention.

Direction buttons allow navigation of the DSCU menus. The right direction button and the cycle button also act as an Enter button where applicable. The left and right arrows are used to navigate between connected instruments (for multi-heading).

The **Home** button returns you to the Readings screen from anywhere in the menu structure. If pressed twice it exits the password entry.

The **Exit** button cancels data entry.

The **Menu** button. You will need to enter a password before being allowed access to the menus.

The numeric keypad for data input.

The **Enter** button is used to end data entry and store the altered value.

DSCU Operation

Readings Screen

On power up the DSCU will search for all of the connected instruments that it has previously been set to find. Note that the default setting is one instrument with ID=1. Appendix A describes how to set the DSCU to find the actual attached instruments. If an instrument is found then it is displayed on the Readings screen.

The Readings screen menu structure is shown below. The DSCU tab shows the name and ID of the DSCU, and the status of the DSCU and any instrument connected to it. If there are no faults or warnings 'System OK' is displayed.

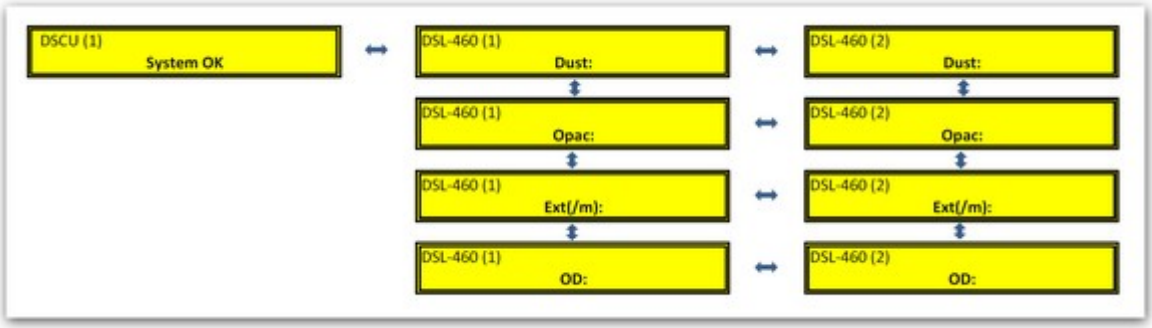
The left / right arrow keys are used to scroll between the DSCU tab and the connected instruments.

When an instrument tab is displayed, the top line of the LCD will display the name of the instrument followed by the ID of the instrument in brackets.

The bottom line of the display shows the measurement name, reading and units e.g. Opacity: 10.0%. If the instrument detects any faults or warnings they will be displayed here. If there is a fault or warning the display will flick between showing the measurement value and the fault(s).

Pressing the down button scrolls through the different measurement readings for the instrument (if more than one is available).

The following example illustrates the display option for a DSCU connected to two DSL-460s, one with ID=1 the other with ID=2.



Menu Structure

Press the Menu button  to access the menus.

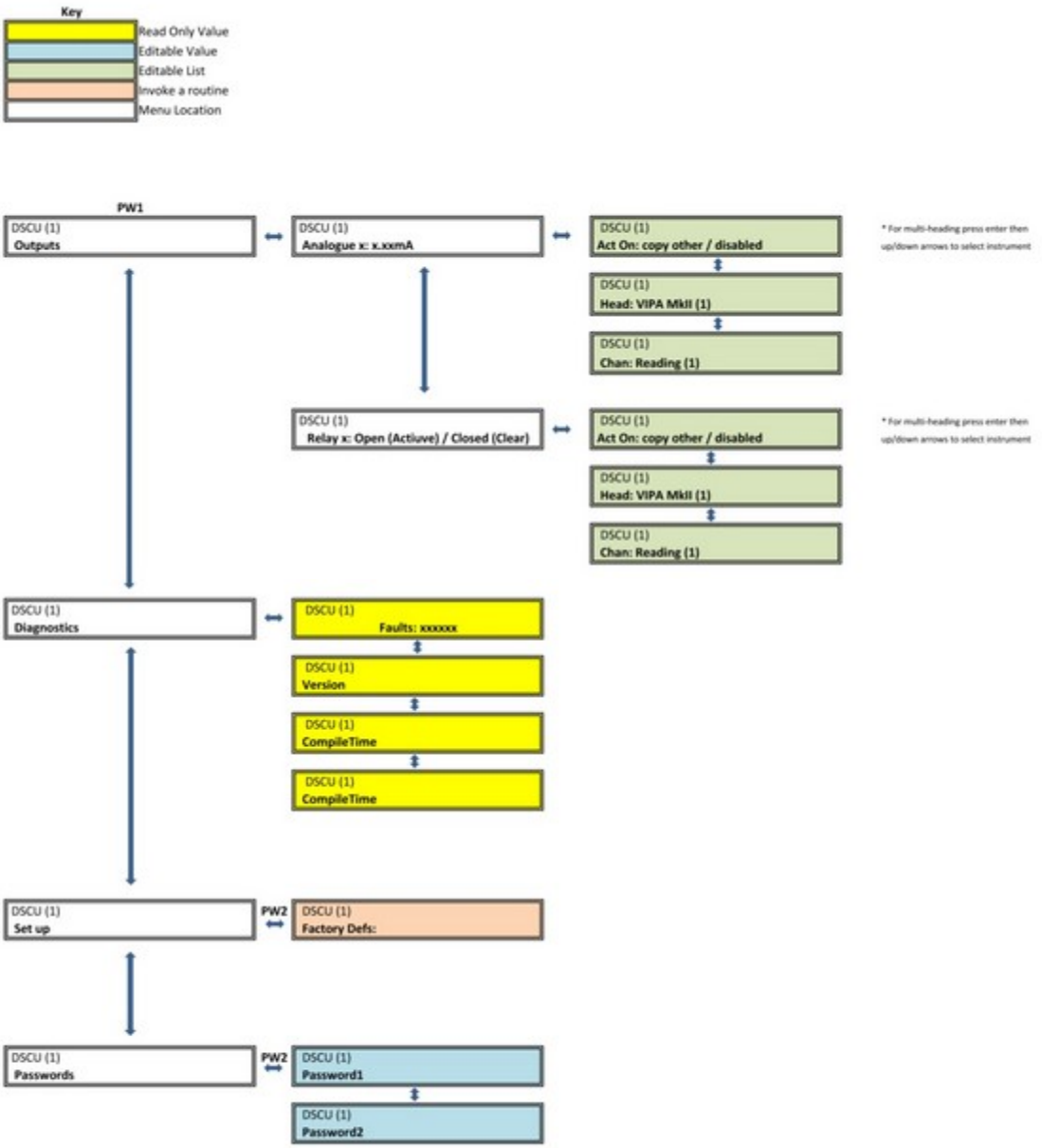
You will be asked to enter a password at this point. The default passwords are as follows:-

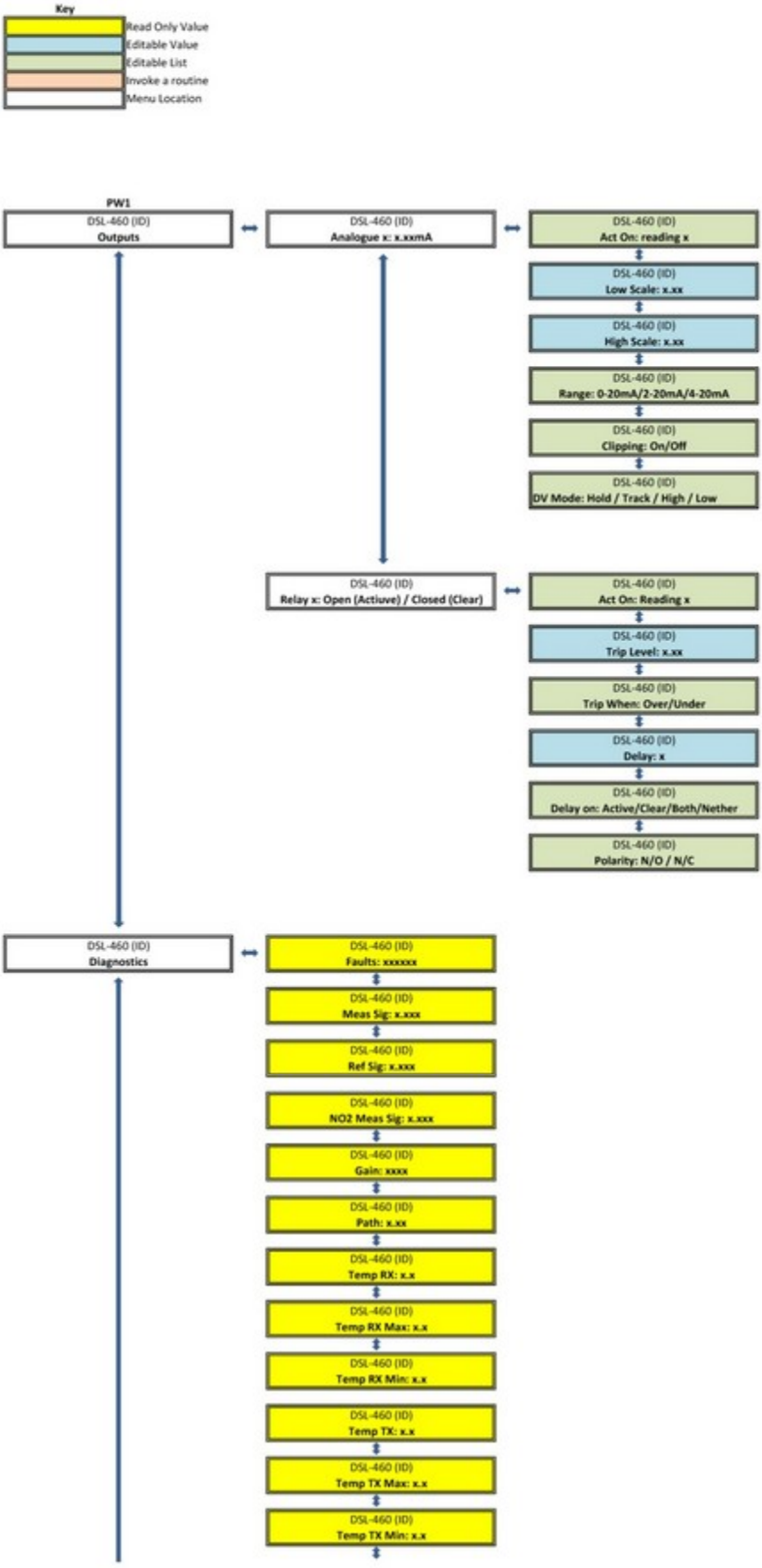
Password 1 (PW1) = 0000

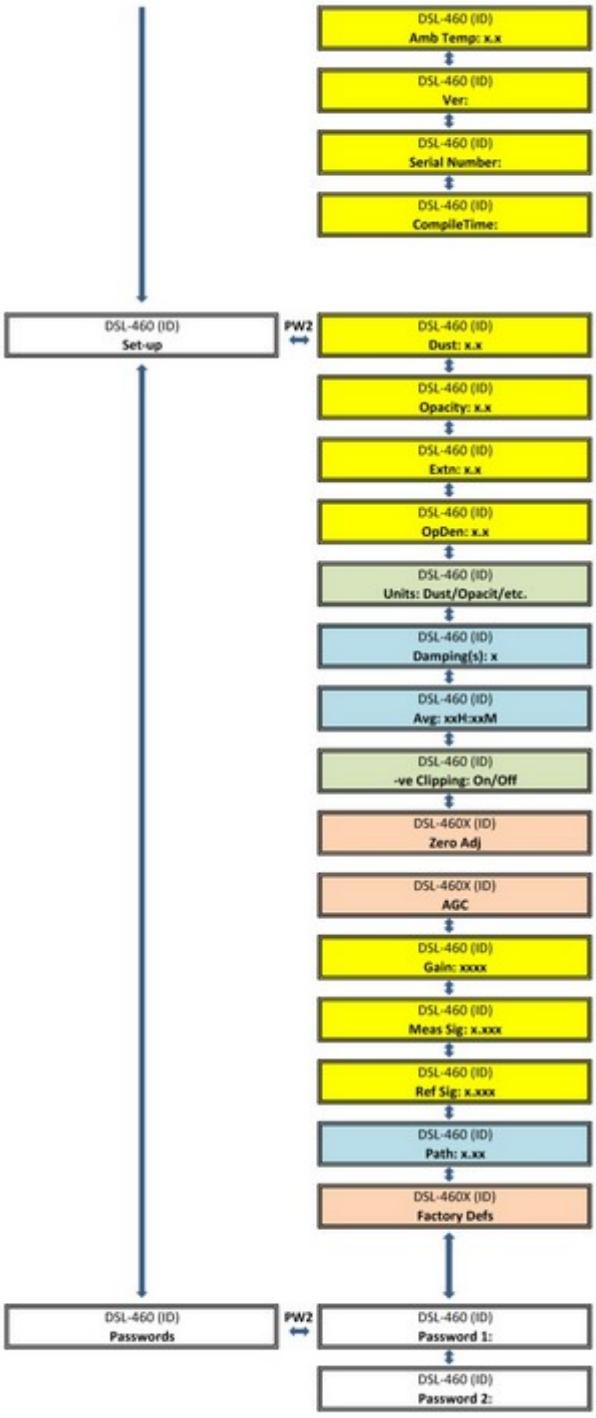
Password 2 (PW2) = 1111

For more information on passwords – see the Password section below.

The diagrams below show the menu structure for the DSCU and, as an example, the menu structure for a connected DSL-460 instrument. The basic layout is the same for all DSL instruments, but the individual parameters will vary.




Key
Read Only Value
Editable Value
Editable List
Invoke a routine
Menu Location
PW1
DSL-460 (ID)
Outputs
DSL-460 (ID)
Analogue x: x.xxmA
DSL-460 (ID)
Act On: reading x
DSL-460 (ID)
Low Scale: x.xx
DSL-460 (ID)
High Scale: x.xx
DSL-460 (ID)
Range: 0-20mA/2-20mA/4-20mA
DSL-460 (ID)
Clipping: On/Off
DSL-460 (ID)
OV Mode: Hold / Track / High / Low
DSL-460 (ID)
Relay x: Open (Actiuve) / Closed (Clear)
DSL-460 (ID)
Act On: Reading x
DSL-460 (ID)
Trip Level: x.xx
DSL-460 (ID)
Trip When: Over/Under
DSL-460 (ID)
Delay: x
DSL-460 (ID)
Delay on: Active/Clear/Both/Nether
DSL-460 (ID)
Polarity: N/O / N/C
DSL-460 (ID)
Diagnostics
DSL-460 (ID)
Faults: xxxxxx
DSL-460 (ID)
Meas Sig: x.xxx
DSL-460 (ID)
Ref Sig: x.xxx
DSL-460 (ID)
NO2 Meas Sig: x.xxx
DSL-460 (ID)
Gain: xxxx
DSL-460 (ID)
Path: x.xx
DSL-460 (ID)
Temp RX: x.x
DSL-460 (ID)
Temp RX Max: x.x
DSL-460 (ID)
Temp RX Min: x.x
DSL-460 (ID)
Temp TX: x.x
DSL-460 (ID)
Temp TX Max: x.x
DSL-460 (ID)
Temp TX Min: x.x


DSL-460 (ID)
Amb Temp: x.x
DSL-460 (ID)
Ver:
DSL-460 (ID)
Serial Number:
DSL-460 (ID)
CompileTime:
DSL-460 (ID)
Set-up
PW2
DSL-460 (ID)
Dust: x.x
DSL-460 (ID)
Opacity: x.x
DSL-460 (ID)
Extn: x.x
DSL-460 (ID)
OpDen: x.x
DSL-460 (ID)
Units: Dust/Opacit/etc.
DSL-460 (ID)
Damping(s): x
DSL-460 (ID)
Avg: xxH:xxM
DSL-460 (ID)
-ve Clipping: On/Off
DSL-460X (ID)
Zero Adj
DSL-460X (ID)
AGC
DSL-460 (ID)
Gain: xxxx
DSL-460 (ID)
Meas Sig: x.xxx
DSL-460 (ID)
Ref Sig: x.xxx
DSL-460 (ID)
Path: x.xx
DSL-460X (ID)
Factory Defs
DSL-460 (ID)
Passwords
PW2
DSL-460 (ID)
Password 1:
DSL-460 (ID)
Password 2:

Menus

The menus for the DSCU itself and any connected instrument comprise of the following sections:-

Outputs

All parameters relating to the analogue and digital outputs from the instrument are shown here. For details on setting up the analogue and digital outputs please refer to the instrument Operators Manual.

