# Newflow

NÅNO

Gas
Differential Pressure
Application

Configuration & User
Manual

Contact:

Newflow Ltd
George House
Derwent Road
Malton, North Yorkshire
YO17 6YB, UK

Tel: +44 1653 697 200
Fax: +44 8700 667 325
Email: sales@newflow.co.uk

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R0	22 Aug 2022	Initial pass Application Ref: 8v0r68	GPL	MPFJ	MOB
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R2					
R3					

Cumulative Total [Mass]	Cumulative Total [SVol]
3313875.55 lbs	2425315.23 Mft³
Cumulative Total [GVol]	Cumulative Total [Energy]
85853.64 Mft³	97222302.4 MMBTU
Line Temperature In Use	Line Pressure In Use
80.2 °F	660.00 psig
Differential Pressure In Use	Heating Value In Use
57.0159 in H20 at 6	50.000000 MJ/kg

Operational Overview

This application is designed for use with one or many differential pressure transmitter/s to calculate a mass flow rate.

Features

- Single or Low-High Stacked Cell options

- USC or Metric units are selectable

- Field calibration of current loops supported

- Web, Local panel and Integral enclosure display options

- Compressibility & Density from AGA 8 in Detailed, Gross Method 1 or Gross Method 2

- Heating value calculated from GPA 2172, AGA 5 or ISO 6976

- DP Flow rate calculations are AGA3 or ISO 5167

- Powerful diagnostic capabilities built in as standard

- Data logger functionality built-in to provide information for further analysis

- OPC-UA and XML communication links are provided for a Supervisory system

Table of Contents

1   Introduction

The Gas Differential Pressure Application is one of a range of applications designed specifically for fiscal measurement of Oil & NGLs utilizing pipelines:

►Liquid Flow Computer Application	Designed for use with Volumetric or Mass pulse based meters such as Turbine, PD, Ultrasonic and Coriolis meters
►Master Meter Application	Designed for use with pulse based meters for Mass to Mass, Mass to Inferred Mass or Volume to Volume proving modes
►Gas Differential Pressure Application	Designed for use with single or multiple differential pressure transmitters.
►LACT-Pro® Metering Application	Flow Meter based Truck Loading Applications and off-loading to day tanks with measurement of produced water
►LACT-Pro® Tank Application	Loading using gauging from Bullet & Cylindrical tanks
►LACT-Pro® Scales Application	Weighbridge tanker loading
►LACT-Pro® PI	For pipeline injection

In addition to this manual, a range of further documentation is available, which includes:

- NÅNOConf Application Deployment Tool, NF_NANOConf-UM
- Installation Manual
- NÅNO XML Comms Manual Rev20

2   Loading the Application

If the required version of the application is already loaded into the NÅNO and the IP address of the unit is known, then skip this section and proceed to Section 3 Configuration Overview.

Loading of applications, and a host of additional tasks, can be accomplished with the NÅNOConf program. Please refer to the NÅNOConf manual (NF_NANOConf-UM) for further information.

3   Configuration Overview

This section of the manual assumes that the Gas Differential Pressure application has been installed, and the IP address of the machine is known. This document explains how the application is configured to match the site.

There are a number of site specific options that need to be configured before the NÅNO will provide useful results. These options can be grouped as:

- Initial Site report data, such as the Owner/Operator, Location and Device ID

- System Setup - these NÅNO specific items include Network Settings, Printers, Time & Date

- User Information - allows additional users & technician login details to be added / configured

- Configuring the measurement units to be used

- Matching the application to the site Piping and Instrumentation Diagram (P&ID)

- Setting the I/O assignments - these have rational default values, but may be changed to suit local wiring requirements, or for fault diagnostic purposes

- Setting the physical parameters, such as sizing & material properties

- Backing up the configuration

The following configuration sequence is recommended, but not obligatory. The menu structure is dynamic and, as items are selected or deselected, associated information may appear or be hidden.

Once you had identified the physical NÅNO using the NÅNOConf deployment tool, you can right click on the unit you wish to set-up and select "Start Web Interface". Alternatively, take a note of the IP address, open a web browser (Firefox, Chrome or Safari are preferred), type the NÅNO's IP address into the browser's address bar and press ENTER.

The default Login screen will be displayed, as shown above.

Unless someone has already configured the machine, and changed the login credentials, the user name will be **admin**, and the password will be **00000000** (that is the number zero repeated 8 times).

After typing the password, you can press the [↵ Enter] key on the keyboard (works with most browsers) or click the Login button, which will work for all browsers.

If the Password and/or Username have been changed from the default, then you will see this:

NOTE: If the Password & Username combination for the machine cannot be determined, there is no back-door method of logging into the NÅNO. The passwords cannot be recovered, but the machine can be reset to factory defaults but this will remove the application, and stored reports. The SD Card information is preserved.

NOTE: The maximum number of concurrent web browser connections is 4. If this is exceeded, the a lock icon will be displayed and the message "Too many users already logged in" shown.

Too many users already logged in

Assuming that the user limit has not been exceeded and you login correctly, then the home screen will be displayed, as shown below.

System ID or Device ID   Alarm Notification   Time & Date User Logout

Breadcrumb Bar

C8A030838DED   ALARM   2019/08/13 11:20:57

Site Map ⊞ Home

  ▸ Site Panel Mimic

  ▸ Operation

Hierarchical Menu Items ▸ System

  ▸ Reports

  ▸ Logs & Info

System ID / Device ID	The System ID / Device ID is configured in the application. The Prover Computer ID is initially unset, so the System ID (the MAC Address) is shown to ensure each machine is unique, but can be changed by administrator level users in the Home ▸ System ▸ Initial Setup ▸ Site/Location Setup Menu.
Alarm Notification	Clicking on this item will take you to the Alarms page. The color of the alarm indicator shows the current alarm status: Flashing red - there are unaccepted alarms. Solid red - there are only accepted but not cleared alarms. Grey - there are no alarms present.
Time / Date	This area of the screen displays the current machine time. Clicking on this item will jump to the Time / Date settings page (see Section 5.1 Time / Date).
Site Map	Clicking this icon takes you to a page showing all of the displays. The menu structure is dynamic and as items are selected or deselected, associated configuration information may appear or be hidden. This enables rapid navigation of the display tree, for users who are familiar with the layout of the data and sub menus. It is possible to get all menu entries in no more than two clicks, using the site-map feature.
Breadcrumb Bar	This navigation aid shows the hierarchical location of the current page: Home ▸ MyMenu ▸ Another Menu Clicking on any of the breadcrumb items will jump to the relevant page.
User Logout	Clicking this icon immediately logs out the current user and returns you to the default login screen.
Sub Menu	A line on the menu with a leading triangle ► is the entry to the next sub menu. Clicking on a sub menu line will take you to the next level in the Hierarchical Menu. The browser "back" button will take you back up a level.
Data Point	The left hand side will show the name of the display point and the right hand side will show the current value of this data. **NOTE:** The home screen does not have any Data Points, only Sub Menus.
Gear Icon	A blue gear icon indicates that the value of the Display Point can be edited by the current user. If the gear icon is gray, this indicates that the display point can be edited, but the current user does not have the required user level. If no icon is show, the display point is read-only and shown for information only.

3.1   Conventions used in this manual

NOTE: The Glossary (see Section 12 Glossary) shows all the icons used in the App.

The browser can show a range of different screen types, such as menus, items names and associated value or status, dialog boxes for editing parameters, previews of reports, and other types of pages.

When a data point is being described in this manual, it will be shown in Bold Italics, as is ***Application Type*** in the next paragraph.

Menu locations will be shown as Home ▸ System ▸ Initial Setup in this manual.

Any line which has a gear icon at the end of the line, is an editable line.

Clicking anywhere on a line with the gear icon will open an edit dialog box. The original web page is now grayed out and the appropriate dialog box overlays the background.

The type of dialog depends upon the context. In the example below, If you navigate to Home ▸ System ▸ Initial App Setup and click the top line ***Application Type*** it will open a Radio Button dialog box, which only allows one choice from several options. This type of dialog box is shown below.
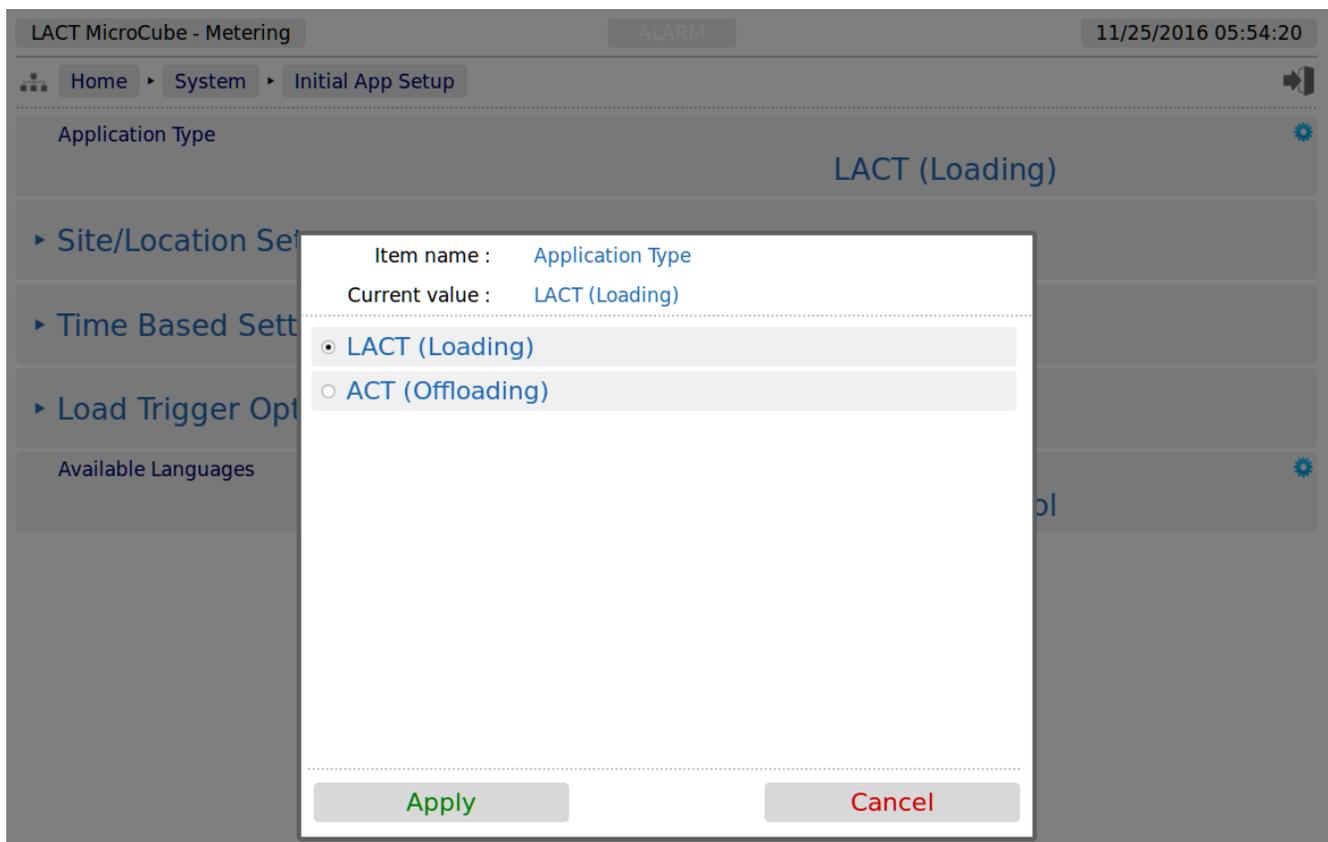
This radio button type dialog box only has two choices, click the line that matches your requirement and click on the ***Apply*** button, to make the selection, or cancel to lose any change made.

There are a range of other dialog boxes, for example the Edit value dialog box shows the name of the item being edited (Item name) and it has a large data entry entry area, which shows "Old Company Name" being replaced with "New Corporation Name" in the screenshot below.
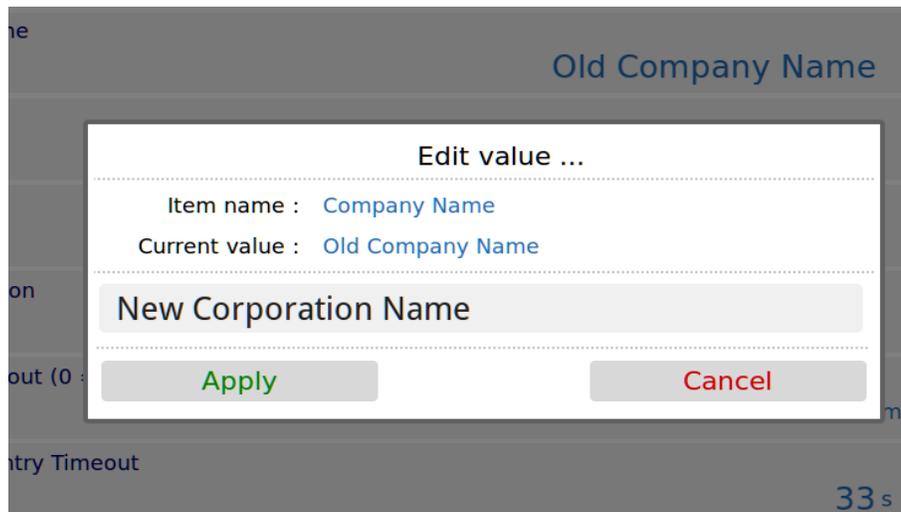
The user can now accept the new value by clicking the green Apply button, or reject the changes by clicking the red Cancel button, at which point the Edit value dialog box closes and the main screen is displayed as normal.

NOTE: If you have changed the Device ID, you will need to refresh the page view before the System ID/Device ID Name on the top Left Hand Side of the screen will be updated.

NOTE: The format of the data entered is checked, but not the validity of that data. In the case of the Device ID, the format is free and you can enter any numbers, characters or Unicode Symbols as you wish, up to the equivalent of 32 ASCII characters.

4   Stage 1 of 5: Initial Application Setup

NOTE: The following configuration sequence is recommended, but not mandatory. The menu structure is dynamic, and as items are selected or deselected, associated information may appear or be hidden. The Initial Setup screen is sub-menu of the System screen.

The default or home page that will be displayed in the browser is shown below:

Local Panel	This is a mimic of the Local Panel and can be used instead of a local panel, to support operators or as a training aid.
Flow Rates	This display shows the live flow rates including the alarm limit settings for the mass flow rate.
Totals	This display shows the cumulative totals and also the current and previous period totals for the unit. A copy of the current flow rates is also shown.
System	This is the entry point to the system configuration sub-menus.
Reports	This section will contain all of the reports produced by the Application.
Logs & Info	All the information supplementary to the reports will be found in the section.

To start the configuration, click the line containing the ▸ System sub menu. This will take you to the top of the System menu page Home ▸ System.

▸ Initial Setup

▸ RTU Setup

▸ Measurement Units

▸ I/O

▸ Process Setup

▸ Totals Reset

Click the top line, **Initial Setup** to start the configuration process.

4.1 Initial Setup

Click the top line, **Site/Location Setup** to continue the configuration process.

4.2 Site/Location Setup

Site Owner/ Operator	This is an alphanumeric text field of up to 32 ASCII characters. Unicode characters can be used, but this will reduce the total number of characters supported. The Site Owner/Operator is printed on all reports.
Site Reference	This is an alphanumeric text field of up to 32 ASCII characters. Unicode characters can be used, but this will reduce the total number of characters supported. The Site Reference is printed on all reports.
Site Location	This is an alphanumeric text field of up to 32 ASCII characters. Unicode characters can be used, but this will reduce the total number of characters supported. The Site Location is printed on all reports.
Device ID	This is a text field, like the entries above, and appears on all reports. The Device ID is also shown on the top left of all web browser pages if configured. **NOTE:** If no Device ID name is set then the hardware unique System ID will be used instead.
Optional Lid Display Setup	An optional display mounted in the NÅNO lid is available. The data available on this display is predetermined and can be enabled or disabled from this menu.

4.2.1   Optional Lid Display Setup

Home ▸ System ▸ Initial Setup ▸ Site/Location Setup ▸ Optional Lid Display Setup

IP Address - Port 1	IP Address - Port 2
Enabled	Disabled
Meter Temperature	Meter Pressure
Disabled	Disabled
Meter Density	
Disabled	
Base Density	Heating Value
Disabled	Disabled
Differential Pressure	
Disabled	
Gross Volume Flow Rate	Energy Flow Rate
Disabled	Disabled
Mass Total	
Disabled	
Mass Flow Rate	Gross Volume Total
Disabled	Disabled
Energy Total	
Disabled	

Clicking on each entry allows the entry to be enabled or disabled from being shown on the lid display. The display automatically cycles round each entry every 10 seconds.

