

HYCONTROL

LEVEL MEASUREMENT SOLUTIONS

Reflex LR & Microflex LR Level Controller

Vision System II Communication Software Operating Instructions



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Vision System II Communication Software Operating Instructions

1. Introduction

Vision System II is a powerful software tool that provides a set-up and diagnostic utility for the Reflex LR and Microflex LR range of ultrasonic instruments.

Reflex LR and Microflex LR instruments are designed to communicate with a control system, over a RS485 2-wire bus, using the MODBUS protocol.

A PC running the Vision System II program can also communicate with the Reflex LR and Microflex LR instruments over this bus, instead of the PLC.

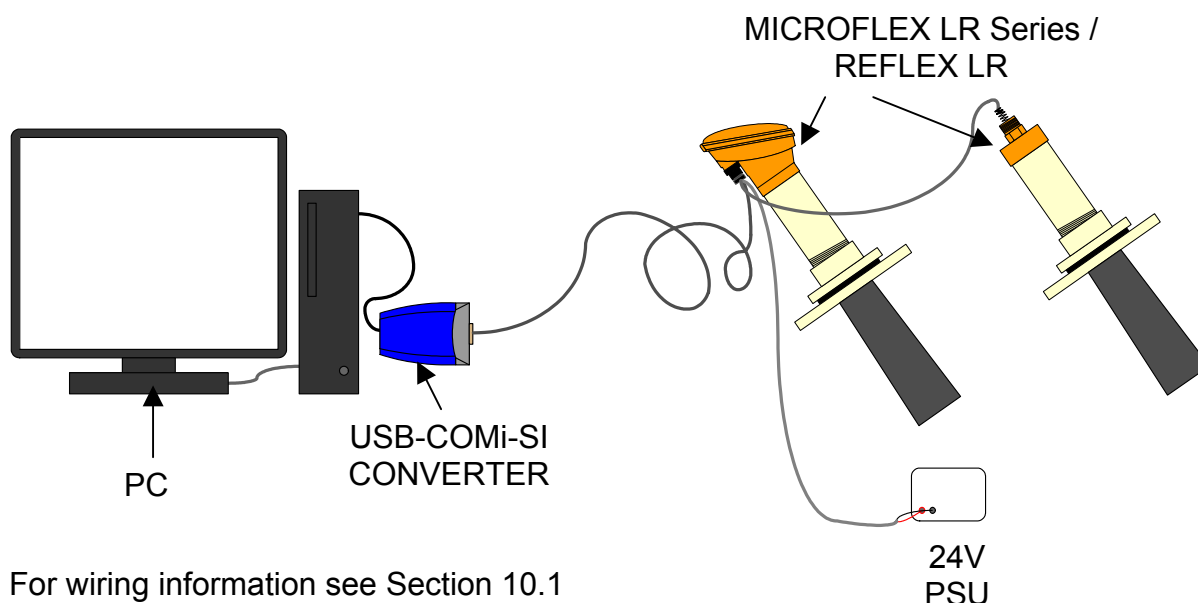
There are three ways a connection can be made between the PC and the RS485 bus.

- Direct connection to a PC com port via a USB-RS485 adaptor, a RS232 to RS485 converter or via a PCMCIA RS485 adaptor.
- A wireless connection via a GSM modem.
- A TCP/IP connection via the internet.

A mixture of up to 128 Reflex LR or Microflex LR instruments may be connected, in parallel, to the bus and each instrument must be assigned a unique ID number (01 - 128) before communication is possible. A termination resistor of 120Ω should be connected across the bus at each end as per normal Modbus practice. See page 34.

As each instrument must have a unique ID it is recommended that the user avoid the use of ID 01 on his system allowing any new instrument to be connected to the bus and reprogrammed without affecting any other connected instruments. See Section 4.

Connecting using the recommended USB-COMi-SI (Isolated RS485 Converter)



For wiring information see Section 10.1

2. Installation

2.1 Installing the program

Place the Vision System II CD in the drive, access it from 'My Computer' or 'Windows Explorer' and double-click on 'Setup.exe'. The program will be installed in C:\Program files\Hycontrol\VisionSystemII.

2.2 Running the program

From the Desktop, click 'Start' 'All Programs' 'Hycontrol' 'VisionSystemII' or navigate to C:\Program Files\Hycontrol\VisionSystemII and double-click on 'VisionSystemII.exe.' In future, it may be convenient to create a short-cut to this file.

The program will come up displaying a box at the top of the screen as shown below:

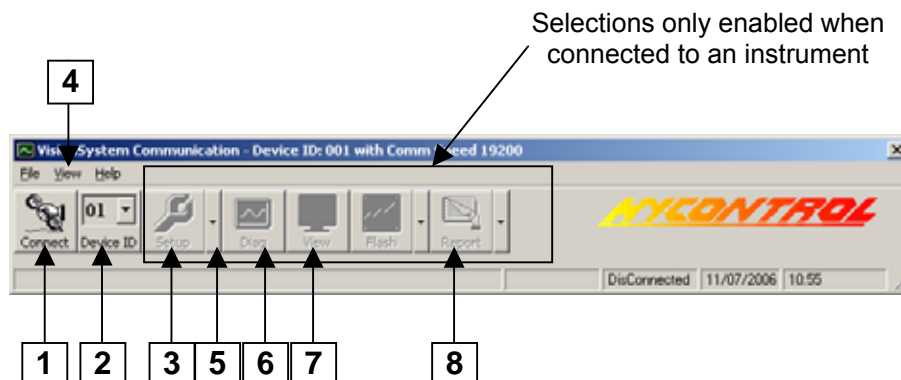


Figure 1: - User interface main screen

- 1 Enables you to connect or disconnect from the instrument.
- 2 Select Device ID. New units are pre-programmed to 01. Only change this if the instrument is being used in a multiple instrument application.
- 3 When enabled – Displays quick start menu. (See page 16).
- 4 To view product properties and set communication parameters.
- 5 When enabled – Gives access to all programming screens.
- 6 When enabled – Displays diagnostic screen.
- 7 When enabled – Displays Tank View screen.
- 8 When enabled – Gives access to report features.

3. Configuration

For direct connection - go to section 3.1.

For GSM modem connection - go to section 3.2.

For TCP/IP connection - go to section 3.3.

3.1 Setting Communication Parameters for direct connection option

Click 'View' (4 on page 5) on top of the tool bar. Click 'Options' on the drop down menu. The following 'Properties' screen comes up.

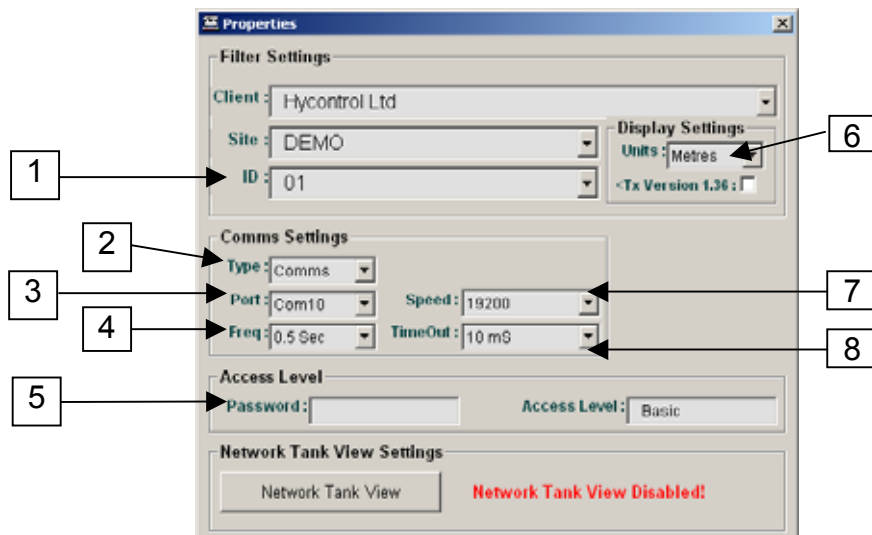


Figure 2: - Communication settings for direct RS485 connection

- 1 Set this field to the ID of the unit you wish to talk to. 01 is the default for single point instruments.
- 2 Set this to 'Comms' if you are connected via a USB to RS485 or RS232 to RS485.
- 3 Enter the number for the port that your RS485 device is connected to. Make sure that this is correct as the instrument will not connect otherwise. Only detected communication ports will be available for selection.
- 4 This is the rate at which parameters are read (and/or written)
- 5 Enter password here if you have Medium level access. (See Appendix A)
- 6 Usually easier to program in metres and then change to feet if required.
- 7 Set speed to 19200.
- 8 This is the time that the program will wait for a valid response from the Reflex LR or Microflex LR, for each query. A time of 10mS is suitable for direct connection.

Click on the X in the top right corner to close the Properties screen.

Click the 'Connect' button (1 on page 5) to establish communication. The button icon changes to a hung-up telephone and is now used to disable communication and it shows an 'Info' screen.

Click the 'Set-up' button (3 on page 5) to bring up the 'Quick Start Menu' screen.

3.2 Setting Communication Parameters for GSM modem option

Click 'View' (4 on page 5) on top of the tool bar. Click 'Options' on the drop down menu. The following 'Properties' screen comes up.

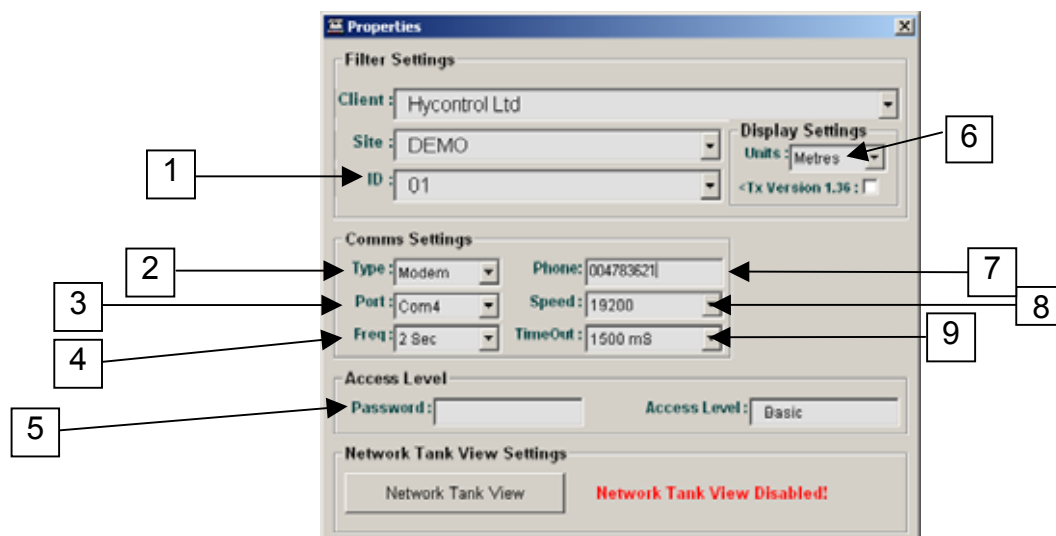


Figure 3: - Communication settings for GSM option

- 1 Set this field to the ID of the unit you wish to talk to. 01 is the default for single point instruments.
- 2 Select 'Modem' for GSM wireless connection.
- 3 Enter the number for the port that your computer's modem is on.
- 4 This is the rate at which parameters are read (and/or written).
- 5 Enter password here if you have Medium level access. (See Appendix A)
- 6 Usually easier to program in metres and then change to feet if required.
- 7 Enter the phone number of the modem you want to call. Press TAB.
- 8 Leave 'Speed' set to 19200 bits per second.
- 9 This is the time that the program will wait for a valid response from the Reflex LR or Microflex LR, for each query. A longer time (Typically 1500mS) is required for modem transmission.

Block diagram of a GSM connection

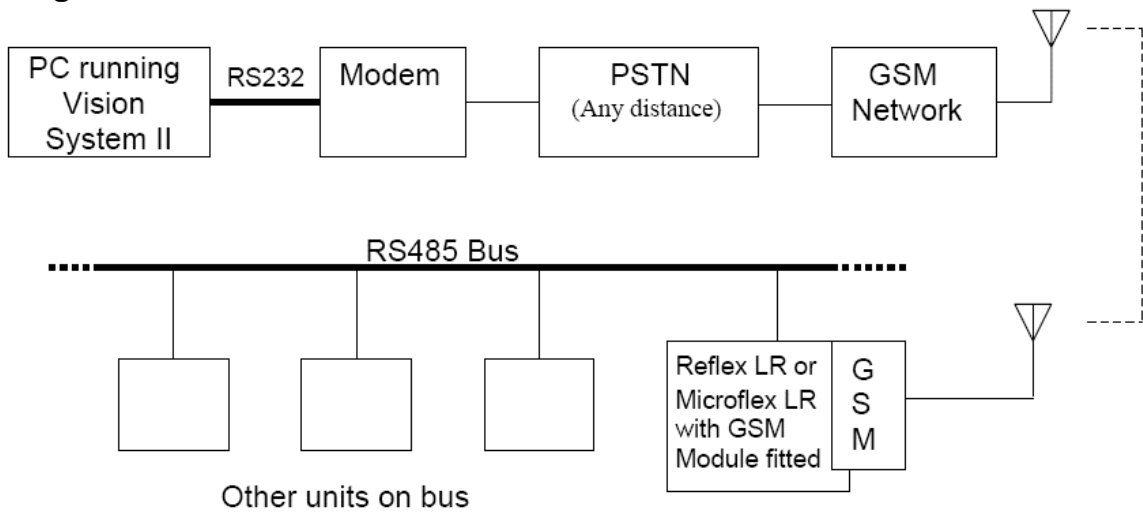


Figure 4: - Block diagram of a GSM connection

Click the 'Connect' button (1 on page 5).

