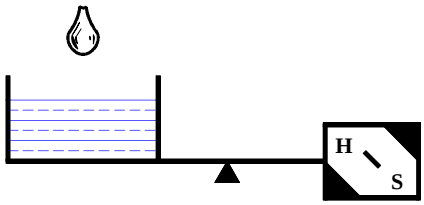

INSTRUCTION MANUAL

MULTI OUTPUT DRY TRANSDUCER

MODEL WL3100

HYDROLOGICAL SERVICES PTY LTD
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HYDROLOGICAL SERVICES STANDARD WARRANTY TERMS

WARRANTY, DISCLAIMER AND LIMITATION OF LIABILITY:

We warrant this product to be free from defects in material and workmanship for a period of three years from the date of shipment hereof or its total rated life, whichever first occurs. During the warranty period, we will repair or replace this product if it is returned to us with shipping charges prepaid and we determine it to be defective. This warranty shall not apply if this product has been subjected to misuse, negligence, accidents, or misapplied, or modified or repaired by unauthorised persons, or improperly installed, and we shall not be liable to any person for personal injury or property damage caused by such a product.

All other warranties, express and implied, including warranties of MERCHANTABILITY and FITNESS FOR A PARTICULAR PURPOSE, are disclaimed. All other remedies and liabilities, including incidental, consequential, and special damages, losses, and expenses, are excluded.

Note: It is Hydrological Services' policy to support all of our products. If design or workmanship problems arise after this statuary warranty period we request that you contact us.

HYDROLOGICAL SERVICES PTY LTD

MULTI OUTPUT DRY TRANSDUCER WL3100

1. Introduction

The Hydrological Services Multi Output Dry Transducer model WL3100 is a low power, microprocessor controlled dry transducer designed for field operation to enable measurement of water level. The internal CMOS circuitry enables the WL3100 to output measured levels in absolute format on an LCD display or as a 4-20mA, RS232 or SDI-12 signal.

The SDI-12 output allows multiple connection to a single data logging recorder, transmitting at 1200 baud over distance up to 60 metres (200 ft).

When used in conjunction with a Hydrological Services Dry Bubble Unit, Model HS-23 or the HS-55 or HS-40 Compressor Units, it allows the measurement of water head to a fine degree of accuracy and repeatability.

Note: All units are factory calibrated over their full operating temperature and pressure range in our Environmental Chamber and Ruska Pressure Calibrator. A calibration certificate is supplied with each Sensor.

2. Specification

a) SPECIFICATION - Mechanical

Enclosure:	Aluminium diecast weatherproof enclosure IP65
Dimensions:	180 x 105 x 100 mm
Weight:	1.2 kg
Isolation Diaphgram	316 Stainless Steel
Operating range:	0-5, 0-10, 0-15 , 0-20, 0-30 metres water head (Imperial units also available up to 100 feet range).
Over pressure:	2.67 x ranges
Operating Temperature:	-40 ^{o}C to +80 ^{o}C (-40 ^{o}F to +176 ^{o}F) (Excluding LCD Display)
Humidity :	100 % non condensing
Overall Accuracy:	±0.02 % F.S. BSL
Long Term Stability:	Typically ±0.05 % F.S./annum
Pressure Connection:	1/40 Tube
Sensor Vent:	Sintered Filter
Calibration:	Over full range against water head.

b) SPECIFICATION - Electrical

Operating Voltage:	9.6 to 16VDC operation ie. from SDI-12 +12 volt supply
Current Loop Operating Voltage:	9V to 30V DC for 4-20mA current loop drive (used as a 2-wire current loop transducer)
Insulation:	Greater than 100M**S** at 500 V DC
LCD Backlight	Powered via SDI-12 port (9.6 to 16 VDC)
LCD Operating Temperature:	-20 ^{o}C to 60 ^{o}C (-4 ^{o}F to 140 ^{o}F)
Display:	Water Level, 4-20mA range, time and date.
Parameters:	User selectable via push buttons on the pressure transducer housing
LCD Operation:	LCD display is standard with auto shutdown after 35 seconds idle.
Power Consumption:	Low standby power < 20uA (when on 3.6V lithium)
Operating Power:	10mA from SDI-12 supply while taking a measurement and 3.0mA between measurements.
Options:	All options are user programmable via the SDI-12 interface and saved in an on board EEPROM.
Units:	Metric or Imperial scaling (selectable)

Output:	RS232, SDI-12 and 4-20mA output.

Note: Proprietary adapter cable needs to be used for RS232 comms via the SDI-12 port. Current drawn from current loop drive is only that which is needed to drive the 4-20mA loop. See section XII for power requirement details.

Battery Backup :	Internal microprocessor operation as well as data integrity is guaranteed by a factory fitted lithium battery for 3 years minimum.
Full Scale :	Full scale range is dependant upon transducer specified (i.e 5, 10, 15, 20, 30) metres
Resolution :	Fixed 1mm (Metric) Fixed 0.01 ft (Imperial)

3. Installation

Before connecting the power to the pressure transducer, you need to connect the instrument line to the pressure transducer as follows:

Undo the nut and remove the ferrules from inside the fitting.

1. Place the nut through the tube and then place the ferrules as shown in the figure2.

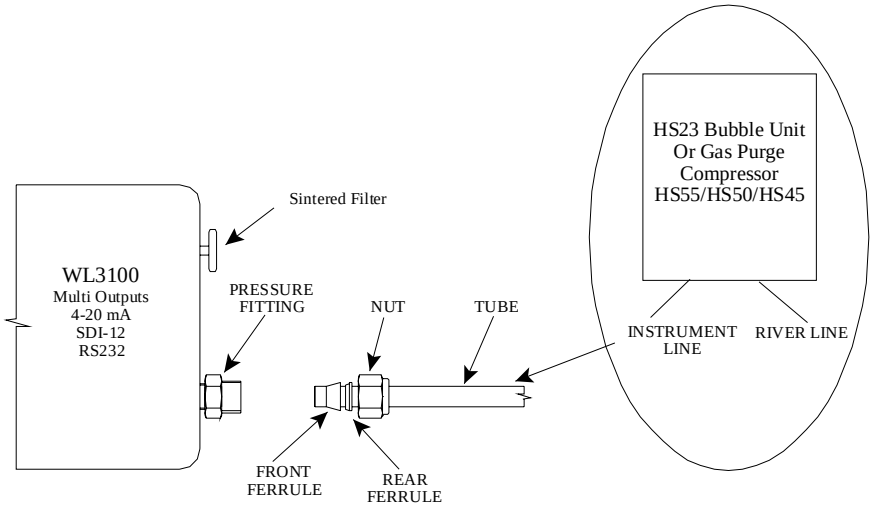


Figure2: Pressure Transducer Installation- Part (a)

2. Tighten the nut as shown in the figure3 below.

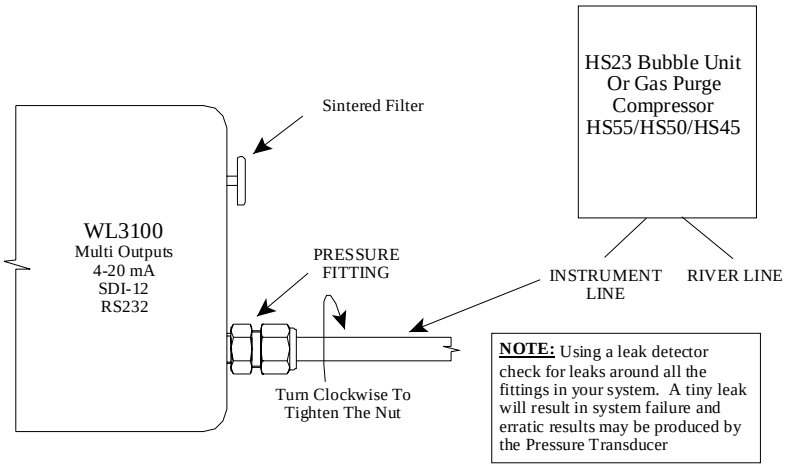


Figure3: Pressure Transducer Installation- Part (b)

1. Using a leak detector, check for leaks.
2. You are ready now to connect the power and run your WL3100.

Note: A pressure leak anywhere in the system will affect your level reading and produce erratic results.