4.3 Time Based Settings

Web Timeout (0 = Disabled)	By default, if you do not interact with the website for 10 minutes the user will be logged out and you will have to re-enter the User Name and Password. This auto-logout is a safety feature to ensure that if a user forgets to logout, it will be less likely that someone else can take control of the machine. On occasion, such as configuring a machine for the first time, the auto-logout feature can be an annoyance so you can either change the period by selecting a different number of minutes for the timeout or, if you enter zero, the timeout is disabled.
	NOTE: In this instance only a number can be typed into the Edit Value Dialog box.
	NOTE: It is recommended that a reasonable number is used once the machine is commissioned, to limit unauthorized access.
Day End Hour	This sets the time at which the Daily report is generated. It is set using military time therefore 0:00 is midnight.

This completes the ▶ **Time Based Settings.**

5   Stage 2 of 5: RTU Setup

The RTU setup configures the computer aspects of the NÅNO. The screenshot below shows the four sub-menus.

Clicking the ▸ **Time / Date** sub-menu will show the screen on the next page.

NOTE: Clicking on the time and date shown on the top-right of the browser screen is a shortcut to the Time / Date menu.

5.1 Time / Date

Time Offset (HH:MM)	+00:00
Date Format	MM/DD/YYYY
Date	08/22/2022
Time	16:58:11
Daylight Saving Time (Enabled)	
Start Date (MM/DD)	03/31
End Date (MM/DD)	10/31
Changeover Hour	01:00
NTP	
Mode	Sync On Startup & Automatic
Server IP Address	216.239.35.8
Last Sync	08/22/2022 16:51:30 +388.697680 seconds
	Manual Sync

The NÅNO has a very high stability clock source which is used for a variety of measurement tasks, such as period measurement, as well as driving the internal time & date system. The internal clock will have an error of less than one second per day when running from a DC power source.

The time facilities in the NÅNO can be used in two ways.

5.1.1 The Local Time Method

The Administrator can decide to use a very simple time setting method. Set the **Time Offset (HH:MM)** to 00:00.

The Date and Time fields should then be set to the local time.

The Daylight Saving Time option may still be used if required. If not required, set the **Start Date** to be the same as the **End Date** and this feature will be disabled.

5.1.2 The NTP Time Method

Alternatively, to synchronize the NÅNO to the Internet time using the Network Time Protocol (NTP) you must input a time offset which represents your geographical timezone, as Internet time is always expressed in UTC (Coordinated Universal Time - see Section 12 Glossary). This is because the NTP server has no knowledge of where the client resides and local time is derived from adding or subtracting the local timezone time offset. The timezone offset can be input manually, for example, during the winter months in Houston, you would set the **Time Offset (HH:MM)** as -06:00 (subtract 6 hours from UTC time).

Similarly in Mumbai, India, you would set the **Time Offset (HH:MM)** as +05:30 (add 5 Hours and 30 minutes to UTC time).

The following system settings are shown:

Time Offset (HH:MM)	This shows the current time offset (in hours:minutes). Clicking on the line will open the Time Offset dialog box which allows the user to input the time offset associated with the local timezone. The : (colon) character is used to separate hours and minutes. The minutes is optional hence if only whole hours are needed, then you can just enter -6 for US Central time during the winter.
Date Format	Shows the current date format. The three following formats are available and each shows an example of the date for Christmas Day for the year 2015: YYYY/MM/DD Example: 2015/12/25 DD/MM/YYYY Example: 25/12/2015 MM/DD/YYYY Example: 12/25/2015 Clicking on the line opens a selection box with the three options, clicking any of the lines selects the appropriate option and indicates the selection with the radio style button. As usual, select Apply or Cancel to exit the selection box.
Date	Shows the current date (using the format defined above). Clicking on the line containing the gear icon allows the user to enter a date, in the format specified above. The / (slash or forward-slash character) is used to separate the day, month and year.
Time	Shows the current local time in 24 hour military time format. Clicking on the line takes you to the Edit Value screen where the user can enter the time. **NOTE:** The : (Colon) symbol must be used to separate the hours from the minutes and seconds.
Daylight Saving Time - This is the heading for the Daylight Savings options. This bar also indicates if Daylight Saving Time is in effect.	

Start Date (MM/DD)	This should be the date in the Spring when the hour is moved forward. Once the start date is reached, at either 1am or 2am (as set in the Changeover Hour), the NÅNO time will jump forward by one hour to 2am or 3am. **NOTE:** The format to enter this information is determined by the **Date Format** above, so could be in MM/DD or DD/MM format. The expected format will be displayed in the name. **NOTE:** It is not recommended that you load during this period as report times and averaged data may be confusing. However, no pulses will be lost and the accumulators and totals will be correct.
End Date (MM/DD)	This is the date in the Fall, when the hour moves back. At the changeover hour, the time will go back from say 2am to 1am and appear to repeat for an hour. When it reaches 2am for the second time, it will NOT jump back another hour. **NOTE:** The format to enter this information is determined by the **Date Format** above, so could be in MM/DD or DD/MM format. The expected format will be displayed in the name.
Changeover Hour	This can be either 1am or 2am, and determines the time of the day, on the selected date, that the time will spring forward by one hour or back by one hour in the Fall.
NTP - This is the heading for the NTP options	
Mode	Four NTP operating modes are available: **Disabled** No NTP synchronization will be performed. **Automatic Sync** At a pseudo-random time within the minute around 03:33 (local time), an NTP sync will be performed. **Sync On Startup** An NTP sync will be performed when the unit is powered on or restarted. **Sync On Startup & Automatic** An NTP sync will be performed when the unit is powered on or restarted and at a pseudo-random time within the minute around 03:33 (local time). Whenever an NTP sync is performed, if the time difference is less than 15 minutes and greater than 0.5 seconds, the machine time will be adjusted accordingly (with the Time Offset applied). Otherwise no action takes place. **NOTE:** Time changes are logged in the System Event Log.
Server IP Address	Specifies the IP address of the NTP Server to use. The IP address must be entered in IPv4 human readable quad-dotted format. There are large numbers of time servers, from government bodies and larger companies. A number of oil companies have their own time server. The NIST time server list can be found at http://tf.nist.gov/tf-cgi/servers.cgi For example: NIST, Boulder is 132.163.96.1 Google also has a series of time servers at 216.239.35.0, 216.239.35.4, 216.239.35.8 and 216.239.35.12
Last Sync	This field records the time & date of the last NTP synchronization, and the time offset between the computer and Network time.

NTP Manual Sync	Clicking the *Manual Sync* line will force the NTP server to request an immediate time update. The time will be applied directly.
	NOTE: No checking is provided on a manual sync, so it is the operator's responsibility to sanity check the result. We advise clicking the *Manual Sync* a second time, checking that the Last Sync message shows a very small correction, and check that the *Date* and *Time* information looks correct.

This completes the ▶ **Time / Date settings**.

For the next phase, click RTU Setup on the breadcrumb bar to go back (or the browser back button) and select ▶ **Network**.

5.2 Network

The NÅNO has two 10/100 MHz Ethernet ports. These ports are connected to two independent network controllers. These can be connected to entirely separate networks (for highest reliability systems) or the same physical network. However, in either case, each controller must be configured so that they are on entirely separate subnets.

The Network page shows the current network settings for both network ports.

The settings can be changed only by administrator users. The operation of this page is slightly different to other pages, in that each line is NOT actioned as it changed. The user pre-loads a consistent set of information (IP address, Netmask & Gateway) and all the information gets applied together, when the *Apply* line is clicked.

If you wish to cancel a setting before the *Apply* is clicked, simply change page by clicking on the breadcrumb bar.

Pre-loaded but not yet applied information is shown in RED text.

In addition to being able set up the Ethernet interfaces, this page has information on the connections made to the machine and allows a System Administrator to close links if required.

NOTE: When configuring the Ethernet IP addresses, the following MUST be carefully noted:

The IP address for each port must NOT be in the same subnet. Due to the fundamental design of the routing mechanism, Ethernet cannot work reliably if two separate controllers share the same subnet.

IP Method (Port 1)	Static	⚙
IP Address (Port 1)	192.168.1.130	⚙
Netmask (Port 1)	255.0.0.0	⚙
Gateway (Port 1)	192.168.1.254	⚙
IP Method (Port 2)	Static	⚙
IP Address (Port 2)	10.250.250.250	⚙
Netmask (Port 2)	255.255.255.0	⚙
	Apply	

SSL Certificate (Generated : 04/06/2022 07:12:43)

| | Generate Certificate | |

Connection Info

| XML Link | 192.168.1.130:592 <-> 192.168.1.75:50343 | ⚙ |

IP Method (Port 1)	This line indicates that either a Static (manually configured) address or a DHCP (automatic) address setting method has been selected for Ethernet Port 1 (ETH1). Clicking on the line containing the gear icon allows the administrator to select between the two options. **NOTE:** If DHCP is chosen as the IP Method, the current in-use IP address, Netmask and Gateway values are shown but grayed out as they are for information only.
IP Address (Port 1)	If DHCP has been selected, then this field will show, in gray text, the IP address that has been allocated to the unit by the DHCP server. If Static IP method has been selected then the line will contain the gear icon and, if the line clicked, the Edit Value dialog box will be opened so the manual IP address to be entered. The IP address must be entered in commonly used IPv4 quad-dotted decimal representation, as shown by the example screen on the previous page.
Netmask (Port 1)	If DHCP has been selected, then this field will show, in gray text, the Netmask that has been allocated to the unit by the DHCP server. If Static IP method has been selected then the line will contain the gear icon and can be changed by clicking the line and the Edit Value dialog box will be opened so the manual Netmask can be input. The Netmask must be entered in IPv4 quad-dotted decimal representation, like an IP address.
Gateway (Port 1)	If DHCP has been selected, then this field will show, in gray text, the gateway that has been allocated to the unit by the DHCP server. If Static IP method has been selected then the line will contain the gear icon and, if the icon is clicked, the Edit Value dialog box will be opened so the manual Gateway address can be set. The Gateway address must be entered in IPv4 quad-dotted decimal representation.
IP Method (Port 2)	Ethernet Port 2 (ETH2) does not allow DHCP to be used. This eliminates a potential problem where both ports are allocated addresses in the same subnet. The second port is always set to Static.
IP Address (Port 2)	Clicking this line allows the user to input the IP address for the second port.
Netmask (Port 2)	Clicking this line allows the user to input the Netmask for the second port.
Apply	Clicking Apply line will accept and action any of the changes highlighted in red on the Network page. Once the changes are accepted, the lines changed will revert to blue colored text.
SSL Certificate (Generated : xxxxxxxxx yyyyyyyy)	
Generate Certificate	Clicking on this link will force the NÅNO to generate a new Self Certified SSL Certificate. Once generated, the NÅNO will automatically add the generated time and date into its subheading above, where *xxxxxxxxx* is the system formatted date and *yyyyyyyy* is the system formatted time. The SSL Certificate is used by some communications links (for example an OPC-UA link).
Connection Info	

XML Link	In the previous screenshot the XML link information shows that 192.168.1.130 Port 592 (the NÅNO unit) is connected to a SCADA system with an IP address of 192.168.1.75 using port 50343. Up to 10 simultaneous XML links can be supported. Clicking on this line opens a "Close Connections?" dialog box. Selecting Confirm will close ALL the XML links.

The screen below shows an example Network setup screen that is modified. The items shown in red are changes and when the Apply line is clicked, Ethernet Port 1 will change to the settings currently highlighted in red.

At this point, the browser will no longer appear to function. The user will have to type the new address into the browser address bar, and login once again, to continue configuration.

This completes the ▸ **Network**. settings.

For the next phase, click RTU Setup on the breadcrumb bar to go back (or the browser back button) and select ▸ **User Info**.

5.3   User Info

The User Info page shows a list of currently configured users.

User details can be viewed by clicking on the relevant line containing the gear icon. Clicking on the admin line opens the Edit Value dialogue box, and you can change the name and password, but not the user level. Note that if you change the admin name to something else, you need to record the new name since you will need this name to log back into the machine.

The second line in the example above has the user details for a manually added 'met' user and the third line for a manually added 'tech' user. The fourth line in the example only shows if you are logged in at admin or metrology level and is called "Add new user ...". Clicking on the text opens the Add new user dialog box, as shown on the right.

The following details can be changed:-

Username	Sets the username. All usernames must be unique.
Level	Sets the access level of the user, as follows: **Metrology** TBC **Admin** Can change all parameters except those designated as Technician only. One user at Admin level is mandatory. **Technician** Not used in this application. **Operator** Not used in this application. **Management** Not used in this application. **Anyone** TBC
Password	To change the password, enter the new password into both password boxes.

Administrator users can edit any user's details or delete a user by selecting the line and clicking the red Delete button.

Non-administrator users can only edit their own username or password.

Adding a new user or clicking on an existing user opens the Edit user dialog box.

NOTE: At least one user MUST be set at Admin level and it is not possible to delete the last remaining Administrator account.

We recommend user names use the following characters only:

- Upper and Lower case letters (A..Z) and (a..z)
- Numbers (0..9)
- Hyphen (-)
- Full-stop (.)
- Space

NOTE: As stated previously, there is no back-door to the security. If you lose the Administrator password, it cannot be recovered and the only course of action is reset to factory default, which will clear all reports and data.

This completes the ▸ **User Info**. settings.

For the next phase, click RTU Setup on the breadcrumb bar to go back (or the browser back button) and select ▸ **Comms**.

5.4 Communications Setup

The Comms menu is used to configure the printers and the mapping of the various reports to the printers available, setting the serial port for the Local Panel, as well as the communications to SCADA and Enterprise systems. The menu is shown below.

Home ▸ System ▸ RTU Setup ▸ Comms

▸ Printer/SD Card

▸ Report Routing

▸ XML Comms

▸ Local Panel

▸ OPC-UA

5.4.1 Printers / SD Card

This application supports up to 3 physical printers, a virtual printer on the SD Card and remote "push" FTP printer. The FTP printer can push data in both Spreadsheet compatible TSV format in addition to text format, as a physical printer replacement.

TSV is Tab Separated Value format, which is identical to CSV, except it allows commas to be used in data.

One physical printer may be serial or networked (PostScript) and the other two physical printers may be network addressed PostScript printers. The screenshot overleaf shows a configured machine.

In the example, Printer 1 has the default name and Printers 2 & 3 have been renamed. Printer 2 has been named Management Office and Printer 3 named Oklahoma Accounts Dept.

Printer 1 has been configured to be a serial printer, using COM1 (the RS232 port) with 9600 baud. Printers 2 and 3 are configured as Networked printers. The relevant IP address has been added and the default TCP port of 9100 used.

The Printer / SD Card configuration page is a long page, so the screenshot of this menu has been split over two pages.

Print spool	Empty

Printer 1

Name	Printer 1
Type	Serial (Codepage 437)
Serial Port	RS232 (COM1) - No handshaking
Baud Rate	9600

Printer 2

Name	MGMT Office
Type	Network (Postscript)
Network Address	10.0.0.107
Network Port	9100
Zoom (%)	100
	Print Test Page

Printer 3

Name	OK City Accounts
Type	Network (Postscript)
Network Address	10.0.0.11
Network Port	9100
Zoom (%)	100
	Print Test Page

SD Card

and continued from page above:

SD Card		
Status	Installed (free 1.41 GiB, total 1.87 GiB)	⚙
Archive Alarms/Events	Weekly	⚙
Archive Historicals	Daily	⚙
FTP		
Server IP Address	66.220.9.50	⚙
Port	21	⚙
Username	mpfj	⚙
Password	********	⚙
Upload Directory	/mob/LP-Oil	⚙
Upload Format	Plain Text	⚙
	Send Test File	⚙

Print spool	This will show Empty if files generated have all been printed but will show the number of files in the printer spool, if the generated file(s) have not been printed.
Printer 1	
Name	Clicking on the line opens the Edit dialog box, and default printer name can be changed.
Type	Printer 1 can be disabled by selecting None, or set as a Serial or Networked (PostScript) printer. In this example, Serial has been selected. Baud rate is only shown for Serial printing.
Serial Port	The Serial printer can be connected to Serial Port 1 or 3.
Baud Rate	This settings allows you to specify the baud rate for the Serial Port. The list of valid values is set by the application.
Printer 2	
Name	Clicking on the line opens the Edit dialog box, and default printer name can be changed.
Type	This printer has been configured as Network (Postscript) printer so the Network information and Zoom (%) options are displayed.
Network Address	The IP address must be entered in IPv4 human readable quad-dotted format, as shown in the screenshot above.
Network Port	This is the TCP port number and depends upon the printer used. Port 9100 is the TCP port number reserved for Page Description Language Data Streams and is the most common.
Zoom (%)	Many postscript printers render data slightly differently so, to accommodate this possible variation, a percentage scaling factor can be applied. This is defaulted to 100% but a different scaling factor can be applied if the test print does not fill the paper correctly.
Print Test Page	Clicking this line with the Apply/Accept Icon forces an immediate test page to be printed. The test print is 64 lines by 80 characters, and is made up of a grid of asterisk (*) characters, with line number and column numbers. The zoom factor can be used to adjust for the printer page size.
Printer 3	
	This section is setup as Printer 2 above.