Diagnostics

The instrument diagnostics are provided here, such as voltages, gains, temperatures etc. All the values in the section are read only, i.e. they cannot be edited.

Setup

Requires a level 2 password (PW2) to access. This section allows changes to be made to parameters, such as selecting units and setting gains, that are normally performed as part of the setup, commissioning and calibration of the instrument.

Passwords

There are two levels of password – PW1 (password level 1) for users to be able to view the data from the instrument, including checking diagnostics, parameters, analogue and digital output settings etc. PW2 (password level 2) is for engineers or experienced users. This allows the same access as PW1 users plus the ability to edit settings and perform setup and calibration functions.

The default passwords are as follows:-

Password 1 (PW1) = 0000

Password 2 (PW2) = 1111

DSCU Analogue and Digital Outputs

The number of analogue outputs and relays fitted to the DSCU depends on the instrument variant. It can be either one (1), four (4) or eight (8).

The analogue outputs can be configured to track any of the analogue outputs of the connected instruments or any measured parameter from any connected instrument. Note analogue outputs can be taken from the DSCU, or from the instrument or from both.

All relays are fully configurable i.e. it is possible to select the unit and select the parameter that each relay acts on.

The first relay by default is set as a system Data Valid. If any instrument connected to the DSCU goes data invalid (i.e. when multi-heading) this will trigger the relay.

For more information on setting up the relays please see ‘Using Utility Software’ section.

Installing the Utility Software and Configuring USB

WARNING: The Utility Software and the USB Driver MUST BE INSTALLED ON THE PC FIRST i.e. before connecting the DSCU to a PC. Connecting a PC to the DSCU before installing the Utility Software and the USB Driver will cause problems with installation and may even cause the installation to fail.

Minimum hardware/software specification for host PC

The Utility Software supplied with the DSCU is not a large or particularly complex program, and therefore has no requirement for a high performance host PC. Any reasonably modern PC/laptop will be suitable. The only “must have” requirements are:

- Windows XP, or newer, operating system
- All recent operating system Service Packs and upgrades (visit the Microsoft website) must have been installed
- At least one free USB slot (assigned to a COM Port between COM1 and COM8 – see later section on Assigning a Valid COM Port) for direct connection to the DSCU; or one free Serial Com Port (9w “D” header) numbered between 1 and 6 for connection via an optional OI.

Installing the USB Driver

The USB Driver software is supplied on a CD that is shipped with the instrument.

1. Ensure that you are logged onto your PC with Administrative rights, so that you have the necessary permission to install software.

2. Copy the USB Driver “CDM xxxxx.exe” file from the CD to any suitable location on the host PC (“My Documents” is a good location).

3. Double click on the .exe file and follow the onscreen installation prompts.

Installing the Utility Software

The DSCU uses the “SCU Utility Software” which can be found on the CD that was shipped with the instrument.

1. Ensure that you are logged onto your PC with Administrative rights, so that you have the necessary permission to install software.

2. Copy the file “SCU Utility Install xxx.exe” from the CD to any suitable location on the host PC (“My Documents” is a good location).

3. Double click on the .exe file and follow the onscreen installation prompts.

The software should now be installed and should appear in the “All Programs” list in the folder “SCU UTILITY”. The software is called “SCU Utility.exe”.

Updating the Utility Software

From time to time DynOptic Systems may release updated versions of the DSCU Utility Software. If you receive an updated version, it is essential that you remove any existing version from your PC before installing the new one.

To remove your existing Utility Software use the Windows “Add or Remove Hardware” option from the Windows “Control Panel”.

Assigning a valid COM Port

When you first connect your PC to the DSCU, it is very likely that your PC will assign the USB connection to a COM Port number outside the acceptable range of COM1 to COM8, in which case the Utility Software will be unable to communicate with the instrument.

You can check which COM Port your PC has assigned to the DSCU by opening Windows “Device Manager” before connecting your DSCU. To open “Device Manager”:

1. Right click on “My Computer”
2. Click on “Manage”
3. Click on “Device Manager”
4. Scroll down to “Ports (COM & LPT)”, then click the “+” symbol to look at the list of COM Ports

Once you can see the list of current COM Ports, connect your PC to the DSCU by plugging the USB cable from your PC into the USB connection inside the DSCU terminal box.

As you connect, your PC should indicate that it has “Found New Hardware” and a new COM Port number should pop up in the “Ports (COM & LPT)” list.

If the new COM Port is between COM1 and COM8 then your PC has allocated a valid COM Port and no further action is required.

However, if the COM Port number that was assigned to the connection is outside the acceptable range then you must change the assigned COM Port to a number between COM1 and COM8. Follow the procedure below to assign a valid COM Port:

1. Right click on the COM Port (in the “Ports (COM & LPT)” list) that appeared when you connected to the DSCU
2. Click “Properties”
3. Select the “Port Settings” tab
4. Click on the “Advanced” button
5. Click the “COM Port” and select a new “COM Port Number” between COM1 and COM8 (avoiding any COM Ports which are marked as in use) from the drop down list

Once you have assigned a valid COM Port number to the USB connection your PC will remember this COM Port assignment and you should not need to repeat the process again when connecting your PC to the instrument, provided that you always use the same PC and you always connect via the same USB slot in your computer.

Note: *If you connect to the DSCU from a different computer, you will need to repeat the process above and assign a valid COM Port.*

Note: *You should always connect to the DSCU using the same USB slot on your PC. If you use a different USB slot you will need to repeat the process above and assign a valid COM Port again, because the PC sees each USB slot as a separate entity.*

Using the Utility Software

WARNING: The Utility Software and the USB Driver MUST BE INSTALLED ON THE PC FIRST i.e. before connecting the DSCU to a PC. Connecting a PC to the DSCU before installing the Utility Software and the USB Driver will cause problems with installation and may even cause the installation to fail.

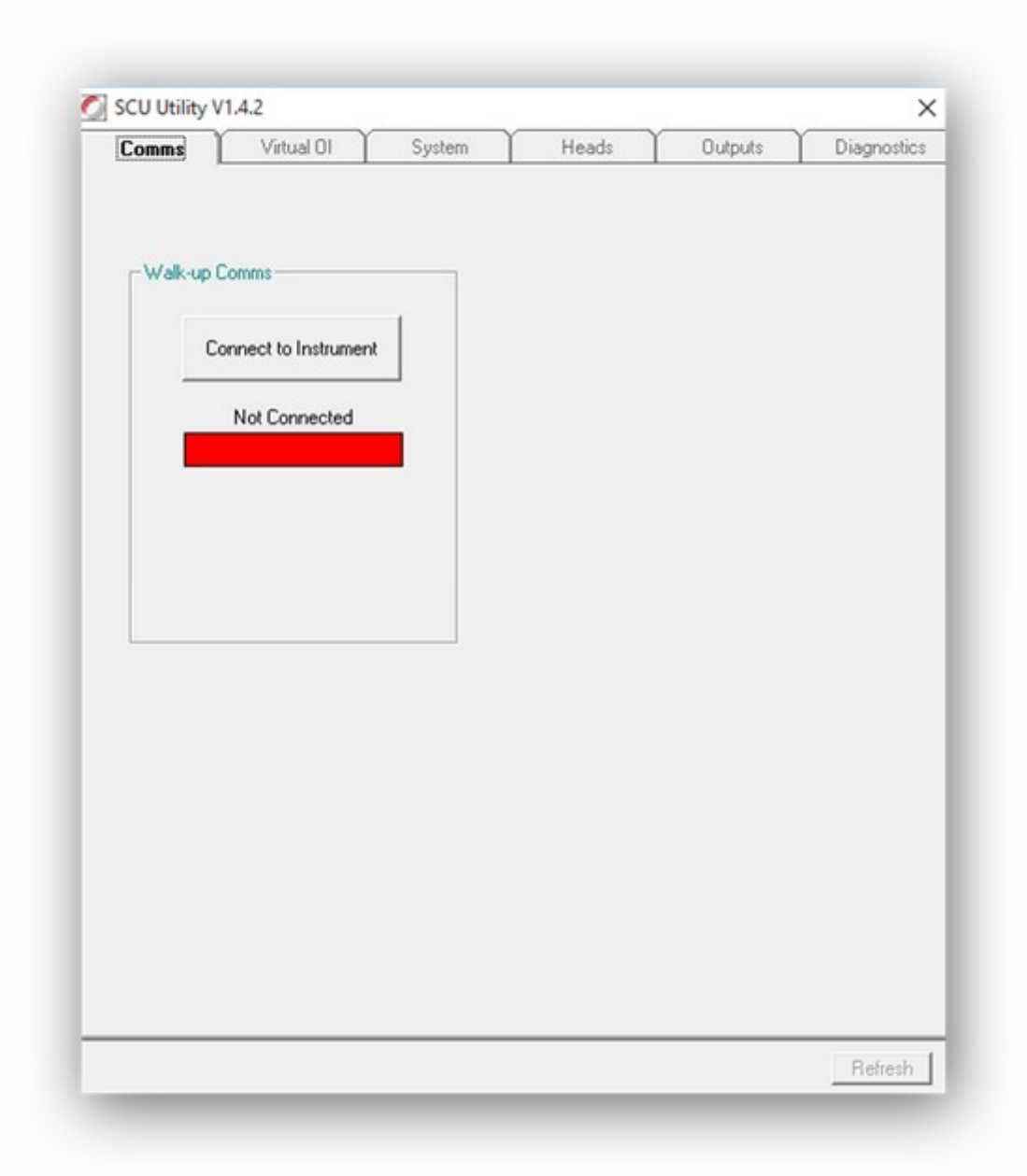
Connecting a PC to the DSCU

Before connecting your PC to the DSCU you MUST have installed the USB Driver and assigned a valid COM Port – see the previous section on installing software.

With the driver installed and com port assigned, connect the PC directly to the DSCU using a standard USB cable (type A to Type B). The USB connection can be found inside the wiring enclosure of the DSCU (on the circuit board inside).

The Comms tab

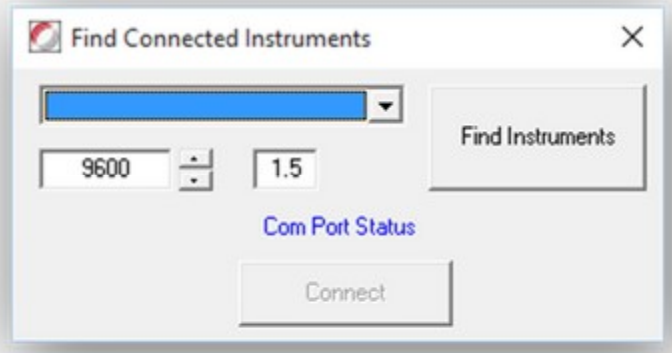
On first running the Utility software you will always arrive at the Comms tab (see below).



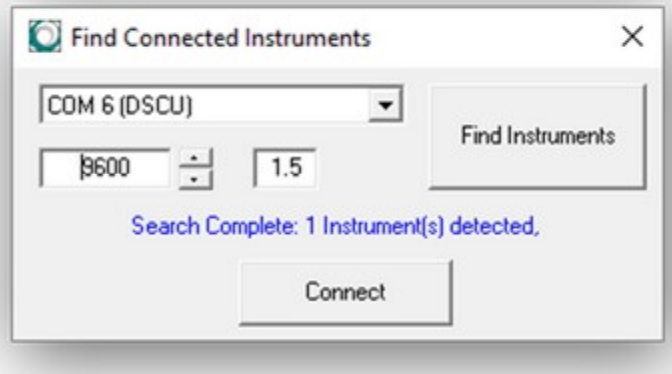
The Comms tab allows you to establish a connection with the DSCU. When you first run the program there will be no connection so the status bar will be red (indicating no connection). You will not be able to select any other tab until a comms connection has been established.

Connect to DSCU

To establish a connection with the DSCU click the “Connect to Instrument” button. The following pop-up window will appear.

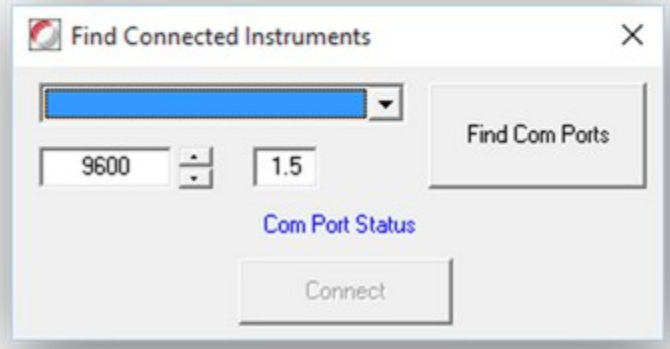


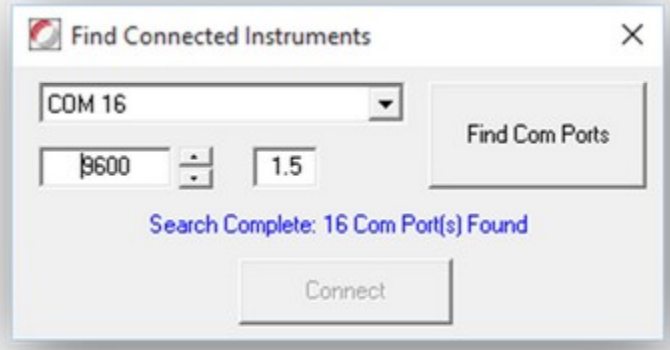
Click the “Find Instruments” button. The software will scan all available computer ports (up to COM 8) for any connected DSCUs (see below).



Select the required DSCU from the list (there will generally only be one) and click “Connect”, you will then be returned to the Comms tab where the status indicator bar will now be green (indicating a positive connection). Note that it may take a few seconds to complete the connection, depending on the number of instruments connected to the DSCU.