The button icon changes to a hung-up telephone and is now used to disable communication.

The 'Dial Number' box comes up as shown below.

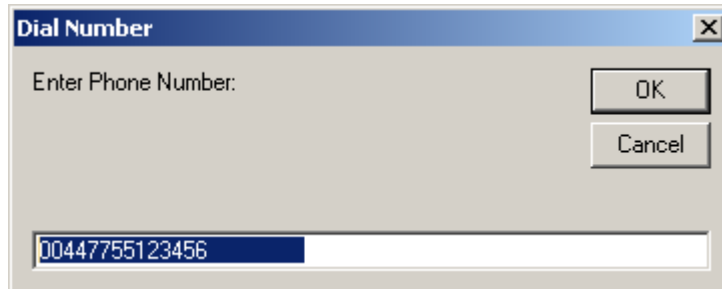


Figure 5: - GSM telephone number entry box

Click 'OK'

The 'Status' box indicates call progress.

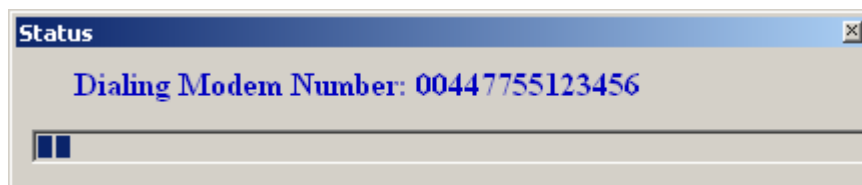


Figure 6: - GSM dialing status box

When the connection is established, click the 'Setup' button (1 on page 5) to bring up the 'Quick Start Menu' screen. (See page 16).

3.3 Setting Communication Parameters for the Network (TCP-IP) connection option

NOT IMPLEMENTED

4. Connecting to a device or Changing the Device ID

4.1 Introduction

Up to 128 Reflex LR or Microflex LR instruments may be connected together in parallel, to the RS485 bus and each instrument must be assigned a unique Device ID number (01 - 128) before communication is possible.

Reflex LR and Microflex LR instruments are shipped with the ID set to '01', which the user must change if more than one instrument is to be used on a bus. It is recommended that the user avoid the use of the 01 ID if he has more than one instrument on his system so that any new instrument can be connected to the bus and its ID changed without affecting the already connected instruments.

This section shows details on how to do the following: -

1. To change the default ID programmed in an instrument from 01, follow steps shown in **4.2**.
2. To connect to an instrument with a Device ID programmed from 01 to 05, follow steps shown in **4.3**.
3. To connect to an instrument with a Device ID programmed greater than 05, follow steps shown in **4.4**.
4. Connecting to an instrument with an unknown Device ID. Follow steps shown in **4.5**.

4.2 Changing the Device ID of an attached Reflex LR or Microflex LR instrument

1. Bring up the properties screen by clicking on 'View' and then 'Options'.

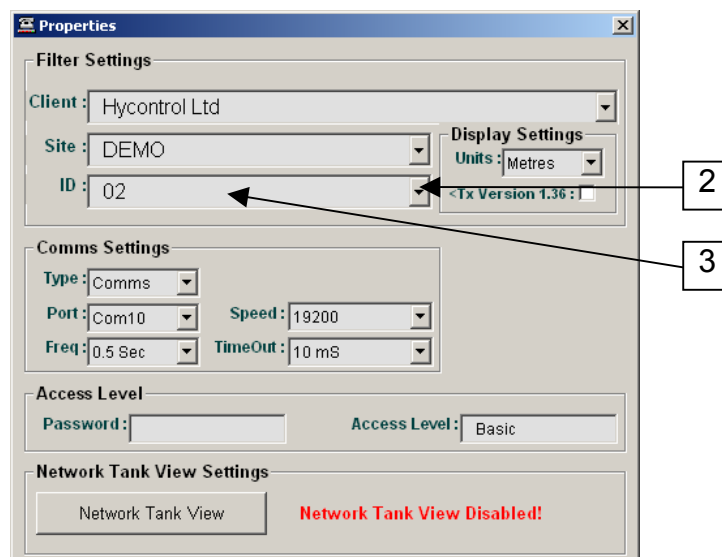


Figure7: - Selecting a new Device ID in 'View' 'Options' setup

2. Click the down arrow of the ID box (2) and select the desired new ID from the list. If it is not in the list, select the blank space at the bottom then enter the required ID and press enter to display the Device ID information screen.
3. Double-click on the ID bar as shown on previous page (3 on page 12), the 'Device ID Information' screen comes up.

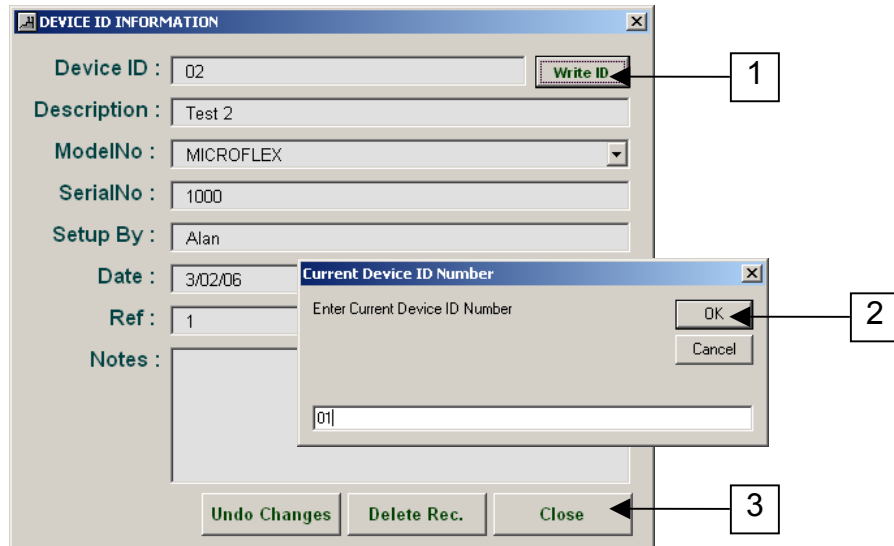


Figure 8: - Changing device ID Number of an instrument

4. Click 'Write ID' button (1); a box comes up asking for the current ID number.
5. Enter the current ID number (01 in this example). Click 'OK' (2)
6. Click 'Close' (3) to save ID.

4.3 Device ID 01 to 05

A Device ID from 01 to 05 can be selected from the drop down ID selection list (1).

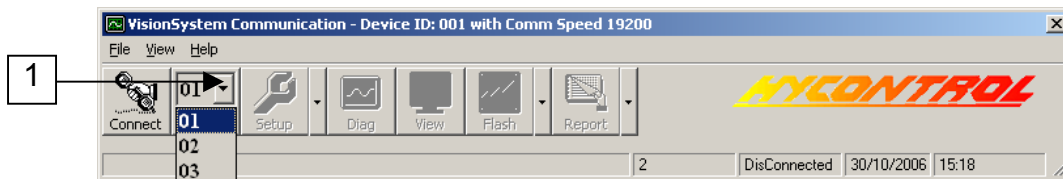


Figure 9: - Device ID selection from main screen

If the ID of the instrument is not 01,02,03,04 or 05 then you need to create a new ID profile by following step 4.4.

4.4 Creating a new Device ID for a pre-programmed instrument

If an instrument has been programmed with an ID that is not between 01 and 05 and cannot be selected from the drop down ID selection list then do the following: -

- 1 Bring up the properties screen by clicking on 'View' and then 'Options'.

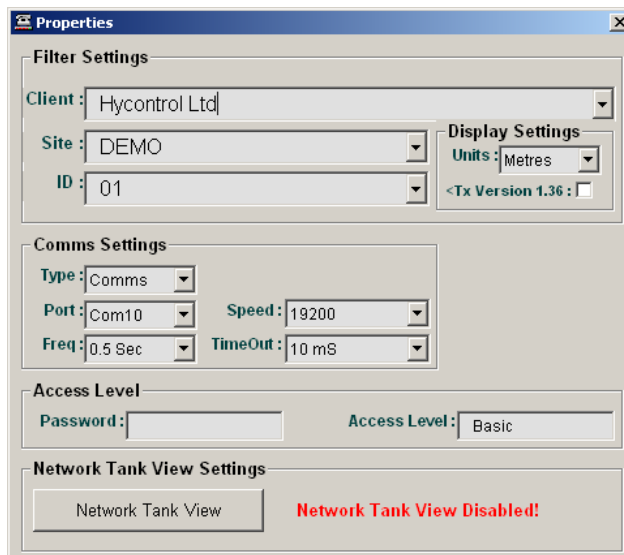


Figure 10: - 'View' 'Options' properties box

- 2 Click on the blank space (1) at the bottom then enter the required ID number and press the 'Enter' key on the keyboard.

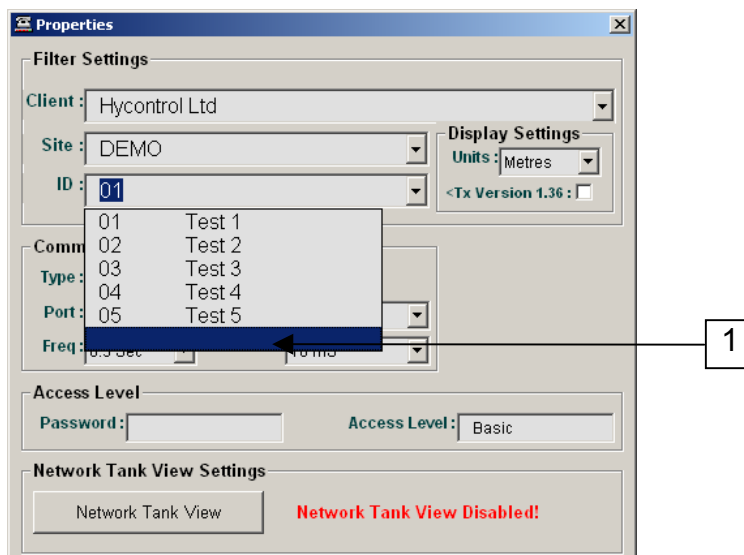


Figure 11: - Selecting a Device ID in 'View' 'Options' properties box

- 3 Enter additional information if required and click on the 'Close' button (1).

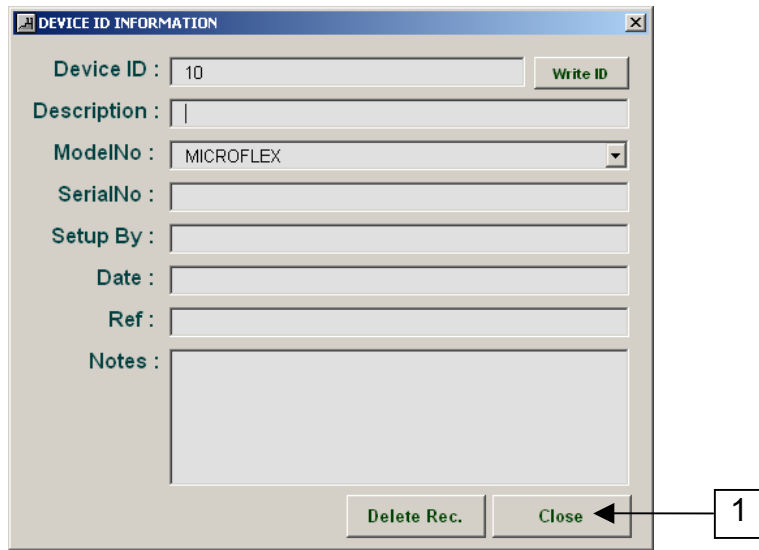


Figure 12: - Device ID information entry box

You now have an extra Device ID in your ID list and can connect to an instrument programmed with that ID number.

4.5 Connecting to an instrument with an unknown Device ID

Click on the 'Connect' button.

You may see the following dialog box and the Info screen with red boxes because it cannot read any information.

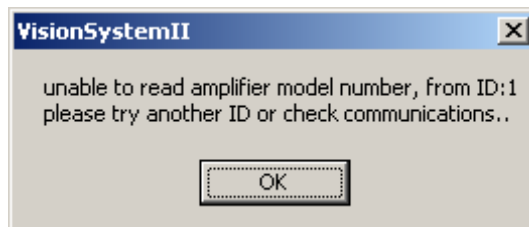


Figure 13: - Device ID undetected message box

If you do Click 'OK' on the above dialog box and perform an ID Search as shown below.