The SD Card is a versatile extension to the on-board non-volatile memory, and can be used as a virtual printer, see Home ▸ System ▸ RTU Setup ▸ Comms ▸ Report/Printer Routing as well as being able to extend the Archive & Events and the Data Logging almost indefinitely.

SD Card	
Status	This will state No Card Inserted, if no SD Card is present or has been dismounted.
	When the NÅNO is turned off, SD Cards may be inserted or removed at any time.
	When power is applied, the NÅNO will automatically mount a card if available. When installed, the status line will show the free space and the total card size in GiB (GibiBytes) or MiB (MibiBytes).
	If a card needs to be removed from a running system, the status line should be clicked, the SD Card Install or Remove dialog box will then be presented. Ensure the Remove option is selected and press Apply. Once the Status has changed, you can take out the SD Card.
	To fit a card to a running machine, put the card into the card slot beneath the Ethernet ports, click the SD Card Status line, select Install and click Apply. The status line will now show the SD Card information.
Archive Alarms/Events	In addition to being able to use the SD Card as a 4th virtual printer, the Alarms and Events can also be "archived" to the SD Card at regular intervals. In essence, this means that all Alarms & Events over the lifetime of the machine could be stored within the NÅNO. The archive can be turned-off by selecting the Disabled option, or the time period between archives can be selected from Daily, Weekly or Monthly, depending upon how often information is generated. The file generated is a ZIP archive file containing six .TSV files containing the Alarm Log, Application Event Log, Metrology Event Log, Operator Event Log, Security Event log and the System Event log.
Archive Historicals	The Historical Data Logger collects data which can be viewed graphically in a browser by navigating to Home ▸ Logs & Info ▸ Trending, and selecting which data to view. The data from each data logging zone can be viewed or downloaded as a .TSV for viewing in a spreadsheet, but the archive module will generate the TSV for each logging zone and will ZIP these files and place them onto the SD Card. The time period between archives can be selected from Daily, Weekly or Monthly, depending upon how often information is generated.
FTP	
Server IP Address	The IP address of the remote FTP server must be entered in IPv4 human readable quad-dotted format, as shown in the screenshot above.
Port	This is the TCP port number, and depends upon the FTP server settings. Port 21 is the usual TCP port number reserved for the File Transfer Protocol (FTP).
Username	The username and password will be allocated by the FTP server administrator.
Password	See above.
Upload Directory	The upload directory can be a fixed path, for example /Site1123/Unit-AB12, and when a report is generated it is placed within this fixed directory path, using a "report name" + "datestamp" filename format so in the FTP server it appears as: `Hourly Report-05052017092716.tsv` Alternatively a very flexible, dynamic path method is available using a %TAG format. This method is exceedingly powerful but may require factory support to implement. If you need additional options, ask your distributor for MiniSpec18.

Upload Format	Clicking this line gives the choice of one of two options selected with a radio button. The two options are:
	Plain Text If this Option is selected all reports are transferred to the FTP server as text formatted documents.
	TSV If this Option is selected all reports are transferred to the FTP server as Tab Separated Values. There is a version of the BOL specially formatted for use as a TSV.
Send Test File	Clicking this line causes a test file to be transferred to the designated FTP server. A pop-up window shows the low level transaction information for debug purposes.

This completes the ▸ **Printer / SD Card**. settings.

For the next phase, click RTU Setup on the breadcrumb bar to go back (or the browser back button) and select ▸ **Report Routing**.

5.4.2   Report & Printer Routing

The Gas Differential Pressure application is configured to have reports. Each report can be sent to any or all of the printers as required.
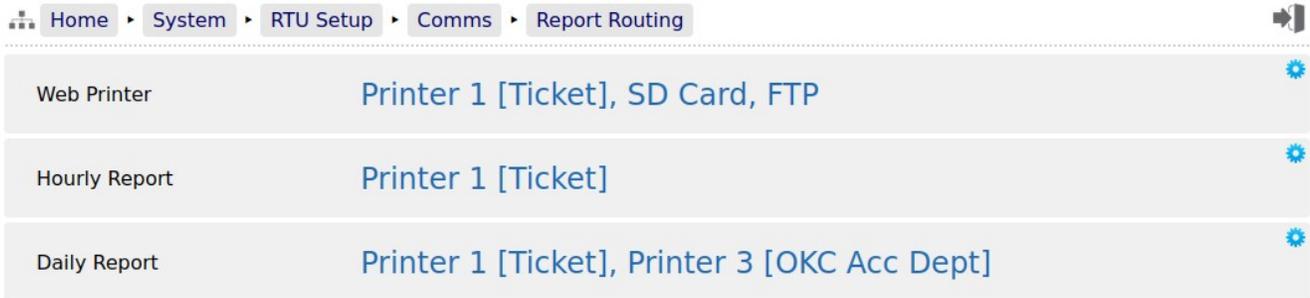
Clicking each line opens up the relevant selection dialog. For example:
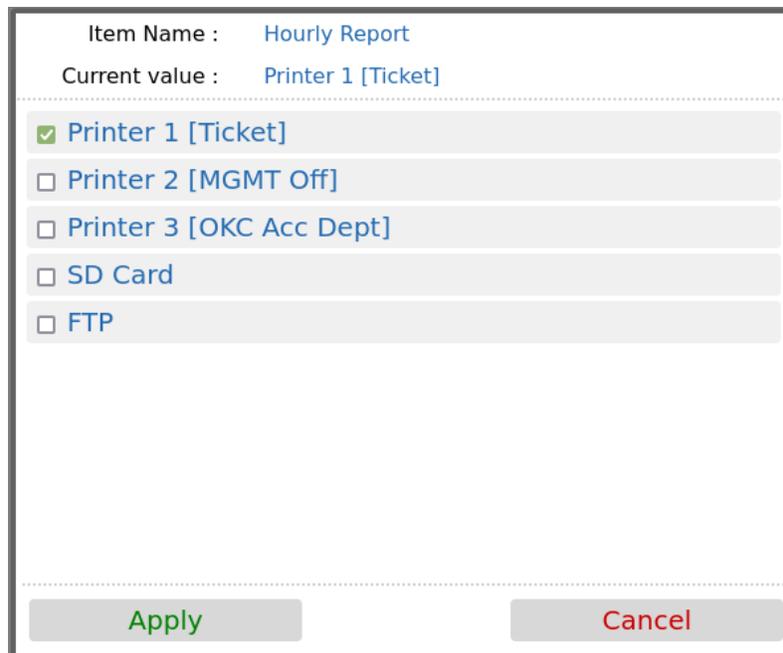
Clicking on the check boxes causes the report when generated to be directed to the selected printer. Reports can be directed to any or all printers. If no printers are selected, the report will not be printed but will still be generated and stored in the reports archive.

5.4.2.1 Reports Archive

The reports are stored in high reliability and predicable NOR Flash using a robust, check-summed linear file system. The use of NAND type flash (as used in USB memory sticks) is not suitable for industrial applications when a guaranteed lifetime and number of write cycles is needed.

The report archive area consists of 16 zones. The first six zones can store a minimum of 1500 reports and the other 10 zones can store a minimum of 250 reports.

5.4.2.2 SD Card Storage

The removable SD Card is a useful resource allowing virtually unlimited storage of the historical trending information and, since it is removable, the information can be quickly retrieved by a PC or Laptop. Below is a screenshot showing the structure and one day's content.
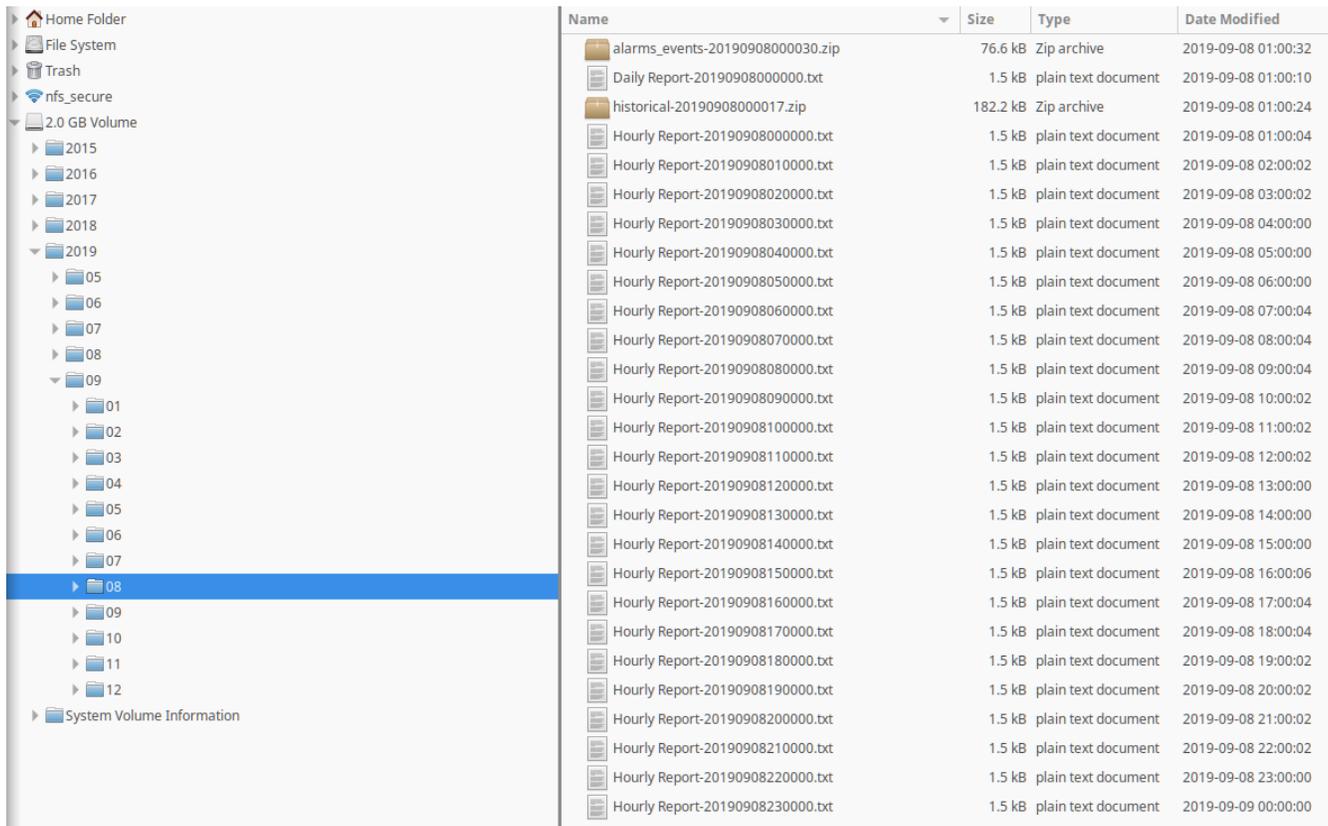
Unlike the Internal Storage/Archive, SD Cards utilize NAND flash and the number of writes is not predicable, nor is any warning given of failure. Therefore, for the best results, we recommend SD Cards are replaced every three years.

This completes the ▸ **Report Routing**. settings.

For the next phase, click RTU Setup on the breadcrumb bar to go back (or the browser back button) and select ▸ **XML Comms**.

5.4.3 XML Comms

All data within the NÅNO can be accessed using the XML communications method.

The NÅNO can be polled periodically for new information but, to save bandwidth and data usages charges, there is also an XML push notification. The push notification informs that an alarm has changed state or a report generated, the machine could then be polled to retrieve the required information. This allows remote systems to be informed of new reports or alarms without having to constantly poll the unit.

The full potential of the XML communications can be found in the accompanying NÅNO XML Comms Manual, available from your distributor. In addition, there is a Windows based demonstration program available for test purposes.

The following details can be changed:-

XML TCP Pull Port #	In XML TCP Pull mode, the NÅNO acts as a slave device and waits for a remote server to initiate the XML requests. The TCP port number can be set to any number between 0 and 65535 but care must be taken in choosing the port number. We recommend the port number is set as 592, unless there is a good reason for changing it.
XML Push Method	This is where the NÅNO acts as a master device and, upon some internal trigger (new report or a change to Alarm status), sends a "status" packet to a remote server. Two "push" connection modes are possible: **Raw** the target sends the status packet as raw XML data to the server. **HTTP** the target uses an HTTP POST request to send the status packet to `http://<server>/notify.`
XML TCP Push IP Address	This is the IP address of the remote server which will receive the push notifications from the NÅNO.
XML TCP Push Port #	This is the TCP port number of the remote server which will receive the push notifications from the NÅNO. Setting the port number to zero will disable the Push notification.

This completes the ▸ **XML Comms**. settings.

For the next phase, click RTU Setup on the breadcrumb bar to go back (or the browser back button) and select ▸ **Local Panel**.

5.4.4 Local Panel

The NÅNO can be used "headless" using a web browser for configuration and operation. Alternatively a Local Panel display can be used when a dedicated display is required.

The optional Local Panel display can be connected to one of the full-duplex serial ports (COM1, or COM3). COM2 is unsuitable for the Local Panel because it is half duplex RS485 only.
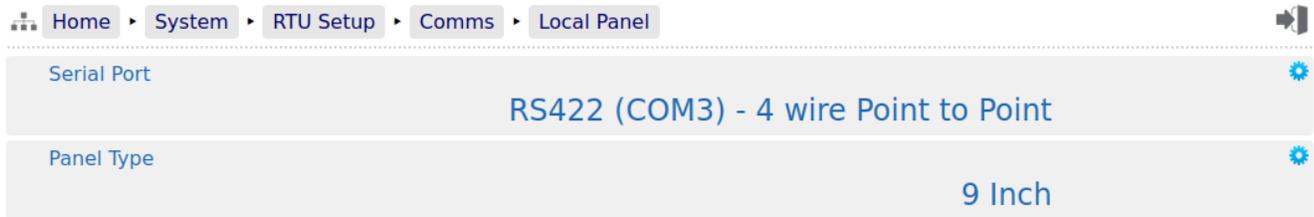
Serial Port	See screenshot and description below.
Panel Type	This allows the NÅNO to interface to either a 7 inch (ComFile) or 9 inch (iCOP) panel: **7 Inch** This option is not supported on this application. **9 Inch** This option is the only valid setting for this application.
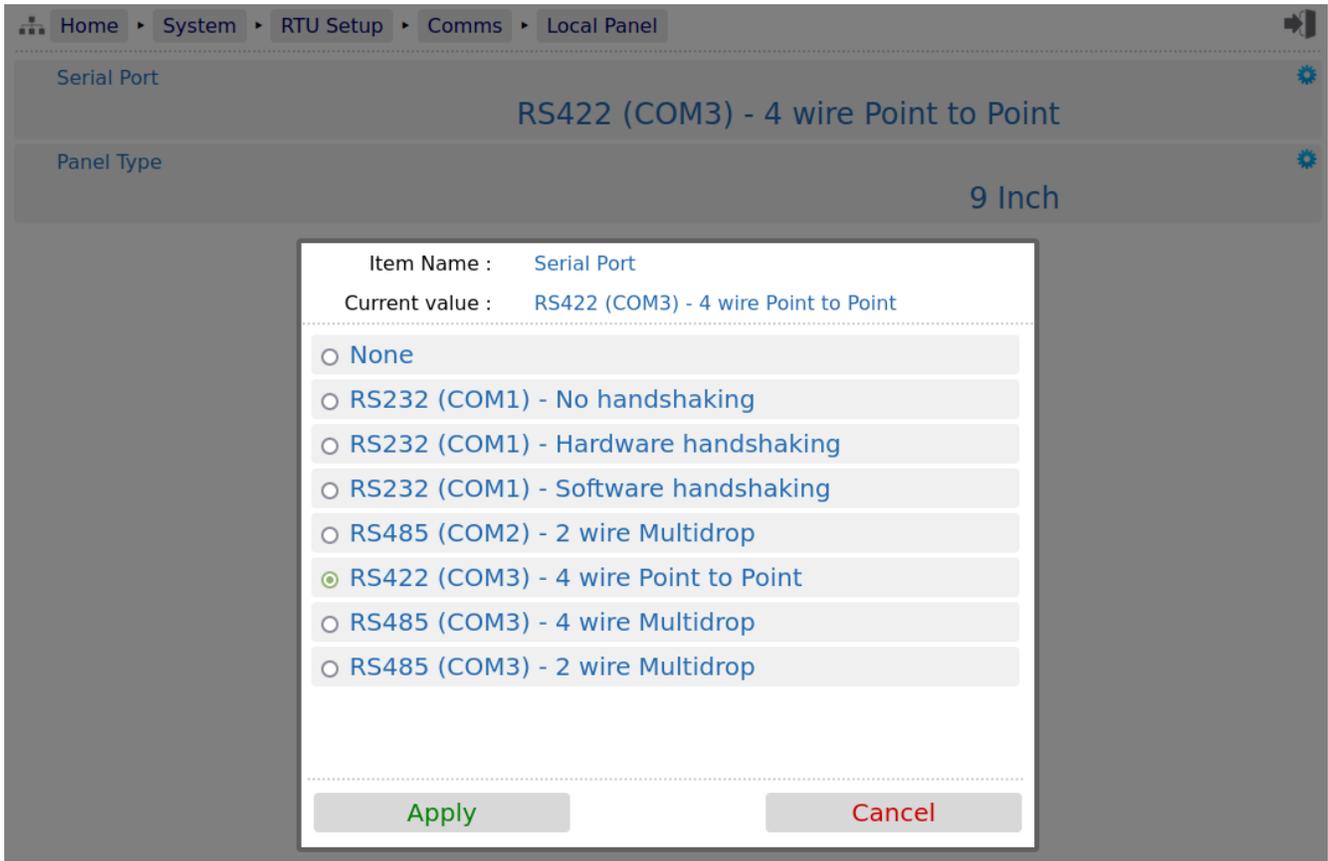
The radio button only allows the selection of one port at a time or None (if no Local Panel is required). If the radio button is grayed out, this indicates that the serial port has already been allocated to another service, such as a serial printer.