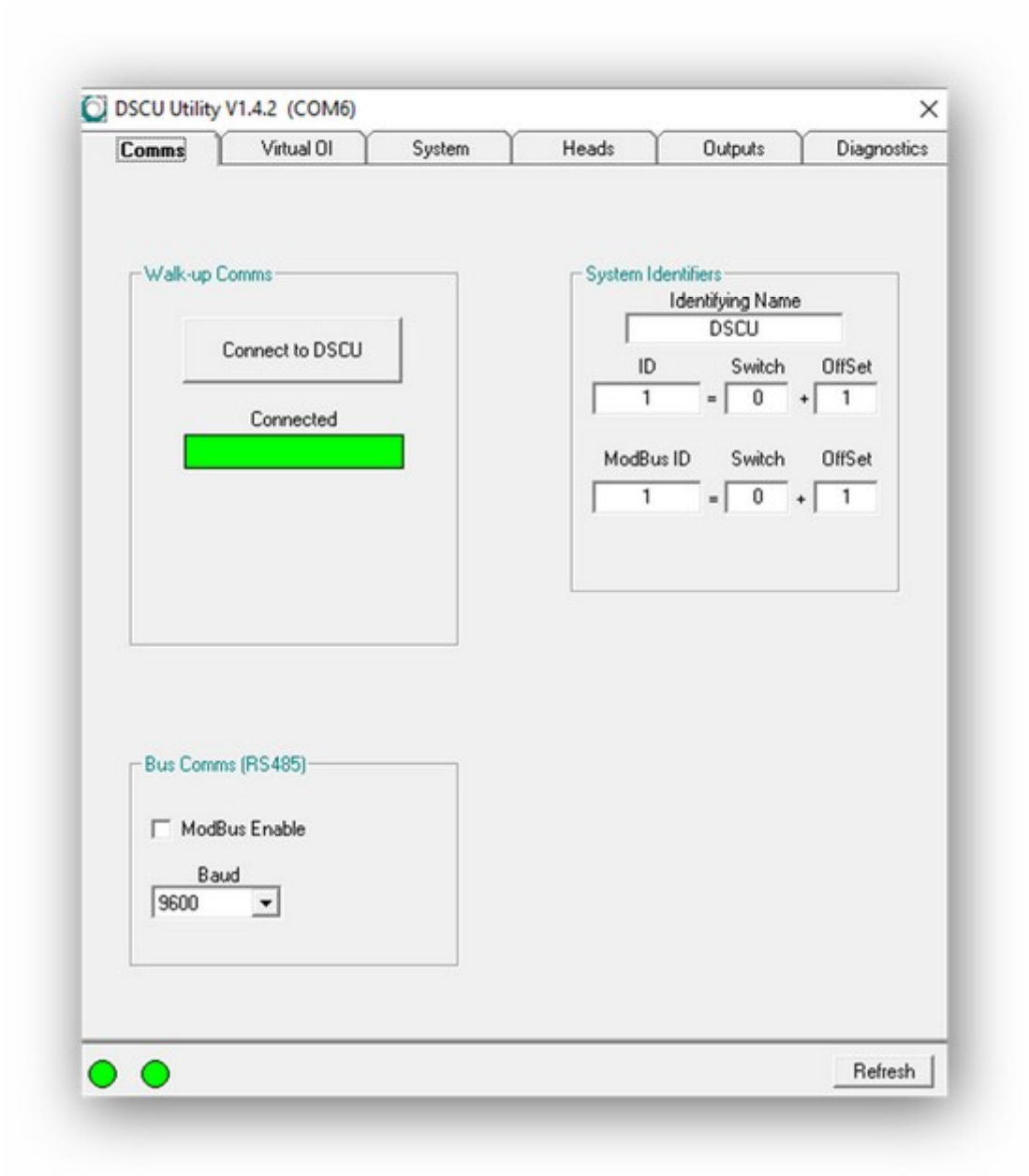
The function of the “Find Instruments” button can be toggled to “Find Com Ports” by right clicking. Clicking this will find all of the available Com ports on the PC, as illustrated below.





To illustrate the multi-heading functionality of the DSCU and the Utility software the following descriptions and screenshots show a DSCU with eight (8) analogues and relays, connected to two DSL-460 MkIIs.

Once a comms connection has been established the connected status bar of the Comms tab will turn green. When first connected the software will scan take a few seconds to identify all of the connected instruments. A Comms tab correctly connected to two instruments is shown below.



Bus Comms (RS485)

Checking the 'ModBus Enable' tick box allows communication with the DSCU via ModBus. For further information please contact DynOptic Systems.

System Identifiers

This section is for use when multiple DSCU's are being connected together.

DSCU's can be connected together via RS485 using ModBUS or DynOptic Systems own ASCII protocols. The name and address for the DSCU can be set here. For more information please contact DynOptic Systems.

Traffic Light Identifiers

The coloured circles at the bottom left of the tab indicates the number of instruments connected to the DSCU and their current status. The status is shown by the following colour codes:-

- Green indicates that the instrument is communicating OK
- Amber indicates that communications with the instrument has failed
- Red indicates that no instrument has been detected

These identifiers are visible on all tabs. The example above shows two instruments communicating successfully.

Refresh

The refresh button is shown on each tab, clicking this will refresh the data from the DSCU to the Utility and will perform a scan for connected instruments, this can take several seconds, depending on how many instruments are connected to the DSCU.

The Virtual OI Tab

The Virtual OI tab shows a representation of the DSCU panel and display and allows full virtual control of the DSCU.

This tab also displays the Fault and Warning Messages from the DSCU or from any instrument connected to the DSCU.

Please refer to the DSCU Controls & Operation section for details on using the keypad and display

Note: *Response time is slower than using the keypad directly as the data has to be called back from the DSCU and all instruments connected to it.*

Fault Messages

If the DSCU, or an instrument connected to the DSCU, self-detects a fault, it will display a brief message, describing the fault on this tab. Most fault messages will continue to be displayed on this tab until an operator clicks on the message to acknowledge it. If the fault is no longer active the message will disappear, but if the fault status is still active the message will re-appear immediately.

Refer to the “Fault Messages and Troubleshooting” section of the manual for DSCU faults and the instrument’s Operators Manual for instrument faults.

Warning Messages

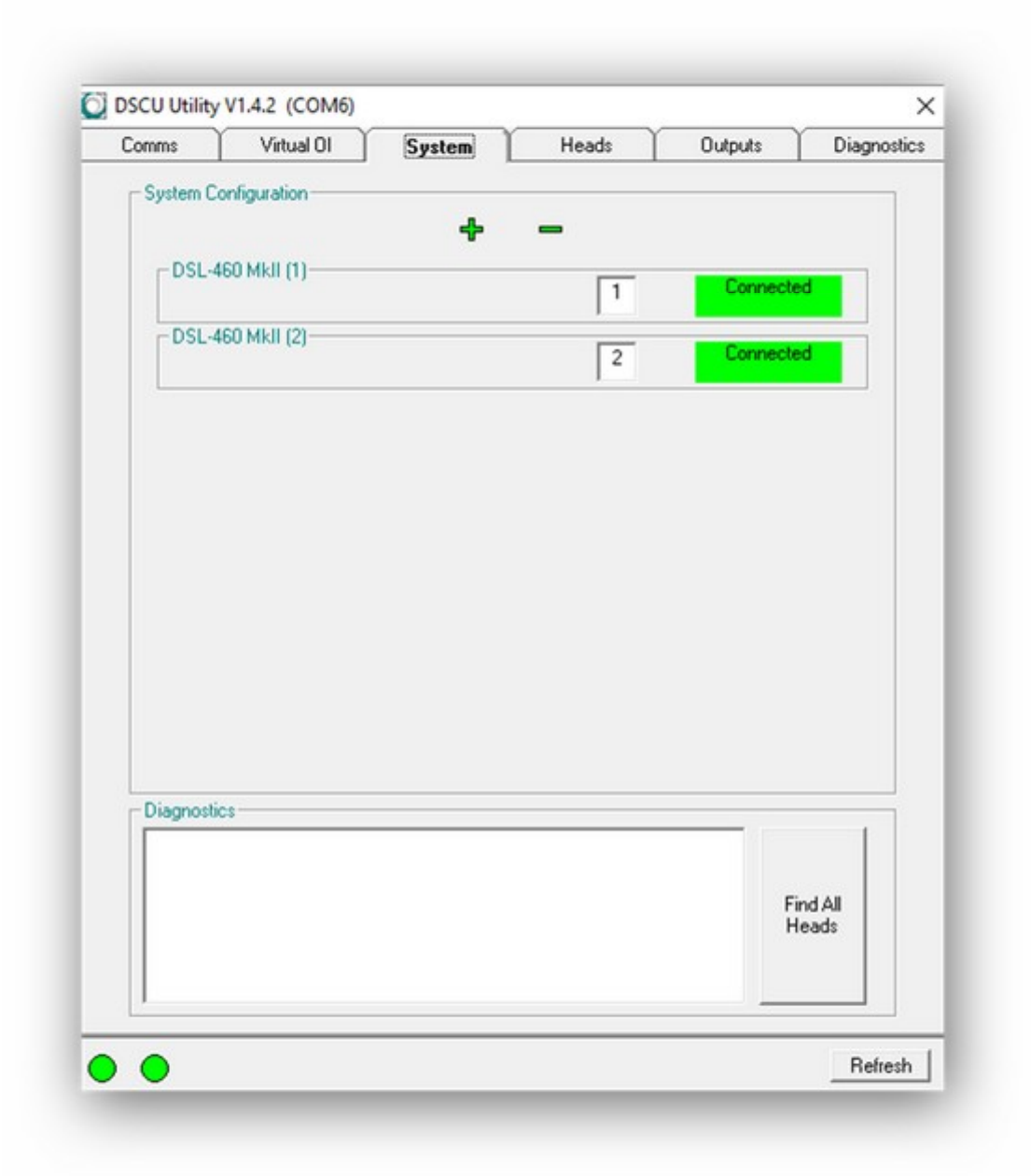
If the DSCU, or an instrument connected to the DSCU, self-detects a parameter that is close to or out of range that needs investigating, a brief warning message will be displayed describing the problem. The warning message will continue to be displayed on this tab until an operator clicks on the message to acknowledge it. If the warning is no longer active the message will disappear, but if the problem causing the warning is still active the message will re-appear immediately.

Refer to the “Fault Messages and Troubleshooting” section of the manual for DSCU warnings and the instrument’s Operators Manual for instrument warnings.

The System Tab

The System Tab allows instruments connected to the DSCU to be added and removed, and shows communication diagnostic data.

The example below shows two DSL-460 MkII instruments connected to the DSCU. Before being connected to the DSCU these two instruments had to be setup to have different RS485 ID's (ID=1 and ID=2). If any two instruments connected to the DSCU have the same ID the connection will fail.

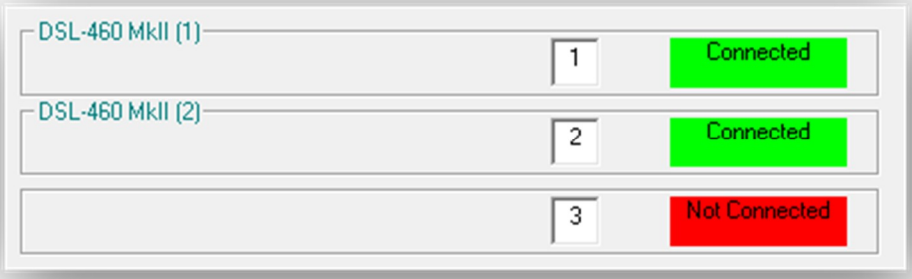


System Configuration

By default the DSCU will be setup to look for only one connected instrument with ID=1. For single instrument operation this is generally all that is required.

The '+' sign is used to tell the DSCU to try and connected to an additional instrument, it is possible to connect up to eight (8) separate instruments to one DSCU. Clicking on the '+' sign adds another instrument connection line with the next ID number. If there is no connected instrument with this ID number the status will be shown as "Not Connected" as shown below.

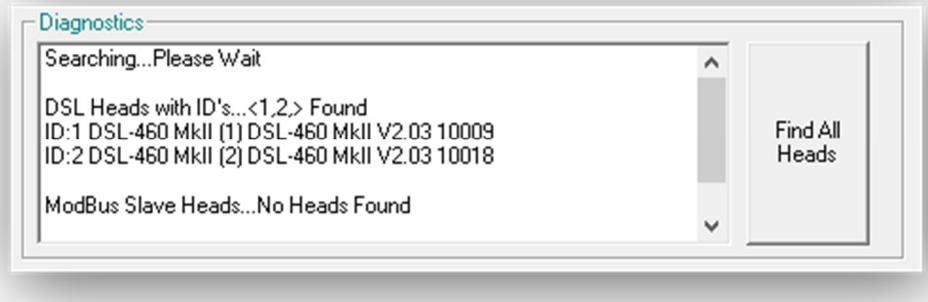
To connect to an actual instrument with a known ID number you need to manually enter the instrument ID number into the ID box.



The '-' sign is used to remove a line from the instrument connection list. Clicking on the '-' sign will remove the last instrument connection line from the list.

Diagnostics

To the right of the Diagnostics box is the 'Find All Heads' button, clicking this button will make the DSCU scans all the addresses available to determine what instruments are actually connected. The results will be shown in the Diagnostics box giving the instrument ID and Type. This information can be used to populate the instrument connection list.



Double click the text in the Diagnostics box to clear it.

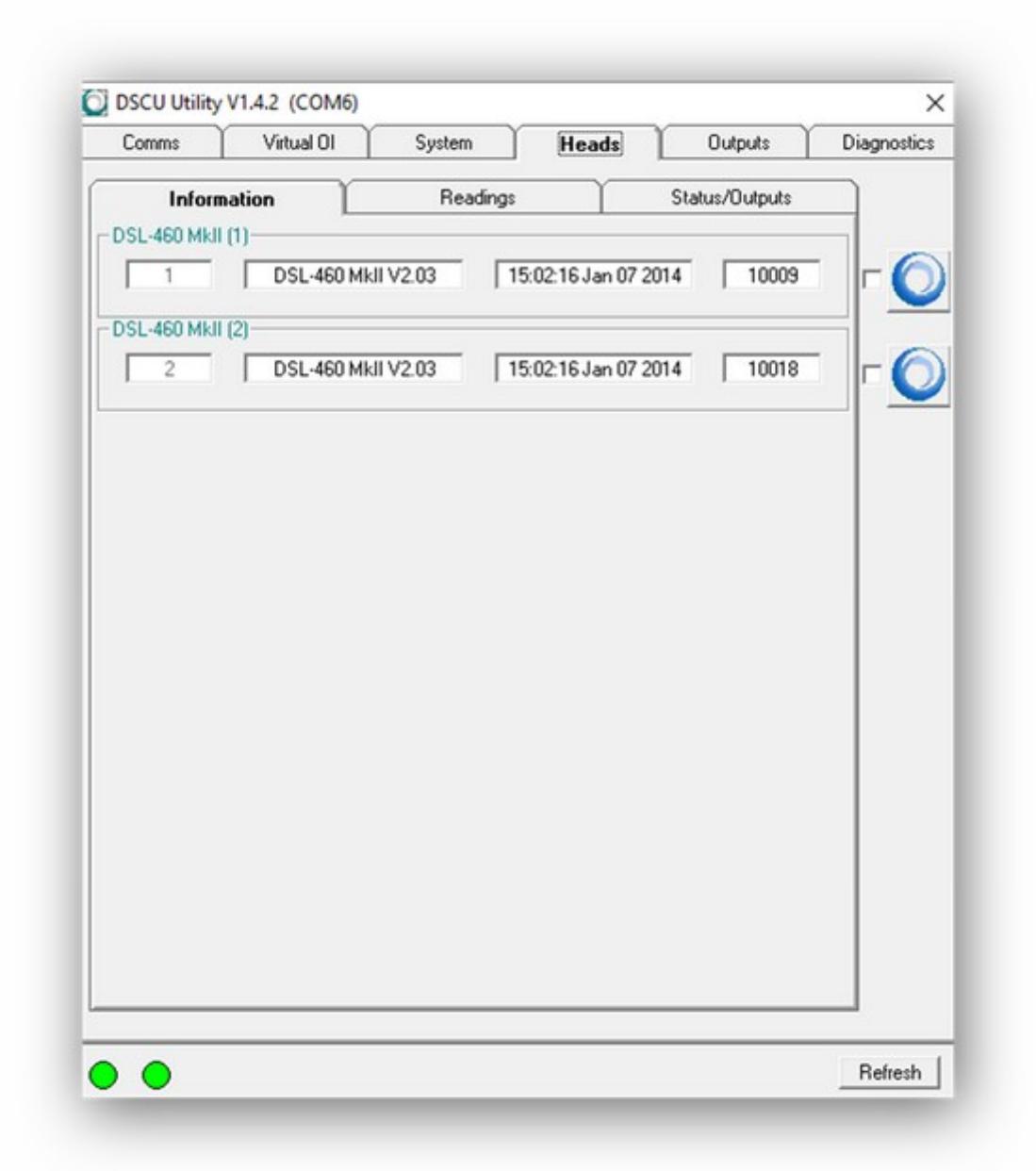
The Heads Tab

The Heads tab shows information about the attached instruments including the readings and the status of their outputs. There is also a quick launch button for the instrument's Utility program and a disable service fault checkbox next to this button.

This tab contains of three sub-tabs, Information, Readings and Status/Outputs.