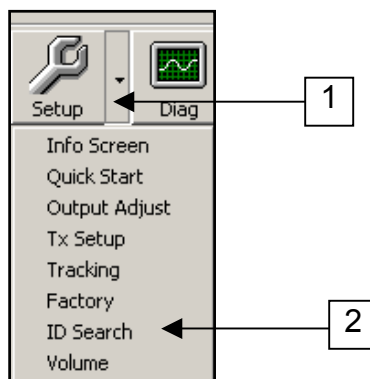


Figure 14: - ID Search screen selection

Click on the down arrow (1) then 'ID Search' (2)

The ID Search box is displayed.

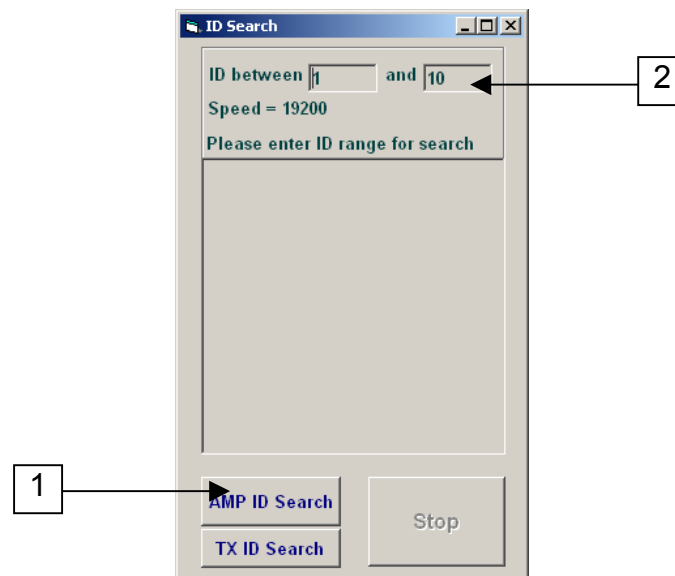


Figure 15: - ID Search screen

Click on 'Amp ID Search' (1) to search for any attached instruments with an ID between 1 and 10. This range can be extended if required up to 128 (2) but will take a few minutes to complete the search.

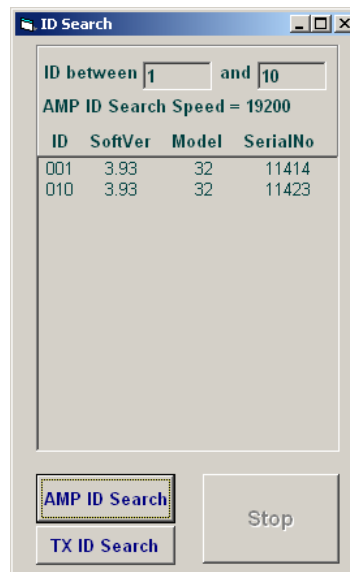


Figure 16: - ID Search screen showing detected instruments

In the above example the results show that 2 instruments have been detected with ID numbers 1 and 10.

If the detected ID you require does not appear in the drop down ID selection list in the main console screen the ID can be added as in step **4.4 Creating a new Device ID for a pre-programmed instrument** on Page 12.

5. Parameter adjustments

5.1 Overview

There are various parameters that can be read and adjusted using the Vision System software these are grouped into the following sections.

- Info screen – Details of instrument: frequency, model & serial number. **(Non adjustable - Read only)**.
- Quick Start screen – Basic application setup.
- Output adjust screen – Modbus, Relay set points and analog output.
- Tx Setup screen – Transducer setup **(Non adjustable - Read only)**
- Tracking screen – Processing of echo **(Non adjustable - Read only)**
- Factory screen – Tuning of transducer factory adjusted **(Non adjustable - Read only)**.
- ID Search screen – Useful for locating instruments on RS485 loop.
- Volume screen – User defined 32 point table **(Requires version 3.93 or greater)**.

5.2 Menu access

To access the parameter groups click on the arrow button (1) between the 'Setup' and 'Diag' buttons on the main screen and select the group of parameters as in 2.

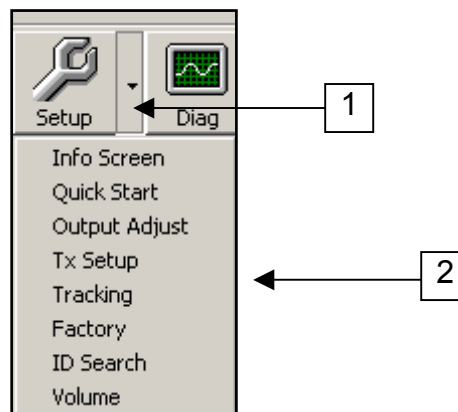


Figure 17: - Access to programming screens

5.3 Info screen – Read only

When you first connect to an instrument with the 'Connect' button (1 on page 5) an Info screen is displayed. This contains the Type, Serial number, Software Version, ModbusID and other information, which are specific to that instrument. *These values are read only and cannot be adjusted.*

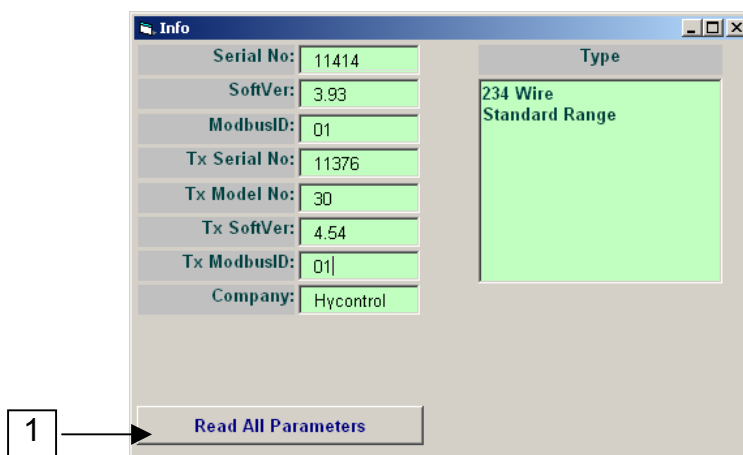


Figure 18: - Info screen

If any of the values do not appear or have a red background, click on 'Read all Parameters' (1) to refresh and re-read the data.

5.4 Quick start menu – Read / Write

To display the 'Quick Start Menu' click the Setup button (1 on page 13) or click the Down Arrow for menu selection as shown in 5.2.

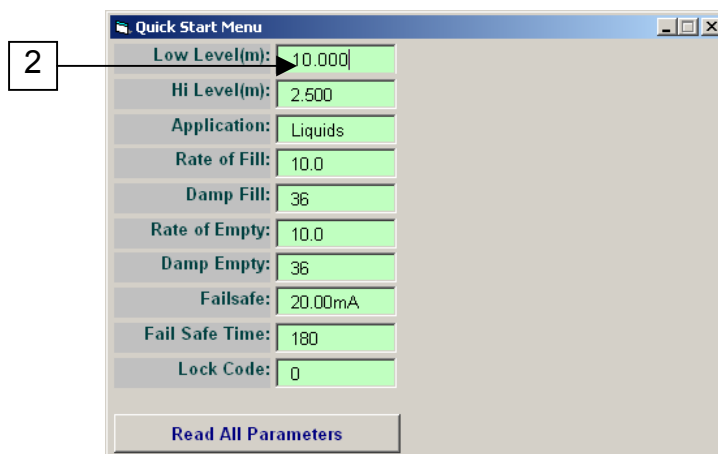


Figure 19: - Quick start menu screen

To Change a parameter

Click on any parameter field to alter it (2). The data may now be altered. Leaving the field by 'enter' or 'tab' will cause the data to be written to the device and

displayed. If the new value was successfully written and displayed, that field will stay green.

A value outside normal limits will not be accepted and the field will return to the last entry displaying “Error in writing data message” (with the required range) that needs to be input.

Parameters that were not written successfully will be displayed with a red background.

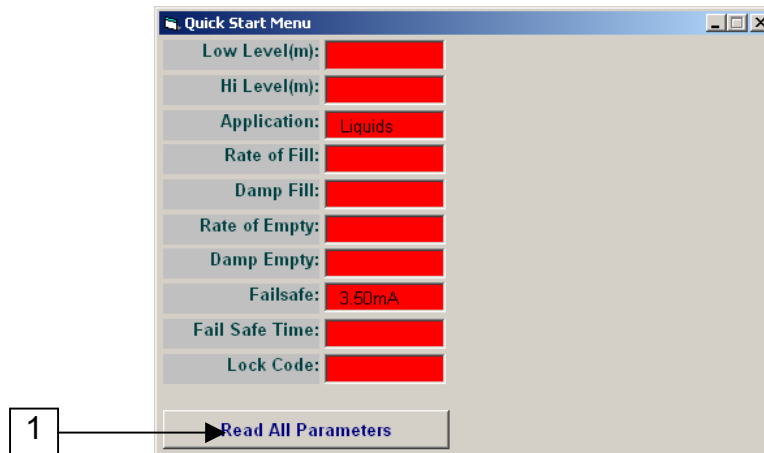


Figure 20: - Reading parameters

To refresh the parameters

To check that all new parameters have been accepted click the ‘Read All Parameters’ (1) button and check that all data displayed is correct.

- Low Level - Enter the distance from the transducer face that corresponds to the low level in the vessel – 4-20mA output level.
- Hi Level - Enter the distance from the transducer face that corresponds to the high level in the vessel – 20mA output level.
- Application - Select from Slurries, Liquids or Solids.
- Rate of fill - Rate of change of level during filling – units/hour.
- Damp fill - Damping during filling (000 to 999), a low number=fast response.
- Rate of Empty - Rate of change of level during emptying – units/hour.
- Damp Empty - Damping during emptying (000 to 999), a low number=fast response
- Failsafe - Select required mA output in failure mode.
- Failsafe time - Select time in seconds before failure is indicated.

5.5 Output Adjustment - Read / Write

MSDA, MI2, Reflex 2DC - No relays

MI3 - 2 Relays

Reflex 234 – 5 Relays

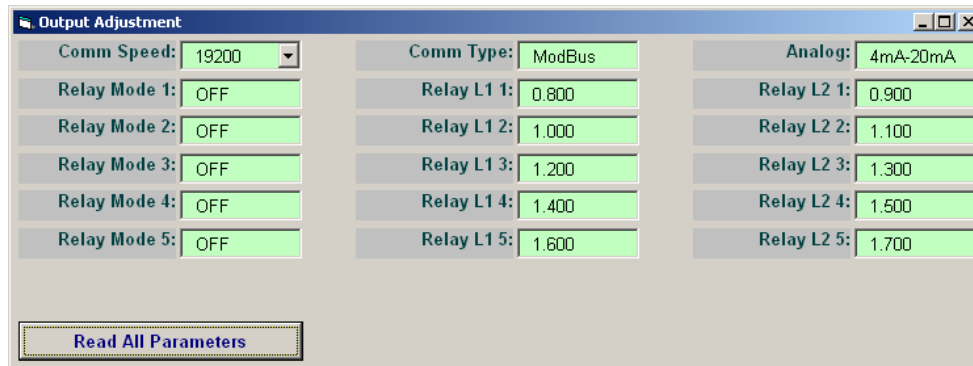


Figure 21: - Output adjustment screen

Relay Mode Options

- OFF - Relay not used
- FS - Relay will be normally energised, and de-energised if instrument goes to failsafe condition.
- EN - Relay normally energised.
Will de-energise if level above L1.
Will re-energise if level below L2.
- DEN - Relay normally de-energised.
Will energise if level above L1.
Will de-energise if level below L2.

NOTE: L1 and L2 values are set in the chosen display units, relative to the distance down from the transducer face.

5.6 Transducer Setup Menu (Tx Setup) – Read only

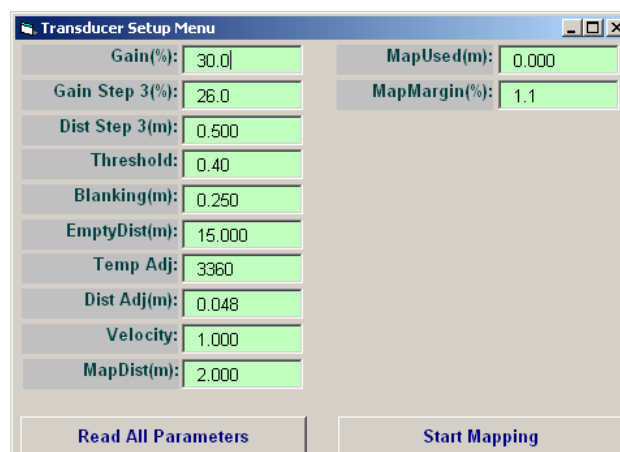
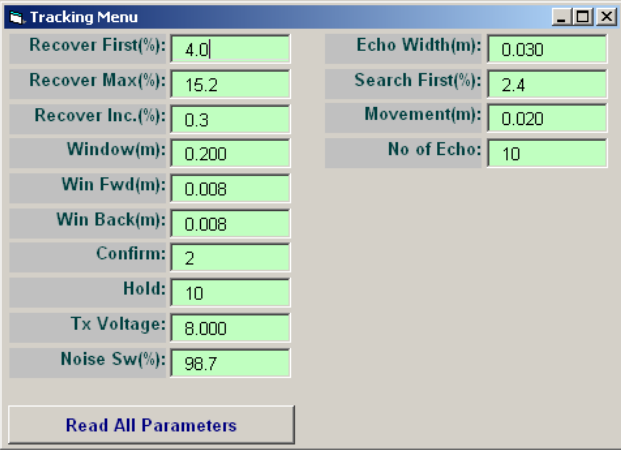


Figure 22: - Transducer Setup Menu (TX Setup) screen

NON ADJUSTABLE in Basic mode.