This completes the ▶ **Local Panel** settings.

For the next phase, click RTU Setup on the breadcrumb bar to go back (or the browser back button) and select ▶ **OPC-UA**.

5.4.5 OPC-UA

OPC-UA communications is the preferred method of retrieving data from the NÅNO.

Relevant Datapoints, Reports and Alarms within the NÅNO can be accessed using the OPC-UA communications method.

The following details can be changed:-

OPC-UA Port	The port number is normally set to 4840 however is changeable if required by the client.
ControlWeb Compatibility Mode	Although the OPC-UA interface is defined, we have found that some implementations differ from the standard. Due to differences found with the ControlWeb PC Application, we added this compatibility mode switch to allow ControlWeb to interface and interact with the NÅNO correctly.

This completes the ▸ **OPC-UA** settings.

For the next phase, click System on the breadcrumb bar to go back (or the browser back button) and select ▸ **Measurement Units**.

6   Stage 3 of 5: Configuring the Measurement Units

The units available in the Gas Differential Pressure Application are highly configurable. The screenshot below shows the unit selection screen:

Home ▸ System ▸ Measurement Units	
Length Unit	in
Temperature Unit	°F
Differential Pressure Unit	in H20 at 60F
Density Unit	lbs/ft³
Measured Pressure Unit	psig
Mass Unit	lbs
Standard Volume Unit	CF (ft³)
Gross Volume Unit	CF (ft³)
Energy Unit	MMBTU
Flow Rate Time Unit	h
Mass/Volume Heating Value?	Volume
Volume Heating Value Unit	BTU/ft³

Length Unit	This is a radio button with four options: Inches (in) Feet (ft) Meters (m) millimeters (mm)
Temperature Unit	Select degrees Celsius (°C) or degrees Fahrenheit (°F).
Differential Pressure Unit	Choose from: mbar KPa psia in H2O at 60F Pa
Density Unit	There are two choices of Density Unit. The selected unit is used throughout the Application: in reports, on displays and as an input parameter. The choices are: kg/m3 or lbs/ft3.
Measured Pressure Unit	There are six options: psia, psig, KPaa, KPag, bara or barg on radio buttons. Select the appropriate one.
Mass Unit	Valid options are: kg tonnes short tons lbs
Standard Volume Unit	Valid options are: Sm3 kSm3 CF (ft3) MCF (ft3 x 1000)
Gross Volume Unit	Valid options are: m3 km3 CF (ft3) MCF (ft3 x 1000)
Energy Unit	Valid options are: MJ GJ TJ BTU MBTU MMBTU
Flow Rate Time Unit	This can be set to Seconds (s), Minutes (min), Hours (h) or Days (d).
Mass/Volume Heating Value?	This allows the Heating Value to be entered and/or displayed in **Volume** or **Mass** units.

Volume Heating Value Unit	Valid options are: MJ/m3 BTU/ft3
Mass Heating Value Unit	Valid options are: MJ/kg BTU/lb

This completes the ▸ **Measurement Units**. settings.

For the next phase, click System on the breadcrumb bar to go back (or the browser back button) and select ▸ **I/O**.

7.1 I/O
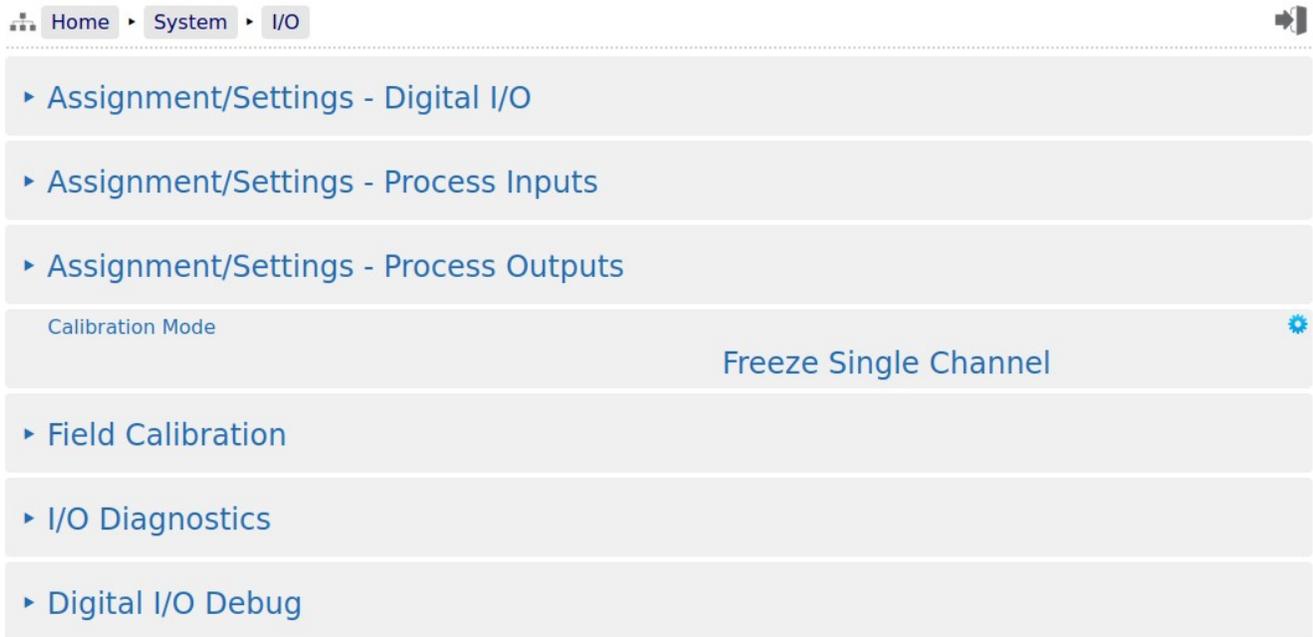
There are six sub-menus and one setting accessible from this screen. They are used to configure the various types of field I/O provided by the NÅNO.

7.1.1 Assignments/Settings – Digital I/O

No digital signals are required for the Gas Differential Pressure application therefore no entries are provided on this display.

7.1.2   Assignments/Settings – Process Inputs

DP Cell 1 Source	Analog Input 1 ⚙
DP Cell 1 Input Type	4-20mA ⚙
DP Cell 2 Source	Analog Input 2 ⚙
DP Cell 2 Input Type	4-20mA ⚙
DP Cell 3 Source	Disabled
DP Cell 3 Input Type	4-20mA
Line Pressure Source	Analog Input 4 ⚙
Line Pressure Input Type	4-20mA ⚙
Line Temperature Source	Analog Input 6 / RTD 1 ⚙
Line Temperature Input Type	RTD ⚙

NOTE: The application does not check for exclusive assignment of any I/O points. It is recommended to record any changes to the I/O using the I/O schedule drawings available in Section 13 I/O Schedules.

DP Cell 1 Source	The DP Cell inputs are configured here however they differ from the regular analog input handling. This will be seen later in the setup as control over how and when they are used is performed by a specific algorithm in the application. In this example, the unit is configured assuming that DP Cell 1 is being measured using a 4-20mA transmitter connected to Analog Input 1. Clicking this line allows the user to assign different Analog Inputs or to Disable DP Cell 1. Although this is possible, DP Cell 1 should always be assigned to an analog input.
DP Cell 1 Input Type	Once the appropriate DP Cell 1 Source has been chosen then the type of input needs to be selected. A 4-20mA transmitter or 1-5 Volt device can be used directly with any of the Analog Inputs. **NOTE:** Hardware jumper settings need to be configured to match this selection.
DP Cell 2 Source	As with the DP Cell 1 Source setting, the DP Cell inputs are configured here however they differ from the regular analog input handling. This will be seen later in the setup as control over how and when they are used is performed by a specific algorithm in the application. In this example, the unit is configured assuming that DP Cell 2 is being measured using a 4-20mA transmitter connected to Analog Input 2. Clicking this line allows the user to assign different Analog Inputs or to Disable DP Cell 2. Depending on the DP Configuration Type (set later), DP Cell 2 can be disabled or assigned to an analog input.
DP Cell 2 Input Type	Once the appropriate DP Cell 2 Source has been chosen then the type of input needs to be selected. A 4-20mA transmitter or 1-5 Volt device can be used directly with any of the Analog Inputs. **NOTE:** Hardware jumper settings need to be configured to match this selection.
DP Cell 3 Source	At present, this setting is provided for information purposes only and is not changeable. This will be extended to allow three cells to be configured and used in future however this option is not available at present.
DP Cell 3 Input Type	As DP Cell 3 Source can not be selected, this option is not relevant currently.
Line Pressure Source	The Gas Differential Pressure application can use either a live Pressure Source, with an optional default (fail-over) value in the case of a transmitter failure or a user entered Override value. The default has a live line pressure and Analog Input 4 is assigned to measure this input. Clicking this line allows the user to assign different Analog Inputs or to Disable the Line Pressure Source, if an override value is being used.

Line Pressure Input Type	Once the appropriate Line Pressure Source has been chosen then the type of input needs to be selected. A 4-20mA transmitter or 1-5 Volt device can be used directly with any of the Analog Inputs. **NOTE:** Hardware jumper settings need to be configured to match this selection.
Line Temperature Source	The Gas Differential Pressure application can use either a live Temperature Source, with an optional default (fail-over) value in the case of a transmitter failure or a user entered Override value. The default has a live line temperature and Analog Input 6 / RTD 1 is assigned to measure this input. Clicking this line allows the user to assign different Analog Inputs or to Disable the Line Temperature Source, if an alternative method is being used.
Line Temperature Input Type	Once the appropriate Line Temperature Source has been chosen then the Type of Temperature needs to be selected. A 4-20mA transmitter or 1-5 Volt device can be used directly with any of the Analog Inputs. Alternatively a 4-wire RTD to be directly connected to either Analog Input 5 or Analog Input 6, but this is not supported by Analog Input channels 1 through 4. If a Line Temperature Source has been selected as 4-20mA then the Line Temperature parameters will also need to be set. See Section 8.1.5 Line Temperature. If the Line Temperature Source is disabled, then the Line Temperature menu will only allow an override value to be entered. **NOTE:** Hardware jumper settings need to be configured to match this selection. **NOTE:** RTD mode can only operate with Analog Input 5 or 6.

7.1.3   Assignments/Settings – Process Outputs

⊞ Home ▸ System ▸ I/O ▸ Assignment/Settings - Process Outputs		➡
Analog Out 01 - Selection		⚙
	Mass Flow Rate	
Analog Out 02 - Selection		⚙
	Standard Density	
Analog Out 01 - Low Scale		⚙
	0	
Analog Out 01 - High Scale		⚙
	100	
Analog Out 02 - Low Scale		⚙
	0	
Analog Out 02 - High Scale		⚙
	100	

NOTE: It is recommended to record any changes to the I/O using the I/O schedule drawings available in Section 13 I/O Schedules.

Analog Out 01 - Selection	Valid options are: GV Flow Rate SV Flow Rate Mass Flow Rate Energy Flow Rate RD Standard Density Line Density CV Pressure Temperature
Analog Out 02 - Selection	Valid options are: GV Flow Rate SV Flow Rate Mass Flow Rate Energy Flow Rate RD Standard Density Line Density CV Pressure Temperature
Analog Out 01 – Low Scale	This is the engineering units value for Analog Out 01 that will represent 4mA.

Analog Out 01 – High Scale	This is the engineering units value for Analog Out 01 that will represent 20mA. Using this and the Low Scale value allows the NÅNO to proportionally scale the output between the two values.
Analog Out 02 – Low Scale	This is the engineering units value for Analog Out 02 that will represent 4mA.
Analog Out 02 – High Scale	This is the engineering units value for Analog Out 02 that will represent 20mA. Using this and the Low Scale value allows the NÅNO to proportionally scale the output between the two values.

7.1.4   Calibration Mode

This option defines how the Analog Inputs work when in field calibration mode. This mode is described below in Section 7.1.5 Field Calibration.

The two options available are to either **Freeze Single Channel** or **Freeze All Channels**.

NOTE: Freezing means that the values passed into the application from the hardware will be held at their last value once Field Calibration is started. The live values will then resume once the Field Calibration is ended on a particular channel. The freezing of channels is only active while the Field Calibration is being performed.

7.1.5　Field Calibration

The NÅNO has very stable, high resolution Analog Input and RTD measurement circuitry which is factory calibrated to a high standard. This will give excellent measurement results without additional user input.

However real-world issues, such as transmitter error, or physical problems, such as a sub-standard design of thermowell, or incorrect placement of a transmitter can lead to the measured value being different to the reality. There are two ways to solve this problem.

The simplest is to apply a one-point bias, or offset adjustment, and this is easily achieved in Technician Mode using the Local Panel. A bias adjustment however may only be reasonable when the operating point does not change too much. If, for example, the bias function is used to adjust a temperature reading, this Bias Adjustment should be checked between Summer and Winter as a minimum.

In addition to the bias or offset for a Process Variable, the Application features a site calibration mode to enable loop calibration of each Analog Input.

This can eliminate certain transmitter errors, such as offset errors and span/gain errors. Loop calibration cannot eliminate problems of non-linearity, although good operating practice can indicate these type of transmitter problems.

The process for calibrating an Analog input is straightforward but remember the user MUST be logged in at Technician Level.

Example:

In this example the pressure input, configured to use Analog Input 1, is to be loop calibrated.

Before the Calibration process can commence, the operator must know the range the transmitter will operate over and the scaling values.

To start the calibration process, navigate to Home ▸ System ▸ I/O ▸ Field Calibration as shown below. This page shows all 6 Analog Inputs. In this example, we are calibrating the loop for 0 to 250 PSI.

You can see that **Analog Input 2** through to **Analog Input 6** show (Default) at the beginning of the line. This shows that these inputs are using the factory calibration values. **Analog Input 1** however does not show (Default) hence Analog Input 1 is running with replacement values.

Step 1

The replacement values must be cleared and set back to default. Click the line associated with the relevant input which will open the Enter Low Scale dialog box. Then click the button named Default. You will be asked to Reset Scale to Default and click the Confirm button.
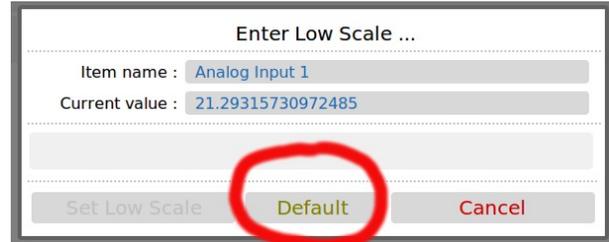
You will be taken back to the previous screen but now *Analog Input 1* will show (Default) in front of the live reading and you are ready to proceed.