Information

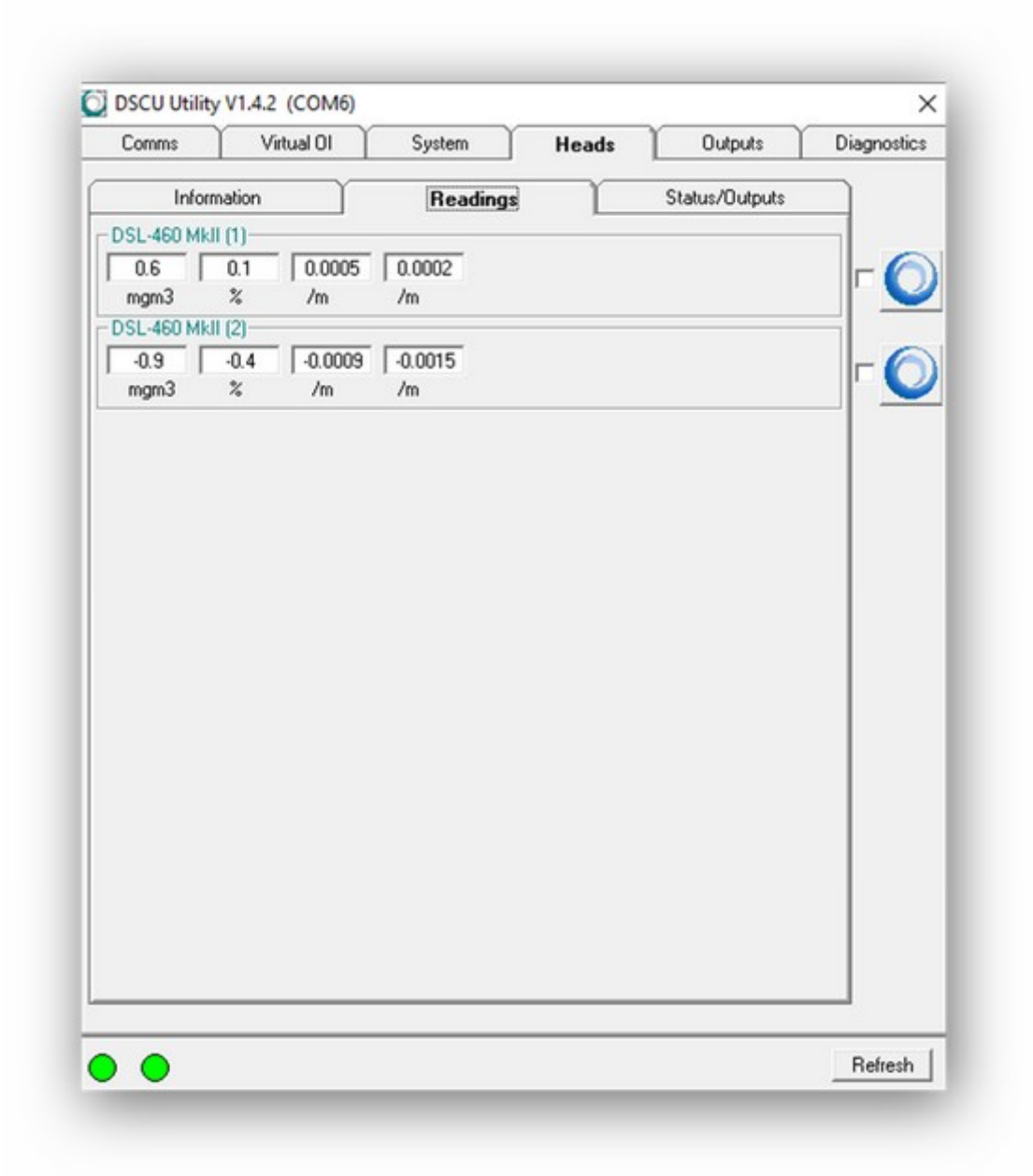
This sub-tab shows information relating to each instrument connected to the DSCU. Each instrument has a descriptive name and the following information is displayed; ID number, instrument description and firmware version, compile time/date of software and the serial number of the instrument's CPU board.



Readings

The readings sub-tab shows all of the readings available from each connected instrument. The number of readings shown will depend on which instrument is connected to the DSCU and how many measurement outputs it can provide.

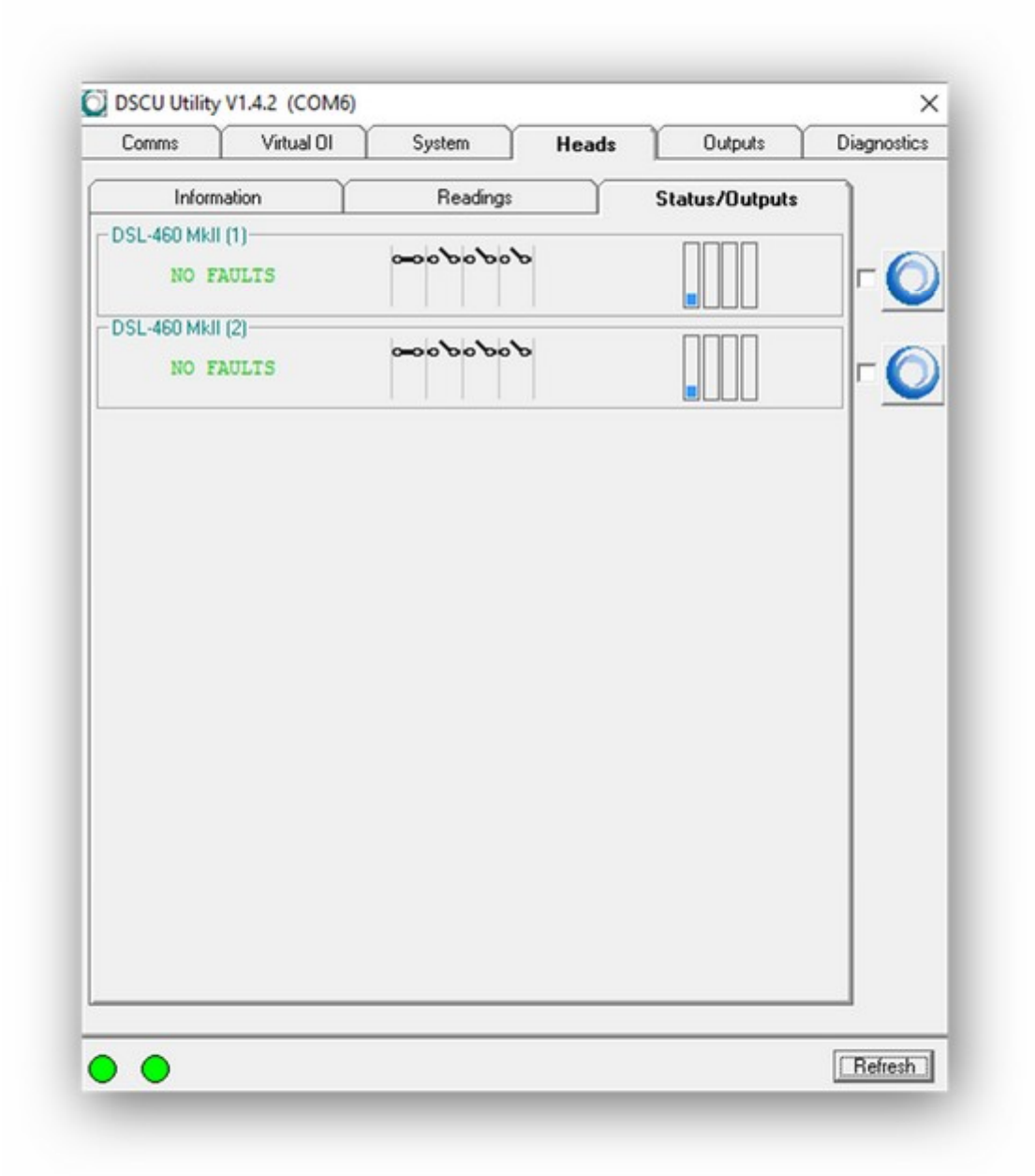
Hover the cursor over the reading for a description of the measurement units.



Status/Outputs

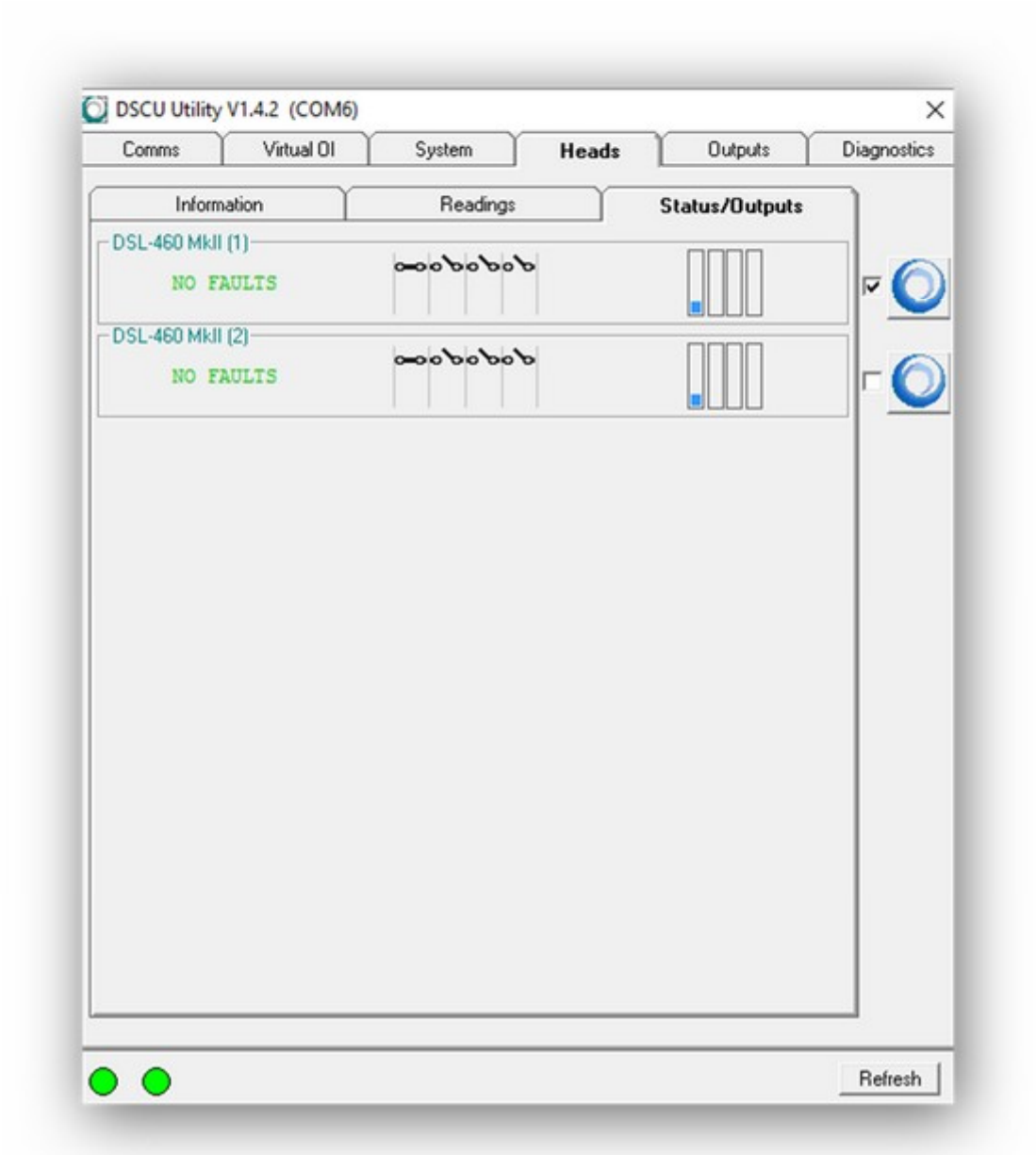
For each connected instrument the Status/Outputs tab shows any fault or warning messages, the status of the relays and the calculated analogue outputs. For more detailed information about the instrument status and setup it will be necessary to open the instrument Utility by clicking on the DynOptic System logo button to the right of the tab (see later).

In the following example both DSL-460 MkII instruments are showing no faults. They both have four (4) relays the first relay is closed and the rest are open. The DSL-460 MkII head can also configure up to four analogue outputs (one real, three virtual), only the first is configured to an instrument reading.



Service Fault Checkbox

On the right hand side of the Heads tab, next to each instrument line, there is an unlabelled Service Fault checkbox. Ticking this checkbox stops the DSCU Service fault form triggering when there is a fault with this instrument. This can be useful in a multiheading system when one instrument needs to be taken offline, for example powered down to be checked or repaired



When a Service Fault checkbox is ticked a 'Service Override' warning message will be displayed on the DSCU and the DSCU Utility (on the Virtual OI Tab) to make operators aware that an instrument has been taken offline.

This feature is used to temporarily isolate an attached instrument. The DSCU will still search for the missing head. To remove the head completely from the DSCU use the 'System Configuration' section to move the unused instrument to the bottom of the list then press the '-' button to remove it.

Utility Quick Launch Buttons

On the right hand side of the Heads tab, for each instrument connected, there is a button with the DynOptic Systems logo on it. Click this button to launch the Utility program for that instrument.

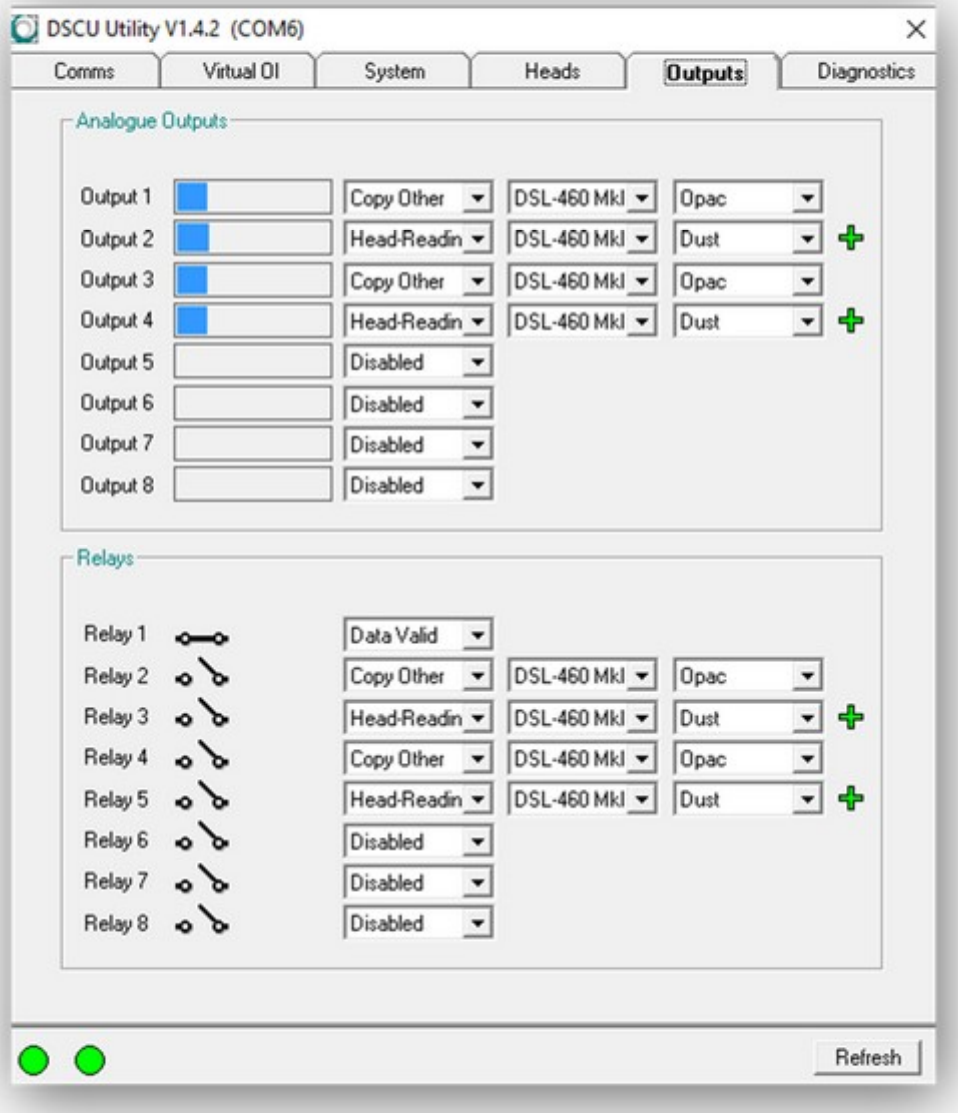
Please refer to the instrument's Operator Manual for full details and instructions on the use of the instrument Utility.