Please contact Hycontrol Service Department for more information.

5.7 Tracking Menu – Read only



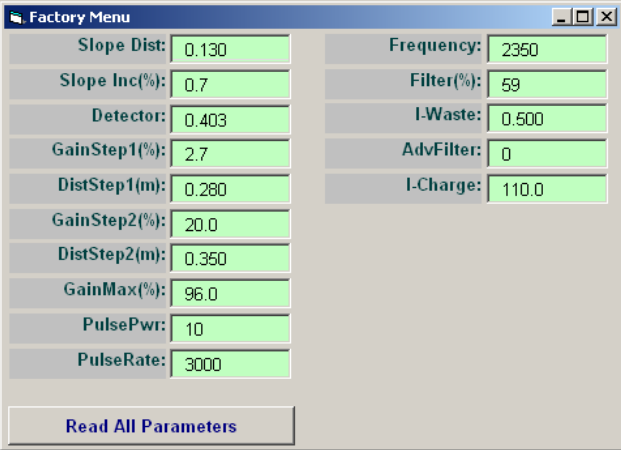
Tracking Menu	
Recover First(%)	4.0
Recover Max(%)	15.2
Recover Inc.(%)	0.3
Window(m)	0.200
Win Fwd(m)	0.008
Win Back(m)	0.008
Confirm	2
Hold	10
Tx Voltage	8.000
Noise Sw(%)	98.7
Echo Width(m)	0.030
Search First(%)	2.4
Movement(m)	0.020
No of Echo	10

Read All Parameters

Figure 23: - Tracking menu screen

NON ADJUSTABLE in Basic mode.
Please contact Hycontrol Service Department for more information.

5.8 Factory Menu – Read only



Factory Menu	
Slope Dist	0.130
Slope Inc(%)	0.7
Detector	0.403
GainStep1(%)	2.7
DistStep1(m)	0.280
GainStep2(%)	20.0
DistStep2(m)	0.350
GainMax(%)	96.0
PulsePwr	10
PulseRate	3000
Frequency	2350
Filter(%)	59
I-Waste	0.500
AdvFilter	0
I-Charge	110.0

Read All Parameters

Figure 24: - Factory menu screen

NON ADJUSTABLE in Basic or Medium mode.
Please contact Hycontrol Service Department for more information.

5.9 ID Search

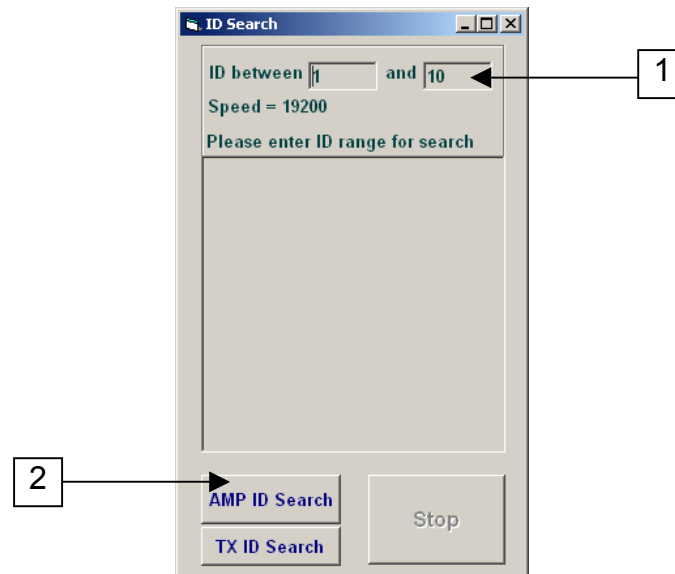


Figure 25: - ID Search screen

ID Search is a useful tool to help identify any instruments connected to the RS485 bus. Entering the range of the search (1) and then clicking on 'AMP ID Search' (2) causes the software to communicate with any Microflex LR or Reflex LR with an identical ID number. A search can be made for all the IDs from 1 to 128 in less than 2 minutes.

See section 4.5 for operation.

5.10 Volume – Read / Write

The Volume screen is used to calculate the volume based on the material level for different vessel shapes. The calculated (Level, Volume) table can be read from or written to a Microflex LR or Reflex LR unit with amplifier software version 3.72 or above and programming software Vision System II V2.0.04 or above.

No.	Mat (m)	Vol%	Vol (Cm)
31	7.500	100.00	0.1
30	7.250	96.67	0.1
29	7.000	93.33	0.1
28	6.750	90.00	0.1
27	6.500	86.67	0.1
26	6.250	83.33	0.0
25	6.000	80.00	0.0
24	5.750	76.67	0.0
23	5.500	73.33	0.0
22	5.250	70.00	0.0
21	5.000	66.67	0.0
20	4.750	63.33	0.0
19	4.500	60.00	0.0
18	4.250	56.67	0.0
17	4.000	53.33	0.0
16	3.750	50.00	0.0
15	3.500	46.67	0.0
14	3.250	43.33	0.0
13	3.000	40.00	0.0
12	2.750	36.67	0.0
11	2.500	33.33	0.0
10	2.250	30.00	0.0
9	2.000	26.67	0.0
8	1.750	23.33	0.0
7	1.500	20.00	0.0
6	1.250	16.67	0.0
5	1.000	13.33	0.0
4	0.750	10.00	0.0

Figure 26: - Volume screen

Low Level = Distance to the point that corresponds to the low level in the vessel (4mA analog output).

Hi Level = Distance from the face of the transducer that corresponds to the high level in the vessel (20mA analog output).

h3 = Distance from the face of the transducer to the top of the vessel.

h2 = Total height of the vessel.

h1 = Height of the bottom section (cone or pyramid base).

d = Diameter of the Cylinder Section.

d2 = Diameter of the Cone Base at the bottom.

w = Width of the rectangular section.

L = Breadth of the rectangular section.

Max Volume = Maximum Calculated Utilized Volume of the Vessel.

Density = Density or Specific Gravity of the material or liquid inside the vessel.

Full Scale Value (FSV) = Maximum Capacity of the Vessel.

Volume User Guide

1. Choose the Vessel Shape.
2. Set the LowLevel and HiLevel according to your application.
3. Set the Vessel parameters such as L, w, d and h1. Refer to the vessel figure for the definition of each parameter.
4. Set the values of h2 and h3 if required (optional). Tick the Enabled box to modify h2 and h3.
By default **h3=HiLevel** and **h2=(LowLevel - HiLevel)**.
5. Choose the Volume unit.
6. Enter Density or Full Scale values if necessary (optional).

$$\text{Full Scale Value (FSV)} = \text{MaxVolume} \times \text{Density}$$

In the above equation, MaxVolume is calculated by software and cannot be modified. The user may enter Density or FSV to determine the other parameter.

7. Except the critical points that are shown with red colour, any pair of (Level, Volume) points can be modified. Double Click on the points to modify.
8. Click on Write Volume to write the Level/Volume table to the unit. This also saves the application setting to the database.
To write successfully, unit must be in RUN mode and amplifier software version must be **3.72** or above.
9. After writing to the unit, make sure that the display changes to Volume and the volume unit shown on the display is the same as that you selected from Vision System II.
10. Click on 'Read Volume' to read the volume table from the unit if required.

6. Reporting Feature

The reporting feature is the ability to print out all parameters in Reflex LR or Microflex LR in a report form. The reporting has 3 sub options in its menu (Preview Current Setup, Preview Stored Setup and Preview Stored Map), all accessible by clicking the down arrow next to the report button.

6.1 Preview Current Setup

This option provides a quick preview of the current connected units setup. The displayed settings are not saved anywhere. NOTE: you must be connected to an instrument to be able to use this option. (See below)

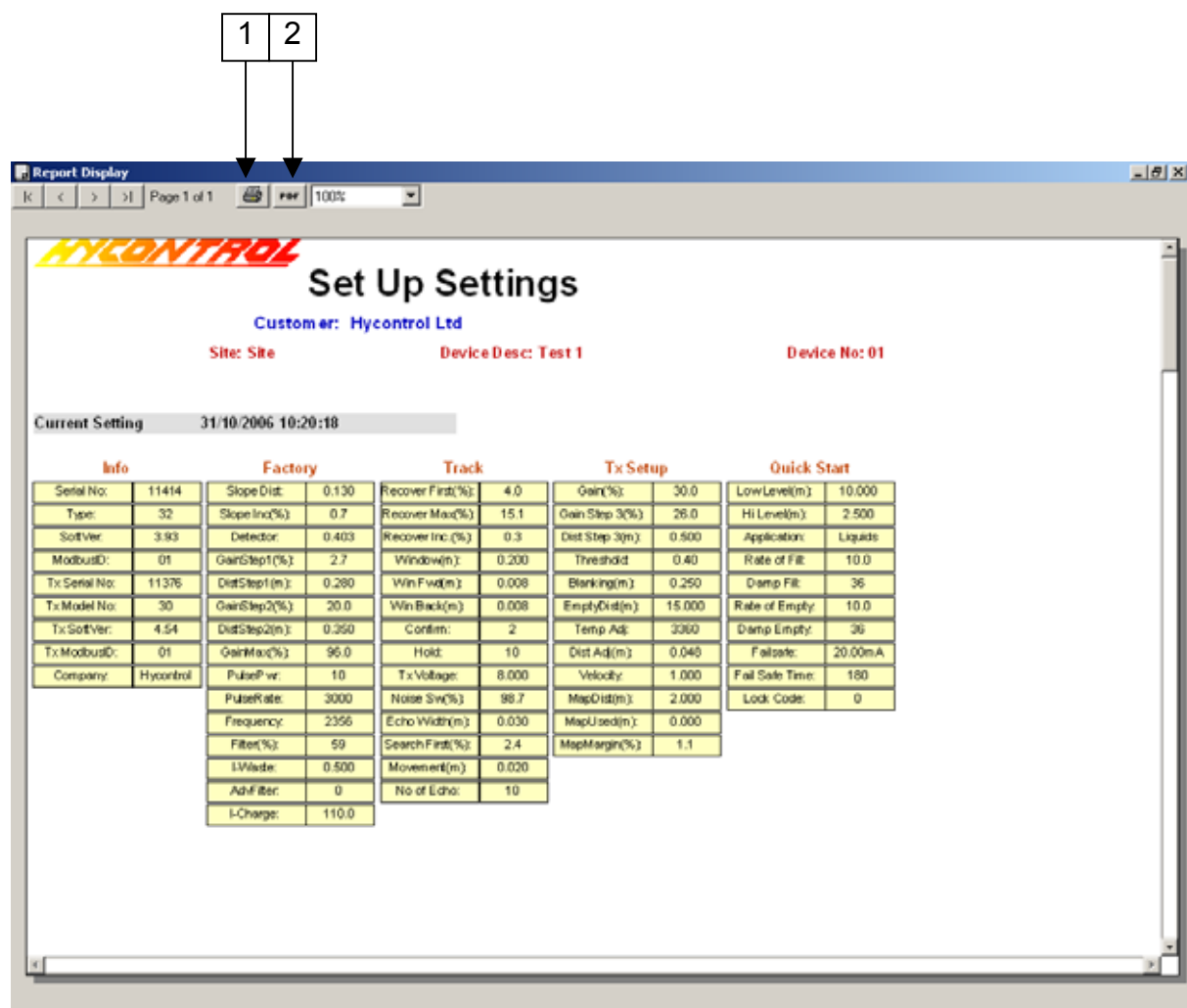


Figure 27: - Preview report screen

A copy of the displayed parameter list can be obtained by clicking on the Printer icon (1).

To create a .pdf copy of the displayed parameter list click on the PDF icon and enter a filename to save as (2).

6.1.1 Save Current Setup

NOTE: This option only becomes available after the “Preview Current Setup” option is selected and has been closed.

After closing ‘Previewed Current Setup’ you can ‘Save Current Setup’ to the database. You will be prompted with a dialogue box asking for comments and a date. Select the correct date from the combo box and then type a descriptive memo for the setup you are saving. Comments could include application information, contact details, or any other information that might be useful to identify the setup.