Step 2

Once again click the line associated with the input. This will open the Enter Low Scale dialog box again.

Vent the pressure as seen by the Pressure Transmitter to atmosphere and the reading shown as the "current value" in the Enter Low Scale dialog box should be around 4mA. If it is drastically different, the cause should be investigated. Once the pressure has normalized to atmospheric, type 4 into the data entry box and click the Set Low Scale Button.
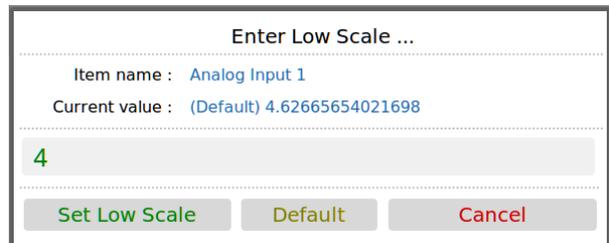
This has pre-loaded 4.0mA into the low scale field. It is not yet being used and will not become active unless confirmed at the end of the process.

The dialog box now prompts you to enter the High Scale value.

Step 3

Now load the dead weight tester until pressure is at the full scale value of 250 PSI in this example.

The live reading should be display numbers around 20mA. Now type 20 into the Enter High Scale dialog box and click the Set High Scale button to set the value.
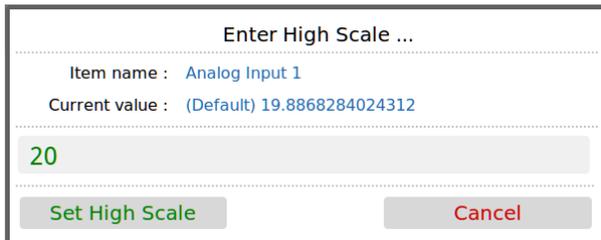
Step 4

The dialog box now changes to "confirm scaling" as shown. The confirm scaling dialog box shows both the low scale and high scale before and after values. If these values appear to be reasonable then pressing the confirm button will accept the field calibration replacement values.

If, subsequently, a problem is found with the field calibration replacement values, the default values can be restored by clicking the relevant line and selecting the *Default* button (as per Step 1 above).

NOTE: Calibration replacement values are stored in the Metrology Event Log. The replacement values are also stored in non volatile memory and retained following a power cycle, update of the Application and update of the firmware.

7.1.6 I/O Diagnostics

```
I/O Diagnostics
ANALOG INPUTS
                  Source          Raw          Low Scale   High Scale    Mode                      In Use
                                  Value                                                            Value
Meter Pressure    Analog Input 4  13.153 mA         0.00      200.00      Override                  100.00 psia
Meter Temperature Analog Input 6      0 mA           0.0         0.0      Override                   20.0 °F
Meter Temperature Analog Input 6  110.63 O                                Override                   20.0 °F
DP - Low/Single   Analog Input 1  13.123 mA       0.0000    100.0000      ---              57.0217779 in H20 at 60F
DP - High         Analog Input 2  12.866 mA       0.0000    200.0000      ---             110.832874 in H20 at 60F

ANALOG OUTPUTS
                                  Source      Value    Low Scale  High Scale    Current
Analog Output 1            Mass Flow Rate  47299.3334         0         100     7571.8 mA
Analog Output 2         Standard Density          50         0         100      12.00 mA

PERIOD INPUTS
Period Input 1               999.937 us
Period Input 2             19998.74 us

End of I/O Diagnostics Page
```

The data shown on this page is live and will be updated every heartbeat. However the web page only updates approximately every second, depending upon bandwidth and connection type.

On this page, two additional screen icons are shown:

The Download Icon indicates that the data on the screen can be downloaded to the PC currently viewing the NÅNO web page. After clicking on this icon, your browser may ask the user what action should be performed with this file. Normally these options are to Save or View the data.

The Print icon indicates that the data on the screen can be printed, via the web printer configured on via Home ▸ System ▸ RTU Setup ▸ Comms ▸ Report Routing.

NOTE: To print to the PC running the browser, use the browser's specific printing method or type Ctrl+P on most browsers on most operating systems.

7.1.7 Digital I/O Debug

Digital Inputs [1..9]	000011000
Digital Outputs [1..6]	110000

Digital Inputs [1..9]	This shows the current status of the Digital Inputs in a very compact manner. A "0" represents the OFF state and a "1" represents the ON state. The left most digit is Digital Input 1.
Digital Outputs [1..6]	There are two aspects to the Digital outputs, a display and an override.
	The display shows the current status of the Digital Outputs in a very compact manner. A "0" represents the OFF state and a "1" represents the ON state. The left most digit is Digital Output 1.
	If you click on the line, the following dialog box will be opened:
	Item name : Digital Outputs [1..6] Current value : 110000 Toggle Digout1 Toggle Digout2 Toggle Digout3 Toggle Digout4 Toggle Digout5 Toggle Digout6 Cancel
	CAUTION: Careless use of this feature may cause operational problems, such as inadvertently changing the state of a permissive output, and so this feature should be used with caution.
	<u>**Do NOT use or disclose Technician Level passwords without careful consideration**</u>
	The current state of the Digital Outputs are shown in the Current value field. In the example above Digout1 and Digout2 are "ON" and the rest are "OFF". If you click on the Toggle Digout for any of the output channels, the output state will be inverted each time you click and the Current value field will be updated.
	In the above example, clicking on Toggle Digout6 would result in Digout 6 changing from "OFF" to "ON", and the current value would then be 110001.
	Pressing Cancel will restore the previous values.

This completes the ▸ **I/O**. Settings.

For the next phase, click System on the breadcrumb bar to go back (or the browser back button) and select ▸ **Process Setup**.

In the this manual jump to Section 8 Stage 5 of 5: Process Setup.

8.1 Process Setup

Home ‣ System ‣ Process Setup

‣ Calculations

‣ Differential Pressure

‣ Gas Composition

‣ Line Temperature

‣ Line Pressure

‣ Line Density

‣ Base Density

‣ Heating Value

This section has eight sub-menus needed to configure the parameters needed to operate the application.

8.1.1 Calculations

The Calculations menu is split into three sub menus.

The third entry, **Temperature Location**, is only visible if the Metric Dataset has been transferred to the NÅNO

8.1.2 Calcs

This display is extremely flexible in it's layout as it is used to setup the Compressibility, Flow and Heating Value calculations. As such, this manual will not show the full screen but will show the sub sections relevant to each calculation option.

AGA 8 – Detailed
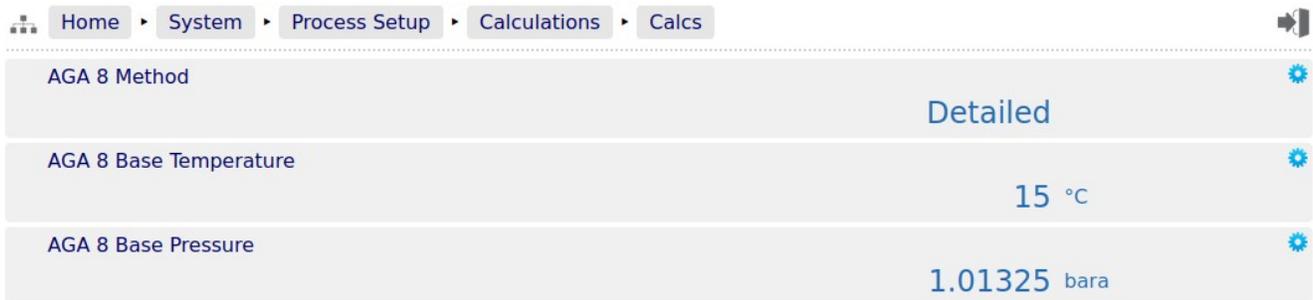
AGA 8 – Gross Method 1

AGA 8 Method	Gross Method 1	⚙
AGA 8 Base Temperature	15 °C	⚙
AGA 8 Base Pressure	1.01325 bara	⚙
Z Heating Value (kJ/dm3)	34.16 MJ/m³	⚙
Z Relative Density	0.599	⚙
Z CO2 Fraction	0.016	⚙

Home ▸ System ▸ Process Setup ▸ Calculations ▸ Calcs

AGA 8 – Gross Method 2

AGA 8 Method	Gross Method 2	⚙
AGA 8 Base Temperature	15 °C	⚙
AGA 8 Base Pressure	1.01325 bara	⚙
Z Relative Density	0.599	⚙
Z CO2 Fraction	0.016	⚙
Z N2 Fraction	0	⚙

Home ▸ System ▸ Process Setup ▸ Calculations ▸ Calcs

Heating Value – ISO 6976

Heating Value Calculation	
	ISO 6976
ISO 6976 Version	1995
ISO 6976 Combustion Temperature	15°C °C
ISO 6976 Metering Reference Temperature	15°C °C
ISO 6976 Metering Reference Pressure	1.01325 bara

Heating Value – GPA 2172

Heating Value Calculation	
	GPA 2172
GPA 2172 Calculation Units	Imperial
GPA 2172 Water Fraction	0
GPA 2172 Base Temperature	15 °C
GPA 2172 Base Pressure	1.01325 bara
GPA 2172 C6+ Switch	60/30/10%
GPA 2172 Saturated Gas	Off

Heating Value – AGA5 2009

Heating Value Calculation	
	AGA5 2009
AGA 5 Imperial/Metric Calculation Selection	Metric
AGA 5 Base Temperature	15 °C
AGA 5 Base Pressure	1.01325 bara

Flow Calculation – ISO 5167

Flow Calculation	⚙
	ISO 5167
ISO 5167 Version	⚙
	1991
Differential Pressure Tapping	⚙
	Flange Tapping
Isentropic Exponent	⚙
	1.3
Viscosity	⚙
	0.0171 cP

Flow Calculation – AGA 3

Flow Calculation	⚙
	AGA 3
AGA 3 Calculation Units	⚙
	US
AGA 3 Rounding	⚙
	Off
AGA 3 Pressure Location	⚙
	Upstream
Differential Pressure Tapping	⚙
	Flange Tapping
Isentropic Exponent	⚙
	1.3
Viscosity	⚙
	0.0171 cP

8.1.2.1   Pipe/Orifice Corrections

Pipe Diameter	4.02500000 in
Pipe Temperature Coefficient	6.2e-06
Pipe Calibration Temperature	68.000000 °F
Orifice Diameter	2.00000000 in
Orifice Temperature Coefficient	9.25e-06
Orifice Calibration Temperature	68.000000 °F

8.1.2.2   Temperature Location

Temperature Location	DOWNSTREAM
Line Temperature (Downstream)	20.0 °C
ISO 5167 Calculated Upstream Temperature	20.000000 °C

8.1.3   Differential Pressure

DP Configuration Type	Lo-Hi Switching ⚙
Differential Pressure In Use	57.0289 in H20 at 60F
Cell In Use	Lo Cell In Use
Cell 1 Low Scale	0.0000 in H20 at 60F ⚙
Cell 1 High Scale	100.0000 in H20 at 60F ⚙
Cell 2 Low Scale	0.0000 in H20 at 60F ⚙
Cell 2 High Scale	200.0000 in H20 at 60F ⚙
Switch Up Point	90 % ⚙
Switch Down Point	80 % ⚙
Switch Deadband Time	0 seconds ⚙
Low DP Cut-Off Value	0.0000 in H20 at 60F ⚙
Low DP Cut-Off Flag	Off
Differential Pressure in Override Mode	No ⚙

8.1.4 Gas Composition

8.1.4.1 Entry

Override Moles [N2]	1.2946 %
Override Moles [CO2]	0.2037 %
Override Moles [H2S]	0 %
Override Moles [H2O]	0.3 %
Override Moles [HELIUM]	0 %
Override Moles [METHANE]	93.6863 %
Override Moles [ETHANE]	3.3106 %
Override Moles [PROPANE]	0.7013 %
Override Moles [N_BUTANE]	0.246 %
Override Moles [I_BUTANE]	0 %
Override Moles [N_PENTANE]	0.1008 %
Override Moles [TOTAL]	100 %

Accept

8.1.4.2 In Use

Selected Moles [N2]	1.2946 %
Selected Moles [CO2]	0.2037 %
Selected Moles [H2S]	0 %
Selected Moles [H2O]	0.3 %
Selected Moles [HELIUM]	0 %
Selected Moles [METHANE]	93.6863 %
Selected Moles [ETHANE]	3.3106 %
Selected Moles [PROPANE]	0.7013 %
Selected Moles [N_BUTANE]	0.246 %
Selected Moles [I_BUTANE]	0 %
Selected Moles [N_PENTANE]	0.1008 %
Selected Moles [TOTAL]	100 %

8.1.5   Line Temperature

If the system has a measured Line Temperature configured and has been set to 4-20mA, the Line Temperature menu will be similar to that shown below.

Line Temperature In Use	This display point shows the temperature being used in the calculations & reports. This may be a live value, a manual override value or a (fail-over) default, depending upon the **Line Temperature In Use Mode**.
Line Temperature Low Alarm Limit	This point shows the currently configured Low Alarm limit. If the **Line Temperature In Use** goes below the configured value, the Low Temperature Alarm will be raised. Clicking the line opens the Edit Value dialog box, allowing the user to choose a different value. If an impossibly low default value is used, no Low Temperature Alarm will ever be raised.
Line Temperature High Alarm Limit	This point shows the currently configured High Alarm limit. If the **Line Temperature In Use** goes above the configured value, the High Temperature Alarm will be raised. Clicking the line opens the Edit Value dialog box, allowing the use to choose a different value. If an impossibly high default value is used, no High Temperature Alarm will ever be raised.

Line Temperature Override Value	This is the value used when the **Line Temperature Mode Setting** has been set to Always Override. If no transmitter has been assigned to the Line Temperature, this override value is always used.
Line Temperature Default Value	This is the value used when the **Line Temperature Mode Setting** has been set to Use Default on Failure, and the measured value is NOT between the low and high input fail points. These are 3.5mA to 20.5mA in Analog mode and 60Ω to 180Ω in RTD mode.
Line Temperature Averaged Value	This is the value used when the **Line Temperature Mode Setting** has been set to Use Averaged on Failure, and the measured value is NOT between the low and high input fail points. These are 3.5mA to 20.5mA in Analog mode and 60Ω to 180Ω in RTD mode.
Line Temperature Live Value	This point displays the live measured temperature value. This item is for information only and cannot be edited.
Line Temperature In Use Mode / Line Temperature Mode Setting	This point indicates the current operating mode. Clicking the line opens the dialog box allowing the user to set and choose the **Line Temperature Mode Setting** which has the following four modes to select: **Always Measured** Uses the calculated value from the measured input regardless of it being within acceptable limits or not. **Always Override** Uses the Override value at all times. **Use Default on Failure** Uses the calculated value from the measured input unless it is either lower or higher than the input fail points, in which case it would use the **Line Temperature Default Value.** **Use Averaged on Failure** Uses the calculated value from the measured input unless it is either lower or higher than the input fail points, in which case it would use the **Line Temperature Averaged Value.**
Line Temperature Automatically Recover After Failure	If Yes is selected, following a failure, once the measured value is between the low and high input fail points the measured value will be used instead of the fail-over default value. These are 3.5mA to 20.5mA in Analog mode and 60Ω to 180Ω in RTD mode. If No has been selected, an extra line is shown when a valid reading is available - it is not shown if no valid reading is available. Line Temperature Automatic Recover After Failure　　　　　　　No　⚙ Line Temperature Manually Recover After Failure　　　　　Recover At this point the fail-over default value will continue to be used until the user presses the Recover button. Once the Recover button has been pressed, it will disappear, the **Line Temperature Operating Status** will revert to **Measured** and the In Use value will also now be the live value.

Line Temperature Low Scale	This point indicates the temperature represented by 4mA. Clicking this line opens the dialog box allowing an alternative temperature to be input. **NOTE:** If the *Line Temperature Type* was set as RTD, the point will not appear since the RTD gives a direct temperature reading.
Line Temperature High Scale	This point indicates the temperature represented by 20mA. Clicking the line opens the dialog box allowing an alternative temperature to be input. **NOTE:** If the *Line Temperature Type* was set as RTD, the point will not appear since the RTD gives a direct temperature reading.

8.1.6 Line Pressure

If the system has a measured Line Pressure configured (see Section 7.1.2 Assignments/Settings – Process Inputs) the display points associated with the Line Pressure are shown on the previous page.

If no Line Pressure is configured a menu showing only the override value will be displayed.