4. Operation

The WL3100 Multi Output Dry Transducer powers up and takes a measurement at the following times :

- When the “Level” is displayed on the LCD, a reading is taken every 12 seconds and the Level on the LCD is updated.
- When the 4-20mA current loop has power applied, a reading is taken every 12 seconds. The 4-20mA current loop is updated at the same time.
- When the SDI-12/RS232 interface requests a measurement using the ‘M’ or ‘C’ commands.
- When the LCD menu “Continuous Meas” is set to YES, a measurement is taken every 12 secs.

5. Error Conditions

If the WL3100 Multi Output Dry Transducer is unable to take a reading (fault condition or loss of +12VDC supply from SDI-12 port), then an error condition is indicated by :

- The LCD displaying “Error” as the water level.
- The 4-20mA current loop increasing to 24mA (indicating the error condition).
- An SDI-12 measurement request will return “9999.999" as the “level”

All of these readings are outside the normal measurement range.

6. Maintenance

The WL3100 Multi Output Dry Transducer requires no maintenance, however all connected mechanical equipment should be periodically checked for cleanliness and ease of operation.

Internal 3.6V AA size lithium batteries should be replaced when required (Expected operating life is 3 years minimum).

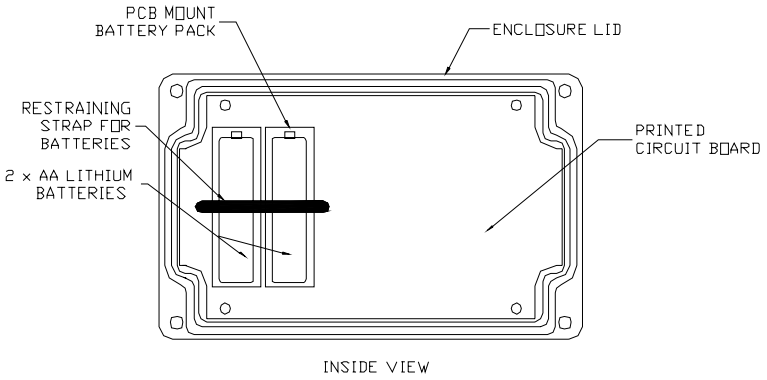


Figure4: Internal Battery Replacement

Internal Batteries Replacement Instruction:

1. Loosen the 4 screws on the enclosure lid
2. Remove the lid
3. Cut restraining strap
4. Remove and replace batteries one at a time, ensuring polarity is correct, so that processor is not interrupted (only use 3.6v Lithium AA batteries)
5. Fit a new restraining strap (150mm cable tie)
6. Replace enclosure lid ensuring a proper fit
7. Tighten the 4 screws

7. External Power

Even though the Multi Output Dry Transducer has an internal lithium battery, **an analog measurement can only be made if +12VDC (9.6V to 16VDC) power is connected.** This supplies power to the analog measurement circuitry.

An adequate 12VDC battery and charger option should be used if the 4-20 mA current loop is to be powered continuously and independently of the telemetry module or data logging equipment.

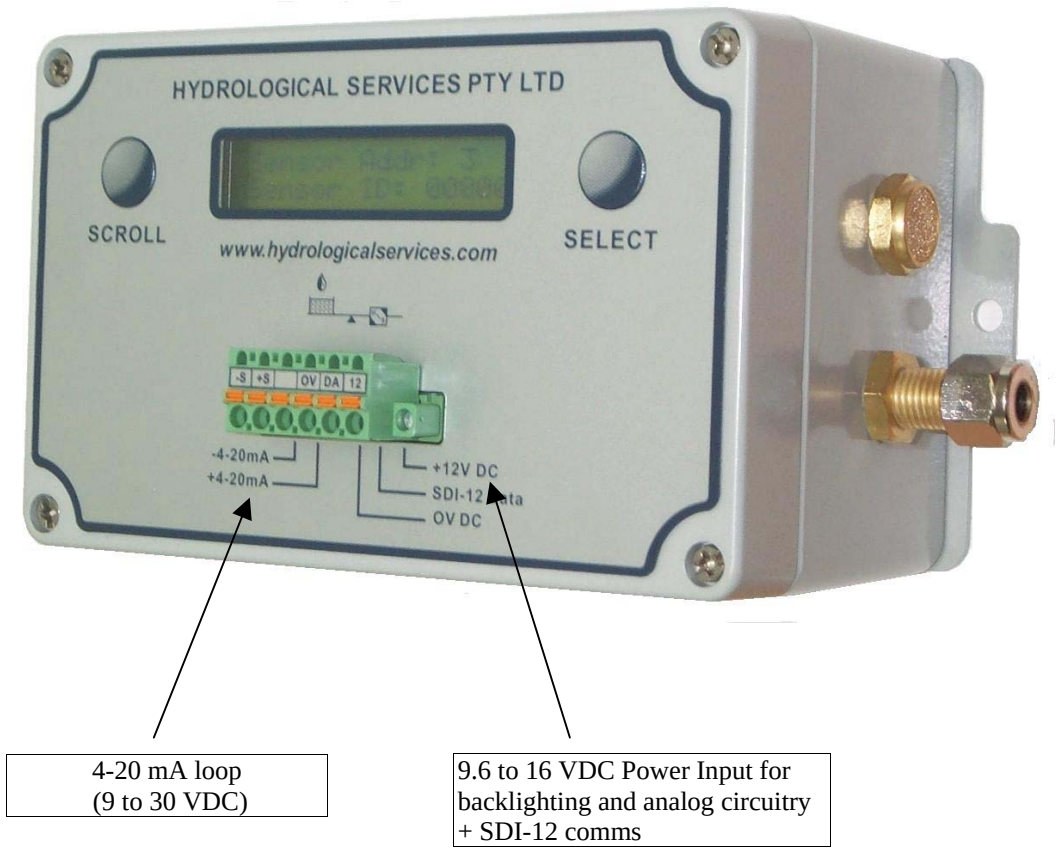


Figure5: External Power Connections

8. LCD Screen

There are 7 main LCD screens available. Some screens display internal data and some allow parameters to be changed. The screens are:

LCD SCREEN	DESCRIPTION
WL3100 S/W 6.2 Level 9.392 m	Display model, S/W Rev and present river level
Sensor Addr: 2 Sensor ID: 12345	Display Sensor SDI-12 address and 5 digit ID
Comms Type: SDI-12	Allows the comms type to be selected SDI-12 or RS232
4-20mA Level: 0.0-10.0 m	Indicates the 4mA Level and the 20mA Level
Set Level: 12.392 m	Allows the present River Level to be preset - internally calculates an offset
Calc Offset: 0.003 m	Displays the internally calculated offset generated through the previous Set Level
Continuous Meas ? Yes	Yes => the river level is continuously measured. No=> the river level is only measured when requested.