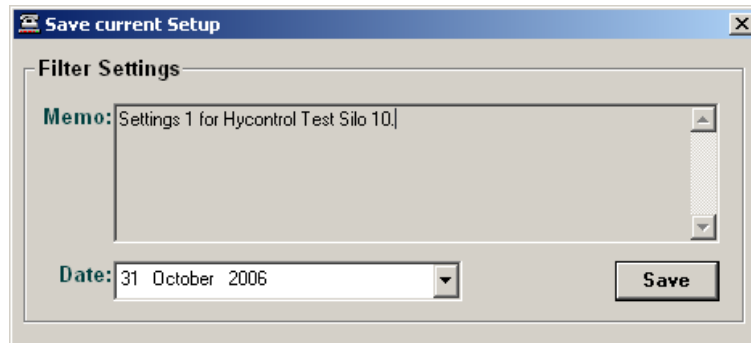


Figure 28: - Save Current Setup box

Click the ‘Save’ button to save the parameters and information to the database.

6.2 Preview Stored Setup

Clicking on ‘Preview Stored Setup’ displays the ‘Print Setup Data’ screen.

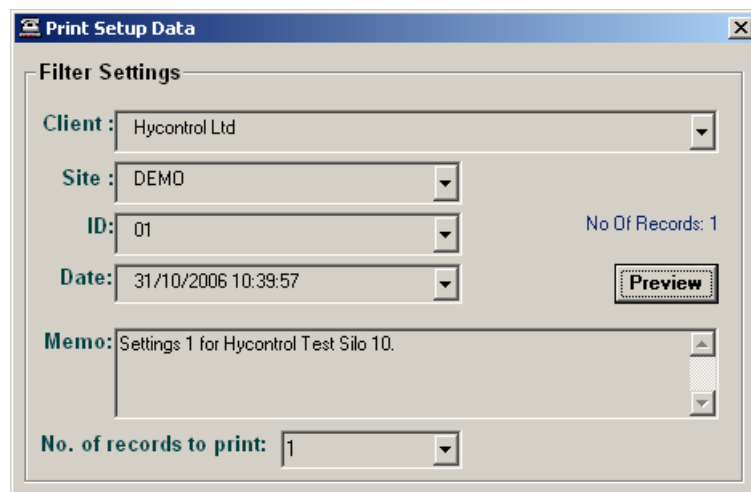


Figure 29: - Print setup box

This screen is used to retrieve saved setups. The screen includes information for client, site, ID and date. All these can be used to filter a search for a particular report. ‘No. of records to print’ dropdown box can provide a report for each instrument in a multi-unit setup. Click the ‘Preview’ button to display the saved report on screen.

6.3 Viewing Mapped Data

6.3.1 Saving Map Data

1. Request mapped data from the unit via the diagnostics screen, by clicking on the 'MapData' check box.
2. You will be prompted for a memo for the map, enter a descriptive memo.



Figure 30: - Save current Map Data screen

6.3.2 Preview Stored Map Report

Click on the arrow to the right of the report button and select 'Preview Stored Map' you will be prompted for the number of maps to display in the report and press 'Ok' button.

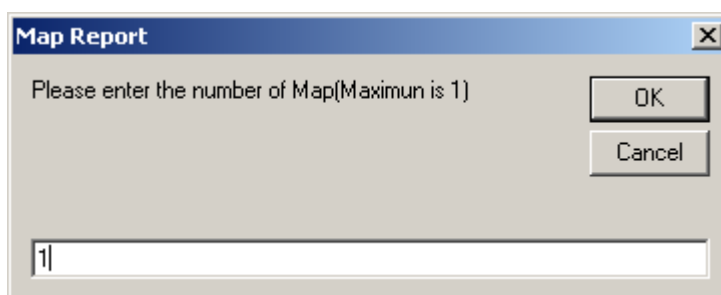
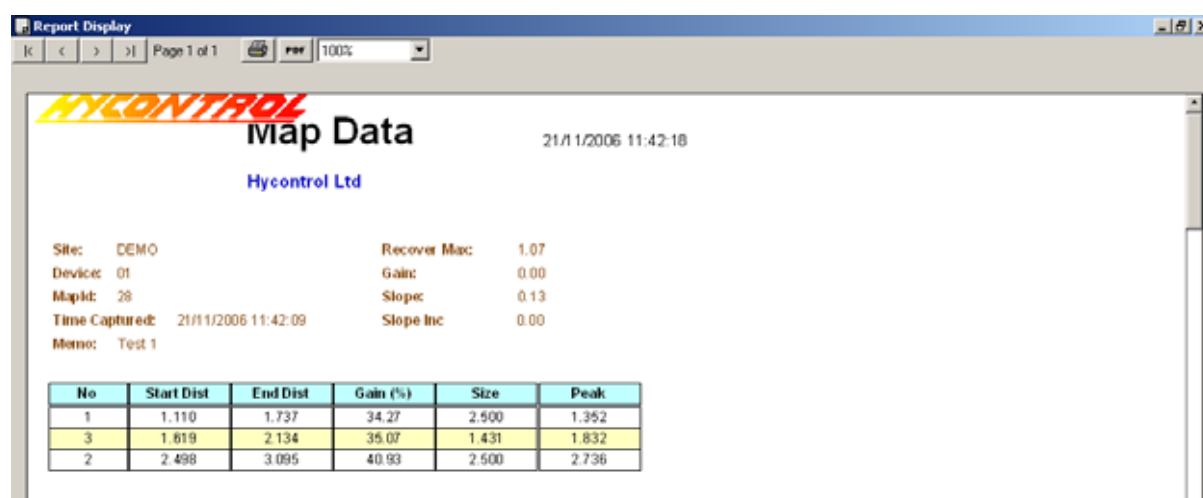


Figure 31: - Map report screen

To display Map report as below.



Report Display

Page 1 of 1

100%

HYCONTROL map Data

21/11/2006 11:42:18

Hycontrol Ltd

Site: DEMO Recover Mac: 1.07
Device: 01 Gain: 0.00
MapId: 28 Slope: 0.13
Time Captured: 21/11/2006 11:42:09 Slope Inc: 0.00
Memo: Test 1

No	Start Dist	End Dist	Gain (%)	Size	Peak
1	1.110	1.737	34.27	2.500	1.352
3	1.819	2.134	35.07	1.431	1.832
2	2.498	3.095	40.93	2.500	2.736

Figure 32: - Map Data report

7. Save/Load setup

A save and load feature allows users to save current settings and parameters and then load them again at a later stage. It also allows the users to write loaded parameters to the unit after loading (this is a considerable time saving feature).

Note: Save/Load feature is only available in Medium and Advanced levels. In basic mode, only Save Setup is available.

7.1 Save setup

The 'Save Setup' menu option saves your settings for future loading or reference.

To use this feature you must be connected to an instrument. Click the 'Connect' button to enable the menu item in the 'File' menu.

Click the 'File' menu and select 'Save Settings'. When the Capture & Save Setup screen is displayed, select the Client, Site, ID, Date and memo of the settings that they wish to save.

Note: The date and memo are purely for identification purposes, so that the user is able to easily recognize the saved settings.

Click the 'Save' button to save the settings to the database.

7.2 Load setup

The 'Load Setup' feature loads previously configured and saved settings. It also has a 'load to unit' option where the saved settings can be loaded and the parameters written directly to the unit.

NOTE: Selecting to have the parameters written directly to the unit will overwrite the parameters already stored in the unit.

Select the Client, Site ID and Date for the settings you wish to load. The Memo area provides a description of what the saved settings represent.

The No. Of Records label displays the number of records available for load.

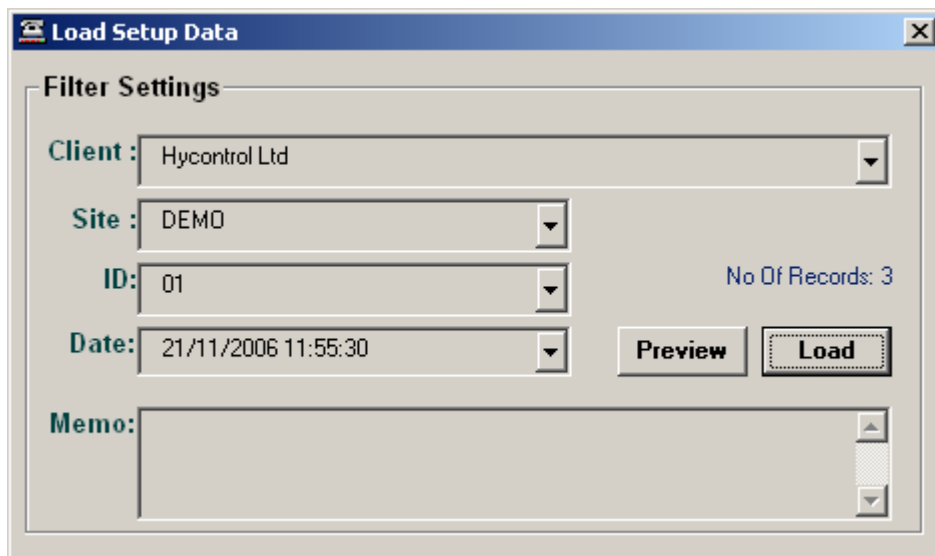


Figure 33: - Load setup data screen

Click 'Load' to display a prompt message asking if the new parameters should be written to the unit.

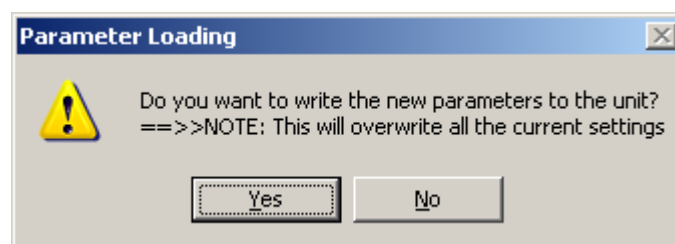


Figure 34: - Confirmation for Load & Overwriting Of Parameters in Unit

If 'YES' is clicked a second confirmation is asked before the parameters are loaded and written to the unit.

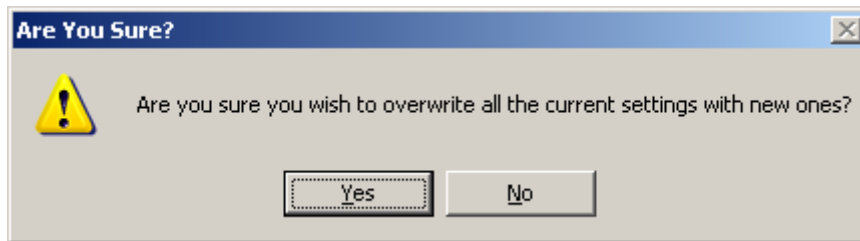


Figure 35: - Secondary Confirmation For Overwriting Of Parameters

If 'No' is clicked the parameters are loaded to all the forms only for viewing, no parameters are overwritten in the unit.

If 'Yes' is clicked the overwritten parameters in the unit are shaded blue so the user knows which parameters have been written to the unit.

Overwritten parameters have blue background, not overwritten parameters remain green

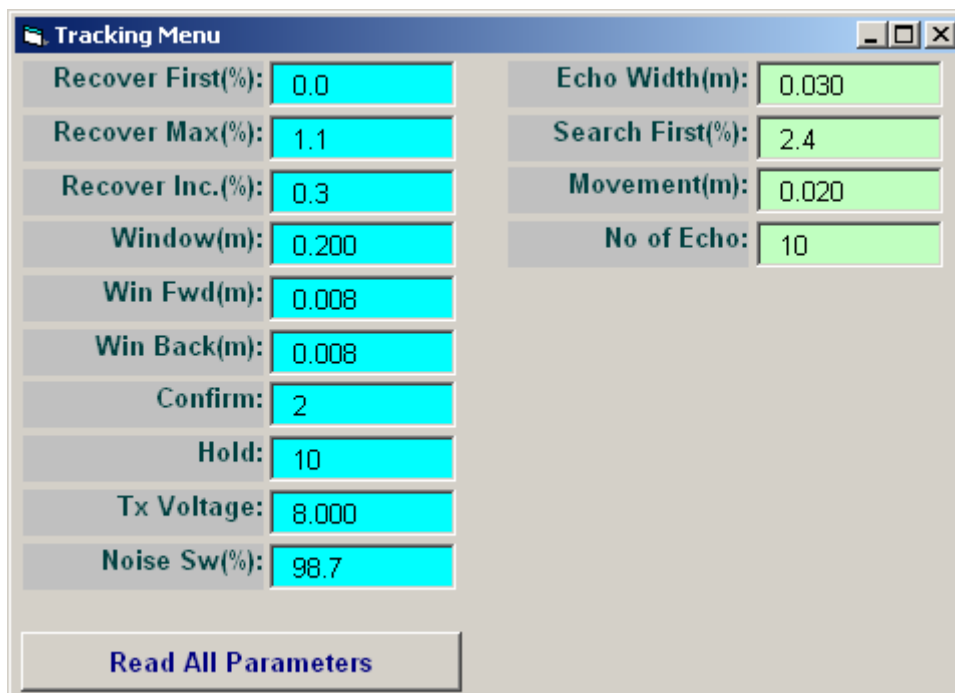


Figure 36: - Tracking menu showing overwritten parameters in light blue

8. Diagnostics

Clicking on the 'Diag' button (6 on page 5) brings up a diagnostics screen similar to below.