Line Pressure In Use	This display point shows the pressure being used in the calculations & reports. This may be a live value, a manual override value or a (fail-over) default, depending upon the *Line Pressure In Use Mode*.
Line Pressure Low Alarm Limit	This point shows the currently configured Low Alarm limit. If the *Line Pressure In Use* goes below the configured value, the Low Pressure Alarm will be raised. Clicking the line opens the Edit Value dialog box, allowing the user to choose a different value. If an impossibly low default value is used, no Low Pressure Alarm will ever be raised.

Line Pressure High Alarm Limit	This point shows the currently configured High Alarm limit. If the *Line Pressure In Use* goes above the configured value, the High Pressure Alarm will be raised. Clicking the line opens the Edit Value dialog box, allowing the use to choose a different value. If an impossibly high default value is used, no High Pressure Alarm will ever be raised.
Line Pressure Override Value	This is the value used when the *Line Pressure Mode Setting* has been set to Always Override. If no transmitter has been assigned to the Line Pressure, this override value is always used.
Line Pressure Default Value	This is the value used when the *Line Pressure Mode Setting* has been set to Use Default on Failure, and the measured value is NOT between the low and high input fail points. These are 3.5mA to 20.5mA.
Line Pressure Averaged Value	This is the value used when the *Line Pressure Mode Setting* has been set to Use Averaged on Failure, and the measured value is NOT between the low and high input fail points. These are 3.5mA to 20.5mA.
Line Pressure Live Value	This point displays the live measured pressure value. This item is for information only and cannot be edited.
Line Pressure In Use Mode / Line Pressure Mode Setting	This point indicates the current operating mode. Clicking the line opens the dialog box allowing the user to set and choose the *Line Pressure Mode Setting* which has the following four modes to select: **Always Measured** Uses the calculated value from the measured input regardless of it being within acceptable limits or not. **Always Override** Uses the Override value at all times. **Use Default on Failure** Uses the calculated value from the measured input unless it is either lower or higher than the input fail points, in which case it would use the *Line Pressure Default Value*. **Use Averaged on Failure** Uses the calculated value from the measured input unless it is either lower or higher than the input fail points, in which case it would use the *Line Pressure Averaged Value*.

Line Pressure Automatically Recover After Failure	If Yes is selected, following a failure, once the measured value is between the low and high input fail points the measured value will be used instead of the fail-over default value. These are 3.5mA to 20.5mA.
	If No has been selected, an extra line is shown when a valid reading is available - it is not shown if no valid reading is available.
	At this point the fail-over default value will continue to be used until the user presses the Recover button. Once the Recover button has been pressed, it will disappear, the **Line Pressure Operating Status** will revert to **Measured** and the In Use value will also now be the live value.
Line Pressure Low Scale	This point indicates the pressure represented by 4mA. Clicking this line opens the dialog box allowing an alternative pressure to be input.
Line Pressure High Scale	This point indicates the pressure represented by 20mA. Clicking the line opens the dialog box allowing an alternative pressure to be input.
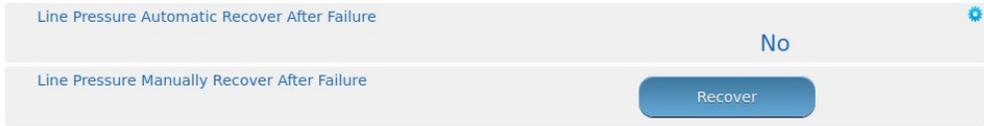
8.1.7 Line Density

Line Density In Use	
	50
Line Density Override Value	⚙
	50.0000000 lbs/ft³
Line Density AGA8 Live Value	
	0.342140647765893
Line Density In Use Mode	⚙
	Override

Line Density In Use	This display point shows the line density being used in the calculations & reports. This may be a live calculated value or a manual override value, depending upon the *Line Density In Use Mode*.
Line Density Override Value	This is the value used when the *Line Density In Use Mode* has been set to Override.
Line Density AGA8 Live Value	This is the live result of the AGA8 calculation. It is the value used when the *Line Density In Use Mode* has been set to CALCULATED.
Line Density In Use Mode	This point indicates the current operating mode. Clicking the line opens the dialog box allowing the user to choose which of the two modes to select: **Override** Uses the *Line Density Override Value* at all times. **CALCULATED** Uses the *Line Density AGA8 Live Value* at all times.

8.1.8 Base Density

Base Density In Use	This display point shows the base density being used in the calculations & reports. This may be a live calculated value or a manual override value, depending upon the *Base Density In Use Mode*.
Base Density Override Value	This is the value used when the *Base Density In Use Mode* has been set to Override.
Z Base Density	This is the live result of the AGA8 or SGERG calculation (whichever has been selected in Section 8.1.2 Calcs). It is the value used when the *Base Density In Use Mode* has been set to AGA 8 / SGERG.
ISO6976 Base Density	This is the live result of the ISO 6976 calculation. It is the value used when the *Base Density In Use Mode* has been set to ISO 6976.
Base Density In Use Mode	This point indicates the current operating mode. Clicking the line opens the dialog box allowing the user to choose which of the three modes to select: **Override** Uses the *Base Density Override Value* at all times. **AGA 8 / SGERG** Uses the *Z Base Density* at all times. **ISO 6976** Uses the *ISO 6976 Base Density* at all times.

8.1.9 Heating Value

Heating Value In Use	This display point shows the heating value being used in the calculations & reports. This may be a live calculated value or a manual override value, depending upon the ***Heating Value In Use Mode***.
Heating Value Override Value	This is the value used when the ***Heating Value In Use Mode*** has been set to Override.
Heating Value Live Value	This is the live result of the ISO 6976, GPA 2172 or AGA 5 calculation (whichever has been selected in Section 8.1.2 Calcs). It is the value used when the ***Heating Value In Use Mode*** has been set to Calculated. See the caveat in the ***Heating Value Mode Setting*** information below
Heating Value In Use Mode / Heating Value Mode Setting	This point indicates the current operating mode. Clicking the line opens the dialog box allowing the user to set and choose the ***Heating Value Mode Setting*** which has the following two modes to select: **Override** Uses the ***Heating Value Override Value*** at all times. **Calculated** Uses the ***Heating Value Live Value*** unless there is an error in the selected calculation. If this is the case, the mode will show Override and the override value will be used until the error is cleared. Choosing Calculated will show the In Use mode as ISO 6976, GPA2172, AGA5 or Override depending on which calculation has been selected in Section 8.1.2 Calcs and any error conditions).

This ends the setup of the Gas Differential Pressure application

NOTE1:   Now would be a good time to back up your changes. With the NÅNOConf tool, Application configurations can be uploaded to the PC for back-up purposes and for cloning more NÅNOs. Additionally, printing a constants log will generate a list of configured data points.

9 Totals Reset

The Totals Reset page allows the accumulators within the NÅNO to be reset from the web pages.

In its simplest implementation the **Totals Reset Method** is set to None. The totals can then be reset at will – as long as the user is logged in. See the example below:

With the **Totals Reset Method** set to either of the other two options (**NMI Jumper** or **Ident Button**) the totals can be reset but only when the relevant security interlock has been satisfied. The example below shows for the Ident Button interlock, however the NMI Jumper is similar.

Screenshot shows when the Ident Button is not pressed:
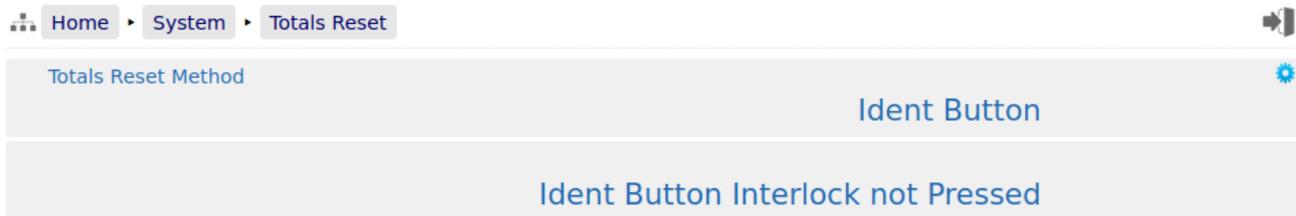
Screenshot shows when the Ident Button is currently pressed:

10   Reports

The screenshot below shows the reports available.

Hourly Report	This report is generated on the hour change.
Daily Report	This report is generated on the hour change at the end of day. The time for this is defined in Section 4.3 Time Based Settings. As an example if the day end is set to 18:00, the report will be generated at 6pm each day.
Last 30 Reports	This shows the last 30 of all types of report generated in time & date order. An example screenshot of the Last 30 Reports is shown below.
SD Card	The SD Card menu is a hierarchical viewer in date order. First select the year, then the month, and finally the day, and all files created on that day will be visible.

10.1   Last 30 Reports

An example of the last 30 Reports view is shown below.

By clicking on any of the reports listed, a preview of the report will be shown. When looking at any report preview page, the report can also be downloaded directly to the PC by clicking on the File Download icon. Download formats include Plain Text and PDF.

The preview below shows the first few lines of a Bill of Lading ticket for clarity and the arrow indicate the purpose of the additional icons on the breadcrumb navigation bar.

Home ▸ Reports ▸ Bill Of Lading ▸ 2016 ▸ February 2 ▸ Preview

```
BILL OF LADING
Original Print
Report Date/Time: 02/02/2016 08:00:59

Company Name:
Device ID:    LACT MicroCube
Meter ID:     ABC123
Comment:

Load Status:  Load Ended

TRUCK LOADING DATA
Batch Sequence:     00001
Truck Ticket:       00019
Transaction #:         19
Run Ticket:           111
Driver ID:     MM
Truck ID:      NNN
Lease
Location:

ACCUMULATORS
Opening Time/Date:      02/02/2016 08:00:49
Opening IV Accumulator:         290.00 bbls
Opening GOV Accumulator:        290.00 bbls
Opening GSV Accumulator:        290.12 bbls
Closing Time/Date:      02/02/2016 08:00:59
Closing IV Accumulator:         310.00 bbls
Closing GOV Accumulator:        310.00 bbls
Closing GSV Accumulator:        310.13 bbls
LOADED VALUES
IV:                              20.00 bbls
Meter Factor:                   1.0000
GOV:                             20.00 bbls
CCF:                            1.00038
GSV:                             20.01 bbls
```

DOWNLOAD ICON

PRINT ICON

LOGOUT ICON

If reports are downloaded to the PC as plain text files, the text attributes will be shown in the downloaded text, for example <b> for bold and <u> for underline.

Clicking the Print icon will cause the file to be printed to the whichever printer has been designated as the web printer during the setup phase.

Alternatively, the screen can be printed from the browser, using the usual method. Frequently Ctrl-P allows printing from a browser.

10.2   Reports Calendar View

Clicking on the reports listed in Home ▸ Reports (except for the Last 30 Reports) will show a year calendar for the current year for the current selected report. The screenshot below shows just the top of the screen.

Home ▸ Reports ▸ Bill Of Lading

«   2016 ⬇   »

JANUARY ⬇						
Mo	Tu	We	Th	Fr	Sa	Su
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

FEBRUARY ⬇						
Mo	Tu	We	Th	Fr	Sa	Su
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29						

MARCH						
Mo	Tu	We	Th	Fr	Sa	Su
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

APRIL						
Mo	Tu	We	Th	Fr	Sa	Su
				1	2	3

MAY						
Mo	Tu	We	Th	Fr	Sa	Su
						1

JUNE						
Mo	Tu	We	Th	Fr	Sa	Su
		1	2	3	4	5

The « and » arrow icons on the Year header move the currently displayed calendar year backwards or forwards. If there are any downloadable files associated with the selected calendar year, then the Download icon will be displayed in the Year header. Clicking this icon will download all the files for that year as a single .ZIP archive file.

NOTE: This could be a very large file.

Each year is split into months and, by default, each day of the month is shown in a light gray typeface. If there any reports associated with the day, then the day will be shown in a bold blue typeface. If there are any reports in the month, then the download icon will be shown in Month header. Clicking the Month download icon will download all the reports for that month as a single .zip archive file.

Clicking on any day shown in a bold blue typeface, will open the daily view screen, which will show all reports associated with that day. All reports are shown with their date and time of creation. Clicking the associated line will open a report preview. The breadcrumb bar will show the download icon which allows the single report currently previewed to be downloaded.

The Day header also has « and » arrow icons which will allows the user to move backwards or forwards a day for each click. If there are no reports for the selected day, the screen will show *No items present*.

10.3   SD Card

Clicking the **SD Card** sub-menu item opens a year calendar view, as for the other reports listed above. The difference is that the SD Card view will show multiple file types, so the file name is displayed as well as the date & time information, much as the **Last 30 Reports** view shows. In addition, it will also show the archived historical (trend) data and the alarms & events archives, as shown below:
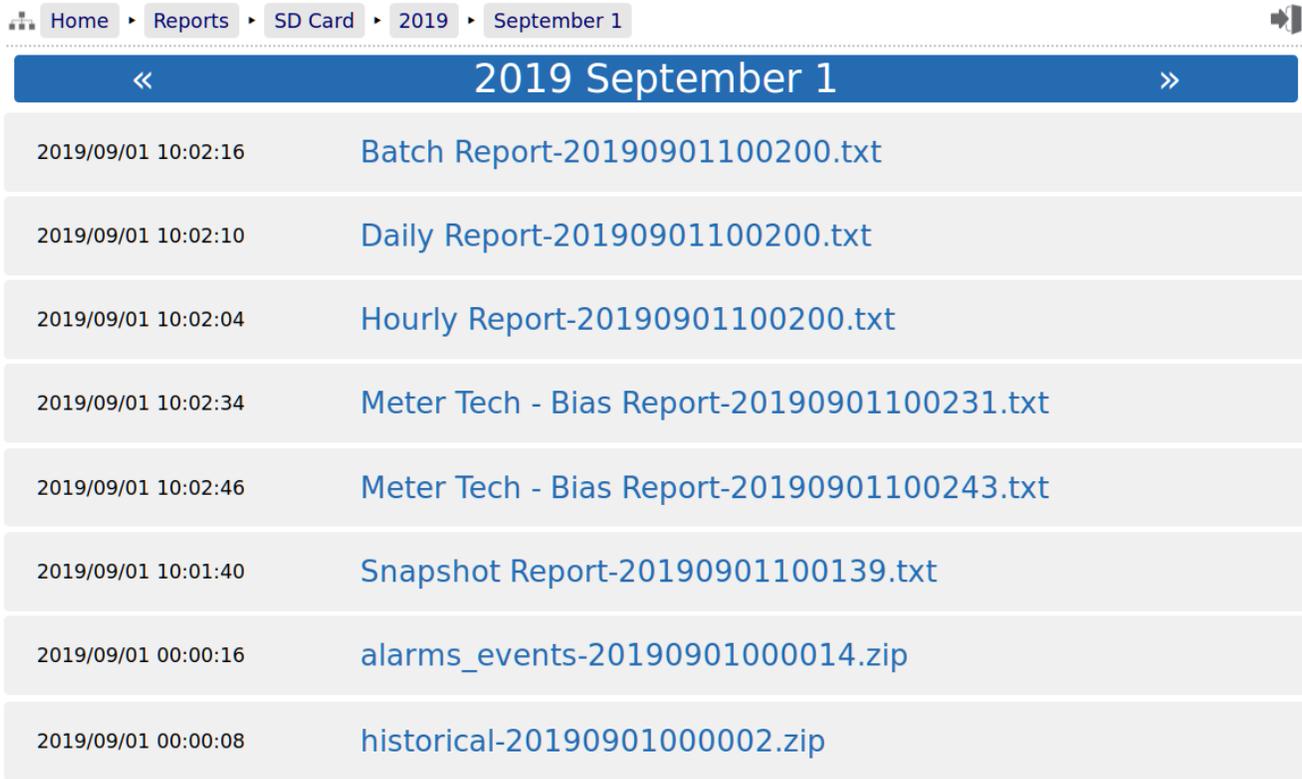
Home ▸ Reports ▸ SD Card ▸ 2019 ▸ September 1	
«	**2019 September 1**	»
2019/09/01 10:02:16	Batch Report-20190901100200.txt
2019/09/01 10:02:10	Daily Report-20190901100200.txt
2019/09/01 10:02:04	Hourly Report-20190901100200.txt
2019/09/01 10:02:34	Meter Tech - Bias Report-20190901100231.txt
2019/09/01 10:02:46	Meter Tech - Bias Report-20190901100243.txt
2019/09/01 10:01:40	Snapshot Report-20190901100139.txt
2019/09/01 00:00:16	alarms_events-20190901000014.zip
2019/09/01 00:00:08	historical-20190901000002.zip

11   Logs and Info

The Logs & Info menu gives the user access to all the accessible data, except for the reports (which are described in Section 10 Reports).