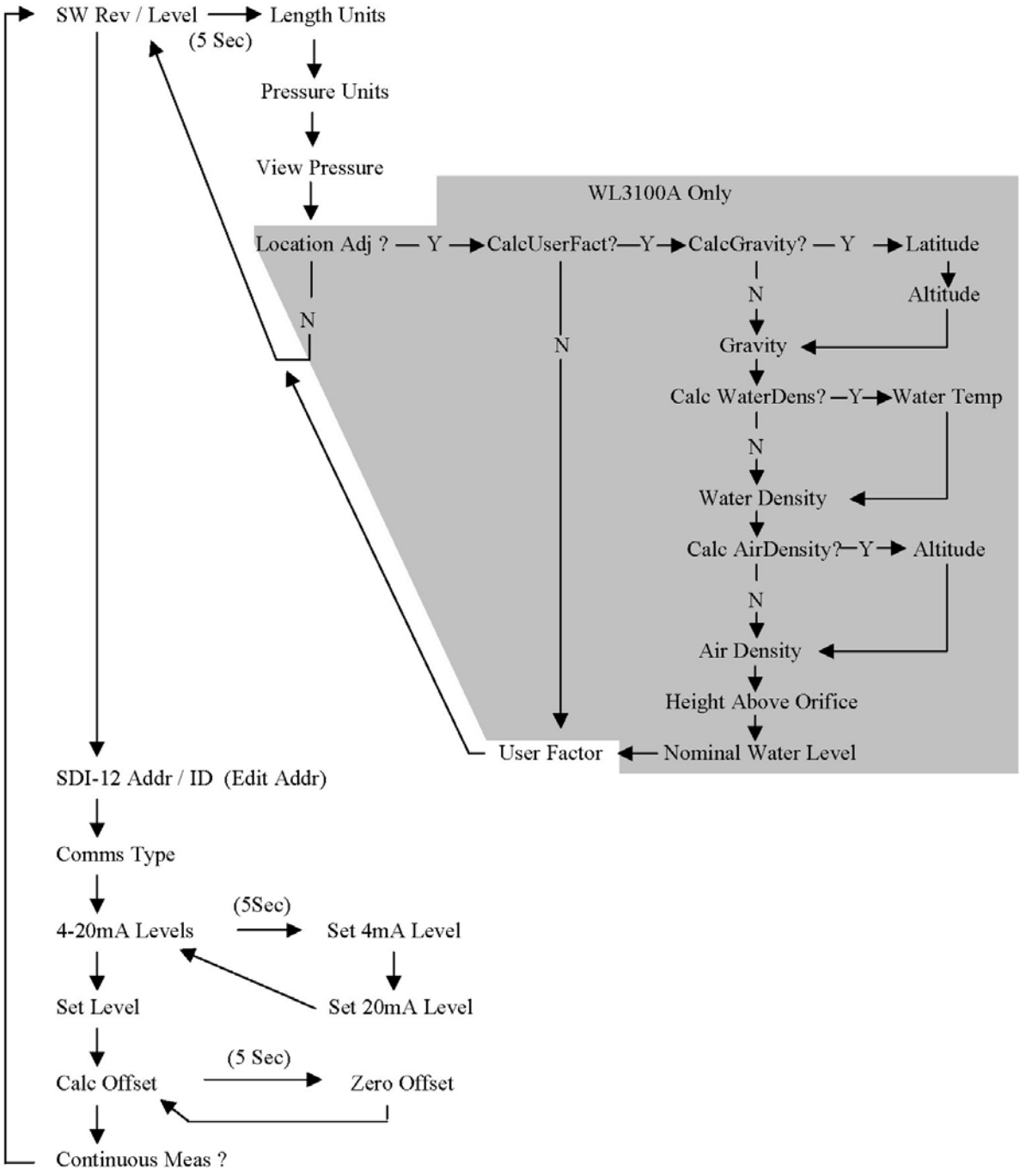
Note: When the River Level is "Set", the difference between the user entered River Level, and the raw data measured from the transducer is calculated. This calculated offset is saved into non-volatile memory, and is added to the raw transducer level each time a measurement is taken. In this way all calculations are made transparent to the operator.

A measurement of the river level is initiated when a button is pressed (LCD is on) OR when "Continuous Meas" is set to Yes and +12V is present OR when 4-20mA current is present, OR when an SDI-12 Measure command is received.

There are many other menu items that allow fine tuning of the calibration if this is required, as well as changing units of measurement (m/ft) and pressure (psi/kPa). Please note the menu tree on the next page should be examined carefully before embarking through it.

Menu Tree

Normally the "Scroll" button is used to step to the next menu item indicated by an arrow. However, when a time (eg. 5 Sec) is indicated above an arrow, the "Select" button is pressed for the indicated time to access the configuration menu item.



8.1 Configurung the WL3100

1. If using the SDI-12 interface, set the required address by stepping to the “Sensor Addr” menu, and pressing the “Select” button and then use the “Scroll” button to set the address from 0 to 9.
2. If using an SDI-12 logger, make sure the “Comms Type” is set to SDI-12. If using an RTU with an SDI-12 to RS232 adapter then set the “Comms Type” to RS232.
3. Use the staff gauge in the river to measure the water level (1.450m)
4. Step to the “Set Level” menu and set it to 1.450m

   If operating in SDI-12 mode, setup is complete.

   If operating in 4-20mA mode then continue with step 5.

5. Estimate the range over which the water level will change.
   (eg. Min level = 1.000m : Max Level = 8.000m)
6. Step to the “4mA / 20mA Level” menu
   Set the 4mA level to 1.000m
   Set the 20mA level to 8.000m

   When the water level is at 1.000m the 4-20mA current will be 4.000mA
   When the water level is at 4.500m the 4-20mA current will be 12.000mA
   When the water level is at 7.000m the 4-20mA current will be 20.000mA
7. The range in this example is 8.000 – 1.000 = 7.000m
   Set the logger range to 7.000m (eg. ML420 range is set with TxR=7.000)
8. The offset in this example is 1.000m
   Set the logger offset to 1.000m (eg. ML420 offset is set with RvHR=1.000)
9. Set the logging interval and transducer warmup period in the data logger. There are 2 ways to set the transducer warmup period – if the “Continuous Meas” is set to YES, then the warmup can be set as low as 1 sec. (Slightly more power is drawn in this mode as the WL3100 continually takes measurements.) If however, the “Continuous Meas” is set to NO, then the warmup must be set for about 15 secs.
   (eg. Say ML420 interval is 15mins and warmup is 1 sec then TXI=015/01)

NOTE : Setting the 4-20mA range to the smallest possible will give the best resolution on a 4-20mA interface !

9. RS 232/SDI-12 Selection

The SDI-12 protocol has very strict timing requirements. The operator may use the SDI-12 to RS232 adaptor cable and then communicate using RS232 from a PC. The “RS232" option must be selected via the LCD and pushbuttons. In this mode all of the timing/break requirements of the SDI-12 are removed. Commands may be typed from a terminal program such as “Hyperterm”. (See Appendix B for details of the SDI-12 to RS232 converter)

Note you must use 1200 baud, 7 bits, even parity and no handshaking.

If using an SDI-12 logger you must select the “SDI-12” option via the LCD and pushbuttons.