Note: *Only one Utility program can be launched at a time.*

Note: *If you change any instrument settings through the Utility quick launch, on closing the instrument Utility then do a DSCU refresh to ensure that all of the changed settings are updated into the DSCU.*

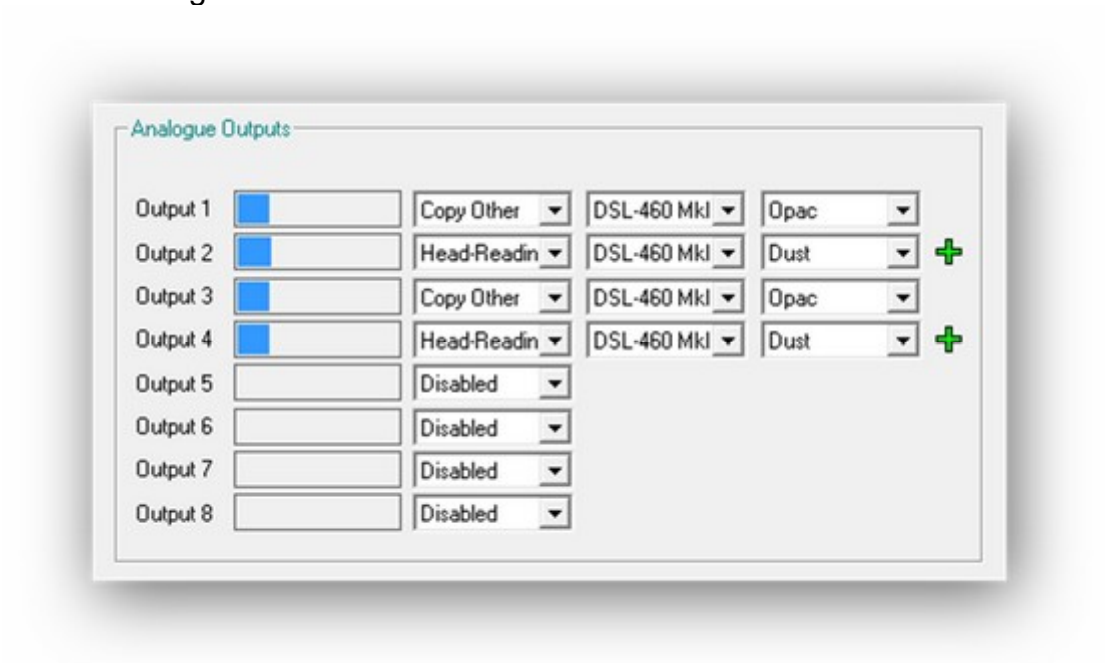
The Outputs Tab

The Outputs Tab shows the status of the all of the analogue and relay outputs from the DSCU. The following example is for a DSCU-8 and so there are eight (8) analogues and eight (8) relays available. Each output can be configured to operate in several different ways.



Analogue Outputs

The DSCU analogue outputs can be configured to output the readings from any instrument that is connected to it. The following example illustrates the different configuration available.



The first part displays graphically the value of the currently selected analogue output.

The first drop down menu allows the selection of ‘Copy Other’, ‘Disabled’ or “Head-Reading”

Copy Other allows the DSCU analogue settings to just copy any analogue settings that have already configured in a connected instrument.

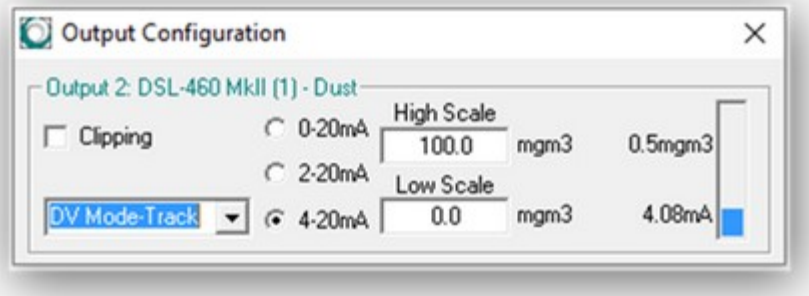
Disabled will deactivate the output (i.e. set it to 0.00mA).

Head-Reading allows the DSCU analogue settings to be manually configured to any measured reading from any connected instrument. This is the most flexible option and does not need the analogues in the instrument to have been configured first.

The second drop down menu allows the selection of one of the connected instruments (not available if ‘Disabled’ has been selected). There can be up to eight (8) separate instruments. In this example there are only two DSL-460 MkII [1] and DSL-460 MkII [2].

The third drop down menu allows you to select which measurement reading is used for the analogue channel. The options available depends on what has been selected in the first drop down menu. If ‘Copy Other’ has been selected the list will be limited to only the measurements configured for the analogues in the instrument. If ‘Head-Reading’ has been selected the list will include all available measured readings from the selected instrument.

If ‘Head-Reading’ has been selected then it is necessary to set the range for the analogue output (for ‘Copy Other’ this information is just copied from the instrument settings). To do this click on the ‘+’ symbol that appears at the right hand side, this opens a new popup window with the following settings.



Clipping

If this box is CHECKED the analogue output will not respond to readings below the value set as “Low Scale”, but will send an analogue output equivalent to the lowest current for the scale selected.

If the box is UNCHECKED then the analogue output will track the measured signal even if it is below the value set as “Low Scale”, but only as low as 0mA.

Note: *that if the instrument reading already has negative clipping applied to it (see the Instrument operators manual) then since the analogue output tracks this reading it will also be clipped to zero.*

Data Valid (DV) Mode

This drop down menu allows you to select what happens to the analogue output in the event of the data being invalid. Both the actual and calculated analogue outputs are acted on. The available options are:-

DV Mode-Track – In the event of data invalid, the analogue output will continue to track the reading. This is the default setting.

DV Mode-Low – In the event of data invalid, the analogue output will be forced to the low scale value.

The analogue output will continue to be held at this value for the duration of the data invalid period.

When the data valid status is returned the output will return to tracking the current measurement reading.

DV Mode-High – In the event of data invalid, the analogue output will be forced to the high scale value.

The analogue output will continue to be held at this value for the duration of the data invalid period.

When the data valid status is returned the output will return to tracking the current measurement reading.

DV Mode-Hold – In the event of data invalid, the analogue output will be held at the last known output current.

The analogue output will continue to be held at this value for the duration of the data invalid period.

When the data valid status is returned the output will return to tracking the current measurement reading.

0-20mA / 2-20mA / 4-20mA

The current loop analogue outputs used on the DSCU can be configured to operate across any one of three scales: 0-20mA, 2-20mA or 4-20mA. Select the required scale using these radio buttons.

High Scale and Low Scale

These two parameters define the upper and lower scaling points of the 0/2/4-20mA output.

Set the low scale value to the reading at which the analogue output should generate 0mA, 2mA or 4mA (depending on selected scale point).

Set the high scale value to the reading at which the analogue output should generate 20mA.

Note: If you change the measurement units, (on the Settings tab), you will need to change the low scale and high scale settings here, as there is no automatic adjustment of scaling values when you change between units.

Output

The output value is a calculated indication of the expected current output in mA; taking into account the low scale and high scale settings and also the 0/2/4mA scale selection.

The value shown here is a calculated value only. It is not an electronically measured value from the actual analogue output circuit. There is no direct connection between the calculated value shown and the actual output. However, unless there is a fault with the instrument, the correlation between the calculated value and the electrical output should be very good.

Relays

The DSCU relays can be configured to operate on the status or readings from any instrument that is connected to it. The following example illustrates the different configuration available.

The first part displays the current status of the relay. This graphically shows whether the relay is open or closed and a bell is displayed if the relay is in alarm status.

The first drop down menu allows the selection of ‘Data Valid’, ‘Copy Other’, ‘Disabled’, ‘Head-Reading’ or ‘Head-Fault/Warning’.

Data Valid is the default setting for relay 1. Any fault that appears on the DSCU will trigger this relay. This includes DSCU faults and faults from any connected instrument.

Copy Other allows the DSCU relay settings to just copy any relay settings that have already been configured in a connected instrument.

Disabled will deactivate the relay.

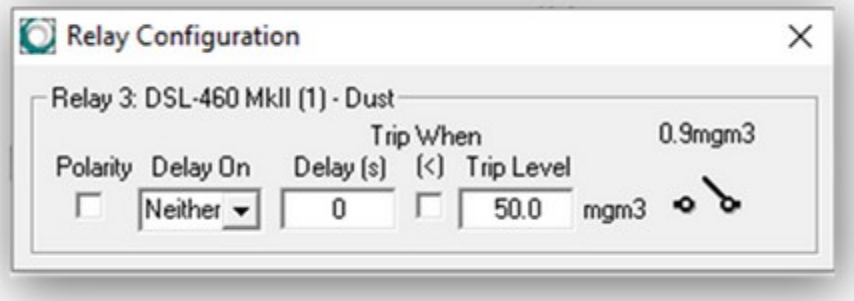
Head-Reading allows the DSCU relay to be manually configured to trigger on any measured reading from any connected instrument. This does not require the relays to have been configured in the instrument.

Head-Fault/Warning allows the DSCU relay to be manually configured to trigger on any fault or warning from any connected instrument. This does not require the relays to have been configured in the instrument.

The second drop down menu allows the selection of one of the connected instruments (not available if 'Disabled' has been selected). There can be up to eight (8) separate instruments. In this example there are only two DSL-460 MkII [1] and DSL-460 MkII [2].

The third drop down menu allows you to select which measurement reading, fault or warning is used for the relay. The options available depends on what has been selected in the first drop down menu. If 'Copy Other' has been selected the list will be limited to the faults and reading alarm levels that have been configured for the relays in the instrument. If 'Head-Reading' has been selected the list will include all available measured readings from the selected instrument. If 'Head-Fault/Warning' has been selected the list will include all of the faults and warnings available from the selected instrument.

If 'Head-Reading' or 'Head-Fault/Warning' has been selected then it is necessary to configure the relay (for 'Copy Other' this information is just copied from the instrument settings). To do this click on the '+' symbol that appears at the right hand side, this opens a new popup window with the following analogue settings. Note for 'Head-Fault/Warning' option not all of these following features are available.



Relay Polarity checkbox

When UNCHECKED, and acting as fault or warning, the relay will be energised when the data is valid, and the relay status indicator will show a closed contact in the data valid condition. The relay will de-energise when the data becomes invalid (i.e. a fault or warning is present). This condition represents the recommended failsafe operation.

When UNCHECKED, and acting as a threshold relay, the relay will be de-energised in a below threshold condition and the relay status indicator will show an open contact. In this polarity the relay will be energised when the reading exceeds the threshold.

With the checkbox CHECKED, the associated relay polarity will be reversed.

The operation of the relays can be delayed using the Delay setting.

Delay On

The activation of the relay can be delayed before triggering. The following options are available:-

Neither – The triggering of the alarm condition is not delayed at the start, or at the end, of the alarm condition.

Clear – The triggering of the alarm condition is not delayed at the start of the alarm condition, but is delayed at the end i.e. when the alarm condition is clear.

Active (default) – The triggering of the alarm condition is delayed by the time set in the 'Delay' box. At the end of the alarm condition, the relay returns immediately to its previous state.

Both – The triggering of the alarm condition is delayed at the start and end of the alarm condition.

Delay

This value is the continuous length of time (in seconds) that the relay is delayed by. The exact function is determined by the 'Delay On' condition.

Delaying the activation of the relay can be used to prevent borderline level changes from "dithering" the relay state. Only genuine, sustained readings in excess of the threshold will actually trigger the alarm.

Trip When (<)

This is only available for a level alarm. Ticking the 'trip when less than' checkbox will cause the alarm condition to be activated when the measurement reading is less than the 'Trip Level'.

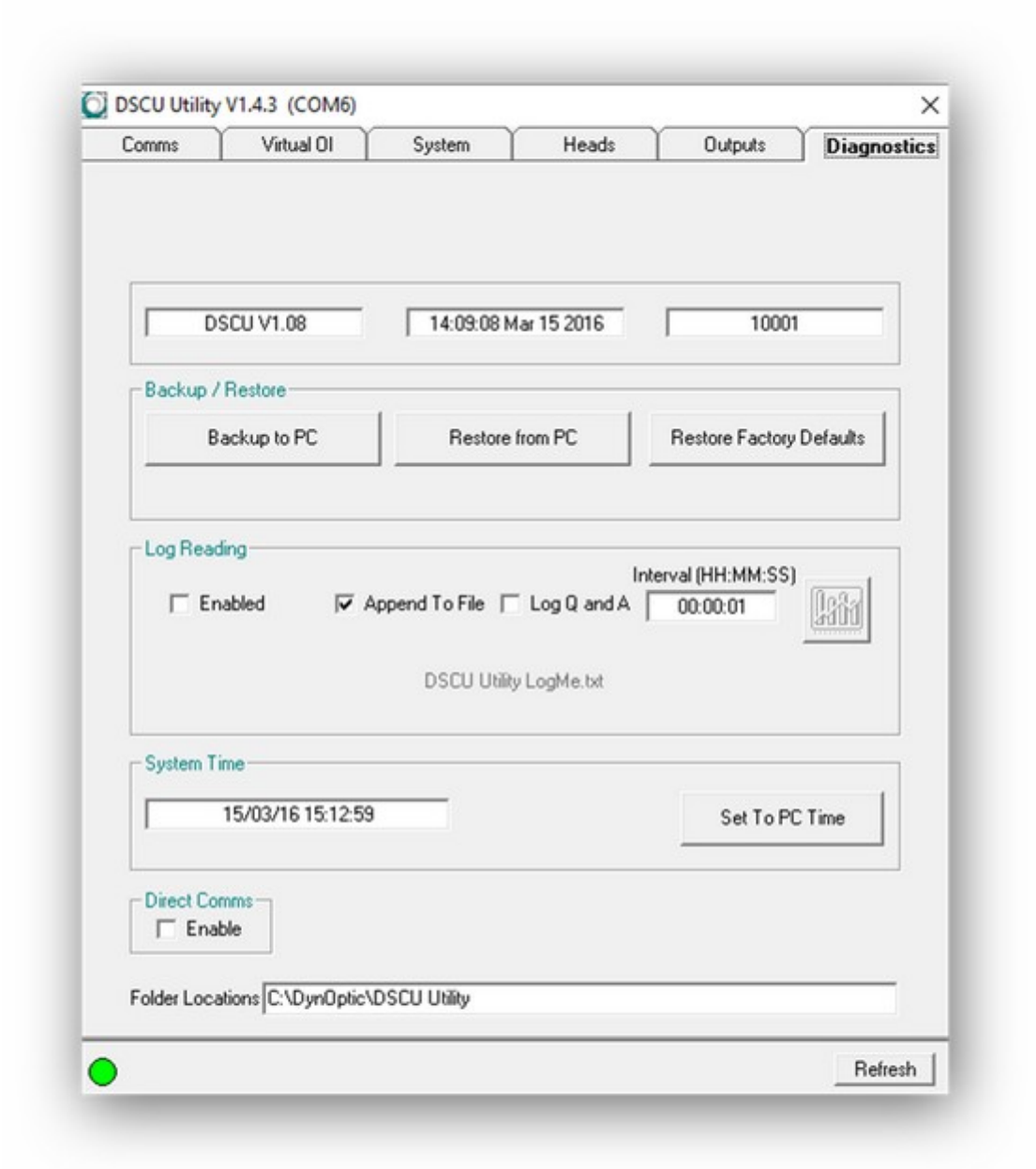
For example this could be used to activate an alarm when the temperature drops below a certain value.