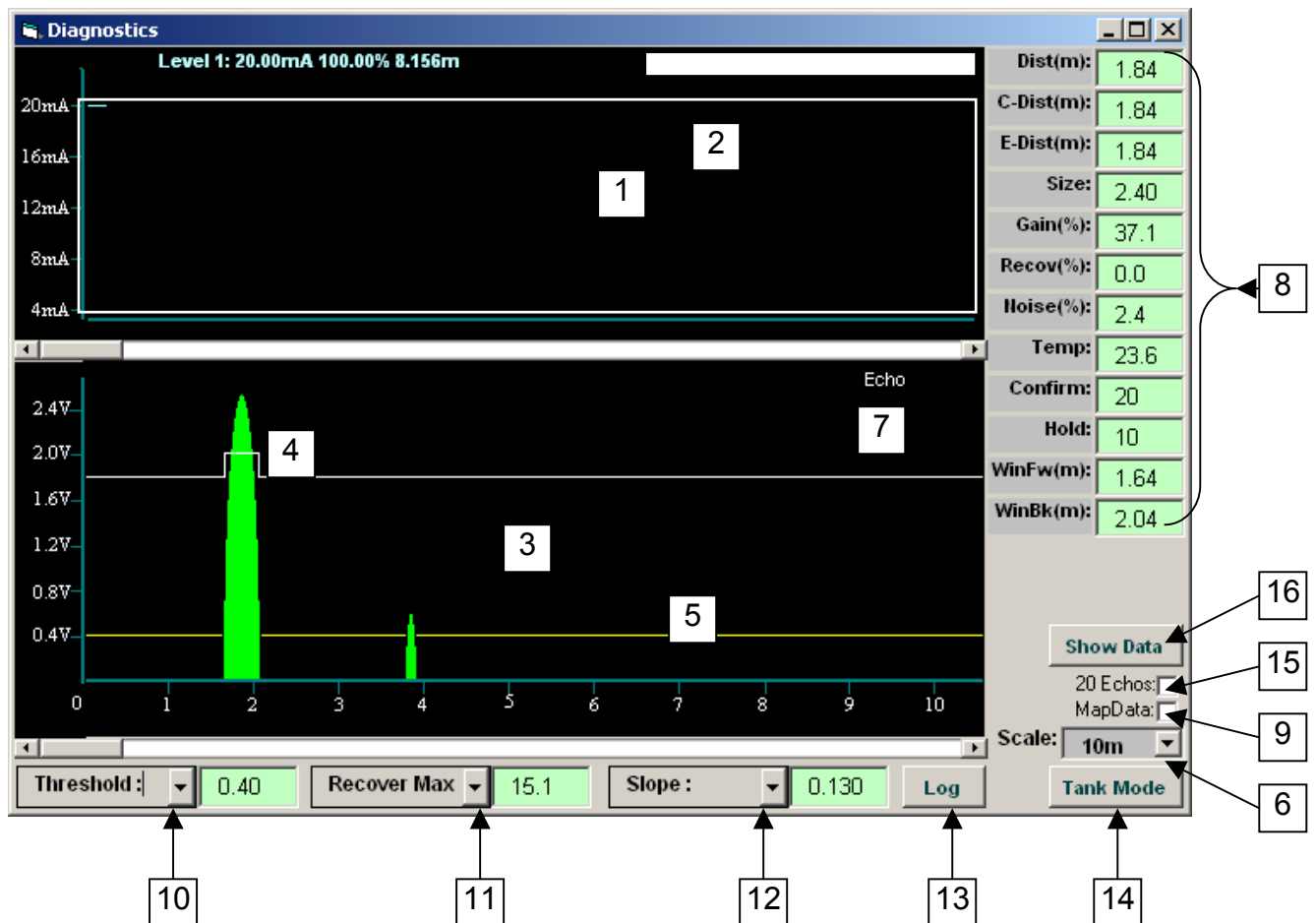


Figure 37: - Diagnostics screen

The top section **1** is a graph of the loop current output over time.

Right clicking the mouse on any part of the trace in section **1** will display the mA value for that point in the top right corner **2** until the mouse button is released.

The bottom section **3** is a display of the echoes received, their amplitude and their distance, from the transducer face.

The 'step' in the horizontal white line **4** represents the time 'window' in which the unit is looking for a valid echo.

The horizontal yellow line **5** represents the threshold. (0.4v in this case)
The horizontal distance scale can be expanded or contracted with the 'Scale' adjustment. **6** The total length can be 1m, 10m, 20m, 40m, or 60m

Clicking anywhere, the tip of an echo for example, will display the voltage at that point, in the top right corner. **7**

The following data are displayed on the right side of the screen: 8

Dist: The distance from the transducer face to the product being measured. This corresponds to the green displayed echo.

C-Dist:

E-Dist: Estimated Distance. Used during start-up to get an approximate distance before the advanced processing produces the final value.

Size: The minimum amplitude for an echo to be accepted when in the recover mode.

Gain%: The percentage of gain that is being used for this measurement.

Recov%: The gain percentage increase applied to recover from a loss of signal.

Noise%: The noise level expressed as a percentage of gain.

Temp: The current temperature (in degrees Celcius) measured at the transducer

Confirm: The number of consecutive, consistent echos received before being confirmed as valid.

Hold: The number of transmit-and-measure cycles performed, when no echo is detected, before the unit goes into Recover mode.

WinFw(m): The distance per pulse that the window will move forwards to go to another echo when the unit is in the recover mode

WinBk(m): The distance per pulse that the window will move backwards to go to another echo when the unit is in the recover mode

Note

In the Recover mode the window will double in width after the 'Hold No' counts down to zero. If no echo is confirmed in this larger window the recover mode will continue until the window covers the position of the echo. The output will then move to the new echo position at a rate dictated by the damping number.

Echos that are 'mapped out' are displayed in red. This information is read from the Reflex LR or Microflex LR only once, so if a change is made to the mapping the display will not be updated until the refresh button **9** is clicked.

The three windows along the bottom **10** **11** **12** can each be configured to display a number of variables...

10	11	12
Gain	Recover First	Slope
Gain Step 3	Recover Max	GainStep 1
Threshold	Recover Inc	DistStep 1
Blanking	DistStep 3	GainStep 2
	Window	DistStep 2

Click the 'Log' button **13** to activate the data-logging function, a box is displayed in which you specify the location and filename for the data file.

A text file will be created and each line contains the following data...

```
Date,Time,Device ID,Distance,E_Dist,Size,Gain,Recover,
Noise,Temp, Confirm,Hold,Win Start,Win End,
EchoNo1,Start Dist1,Peak Dist1,Size1,Gain1,EndDist1,
EchoNo2,Start Dist2,Peak Dist2,Size2,Gain2,EndDist2,
EchoNo3,Start Dist3,Peak Dist3,Size3,Gain3,EndDist3,
EchoNo4,Start Dist4,Peak Dist4,Size4,Gain4,EndDist4,
EchoNo5,Start Dist5,Peak Dist5,Size5,Gain5,EndDist5,
EchoNo6,Start Dist6,Peak Dist6,Size6,Gain6,EndDist6,
EchoNo7,Start Dist7,Peak Dist7,Size7,Gain7,EndDist7,
EchoNo8,Start Dist8,Peak Dist8,Size8,Gain8,EndDist8,
EchoNo9,Start Dist9,Peak Dist9,Size9,Gain9,EndDist9,
EchoNo10,Start Dist10,Peak Dist10,Size10,Gain10,EndDist10
```


14 Tank Mode – clicking on this divides the screen as shown. Click back on 'Normal' for normal screen layout.

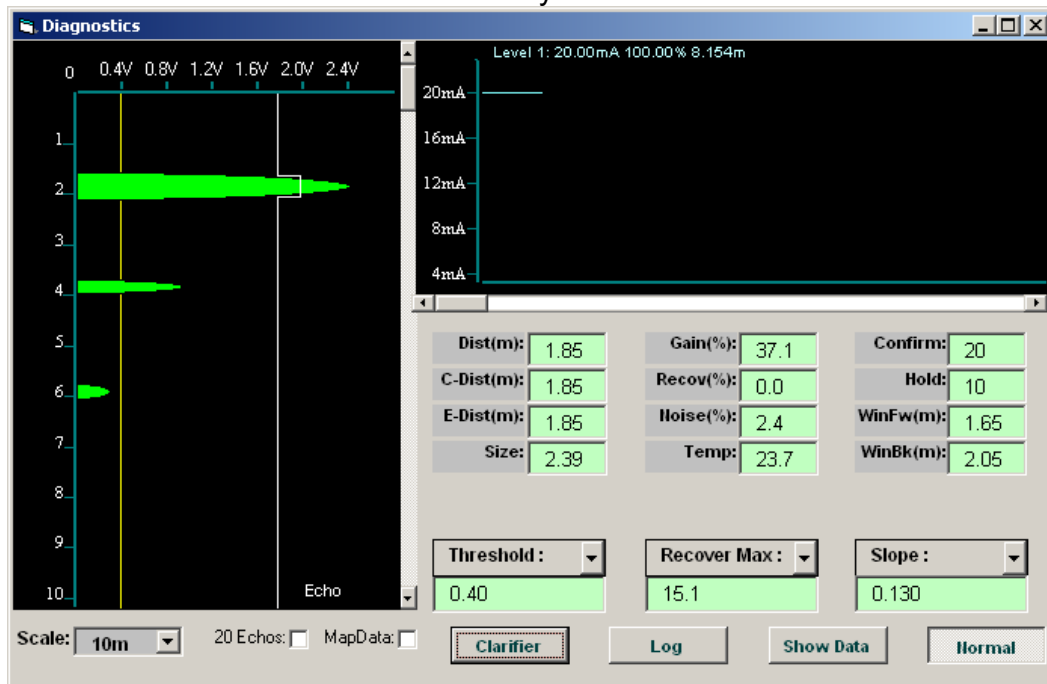


Figure 38: - Diagnostics screen in upright tank mode

15 20 Echos. When this is selected on diagnostic, Vision System reads a maximum of 20 echos. You may see 1-20 echos by selecting Show Data. By default this value is 10.

16 Show Data – clicking on this screen shows echo Start/End and Gain% & Size of echo in volts (v). Click on 'Hide Data' to hide the 'Show Data' screen.

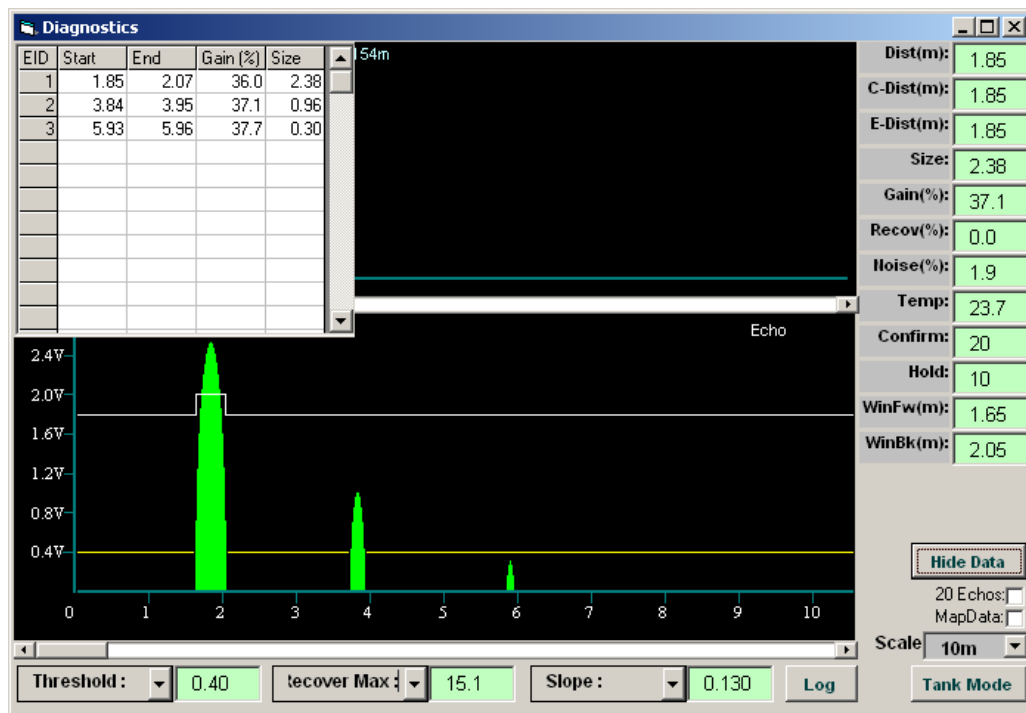


Figure 39: - Diagnostics screen showing multiple echo data

9. Tank view

Clicking the 'Tank View' button (7 on page 5) allows the data from multiple units to be displayed, nine units per screen, as shown below.