9.1 SDI-12 V1.3 Compliant Command Set

(CRC commands are implemented)

(Please **note** the letter ‘a’ in the commands below refer to the SDI-12 address 0, 1, 2,….9)

Name	**Command**	**Response**
Break	Continuous spacing for at least 12 milliseconds	None
Acknowledge Active	a!	a<CR><LF>
Send Identification	aI!	allccccccccmmmmmmmvvvxxx...xx<CR><LF> (Refer Note 1.)
Change Address	aAb!	b<CR><LF>
Address Query	?!	a<CR><LF>
Start Measurement	aM! or aMC!	atttn<CR><LF> (Refer Note 2)
Send Data	aD0!	a<value><CR><LF> or a<value><CRC><CR><LF>
Continuous Measurement	aR0! or aRC0!	a<value><CR><LF> (Refer Note 3) a<value><CRC><CR><LF>
Start Verification	aV!	atttn<CR><LF> (Refer Note 4)
Start Concurrent Measurement	aC! or aCC!	atttnn<CR><LF> (Refer Note 2)

Note 1.

a13HydrServWL31006.412345<CR><LF>

```
  --  ------------ ---------  ---  ------
| |       |           |       |     |
| |       |           |       |     ---      5 digit Sensor ID (eg 12345)(as set in aX4 command)
| |       |           |       ---------      S/W Revision (eg 6.4)
| |       |           ----------------       Model (WL3100)
| |       ----------------------------       Company ID (HydrServ)
| -------------------------------------      SDI-12 Version V1.3 Compliant
-------------------------------------       Unit Address
```

Note 2.

The measurement command “M” and the concurrent command “C” will both return a time “ttt” of 012 indicating that the measurement will be ready in 12 seconds. Do not request data within this 12 second window, or an empty reply will be received. (In accordance with the SDI-12 protocol.) When an “M” command is in progress, the dry transducer will issue a service request “a<CR><LF>” when the measurement is complete and ready for a data request. (Again, in accordance with the SDI-12 protocol)

Note 3.

The Continuous Measurement command returns the present River Level.
If the LCD command “Continuous Meas ?” is set to “Yes” then the river level is continuously measured when 12V is present and so the aR0! returns the river level without having to issue an aM! Measure command.

Note 4.

aV! Initiate Verify Command

Test the lithium battery.
The Multi Output Dry Transducer returns a0001<CR><LF> indicating that there is 1 measurement available and it will be ready in 0 seconds. When the Data command aD0! is issued the dry transducer will reply with :
a+o<CR><LF>
|
---------- Lithium Battery Condition (0=> Battery OK : 1=> Battery Low)

***** PLEASE NOTE *****
For more information on SDI-12 commands, go to the www.sdi-12.org website and download the “SDI-12 Protocol Specification” available on the home page.

9.2 Special SDI-12 Commands

The following commands conform to the SDI-12 protocol, and allow specific parameters within the WL3100 to be configured. Care should be taken with some commands, as they may destroy the factory calibration.

aXn!	Return data associated with command 'n'. The multi output dry transducer will reply with a0001<CR><LF> **The aDO! command must be issued to get the actual data.**
aXn+xxxx!	Set parameter for command 'n'. The multi output dry transducer will reply with a0001<CR><LF> **The aDO! command must be issued to get the actual data.**

Set/Get Current Value

aX0!	Get the river level (River level from last measurement).
aX0+0012.345!	Set the river level to +12.345 m (or ft).

Get Multi Output Dry Transducer Pressure

aX1!	Get the Pressure. eg. +0004.524 psi (or kPa)

Get/Set the 4mA Level

aX2!	Get the 4mA Level.
aX2+0002.5!	Sets the 4mA Level to 2.5m (or ft) When the water level is 2.5m then the 4-20mA loop will pass 4mA

Get/Set the 20mA Level

aX3!	Get the 20mA Level.
aX3+0020.0!	Sets the 20mA Level to 20.0m (or ft) When the water level is 20.0m then the 4-20mA loop will pass 20mA

Set/Get ID Number

aX4!	Get the dry transducer ID.
aX4+12345!	Set the dry trasnducer ID. Acceptable values 0-65535. This value appears in the Identify command.

Set/Get Time

aX5!	Get the dry transducer Time.
aX5+0135!	Set the dry transducer Time to 01:35 (24 hour clock)

Set/Get Date

aX6!	Get the dry transducer Date.
aX6+011204!	Set the dry transducer Date to 1-Dec-2004.

Set/Get the User Factor

aX7!	Get the User Factor.
aX7+0.705373!	Set the User Factor to 0.705373 m/psi

Increment the 4mA Calibration

aX96+00!	Examine the present 4mA Calibration without altering it.

(This also saves the calibration)
aX96+05! Increment the 4mA Calibration by 5 steps
(This should be done while accurately measuring the current on the 4-20mA loop)
(If the calibration is changed, always finish by sending aX96+00! to save it)

Increment the 20mA Calibration

aX97+00! Examine the present 20mA Calibration without altering it.
(This also saves the calibration)
aX97+03! Increment the 20mA Calibration by 3 step
(This should be done while accurately measuring the current on the 4-20mA loop)
(If the calibration is changed, always finish by sending aX97+00! to save it)

Set/Get the Lo Pressure **(NOTE: This command could destroy the factory calibration)**

aX98! Get the value used to set the Low Pressure.
aX98+0000.702! Set the Low Pressure to 0.702 psi (or kPa)
(Perform a measure aM! before setting the low pressure - see note below)

Set/Get the Hi Pressure **(NOTE: This command could destroy the factory calibration)**

aX99! Get the value used to set the High Pressure.
aX99+0016.317! Set the High Pressure to 16.317 psi (or kPa)

The normal sequence of setting the Lo or Hi pressure would be :
(NOTE : Accurate pressure measuring equipment is required for this procedure)
1. Set the pressure to the Lo end of the scale and measure with accurate equipment
2. Perform a measure aM!
3. Perform a Get Pressure aX1! and then Get Data aD0!
4. If the pressure is different to that measured, perform a Set Lo (or Hi) Pressure
5. Repeat steps 2, 3 and 4 for Lo pressure until the returned value matches the value on the accurate measuring equipment.
6. Increase the pressure to the Hi end of the scale and repeat steps 1 to 5 for Hi pressure until the returned value matches the value on the accurate measuring equipment

10. Field Setup Procedure

1. Install the WL3100 Multi Output Dry Transducer as per mechanical installation procedures.

2. Press either of the two push buttons on the dry transducer to activate the LCD display.

3. Use the scroll button to scroll through the menu to “Set Level”and press the select button.

4. Use the select button to move the blinking cursor to the desired digit position (that needs to be changed), and use the scroll button to increment the value. When the rightmost digit is at the desired value press the select button to save the value. Press select button again to start with the left most digit again.

5. After the select button is used to save a value ie. Water level, date, etc., then pressing the scroll button will continue to step you through the menu as before.

6. The 4-20mA current loop will be continuously updated as the various parameters are changed.

7. The 4mA water level and the 20mA water level can be set separately. (See the menu tree structure in the LCD Operation section)

8. The various parameters may also be set by the SDI-12 “special command” set, via the SDI-12 Input connection, or the RS-232 connection if a laptop is available using a simple terminal emulation program whereby ASCII characters are typed (adhering to the SDI-12 Ver 1.3 protocol). **Note:** If the commands are being typed by the operator, the “Comms Type” must be set to RS232. In this mode the strict SDI-12 timing is ignored. An adapter cable needs to be used in this mode. See section Appendix B.