Trip Level

This is only available for a level alarm. This parameter defines the measurement reading at which the alarm level relay will trip.

The Diagnostics Tab

The Diagnostics tab has a number of information only boxes and some features for backup and restore. See the following screen shot.



DSCU Information

The first three boxes display the DSCU firmware version, compile time and PCB serial number.

Backup to PC

Clicking this button will cause the current DSCU settings to be saved in a backup text file in the location: 'C:\DynOptic\DSCU Utility\BACKUPS' on the

PC. The filename of the backup file will incorporate the date, time and electronic serial number of the DSCU at time of backup.

It is highly recommended that you use this button to take a backup of your DSCU settings after successfully completing your installation and set-up. The backup file can be used to restore the DSCU settings, should the live settings ever be lost or become corrupted.

Restore from PC

Clicking this button will allow you to choose a backup file from which to restore your DSCU settings.

Alarm points and scaling factors will all be overwritten, so it is essential that you have confidence in the log file from which you restore.

WARNING: It is highly recommended that you take a backup prior to restoring, so that in the event that you restore from a bad file or unusable settings, you can always restore back to a known good point.

WARNING: Restoring from a log file will overwrite ALL settings, parameters and variables. Restoring from a log file could change the setup and configuration of your instrument.

Restore Factory Defaults

Clicking this button will restore all settings and parameters to default values as determined at our factory.

WARNING: This action will overwrite all existing settings and parameters with default values, so your setup and configuration settings will be lost.

Log Reading

Log Reading - Enabled

When checked the measured parameter will be logged in a CSV file. The files are stored in the location 'C:\DynOptic\DSCU Utility\ READINGS LOGS', you must be logged onto the PC as an administrator for the logs to be stored. The logs will be created at intervals defined by the Interval setting.

The default value logged in the CSV file is the reading measured by analogue channel 1. Contact DynOptic Systems to log other parameters.

Log Reading – Append to File

This box is checked by default. When checked the log file created will be a single file using the electronic serial number of the DSCU as a reference in the filename and each new log is appended within that file. A new file is created each day with the date forming part of the filename

When the 'Append to File' box is unchecked, the logging will generate a new file at each logging interval, using the time, date and electronic serial number of the DSCU as the file name.

The log file(s) can be opened in a text editor or spreadsheet and can be used for data logging, trend graphing or for diagnostics.

Log Reading – Log Q and A

The logging function uses a "question and answer" system to retrieve data for the log. In this system the DSCU Utility Software sends a question (an ASCII text string) to the DSCU, which responds with an answer (usually a number).

When the 'Log Reading' checkbox is un-checked, the log file (in whichever format) only includes the answer, but when this box is checked the log file includes both the question and answer.

By default the question that is asked relates to the measurement reading of the first analogue output of the DSCU only. However, with advice from DynOptic Systems, advanced users may modify the question so that the log file records additional or alternative data; for example other instrument readings, relay thresholds or analogue output scaling values.

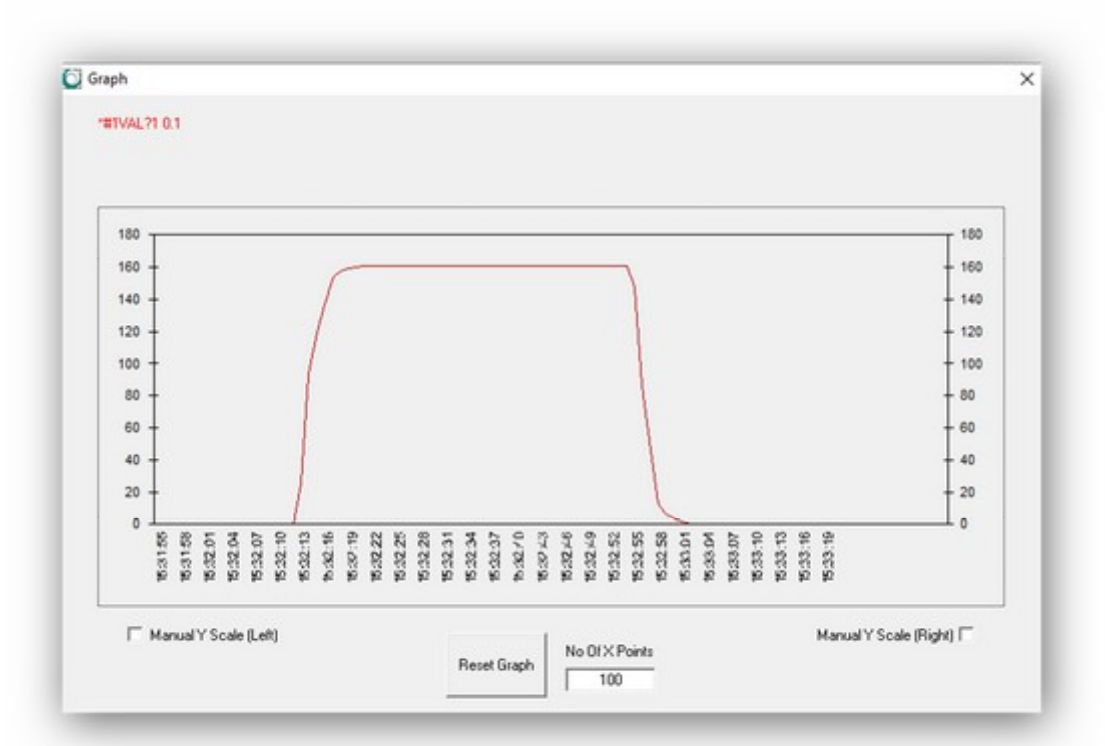
In these circumstances it is beneficial to log both the question and the answer so that the log file is more easily interpreted.

The file that is edited to modify the question is 'DSCU Utility LogMe.txt', Left clicking on the filename opens the location folder and allows users to browse the PC to select a different 'LogMe' file. Right clicking on the filename opens

the current file in a text editor. Please seek advice from DynOptic Systems before making any changes to this file.

Log Reading - Interval
The time interval between the creation / update of log files is determined here.

Graph Button
As well as a log file being created, the data can be viewed using the graphing feature. While logging click on the 'Graph Icon' a new graph window will appear (see screenshot below).

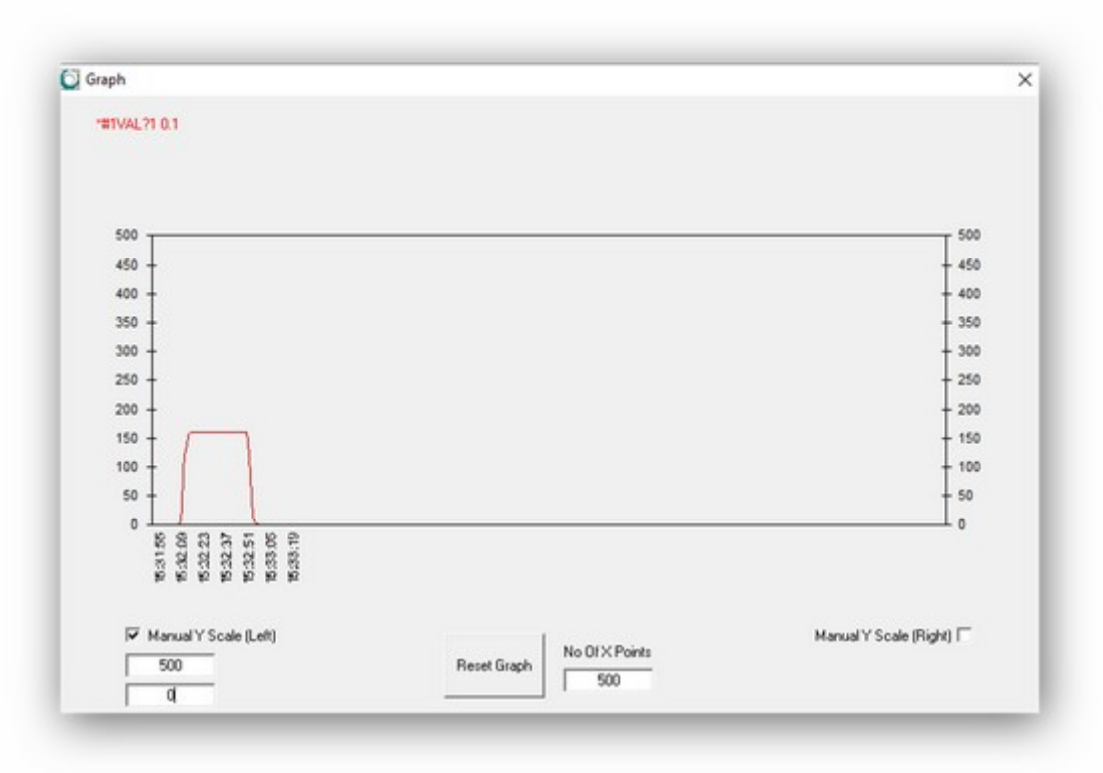


The default file, 'DSCU Utility LogMe.txt', only logs the reading on Channel 1 (*#1VAL?1) and this appears at the top in red '*#1VAL?1'. If the 'DSCU Utility LogMe.txt' file has been changed to log several the first four lines of results are displayed on the graph.

There are two 'Y' axis, and by clicking on the coloured text at the top '*#1VAL?1', the axis that this data is plotted against can be changed; Left = Left Y-Axis, Centre = Not displayed and Right = Right Y-Axis.

The Y-Axis scales are automatic but can be manually changed by checking the 'Manual Y Scale' tick box and then entering the required minimum and maximum values, as illustrated below.

The number of X coordinates can be changed (between 100 and 3600) by entering the value in the 'No Of X Points' box and pressing enter, as illustrated below.



The ‘Reset Graph’ button clears the currently displayed data.

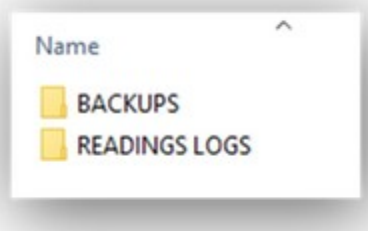
To exit the graphing feature, close the window using the cross at the top right hand corner of the window to return to the main Portal.

System Count

If the DSCU has a real time clock fitted then System time shows the current time of the internal clock. Clicking the ‘Set To PC Time’ button will synchronise this time to the clock of the PC being used.

Folder Location

This box shows the location on the PC of the folder that contains all of the data stored by the Utility. Left clicking on this filename opens the folder to show two subfolders.

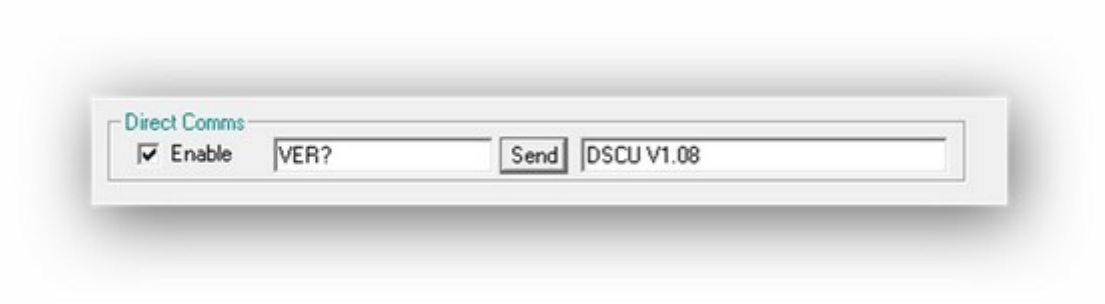


BACKUPS: Is where the DSCU backups are stored (see ‘Backup to PC’)

READINGS LOGS: Is where the reading logs are stored (see ‘Log Reading’)

Direct Comms

Selecting the “Enable” box opens up an input box, as shown below, which provides direct communication access to the DSCU and through the DSCU to any connected instrument. This can be used to read and edit additional system parameters. This feature should only be used with help from DynOptic Systems.



Fault Messages and Trouble Shooting

Error messages and warnings can appear either on the Virtual OI tab of the DSCU Utility Software, or in the DSCU display.

Where messages appear in the Utility Software most will remain permanently displayed on the Virtual OI tab until the fault or warning has been cleared and the operator has clicked on the text to acknowledge the fault or warning. This means that even if a fault or warning occurs only temporarily, and has been resolved before the operator views the Utility Software, the message will remain visible until the operator has clicked to acknowledge it. Fault and warning message text can only be cleared if the cause of the fault or warning has been resolved.

Where messages appear on the DSCU display they will flash intermittently over the reading display. This means that the operator can still navigate and use the DSCU, but will be constantly reminded of the fault by the flashing message. Flashing messages will automatically disappear when the fault or warning has been resolved.

Fault messages indicate there is a fault with the instrument and that the readings are not valid. Warning messages indicate that there may be a problem, and the warning should be investigated.

The following section describes the DSCU fault and warning messages, outlines potential causes and highlights actions that can be taken to try and resolve the issue. If the actions described do not solve the problem then further advice should be sought from your DynOptic representative. For information on instrument faults and warnings please refer to the instrument operators manual.

DSCU Fault Messages

SERVICE FAULT

If the DSCU or any instrument connected to the DSCU detects a fault, the Service Fault will be shown.

A fault can be triggered by missing head(s) or a fault with any unit connected.

Check which unit is showing a fault to find out the specific fault message.

MEMORY FAULT

The DSCU employs CRC checking on the EEPROM memory. Each time the instrument is powered up the CRC checking compares the state of EEPROM that it last knew, against the state of the EEPROM memory on power up.

If the DSCU finds a discrepancy between the two EEPROM memory states, a MEM fault is registered.

On registering the MEM fault the instrument performs a self-checking routine which analyses each byte of memory and ensures that the values stored there are within an acceptable range. Values outside the acceptable range are considered to be corrupted values and the memory byte is replaced with a default value from FLASH memory. Essentially the instrument heals itself.

Memory corruption is rare, but can occur in certain circumstances, for example if the instrument suffers a power loss whilst writing to its EEPROM memory.

Discrepancies can also be caused by a firmware upgrade, so they can be an expected result of such actions.

On encountering a MEM fault operators should always power cycle the instrument, i.e. switch it off, then on again. This action should clear the fault because self-healing process will have installed a new value in the corrupted memory byte, and the compared states of the power off memory and the power on memory should now match.

If a power cycle does not clear the fault it is likely that there is a more serious problem and you should contact DynOptic or your distributor for further assistance.

Please note that when the instrument self-heals by replacing corrupted data with default data from FLASH memory, operational settings and values may have been overwritten. It is therefore essential that all parameters, settings, and values are checked for validity by the operator immediately after resolving a MEM fault.

ALL HEADS MISSING

If the DSCU cannot detect any instruments connected to it, the All Heads Missing fault will be shown.

Check the wiring between the DSCU and all connected instruments.

Check that each instrument has been set to a unique id, otherwise conflicts will occur.

SOME HEADS MISSING

If the DSCU cannot detect some instruments connected to it, the Some Heads Missing fault will be shown.

Check the wiring between the DSCU and all connected instruments.

Check that each instrument has been set to a unique id, otherwise conflicts will occur.

DSCU Warning Messages

SYSTEM ALARM

If any of the instruments connected to the DSCU flag a threshold alarm, the System Alarm warning will be triggered.

Check the instrument to see the specific threshold alarm that has been flagged.

SERVICE OVERRIDE

If an instrument needs to be removed from the system, the service fault checkbox can be ticked to disable the Service Fault from triggering. If the checkbox is enabled the Service Override warning will be displayed on the DSCU & Utility.

COMMS CRC FAULT

The DSCU employs real time CRC checking on the communications between the DSCU and the connected instruments to maintain data integrity. This checking can determine if any packets of information sent between the DSCU and the connected instruments, or vice versa, have been corrupted.