In this example, Device ID records have been created for five units (01 to 05) but only one unit (device ID = 01) is connected.

If more than nine device ID records exist, buttons for the next and subsequent screens will be displayed here _____

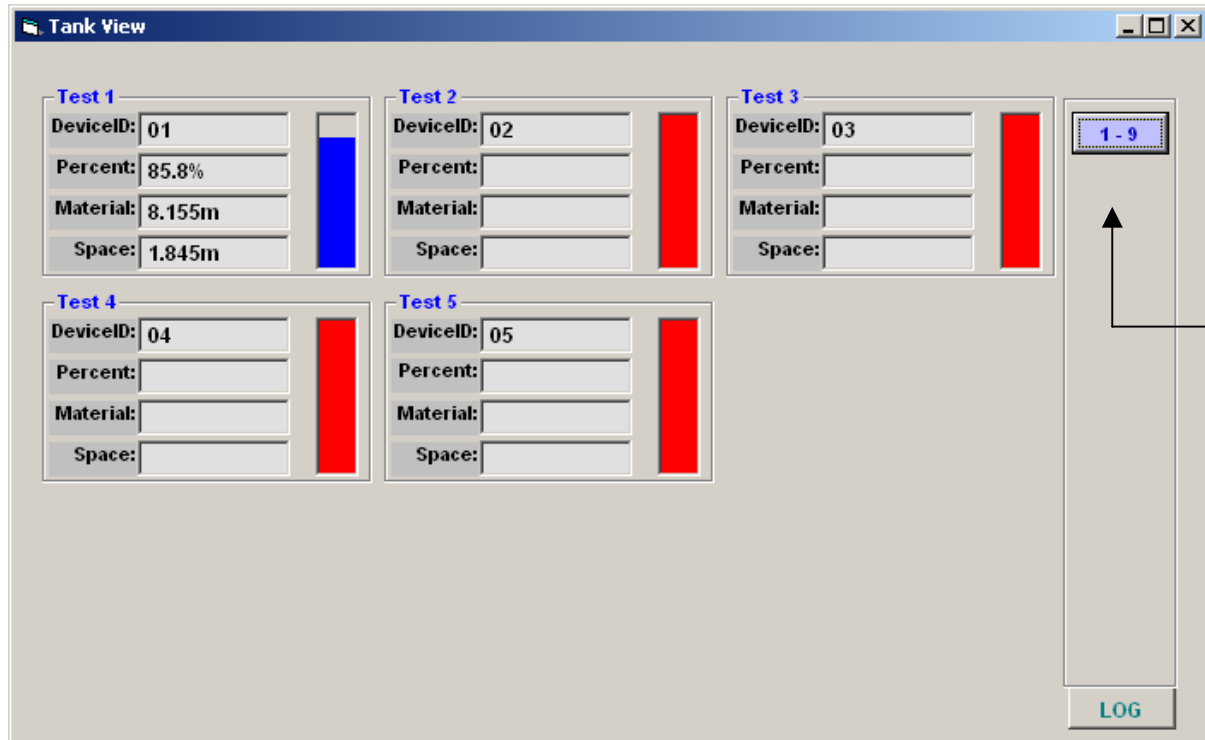


Figure 40: - Tank display screen

10. RS485 Troubleshooting

Unable to communicate with a Reflex LR or Microflex LR device?

10.1 Introduction

To be able to communicate with a Reflex LR or Microflex LR instrument via the Vision System II requires the following steps to have taken place.

1. The instrument to be connected to the PC via a (USB or RS232) to RS485 converter and wired in accordance with the wiring diagram and good wiring practice (Section 10.2).
2. Both the Vision System II software and the instrument must have the same baud rate selected (Section 10.5). (Default=19200baud).
3. The COM port used by the RS485 converter must be selected in the Vision System (Section 10.4).
4. Each instrument attached to the same RS485 communication bus must have a different Device ID (Section 10.7).

For the Vision System to successfully connect to an instrument. The Device ID selected in the Device ID selection box on the Vision System must match the Device ID of the instrument (Section 10.7).

10.2 Wiring

- 1 x USB serial adapter USB-COMi or USB-COMi-SI (www.easysync.co.uk)
- 1 x Twisted pair screened cable (Belden 8451 or Alpha 2461 or equivalent).
- 2 x 120Ω resistors

The following wiring can be used to connect to the Reflex LR or Microflex LR using either the USB-COMi & USB-COMi-SI RS485 serial converter.

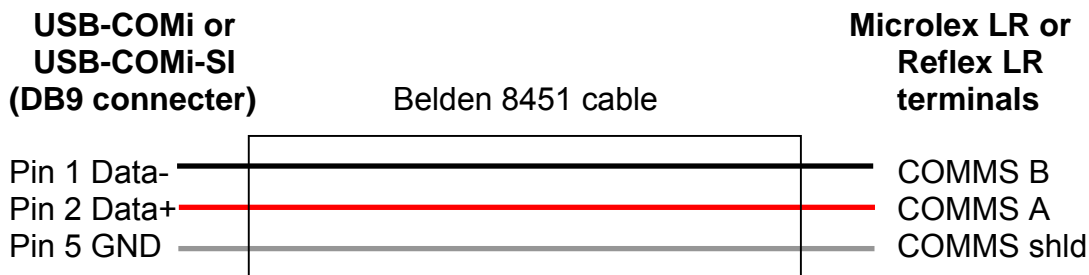


Figure 41: - USB-COMi & USB-COMi-SI wiring to Microflex LR & Reflex LR

USB-COMi / USB-COMi-SI jumper settings

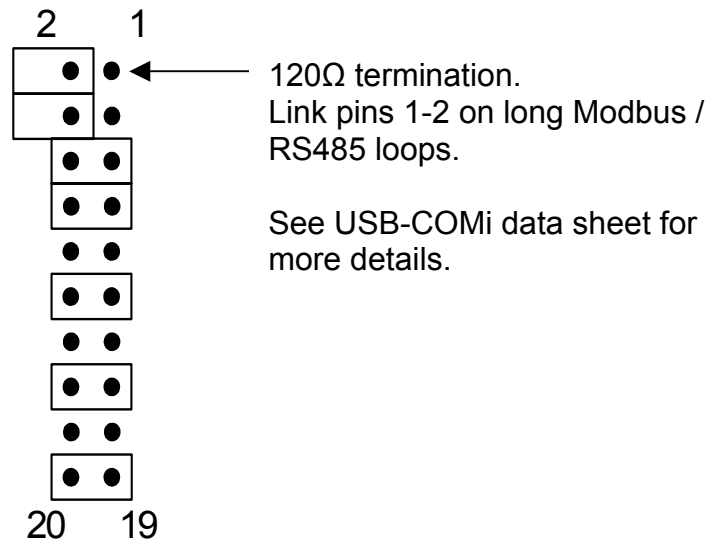


Figure 42: - Jumper settings

10.3 MODBUS Communication with multiple REFLEX LR and MICROFLEX LR instruments

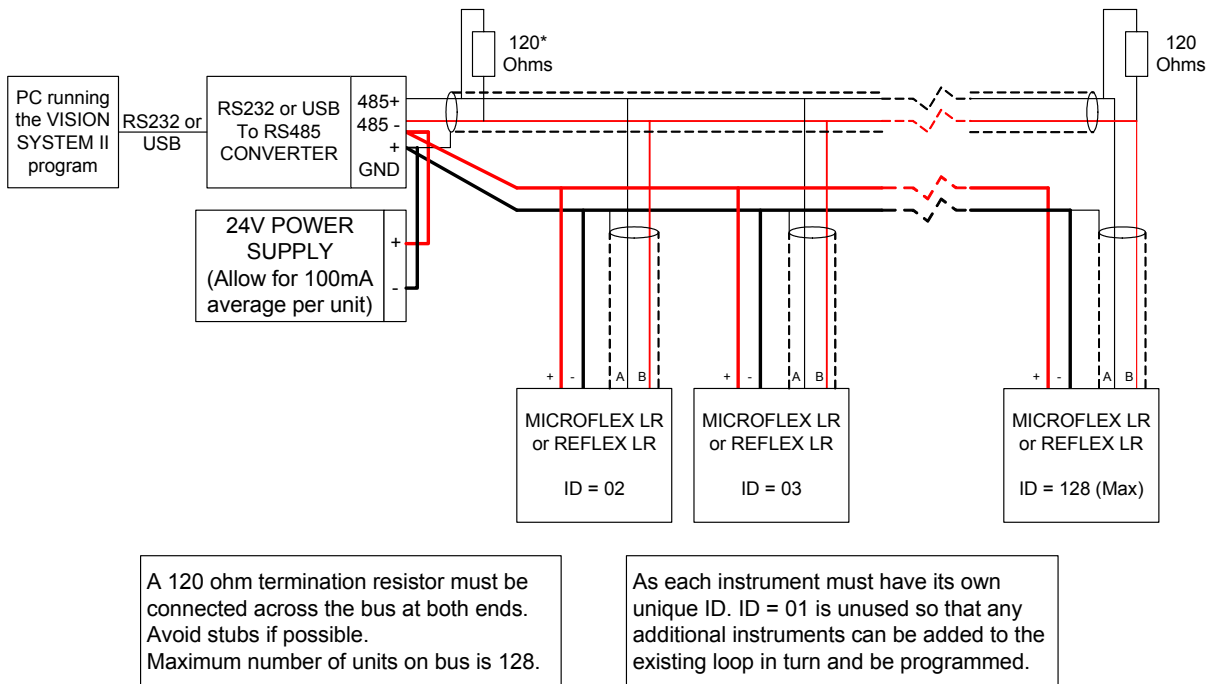


Figure 43: - MODBUS wiring diagram

*This resistor is not required if using either the USB-COMi or USB-COMi-SI with pins 1 and 2 of the internal jumper settings linked together.

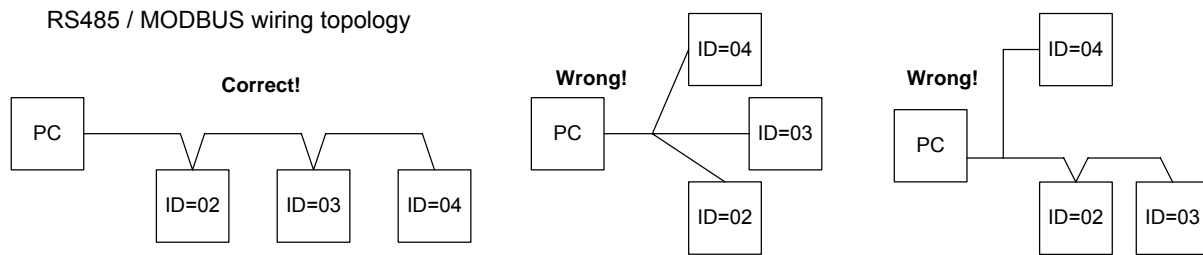


Figure 44: - RS485 / MODBUS wiring topology

10.4 Setting COM port

Check that the correct COM port has been selected in the Vision System II properties screen. To display this screen click 'View' from main menu then 'Options...'

Note:

1. Only valid COM ports detected by the Vision System II software will appear in the Vision System properties screen.
2. It is possible for Windows to assign different logical COM port numbers to the same hardware port when used by different devices. To check for the assigned COM port use Windows Device Manager as shown on following page.

10.5 Setting baud rate

As default all Reflex & Microflex LR instruments have the Baud rate set to 19200baud. Ensure that the baud rate selected in Vision System II matches the baud rate set in the attached instruments.

10.6 Using Windows Device Manager to view detected COM ports.

You can check your Windows Device Manager to view all of the detected COM ports.

To open Windows Device Manager, click on 'Start' in task bar, right click on 'My Computer' select 'Properties'. Click the 'Hardware' tab and click the 'Device Manager' button.

In Device Manager double click on 'Ports (COM & LPT)' (1) to see which COM ports Windows has assigned.

In this following screen shot Windows has assigned COM10 as the USB Serial Port.