11. Power Consumption

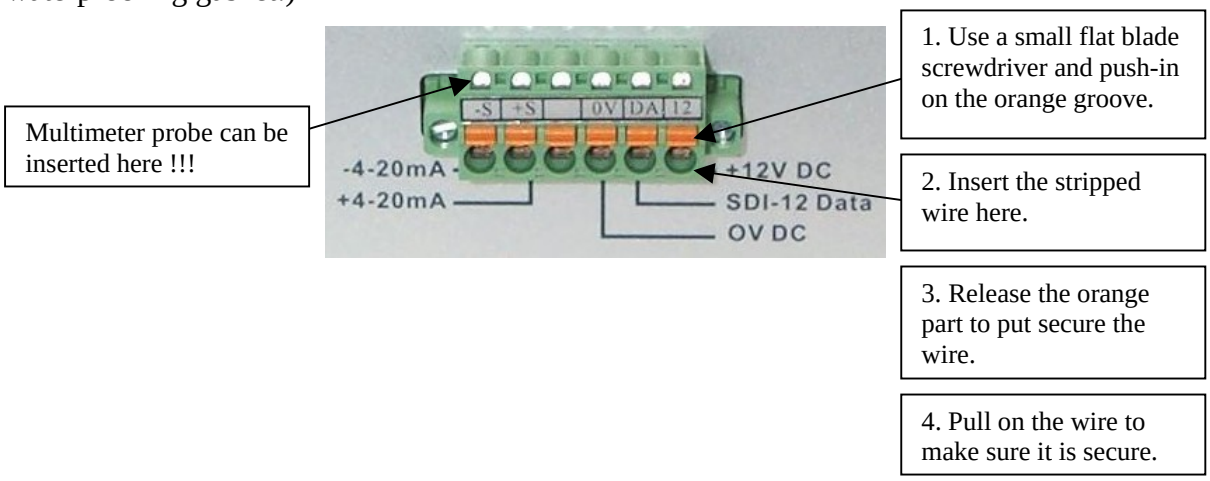
There are several different power supply options and the current consumption depends on which option is used.
NOTE : ** Analog measurements cannot be taken unless 12V power is connected. ******

	NO EXTERNAL POWER - NO ANALOG MEASUREMENT	**SDI-12 12V POWER (ALLOWS ANALOG MEASUREMENT)**		**ACTIVE 4-20 mA LOOP CURRENT**
Mode	Internal Lithium Battery	Internal Lithium Battery	SDI-12 Power	
Asleep	3 to 30 FA	0	Stays awake when 12V is present 3.5mA continuous (not measuring)	4-20 mA
RS232 Comms	< 2 mA for 45 sec	0	17 mA for 1.5 sec (while measuring) 3.5 mA otherwise	4-20 mA
SDI-12 Comms	< 2 mA for 20 sec	0	17 mA for 1.5 sec (while measuring) 3.5 mA otherwise	4-20 mA
LCD on	< 8 mA for 30 sec	0	70 to 83 mA @ 12V (Backlighting on)	4-20 mA

12. Wiring Details

Screwless Terminals

The plug in terminal block shown is a screwless terminal that keeps a constant tension on the wire that is inserted. (The mating socket on the front panel of the WL3100 is sealed with a waterproofing gasket.)

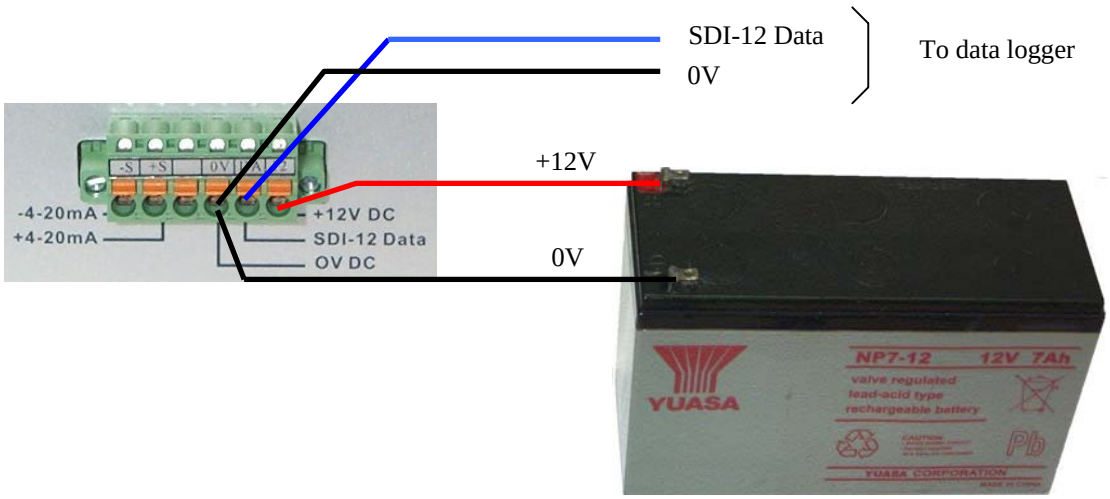


External Power

The WL3100 will only be able to make a water level measurement if +12VDC (9.6V to 16VDC) power is connected.

An adequate 12VDC (9 to 30VDC) battery and charger option should be used if the optically isolated 4-20 mA current loop is to be powered continuously and independently of the telemetry module or data logging equipment.

The easiest way to see if +12V is present is to press one of the WL3100 buttons and check that the backlighting comes on.



4-20mA Interface

The 4-20mA interface in the WL3100 is optically isolated from the 0V and +12VDC on the right hand end of the connector. The 4-20mA circuitry **must** be powered by the loop.

There are 2 ways to take 4-20mA measurements :

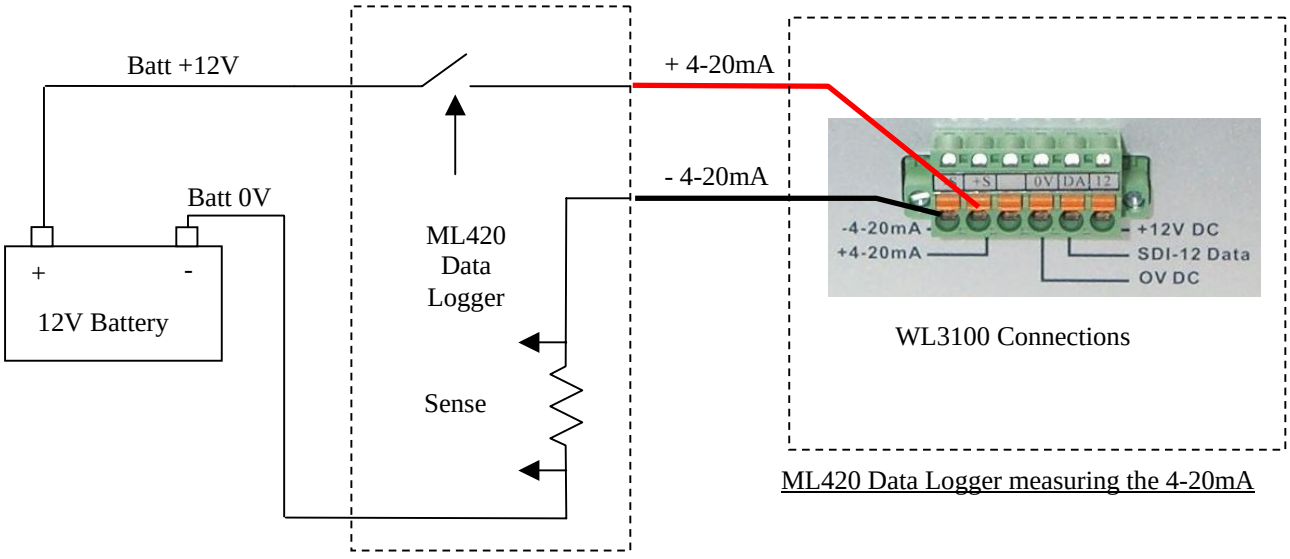
1. "Continuous Meas" set to Off

When the WL3100 detects loop power, it initiates a water level measurement – this takes 12 seconds – the 4-20mA current is updated at the end of the measurement and the data logger can measure the current. Therefore the data logger **must** be set for transducer "warm-up" of about 15 secs.