If the instrument finds an error in a data packet, it will reject that data and request that the data be resent. If the CRC checking identifies a repeatedly high proportion of CRC failures the instrument will flag a CRC FAULT.

CRC failures are caused by corruption of the data passed along the interconnecting cable between the DSCU and the connected instruments. Corruption is rare and is usually caused by RF interference, electromagnetic radiation, or a poor connection in the wiring.

Check that the interconnecting cable is screened and that the screen is connected to Earth as described in the installation manual. Also check all wiring connections for loose wires, poor connections, or loose terminal screws.

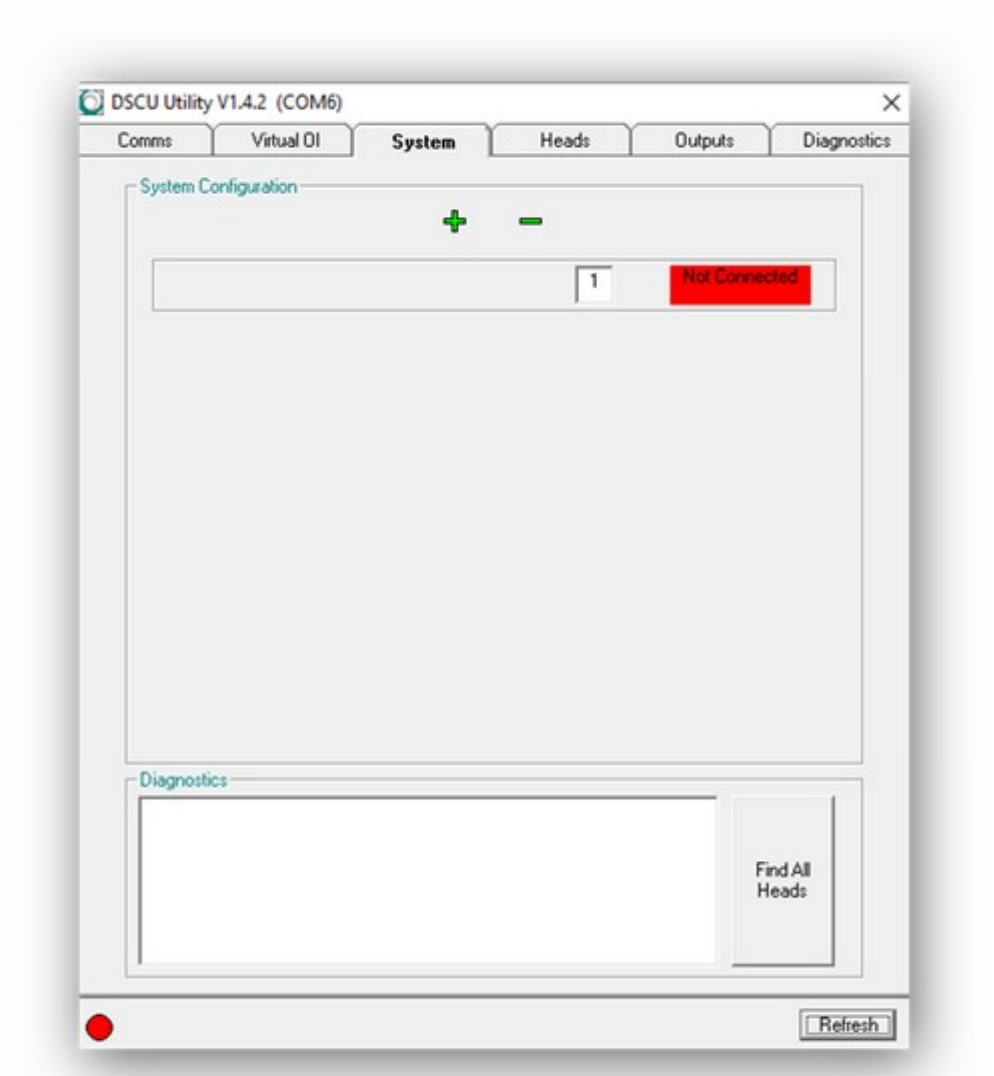
This problem can also be caused by having an incorrect combination of negative and positive bias applied to the RS485 signals in the interconnecting cable, or by missing termination links. Also check that the termination link (LK5) is fitted on the circuit board in the DSCU.

Appendix A – DSCU Initial Set-Up Procedure

The default setting for the DSCU is to have only one head attached and for its ID address to be ‘1’. When the DSCU is first turned on it will search for one instrument with this ID on the network. If one is found then the reading will be displayed (if no faults are returned). For single instrument use this is generally all that is required.

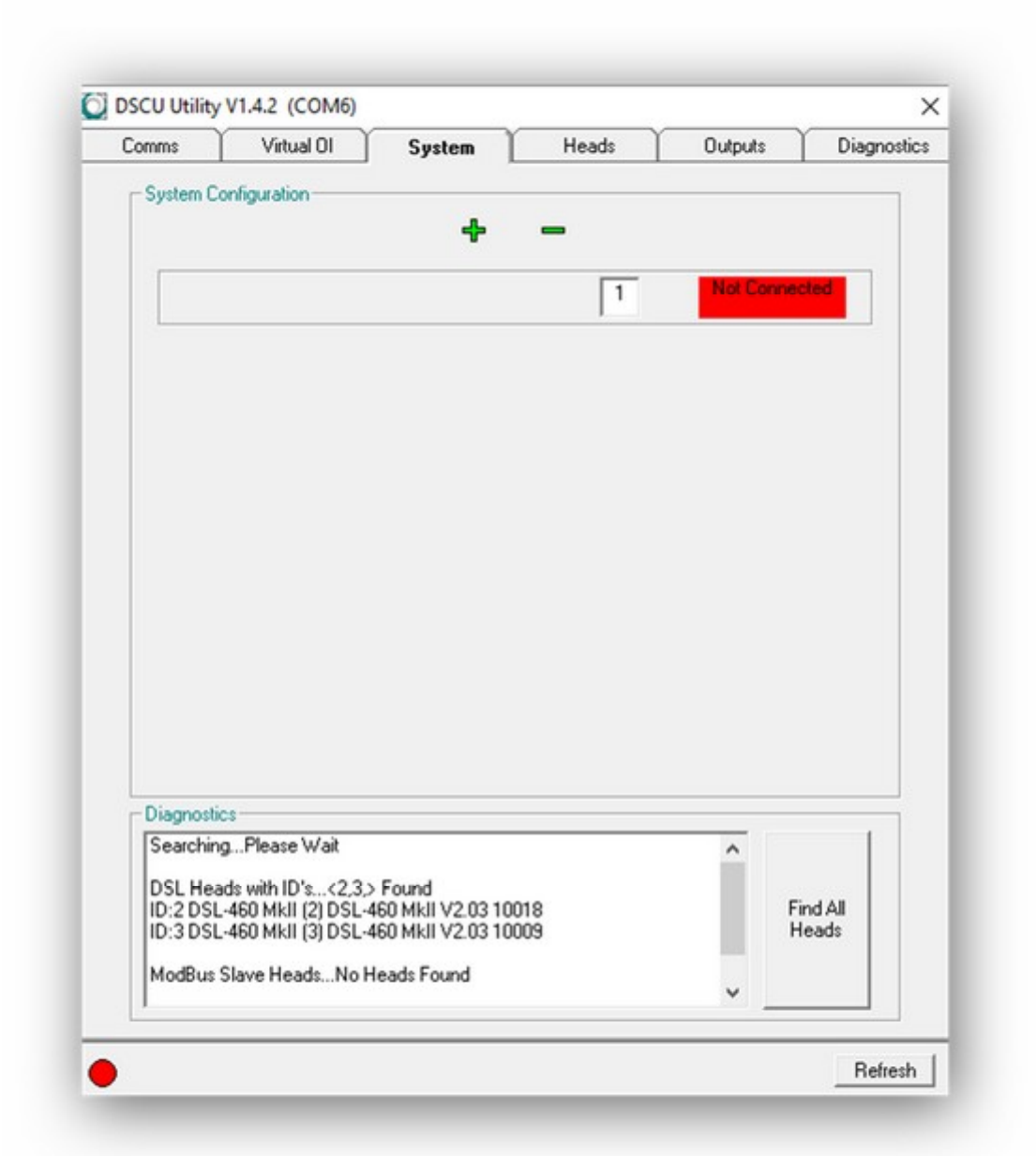
However, if the ID of the attached instrument is not ‘1’ or there are several instruments connected (multi-heading) then the System tab of the DSCU Utility will be required to correctly setup the DSCU.

In the example shown below the DSCU has not found an instrument with ID=1 and so it is shown in red (not connected).

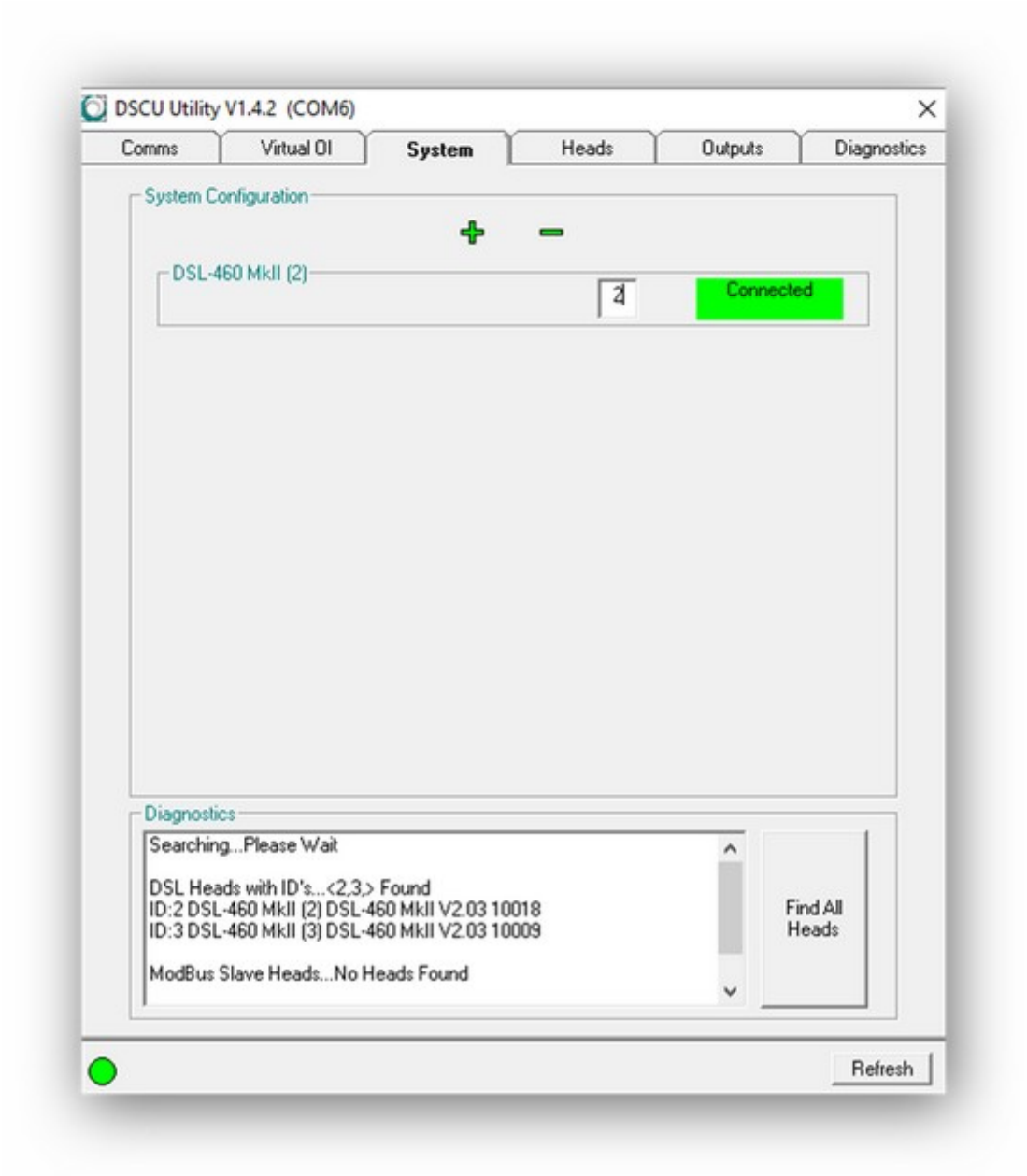


To identify how many heads are connected to the DSCU and what their IDs are, click on the ‘Find All Heads’ button. In the example below two DSL-460 MkIIs have been found with ID’s ‘2’ and ‘3’.

If the number of heads identified does not equal the actual number physically connected to the RS485 bus it will be necessary to check all of the RS485 connections and also to confirm that all of the instruments have unique ID numbers.

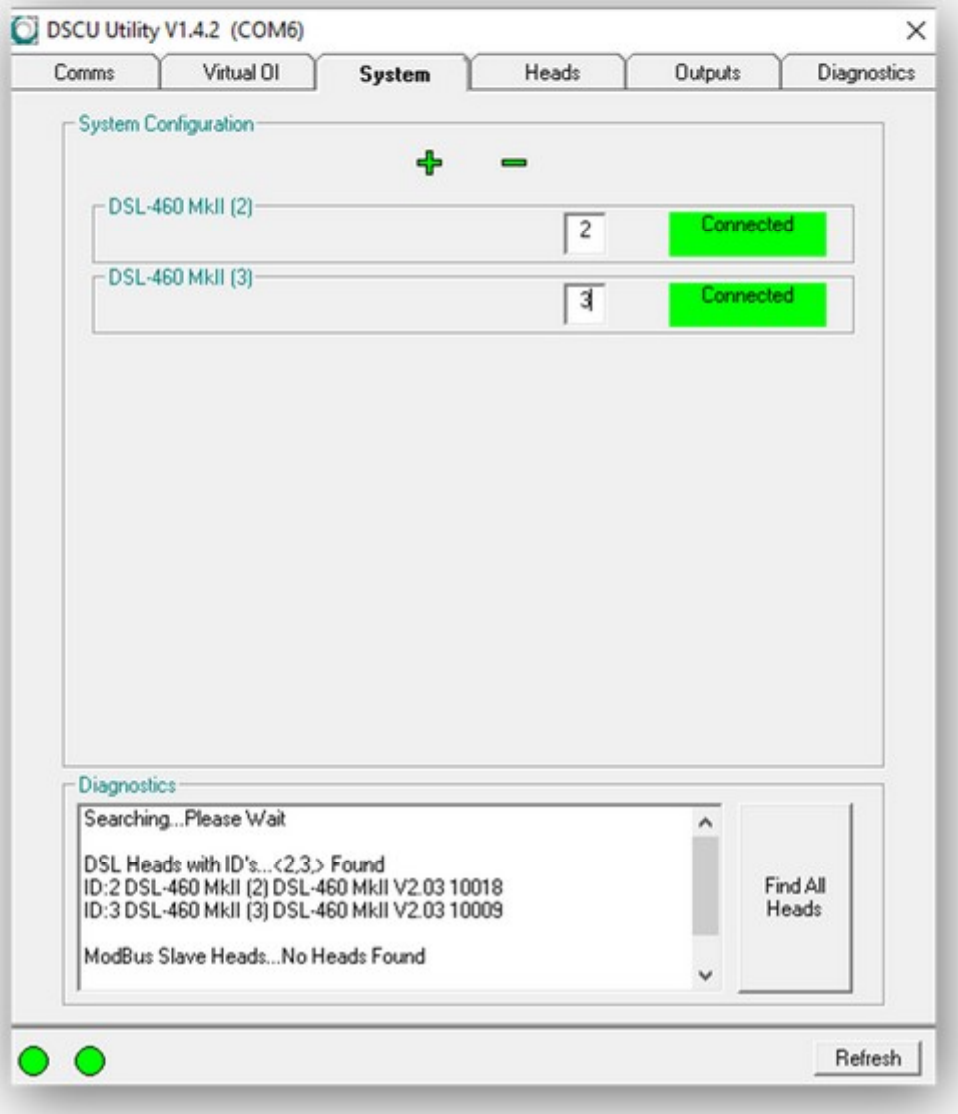


The system configuration can now be edited to match the known number of instruments and IDs. In the example shown below the number in the ID box of the single instrument was changed from ‘1’ to ‘2’. On pressing enter the DSCU searched and found the instrument with ID=2.