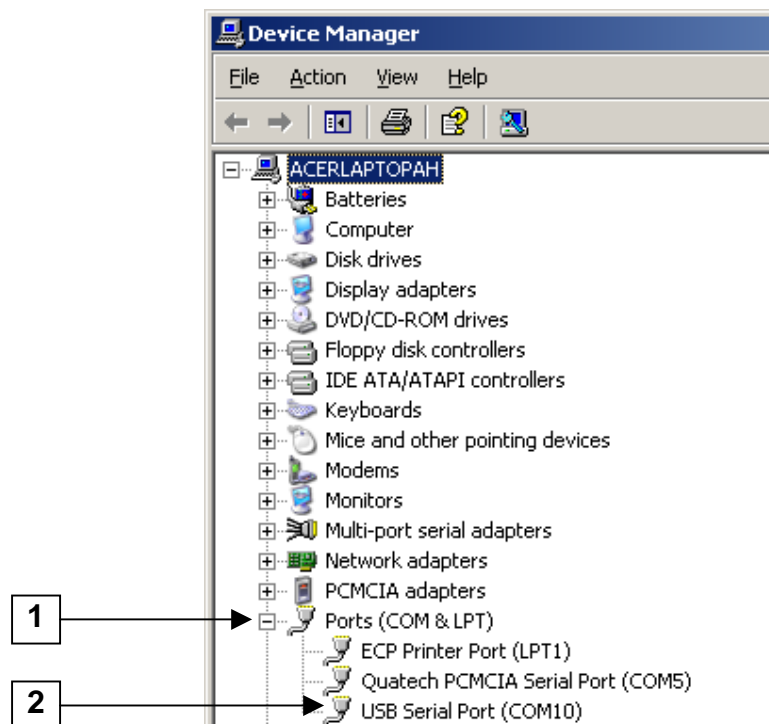


Figure 45: - Using Device Manager

The detected COM port should be selected in the Vision System II. (See Section 10.4)

10.7 Setting Device ID

Check that the Device ID selected in Vision System II matches the one selected in the instrument you wish to connect to, and that any other instruments attached to the same RS485 loop each have a unique Device ID.

You can use the ID Search tool to identify any connected instrument on the RS485 bus by clicking on AMP ID Search as shown in **Section 5.9**. This will identify any connected instruments and their IDs.

To connect to instruments with a Device ID greater than 5 you will either need to change one of the ID definitions as in **Section 4.3** or add a new Device ID as shown in **Section 4.2**.

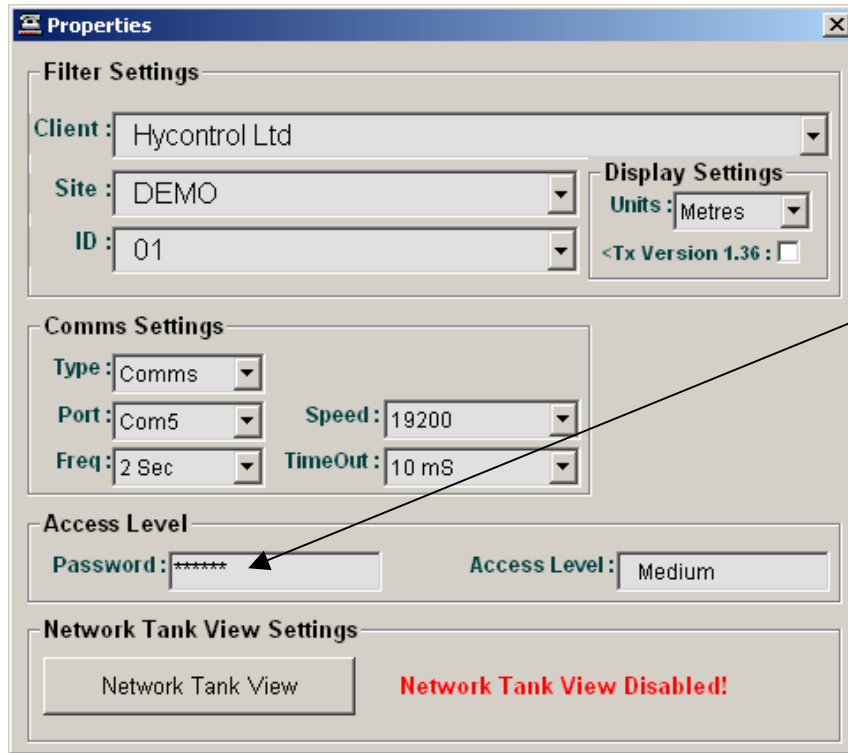
Appendix A - Access level

A password is required for any access level other than Basic.
Please contact Hycontrol Service Department for more information.

1. Basic
2. Medium

Access Level		Basic	Medium
Password Required		No	Yes
Setup Forms	Info	R	R
	Quick Start	R/W	R/W
	Relays in OutputAdj	R/W	R/W
	Comm in OutputAdj	R	R
	TxSetup	R	R/W
	Tracking	R	R/W
	Factory	R	R
	Diagnostic	R	R/W
	Volume	R/W	R/W
Functions	ID Search	Yes	Yes
	Flashing	No	Yes
	Saving Data	Yes	Yes
	Report	Yes	Yes
	Loading Data	No	Yes

Figure 46: - Access level table



1. Enter the Password and press return key to determine the Access Level.

Figure 47: - Password entry



Invalid Password resets the Access Level to Basic.

Figure 48: - Invalid password message

Appendix B - Modbus Diagnostic Registers (Ver 3.85 and later)

Reflex LR and Microflex LR series units communicate using '2 wire' (plus Ground) RS485 connection, and can be connected in 'multi-drop' configurations.

Protocol: Modbus RTU (2 wire)
Speed: 19200 Baud
Data bits: 8
Parity: None
Stop Bits: 1

Reflex LR and Microflex LR series units act as 'slave' devices on a Modbus network.

Units are shipped from the factory with a default Modbus address of 1. The Modbus address of any unit can be changed individually if units are to be connected in a multi-drop network. Each address number must only be used once on any network (possible addresses are 1...255).

The registers below are not an exhaustive list, though all commonly used functions are covered.

Diagnostic Block (*Read Only*): *Can be read as Singles or any Block wholly within the limits of this range of addresses*

40124 -	LOW LEVEL span set point in mm
40125 -	HIGH LEVEL span set point in mm
40126 -	DISPLAYED DISTANCE (DISTANCE) in mm
40127 -	NOT USED
40128 -	NEW DISTANCE (E-DISTANCE) in mm
40129 -	CONFIRM DISTANCE (C-DISTANCE) in mm
40130 -	ECHO SIZE in Volts/102
40131 -	GAIN at Echo detection point in %/7.5
40132 -	NOT USED (Gain Limit)
40133 -	RECOVER GAIN currently being used in %/7.5
40134 -	NOISE in %/7.5
40135 -	TEMPERATURE in Degrees K/10 ((DegreesC-273.2)/10)
40136 -	NOT USED
40137 -	CONFIRM COUNTER current value
40138 -	HOLD COUNTER current value
40139 -	NOT USED
40140 -	WINDOW FORWARD POSITION in mm
40141 -	WINDOW BACK POSITION in mm

Identity Information (*Read Only*): *MUST Read as SINGLES-NOT BLOCKS*:

- 40002 - SERIAL NUMBER raw number
- 40003 - TYPE NUMBER raw binary values- bits defined as listed here:
 - Bit0- Power Configuration- '0'= 234 wire
'1'= 2 wire
 - Bit1- Range/Resolution- '0'=Standard(60m/1mm)
'1'=Long(175/4mm)
 - Bit5- Mechanical Config- '0'=Remote
'1'=Integral
- 40004 - AMPLIFIER SOFTWARE VERSION raw number/100
- 40005 - AMPLIFIER MODBUS ID raw number
- 40006 - AMPLIFIER MODEL NUMBER- values defined as listed here:
 - 0-Acoustic Wave
 - 1-Sonar
 - 7-Crane Master
 - 8-Dedicated Flow
 - 9-Position Slave
- 40402 - TRANSDUCER SERIAL NUMBER raw number
- 40403 - TRANSDUCER MODEL NUMBER raw number (tx freq. in kHz)
- 40404 - TRANSDUCER SOFTWARE VERSION raw number/100
- 40405 - TRANSDUCER MODBUS ID raw number

Span Adjustment (*Read/Write*) *MUST Read/Write SINGLES-NOT BLOCKS*:

- 40013 - LOW LEVEL span set point in mm
- 40014 - HIGH LEVEL span set point in mm

RELAY Function Adjustment (*Read/Write*) *MUST Read/Write SINGLES-NOT BLOCKS*:

- 40052 - Relay 1 Mode setting- values defined as listed here:
 - 0-OFF
 - 1-FS (Failsafe)
 - 2-EN (Energise on Level)
 - 3-DEN (De-Energise on Level)
- 40053 - Relay 2 Mode setting- values defined as listed for Relay 1 above
- 40054 - Relay 3 Mode setting- values defined as listed for Relay 1 above
- 40055 - Relay 4 Mode setting- values defined as listed for Relay 1 above
- 40056 - Relay 5 Mode setting- values defined as listed for Relay 1 above
- 40036 - Relay 1 L1 set point in mm
- 40037 - Relay 1 L2 set point in mm
- 40038 - Relay 2 L1 set point in mm
- 40039 - Relay 2 L2 set point in mm
- 40040 - Relay 3 L1 set point in mm
- 40041 - Relay 3 L2 set point in mm
- 40042 - Relay 4 L1 set point in mm
- 40043 - Relay 4 L2 set point in mm
- 40044 - Relay 5 L1 set point in mm
- 40045 - Relay 5 L2 set point in mm

Extended Params (Read/Write) *MUST Read/Write SINGLES-NOT BLOCKS*:

- 40060- DISPLAY UNITS parameter setting- values defined as listed here:
0-Frequency (Hz) *Not valid for level instruments*
1-Pressure (kPa) *Not valid for level instruments*
2-Pressure (PSI) *Not valid for level instruments*
3-Millimetres
4-Centimetres
5-Metres
6-Feet
7-Inches
- 40015- FAILSAFE MODE parameter setting- values defined as listed here:
0- 3.5mA
1- 3.8mA
2- 20.2mA
3- Last Known
4- 4.0mA
5- 20.0mA
- 40016- FAILSAFE TIME parameter setting- in seconds
- 40017- APPLICATION TYPE parameter setting- values defined as listed here:
0-Liquid
1-Solid
2-Slurry
3-Position
- 40018- FILL RATE parameter setting- in metres per hour/10
- 40019- EMPTY RATE parameter setting- in metres per hour/10
- 40020- DISPLAY MODE parameter setting- values defined as listed here:
1-Volume
2-Flow
3-Material %
4-Material
5-Space (Ullage)
6-Differential Output
7-Average Material
- 40065- FLOW UNITS parameter setting- values defined as listed here:
32-Litres
33-Kilolitres
34-Megalitres
35-Cubic Metres
36-Cubic Feet
- 40031- FLOW EXPONENT parameter setting- in raw units/100
- 40032- FLOW MAX parameter setting- in selected flow units per second/10
- 40033- LOW CUT OFF parameter setting- in mm
- 40033- OFFSET parameter setting- in mm (0-5000)
- 40021- LOCK CODE parameter setting- raw number
- 40022- FILL DAMPING parameter setting- raw number
- 40023- EMPTY DAMPING parameter setting- raw number
- 40064- ANALOG mode parameter setting- values defined as listed here:
0- 4-20mA (4mA low, 20mA high- standard)
1- 20-4mA (20mA low, 4mA high- inverted)
- 40448- GAIN parameter setting in %/7.5

40449- GAIN STEP parameter setting in %/7.5
 40450- DISTANCE STEP parameter setting in mm
 40451- THRESHOLD parameter setting in Volts/100
 40452- BLANKING parameter setting in mm
 40453- EMPTY DISTANCE parameter setting in mm
 40454- TEMPERATURE ADJ parameter setting- raw number
 40455- DISTANCE ADJ parameter setting in mm
 40456- VELOCITY parameter setting Value/10000
 40457- MAP DISTANCE parameter setting in mm
 40458- MAP USED parameter setting in mm
 40461- MAP MARGIN parameter setting in %/7.5
 40434- RECOVER FIRST parameter setting in %/7.5
 40435- RECOVER MAX parameter setting in %/7.5
 40436- RECOVER INCREMENT parameter setting in %/7.5
 40437- WINDOW parameter setting in mm
 40438- WINFWD INC parameter setting in mm
 40439- WINBACK INC parameter setting in mm
 40440- CONFIRM parameter setting- raw number
 40441- HOLD parameter setting- raw number
 40442- TX VOLTAGE parameter setting in V/413.25
 40445- NOISE SWITCH parameter setting in %/7.5
 40446- ECHO WIDTH parameter setting in mm
 40433- SEARCH FIRST parameter in %/7.5
 40034- MOVEMENT parameter setting in mm
 40419- SLOPE DIST parameter setting in mm
 40420- SLOPE INC parameter setting in %/7.5
 40421- DETECTOR parameter setting in V/1240.7
 40422- GAIN STEP1 parameter setting in %/7.5
 40423- DISTANCE STEP1 parameter setting in mm
 40424- GAIN STEP2 parameter setting in %/7.5
 40425- DISTANCE STEP2 parameter setting in mm
 40426- GAIN MAX parameter setting in %/7.5
 40427- PULSE POWER parameter setting- raw number
 40428- PULSE RATE parameter setting- raw number
 40429- FREQUENCY parameter setting- raw number
 40430- FILTER parameter setting- raw number
 40431- ADVANCED FILTER parameter setting- raw number
 40026- I-WASTE parameter setting in mA/1000
 40035- I-CHARGE parameter setting in mA/37.22