2. "Continuous Meas" set to On

The WL3100 is set to take a measurement continuously (every 12 secs). When the WL3100 detects loop power, it updates the 4-20mA current within 100mS - with the water level previously measured within the last 12 secs. Therefore the data logger can be set for a transducer "warm-up" of about 1 sec.

The following diagram shows how the 4-20mA interface must be loop powered.
(This example uses the Hydrological Services ML420 Data Logger.)



To conserve power, the data logger switches power to the 4-20mA circuit only when it wants to make a measurement.

PLEASE NOTE : The SDI-12 interface and the 4-20mA interface can be used at the same time by 2 different devices. For example, a data logger can be connected to the SDI-12 interface while an RTU is connected to the 4-20mA interface !!!

APPENDIX A Fine Tuning

The WL3100 Software Rev 6.5 has many enhancements to improve the performance. These include :

- Measures pressure in psi or kPa - factory calibrated.
- Displays water level in m or ft.
- User scaling factor to take into account local conditions such as gravity, water density, etc.
- Ability to calculate gravity, water density, air density and user factor.
- Factory calibration of the 4mA and 20mA current end points.
- Adjustable 4mA and 20mA water levels.
- Negative levels for the 4mA and 20mA levels - to match the site gauge readings.
- Display of the internally calculated water level offset + ability to zero this offset if required
- Update the 4-20mA current within 100mS of detecting loop power
- SDI-12 Version 1.3 compliant with CRC

The WL3100 measures gauge pressure and applies temperature compensation to correct for errors in the transducer. The measured pressure is converted to a water level through a "User Factor". Adjustment of this "User Factor"allows for variations introduced by the equipment location in the world, as well as local conditions.

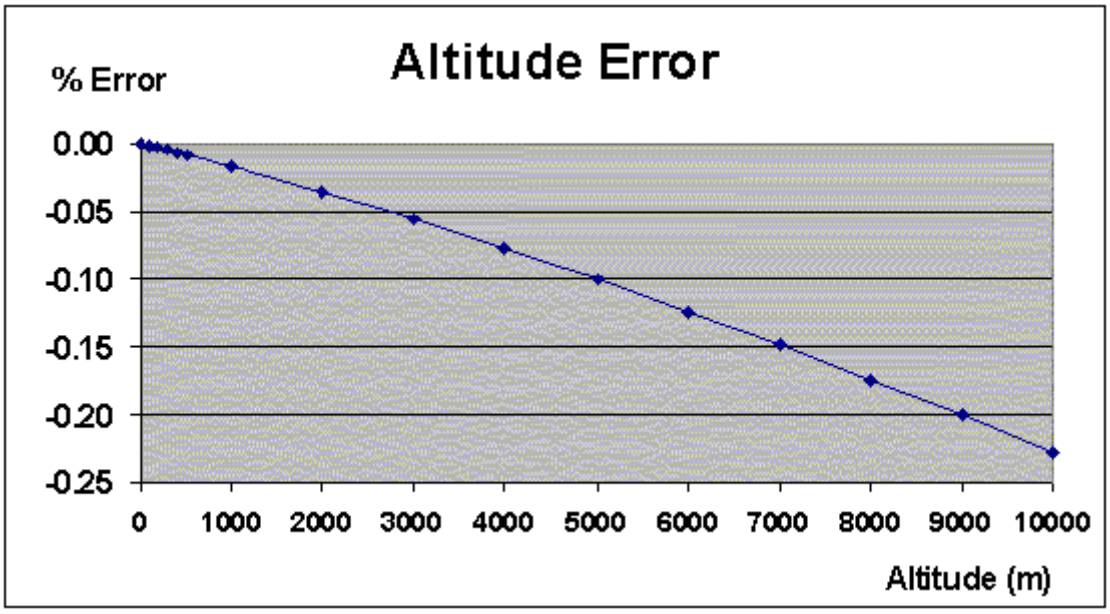
Water Level = Pressure x User Factor + Offset

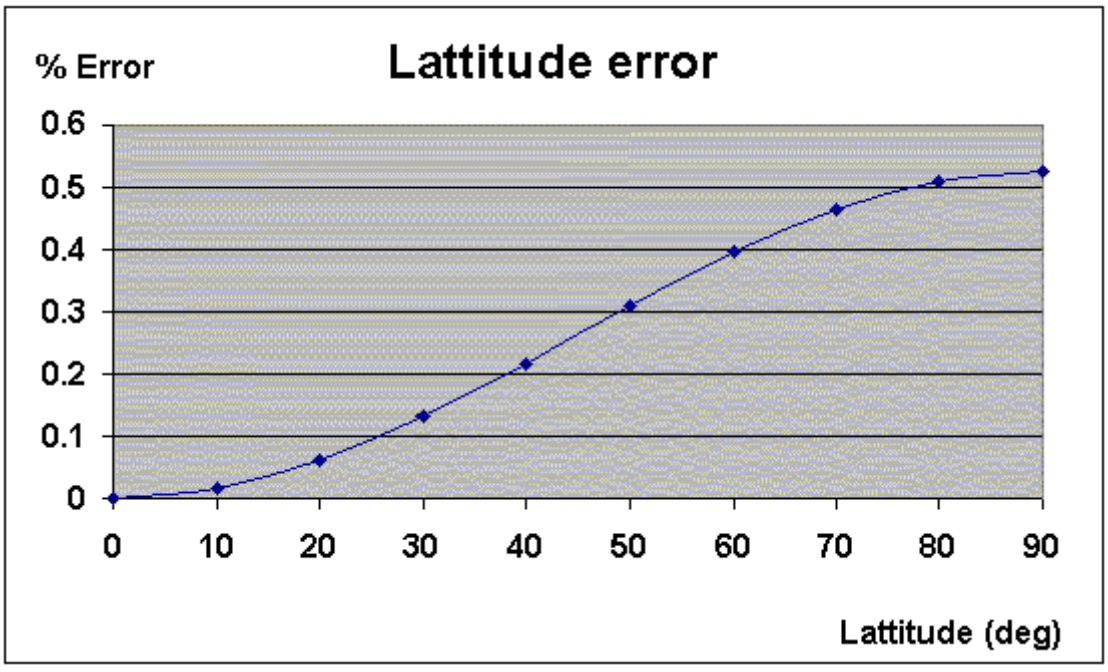
The User Factor is a function of gravity, water density, air density, equipment height above the orifice, and nominal water level.
(Note that gravity is itself a function of latitude and altitude)
(Note that water density is a function of water temperature)
(Note that air density is a function of altitude)