The ‘+’ symbol is now used to insert a second connection and ‘3’ was typed into the ID box. On pressing enter the DSCU searched and connected to the DSL-460 MkIII with ID=3.

The DSCU is now correctly set-up to communicate with the two attached instruments.

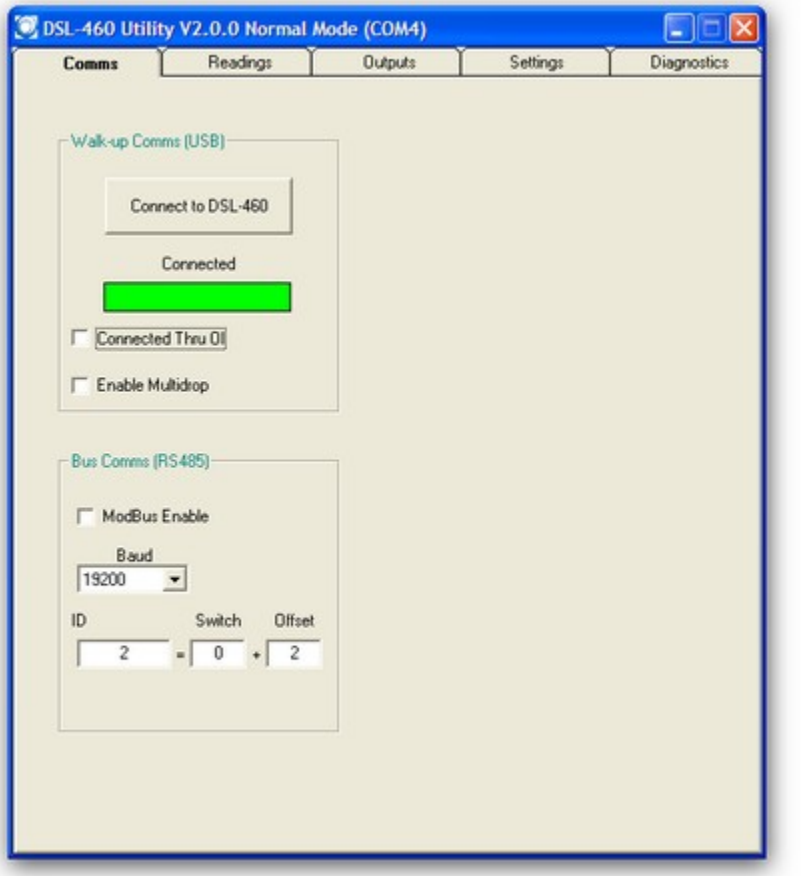

DSCU Utility V1.4.2 (COM6)
Comms
Virtual OI
System
Heads
Outputs
Diagnostics
System Configuration
DSL-460 MkII (2)
2
Connected
DSL-460 MkII (3)
3
Connected
Diagnostics
Searching...Please Wait
DSL Heads with ID's...<2,3,> Found
ID:2 DSL-460 MkII (2) DSL-460 MkII V2.03 10018
ID:3 DSL-460 MkII (3) DSL-460 MkII V2.03 10009
ModBus Slave Heads...No Heads Found
Find All Heads
Refresh

Appendix B – Setting the Instrument Head Address

When setting up a multi-headed system each instrument connected to the DSCU must be assigned a unique head address. This should be carried out when the heads are installed. If the DSCU tries to communicate with two heads that have the same ID the communication will be corrupted and several fault messages will be displayed.

The instrument ID must be set using the instrument Utility connected directly to the walk-up comms of the instrument (i.e. not via the DSCU).

As an example the screenshot below shows the Utility Comms tab for a DSL-460. At the bottom of the Comms tab is the ID section.



To set the ID type the required address into the ‘Offset’ box and press enter.

The instrument ID is displayed in the box under ‘ID’, as the sum of the Switch and Offset values. Make a note of the ID as each instrument must have a unique number.

Note: *If one or more instruments are set to the same address conflicts will occur and the system will not work.*

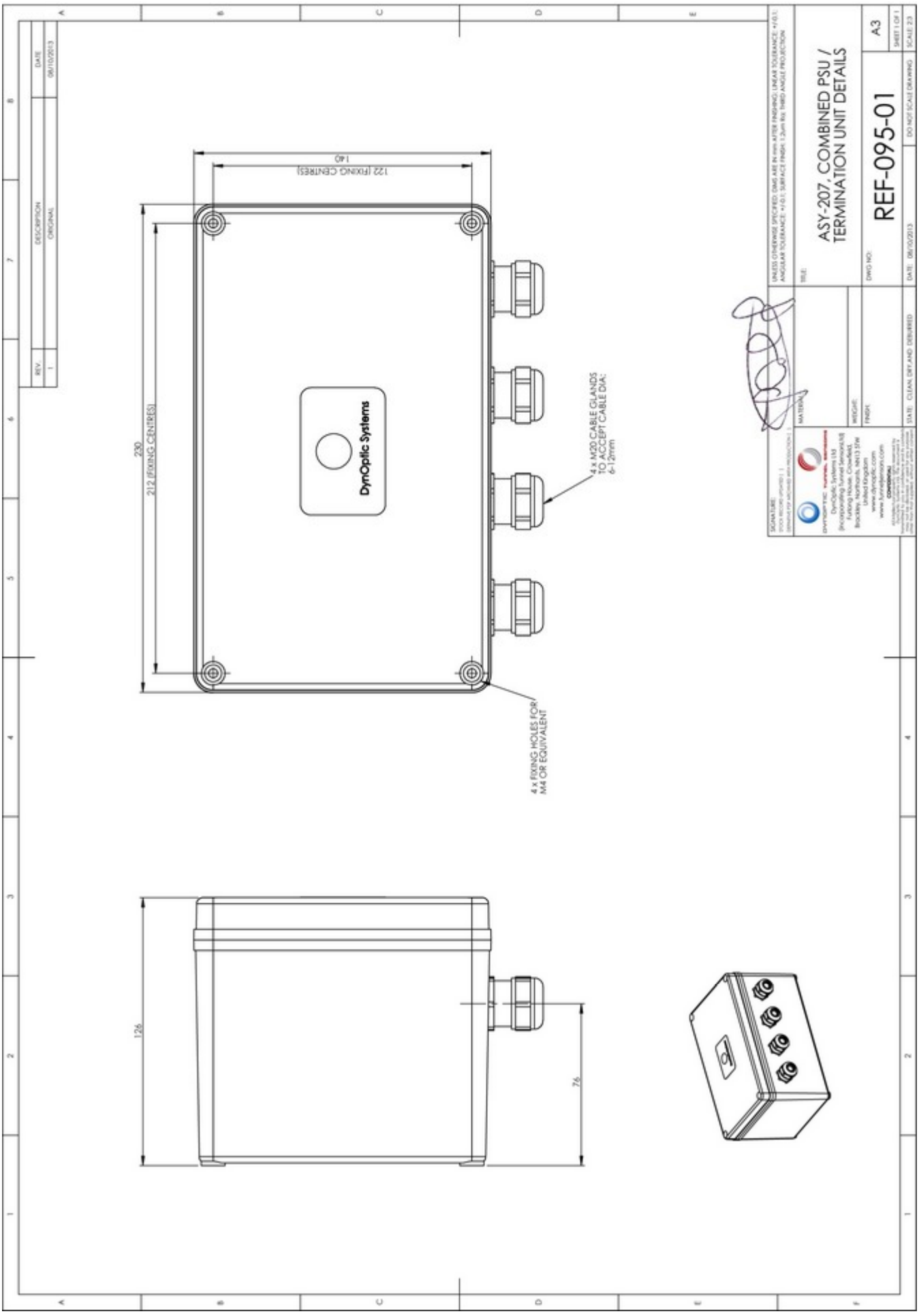
Appendix C – Optional Combined PSU / Termination Unit

The optional Combined PSU / Termination Unit is installed close to the instrument to provide a local power supply and terminals for connecting bus communications as illustrated in the drawing REF-056.

Note: *Please take note of the warnings and guidance with regards to the installation of the PSU / Termination Unit as described in previous sections.*

Wall mounting the PSU / Termination Unit

The PSU / Termination Unit can be fixed to a wall or panel using 4 off M4 bolts. See drawing REF-095 below:-


ASY-207, COMBINED PSU / TERMINATION UNIT DETAILS
REF-095-01
A3
DynOptic Systems
230
212 (FIXING CENTRES)
122 (FIXING CENTRES)
140
4 x M20 CABLE GLANDS TO ACCEPT CABLE DIA: 6-12mm
4 x FIXING HOLES FOR M4 OR EQUIVALENT
126
76
DESCRIPTION
ORIGINAL
DATE
08/10/2013
REV.
1

Electrical Installation & Wiring

Note: *Please take note of the warnings and guidance with regards to the electrical installation and wiring of the PSU / Termination Unit as described in previous sections.*

Note: *The umbilical cable between the PSU / Termination Unit and the instrument should be less than 2m. Longer cable lengths can lead to communication problems.*

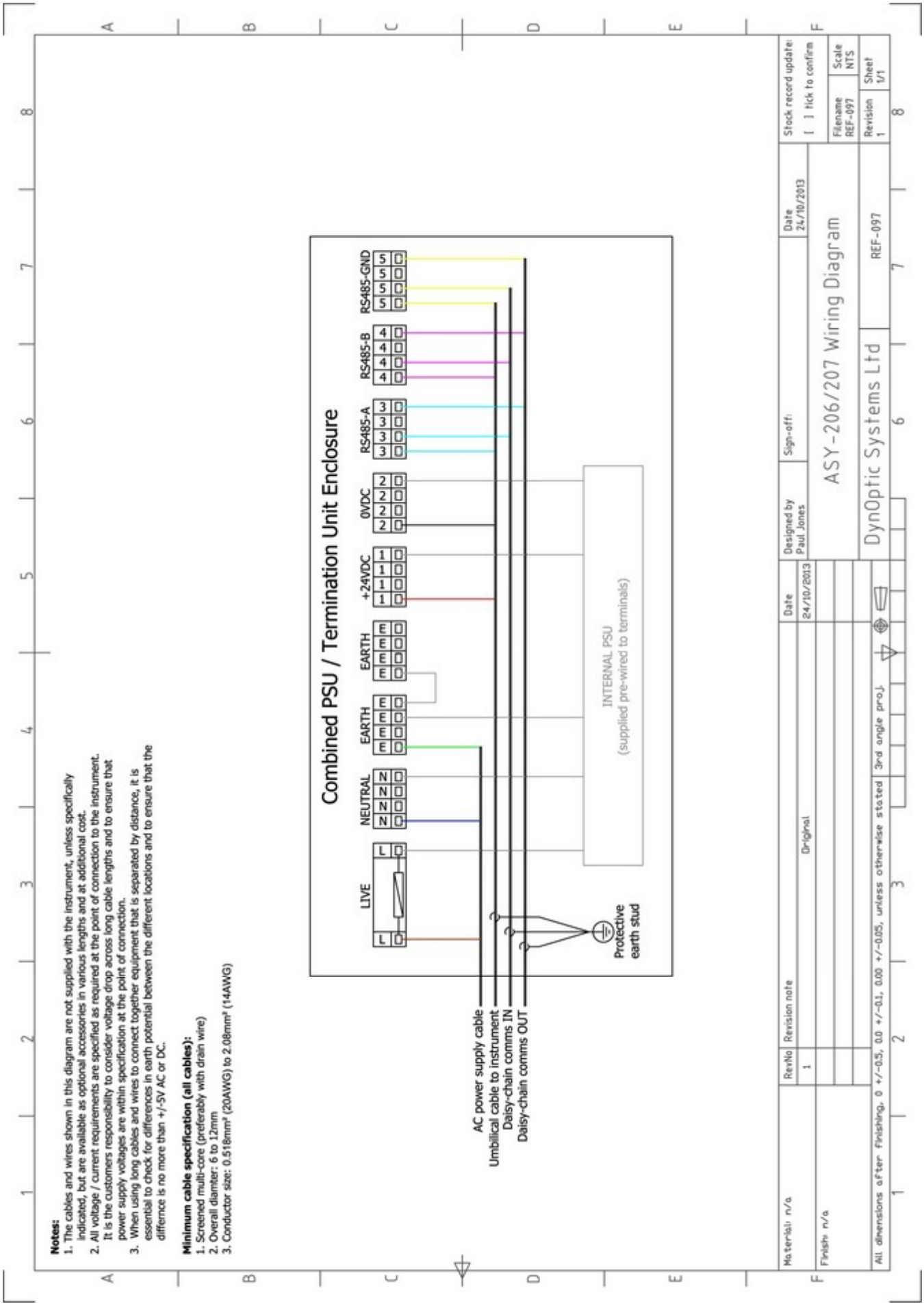
Due to the variable lengths possible, cable is not normally supplied with the instruments. Suitable cable can be organised locally or purchased separately from DynOptic Systems. This cable must have a minimum of 4 cores and meet the specification shown below.

When using long cable runs it is essential to check for differences in earth potential between the different locations and to ensure that the difference is no more than +/-5V AC or DC.

All cables should have an individual core size of between 0.518mm² (20AWG) and 2.08mm² (14AWG).

All cables must be screened, ideally individually screened twisted pairs with a common drain wire, such as Belden 9873 (6 core, screened pair, 20AWG).

The overall diameter of the cable should be between 6 and 12mm.


Notes:
1. The cables and wires shown in this diagram are not supplied with the instrument, unless specifically indicated, but are available as optional accessories in various lengths and at additional cost.
2. All voltage / current requirements are specified as required at the point of connection to the instrument. It is the customers responsibility to consider voltage drop across long cable lengths and to ensure that power supply voltages are within specification at the point of connection.
3. When using long cables and wires to connect together equipment that is separated by distance, it is essential to check for differences in earth potential between the different locations and to ensure that the differnce is no more than +/-5V AC or DC.
Minimum cable specification (all cables):
1. Screened multi-core (preferably with drain wire)
2. Overall diamter: 6 to 12mm
3. Conductor size: 0.518mm² (20AWG) to 2.08mm² (14AWG)
Combined PSU / Termination Unit Enclosure
LIVE
NEUTRAL
EARTH
EARTH
EARTH
+24VDC
0VDC
RS485-A
RS485-B
RS485-GND
INTERNAL PSU
(supplied pre-wired to terminals)
Protective earth stud
AC power supply cable
Umbilical cable to instrument
Daisy-chain comms IN
Daisy-chain comms OUT
Material: n/a
Finish: n/a
RevNo
Revision note
Date
Original
24/10/2013
Designed by
Paul Jones
Sign-off:
Date
24/10/2013
ASY-206/207 Wiring Diagram
DynOptic Systems Ltd
REF-097
Stock record update:
[ ] tick to confirm
Filename
REF-097
Scale
NTS
Revision
1
Sheet
1/1
All dimensions after finishing. 0 +/-0.5, 0.0 +/-0.1, 0.00 +/-0.05, unless otherwise stated
3rd angle proj.

Revision Control

Version	Revision Date	Revision Details	Author
V1.0	07/05/2013	Original.	Dominic Sheedy
V1.1	08/11/2013	Added Appendix C detailing Combined PSU / Termination Unit. New warning section added.	Dominic Sheedy
V1.2	30/01/2015	Added warning about not unplugging the front panel ribbon cable from the main circuit board.	Colin Edge
V1.3	05/05/2015	Updated UTILITY installation method	Colin Edge
V1.4	17/03/2016	Updated to reflect DSCU variants, added more details on the analogue and relay configurations, corrected wiring diagram (REF-040).	Colin Edge

All technical details and specifications are subject to change without notice