Home ▸ **Logs & Info**

- ▸ **Live Reports & Diagnostics**
- ▸ **System Information**
- ▸ **Alarm Logs**
- ▸ **Event Logs**
- ▸ **Constants Log**
- ▸ **Trending**

Live Reports & Diagnostics	This submenu shows calculation debug information.
System Information	Low level information regarding the hardware and software in use, as explained in Section 11.2 System Information.
Alarm Logs	The comprehensive Alarm Logs are explained in Section 11.3 Alarm Logs.
Events Logs	There are 5 categories of events, detailed in Section 11.4 Event Logs.
Constants Log	The constant log is detailed in Section 11.5 Constants Log.
Trending	The application has an in-built data logger. The historical data from the logger can be downloaded for analysis, or the trends can be viewed graphically via the embedded web-server. See below in Section 11.6 Trending for more details.

11.1 Live Reports & Diagnostics

This menu gives debug information for the selected calculations within the application. Below is an example screenshot of a NÅNO configured for the US market.
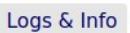
11.2 System Information

System Uptime	10 days, 23:23:50
System ID	247D4D0018D1
System Firmware	4v7r9062-B
I/O Firmware	HW 3.03 SW 2.11
Metrology Firmware	1v1
System O/S	5.7.7 [RevB]
Expansion Board Date	14/01/19 12:26:49
Expansion Board Ident	5WT1
Application Name	Gas Orifice - 8v0
Application Version	8v0r69
Dataset	USC
Application Checksum	0272BE7351E25EC2
Metrology Checksum	0000000000000000
Constants Checksum	DA8508B9D41BD3D0
Profile (mSec) [Min/Last/Avg/Max]	22 / 30 / 30 / 43
Digital Inputs [1..9]	000011000
Digital Outputs [1..6]	110000
Pulse Outputs Buckets [1..2]	0 / 0

System Uptime	This shows how long the unit has been running since the last restart.
System ID	The System ID is a unique hardware number for every device.
System Firmware	This is the runtime firmware version and represents the firmware held in the CPU card.
I/O Firmware	This information refers to the Logic design and the CPU firmware within the I/O Processor.
Metrology Firmware	This is the firmware version of any Metrology specific functionality in the System Firmware.
System O/S	This shows the version of the Linux Operating System in use.
Expansion Board Date	This is the date the expansion board was calibrated. The expansion board type fitted to the NÅNO is the 6+2 Channel Analog I/O board.
Expansion Board Ident	This factory information contains the expansion board serial number and calibration information.
Application Name	This is the name of the application current running.
Application Version	This is the version number of the application current running.
Dataset	This shows which Dataset was selected when the application was downloaded by NÅNOConf. The dataset contains a consistent set of constants, so a pipe diameter may be defaulted to 12 inches in USC but 300mm in Metric for example.
Application Checksum	This is the checksum value of the application current running, including the cold start constants.
Metrology Checksum	Any code or constants designated as a Metrology field will be included in this checksum but data such as a Tag Name, or a site address field would not be.
Constants Checksum	This is the checksum of all constants, both Metrology and other constants that can be changed by an Administrator or Technician level user.
Profile (mSec) [Min/Last/Avg/ Maximum]	These four numbers indicate the performance of the C‖Cure runtime engine. Clicking the line opens a dialog that allows the maximum recorded profile information to be reset.
Digital Inputs [1..9]	This shows the current status of the Digital Inputs in a very compact manner. A "0" represents the OFF state and a "1" represents the ON state. The left most digit is Digital Input 1.
Digital Outputs [1..6]	This shows the current status of the Digital Outputs in a very compact manner. A "0" represents the OFF state and a "1" represents the ON state. The left most digit is Digital Output 1.
Pulse Outputs Buckets [1..2]	This is a status only display and shows the number of pulses generated by the application that are still waiting to be output. The value to the left of the "/" is associated with Pulse Output 1 and the value on the right is associated with Pulse Output 2. In normal operation, these should show 0 or occasionally 1, but any other value indicates a mismatch in the Sampler Pulse setup, and pulse are being generated faster than they can be delivered.

11.3   Alarm Logs

Clicking on Alarm Logs will show calendar view for the Alarm logs. The calendar view operates in the same manner as the Reports Calendar view, see Section 10.2 Reports Calendar View for more details. Drilling down to each day shows all of the Alarms stored in sequential time order. The NÅNO stores 1000 Alarms and they can all be downloaded from the website or via XML communications.

Each Alarm is time and date stamped, has a description of the Alarm, states if the Alarm is being set, accepted or cleared.

At the end of the line is an information bubble, known as the Additional Log Values (ALVs).

Hovering the mouse pointer over the information bubble results in a small pop-up window that shows the cumulative totals for the Oil Indicated Volume (IV) and Oil Gross Observed Volume (GOV) together with the Water IV, GOV and NSV at the time the Alarm was recorded.

Coastal LACT MicroCube Demo	ALARM	02/04/2016 10:37:12

Home ‣ Logs & Trends ‣ Alarm Logs ‣ 2016 ‣ February 4		
«	**2016 February 4**	»
02/04/2016 10:06:59 [admin]	System Restart	ACC ⓘ
02/04/2016 09:48:56	System Restart	CLR ⓘ
02/04/2016 09:48:55	System Restart	SET ⓘ
02/04/2016 09:09:13 [admin]	Oil Temperature Transmitter Fail	ACC ⓘ
02/04/2016 09:09:10	Water Temperature Transmitter Fail	CLR ⓘ
02/04/2016 09:09:10	Oil Temperature Transmitter Fail	CLR ⓘ
02/04/2016 09:09:08	Oil Temperature Transmitter Fail	SET ⓘ

If the entire Alarm history is needed, it can be retrieved using the XML communications for routine and regular use, but for immediate access, the data can be downloaded from the NÅNO website, simply by clicking on the Download Icon, at the top of the screen. The data will be downloaded as a single file in Tab Separated Value (.TSV) format and can be opened and manipulated in LibreOffice, Excel or other spreadsheet programs.

11.4   Event Logs

Home ▸ Logs & Trends ▸ Event Logs

System Event Log

Operator Event Log

Metrology Event Log

Security Event Log

Application Event Log

Combined Event Log

There are 5 categories of events. The Operator Event Log stores 2500 events and all the others store 1000 events each (6500 events in total). Each event also has the ALVs logged to aid forensic analysis.

System Event Log	Events that change the Time / Date settings, Network Settings, User Information, SD Card state, Power Cycles and Communications (including Printers, XML and Modbus ports, Local Panel) as well as remote events using the NÅNOConf configuration tool.
Operator Event Log	This log records all the input from the Local Panel, from the driver or the Metering Technician, as well as changes to the Application settings made from the website.
Metrology Event Log	Any item changed that is declared as a Metrology point is logged here. Field calibration events are stored in this log.
Security Event Log	This log is used to record who logged in and out, the type of login, web or XML and the IP address of the user.
Application Event Log	Used to log application specific events. These are configured in the code blocks so are custom to each application.
Combined Event Log	This shows the last 32 events of any type in reverse time order.

As an example, clicking on System Event Log will show all events for the selected day, in sequential time order. The screenshot below is part of the log.

NOTE: An example of the ALVs is shown in the smaller white text within the black box.

The Event log is similar to the Alarm log, in that only a single day's events are displayed at a time on the website, but all the data can be collected using the XML communications, or downloaded from the website as a Tab Separated Value document.

The Event Log fields are slightly different. The 1st Column shows the time the event was logged and the source of the event. The second column is a description of the event. The last column shows the ALVs information bubble, containing the cumulative totals for Oil IV & GOV and the Water IV, GOV & NSV snapshot values.

11.5　Constants Log

Clicking on the Constants Log generates a log file with all the editable data points. This file can be printed or downloaded via XML or from the website.

NOTE:　The screenshot below is just the first few lines of the Constant Log, the whole document is too long to display in this manual
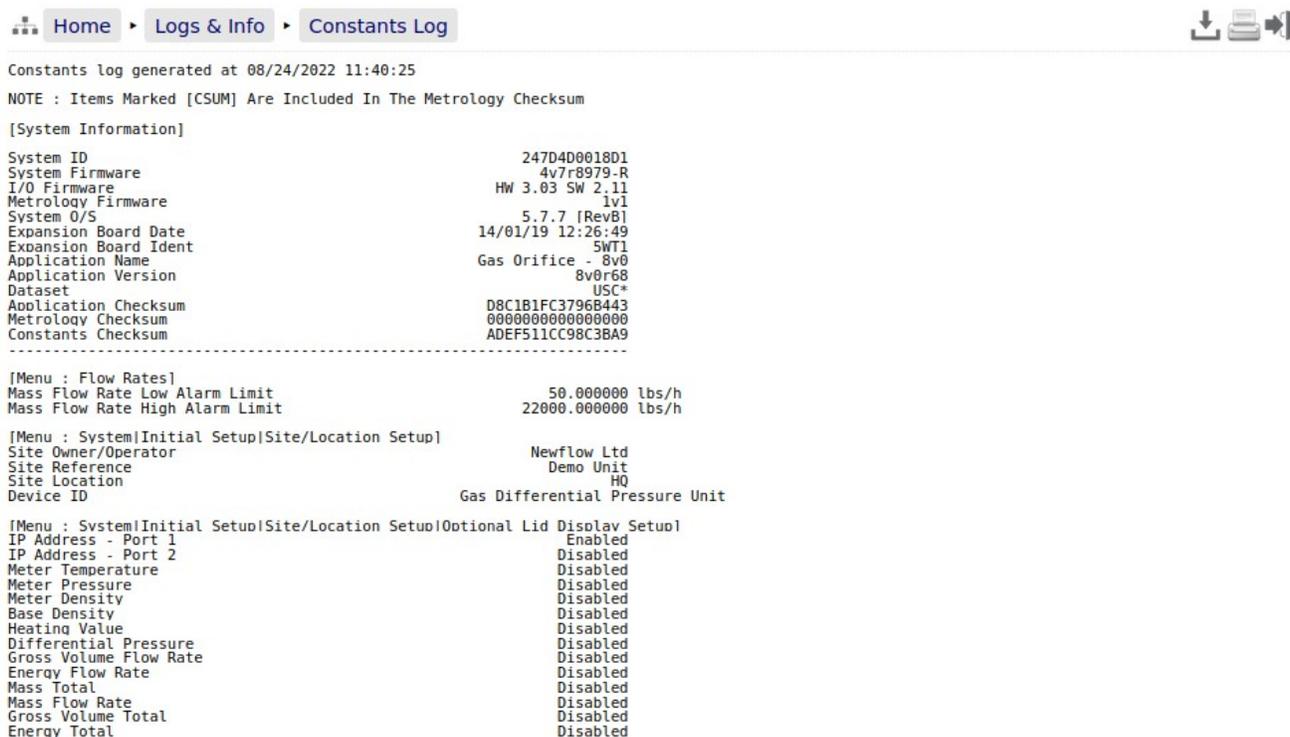

```
Home  ▸  Logs & Info  ▸  Constants Log                                    ⤓ 🖨 ↦

Constants log generated at 08/24/2022 11:40:25

NOTE : Items Marked [CSUM] Are Included In The Metrology Checksum

[System Information]
System ID                                       247D4D0018D1
System Firmware                                    4v7r8979-R
I/O Firmware                                    HW 3.03 SW 2.11
Metrology Firmware                                        1v1
System O/S                                        5.7.7 [RevB]
Expansion Board Date                          14/01/19 12:26:49
Expansion Board Ident                                    5WT1
Application Name                              Gas Orifice - 8v0
Application Version                                    8v0r68
Dataset                                                  USC*
Application Checksum                           D8C1B1FC3796B443
Metrology Checksum                            0000000000000000
Constants Checksum                            ADEF511CC98C3BA9
-----------------------------------------------------------------

[Menu : Flow Rates]
Mass Flow Rate Low Alarm Limit                    50.000000 lbs/h
Mass Flow Rate High Alarm Limit                22000.000000 lbs/h

[Menu : System|Initial Setup|Site/Location Setup]
Site Owner/Operator                             Newflow Ltd
Site Reference                                    Demo Unit
Site Location                                            HQ
Device ID                              Gas Differential Pressure Unit

[Menu : System|Initial Setup|Site/Location Setup|Optional Lid Display Setup]
IP Address - Port 1                                  Enabled
IP Address - Port 2                                 Disabled
Meter Temperature                                   Disabled
Meter Pressure                                      Disabled
Meter Density                                       Disabled
Base Density                                        Disabled
Heating Value                                       Disabled
Differential Pressure                               Disabled
Gross Volume Flow Rate                              Disabled
Energy Flow Rate                                    Disabled
Mass Total                                          Disabled
Mass Flow Rate                                      Disabled
Gross Volume Total                                  Disabled
Energy Total                                        Disabled
```

11.6   Trending

The NÅNO has a powerful data logging facility combined with an easy to use web-based visualization tool which gives unrivaled trending information.

There are three separate historical data zones, each of which can store 20,000 records. Each record is comprised of up to 13 data points and the time-stamp for when the selected data points were snapshot by the trigger. Each historical data zone can have a separate trigger, and the collection of data points in each zone can be different.

If **All active slots** was selected then a chart showing a composite of all the data points is generated, in a time line (x-axis) against a single y-axis which indicates the value. In the example shown below, the chart is dominated by two data slots with large values.
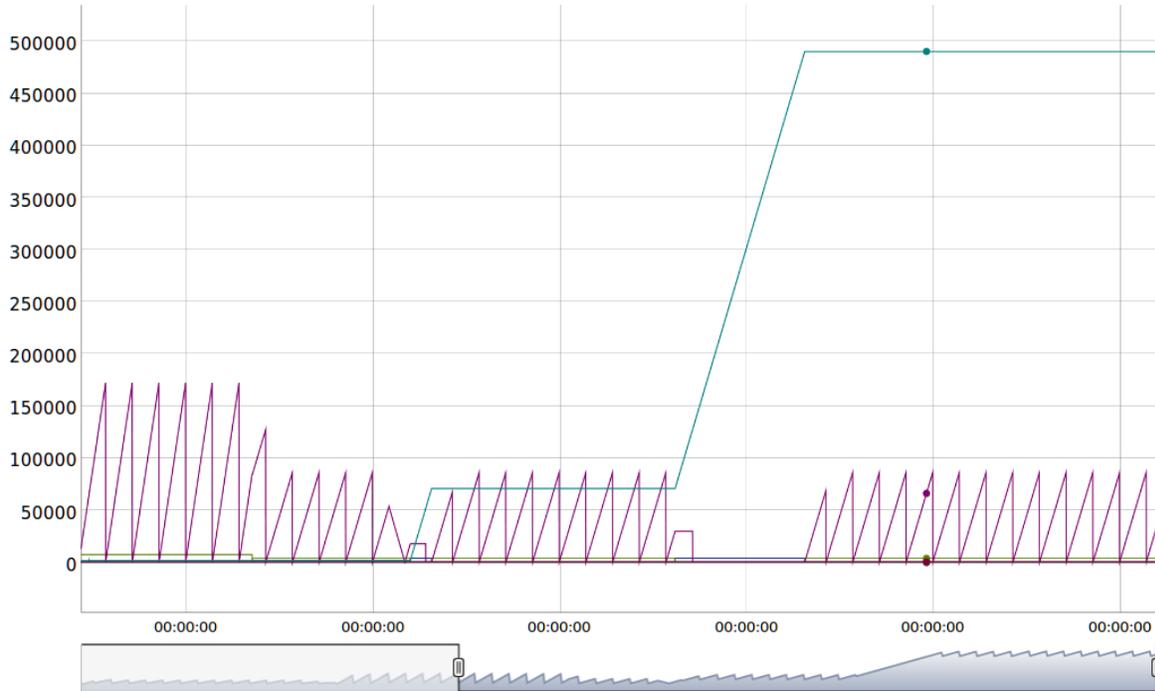
Show Series:
☑ Oil Pressure In Use (psig)
☑ Oil Temperature In Use (°F)
☑ S&W In Use (%)
☑ Oil Indicated Volume Flow Rate (bbls/hr)
☑ Water Indicated Volume Flow Rate (bbls/hr)
☑ Auxiliary Input 1 - In Use (%)
☑ Auxiliary Input 2 - In Use (%)
☑ Auxiliary Input 3 - In Use (%)
☑ Auxiliary Input 4 - In Use (%)
☑ Current Water Day Total [IV] (bbls)
☑ Water Temperature In Use (°F)
☑ Oil Local Totalizer [IV] (bbls)
☑ Oil Non-Resettable Total [IV] (bbls)

26/12/2015, 18:20:00:
Oil Pressure In Use (psig): 51
Oil Temperature In Use (°F): 90
S&W In Use (%): 0.471
Oil Indicated Volume Flow Rate (bbls/hr): 0
Water Indicated Volume Flow Rate (bbls/hr): 3600
Auxiliary Input 1 - In Use (%): 100.723
Auxiliary Input 2 - In Use (%): -22.7127
Auxiliary Input 3 - In Use (%): 5.8891
Auxiliary Input 4 - In Use (%): 29.3789
Current Water Day Total [IV] (bbls): 66000.04
Water Temperature In Use (°F): 60
Oil Local Totalizer [IV] (bbls): 10
Oil Non-Resettable Total [IV] (bbls): 490395.12

Under the **Show Series** title, there is a list of each data slot with an associated tick box. If the larger value item, in this example "Oil Non-Resettable Total [IV] (bbls)", checkbox is clicked to toggle the tick to "off", then this slot will no longer be displayed and the display will re-scale.