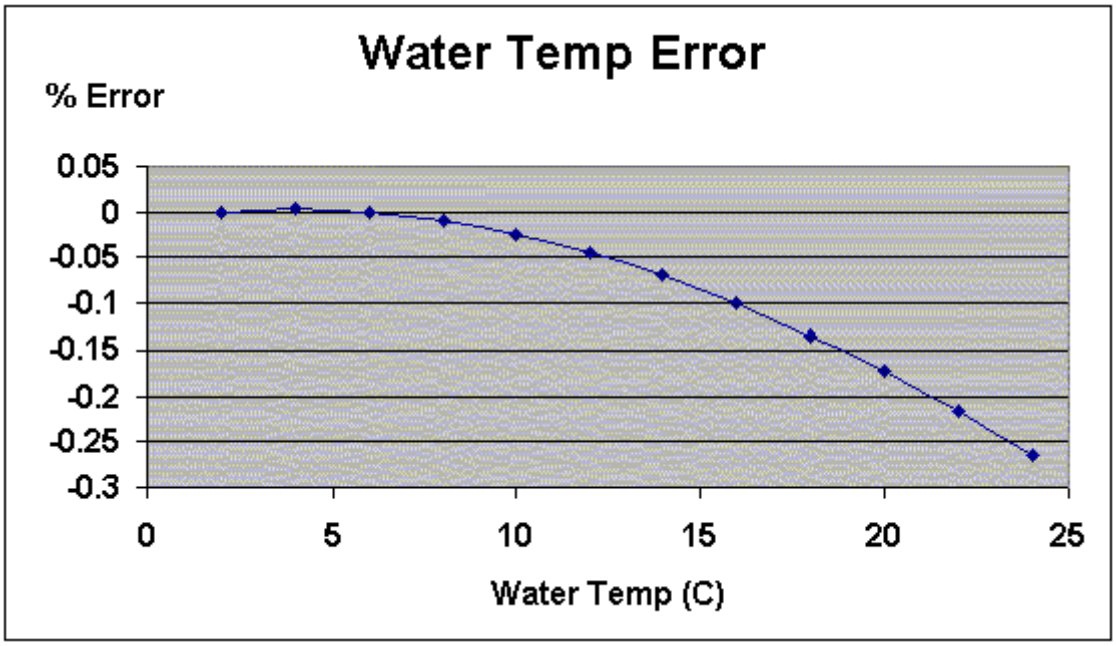
The User Factor may be entered directly into the WL3100, or it can be calculated internally by entering the information listed above (for the WL3100A only). (See the Menu Tree in the LCD Screen section) Various combinations of information may be entered, depending on what is known. For example, the operator could enter the gravity directly - or alternatively the latitude and altitude could be entered and the WL3100A will calculate the gravity for you.

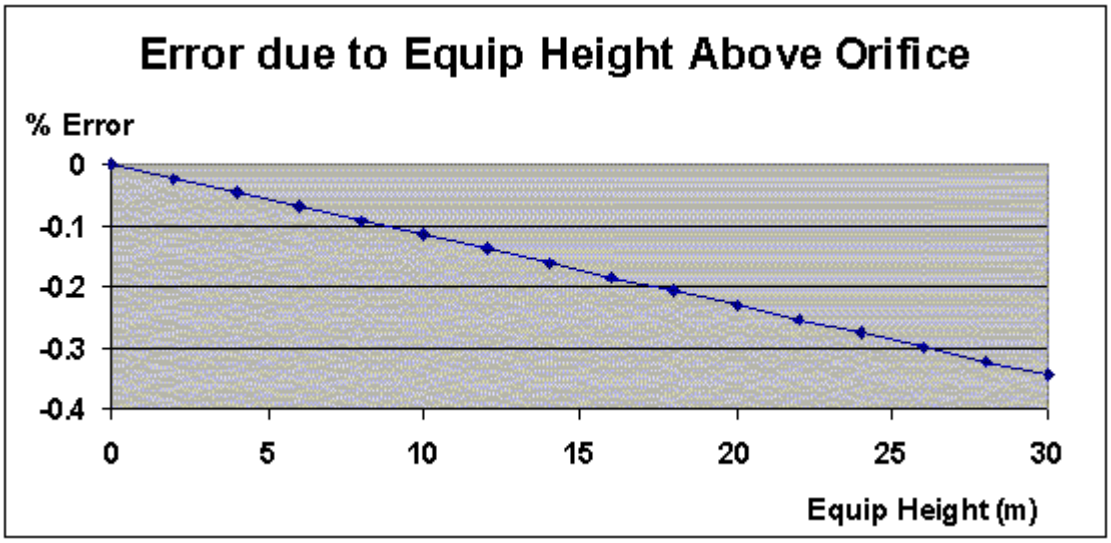
The WL3100 can be configured to measure pressure in psi or kPa - and it can be configured to measure the water height in m or ft. The User Factor is automatically corrected to account for any change in units.

Typical errors that are introduced by the above factors are demonstrated in the graphs on the following pages.


Altitude Error
% Error
0.00
-0.05
-0.10
-0.15
-0.20
-0.25
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000
Altitude (m)


Lattitude error
% Error
0.6
0.5
0.4
0.3
0.2
0.1
0
0
10
20
30
40
50
60
70
80
90
Lattitude (deg)


Water Temp Error
% Error
0.05
0
-0.05
-0.1
-0.15
-0.2
-0.25
-0.3
0
5
10
15
20
25
Water Temp (C)


Error due to Equip Height Above Orifice
% Error
0
-0.1
-0.2
-0.3
-0.4
0
5
10
15
20
25
30
Equip Height (m)

4-20mA Level

The 4-20mA Level parameters in the WL3100 sets the water level required to make 4mA and 20mA appear on the 4-20mA interface. For example, the customer can take a 0-10m range WL3100 and set the 4mA level to 0.000m and the 20mA level to 5.000m thus effectively giving a 0-5m range transducer !!!
That is :

Water Level	**4-20mA Current**
4mA Level	4.000mA
20mA Level	20.000mA

These levels may be changed by the user by :

1. Use the scroll button to view the 4-20mA Level menu item.
2. Press and hold the select button for 5 seconds until Set 4mA Level appears.
3. Press the select button to make the first digit flash.
4. Press the scroll button to change it. Press select for the next digit etc.
5. When the 4mA Level is complete, press scroll to select the 20mA Level.
6. Repeat steps 3 and 4 to change the 20mA Levels.

Calculated Offset

When the "Set Level" function is performed, the WL3100 calculates an offset between the measured water level and the desired water level. That is :

Displayed (desired) Water Level = Measured Water Level + Calculated Offset

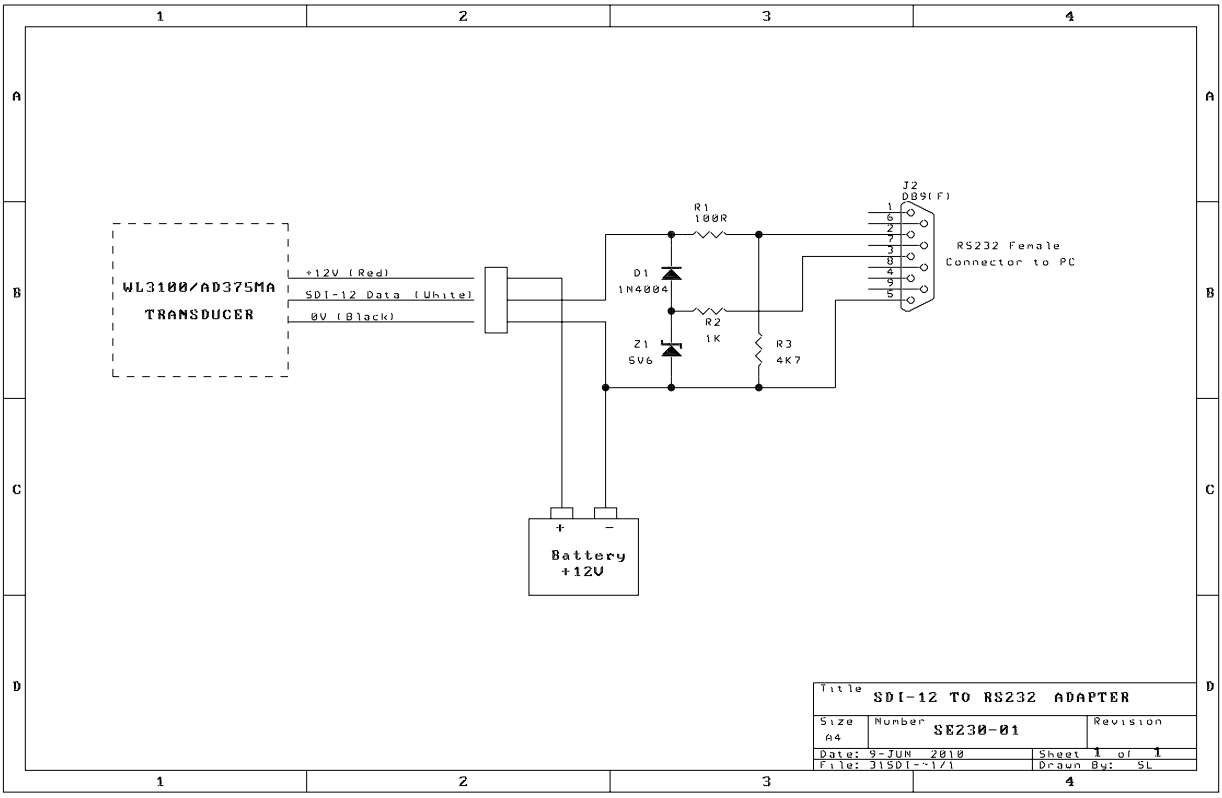
This calculated offset can now be viewed in the "Calc Offset" menu. (This is for reference only, and serves no other purpose)

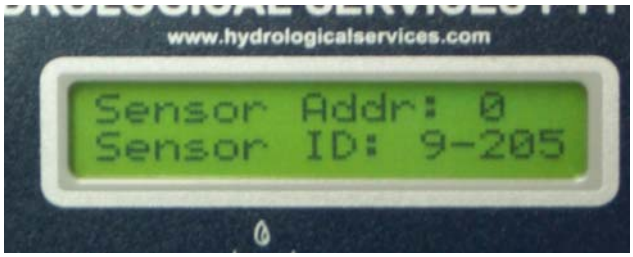
If the user wishes to force this offset to 0, then simply press and hold the select button for 5 seconds while "Calc Offset" is displayed.

APPENDIX B SDI-12 to RS232 Interface

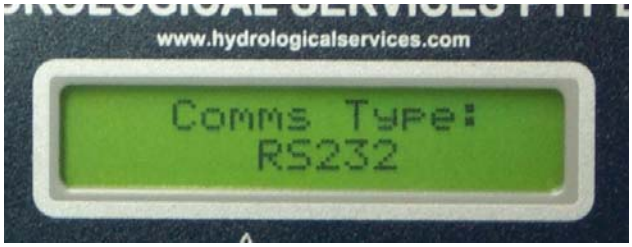
The following schematic is for an SDI-12 to RS232 adapter that can be used for any Hydrological Services SDI-12 transducer.

The adapter will allow a transducer to be connected to a PC, and will communicate at 1200 baud, 7 bits and even parity. To bypass the strict timing requirements of SDI-12, simply change the "Comms Type" on the LCD to RS232.





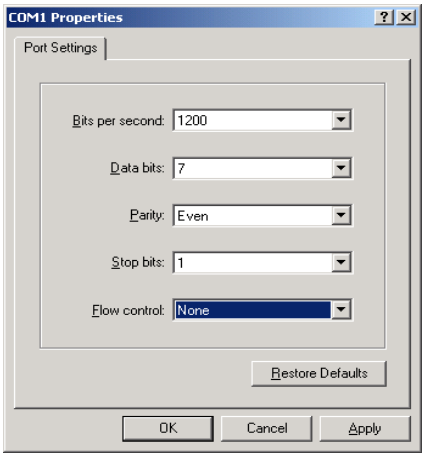
Set SDI-12 Address to 0

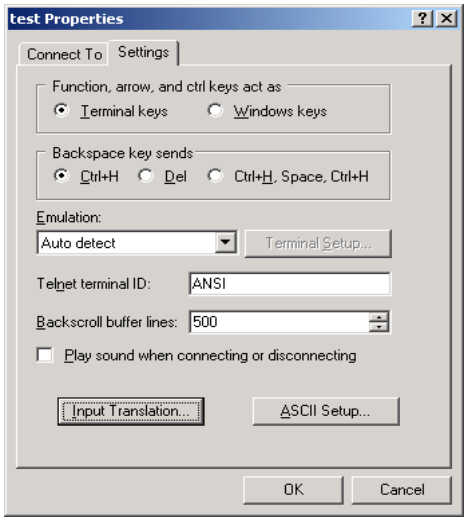


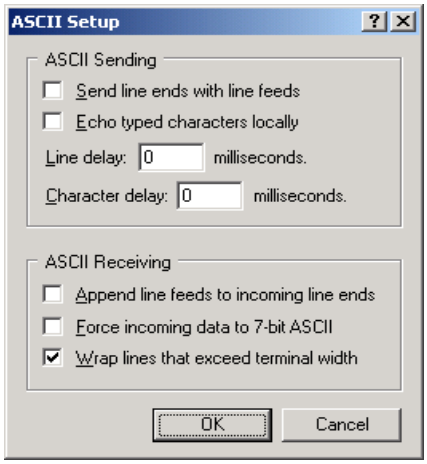
Set Comms Type to RS232

Settings for Hyperterminal

Comm Port depends on your PC







Sample SDI-12 comms session:

(commands sent to the WL3100 are in "red" and the WL3100 replies are in "black")

?! 0 (What address are you ? reply indicating 0)

0I! 013HydrServWL31007.0A-001 (ID command – product ID reply)

0M! 00121 (Measure command – reply indicating 1 measurement ready in 12 secs)
0 (Service Request indicating measurement is ready from address 0)

0D0! 0+0001.234 (Data command – reply indicating water level is 1.234m)

0R0! 0+0001.234 (Continuous Measure – same result as an M and D command combination – when "Continuous Meas" is set to YES)

(Compliance with SDI-12 Spec V 1.3 (implementing the CRC) occurs in WL3100 S/W Rev 6.2 and higher)

0MC! 00121 (Measure command with CRC request – reply 1 meas ready in 12 secs)
0 (Service Request indicating measurement is ready from address 0)

0D0! 0+0001.028Kb| (Data command – reply indicating water level is 1.028m with a CRC of "Kb|" according to the SDI-12 specification)

0RC0! 0+0001.028Kb| (Continuous measure with a CRC request – same result as an M and D command combination with a CRC of "Kb|" – when "Continuous Meas" is set to YES)