You can also scale the time line by using the slider bars between the graph and the list of slots in use. The example below has the left-hand slider moved inwards by about a third.

If the cursor is placed over the graph, a dot will appear on each slot at the same instance in time and a readout of the value for each slot and the time the record was made is shown. In the example below, the cursor is highlighting 26/12/2015 at 18:20:00 and the **Oil Pressure In Use (psig)** is showing 51.

NOTE: As well as being able to display the Historical Data in a zoom-able chart, the Historical Data can be downloaded and saved on a PC and displayed in a spreadsheet. To accomplished this, simply click on the download icon.

	Date	Oil Pressure In Use (psig)	Oil Temperature In Use (°F)	S&W In Use (%)	Oil Indicated Volume Flow Rate (bbls/hr)	Water Indicated Volume Flow Rate (bbls/hr)	Auxiliary Input 1 - In Use (%)	Auxiliary Input 2 - In Use (%)	Auxiliary Input 3 - In Use (%)	Auxiliary Input 4 - In Use (%)	Current Water Day Total [IV] (bbls)	Water Temperature In Use (°F)	Oil Local Totalizer [IV] (bbls)	Oil Non-Resettable Total [IV] (bbls)
2	05/01/16 03:10	50.6	90	0.463	0	3600	100.8274	-22.7144	5.7813	29.3803	11400	60	10	490405.12
3	05/01/16 03:05	50.6	90	0.463	0	3600	100.8254	-22.7148	5.7814	29.3805	11100	60	10	490405.12
4	05/01/16 03:00	50.59	90	0.462	0	3600	100.8251	-22.7138	5.779	29.3798	10800	60	10	490405.12
5	05/01/16 02:55	50.59	90	0.462	0	3600	100.8264	-22.7133	5.7785	29.3796	10500	60	10	490405.12
6	05/01/16 02:50	50.59	90	0.462	0	3600	100.8258	-22.7137	5.7802	29.3795	10200	60	10	490405.12
7	05/01/16 02:45	50.59	90	0.462	0	3600	100.8249	-22.7153	5.78	29.3809	9900	60	10	490405.12
8	05/01/16 02:40	50.58	90	0.462	0	3600	100.8253	-22.715	5.7771	29.3806	9600	60	10	490405.12
9	05/01/16 02:35	50.58	90	0.462	0	3600	100.8248	-22.7138	5.7771	29.3803	9300	60	10	490405.12
10	05/01/16 02:30	50.58	90	0.462	0	3600	100.8242	-22.7141	5.777	29.3804	9000	60	10	490405.12
11	05/01/16 02:25	50.58	90	0.462	0	3600	100.8245	-22.7138	5.7767	29.38	8700	60	10	490405.12
12	05/01/16 02:20	50.58	90	0.462	0	3600	100.8233	-22.7145	5.7772	29.3806	8400	60	10	490405.12
13	05/01/16 02:15	50.58	90	0.462	0	3600	100.8231	-22.7152	5.7771	29.38	8100	60	10	490405.12
14	05/01/16 02:10	50.58	90	0.462	0	3600	100.8239	-22.7143	5.7752	29.3797	7800	60	10	490405.12
15	05/01/16 02:05	50.58	90	0.462	0	3600	100.8222	-22.7126	5.7768	29.3798	7500	60	10	490405.12
16	05/01/16 02:00	50.58	90	0.462	0	3600	100.8219	-22.7142	5.7775	29.3804	7200	60	10	490405.12
17	05/01/16 01:55	50.58	90	0.462	0	3600	100.821	-22.714	5.7766	29.38	6900	60	10	490405.12

The example above only shows 16 of the possible 20,000 records.

11.7 Diagnostic Information

The Gas Differential Pressure Application has been designed for ease of use as well as simplifying installation & commissioning and gives a remarkable amount of information to help diagnose process problems. There are three main areas of information:

Live Reports & Diagnostics	Home ▸ Logs & Info ▸ Live Reports & Diagnostics ▸ Calculation Debug This allows an operator to see all the debug information for the selected calculations.
System Information	Home ▸ Logs & Info ▸ System Information This shows the System Information for the NÅNO. See Section 11.2 System Information for more details.
Trending	Home ▸ Logs & Info ▸ Trending The historical data logging and trending displays are a powerful tool for investigating process issues.

12   Glossary

Icon	Description
	If a line contains the blue "gear" icon, this indicates that the line can be edited. Click the line to open the edit dialog.
	If a line contains a gray colored "gear" icon, this indicates that the line has editable data, but the current user does NOT have the necessary user level privileges.
	Sitemap Icon. Clicking this icon opens the sitemap allowing rapid navigation around the website.
	Logout Icon. Clicking this icon will logout the current user of the session, and takes you back to the login screen.
	Download Icon. This icon is visible when information is available for downloading from the NÅNO. Clicking this icon allows the information to be viewed or downloaded depending upon browser preferences.
	Print Icon. Clicking this item causes the current viewed screen to be printed to the designated Web printer.
	Accept/Apply Icon. This is used when several pieces of information are preset and then actioned as a group, for example setting networking parameters.

Term	Description
ADC	Analog to Digital Converter
ALVs	Additional Log Values - data that is snapshot when an Alarm or Event occurs.
AO	BLM Authorized Officer
APP	A configuration file for the NÅNO where all hard coded calculation routing has been finalized. Field settings may or may not have been entered.
BLM	Bureau of Land Management
BPV	Base Prover Volume
CONSTANTS	Numbers which are only infrequently changed.
ConstED	An off-line configuration program for NÅNO applications.
CPU	Central Processor Unit
CSV	Comma Separated Values (a spreadsheet format)
DCS	Distributed Control System

DEFAULT VALUE	A fallback value that the input 'defaults' to if measurement is not possible due to the input from the transmitter being determined BAD.
FIELD SETTINGS	Constants, Limits, Scalings for a specific Meter Run. This does not relate to specific calculations as these will be defined in the Application.
FWA	Flow Weighted Average
HMI	Human Machine Interface
LACT	Lease Automated Custody Transfer
mA	milliAmp
METER RUN	The pipework and associated instrumentation for a single device to measure flow. Typically a turbine meter, orifice meter, Coriolis meter, ultrasonic meter, etc.
OVERRIDE VALUE	A fixed manual entry to 'override' any transmitter values.
PLC	Programmable Logic Controller
PROVER	The pipework and associated instrumentation for a single device to verify the data produced by a meter run flow device. Typically a Ball or Piston type Prover.
RTD	Resistance Temperature Detector
RX	Received information
SECURITY CODE	Security Codes are used to limit access by operators to parameters retained in NON VOLATILE memory.
STATION	Possibly pipework and associated instrumentation or just an application to collate data (and possibly disseminate header data) from a number of meter runs (and possibly a Prover) into a single source for display and/or passing to a Supervisory Computer.
TAGNAME	Alphanumeric string used to represent an item held within the computer database.
TSV	Tab Separated Values (a variant of CSV)
TX	Transmitted information
UTC	"Coordinated Universal Time" or UTC is the primary time standard by which the world regulates clocks and time
VARIABLES	Changeable values

Digital & Serial
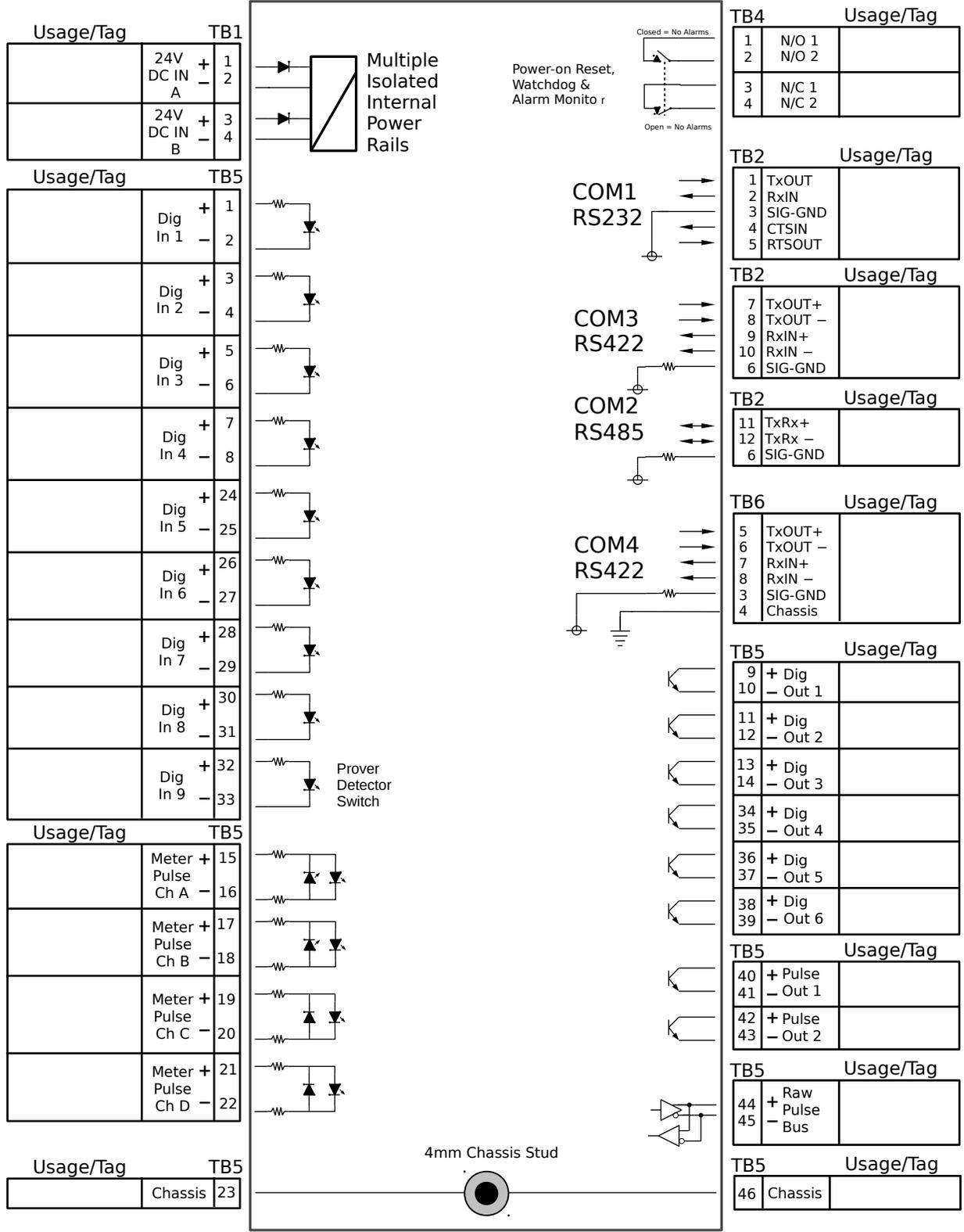
Analog Expansion

Usage/Tag — TB3

Usage/Tag			TB3
	AnIn 1	+	TB3-1
		−	TB3-2
	AnIn 2	+	TB3-3
		−	TB3-4
	AnIn 3	+	TB3-5
		−	TB3-6
	AnIn 4	+	TB3-7
		−	TB3-8

Usage/Tag — TB3 & TB6

Usage/Tag			TB3 & TB6
	AnIn 5 or RTD 2	I +	TB6-1
		V +	TB3-9
		V −	TB3-10
		I −	TB6-2

1mA

Usage/Tag — TB3

Usage/Tag			TB3
	RTD 1 or AnIn 6	I +	TB3 - 15
		V +	TB3 - 16
		V −	TB3 - 17
		I −	TB3 - 18

1mA
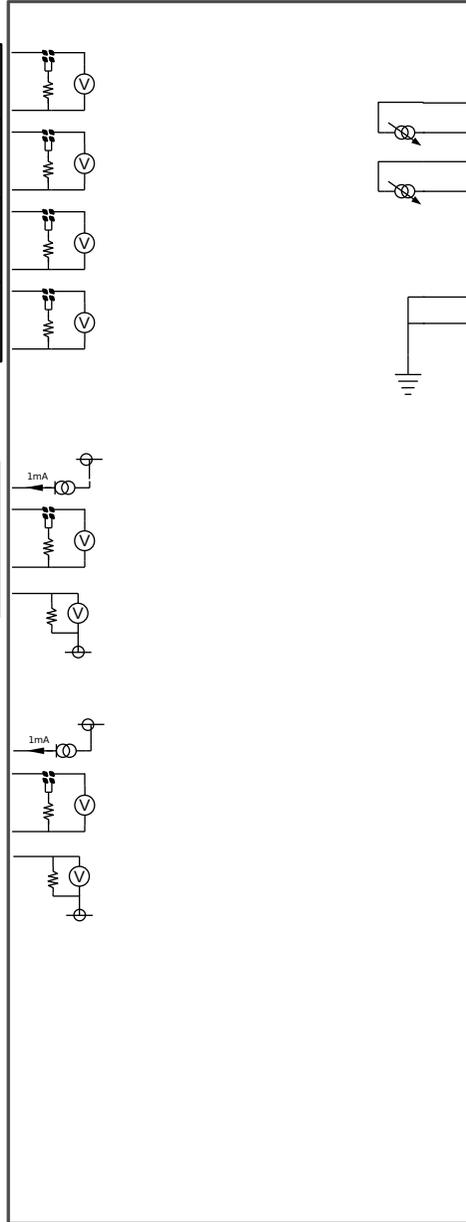
TB3 — Usage/Tag

TB3			Usage/Tag
TB3-11	V +	AnOut 1	
TB3-12	I −		
TB3-13	V +	AnOut 2	
TB3-14	I −		

TB3

TB3		
TB3-19	Chassis	
TB3-20		

Newflow Ltd, Malton UK

NÅNO *Gen³*
300 Series

UK CA

CE 2021

Newflow

TB6

	COM4 RS422 TX		COM4 RS422 RX		
	+	−	+	−	SCN
RTD2					
I+	I−				
5	6	7	8		
1	2	3	4		

TB3

ANOUT 1		ANIN 1		ANOUT 2		ANIN 2		RTD1 ANIN 6 I+ V+ V− I−				ANIN 3		ANIN 4		ANIN 5 RTD2 V+ V−		
+	−	+	−	+	−	+	−					+	−	+	−	+	−	
11	12	1	2	13	14	3	4	15	16	17	18	5	6	7	8	9	10	19 20

TB2

COM3 RS422 TX		COM3 RS422 RX		COM2 RS485		COM1 RS232					
+	−	+	−	+	−	TX	RX	GND	CTS	RTS	SCN
7	8	9	10	11	12	1	2	3	4	5	6

TB5

DIGIN 1		DIGIN 2		DIGIN 3		DIGIN 4		DIGOUT 1		DIGOUT 2	
+	−	+	−	+	−	+	−	+	−	+	−
1	2	3	4	5	6	7	8	9	10	11	12

DIGIN 5		DIGIN 6		DIGIN 7		DIGIN 8		DIGIN 9		DIGOUT 4	
+	−	+	−	+	−	+	−	+	−	+	−
24	25	26	27	28	29	30	31	32	33	34	35

TB5

DIGOUT 3		DIGOUT 5		DIGOUT 6		PULSE OUT 1		PULSE OUT 2		RAW PULSE		
+	−	+	−	+	−	+	−	+	−	+	−	
13	14	36	37	38	39	40	41	42	43	44	45	46

		PULSE IN CH A		PULSE IN CH B		PULSE IN CH C		PULSE IN CH D	
		+	−	+	−	+	−	+	−
		15	16	17	18	19	20	21	22	23

TB4

Watchdog N/C		Watchdog N/O	
3	4	1	2

TB1

PSU B +24V 0V		PSU A +24V 0V	
3	4	1	2